1. General Description

A: GENERAL DESCRIPTION

Description of turbo models are included in CO (H4SO) section. <Ref. to CO(H4SO)-2, General Description.>

1. General Description

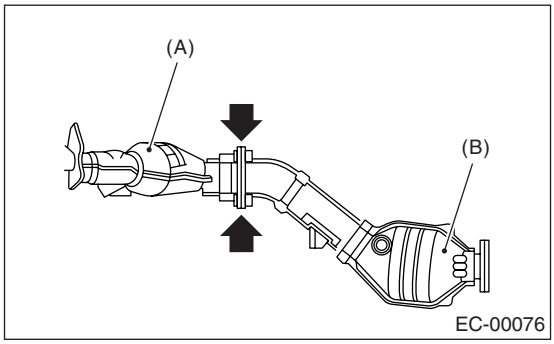
A: CAUTION

• Wear working clothing, including a cap, protective goggles, and protective shoes during operation.
• Remove contamination including dirt and corrosion before removal, installation or disassembly.
• Keep the disassembled parts in order and protect them from dust or dirt.
• Before removal, installation or disassembly, be sure to clarify the failure. Avoid unnecessary removal, installation, disassembly, and replacement.
• Be careful not to burn your hands, because each part on the vehicle is hot after running.
• Be sure to tighten fasteners including bolts and nuts to the specified torque.
• Place shop jacks or safety stands at the specified points.
• Before disconnecting electrical connectors of sensors or units, be sure to disconnect the negative terminal from battery.

2. Front Catalytic Converter

A: REMOVAL

1) Remove the center exhaust pipe. <Ref. to EX(H4DOTC)-8, REMOVAL, Center Exhaust Pipe.>
2) Separate the front catalytic converter (A) from rear catalytic converter (B).



B: INSTALLATION

NOTE:
Replace the gaskets with new ones.
Install in the reverse order of removal.

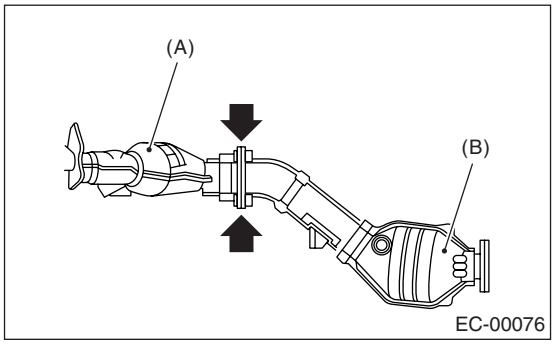
C: INSPECTION

1) Make sure there are no exhaust leaks from connections and welds.
2) Make sure there are no holes or rusting.

3. Rear Catalytic Converter

A: REMOVAL

1) Remove the center exhaust pipe. <Ref. to EX(H4DOTC)-8, REMOVAL, Center Exhaust Pipe.>
2) Separate the rear catalytic converter (B) from front catalytic converter (A).



B: INSTALLATION

NOTE:
Replace the gaskets with new ones.
Install in the reverse order of removal.

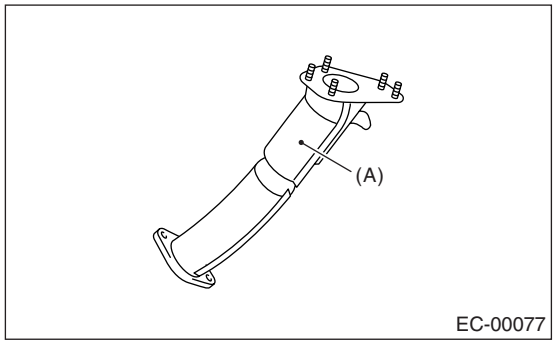
C: INSPECTION

1) Make sure there are no exhaust leaks from connections and welds.
2) Make sure there are no holes or rusting.

4. Precatalytic Converter

A: REMOVAL

Precatalytic converter (A) is built in the joint pipe. Refer to the removal of joint pipe for removal procedure. <Ref. to EX(H4DOTC)-12, REMOVAL, Joint Pipe.>



B: INSTALLATION

Precatalytic converter is built in the joint pipe. Refer to the installation of joint pipe for installation procedure. <Ref. to EX(H4DOTC)-12, INSTALLATION, Joint Pipe.>

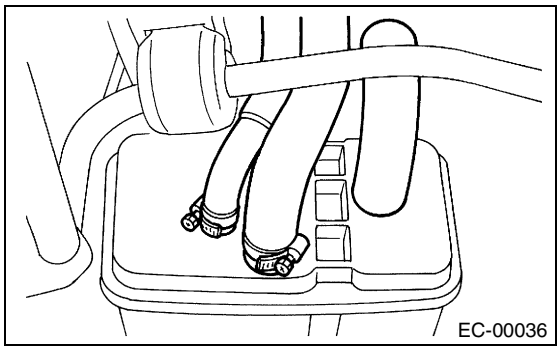
C: INSPECTION

1) Make sure there are no exhaust leaks from connections and welds.
2) Make sure there are no holes or rusting.

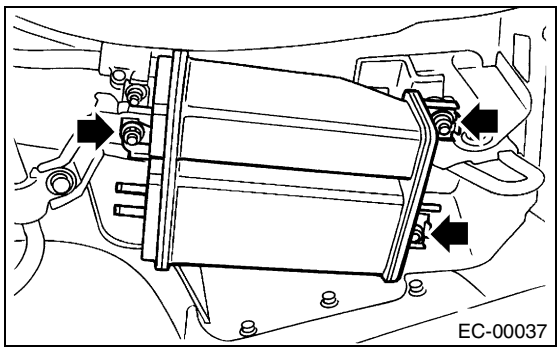
5. Canister

A: REMOVAL

1) Lift-up the vehicle.
2) Loosen the two clamps which hold two canister hoses, and disconnect the evaporation three hoses from canister.



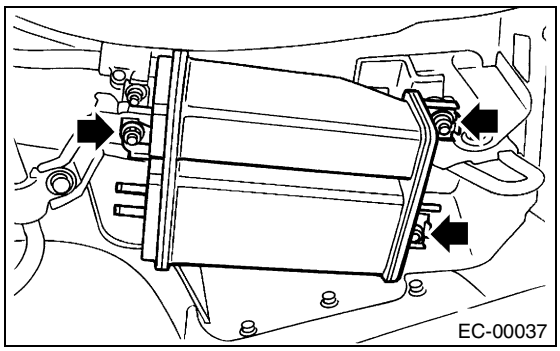
3) Remove the canister from body.



B: INSTALLATION

1) Install in the reverse order of removal.

Tightening torque:
23 N·m (2.3 kgf-m, 17 ft-lb)



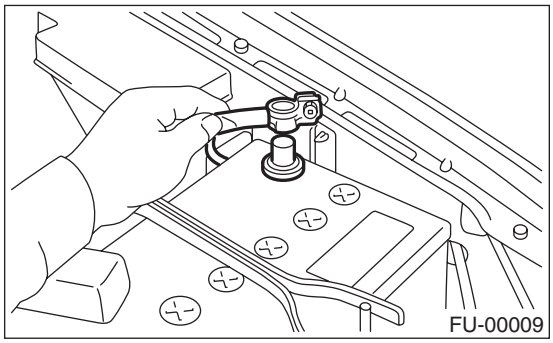
C: INSPECTION

Make sure the canister and canister hoses are not cracked or loose.

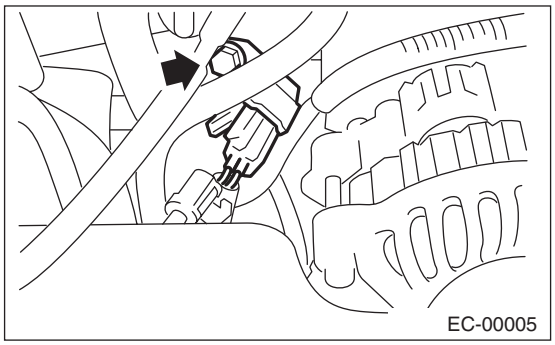
6. Purge Control Solenoid Valve

A: REMOVAL

1) Disconnect the ground terminal from battery.



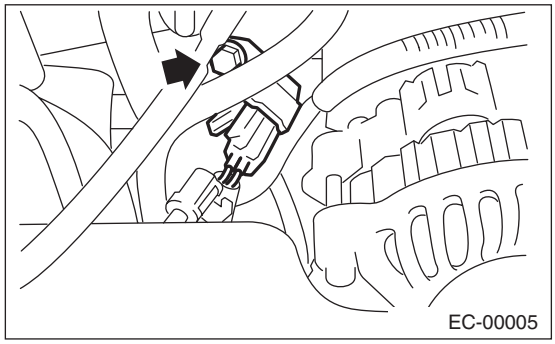
2) Disconnect the connector and hoses from purge control solenoid valve.
3) Remove the bolt which installs the purge control solenoid valve onto intake manifold.



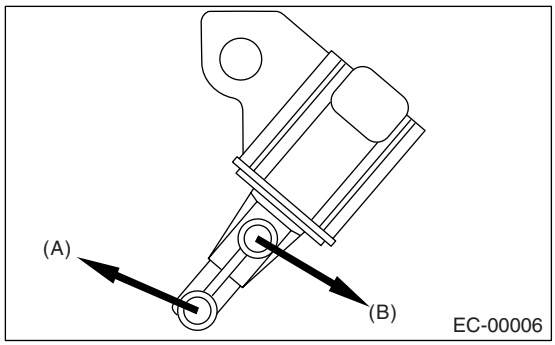
B: INSTALLATION

Install in the reverse order of removal.

Tightening torque:
16 N·m (1.6 kgf-m, 11.6 ft-lb)



CAUTION:
Carefully connect the evaporation hoses.



(A) To intake manifold
(B) To purge value

C: INSPECTION

Make sure the hoses are not cracked or loose.

7. Main Fuel Level Sensor

A: REMOVAL

For work procedures, refer to “FU(H4DOTC)” section. <Ref. to FU(H4DOTC)-65, REMOVAL, Fuel Level Sensor.>

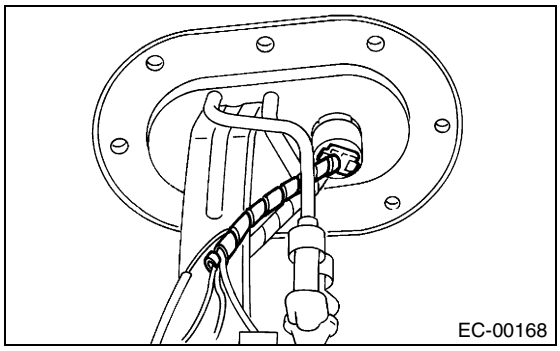
B: INSTALLATION

For work procedures, refer to “FU(H4DOTC)” section.
<Ref. to FU(H4DOTC)-65, INSTALLATION, Fuel Level Sensor.>

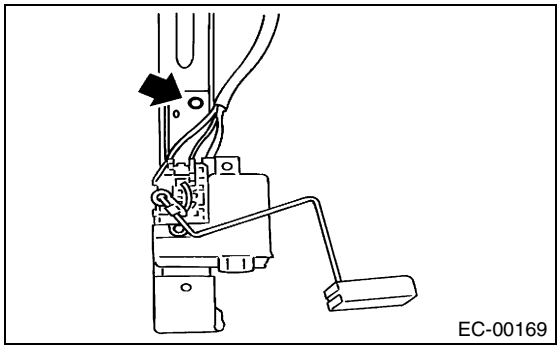
8. Fuel Temperature Sensor

A: REMOVAL

1) Remove the fuel pump assembly. <Ref. to FU(H4DOTC)-63, REMOVAL, Fuel Pump.>
2) Disconnect the connector from fuel pump bracket.



3) Remove the main fuel level sensor from fuel pump assembly. <Ref. to FU(H4DOTC)-65, REMOVAL, Fuel Level Sensor.>



NOTE:
Fuel temperature sensor is a unit with the fuel pump. If replacing it, replace as a fuel pump.

B: INSTALLATION

Install in the reverse order of removal.

WARNING:
Spark may occur and ignite if fuel is nearby.

9. Fuel Sub Level Sensor

A: REMOVAL

For work procedures, refer to “FU(H4DOTC)” section. <Ref. to FU(H4DOTC)-66, REMOVAL, Fuel Sub Level Sensor.>

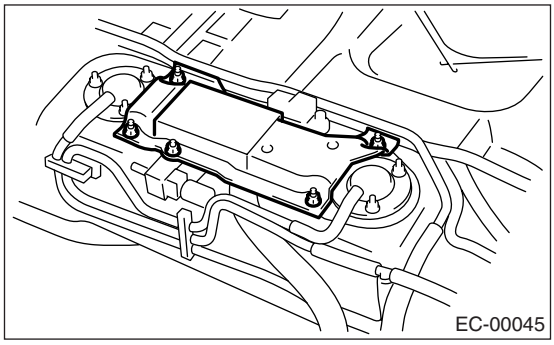
B: INSTALLATION

For work procedures, refer to “FU(H4DOTC)” section. <Ref. to FU(H4DOTC)-67, INSTALLATION, Fuel Sub Level Sensor.>

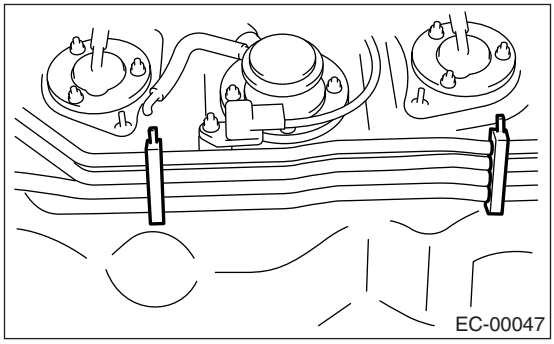
10.Fuel Tank Pressure Sensor

A: REMOVAL

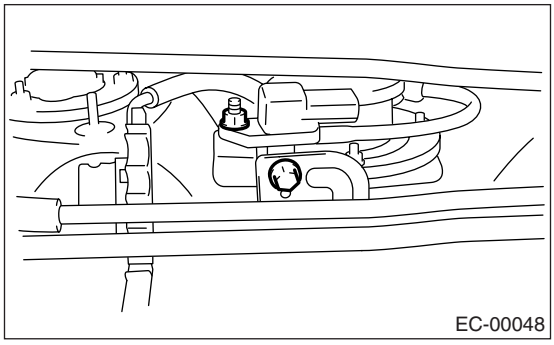
1) Remove the fuel tank. <Ref. to FU(H4DOTC)-55, REMOVAL, Fuel Tank.>
2) Remove the protector cover.


EC-00045

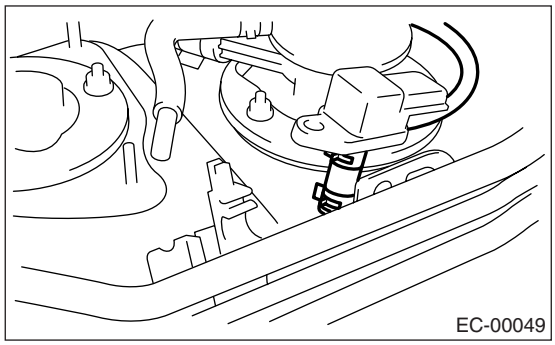
3) Disconnect the connector from fuel pressure sensor.
4) Release the clips which hold fuel pipes onto fuel tank.


EC-00047

5) Remove the bolt and nut which hold the fuel tank pressure sensor onto the bracket.


EC-00048

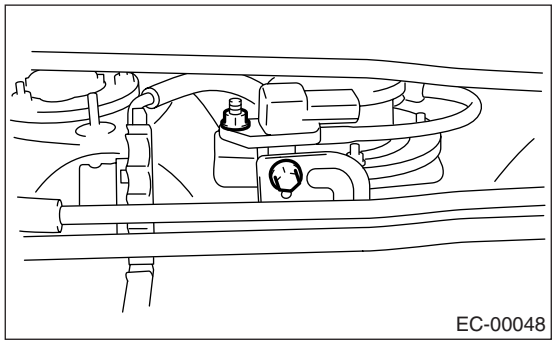
6) Disconnect the pressure hose from fuel tank pressure sensor.


EC-00049

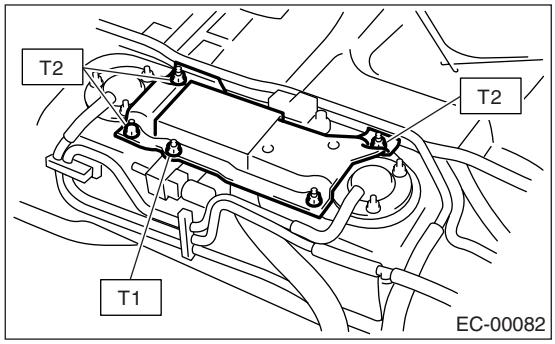
B: INSTALLATION

Install in the reverse order of removal.

Tightening torque:
7.4 N·m (0.75 kgf-m, 5.4 ft-lb)


EC-00048

Tightening torque:
T1: 7.4 N·m (0.75 kgf-m, 5.4 ft-lb)
T2: 4.4 N·m (0.45 kgf-m, 3.3 ft-lb)



EC-00082

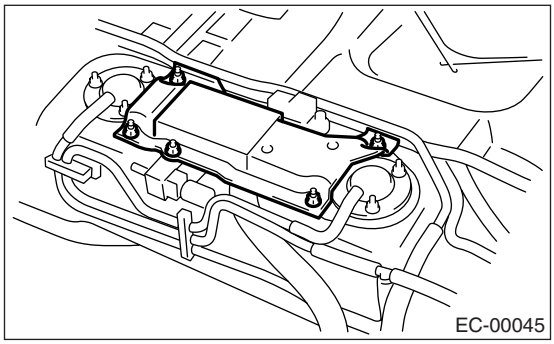
C: INSPECTION

Make sure the hoses are not cracked or loose.

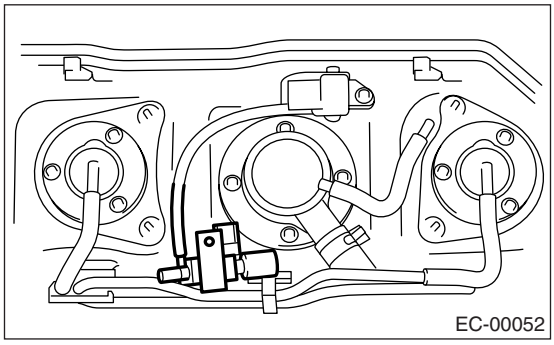
11.Fuel Tank Sensor Control Valve

A: REMOVAL

1) Remove the fuel tank. <Ref. to FU(H4DOTC)-55, REMOVAL, Fuel Tank.>
2) Remove the protector cover.



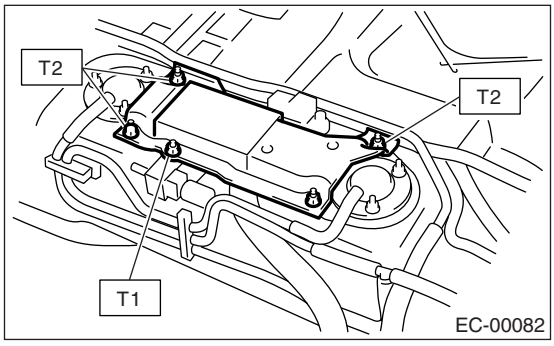
3) Disconnect the connector from fuel tank sensor control valve.
4) Disconnect hose and remove fuel tank sensor control valve.



B: INSTALLATION

Install in the reverse order of removal.

Tightening torque:
T1: 7.4 N·m (0.75 kgf-m, 5.4 ft-lb)
T2: 4.4 N·m (0.45 kgf-m, 3.3 ft-lb)



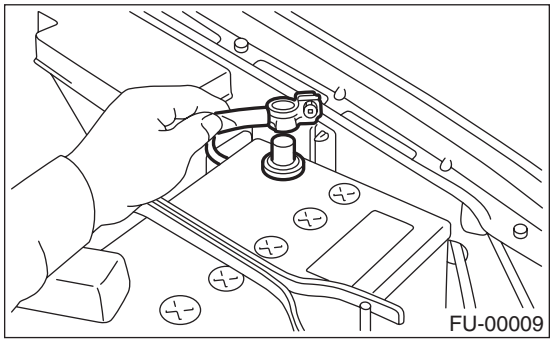
C: INSPECTION

Make sure the hoses are not cracked or loose.

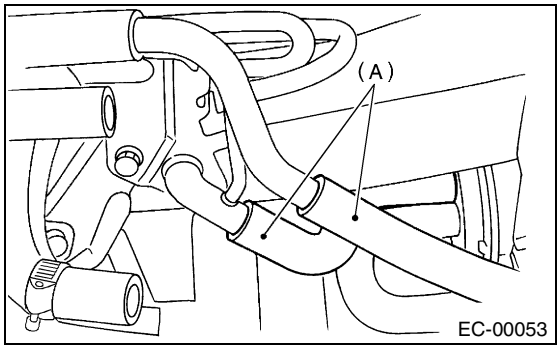
12.Pressure Control Solenoid Valve

A: REMOVAL

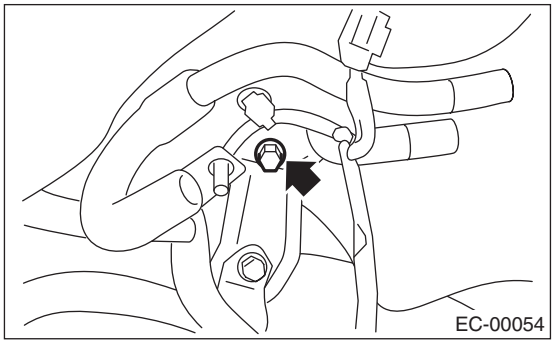
1) Disconnect the ground terminal from battery.



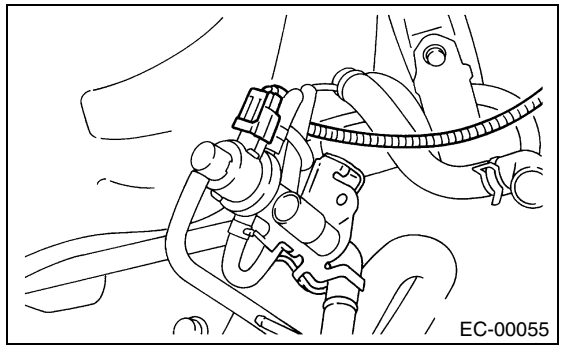
2) Remove the canister. <Ref. to EC(H4DOTC)-6, REMOVAL, Canister.>
3) Disconnect the evaporation hoses (A) from joint pipes.



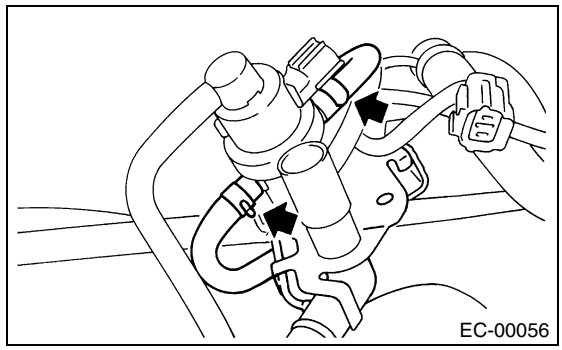
4) Remove the bolt which installs pressure control solenoid valve holding bracket on body.



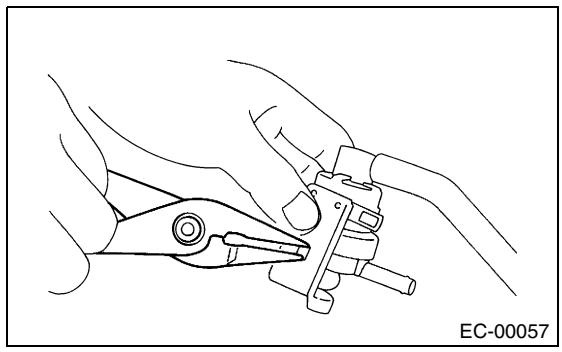
5) Disconnect the connector from pressure control solenoid valve.



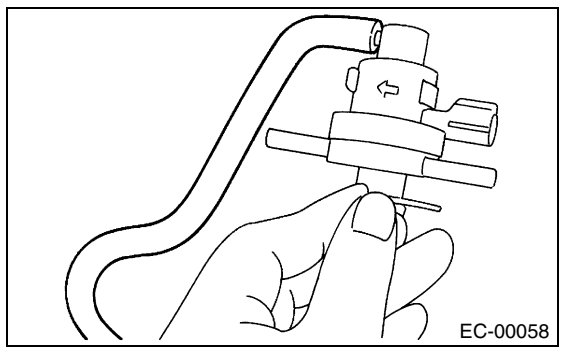
6) Disconnect the two evaporation hoses from pressure control solenoid valve.
7) Remove the pressure control solenoid valve with bracket.



8) Remove the pressure control solenoid valve from bracket.



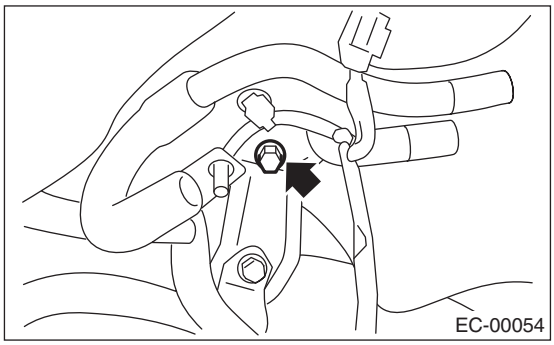
9) Disconnect the vacuum hose from pressure control solenoid valve.



B: INSTALLATION

Install in the reverse order of removal.

Tightening torque:
17.6 N·m (1.8 kgf-m, 13.0 ft-lb)



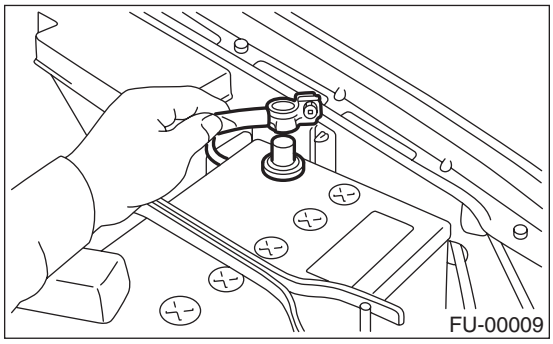
C: INSPECTION

Make sure the hoses are not cracked or loose.

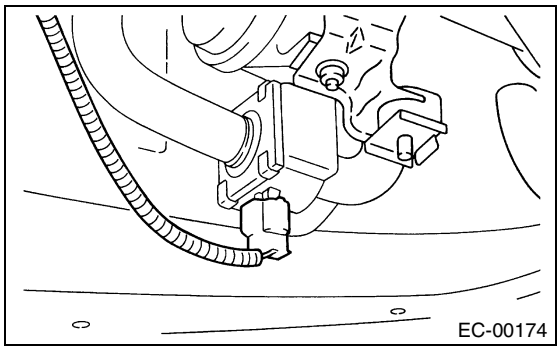
13.Drain Filter

A: REMOVAL

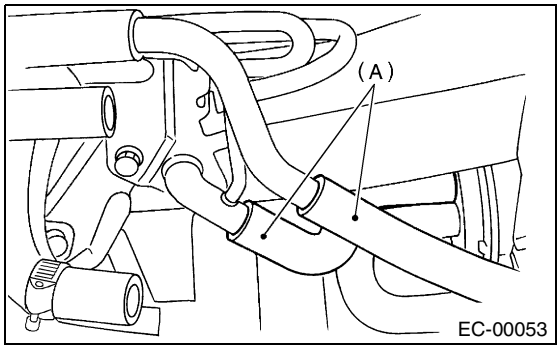
1) Disconnect the ground terminal from battery.



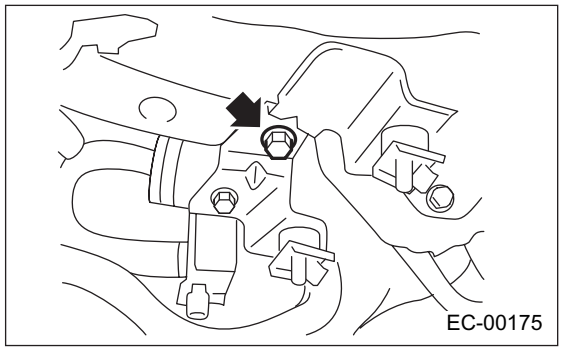
2) Lift-up the vehicle.
3) Remove the canister. <Ref. to EC(H4DOTC)-6, REMOVAL, Canister.>
4) Disconnect the connector from drain valve.



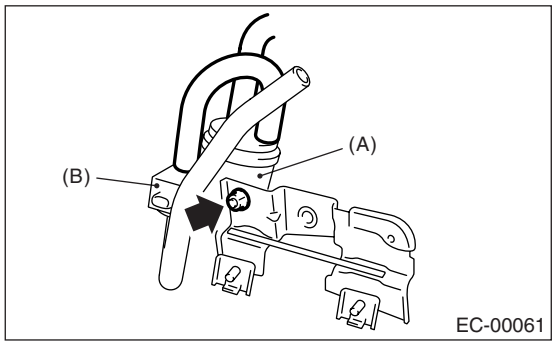
5) Disconnector the evaporation hoses (A) from joint pipes.



6) Remove the bolt which installs the drain filter and drain valve brackets on body, and remove them as a unit.



7) Disconnect the evaporation hoses, and remove the drain filter from the bracket.

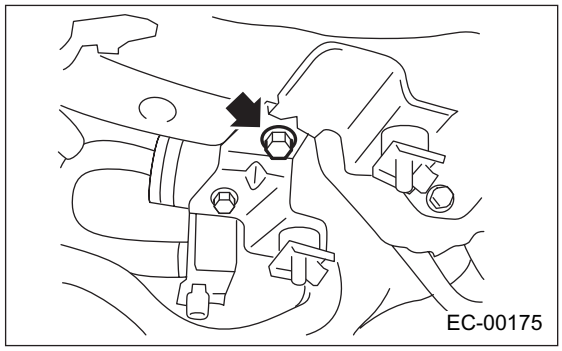


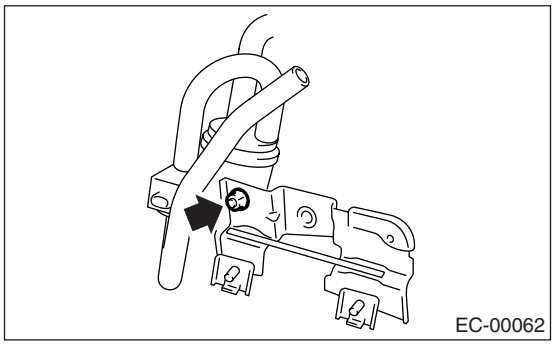
(A) Drain filter
(B) Drain valve

B: INSTALLATION

Install in the reverse order of removal.

Tightening torque:
23 N·m (2.3 kgf-m, 17 ft-lb)





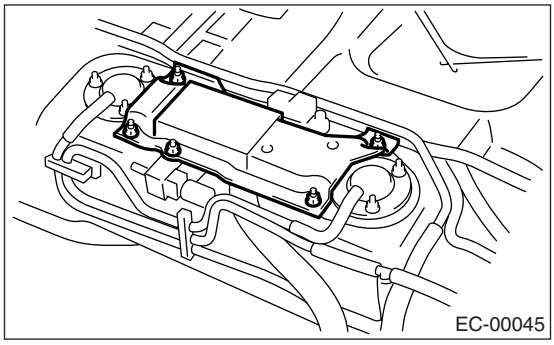
C: INSPECTION

1) Make sure all hoses are installed correctly.
2) Make sure the hoses are not cracked or loose.

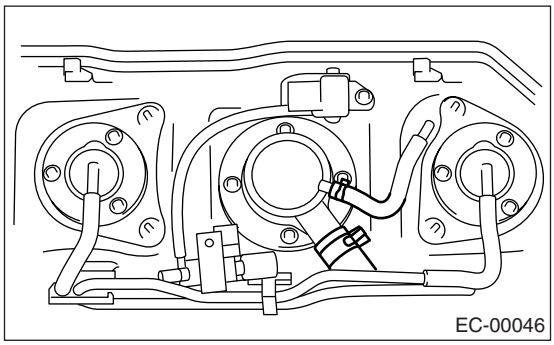
14.Vent Valve

A: REMOVAL

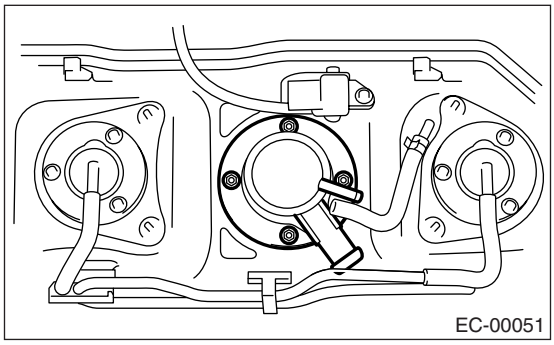
1) Remove the fuel tank. <Ref. to FU(H4DOTC)-55, REMOVAL, Fuel Tank.>
2) Remove the protector cover.



3) Remove the clips, and disconnect the hoses from vent valve.



4) Remove the nuts and then remove the vent valve.

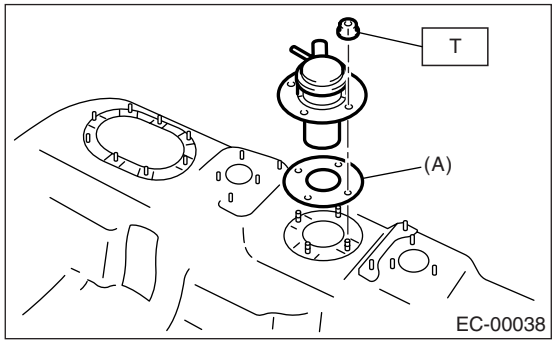


B: INSTALLATION

Install in the reverse order of removal.

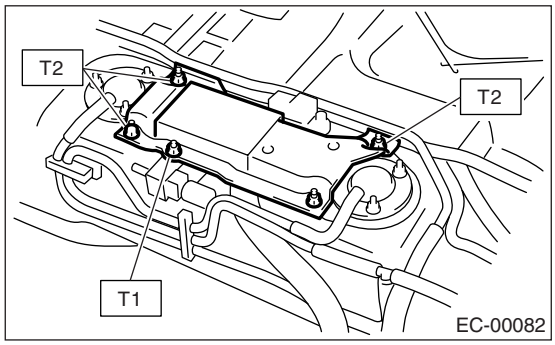
CAUTION:
Replace the rubber seat with a new one.

Tightening torque:
T: 4.4 N·m (0.45 kgf-m, 3.3 ft-lb)



(A) Rubber seat

Tightening torque:
T1: 7.4 N·m (0.75 kgf-m, 5.4 ft-lb)
T2: 4.4 N·m (0.45 kgf-m, 3.3 ft-lb)



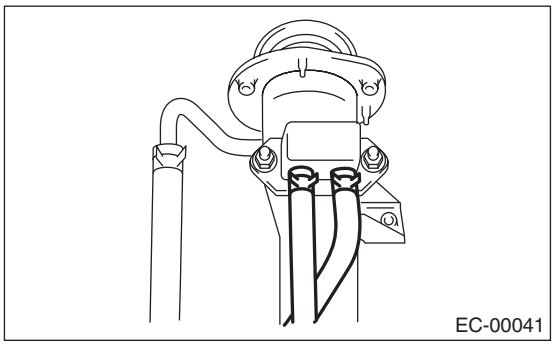
C: INSPECTION

Make sure the hoses are not cracked or loose.

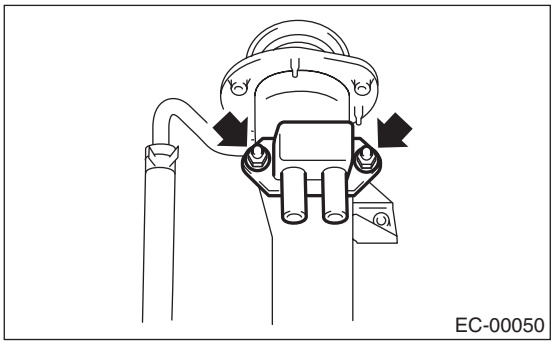
15.Shut Valve

A: REMOVAL

1) Remove the fuel filler pipe. <Ref. to FU(H4DOTC)-58, REMOVAL, Fuel Filler Pipe.>
2) Disconnect the evaporation hoses from shut valve.



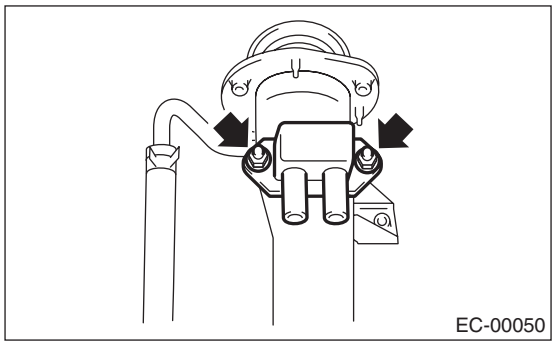
3) Remove the shut valve from fuel filler pipe.



B: INSTALLATION

Install in the reverse order of removal.

Tightening torque:
4.5 N·m (0.46 kgf-m, 3.3 ft-lb)



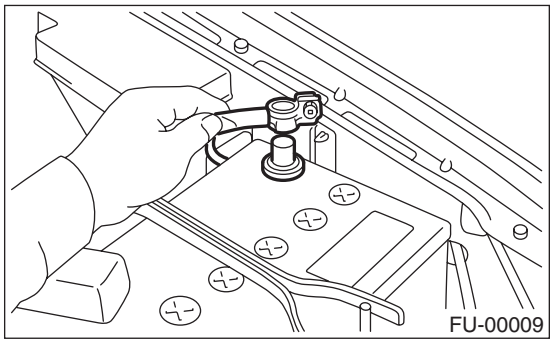
C: INSPECTION

Make sure the hoses are not cracked or loose.

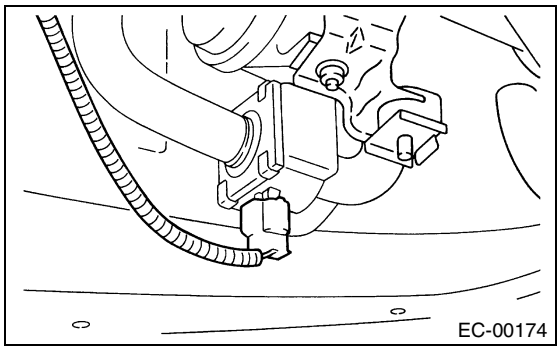
16.Drain Valve

A: REMOVAL

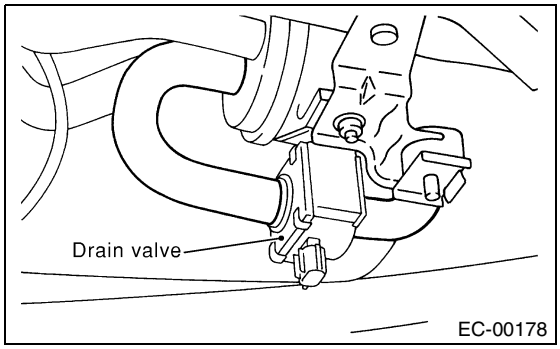
1) Disconnect the ground terminal from battery.



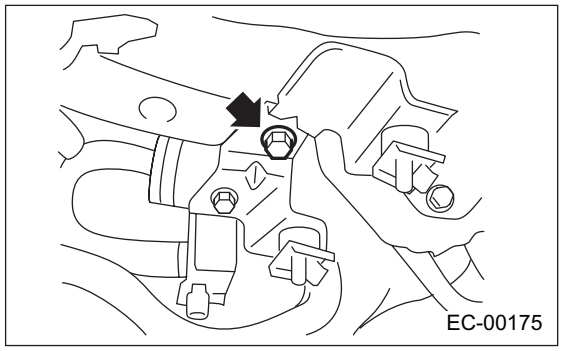
2) Lift-up the vehicle.
3) Remove the canister. <Ref. to EC(H4DOTC)-6, REMOVAL, Canister.>
4) Disconnect the connector from drain valve.



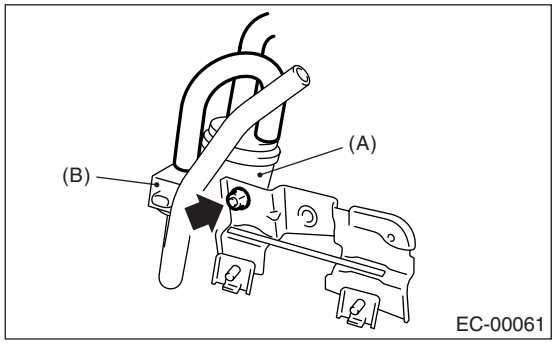
5) Disconnect the evaporation hoses from drain valve.



6) Remove the bolt which installs the drain filter and drain valve brackets on body, and remove them as a unit.



7) Remove the drain valve from bracket.

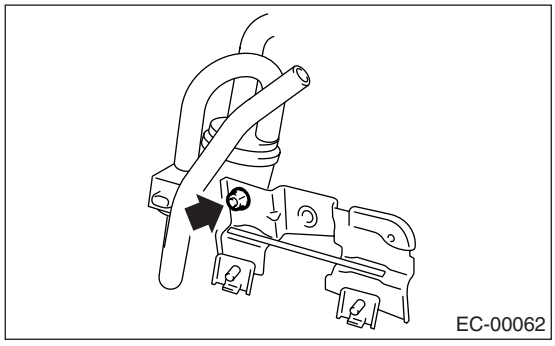


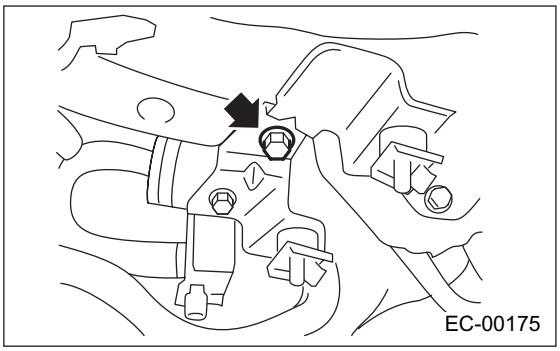
(A) Drain filter
(B) Drain valve

B: INSTALLATION

Install in the reverse order of removal.

Tightening torque:
23 N·m (2.3 kgf-m, 17 ft-lb)





C: INSPECTION

1) Make sure all hoses are installed correctly.
2) Make sure the hoses are not cracked or loose.

1. Basic Diagnostic Procedure

A: PROCEDURE

1. ENGINE

	Step	Check	Yes	No
1	**CHECK ENGINE START FAILURE** 1)Ask the customer when and how the trouble occurred using the interview check list. <Ref. to EN(H4DOTC)-4, CHECK, Check List for Interview.> 2)Start the engine. Does the engine start?	Engine starts.	Go to step **2.**	Inspection using "Diagnostics for Engine Start Failure". <Ref. to EN(H4DOTC)-60, Diagnostics for Engine Starting Failure.>
2	**CHECK ILLUMINATION OF CHECK ENGINE MALFUNCTION INDICATOR LAMP (MIL).** Does CHECK ENGINE malfunction indicator lamp illuminate?	Lamp illuminates.	Go to step **3.**	Inspection using "General Diagnostics Table". <Ref. to EN(H4DOTC)-390, General Diagnostic Table.>
3	**CHECK DIAGNOSTIC TROUBLE CODE (DTC) ON DISPLAY.** 1)Turn ignition switch to OFF. 2)Connect the Subaru Select Monitor or the OBD-II general scan tool to data link connector. 3)Turn the ignition switch to ON and the Subaru Select Monitor or OBD-II general scan tool switch to ON. 4)Read the DTC on the Subaru Select Monitor or OBD-II general scan tool. Does the Subaru Select Monitor or OBD-II general scan tool indicate DTC?	DTC is indicated.	Record the DTC. Repair the cause of the trouble. <Ref. to EN(H4DOTC)-81, List of Diagnostic Trouble Codes (DTC).> Go to step **4.**	Repair the related parts. NOTE: If DTC is not shown on display although the MIL illuminates, perform diagnostics of MIL (CHECK ENGINE malfunction indicator lamp) circuit or combination meter. <Ref. to EN(H4DOTC)-52, Engine Malfunction Indicator Lamp (MIL).>
4	**PERFORM THE DIAGNOSIS.** 1)Perform the clear memory mode. <Ref. to EN(H4DOTC)-49, Clear Memory Mode.> 2)Perform the inspection mode. <Ref. to EN(H4DOTC)-41, Inspection Mode.> Does the Subaru Select Monitor or OBD-II general scan tool indicate DTC?	DTC is indicated.	Inspect using Diagnostics Procedure with Diagnostic Trouble Code (DTC). <Ref. to EN(H4DOTC)-88, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>	Finish the diagnosis.

2. AUTOMATIC TRANSMISSION

When any diagnostic trouble code (DTC) related to the automatic transmission is shown on the display, carry out the following basic check. After that, carry out the replacement or repair work.
1) ATF level check <Ref. to AT-30, ATF.>
2) Differential gear oil level check <Ref. to AT-31, Differential Gear Oil.>
3) ATF leak check <Ref. to AT-30, ATF.>
4) Differential gear oil leak check <Ref. to AT-31, Differential Gear Oil.>
5) Stall test <Ref. to AT-33, Stall Test.>
6) Line pressure test <Ref. to AT-36, Line Pressure Test.>
7) Transfer clutch pressure test <Ref. to AT-38, Transfer Clutch Pressure Test.>
8) Time lag test <Ref. to AT-35, Time Lag Test.>
9) Road test <Ref. to AT-32, Road Test.>
10) Shift characteristics <Ref. to AT-38, Transfer Clutch Pressure Test.>

2. Check List for Interview

A: CHECK

1. CHECK LIST NO. 1

Check the following items when problem has occurred.

NOTE:
Use copies of this page for interviewing customers.

Customer's name		Engine No.	
Date of sale		Fuel brand	
Date of repair		Odometer reading	km
VIN			miles
Weather	❑ Fine ❑ Cloudy ❑ Rainy ❑ Snowy ❑ Various/Others:		
Outdoor temperature	°C (°F)		
	❑ Hot ❑ Warm ❑ Cool ❑ Cold		
Place	❑ Expressway ❑ Suburbs ❑ Inner city ❑ Uphill ❑ Downhill ❑ Rough road ❑ Others:		
Engine temperature	❑ Cold ❑ Warming-up ❑ After warming-up ❑ Any temperature ❑ Others:		
Engine speed	rpm		
Vehicle speed	MPH		
Driving conditions	❑ Not affected ❑ At starting ❑ While idling ❑ At racing-up ❑ While accelerating ❑ While cruising ❑ While decelerating ❑ While turning (RH/LH)		
Headlight	❑ ON/❑ OFF	Rear defogger	❑ ON/❑ OFF
Blower	❑ ON/❑ OFF	Radio	❑ ON/❑ OFF
A/C compressor	❑ ON/❑ OFF	CD/Cassette tape player	❑ ON/❑ OFF
Cooling fan	❑ ON/❑ OFF	Car phone	❑ ON/❑ OFF
Front wiper	❑ ON/❑ OFF	CB	❑ ON/❑ OFF
Rear wiper	❑ ON/❑ OFF		

2. CHECK LIST NO. 2

Check the following items about the vehicle's state when MIL turns on.

NOTE:
Use copies of this page for interviewing customers.

a) Other warning lights or indicators turn on. ❑ Yes /❑ No
❑ Low fuel warning light ❑ Charge indicator light ❑ AT diagnostics indicator light ❑ ABS warning light ❑ Engine oil pressure warning light
b) Fuel level
• Lack of fuel: ❑ Yes /❑ No • Indicator position of fuel gauge:
c) Intentional connecting or disconnecting of harness connectors or spark plug cords: ❑ Yes /❑ No
• What:
d) Intentional connecting or disconnecting of hoses: ❑ Yes/❑ No
• What:
e) Parts other than genuine parts installed: ❑ Yes/❑ No
• What: • Where:
f) Occurrence of noise: ❑ Yes /❑ No
• From where: • What kind:
g) Occurrence of smell: ❑Yes/❑ No
• From where: • What kind:
h) Intrusion of water into engine compartment or passenger compartment: ❑ Yes /❑ No
i) Troubles occurred
❑ Engine does not start ❑ Engine stalls during idling ❑ Engine stalls while driving ❑ Engine speed decreases ❑ Engine speed does not decrease ❑ Rough idling ❑ Poor acceleration ❑ Back fire ❑ After fire ❑ No shift ❑ Excessive shift shock

3. General Description

A: CAUTION

1) Airbag system wiring harness is routed near the engine control module (ECM), main relay and fuel pump relay.

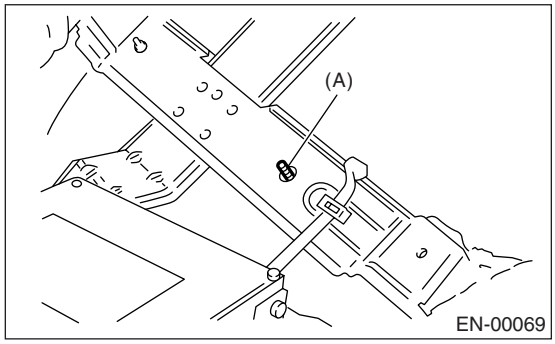
CAUTION:
• All airbag system wiring harness and connectors are colored yellow. Do not use electrical test equipment on these circuits.
• Be careful not to damage the airbag system wiring harness when servicing the engine control module (ECM), transmission control module (TCM), main relay and fuel pump relay.

2) Never connect the battery in reverse polarity.
• The ECM will be destroyed instantly.
• The fuel injector and other parts will be damaged in just a few minutes more.
3) Do not disconnect the battery cables while the engine is running.
• A large counter electromotive force will be generated in the generator, and this voltage may damage electronic parts such as the ECM, etc.
4) Before disconnecting the connectors of each sensor and the ECM, be sure to turn OFF the ignition switch.
5) Poor contact has been identified as a primary cause of this problem. Use a tapered pin with a diameter of less than 0.64 mm (0.025 in) to measure the voltage and/or resistance of individual sensors or all electrical control modules. Do not insert the pin more than 5 mm (0.20 in) into the part.
6) Before removing the ECM from the located position, disconnect the two cables from battery.
• Otherwise, the ECM may be damaged.

CAUTION:
When replacing the ECM, be careful not to use the wrong version. Avoid any damage on the fuel injection system.

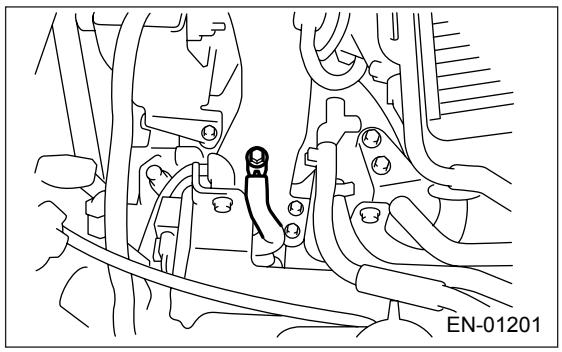
7) The connectors to each sensor in the engine compartment and the harness connectors on the engine side and body side are all designed to be waterproof. However, it is still necessary to take care not to allow water to get into the connectors when washing the vehicle, or when servicing the vehicle on a rainy day.

8) Use ECM mounting stud bolts at the body head grounding point when measuring voltage and resistance inside the passenger's compartment.

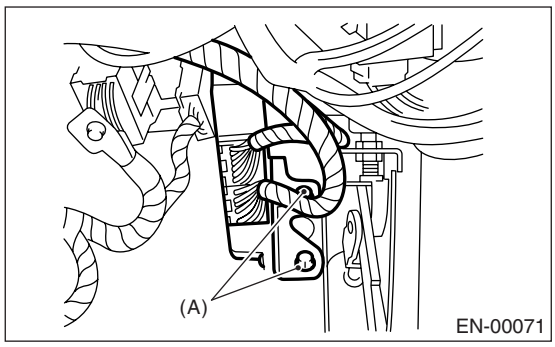


(A) Stud bolt

9) Use the engine grounding terminal or the engine block as the grounding point to the body when measuring voltage and resistance in the engine compartment.



10) Use TCM mounting stud bolts at the body head grounding point when measuring voltage and resistance inside the passenger's compartment.



(A) Stud bolt

11) Every MFI-related part is a precision part. Do not drop them.
12) Observe the following cautions when installing a radio in MFI equipped models.

CAUTION:
• The antenna must be kept as far apart as possible from the control unit.
(The ECM is located under the steering column, inside of the instrument panel lower trim panel.)
• The antenna feeder must be placed as far apart as possible from the ECM and MFI harness.
• Carefully adjust the antenna for correct matching.
• When mounting a large power type radio, pay special attention to the three items above mentioned.
• Incorrect installation of the radio may affect the operation of the ECM.

13) Before disconnecting the fuel hose, disconnect the fuel pump connector and crank the engine for more than five seconds to release pressure in the fuel system. If engine starts during this operation, run it until it stops.
14) Problems in the electronic-controlled automatic transmission may be caused by failure of the engine, the electronic control system, the transmission proper, or by a combination of these. These three causes (engine, electronic-controlled system, transmission) must be distinguished clearly when performing diagnostics.
15) Diagnostics should be conducted by starting from simple, easy operations and proceeding to complicated, difficult operations. The most important thing in diagnostics is to understand the customer's complaint, and distinguish between the three causes.
16) On ABS vehicles, when performing driving test in jacked-up or lifted-up position, sometimes the warning light may come on, but this is not a malfunction of the system. The reason for this is the speed difference between the front and rear wheels. After diagnosis of engine control system, perform the ABS memory clearance procedure of self-diagnosis system.

B: INSPECTION

Before performing diagnostics, check the following items which might affect engine problems:

1. BATTERY

1) Measure battery voltage and specific gravity of electrolyte.

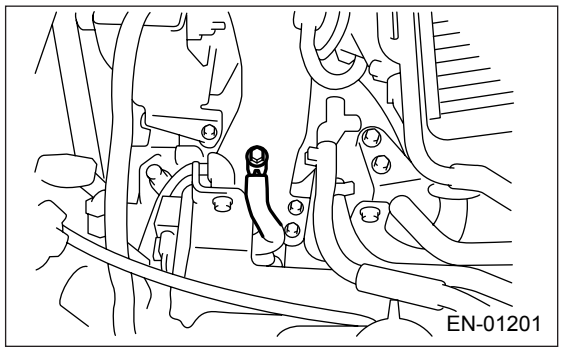
Standard voltage: 12 V

Specific gravity: Above 1.260

2) Check the condition of the main and other fuses, and harnesses and connectors. Also check for proper grounding.

2. ENGINE GROUNDING

Make sure the engine grounding terminal is properly connected to the engine.



C: NOTE

1. GENERAL DESCRIPTION

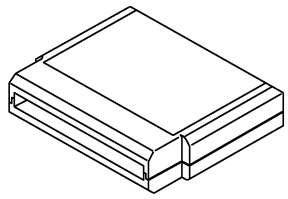
• The on-board diagnostics (OBD) system detects and indicates a fault in various inputs and outputs of the complex electronic control. CHECK ENGINE malfunction indicator lamp (MIL) in the combination meter indicates occurrence of a fault or trouble.
• Further, against a sensor failure that may disable the drive, a fail-safe function is provided to ensure the minimal driveability.
• The OBD system incorporated with the vehicles within this engine family complies with Section 1968.1, California Code of Regulations (OBD-II regulation). The OBD system monitors the components and the system malfunction listed in Engine Section which affects on emissions.
• When the system decides that a malfunction occurs, the MIL illuminates. At the same time of the MIL illumination or blinking, a diagnostic trouble code (DTC) and a freeze frame data of engine conditions are stored into the on-board computer.
• The OBD system stores freeze frame engine condition data (engine load, engine coolant temperature, fuel trim, engine speed and vehicle speed, etc.) into the on-board computer when it detects a malfunction first.

• If the OBD system detects malfunctions such as fault of fuel trim or misfire, the OBD system first stores freeze frame engine conditions about the fuel trim or misfire.
• When the malfunction does not occur again for three consecutive driving cycles, the MIL turns off, but the DTC remains in the on-board computer.
• The OBD-II system is capable of communication with a general scan tool (OBD-II general scan tool) conforming to ISO 9141 CARB.
• The OBD-II diagnostics procedure is different from the usual diagnostics procedure. When troubleshooting OBD-II vehicles, connect a Subaru Select Monitor or an OBD-II general scan tool to the vehicle.

2. ENGINE AND EMISSION CONTROL SYSTEM

• The Multipoint Fuel Injection (MFI) system is a system that supplies the optimum air-fuel mixture to the engine for all the various operating conditions through the use of the latest electronic technology.
With this system, fuel is pressurized at a constant pressure and injected into the intake air passage of the cylinder head. The injection quantity of fuel is controlled by an intermittent injection system where the electro-magnetic injection valve (fuel injector) opens only for a short period of time, depending on the quantity of air required for one cycle of operation. In actual operation, the injection quantity is determined by the duration of an electric pulse applied to the fuel injector and this permits simple, yet highly precise metering of the fuel.
• Further, all the operating conditions of the engine are converted into electric signals, and this results in additional features of the system, such as large improved adaptability, easier addition of compensating element, etc.
The MFI system also has the following features:
- Reduced emission of harmful exhaust gases.
- Reduced fuel consumption.
- Increased engine output.
- Superior acceleration and deceleration.
- Superior startability and warm-up performance in cold weather since compensation is made for coolant and intake air temperature.

D: PREPARATION TOOL

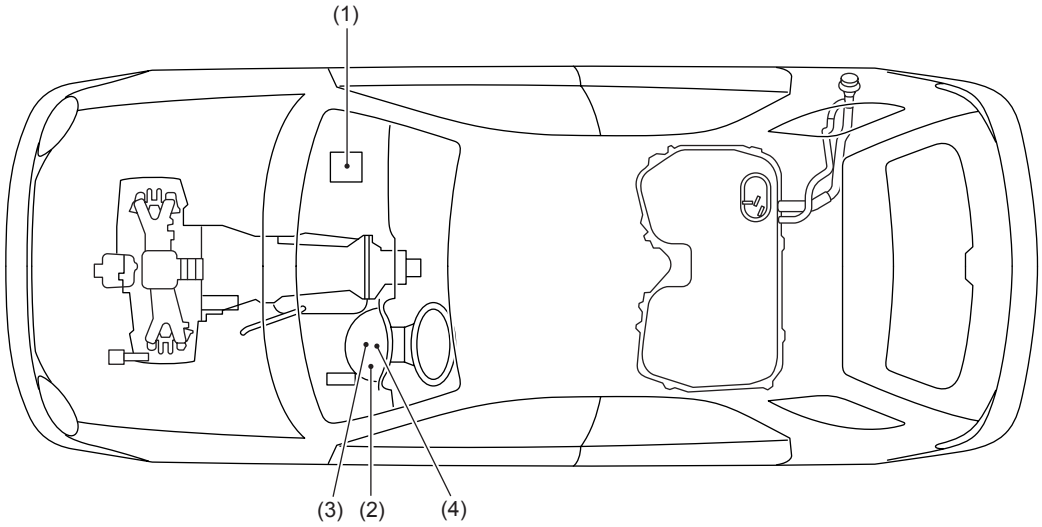
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST24082AA210	24082AA210	CARTRIDGE	Troubleshooting for electrical systems.
 ST22771AA030	22771AA030	SUBARU SELECT MONITOR KIT	Troubleshooting for electrical systems. • English: 22771AA030 (without printer) • German: 22771AA070 (without printer) • French: 22771AA080 (without printer) • Spanish: 22771AA090 (without printer)

4. Electrical Components Location

A: LOCATION

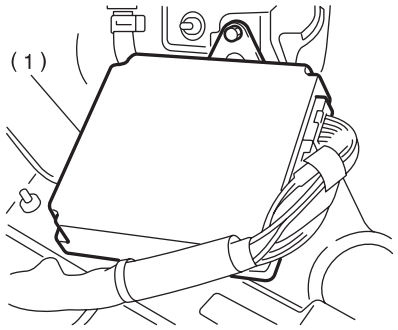
1. ENGINE

• Module

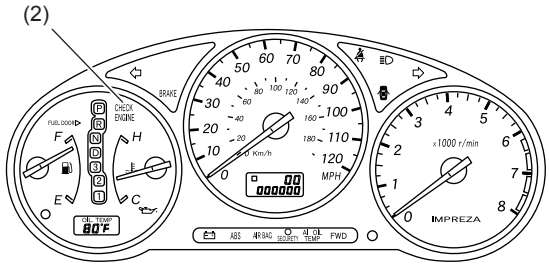


EN-01202

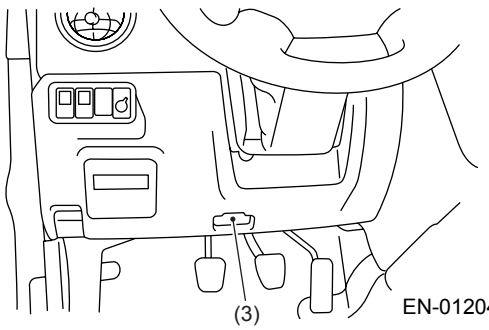
(1) Engine control module (ECM)
(2) CHECK ENGINE malfunction indicator lamp (MIL)
(3) Data link connector
(4) Test mode connector



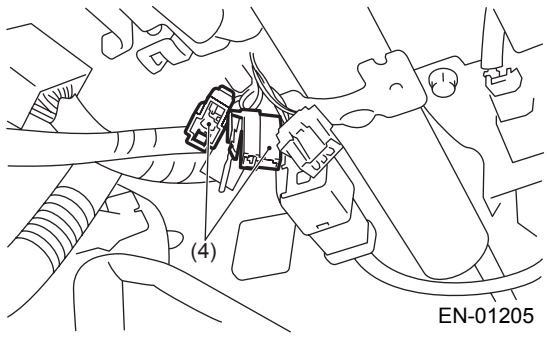
EN-00156



EN-01203

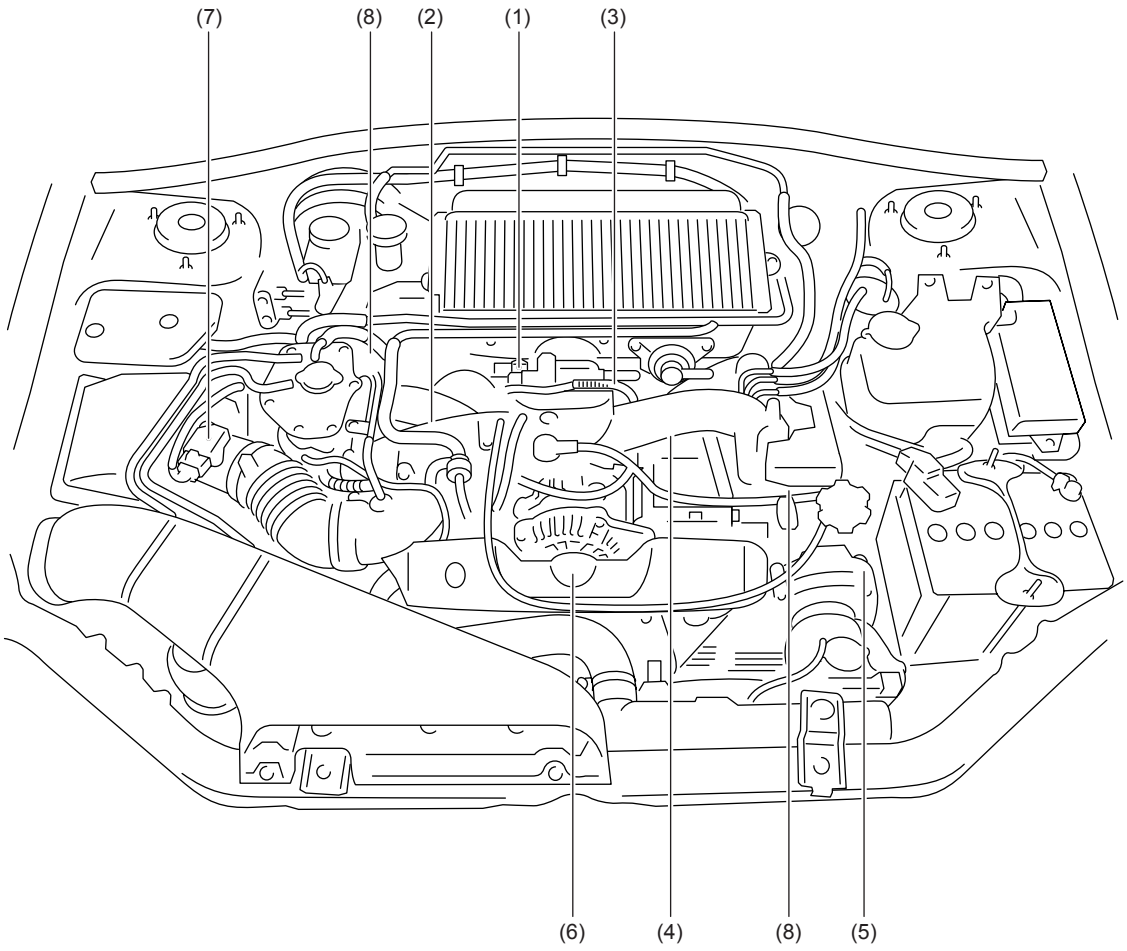


EN-01204

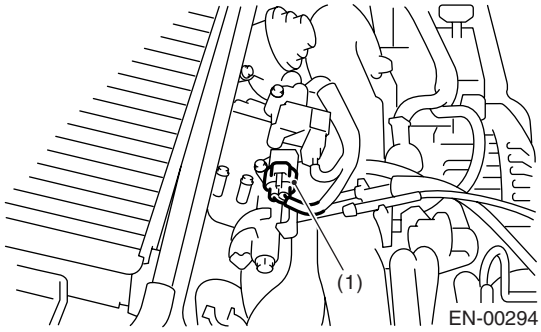


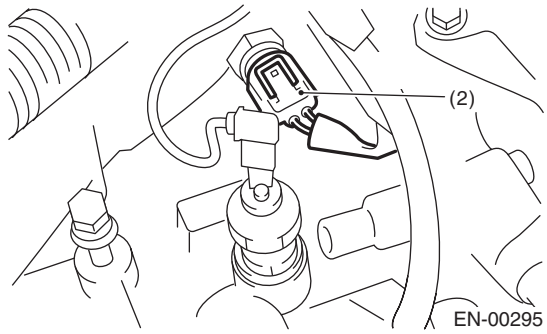
EN-01205

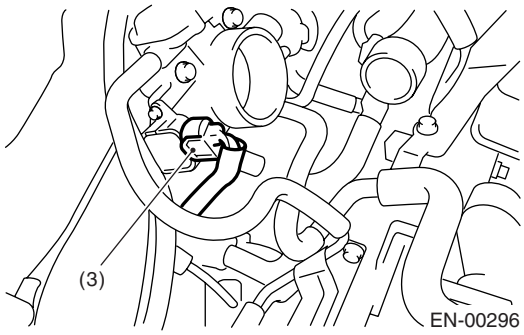
• Sensors

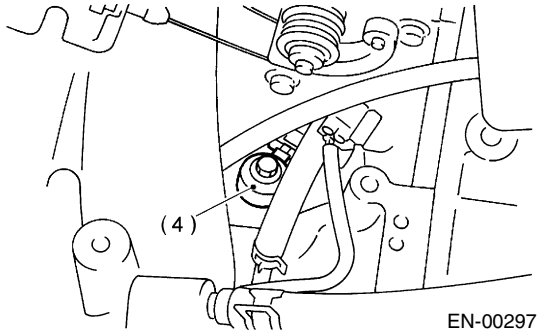


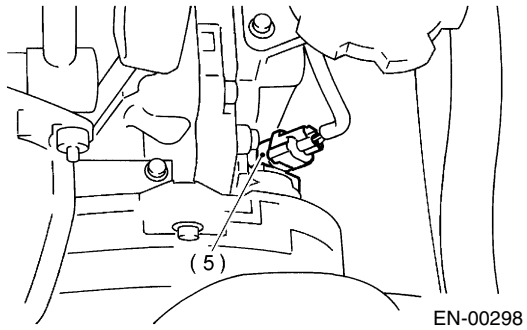
(1) Pressure sensor
(2) Engine coolant temperature sensor
(3) Throttle position sensor
(4) Knock sensor
(5) Camshaft position sensor
(6) Crankshaft position sensor
(7) Mass air flow & intake air temperature sensor
(8) Tumble generator valve position sensor

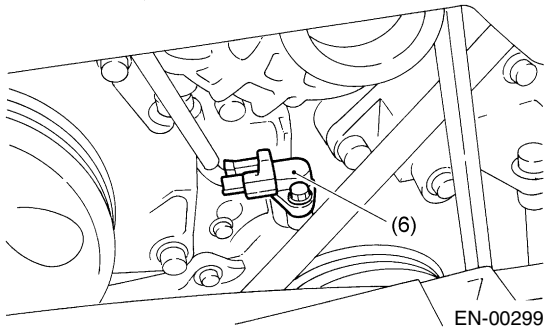

(1)
EN-00294

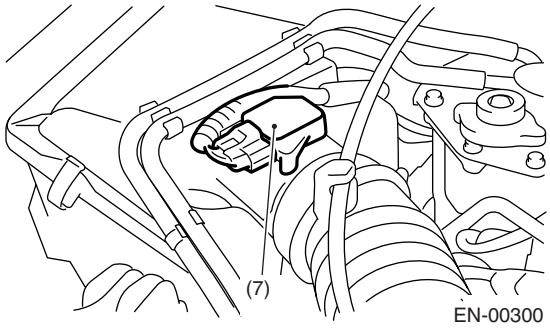

(2)
EN-00295

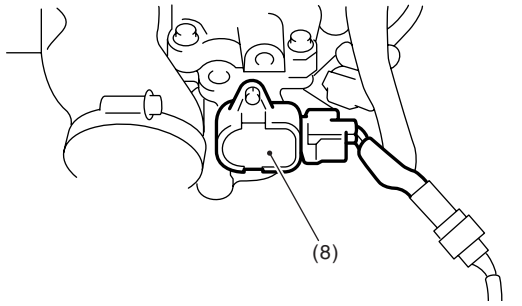

(3)
EN-00296

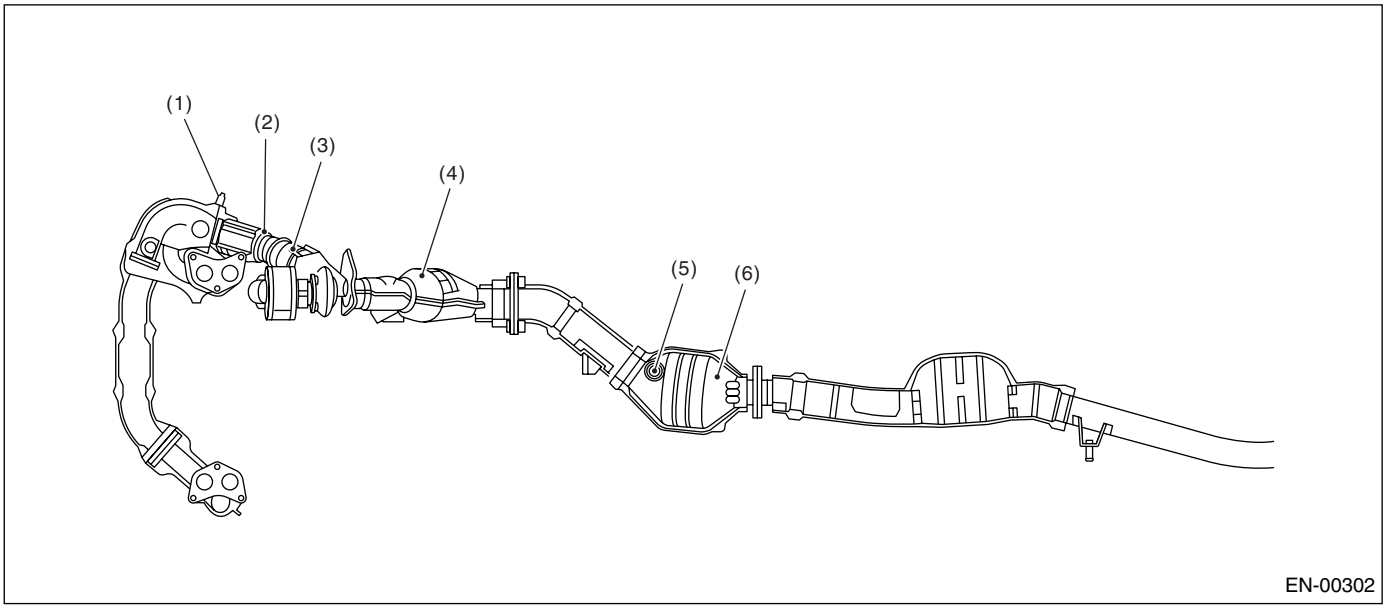

(4)
EN-00297


(5)
EN-00298

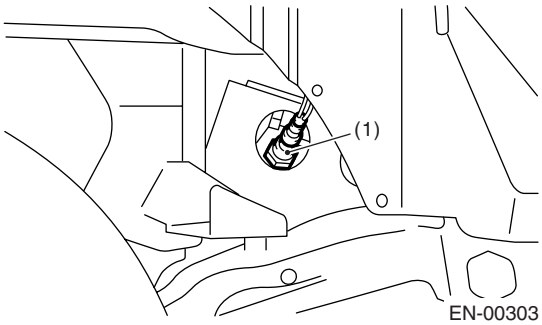

(6)
EN-00299


(7)
EN-00300

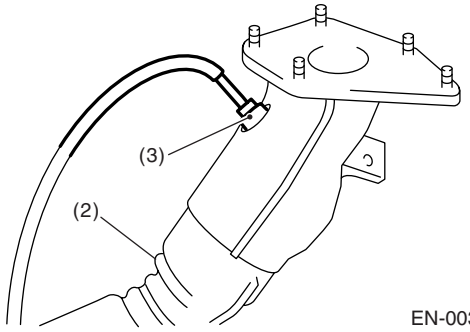

(8)
EN-00301



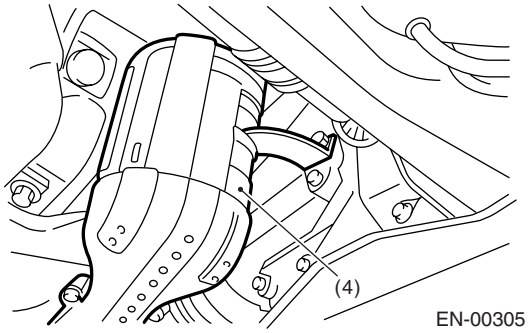
(1) Front oxygen (A/F) sensor
(2) Pre-catalytic converter
(3) Exhaust temperature sensor
(4) Front catalytic converter
(5) Rear oxygen sensor
(6) Rear catalytic converter



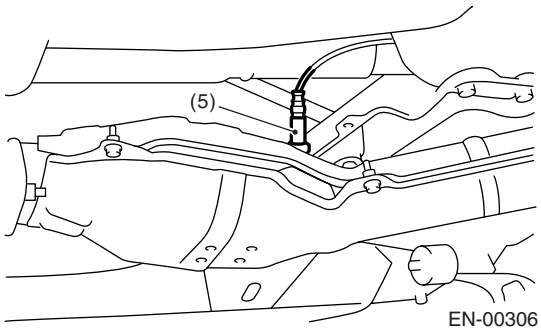
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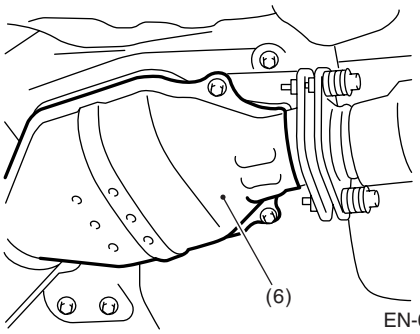
EN-00304



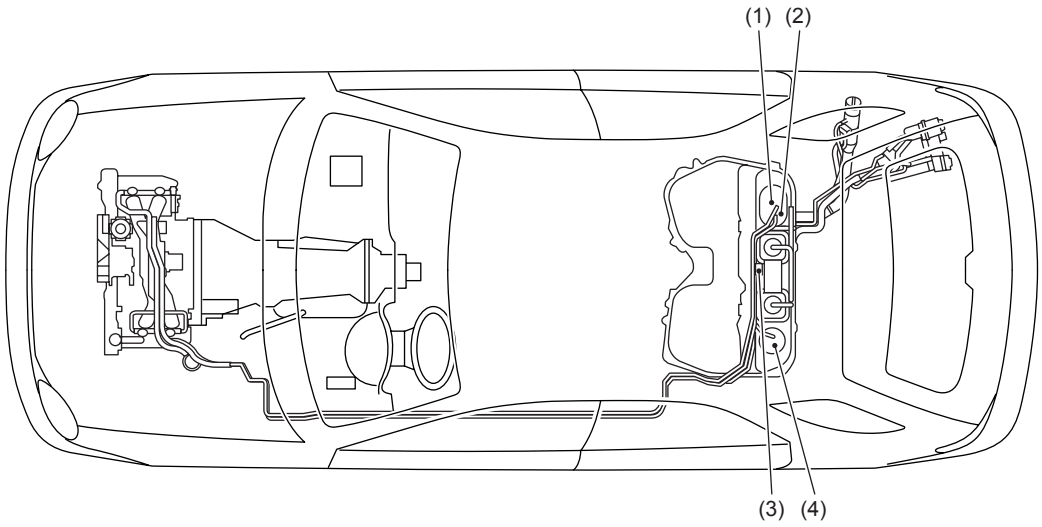
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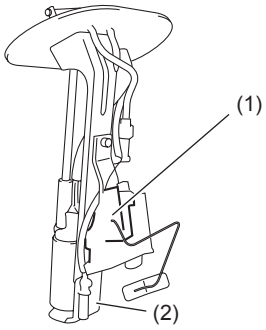
EN-00306



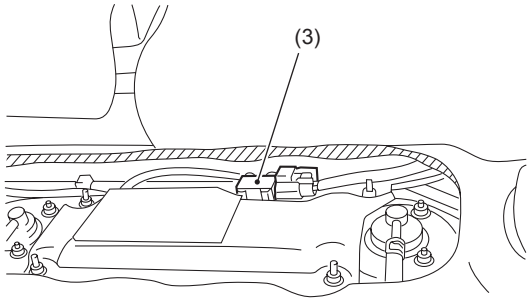
EN-00307



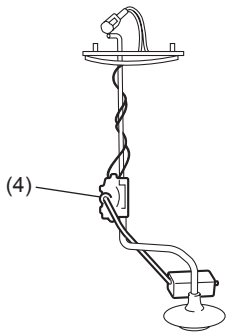
(1) Fuel level sensor
(2) Fuel temperature sensor
(3) Fuel tank pressure sensor
(4) Fuel sub level sensor



EN-01208

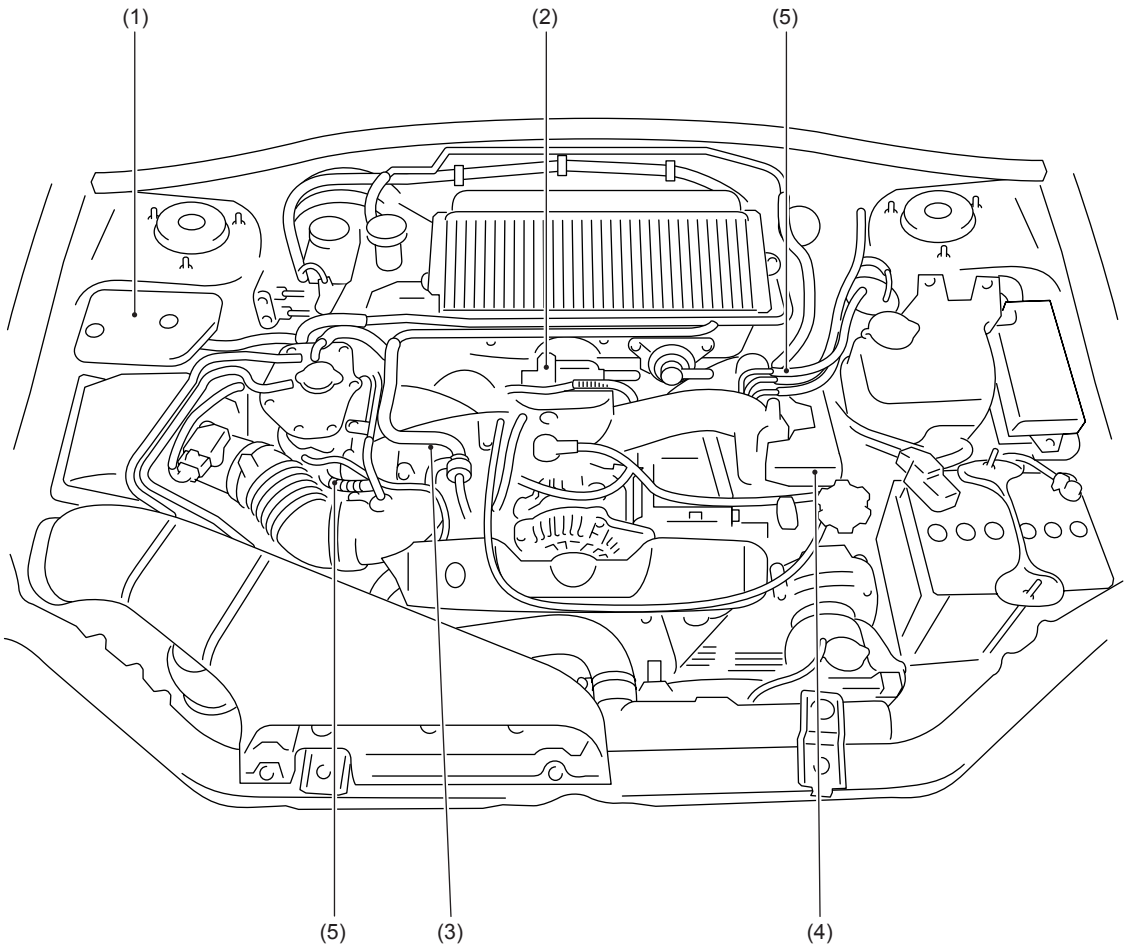


EN-01209

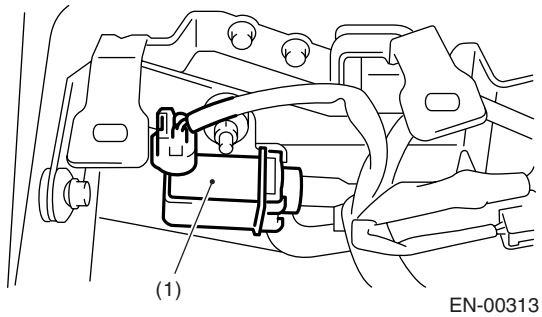


EN-01210

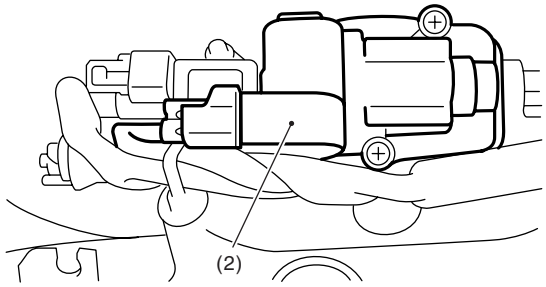
• Solenoid Valves, Actuators, Emission Control System Parts and Ignition System Parts



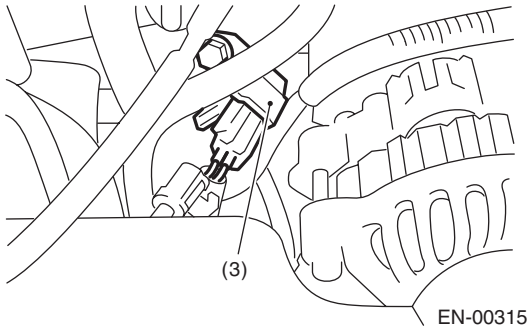
(1) Waste gate control solenoid valve
(2) Idle air control solenoid valve
(3) Purge control solenoid valve
(4) Ignition coil
(5) Tumble generator valve actuator



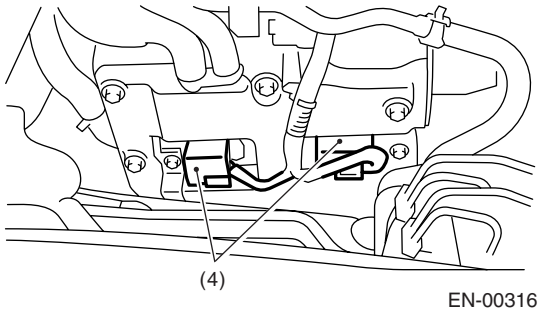
EN-00313



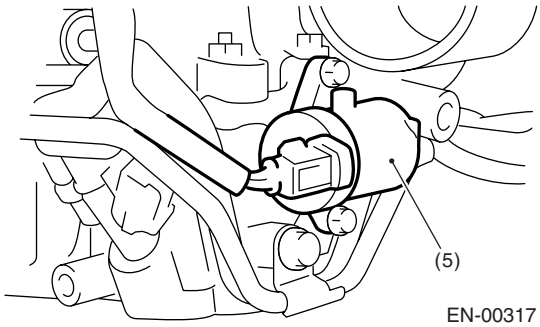
EN-00314



EN-00315

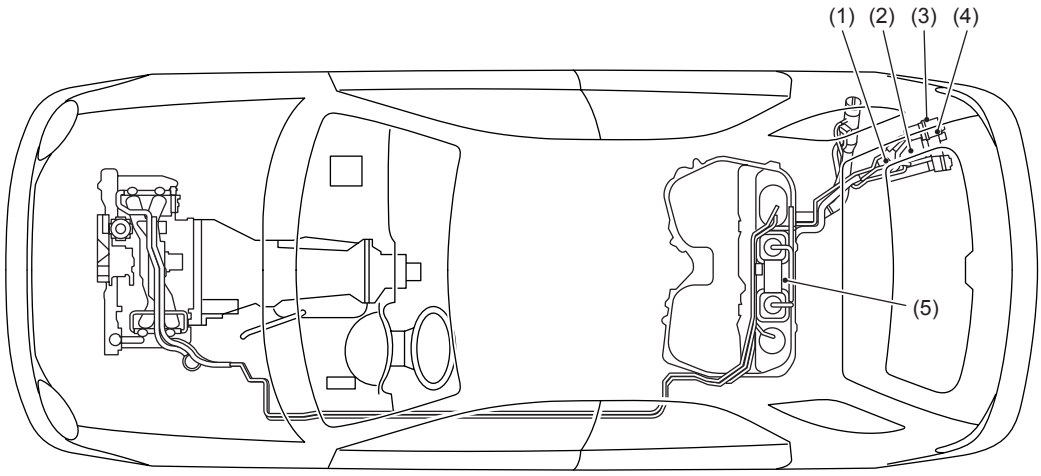


EN-00316



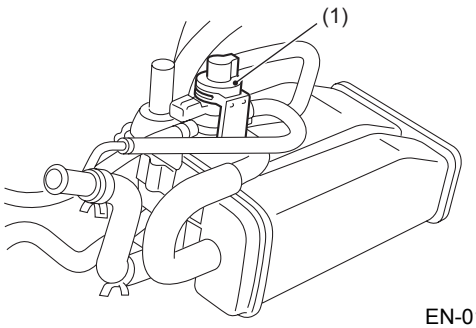
EN-00317

ELECTRICAL COMPONENTS LOCATION

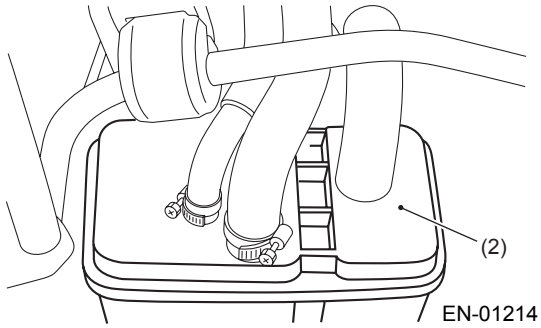


EN-01212

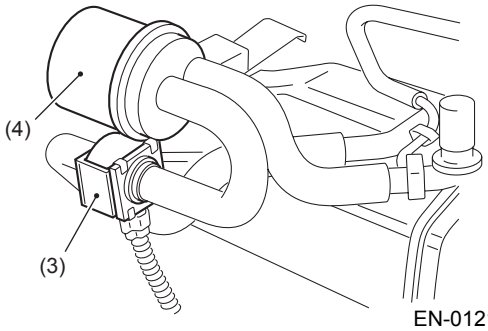
(1) Pressure control solenoid valve
(2) Canister
(3) Drain valve
(4) Drain filter
(5) Fuel tank sensor control valve



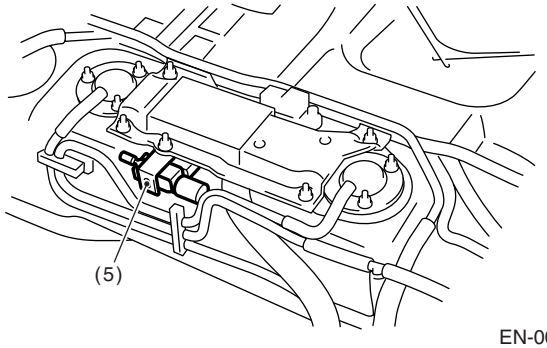
EN-01213



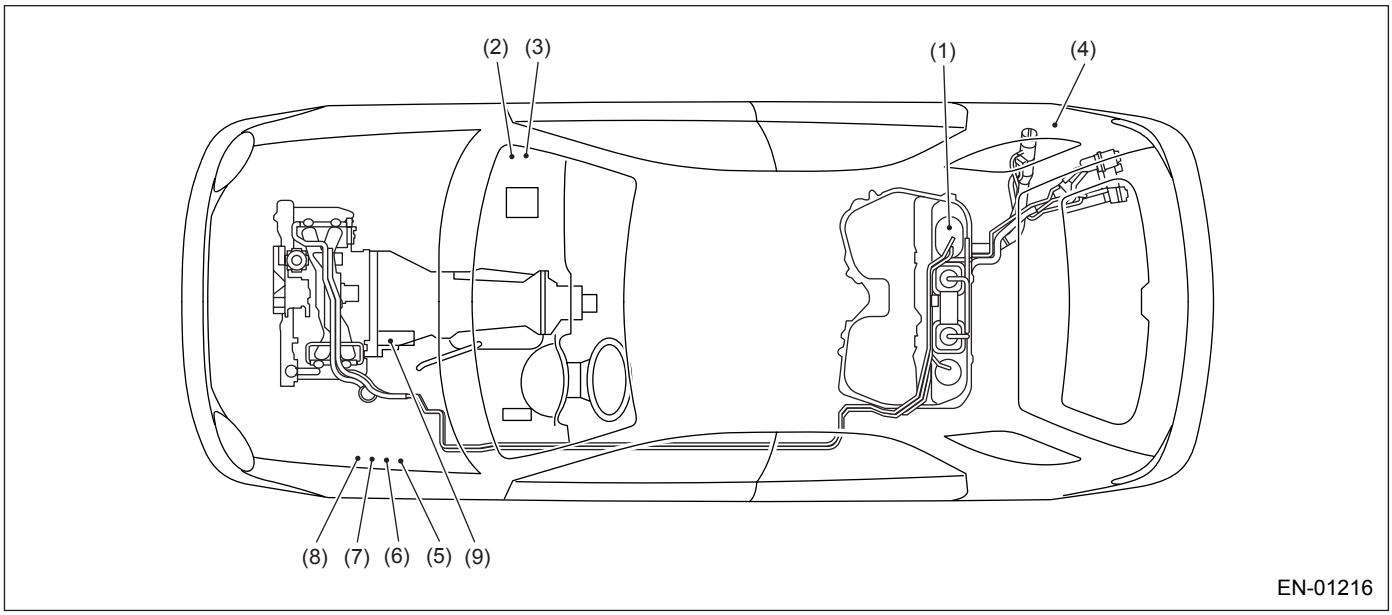
EN-01214



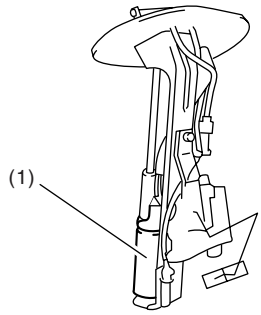
EN-01215



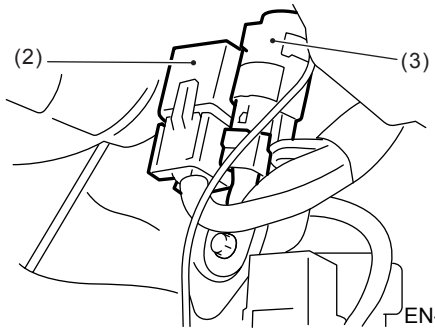
EN-00234



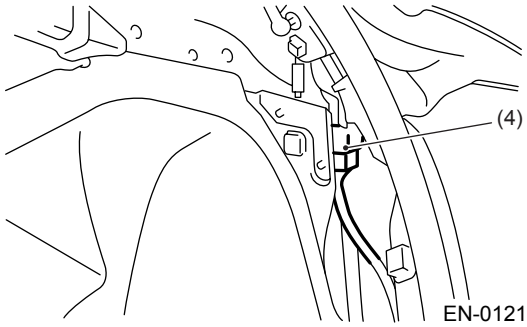
(1) Fuel pump
(2) Main relay
(3) Fuel pump relay
(4) Fuel pump controller
(5) Radiator main fan relay 1
(6) Radiator main fan relay 2
(7) Radiator sub fan relay 1
(8) Radiator sub fan relay 2
(9) Starter



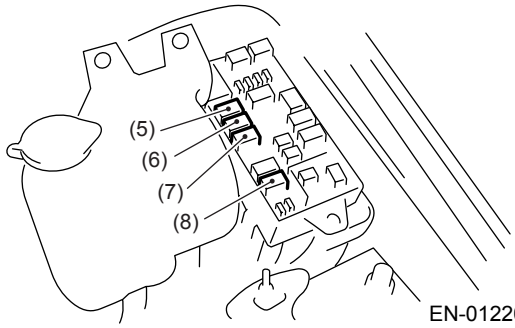
EN-01217



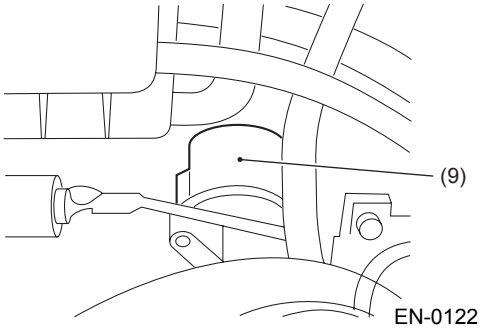
EN-01218



EN-01219



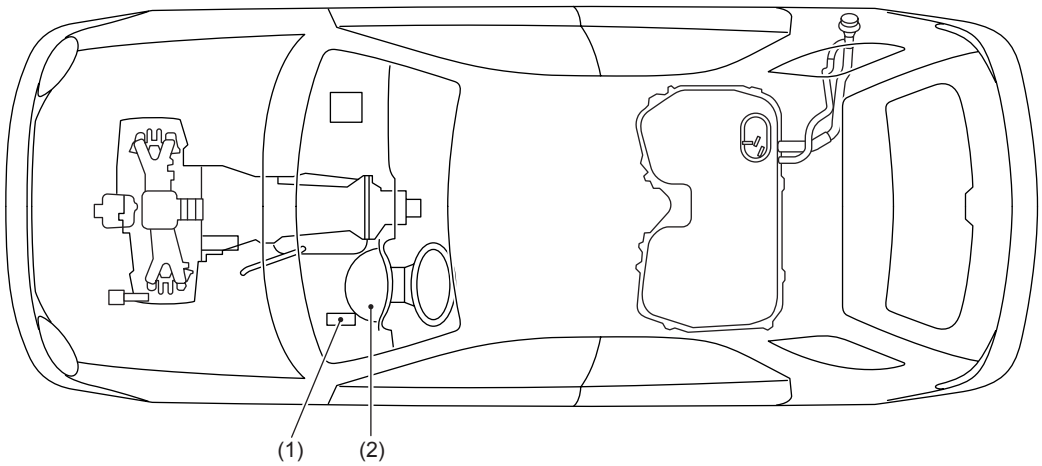
EN-01220



EN-01221

2. TRANSMISSION

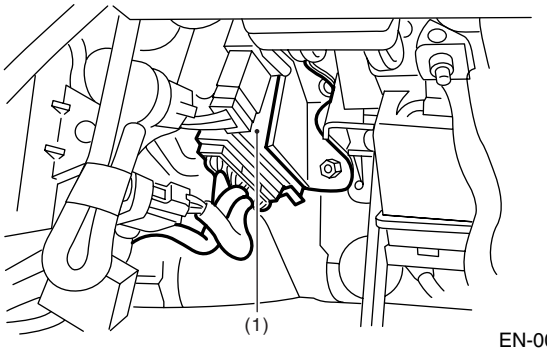
• Module



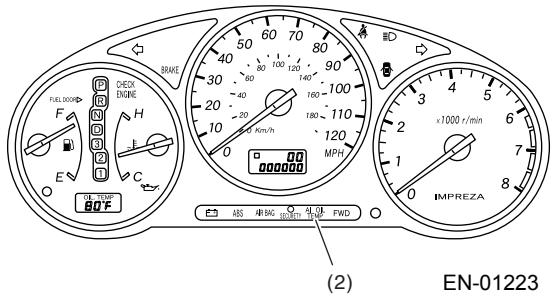
EN-01222

(1) Transmission control module (TCM) (AT vehicles)

(2) AT diagnostic indicator light (AT vehicles)

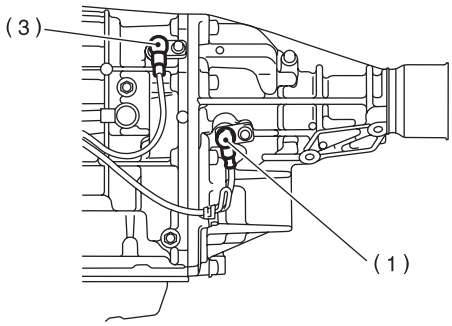


EN-00327

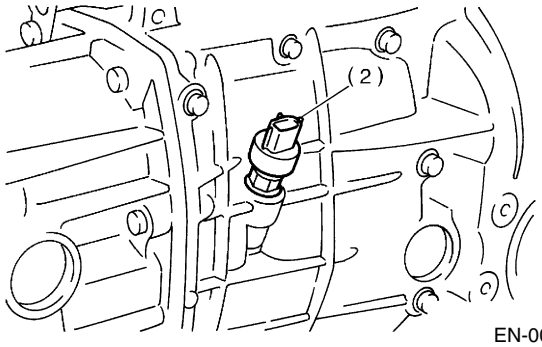


EN-01223

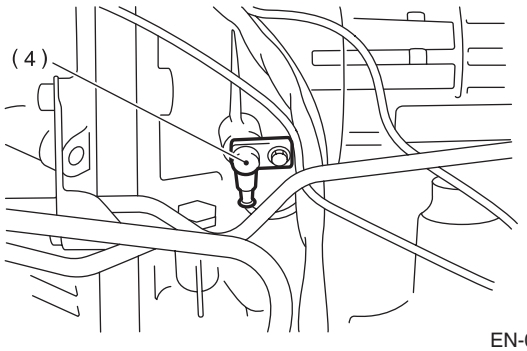
• Sensors



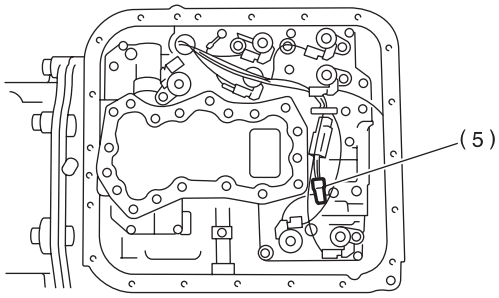
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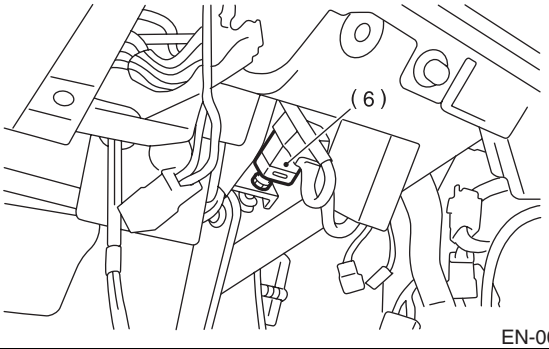
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EN-00186



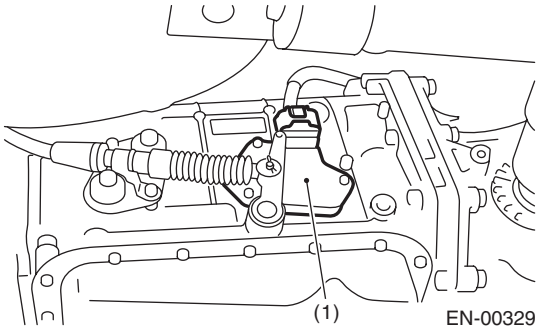
EN-00187

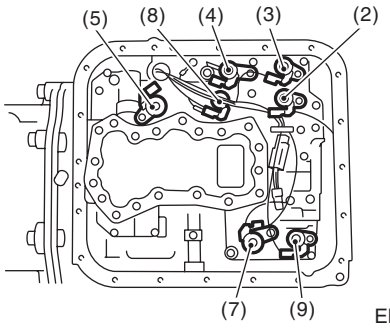


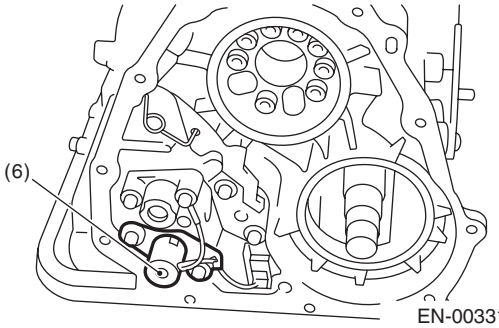
EN-00188

(1) Rear vehicle speed sensor (AT vehicles)
(2) Front vehicle speed sensor (MT vehicles)
(3) Front vehicle speed sensor (AT vehicles)
(4) Torque converter turbine speed sensor (AT vehicles)
(5) ATF temperature sensor (AT vehicles)
(6) Brake light switch

• Solenoid Valves and Switches (AT Vehicles)



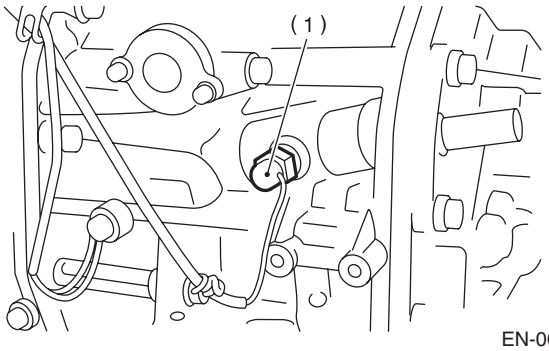




SUBARU.

(1) Inhibitor switch
(2) Shift solenoid valve 1
(3) Shift solenoid valve 2
(4) Line pressure duty solenoid
(5) Lockup duty solenoid
(6) Transfer duty solenoid
(7) 2-4 brake duty solenoid
(8) Low clutch timing solenoid valve
(9) 2-4 brake timing solenoid valve

• Solenoid Valves and Switches (MT Vehicles)

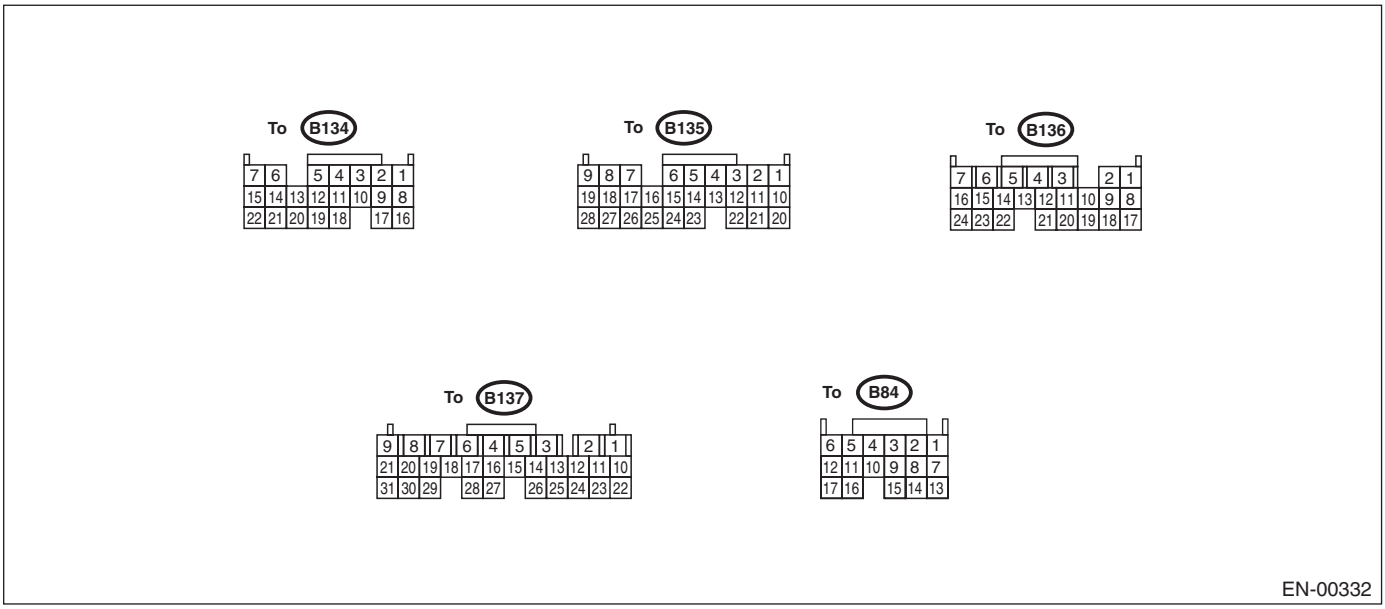


SUBARU.

(1) Neutral position switch

5. Engine Control Module (ECM) I/O Signals

A: ELECTRICAL SPECIFICATIONS



Content		Connector No.	Terminal No.	Signal (V)		Note
				Ignition SW ON (Engine OFF)	Engine ON (Idling)	
Crankshaft position sensor	Signal (+)	B135	2	0	–7 — +7	Sensor output waveform
	Signal (–)	B135	11	0	0	—
	Shield	B135	21	0	0	—
Camshaft position sensor	Signal (+)	B135	1	0	–7 — +7	Sensor output waveform
	Signal (–)	B135	10	0	0	—
	Shield	B135	21	0	0	—
Throttle position sensor	Signal	B135	7	Fully closed: 0.2 — 1.0 Wide open: 4.2 — 4.7		—
	Power supply	B135	9	5	5	—
	GND (sensor)	B135	19	0	0	—
Rear oxygen sensor	Signal	B135	17	0	0 — 0.9	—
	Shield	B135	26	0	0	—
	GND (sensor)	B135	19	0	0	—
Front oxygen (A/F) sensor heater	Signal 1	B137	5	0 — 1.0	0 — 1.0	—
	Signal 2	B137	4	0 — 1.0	0 — 1.0	—
Rear oxygen sensor heater signal		B136	13	0 — 1.0	0 — 1.0	—
Engine coolant temperature sensor	Signal	B135	18	1.0 — 1.4	1.0 — 1.4	After engine warmed up.
	GND (sensor)	B135	19	0	0	After engine warmed up.
Vehicle speed signal		B134	1	0 or 5	0 or 5	“5” and “0” are repeatedly displayed when vehicle is driven.

Content		Connector No.	Terminal No.	Signal (V)		Note
				Ignition SW ON (Engine OFF)	Engine ON (Idling)	
Mass air flow sensor	Signal	B84	13	—	0.3 — 4.5	—
	Shield	B84	8	0	0	—
	GND	B84	7	0	0	—
Intake air temperature sensor signal		B135	27	—	—	—
Exhaust gas temperature sensor	Signal	B135	16	—	—	—
	GND (sensor)	B135	19	0	0	—
Tumble generator valve position sensor RH	Signal	B135	23	Fully closed: 0.2 — 1.0 Wide open: 4.2 — 4.7		—
	Power supply	B135	9	5	5	—
	GND (sensor)	B135	19	0	0	—
Tumble generator valve position sensor LH	Signal	B135	13	Fully closed: 0.2 — 1.0 Wide open: 4.2 — 4.7		—
	Power supply	B135	9	5	5	—
	GND (sensor)	B135	19	0	0	—
Tumble generator valve RH (open)		B84	4	0 or 5	0 or 5	—
Tumble generator valve RH (closed)		B84	5	0 or 5	0 or 5	—
Tumble generator valve LH (open)		B84	10	0 or 5	0 or 5	—
Tumble generator valve LH (closed)		B84	11	0 or 5	0 or 5	—
Waste gate control solenoid valve		B137	24	10 — 13	13 — 14	—
Starter switch		B134	16	0	0	Cranking: 8 — 14
A/C switch		B134	2	ON: 10 — 13 OFF: 0	ON: 13 — 14 OFF: 0	—
Ignition switch		B134	5	10 — 13	13 — 14	—
Neutral position switch		B134	8	ON: 12±0.5 OFF: 0		Switch is ON when gear is in neutral position.
Test mode connector		B134	14	5	5	When connected: 0
Knock sensor	Signal	B135	4	2.8	2.8	—
	Shield	B135	22	0	0	—
Backup power supply		B137	10	10 — 13	13 — 14	Ignition switch OFF: 10 — 13
Control unit power supply		B137	2	10 — 13	13 — 14	—
		B137	3	10 — 13	13 — 14	—
Sensor power supply		B135	9	5	5	—
Line end check 1		B134	10	0	0	—
Ignition control	#1	B136	24	0	13 — 14	Waveform
	#2	B136	23	0	13 — 14	Waveform
	#3	B136	22	0	13 — 14	Waveform
	#4	B136	21	0	13 — 14	Waveform

Content		Connector No.	Terminal No.	Signal (V)		Note
				Ignition SW ON (Engine OFF)	Engine ON (Idling)	
Fuel injector	#1	B137	1	10 — 13	1 — 14	Waveform
	#2	B136	6	10 — 13	1 — 14	Waveform
	#3	B136	5	10 — 13	1 — 14	Waveform
	#4	B136	4	10 — 13	1 — 14	Waveform
Idle air control solenoid valve	Signal	B136	10	0 or 13 — 14	0 or 13 — 14	Waveform
Fuel pump controller	Signal 1	B134	13	—	—	—
	Signal 2	B136	15	—	—	—
A/C relay control		B137	27	ON: 0.5 or less OFF: 10 — 13	ON: 0.5 or less OFF: 13 — 14	—
Radiator fan relay 1 control		B137	17	ON: 0.5 or less OFF: 10 — 13	ON: 0.5 or less OFF: 13 — 14	—
Radiator fan relay 2 control		B137	28	ON: 0.5 or less OFF: 10 — 13	ON: 0.5 or less OFF: 13 — 14	Only vehicles with A/C
Malfunction indicator lamp		B137	15	—	—	ON: 1 or less OFF: 10 — 14
Engine speed output		B136	9	—	0 — 13 or more	Waveform
Purge control solenoid valve		B137	16	ON: 1 or less OFF: 10 — 13	ON: 1 or less OFF: 13 — 14	—
Pressure sensor	Signal	B135	8	1.7 — 2.4	1.1 — 1.6	—
	Power supply	B135	9	5	5	
	GND (sensor)	B135	19	0	0	
Exhaust temperature sensor		B135	16	2.5 — 3.8	2.5 — 3.8	Ambient temperature: 25°C (75°F)
Fuel tank pressure sensor	Signal	B135	15	2.3 — 2.7	2.3 — 2.7	The valve operates when fuel filler cap is removed and reinstalled.
	GND (sensor)	B135	19	0	0	—
Pressure control solenoid valve		B137	22	ON: 1 or less OFF: 10 — 13	ON: 1 or less OFF: 13 — 14	—
Drain valve		B137	11	ON: 1 or less OFF: 10 — 13	ON: 1 or less OFF: 13 — 14	—
Fuel tank sensor control valve		B137	23	ON: 1 or less OFF: 10 — 13	ON: 1 or less OFF: 13 — 14	—
Fuel level sensor		B135	25	0.12 — 4.75	0.12 — 4.75	—
Small light switch		B134	17	ON: 0 OFF: 10 — 13	ON: 0 OFF: 13 — 14	—
Blower fan switch		B134	9	ON: 0 OFF: 10 — 13	ON: 0 OFF: 13 — 14	—
Rear defogger switch		B134	3	ON: 0 OFF: 10 — 13	ON: 0 OFF: 13 — 14	—
Power steering oil pressure switch		B135	24	10 — 13	ON: 0 OFF: 13 — 14	—
Front oxygen (A/F) sensor signal (+)		B137	29	2.8 — 3.2	2.8 — 3.2	—
Front oxygen (A/F) sensor signal (−)		B137	19	2.4 — 2.7	2.4 — 2.7	—

Content	Connector No.	Terminal No.	Signal (V)		Note
			Ignition SW ON (Engine OFF)	Engine ON (Idling)	
Front oxygen (A/F) sensor shield	B137	18	0	0	—
SSM/GST communication line	B134	21	Less than 1 ←→ More than 4	Less than 1 ←→ More than 4	—
Torque control 1 signal	B134	19	4 or more	4 or more	—
Torque control 2 signal	B134	18	4 or more	4 or more	—
Torque control cut signal	B136	14	8	8	—
AT diagnosis input signal	B135	20	Less than 1 ←→ More than 4	Less than 1 ←→ More than 4	Waveform
AT load signal	B135	28	4.3 — 4.4	0.9 — 1.4	—
GND (sensor)	B135	19	0	0	—
GND (injectors)	B136	8	0	0	—
GND (ignition system)	B136	18	0	0	—
GND (power supply)	B136	17	0	0	—
	B134	22	0	0	—
GND (control systems)	B134	7	0	0	—
	B134	15	0	0	—
GND (oxygen sensor heater 1)	B137	9	0	0	—
GND (oxygen sensor heater 2)	B137	8	0	0	—

6. Engine Condition Data

A: ELECTRICAL SPECIFICATIONS

Content	Specified data
Engine load	1.6 — 2.9 (%): Idling
	6.4 — 12.8 (%): racing at 2,500 rpm

Measuring conditions:
- After engine warmed up.
- Gear in neutral position.
- A/C switched OFF.
- All accessory switches OFF.

7. Transmission Control Module (TCM) I/O Signals

A: ELECTRICAL SPECIFICATIONS

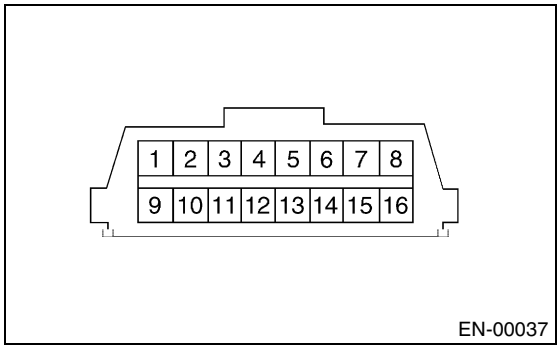
<Ref. to AT-11, Transmission Control Module (TCM) I/O Signal.>

8. Data Link Connector

A: NOTE

1) This connector is used both for OBD-II general scan tools and the Subaru Select Monitor.
2) Terminals No. 4 to No. 6 of the data link connector are used for Subaru Select Monitor signals.

CAUTION:
Do not connect any scan tools other than OBD-II general scan tools or the Subaru Select Monitor, because the circuit for the Subaru Select Monitor may be damaged.



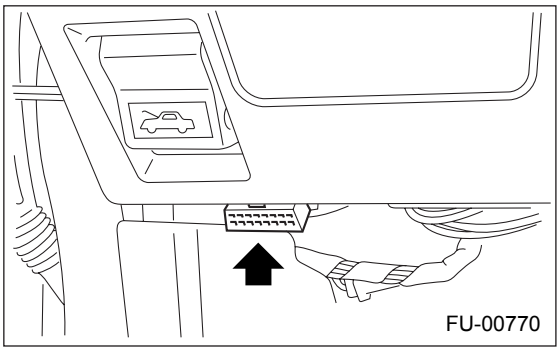
Terminal No.	Contents	Terminal No.	Contents
1	Power supply	9	Blank
2	Blank	10	K line of ISO 9141 CARB
3	Blank	11	Blank
4	Blank	12	Ground
5	Blank	13	Ground
6	Line end check signal 1	14	Blank
7	Blank	15	Blank
8	Line end check signal 2	16	Blank

9. OBD-II General Scan Tool

A: OPERATION

1. HOW TO USE OBD-II GENERAL SCAN TOOL

1) Prepare a general scan tool (OBD-II general scan tool) required by SAE J1978.
2) Open the cover and connect the OBD-II general scan tool to the data link connector located in the lower portion of the instrument panel (on the driver's side).



3) Using the OBD-II general scan tool, call up diagnostic trouble code(s) and freeze frame data.

OBD-II general scan tool functions consist of:
(1) MODE $01: Current power train diagnostic data
(2) MODE $02: Power train freeze frame data
(3) MODE $03: Emission-related power train diagnostic trouble code
(4) MODE $04: Clear/reset emission-related diagnostic information

Read out data according to repair procedures. (For detailed operation procedures, refer to the OBD-II General Scan Tool Instruction Manual.)

NOTE:
For details concerning diagnostic trouble codes (DTCs), refer to the List of Diagnostic Trouble Codes (DTC). <Ref. to EN(H4DOTC)-81, List of Diagnostic Trouble Codes (DTC).>

2. MODE $01 (CURRENT POWER TRAIN DIAGNOSTIC DATA)

Refers to data denoting the current operating condition of analog input/output, digital input/output and/or the power train system.
A list of support data and PID (Parameter Identification) codes are shown in the following table.

PID	Data	Unit of measure
01	Number of emission-related power train diagnostic trouble codes and MIL status	ON/OFF
03	Fuel system control status	—
04	Calculated engine load value	%
05	Engine coolant temperature	°C
06	Short term fuel trim	%
07	Long term fuel trim	%
0B	Intake manifold absolute pressure	kPa
0C	Engine speed	rpm
0D	Vehicle speed	km/h
0E	Ignition timing advance	°
0F	Intake air temperature	°C
10	Air flow rate from pressure sensor	g/sec
11	Throttle valve opening angle	%
13	Check whether oxygen sensor is installed.	—
15	Oxygen sensor output voltage and short term fuel trim associated with oxygen sensor — bank 2	V and %
24	A/F sensor 1 output voltage and short term fuel trim associated with A/F sensor 1	V and %
1C	On-board diagnostic system	—

NOTE:
Refer to OBD-II general scan tool manufacturer's instruction manual to access generic OBD-II PIDs (MODE $01).

3. MODE $02 (POWER TRAIN FREEZE FRAME DATA)

Refers to data denoting the operating condition when trouble is sensed by the on-board diagnosis system. A list of support data and PID (Parameter Identification) codes are shown in the following table.

PID	Data	Unit of measure
02	DTC that caused CARB required freeze frame data storage	—
03	Fuel system control status	—
04	Calculated engine load value	%
05	Engine coolant temperature	°C
06	Short term fuel trim	%
07	Long term fuel trim	%
0B	Intake manifold absolute pressure	kPa
0C	Engine speed	rpm
0D	Vehicle speed	km/h

NOTE:
Refer to OBD-II general scan tool manufacturer's instruction manual to access freeze frame data (MODE $02).

4. MODE $03 (EMISSION-RELATED POWER TRAIN DIAGNOSTIC TROUBLE CODE)

Refer to Read Diagnostic Trouble Code for information about data denoting emission-related power train diagnostic trouble codes. <Ref. to EN(H4DOTC)-40, Read Diagnostic Trouble Code.>

5. MODE $04 (CLEAR/RESET EMISSION-RELATED DIAGNOSTIC INFORMATION)

Refers to the mode used to clear or reset emission-related diagnostic information (OBD-II trouble diagnostic information).

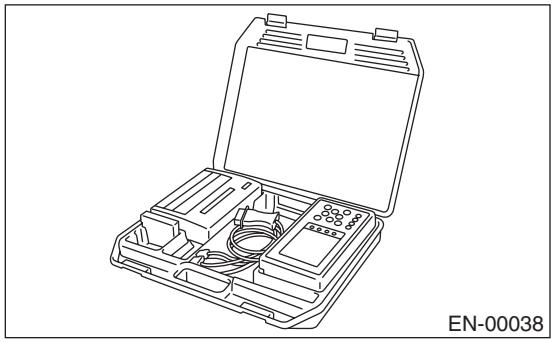
NOTE:
Refer to OBD-II general scan tool manufacturer's instruction manual to clear or reset emission-related diagnostic information (MODE $04).

10.Subaru Select Monitor

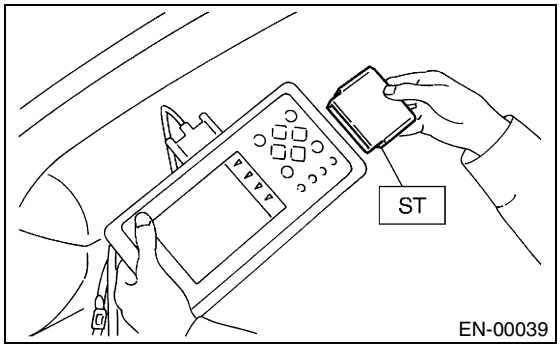
A: OPERATION

1. HOW TO USE SUBARU SELECT MONITOR

1) Prepare the Subaru Select Monitor kit. <Ref. to EN(H4DOTC)-9, PREPARATION TOOL, General Description.>

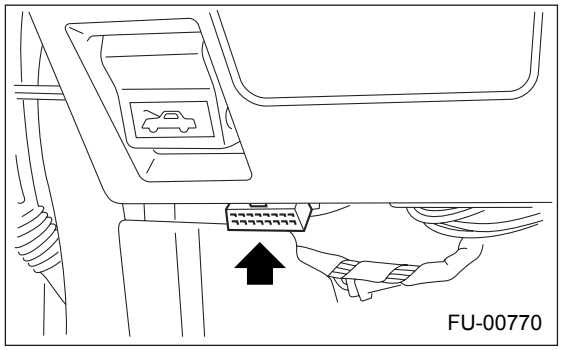


2) Connect the diagnosis cable to Subaru Select Monitor.
3) Insert the cartridge into Subaru Select Monitor. <Ref. to EN(H4DOTC)-9, PREPARATION TOOL, General Description.>



4) Connect the Subaru Select Monitor to data link connector.

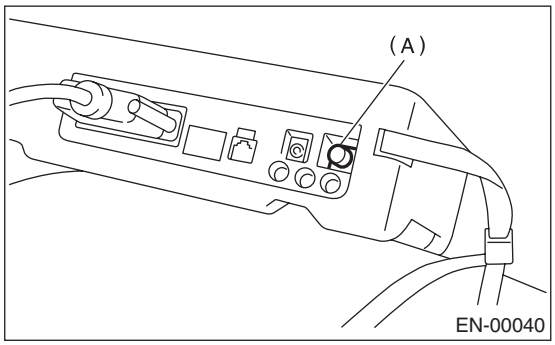
(1) The data link connector is located in the lower portion of the instrument panel (on the driver's side).



(2) Connect the diagnosis cable to data link connector.

CAUTION:
Do not connect scan tools other than the Subaru Select Monitor or OBD-II general scan tools.

5) Turn the ignition switch to ON (engine OFF) and Subaru Select Monitor switch to ON.



(A) Power switch

6) Using the Subaru Select Monitor, call up diagnostic trouble codes (DTC) and various data, then record them.

2. READ DIAGNOSTIC TROUBLE CODE (DTC) FOR ENGINE. (NORMAL MODE)

Refer to Read Diagnostic Trouble Code for information about how to indicate DTCs. <Ref. to EN(H4DOTC)-40, Read Diagnostic Trouble Code.>

3. READ DIAGNOSTIC TROUBLE CODE (DTC) FOR ENGINE. (OBD MODE)

Refer to Read Diagnostic Trouble Code for information about how to indicate DTCs. <Ref. to EN(H4DOTC)-40, Read Diagnostic Trouble Code.>

4. READ CURRENT DATA FOR ENGINE. (NORMAL MODE)

1) On the «Main Menu» display screen, select {Each System Check} and press the [YES] key.
2) On the «System Selection Menu» display screen, select {Engine Control System} and press the [YES] key.
3) Press the [YES] key after the engine type information is displayed.
4) On the «Engine Diagnosis» display screen, select {Current Data Display & Save} and press the [YES] key.
5) On the «Data Display Menu» display screen, select {Data Display} and press the [YES] key.
6) Using the scroll key, move the display screen up or down until the desired data is shown.
• A list of the support data is shown in the following table.

Contents	Display	Unit of measure
Battery voltage	Battery Voltage	V
Vehicle speed signal	Vehicle Speed	km/h or MPH
Engine speed signal	Engine Speed	rpm
Engine coolant temperature signal	Coolant Temp.	°C or °F
Ignition timing signal	Ignition Timing	deg
Throttle position signal	Throttle Opening Angle	%
Throttle position signal	Throttle Sensor Voltage	V
Injection pulse width	Fuel Injection #1 Pulse	ms
Idle air control signal	ISC Valve Duty Ratio	%
Fuel pump duty control signal	Fuel Pump Duty	%
A/F sensor current	A/F Sensor #1 Current	mA
A/F sensor resistance	A/F Sensor #1 Resistance	Ω
Front oxygen (A/F) sensor output signal	A/F Sensor #1	—
Rear oxygen sensor output signal	Rear O_2 Sensor	V
Short term fuel trim	A/F Correction #1	%
Knock sensor signal	Knocking Correction	deg
Atmospheric absolute pressure signal	Atmosphere Pressure	mmHg or kPa or inHg or psi
Intake manifold relative pressure signal	Mani. Relative Pressure	mmHg or kPa or inHg or psi
Intake manifold absolute pressure signal	Mani. Absolute Pressure	mmHg or kPa or inHg or psi
A/F correction (short term fuel trim) by rear oxygen sensor	A/F Correction #3	%
Long term fuel trim	A/F Learning #1	%
Front oxygen (A/F) sensor heater current	A/F Heater Current 1	A
Rear oxygen sensor heater voltage	Rear O_2 Heater Voltage	V
Canister purge control solenoid valve duty ratio	CPC Valve Duty Ratio	%
Primary supercharged pressure control signal	Primary Control	%
Tumble generator valve position sensor signal (RH)	TGV Position Sensor R	V
Tumble generator valve position sensor signal (LH)	TGV Position Sensor L	V
Tumble generator valve drive signal	TGV Drive	OPEN or CLOSED
Fuel level signal	Fuel Level	V
Intake air temperature signal	Intake Air Temp.	°C or °F
Learned ignition timing	Learned Ignition Timing	deg
Mass air flow sensor signal	Mass Air Flow	g/s
Mass air flow sensor signal	Air Flow Sensor Voltage	V
Fuel tank pressure sensor signal	Fuel Tank Pressure	mmHg or kPa or inHg or psi
Fuel temperature signal	Fuel Temp.	°C or °F
Exhaust temperature signal	Exhaust Gas Temperature	°C or °F
MT/AT identification signal	AT Vehicle ID Signal	ON or OFF
Fuel pressure control solenoid valve signal	PCV Solenoid Valve	ON or OFF

Contents	Display	Unit of measure
Drain valve signal	Vent. Solenoid Valve	ON or OFF
Fuel tank sensor control valve signal	Tank Sensor Cntl Valve	ON or OFF
Ignition switch signal	Ignition Switch	ON or OFF
Test mode connector signal	Test Mode Signal	ON or OFF
Neutral position switch signal	Neutral Position Switch	ON or OFF
Air conditioning switch signal	A/C Switch	ON or OFF
Air conditioning signal	A/C Compressor Signal	ON or OFF
Radiator main fan relay signal	Radiator Fan Relay #1	ON or OFF
Fuel pump relay signal	Fuel Pump Relay	ON or OFF
Knocking signal	Knocking Signal	ON or OFF
Radiator sub fan relay signal	Radiator Fan Relay #2	ON or OFF
Power steering switch signal	P/S Switch	ON or OFF
Engine torque control signal #1	Torque Control Signal #1	ON or OFF
Engine torque control signal #2	Torque Control Signal #2	ON or OFF
Engine torque control permission signal	Torque Permission Signal	ON or OFF
Rear oxygen sensor rich signal	Rear O_2 Rich Signal	ON or OFF
Starter switch signal	Starter Switch	ON or OFF
Idle switch signal	Idle Switch	ON or OFF
Crankshaft position sensor signal	Crankshaft Position Sig.	ON or OFF
Camshaft position sensor signal	Camshaft Position Sig.	ON or OFF
Rear defogger switch signal	Rear Defogger SW	ON or OFF
Blower fan switch signal	Blower Fan SW	ON or OFF
Small light switch signal	Light Switch	ON or OFF
Tumble generator valve output signal	TGV Output	ON or OFF
A/C middle pressure switch signal	A/C Mid Pressure Switch	ON or OFF

NOTE:
For detailed operation procedures, refer to the SUBARU SELECT MONITOR OPERATION MANUAL.

5. READ CURRENT DATA FOR ENGINE. (OBD MODE)

1) On the «Main Menu» display screen, select {Each System Check} and press the [YES] key.
2) On the «System Selection Menu» display screen, select {Engine Control System} and press the [YES] key.
3) Press the [YES] key after the engine type information is displayed.
4) On the «Engine Diagnosis» display screen, select {OBD System} and press the [YES] key.
5) On the «OBD Menu» display screen, select {Current Data Display & Save} and press the [YES] key.
6) On the «Data Display Menu» display screen, select {Data Display} and press the [YES] key.
7) Using the scroll key, move the display screen up or down until the desired data is shown.
• A list of the support data is shown in the following table.

Contents	Display	Unit of measure
Number of diagnostic trouble code	Number of Diagnosis Code	—
Malfunction indicator lamp status	MI (MIL)	Complete or incomplete
Monitoring test of misfire	Misfire monitoring	Complete or incomplete
Monitoring test of fuel system	Fuel system monitoring	Complete or incomplete
Monitoring test of comprehensive components	Component monitoring	Complete or incomplete
Test of catalytic converter	Catalyst Diagnosis	No support
Test of heated catalytic converter	Heated catalyst	No support
Test of evaporative emission purge control system	Evaporative purge system	No support
Test of secondary air system	Secondary air system	No support
Test of air conditioning system refrigerant	A/C system refrigerant	No support
Test of oxygen sensor	Oxygen sensor	Complete or incomplete
Test of oxygen sensor heater	O_2 Heater Diagnosis	Complete or incomplete
Test of EGR system	EGR system	No support
Air fuel ratio control system for bank 1	Fuel System for Bank 1	—
Engine load data	Calculated load value	%
Engine coolant temperature signal	Coolant Temp.	°C or °F
Short term fuel trim by front oxygen (A/F) sensor	Short term fuel trim B1	%
Long term fuel trim by front oxygen (A/F) sensor	Long term fuel trim B1	%
Intake manifold absolute pressure signal	Mani. Absolute Pressure	mmHg or kPa or inHg or psi
Engine speed signal	Engine Speed	rpm
Vehicle speed signal	Vehicle Speed	km/h or MPH
Ignition timing advance for #1 cylinder	Ignition timing adv. #1	°
Intake air temperature signal	Intake Air Temp.	°C or °F
Intake air amount	Mass Air Flow	g/s
Throttle position signal	Throttle Opening Angle	%
A/F sensor signal	A/F sensor	ON or OFF
Rear oxygen sensor output signal	Oxygen sensor #12	V
Air fuel ratio correction by rear oxygen sensor	Short term fuel trim #12	%
On-board diagnostic system	OBD System	—

NOTE:
For detailed operation procedures, refer to the SUBARU SELECT MONITOR OPERATION MANUAL.

6. READ FREEZE FRAME DATA FOR ENGINE. (OBD MODE)

1) On the «Main Menu» display screen, select {Each System Check} and press the [YES] key.
2) On the «System Selection Menu» display screen, select {Engine Control System} and press the [YES] key.
3) Press the [YES] key after the engine type information is displayed.
4) On the «Engine Diagnosis» display screen, select {OBD System} and press the [YES] key.
5) On the «OBD Menu» display screen, select {Freeze Frame Data} and press the [YES] key.
• A list of the support data is shown in the following table.

Contents	Display	Unit of measure
Diagnostic trouble code (DTC) for freeze frame data	Freeze frame data	DTC
Air fuel ratio control system for bank 1	Fuel system for Bank1	ON or OFF
Engine load data	Engine Load	%
Engine coolant temperature signal	Coolant Temp.	°C or °F
Short term fuel trim by front oxygen (A/F) sensor	Short term fuel trim B1	%
Long term fuel trim by front oxygen (A/F) sensor	Long term fuel trim B1	%
Intake manifold absolute pressure signal	Mani. Absolute Pressure	mmHg or kPa or inHg or psi
Engine speed signal	Engine Speed	rpm
Vehicle speed signal	Vehicle Speed	km/h or MPH

NOTE:
For detailed operation procedures, refer to the SUBARU SELECT MONITOR OPERATION MANUAL.

7. LED OPERATION MODE FOR ENGINE

1) On the «Main Menu» display screen, select {Each System Check} and press the [YES] key.
2) On the «System Selection Menu» display screen, select {Engine Control System} and press the [YES] key.
3) Press the [YES] key after the engine type information is displayed.
4) On the «Engine Diagnosis» display screen, select {Current Data Display & Save} and press the [YES] key.
5) On the «Data Display Menu» display screen, select {Data & LED Display} and press the [YES] key.
6) Using the scroll key, move the display screen up or down until the desired data is shown.
• A list of the support data is shown in the following table.

Contents	Display	Message	LED "ON" requirements
Ignition switch signal	Ignition Switch	ON or OFF	When ignition switch is turned ON.
Test mode connector signal	Test Mode Signal	ON or OFF	When test mode connector is connected.
Neutral position switch signal	Neutral SW	ON or OFF	When neutral position signal is entered.
Air conditioning switch signal	A/C SW	ON or OFF	When air conditioning switch is turned ON.
Air conditioning relay signal	A/C Relay	ON or OFF	When air conditioning relay is in function.
Radiator main fan relay signal	Radiator Fan Relay #1	ON or OFF	When radiator main fan relay is in function.
Knocking signal	Knocking Signal	ON or OFF	When knocking signal is entered.
Radiator sub fan relay signal	Radiator Fan Relay #2	ON or OFF	When radiator sub fan relay is in function.
Engine torque control signal #1	Torque Control Signal #1	ON or OFF	When engine torque control signal 1 is entered.
Engine torque control signal #2	Torque Control Signal #2	ON or OFF	When engine torque control signal 2 is entered.
Engine torque control permission signal	Torque Control Permit	ON or OFF	When engine torque control permission signal is entered.
Rear oxygen sensor rich signal	Rear O_2 Rich Signal	ON or OFF	When rear oxygen sensor mixture ratio is rich.
Starter switch signal	Starter Switch Signal	ON or OFF	When starter switch signal is entered.
Idle switch signal	Idle Switch Signal	ON or OFF	When idle switch signal is entered.
Crankshaft position sensor signal	Crankshaft Position Sig.	ON or OFF	When crankshaft position sensor signal is entered.
Camshaft position sensor signal	Camshaft Position Sig.	ON or OFF	When camshaft position sensor signal is entered.
Power steering switch signal	P/S SW	ON or OFF	When power steering switch signal is entered.
Rear defogger switch signal	Rear Defogger SW	ON or OFF	When rear defogger switch is turned ON.
Blower fan switch signal	Blower Fan SW	ON or OFF	When blower fan switch is turned ON.
Light switch signal	Light SW	ON or OFF	When small light switch is turned ON.
Tumble generator valve actuator signal	TGV Signal	ON or OFF	When TGV actuator signal is entered.
Tumble generator valve drive signal	TGV Drive	ON or OFF	When TGV moves and valve opens.
Fuel pressure control solenoid valve signal	PCV Solenoid Valve	ON or OFF	When fuel pressure control solenoid valve is in function.
Drain valve signal	Vent. Solenoid Valve	ON or OFF	When drain valve is in function.

NOTE:
For detailed operation procedures, refer to the SUBARU SELECT MONITOR OPERATION MANUAL.

8. READ CURRENT DATA FOR AT.

1) On the «Main Menu» display screen, select {Each System Check} and press the [YES] key.
2) On the «System Selection Menu» display screen, select the {Transmission Control System} and press the [YES] key.
3) Press the [YES] key after the transmission type information is displayed.
4) On the «Transmission Diagnosis» display screen, select {Current Data Display & Save} and press the [YES] key.
5) On the «Data Display Menu» display screen, select {Data Display} and press the [YES] key.
6) Using the scroll key, move the display screen up or down until the desired data is shown.
• A list of the support data is shown in the following table.

Contents	Display	Unit of measure
Battery voltage	Battery Voltage	V
Rear vehicle speed sensor signal	Rear Wheel Speed	km/h or MPH
Front vehicle speed sensor signal	Front Wheel Speed	km/h or MPH
Engine speed signal	Engine Speed	rpm
Automatic transmission fluid temperature signal	ATF Temp.	°C or °F
Mass air flow sensor signal	Air Flow Sensor Voltage	V
Throttle position signal	Throttle Sensor Voltage	V
Gear position	Gear Position	—
Line pressure control duty ratio	Line Pressure Duty Ratio	%
Lockup clutch control duty ratio	Lock Up Duty Ratio	%
Transfer clutch control duty ratio	Transfer Duty Ratio	%
Power supply for throttle position sensor	Throttle Sensor Power	V
Torque converter turbine speed signal	Turbine Revolution Speed	rpm
2-4 brake timing pressure control duty ratio	Brake Clutch Duty Ratio	%
Stop light switch signal	Stop Light Switch	ON or OFF
Antilock brake system signal	ABS Signal	ON or OFF
Cruise control system signal	Cruise Control Signal	ON or OFF
Neutral/Parking range signal	N/P Range Signal	ON or OFF
Reverse range signal	R Range Signal	ON or OFF
Drive range signal	D Range Signal	ON or OFF
3rd range signal	3rd Range Signal	ON or OFF
2nd range signal	2nd Range Signal	ON or OFF
1st range signal	1st Range Signal	ON or OFF
Shift control solenoid A	Shift Solenoid #1	ON or OFF
Shift control solenoid B	Shift Solenoid #2	ON or OFF
Torque control output signal #1	Torque Control Signal #1	ON or OFF
Torque control output signal #2	Torque Control Signal #2	ON or OFF
Torque control cut signal	Torque Control Cut Sig.	ON or OFF
2-4 brake timing control solenoid valve	2-4 Brake Timing Sol.	ON or OFF
Low clutch timing control solenoid valve	Low Clutch Timing Sol.	ON or OFF
Automatic transmission diagnosis indicator lamp	Diagnosis Lamp	ON or OFF

NOTE:
For detailed operation procedures, refer to the SUBARU SELECT MONITOR OPERATION MANUAL.

11. Read Diagnostic Trouble Code

A: OPERATION

1. SUBARU SELECT MONITOR (NORMAL MODE)

1) On the «Main Menu» display screen, select {Each System Check} and press the [YES] key.
2) On the «System Selection Menu» display screen, select {Engine Control System} and press the [YES] key.
3) Press the [YES] key after the engine type information is displayed.
4) On the «Engine Diagnosis» display screen, select {Diagnostic Code(s) Display} and press the [YES] key.
5) On the «Diagnostic Code(s) Display» display screen, select {Current Diagnostic Code(s)} or {History Diagnostic Code(s)} and press the [YES] key.

NOTE:
• For detailed operation procedures, refer to the SUBARU SELECT MONITOR OPERATION MANUAL.
• For details concerning diagnostic trouble codes (DTCs), refer to the List of Diagnostic Trouble Codes (DTC). <Ref. to EN(H4DOTC)-81, List of Diagnostic Trouble Codes (DTC).>

2. SUBARU SELECT MONITOR (OBD MODE)

1) On the «Main Menu» display screen, select {2. Each System Check} and press the [YES] key.
2) On the «System Selection Menu» display screen, select {Engine Control System} and press the [YES] key.
3) Press the [YES] key after the engine type information is displayed.
4) On the «Engine Diagnosis» display screen, select {OBD System} and press the [YES] key.
5) On the «OBD Menu» display screen, select {Diagnosis Code(s) Display} and press the [YES] key.
6) Make sure that a diagnostic trouble code (DTC) is shown on the display screen.

NOTE:
• For detailed operation procedures, refer to the SUBARU SELECT MONITOR OPERATION MANUAL.
• For details concerning diagnostic trouble codes (DTCs), refer to the List of Diagnostic Trouble Codes (DTC). <Ref. to EN(H4DOTC)-81, List of Diagnostic Trouble Codes (DTC).>

3. OBD-II GENERAL SCAN TOOL

Refers to data denoting emission-related power train diagnostic trouble codes (DTC).
For details concerning diagnostic trouble codes (DTCs), refer to the List of Diagnostic Trouble Codes (DTC). <Ref. to EN(H4DOTC)-81, List of Diagnostic Trouble Codes (DTC).>

NOTE:
Refer to OBD-II general scan tool manufacturer's instruction manual to access emission-related power train diagnostic trouble codes (DTC) (MODE $03).

12.Inspection Mode

A: OPERATION

Carry out trouble diagnosis shown in the following DTC table.
When performing trouble diagnosis which is not shown in the DTC table, refer to the next item Drive Cycle. <Ref. to EN(H4DOTC)-47, Drive Cycle.>

DTC No.	Designation	Condition
P0030	HO2S Heater Control Circuit (Bank 1 Sensor 1)	—
P0031	HO2S Heater Control Circuit Low (Bank 1 Sensor 1)	—
P0032	HO2S Heater Control Circuit High (Bank 1 Sensor 1)	—
P0037	HO2S Heater Control Circuit Low (Bank 1 Sensor 2)	—
P0038	HO2S Heater Control Circuit High (Bank 1 Sensor 2)	—
P0068	Manifold Absolute Pressure/Barometric Pressure Circuit Range/Performance	—
P0102	Mass or Volume Air Flow Circuit Low Input	—
P0103	Mass or Volume Air Flow Circuit High Input	—
P0107	Manifold Absolute Pressure/Barometric Pressure Circuit Low Input	—
P0108	Manifold Absolute Pressure/Barometric Pressure Circuit High Input	—
P0112	Intake Air Temperature Circuit Low Input	—
P0113	Intake Air Temperature Circuit High Input	—
P0117	Engine Coolant Temperature Circuit Low Input	—
P0118	Engine Coolant Temperature Circuit High Input	—
P0122	Throttle/Pedal Position Sensor/Switch “A” Circuit Low Input	—
P0123	Throttle/Pedal Position Sensor/Switch “A” Circuit High Input	—
P0129	Atmospheric Pressure Sensor Circuit Range/Performance	—
P0130	O_2 Sensor Circuit (Bank 1 Sensor 1)	—
P0134	O_2 Sensor Circuit No ACTIvity Detected (Bank 1 Sensor 1)	—
P0137	O_2 Sensor Circuit Low Voltage (Bank 1 Sensor 2)	—
P0138	O_2 Sensor Circuit High Voltage (Bank 1 Sensor 2)	—
P0171	System too Lean (Bank 1)	—
P0172	System too Rich (Bank 1)	—
P0182	Fuel Temperature Sensor “A” Circuit Low Input	—
P0183	Fuel Temperature Sensor “A” Circuit High Input	—
P0230	Fuel Pump Primary Circuit	—
P0245	Turbo/Super Charger Wastegate Solenoid “A” Low	—
P0246	Turbo/Super Charger Wastegate Solenoid “A” High	—
P0327	Knock Sensor 1 Circuit Low Input (Bank 1 or Single Sensor)	—
P0328	Knock Sensor 1 Circuit High Input (Bank 1 or Single Sensor)	—
P0335	Crankshaft Position Sensor “A” Circuit	—
P0336	Crankshaft Position Sensor “A” Circuit Range/Performance	—
P0340	Camshaft Position Sensor “A” Circuit (Bank 1 or Single Sensor)	—
P0341	Camshaft Position Sensor “A” Circuit Range/Performance (Bank 1 or Single Sensor)	—
P0447	Evaporative Emission Control System Vent Control Circuit Open	—
P0448	Evaporative Emission Control System Vent Control Circuit Shorted	—
P0452	Evaporative Emission Control System Pressure Sensor Low Input	—
P0453	Evaporative Emission Control System Pressure Sensor High Input	—
P0458	Evaporative Emission Control System Purge Control Valve Circuit Low	—
P0459	Evaporative Emission Control System Purge Control Valve Circuit High	—
P0462	Fuel Level Sensor Circuit Low Input	—
P0463	Fuel Level Sensor Circuit High Input	—
P0502	Vehicle Speed Sensor Circuit Low Input	—
P0503	Vehicle Speed Sensor Intermittent/Erratic/High	—

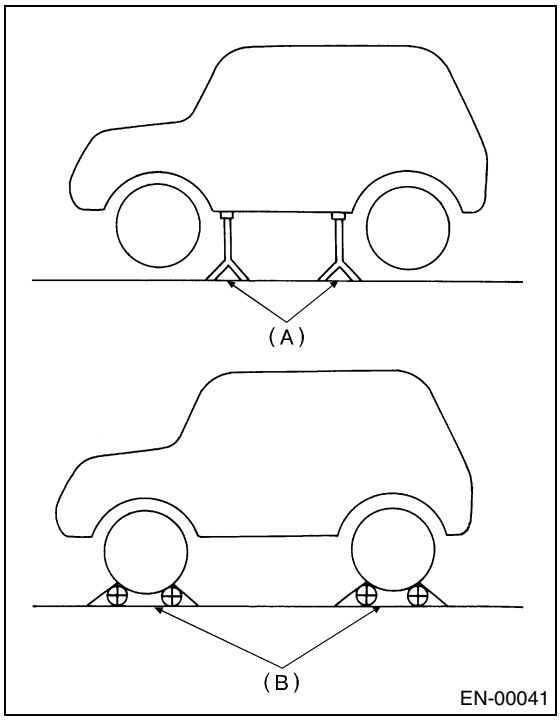
DTC No.	Designation	Condition
P0508	Idle Control System Circuit Low	—
P0509	Idle Control System Circuit High	—
P0512	Starter Switch Circuit High Input	—
P0519	Idle Control System Malfunction (Fail-safe)	—
P0567	Cruise Control Set Signal Circuit Malfunction for AT	—
P0604	Internal Control Module Random Access Memory (RAM) Error	—
P0691	Cooling Fan 1 Control Circuit Low	—
P0692	Cooling Fan 1 Control Circuit High	—
P0703	Torque Converter/Brake Switch “B” Circuit	—
P0705	Transmission Range Sensor Circuit (PRNDL Input)	—
P0710	Transmission Fluid Temperature Sensor Circuit	—
P0716	Input/Turbine Speed Sensor Circuit	—
P0720	Output Speed Sensor Circuit	—
P0725	Engine Speed Input Circuit	—
P0731	Gear 1 Incorrect Ratio	—
P0732	Gear 2 Incorrect Ratio	—
P0733	Gear 3 Incorrect Ratio	—
P0734	Gear 4 Incorrect Ratio	—
P0741	Torque Converter Clutch Circuit Performance or Stuck Off	—
P0743	Torque Converter Clutch Circuit Electrical	—
P0748	Pressure Control Solenoid “A” Electrical	—
P0753	Shift Solenoid “A” Electrical	—
P0758	Shift Solenoid “B” Electrical	—
P0771	AT Low Clutch Timing Solenoid Valve Circuit Malfunction	—
P0778	Pressure Control Solenoid “B” Electrical	—
P0785	Shift/Timing Solenoid	—
P0851	Neutral Switch Input Circuit Low	—
P0852	Neutral Switch Input Circuit High	—
P0864	TCM Communication Circuit Range/Performance	—
P0865	TCM Communication Circuit Low	—
P0866	TCM Communication Circuit High	—
P1086	Tumble Generated Valve Position Sensor 2 Circuit Low	—
P1087	Tumble Generated Valve Position Sensor 2 Circuit High	—
P1088	Tumble Generated Valve Position Sensor 1 Circuit Low	—
P1089	Tumble Generated Valve Position Sensor 1 Circuit High	—
P1090	Tumble Generated Valve System 1 (Valve Open)	Coolant temperature at start: −0.63 — 60°C (30.9 — 140°F).
P1091	Tumble Generated Valve System 1 (Valve Close)	—
P1092	Tumble Generated Valve System 2 (Valve Open)	Coolant temperature at start: −0.63 — 60°C (30.9 — 140°F).
P1093	Tumble Generated Valve System 2 (Valve Close)	—
P1094	Tumble Generated Valve Signal 1 Circuit Malfunction (Open)	—
P1095	Tumble Generated Valve Signal 1 Circuit Malfunction (Short)	—
P1096	Tumble Generated Valve Signal 2 Circuit Malfunction (Open)	—
P1097	Tumble Generated Valve Signal 2 Circuit Malfunction (Short)	—
P1110	Atmospheric Pressure sensor circuit malfunction (Low input)	—
P1111	Atmospheric Pressure sensor circuit malfunction (High input)	—
P1134	A/F sensor Micro-computer problem	—
P1152	O_2 Sensor Circuit Range/Performance (Low) (Bank1 Sensor1)	—
P1153	O_2 Sensor Circuit Range/Performance (High) (Bank1 Sensor1)	—
P1400	Fuel Tank Pressure Control Solenoid Valve Circuit Low	—

DTC No.	Designation	Condition
P1420	Fuel Tank Pressure Control Sol. Valve Circuit High	—
P1446	Fuel Tank Sensor Control Valve Circuit Low	—
P1447	Fuel Tank Sensor Control Valve Circuit High	—
P1518	Starter Switch Circuit Low Input	—
P1540	Vehicle Speed Sensor Malfunction at Low Speed	—
P1560	Back-up Voltage Circuit Malfunction	—
P1698	Engine Torque Control Cut Signal Circuit Malfunction (Low Input)	—
P1699	Engine Torque Control Cut Signal Circuit Malfunction (High Input)	—
P1700	Throttle Position Sensor Circuit Malfunction for AT	—
P1711	Engine Torque Control Signal #1 Circuit Malfunction	—
P1712	Engine Torque Control Signal #2 Circuit Malfunction	—

1. PREPARATION FOR THE INSPECTION MODE

1) Make sure that the fuel remains approx. half amount [20 — 40 ℓ (5.3 — 10.6 US gal, 4.4 — 8.8 Imp gal)], and battery voltage is 12V or more.
2) Raise the vehicle using a garage jack and place on safety stands, or drive the vehicle onto free rollers.

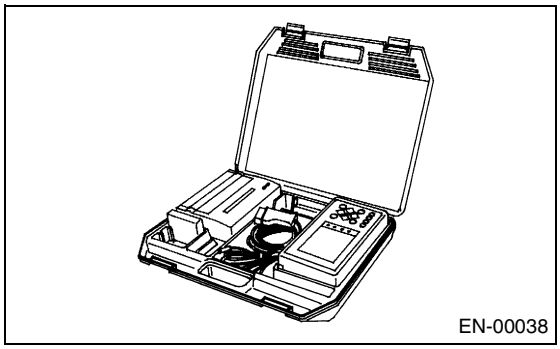
WARNING:
• Before raising the vehicle, ensure the parking brake is applied.
• Do not use a pantograph jack in place of a safety stand.
• Secure a rope or wire to the front and rear towing or tie-down hooks to prevent lateral runout of front wheels.
• Do not abruptly depress/release the clutch pedal or accelerator pedal during works even when engine is operating at low speeds since this may cause vehicle to jump off free rollers.
• In order to prevent the vehicle from slipping due to vibration, do not place any wooden blocks or similar items between the safety stands and the vehicle.
• Since the rear wheels will also rotate, do not place anything near them. Also, make sure that nobody goes in front of the vehicle.



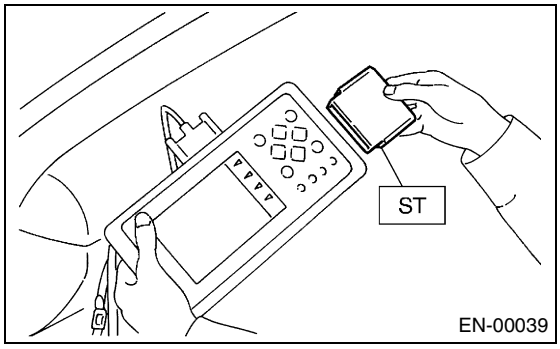
(A) Safety stand
(B) Free rollers

2. SUBARU SELECT MONITOR

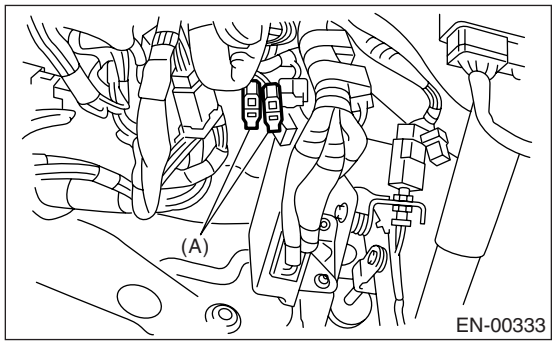
1) After performing the diagnostics and clearing the memory, check for any remaining unsolved trouble data. <Ref. to EN(H4DOTC)-49, Clear Memory Mode.>
2) Warm up the engine.
3) Prepare the Subaru Select Monitor kit. <Ref. to EN(H4DOTC)-9, PREPARATION TOOL, General Description.>



4) Connect the diagnosis cable to Subaru Select Monitor.
5) Insert the cartridge into Subaru Select Monitor. <Ref. to EN(H4DOTC)-9, PREPARATION TOOL, General Description.>



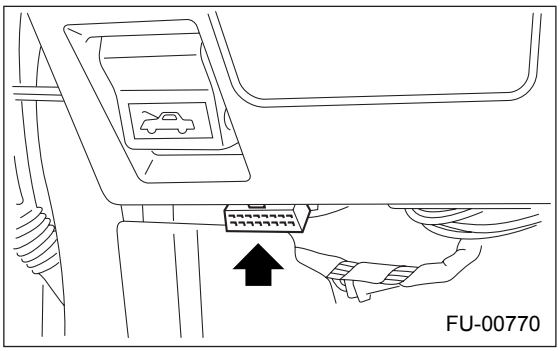
6) Connect the test mode connector (A) at the lower portion of the instrument panel (on the driver's side).



(A) Test mode connector

7) Connect the Subaru Select Monitor to data link connector.

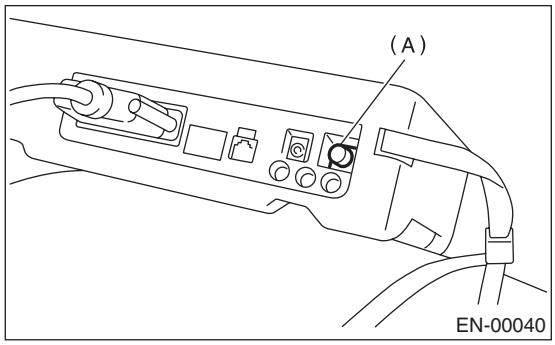
(1) Connect the Subaru Select Monitor to data link connector located at the lower portion of the instrument panel (on the driver's side).



(2) Connect the diagnosis cable to data link connector.

CAUTION:
Do not connect scan tools other than the Subaru Select Monitor or OBD-II general scan tools.

8) Turn the ignition switch to ON (engine OFF) and Subaru Select Monitor switch to ON.



(A) Power switch

9) On the «Main Menu» display screen, select {2. Each System Check} and press the [YES] key.
10) On the «System Selection Menu» display screen, select {Engine Control System} and press the [YES] key.
11) Press the [YES] key after the engine type information is displayed.
12) On the «Engine Diagnosis» display screen, select {Dealer Check Mode Procedure} and press the [YES] key.
13) When "Perform Inspection (Dealer Check) Mode?" is shown on the display screen, press the [YES] key.
14) Perform subsequent procedures as instructed on the display screen.

- If a trouble still remains in the memory, the corresponding diagnostic trouble code (DTC) appears on the display screen.

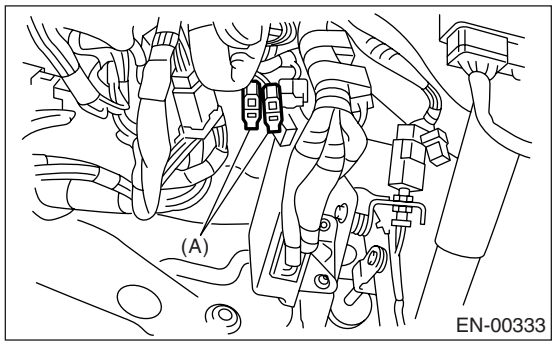
NOTE:
- For detailed operation procedures, refer to the SUBARU SELECT MONITOR OPERATION MANUAL.
- For details concerning diagnostic trouble codes (DTC), refer to the List of Diagnostic Trouble Codes (DTC).

<Ref. to EN(H4DOTC)-81, List of Diagnostic Trouble Codes (DTC).>

- Release the parking brake.
- The speed difference between front and rear wheels may cause the ABS warning light to turn on, but this does not indicate a malfunction. When the engine control diagnosis is finished, perform the ABS memory clearance procedure of self-diagnosis system.

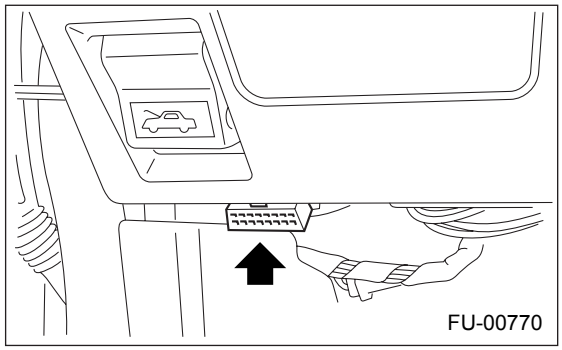
3. OBD-II GENERAL SCAN TOOL

1) After performing the diagnostics and clearing the memory, check for any remaining unsolved trouble data. <Ref. to EN(H4DOTC)-49, Clear Memory Mode.>
2) Warm up the engine.
3) Connect the test mode connector (A) at the lower portion of the instrument panel (on the driver's side).



4) Connect the OBD-II general scan tool to the data link connector located at the lower portion of the instrument panel (on the driver's side).

CAUTION:
Do not connect scan tools other than the Subaru Select Monitor or OBD-II general scan tools.



5) Start the engine.

NOTE:
• Ensure the selector lever is placed in P position before starting. (AT vehicles)
• Depress the clutch pedal when starting the engine. (MT vehicles)

6) Using the selector lever or shift lever, turn the “P” position switch and “N” position switch to ON.
7) Depress the brake pedal to turn brake switch ON. (AT vehicles)
8) Keep the engine speed in 2,500 — 3,000 rpm range for 40 seconds.
9) Place the selector lever or shift lever in D position (AT vehicles) or 1st gear (MT vehicles) and drive the vehicle at 5 to 10 km/h (3 to 6 MPH).

NOTE:
• On AWD vehicles, release the parking brake.
• The speed difference between front and rear wheels may cause the ABS warning light to turn on, but this does not indicate a malfunction. When the engine control diagnosis is finished, perform the ABS memory clearance procedure of self-diagnosis system.

10) Using the OBD-II general scan tool, check for diagnostic trouble code(s) (DTC(s)) and record the result(s).

NOTE:
• For detailed operation procedures, refer to the OBD-II General Scan Tool Instruction Manual.
• For details concerning diagnostic trouble codes (DTC), refer to the List of Diagnostic Trouble Codes (DTC).
<Ref. to EN(H4DOTC)-81, List of Diagnostic Trouble Codes (DTC).>

13.Drive Cycle

A: OPERATION

There are three drive patterns for trouble diagnosis. Driving in the specified pattern allows to diagnose malfunctioning items listed below. After the malfunctioning items listed below are repaired, always check whether they correctly resume their functions by driving in the required drive pattern.

1. PREPARATION FOR THE DRIVE CYCLE

1) Make sure that the fuel remains approx. half amount [20 — 40 ℓ (5.3 — 10.6 US gal, 4.4 — 8.8 Imp gal)], and battery voltage is 12 V or more.
2) After performing the diagnostics and clearing the memory, check for any remaining unsolved trouble data. <Ref. to EN(H4DOTC)-49, Clear Memory Mode.>
3) Separate the test mode connector.

NOTE:
• Except for when the water temperature at starting is specified, diagnoses should always be carried out after the engine is warmed up.
• DTCs marked with * must be diagnosed twice; after the first diagnosis is finished, stop the engine and carry out the second time under same conditions.

2. DRIVE AT 80 KM/H (50 MPH) FOR 20 MINUTES AND THEN IDLE THE ENGINE FOR 1 MINUTE.

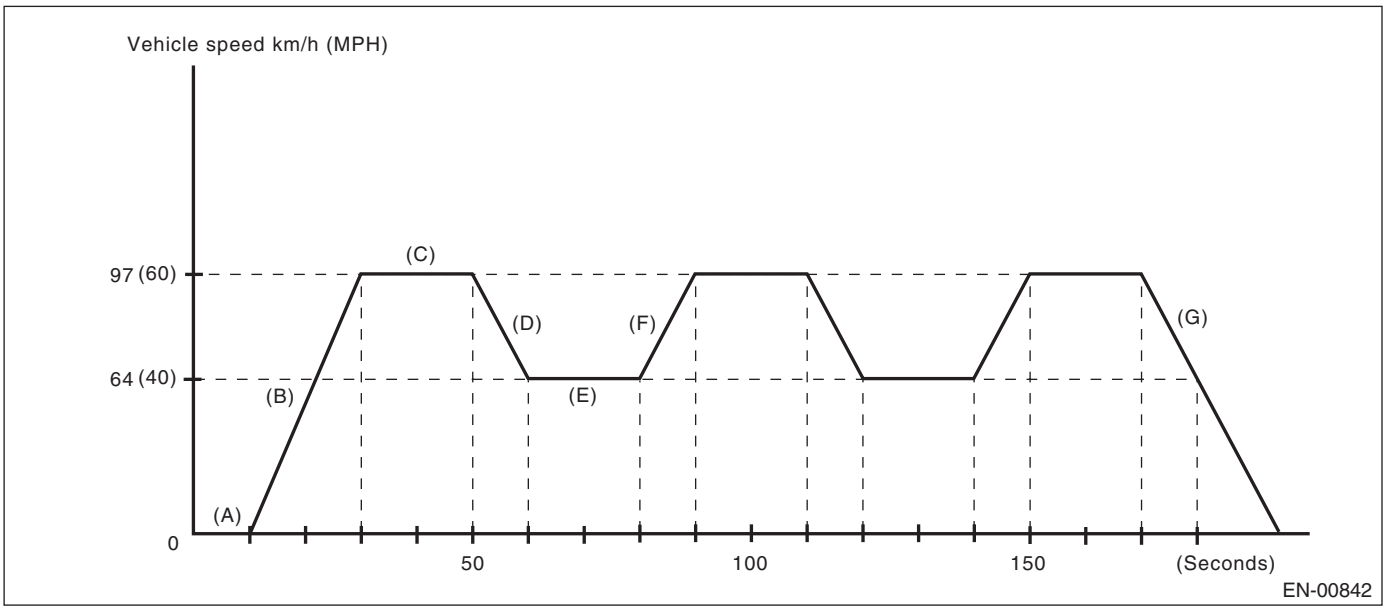
DTC No.	Description	Condition
*P0111	Intake Air Temperature Circuit Range/Performance	Coolant temperature at start lower than 30°C (86°F)
*P0125	Insufficient Coolant Temperature for Closed Loop Fuel Control	Coolant temperature at start lower than 20°C (68°F)
*P0128	Coolant Thermostat (Coolant Temperature Below Thermostat Regulating Temperature)	Coolant temperature at start lower than 55°C (131°F)
*P0130	O_2 Sensor Circuit (Bank 1 Sensor 1)	—
*P0133	O_2 Sensor Circuit Slow Response (Bank 1 Sensor 1)	—
*P0181	Fuel Temperature Sensor “A” Circuit Range/Performance	—
*P0420	Catalytist System Efficiency Below Threshold (Bank 1)	—
*P0442	Evaporative Emission Control System Leak Detected (small leak)	—
*P0451	Evaporative Emission Control System Pressure Sensor Range/Performance	—
*P0456	Evaporative Emission Control System Leak Detected (very small leak)	—
*P0457	Evaporative Emission Control System Leak Detected (fuel cap loose/off)	—
P0461	Fuel Level Sensor Performance Problem (Travel Distance)	—
*P0464	Fuel Level Sensor Circuit Intermittent	—
P0545	Exhaust Gas Temperature Sensor Circuit Low-Bank1	—
P0546	Exhaust Gas Temperature Sensor Circuit High-Bank1	—
P1312	Exhaust Gas Temperature Sensor Malfunction	Coolant temperature at start lower than 40°C (104°F)
P1443	Vent Control Solenoid Valve Function Problem	—
*P1448	Fuel Tank Sensor Control Valve Range/Performance	—

3. IDLE FOR 10 MINUTES

NOTE:
Before the diagnosis, drive the vehicle at 10 km/h (6 MPH) or more.

DTC No.	Description	Condition
*P0483	Cooling Fan Rationality Check	—
*P0506	Idle control system RPM lower than expected	—
*P0507	Idle control system RPM higher than expected	—

4. DRIVE ACCORDING TO THE FOLLOWING DRIVE PATTERN



(A) Idle engine for more than 10 seconds.
(B) Accelerate to 97 km/h (60 MPH) within 20 seconds.
(C) Drive vehicle at 97 km/h (60 MPH) for 20 seconds.
(D) Decelerate with fully closed throttle to 64 km/h (40 MPH).
(E) Drive vehicle at 64 km/h (40 MPH) for 20 seconds.
(F) Accelerate to 97 km/h (60 MPH) within 10 seconds.
(G) Stop vehicle with throttle fully closed.

DTC No.	Description	Condition
*P0121	Throttle/Pedal Position Sensor/Switch “A” Circuit Range/Performance	—
*P0139	O_2 Sensor Circuit Slow Response (Bank 1 Sensor 2)	—
*P0301	Cylinder 1 Misfire Detected	Diagnosis may be performed only once.
*P0302	Cylinder 2 Misfire Detected	Diagnosis may be performed only once.
*P0303	Cylinder 3 Misfire Detected	Diagnosis may be performed only once.
*P0304	Cylinder 4 Misfire Detected	Diagnosis may be performed only once.
*P0101	Mass or Volume Air Flow Circuit Range/Performance	—
P0244	Turbo/Super Charger Wastegate Solenoid “A” Range/Performance	—
P1301	Misfire Ditected (High Temperature Exhaust Gas)	—
P1544	Exhaust Gas Temperature Too High	—

14.Clear Memory Mode

A: OPERATION

1. SUBARU SELECT MONITOR (NORMAL MODE)

1) On the «Main Menu» display screen, select {2. Each System Check} and press the [YES] key.
2) On the «System Selection Menu» display screen, select {Engine Control System} and press the [YES] key.
3) Press the [YES] key after the engine type information is displayed.
4) On the «Engine Diagnosis» display screen, select {Clear Memory} and press the [YES] key.
5) When “Done” and “Turn Ignition Switch OFF” are shown on the display screen, turn the Subaru Select Monitor and ignition switch to OFF.

NOTE:
• For detailed operation procedures, refer to the SUBARU SELECT MONITOR OPERATION MANUAL.

2. SUBARU SELECT MONITOR (OBD MODE)

1) On the «Main Menu» display screen, select {2. Each System Check} and press the [YES] key.
2) On the «System Selection Menu» display screen, select {Engine Control System} and press the [YES] key.
3) Press the [YES] key after the engine type information is displayed.
4) On the «Engine Diagnosis» display screen, select {OBD System} and press the [YES] key.
5) On the «OBD Menu» display screen, select {4. Diagnosis Code(s) Cleared} and press the [YES] key.
6) When “Clear Diagnostic Code?” is shown on the display screen, press the [YES] key.
7) Turn the Subaru Select Monitor and ignition switch to OFF.

NOTE:
• For detailed operation procedures, refer to the SUBARU SELECT MONITOR OPERATION MANUAL.

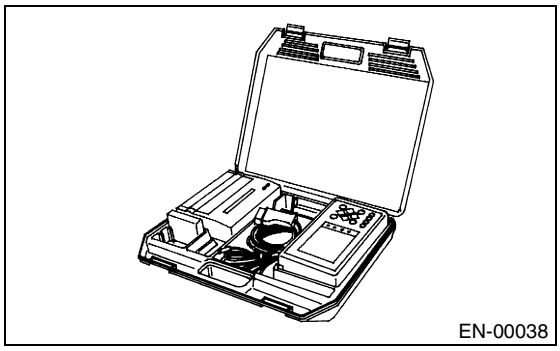
3. OBD-II GENERAL SCAN TOOL

For clear memory procedures using the OBD-II general scan tool, refer to the OBD-II General Scan Tool Instruction Manual.

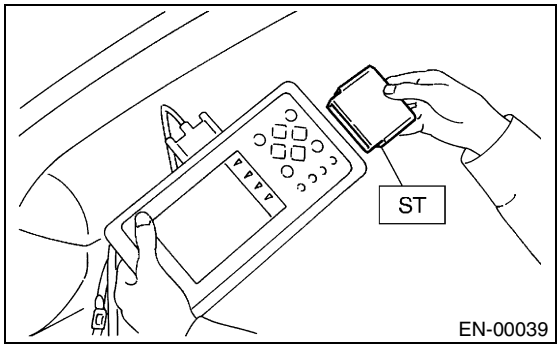
15. Compulsory Valve Operation Check Mode

A: OPERATION

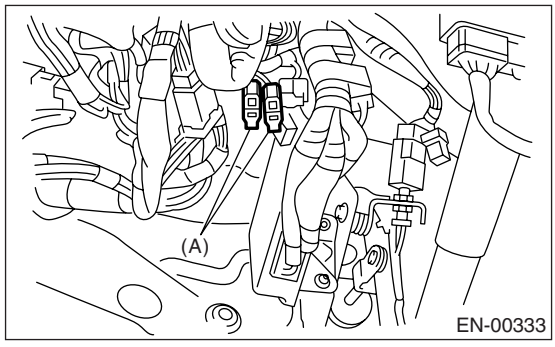
1) Prepare the Subaru Select Monitor kit. <Ref. to EN(H4DOTC)-9, PREPARATION TOOL, General Description.>



2) Connect the diagnosis cable to Subaru Select Monitor.
3) Insert the cartridge into Subaru Select Monitor. <Ref. to EN(H4DOTC)-9, PREPARATION TOOL, General Description.>

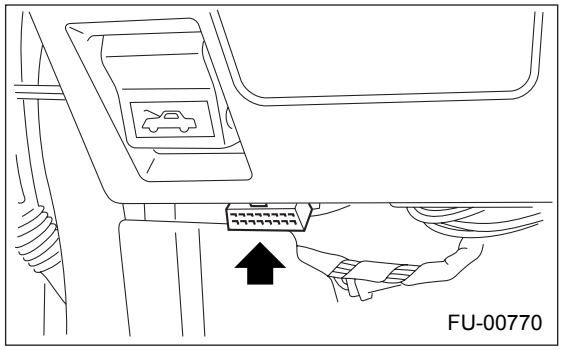


4) Connect the test mode connector (A) at the lower portion of the instrument panel (on the driver's side).



5) Connect the Subaru Select Monitor to data link connector.

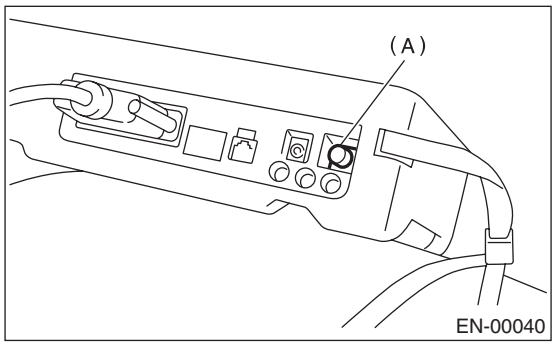
(1) Connect the Subaru Select Monitor to data link connector located at the lower portion of the instrument panel (on the driver's side).



(2) Connect the diagnosis cable to data link connector.

CAUTION:
Do not connect scan tools other than the Subaru Select Monitor or OBD-II general scan tools.

6) Turn the ignition switch to ON (engine OFF) and Subaru Select Monitor switch to ON.



(A) Power switch

7) On the «Main Menu» display screen, select {2. Each System Check} and press the [YES] key.
8) On the «System Selection Menu» display screen, select {Engine Control System} and press the [YES] key.
9) Press the [YES] key after the engine type information is displayed.
10) On the «Engine Diagnosis» display screen, select {System Operation Check Mode} and press the [YES] key.
11) On the «System Operation Check Mode» display screen, select {Actuator ON/OFF Operation} and press the [YES] key.
12) Select the desired compulsory actuator on the «Actuator ON/OFF Operation» display screen and press the [YES] key.

13) Pressing the [NO] key completes the compulsory operation check mode. The display will then return to the «Actuator ON/OFF Operation» screen.

• A list of the support data is shown in the following table.

Contents	Display
Compulsory fuel pump relay operation check	Fuel Pump Relay
Compulsory radiator fan relay operation check	Radiator Fan Relay
Compulsory air conditioning relay operation check	A/C Compressor Relay
Compulsory purge control solenoid valve operation check	CPC Solenoid Valve
Compulsory pressure control solenoid valve operation check	PCV Solenoid Valve
Compulsory drain valve operation check.	Vent Control Solenoid Valve
Compulsory fuel tank sensor control valve operation check	Fuel Tank Sensor Control Valve

NOTE:
• The following parts will be displayed but not functional because they are not installed on the vehicle.

Display
EGR Solenoid Valve
ASV Solenoid Valve
FICD Solenoid
Pressure Switching Sol. 1
Pressure Switching Sol. 2
AAI Solenoid Valve

• For detailed operation procedures, refer to the SUBARU SELECT MONITOR OPERATION MANUAL.

16.Engine Malfunction Indicator Lamp (MIL)

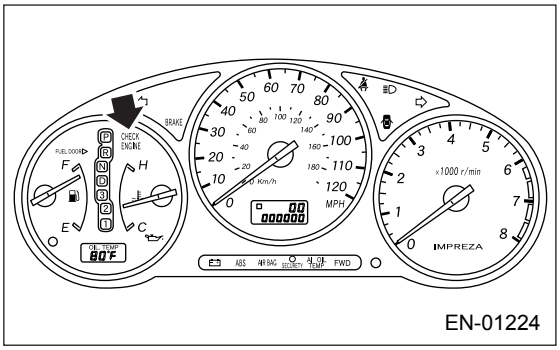
A: PROCEDURE

1. Activation of CHECK ENGINE Malfunction Indicator Lamp (MIL) <Ref. to EN(H4DOTC)-52, ACTIVATION OF CHECK ENGINE MALFUNCTION INDICATOR LAMP (MIL), Engine Malfunction Indicator Lamp (MIL).>
↓
2. Check whether the CHECK ENGINE Malfunction Indicator Lamp (MIL) does not come on. <Ref. to EN(H4DOTC)-53, CHECK ENGINE MALFUNCTION INDICATOR LAMP (MIL) DOES NOT COME ON., Engine Malfunction Indicator Lamp (MIL).>
↓
3. Check whether the CHECK ENGINE Malfunction Indicator Lamp (MIL) does not turn off. <Ref. to EN(H4DOTC)-55, CHECK ENGINE MALFUNCTION INDICATOR LAMP (MIL) DOES NOT TURN OFF., Engine Malfunction Indicator Lamp (MIL).>
↓
4. Check whether the CHECK ENGINE malfunction indicator lamp (MIL) does not blink at a cycle of 3 Hz. <Ref. to EN(H4DOTC)-56, CHECK ENGINE MALFUNCTION INDICATOR LAMP (MIL) DOES NOT BLINK AT A CYCLE OF 3 HZ., Engine Malfunction Indicator Lamp (MIL).>
↓
5. Check whether the CHECK ENGINE malfunction indicator lamp (MIL) remains blinking at a cycle of 3 Hz. <Ref. to EN(H4DOTC)-58, CHECK ENGINE MALFUNCTION INDICATOR LAMP (MIL) REMAINS BLINKING AT A CYCLE OF 3 HZ., Engine Malfunction Indicator Lamp (MIL).>

B: ACTIVATION OF CHECK ENGINE MALFUNCTION INDICATOR LAMP (MIL)

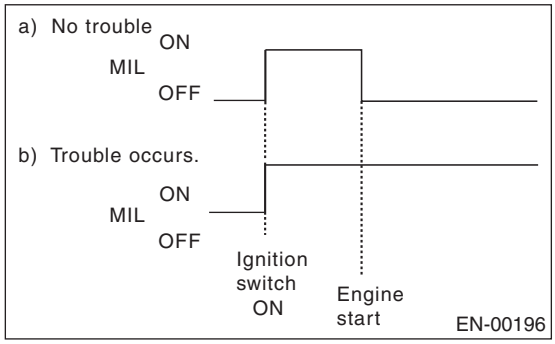
1) When the ignition switch is turned to ON (engine off), the CHECK ENGINE malfunction indicator lamp (MIL) in the combination meter illuminates.

NOTE:
If the MIL does not illuminate, perform diagnostics of the CHECK ENGINE light circuit or the combination meter circuit. <Ref. to EN(H4DOTC)-53, CHECK ENGINE MALFUNCTION INDICATOR LAMP (MIL) DOES NOT COME ON., Engine Malfunction Indicator Lamp (MIL).>

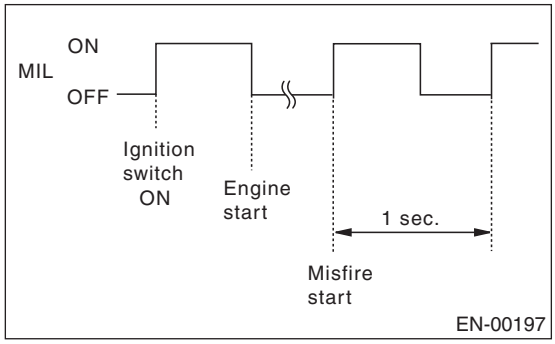


(A) CHECK ENGINE malfunction indicator lamp (MIL)

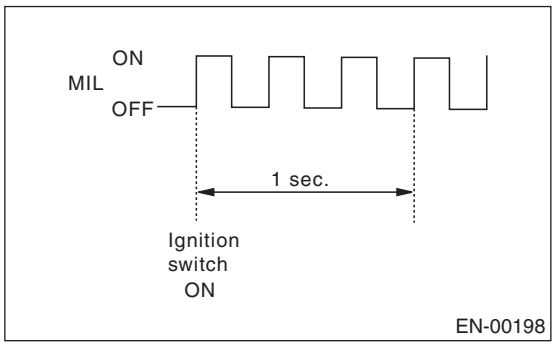
2) After starting the engine, the MIL goes out. If it does not, either the engine or the emission control system is malfunctioning.



3) If the diagnosis system senses a misfire which could damage the catalytic converter, the MIL will blink at a cycle of 1 Hz.



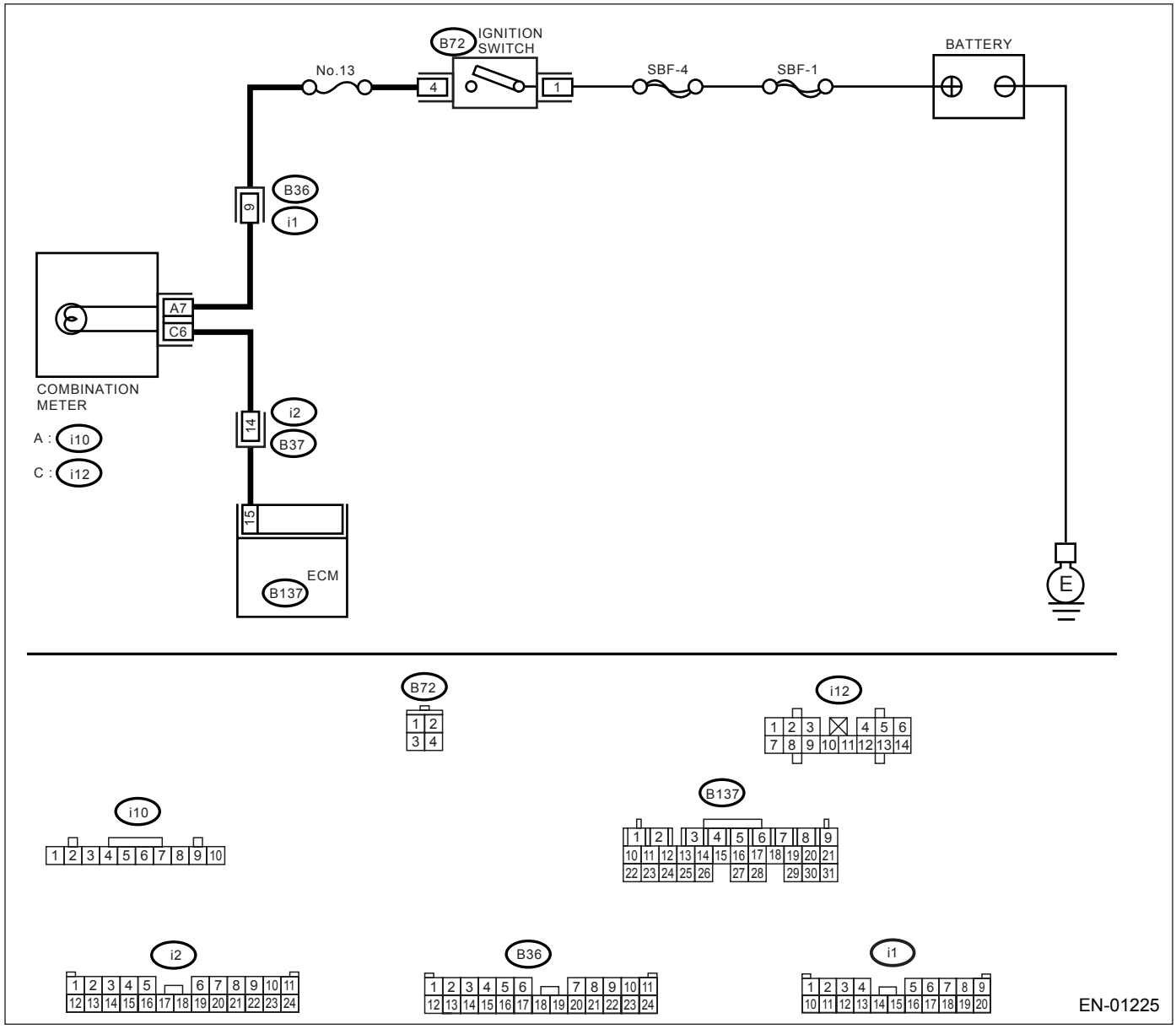
4) When the ignition switch is turned to ON (engine off) or to START with the test mode connector connected, the MIL blinks at a cycle of 3 Hz.



C: CHECK ENGINE MALFUNCTION INDICATOR LAMP (MIL) DOES NOT COME ON.

- **DIAGNOSIS:**
  - The CHECK ENGINE malfunction indicator lamp (MIL) circuit is open or shorted.
- **TROUBLE SYMPTOM:**
  - When the ignition switch is turned ON (engine OFF), MIL does not come on.

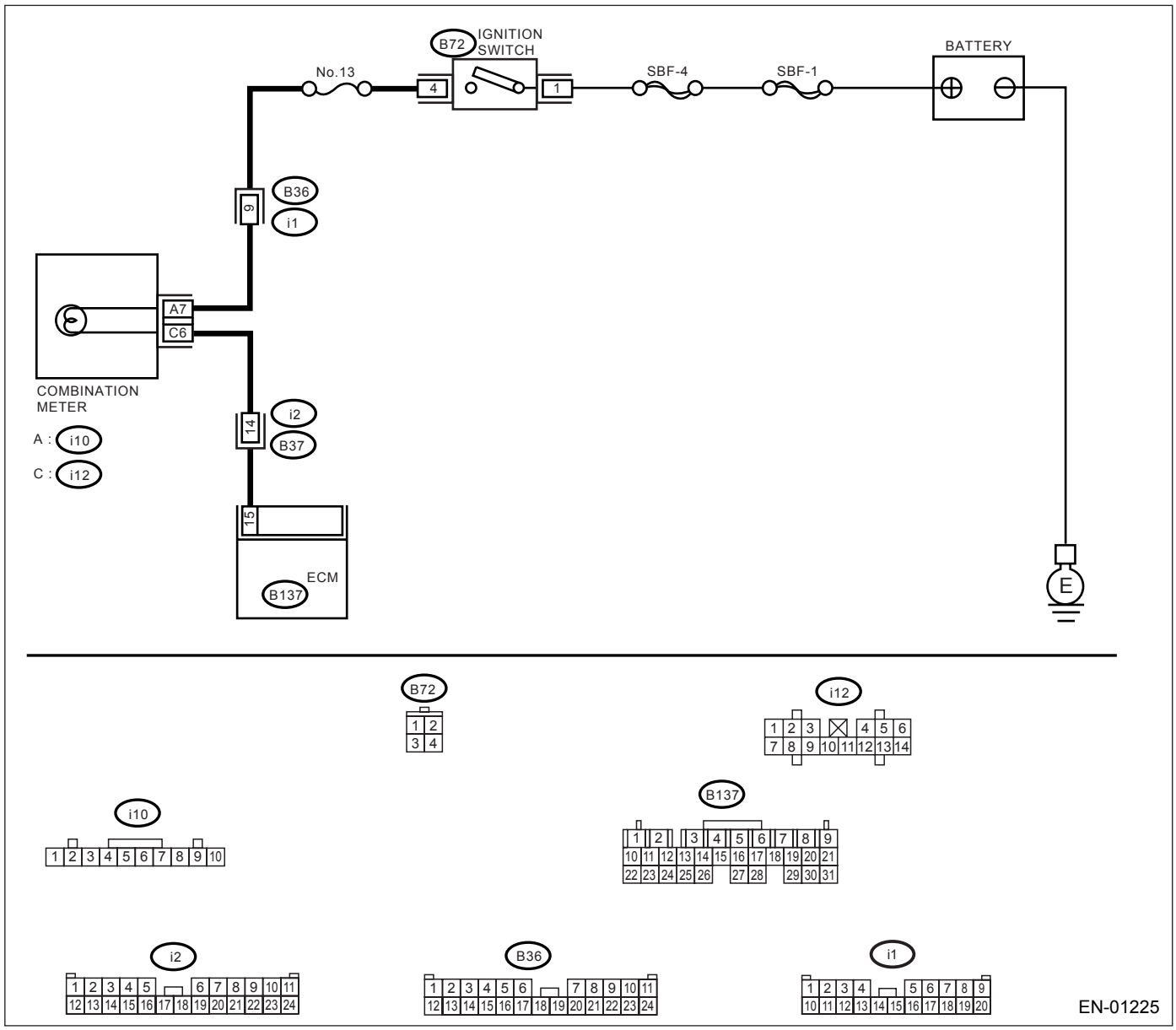
- **WIRING DIAGRAM:**



	Step	Check	Yes	No
1	**CHECK OUTPUT SIGNAL FROM ECM.** 1)Turn ignition switch to ON. 2)Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B137) No. 15 (+) — Chassis ground (−):*** Is the measured value less than the specified value?	1 V	Go to step **4.**	Go to step **2.**
2	**CHECK FOR POOR CONTACT.** Does the MIL illuminate when shaking or pulling ECM connector and harness?	MIL illuminates.	Repair poor contact in ECM connector.	Go to step **3.**
3	**CHECK ECM CONNECTOR.** Is the ECM connector correctly connected?	Correctly connected.	Replace the ECM. <Ref. to FU(H4DOTC)-50, Engine Control Module.>	Repair connection of ECM connector.
4	**CHECK HARNESS BETWEEN COMBINATION METER AND ECM CONNECTOR.** 1)Turn ignition switch to OFF. 2)Remove the combination meter. <Ref. to IDI-12, Combination Meter Assembly.> 3)Disconnect the connector from ECM and combination meter. 4)Measure the resistance of harness between ECM and combination meter connector. ***Connector & terminal*** ***(B137) No. 15 — (i12) No. 6:*** Is the measured value less than the specified value?	1 Ω	Go to step **5.**	Repair harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between ECM and combination meter connector • Poor contact in coupling connector
5	**CHECK FOR POOR CONTACT.** Check for poor contact in combination meter connector. Is there poor contact in combination meter connector?	There is poor contact.	Repair poor contact in combination meter connector.	Go to step **6.**
6	**CHECK HARNESS BETWEEN COMBINATION METER AND IGNITION SWITCH CONNECTOR.** 1)Turn ignition switch to ON. 2)Measure the voltage between combination meter connector and chassis ground. ***Connector & terminal*** ***(i10) No. 7 (+) — Chassis ground (−):*** Is the measured value more than the specified value?	10 V	Replace the combination meter circuit board. <Ref. to IDI-12, Combination Meter Assembly.>	Check the following and repair if necessary. NOTE: • Blown out fuse (No. 13). • Open or short circuit in harness between fuse (No. 13) and battery terminal • Poor contact in ignition switch connector

D: CHECK ENGINE MALFUNCTION INDICATOR LAMP (MIL) DOES NOT TURN OFF.

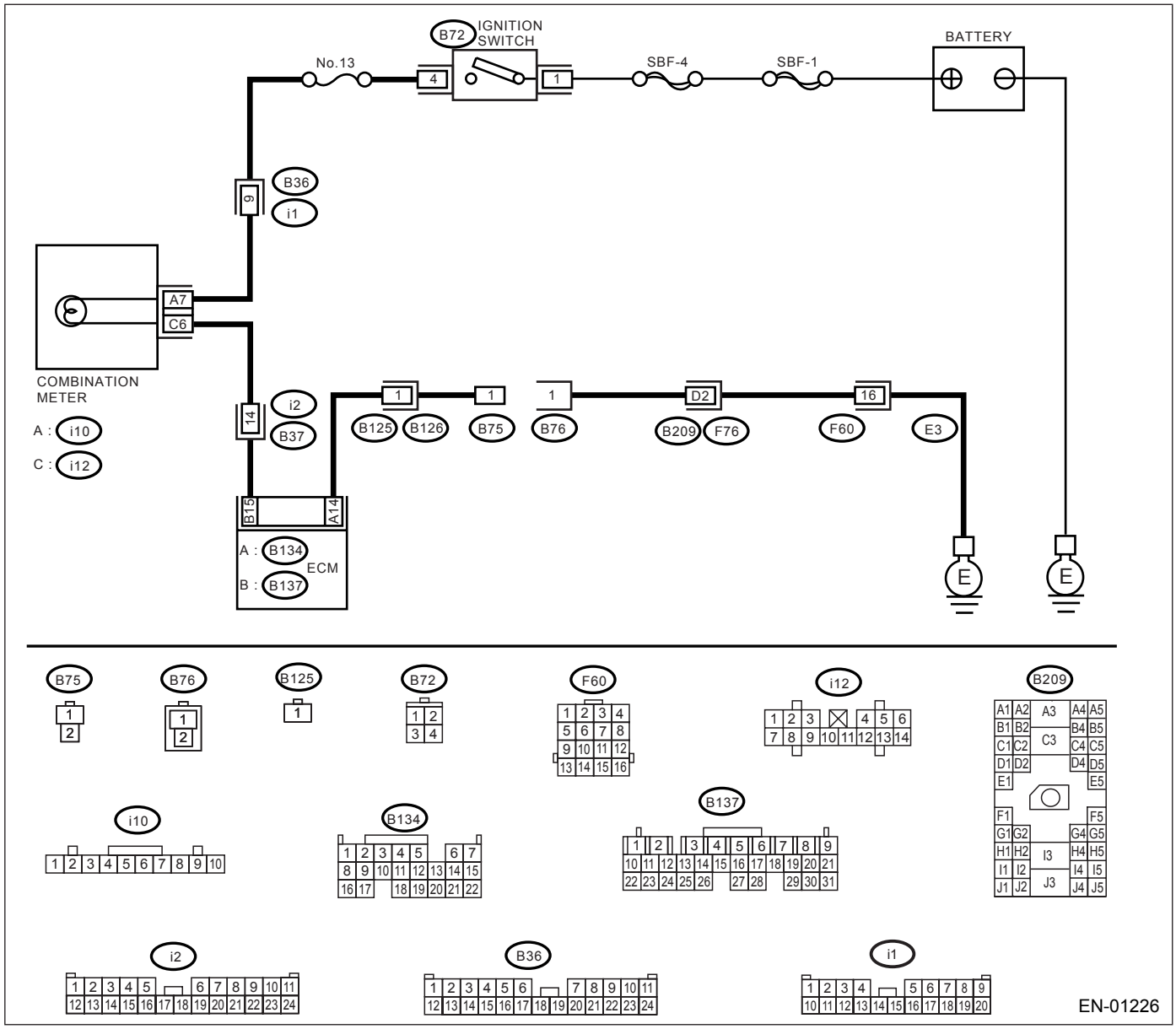
- **DIAGNOSIS:**
  - The CHECK ENGINE malfunction indicator lamp (MIL) circuit is shorted.
- **TROUBLE SYMPTOM:**
  - Although MIL comes on when the engine runs, a diagnostic trouble code (DTC) is not shown on the Subaru Select Monitor or OBD-II general scan tool display.
- **WIRING DIAGRAM:**



Step		Check	Yes	No
1	**CHECK HARNESS BETWEEN COMBINATION METER AND ECM CONNECTOR.** 1)Turn ignition switch to OFF. 2)Disconnect the connector from ECM. 3)Turn ignition switch to ON. Does the MIL illuminate?	MIL illuminates.	Repair short circuit in harness between combination meter and ECM connector.	Replace the ECM. <Ref. to FU(H4DOTC)-50, Engine Control Module.>

E: CHECK ENGINE MALFUNCTION INDICATOR LAMP (MIL) DOES NOT BLINK AT A CYCLE OF 3 HZ.

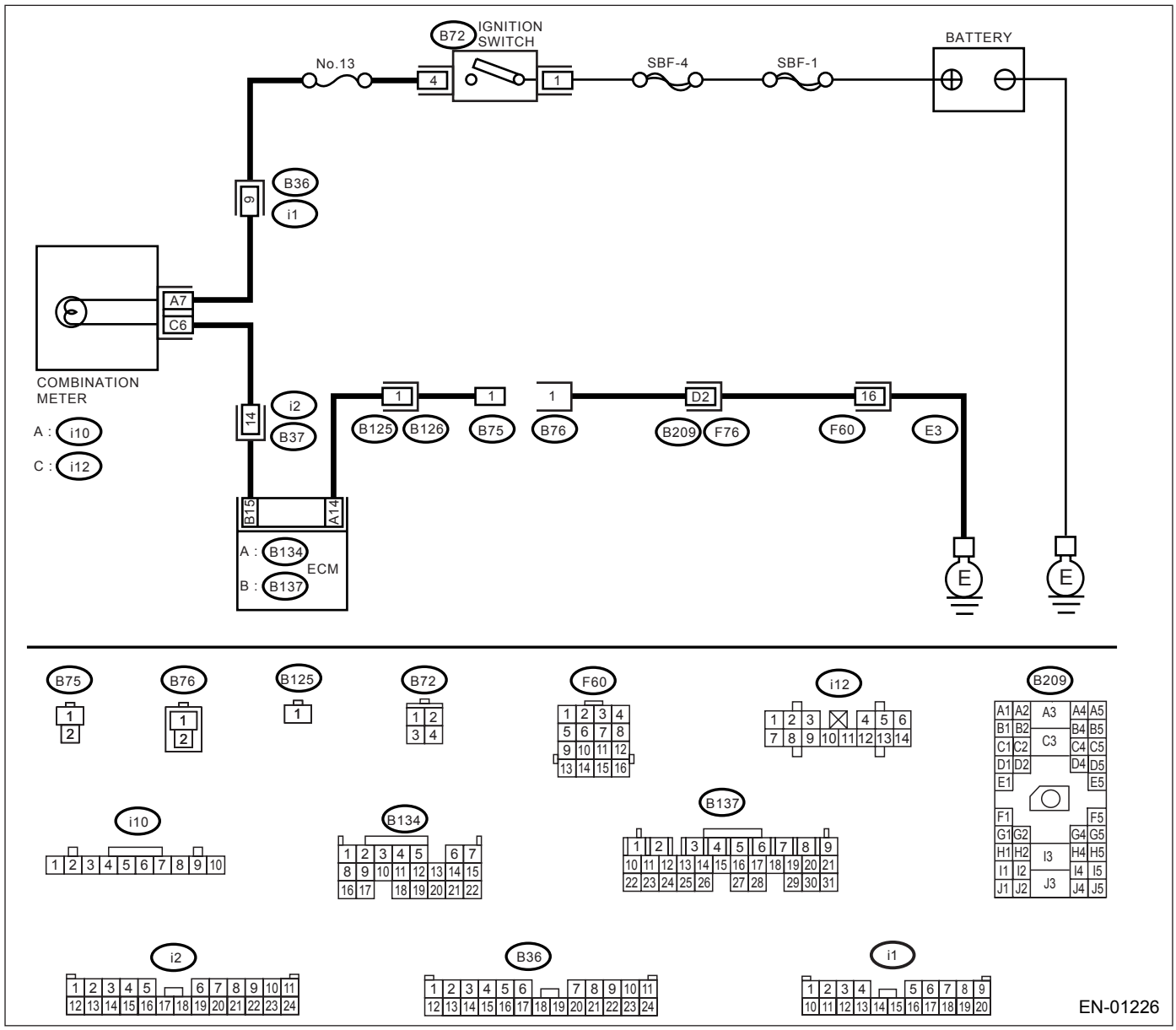
- **DIAGNOSIS:**
  - The CHECK ENGINE malfunction indicator lamp (MIL) circuit is open or shorted.
  - Test mode connector circuit is open.
- **TROUBLE SYMPTOM:**
  - When in inspection mode, MIL does not blink at a cycle of 3 Hz.
- **WIRING DIAGRAM:**



	Step	Check	Yes	No
1	**CHECK STATUS OF CHECK ENGINE MALFUNCTION INDICATOR LAMP (MIL).** 1)Turn ignition switch to OFF. 2)Disconnect the test mode connector. 3)Turn ignition switch to ON. (engine OFF) Does the MIL illuminate?	MIL illuminates.	Go to step **2.**	Repair the MIL circuit. <Ref. to EN(H4DOTC)-53, CHECK ENGINE MALFUNCTION INDICATOR LAMP (MIL) DOES NOT COME ON., Engine Malfunction Indicator Lamp (MIL).>
2	**CHECK HARNESS BETWEEN COMBINATION METER AND ECM CONNECTOR.** 1)Turn ignition switch to OFF. 2)Disconnect the connector from ECM. 3)Turn ignition switch to ON. Does the MIL illuminate?	MIL illuminates.	Repair short circuit to ground in harness between combination meter and ECM connector.	Go to step **3.**
3	**CHECK HARNESS BETWEEN TEST MODE CONNECTOR AND CHASSIS GROUND.** 1)Turn ignition switch to OFF. 2)Disconnect the connector from ECM. 3)Measure the resistance of harness between test mode connector and chassis ground. ***Connector & terminal*** ***(B76) No. 1 — Chassis ground:*** Is the measured value less than the specified value?	1 Ω	Go to step **4.**	Repair harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between test mode connector and chassis ground
4	**CHECK FOR POOR CONTACT.** Check for poor contact in ECM connector. Is there poor contact in ECM connector?	There is poor contact.	Repair poor contact in ECM connector.	Go to step **5.**
5	**CHECK HARNESS BETWEEN ECM AND TEST MODE CONNECTOR.** 1)Connect the test mode connector. 2)Measure the resistance of harness between ECM and chassis ground. ***Connector & terminal*** ***(B134) No. 14 — Chassis ground:*** Is the measured value less than the specified value?	1 Ω	Go to step **6.**	Repair open circuit in harness between ECM and test mode connector.
6	**CHECK FOR POOR CONTACT.** Check for poor contact in ECM connector. Is there poor contact in ECM connector?	There is poor contact.	Repair poor contact in ECM connector.	Replace the ECM. <Ref. to FU(H4DOTC)-50, Engine Control Module.>

F: CHECK ENGINE MALFUNCTION INDICATOR LAMP (MIL) REMAINS BLINKING AT A CYCLE OF 3 HZ.

- **DIAGNOSIS:**
  - Test mode connector circuit is shorted.
- **TROUBLE SYMPTOM:**
  - MIL blinks at a cycle of 3 Hz when the ignition switch is turned to ON.
- **WIRING DIAGRAM:**



	Step	Check	Yes	No
1	**CHECK TEST MODE CONNECTOR.** 1)Disconnect the test mode connector. 2)Turn ignition switch to ON. Does the MIL blink ON/OFF?	MIL blinks.	Go to step **2.**	System is in good order. NOTE: MIL blinks at a cycle of 3 Hz when test mode connector is connected.
2	**CHECK HARNESS BETWEEN ECM CONNECTOR AND ENGINE GROUNDING TERMINAL.** 1)Turn ignition switch to OFF. 2)Disconnect the connector from ECM. 3)Measure the resistance of harness between ECM connector and chassis ground. ***Connector & terminal*** ***(B134) No. 14 — Chassis ground:*** Is the measured value less than the specified value?	5 Ω	Repair short circuit in harness between ECM and test mode connector.	Replace the ECM. <Ref. to FU(H4DOTC)-50, Engine Control Module.>

17.Diagnostics for Engine Starting Failure

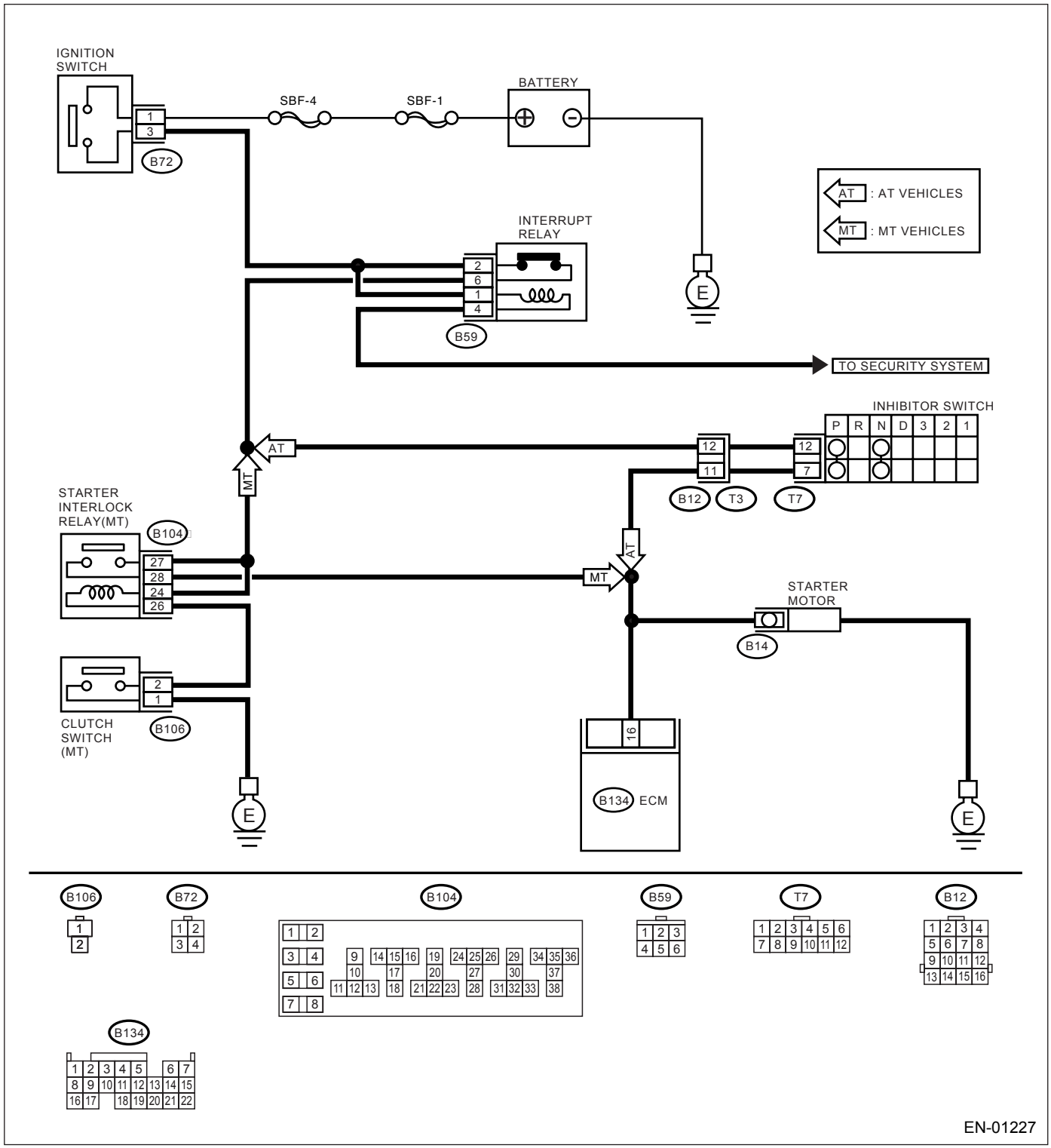
A: PROCEDURE

1. Inspection of starter motor circuit. <Ref. to EN(H4DOTC)-62, STARTER MOTOR CIRCUIT, Diagnostics for Engine Starting Failure.>
↓
2. Inspection of ECM power supply and ground line. <Ref. to EN(H4DOTC)-68, CONTROL MODULE POWER SUPPLY AND GROUND LINE, Diagnostics for Engine Starting Failure.>
↓
3. Inspection of ignition control system. <Ref. to EN(H4DOTC)-72, IGNITION CONTROL SYSTEM, Diagnostics for Engine Starting Failure.>
↓
4. Inspection of fuel pump circuit. <Ref. to EN(H4DOTC)-76, FUEL PUMP CIRCUIT, Diagnostics for Engine Starting Failure.>
↓
5. Inspection of fuel injector circuit. <Ref. to EN(H4DOTC)-78, FUEL INJECTOR CIRCUIT, Diagnostics for Engine Starting Failure.>

B: STARTER MOTOR CIRCUIT

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to EN(H4DOTC)-49, Clear Memory Mode.> and INSPECTION MODE <Ref. to EN(H4DOTC)-41, Inspection Mode.>.

- **WIRING DIAGRAM:**



Step		Check	Yes	No
1	**CHECK OPERATION OF STARTER MOTOR.** Does the starter motor operate when switch is turned to ST?	Starter operates.	Go to step **2.**	Go to step **3.**

	Step	Check	Yes	No
2	**CHECK DTC.** Is a DTC displayed?	DTC is displayed.	Inspect the related DTC using "List of Diagnostic Trouble Codes (DTC)". <Ref. to EN(H4DOTC)-81, List of Diagnostic Trouble Codes (DTC).>	Repair poor contact in ECM connector.
3	**CHECK INPUT SIGNAL FOR STARTER MOTOR.** 1)Turn ignition switch to OFF. 2)Disconnect the connector from starter motor. 3)Turn the ignition switch to ST. 4)Measure the power supply voltage between starter motor connector terminal and engine ground. ***Connector & terminal*** ***(B14) No. 1 (+) — Engine ground (−):*** Is the measured value more than the specified value? NOTE: •On AT vehicles, place the selector lever in the "P" or "N" position. •On MT vehicles, depress the clutch pedal.	10 V	Go to step **4.**	Go to step **5.**
4	**CHECK GROUND CIRCUIT OF STARTER MOTOR.** 1)Turn ignition switch to OFF. 2)Disconnect the terminal from starter motor. 3)Measure the resistance of ground cable between ground cable terminal and engine ground. Is the measured value less than the specified value?	5 Ω	Check the starter motor. <Ref. to SC(H4SO)-7, Starter.>	Repair open circuit of ground cable.
5	**CHECK HARNESS BETWEEN BATTERY AND IGNITION SWITCH CONNECTOR.** 1)Disconnect the connector from ignition switch. 2)Measure the power supply voltage between ignition switch connector and chassis ground. ***Connector & terminal*** ***(B72) No. 1 (+) — Chassis ground (−):*** Is the measured value more than the specified value?	10 V	Go to step **6.**	Repair open circuit in harness between ignition switch and battery, and check fuse SBF No. 4 and SBF No. 1.
6	**CHECK IGNITION SWITCH.** 1)Disconnect the connector from ignition switch. 2)Measure the resistance between ignition switch terminals while turning ignition switch to the "ST" position. ***Terminal*** ***No. 1 — No. 3:*** Is the measured value less than the specified value?	5 Ω	Go to step **7.**	Replace the ignition switch.
7	**CHECK TRANSMISSION TYPE.** Is the transmission AT?	AT.	Go to step **8.**	Go to step **10.**

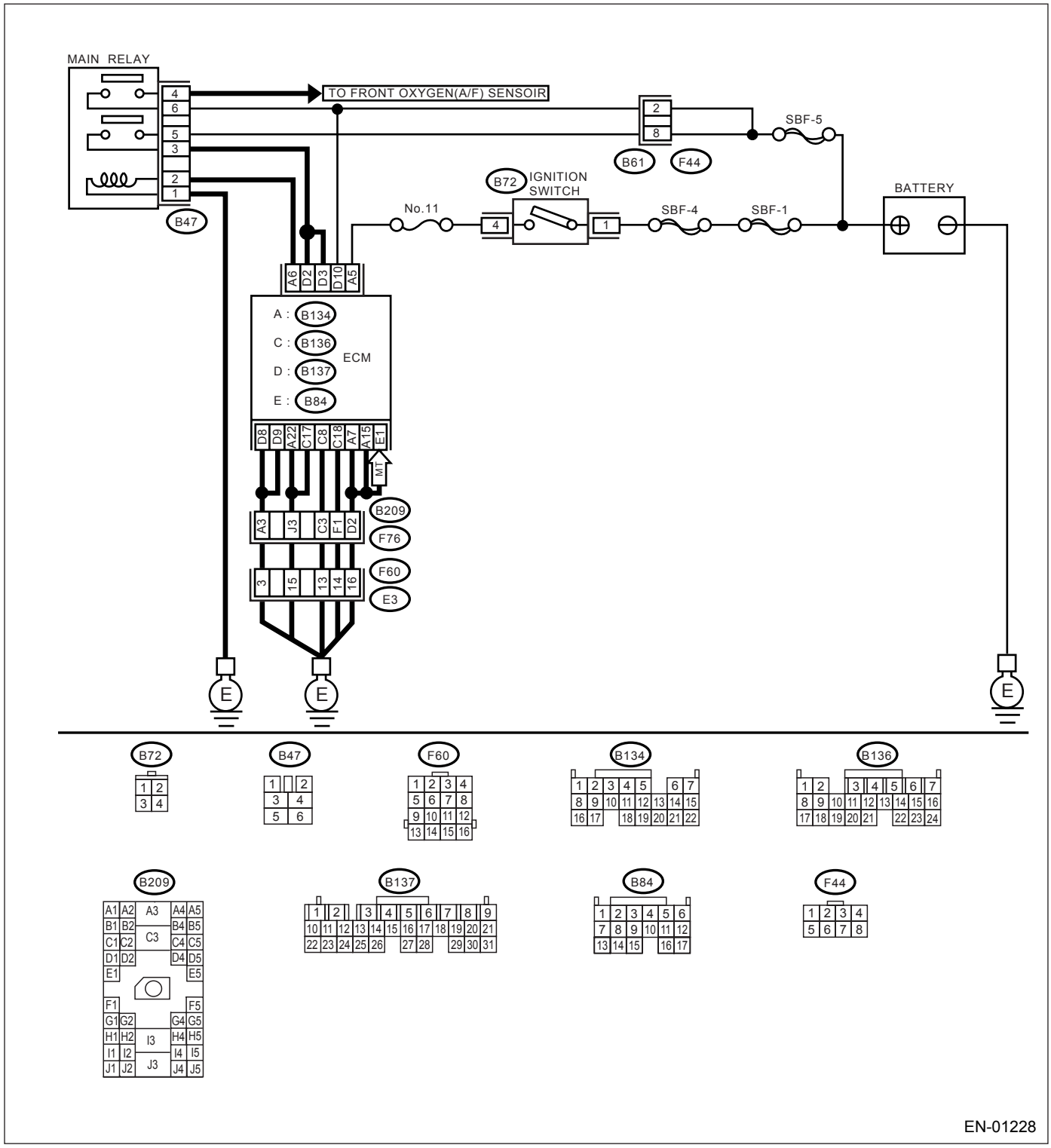
	Step	Check	Yes	No
8	**CHECK INPUT VOLTAGE OF INHIBITOR SWITCH.** 1)Turn ignition switch to OFF. 2)Disconnect the connector from inhibitor switch. 3)Connect the connector to ignition switch. 4)Measure the input voltage between inhibitor switch connector terminal and engine ground while turning ignition switch to ST. ***Connector & terminal*** ***(B12) No. 12 (+) — Engine ground (−):*** Is the measured value more than the specified value?	10 V	Go to step **9.**	Repair open or short circuit to ground in harness between inhibitor switch and ignition switch. NOTE: Check security system (if equipped). <Ref. to SL-23, Security System.>
9	**CHECK INHIBITOR SWITCH.** 1)Place the selector lever in "P" or "N" position. 2)Measure the resistance between inhibitor switch terminals. ***Connector & terminal*** ***(T3) No. 11 — No. 12:*** Is the measured value less than the specified value?	1 Ω	Repair open or short circuit to ground in harness between inhibitor switch and starter motor.	Replace the inhibitor switch. <Ref. to AT-48, Inhibitor Switch.>
10	**CHECK INPUT VOLTAGE OF STARTER INTERLOCK RELAY.** 1)Turn ignition switch to OFF. 2)Disconnect the connector from starter interlock relay. 3)Connect the connector to ignition switch. 4)Measure the input voltage between starter interlock relay connector and chassis ground while turning ignition switch to ST. ***Connector & terminal*** ***(B104) No. 27 (+) — Chassis ground (−):*** ***(B104) No. 24 (+) — Chassis ground (−):*** Is the measured value more than the specified value?	10 V	Go to step **11.**	Repair open or short circuit to ground in harness between starter interlock relay and ignition switch. NOTE: Check security system (if equipped). <Ref. to SL-23, Security System.>
11	**CHECK STARTER INTERLOCK RELAY.** 1)Connect the battery to starter interlock relay terminals No. 26 and No. 24. 2)Measure the resistance between starter interlock relay terminals. ***Terminal*** ***No. 27 — No. 28:*** Is the measured value less than the specified value?	1 Ω	Go to step **12.**	Replace the starter interlock relay.
12	**CHECK GROUND CIRCUIT OF CLUTCH SWITCH.** 1)Disconnect the connector from clutch switch. 2)Measure the resistance between clutch switch connector and chassis ground. ***Connector & terminal*** ***(B106) No. 1 — Chassis ground:*** Is the measured value less than the specified value?	1 Ω	Go to step **13.**	Repair open circuit of ground cable.

	Step	Check	Yes	No
13	**CHECK CLUTCH SWITCH.** 1)Measure the resistance between clutch switch terminals while depressing the clutch pedal. ***Terminal*** ***No. 1 — No. 2:*** Is the measured value less than the specified value?	1 Ω	Go to step **14.**	Replace the clutch switch. <Ref. to CL-30, Clutch Switch.>
14	**CHECK CLUTCH SWITCH CIRCUIT.** 1)Connect the connector to clutch switch. 2)Measure the resistance between starter interlock relay connector and chassis ground while depressing the clutch pedal. ***Connector & terminal*** ***(B104) No. 26 (+) — Chassis ground:*** Is the measured value less than the specified value?	1 Ω	Repair short circuit to ground in harness between starter interlock relay and starter motor.	Repair open circuit in harness between starter interlock relay and clutch switch.

C: CONTROL MODULE POWER SUPPLY AND GROUND LINE

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to EN(H4DOTC)-49, Clear Memory Mode.> and INSPECTION MODE <Ref. to EN(H4DOTC)-41, Inspection Mode.>.

- **WIRING DIAGRAM:**



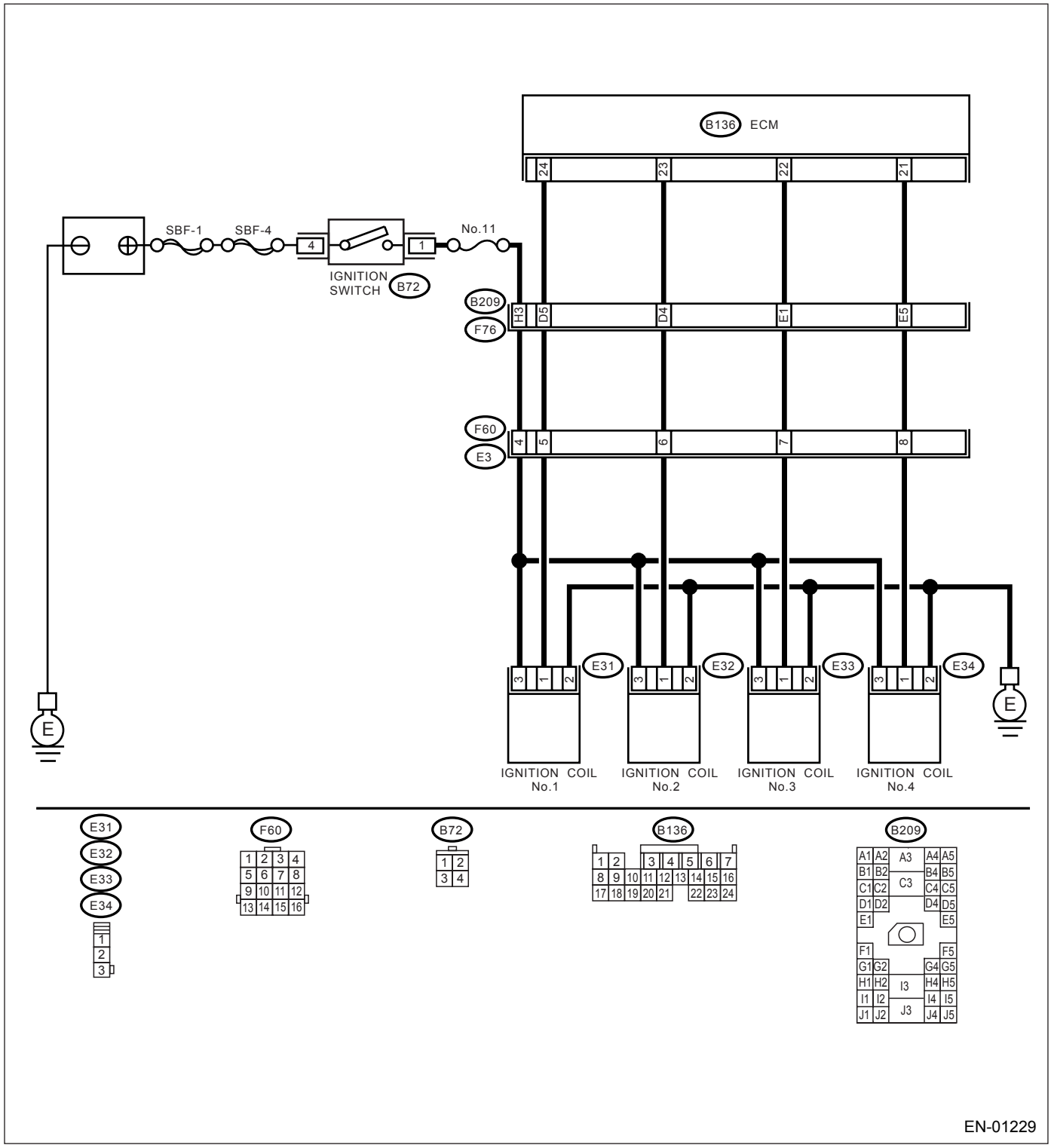
	Step	Check	Yes	No
1	**CHECK MAIN RELAY.** 1)Turn ignition switch to OFF. 2)Remove the main relay. 3)Connect the battery to main relay terminals No. 1 and No. 2. 4)Measure the resistance between main relay terminals. ***Terminal*** ***No. 3 — No. 5:*** ***No. 4 — No. 6:*** Is the measured value less than the specified value?	10 Ω	Go to step **2.**	Replace the main relay.
2	**CHECK GROUND CIRCUIT OF ECM.** 1)Disconnect the connector from ECM. 2)Measure the resistance of harness between ECM and chassis ground. ***Connector & terminal*** ***(B134) No. 7 — Chassis ground:*** ***(B134) No. 15 — Chassis ground:*** ***(B134) No. 22 — Chassis ground:*** ***(B136) No. 8 — Chassis ground:*** ***(B136) No. 17 — Chassis ground:*** ***(B136) No. 18 — Chassis ground:*** ***(B137) No. 8 — Chassis ground:*** ***(B137) No. 9 — Chassis ground:*** ***(B84) No. 1 — Chassis ground:*** Is the measured value less than the specified value?	5 Ω	Go to step **3.**	Repair open circuit in harness between ECM connector and engine grounding terminal.
3	**CHECK INPUT VOLTAGE OF ECM.** Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B137) No. 10 (+) — Chassis ground (−):*** ***(B134) No. 5 (+) — Chassis ground (−):*** Is the measured value more than the specified value?	10 V	Go to step **4.**	Repair open or short circuit to ground in power supply circuit.
4	**CHECK HARNESS BETWEEN ECM AND MAIN RELAY CONNECTOR.** 1)Turn ignition switch to OFF. 2)Measure the resistance between ECM and chassis ground. ***Connector & terminal*** ***(B134) No. 6 — Chassis ground:*** Is the measured value more than the specified value?	1 MΩ	Go to step **5.**	Repair short circuit to ground in harness between ECM connector and main relay connector, then replace the ECM.
5	**CHECK OUTPUT VOLTAGE FROM ECM.** 1)Connect the connector to ECM. 2)Turn ignition switch to ON. 3)Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B134) No. 6 (+) — Chassis ground (−):*** Is the measured value more than the specified value?	10 V	Go to step **6.**	Replace the ECM. <Ref. to FU(H4DOTC)-50, Engine Control Module.>

	Step	Check	Yes	No
6	**CHECK INPUT VOLTAGE OF MAIN RELAY.** Check the voltage between main relay connector and chassis ground. ***Connector & terminal*** ***(B47) No. 2 (+) — Chassis ground (–):*** Is the measured value more than the specified value?	10 V	Go to step **7.**	Repair open circuit in harness between ECM connector and main relay connector.
7	**CHECK GROUND CIRCUIT OF MAIN RELAY.** 1)Turn ignition switch to OFF. 2)Measure the resistance between main relay connector and chassis ground. ***Connector & terminal*** ***(B47) No. 1 — Chassis ground:*** Is the measured value less than the specified value?	5 Ω	Go to step **8.**	Repair open circuit between main relay and chassis ground.
8	**CHECK INPUT VOLTAGE OF MAIN RELAY.** Check the voltage between main relay connector and chassis ground. ***Connector & terminal*** ***(B47) No. 5 (+) — Chassis ground (–):*** ***(B47) No. 6 (+) — Chassis ground (–):*** Is the measured value more than the specified value?	10 V	Go to step **9.**	Repair open or short circuit to ground in harness of power supply circuit.
9	**CHECK INPUT VOLTAGE OF ECM.** 1)Connect the main relay connector. 2)Turn ignition switch to ON. 3)Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B137) No. 2 (+) — Chassis ground (–):*** ***(B137) No. 3 (+) — Chassis ground (–):*** Is the measured value more than the specified value?	10 V	Check ignition control system. <Ref. to EN(H4DOTC)-72, IGNITION CONTROL SYSTEM, Diagnostics for Engine Starting Failure.>	Repair open or short circuit to ground in harness between ECM connector and main relay connector.

D: IGNITION CONTROL SYSTEM

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to EN(H4DOTC)-49, Clear Memory Mode.> and INSPECTION MODE <Ref. to EN(H4DOTC)-41, Inspection Mode.>.

- **WIRING DIAGRAM:**



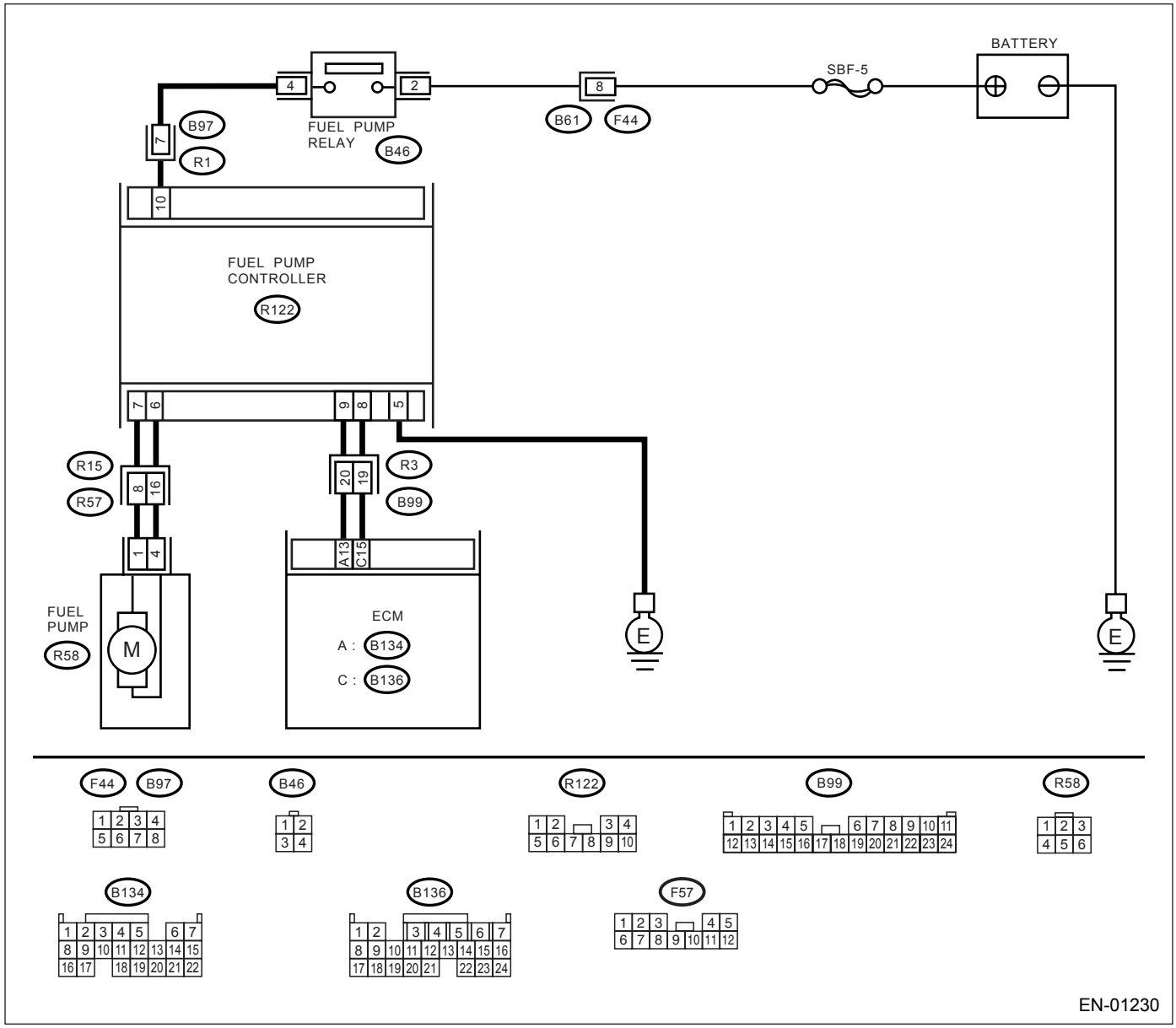
	Step	Check	Yes	No
1	**CHECK SPARK PLUG CONDITION.** 1)Remove the spark plug. <Ref. to IG(H4DOTC)-5, INSTALLATION, Spark Plug.> 2)Check the condition of the spark plug. <Ref. to IG(H4DOTC)-6, INSPECTION, Spark Plug.> Is the spark plug's condition OK?	OK.	Go to step **2.**	Replace the spark plug.
2	**CHECK IGNITION SYSTEM FOR SPARKS.** 1)Connect the spark plug to ignition coil. 2)Lower the fuel pressure. <Ref. to FU(H4DOTC)-54, RELEASING OF FUEL PRESSURE, OPERATION, Fuel.> 3)Bring the spark plug's threaded portion in contact with the engine. 4)With the throttle wide open, crank the engine to check that sparks are generated at each cylinder. Are sparks generated at each cylinder?	Sparks are generated.	Check fuel pump system. <Ref. to EN(H4DOTC)-76, FUEL PUMP CIRCUIT, Diagnostics for Engine Starting Failure.>	Go to step **3.**
3	**CHECK POWER SUPPLY CIRCUIT FOR IGNITION COIL & IGNITOR ASSEMBLY.** 1)Turn ignition switch to OFF. 2)Disconnect the connector from ignition coil & ignitor assembly. 3)Turn ignition switch to ON. 4)Measure the power supply voltage between ignition coil & ignitor assembly connector and engine ground. ***Connector & terminal*** ***(E31) No. 3 (+) — Engine ground (−):*** ***(E32) No. 3 (+) — Engine ground (−):*** ***(E33) No. 3 (+) — Engine ground (−):*** ***(E34) No. 3 (+) — Engine ground (−):*** Is the measured value more than the specified value?	10 V	Go to step **4.**	Repair harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between ignition coil & ignitor assembly, and ignition switch connector • Poor contact in coupling connector
4	**CHECK HARNESS OF IGNITION COIL & IGNITOR ASSEMBLY GROUND CIRCUIT.** 1)Turn ignition switch to OFF. 2)Measure the resistance between ignition coil & ignitor assembly connector and engine ground. ***Connector & terminal*** ***(E31) No. 2 — Engine ground:*** ***(E32) No. 2 — Engine ground:*** ***(E33) No. 2 — Engine ground:*** ***(E34) No. 2 — Engine ground:*** Is the measured value less than the specified value?	5 Ω	Go to step **5.**	Repair harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between ignition coil & ignitor assembly connector and engine grounding terminal

	Step	Check	Yes	No
5	**CHECK HARNESS BETWEEN ECM AND IGNITION COIL & IGNITOR ASSEMBLY CONNECTOR.** 1)Turn ignition switch to OFF. 2)Disconnect the connector from ECM. 3)Disconnect the connector from ignition coil & ignitor assembly. 4)Measure the resistance of harness between ECM and ignition coil & ignitor assembly connector. ***Connector & terminal*** ***(B136) No. 21 — (E34) No. 1:*** ***(B136) No. 22 — (E33) No. 1:*** ***(B136) No. 23 — (E32) No. 1:*** ***(B136) No. 24 — (E31) No. 1:*** Is the measured value less than the specified value?	1 Ω	Go to step **6.**	Repair harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between ECM and ignition coil & ignitor assembly connector • Poor contact in coupling connector
6	**CHECK HARNESS BETWEEN ECM AND IGNITION COIL & IGNITOR ASSEMBLY CONNECTOR.** Measure the resistance of harness between ECM and engine ground. ***Connector & terminal*** ***(B136) No. 21 — Engine ground:*** ***(B136) No. 22 — Engine ground:*** ***(B136) No. 23 — Engine ground:*** ***(B136) No. 24 — Engine ground:*** Is the measured value more than the specified value?	1 MΩ	Go to step **7.**	Repair short circuit to ground in harness between ECM and ignition coil & ignitor assembly connector.
7	**CHECK FOR POOR CONTACT.** Check for poor contact in ECM connector. Is there poor contact in ECM connector?	There is poor contact.	Repair poor contact in ECM connector.	Replace the ignition coil & ignitor assembly.

E: FUEL PUMP CIRCUIT

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to EN(H4DOTC)-49, Clear Memory Mode.> and INSPECTION MODE <Ref. to EN(H4DOTC)-41, Inspection Mode.>.

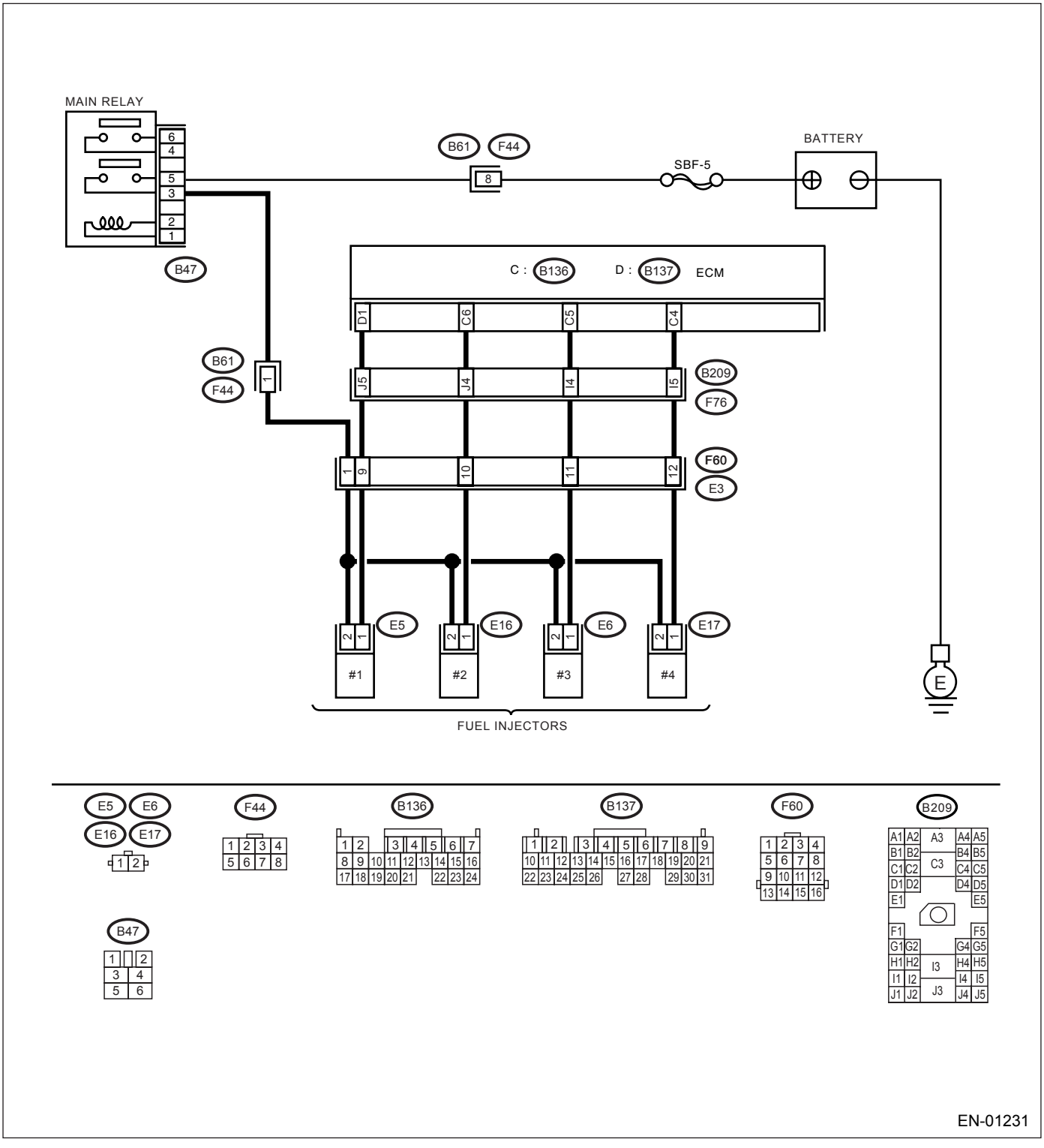
- **WIRING DIAGRAM:**



	Step	Check	Yes	No
1	**CHECK OPERATING SOUND OF FUEL PUMP.** Make sure that the fuel pump operates for two seconds when the ignition switch is tuned to ON. NOTE: Fuel pump operation can also be executed using Subaru Select Monitor. For the procedure, refer to Compulsory Valve Operation Check Mode. <Ref. to EN(H4DOTC)-50, Compulsory Valve Operation Check Mode.> Does the fuel pump produce an operating sound?	Operating sound is produced.	Check fuel injector circuit. <Ref. to EN(H4DOTC)-78, FUEL INJECTOR CIRCUIT, Diagnostics for Engine Starting Failure.>	Read diagnostic trouble code (DTC). <Ref. to EN(H4DOTC)-40, OPERATION, Read Diagnostic Trouble Code.>

F: FUEL INJECTOR CIRCUIT

CAUTION:
- **Check or repair only faulty parts.**
- **After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to EN(H4DOTC)-49, Clear Memory Mode.> and INSPECTION MODE <Ref. to EN(H4DOTC)-41, Inspection Mode.>.**
- **WIRING DIAGRAM:**



EN-01231

	Step	Check	Yes	No
1	**CHECK OPERATION OF EACH FUEL INJECTOR.** While cranking the engine, check that each fuel injector emits an operating sound. Use a sound scope or hold a screwdriver against the injector for this check. Does the fuel pump produce an operating sound?	Operating sound is produced.	Check the fuel pressure. <Ref. to ME(H4DOTC)-27, INSPECTION, Fuel Pressure.>	Go to step **2.**
2	**CHECK POWER SUPPLY TO EACH FUEL INJECTOR.** 1)Turn ignition switch to OFF. 2)Disconnect the connector from fuel injector. 3)Turn ignition switch to ON. 4)Measure the power supply voltage between the fuel injector terminal and engine ground. ***Connector & terminal*** ***#1 (E5) No. 2 (+) — Engine ground (–):*** ***#2 (E16) No. 2 (+) — Engine ground (–):*** ***#3 (E6) No. 2 (+) — Engine ground (–):*** ***#4 (E17) No. 2 (+) — Engine ground (–):*** Is the measured value more than the specified value?	10 V	Go to step **3.**	Repair harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between main relay and fuel injector connector • Poor contact in main relay connector • Poor contact in coupling connector • Poor contact in fuel injector connector
3	**CHECK HARNESS BETWEEN ECM AND FUEL INJECTOR CONNECTOR.** 1)Disconnect the connector from ECM. 2)Measure the resistance of harness between ECM and fuel injector connector. ***Connector & terminal*** ***(B137) No. 1 — (E5) No. 1:*** ***(B136) No. 6 — (E16) No. 1:*** ***(B136) No. 5 — (E6) No. 1:*** ***(B136) No. 4 — (E6) No. 1:*** Is the measured value less than the specified value?	1 Ω	Go to step **4.**	Repair harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between ECM and fuel injector connector • Poor contact in coupling connector
4	**CHECK HARNESS BETWEEN ECM AND FUEL INJECTOR CONNECTOR.** Measure the resistance of harness between ECM and fuel injector connector. ***Connector & terminal*** ***(B137) No. 1 — Chassis ground:*** ***(B136) No. 6 — Chassis ground:*** ***(B136) No. 5 — Chassis ground:*** ***(B136) No. 4 — Chassis ground:*** Is the measured value less than the specified value?	1 Ω	Repair short circuit to ground in harness between ECM and fuel injector connector.	Go to step **5.**
5	**CHECK EACH FUEL INJECTOR.** 1)Turn ignition switch to OFF. 2)Measure the resistance between each fuel injector terminals. ***Terminal*** ***No. 1 — No. 2:*** Is the measured value within the specified range?	5 — 20 Ω	Go to step **6.**	Replace the faulty fuel injector.

Step		Check	Yes	No
6	**CHECK FOR POOR CONTACT.** Check for poor contact in ECM connector. Is there poor contact in ECM connector?	There is poor contact.	Repair poor contact in ECM connector.	Inspection using “General Diagnostic Table”. <Ref. to EN(H4DOTC)-390, INSPECTION, General Diagnostic Table.>

18.List of Diagnostic Trouble Codes (DTC)

A: LIST

DTC No.	Description	Index
P0030	HO2S Heater Control Circuit (Bank 1 Sensor 1)	<Ref. to EN(H4DOTC)-88, DTC P0030 — HO_2S HEATER CONTROL CIRCUIT (BANK 1 SENSOR 1) —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0031	HO2S Heater Control Circuit Low (Bank 1 Sensor 1)	<Ref. to EN(H4DOTC)-90, DTC P0031 — HO_2S HEATER CONTROL CIRCUIT LOW (BANK 1 SENSOR 1) —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0032	HO2S Heater Control Circuit High (Bank 1 Sensor 1)	<Ref. to EN(H4DOTC)-94, DTC P0032 — HO_2S HEATER CONTROL CIRCUIT HIGH (BANK 1 SENSOR 1) —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0037	HO2S Heater Control Circuit Low (Bank 1 Sensor 2)	<Ref. to EN(H4DOTC)-96, DTC P0037 — HO_2S HEATER CONTROL CIRCUIT LOW (BANK 1 SENSOR 2) —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0038	HO2S Heater Control Circuit High (Bank 1 Sensor 2)	<Ref. to EN(H4DOTC)-100, DTC P0038 — HO_2S HEATER CONTROL CIRCUIT HIGH (BANK 1 SENSOR 2) —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0068	Manifold Absolute Pressure/Barometric Pressure Circuit Range/Performance	<Ref. to EN(H4DOTC)-102, DTC P0068 — MANIFOLD ABSOLUTE PRESSURE/BAROMETRIC PRESSURE CIRCUIT RANGE/PERFORMANCE —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0101	Mass or Volume Air Flow Circuit Range/Performance	<Ref. to EN(H4DOTC)-104, DTC P0101 — MASS OR VOLUME AIR FLOW CIRCUIT RANGE/PERFORMANCE —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0102	Mass or Volume Air Flow Circuit Low Input	<Ref. to EN(H4DOTC)-106, DTC P0102 — MASS OR VOLUME AIR FLOW CIRCUIT LOW INPUT —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0103	Mass or Volume Air Flow Circuit High Input	<Ref. to EN(H4DOTC)-110, DTC P0103 — MASS OR VOLUME AIR FLOW CIRCUIT HIGH INPUT —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0107	Manifold Absolute Pressure/Barometric Pressure Circuit Low Input	<Ref. to EN(H4DOTC)-112, DTC P0107 — MANIFOLD ABSOLUTE PRESSURE/BAROMETRIC PRESSURE CIRCUIT LOW INPUT —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0108	Manifold Absolute Pressure/Barometric Pressure Circuit High Input	<Ref. to EN(H4DOTC)-116, DTC P0108 — MANIFOLD ABSOLUTE PRESSURE/BAROMETRIC PRESSURE CIRCUIT HIGH INPUT —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0111	Intake Air Temperature Circuit Range/Performance	<Ref. to EN(H4DOTC)-120, DTC P0111 — INTAKE AIR TEMPERATURE CIRCUIT RANGE/PERFORMANCE —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0112	Intake Air Temperature Circuit Low Input	<Ref. to EN(H4DOTC)-122, DTC P0112 — INTAKE AIR TEMPERATURE CIRCUIT LOW INPUT —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0113	Intake Air Temperature Circuit High Input	<Ref. to EN(H4DOTC)-124, DTC P0113 — INTAKE AIR TEMPERATURE CIRCUIT HIGH INPUT —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0117	Engine Coolant Temperature Circuit Low Input	<Ref. to EN(H4DOTC)-128, DTC P0117 — ENGINE COOLANT TEMPERATURE CIRCUIT LOW INPUT —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0118	Engine Coolant Temperature Circuit High Input	<Ref. to EN(H4DOTC)-130, DTC P0118 — ENGINE COOLANT TEMPERATURE CIRCUIT HIGH INPUT —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0121	Throttle/Pedal Position Sensor/Switch “A” Circuit Range/Performance	<Ref. to EN(H4DOTC)-134, DTC P0121 — THROTTLE/PEDAL POSITION SENSOR/SWITCH “A” CIRCUIT RANGE/PERFORMANCE —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

DTC No.	Description	Index
P0122	Throttle/Pedal Position Sensor/ Switch “A” Circuit Low Input	<Ref. to EN(H4DOTC)-136, DTC P0122 — THROTTLE/PEDAL POSITION SENSOR/SWITCH “A” CIRCUIT LOW INPUT —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0123	Throttle/Pedal Position Sensor/ Switch “A” Circuit High Input	<Ref. to EN(H4DOTC)-140, DTC P0123 — THROTTLE/PEDAL POSITION SENSOR/SWITCH “A” CIRCUIT HIGH INPUT —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0125	Insufficient Coolant Temperature for Closed Loop Fuel Control	<Ref. to EN(H4DOTC)-142, DTC P0125 — INSUFFICIENT COOLANT TEMPERATURE FOR CLOSED LOOP FUEL CONTROL —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0128	Coolant Thermostat (Coolant Temperature Below Thermostat Regulating Temperature)	<Ref. to EN(H4DOTC)-144, DTC P0128 — COOLANT THERMOSTAT (COOLANT TEMPERATURE BELOW THERMOSTAT REGULATING TEMPERATURE) —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0129	Atmospheric Pressure Sensor Circuit Range/Performance	<Ref. to EN(H4DOTC)-145, DTC P0129 — ATMOSPHERIC PRESSURE SENSOR CIRCUIT RANGE/PERFORMANCE —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0130	O_2 Sensor Circuit (Bank 1 Sensor 1)	<Ref. to EN(H4DOTC)-146, DTC P0130 — O_2 SENSOR CIRCUIT (BANK 1 SENSOR 1) —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0133	O_2 Sensor Circuit Slow Response (Bank 1 Sensor 1)	<Ref. to EN(H4DOTC)-148, DTC P0133 — O_2 SENSOR CIRCUIT SLOW RESPONSE (BANK 1 SENSOR 1) —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0134	O_2 Sensor Circuit No Activity Detected (Bank 1 Sensor 1)	<Ref. to EN(H4DOTC)-149, DTC P0134 — O_2 SENSOR CIRCUIT NO ACTIVITY DETECTED (BANK 1 SENSOR 1) —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0137	O_2 Sensor Circuit Low Voltage (Bank 1 Sensor 2)	<Ref. to EN(H4DOTC)-150, DTC P0137 — O_2 SENSOR CIRCUIT LOW VOLTAGE (BANK 1 SENSOR 2) —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0138	O_2 Sensor Circuit High Voltage (Bank 1 Sensor 2)	<Ref. to EN(H4DOTC)-154, DTC P0138 — O_2 SENSOR CIRCUIT HIGH VOLTAGE (BANK 1 SENSOR 2) —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0139	O_2 Sensor Circuit Slow Response (Bank 1 Sensor 2)	<Ref. to EN(H4DOTC)-158, DTC P0139 — O_2 SENSOR CIRCUIT SLOW RESPONSE (BANK 1 SENSOR 2) —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0171	System too Lean (Bank 1)	<Ref. to EN(H4DOTC)-159, DTC P0171 — SYSTEM TOO LEAN (BANK 1) —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0172	System too Rich (Bank 1)	<Ref. to EN(H4DOTC)-160, DTC P0172 — SYSTEM TOO RICH (BANK 1) —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0181	Fuel Temperature Sensor “A” Circuit Range/Performance	<Ref. to EN(H4DOTC)-164, DTC P0181 — FUEL TEMPERATURE SENSOR “A” CIRCUIT RANGE/PERFORMANCE —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0182	Fuel Temperature Sensor “A” Circuit Low Input	<Ref. to EN(H4DOTC)-166, DTC P0182 — FUEL TEMPERATURE SENSOR “A” CIRCUIT LOW INPUT —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0183	Fuel Temperature Sensor “A” Circuit High Input	<Ref. to EN(H4DOTC)-168, DTC P0183 — FUEL TEMPERATURE SENSOR “A” CIRCUIT HIGH INPUT —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0230	Fuel Pump Primary Circuit	<Ref. to EN(H4DOTC)-172, DTC P0230 — FUEL PUMP PRIMARY CIRCUIT —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0244	Turbo/Super Charger Wastegate Solenoid “A” Range/Performance	<Ref. to EN(H4DOTC)-176, DTC P0244 — TURBO/SUPER CHARGER WASTEGATE SOLENOID “A” RANGE/PERFORMANCE —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0245	Turbo/Super Charger Wastegate Solenoid “A” Low	<Ref. to EN(H4DOTC)-178, DTC P0245 — TURBO/SUPER CHARGER WASTEGATE SOLENOID “A” LOW —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

DTC No.	Description	Index
P0246	Turbo/Super Charger Wastegate Solenoid “A” High	<Ref. to EN(H4DOTC)-182, DTC P0246 — TURBO/SUPER CHARGER WASTEGATE SOLENOID “A” HIGH —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0301	Cylinder 1 misfire detected	<Ref. to EN(H4DOTC)-184, DTC P0301 — CYLINDER 1 MISFIRE DETECTED —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0302	Cylinder 2 misfire detected	<Ref. to EN(H4DOTC)-184, DTC P0302 — CYLINDER 2 MISFIRE DETECTED —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0303	Cylinder 3 misfire detected	<Ref. to EN(H4DOTC)-184, DTC P0303 — CYLINDER 3 MISFIRE DETECTED —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0304	Cylinder 4 misfire detected	<Ref. to EN(H4DOTC)-186, DTC P0304 — CYLINDER 4 MISFIRE DETECTED —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0327	Knock Sensor 1 Circuit Low Input (Bank 1 or Single Sensor)	<Ref. to EN(H4DOTC)-192, DTC P0327 — KNOCK SENSOR 1 CIRCUIT LOW INPUT (BANK 1 OR SINGLE SENSOR) —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0328	Knock Sensor 1 Circuit High Input (Bank 1 or Single Sensor)	<Ref. to EN(H4DOTC)-194, DTC P0328 — KNOCK SENSOR 1 CIRCUIT HIGH INPUT (BANK 1 OR SINGLE SENSOR) —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0335	Crankshaft Position Sensor “A” Circuit	<Ref. to EN(H4DOTC)-196, DTC P0335 — CRANKSHAFT POSITION SENSOR “A” CIRCUIT —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0336	Crankshaft Position Sensor “A” Circuit Range/Performance	<Ref. to EN(H4DOTC)-198, DTC P0336 — CRANKSHAFT POSITION SENSOR “A” CIRCUIT RANGE/PERFORMANCE —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0340	Camshaft Position Sensor “A” Circuit (Bank 1 or Single Sensor)	<Ref. to EN(H4DOTC)-200, DTC P0340 — CAMSHAFT POSITION SENSOR “A” CIRCUIT (BANK 1 OR SINGLE SENSOR) —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0341	Camshaft Position Sensor “A” Circuit Range/Performance (Bank 1 or Single Sensor)	<Ref. to EN(H4DOTC)-202, DTC P0341 — CAMSHAFT POSITION SENSOR “A” CIRCUIT RANGE/PERFORMANCE (BANK 1 OR SINGLE SENSOR) —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0420	Catalyst System Efficiency Below Threshold (Bank 1)	<Ref. to EN(H4DOTC)-206, DTC P0420 — CATALYST SYSTEM EFFICIENCY BELOW THRESHOLD (BANK 1) —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0442	Evaporative Emission Control System Leak Detected (small leak)	<Ref. to EN(H4DOTC)-208, DTC P0442 — EVAPORATIVE EMISSION CONTROL SYSTEM LEAK DETECTED (SMALL LEAK) —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0447	Evaporative Emission Control System Vent Control Circuit Open	<Ref. to EN(H4DOTC)-212, DTC P0447 — EVAPORATIVE EMISSION CONTROL SYSTEM VENT CONTROL CIRCUIT OPEN —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0448	Evaporative Emission Control System Vent Control Circuit Shorted	<Ref. to EN(H4DOTC)-216, DTC P0448 — EVAPORATIVE EMISSION CONTROL SYSTEM VENT CONTROL CIRCUIT SHORTED —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0451	Evaporative Emission Control System Pressure Sensor Range/Performance	<Ref. to EN(H4DOTC)-218, DTC P0451 — EVAPORATIVE EMISSION CONTROL SYSTEM PRESSURE SENSOR RANGE/PERFORMANCE —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0452	Evaporative Emission Control System Pressure Sensor Low Input	<Ref. to EN(H4DOTC)-220, DTC P0452 — EVAPORATIVE EMISSION CONTROL SYSTEM PRESSURE SENSOR LOW INPUT —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0453	Evaporative Emission Control System Pressure Sensor High Input	<Ref. to EN(H4DOTC)-224, DTC P0453 — EVAPORATIVE EMISSION CONTROL SYSTEM PRESSURE SENSOR HIGH INPUT —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0456	Evaporative Emission Control System Leak Detected (very small leak)	<Ref. to EN(H4DOTC)-228, DTC P0456 — EVAPORATIVE EMISSION CONTROL SYSTEM LEAK DETECTED (VERY SMALL LEAK) —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0457	Evaporative Emission Control System Leak Detected (fuel cap loose/off)	<Ref. to EN(H4DOTC)-232, DTC P0457 — EVAPORATIVE EMISSION CONTROL SYSTEM LEAK DETECTED (FUEL CAP LOOSE/OFF) —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

DTC No.	Description	Index
P0458	Evaporative Emission Control System Purge Control Valve Circuit Low	<Ref. to EN(H4DOTC)-236, DTC P0458 — EVAPORATIVE EMISSION CONTROL SYSTEM PURGE CONTROL VALVE CIRCUIT LOW —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0459	Evaporative Emission Control System Purge Control Valve Circuit High	<Ref. to EN(H4DOTC)-240, DTC P0459 — EVAPORATIVE EMISSION CONTROL SYSTEM PURGE CONTROL VALVE CIRCUIT HIGH —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0461	Fuel Level Sensor Circuit Range/Performance	<Ref. to EN(H4DOTC)-244, DTC P0461 — FUEL LEVEL SENSOR CIRCUIT RANGE/PERFORMANCE —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0462	Fuel level sensor circuit low input	<Ref. to EN(H4DOTC)-246, DTC P0462 — FUEL LEVEL SENSOR CIRCUIT LOW INPUT —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0463	Fuel level sensor circuit high input	<Ref. to EN(H4DOTC)-250, DTC P0463 — FUEL LEVEL SENSOR CIRCUIT HIGH INPUT —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0464	Fuel Level Sensor Circuit Intermittent	<Ref. to EN(H4DOTC)-254, DTC P0464 — FUEL LEVEL SENSOR CIRCUIT INTERMITTENT —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0483	Cooling Fan Rationality Check	<Ref. to EN(H4DOTC)-256, DTC P0483 — COOLING FAN RATIONALITY CHECK —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0502	Vehicle Speed Sensor Circuit Low Input	<Ref. to EN(H4DOTC)-260, DTC P0502 — VEHICLE SPEED SENSOR CIRCUIT LOW INPUT —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0503	Vehicle Speed Sensor Intermittent/Erratic/High	<Ref. to EN(H4DOTC)-262, DTC P0503 — VEHICLE SPEED SENSOR INTERMITTENT/ERRATIC/HIGH —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0506	Idle Control System RPM Lower Than Expected	<Ref. to EN(H4DOTC)-264, DTC P0506 — IDLE CONTROL SYSTEM RPM LOWER THAN EXPECTED —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0507	Idle Control System RPM Higher Than Expected	<Ref. to EN(H4DOTC)-266, DTC P0507 — IDLE CONTROL SYSTEM RPM HIGHER THAN EXPECTED —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0508	Idle Control System Circuit Low	<Ref. to EN(H4DOTC)-268, DTC P0508 — IDLE CONTROL SYSTEM CIRCUIT LOW —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0509	Idle Control System Circuit High	<Ref. to EN(H4DOTC)-270, DTC P0509 — IDLE CONTROL SYSTEM CIRCUIT HIGH —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0512	Starter switch circuit high input	<Ref. to EN(H4DOTC)-272, DTC P0512 — STARTER SWITCH CIRCUIT HIGH INPUT —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0519	Idle Control System Malfunction (Fail-safe)	<Ref. to EN(H4DOTC)-276, DTC P0519 — IDLE CONTROL SYSTEM MALFUNCTION (FAIL-SAFE) —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0545	Exthaust Gas Temperature Sensor Circuit Low-Bank 1	<Ref. to EN(H4DOTC)-278, DTC P0545 — EXTHAUST GAS TEMPERATURE SENSOR CIRCUIT LOW-BANK 1 —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0546	Exthaust Gas Temperature Sensor Circuit High-Bank 1	<Ref. to EN(H4DOTC)-280, DTC P0546 — EXTHAUST GAS TEMPERATURE SENSOR CIRCUIT HIGH-BANK 1 —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0565	Cruise Control Set Signal Circuit Malfunction for AT	<Ref. to EN(H4DOTC)-284, DTC P0565 — CRUISE CONTROL SET SIGNAL CIRCUIT MALFUNCTION FOR AT —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0604	Internal Control Module Random Access Memory (RAM) Error	<Ref. to EN(H4DOTC)-286, DTC P0604 — INTERNAL CONTROL MODULE RANDOM ACCESS MEMORY (RAM) ERROR —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0691	Cooling Fan 1 Control Circuit Low	<Ref. to EN(H4DOTC)-288, DTC P0691 — COOLING FAN 1 CONTROL CIRCUIT LOW —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

DTC No.	Description	Index
P0692	Cooling Fan 1 Control Circuit High	<Ref. to EN(H4DOTC)-292, DTC P0692 — COOLING FAN 1 CONTROL CIRCUIT HIGH —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0703	Torque Converter/Brake Switch “B” Circuit	<Ref. to EN(H4DOTC)-295, DTC P0703 — TORQUE CONVERTER/BRAKE SWITCH “B” CIRCUIT —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0705	Transmission Range Sensor Circuit (PRNDL Input)	<Ref. to AT-127, CHECK INHIBITOR SWITCH., Diagnostic Procedure for No-Diagnostic Trouble Code (DTC).>
P0710	Transmission Fluid Temperature Sensor Circuit	<Ref. to AT-50, DTC 27 ATF TEMPERATURE SENSOR, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0716	Input/Turbine Speed Sensor Circuit	<Ref. to AT-66, DTC 36 TORQUE CONVERTER TURBINE SPEED SENSOR, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0720	Output Speed Sensor Circuit	<Ref. to AT-61, DTC 33 FRONT VEHICLE SPEED SENSOR, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0726	Engine Speed Input Circuit	<Ref. to AT-44, DTC 11 ENGINE SPEED SIGNAL, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0731	Gear 1 incorrect ratio	<Ref. to EN(H4DOTC)-297, DTC P0731 — GEAR 1 INCORRECT RATIO — , Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0732	Gear 2 incorrect ratio	<Ref. to EN(H4DOTC)-297, DTC P0732 — GEAR 2 INCORRECT RATIO — , Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0733	Gear 3 incorrect ratio	<Ref. to EN(H4DOTC)-297, DTC P0733 — GEAR 3 INCORRECT RATIO — , Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0734	Gear 4 incorrect ratio	<Ref. to EN(H4DOTC)-298, DTC P0734 — GEAR 4 INCORRECT RATIO — , Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0741	Torque Converter Clutch Circuit Performance or Stuck Off	<Ref. to EN(H4DOTC)-299, DTC P0741 — TORQUE CONVERTER CLUTCH CIRCUIT PERFORMANCE OR STUCK OFF —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0743	Torque Converter Clutch Circuit Electrical	<Ref. to AT-104, DTC 77 LOCK-UP DUTY SOLENOID, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0748	Pressure Control Solenoid “A” Electrical	<Ref. to AT-92, DTC 75 LINE PRESSURE DUTY SOLENOID, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0753	Shift Solenoid “A” Electrical	<Ref. to AT-76, DTC 71 SHIFT SOLENOID 1, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0758	Shift Solenoid “B” Electrical	<Ref. to AT-80, DTC 72 SHIFT SOLENOID 2, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0771	AT Low Clutch Timing Solenoid Valve Circuit Malfunction	<Ref. to AT-84, DTC 73 LOW CLUTCH TIMING SOLENOID, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0778	Pressure Control Solenoid “B” Electrical	<Ref. to AT-98, DTC 76 2–4 BRAKE DUTY SOLENOID, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0785	Shift/Timing Solenoid	<Ref. to AT-88, DTC 74 2-4 BRAKE TIMING SOLENOID, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0851	Neutral Switch Input Circuit Low	<Ref. to EN(H4DOTC)-302, DTC P0851 — NEUTRAL SWITCH INPUT CIRCUIT LOW (AT) —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>or<Ref. to EN(H4DOTC)-304, DTC P0851 — NEUTRAL SWITCH INPUT CIRCUIT LOW (MT) —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0852	Neutral Switch Input Circuit High	<Ref. to EN(H4DOTC)-308, DTC P0852 — NEUTRAL SWITCH INPUT CIRCUIT HIGH (AT) —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>or<Ref. to EN(H4DOTC)-312, DTC P0852 — NEUTRAL SWITCH INPUT CIRCUIT HIGH (MT) —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0864	TCM Communication Circuit Range/Performance	<Ref. to EN(H4DOTC)-316, DTC P0864 — TCM COMMUNICATION CIRCUIT RANGE/PERFORMANCE —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0865	AT Diagnosis Input Signal Circuit Low Input	<Ref. to EN(H4DOTC)-318, DTC P0865 — AT DIAGNOSIS INPUT SIGNAL CIRCUIT LOW INPUT —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

DTC No.	Description	Index
P0866	AT Diagnosis Input Signal Circuit High Input	<Ref. to EN(H4DOTC)-320, DTC P0866 — AT DIAGNOSIS INPUT SIGNAL CIRCUIT HIGH INPUT —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1086	Tumble Generated Valve Position Sensor 2 Circuit Low	<Ref. to EN(H4DOTC)-322, DTC P1086 — TUMBLE GENERATED VALVE POSITION SENSOR 2 CIRCUIT LOW —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1087	Tumble Generated Valve Position Sensor 2 Circuit High	<Ref. to EN(H4DOTC)-326, DTC P1087 — TUMBLE GENERATED VALVE POSITION SENSOR 2 CIRCUIT HIGH —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1088	Tumble Generated Valve Position Sensor 1 Circuit Low	<Ref. to EN(H4DOTC)-328, DTC P1088 — TUMBLE GENERATED VALVE POSITION SENSOR 1 CIRCUIT LOW —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1089	Tumble Generated Valve Position Sensor 1 Circuit High	<Ref. to EN(H4DOTC)-332, DTC P1089 — TUMBLE GENERATED VALVE POSITION SENSOR 1 CIRCUIT HIGH —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1090	Tumble Generated Valve System 1 (Valve Open)	<Ref. to EN(H4DOTC)-334, DTC P1090 — TUMBLE GENERATED VALVE SYSTEM 1 (VALVE OPEN) —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1091	Tumble Generated Valve System 1 (Valve Close)	<Ref. to EN(H4DOTC)-334, DTC P1091 — TUMBLE GENERATED VALVE SYSTEM 1 (VALVE CLOSE) —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1092	Tumble Generated Valve System 2 (Valve Open)	<Ref. to EN(H4DOTC)-335, DTC P1092 — TUMBLE GENERATED VALVE SYSTEM 2 (VALVE OPEN) —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1093	Tumble Generated Valve System 2 (Valve Close)	<Ref. to EN(H4DOTC)-335, DTC P1093 — TUMBLE GENERATED VALVE SYSTEM 2 (VALVE CLOSE) —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1094	Tumble Generated Valve Signal 1 Circuit Malfunction (Open)	<Ref. to EN(H4DOTC)-336, DTC P1094 — TUMBLE GENERATED VALVE SIGNAL 1 CIRCUIT MALFUNCTION (OPEN) —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1095	Tumble Generated Valve Signal 1 Circuit Malfunction (Short)	<Ref. to EN(H4DOTC)-338, DTC P1095 — TUMBLE GENERATED VALVE SIGNAL 1 CIRCUIT MALFUNCTION (SHORT) —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1096	Tumble Generated Valve Signal 2 Circuit Malfunction (Open)	<Ref. to EN(H4DOTC)-340, DTC P1096 — TUMBLE GENERATED VALVE SIGNAL 2 CIRCUIT MALFUNCTION (OPEN) —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1097	Tumble Generated Valve Signal 2 Circuit Malfunction (Short)	<Ref. to EN(H4DOTC)-342, DTC P1097 — TUMBLE GENERATED VALVE SIGNAL 2 CIRCUIT MALFUNCTION (SHORT) —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1110	Atmospheric Pressure sensor circuit malfunction (Low input)	<Ref. to EN(H4DOTC)-343, DTC P1110 — ATMOSPHERIC PRESSURE SENSOR CIRCUIT MALFUNCTION (LOW INPUT) —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1111	Atmospheric Pressure sensor circuit malfunction (High input)	<Ref. to EN(H4DOTC)-344, DTC P1111 — ATMOSPHERIC PRESSURE SENSOR CIRCUIT MALFUNCTION (HIGH INPUT) —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1134	A/F sensor Micro-computer problem	<Ref. to EN(H4DOTC)-345, DTC P1134 — A/F SENSOR MICRO-COMPUTER PROBLEM —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1152	O_2 Sensor Circuit Range/Performance (Low) (Bank1 Sensor1)	<Ref. to EN(H4DOTC)-346, DTC P1152 — O_2 SENSOR CIRCUIT RANGE/PERFORMANCE (LOW) (BANK1 SENSOR1) —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1153	O_2 Sensor Circuit Range/Performance (High) (Bank1 Sensor1)	<Ref. to EN(H4DOTC)-348, DTC P1153 — O_2 SENSOR CIRCUIT RANGE/PERFORMANCE (HIGH) (BANK1 SENSOR1) —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1301	Misfire Ditected (High Temperature Exhaust Gas)	<Ref. to EN(H4DOTC)-352, DTC P1301 — MISFIRE DITECTED (HIGH TEMPERATURE EXHAUST GAS) —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

DTC No.	Description	Index
P1312	Exhaust Gas Temperature Sensor Malfunction	<Ref. to EN(H4DOTC)-354, DTC P1312 — EXHAUST GAS TEMPERATURE SENSOR MALFUNCTION —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1400	Fuel Tank Pressure Control Solenoid Valve Circuit Low	<Ref. to EN(H4DOTC)-356, DTC P1400 — FUEL TANK PRESSURE CONTROL SOLENOID VALVE CIRCUIT LOW —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1420	Fuel Tank Pressure Control sol. Valve Circuit High	<Ref. to EN(H4DOTC)-360, DTC P1420 — FUEL TANK PRESSURE CONTROL SOL. VALVE CIRCUIT HIGH —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1443	Vent Control Solenoid Valve Function Problem	<Ref. to EN(H4DOTC)-364, DTC P1443 — VENT CONTROL SOLENOID VALVE FUNCTION PROBLEM —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1446	Fuel Tank Sensor Control Valve Circuit Low	<Ref. to EN(H4DOTC)-366, DTC P1446 — FUEL TANK SENSOR CONTROL VALVE CIRCUIT LOW —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1447	Fuel Tank Sensor Control Valve Circuit High	<Ref. to EN(H4DOTC)-370, DTC P1447 — FUEL TANK SENSOR CONTROL VALVE CIRCUIT HIGH —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1448	Fuel Tank Sensor Control Valve Range/Performance	<Ref. to EN(H4DOTC)-372, DTC P1448 — FUEL TANK SENSOR CONTROL VALVE RANGE/PERFORMANCE —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1518	Starter Switch Circuit Low Input	<Ref. to EN(H4DOTC)-374, DTC P1518 — STARTER SWITCH CIRCUIT LOW INPUT —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1544	Exhaust Gas Temperature Too High	<Ref. to EN(H4DOTC)-378, DTC P1544 — EXHAUST GAS TEMPERATURE TOO HIGH —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1560	Back-up voltage circuit malfunction	<Ref. to EN(H4DOTC)-380, DTC P1560 — BACK-UP VOLTAGE CIRCUIT MALFUNCTION —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1698	Engine Torque Control Cut Signal Circuit Malfunction (Low Input)	<Ref. to EN(H4DOTC)-382, DTC P1698 — ENGINE TORQUE CONTROL CUT SIGNAL CIRCUIT MALFUNCTION (LOW INPUT) —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1699	Engine Torque Control Cut Signal Circuit Malfunction (High Input)	<Ref. to EN(H4DOTC)-384, DTC P1699 — ENGINE TORQUE CONTROL CUT SIGNAL CIRCUIT MALFUNCTION (HIGH INPUT) —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1700	Throttle Position Sensor Circuit Malfunction for AT	<Ref. to AT-54, DTC 31 THROTTLE POSITION SENSOR, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1711	Engine Torque Control Signal #1 Circuit Malfunction	<Ref. to EN(H4DOTC)-386, DTC P1711 — ENGINE TORQUE CONTROL SIGNAL #1 CIRCUIT MALFUNCTION —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1712	Engine Torque Control Signal #2 Circuit Malfunction	<Ref. to EN(H4DOTC)-388, DTC P1712 — ENGINE TORQUE CONTROL SIGNAL #2 CIRCUIT MALFUNCTION —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

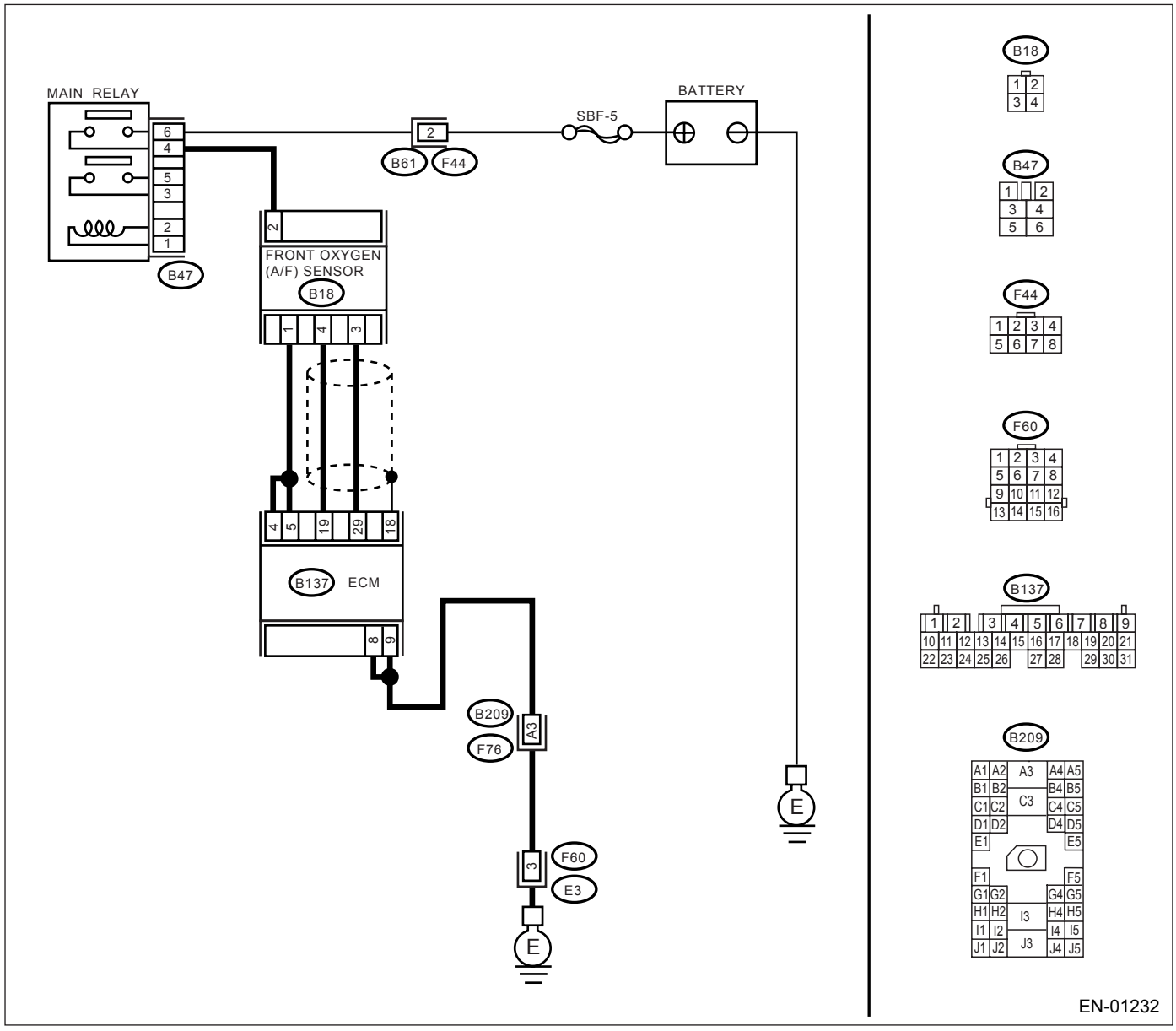
19.Diagnostic Procedure with Diagnostic Trouble Code (DTC)

A: DTC P0030 — HO_2S HEATER CONTROL CIRCUIT (BANK 1 SENSOR 1) —

- **DTC DETECTING CONDITION:**
  - Fault occurs in two consecutive driving cycles

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to EN(H4DOTC)-49, OPERATION, Clear Memory Mode.> and INSPECTION MODE <Ref. to EN(H4DOTC)-41, Inspection Mode.>.

- **WIRING DIAGRAM:**



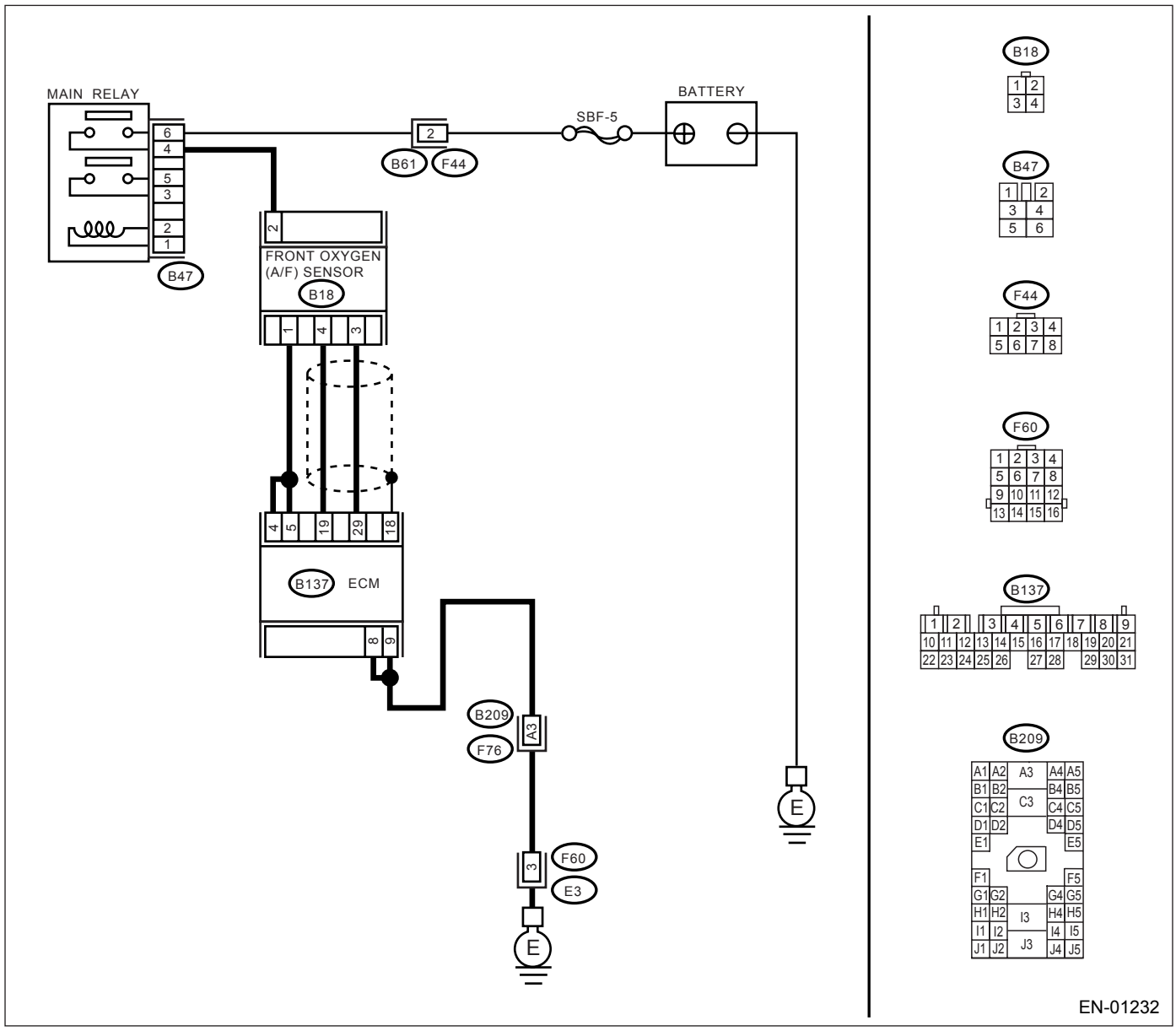
	Step	Check	Yes	No
1	**CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR CONNECTOR.** 1)Start and warm-up the engine. 2)Turn ignition switch to OFF. 3)Disconnect the connectors from ECM and front oxygen (A/F) sensor. 4)Measure the resistance of harness between ECM and front oxygen (A/F) sensor connector. ***Connector & terminal*** ***(B137) No. 5 — (B18) No. 1:*** ***(B137) No. 4 — (B18) No. 1:*** Is the measured value less than the specified value?	1 Ω	Go to step **2.**	Repair the open circuit in harness between ECM and front oxygen (A/F) sensor connector.
2	**CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR CONNECTOR.** Measure the resistance of harness between ECM and front oxygen (A/F) sensor connector. ***Connector & terminal*** ***(B137) No. 19 — (B18) No. 4:*** ***(B137) No. 29 — (B18) No. 3:*** Is the measured value less than the specified value?	1 Ω	Go to step **3.**	Repair the open circuit in harness between ECM and front oxygen (A/F) sensor connector.
3	**CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR CONNECTOR.** Measure the resistance of harness between main relay and front oxygen (A/F) sensor connector. ***Connector & terminal*** ***(B47) No. 4 — (B18) No. 2:*** Is the measured value less than the specified value?	1 Ω	Go to step **4.**	Repair the open circuit in harness between ECM and front oxygen (A/F) sensor connector.
4	**CHECK FRONT OXYGEN (A/F) SENSOR.** Measure the resistance between front oxygen (A/F) sensor connector terminals. ***Terminal*** ***No. 2 — No. 1:*** Is the measured value less than the specified value?	5 Ω	Go to step **5.**	Replace the front oxygen (A/F) sensor. <Ref. to FU(H4DOTC)-45, Front Oxygen (A/F) Sensor.>
5	**CHECK FOR POOR CONTACT.** Check for poor contact in ECM and front oxygen (A/F) sensor connectors. Is there poor contact in ECM or front oxygen (A/F) sensor connector?	There is poor contact.	Repair the poor contact in ECM or front oxygen (A/F) sensor connector.	Replace the front oxygen (A/F) sensor. <Ref. to FU(H4DOTC)-45, Front Oxygen (A/F) Sensor.>

B: DTC P0031 — HO_2S HEATER CONTROL CIRCUIT LOW (BANK 1 SENSOR 1) —

- **DTC DETECTING CONDITION:**
  - Immediately at fault recognition

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to EN(H4DOTC)-49, OPERATION, Clear Memory Mode.> and INSPECTION MODE <Ref. to EN(H4DOTC)-41, Inspection Mode.>.

- **WIRING DIAGRAM:**



	Step	Check	Yes	No
1	**CHECK POWER SUPPLY TO FRONT OXYGEN (A/F) SENSOR.** 1)Turn ignition switch to OFF. 2)Disconnect the connector from front oxygen (A/F) sensor. 3)Turn ignition switch to ON. 4)Measure the voltage between front oxygen (A/F) sensor connector and engine ground. ***Connector & terminal*** ***(B18) No. 2 (+) — Engine ground (–):*** Is the measured value more than the specified value?	10 V	Go to step **2.**	Repair power supply line. NOTE: In this case, repair the following: • Open circuit in harness between main relay and front oxygen (A/F) sensor connector • Poor contact in main relay connector • Malfunction in main relay
2	**CHECK GROUND CIRCUIT OF ECM.** Measure the resistance of harness between ECM connector and chassis ground. ***Connector & terminal*** ***(B137) No. 8 — Chassis ground:*** ***(B137) No. 9 — Chassis ground:*** Is the measured value less than the specified value?	5 Ω	Go to step **3.**	Repair harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between ECM and engine ground cable • Poor contact in ECM connector • Poor contact in coupling connector
3	**CHECK CURRENT DATA.** 1)Start the engine. 2)Read the data of front oxygen (A/F) sensor heater current using Subaru Select Monitor or OBD-II general scan tool. Is the measured value more than the specified value? NOTE: •Subaru Select Monitor For detailed operation procedures, refer to READ CURRENT DATA FOR ENGINE. <Ref. to EN(H4DOTC)-33, Subaru Select Monitor.> •OBD-II general scan tool For detailed operation procedures, refer to the OBD-II General Scan Tool Instruction Manual.	0.2 A	Repair poor contact in connector. NOTE: In this case, repair the following: • Poor contact in front oxygen (A/F) sensor connector • Poor contact in ECM connector	Go to step **4.**
4	**CHECK OUTPUT SIGNAL FROM ECM.** 1)Start and idle the engine. 2)Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B137) No. 4 (+) — Chassis ground (–):*** ***(B137) No. 5 (+) — Chassis ground (–):*** Is the measured value less than the specified value?	1.0 V	Go to step **6.**	Go to step **5.**

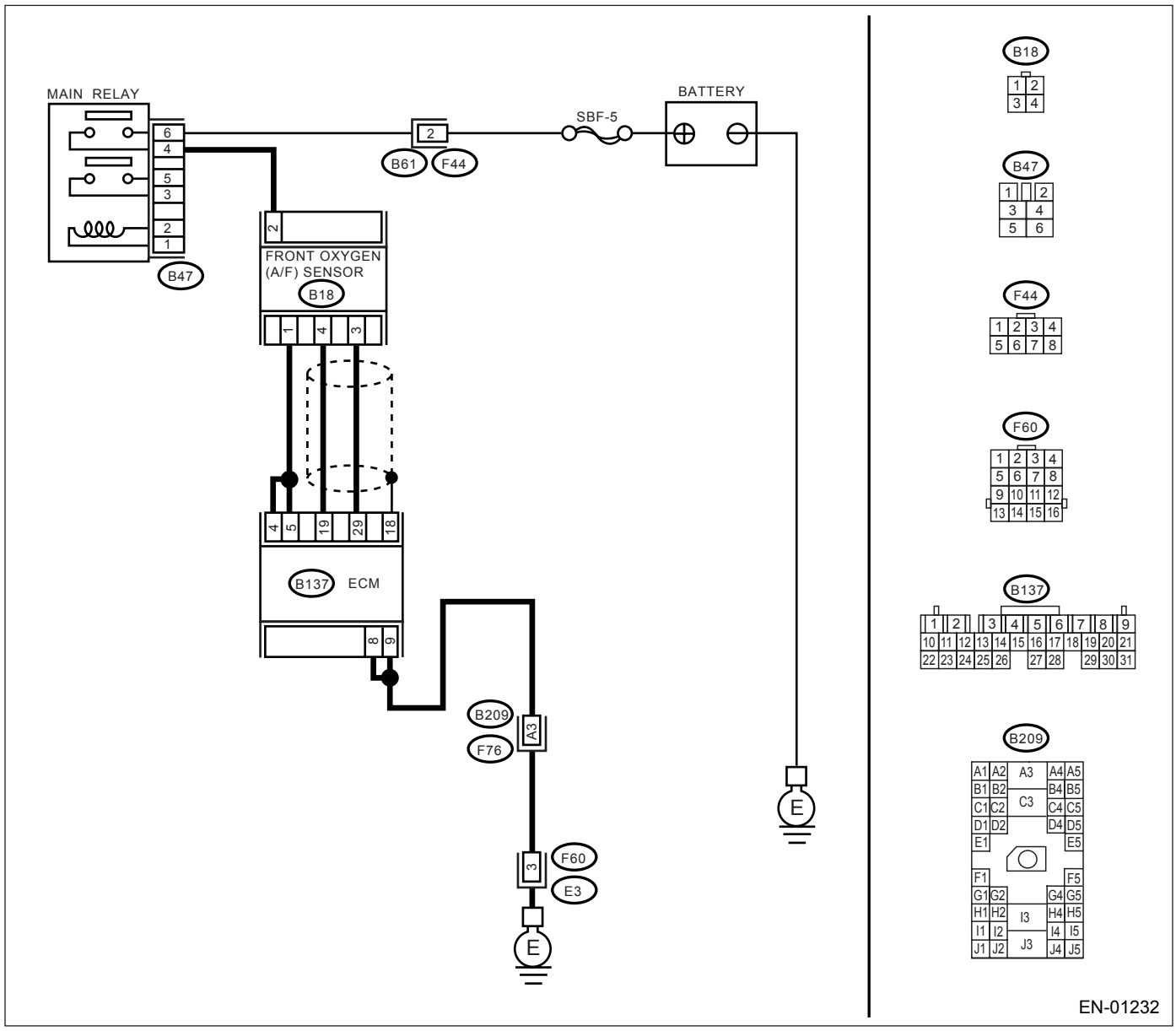
	Step	Check	Yes	No
5	**CHECK OUTPUT SIGNAL FROM ECM.** Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B137) No. 4 (+) — Chassis ground (−):*** ***(B137) No. 5 (+) — Chassis ground (−):*** Does the voltage variance stay less than the specified value while monitoring the voltmeter and shaking the ECM harness and connector ?	1.0 V	Repair poor contact in ECM connector.	Go to step **6.**
6	**CHECK FRONT OXYGEN (A/F) SENSOR.** 1)Turn ignition switch to OFF. 2)Measure the resistance between front oxygen (A/F) sensor connector terminals. ***Terminal*** ***No. 2 — No. 1:*** Is the measured value less than the specified value?	10 Ω	Repair harness and connector. NOTE: In this case, repair the following: • Open or short circuit to ground in harness between front oxygen (A/F) sensor and ECM connector • Poor contact in front oxygen (A/F) sensor connector • Poor contact in ECM connector	Replace the front oxygen (A/F) sensor. <Ref. to FU(H4DOTC)-45, Front Oxygen (A/F) Sensor.>

C: DTC P0032 — HO_2S HEATER CONTROL CIRCUIT HIGH (BANK 1 SENSOR 1) —

- **DTC DETECTING CONDITION:**
  - Immediately at fault recognition

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to EN(H4DOTC)-49, OPERATION, Clear Memory Mode.> and INSPECTION MODE <Ref. to EN(H4DOTC)-41, Inspection Mode.>.

- **WIRING DIAGRAM:**



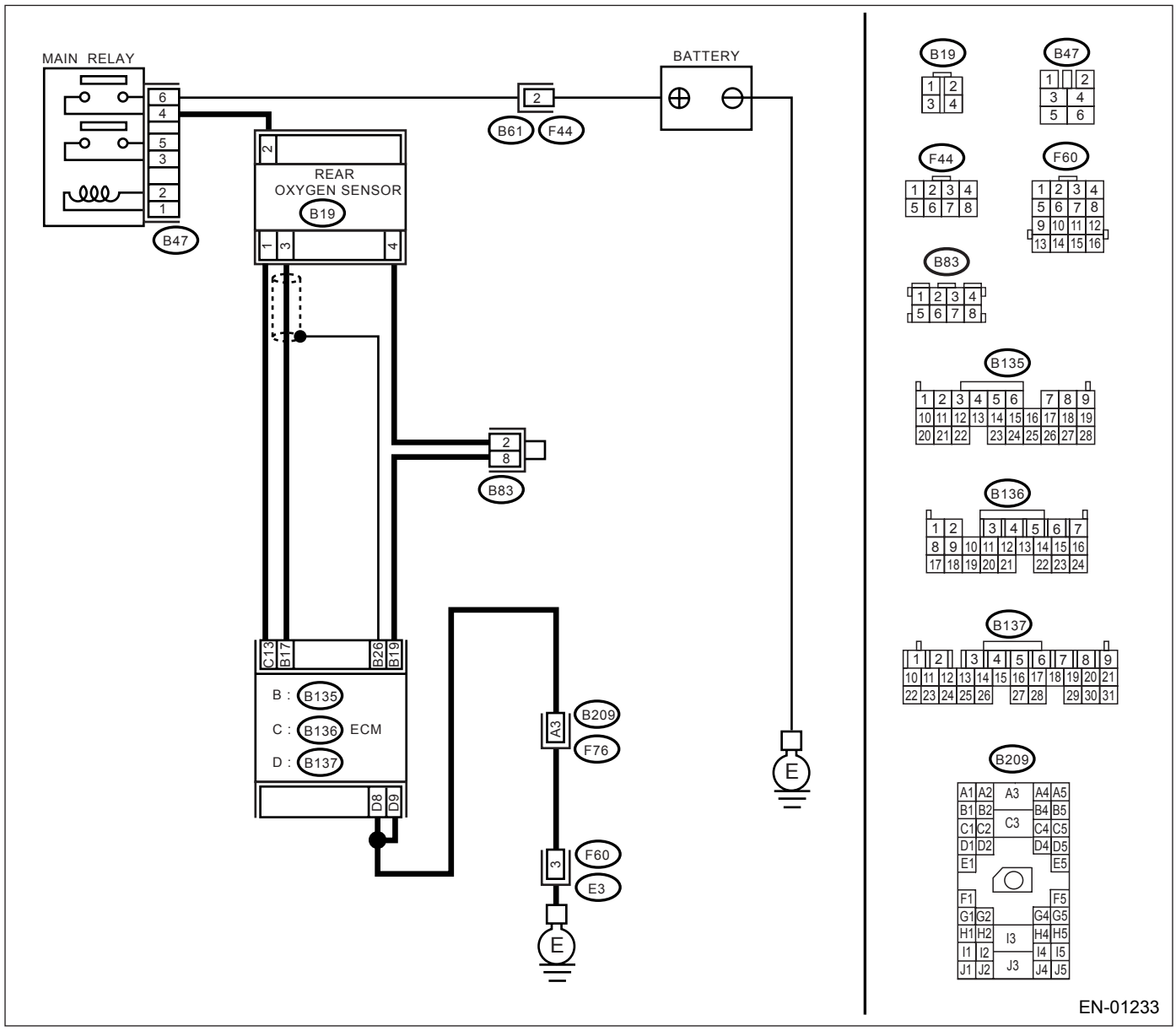
	Step	Check	Yes	No
1	**CHECK OUTPUT SIGNAL FROM ECM.** 1)Turn ignition switch to ON. 2)Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B137) No. 4 (+) — Chassis ground (−):*** ***(B137) No. 5 (+) — Chassis ground (−):*** Is the measured value more than the specified value?	8 V	Go to step **3.**	Go to step **2.**
2	**CHECK FRONT OXYGEN (A/F) SENSOR HEATER CURRENT.** 1)Turn ignition switch to OFF. 2)Repair the short circuit to battery in harness between ECM and front oxygen (A/F) sensor connector. 3)Turn ignition switch to ON. 4)Read the data of front oxygen (A/F) sensor heater current using Subaru Select Monitor or OBD-II general scan tool. Is the measured value more than the specified value? NOTE: •Subaru Select Monitor For detailed operation procedures, refer to READ CURRENT DATA FOR ENGINE. <Ref. to EN(H4DOTC)-33, Subaru Select Monitor.> •OBD-II general scan tool For detailed operation procedures, refer to the OBD-II General Scan Tool Instruction Manual.	2.3 A	Replace the ECM. <Ref. to FU(H4DOTC)-50, Engine Control Module.>	END
3	**CHECK OUTPUT SIGNAL FROM ECM.** Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B137) No. 4 (+) — Chassis ground (−):*** ***(B137) No. 5 (+) — Chassis ground (−):*** Does the voltage variance exceed the specified value while monitoring the voltmeter and shaking the ECM harness and connector ?	8 V	Repair the short circuit to battery in harness between ECM and front oxygen (A/F) sensor connector.	END

D: DTC P0037 — HO_2S HEATER CONTROL CIRCUIT LOW (BANK 1 SENSOR 2) —

- **DTC DETECTING CONDITION:**
  - Immediately at fault recognition

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to EN(H4DOTC)-49, OPERATION, Clear Memory Mode.> and INSPECTION MODE <Ref. to EN(H4DOTC)-41, Inspection Mode.>.

- **WIRING DIAGRAM:**



	Step	Check	Yes	No
1	**CHECK GROUND CIRCUIT OF ECM.** 1)Turn ignition switch to OFF. 2)Disconnect the connector from ECM. 3)Measure the resistance of harness between ECM connector and chassis ground. ***Connector & terminal*** ***(B137) No. 8 — Chassis ground:*** ***(B137) No. 9 — Chassis ground:*** Is the measured value less than the specified value?	5 Ω	Go to step **2.**	Repair harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between ECM and engine ground cable • Poor contact in ECM connector • Poor contact in coupling connector
2	**CHECK CURRENT DATA.** 1)Start the engine. 2)Read the data of rear oxygen sensor heater current using Subaru Select Monitor or OBD-II general scan tool. Is the measured value more than the specified value? NOTE: •Subaru Select Monitor For detailed operation procedures, refer to READ CURRENT DATA FOR ENGINE. <Ref. to EN(H4DOTC)-33, Subaru Select Monitor.> •OBD-II general scan tool For detailed operation procedures, refer to the OBD-II General Scan Tool Instruction Manual.	0.2 A	Repair the connector. NOTE: In this case, repair the following: • Poor contact in rear oxygen sensor connector • Poor contact in rear oxygen sensor connecting harness connector • Poor contact in ECM connector	Go to step **3.**
3	**CHECK OUTPUT SIGNAL FROM ECM.** 1)Start and idle the engine. 2)Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B136) No. 13 (+) — Chassis ground (−):*** Is the measured value less than the specified value?	1.0 V	Go to step **6.**	Go to step **4.**
4	**CHECK OUTPUT SIGNAL FROM ECM.** Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B136) No. 13 (+) — Chassis ground (−):*** Does the voltage variance stay less than the specified value while monitoring the voltmeter and shaking the ECM harness and connector ?	1.0 V	Repair poor contact in ECM connector.	Go to step **5.**
5	**CHECK OUTPUT SIGNAL FROM ECM.** 1)Turn ignition switch to OFF. 2)Disconnect the connector from rear oxygen sensor. 3)Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B136) No. 13 (+) — Chassis ground (−):*** Is the measured value less than the specified value?	1.0 V	Replace the ECM. <Ref. to FU(H4DOTC)-50, Engine Control Module.>	Repair short circuit to battery in harness between ECM and rear oxygen sensor connector. After repair, replace the ECM. <Ref. to FU(H4DOTC)-50, Engine Control Module.>

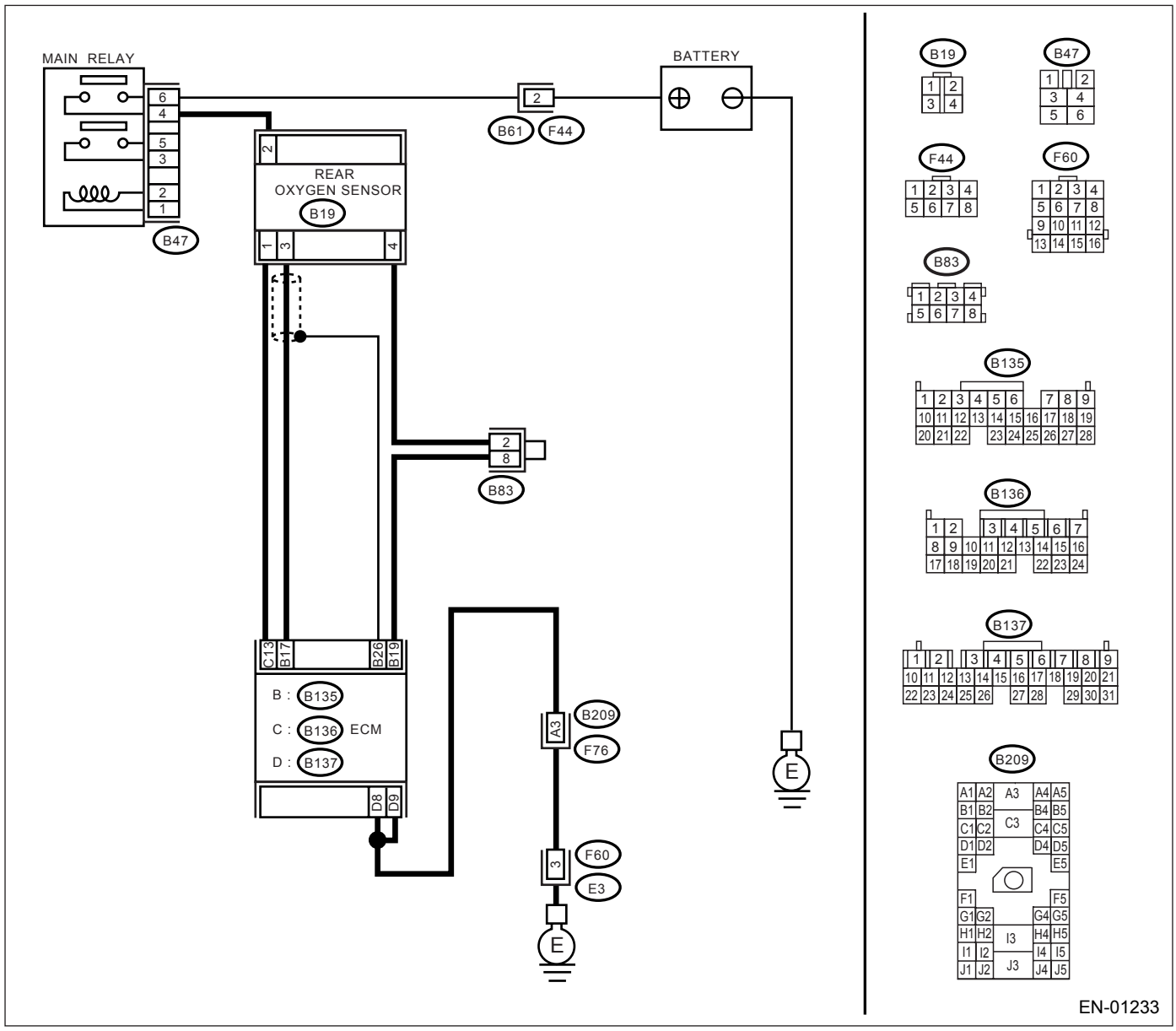
	Step	Check	Yes	No
6	**CHECK POWER SUPPLY TO REAR OXYGEN SENSOR.** 1)Turn ignition switch to OFF. 2)Disconnect the connector from rear oxygen sensor. 3)Turn ignition switch to ON. 4)Measure the voltage between rear oxygen sensor connector and engine ground or chassis ground. ***Connector & terminal*** ***(B19) No. 1 (+) — Chassis ground (–):*** Is the measured value more than the specified value?	10 V	Go to step **7.**	Repair power supply line. NOTE: In this case, repair the following: • Open circuit in harness between main relay and rear oxygen sensor connector • Poor contact in main relay connector • Malfunction in main relay
7	**CHECK REAR OXYGEN SENSOR.** 1)Turn ignition switch to OFF. 2)Measure the resistance between rear oxygen sensor connector terminals. ***Terminal*** ***No. 1 — No. 2:*** Is the measured value less than the specified value?	30 Ω	Repair harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between rear oxygen sensor and ECM connector • Poor contact in rear oxygen sensor connector • Poor contact in ECM connector • Poor contact in coupling connector	Replace the rear oxygen sensor. <Ref. to FU(H4DOTC)-47, Rear Oxygen Sensor.>

E: DTC P0038 — HO_2S HEATER CONTROL CIRCUIT HIGH (BANK 1 SENSOR 2) —

- **DTC DETECTING CONDITION:**
  - Immediately at fault recognition

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to EN(H4DOTC)-49, OPERATION, Clear Memory Mode.> and INSPECTION MODE <Ref. to EN(H4DOTC)-41, Inspection Mode.>.

- **WIRING DIAGRAM:**



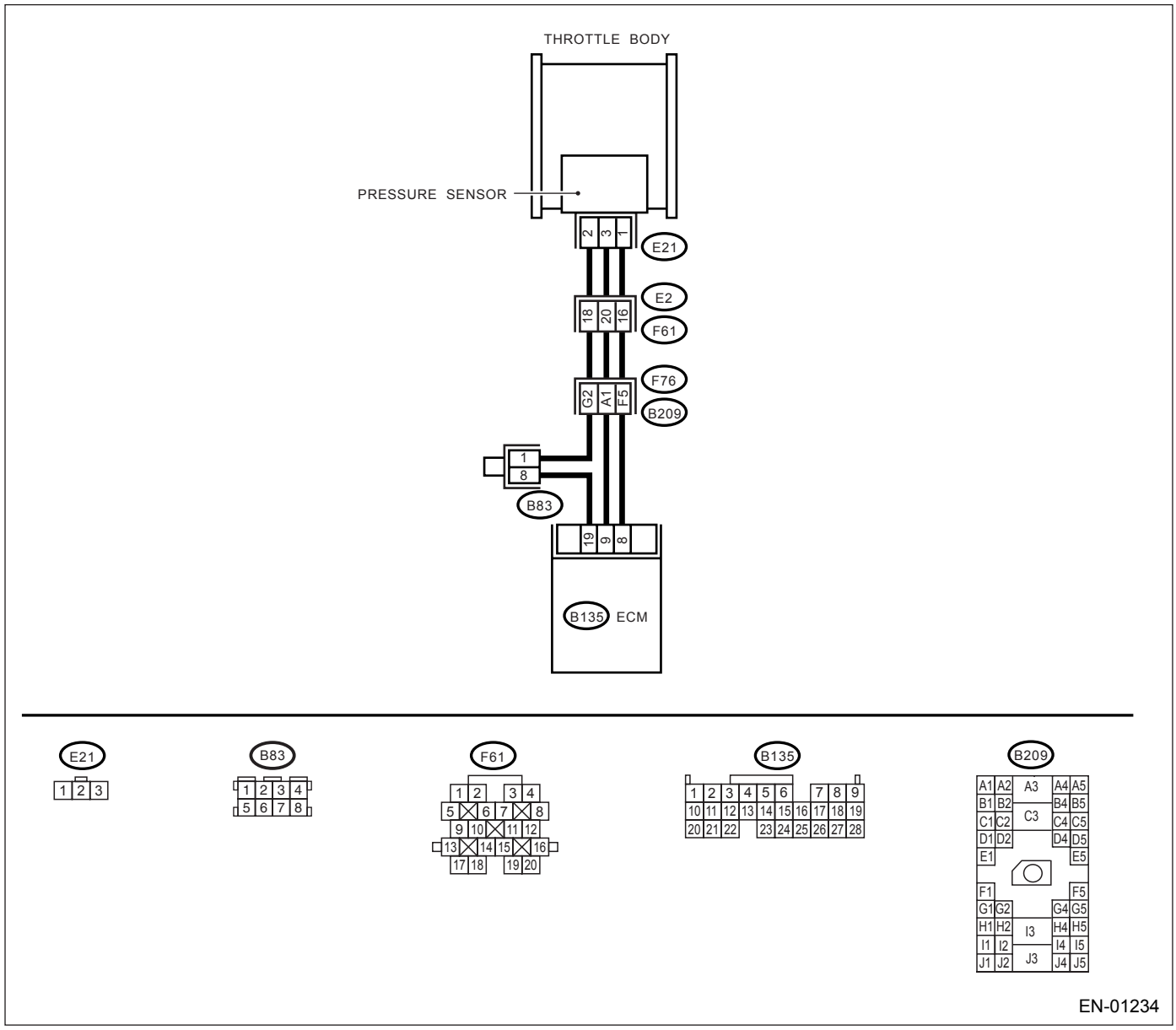
	Step	Check	Yes	No
1	**CHECK INPUT SIGNAL FOR ECM.** 1)Turn ignition switch to OFF. 2)Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B136) No. 13 (+) — Chassis ground (−):*** Is the measured value more than the specified value?	8 V	Go to step **2.**	Go to step **3.**
2	**CHECK CURRENT DATA.** 1)Repair short circuit to battery in harness between ECM and rear oxygen sensor connector. 2)Turn ignition switch to ON. 3)Read the data of rear oxygen sensor heater current using Subaru Select Monitor or OBD-II general scan tool. Is the measured value more than the specified value? NOTE: •Subaru Select Monitor For detailed operation procedures, refer to READ CURRENT DATA FOR ENGINE. <Ref. to EN(H4DOTC)-33, Subaru Select Monitor.> •OBD-II general scan tool For detailed operation procedures, refer to the OBD-II General Scan Tool Instruction Manual.	7 A	Replace the ECM. <Ref. to FU(H4DOTC)-50, Engine Control Module.>	END
3	**CHECK FOR POOR CONTACT.** Check for poor contact in ECM connector. Is there poor contact in ECM connector?	There is poor contact.	Repair poor contact in ECM connector.	END

F: DTC P0068 — MANIFOLD ABSOLUTE PRESSURE/BAROMETRIC PRESSURE CIRCUIT RANGE/PERFORMANCE —

- **DTC DETECTING CONDITION:**
  - Fault occurs in two consecutive driving cycles
- **TROUBLE SYMPTOM:**
  - Failure of engine to start

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to EN(H4DOTC)-49, OPERATION, Clear Memory Mode.> and INSPECTION MODE <Ref. to EN(H4DOTC)-41, Inspection Mode.>.

- **WIRING DIAGRAM:**



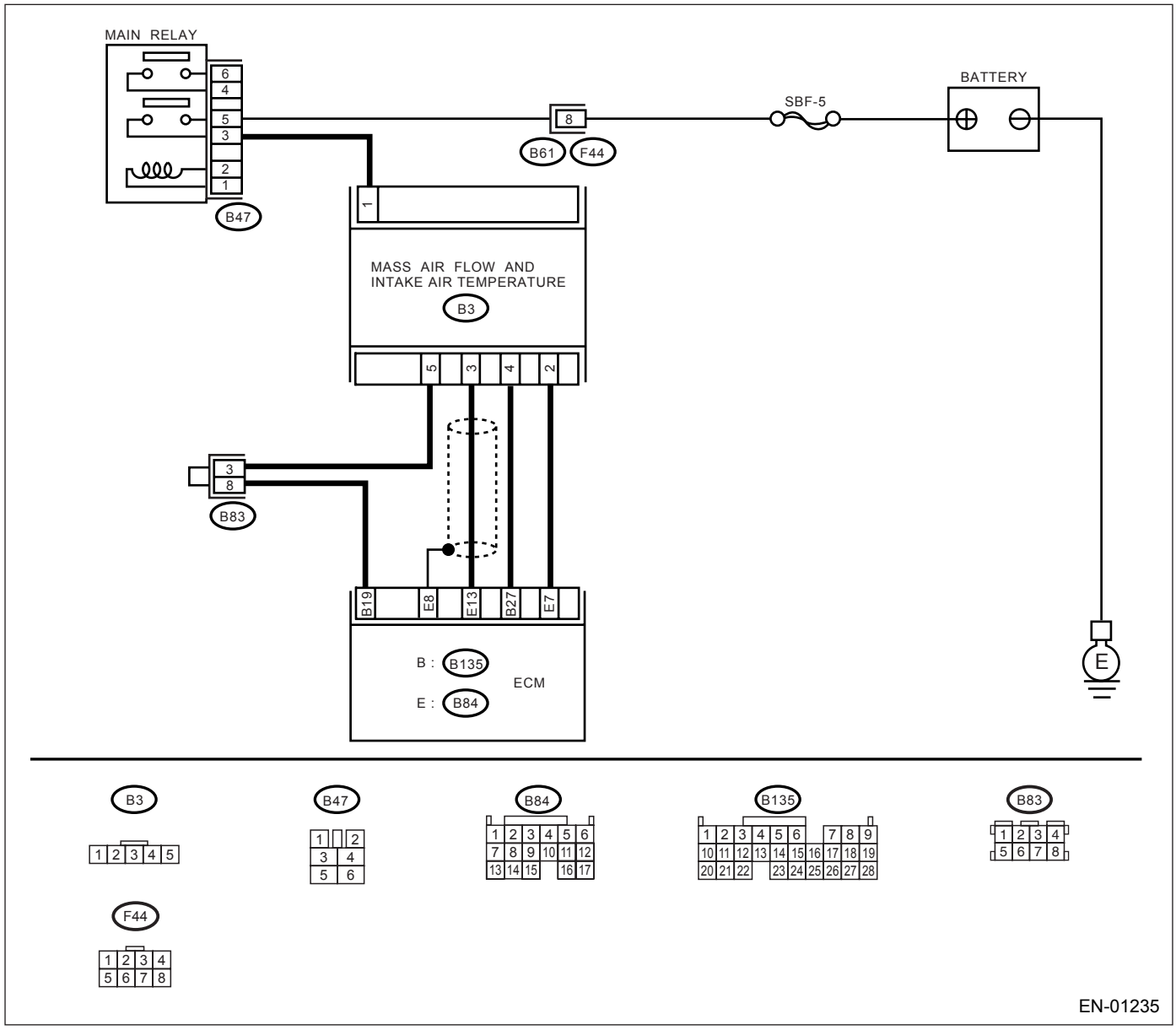
	Step	Check	Yes	No
1	**CHECK IDLE SWITCH SIGNAL.** 1)Turn ignition switch to ON. 2)Activate the LED operation mode for engine using the Subaru Select Monitor. Does the {Idle Switch Signal} LED come on? NOTE: •Subaru Select Monitor For detailed operation procedures, refer to LED Operation Mode for Engine. <Ref. to EN(H4DOTC)-33, Subaru Select Monitor.>	LED comes on.	Go to step **2.**	Check throttle position sensor circuit. <Ref. to EN(H4DOTC)-134, DTC P0121 — THROTTLE/ PEDAL POSITION SENSOR/ SWITCH “A” CIRCUIT RANGE/ PERFORMANCE —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).> NOTE: In this case, it is not necessary to inspect DTC P0106.
2	**CHECK FOR OTHER DIAGNOSTIC TROUBLE CODE (DTC) ON DISPLAY.** Is any other DTC displayed?	Other DTC is displayed.	Record related DTCs. List of Diagnostic Trouble Codes (DTC) <Ref. to EN(H4DOTC)-81, List of Diagnostic Trouble Codes (DTC).> NOTE: In this case, it is not necessary to inspect DTC P0106.	Go to step **3.**
3	**CHECK CONDITION OF INTAKE MANIFOLD PRESSURE SENSOR.** Is the pressure sensor installation bolt tightened securely?	Tightened securely.	Go to step **4.**	Tighten pressure sensor installation bolt securely.
4	**CHECK CONDITION OF THROTTLE BODY.** Is the throttle body installation bolt tightened securely?	Tightened securely.	Replace the pressure sensor. <Ref. to FU(H4DOTC)-35, Pressure Sensor.>	Tighten throttle body installation bolt securely.

G: DTC P0101 — MASS OR VOLUME AIR FLOW CIRCUIT RANGE/PERFORMANCE —

- **DTC DETECTING CONDITION:**
  - Fault occurs in two consecutive driving cycles
- **TROUBLE SYMPTOM:**
  - Erroneous idling
  - Engine stalls.
  - Poor driving performance

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to EN(H4DOTC)-49, OPERATION, Clear Memory Mode.> and INSPECTION MODE <Ref. to EN(H4DOTC)-41, Inspection Mode.>.

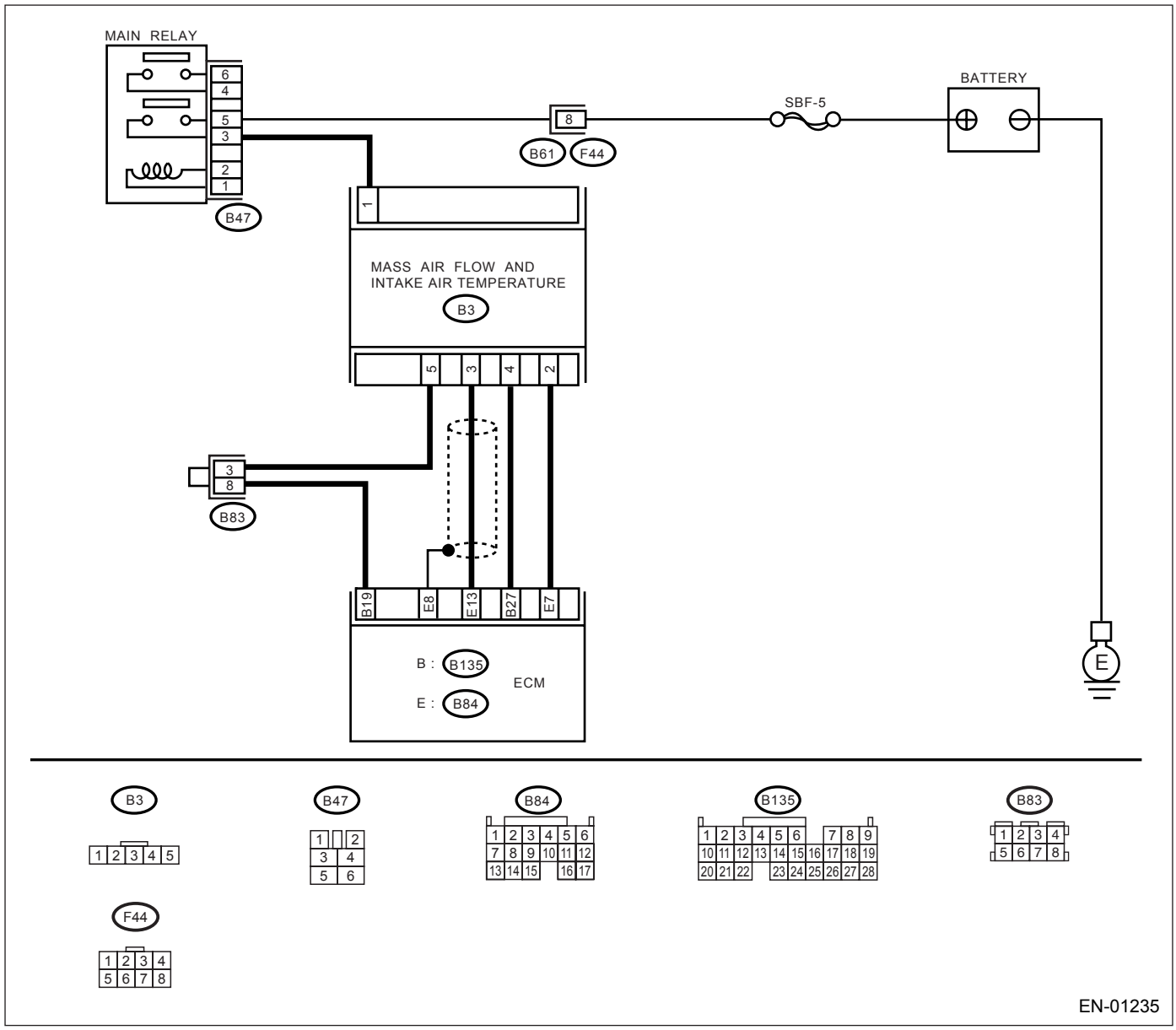
- **WIRING DIAGRAM:**



	Step	Check	Yes	No
1	**CHECK FOR OTHER DIAGNOSTIC TROUBLE CODE (DTC) ON DISPLAY.** Is any other DTC displayed?	Other DTC is displayed.	Inspect the relevant DTC using the “List of Diagnostic Trouble Codes (DTC)”. <Ref. to EN(H4DOTC)-81, List of Diagnostic Trouble Codes (DTC).> NOTE: In this case, it is not necessary to inspect DTC P0101.	Replace mass air flow & intake air temperature sensor. <Ref. to FU(H4DOTC)-34, Mass Air Flow and Intake Air Temperature Sensor.>

H: DTC P0102 — MASS OR VOLUME AIR FLOW CIRCUIT LOW INPUT —

- **DTC DETECTING CONDITION:**
  - Immediately at fault recognition
- **TROUBLE SYMPTOM:**
  - Erroneous idling
  - Engine stalls
  - Poor driving performance
- **WIRING DIAGRAM:**



	Step	Check	Yes	No
1	**Connect a Subaru Select Monitor or OBD-II general scan tool to read the data.** 1)Turn ignition switch to OFF. 2)Connect the Subaru Select Monitor or the OBD-II general scan tool to data link connector. 3)Turn the ignition switch to ON and the Subaru Select Monitor or OBD-II general scan tool switch to ON. 4)Start the engine. 5)Read the mass air flow sensor voltage using Subaru Select Monitor or OBD-II general scan tool. Is the measured value within the specified range? NOTE: •Subaru Select Monitor For detailed operation procedures, refer to READ CURRENT DATA FOR ENGINE. <Ref. to EN(H4DOTC)-33, Subaru Select Monitor.> •OBD-II general scan tool For detailed operation procedures, refer to the OBD-II General Scan Tool Instruction Manual.	0.2 — 4.7 V	The MIL may light up, however, the circuit is returned to the normal status at the moment. A temporary poor contact in the connector or harness may be the cause. Repair the harness or connector for mass air flow sensor. NOTE: In this case, repair the following: • Open or short circuit to ground in harness between mass air flow sensor and ECM connector. • Poor contact in mass air flow sensor or ECM connector	Go to step **2.**
2	**CHECK INPUT SIGNAL FOR ECM.** Idle the engine and measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B84) No. 13 (+) — Chassis ground (−):*** Is the measured value less than the specified value?	0.2 V	Go to step **4.**	Go to step **3.**
3	**CHECK INPUT SIGNAL FOR ECM. (USING SUBARU SELECT MONITOR.)** Idle the engine and measure the voltage between ECM connector and chassis ground. Does the voltage variance exceed the specified value while monitoring the Subaru Select Monitor and shaking the ECM harness and connector ?	0.2 V	Repair poor contact in ECM connector.	Contact SOA (distributor) service. NOTE: Inspection by DTM is required, because probable cause is deterioration of multiple parts.
4	**CHECK POWER SUPPLY FOR MASS AIR FLOW SENSOR.** 1)Turn ignition switch to OFF. 2)Disconnect the connector from mass air flow sensor. 3)Turn ignition switch to ON. 4)Check the voltage between mass air flow sensor connector and chassis ground. ***Connector & terminal*** ***(B3) No. 1 (+) — Chassis ground (−):*** Is the measured value more than the specified value?	5 V	Go to step **5.**	Repair open circuit between mass air flow sensor and main relay.

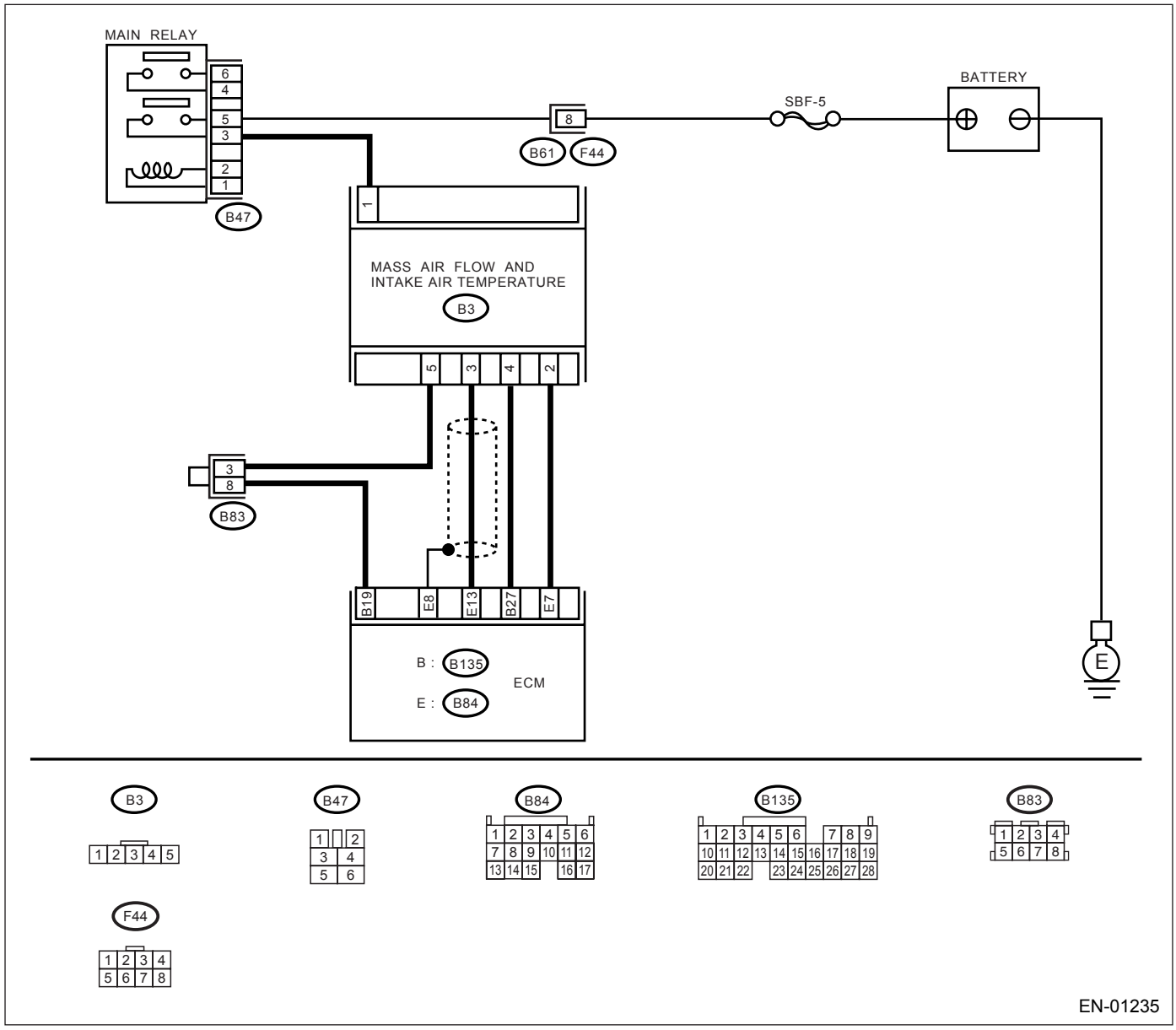
	Step	Check	Yes	No
5	**CHECK HARNESS BETWEEN ECM AND MASS AIR FLOW SENSOR CONNECTOR.** 1)Turn ignition switch to OFF. 2)Disconnect the connector from ECM. 3)Measure the resistance of harness between ECM and mass air flow sensor connector. ***Connector & terminal*** ***(B84) No. 13 — (B3) No. 3:*** ***(B84) No. 7 — (B3) No. 2:*** ***(B135) No. 19 — (B3) No. 5:*** Is the measured value less than the specified value?	1 Ω	Go to step **6.**	Repair open circuit between ECM and mass air flow sensor connector.
6	**CHECK HARNESS BETWEEN ECM AND MASS AIR FLOW SENSOR CONNECTOR.** Measure the resistance of harness between ECM and chassis ground. ***Connector & terminal*** ***(B84) No. 13 — Chassis ground:*** ***(B84) No. 7 — Chassis ground:*** ***(B135) No. 19 — Chassis ground:*** Is the measured value more than the specified value?	1 MΩ	Go to step **7.**	Repair short circuit to ground between ECM and mass air flow sensor connector.
7	**CHECK FOR POOR CONTACT.** Check for poor contact in mass air flow sensor connector. Is there poor contact in mass air flow sensor connector?	There is poor contact.	Repair poor contact in mass air flow sensor connector.	Replace mass air flow & intake air temperature sensor. <Ref. to FU(H4DOTC)-34, Mass Air Flow and Intake Air Temperature Sensor.>

I: DTC P0103 — MASS OR VOLUME AIR FLOW CIRCUIT HIGH INPUT —

- **DTC DETECTING CONDITION:**
  - Immediately at fault recognition
- **TROUBLE SYMPTOM:**
  - Erroneous idling
  - Engine stalls
  - Poor driving performance

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to EN(H4DOTC)-49, OPERATION, Clear Memory Mode.> and INSPECTION MODE <Ref. to EN(H4DOTC)-41, Inspection Mode.>.

- **WIRING DIAGRAM:**



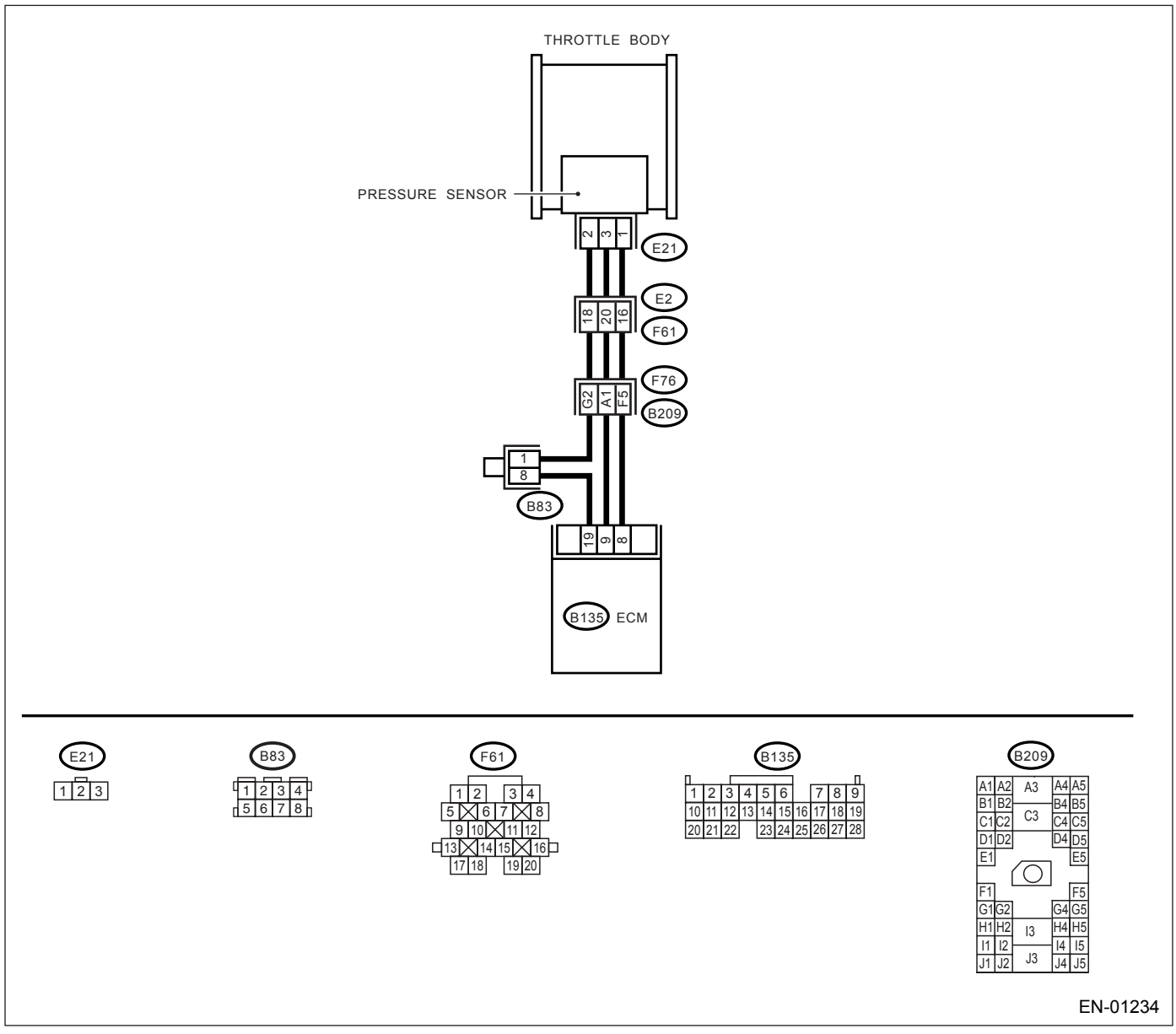
	Step	Check	Yes	No
1	**Connect a Subaru Select Monitor or OBD-II general scan tool to read the data.** 1)Turn ignition switch to OFF. 2)Connect the Subaru Select Monitor or the OBD-II general scan tool to data link connector. 3)Turn the ignition switch to ON and the Subaru Select Monitor or OBD-II general scan tool switch to ON. 4)Start the engine. 5)Read the mass air flow sensor voltage using Subaru Select Monitor or OBD-II general scan tool. Is the measured value within the specified range? NOTE: •Subaru Select Monitor For detailed operation procedures, refer to READ CURRENT DATA FOR ENGINE. <Ref. to EN(H4DOTC)-33, Subaru Select Monitor.> •OBD-II general scan tool For detailed operation procedures, refer to the OBD-II General Scan Tool Instruction Manual.	0.2 — 4.7 V	The MIL may light up, however, the circuit is returned to the normal status at the moment.	Go to step **2.**
2	**CHECK HARNESS BETWEEN ECM AND MASS AIR FLOW SENSOR CONNECTOR.** 1)Turn ignition switch to OFF. 2)Disconnect the connector from mass air flow sensor. 3)Turn ignition switch to ON. 4)Check the voltage between mass air flow sensor connector and chassis ground. ***Connector & terminal*** ***(B3) No. 3 (+) — Chassis ground (−):*** Is the measured value more than the specified value?	5 V	Repair short circuit to battery in harness between mass air flow sensor connector and ECM connector.	Go to step **3.**
3	**CHECK HARNESS BETWEEN ECM AND MASS AIR FLOW SENSOR CONNECTOR.** 1)Turn ignition switch to OFF. 2)Disconnect the connector from ECM. 3)Measure the resistance of harness between ECM connector and mass air flow sensor connector. ***Connector & terminal*** ***(B3) No. 2 — (B84) No. 7:*** Is the measured value less than the specified value?	1 Ω	Replace the mass air flow sensor. <Ref. to FU(H4DOTC)-34, Mass Air Flow and Intake Air Temperature Sensor.>	Repair open circuit in harness between mass air flow sensor connector and ECM connector.

J: DTC P0107 — MANIFOLD ABSOLUTE PRESSURE/BAROMETRIC PRESSURE CIRCUIT LOW INPUT —

- **DTC DETECTING CONDITION:**
  - Immediately at fault recognition

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to EN(H4DOTC)-49, OPERATION, Clear Memory Mode.> and INSPECTION MODE <Ref. to EN(H4DOTC)-41, Inspection Mode.>.

- **WIRING DIAGRAM:**



	Step	Check	Yes	No
1	**CHECK INPUT SIGNAL FOR ECM.** Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B135) No. 9 (+) — Chassis ground (–):*** Is the measured value more than the specified value?	4.5 V	Go to step **3.**	Go to step **2.**
2	**CHECK INPUT SIGNAL FOR ECM.** Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B135) No. 9 (+) — Chassis ground (–):*** Does the voltage variance exceed the specified value while monitoring the voltmeter and shaking the ECM harness and connector ?	4.5 V	Repair poor contact in ECM connector.	Contact SOA (distributor) service. NOTE: Inspection by DTM is required, because probable cause is deterioration of multiple parts.
3	**CHECK INPUT SIGNAL FOR ECM.** Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B135) No. 8 (+) — Chassis ground (–):*** Is the measured value less than the specified value?	0.7 V	Go to step **4.**	Contact SOA (distributor) service. NOTE: Inspection by DTM is required, because probable cause is deterioration of multiple parts.
4	**CHECK HARNESS BETWEEN ECM AND PRESSURE SENSOR CONNECTOR.** 1)Turn ignition switch to OFF. 2)Disconnect the connector from pressure sensor. 3)Turn ignition switch to ON. 4)Measure the voltage between pressure sensor connector and engine ground. ***Connector & terminal*** ***(E21) No. 3 (+) — Engine ground (–):*** Is the measured value more than the specified value?	4.5 V	Go to step **5.**	Repair open circuit in harness between ECM and pressure sensor connector.
5	**CHECK HARNESS BETWEEN ECM AND PRESSURE SENSOR CONNECTOR.** 1)Turn ignition switch to OFF. 2)Disconnect the connector from ECM. 3)Measure the resistance of harness between ECM and intake manifold pressure sensor connector. ***Connector & terminal*** ***(B135) No. 19 — (E21) No. 2:*** Is the measured value less than the specified value?	1 Ω	Go to step **6.**	Repair open circuit in harness between ECM and pressure sensor connector.
6	**CHECK HARNESS BETWEEN ECM AND PRESSURE SENSOR CONNECTOR.** Measure the resistance of harness between intake manifold pressure sensor connector and engine ground. ***Connector & terminal*** ***(E21) No. 1 — Engine ground:*** Is the measured value more than the specified value?	1 MΩ	Go to step **7.**	Repair short circuit to ground in harness between ECM and pressure sensor connector.

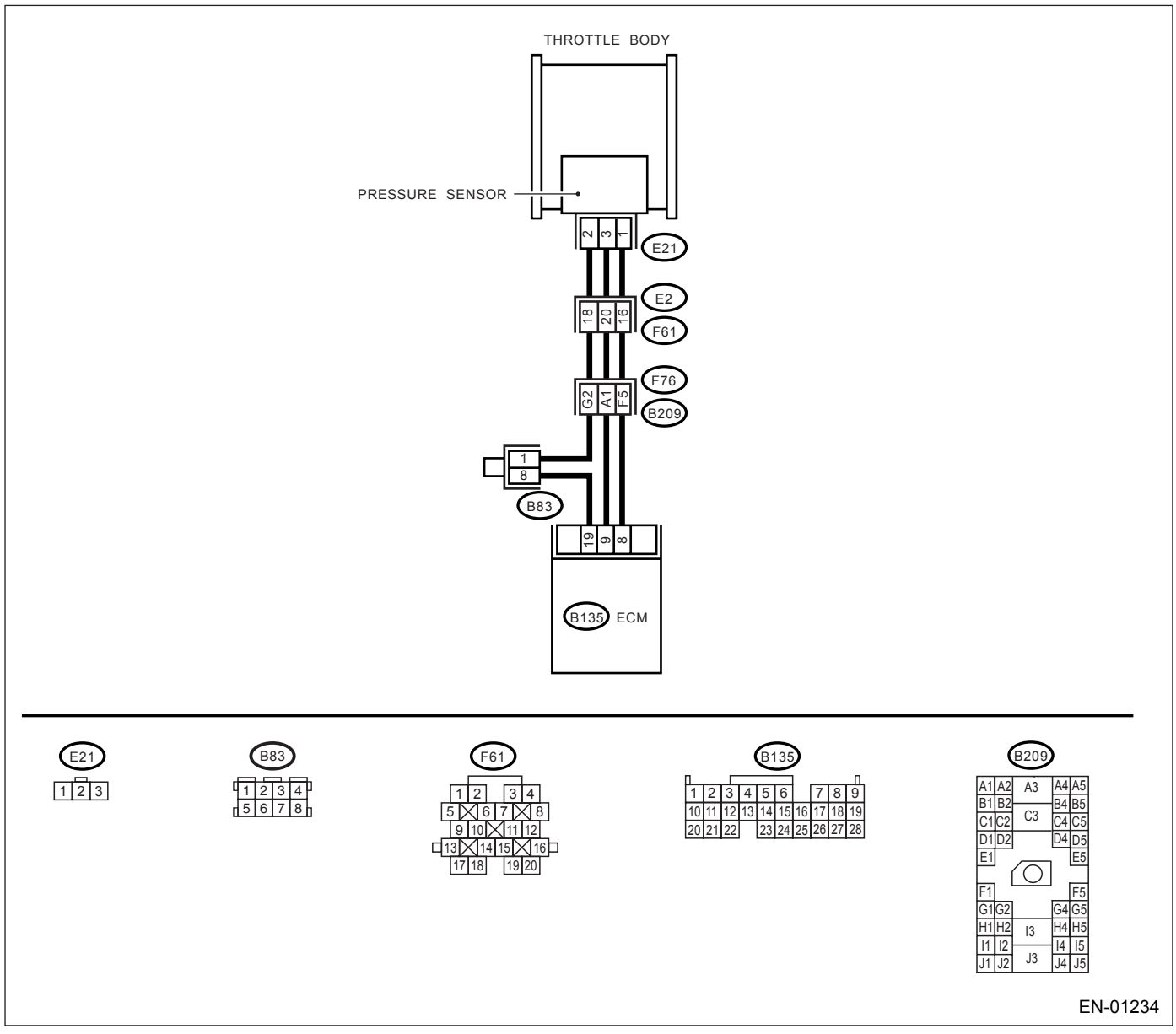
	Step	Check	Yes	No
7	**CHECK FOR POOR CONTACT.** Check for poor contact in pressure sensor connector. Is there poor contact in pressure sensor connector?	There is poor contact.	Repair poor contact in pressure sensor connector.	Replace the pressure sensor. <Ref. to FU(H4DOTC)-35, Pressure Sensor.>

K: DTC P0108 — MANIFOLD ABSOLUTE PRESSURE/BAROMETRIC PRESSURE CIRCUIT HIGH INPUT —

- **DTC DETECTING CONDITION:**
  - Immediately at fault recognition

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to EN(H4DOTC)-49, OPERATION, Clear Memory Mode.> and INSPECTION MODE <Ref. to EN(H4DOTC)-41, Inspection Mode.>.

- **WIRING DIAGRAM:**



	Step	Check	Yes	No
1	**CHECK INPUT SIGNAL FOR ECM.** Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B135) No. 9 (+) — Chassis ground (−):*** Is the measured value more than the specified value?	4.5 V	Go to step **3.**	Go to step **2.**
2	**CHECK INPUT SIGNAL FOR ECM.** Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B135) No. 9 (+) — Chassis ground (−):*** Does the voltage variance exceed the specified value while monitoring the voltmeter and shaking the ECM harness and connector ?	4.5 V	Repair poor contact in ECM connector.	Contact SOA (distributor) service. NOTE: Inspection by DTM is required, because probable cause is deterioration of multiple parts.
3	**CHECK INPUT SIGNAL FOR ECM.** Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B135) No. 8 (+) — Chassis ground (−):*** Is the measured value more than the specified value?	4.5 V	Go to step **4.**	Contact SOA (distributor) service. NOTE: Inspection by DTM is required, because probable cause is deterioration of multiple parts.
4	**CHECK HARNESS BETWEEN ECM AND PRESSURE SENSOR CONNECTOR.** 1)Turn ignition switch to OFF. 2)Disconnect the connector from pressure sensor. 3)Turn ignition switch to ON. 4)Measure the voltage between pressure sensor connector and engine ground. ***Connector & terminal*** ***(E21) No. 3 (+) — Engine ground (−):*** Is the measured value more than the specified value?	4.5 V	Go to step **5.**	Repair open circuit in harness between ECM and pressure sensor connector.
5	**CHECK HARNESS BETWEEN ECM AND PRESSURE SENSOR CONNECTOR.** 1)Turn ignition switch to OFF. 2)Disconnect the connector from ECM. 3)Measure the resistance of harness between ECM and pressure sensor connector. ***Connector & terminal*** ***(B135) No. 8 — (E21) No. 1:*** Is the measured value less than the specified value?	1 Ω	Go to step **6.**	Repair open circuit in harness between ECM and pressure sensor connector.
6	**CHECK HARNESS BETWEEN ECM AND INTAKE MANIFOLD PRESSURE SENSOR CONNECTOR.** Measure the resistance of harness between ECM and pressure sensor connector. ***Connector & terminal*** ***(B135) No. 19 — (E21) No. 2:*** Is the measured value less than the specified value?	1 Ω	Go to step **7.**	Repair open circuit in harness between ECM and pressure sensor connector.

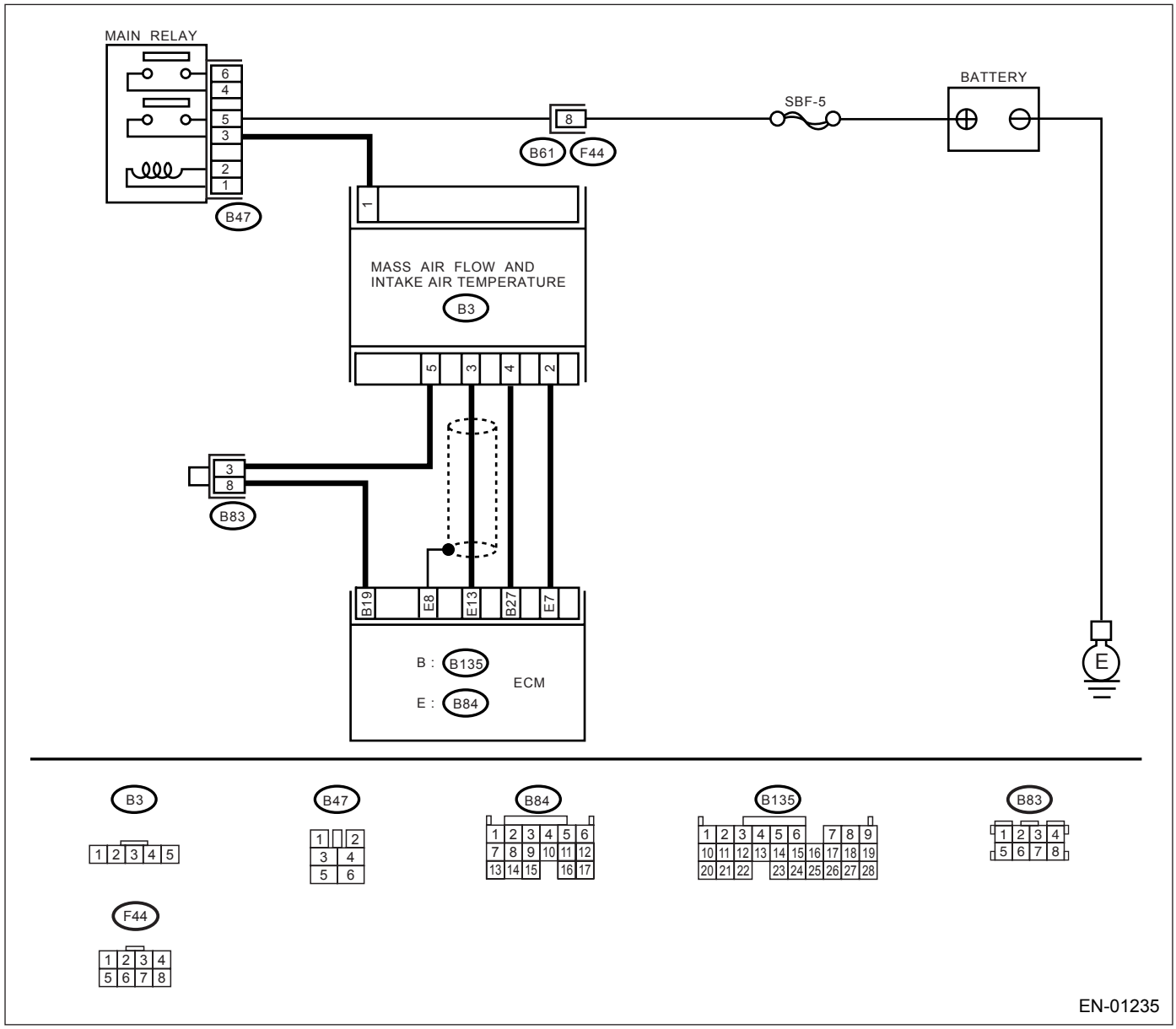
	Step	Check	Yes	No
7	**CHECK FOR POOR CONTACT.** Check for poor contact in pressure sensor connector. Is there poor contact in pressure sensor connector?	There is poor contact.	Repair poor contact in pressure sensor connector.	Replace the pressure sensor. <Ref. to FU(H4DOTC)-35, Pressure Sensor.>

L: DTC P0111 — INTAKE AIR TEMPERATURE CIRCUIT RANGE/PERFORMANCE —

- **DTC DETECTING CONDITION:**
  - Fault occurs in two consecutive driving cycles
- **TROUBLE SYMPTOM:**
  - Erroneous idling
  - Poor driving performance

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to EN(H4DOTC)-49, OPERATION, Clear Memory Mode.> and INSPECTION MODE <Ref. to EN(H4DOTC)-41, OPERATION, Inspection Mode.>.

- **WIRING DIAGRAM:**



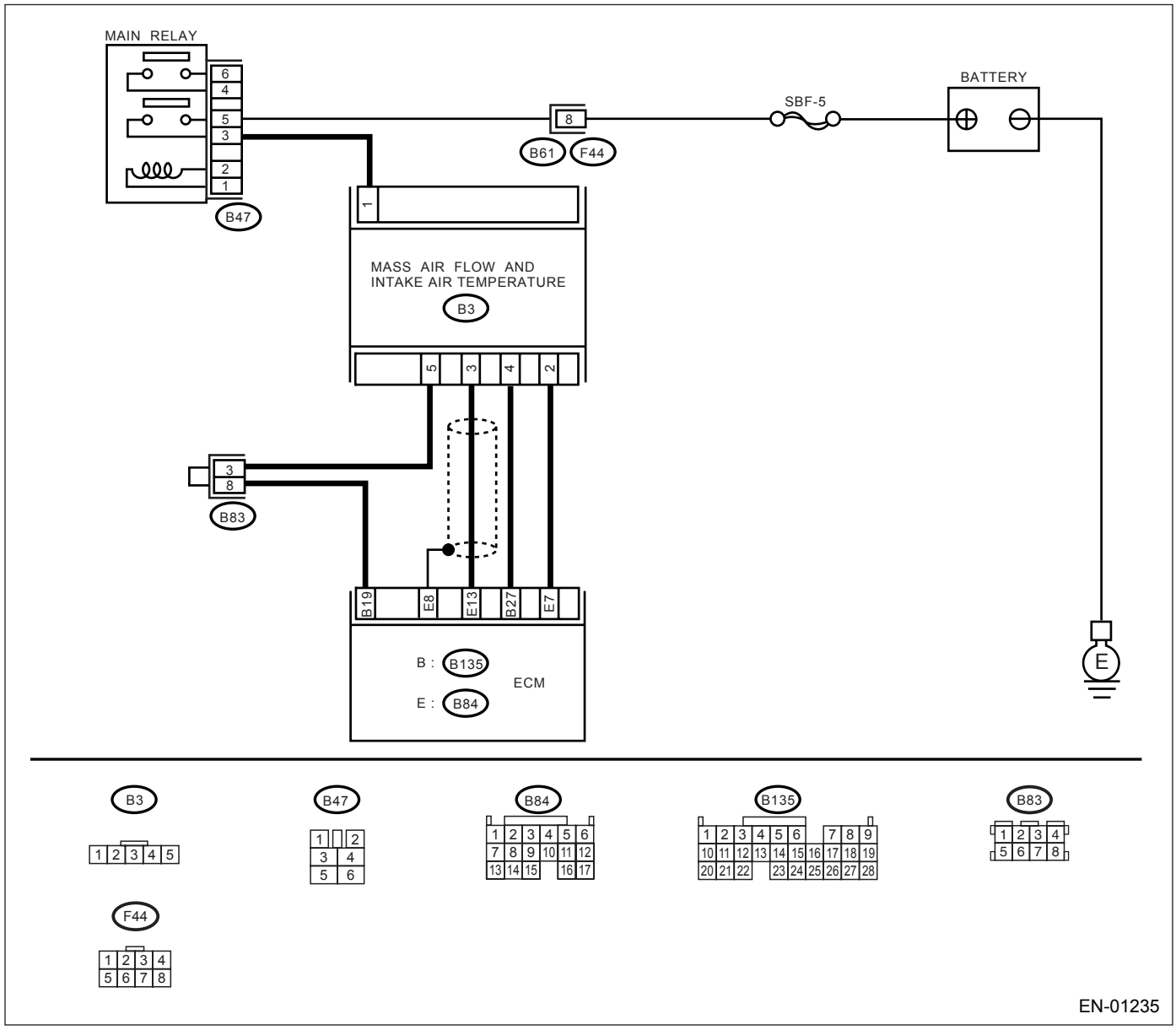
	Step	Check	Yes	No
1	**CHECK FOR OTHER DTC ON DISPLAY.** Is any other DTC displayed?	Other DTC is displayed.	Inspect DTC using "List of Diagnostic Trouble Codes (DTC)". <Ref. to EN(H4DOTC)-81, List of Diagnostic Trouble Codes (DTC).> NOTE: In this case, it is not necessary to inspect DTC P0111.	Replace mass air flow & intake air temperature sensor. <Ref. to FU(H4DOTC)-34, Mass Air Flow and Intake Air Temperature Sensor.>

M: DTC P0112 — INTAKE AIR TEMPERATURE CIRCUIT LOW INPUT —

- **DTC DETECTING CONDITION:**
  - Immediately at fault recognition
- **TROUBLE SYMPTOM:**
  - Erroneous idling
  - Poor driving performance

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to EN(H4DOTC)-49, OPERATION, Clear Memory Mode.> and INSPECTION MODE <Ref. to EN(H4DOTC)-41, Inspection Mode.>.

- **WIRING DIAGRAM:**



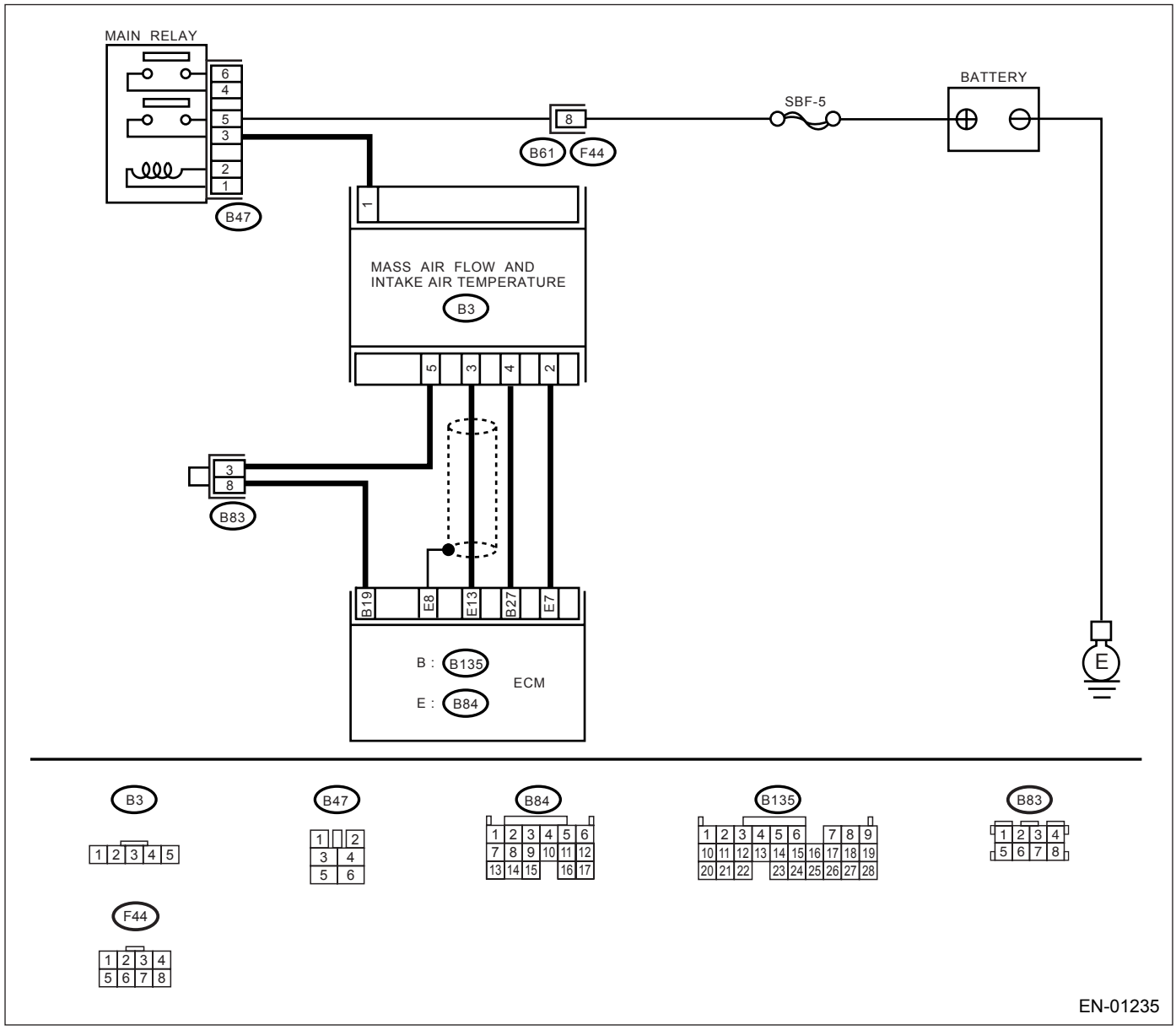
	Step	Check	Yes	No
1	**CHECK CURRENT DATA.** 1)Start the engine. 2)Read the data of intake air temperature sensor signal using Subaru Select Monitor or OBD-II general scan tool. Is the measured value more than the specified value? NOTE: •Subaru Select Monitor For detailed operation procedures, refer to READ CURRENT DATA FOR ENGINE. <Ref. to EN(H4DOTC)-33, Subaru Select Monitor.> •OBD-II general scan tool For detailed operation procedures, refer to the OBD-II General Scan Tool Instruction Manual.	55 °C (131°F)	Go to step **2.**	Repair poor contact. NOTE: In this case, repair the following: • Poor contact in mass air flow & intake air temperature sensor • Poor contact in ECM • Poor contact in joint connector
2	**CHECK HARNESS BETWEEN MASS AIR FLOW & INTAKE AIR TEMPERATURE SENSOR AND ECM CONNECTOR.** 1)Turn ignition switch to OFF. 2)Disconnect the connector from mass air flow & intake air temperature sensor. 3)Turn ignition switch to ON. 4)Read the data of intake air temperature sensor signal using Subaru Select Monitor or OBD-II general scan tool. Is the measured value less than the specified value? NOTE: •Subaru Select Monitor For detailed operation procedures, refer to READ CURRENT DATA FOR ENGINE. <Ref. to EN(H4DOTC)-33, Subaru Select Monitor.> •OBD-II general scan tool For detailed operation procedures, refer to the OBD-II General Scan Tool Instruction Manual.	–36 °C (–97°F)	Replace mass air flow & intake air temperature sensor. <Ref. to FU(H4DOTC)-34, Mass Air Flow and Intake Air Temperature Sensor.>	Repair short circuit to ground in harness between mass air flow & intake air temperature sensor and ECM connector.

N: DTC P0113 — INTAKE AIR TEMPERATURE CIRCUIT HIGH INPUT —

- **DTC DETECTING CONDITION:**
  - Immediately at fault recognition
- **TROUBLE SYMPTOM:**
  - Erroneous idling
  - Poor driving performance

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to EN(H4DOTC)-49, OPERATION, Clear Memory Mode.> and INSPECTION MODE <Ref. to EN(H4DOTC)-41, Inspection Mode.>.

- **WIRING DIAGRAM:**



	Step	Check	Yes	No
1	**CHECK CURRENT DATA.** 1)Start the engine. 2)Read the data of intake air temperature sensor signal using Subaru Select Monitor or OBD-II general scan tool. Is the measured value less than the specified value? NOTE: •Subaru Select Monitor For detailed operation procedures, refer to READ CURRENT DATA FOR ENGINE. <Ref. to EN(H4DOTC)-33, Subaru Select Monitor.> •OBD-II general scan tool For detailed operation procedures, refer to the OBD-II General Scan Tool Instruction Manual.	–36 °C (–97°F)	Go to step **2.**	Repair poor contact. NOTE: In this case, repair the following: • Poor contact in mass air flow & intake air temperature sensor • Poor contact in ECM • Poor contact in joint connector
2	**CHECK HARNESS BETWEEN MASS AIR FLOW & INTAKE AIR TEMPERATURE SENSOR AND ECM CONNECTOR.** 1)Turn ignition switch to OFF. 2)Disconnect the connector from mass air flow & intake air temperature sensor. 3)Measure the voltage between mass air flow & intake air temperature sensor connector and engine ground. ***Connector & terminal*** ***(B3) No. 4 (+) — Engine ground (–):*** Is the measured value more than the specified value?	10 V	Repair short circuit to battery in harness between mass air flow & intake air temperature sensor and ECM connector.	Go to step **3.**
3	**CHECK HARNESS BETWEEN MASS AIR FLOW & INTAKE AIR TEMPERATURE SENSOR AND ECM CONNECTOR.** 1)Turn ignition switch to ON. 2)Measure the voltage between mass air flow & intake air temperature sensor connector and engine ground. ***Connector & terminal*** ***(B3) No. 4 (+) — Engine ground (–):*** Is the measured value more than the specified value?	10 V	Repair short circuit to battery in harness between mass air flow & intake air temperature sensor and ECM connector.	Go to step **4.**
4	**CHECK HARNESS BETWEEN MASS AIR FLOW & INTAKE AIR TEMPERATURE SENSOR AND ECM CONNECTOR.** Measure the voltage between mass air flow & intake air temperature sensor and engine ground. ***Connector & terminal*** ***(B3) No. 4 (+) — Engine ground (–):*** Is the measured value more than the specified value?	4 V	Go to step **5.**	Repair harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between mass air flow & intake air temperature sensor and ECM connector. • Poor contact in mass air flow & intake air temperature sensor • Poor contact in ECM • Poor contact in joint connector

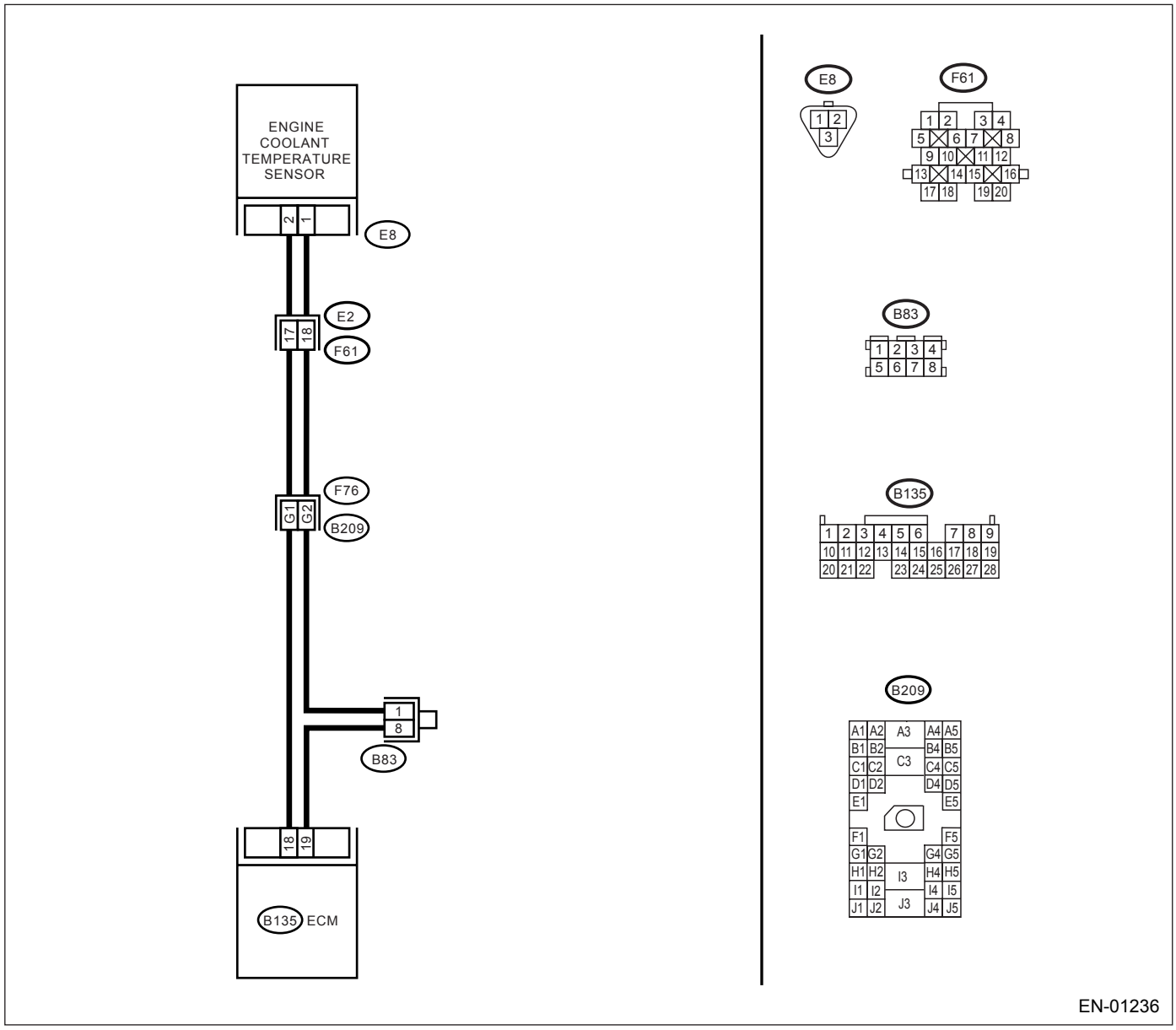
	Step	Check	Yes	No
5	**CHECK HARNESS BETWEEN MASS AIR FLOW & INTAKE AIR TEMPERATURE SENSOR AND ECM CONNECTOR.** 1)Turn ignition switch to OFF. 2)Measure the resistance between mass air flow & intake air temperature sensor and engine ground. ***Connector & terminal*** ***(B3) No. 5 — Engine ground:*** Is the measured value less than the specified value?	5 Ω	Replace mass air flow & intake air temperature sensor. <Ref. to FU(H4DOTC)-34, Mass Air Flow and Intake Air Temperature Sensor.>	Repair harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between mass air flow & intake air temperature sensor and ECM connector. • Poor contact in mass air flow & intake air temperature sensor • Poor contact in ECM • Poor contact in joint connector

O: DTC P0117 — ENGINE COOLANT TEMPERATURE CIRCUIT LOW INPUT —

- **DTC DETECTING CONDITION:**
  - Immediately at fault recognition
- **TROUBLE SYMPTOM:**
  - Hard to start
  - Erroneous idling
  - Poor driving performance

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to EN(H4DOTC)-49, OPERATION, Clear Memory Mode.> and INSPECTION MODE <Ref. to EN(H4DOTC)-41, Inspection Mode.>.

- **WIRING DIAGRAM:**



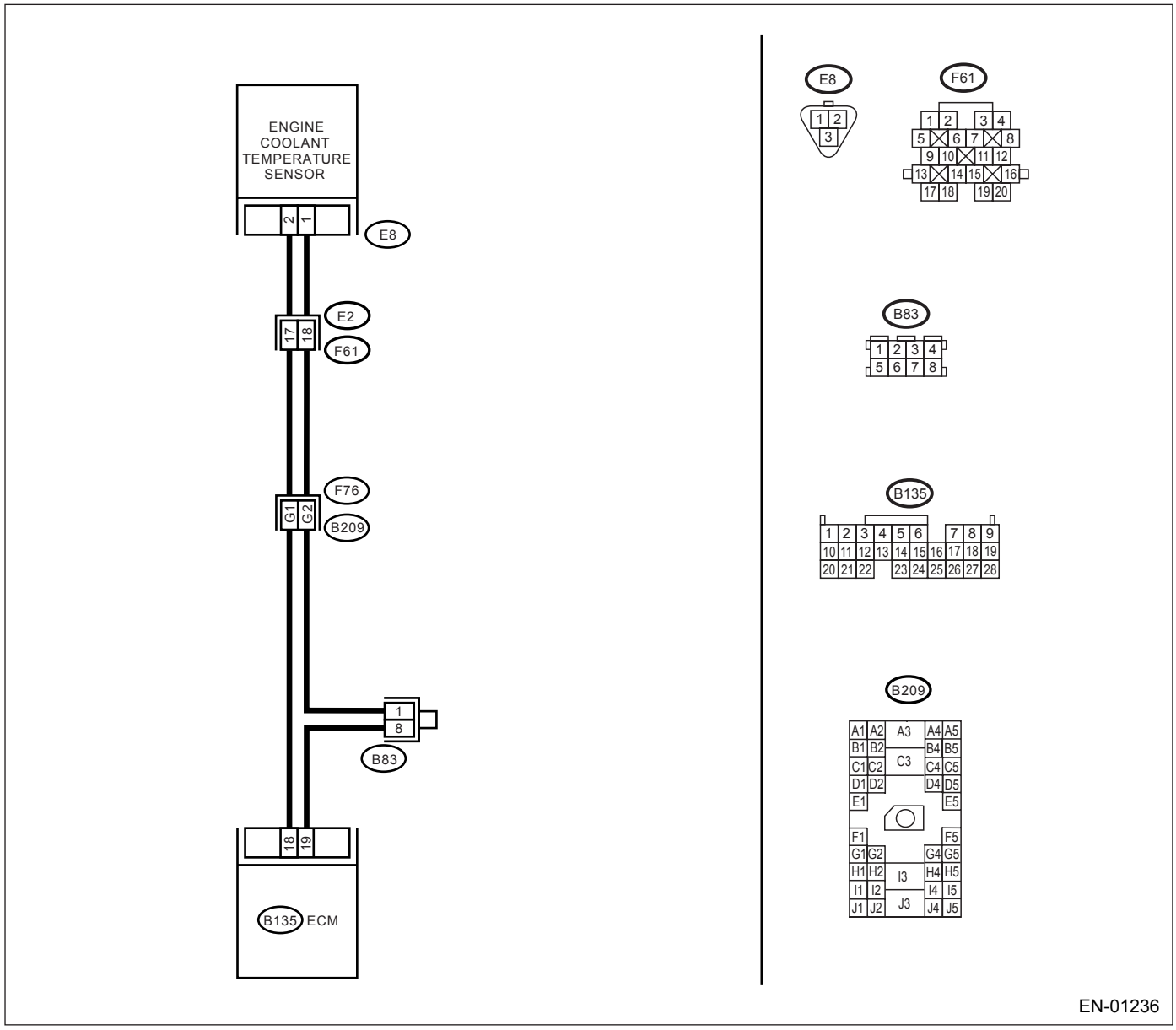
	Step	Check	Yes	No
1	**CHECK CURRENT DATA.** 1)Start the engine. 2)Read the data of engine coolant temperature sensor signal using Subaru Select Monitor or OBD-II general scan tool. Is the measured value more than the specified value? NOTE: •Subaru Select Monitor For detailed operation procedures, refer to READ CURRENT DATA FOR ENGINE. <Ref. to EN(H4DOTC)-33, Subaru Select Monitor.> •OBD-II general scan tool For detailed operation procedures, refer to the OBD-II General Scan Tool Instruction Manual.	120°C (248°F)	Go to step **2.**	Repair poor contact. NOTE: In this case, repair the following: • Poor contact in engine coolant temperature sensor • Poor contact in ECM • Poor contact in coupling connector • Poor contact in joint connector
2	**CHECK HARNESS BETWEEN ENGINE COOLANT TEMPERATURE SENSOR AND ECM CONNECTOR.** 1)Turn ignition switch to OFF. 2)Disconnect the connector from engine coolant temperature sensor. 3)Turn ignition switch to ON. 4)Read the data of engine coolant temperature sensor signal using Subaru Select Monitor or OBD-II general scan tool. Is the measured value less than the specified value? NOTE: •Subaru Select Monitor For detailed operation procedures, refer to READ CURRENT DATA FOR ENGINE. <Ref. to EN(H4DOTC)-33, Subaru Select Monitor.> •OBD-II general scan tool For detailed operation procedures, refer to the OBD-II General Scan Tool Instruction Manual.	–40 °C (–40°F)	Replace the engine coolant temperature sensor. <Ref. to FU(H4DOTC)-29, Engine Coolant Temperature Sensor.>	Repair short circuit to ground in harness between engine coolant temperature sensor and ECM connector.

P: DTC P0118 — ENGINE COOLANT TEMPERATURE CIRCUIT HIGH INPUT —

- **DTC DETECTING CONDITION:**
  - Immediately at fault recognition
- **TROUBLE SYMPTOM:**
  - Hard to start
  - Erroneous idling
  - Poor driving performance

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to EN(H4DOTC)-49, OPERATION, Clear Memory Mode.> and INSPECTION MODE <Ref. to EN(H4DOTC)-41, Inspection Mode.>.

- **WIRING DIAGRAM:**



	Step	Check	Yes	No
1	**CHECK CURRENT DATA.** 1)Start the engine. 2)Read the data of engine coolant temperature sensor signal using Subaru Select Monitor or OBD-II general scan tool. Is the measured value less than the specified value? NOTE: •Subaru Select Monitor For detailed operation procedures, refer to READ CURRENT DATA FOR ENGINE. <Ref. to EN(H4DOTC)-33, Subaru Select Monitor.> •OBD-II general scan tool For detailed operation procedures, refer to the OBD-II General Scan Tool Instruction Manual.	–40°C (–40°F)	Go to step **2.**	Repair poor contact. NOTE: In this case, repair the following: • Poor contact in engine coolant temperature sensor • Poor contact in ECM • Poor contact in coupling connector • Poor contact in joint connector
2	**CHECK HARNESS BETWEEN ENGINE COOLANT TEMPERATURE SENSOR AND ECM CONNECTOR.** 1)Turn ignition switch to OFF. 2)Disconnect the connector from engine coolant temperature sensor. 3)Measure the voltage between engine coolant temperature sensor connector and engine ground. ***Connector & terminal*** ***(E8) No. 2 (+) — Engine ground (–):*** Is the measured value more than the specified value?	10 V	Repair short circuit to battery in harness between ECM and engine coolant temperature sensor connector.	Go to step **3.**
3	**CHECK HARNESS BETWEEN ENGINE COOLANT TEMPERATURE SENSOR AND ECM CONNECTOR.** 1)Turn ignition switch to ON. 2)Measure the voltage between engine coolant temperature sensor connector and engine ground. ***Connector & terminal*** ***(E8) No. 2 (+) — Engine ground (–):*** Is the measured value more than the specified value?	10 V	Repair short circuit to battery in harness between ECM and engine coolant temperature sensor connector.	Go to step **4.**
4	**CHECK HARNESS BETWEEN ENGINE COOLANT TEMPERATURE SENSOR AND ECM CONNECTOR.** Measure the voltage between engine coolant temperature sensor connector and engine ground. ***Connector & terminal*** ***(E8) No. 2 (+) — Engine ground (–):*** Is the measured value more than the specified value?	4 V	Go to step **5.**	Repair harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between ECM and engine coolant temperature sensor connector • Poor contact in engine coolant temperature sensor connector • Poor contact in ECM connector • Poor contact in coupling connector • Poor contact in joint connector

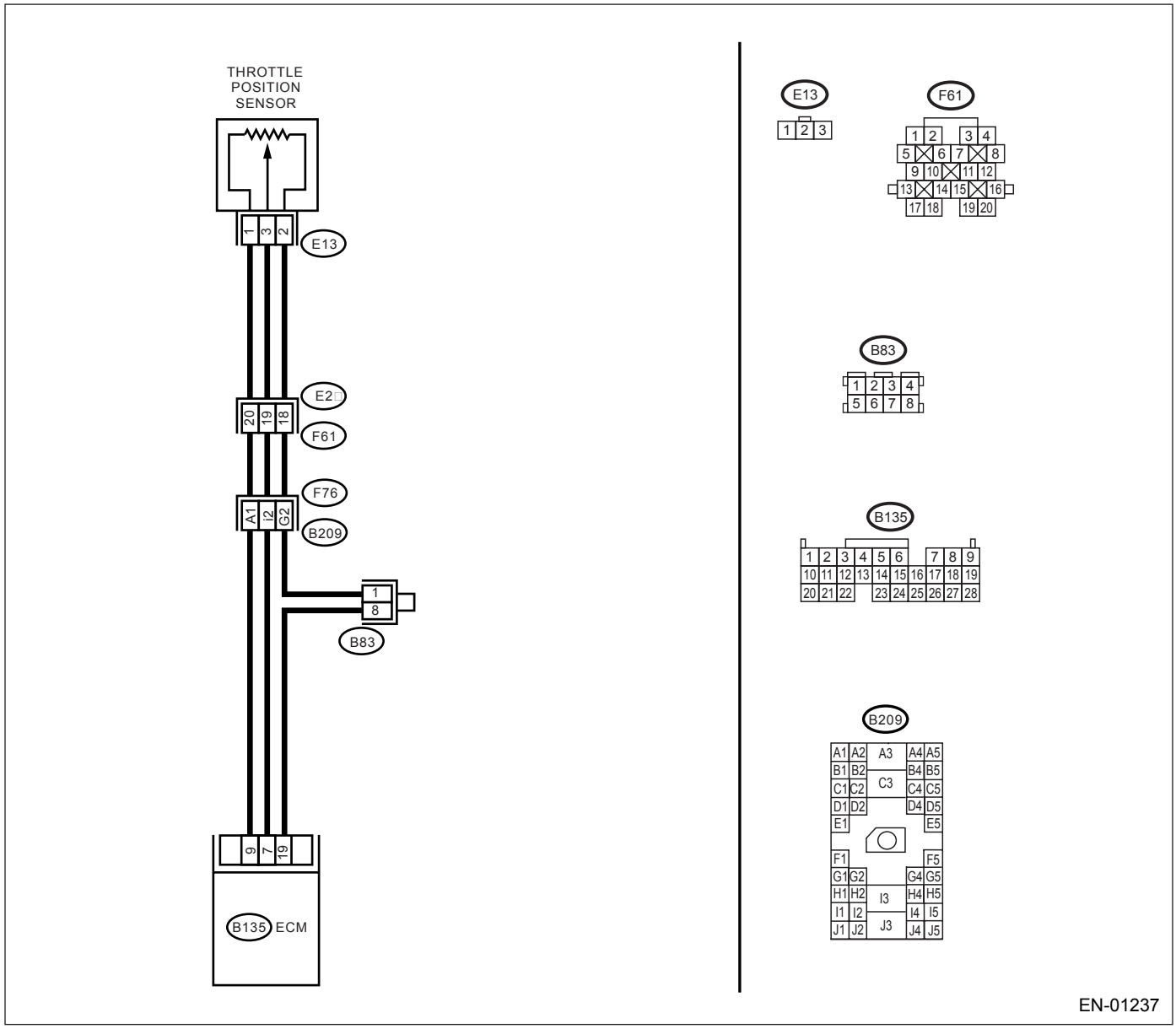
	Step	Check	Yes	No
5	**CHECK HARNESS BETWEEN ENGINE COOLANT TEMPERATURE SENSOR AND ECM CONNECTOR.** 1)Turn ignition switch to OFF. 2)Measure the resistance of harness between engine coolant temperature sensor connector and engine ground. ***Connector & terminal*** ***(E8) No. 1 — Engine ground:*** Is the measured value less than the specified value?	5 Ω	Replace the engine coolant temperature sensor. <Ref. to FU(H4DOTC)-29, Engine Coolant Temperature Sensor.>	Repair harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between ECM and engine coolant temperature sensor connector • Poor contact in engine coolant temperature sensor connector • Poor contact in ECM connector • Poor contact in coupling connector • Poor contact in joint connector

Q: DTC P0121 — THROTTLE/PEDAL POSITION SENSOR/SWITCH "A" CIRCUIT RANGE/PERFORMANCE —

- **DTC DETECTING CONDITION:**
  - Fault occurs in two consecutive driving cycles
- **TROUBLE SYMPTOM:**
  - Erroneous idling
  - Engine stalls
  - Poor driving performance
  - Fuel supply is cut

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to EN(H4DOTC)-49, OPERATION, Clear Memory Mode.> and INSPECTION MODE <Ref. to EN(H4DOTC)-41, Inspection Mode.>.

- **WIRING DIAGRAM:**



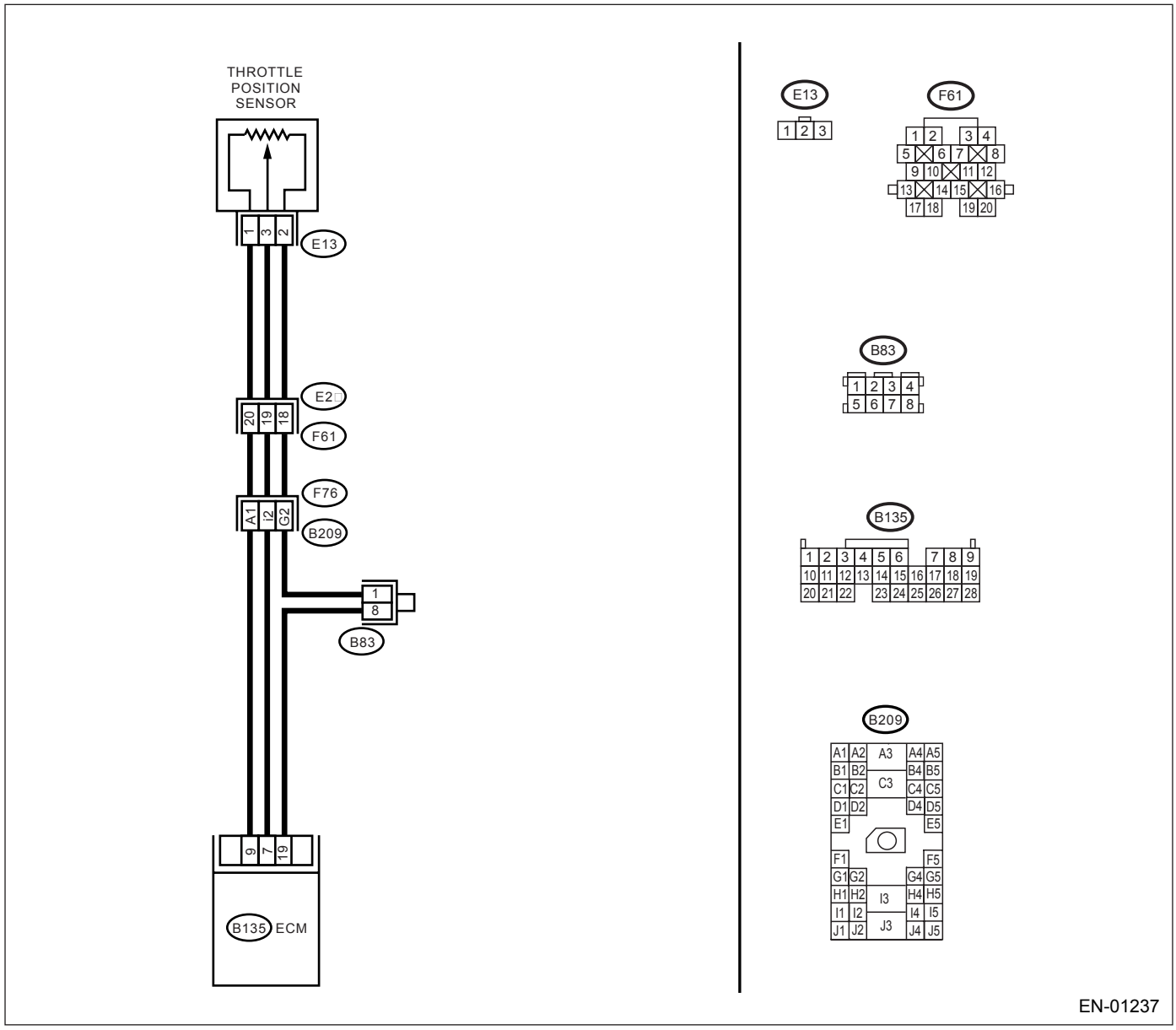
	Step	Check	Yes	No
1	**CHECK FOR OTHER DIAGNOSTIC TROUBLE CODE (DTC) ON DISPLAY.** Is any other DTC displayed?	Other DTC is displayed.	Inspect the relevant DTC using the “List of Diagnostic Trouble Codes (DTC)”. <Ref. to EN(H4DOTC)-81, List of Diagnostic Trouble Codes (DTC).> NOTE: In this case, it is not necessary to inspect DTC P0121.	Replace the throttle position sensor. <Ref. to FU(H4DOTC)-33, Throttle Position Sensor.>

R: DTC P0122 — THROTTLE/PEDAL POSITION SENSOR/SWITCH "A" CIRCUIT LOW INPUT —

- **DTC DETECTING CONDITION:**
  - Immediately at fault recognition
- **TROUBLE SYMPTOM:**
  - Erroneous idling
  - Engine stalls
  - Poor driving performance

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to EN(H4DOTC)-49, OPERATION, Clear Memory Mode.> and INSPECTION MODE <Ref. to EN(H4DOTC)-41, Inspection Mode.>.

- **WIRING DIAGRAM:**



	Step	Check	Yes	No
1	**CHECK CURRENT DATA.** 1)Start the engine. 2)Read the data of throttle position sensor signal using Subaru Select Monitor or OBD-II general scan tool. Is the measured value less than the specified value? NOTE: •Subaru Select Monitor For detailed operation procedures, refer to READ CURRENT DATA FOR ENGINE. <Ref. to EN(H4DOTC)-33, Subaru Select Monitor.> •OBD-II general scan tool For detailed operation procedures, refer to the OBD-II General Scan Tool Instruction Manual.	0.15 V	Go to step **2.**	The MIL may light up, however, the circuit is returned to the normal status at the moment. A temporary poor contact of the connector may be the cause. NOTE: In this case, repair the following: • Poor contact in throttle position sensor connector • Poor contact in ECM connector • Poor contact in coupling connector
2	**CHECK INPUT SIGNAL FOR ECM.** Measure the voltage between ECM connector and chassis ground while throttle valve is fully closed. ***Connector & terminal*** ***(B135) No. 9 (+) — Chassis ground (−):*** Is the measured value more than the specified value?	4.5 V	Go to step **4.**	Go to step **3.**
3	**CHECK INPUT SIGNAL FOR ECM.** Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B135) No. 9 (+) — Chassis ground (−):*** Does the voltage variance exceed the specified value while monitoring the voltmeter and shaking the ECM harness and connector ?	4.5 V	Repair poor contact in ECM connector.	Contact SOA (distributor) service. NOTE: Inspection by DTM is required, because probable cause is deterioration of multiple parts.
4	**CHECK INPUT SIGNAL FOR ECM.** Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B135) No. 7 (+) — Chassis ground (−):*** Is the measured value less than the specified value?	0.15 V	Go to step **6.**	Go to step **5.**
5	**CHECK INPUT SIGNAL FOR ECM. (USING SUBARU SELECT MONITOR.)** Measure the voltage between ECM connector and chassis ground. Does the voltage variance exceed the specified value while monitoring the Subaru Select Monitor and shaking the ECM harness and connector ?	0.15 V	Repair poor contact in ECM connector.	Go to step **6.**

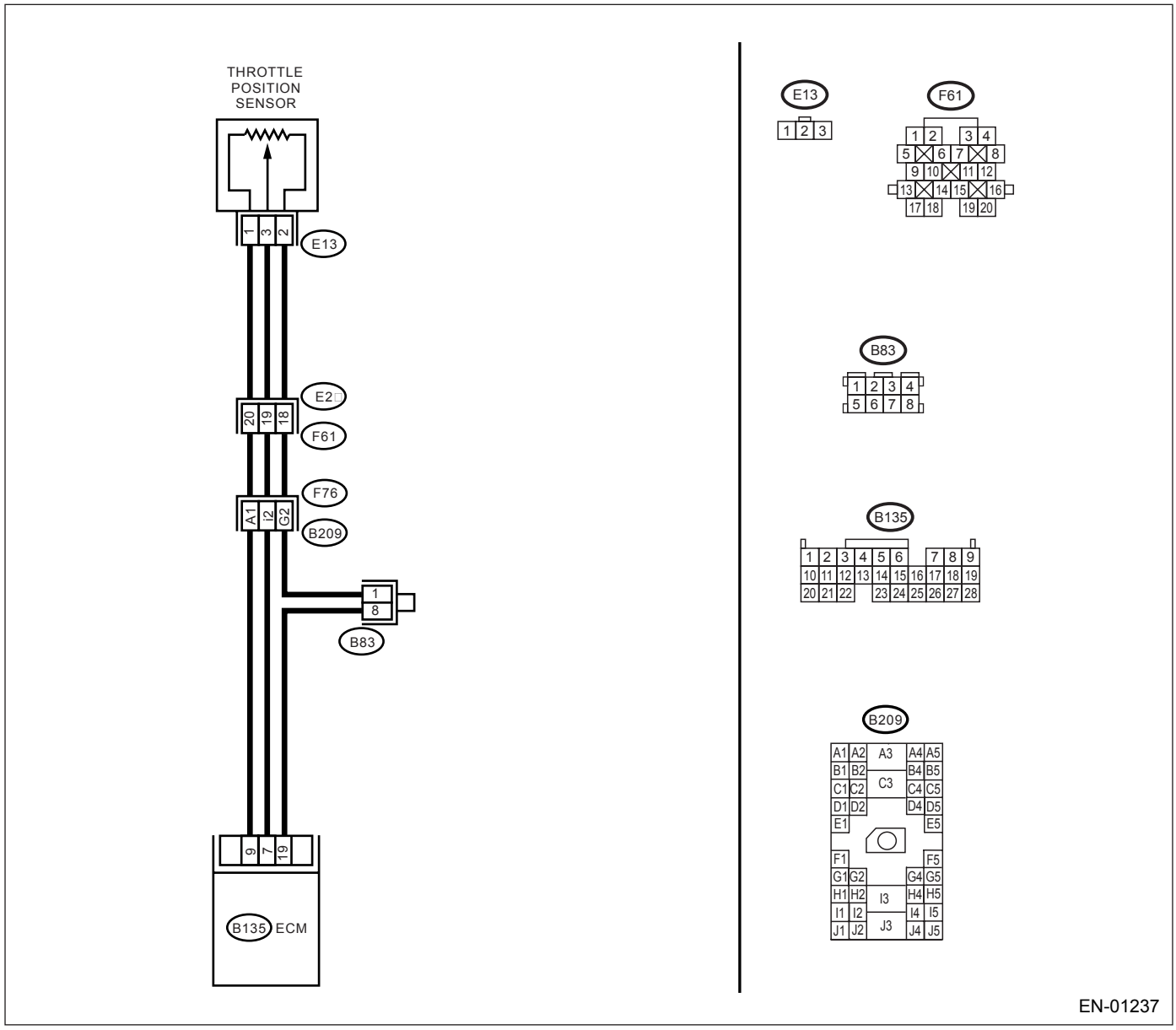
	Step	Check	Yes	No
6	**CHECK HARNESS BETWEEN ECM AND THROTTLE POSITION SENSOR CONNECTOR.** 1)Turn ignition switch to OFF. 2)Disconnect the connectors from throttle position sensor. 3)Turn ignition switch to ON. 4)Measure the voltage between throttle position sensor connector and engine ground. ***Connector & terminal*** ***(E13) No. 1 (+) — Engine ground (−):*** Is the measured value more than the specified value?	4.5 V	Go to step **7.**	Repair harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between throttle position sensor and ECM connector • Poor contact in throttle position sensor connector • Poor contact in ECM connector • Poor contact in coupling connector • Poor contact in joint connector
7	**CHECK HARNESS BETWEEN ECM AND THROTTLE POSITION SENSOR CONNECTOR.** 1)Turn ignition switch to OFF. 2)Measure the resistance of harness between ECM connector and throttle position sensor connector. ***Connector & terminal*** ***(B135) No. 7 — (E13) No. 3:*** Is the measured value less than the specified value?	1 Ω	Go to step **8.**	Repair harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between throttle position sensor and ECM connector • Poor contact in ECM connector • Poor contact in throttle position sensor connector • Poor contact in coupling connector
8	**CHECK HARNESS BETWEEN ECM AND THROTTLE POSITION SENSOR CONNECTOR.** Measure the resistance of harness between throttle position sensor connector and engine ground. ***Connector & terminal*** ***(E13) No. 3 — Engine ground:*** Is the measured value less than the specified value?	10 Ω	Repair short circuit to ground in harness between throttle position sensor and ECM connector.	Go to step **9.**
9	**CHECK FOR POOR CONTACT.** Check for poor contact in throttle position sensor connector. Is there poor contact in throttle position sensor connector?	There is poor contact.	Repair poor contact in throttle position sensor connector.	Replace the throttle position sensor. <Ref. to FU(H4DOTC)-33, Throttle Position Sensor.>

S: DTC P0123 — THROTTLE/PEDAL POSITION SENSOR/SWITCH "A" CIRCUIT HIGH INPUT —

- **DTC DETECTING CONDITION:**
  - Immediately at fault recognition
- **TROUBLE SYMPTOM:**
  - Erroneous idling
  - Engine stalls
  - Poor driving performance

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to EN(H4DOTC)-49, OPERATION, Clear Memory Mode.> and INSPECTION MODE <Ref. to EN(H4DOTC)-41, Inspection Mode.>.

- **WIRING DIAGRAM:**



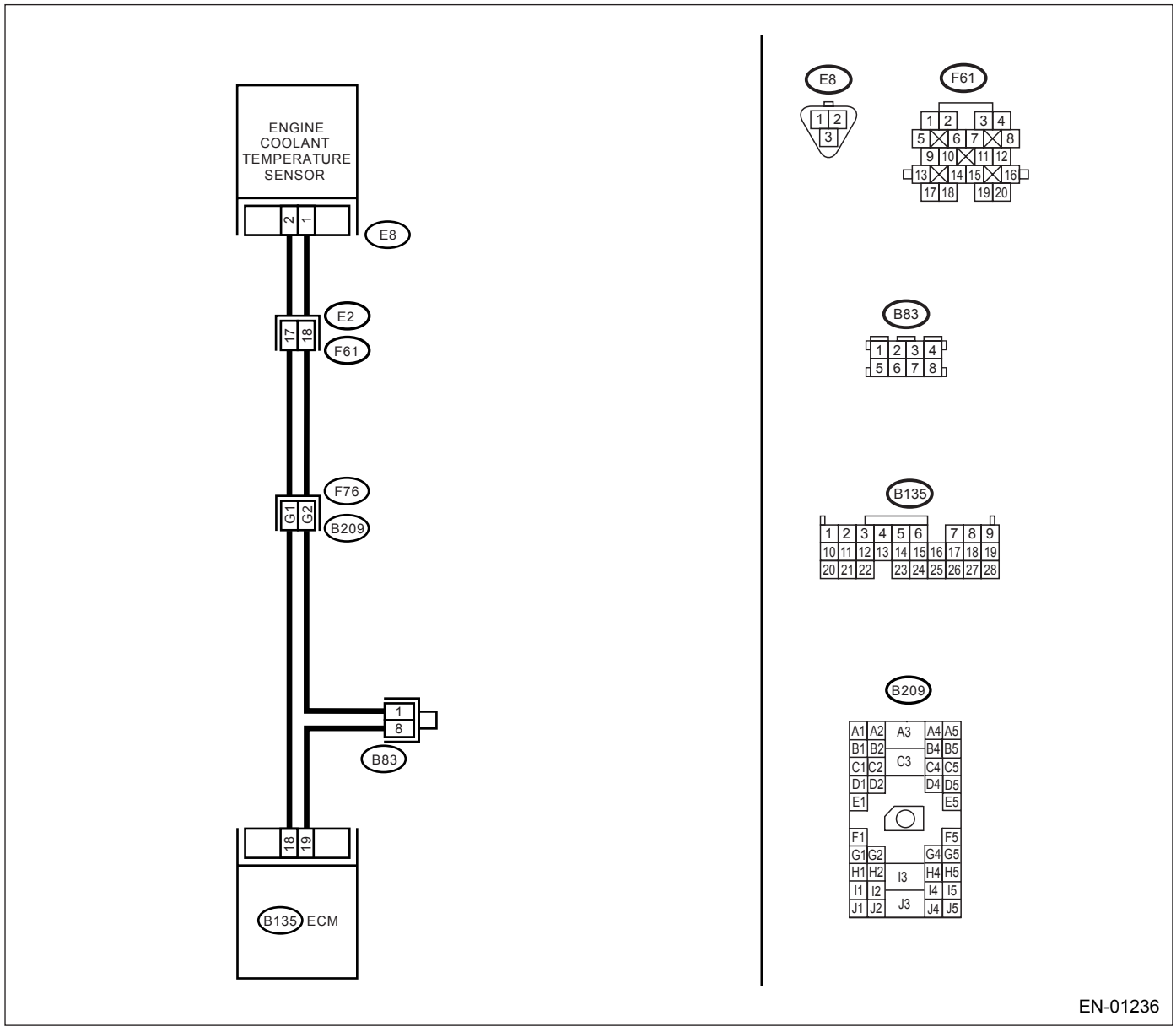
	Step	Check	Yes	No
1	**CHECK CURRENT DATA.** 1)Start the engine. 2)Read the data of throttle position sensor signal using Subaru Select Monitor or OBD-II general scan tool. Is the measured value more than the specified value? NOTE: •Subaru Select Monitor For detailed operation procedures, refer to READ CURRENT DATA FOR ENGINE. <Ref. to EN(H4DOTC)-33, Subaru Select Monitor.> •OBD-II general scan tool For detailed operation procedures, refer to the OBD-II General Scan Tool Instruction Manual.	4.7 V	Go to step **2.**	The MIL may light up, however, the circuit is returned to the normal status at the moment. A temporary poor contact of the connector may be the cause. NOTE: In this case, repair the following: • Poor contact in throttle position sensor connector • Poor contact in ECM connector • Poor contact in coupling connector
2	**CHECK HARNESS BETWEEN THROTTLE POSITION SENSOR AND ECM CONNECTOR.** 1)Turn ignition switch to OFF. 2)Disconnect the connectors from throttle position sensor. 3)Measure the resistance of harness between throttle position sensor connector and engine ground. ***Connector & terminal*** ***(E13) No. 2 — Engine ground:*** Is the measured value less than the specified value?	5 Ω	Go to step **3.**	Repair harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between throttle position sensor and ECM connector • Poor contact in coupling connector • Poor contact in joint connector
3	**CHECK HARNESS BETWEEN THROTTLE POSITION SENSOR AND ECM CONNECTOR.** 1)Turn ignition switch to ON. 2)Measure the voltage between throttle position sensor connector and engine ground. ***Connector & terminal*** ***(E13) No. 3 (+) — Engine ground (−):*** Is the measured value more than the specified value?	4.7 V	Repair short circuit to battery in harness between throttle position sensor and ECM connector. After repair, replace the ECM. <Ref. to FU(H4DOTC)-50, Engine Control Module.>	Replace the throttle position sensor. <Ref. to FU(H4DOTC)-33, Throttle Position Sensor.>

T: DTC P0125 — INSUFFICIENT COOLANT TEMPERATURE FOR CLOSED LOOP FUEL CONTROL —

- **DTC DETECTING CONDITION:**
  - Fault occurs in two consecutive driving cycles
- **TROUBLE SYMPTOM:**
  - Engine would not return to idling.

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to EN(H4DOTC)-49, OPERATION, Clear Memory Mode.> and INSPECTION MODE <Ref. to EN(H4DOTC)-41, Inspection Mode.>.

- **WIRING DIAGRAM:**



EN-01236

	Step	Check	Yes	No
1	**CHECK FOR OTHER DIAGNOSTIC TROUBLE CODE (DTC) ON DISPLAY.** Is any other DTC displayed?	Other DTC is displayed.	Inspect the relevant DTC using the “List of Diagnostic Trouble Codes (DTC)”. <Ref. to EN(H4DOTC)-81, List of Diagnostic Trouble Codes (DTC).> NOTE: In this case, it is not necessary to inspect DTC P0125.	Go to step **2.**
2	**CHECK ENGINE COOLING SYSTEM.** NOTE: Check the following items. •Thermostat stuck open •Coolant level •Coolant freeze •Tire diameter Is there a fault in engine cooling system?	There is a fault.	Replace the thermostat. <Ref. to CO(H4SO)-36, Thermostat.>	Replace the engine coolant temperature sensor. <Ref. to FU(H4DOTC)-29, Engine Coolant Temperature Sensor.>

U: DTC P0128 — COOLANT THERMOSTAT (COOLANT TEMPERATURE BELOW THERMOSTAT REGULATING TEMPERATURE) —

- **DTC DETECTING CONDITION:**
  - Fault occurs in two consecutive driving cycles
- **TROUBLE SYMPTOM:**
  - Thermostat remains open.

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to EN(H4DOTC)-49, OPERATION, Clear Memory Mode.> and INSPECTION MODE <Ref. to EN(H4DOTC)-41, OPERATION, Inspection Mode.>.

	Step	Check	Yes	No
1	**CHECK VEHICLE CONDITION.** Was the vehicle driven or idled with the engine partially submerged under water?	Vehicle was driven or idled with part of engine submerged under water.	In this case, it is not necessary to inspect DTC P0128.	Go to step **2.**
2	**CHECK FOR OTHER DTC ON DISPLAY.** Is any other DTC displayed?	Other DTC is displayed.	Inspect DTC using "List of Diagnostic Trouble Codes (DTC)". <Ref. to EN(H4DOTC)-81, List of Diagnostic Trouble Codes (DTC).>	Go to step **3.**
3	**CHECK ENGINE COOLANT.** Are coolant level and mixture ratio of cooling water to anti-freeze solution correct?	Level and mixture ratio are correct.	Go to step **4.**	Replace the engine coolant. <Ref. to CO(H4SO)-29, REPLACEMENT, Engine Coolant.>
4	**CHECK RADIATOR FAN.** 1)Start the engine. 2)Check radiator fan operation. Does the radiator fan continuously rotate for more than 3 minutes during idling?	Radiator fan rotates.	Repair radiator fan circuit. <Ref. to CO(H4SO)-47, Radiator Main Fan and Fan Motor.> and <Ref. to CO(H4SO)-49, Radiator Sub Fan and Fan Motor.>.	Replace the thermostat. <Ref. to CO(H4SO)-36, Thermostat.>

V: DTC P0129 — ATMOSPHERIC PRESSURE SENSOR CIRCUIT RANGE/PERFORMANCE —

- **DTC DETECTING CONDITION:**
  - Fault occurs in two consecutive driving cycles

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to EN(H4DOTC)-49, OPERATION, Clear Memory Mode.> and INSPECTION MODE <Ref. to EN(H4DOTC)-41, Inspection Mode.>.

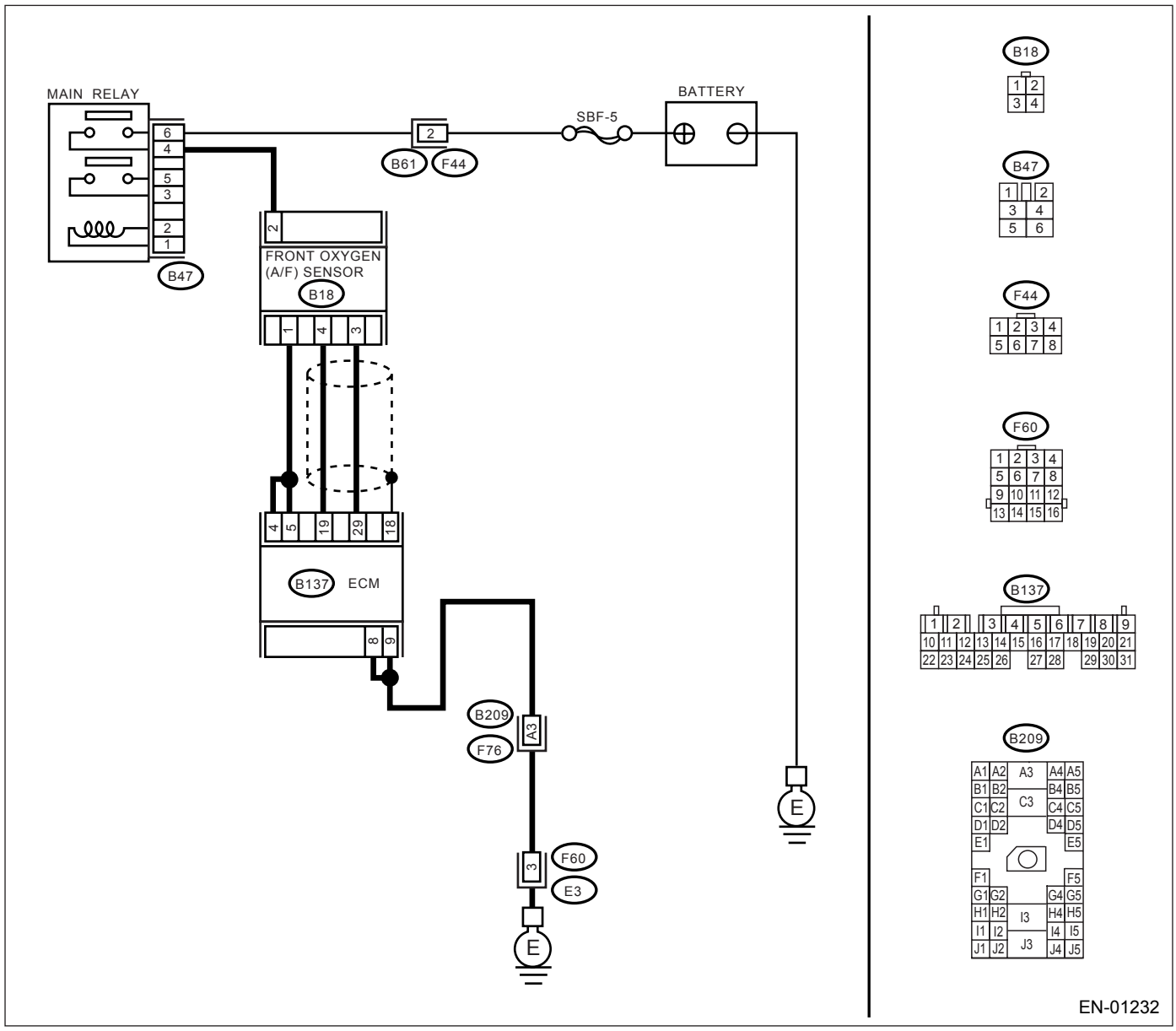
Step		Check	Yes	No
1	**CHECK FOR OTHER DIAGNOSTIC TROUBLE CODE (DTC) ON DISPLAY.** Is any other DTC displayed?	Other DTC is displayed.	Replace the ECM. <Ref. to FU(H4DOTC)-50, Engine Control Module.> NOTE: The barometric pressure sensor is incorporated in the ECM.	It is not necessary to inspect DTC P0129.

W: DTC P0130 — O_2 SENSOR CIRCUIT (BANK 1 SENSOR 1) —

- **DTC DETECTING CONDITION:**
  - Immediately at fault recognition

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to EN(H4DOTC)-49, OPERATION, Clear Memory Mode.> and INSPECTION MODE <Ref. to EN(H4DOTC)-41, Inspection Mode.>.

- **WIRING DIAGRAM:**



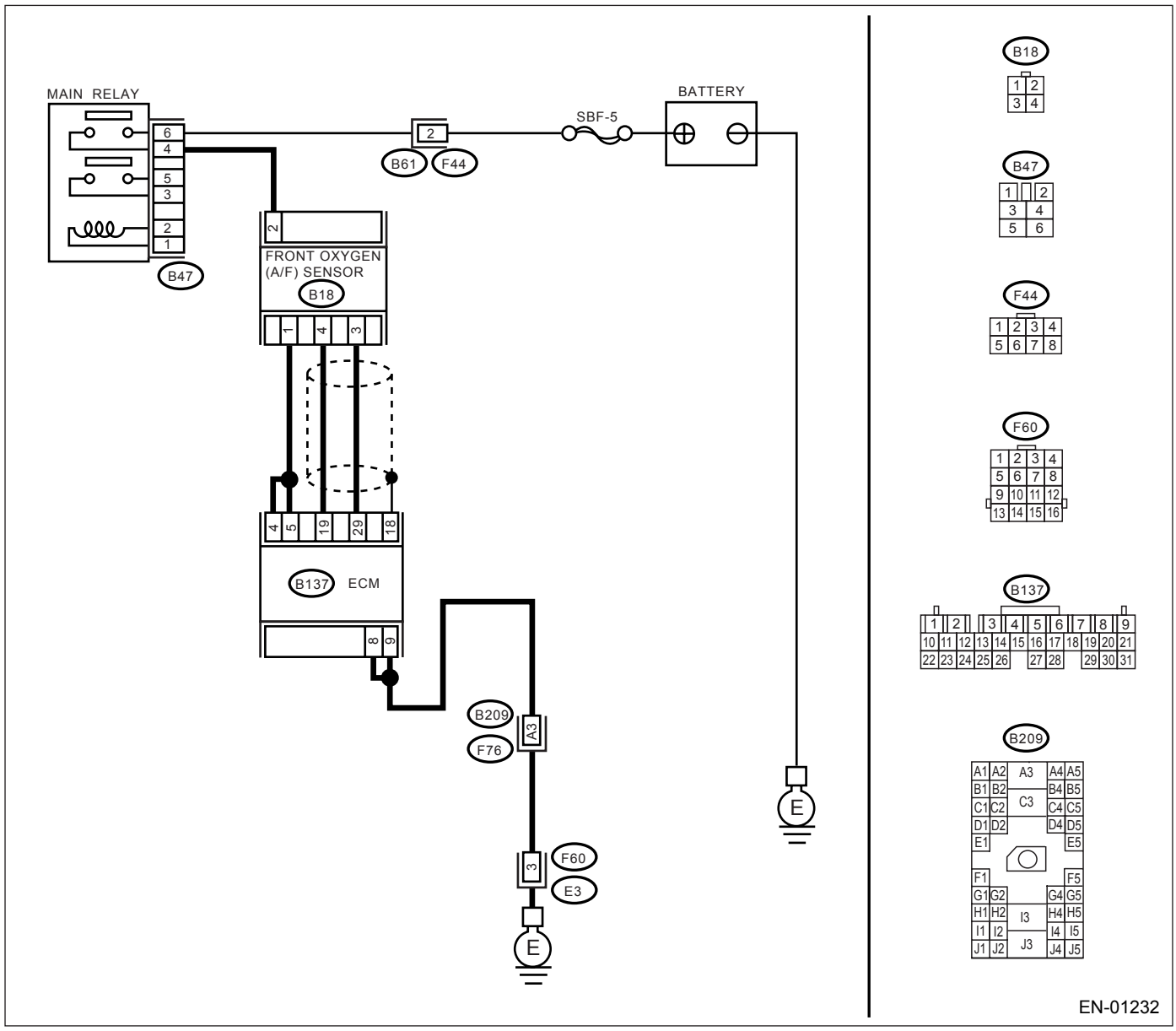
	Step	Check	Yes	No
1	**CHECK FOR OTHER DIAGNOSTIC TROUBLE CODE (DTC) ON DISPLAY.** Is any other DTC displayed?	Other DTC is displayed.	Inspect the relevant DTC using the "List of Diagnostic Trouble Codes (DTC)". <Ref. to EN(H4DOTC)-81, List of Diagnostic Trouble Codes (DTC).>	Go to step **2.**
2	**CHECK FRONT OXYGEN (A/F) SENSOR DATA.** 1)Start the engine. 2)While observing the Subaru Select Monitor or OBD-II general scan tool screen, warm-up the engine until coolant temperature is above 70°C (158°F). If the engine is already warmed-up, operate at idle speed for at least 1 minute. 3)Read the data of front oxygen (A/F) sensor signal using Subaru Select Monitor or OBD-II general scan tool. Is the measured value within the specified range? NOTE: •Subaru Select Monitor For detailed operation procedures, refer to "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H4DOTC)-33, Subaru Select Monitor.> •OBD-II general scan tool For detailed operation procedures, refer to the OBD-II General Scan Tool Instruction Manual.	0.85 — 1.15 (idling)	Go to step **3.**	Go to step **4.**
3	**CHECK REAR OXYGEN SENSOR SIGNAL.** 1)Race up the engine from idling to 5,000 rpm for a total of 5 cycles. NOTE: To increase engine speed to 5,000 rpm, slowly depress accelerator pedal, taking approximately 5 seconds, and quickly release accelerator pedal to decrease engine speed. 2)Activate the LED operation mode for engine. Does the {Rear O2 Rich Signal} LED blink? NOTE: •Subaru Select Monitor For detailed operation procedures, refer to LED Operation Mode for Engine. <Ref. to EN(H4DOTC)-33, Subaru Select Monitor.>	LED blinks.	Repair poor contact in front oxygen (A/F) sensor and rear oxygen sensor connectors.	Replace the rear oxygen sensor. <Ref. to FU(H4DOTC)-47, Rear Oxygen Sensor.>
4	**CHECK EXHAUST SYSTEM.** Check exhaust system parts. NOTE: Check the following items. •Loose installation of portions •Damage (crack, hole etc.) of parts •Looseness of front oxygen (A/F) sensor •Looseness and ill fitting of parts between front oxygen (A/F) sensor and rear oxygen sensor Is there a fault in exhaust system?	There is a fault.	Repair or replace faulty parts.	Replace the front oxygen (A/F) sensor. <Ref. to FU(H4DOTC)-45, Front Oxygen (A/F) Sensor.>

X: DTC P0133 — O_2 SENSOR CIRCUIT SLOW RESPONSE (BANK 1 SENSOR 1) —

- **DTC DETECTING CONDITION:**
  - Fault occurs in two consecutive driving cycles

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to EN(H4DOTC)-49, OPERATION, Clear Memory Mode.> and INSPECTION MODE <Ref. to EN(H4DOTC)-41, Inspection Mode.>.

- **WIRING DIAGRAM:**



	Step	Check	Yes	No
1	**CHECK FOR OTHER DIAGNOSTIC TROUBLE CODE (DTC) ON DISPLAY.** Is any other DTC displayed?	Other DTC is displayed.	Inspect the relevant DTC using the "List of Diagnostic Trouble Codes (DTC)". <Ref. to EN(H4DOTC)-81, List of Diagnostic Trouble Codes (DTC).> NOTE: In this case, it is not necessary to inspect DTC P0133.	Go to step **2.**
2	**CHECK EXHAUST SYSTEM.** NOTE: Check the following items. •Loose installation of front portion of exhaust pipe onto cylinder heads •Loose connection between front exhaust pipe and front catalytic converter •Damage of exhaust pipe resulting in a hole Is there a fault in exhaust system?	There is a fault.	Repair exhaust system.	Replace the front oxygen (A/F) sensor. <Ref. to FU(H4DOTC)-45, Front Oxygen (A/F) Sensor.>

Y: DTC P0134 — O_2 SENSOR CIRCUIT NO ACTIVITY DETECTED (BANK 1 SENSOR 1) —

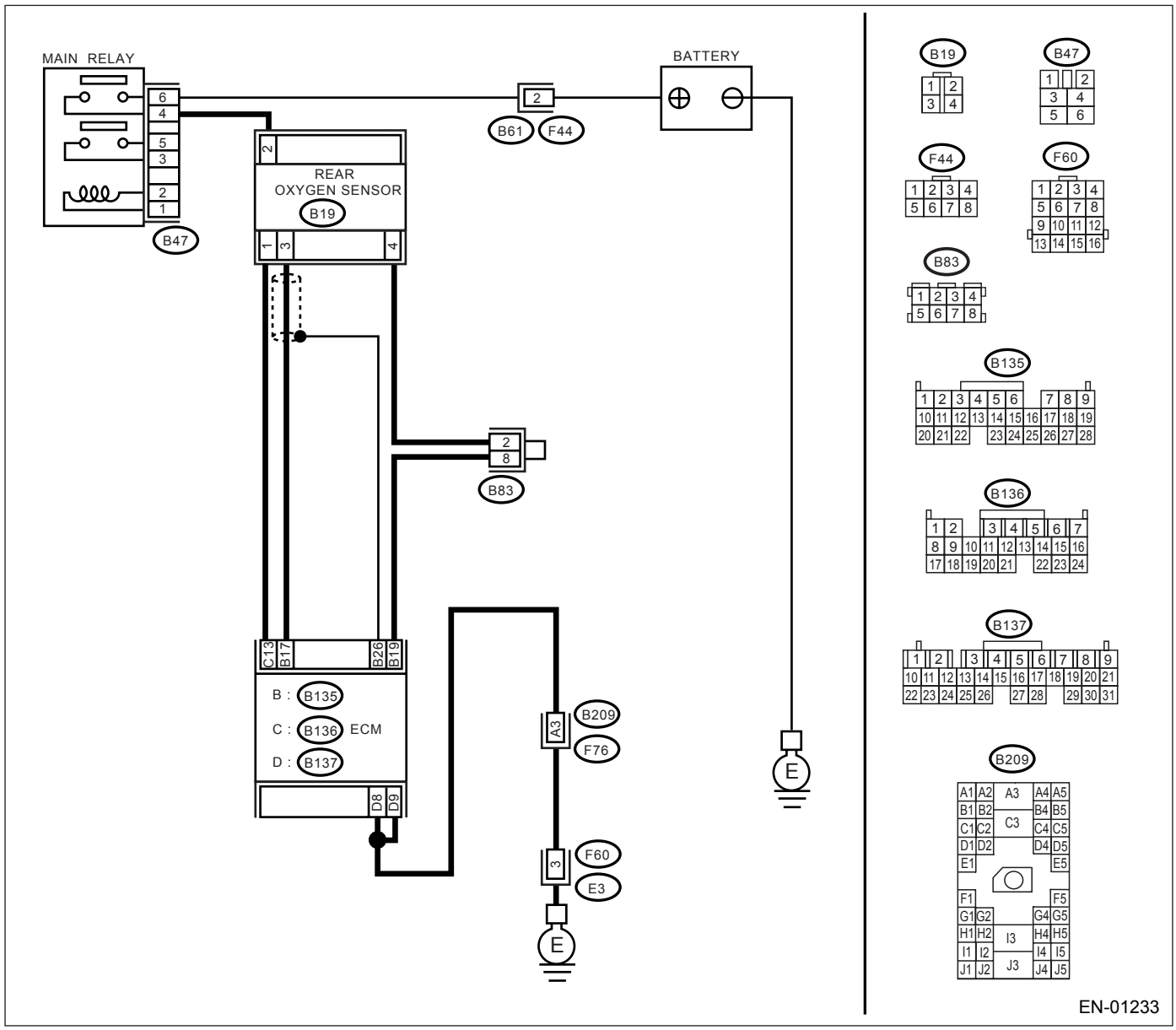
NOTE:
For the diagnostic procedure, refer to DTC P0130. <Ref. to EN(H4DOTC)-146, DTC P0130 — O_2 SENSOR CIRCUIT (BANK 1 SENSOR 1) —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

Z: DTC P0137 — O_2 SENSOR CIRCUIT LOW VOLTAGE (BANK 1 SENSOR 2) —

- **DTC DETECTING CONDITION:**
  - Fault occurs in two consecutive driving cycles

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to EN(H4DOTC)-49, OPERATION, Clear Memory Mode.> and INSPECTION MODE <Ref. to EN(H4DOTC)-41, Inspection Mode.>.

- **WIRING DIAGRAM:**



	Step	Check	Yes	No
1	**CHECK FOR OTHER DIAGNOSTIC TROUBLE CODE (DTC) ON DISPLAY.** Is any other DTC displayed?	Other DTC is displayed.	Inspect the DTC using the "List of Diagnostic Trouble Codes (DTC)". <Ref. to EN(H4DOTC)-81, List of Diagnostic Trouble Codes (DTC).>	Go to step **2.**
2	**CHECK REAR OXYGEN SENSOR DATA.** 1)Warm-up the engine until engine coolant temperature is above 70°C (158°F), and keep the engine speed at 2,000 to 3,000 rpm for 2 minutes. 2)Read the data of rear oxygen sensor signal using Subaru Select Monitor or OBD-II general scan tool. Does the value change? NOTE: •Subaru Select Monitor For detailed operation procedures, refer to READ CURRENT DATA FOR ENGINE. <Ref. to EN(H4DOTC)-33, Subaru Select Monitor.> •OBD-II general scan tool For detailed operation procedures, refer to the OBD-II General Scan Tool Instruction Manual.	Value changes.	Go to step **6.**	Go to step **3.**
3	**CHECK REAR OXYGEN SENSOR DATA.** Read the data of rear oxygen sensor signal using Subaru Select Monitor or OBD-II general scan tool. Is the measured value within the specified range?	0.2 — 0.4 V	Go to step **4.**	Replace the rear oxygen sensor. <Ref. to FU(H4DOTC)-47, Rear Oxygen Sensor.>
4	**CHECK HARNESS BETWEEN ECM AND REAR OXYGEN SENSOR CONNECTOR.** 1)Turn ignition switch to OFF. 2)Disconnect the connectors from ECM and rear oxygen sensor. 3)Measure the resistance of harness between ECM and rear oxygen sensor connector. ***Connector & terminal*** ***(B135) No. 17 — (B19) No. 3:*** Is the measured value more than the specified value?	3 Ω	Repair open circuit in harness between ECM and rear oxygen sensor connector.	Go to step **5.**
5	**CHECK HARNESS BETWEEN REAR OXYGEN SENSOR AND ECM CONNECTOR.** 1)Turn ignition switch to OFF. 2)Disconnect the connector from rear oxygen sensor. 3)Turn ignition switch to ON. 4)Measure the voltage between rear oxygen sensor harness connector and engine ground, or chassis ground. ***Connector & terminal*** ***(B19) No. 4 (+) — Engine ground (−):*** Is the measured value more than the specified value?	0.2 V	Replace the rear oxygen sensor. <Ref. to FU(H4DOTC)-47, Rear Oxygen Sensor.>	Repair harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between rear oxygen sensor and ECM connector • Poor contact in rear oxygen sensor connector • Poor contact in ECM connector

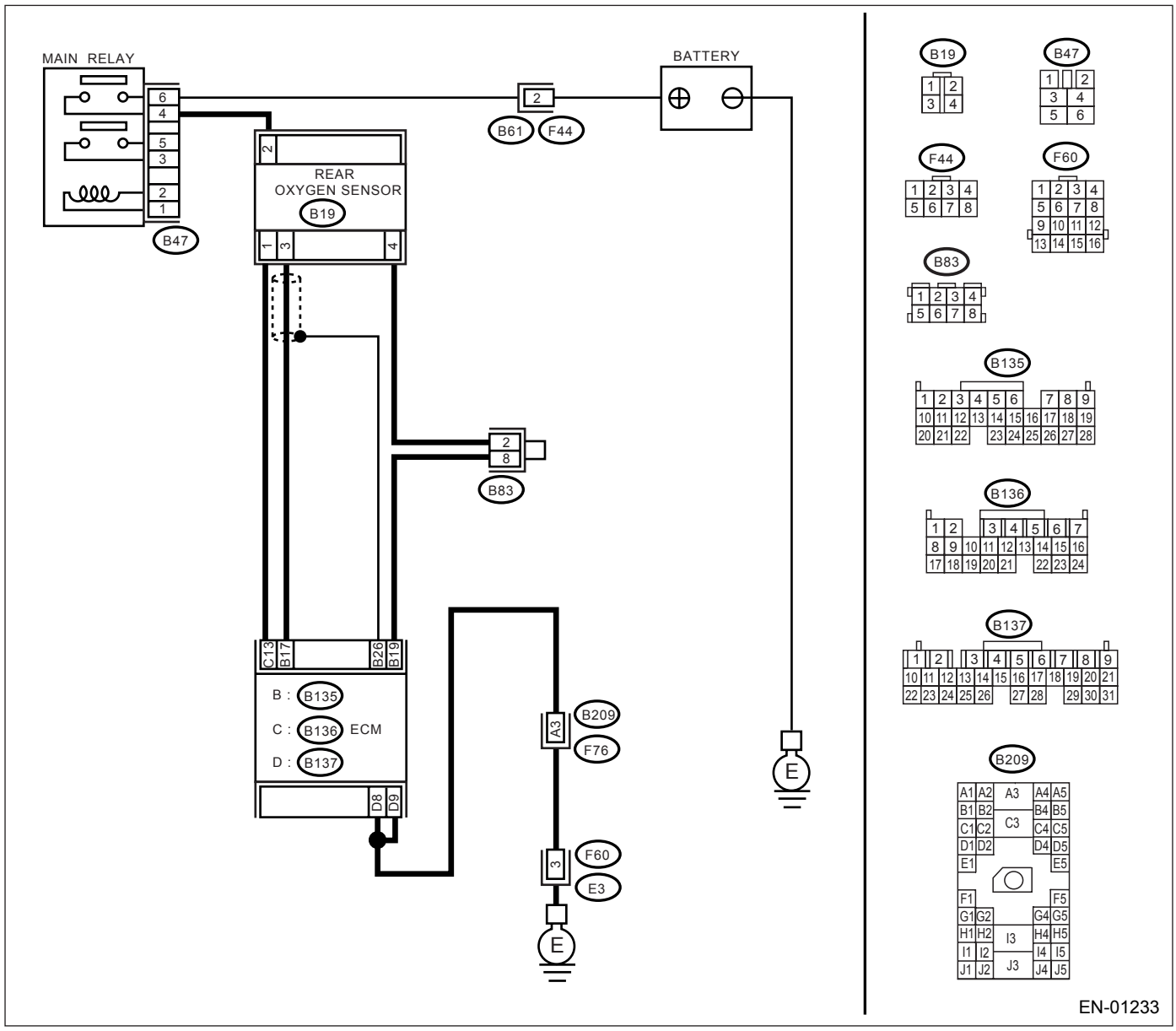
	Step	Check	Yes	No
6	**CHECK EXHAUST SYSTEM.** Check exhaust system parts. NOTE: Check the following items. •Loose installation of portions •Damage (crack, hole etc.) of parts •Looseness and ill fitting of parts between front oxygen (A/F) sensor and rear oxygen sensor Is there a fault in exhaust system?	There is a fault.	Repair or replace faulty parts.	Replace the rear oxygen sensor. <Ref. to FU(H4DOTC)-47, Rear Oxygen Sensor.>

AA:DTC P0138 — O_2 SENSOR CIRCUIT HIGH VOLTAGE (BANK 1 SENSOR 2) —

- **DTC DETECTING CONDITION:**
  - Fault occurs in two consecutive driving cycles

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to EN(H4DOTC)-49, OPERATION, Clear Memory Mode.> and INSPECTION MODE <Ref. to EN(H4DOTC)-41, Inspection Mode.>.

- **WIRING DIAGRAM:**



	Step	Check	Yes	No
1	**CHECK FOR OTHER DIAGNOSTIC TROUBLE CODE (DTC) ON DISPLAY.** Is any other DTC displayed?	Other DTC is displayed.	Inspect the DTC using the "List of Diagnostic Trouble Codes (DTC)". <Ref. to EN(H4DOTC)-81, List of Diagnostic Trouble Codes (DTC).>	Go to step **2.**
2	**CHECK REAR OXYGEN SENSOR DATA.** 1)Warm-up the engine until engine coolant temperature is above 70°C (158°F), and keep the engine speed at 2,000 to 3,000 rpm for 2 minutes. 2)Read the data of rear oxygen sensor signal using Subaru Select Monitor or OBD-II general scan tool. Does the value change? NOTE: •Subaru Select Monitor For detailed operation procedures, refer to READ CURRENT DATA FOR ENGINE. <Ref. to EN(H4DOTC)-33, Subaru Select Monitor.> •OBD-II general scan tool For detailed operation procedures, refer to the OBD-II General Scan Tool Instruction Manual.	Value changes.	Go to step **6.**	Go to step **3.**
3	**CHECK REAR OXYGEN SENSOR DATA.** Read the data of rear oxygen sensor signal using Subaru Select Monitor or OBD-II general scan tool. Is the measured value within the specified range?	0.2 — 0.4 V	Go to step **4.**	Replace the rear oxygen sensor. <Ref. to FU(H4DOTC)-47, Rear Oxygen Sensor.>
4	**CHECK HARNESS BETWEEN ECM AND REAR OXYGEN SENSOR CONNECTOR.** 1)Turn ignition switch to OFF. 2)Disconnect the connectors from ECM and rear oxygen sensor. 3)Measure the resistance of harness between ECM and rear oxygen sensor connector. ***Connector & terminal*** ***(B135) No. 17 — (B19)No. 3:*** Is the measured value more than the specified value?	3 Ω	Repair open circuit in harness between ECM and rear oxygen sensor connector.	Go to step **5.**
5	**CHECK HARNESS BETWEEN REAR OXYGEN SENSOR AND ECM CONNECTOR.** 1)Turn ignition switch to OFF. 2)Disconnect the connector from rear oxygen sensor. 3)Turn ignition switch to ON. 4)Measure the voltage between rear oxygen sensor harness connector and engine ground, or chassis ground. ***Connector & terminal*** ***(B19) No. 3 (+) — Engine ground (−):*** Is the measured value more than the specified value?	0.2 V	Replace the rear oxygen sensor. <Ref. to FU(H4DOTC)-47, Rear Oxygen Sensor.>	Repair harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between rear oxygen sensor and ECM connector • Poor contact in rear oxygen sensor connector • Poor contact in ECM connector

	Step	Check	Yes	No
6	**CHECK EXHAUST SYSTEM.** Check exhaust system parts. NOTE: Check the following items. •Loose installation of portions •Damage (crack, hole etc.) of parts •Looseness and ill fitting of parts between front oxygen (A/F) sensor and rear oxygen sensor Is there a fault in exhaust system?	There is a fault.	Repair or replace faulty parts.	Replace the rear oxygen sensor. <Ref. to FU(H4DOTC)-47, Rear Oxygen Sensor.>

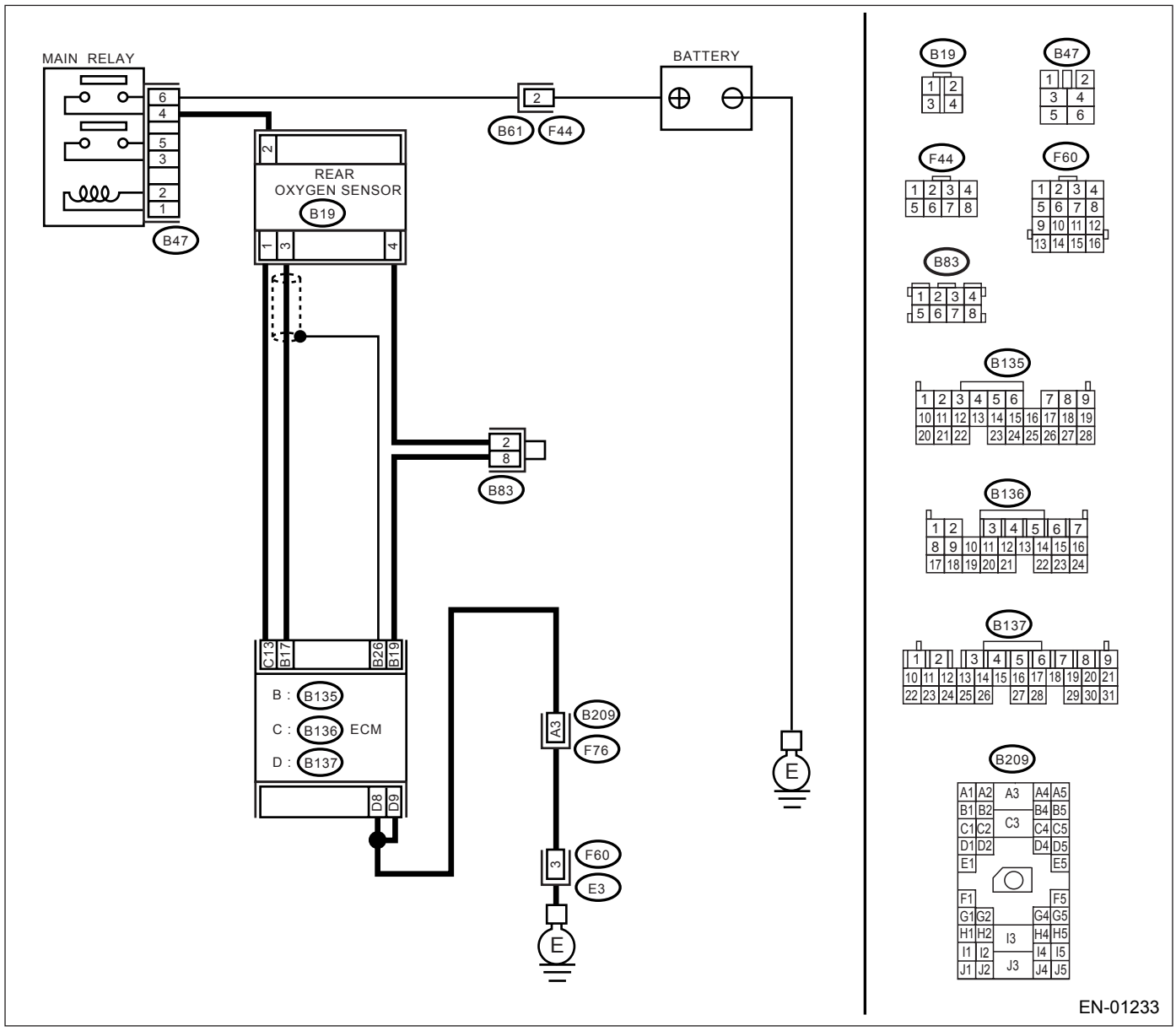
AB:DTC P0139 — O_2 SENSOR CIRCUIT SLOW RESPONSE (BANK 1 SENSOR 2)

—

- **DTC DETECTING CONDITION:**
  - Fault occurs in two consecutive driving cycles

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to EN(H4DOTC)-49, OPERATION, Clear Memory Mode.> and INSPECTION MODE <Ref. to EN(H4DOTC)-41, Inspection Mode.>.

- **WIRING DIAGRAM:**



Step		Check	Yes	No
1	**CHECK FOR OTHER DIAGNOSTIC TROUBLE CODE (DTC) ON DISPLAY.** Is any other DTC displayed?	Other DTC is displayed.	Inspect the relevant DTC using the “List of Diagnostic Trouble Codes (DTC)”. <Ref. to EN(H4DOTC)-81, List of Diagnostic Trouble Codes (DTC).> NOTE: In this case, it is not necessary to inspect DTC P0139.	Replace the rear oxygen sensor. <Ref. to FU(H4DOTC)-47, Rear Oxygen Sensor.>

AC:DTC P0171 — SYSTEM TOO LEAN (BANK 1) —

NOTE:
For the diagnostic procedure, refer to DTC P0172. <Ref. to EN(H4DOTC)-160, DTC P0172 — SYSTEM TOO RICH (BANK 1) —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

AD:DTC P0172 — SYSTEM TOO RICH (BANK 1) —

- **DTC DETECTING CONDITION:**
  - Fault occurs in two consecutive driving cycles
- **TROUBLE SYMPTOM:**
  - Erroneous idling
  - Engine stalls
  - Poor driving performance

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to EN(H4DOTC)-49, OPERATION, Clear Memory Mode.> and INSPECTION MODE <Ref. to EN(H4DOTC)-41, Inspection Mode.>.

	Step	Check	Yes	No
1	**CHECK EXHAUST SYSTEM.** Are there holes or loose bolts on exhaust system?	No holes or loose bolts.	Go to step **2.**	Repair exhaust system.
2	**CHECK AIR INTAKE SYSTEM.** Are there holes, loose bolts or disconnection of hose on air intake system?	No holes, loose bolts or disconnection.	Go to step **3.**	Repair air intake system.
3	**CHECK FUEL PRESSURE.** **Warning:** **•Place "NO FIRE" signs near the working area.** **•Be careful not to spill fuel on the floor.** 1)Lower the fuel pressure. (1) Disconnect the connector from fuel pump relay. (2) Start the engine and run it until it stalls. (3) After the engine stalls, crank it for five more seconds. (4) Turn ignition switch to OFF. 2)Connect the connector to fuel pump relay. 3)Disconnect the fuel delivery hose from fuel filter, and connect fuel pressure gauge. 4)Install the fuel filler cap. 5)Start the engine and idle while gear position is neutral. 6)Measure the fuel pressure while disconnecting pressure regulator vacuum hose from intake manifold. Is the measured value within the specified range? **Warning:** **Before removing the fuel pressure gauge, lower the fuel pressure.** NOTE: If fuel pressure does not increase, squeeze fuel return hose 2 to 3 times, then measure fuel pressure again.	284 — 314 kPa (2.9 — 3.2 kg/cm^2, 41 — 46 psi)	Go to step **4.**	Repair the following items. Fuel pressure too high: • Clogged fuel return line or bent hose Fuel pressure too low: • Improper fuel pump discharge • Clogged fuel supply line

	Step	Check	Yes	No
4	**CHECK FUEL PRESSURE.** After connecting the pressure regulator vacuum hose, measure fuel pressure. Is the measured value within the specified range? **Warning:** **Before removing the fuel pressure gauge, release fuel pressure.** NOTE: •If fuel pressure does not increase, squeeze fuel return hose 2 to 3 times, then measure fuel pressure again. •If the value measured in this step is out of specification, check or replace pressure regulator and pressure regulator vacuum hose.	206 — 235 kPa (2.1 — 2.4 kg/cm^2, 30 — 34 psi)	Go to step **5.**	Repair the following items. Fuel pressure too high: • Faulty pressure regulator • Clogged fuel return line or bent hose Fuel pressure too low: • Faulty pressure regulator • Improper fuel pump discharge • Clogged fuel supply line
5	**CHECK ENGINE COOLANT TEMPERATURE SENSOR** 1)Start the engine and warm it up completely. 2)Read the data of engine coolant temperature sensor signal using Subaru Select Monitor or OBD-II general scan tool. Is the measured value more than the specified value? NOTE: •Subaru Select Monitor For detailed operation procedures, refer to READ CURRENT DATA FOR ENGINE. <Ref. to EN(H4DOTC)-33, Subaru Select Monitor.> •OBD-II general scan tool For detailed operation procedures, refer to the OBD-II General Scan Tool Instruction Manual.	60°C (140°F)	Go to step **6.**	Replace the engine coolant temperature sensor. <Ref. to FU(H4DOTC)-29, Engine Coolant Temperature Sensor.>
6	**CHECK MASS AIR FLOW & INTAKE AIR TEMPERATURE SENSOR** 1)Start the engine and warm-up engine until coolant temperature is greater than 60°C (140°F). 2)Place the shift lever in neutral position. 3)Turn the A/C switch to OFF. 4)All accessory switches OFF. 5)Read the data of mass air flow & intake air temperature sensor signal using Subaru Select Monitor or OBD-II general scan tool. Is the measured value within the specified range? NOTE: •Subaru Select Monitor For detailed operation procedures, refer to READ CURRENT DATA FOR ENGINE. <Ref. to EN(H4DOTC)-33, Subaru Select Monitor.> •OBD-II general scan tool For detailed operation procedures, refer to the OBD-II General Scan Tool Instruction Manual.	Ignition switch ON: 73.3 — 106.6 kPa (550 — 800 mmHg, 21.65 — 31.50 inHg) Idling: 24.0 — 41.3 kPa (180 — 310 mmHg, 7.09 — 12.20 inHg)	Go to step **7.**	Replace mass air flow & intake air temperature sensor. <Ref. to FU(H4DOTC)-34, Mass Air Flow and Intake Air Temperature Sensor.>

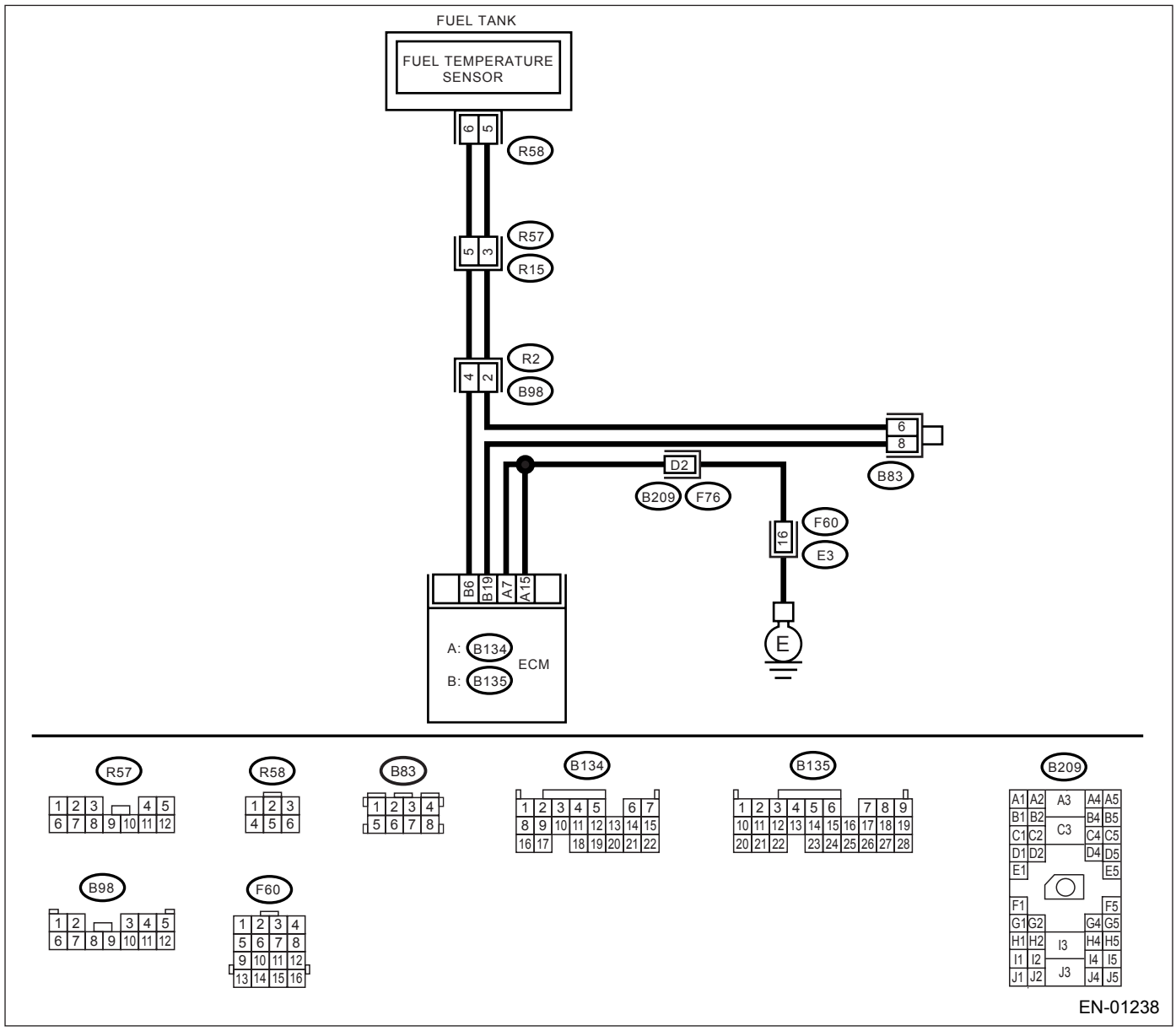
	Step	Check	Yes	No
7	**CHECK MASS AIR FLOW & INTAKE AIR TEMPERATURE SENSOR** 1)Start the engine and warm-up engine until coolant temperature is greater than 60°C (140°F). 2)Place the shift lever in neutral position. 3)Turn the A/C switch to OFF. 4)All accessory switches OFF. 5)Open the hood. 6)Measure the ambient temperature. 7)Read the data of mass air flow & intake air temperature sensor signal using Subaru Select Monitor or OBD-II general scan tool. Is the value of intake air temperature minus ambient temperature within the specified range? NOTE: •Subaru Select Monitor For detailed operation procedures, refer to READ CURRENT DATA FOR ENGINE. <Ref. to EN(H4DOTC)-33, Subaru Select Monitor.> •OBD-II general scan tool For detailed operation procedures, refer to the OBD-II General Scan Tool Instruction Manual.	−10°C (14°F) — 50°C (122°F)	Contact SOA (distributor) service. NOTE: Inspection by DTM is required, because probable cause is deterioration of multiple parts.	Check mass air flow & intake air temperature sensor. <Ref. to FU(H4DOTC)-34, Mass Air Flow and Intake Air Temperature Sensor.>

AE:DTC P0181 — FUEL TEMPERATURE SENSOR “A” CIRCUIT RANGE/PERFORMANCE —

- **DTC DETECTING CONDITION:**
  - Fault occurs in two consecutive driving cycles

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to EN(H4DOTC)-49, OPERATION, Clear Memory Mode.> and INSPECTION MODE <Ref. to EN(H4DOTC)-41, OPERATION, Inspection Mode.>.

- **WIRING DIAGRAM:**



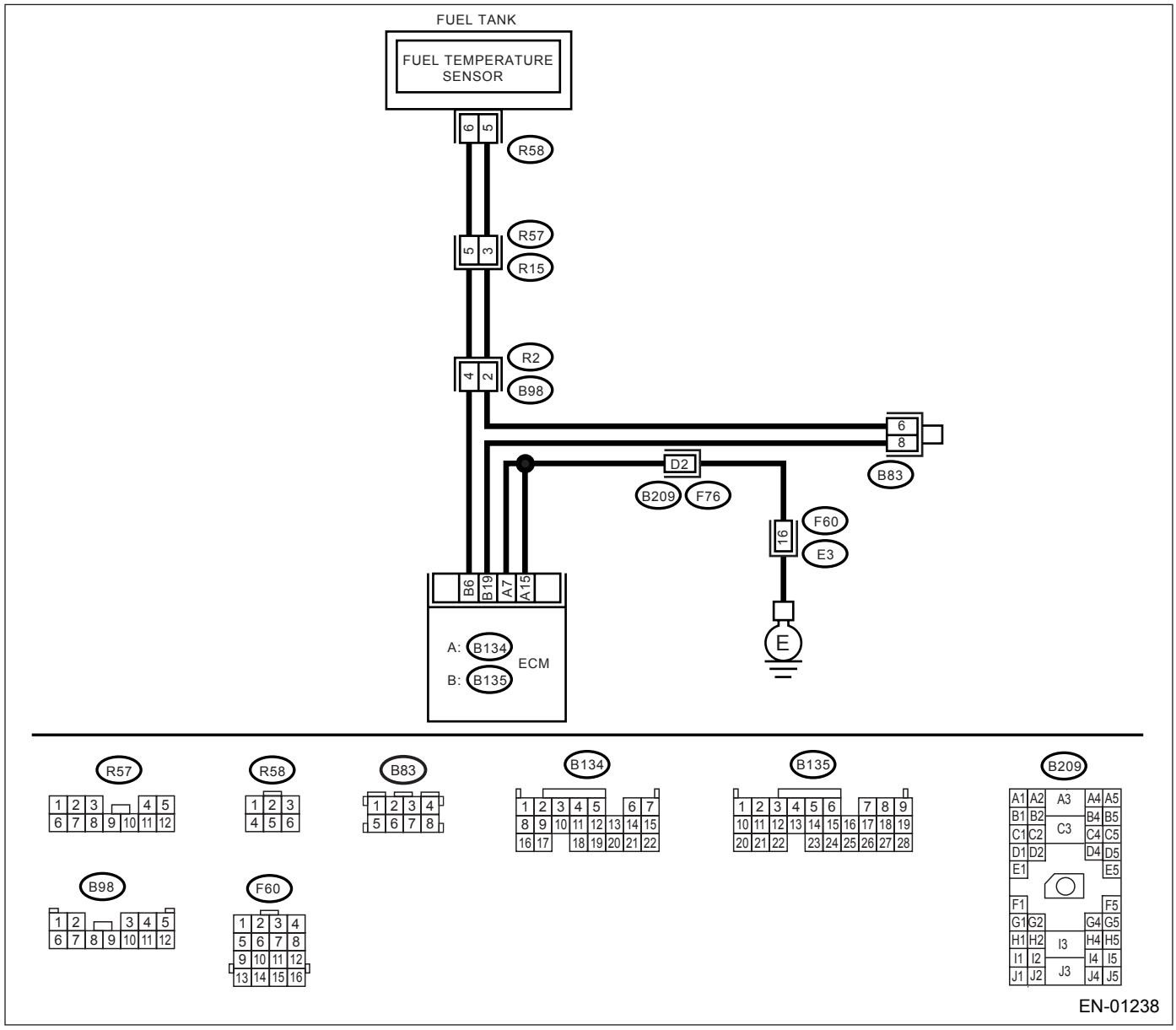
	Step	Check	Yes	No
1	**CHECK FOR OTHER DTC ON DISPLAY.** Is any other DTC displayed?	Other DTC is displayed.	Inspect DTC using "List of Diagnostic Trouble Codes (DTC)". <Ref. to EN(H4DOTC)-81, List of Diagnostic Trouble Codes (DTC).> NOTE: In this case, it is not necessary to inspect DTC P0181.	Replace the fuel temperature sensor. <Ref. to EC(H4DOTC)-9, Fuel Temperature Sensor.>

AF:DTC P0182 — FUEL TEMPERATURE SENSOR "A" CIRCUIT LOW INPUT —

- **DTC DETECTING CONDITION:**
  - Immediately at fault recognition

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to EN(H4DOTC)-49, OPERATION, Clear Memory Mode.> and INSPECTION MODE <Ref. to EN(H4DOTC)-41, OPERATION, Inspection Mode.>.

- **WIRING DIAGRAM:**



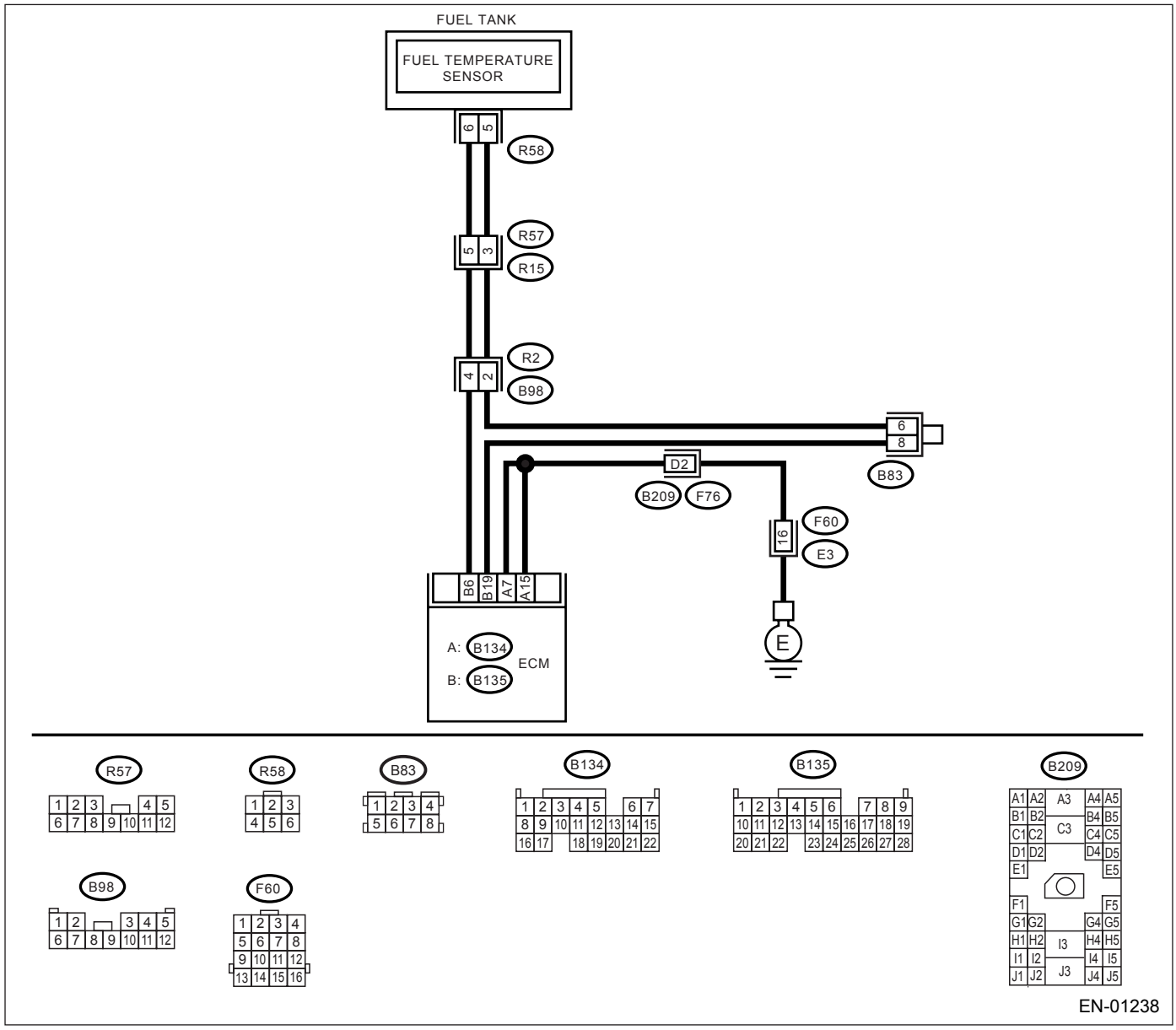
	Step	Check	Yes	No
1	**CHECK CURRENT DATA.** 1)Start the engine. 2)Read the data of fuel temperature sensor signal using Subaru Select Monitor or OBD-II general scan tool. Is the measured value more than the specified value? NOTE: •Subaru Select Monitor For detailed operation procedures, refer to "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H4DOTC)-33, Subaru Select Monitor.> •OBD-II general scan tool For detailed operation procedures, refer to the OBD-II General Scan Tool Instruction Manual.	150°C (302°F)	Go to step **2.**	The MIL may light up, however, the circuit is returned to the normal status at the moment.
2	**CHECK CURRENT DATA.** 1)Turn ignition switch to OFF. 2)Remove the access hole lid. 3)Disconnect the connector from fuel pump. 4)Turn ignition switch to ON. 5)Read the data of fuel temperature sensor signal using Subaru Select Monitor or OBD-II general scan tool. Is the measured value less than the specified value? NOTE: •Subaru Select Monitor For detailed operation procedures, refer to "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H4DOTC)-33, Subaru Select Monitor.> •OBD-II general scan tool For detailed operation procedures, refer to the OBD-II General Scan Tool Instruction Manual.	−40°C (−40°F)	Replace the fuel temperature sensor. <Ref. to EC(H4DOTC)-9, Fuel Temperature Sensor.>	Repair short circuit to ground in harness between fuel pump and ECM connector.

AG:DTC P0183 — FUEL TEMPERATURE SENSOR "A" CIRCUIT HIGH INPUT —

- **DTC DETECTING CONDITION:**
  - Immediately at fault recognition

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to EN(H4DOTC)-49, OPERATION, Clear Memory Mode.> and INSPECTION MODE <Ref. to EN(H4DOTC)-41, OPERATION, Inspection Mode.>.

- **WIRING DIAGRAM:**



EN-01238

	Step	Check	Yes	No
1	**CHECK CURRENT DATA.** 1)Start the engine. 2)Read the data of fuel temperature sensor signal using Subaru Select Monitor or OBD-II general scan tool. Is the measured value less than the specified value? NOTE: •Subaru Select Monitor For detailed operation procedures, refer to "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H4DOTC)-33, Subaru Select Monitor.> •OBD-II general scan tool For detailed operation procedures, refer to the OBD-II General Scan Tool Instruction Manual.	–40°C (–40°F)	Go to step **2.**	Repair poor contact. NOTE: In this case, repair the following: • Poor contact in fuel pump connector • Poor contact in ECM connector • Poor contact in coupling connector • Poor contact in joint connector
2	**CHECK HARNESS BETWEEN FUEL TEMPERATURE SENSOR AND ECM CONNECTOR.** 1)Turn ignition switch to OFF. 2)Remove the access hole lid. 3)Disconnect the connector from fuel pump. 4)Measure the voltage between fuel pump connector and chassis ground. ***Connector & terminal*** ***(R58) No. 6 (+) — Chassis ground (–):*** Is the measured value more than the specified value?	10 V	Repair short circuit to battery in harness between ECM and fuel pump connector.	Go to step **3.**
3	**CHECK HARNESS BETWEEN FUEL TEMPERATURE SENSOR AND ECM CONNECTOR.** 1)Turn ignition switch to ON. 2)Measure the voltage between fuel pump connector and chassis ground. ***Connector & terminal*** ***(R58) No. 6 (+) — Chassis ground (–):*** Is the measured value more than the specified value?	10 V	Repair short circuit to battery in harness between ECM and fuel pump connector.	Go to step **4.**
4	**CHECK HARNESS BETWEEN FUEL TEMPERATURE SENSOR AND ECM CONNECTOR.** Measure the voltage between fuel pump connector and chassis ground. ***Connector & terminal*** ***(R58) No. 6 (+) — Chassis ground (–):*** Is the measured value more than the specified value?	4 V	Go to step **5.**	Repair harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between ECM and fuel pump connector • Poor contact in fuel pump connector • Poor contact in ECM connector • Poor contact in coupling connector

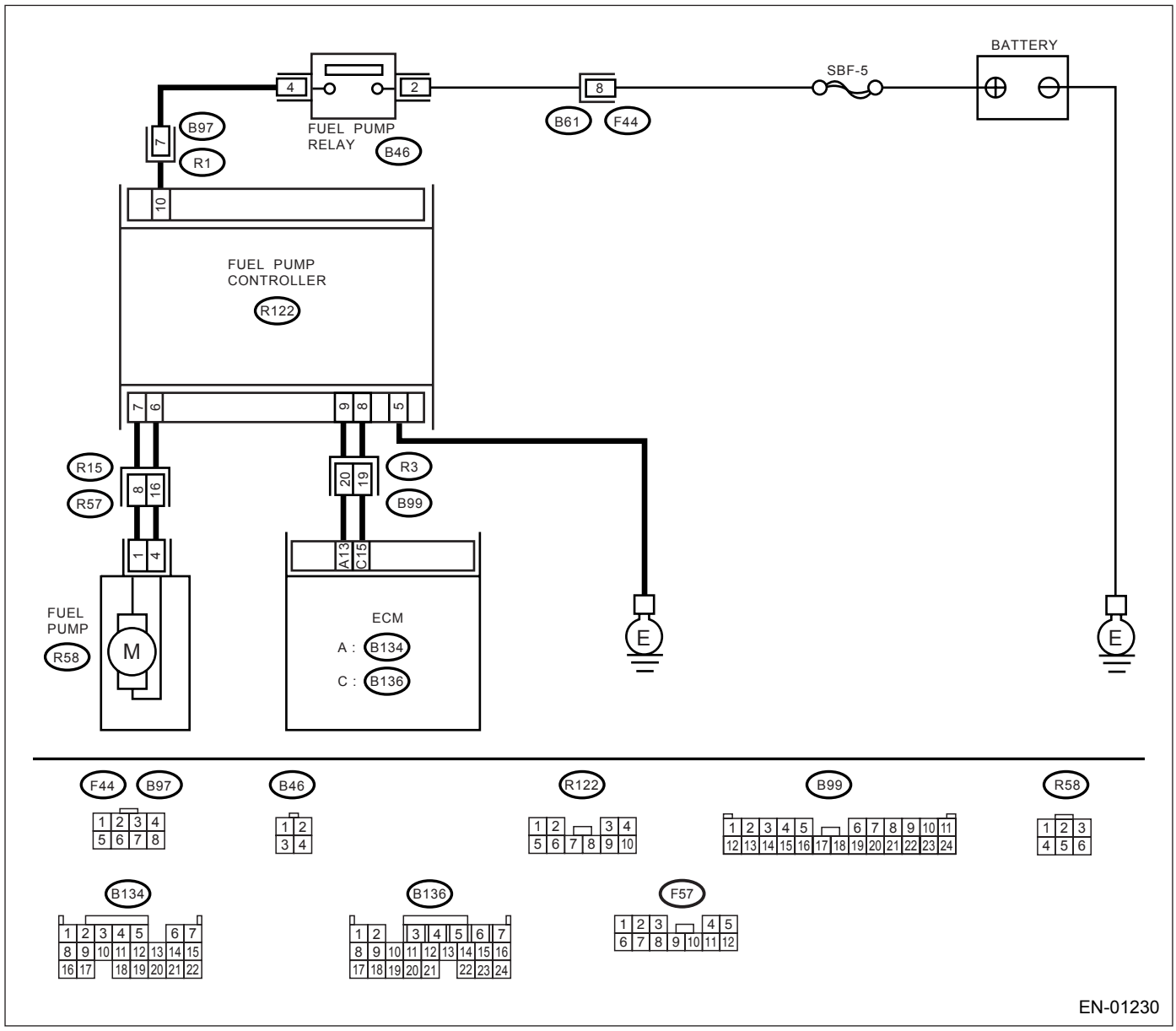
	Step	Check	Yes	No
5	**CHECK HARNESS BETWEEN FUEL TEMPERATURE SENSOR AND ECM CONNECTOR.** 1)Turn ignition switch to OFF. 2)Disconnect the connector from ECM. 3)Measure the resistance of harness between fuel pump connector and ECM. ***Connector & terminal*** ***(R58) No. 5 — (B135) No. 19:*** Is the measured value less than the specified value?	1 Ω	Replace the fuel temperature sensor. <Ref. to EC(H4DOTC)-9, Fuel Temperature Sensor.>	Repair harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between ECM and fuel pump connector • Poor contact in fuel pump connector • Poor contact in ECM connector • Poor contact in coupling connector • Poor contact in joint connector

AH:DTC P0230 — FUEL PUMP PRIMARY CIRCUIT —

- **DTC DETECTING CONDITION:**
  - Immediately at fault recognition

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to EN(H4DOTC)-49, OPERATION, Clear Memory Mode.> and INSPECTION MODE <Ref. to EN(H4DOTC)-41, Inspection Mode.>.

- **WIRING DIAGRAM:**



	Step	Check	Yes	No
1	**CHECK POWER SUPPLY CIRCUIT TO FUEL PUMP CONTROLLER.** 1)Turn ignition switch to OFF. 2)Disconnect the connector from fuel pump controller. 3)Turn ignition switch to ON. 4)Measure the voltage between fuel pump controller and chassis ground. ***Connector & terminal*** ***(R122) No. 10 (+) — Chassis ground (−):*** Is the measured value more than the specified value?	10 V	Go to step **2.**	Repair the power supply circuit. NOTE: In this case, repair the following: • Open or short circuit to ground in harness between fuel pump relay and fuel pump controller. • Poor contact in fuel pump controller connector • Poor contact in fuel pump relay connector
2	**CHECK GROUND CIRCUIT OF FUEL PUMP CONTROLLER.** 1)Turn ignition switch to OFF. 2)Measure the resistance of harness between fuel pump controller and chassis ground. ***Connector & terminal*** ***(R122) No. 5 — Chassis ground:*** Is the measured value less than the specified value?	5 Ω	Go to step **3.**	Repair harness and connector. NOTE: In this case, repair the following: • Open circuit in between fuel pump controller and chassis ground • Poor contact in fuel pump controller connector
3	**CHECK HARNESS BETWEEN FUEL PUMP CONTROLLER AND FUEL PUMP CONNECTOR.** 1)Disconnect the connector from fuel pump. 2)Measure the resistance of harness between fuel pump controller and fuel pump connector. ***Connector & terminal*** ***(R122) No. 7 — (R58) No. 1:*** ***(R122) No. 6 — (R58) No. 4:*** Is the measured value less than the specified value?	1 Ω	Go to step **4.**	Repair the open circuit in between fuel pump controller and fuel pump.
4	**CHECK HARNESS BETWEEN FUEL PUMP CONTROLLER AND FUEL PUMP CONNECTOR.** Measure the resistance of harness between fuel pump controller and chassis ground. ***Connector & terminal*** ***(R122) No. 7 — Chassis ground:*** ***(R122) No. 6 — Chassis ground:*** Is the measured value more than the specified value?	1 MΩ	Go to step **5.**	Repair the short circuit to ground in between fuel pump controller and fuel pump.

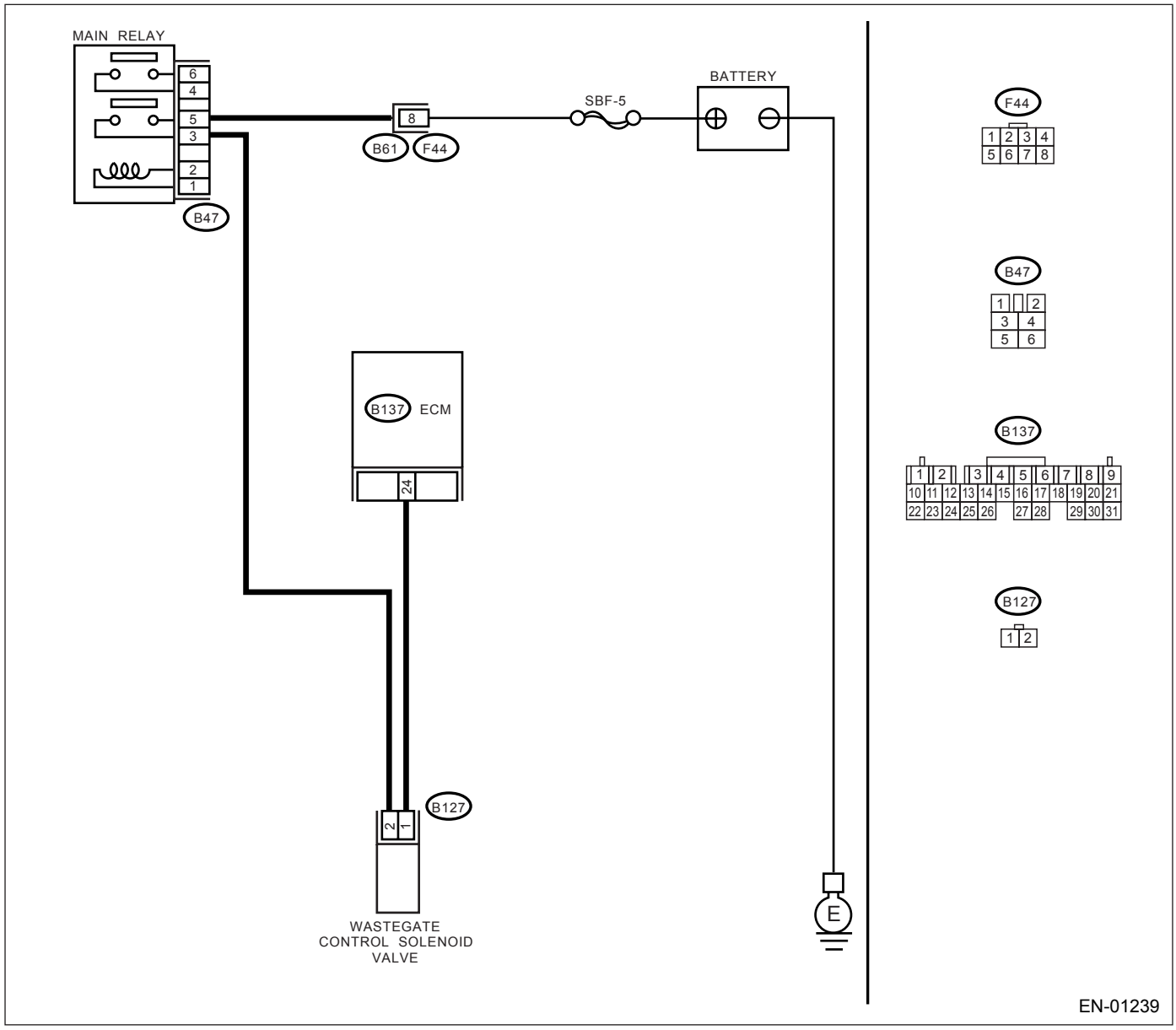
	Step	Check	Yes	No
5	**CHECK HARNESS BETWEEN FUEL PUMP CONTROLLER AND ECM CONNECTOR.** 1)Turn ignition switch to OFF. 2)Disconnect the connector from ECM. 3)Measure the resistance of harness between fuel pump controller and ECM connector. ***Connector & terminal*** ***(R122) No. 9 — (B134) No. 13:*** ***(R122) No. 8 — (B136) No. 16:*** Is the measured value less than the specified value?	1 Ω	Go to step **6.**	Repair harness and connector. NOTE: In this case, repair the following: • Open circuit in between fuel pump controller and ECM • Poor contact between fuel pump controller and ECM connector
6	**CHECK HARNESS BETWEEN FUEL PUMP CONTROLLER AND ECM CONNECTOR.** Measure the resistance of harness between fuel pump controller and chassis ground. ***Connector & terminal*** ***(R122) No. 9 — Chassis ground:*** ***(R122) No. 8 — Chassis ground:*** Is the measured value more than the specified value?	1 MΩ	Go to step **7.**	Repair the short circuit to ground in between fuel pump controller and ECM.
7	**CHECK FOR POOR CONTACT.** Check for poor contact between ECM and fuel pump controller connector. Is there poor contact between ECM and fuel pump controller connector?	There is poor contact.	Repair poor contact between ECM and fuel pump controller.	Replace the fuel pump controller. <Ref. to FU(H4DOTC)-53, Fuel Pump Controller.>

AI: DTC P0244 — TURBO/SUPER CHARGER WASTEGATE SOLENOID "A" RANGE/PERFORMANCE —

- **DTC DETECTING CONDITION:**
  - Immediately at fault recognition
- **TROUBLE SYMPTOM:**
  - Erroneous idling
  - Engine stalls
  - Poor driving performance

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to EN(H4DOTC)-49, OPERATION, Clear Memory Mode.> and INSPECTION MODE <Ref. to EN(H4DOTC)-41, Inspection Mode.>.

- **WIRING DIAGRAM:**



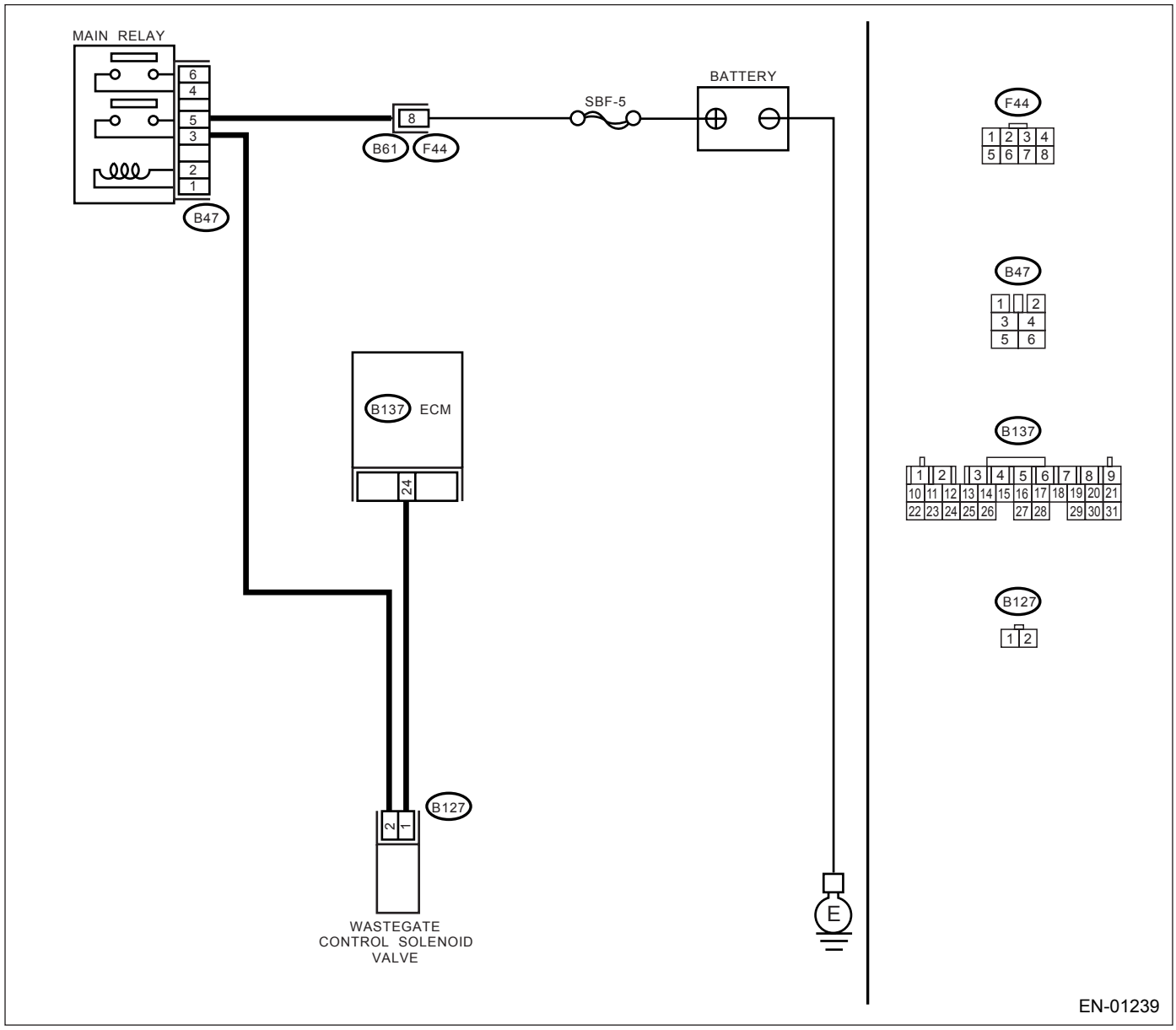
Step		Check	Yes	No
1	**CHECK FOR OTHER DIAGNOSTIC TROUBLE CODE (DTC) ON DISPLAY.** Is any other DTC displayed?	Other DTC is displayed.	Inspect the relevant DTC using the “List of Diagnostic Trouble Codes (DTC)”. <Ref. to EN(H4DOTC)-81, List of Diagnostic Trouble Codes (DTC).> NOTE: In this case, it is not necessary to inspect DTC P0244.	Replace the waste gate control solenoid valve. <Ref. to FU(H4DOTC)-44, Wastegate Control Solenoid Valve.>

AJ:DTC P0245 — TURBO/SUPER CHARGER WASTEGATE SOLENOID “A” LOW —

- **DTC DETECTING CONDITION:**
  - Immediately at fault recognition
- **TROUBLE SYMPTOM:**
  - Erroneous idling

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to EN(H4DOTC)-49, OPERATION, Clear Memory Mode.> and INSPECTION MODE <Ref. to EN(H4DOTC)-41, Inspection Mode.>.

- **WIRING DIAGRAM:**



	Step	Check	Yes	No
1	**CHECK OUTPUT SIGNAL FROM ECM.** 1)Turn ignition switch to ON. 2)Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B137) No. 24 (+) — Chassis ground (−):*** Is the measured value more than the specified value?	10 V	The MIL may light up, however, the circuit is returned to the normal status at the moment. Contact SOA (distributor) service. NOTE: Inspection by DTM is required, because probable cause is deterioration of multiple parts.	Go to step **2.**
2	**CHECK HARNESS BETWEEN WASTE GATE CONTROL SOLENOID VALVE AND ECM CONNECTOR.** 1)Turn ignition switch to OFF. 2)Disconnect the connectors from waste gate control solenoid valve and ECM. 3)Measure the resistance of harness between waste gate control solenoid valve connector and engine ground. ***Connector & terminal*** ***(B127) No. 1 — Engine ground:*** Is the measured value less than the specified value?	10 Ω	Repair short circuit to ground in harness between ECM and waste gate control solenoid valve connector.	Go to step **3.**
3	**CHECK HARNESS BETWEEN WASTE GATE CONTROL SOLENOID VALVE AND ECM CONNECTOR.** Measure the resistance of harness between waste gate control solenoid valve and ECM. ***Connector & terminal*** ***(B137) No. 24 — (B127) No. 1:*** Is the measured value less than the specified value?	1 Ω	Go to step **4.**	Repair open circuit in harness between ECM and waste gate control solenoid valve connector. NOTE: In this case, repair the following: • Open circuit in harness between ECM and waste gate control solenoid valve connector
4	**CHECK WASTE GATE CONTROL SOLENOID VALVE.** 1)Remove the waste gate control solenoid valve. 2)Measure the resistance between waste control solenoid valve terminals. ***Terminal*** ***No. 1 — No. 2:*** Is the measured value within the specified range?	30 — 34 Ω	Go to step **5.**	Replace the waste gate control solenoid valve. <Ref. to FU(H4DOTC)-44, Wastegate Control Solenoid Valve.>

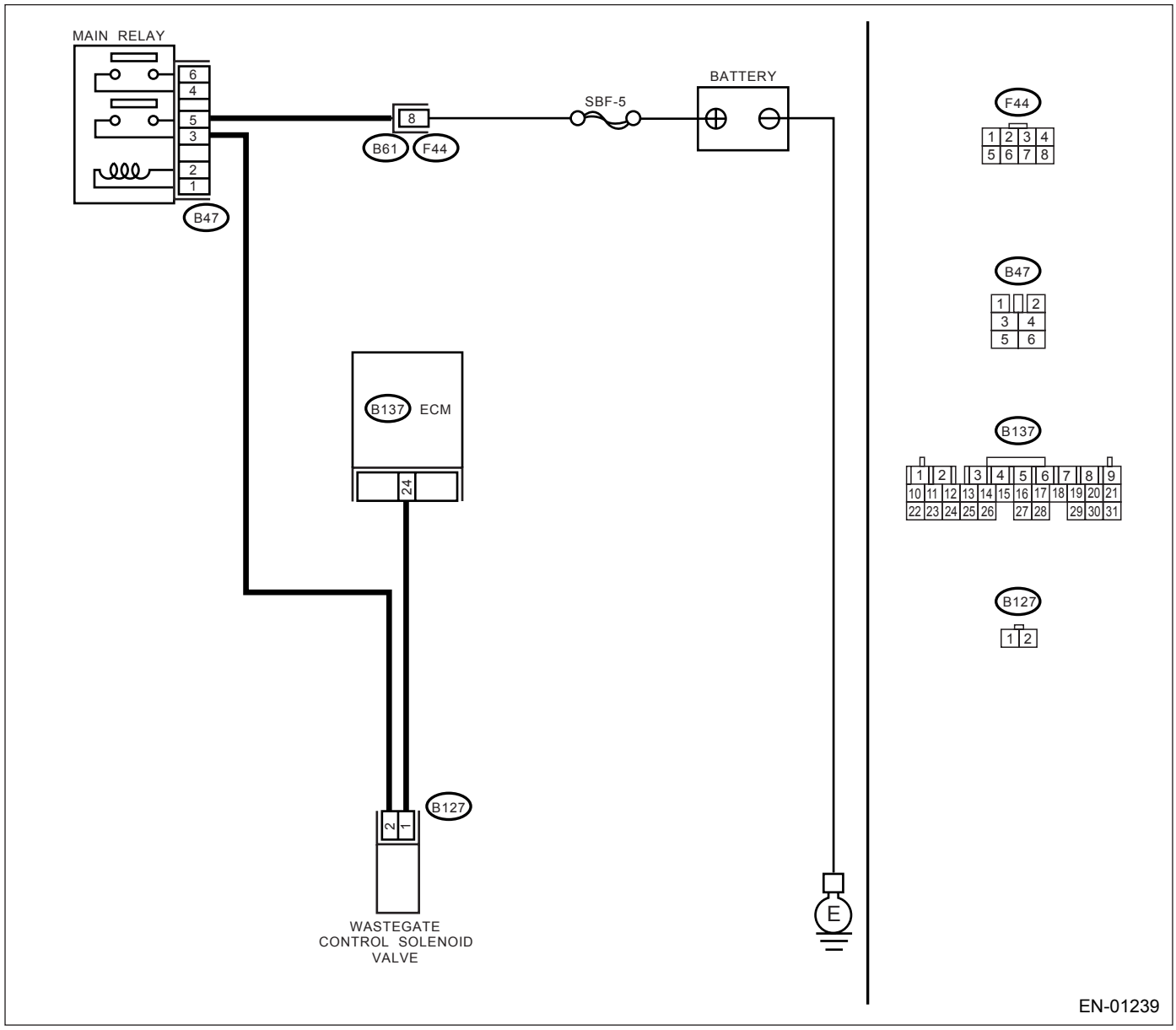
	Step	Check	Yes	No
5	**CHECK POWER SUPPLY TO WASTE GATE CONTROL SOLENOID VALVE.** 1)Turn ignition switch to ON. 2)Measure the voltage between waste gate control solenoid valve and engine ground. ***Connector & terminal*** ***(B127) No. 2 (+) — Engine ground (−):*** Is the measured value more than the specified value?	10 V	Go to step **6.**	Repair open circuit in harness between main relay and waste gate control solenoid valve connector.
6	**CHECK FOR POOR CONTACT.** Check for poor contact in waste gate control solenoid valve connector. Is there poor contact in waste gate control solenoid valve connector?	There is poor contact.	Repair poor contact in waste gate control solenoid valve connector.	Contact SOA (distributor) service. NOTE: Inspection by DTM is required, because probable cause is deterioration of multiple parts.

AK:DTC P0246 — TURBO/SUPER CHARGER WASTEGATE SOLENOID “A” HIGH —

- **DTC DETECTING CONDITION:**
  - Immediately at fault recognition
- **TROUBLE SYMPTOM:**
  - Erroneous idling

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to EN(H4DOTC)-49, OPERATION, Clear Memory Mode.> and INSPECTION MODE <Ref. to EN(H4DOTC)-41, Inspection Mode.>.

- **WIRING DIAGRAM:**



	Step	Check	Yes	No
1	**CHECK OUTPUT SIGNAL FROM ECM.** 1)Turn ignition switch to ON. 2)Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B137) No. 24 (+) — Chassis ground (−):*** Is the measured value more than the specified value?	10 V	Go to step **3.**	Go to step **2.**
2	**CHECK FOR POOR CONTACT.** Check for poor contact in ECM connector. Is there poor contact in ECM connector?	There is poor contact.	Repair poor contact in ECM connector.	Replace the ECM. <Ref. to FU(H4DOTC)-50, Engine Control Module.>
3	**CHECK HARNESS BETWEEN WASTE GATE CONTROL SOLENOID VALVE AND ECM CONNECTOR.** 1)Turn ignition switch to OFF. 2)Disconnect the connector from waste gate control solenoid valve. 3)Turn ignition switch to ON. 4)Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B137) No. 24 (+) — Chassis ground (−):*** Is the measured value more than the specified value?	10 V	Repair short circuit to battery in harness between ECM and waste gate control solenoid valve connector. After repair, replace the ECM. <Ref. to FU(H4DOTC)-50, Engine Control Module.>	Go to step **4.**
4	**CHECK WASTE GATE CONTROL SOLENOID VALVE.** 1)Turn ignition switch to OFF. 2)Measure the resistance between waste control solenoid valve terminals. ***Terminal*** ***No. 1 — No. 2:*** Is the measured value less than the specified value?	1 Ω	Replace the waste gate control solenoid valve and ECM. <Ref. to FU(H4DOTC)-44, Wastegate Control Solenoid Valve.> and <Ref. to FU(H4DOTC)-50, Engine Control Module.>	Go to step **5.**
5	**CHECK FOR POOR CONTACT.** Check for poor contact in ECM connector. Is there poor contact in ECM connector?	There is poor contact.	Repair poor contact in ECM connector.	Replace the ECM. <Ref. to FU(H4DOTC)-50, Engine Control Module.>

AL:DTC P0301 — CYLINDER 1 MISFIRE DETECTED —

NOTE:
For the diagnostic procedure, refer to DTC P0304. <Ref. to EN(H4DOTC)-186, DTC P0304 — CYLINDER 4 MISFIRE DETECTED —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

AM:DTC P0302 — CYLINDER 2 MISFIRE DETECTED —

NOTE:
For the diagnostic procedure, refer to DTC P0304. <Ref. to EN(H4DOTC)-186, DTC P0304 — CYLINDER 4 MISFIRE DETECTED —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

AN:DTC P0303 — CYLINDER 3 MISFIRE DETECTED —

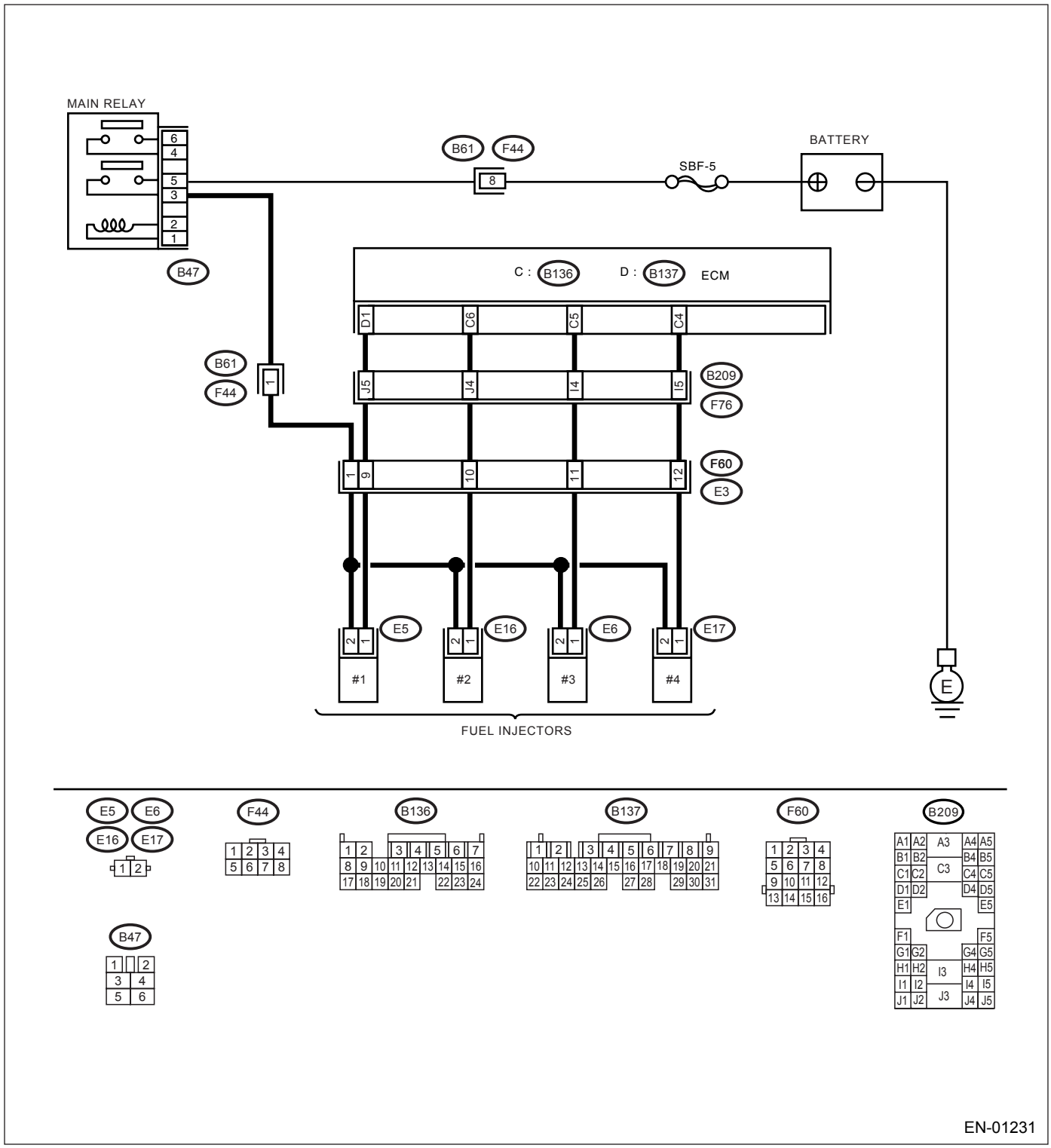
NOTE:
For the diagnostic procedure, refer to DTC P0304. <Ref. to EN(H4DOTC)-186, DTC P0304 — CYLINDER 4 MISFIRE DETECTED —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

AO:DTC P0304 — CYLINDER 4 MISFIRE DETECTED —

- **DTC DETECTING CONDITION:**
  - Fault occurs in two consecutive driving cycles
  - Immediately at fault recognition (when a misfire which could damage catalyst occurs.)
- **TROUBLE SYMPTOM:**
  - Engine stalls
  - Erroneous idling
  - Rough driving

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to EN(H4DOTC)-49, OPERATION, Clear Memory Mode.> and INSPECTION MODE <Ref. to EN(H4DOTC)-41, Inspection Mode.>.

- **WIRING DIAGRAM:**



	Step	Check	Yes	No
1	**CHECK FOR OTHER DIAGNOSTIC TROUBLE CODE (DTC) ON DISPLAY.** Is any other DTC displayed?	Other DTC is displayed.	Inspect the relevant DTC using the "List of Diagnostic Trouble Codes (DTC)". <Ref. to EN(H4DOTC)-81, List of Diagnostic Trouble Codes (DTC).>	Go to step **2.**
2	**CHECK OUTPUT SIGNAL FROM ECM.** 1)Turn ignition switch to ON. 2)Measure the voltage between ECM connector and chassis ground on faulty cylinders. ***Connector & terminal*** ***#1 (B137) No. 1 (+) — Chassis ground (–):*** ***#2 (B136) No. 6 (+) — Chassis ground (–):*** ***#3 (B136) No. 5 (+) — Chassis ground (–):*** ***#4 (B136) No. 4 (+) — Chassis ground (–):*** Is the measured value more than the specified value?	10 V	Go to step **7.**	Go to step **3.**
3	**CHECK HARNESS BETWEEN FUEL INJECTOR AND ECM CONNECTOR.** 1)Turn ignition switch to OFF. 2)Disconnect the connector from fuel injector on faulty cylinders. 3)Disconnect the connector from ECM. 4)Measure the resistance between ECM connector and engine ground on faulty cylinders. ***Connector & terminal*** ***#1 (E5) No. 1 — Engine ground:*** ***#2 (E16) No. 1 — Engine ground:*** ***#3 (E6) No. 1 — Engine ground:*** ***#4 (E17) No. 1 — Engine ground:*** Is the measured value less than the specified value?	10 Ω	Repair short circuit to ground in harness between fuel injector and ECM connector.	Go to step **4.**
4	**CHECK HARNESS BETWEEN FUEL INJECTOR AND ECM CONNECTOR.** Measure the resistance of harness connector between ECM connector and fuel injector on faulty cylinders. ***Connector & terminal*** ***#1 (B137) No. 1 — (E5) No. 1:*** ***#2 (B136) No. 6 — (E16) No. 1:*** ***#3 (B136) No. 5 — (E6) No. 1:*** ***#4 (B136) No. 4 — (E17) No. 1:*** Is the measured value less than the specified value?	1 Ω	Go to step **5.**	Repair harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between ECM and fuel injector connector • Poor contact in coupling connector
5	**CHECK FUEL INJECTOR.** Measure the resistance between fuel injector terminals on faulty cylinder. ***Terminal*** ***No. 1 — No. 2:*** Is the measured value within the specified range?	5 — 20 Ω	Go to step **6.**	Replace the faulty fuel injector. <Ref. to FU(H4DOTC)-37, Fuel Injector.>

	Step	Check	Yes	No
6	**CHECK POWER SUPPLY LINE.** 1)Turn ignition switch to ON. 2)Measure the voltage between fuel injector and engine ground on faulty cylinders. ***Connector & terminal*** ***#1 (E5) No. 2 (+) — Engine ground (–):*** ***#2 (E16) No. 2 (+) — Engine ground (–):*** ***#3 (E6) No. 2 (+) — Engine ground (–):*** ***#4 (E17) No. 2 (+) — Engine ground (–):*** Is the measured value more than the specified value?	10 V	Repair poor contact in all connectors in fuel injector circuit.	Repair harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between main relay and fuel injector connector on faulty cylinders • Poor contact in coupling connector • Poor contact in main relay connector • Poor contact in fuel injector connector on faulty cylinders
7	**CHECK HARNESS BETWEEN FUEL INJECTOR AND ECM CONNECTOR.** 1)Turn ignition switch to OFF. 2)Disconnect the connector from fuel injector on faulty cylinder. 3)Turn ignition switch to ON. 4)Measure the voltage between ECM connector and chassis ground on faulty cylinders. ***Connector & terminal*** ***#1 (B137) No. 1 (+) — Chassis ground (–):*** ***#2 (B136) No. 6 (+) — Chassis ground (–):*** ***#3 (B136) No. 5 (+) — Chassis ground (–):*** ***#4 (B136) No. 4 (+) — Chassis ground (–):*** Is the measured value more than the specified value?	10 V	Repair short circuit to battery in harness between ECM and fuel injector. After repair, replace the ECM. <Ref. to FU(H4DOTC)-50, Engine Control Module.>	Go to step **8.**
8	**CHECK FUEL INJECTOR.** 1)Turn ignition switch to OFF. 2)Measure the resistance between fuel injector terminals on faulty cylinder. ***Terminal*** ***No. 1 — No. 2:*** Is the measured value less than the specified value?	1 Ω	Replace the faulty fuel injector and the ECM. <Ref. to FU(H4DOTC)-37, Fuel Injector.> and <Ref. to FU(H4DOTC)-50, Engine Control Module.>	Go to step **9.**
9	**CHECK INSTALLATION OF CAMSHAFT POSITION SENSOR/CRANKSHAFT POSITION SENSOR.** Is the camshaft position sensor or crankshaft position sensor loosely installed?	Loosely installed.	Tighten camshaft position sensor or crankshaft position sensor.	Go to step **10.**
10	**CHECK CRANKSHAFT SPROCKET.** Remove the timing belt cover. Is the crankshaft sprocket rusted or does it have broken teeth?	Rusted. Or broken.	Replace the crankshaft sprocket. <Ref. to ME(H4DOTC)-58, Crankshaft Sprocket.>	Go to step **11.**

	Step	Check	Yes	No
11	**CHECK INSTALLATION CONDITION OF TIMING BELT.** Turn the crankshaft, and align alignment mark on crankshaft sprocket with alignment mark on cylinder block. Is the timing belt dislocated from its proper position?	Dislocated.	Repair installation condition of timing belt. <Ref. to ME(H4DOTC)-48, Timing Belt Assembly.>	Go to step **12.**
12	**CHECK FUEL LEVEL.** Is the fuel meter indication higher than the “Lower” level?	Indication is higher.	Go to step **13.**	Replenish fuel so fuel meter indication becomes higher than the “Lower” level. After replenishing fuel, Go to step **13.**
13	**CHECK STATUS OF CHECK ENGINE MALFUNCTION INDICATOR LAMP (MIL).** 1)Clear the memory using Subaru Select Monitor. <Ref. to EN(H4DOTC)-49, Clear Memory Mode.> 2)Start the engine, and drive the vehicle for more than 10 minutes. Does the MIL illuminate or blink?	Illuminates or blinks.	Go to step **15.**	Go to step **14.**
14	**CHECK CAUSE OF MISFIRE DIAGNOSED.** Was the cause of misfire identified when the engine is running?	Cause identified.	Finish diagnostics operation, if the engine has no abnormality.	Repair poor contact. NOTE: In this case, repair the following: • Poor contact in ignition coil connector • Poor contact in fuel injector connector on faulty cylinders • Poor contact in ECM connector • Poor contact in coupling connector
15	**CHECK AIR INTAKE SYSTEM.** Is there a fault in air intake system?	There is a fault.	Repair air intake system. NOTE: Check the following items. • Are there air leaks or air suction caused by loose or dislocated nuts and bolts? • Are there cracks or any disconnection of hoses?	Go to step **16.**

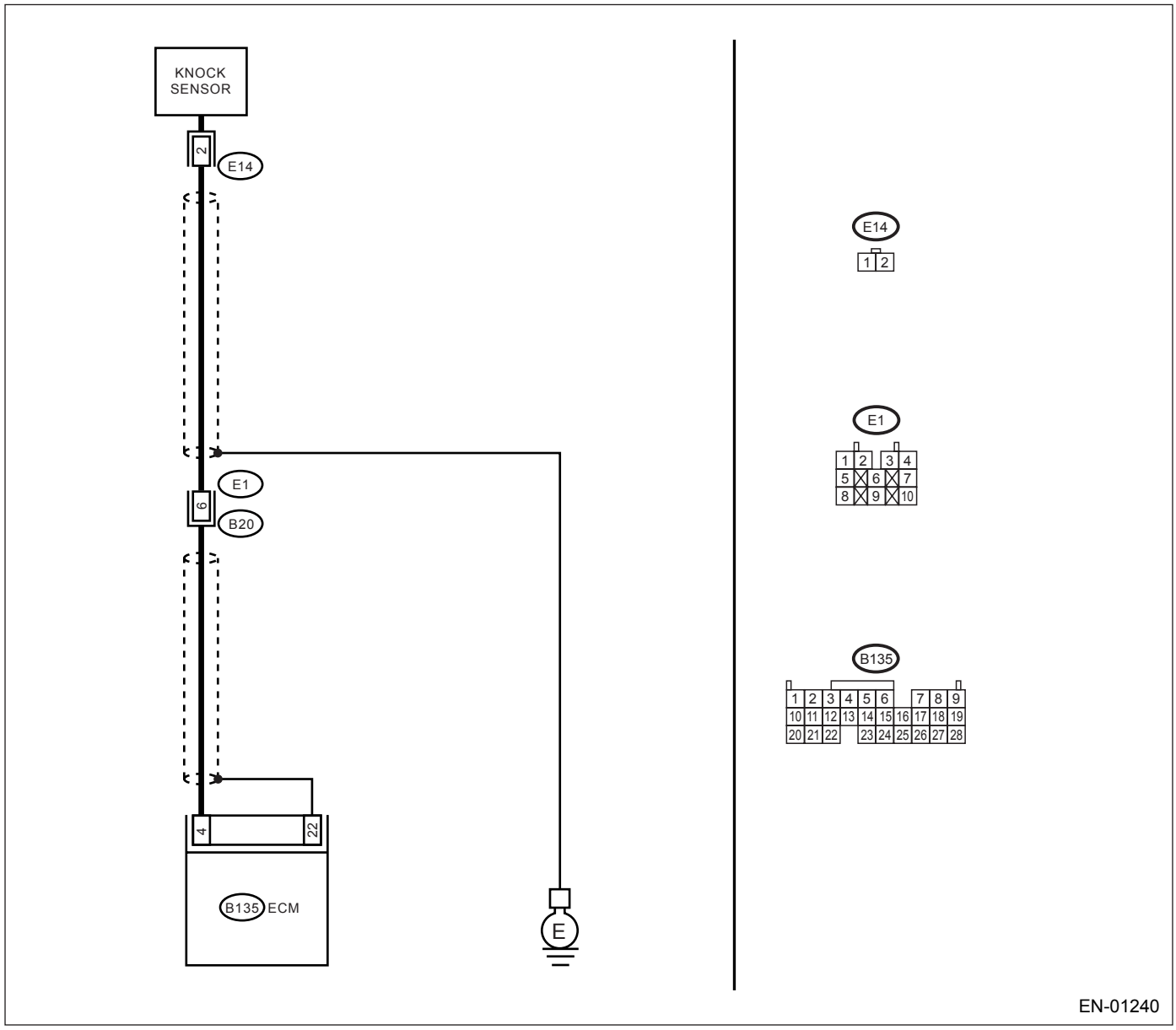
Step		Check	Yes	No
16	**CHECK CYLINDER.** Is there a fault in that cylinder?	There is a fault.	Repair or replace faulty parts. NOTE: Check the following items. • Spark plug • Fuel injector • Compression	Go to DTC P0171 and P0172. <Ref. to EN(H4DOTC)-159, DTC P0171 — SYSTEM TOO LEAN (BANK 1) —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

AP:DTC P0327 — KNOCK SENSOR 1 CIRCUIT LOW INPUT (BANK 1 OR SINGLE SENSOR) —

- **DTC DETECTING CONDITION:**
  - Immediately at fault recognition
- **TROUBLE SYMPTOM:**
  - Poor driving performance
  - Knocking occurs.

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to EN(H4DOTC)-49, OPERATION, Clear Memory Mode.> and INSPECTION MODE <Ref. to EN(H4DOTC)-41, Inspection Mode.>.

- **WIRING DIAGRAM:**



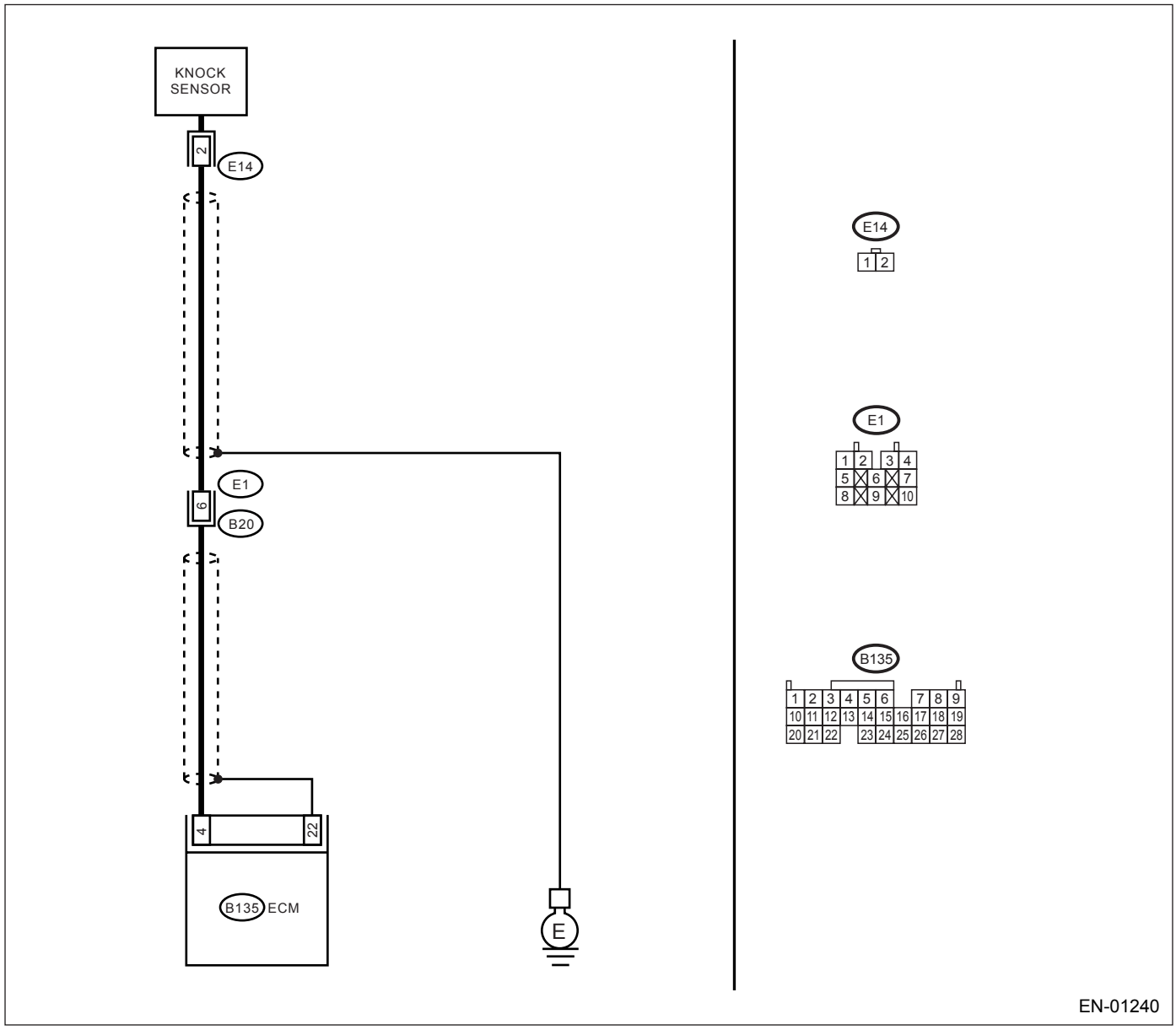
	Step	Check	Yes	No
1	**CHECK HARNESS BETWEEN KNOCK SENSOR AND ECM CONNECTOR.** 1)Turn ignition switch to OFF. 2)Disconnect the connector from ECM. 3)Measure the resistance between ECM harness connector and chassis ground. ***Connector & terminal*** ***(B135) No. 4 — Chassis ground:*** Is the measured value more than the specified value?	700 kΩ	Go to step **2.**	Repair harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between knock sensor and ECM connector • Poor contact in knock sensor connector • Poor contact in coupling connector
2	**CHECK KNOCK SENSOR.** 1)Disconnect the connector from knock sensor. 2)Measure the resistance between knock sensor connector terminal and engine ground. ***Terminal*** ***No. 2 — Engine ground:*** Is the measured value more than the specified value?	700 kΩ	Go to step **3.**	Repair harness and connector. NOTE: In this case, repair the following: • Poor contact in knock sensor connector • Poor contact in coupling connector
3	**CHECK CONDITION OF KNOCK SENSOR INSTALLATION.** Is the knock sensor installation bolt tightened securely?	Tightened securely.	Replace the knock sensor. <Ref. to FU(H4DOTC)-32, Knock Sensor.>	Tighten knock sensor installation bolt securely.

AQ:DTC P0328 — KNOCK SENSOR 1 CIRCUIT HIGH INPUT (BANK 1 OR SINGLE SENSOR) —

- **DTC DETECTING CONDITION:**
  - Immediately at fault recognition
- **TROUBLE SYMPTOM:**
  - Poor driving performance
  - Knocking occurs.

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to EN(H4DOTC)-49, OPERATION, Clear Memory Mode.> and INSPECTION MODE <Ref. to EN(H4DOTC)-41, Inspection Mode.>.

- **WIRING DIAGRAM:**



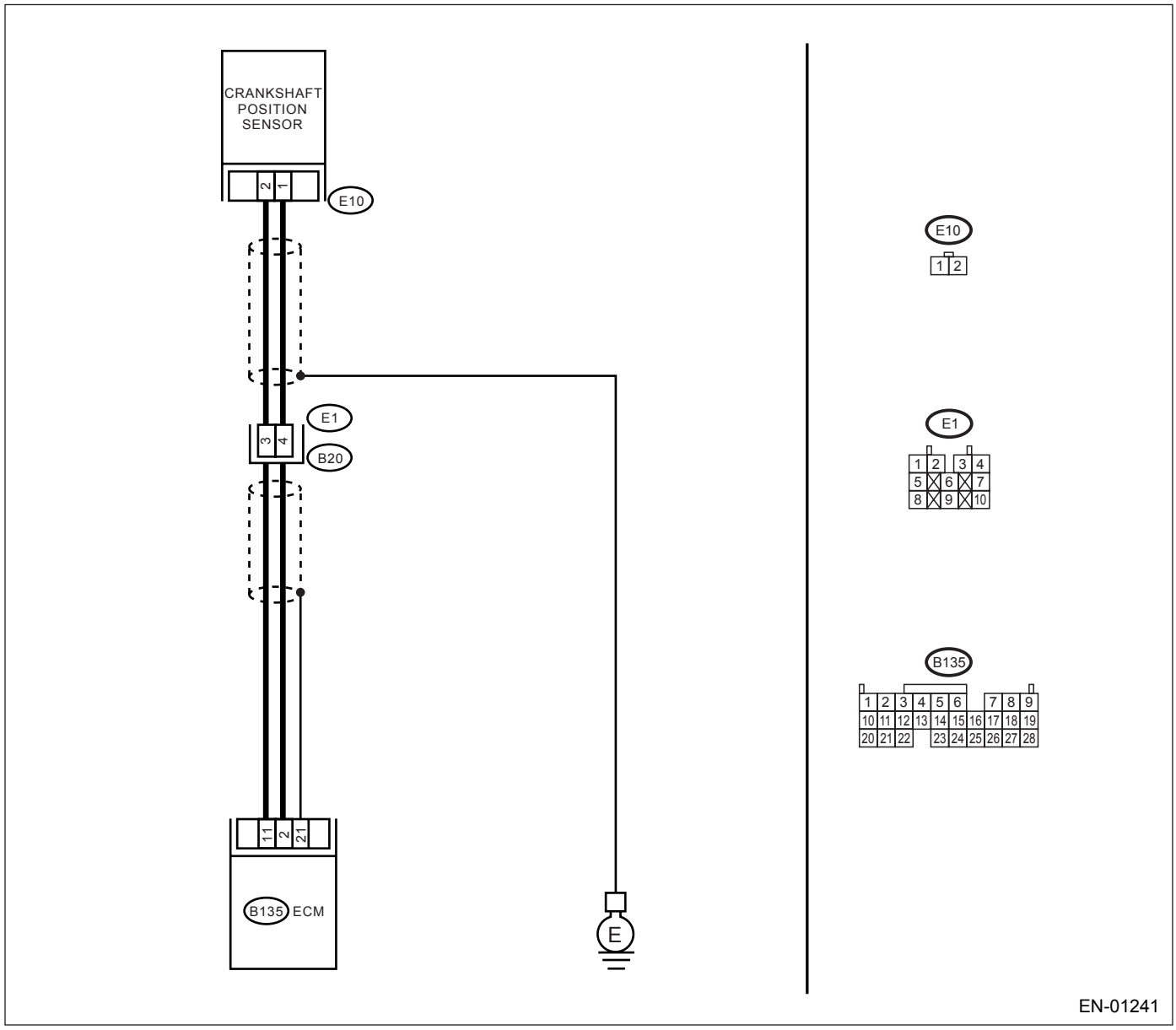
	Step	Check	Yes	No
1	**CHECK HARNESS BETWEEN KNOCK SENSOR AND ECM CONNECTOR.** Measure the resistance of harness between ECM connector and chassis ground. ***Connector & terminal*** ***(B135) No. 4 — Chassis ground:*** Is the measured value less than the specified value?	400 kΩ	Go to step **2.**	Go to step **3.**
2	**CHECK KNOCK SENSOR.** 1)Disconnect the connector from knock sensor. 2)Measure the resistance between knock sensor connector terminal and engine ground. ***Terminal*** ***No. 2 — Engine ground:*** Is the measured value less than the specified value?	400 kΩ	Replace the knock sensor. <Ref. to FU(H4DOTC)-32, Knock Sensor.>	Repair short circuit to ground in harness between knock sensor connector and ECM connector. NOTE: The harness between both connectors are shielded. Repair short circuit of harness together with shield.
3	**CHECK INPUT SIGNAL FOR ECM.** 1)Connect the connectors to ECM and knock sensor. 2)Turn ignition switch to ON. 3)Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B135) No. 4 (+) — Chassis ground (−):*** Is the measured value more than the specified value?	2 V	The MIL may light up, however, the circuit is returned to the normal status at the moment. (However, the possibility of poor contact still remains.) NOTE: In this case, repair the following: • Poor contact in knock sensor connector • Poor contact in ECM connector • Poor contact in coupling connector	Repair poor contact in ECM connector.

AR:DTC P0335 — CRANKSHAFT POSITION SENSOR “A” CIRCUIT —

- **DTC DETECTING CONDITION:**
  - Immediately at fault recognition
- **TROUBLE SYMPTOM:**
  - Engine stalls
  - Failure of engine to start

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to EN(H4DOTC)-49, OPERATION, Clear Memory Mode.> and INSPECTION MODE <Ref. to EN(H4DOTC)-41, Inspection Mode.>.

- **WIRING DIAGRAM:**



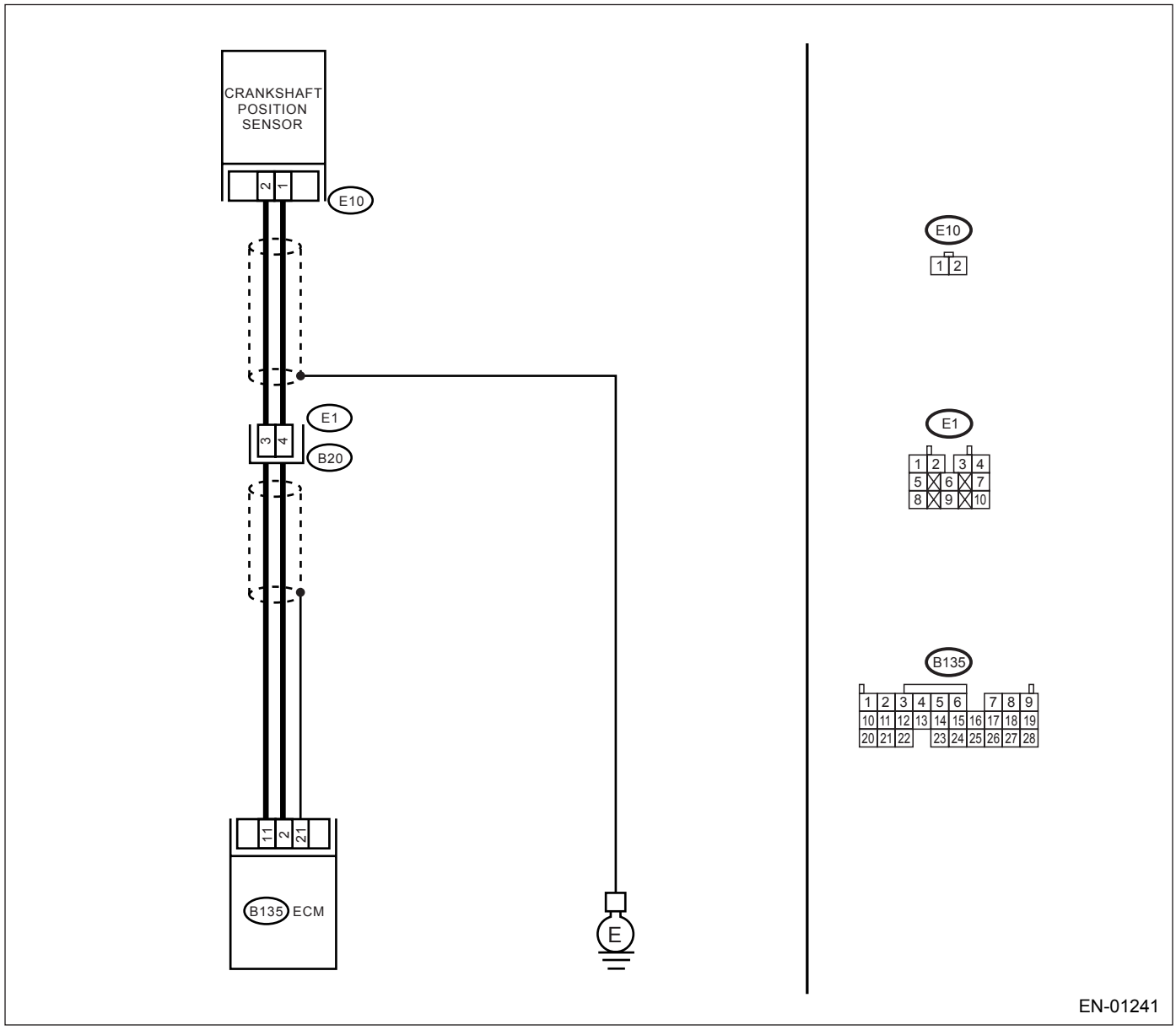
	Step	Check	Yes	No
1	**CHECK HARNESS BETWEEN CRANKSHAFT POSITION SENSOR AND ECM CONNECTOR.** 1)Turn ignition switch to OFF. 2)Disconnect the connector from crankshaft position sensor. 3)Measure the resistance of harness between crankshaft position sensor connector and engine ground. ***Connector & terminal*** ***(E10) No. 1 — Engine ground:*** Is the measured value more than the specified value?	100 kΩ	Repair harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between crankshaft position sensor and ECM connector • Poor contact in ECM connector • Poor contact in coupling connector	Go to step **2.**
2	**CHECK HARNESS BETWEEN CRANKSHAFT POSITION SENSOR AND ECM CONNECTOR.** Measure the resistance of harness between crankshaft position sensor connector and engine ground. ***Connector & terminal*** ***(E10) No. 1 — Engine ground:*** Is the measured value less than the specified value?	10 Ω	Repair short circuit to ground in harness between crankshaft position sensor and ECM connector. NOTE: The harness between both connectors are shielded. Repair short circuit to ground in harness together with shield.	Go to step **3.**
3	**CHECK HARNESS BETWEEN CRANKSHAFT POSITION SENSOR AND ECM CONNECTOR.** Measure the resistance of harness between crankshaft position sensor connector and engine ground. ***Connector & terminal*** ***(E10) No. 2 — Engine ground:*** Is the measured value less than the specified value?	5 Ω	Go to step **4.**	Repair harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between crankshaft position sensor and ECM connector • Poor contact in ECM connector • Poor contact in coupling connector
4	**CHECK CONDITION OF CRANKSHAFT POSITION SENSOR.** Is the crankshaft position sensor installation bolt tightened securely?	Tightened securely.	Go to step **5.**	Tighten crankshaft position sensor installation bolt securely.
5	**CHECK CRANKSHAFT POSITION SENSOR.** 1)Remove the crankshaft position sensor. 2)Measure the resistance between connector terminals of crankshaft position sensor. ***Terminal*** ***No. 1 — No. 2:*** Is the measured value within the specified range?	1 — 4 kΩ	Repair poor contact in crankshaft position sensor connector.	Replace the crankshaft position sensor. <Ref. to FU(H4DOTC)-30, Crankshaft Position Sensor.>

AS:DTC P0336 — CRANKSHAFT POSITION SENSOR “A” CIRCUIT RANGE/ PERFORMANCE —

- **DTC DETECTING CONDITION:**
  - Fault occurs in two consecutive driving cycles
- **TROUBLE SYMPTOM:**
  - Engine stalls
  - Failure of engine to start

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to EN(H4DOTC)-49, OPERATION, Clear Memory Mode.> and INSPECTION MODE <Ref. to EN(H4DOTC)-41, Inspection Mode.>.

- **WIRING DIAGRAM:**



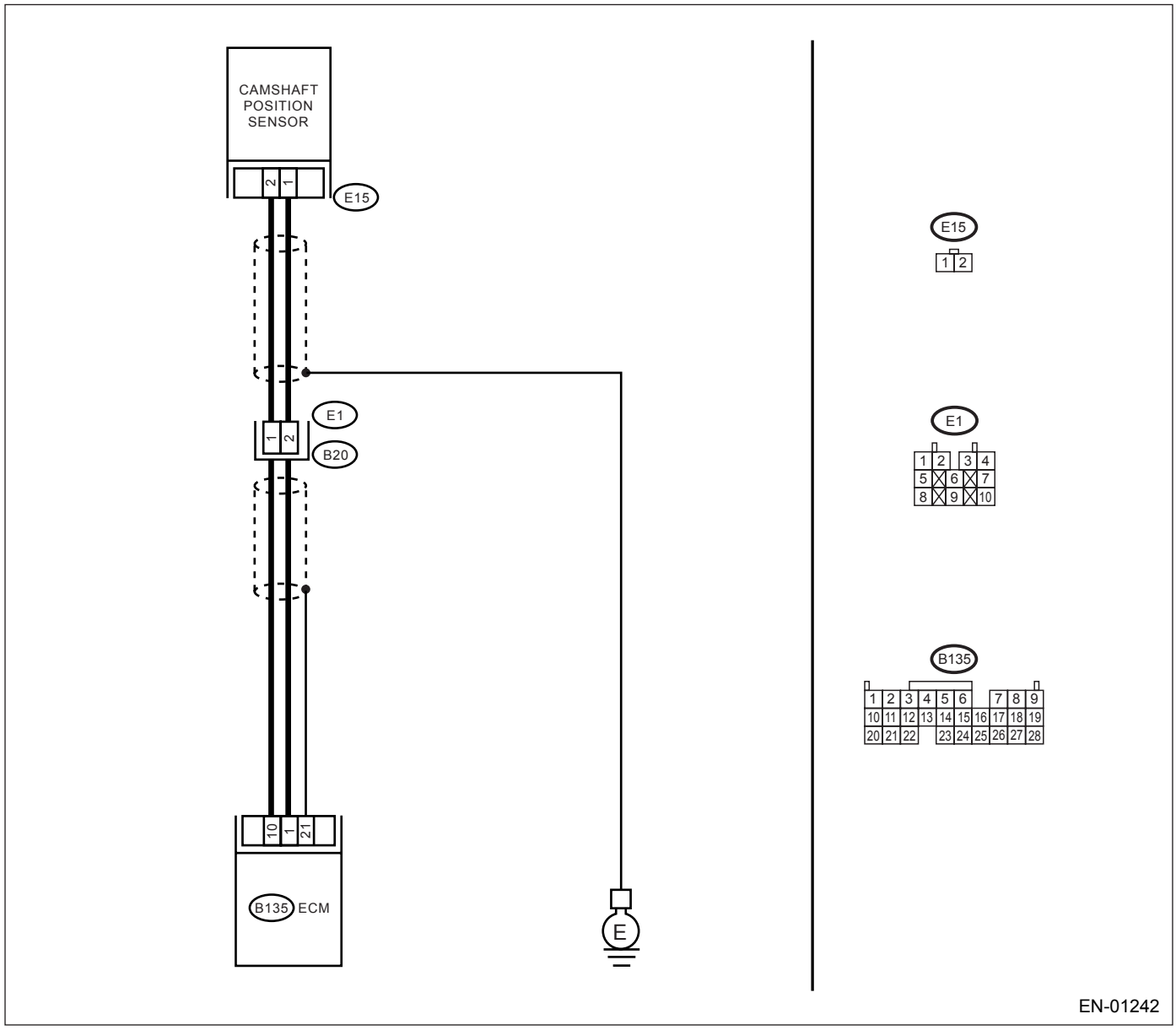
	Step	Check	Yes	No
1	**CHECK FOR OTHER DIAGNOSTIC TROUBLE CODE (DTC) ON DISPLAY.** Is any other DTC displayed?	Other DTC is displayed.	Inspect the relevant DTC using the “List of Diagnostic Trouble Codes (DTC)”. <Ref. to EN(H4DOTC)-81, List of Diagnostic Trouble Codes (DTC).>	Go to step **2.**
2	**CHECK CONDITION OF CRANKSHAFT POSITION SENSOR.** Turn ignition switch to OFF. Is the crankshaft position sensor installation bolt tightened securely?	Tightened securely.	Go to step **3.**	Tighten crankshaft position sensor installation bolt securely.
3	**CHECK CRANKSHAFT SPROCKET.** Remove the front belt cover. Are crankshaft sprocket teeth cracked or damaged?	There is a crack or damage.	Replace the crankshaft sprocket. <Ref. to FU(H4DOTC)-30, Crankshaft Position Sensor.>	Go to step **4.**
4	**CHECK INSTALLATION CONDITION OF TIMING BELT.** Turn the crankshaft, and align alignment mark on crankshaft sprocket with alignment mark on cylinder block. Is the timing belt dislocated from its proper position?	Dislocated.	Repair installation condition of timing belt. <Ref. to ME(H4DOTC)-48, Timing Belt Assembly.>	Replace the crankshaft position sensor. <Ref. to FU(H4DOTC)-30, Crankshaft Position Sensor.>

AT:DTC P0340 — CAMSHAFT POSITION SENSOR “A” CIRCUIT (BANK 1 OR SINGLE SENSOR) —

- **DTC DETECTING CONDITION:**
  - Immediately at fault recognition
- **TROUBLE SYMPTOM:**
  - Engine stalls
  - Failure of engine to start

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to EN(H4DOTC)-49, OPERATION, Clear Memory Mode.> and INSPECTION MODE <Ref. to EN(H4DOTC)-41, Inspection Mode.>.

- **WIRING DIAGRAM:**



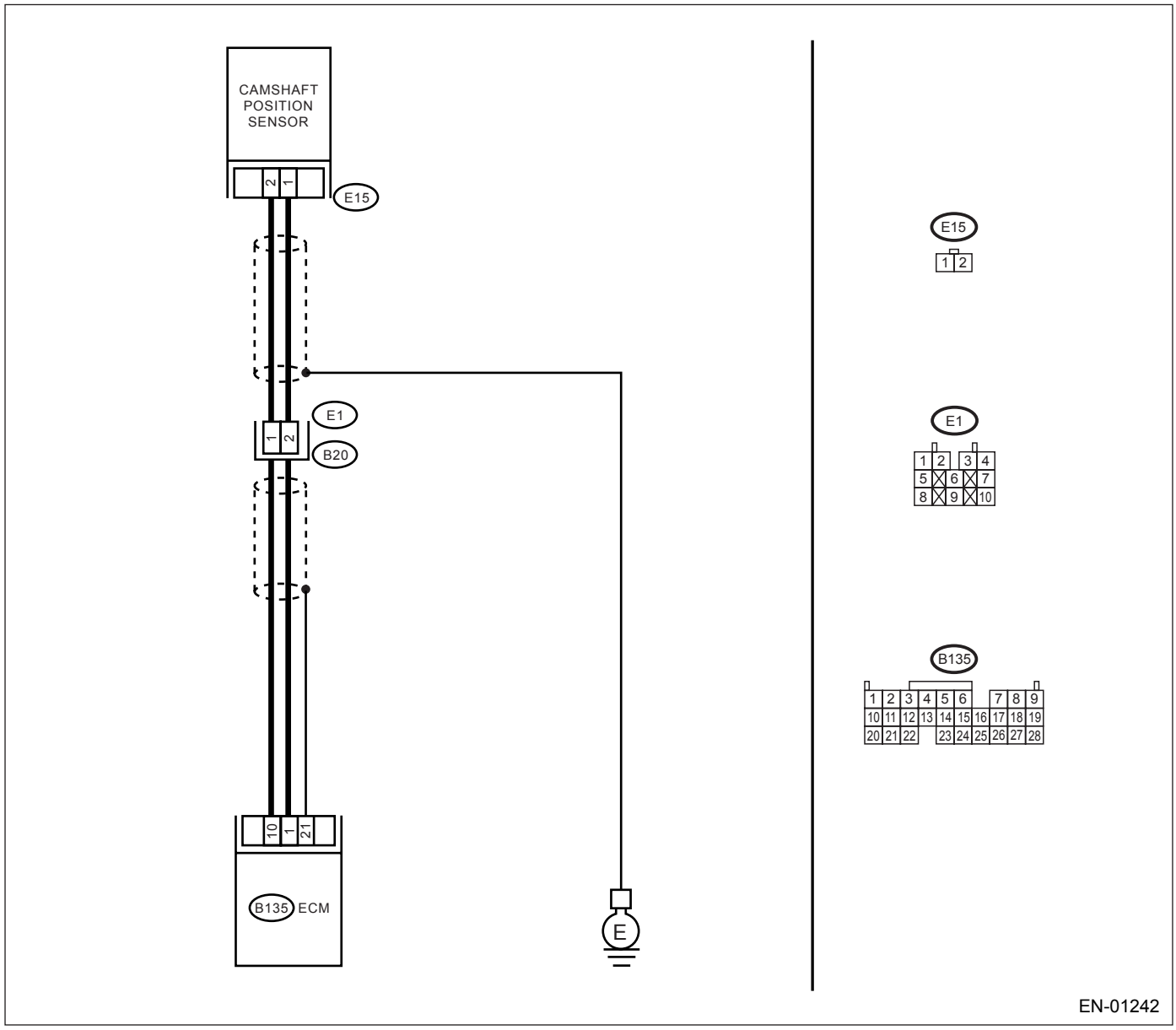
	Step	Check	Yes	No
1	**CHECK HARNESS BETWEEN CAMSHAFT POSITION SENSOR AND ECM CONNECTOR.** 1)Turn ignition switch to OFF. 2)Disconnect the connector from camshaft position sensor. 3)Measure the resistance of harness between camshaft position sensor connector and engine ground. ***Connector & terminal*** ***(E15) No. 1 — Engine ground:*** Is the measured value more than the specified value?	100 kΩ	Repair harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between camshaft position sensor and ECM connector • Poor contact in ECM connector • Poor contact in coupling connector	Go to step **2.**
2	**CHECK HARNESS BETWEEN CAMSHAFT POSITION SENSOR AND ECM CONNECTOR.** Measure the resistance of harness between camshaft position sensor connector and engine ground. ***Connector & terminal*** ***(E15) No. 1 — Engine ground:*** Is the measured value less than the specified value?	10 Ω	Repair short circuit to ground in harness between camshaft position sensor and ECM connector. NOTE: The harness between both connectors are shielded. Repair short circuit to ground in harness together with shield.	Go to step **3.**
3	**CHECK HARNESS BETWEEN CAMSHAFT POSITION SENSOR AND ECM CONNECTOR.** Measure the resistance of harness between camshaft position sensor connector and engine ground. ***Connector & terminal*** ***(E15) No. 2 — Engine ground:*** Is the measured value less than the specified value?	5 Ω	Go to step **4.**	Repair harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between camshaft position sensor and ECM connector • Poor contact in ECM connector • Poor contact in coupling connector
4	**CHECK CONDITION OF CAMSHAFT POSITION SENSOR.** Is the camshaft position sensor installation bolt tightened securely?	Tightened securely.	Go to step **5.**	Tighten camshaft position sensor installation bolt securely.
5	**CHECK CAMSHAFT POSITION SENSOR.** 1)Remove the camshaft position sensor. 2)Measure the resistance between connector terminals of camshaft position sensor. ***Terminal*** ***No. 1 — No. 2:*** Is the measured value within the specified range?	1 — 4 kΩ	Repair poor contact in camshaft position sensor connector.	Replace the camshaft position sensor. <Ref. to FU(H4DOTC)-31, Camshaft Position Sensor.>

AU:DTC P0341 — CAMSHAFT POSITION SENSOR “A” CIRCUIT RANGE/PERFORMANCE (BANK 1 OR SINGLE SENSOR) —

- **DTC DETECTING CONDITION:**
  - Fault occurs in two consecutive driving cycles
- **TROUBLE SYMPTOM:**
  - Engine stalls
  - Failure of engine to start

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to EN(H4DOTC)-49, OPERATION, Clear Memory Mode.> and INSPECTION MODE <Ref. to EN(H4DOTC)-41, Inspection Mode.>.

- **WIRING DIAGRAM:**



	Step	Check	Yes	No
1	**CHECK FOR OTHER DIAGNOSTIC TROUBLE CODE (DTC) ON DISPLAY.** Is any other DTC displayed?	Other DTC is displayed.	Inspect the relevant DTC using the "List of Diagnostic Trouble Codes (DTC)". <Ref. to EN(H4DOTC)-81, List of Diagnostic Trouble Codes (DTC).>	Go to step **2.**
2	**CHECK HARNESS BETWEEN CAMSHAFT POSITION SENSOR AND ECM CONNECTOR.** 1)Turn ignition switch to OFF. 2)Disconnect the connector from camshaft position sensor. 3)Measure the resistance of harness between camshaft position sensor connector and engine ground. ***Connector & terminal*** ***(E15) No. 1 — Engine ground:*** Is the measured value more than the specified value?	100 kΩ	Repair harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between camshaft position sensor and ECM connector • Poor contact in ECM connector • Poor contact in coupling connector	Go to step **3.**
3	**CHECK HARNESS BETWEEN CAMSHAFT POSITION SENSOR AND ECM CONNECTOR.** Measure the resistance of harness between camshaft position sensor connector and engine ground. ***Connector & terminal*** ***(E15) No. 1 — Engine ground:*** Is the measured value less than the specified value?	10 Ω	Repair short circuit to ground in harness between camshaft position sensor and ECM connector. NOTE: The harness between both connectors are shielded. Repair short circuit to ground in harness together with shield.	Go to step **4.**
4	**CHECK HARNESS BETWEEN CAMSHAFT POSITION SENSOR AND ECM CONNECTOR.** Measure the resistance of harness between camshaft position sensor connector and engine ground. ***Connector & terminal*** ***(E15) No. 2 — Engine ground:*** Is the measured value less than the specified value?	5 Ω	Go to step **5.**	Repair harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between camshaft position sensor and ECM connector • Poor contact in ECM connector • Poor contact in coupling connector
5	**CHECK CONDITION OF CAMSHAFT POSITION SENSOR.** Is the camshaft position sensor installation bolt tightened securely?	Tightened securely.	Go to step **6.**	Tighten camshaft position sensor installation bolt securely.

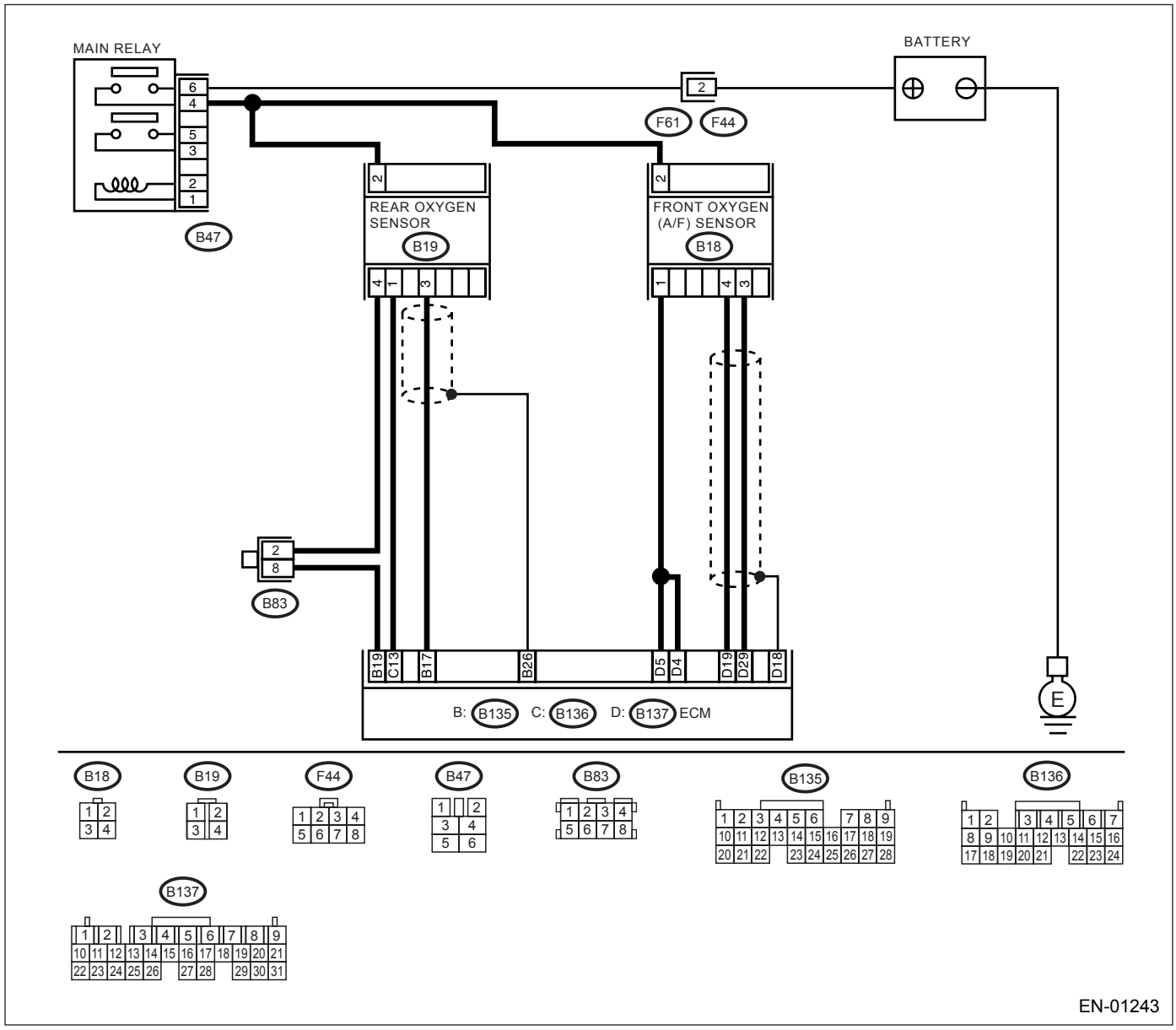
	Step	Check	Yes	No
6	**CHECK CAMSHAFT POSITION SENSOR.** 1)Remove the camshaft position sensor. 2)Measure the resistance between connector terminals of camshaft position sensor. ***Terminal*** ***No. 1 — No. 2:*** Is the measured value within the specified range?	1 — 4 kΩ	Go to step **7.**	Replace the camshaft position sensor. <Ref. to FU(H4DOTC)-31, Camshaft Position Sensor.>
7	**CHECK CONDITION OF CAMSHAFT POSITION SENSOR.** Turn ignition switch to OFF. Is the camshaft position sensor installation bolt tightened securely?	Tightened securely.	Go to step **8.**	Tighten camshaft position sensor installation bolt securely.
8	**CHECK CAMSHAFT SPROCKET.** Remove the front belt cover. <Ref. to ME(H4DOTC)-47, Belt Cover.> Are camshaft sprocket teeth cracked or damaged?	There is a crack or damage.	Replace the camshaft sprocket. <Ref. to ME(H4DOTC)-57, Camshaft Sprocket.>	Go to step **9.**
9	**CHECK INSTALLATION CONDITION OF TIMING BELT.** Turn the crankshaft, and align alignment mark on camshaft sprocket with alignment mark on timing belt cover LH. Is the timing belt dislocated from its proper position?	Dislocated.	Repair installation condition of timing belt. <Ref. to ME(H4DOTC)-48, Timing Belt Assembly.>	Replace the camshaft position sensor. <Ref. to FU(H4DOTC)-31, Camshaft Position Sensor.>

AV:DTC P0420 — CATALYST SYSTEM EFFICIENCY BELOW THRESHOLD (BANK 1) —

- **DTC DETECTING CONDITION:**
  - Fault occurs in two consecutive driving cycles
- **TROUBLE SYMPTOM:**
  - Engine stalls
  - Idle mixture is out of specifications.

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to EN(H4DOTC)-49, OPERATION, Clear Memory Mode.> and INSPECTION MODE <Ref. to EN(H4DOTC)-41, Inspection Mode.>.

- **WIRING DIAGRAM:**



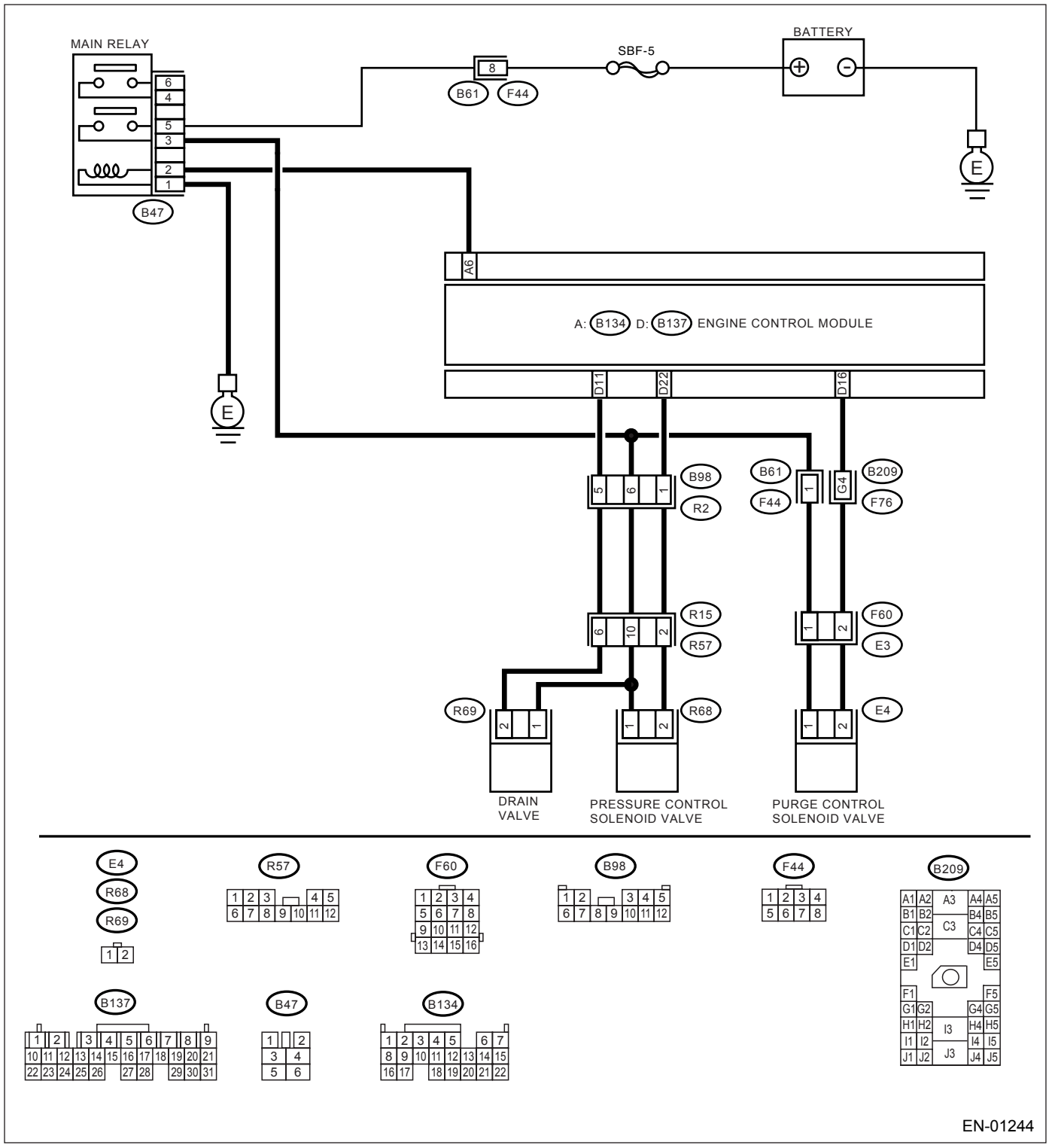
	Step	Check	Yes	No
1	**CHECK FOR OTHER DIAGNOSTIC TROUBLE CODE (DTC) ON DISPLAY.** Is any other DTC displayed?	Other DTC is displayed.	Inspect the relevant DTC using the "List of Diagnostic Trouble Codes (DTC)". <Ref. to EN(H4DOTC)-81, List of Diagnostic Trouble Codes (DTC).> NOTE: In this case, it is not necessary to inspect DTC P0420.	Go to step **2.**
2	**CHECK EXHAUST SYSTEM.** Check for gas leaks or air suction caused by loose or dislocated nuts and bolts, and open hole at exhaust pipes. NOTE: Check the following positions. •Between cylinder head and front exhaust pipe •Between front exhaust pipe and front catalytic converter •Between front catalytic converter and rear catalytic converter Is there a fault in exhaust system?	There is a fault.	Repair or replace the exhaust system. <Ref. to EX(H4DOTC)-2, General Description.>	Go to step **3.**
3	**CHECK REAR CATALYTIC CONVERTER.** Separate the rear catalytic converter from rear exhaust pipe. Is there any damage on rear face of rear catalytic converter?	There is damage.	Replace the front and rear catalytic converters. <Ref. to EC(H4DOTC)-3, Front Catalytic Converter.> and <Ref. to EC(H4DOTC)-4, Rear Catalytic Converter.>	Go to step **4.**
4	**CHECK FRONT CATALYTIC CONVERTER.** Remove the front catalytic converter. Is there any damage on rear face of front catalytic converter?	There is damage.	Replace the front catalytic converter. <Ref. to EC(H4DOTC)-3, Front Catalytic Converter.>	Contact SOA (distributor) service. NOTE: Inspection by DTM is required, because probable cause is deterioration of multiple parts.

AW:DTC P0442 — EVAPORATIVE EMISSION CONTROL SYSTEM LEAK DETECTED (SMALL LEAK) —

- **DTC DETECTING CONDITION:**
  - Fault occurs in two consecutive driving cycles
- **TROUBLE SYMPTOM:**
  - Fuel odor
  - There is a hole of more than 1.0 mm (0.04 in) dia. in evaporation system or fuel tank.

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to EN(H4DOTC)-49, OPERATION, Clear Memory Mode.> and INSPECTION MODE <Ref. to EN(H4DOTC)-41, OPERATION, Inspection Mode.>.

- **WIRING DIAGRAM:**



EN-01244

	Step	Check	Yes	No
1	**CHECK FOR OTHER DTC ON DISPLAY.** Is any other DTC displayed?	Other DTC is displayed.	Inspect the relevant DTC using "List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H4DOTC)-81, List of Diagnostic Trouble Codes (DTC).>	Go to step **2.**
2	**CHECK FUEL FILLER CAP.** 1)Turn ignition switch to OFF. 2)Check the fuel filler cap. Is the fuel filler cap tightened securely? NOTE: The DTC is stored in memory if fuel filler cap is or was loose or if the cap chain was caught while tightening.	Tightened securely.	Go to step **3.**	Tighten fuel filler cap securely.
3	**CHECK FUEL FILLER CAP.** Is the fuel filler cap SUBARU genuine?	The SUBAU genuine fuel filler cap is used.	Go to step **4.**	Replace with a SUBARU genuine fuel filler cap.
4	**CHECK FUEL FILLER PIPE PACKING.** Is there any damage to the seal between fuel filler cap and fuel filler pipe?	There is damage.	Repair or replace the fuel filler cap and fuel filler pipe. <Ref. to FU(H4DOTC)-58, Fuel Filler Pipe.>	Go to step **5.**
5	**CHECK DRAIN VALVE.** 1)Connect the test mode connector. 2)Turn ignition switch to ON. 3)Operate the drain valve. Does the drain valve operate? NOTE: Drain valve operation can also be executed using Subaru Select Monitor. For the procedure, refer to "Compulsory Valve Operation Check Mode". <Ref. to EN(H4DOTC)-50, Compulsory Valve Operation Check Mode.>	Operates.	Go to step **6.**	Replace the drain valve. <Ref. to EC(H4DOTC)-19, Drain Valve.>
6	**CHECK PURGE CONTROL SOLENOID VALVE.** Operate the purge control solenoid valve. Does the purge control solenoid valve operate? NOTE: Purge control solenoid valve operation can also be executed using Subaru Select Monitor. For the procedure, refer to "Compulsory Valve Operation Check Mode". <Ref. to EN(H4DOTC)-50, Compulsory Valve Operation Check Mode.>	Operates.	Go to step **7.**	Replace the purge control solenoid valve. <Ref. to EC(H4DOTC)-7, Purge Control Solenoid Valve.>

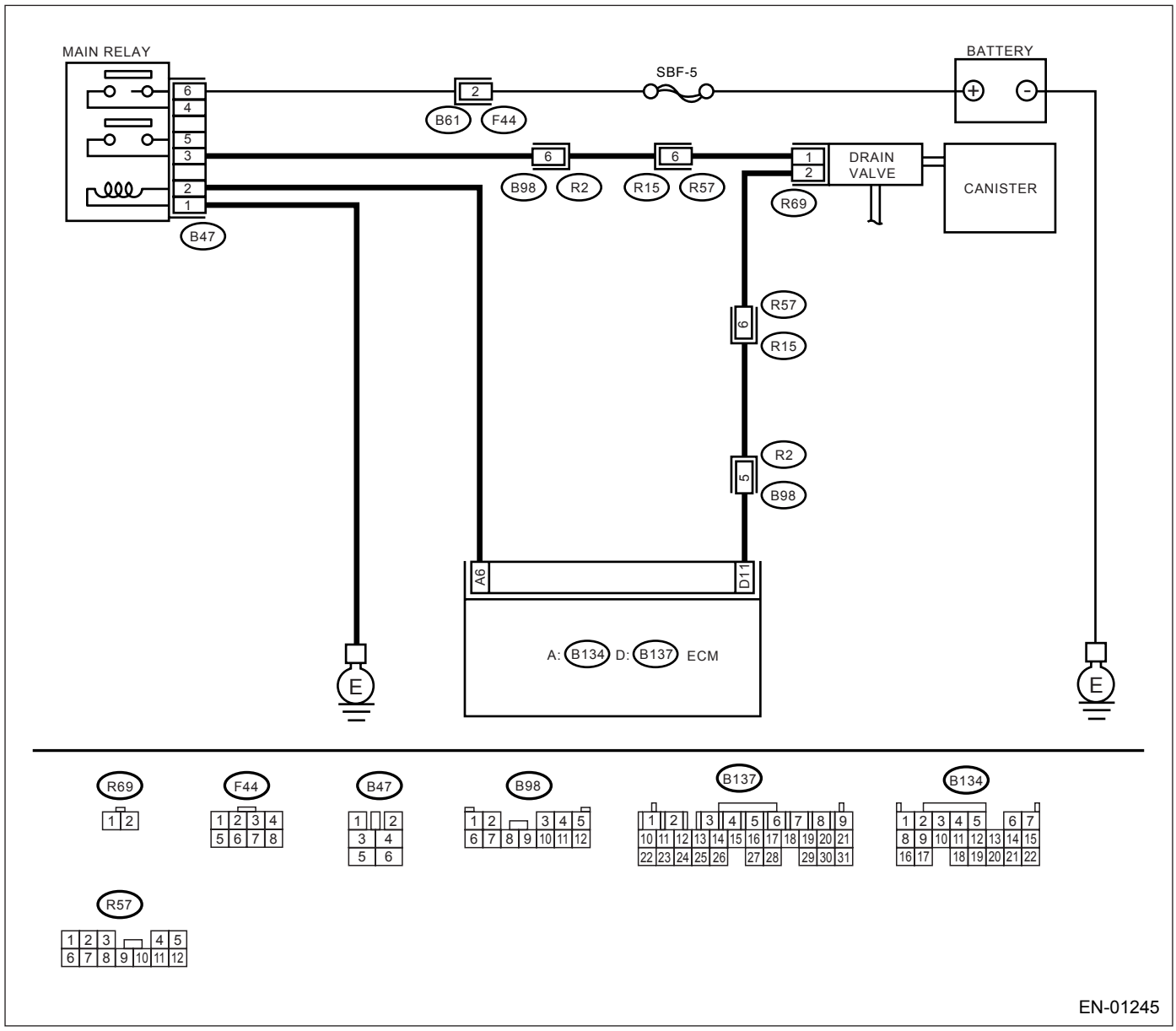
	Step	Check	Yes	No
7	**CHECK PRESSURE CONTROL SOLENOID VALVE.** Operate the pressure control solenoid valve. Does the pressure control solenoid valve operate? NOTE: Pressure control solenoid valve operation can also be executed using Subaru Select Monitor. For the procedure, refer to "Compulsory Valve Operation Check Mode". <Ref. to EN(H4DOTC)-50, Compulsory Valve Operation Check Mode.>	Operates.	Go to step **8.**	Replace the pressure control solenoid valve. <Ref. to EC(H4DOTC)-13, Pressure Control Solenoid Valve.>
8	**CHECK EVAPORATIVE EMISSION CONTROL SYSTEM LINE.** Turn ignition switch to OFF. Is there a hole of more than 1.0 mm (0.04 in) dia. on evaporation line?	There is a hole.	Repair or replace the evaporation line. <Ref. to FU(H4DOTC)-71, Fuel Delivery, Return and Evaporation Lines.>	Go to step **9.**
9	**CHECK CANISTER.** Is the canister damaged or is there a hole of more than 1.0 mm (0.04 in) dia. in it?	There is damage or a hole.	Repair or replace the canister. <Ref. to EC(H4DOTC)-6, Canister.>	Go to step **10.**
10	**CHECK FUEL TANK.** Remove the fuel tank. <Ref. to FU(H4DOTC)-55, Fuel Tank.> Is the fuel tank damaged or is there a hole of more than 1.0 mm (0.04 in) dia. in it?	There is damage or a hole.	Repair or replace the fuel tank. <Ref. to FU(H4DOTC)-55, Fuel Tank.>	Go to step **11.**
11	**CHECK ANY OTHER MECHANICAL TROUBLE IN EVAPORATIVE EMISSION CONTROL SYSTEM.** Are there holes of more than 1.0 mm (0.04 in) dia., cracks, clogging,or disconnections, bend, misconnection of hoses or pipes in evaporative emission control system?	There are holes, cracks, clogging, or disconnection, bend, misconnection of hoses or pipes.	Repair or replace the hoses or pipes.	Contact with SOA (distributor) service. NOTE: Inspection by DTM is required, because probable cause is deterioration of multiple parts.

AX:DTC P0447 — EVAPORATIVE EMISSION CONTROL SYSTEM VENT CONTROL CIRCUIT OPEN —

- **DTC DETECTING CONDITION:**
  - Fault occurs in two consecutive driving cycles

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to EN(H4DOTC)-49, OPERATION, Clear Memory Mode.> and INSPECTION MODE <Ref. to EN(H4DOTC)-41, OPERATION, Inspection Mode.>.

- **WIRING DIAGRAM:**



EN-01245

	Step	Check	Yes	No
1	**CHECK OUTPUT SIGNAL FROM ECM.** 1)Turn ignition switch to ON. 2)Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B137) No. 11 (+) — Chassis ground (−):*** Is the measured value more than the specified value?	10 V	Go to step **2.**	Go to step **3.**
2	**CHECK FOR POOR CONTACT.** Check for poor contact in ECM connector. Is there poor contact in ECM connector?	There is poor contact.	Repair poor contact in ECM connector.	The MIL may light up, however, the circuit is returned to the normal status at the moment. (However, the possibility of poor contact still remains.) NOTE: In this case, repair the following: • Poor contact in drain valve connector • Poor contact in ECM connector • Poor contact in coupling connector
3	**CHECK HARNESS BETWEEN DRAIN VALVE AND ECM CONNECTOR.** 1)Turn ignition switch to OFF. 2)Disconnect the connectors from drain valve and ECM. 3)Measure the resistance of harness between drain valve connector and chassis ground. ***Connector & terminal*** ***(R69) No. 2 — Chassis ground:*** Is the measured value more than the specified value?	1 MΩ	Go to step **4.**	Repair short circuit to ground in harness between ECM and drain valve connector.
4	**CHECK HARNESS BETWEEN DRAIN VALVE AND ECM CONNECTOR.** Measure the resistance of harness between ECM and drain valve connector. ***Connector & terminal*** ***(B137) No. 11 — (R69) No. 2:*** Is the measured value less than the specified value?	1 Ω	Go to step **5.**	Repair harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between ECM and drain valve connector • Poor contact in coupling connector
5	**CHECK DRAIN VALVE.** Measure the resistance between drain valve terminals. ***Terminal*** ***No. 1 — No. 2:*** Is the measured value within the specified range?	10 — 100 Ω	Go to step **6.**	Replace the drain valve. <Ref. to EC(H4DOTC)-19, Drain Valve.>

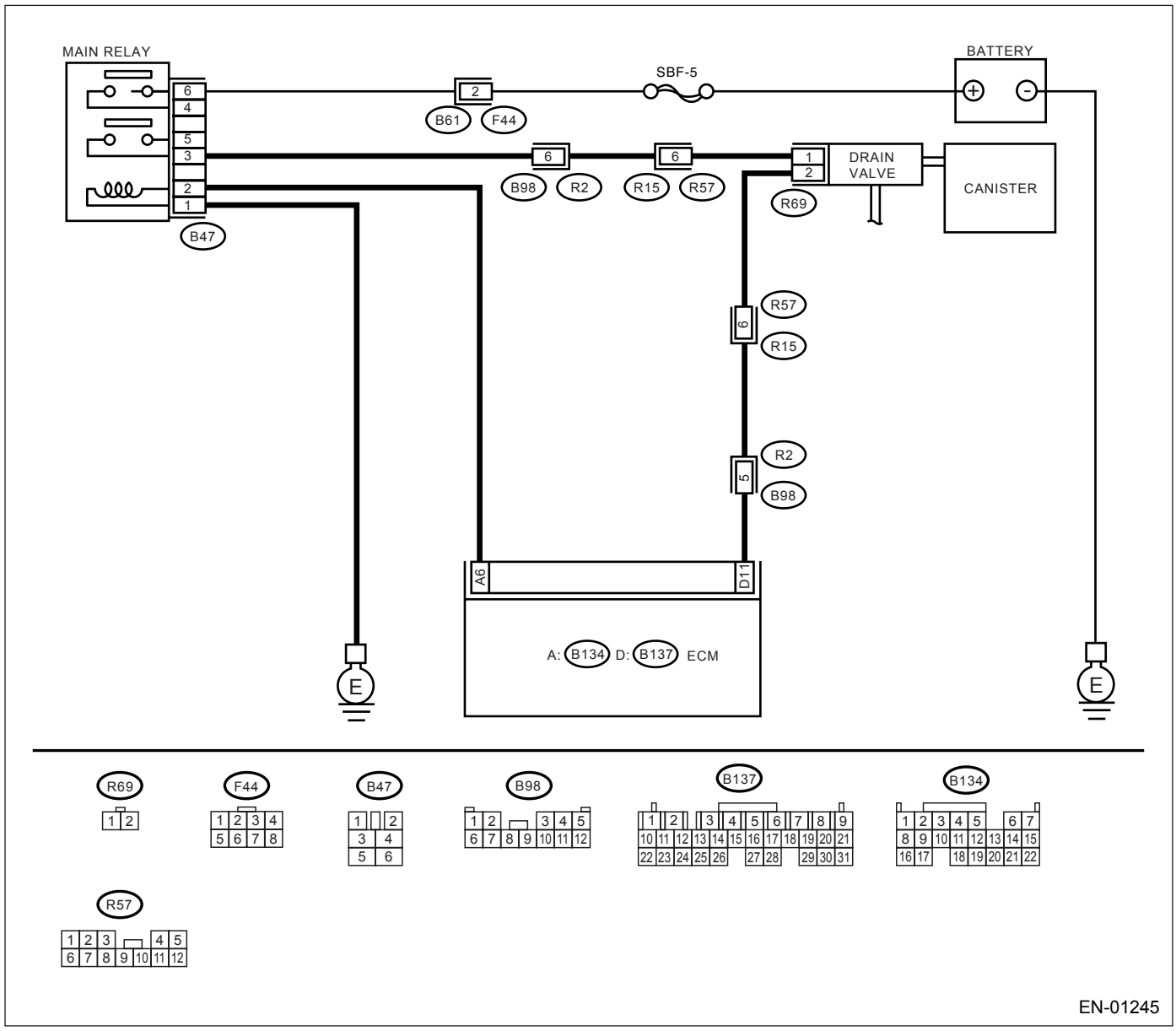
	Step	Check	Yes	No
6	**CHECK POWER SUPPLY TO DRAIN VALVE.** 1)Turn ignition switch to ON. 2)Measure the voltage between drain valve and chassis ground. ***Connector & terminal*** ***(R69) No. 1 (+) — Chassis ground (−):*** Is the measured value more than the specified value?	10 V	Go to step **7.**	Repair harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between main relay and drain valve • Poor contact in coupling connector • Poor contact in main relay connector
7	**CHECK FOR POOR CONTACT.** Check for poor contact in drain valve connector. Is there poor contact in drain valve connector?	There is poor contact.	Repair poor contact in drain valve connector.	Contact with SOA (distributor) service. NOTE: Inspection by DTM is required, because probable cause is deterioration of multiple parts.

AY:DTC P0448 — EVAPORATIVE EMISSION CONTROL SYSTEM VENT CONTROL CIRCUIT SHORTED —

- **DTC DETECTING CONDITION:**
  - Fault occurs in two consecutive driving cycles

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to EN(H4DOTC)-49, OPERATION, Clear Memory Mode.> and INSPECTION MODE <Ref. to EN(H4DOTC)-41, OPERATION, Inspection Mode.>.

- **WIRING DIAGRAM:**



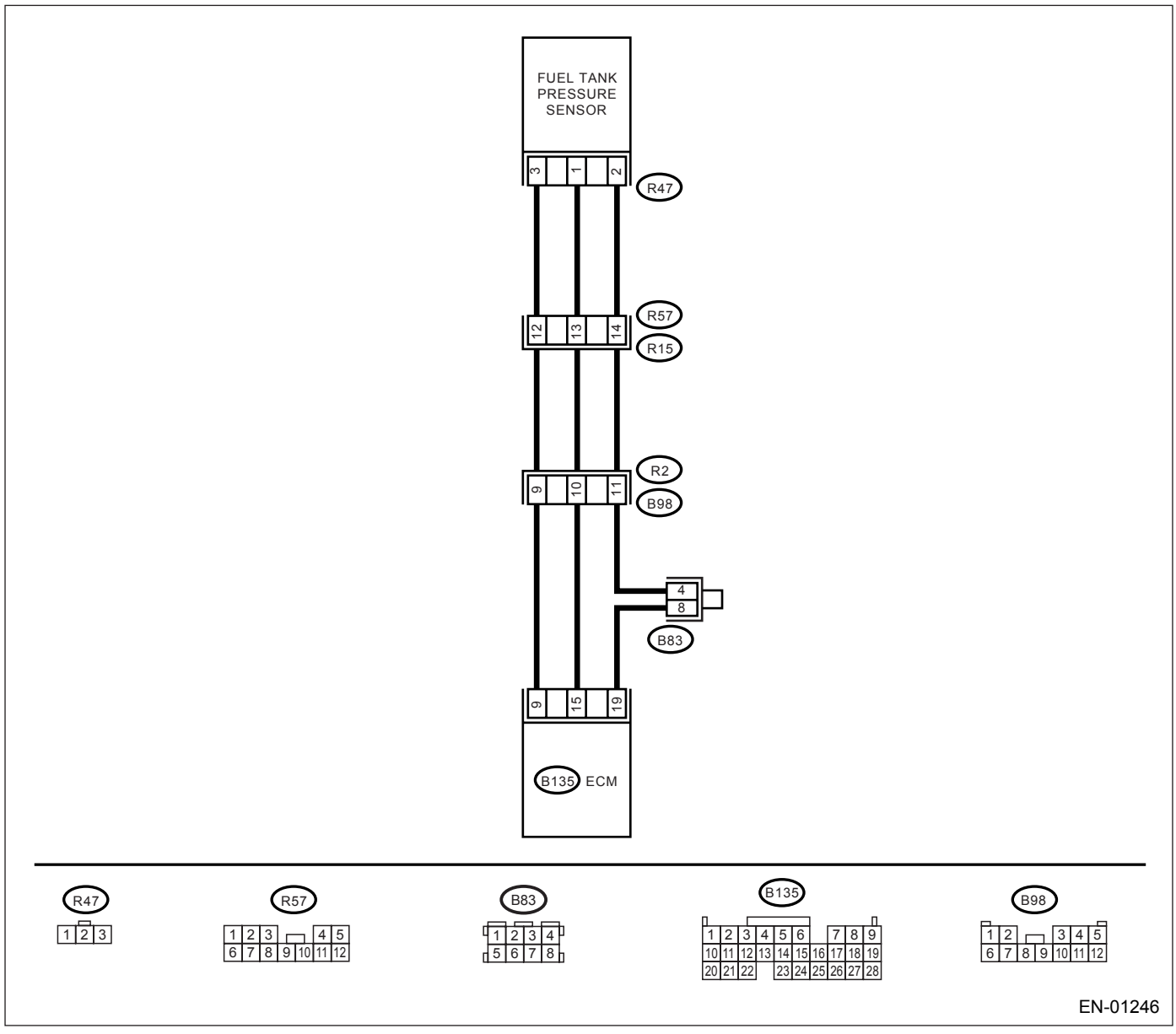
	Step	Check	Yes	No
1	**CHECK INPUT SIGNAL FOR ECM.** 1)Turn ignition switch to OFF. 2)Connect the test mode connector at the lower portion of instrument panel (on the driver's side). 3)Turn ignition switch to ON. 4)While operating the drain valve, measure voltage between ECM and chassis ground. NOTE: Drain valve operation can be excecuted using Subaru Select Monitor. For the procedure, refer to "Compulsory Valve Operation Check Mode". <Ref. to EN(H4DOTC)-50, Compulsory Valve Operation Check Mode.> ***Connector & terminal*** ***(B137) No. 11 (+) — Chassis ground (−):*** Does the measured value change within the specified range?	0 — 10 V	Go to step **2.**	The MIL may light up, however, the circuit is returned to the normal status at the moment. In this case, repair poor contact in ECM connector.
2	**CHECK INPUT SIGNAL FOR ECM.** 1)Turn ignition switch to ON. 2)Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B137) No. 11 (+) — Chassis ground (−):*** Is the measured value more than the specified value?	10 V	Go to step **4.**	Go to step **3.**
3	**CHECK FOR POOR CONTACT.** Check for poor contact in ECM connector. Is there poor contact in ECM connector?	There is poor contact.	Repair poor contact in ECM connector.	Replace the ECM. <Ref. to FU(H4DOTC)-50, Engine Control Module.>
4	**CHECK HARNESS BETWEEN DRAIN VALVE AND ECM CONNECTOR.** 1)Turn ignition switch to OFF. 2)Disconnect the connector from drain valve. 3)Turn ignition switch to ON. 4)Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B137) No. 11 (+) — Chassis ground (−):*** Is the measured value more than the specified value?	10 V	Repair short circuit to battery in harness between ECM and drain valve connector. After repair, replace the ECM. <Ref. to FU(H4DOTC)-50, Engine Control Module.>	Go to step **5.**
5	**CHECK DRAIN VALVE.** 1)Turn ignition switch to OFF. 2)Measure the resistance between drain valve terminals. ***Terminal*** ***No. 1 — No. 2:*** Is the measured value less than the specified value?	1 Ω	Replace the drain valve <Ref. to EC(H4DOTC)-19, Drain Valve.> and ECM <Ref. to FU(H4DOTC)-50, Engine Control Module.>.	Go to step **6.**
6	**CHECK FOR POOR CONTACT.** Check for poor contact in ECM connector. Is there poor contact in ECM connector?	There is poor contact.	Repair poor contact in ECM connector.	Replace the ECM. <Ref. to FU(H4DOTC)-50, Engine Control Module.>

AZ:DTC P0451 — EVAPORATIVE EMISSION CONTROL SYSTEM PRESSURE SENSOR RANGE/PERFORMANCE —

- **DTC DETECTING CONDITION:**
  - Fault occurs in two consecutive driving cycles

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to EN(H4DOTC)-49, OPERATION, Clear Memory Mode.> and INSPECTION MODE <Ref. to EN(H4DOTC)-41, OPERATION, Inspection Mode.>.

- **WIRING DIAGRAM:**



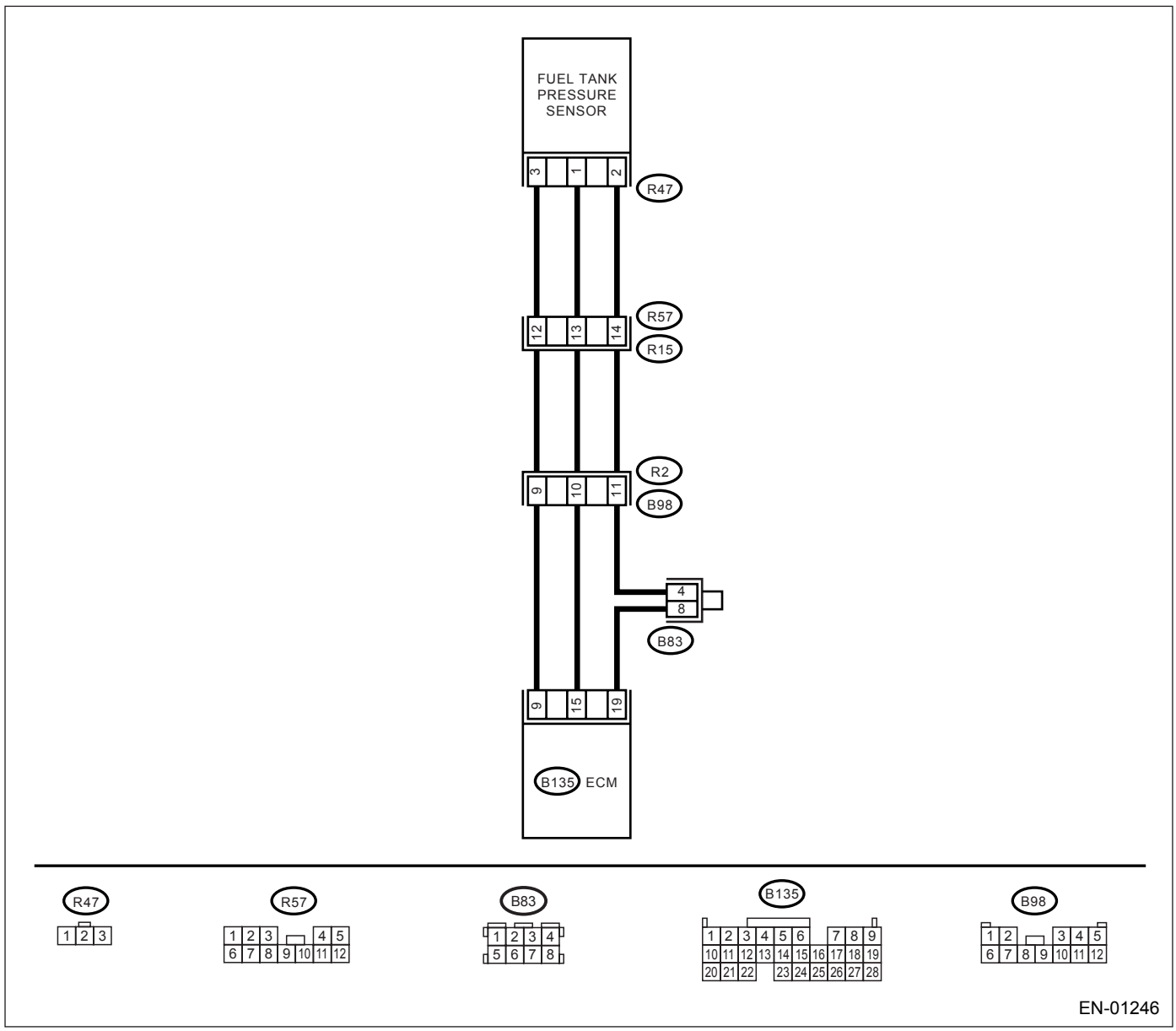
	Step	Check	Yes	No
1	**CHECK FOR OTHER DTC ON DISPLAY.** Is any other DTC displayed?	Other DTC is displayed.	Inspect the relevant DTC using "List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H4DOTC)-81, List of Diagnostic Trouble Codes (DTC).>	Go to step **2.**
2	**CHECK FUEL FILLER CAP.** 1)Turn ignition switch to OFF. 2)Open the fuel flap. Is the fuel filler cap tightened securely?	Tightened securely.	Go to step **3.**	Tighten fuel filler cap securely.
3	**CHECK PRESSURE/VACUUM LINE.** Is there a fault in pressure/vacuum line? NOTE: Check the following items. •Disconnection, leakage and clogging of the vacuum hoses and pipes between fuel tank pressure sensor and fuel tank •Disconnection, leakage and clogging of air ventilation hoses and pipes between fuel filler pipe and fuel tank	There is a fault.	Repair or replace the hoses and pipes.	Replace the fuel tank pressure sensor. <Ref. to EC(H4DOTC)-11, Fuel Tank Pressure Sensor.>

BA:DTC P0452 — EVAPORATIVE EMISSION CONTROL SYSTEM PRESSURE SENSOR LOW INPUT —

- **DTC DETECTING CONDITION:**
  - Fault occurs in two consecutive driving cycles

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to EN(H4DOTC)-49, OPERATION, Clear Memory Mode.> and INSPECTION MODE <Ref. to EN(H4DOTC)-41, OPERATION, Inspection Mode.>.

- **WIRING DIAGRAM:**



	Step	Check	Yes	No
1	**CHECK CURRENT DATA.** 1)Turn ignition switch to OFF. 2)Remove the fuel filler cap. 3)Install the fuel filler cap. 4)Turn ignition switch to ON. 5)Read the data of fuel tank pressure sensor signal using Subaru Select Monitor or the OBD-II general scan tool. Is the measured value less than the specified value? NOTE: •Subaru Select Monitor For detailed operation procedures, refer to "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H4DOTC)-33, Subaru Select Monitor.> •OBD-II general scan tool For detailed operation procedures, refer to the OBD-II General Scan Tool Instruction Manual.	–2.8 kPa (–21.0 mmHg, –0.827 inHg)	Go to step **2.**	The MIL may light up, however, the circuit is returned to the normal status at the moment.
2	**CHECK POWER SUPPLY TO FUEL TANK PRESSURE SENSOR.** Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B135) No. 9 (+) — Chassis ground (–):*** Is the measured value more than the specified value?	4.5 V	Go to step **4.**	Go to step **3.**
3	**CHECK POWER SUPPLY TO FUEL TANK PRESSURE SENSOR.** Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B135) No. 9 (+) — Chassis ground (–):*** Is the measured value more than the specified value?	4.5 V	Repair poor contact in ECM connector.	Contact with SOA (distributor) service. NOTE: Inspection by DTM is required, because probable cause is deterioration of multiple parts.
4	**CHECK INPUT SIGNAL FOR ECM.** Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B135) No. 15 (+) — Chassis ground (–):*** Is the measured value less than the specified value?	0.2 V	Go to step **6.**	Go to step **5.**
5	**CHECK INPUT SIGNAL FOR ECM. (USING SUBARU SELECT MONITOR.)** Read the data of fuel tank pressure sensor signal using Subaru Select Monitor. Does the measured value exceed the specified value by shaking the ECM harness and connector? NOTE: •Subaru Select Monitor For detailed operation procedures, refer to "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H4DOTC)-33, Subaru Select Monitor.>	– 2.8 kPa (–21.0 mmHg, –0.827 inHg)	Repair poor contact in ECM connector.	Go to step **6.**

	Step	Check	Yes	No
6	**CHECK HARNESS BETWEEN ECM AND COUPLING CONNECTOR IN REAR WIRING HARNESS.** 1)Turn ignition switch to OFF. 2)Remove the rear seat cushion. 3)Separate rear wiring harness and fuel tank cord. 4)Turn ignition switch to ON. 5)Measure the voltage between rear wiring harness connector and chassis ground. ***Connector & terminal*** ***(R15) No. 12 (+) — Chassis ground (−):*** Is the measured value more than the specified value?	4.5 V	Go to step **7.**	Repair harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between ECM and rear wiring harness connector • Poor contact in coupling connector
7	**CHECK HARNESS BETWEEN ECM AND COUPLING CONNECTOR IN REAR WIRING HARNESS.** 1)Turn ignition switch to OFF. 2)Disconnect the connector from ECM. 3)Measure the resistance of harness between ECM and rear wiring harness connector. ***Connector & terminal*** ***(B135) No. 19 — (R15) No. 14:*** Is the measured value less than the specified value?	1 Ω	Go to step **8.**	Repair harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between ECM and rear wiring harness connector • Poor contact in coupling connector • Poor contact in joint connector
8	**CHECK HARNESS BETWEEN ECM AND COUPLING CONNECTOR IN REAR WIRING HARNESS.** Measure the resistance of harness between rear wiring harness connector and chassis ground. ***Connector & terminal*** ***(R15) No. 14 — Chassis ground:*** Is the measured value more than the specified value?	500 kΩ	Go to step **9.**	Repair short circuit to ground in harness between ECM and rear wiring harness connector.
9	**CHECK FUEL TANK CORD.** 1)Disconnect the connector from fuel tank pressure sensor. 2)Measure the resistance of fuel tank cord. ***Connector & terminal*** ***(R57) No. 12 — (R47) No. 3:*** Is the measured value less than the specified value?	1 Ω	Go to step **10.**	Repair open circuit in fuel tank cord.
10	**CHECK FUEL TANK CORD.** Measure the resistance of fuel tank cord. ***Connector & terminal*** ***(R57) No. 14 — (R47) No. 2:*** Is the measured value less than the specified value?	1 Ω	Go to step **11.**	Repair open circuit in fuel tank cord.

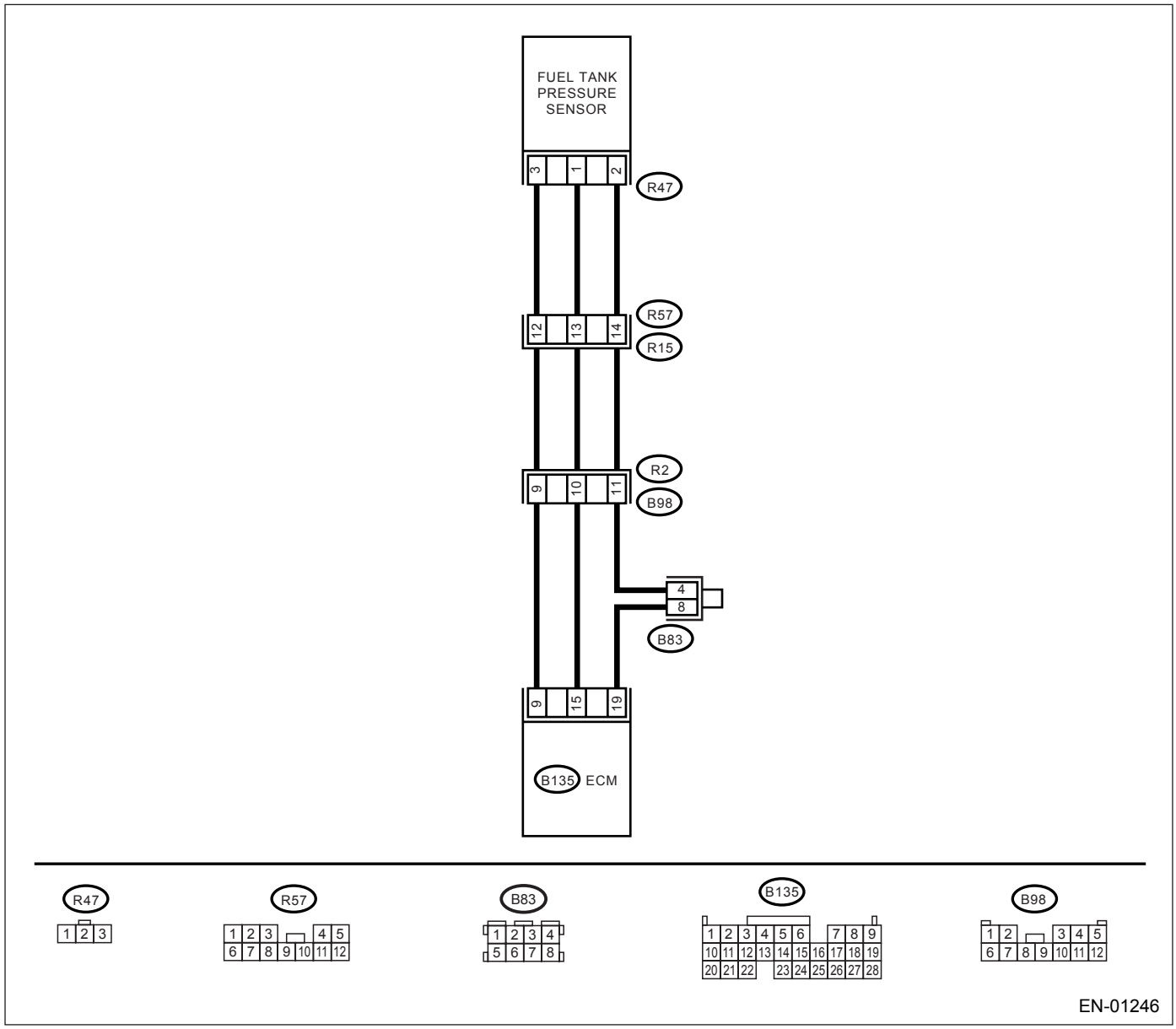
	Step	Check	Yes	No
11	**CHECK FUEL TANK CORD.** Measure the resistance of harness between fuel tank pressure sensor connector and engine ground. ***Connector & terminal*** ***(R47) No. 1 — Chassis ground:*** Is the measured value more than the specified value?	500 kΩ	Go to step **12.**	Repair short circuit to ground in fuel tank cord.
12	**CHECK FOR POOR CONTACT.** Check for poor contact in fuel tank pressure sensor connector. Is there poor contact in fuel tank pressure sensor connector?	There is poor contact.	Repair poor contact in fuel tank pressure sensor connector.	Replace the fuel tank pressure sensor. <Ref. to EC(H4DOTC)-11, Fuel Tank Pressure Sensor.>

BB:DTC P0453 — EVAPORATIVE EMISSION CONTROL SYSTEM PRESSURE SENSOR HIGH INPUT —

- **DTC DETECTING CONDITION:**
  - Fault occurs in two consecutive driving cycles

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to EN(H4DOTC)-49, OPERATION, Clear Memory Mode.> and INSPECTION MODE <Ref. to EN(H4DOTC)-41, OPERATION, Inspection Mode.>.

- **WIRING DIAGRAM:**



	Step	Check	Yes	No
1	**CHECK CURRENT DATA.** 1)Turn ignition switch to OFF. 2)Remove the fuel filler cap. 3)Install the fuel filler cap. 4)Turn ignition switch to ON. 5)Read the data of fuel tank pressure sensor signal using Subaru Select Monitor or the OBD-II general scan tool. Is the measured value more than the specified value? NOTE: •Subaru Select Monitor For detailed operation procedures, refer to "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H4DOTC)-33, Subaru Select Monitor.> •OBD-II general scan tool For detailed operation procedures, refer to the OBD-II General Scan Tool Instruction Manual.	2.8 kPa (21.0 mmHg, 0.827 inHg)	Go to step **11.**	Go to step **2.**
2	**CHECK POWER SUPPLY TO FUEL TANK PRESSURE SENSOR.** Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B135) No. 9 (+) — Chassis ground (−):*** Is the measured value more than the specified value?	4.5 V	Go to step **4.**	Go to step **3.**
3	**CHECK POWER SUPPLY TO FUEL TANK PRESSURE SENSOR.** Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B135) No. 9 (+) — Chassis ground (−):*** Does the measured value exceed the specified value by shaking the ECM harness and connector?	4.5 V	Repair poor contact in ECM connector.	Replace the ECM. <Ref. to FU(H4DOTC)-50, Engine Control Module.>
4	**CHECK INPUT SIGNAL FOR ECM.** Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B135) No. 15 (+) — Chassis ground (−):*** Is the measured value less than the specified value?	0.2 V	Go to step **6.**	Go to step **5.**
5	**CHECK INPUT SIGNAL FOR ECM. (USING SUBARU SELECT MONITOR.)** Read the data of fuel tank pressure sensor signal using Subaru Select Monitor. Does the measured value exceed the specified value by shaking the ECM harness and connector? NOTE: •Subaru Select Monitor For detailed operation procedures, refer to "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H4DOTC)-33, Subaru Select Monitor.>	− 2.8 kPa (−21.0 mmHg, −0.827 inHg)	Repair poor contact in ECM connector.	Go to step **6.**

	Step	Check	Yes	No
6	**CHECK HARNESS BETWEEN ECM AND COUPLING CONNECTOR IN REAR WIRING HARNESS.** 1)Turn ignition switch to OFF. 2)Remove the rear seat cushion. 3)Separate rear wiring harness and fuel tank cord. 4)Turn ignition switch to ON. 5)Measure the voltage between rear wiring harness connector and chassis ground. ***Connector & terminal*** ***(R15) No. 12 (+) — Chassis ground (−):*** Is the measured value more than the specified value?	4.5 V	Go to step **7.**	Repair harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between ECM and rear wiring harness connector • Poor contact in coupling connector
7	**CHECK HARNESS BETWEEN ECM AND COUPLING CONNECTOR IN REAR WIRING HARNESS.** 1)Turn ignition switch to OFF. 2)Disconnect the connector from ECM. 3)Measure the resistance of harness between ECM and rear wiring harness connector. ***Connector & terminal*** ***(B135) No. 15 — (R15) No. 13:*** ***(B135) No. 19 — (R15) No. 14:*** Is the measured value less than the specified value?	1 Ω	Go to step **8.**	Repair harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between ECM and rear wiring harness connector • Poor contact in coupling connector
8	**CHECK FUEL TANK CORD.** 1)Disconnect the connector from fuel tank pressure sensor. 2)Measure the resistance of fuel tank cord. ***Connector & terminal*** ***(R57) No. 13 — (R47) No. 1:*** Is the measured value less than the specified value?	1 Ω	Go to step **9.**	Repair open circuit in fuel tank cord.
9	**CHECK FUEL TANK CORD.** Measure the resistance of fuel tank cord. ***Connector & terminal*** ***(R57) No. 14 — (R47) No. 2:*** Is the measured value less than the specified value?	1 Ω	Go to step **10.**	Repair open circuit in fuel tank cord.
10	**CHECK FOR POOR CONTACT.** Check for poor contact in fuel tank pressure sensor connector. Is there poor contact in fuel tank pressure sensor connector?	There is poor contact.	Repair poor contact in fuel tank pressure sensor connector.	Replace the fuel tank pressure sensor. <Ref. to EC(H4DOTC)-11, Fuel Tank Pressure Sensor.>

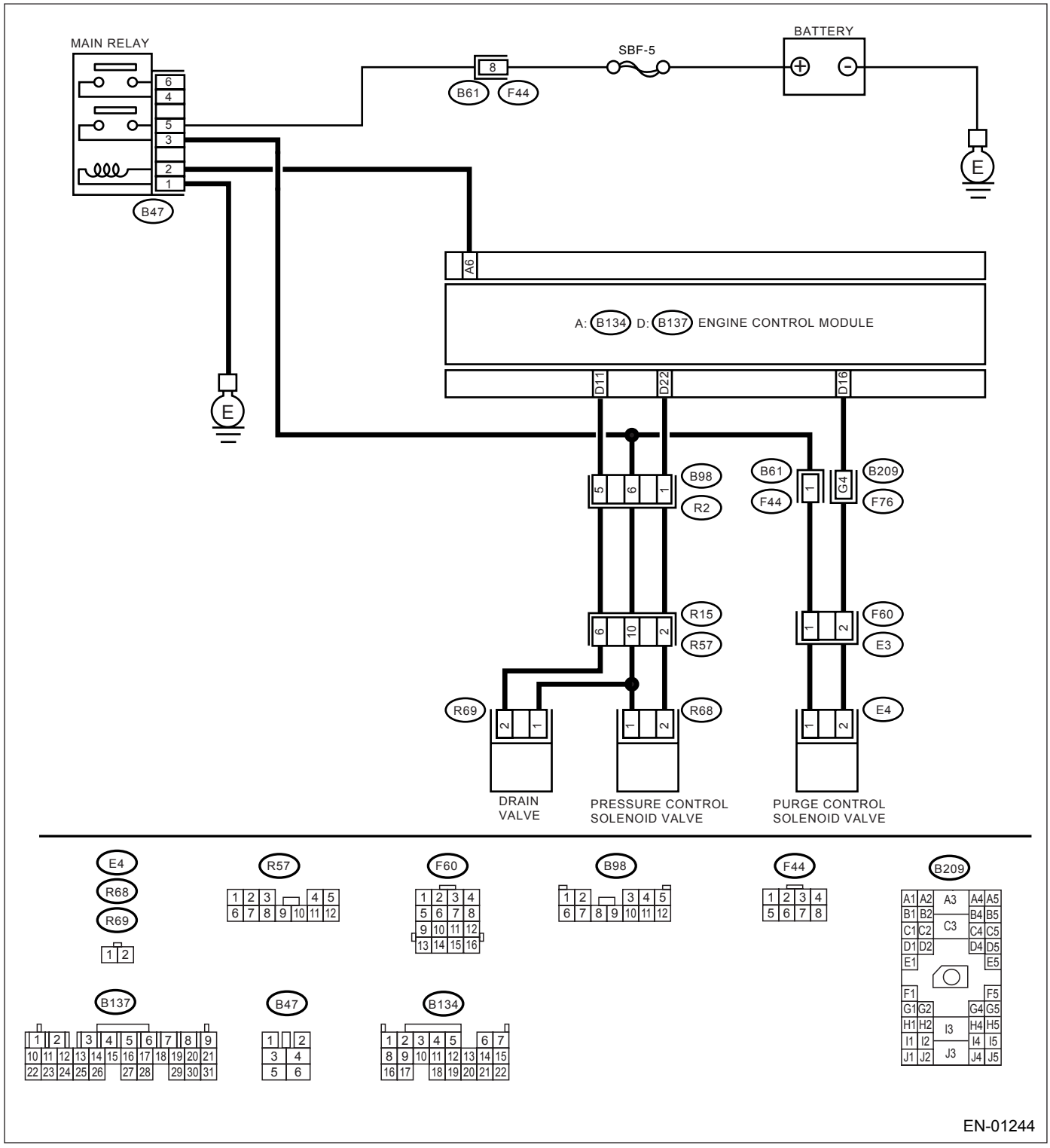
	Step	Check	Yes	No
11	**CHECK HARNESS BETWEEN ECM AND FUEL TANK PRESSURE SENSOR CONNECTOR.** 1)Turn ignition switch to OFF. 2)Disconnect the connector from fuel tank pressure sensor. 3)Turn ignition switch to ON. 4)Read the data of fuel tank pressure sensor signal using Subaru Select Monitor or the OBD-II general scan tool. Is the measured value more than the specified value? NOTE: •Subaru Select Monitor For detailed operation procedures, refer to “READ CURRENT DATA FOR ENGINE”. <Ref. to EN(H4DOTC)-33, Subaru Select Monitor.> •OBD-II general scan tool For detailed operation procedures, refer to the OBD-II General Scan Tool Instruction Manual.	2.8 kPa (21.0 mmHg, 0.827 inHg)	Repair short circuit to battery in harness between ECM and fuel tank pressure sensor connector.	Replace the fuel tank pressure sensor. <Ref. to EC(H4DOTC)-11, Fuel Tank Pressure Sensor.>

BC:DTC P0456 — EVAPORATIVE EMISSION CONTROL SYSTEM LEAK DETECTED (VERY SMALL LEAK) —

- **DTC DETECTING CONDITION:**
  - Fault occurs in two consecutive driving cycles
- **TROUBLE SYMPTOM:**
  - Fuel odor
  - There is a hole of more than 0.5 mm (0.020 in) dia. in evaporation system or fuel tank.

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to EN(H4DOTC)-49, OPERATION, Clear Memory Mode.> and INSPECTION MODE <Ref. to EN(H4DOTC)-41, OPERATION, Inspection Mode.>.

- **WIRING DIAGRAM:**



	Step	Check	Yes	No
1	**CHECK FOR OTHER DTC ON DISPLAY.** Is any other DTC displayed?	Other DTC is displayed.	Inspect the relevant DTC using "List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H4DOTC)-81, List of Diagnostic Trouble Codes (DTC).>	Go to step **2.**
2	**CHECK FUEL FILLER CAP.** 1)Turn ignition switch to OFF. 2)Check the fuel filler cap. Is the fuel filler cap tightened securely? NOTE: The DTC is stored in memory if fuel filler cap is or was loose or if the cap chain was caught while tightening.	Tightened securely.	Go to step **3.**	Tighten fuel filler cap securely.
3	**CHECK FUEL FILLER CAP.** Is the fuel filler cap SUBARU genuine?	The SUBAU genuine fuel filler cap is used.	Go to step **4.**	Replace with a SUBARU genuine fuel filler cap.
4	**CHECK FUEL FILLER PIPE PACKING.** Is there any damage to the seal between fuel filler cap and fuel filler pipe?	There is damage.	Repair or replace the fuel filler cap and fuel filler pipe. <Ref. to FU(H4DOTC)-58, Fuel Filler Pipe.>	Go to step **5.**
5	**CHECK DRAIN VALVE.** 1)Connect the test mode connector. 2)Turn ignition switch to ON. 3)Operate the drain valve. Does the drain valve operate? NOTE: Drain valve operation can also be executed using Subaru Select Monitor. For the procedure, refer to "Compulsory Valve Operation Check Mode". <Ref. to EN(H4DOTC)-50, Compulsory Valve Operation Check Mode.>	Operates.	Go to step **6.**	Replace the drain valve. <Ref. to EC(H4DOTC)-19, Drain Valve.>
6	**CHECK PURGE CONTROL SOLENOID VALVE.** Operate the purge control solenoid valve. Does the purge control solenoid valve operate? NOTE: Purge control solenoid valve operation can also be executed using Subaru Select Monitor. For the procedure, refer to "Compulsory Valve Operation Check Mode". <Ref. to EN(H4DOTC)-50, Compulsory Valve Operation Check Mode.>	Operates.	Go to step **7.**	Replace the purge control solenoid valve. <Ref. to EC(H4DOTC)-7, Purge Control Solenoid Valve.>

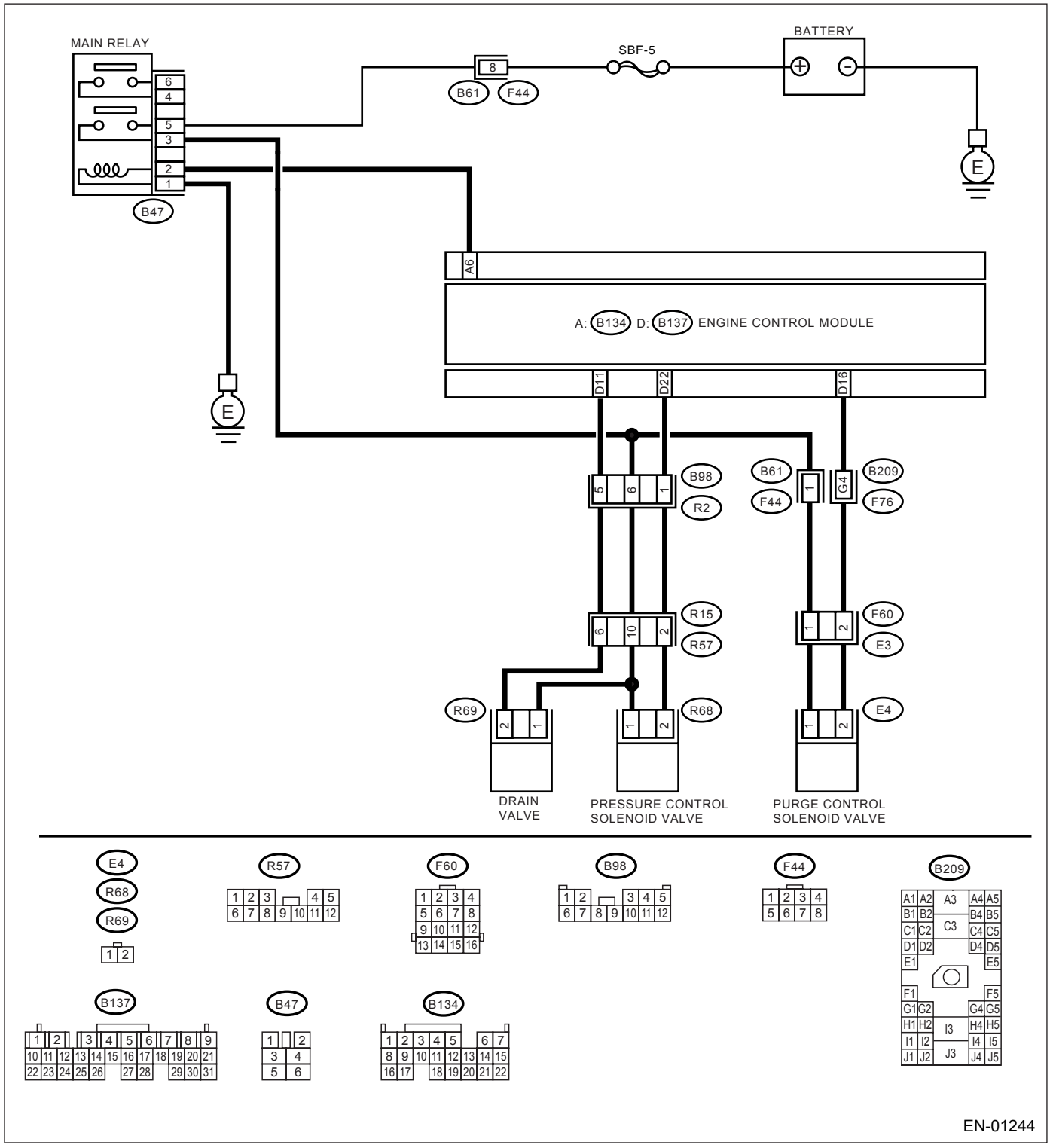
	Step	Check	Yes	No
7	**CHECK PRESSURE CONTROL SOLENOID VALVE.** Operate the pressure control solenoid valve. Does the pressure control solenoid valve operate? NOTE: Pressure control solenoid valve operation can also be executed using Subaru Select Monitor. For the procedure, refer to "Compulsory Valve Operation Check Mode". <Ref. to EN(H4DOTC)-50, Compulsory Valve Operation Check Mode.>	Operates.	Go to step **8.**	Replace the pressure control solenoid valve. <Ref. to EC(H4DOTC)-7, Purge Control Solenoid Valve.>
8	**CHECK EVAPORATIVE EMISSION CONTROL SYSTEM LINE.** Turn ignition switch to OFF. Is there a hole of more than 0.5 mm (0.020 in) dia. on evaporation line?	There is a hole.	Repair or replace the evaporation line. <Ref. to FU(H4DOTC)-71, Fuel Delivery, Return and Evaporation Lines.>	Go to step **9.**
9	**CHECK CANISTER.** Is the canister damaged or is there a hole of more than 0.5 mm (0.020 in) dia. in it?	There is damage or a hole.	Repair or replace the canister. <Ref. to EC(H4DOTC)-6, Canister.>	Go to step **10.**
10	**CHECK FUEL TANK.** Remove the fuel tank. <Ref. to FU(H4DOTC)-55, Fuel Tank.> Is the fuel tank damaged or is there a hole of more than 0.5 mm (0.020 in) dia. in it?	There is damage or a hole.	Repair or replace the fuel tank. <Ref. to FU(H4DOTC)-55, Fuel Tank.>	Go to step **11.**
11	**CHECK ANY OTHER MECHANICAL TROUBLE IN EVAPORATIVE EMISSION CONTROL SYSTEM.** Are there holes of more than 0.5 mm (0.020 in) dia., cracks, clogging, or disconnections, bend, misconnection of hoses or pipes in evaporative emission control system?	There are holes, cracks, clogging, or disconnection, bend, misconnection of hoses or pipes.	Repair or replace the hoses or pipes.	Contact with SOA (distributor) service. NOTE: Inspection by DTM is required, because probable cause is deterioration of multiple parts.

BD:DTC P0457 — EVAPORATIVE EMISSION CONTROL SYSTEM LEAK DETECTED (FUEL CAP LOOSE/OFF) —

- **DTC DETECTING CONDITION:**
  - Fault occurs in two consecutive driving cycles
- **TROUBLE SYMPTOM:**
  - Fuel odor
  - Fuel filler cap is loose or not installed.

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to EN(H4DOTC)-49, OPERATION, Clear Memory Mode.> and INSPECTION MODE <Ref. to EN(H4DOTC)-41, OPERATION, Inspection Mode.>.

- **WIRING DIAGRAM:**



	Step	Check	Yes	No
1	**CHECK FOR OTHER DTC ON DISPLAY.** Is any other DTC displayed?	Other DTC is displayed.	Inspect the relevant DTC using "List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H4DOTC)-81, List of Diagnostic Trouble Codes (DTC).>	Go to step **2.**
2	**CHECK FUEL FILLER CAP.** 1)Turn ignition switch to OFF. 2)Check the fuel filler cap. Is the fuel filler cap tightened securely? NOTE: The DTC is stored in memory if fuel filler cap is or was loose or if the cap chain was caught while tightening.	Tightened securely.	Go to step **3.**	Tighten fuel filler cap securely.
3	**CHECK FUEL FILLER CAP.** Is the fuel filler cap SUBARU genuine?	The SUBAU genuine fuel filler cap is used.	Go to step **4.**	Replace with a SUBARU genuine fuel filler cap.
4	**CHECK FUEL FILLER PIPE PACKING.** Is there any damage to the seal between fuel filler cap and fuel filler pipe?	There is damage.	Repair or replace the fuel filler cap and fuel filler pipe. <Ref. to FU(H4DOTC)-58, Fuel Filler Pipe.>	Go to step **5.**
5	**CHECK DRAIN VALVE.** 1)Connect the test mode connector. 2)Turn ignition switch to ON. 3)Operate the drain valve. Does the drain valve operate? NOTE: Drain valve operation can also be executed using Subaru Select Monitor. For the procedure, refer to "Compulsory Valve Operation Check Mode". <Ref. to EN(H4DOTC)-50, Compulsory Valve Operation Check Mode.>	Operates.	Go to step **6.**	Replace the drain valve. <Ref. to EC(H4DOTC)-19, Drain Valve.>
6	**CHECK PURGE CONTROL SOLENOID VALVE.** Operate the purge control solenoid valve. Does the purge control solenoid valve operate? NOTE: Purge control solenoid valve operation can also be executed using Subaru Select Monitor. For the procedure, refer to "Compulsory Valve Operation Check Mode". <Ref. to EN(H4DOTC)-81, List of Diagnostic Trouble Codes (DTC).>	Operates.	Go to step **7.**	Replace the purge control solenoid valve. <Ref. to EC(H4DOTC)-7, Purge Control Solenoid Valve.>

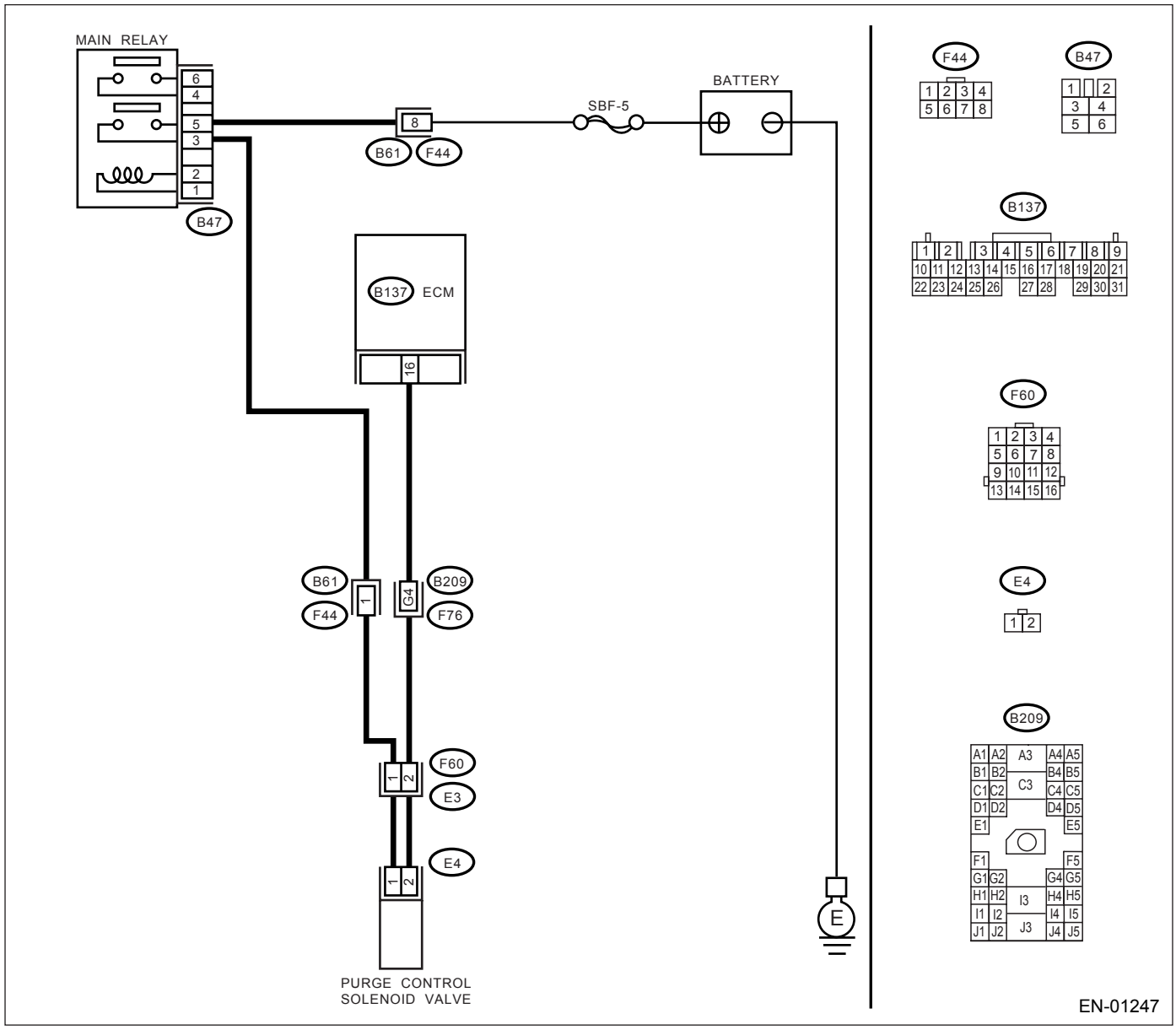
	Step	Check	Yes	No
7	**CHECK PRESSURE CONTROL SOLENOID VALVE.** Operate the pressure control solenoid valve. Does the pressure control solenoid valve operate? NOTE: Pressure control solenoid valve operation can also be executed using Subaru Select Monitor. For the procedure, refer to "Compulsory Valve Operation Check Mode". <Ref. to EN(H4DOTC)-50, Compulsory Valve Operation Check Mode.>	Operates.	Go to step **8.**	Replace the pressure control solenoid valve. <Ref. to EC(H4DOTC)-7, Purge Control Solenoid Valve.>
8	**CHECK CANISTER.** Is the canister damaged?	There is damage.	Repair or replace the canister. <Ref. to EC(H4DOTC)-6, Canister.>	Go to step **9.**
9	**CHECK FUEL TANK.** Remove the fuel tank. <Ref. to FU(H4DOTC)-55, Fuel Tank.> Is the fuel tank damaged?	There is damage.	Repair or replace the fuel tank. <Ref. to FU(H4DOTC)-55, Fuel Tank.>	Go to step **10.**
10	**CHECK ANY OTHER MECHANICAL TROUBLE IN EVAPORATIVE EMISSION CONTROL SYSTEM.** Are there holes of more than 0.5 mm (0.020 in) dia., cracks, clogging, or disconnections, misconnection of hoses or pipes in evaporative emission control system?	There are holes, cracks, clogging, or disconnection, misconnection of hoses or pipes.	Repair or replace the hoses or pipes.	Contact with SOA (distributor) service. NOTE: Inspection by DTM is required, because probable cause is deterioration of multiple parts.

BE:DTC P0458 — EVAPORATIVE EMISSION CONTROL SYSTEM PURGE CONTROL VALVE CIRCUIT LOW —

- **DTC DETECTING CONDITION:**
  - Fault occurs in two consecutive driving cycles
- **TROUBLE SYMPTOM:**
  - Erroneous idling

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to EN(H4DOTC)-49, OPERATION, Clear Memory Mode.> and INSPECTION MODE <Ref. to EN(H4DOTC)-41, Inspection Mode.>.

- **WIRING DIAGRAM:**



	Step	Check	Yes	No
1	**CHECK OUTPUT SIGNAL FROM ECM.** 1)Turn ignition switch to ON. 2)Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B137) No. 16 (+) — Chassis ground (−):*** Is the measured value more than the specified value?	10 V	The MIL may light up, however, the circuit is returned to the normal status at the moment. Contact SOA (distributor) service. NOTE: Inspection by DTM is required, because probable cause is deterioration of multiple parts.	Go to step **2.**
2	**CHECK HARNESS BETWEEN PURGE CONTROL SOLENOID VALVE AND ECM CONNECTOR.** 1)Turn ignition switch to OFF. 2)Disconnect the connectors from purge control solenoid valve and ECM. 3)Measure the resistance of harness between purge control solenoid valve connector and engine ground. ***Connector & terminal*** ***(E4) No. 2 — Engine ground:*** Is the measured value less than the specified value?	10 Ω	Repair short circuit to ground in harness between ECM and purge control solenoid valve connector.	Go to step **3.**
3	**CHECK HARNESS BETWEEN PURGE CONTROL SOLENOID VALVE AND ECM CONNECTOR.** Measure the resistance of harness between ECM and purge control solenoid valve. ***Connector & terminal*** ***(B137) No. 16 — (E4) No. 2:*** Is the measured value less than the specified value?	1 Ω	Go to step **4.**	Repair open circuit in harness between ECM and purge control solenoid valve connector. NOTE: In this case, repair the following: • Open circuit in harness between ECM and purge control solenoid valve connector • Poor contact in coupling connector
4	**CHECK PURGE CONTROL SOLENOID VALVE.** 1)Remove the purge control solenoid valve. 2)Measure the resistance between purge control solenoid valve terminals. ***Terminal*** ***No. 1 — No. 2:*** Is the measured value within the specified range?	10 — 100 Ω	Go to step **5.**	Replace the purge control solenoid valve. <Ref. to EC(H4DOTC)-7, Purge Control Solenoid Valve.>

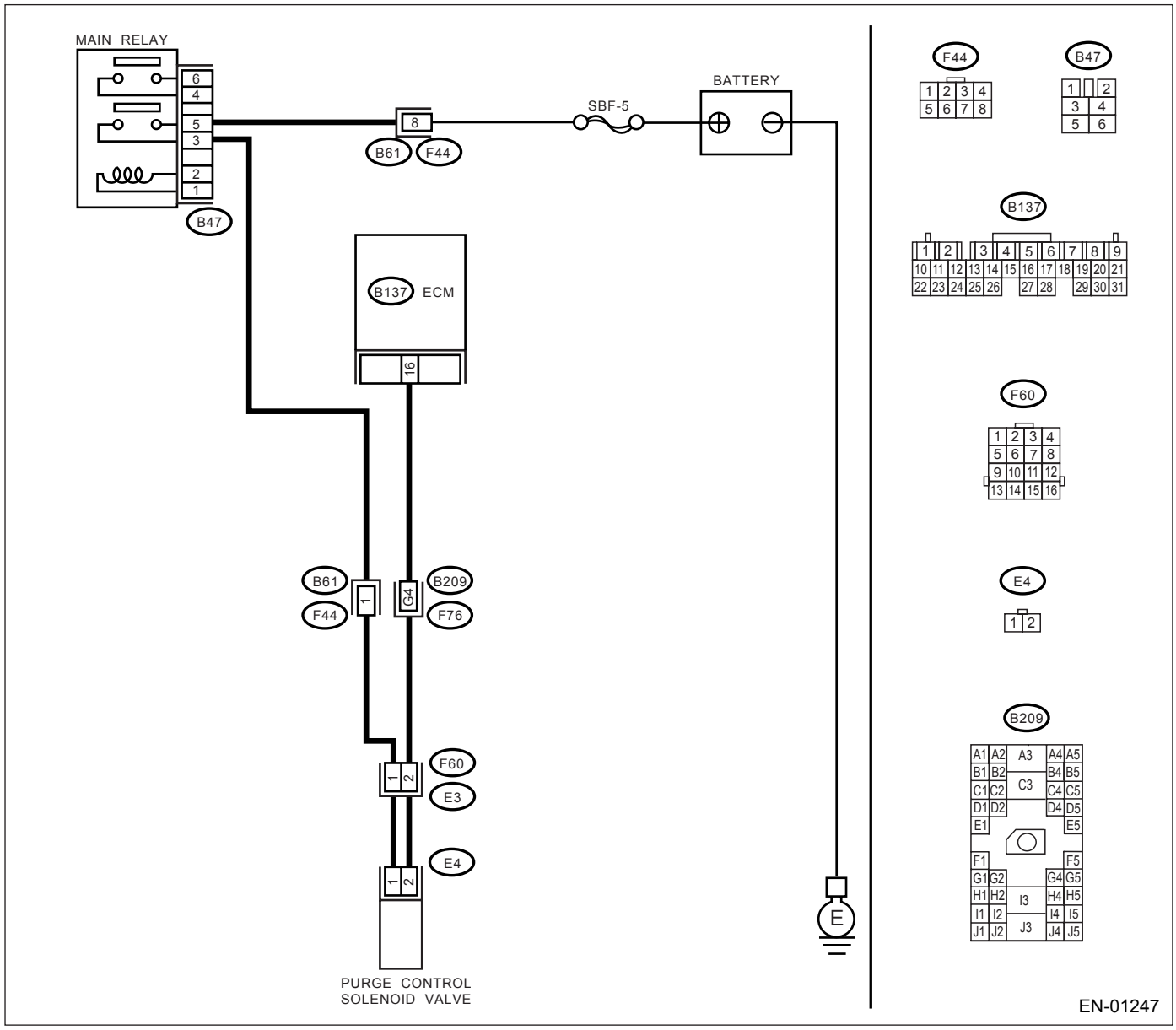
	Step	Check	Yes	No
5	**CHECK POWER SUPPLY TO PURGE CONTROL SOLENOID VALVE.** 1)Turn ignition switch to ON. 2)Measure the voltage between purge control solenoid valve and engine ground. ***Connector & terminal*** ***(E4) No. 1 (+) — Engine ground (−):*** Is the measured value more than the specified value?	10 V	Go to step **6.**	Repair open circuit in harness between main relay and purge control solenoid valve connector.
6	**CHECK FOR POOR CONTACT.** Check for poor contact in purge control solenoid valve connector. Is there poor contact in purge control solenoid valve connector?	There is poor contact.	Repair poor contact in purge control solenoid valve connector.	Contact SOA (distributor) service. NOTE: Inspection by DTM is required, because probable cause is deterioration of multiple parts.

BF:DTC P0459 — EVAPORATIVE EMISSION CONTROL SYSTEM PURGE CONTROL VALVE CIRCUIT HIGH —

- **DTC DETECTING CONDITION:**
  - Fault occurs in two consecutive driving cycles
- **TROUBLE SYMPTOM:**
  - Erroneous idling

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to EN(H4DOTC)-49, OPERATION, Clear Memory Mode.> and INSPECTION MODE <Ref. to EN(H4DOTC)-41, Inspection Mode.>.

- **WIRING DIAGRAM:**



	Step	Check	Yes	No
1	**CHECK OUTPUT SIGNAL FROM ECM.** 1)Turn ignition switch to OFF. 2)Connect the test mode connector at the lower portion of instrument panel (on the driver's side). 3)Turn ignition switch to ON. 4)While operating the purge control solenoid valve, measure voltage between ECM and chassis ground. NOTE: Purge control solenoid valve operation can also be executed using Subaru Select Monitor. For the procedure, refer to Compulsory Valve Operation Check Mode. <Ref. to EN(H4DOTC)-50, Compulsory Valve Operation Check Mode.> ***Connector & terminal*** ***(B137) No. 16 (+) — Chassis ground (−):*** Is the measured value within the specified range?	0 — 13 V	Go to step **2.**	The MIL may light up, however, the circuit is returned to the normal status at the moment. In this case, repair poor contact in ECM connector.
2	**CHECK OUTPUT SIGNAL FROM ECM.** 1)Turn ignition switch to ON. 2)Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B137) No. 16 (+) — Chassis ground (−):*** Is the measured value more than the specified value?	10 V	Go to step **4.**	Go to step **3.**
3	**CHECK FOR POOR CONTACT.** Check for poor contact in ECM connector. Is there poor contact in ECM connector?	There is poor contact.	Repair poor contact in ECM connector.	Replace the ECM. <Ref. to FU(H4DOTC)-50, Engine Control Module.>
4	**CHECK HARNESS BETWEEN PURGE CONTROL SOLENOID VALVE AND ECM CONNECTOR.** 1)Turn ignition switch to OFF. 2)Disconnect the connector from purge control solenoid valve. 3)Turn ignition switch to ON. 4)Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B137) No. 16 (+) — Chassis ground (−):*** Is the measured value more than the specified value?	10 V	Repair short circuit to battery in harness between ECM and purge control solenoid valve connector. After repair, replace the ECM. <Ref. to FU(H4DOTC)-50, Engine Control Module.>	Go to step **5.**
5	**CHECK PURGE CONTROL SOLENOID VALVE.** 1)Turn ignition switch to OFF. 2)Measure the resistance between purge control solenoid valve terminals. ***Terminal*** ***No. 1 — No. 2:*** Is the measured value less than the specified value?	1 Ω	Replace the purge control solenoid valve and ECM. <Ref. to EC(H4DOTC)-7, Purge Control Solenoid Valve.> and <Ref. to FU(H4DOTC)-50, Engine Control Module.>	Go to step **6.**

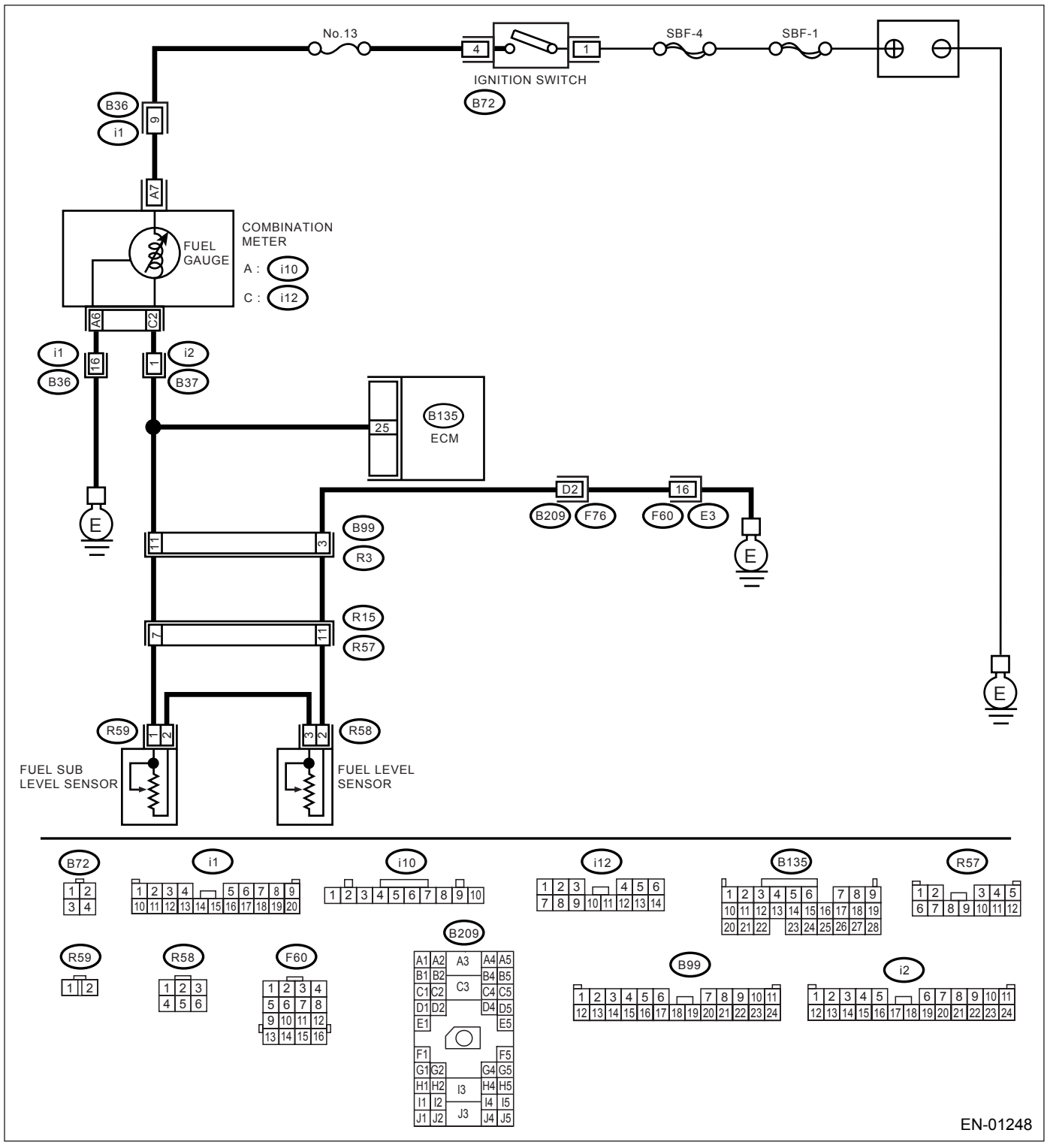
	Step	Check	Yes	No
6	**CHECK FOR POOR CONTACT.** Check for poor contact in ECM connector. Is there poor contact in ECM connector?	There is poor contact.	Repair poor contact in ECM connector.	Replace the ECM. <Ref. to FU(H4DOTC)-50, Engine Control Module.>

BG:DTC P0461 — FUEL LEVEL SENSOR CIRCUIT RANGE/PERFORMANCE —

- **DTC DETECTING CONDITION:**
  - Fault occurs in two consecutive driving cycles

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to EN(H4DOTC)-49, OPERATION, Clear Memory Mode.> and INSPECTION MODE <Ref. to EN(H4DOTC)-41, Inspection Mode.>.

- **WIRING DIAGRAM:**



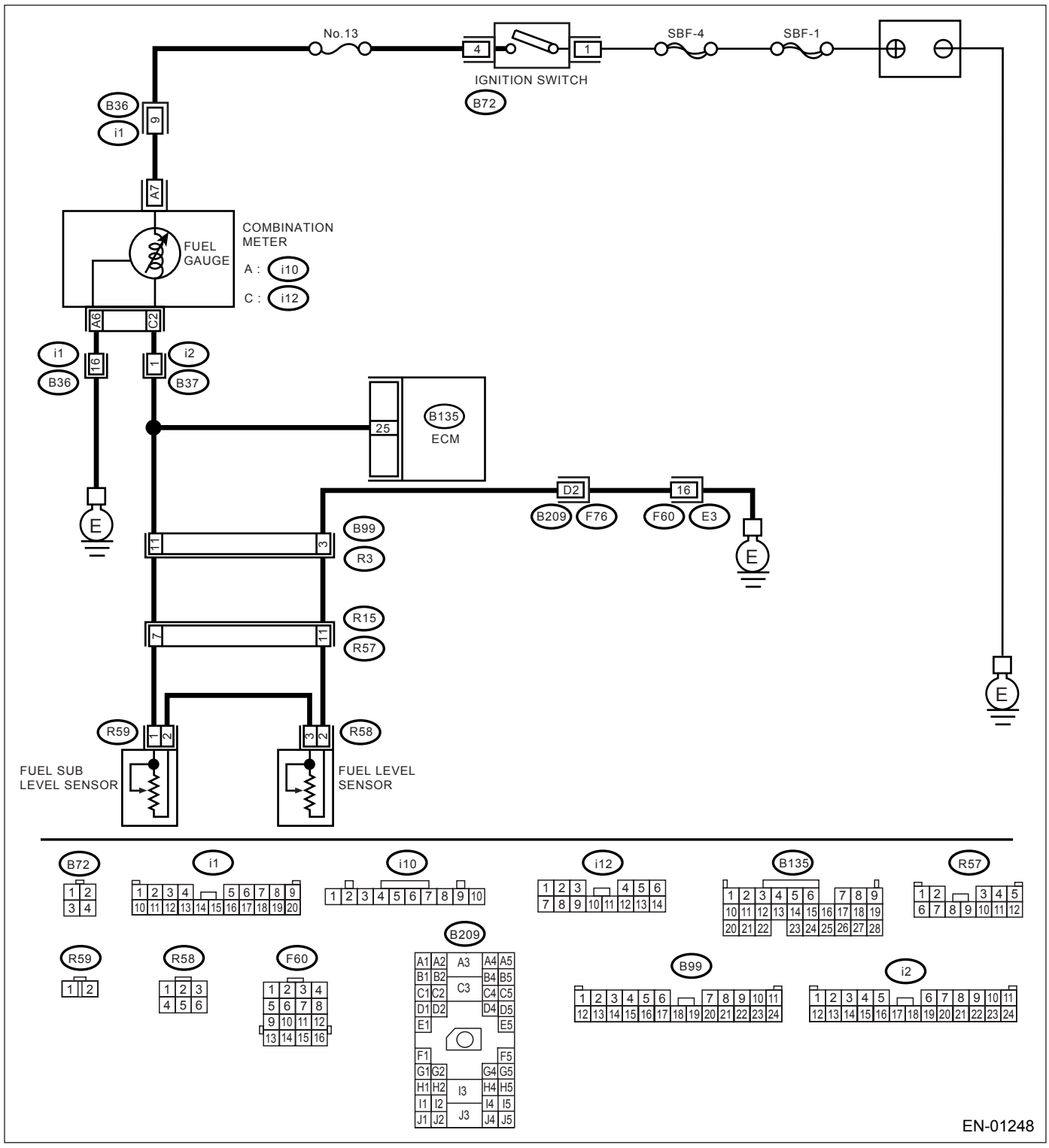
	Step	Check	Yes	No
1	**CHECK FOR OTHER DIAGNOSTIC TROUBLE CODE (DTC) ON DISPLAY.** Is any other DTC displayed?	Other DTC is displayed.	Inspect the relevant DTC using the “List of Diagnostic Trouble Codes (DTC)”. <Ref. to EN(H4DOTC)-81, List of Diagnostic Trouble Codes (DTC).> NOTE: In this case, it is not necessary to inspect DTC P0461.	Replace the fuel level sensor and fuel sub level sensor. <Ref. to FU(H4DOTC)-65, Fuel Level Sensor.> and <Ref. to FU(H4DOTC)-66, Fuel Sub Level Sensor.>

BH:DTC P0462 — FUEL LEVEL SENSOR CIRCUIT LOW INPUT —

- **DTC DETECTING CONDITION:**
  - Fault occurs in two consecutive driving cycles

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to EN(H4DOTC)-49, OPERATION, Clear Memory Mode.> and INSPECTION MODE <Ref. to EN(H4DOTC)-41, Inspection Mode.>.

- **WIRING DIAGRAM:**



	Step	Check	Yes	No
1	**CHECK SPEEDOMETER AND TACHOMETER OPERATION IN COMBINATION METER.** Does the speedometer and tachometer operate normally?	They operate normally.	Go to step **2.**	Repair or replace the combination meter. <Ref. to IDI-4, Combination Meter System.>
2	**CHECK INPUT SIGNAL FOR ECM.** 1)Turn ignition switch to ON. (engine OFF) 2)Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B135) No. 25 (+) — Chassis ground (−):*** Is the measured value less than the specified value?	0.12 V	Go to step **4.**	Go to step **3.**
3	**CHECK INPUT SIGNAL FOR ECM. (USING SUBARU SELECT MONITOR.)** Read the data of fuel level sensor signal using Subaru Select Monitor. NOTE: •Subaru Select Monitor For detailed operation procedures, refer to READ CURRENT DATA FOR ENGINE. <Ref. to EN(H4DOTC)-33, Subaru Select Monitor.> Does the voltage variance stay within the specified range while monitoring the Subaru Select Monitor and shaking the ECM harness and connector ?	0.12 V	Repair poor contact in ECM connector.	The MIL may light up, however, the circuit is returned to the normal status at the moment. A temporary poor contact of the connector may be the cause. NOTE: In this case, repair the following: • Poor contact in combination meter connector • Poor contact in ECM connector • Poor contact in coupling connector
4	**CHECK INPUT VOLTAGE OF ECM.** 1)Turn ignition switch to OFF. 2)Disconnect fuel tank cord connector (R57) and rear wiring harness connector (R15). 3)Turn ignition switch to ON. 4)Measure the voltage of harness between ECM connector and chassis ground. ***Connector & terminal*** ***(B135) No. 25 (+) — Chassis ground (−):*** Is the measured value more than the specified value?	0.12 V	Go to step **5.**	Go to step **6.**
5	**CHECK HARNESS BETWEEN ECM AND COMBINATION METER.** 1)Turn ignition switch to OFF. 2)Disconnect the connector from connector (i10), (i11) and ECM connector. 3)Measure the resistance between ECM and chassis ground. ***Connector & terminal*** ***(B135) No. 25 — Chassis ground:*** Is the measured value more than the specified value?	1 MΩ	Go to step **7.**	Repair short circuit to ground in harness between ECM and combination meter connector.

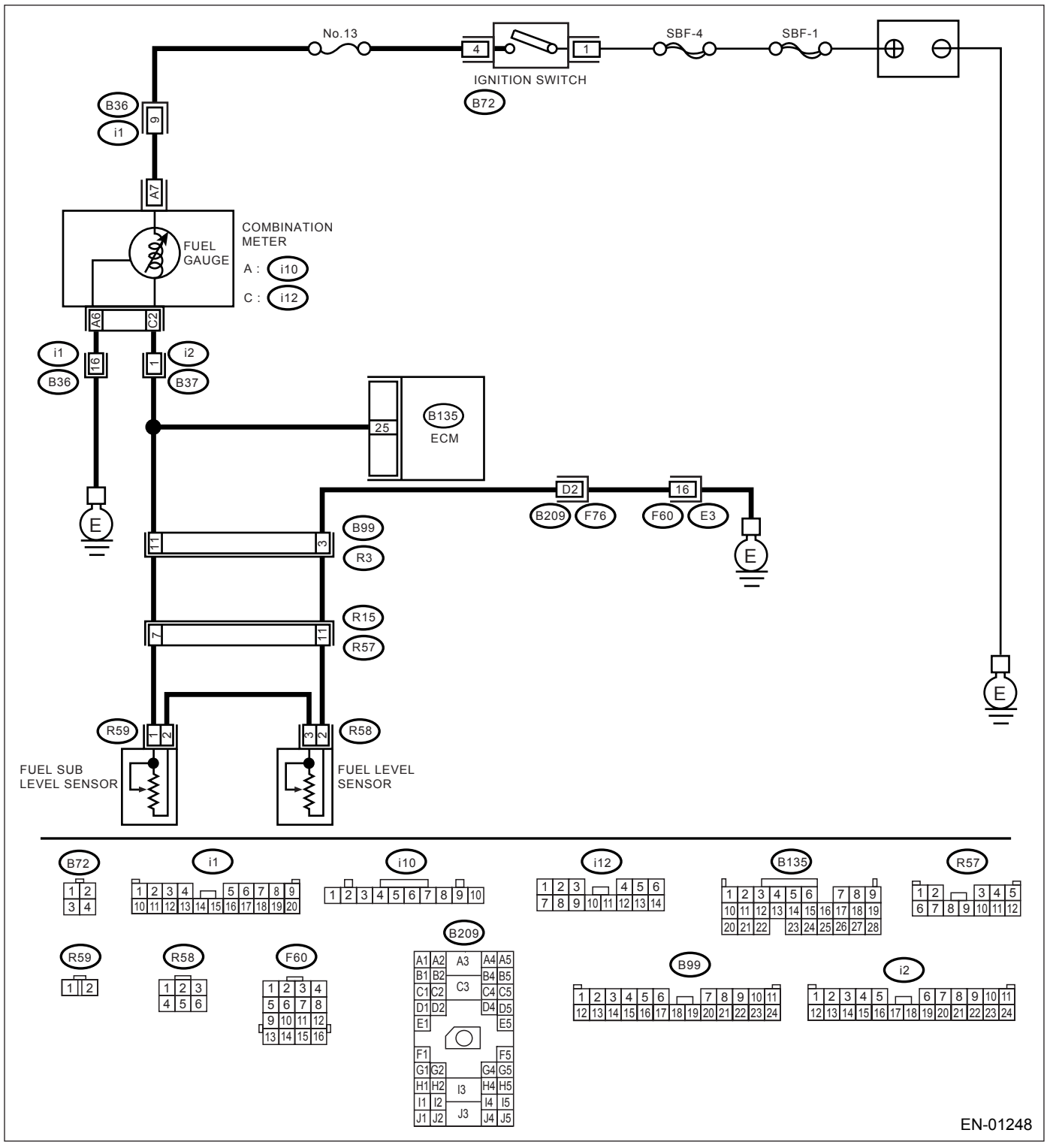
	Step	Check	Yes	No
6	**CHECK HARNESS BETWEEN ECM AND COMBINATION METER.** Measure the resistance between ECM and combination meter connector. ***Connector & terminal*** ***(B135) No. 25 — (i12) No. 2:*** Is the measured value less than the specified value?	10 Ω	Repair or replace the combination meter. <Ref. to IDI-4, Combination Meter System.>	Repair open circuit between ECM and combination meter connector. NOTE: In this case, repair the following: Poor contact in coupling connector
7	**CHECK FUEL TANK CORD.** 1)Turn ignition switch to OFF. 2)Disconnect the connector from fuel sub level sensor. 3)Measure the resistance between fuel sub level sensor and chassis ground. ***Connector & terminal*** ***(R59) No. 1 — Chassis ground:*** Is the measured value more than the specified value?	1 MΩ	Go to step **8.**	Repair short circuit to ground in fuel tank cord.
8	**CHECK FUEL TANK CORD.** 1)Disconnect the connector from fuel pump assembly. 2)Measure the resistance between fuel pump assembly and chassis ground. ***Connector & terminal*** ***(R59) No. 2 — Chassis ground:*** Is the measured value more than the specified value?	1 MΩ	Go to step **9.**	Repair short circuit to ground in fuel tank cord.
9	**CHECK FUEL LEVEL SENSOR.** 1)Remove the fuel pump assembly. <Ref. to FU(H4DOTC)-63, Fuel Pump.> 2)Measure the resistance between fuel level sensor and terminals with its float set to the full position. ***Terminal*** ***No. 2 — No. 3:*** Is the measured value within the specified range?	0.5 — 2.5 Ω	Go to step **10.**	Replace the fuel level sensor.
10	**CHECK FUEL SUB LEVEL SENSOR.** 1)Remove the fuel sub level sensor. <Ref. to FU(H4DOTC)-66, Fuel Sub Level Sensor.> 2)Measure the resistance between fuel sub level sensor and terminals with its float set to the full position. ***Terminal*** ***No. 1 — No. 2:*** Is the measured value within the specified range?	0.5 — 2.5 Ω	Repair poor contact in harness between ECM and combination meter connector.	Replace the fuel sub level sensor.

BI: DTC P0463 — FUEL LEVEL SENSOR CIRCUIT HIGH INPUT —

- **DTC DETECTING CONDITION:**
  - Fault occurs in two consecutive driving cycles

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to EN(H4DOTC)-49, OPERATION, Clear Memory Mode.> and INSPECTION MODE <Ref. to EN(H4DOTC)-41, Inspection Mode.>.

- **WIRING DIAGRAM:**



	Step	Check	Yes	No
1	**CHECK SPEEDOMETER AND TACHOMETER OPERATION IN COMBINATION METER.** Does the speedometer and tachometer operate normally?	They operate normally.	Go to step **2.**	Repair or replace the combination meter. <Ref. to IDI-4, Combination Meter System.>
2	**CHECK INPUT SIGNAL FOR ECM.** 1)Turn ignition switch to ON. (engine OFF) 2)Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B135) No. 25 (+) — Chassis ground (−):*** Is the measured value more than the specified value?	4.75 V	Go to step **3.**	The MIL may light up, however, the circuit is returned to the normal status at the moment. A temporary poor contact of the connector may be the cause. NOTE: In this case, repair the following: • Poor contact in fuel pump connector • Poor contact in coupling connector
3	**CHECK INPUT VOLTAGE OF ECM.** 1)Turn ignition switch to OFF. 2)Disconnect the combination meter connector (i11) and ECM connector. 3)Turn ignition switch to ON. 4)Measure the voltage of harness between ECM and chassis ground. ***Connector & terminal*** ***(B135) No. 25 (+) — Chassis ground (−):*** Is the measured value more than the specified value?	4.75 V	Go to step **4.**	Repair short circuit to battery between ECM and combination meter connector.
4	**CHECK HARNESS BETWEEN ECM AND FUEL TANK CORD.** 1)Turn ignition switch to OFF. 2)Disconnect fuel tank cord connector (R57) and rear wiring harness connector (R15). 3)Measure the resistance between ECM and fuel tank cord. ***Connector & terminal*** ***(B135) No. 25 — (R15) No. 7:*** Is the measured value less than the specified value?	5 Ω	Go to step **5.**	Repair open circuit between ECM and fuel tank cord.
5	**CHECK HARNESS BETWEEN FUEL TANK CORD AND CHASSIS GROUND.** Measure the resistance between fuel tank cord and chassis ground. ***Connector & terminal*** ***(R15) No. 11 — Chassis ground:*** Is the measured value less than the specified value?	5 Ω	Go to step **6.**	Repair open circuit between fuel tank cord and chassis ground. NOTE: In this case, repair the following: Poor contact in coupling connector

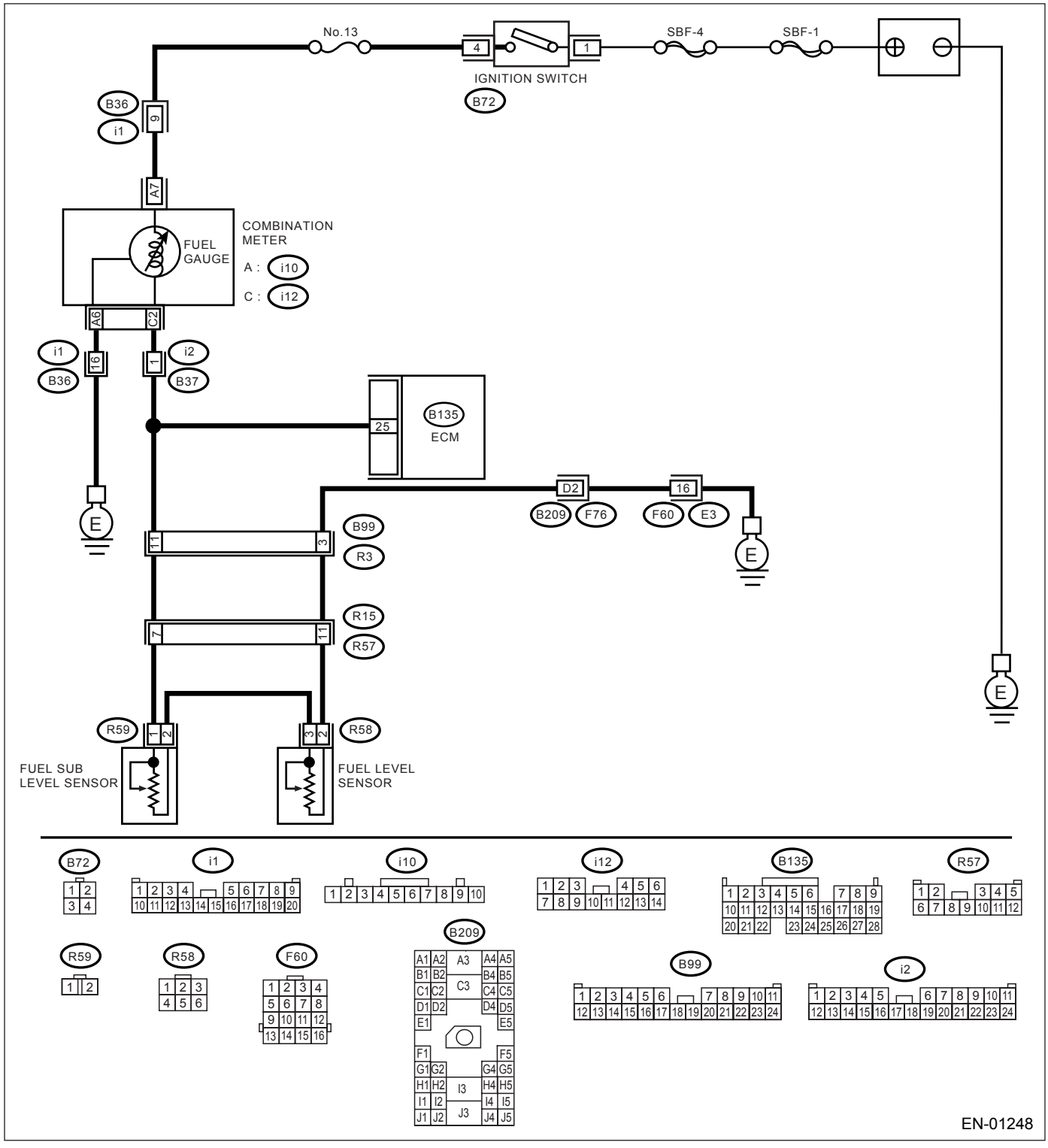
	Step	Check	Yes	No
6	**CHECK FUEL TANK CORD.** 1)Disconnect the connector from fuel level sensor. 2)Measure the resistance between fuel level sensor and coupling connector. ***Connector & terminal*** ***(R57) No. 11 — (R58) No. 2:*** Is the measured value less than the specified value?	10 Ω	Go to step **7.**	Repair open circuit between coupling connector and fuel level sensor.
7	**CHECK FUEL TANK CORD.** 1)Disconnect the connector from fuel sub level sensor. 2)Measure the resistance between fuel level sensor and fuel sub level sensor. ***Connector & terminal*** ***(R58) No. 3 — (R59) No. 2:*** Is the measured value less than the specified value?	10 Ω	Go to step **8.**	Repair open circuit between fuel level sensor and fuel sub level sensor.
8	**CHECK FUEL TANK CORD.** Measure the resistance between fuel sub level sensor and coupling connector. ***Connector & terminal*** ***(R57) No. 7 — (R59) No. 1:*** Is the measured value less than the specified value?	10 Ω	Go to step **9.**	Repair open circuit between coupling connector and fuel sub level sensor.
9	**CHECK FUEL LEVEL SENSOR.** 1)Remove the fuel pump assembly. <Ref. to FU(H4DOTC)-63, Fuel Pump.> 2)While moving the fuel level sensor float up and down, measure resistance between fuel level sensor terminals. ***Terminal*** ***No. 2 — No. 3:*** Is the measured value more than the specified value?	53 Ω	Replace the fuel level sensor. <Ref. to FU(H4DOTC)-65, Fuel Level Sensor.>	Go to step **10.**
10	**CHECK FUEL SUB LEVEL SENSOR.** 1)Remove the fuel sub level sensor. <Ref. to FU(H4DOTC)-66, Fuel Sub Level Sensor.> 2)While moving the fuel sub level sensor float up and down, measure resistance between fuel sub level sensor terminals. ***Terminal*** ***No. 1 — No. 2:*** Is the measured value more than the specified value?	45 Ω	Replace the fuel sub level sensor. <Ref. to FU(H4DOTC)-66, Fuel Sub Level Sensor.>	Replace the combination meter. <Ref. to IDI-12, Combination Meter Assembly.>

BJ:DTC P0464 — FUEL LEVEL SENSOR CIRCUIT INTERMITTENT —

- **DTC DETECTING CONDITION:**
  - Fault occurs in two consecutive driving cycles

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to EN(H4DOTC)-49, OPERATION, Clear Memory Mode.> and INSPECTION MODE <Ref. to EN(H4DOTC)-41, OPERATION, Inspection Mode.>.

- **WIRING DIAGRAM:**



	Step	Check	Yes	No
1	**CHECK FOR OTHER DTC ON DISPLAY.** Is any other DTC displayed?	Other DTC is displayed.	Inspect DTC P0462 or P0463 using “List of Diagnostic Trouble Code (DTC)”. <Ref. to EN(H4DOTC)-81, List of Diagnostic Trouble Codes (DTC).>	Go to step **2.**
2	**CHECK FUEL LEVEL SENSOR.** 1)Remove the fuel pump assembly. <Ref. to FU(H4DOTC)-63, Fuel Pump.> 2)While moving the fuel level sensor float up and down, make sure that the resistance between fuel level sensor terminals changes smoothly. ***Terminal*** ***No. 3 — No. 2:*** Does the resistance change smoothly?	Changes smoothly.	Go to step **3.**	Replace the fuel level sensor. <Ref. to FU(H4DOTC)-65, Fuel Level Sensor.>
3	**CHECK FUEL SUB LEVEL SENSOR.** 1)Remove the fuel sub level sensor. <Ref. to FU(H4DOTC)-65, Fuel Level Sensor.> 2)While moving the fuel sub level sensor float up and down, make sure that the resistance between fuel level sensor terminals changes smoothly. ***Terminal*** ***No. 1 — No. 2:*** Does the resistance change smoothly?	Changes smoothly.	Repair poor contact in ECM, combination meter and coupling connectors.	Replace the fuel sub level sensor. <Ref. to FU(H4DOTC)-65, Fuel Level Sensor.>

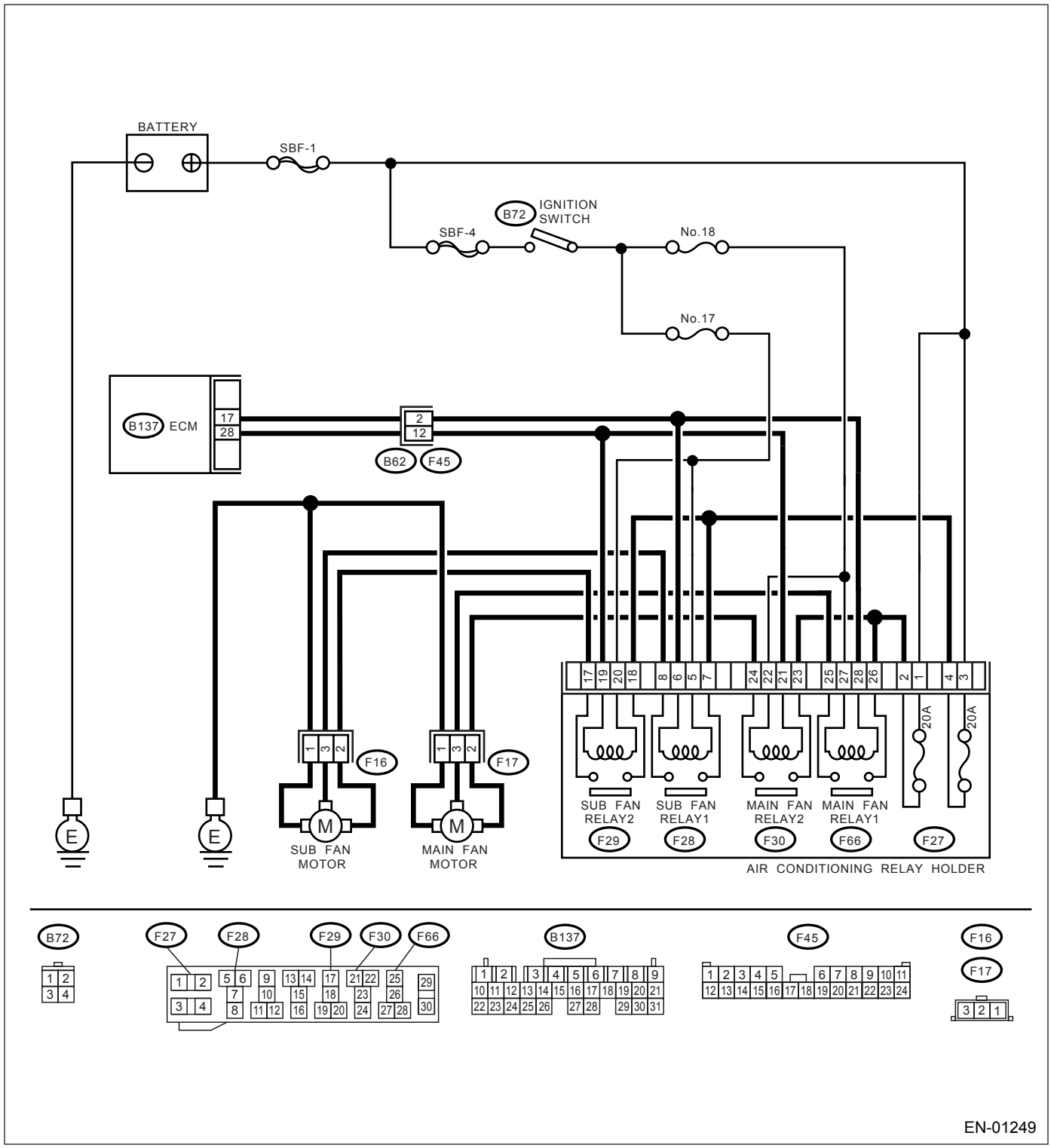
BK:DTC P0483 — COOLING FAN RATIONALITY CHECK —

- **DTC DETECTING CONDITION:**
  - Fault occurs in two consecutive driving cycles
- **TROUBLE SYMPTOM:**
  - Occurrence of noise
  - Overheating

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to EN(H4DOTC)-49, OPERATION, Clear Memory Mode.> and INSPECTION MODE <Ref. to EN(H4DOTC)-41, Inspection Mode.>.

NOTE:
If the vehicle is placed very close to a wall or another vehicle with the engine idling, the normal cooling function may be impeded causing the OBD system to interpret as a malfunction.

- **WIRING DIAGRAM:**



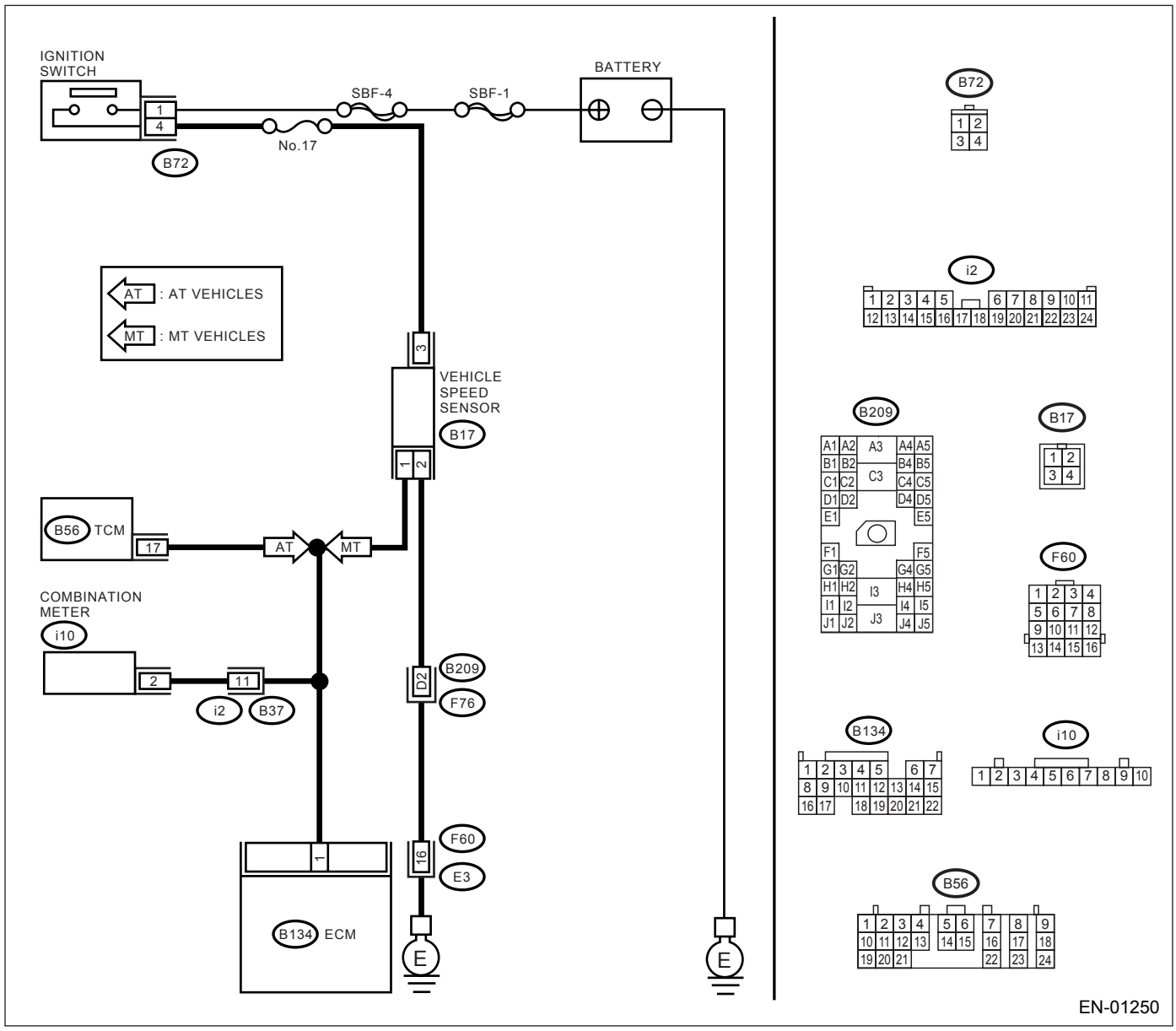
Step		Check	Yes	No
1	**CHECK FOR OTHER DIAGNOSTIC TROUBLE CODE (DTC) ON DISPLAY.** Is any other DTC displayed?	Other DTC is displayed.	Inspect the relevant DTC using the “List of Diagnostic Trouble Codes (DTC)”. <Ref. to EN(H4DOTC)-81, List of Diagnostic Trouble Codes (DTC).>	Inspect radiator fan, fan motor and thermostat, and replace the thermostat if stuck. <Ref. to CO(H4SO)-47, Radiator Main Fan and Fan Motor.> and <Ref. to CO(H4SO)-49, Radiator Sub Fan and Fan Motor.>

BL:DTC P0502 — VEHICLE SPEED SENSOR CIRCUIT LOW INPUT —

- **DTC DETECTING CONDITION:**
  - Immediately at fault recognition

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to EN(H4DOTC)-49, OPERATION, Clear Memory Mode.> and INSPECTION MODE <Ref. to EN(H4DOTC)-41, Inspection Mode.>.

- **WIRING DIAGRAM:**



Step		Check	Yes	No
1	**CHECK TRANSMISSION TYPE.** Is the transmission AT?	AT.	Go to step **2.**	Go to step **4.**

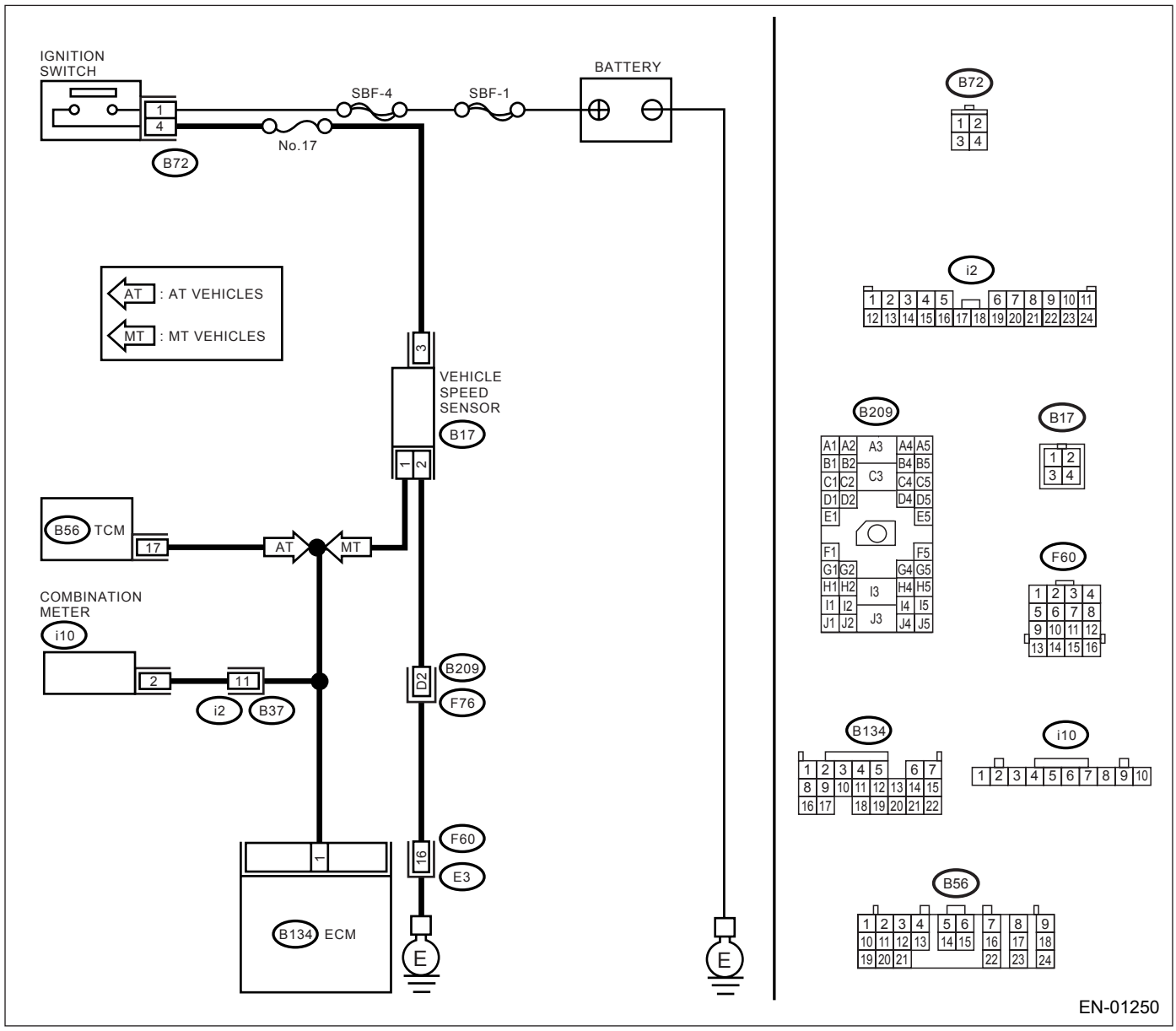
	Step	Check	Yes	No
2	**CHECK HARNESS BETWEEN ECM AND TCM CONNECTOR.** 1)Turn ignition switch to OFF. 2)Disconnect the connector from ECM and TCM. 3)Measure the resistance of harness between TCM connector and chassis ground. ***Connector & terminal*** ***(B56) No. 17 — Chassis ground:*** Is the measured value more than the specified value?	1 MΩ	Go to step **3.**	Repair short circuit to ground in harness between ECM and TCM connector.
3	**CHECK FOR POOR CONTACT.** Check for poor contact in TCM connector. Is there poor contact in TCM connector?	There is poor contact.	Repair poor contact in TCM connector.	Contact SOA (distributor) service.
4	**CHECK HARNESS BETWEEN VEHICLE SPEED SENSOR AND ECM CONNECTOR.** 1)Turn ignition switch to OFF. 2)Disconnect connectors from vehicle speed sensor and ECM. 3)Measure the resistance of harness between vehicle speed sensor connector and chassis ground. ***Connector & terminal*** ***(B17) No. 1 — Chassis ground:*** Is the measured value more than the specified value?	1 MΩ	Go to step **5.**	Repair short circuit to ground in harness between vehicle speed sensor and ECM connector.
5	**CHECK FOR POOR CONTACT.** Check for poor contact in vehicle speed sensor connector. Is there poor contact in vehicle speed sensor connector?	There is poor contact.	Repair poor contact in vehicle speed sensor connector.	Replace the vehicle speed sensor. <Ref. to MT-39, Vehicle Speed Sensor.>

BM:DTC P0503 — VEHICLE SPEED SENSOR INTERMITTENT/ERRATIC/HIGH —

- **DTC DETECTING CONDITION:**
  - Immediately at fault recognition

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to EN(H4DOTC)-49, OPERATION, Clear Memory Mode.> and INSPECTION MODE <Ref. to EN(H4DOTC)-41, Inspection Mode.>.

- **WIRING DIAGRAM:**



Step		Check	Yes	No
1	**CHECK TRANSMISSION TYPE.** Is the transmission AT?	AT.	Go to step **2.**	Go to step **3.**

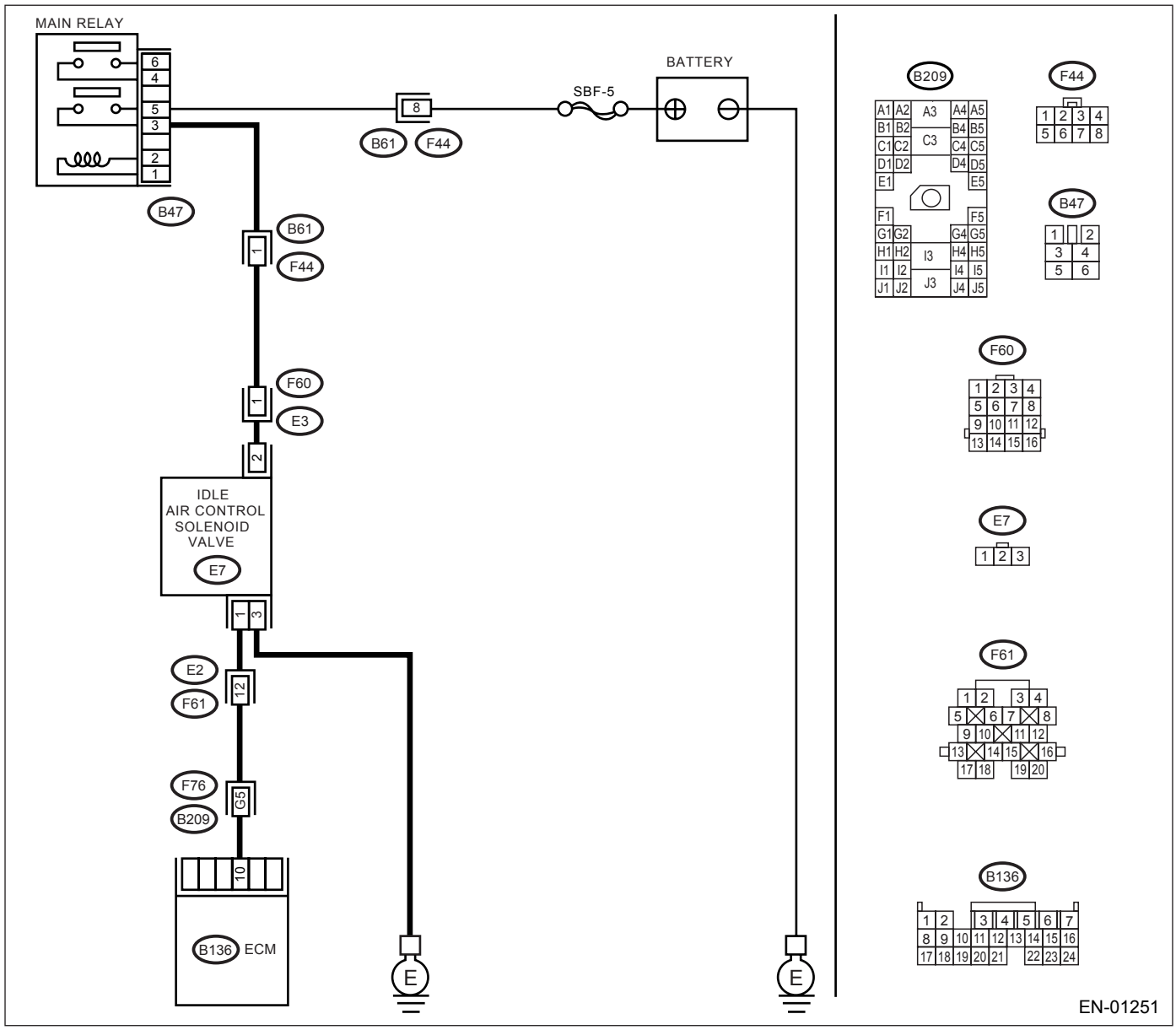
	Step	Check	Yes	No
2	**CHECK DTC P0720 ON DISPLAY.** Does the Subaru Select Monitor or OBD-II general scan tool indicate DTC P0720?	DTC P0720 is indicated.	Inspect the front vehicle speed sensor signal circuit. <Ref. to AT-61, DTC 33 FRONT VEHICLE SPEED SENSOR, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>	Go to step **3.**
3	**CHECK SPEEDOMETER OPERATION IN COMBINATION METER.** Does the speedometer operate normally?	Speedometer is normal.	Go to step **4.**	Check the speedometer. <Ref. to IDI-14, Speedometer.>
4	**CHECK HARNESS BETWEEN ECM AND COMBINATION METER CONNECTOR.** 1)Turn ignition switch to OFF. 2)Disconnect the connector from combination meter. 3)Measure the resistance between ECM and combination meter. ***Connector & terminal*** ***(B134) No. 1 — (i10) No. 2:*** Is the measured value less than the specified value?	10 Ω	Repair poor contact in ECM connector.	Repair harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between ECM and combination meter connector • Poor contact in ECM connector • Poor contact in combination meter connector • Poor contact in coupling connector

BN:DTC P0506 — IDLE CONTROL SYSTEM RPM LOWER THAN EXPECTED —

- **DTC DETECTING CONDITION:**
  - Fault occurs in two consecutive driving cycles
- **TROUBLE SYMPTOM:**
  - Engine is difficult to start.
  - Engine does not start.
  - Erroneous idling
  - Engine stalls

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to EN(H4DOTC)-49, OPERATION, Clear Memory Mode.> and INSPECTION MODE <Ref. to EN(H4DOTC)-41, Inspection Mode.>.

- **WIRING DIAGRAM:**



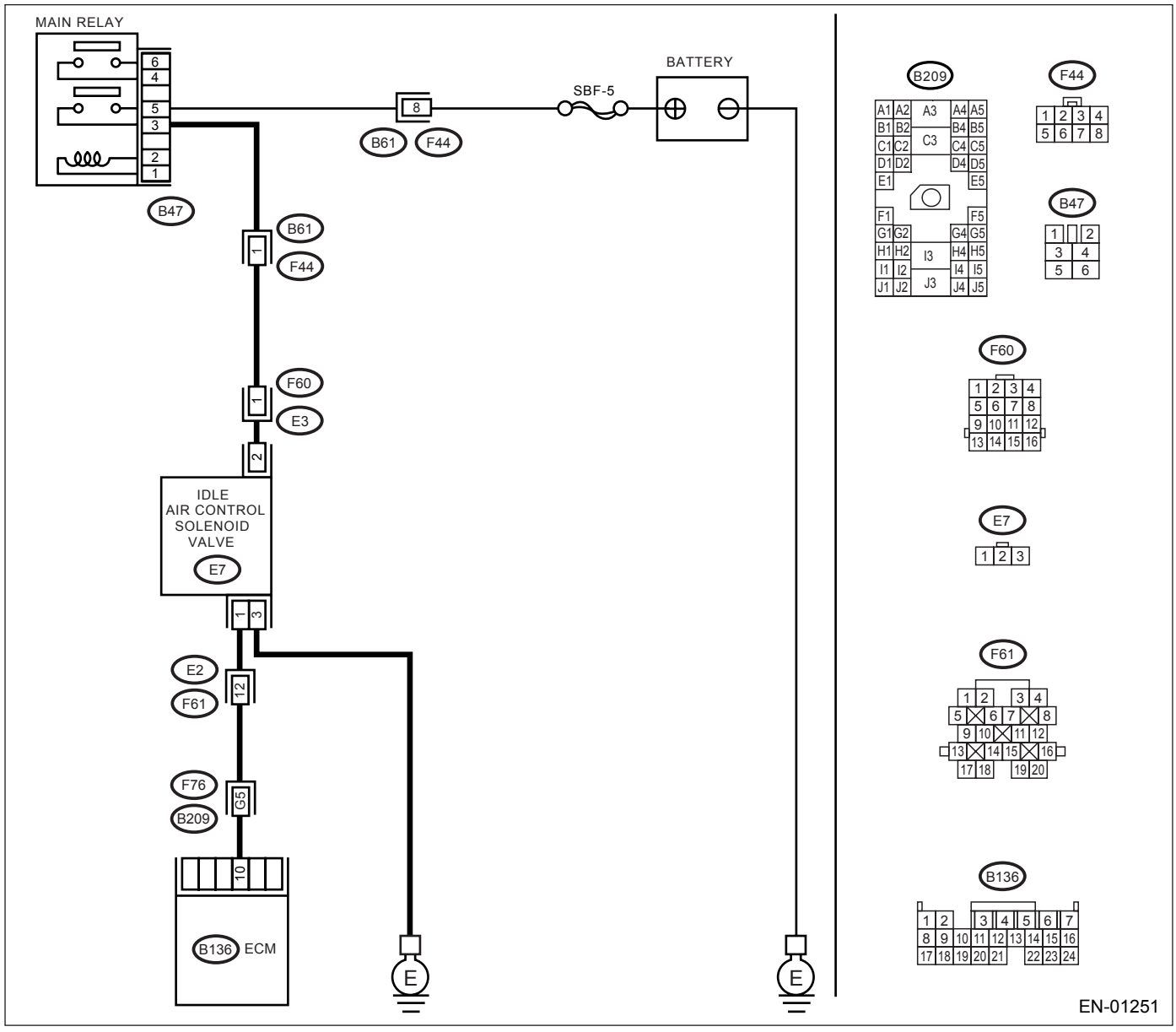
	Step	Check	Yes	No
1	**CHECK FOR OTHER DIAGNOSTIC TROUBLE CODE (DTC) ON DISPLAY.** Is any other DTC displayed?	Other DTC is displayed.	Inspect the relevant DTC using the "List of Diagnostic Trouble Codes (DTC)". <Ref. to EN(H4DOTC)-81, List of Diagnostic Trouble Codes (DTC).> NOTE: In this case, it is not necessary to inspect DTC P0506.	Go to step **2.**
2	**CHECK IDLE AIR CONTROL SOLENOID VALVE.** 1)Turn ignition switch to OFF. 2)Remove the idle air control solenoid valve from throttle body. <Ref. to FU(H4DOTC)-36, REMOVAL, Idle Air Control Solenoid Valve.> 3)Using an air gun, force air into the idle air control solenoid valve bypass air inlet. Confirm that forced air escapes from both the main air passage and assist air passage. Does air flow out?	Air flows out.	Go to step **4.**	Replace the idle air control solenoid valve. <Ref. to FU(H4DOTC)-36, Idle Air Control Solenoid Valve.> After replacement, Go to step **3.**
3	**CHECK IDLE AIR CONTROL SOLENOID VALVE DUTY RATIO.** 1)Turn ignition switch to ON. 2)Start and warm-up the engine. 3)All accessory switches OFF. 4)Read the data of idle air control solenoid duty ratio using Subaru Select Monitor or OBD-II general scan tool. Is the measured value more than the specified value? NOTE: •Subaru Select Monitor For detailed operation procedures, refer to READ CURRENT DATA FOR ENGINE. <Ref. to EN(H4DOTC)-33, Subaru Select Monitor.> •OBD-II general scan tool For detailed operation procedures, refer to the OBD-II General Scan Tool Instruction Manual.	60 %	Go to step **4.**	END
4	**CHECK AIR BYPASS LINE.** 1)Turn ignition switch to OFF. 2)Remove the idle air control solenoid valve from throttle body. <Ref. to FU(H4DOTC)-36, REMOVAL, Idle Air Control Solenoid Valve.> 3)Remove throttle body — intake manifold. <Ref. to FU(H4DOTC)-14, REMOVAL, Throttle Body.> 4)Using an air gun, force air into the solenoid valve installation area and into the throttle valve. Confirm that forced air escapes from both of these parts. Does air flow out?	Air flows out.	Replace the idle air control solenoid valve. <Ref. to FU(H4DOTC)-36, Idle Air Control Solenoid Valve.>	Replace the throttle body. <Ref. to FU(H4DOTC)-14, Throttle Body.>

BO:DTC P0507 — IDLE CONTROL SYSTEM RPM HIGHER THAN EXPECTED —

- **DTC DETECTING CONDITION:**
  - Fault occurs in two consecutive driving cycles
- **TROUBLE SYMPTOM:**
  - Engine keeps running at higher revolution than specified idling revolution.

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to EN(H4DOTC)-49, OPERATION, Clear Memory Mode.> and INSPECTION MODE <Ref. to EN(H4DOTC)-41, Inspection Mode.>.

- **WIRING DIAGRAM:**



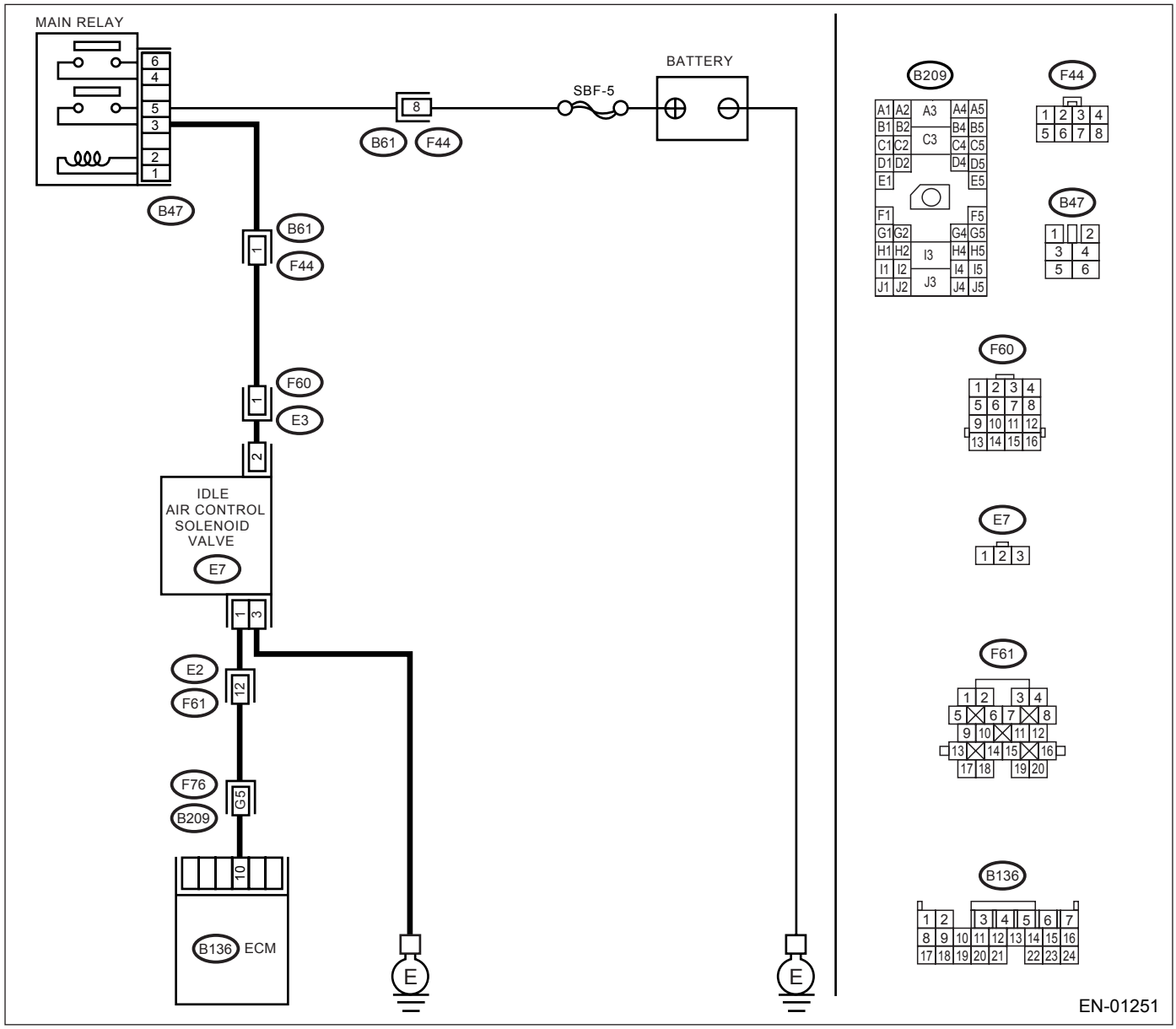
	Step	Check	Yes	No
1	**CHECK FOR OTHER DIAGNOSTIC TROUBLE CODE (DTC) ON DISPLAY.** Is any other DTC displayed?	Other DTC is displayed.	Inspect the relevant DTC using the “List of Diagnostic Trouble Codes (DTC)”. <Ref. to EN(H4DOTC)-81, List of Diagnostic Trouble Codes (DTC).> NOTE: In this case, it is not necessary to inspect DTC P0507.	Go to step **2.**
2	**CHECK THROTTLE CABLE.** Is there a play for adjustment at the throttle cable?	There is play.	Go to step **3.**	Adjust throttle cable. <Ref. to SP(H4SO)-6, INSTALLATION, Accelerator Control Cable.>
3	**CHECK AIR INTAKE SYSTEM.** 1)Turn ignition switch to ON. 2)Start and idle the engine. 3)Check the following items. •Loose installation of intake manifold, idle air control solenoid valve and throttle body •Cracks of intake manifold gasket, idle air control solenoid valve gasket and throttle body gasket •Disconnections of vacuum hoses Is there a fault in air intake system?	There is a fault.	Repair air suction and leaks.	Replace the idle air control solenoid valve. <Ref. to FU(H4DOTC)-36, Idle Air Control Solenoid Valve.>

BP:DTC P0508 — IDLE CONTROL SYSTEM CIRCUIT LOW —

- **DTC DETECTING CONDITION:**
  - Immediately at fault recognition
- **TROUBLE SYMPTOM:**
  - Erroneous idling
  - Engine stalls
  - Engine breathing

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to EN(H4DOTC)-49, OPERATION, Clear Memory Mode.> and INSPECTION MODE <Ref. to EN(H4DOTC)-41, Inspection Mode.>.

- **WIRING DIAGRAM:**



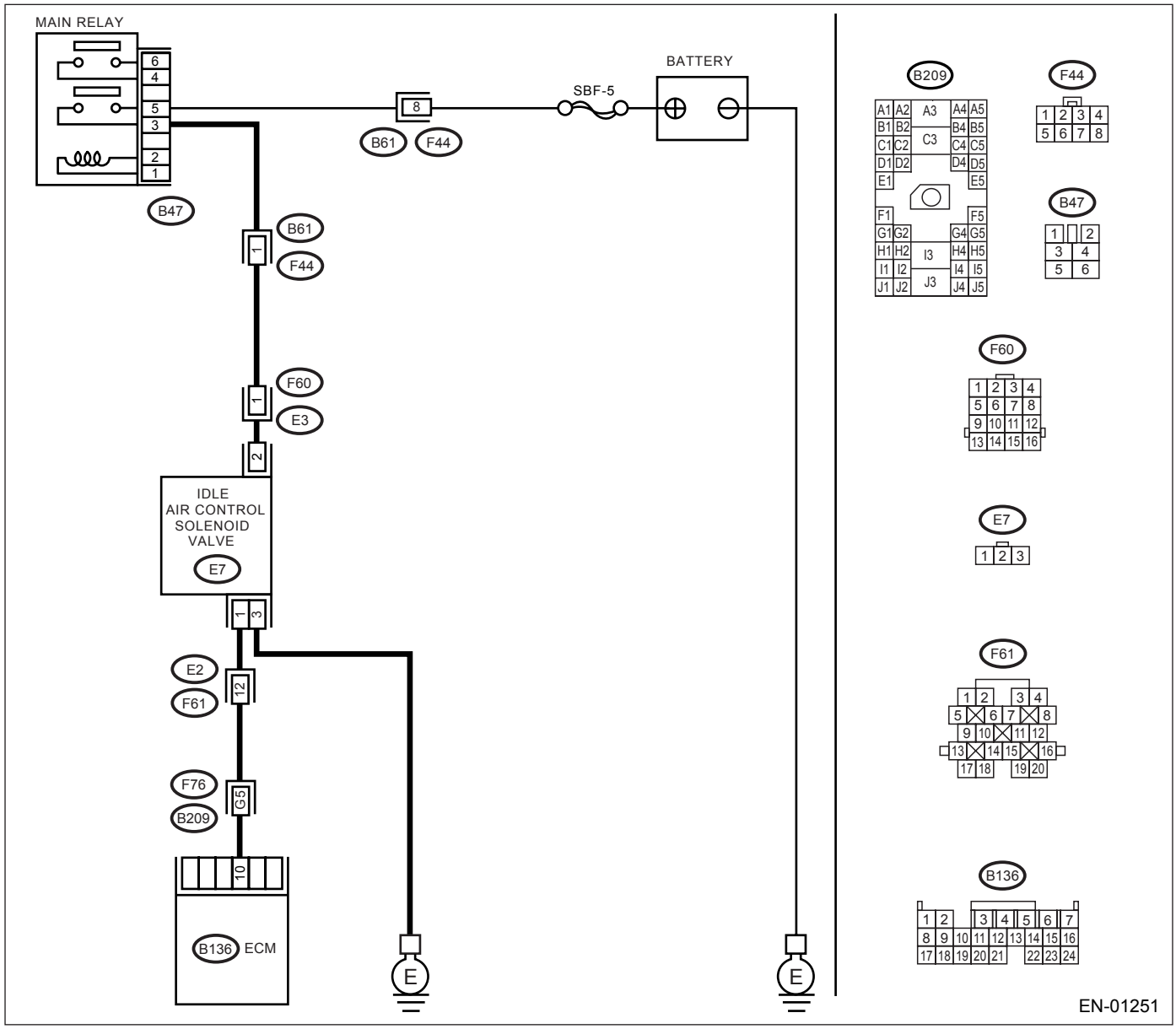
	Step	Check	Yes	No
1	**CHECK OUTPUT SIGNAL FROM ECM.** 1)Turn ignition switch to ON. 2)Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B136) No. 10 (+) — Chassis ground (−):*** Is the measured value more than the specified value?	3 V	Repair poor contact in ECM connector.	Go to step **2.**
2	**CHECK POWER SUPPLY TO IDLE AIR CONTROL SOLENOID VALVE.** 1)Turn ignition switch to OFF. 2)Disconnect the connector from idle air control solenoid valve. 3)Turn ignition switch to ON. 4)Measure the voltage between idle air control solenoid valve and engine ground. ***Connector & terminal*** ***(E7) No. 2 (+) — Engine ground (−):*** Is the measured value more than the specified value?	10 V	Go to step **3.**	Repair harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between idle air control solenoid valve and main relay connector • Poor contact in coupling connector
3	**CHECK HARNESS BETWEEN ECM AND IDLE AIR CONTROL SOLENOID VALVE CONNECTOR.** 1)Turn ignition switch to OFF. 2)Disconnect the connector from ECM. 3)Measure the resistance of harness between ECM and idle air control solenoid valve connector. ***Connector & terminal*** ***(B136) No. 10 — (E7) No. 1:*** Is the measured value less than the specified value?	1 Ω	Go to step **4.**	Repair harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between ECM and idle air control solenoid valve connector • Poor contact in coupling connector
4	**CHECK HARNESS BETWEEN ECM AND IDLE AIR CONTROL SOLENOID VALVE CONNECTOR.** Measure the resistance of harness between ECM and chassis ground. ***Connector & terminal*** ***(B136) No. 10 — Chassis ground:*** Is the measured value less than the specified value?	10 Ω	Repair short circuit to ground in harness between ECM and idle air control solenoid valve connector.	Go to step **5.**
5	**CHECK GROUND CIRCUIT OF IDLE AIR CONTROL SOLENOID VALVE.** Measure the resistance of harness between idle air control solenoid valve connector and engine ground. ***Connector & terminal*** ***(E7) No. 3 — Engine ground:*** Is the measured value less than the specified value?	5 Ω	Go to step **6.**	Repair open circuit in harness between idle air control solenoid valve connector and engine grounding cable.
6	**CHECK FOR POOR CONTACT.** Check for poor contact in ECM connector and idle air control solenoid valve connector. Is there poor contact in ECM connector or idle air control solenoid valve connector?	There is poor contact.	Is there poor contact in ECM connector or idle air control solenoid valve connector?	Replace the idle air control solenoid valve. <Ref. to FU(H4DOTC)-36, Idle Air Control Solenoid Valve.>

BQ:DTC P0509 — IDLE CONTROL SYSTEM CIRCUIT HIGH —

- **DTC DETECTING CONDITION:**
  - Immediately at fault recognition
- **TROUBLE SYMPTOM:**
  - Erroneous idling
  - Engine stalls
  - Engine breathing

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to EN(H4DOTC)-49, OPERATION, Clear Memory Mode.> and INSPECTION MODE <Ref. to EN(H4DOTC)-41, Inspection Mode.>.

- **WIRING DIAGRAM:**



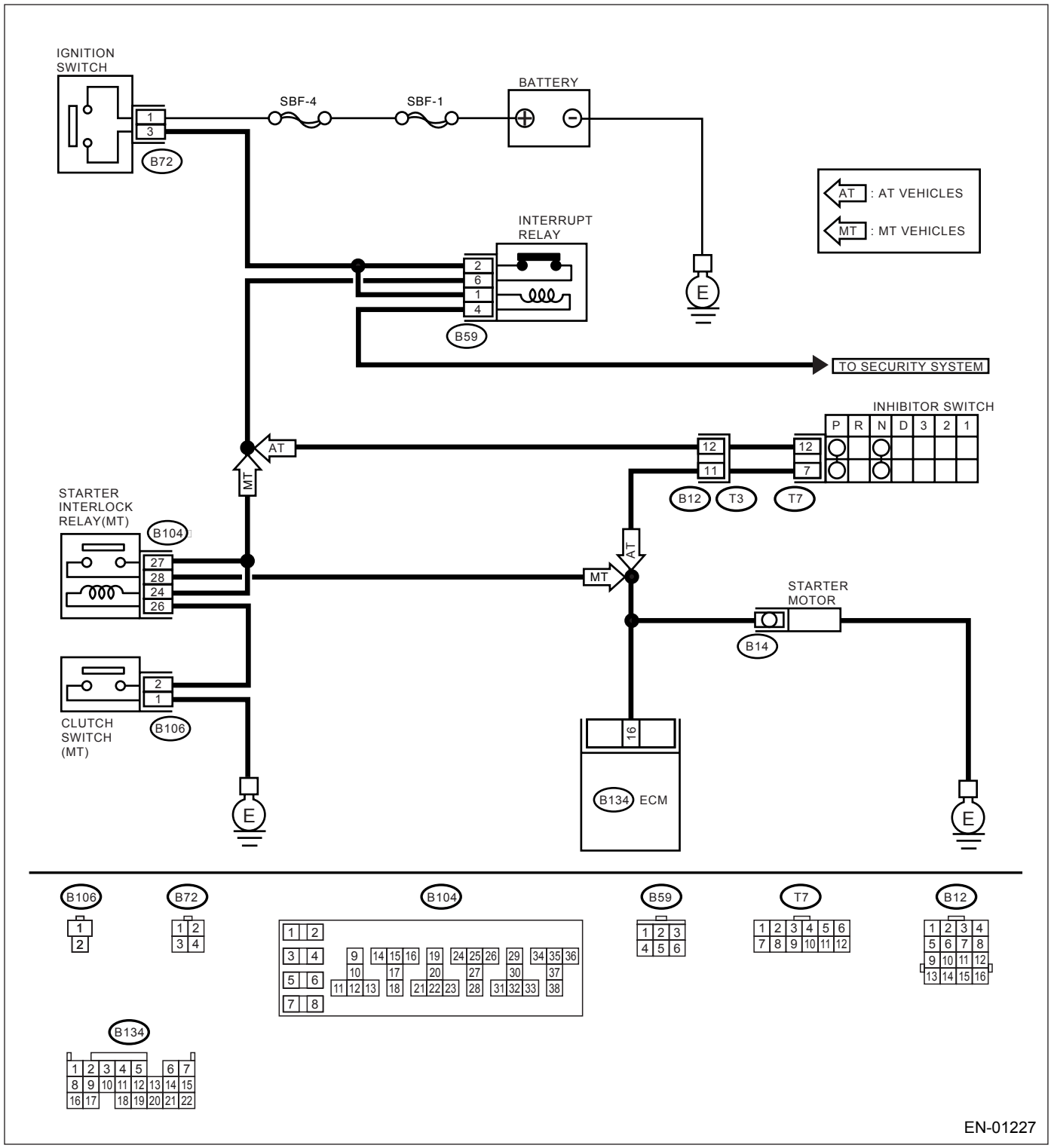
	Step	Check	Yes	No
1	**CHECK THROTTLE CABLE.** Is there a play for adjustment at the throttle cable?	There is play.	Go to step **2.**	Adjust throttle cable. <Ref. to SP(H4SO)-6, INSTALLATION, Accelerator Control Cable.>
2	**CHECK OUTPUT SIGNAL FROM ECM.** 1)Turn ignition switch to ON. 2)Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B136) No. 10 (+) — Chassis ground (−):*** Is the measured value more than the specified value?	10 V	Go to step **3.**	Go to step **4.**
3	**CHECK OUTPUT SIGNAL FROM ECM.** 1)Turn ignition switch to OFF. 2)Disconnect the connector from idle air control solenoid valve. 3)Turn ignition switch to ON. 4)Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B136) No. 10 (+) — Chassis ground (−):*** Is the measured value more than the specified value?	10 V	Repair short circuit to battery in harness between ECM and idle air control solenoid valve connector. After repair, replace the ECM. <Ref. to FU(H4DOTC)-50, Engine Control Module.>	Replace the idle air control solenoid valve and ECM. <Ref. to FU(H4DOTC)-36, Idle Air Control Solenoid Valve.> and <Ref. to FU(H4DOTC)-50, Engine Control Module.>
4	**CHECK OUTPUT SIGNAL FROM ECM.** Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B136) No. 10 (+) — Chassis ground (−):*** Does the voltage variance exceed the specified value while monitoring the voltmeter and shaking the ECM harness and connector ?	10 V	Repair short circuit to battery in harness between ECM and idle air control solenoid valve connector. After repair, replace the ECM. <Ref. to FU(H4DOTC)-50, Engine Control Module.>	Contact SOA (distributor) service. NOTE: Inspection by DTM is required, because probable cause is deterioration of multiple parts.

BR:DTC P0512 — STARTER SWITCH CIRCUIT HIGH INPUT —

- **DTC DETECTING CONDITION:**
  - Immediately at fault recognition
- **TROUBLE SYMPTOM:**
  - Failure of engine to start

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to EN(H4DOTC)-49, OPERATION, Clear Memory Mode.> and INSPECTION MODE <Ref. to EN(H4DOTC)-41, Inspection Mode.>.

- **WIRING DIAGRAM:**



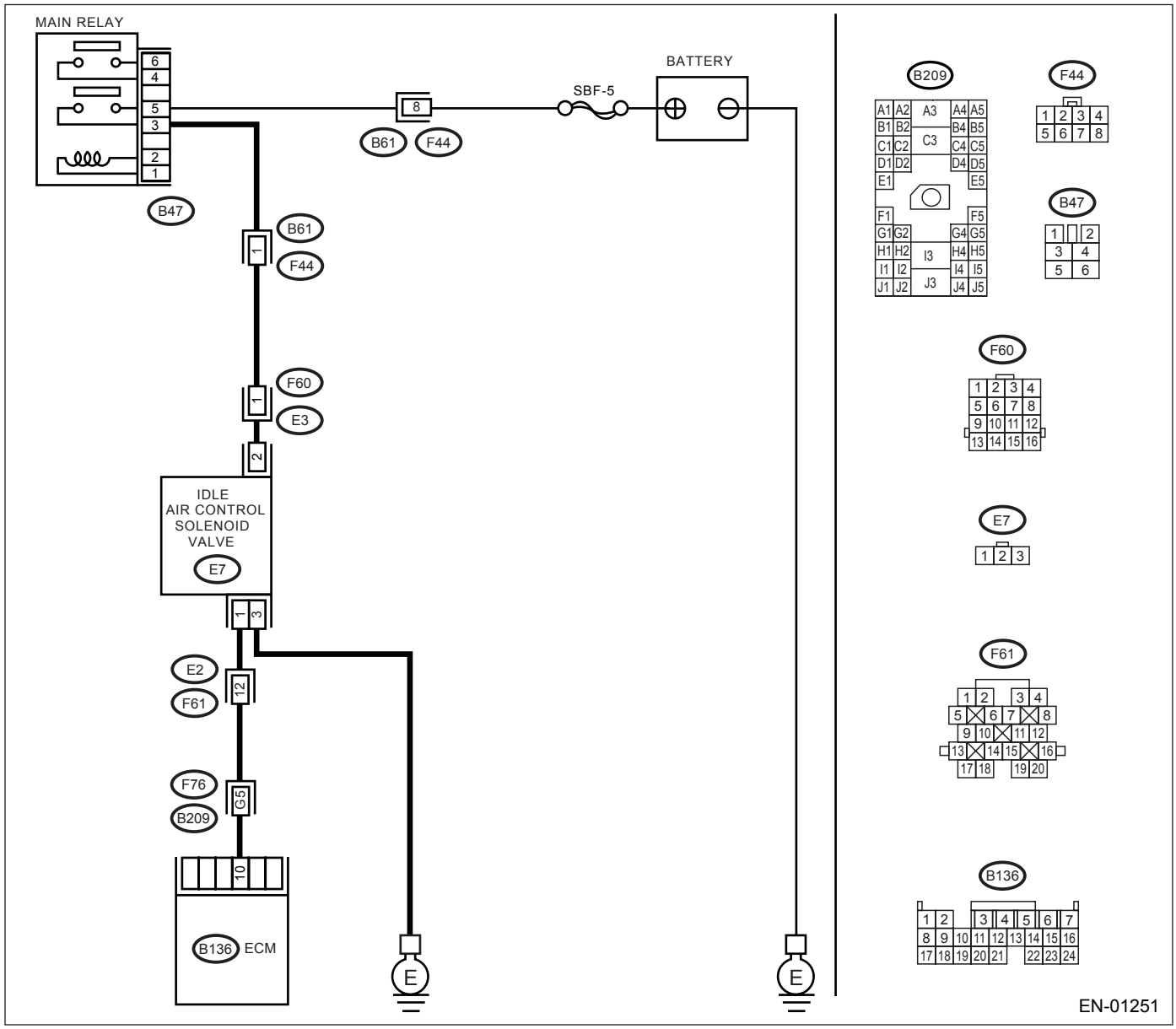
	Step	Check	Yes	No
1	**CHECK OPERATION OF STARTER MOTOR.** Does the starter motor operate when ignition switch is turned to ON?	Starter motor operates.	Repair short circuit to battery in starter motor circuit. After repair, replace the ECM. <Ref. to FU(H4DOTC)-50, Engine Control Module.>	Check starter motor circuit. <Ref. to EN(H4DOTC)-62, STARTER MOTOR CIRCUIT, Diagnostics for Engine Starting Failure.>

BS:DTC P0519 — IDLE CONTROL SYSTEM MALFUNCTION (FAIL-SAFE) —

- **DTC DETECTING CONDITION:**
  - Immediately at fault recognition
- **TROUBLE SYMPTOM:**
  - Engine keeps running at higher revolution than specified idling revolution.
  - Fuel supply is cut by the fail-safe function.

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to EN(H4DOTC)-49, OPERATION, Clear Memory Mode.> and INSPECTION MODE <Ref. to EN(H4DOTC)-41, Inspection Mode.>.

- **WIRING DIAGRAM:**



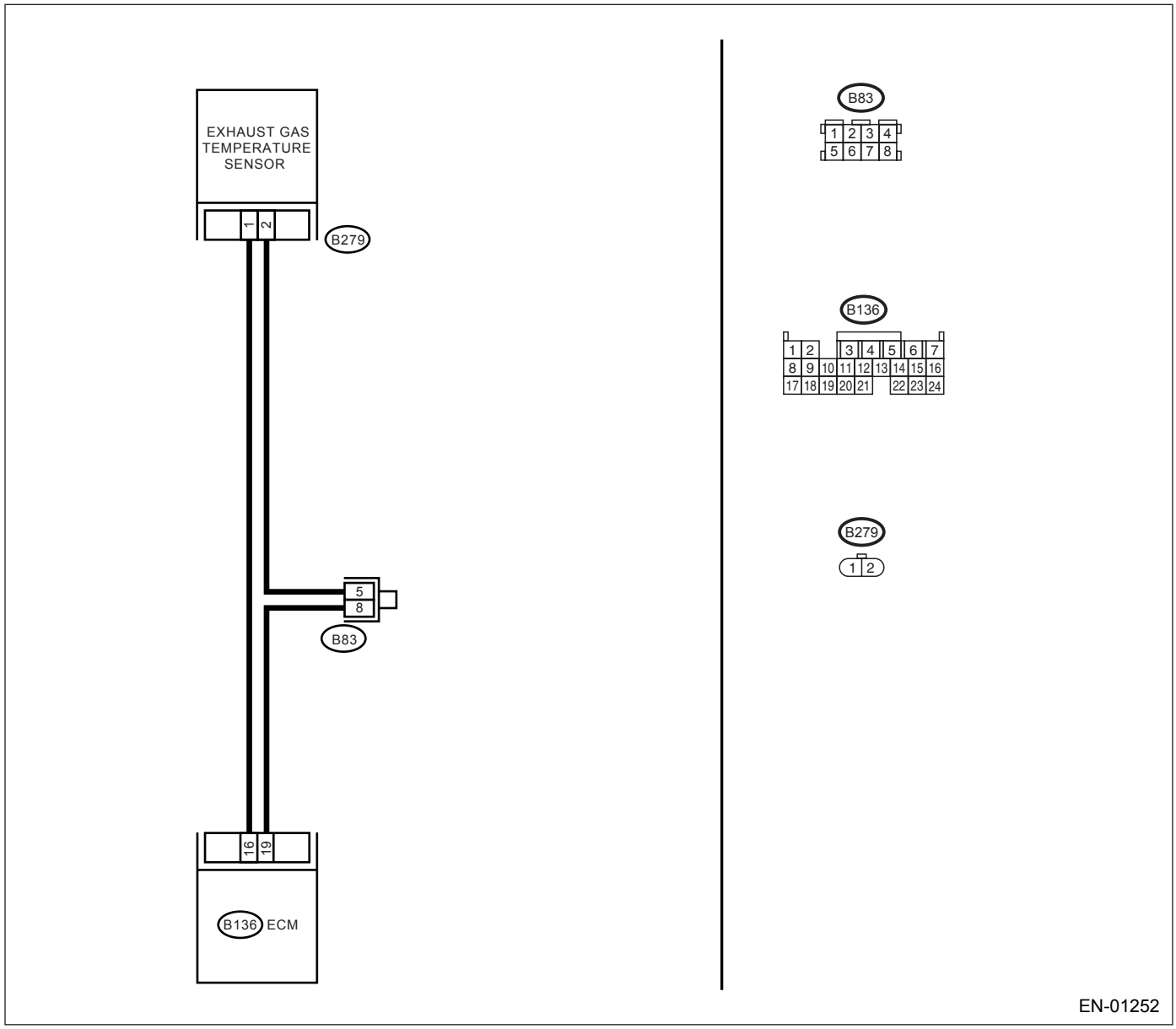
	Step	Check	Yes	No
1	**CHECK FOR OTHER DIAGNOSTIC TROUBLE CODE (DTC) ON DISPLAY.** Is any other DTC displayed?	Other DTC is displayed.	Inspect the relevant DTC using the "List of Diagnostic Trouble Codes (DTC)". <Ref. to EN(H4DOTC)-81, List of Diagnostic Trouble Codes (DTC).> NOTE: In this case, it is not necessary to inspect DTC P0519.	Go to step **2.**
2	**CHECK AIR INTAKE SYSTEM.** 1)Turn ignition switch to ON. 2)Start and idle the engine. 3)Check the following items. •Loose installation of intake manifold, idle air control solenoid valve and throttle body •Cracks of intake manifold gasket, idle air control solenoid valve gasket and throttle body gasket •Disconnections of vacuum hoses Is there a fault in air intake system?	There is a fault.	Repair air suction and leaks.	Go to step **3.**
3	**CHECK THROTTLE CABLE.** Is there a play for adjustment at the throttle cable?	There is play.	Go to step **4.**	Adjust throttle cable. <Ref. to SP(H4SO)-6, INSTALLATION, Accelerator Control Cable.>
4	**CHECK AIR BYPASS LINE.** 1)Turn ignition switch to OFF. 2)Remove the idle air control solenoid valve from throttle body. <Ref. to FU(H4DOTC)-36, Idle Air Control Solenoid Valve.> 3)Confirm that there are no foreign particles in the bypass air line. Is the bypass air line clogged by foreign particles?	Line is clogged.	Remove foreign particles from bypass air line.	Replace the idle air control solenoid valve. <Ref. to FU(H4DOTC)-36, Idle Air Control Solenoid Valve.>

BT:DTC P0545 — EXHAUST GAS TEMPERATURE SENSOR CIRCUIT LOW-BANK 1 —

- **DTC DETECTING CONDITION:**
  - Immediately at fault recognition
- **TROUBLE SYMPTOM:**
  - Hard to start
  - Erroneous idling
  - Poor driving performance

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to EN(H4DOTC)-49, OPERATION, Clear Memory Mode.> and INSPECTION MODE <Ref. to EN(H4DOTC)-41, Inspection Mode.>.

- **WIRING DIAGRAM:**



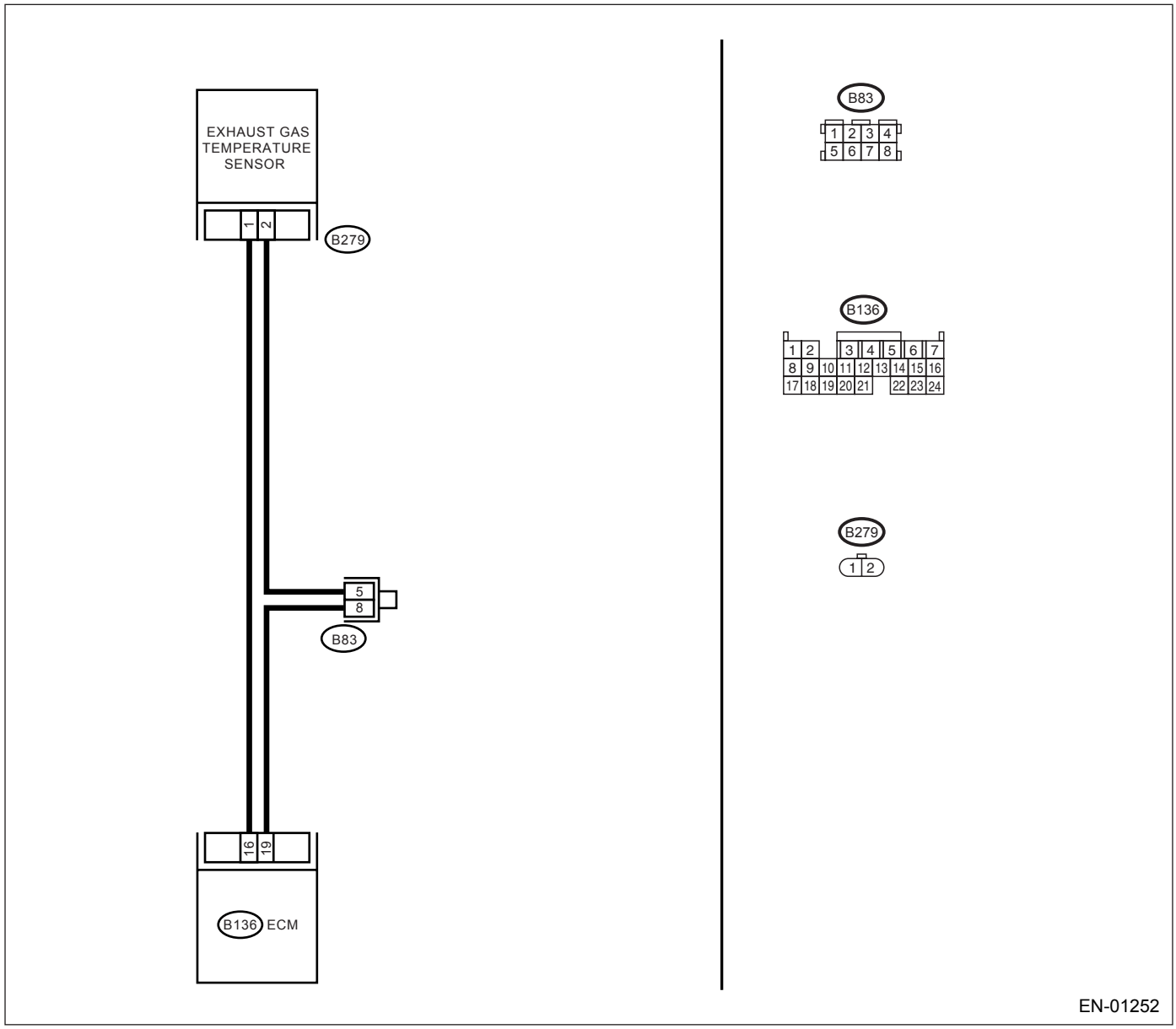
	Step	Check	Yes	No
1	**CHECK CURRENT DATA.** 1)Start the engine. 2)Read the data of exhaust gas temperature sensor signal using Subaru Select Monitor or OBD-II general scan tool. Is the measured value more than the specified value? NOTE: •Subaru Select Monitor For detailed operation procedures, refer to READ CURRENT DATA FOR ENGINE. <Ref. to EN(H4DOTC)-33, Subaru Select Monitor.> •OBD-II general scan tool For detailed operation procedures, refer to the OBD-II General Scan Tool Instruction Manual.	1200°C (2192°F)	Go to step **2.**	Repair poor contact. NOTE: In this case, repair the following: • Poor contact in exhaust gas temperature sensor • Poor contact in ECM • Poor contact in joint connector
2	**CHECK HARNESS BETWEEN EXHAUST GAS TEMPERATURE SENSOR AND ECM CONNECTOR.** 1)Turn ignition switch to OFF. 2)Disconnect the connector from exhaust gas temperature sensor. 3)Turn ignition switch to ON. 4)Read the data of exhaust gas temperature sensor signal using Subaru Select Monitor or OBD-II general scan tool. Is the measured value less than the specified value? NOTE: •Subaru Select Monitor For detailed operation procedures, refer to READ CURRENT DATA FOR ENGINE. <Ref. to EN(H4DOTC)-33, Subaru Select Monitor.> •OBD-II general scan tool For detailed operation procedures, refer to the OBD-II General Scan Tool Instruction Manual.	372°C (702°F)	Replace the exhaust gas temperature sensor. <Ref. to FU(H4DOTC)-49, Exhaust Temperature Sensor.>	Repair short circuit to ground in harness between exhaust gas temperature sensor and ECM connector.

BU:DTC P0546 — EXHAUST GAS TEMPERATURE SENSOR CIRCUIT HIGH-BANK 1 —

- **DTC DETECTING CONDITION:**
  - Immediately at fault recognition
- **TROUBLE SYMPTOM:**
  - Hard to start
  - Erroneous idling
  - Poor driving performance

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to EN(H4DOTC)-49, OPERATION, Clear Memory Mode.> and INSPECTION MODE <Ref. to EN(H4DOTC)-41, Inspection Mode.>.

- **WIRING DIAGRAM:**



	Step	Check	Yes	No
1	**CHECK CURRENT DATA.** 1)Start the engine. 2)Read the data of exhaust gas temperature sensor signal using Subaru Select Monitor or OBD-II general scan tool. Is the measured value less than the specified value? NOTE: •Subaru Select Monitor For detailed operation procedures, refer to READ CURRENT DATA FOR ENGINE. <Ref. to EN(H4DOTC)-33, Subaru Select Monitor.> •OBD-II general scan tool For detailed operation procedures, refer to the OBD-II General Scan Tool Instruction Manual.	372°C (702°F)	Go to step **2.**	Repair poor contact. NOTE: In this case, repair the following: • Poor contact in exhaust gas temperature sensor • Poor contact in ECM • Poor contact in joint connector
2	**CHECK HARNESS BETWEEN EXHAUST GAS TEMPERATURE SENSOR AND ECM CONNECTOR.** 1)Turn ignition switch to OFF. 2)Disconnect the connector from exhaust gas temperature sensor. 3)Measure the voltage between exhaust gas temperature sensor connector and engine ground. ***Connector & terminal*** ***(B279) No. 1 (+) — Engine ground (−):*** Is the measured value more than the specified value?	10 V	Repair short circuit to battery in harness between ECM and exhaust gas temperature sensor connector.	Go to step **3.**
3	**CHECK HARNESS BETWEEN EXHAUST GAS TEMPERATURE SENSOR AND ECM CONNECTOR.** 1)Turn ignition switch to ON. 2)Measure the voltage between exhaust gas temperature sensor connector and engine ground. ***Connector & terminal*** ***(B279) No. 1 (+) — Engine ground (−):*** Is the measured value more than the specified value?	10 V	Repair short circuit to battery in harness between ECM and exhaust gas temperature sensor connector.	Go to step **4.**
4	**CHECK HARNESS BETWEEN EXHAUST GAS TEMPERATURE SENSOR AND ECM CONNECTOR.** Measure the voltage between exhaust gas temperature sensor connector and engine ground. ***Connector & terminal*** ***(B279) No. 1 (+) — Engine ground (−):*** Is the measured value more than the specified value?	4 V	Go to step **5.**	Repair harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between ECM and exhaust gas temperature sensor connector • Poor contact in exhaust gas temperature sensor connector • Poor contact in ECM connector • Poor contact in joint connector

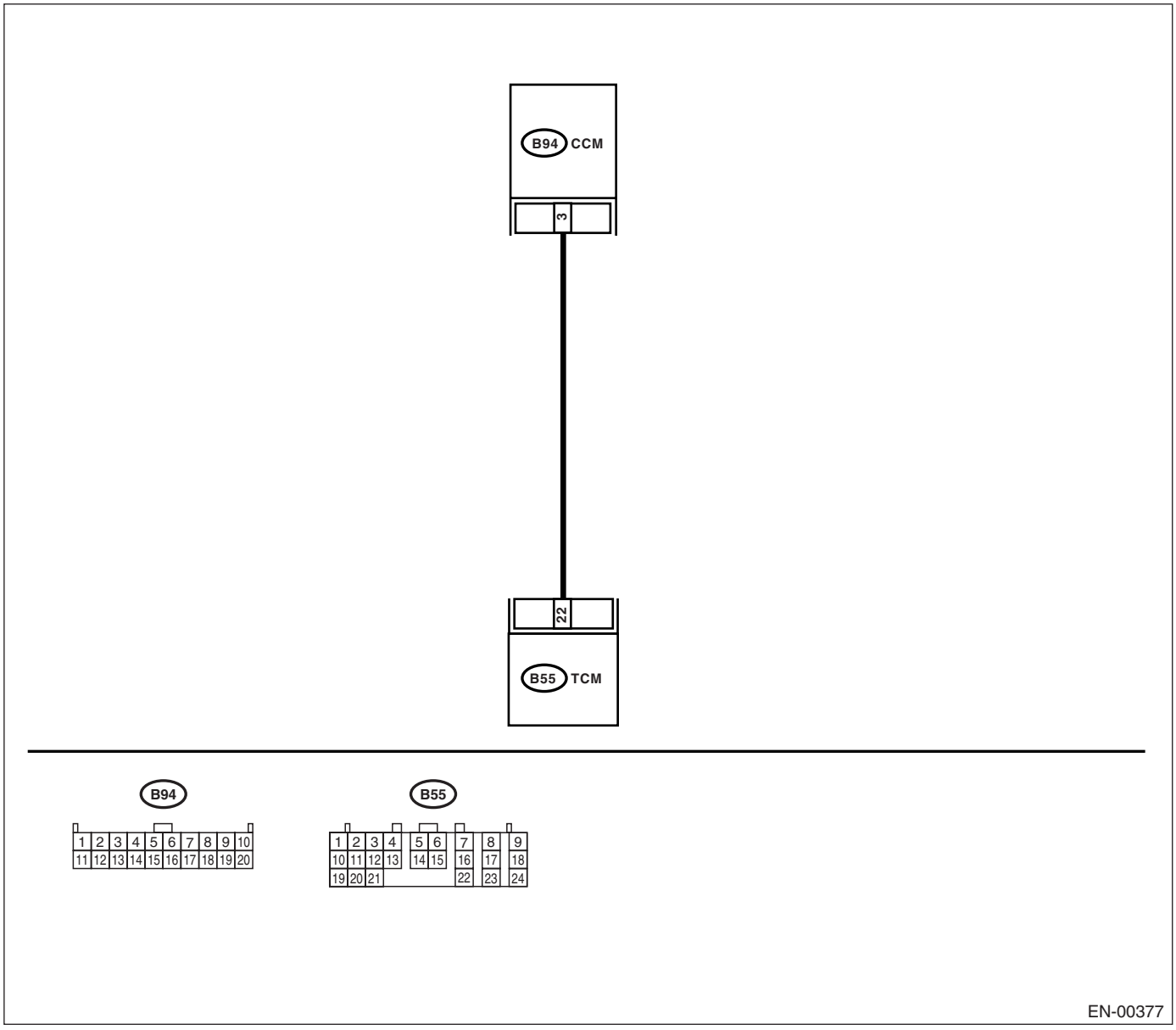
	Step	Check	Yes	No
5	**CHECK HARNESS BETWEEN EXHAUST GAS TEMPERATURE SENSOR AND ECM CONNECTOR.** 1)Turn ignition switch to OFF. 2)Measure the resistance of harness between exhaust gas temperature sensor connector and engine ground. ***Connector & terminal*** ***(B279) No. 2 — Engine ground:*** Is the measured value less than the specified value?	5 Ω	Replace the exhaust gas temperature sensor. <Ref. to FU(H4DOTC)-49, Exhaust Temperature Sensor.>	Repair harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between ECM and exhaust gas temperature sensor connector • Poor contact in exhaust gas temperature sensor connector • Poor contact in ECM connector • Poor contact in joint connector

BV:DTC P0565 — CRUISE CONTROL SET SIGNAL CIRCUIT MALFUNCTION FOR AT —

- **DTC DETECTING CONDITION:**
  - Fault occurs in two consecutive driving cycles

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to EN(H4DOTC)-49, OPERATION, Clear Memory Mode.> and INSPECTION MODE <Ref. to EN(H4DOTC)-41, Inspection Mode.>.

- **WIRING DIAGRAM:**



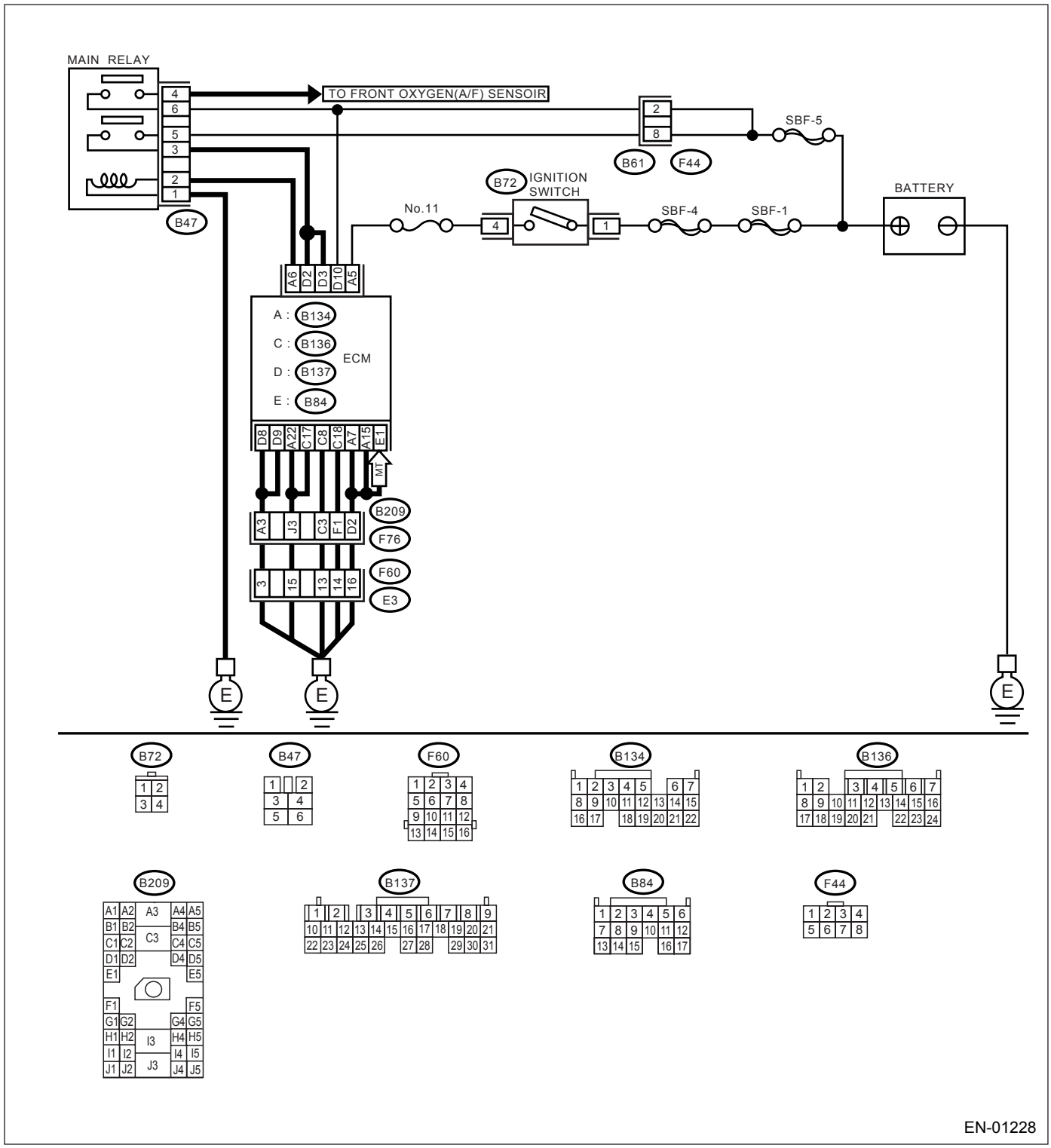
	Step	Check	Yes	No
1	**CHECK HARNESS BETWEEN TCM AND CCM CONNECTOR.** 1)Turn ignition switch to OFF. 2)Disconnect the connectors from TCM and CCM. 3)Measure the resistance of harness between TCM and CCM connector. ***Connector & terminal*** ***(B55) No. 22 — (B94) No. 3:*** Is the measured value less than the specified value?	1 Ω	Go to step **2.**	Repair open circuit in harness between TCM and CCM connector.
2	**CHECK HARNESS BETWEEN TCM AND CCM CONNECTOR.** Measure the resistance of harness between TCM and chassis ground. ***Connector & terminal*** ***(B55) No. 22 — Chassis ground:*** Is the measured value less than the specified value?	10 Ω	Repair short circuit in harness between TCM and CCM connector.	Go to step **3.**
3	**CHECK INPUT SIGNAL FOR TCM.** 1)Connect the connector to TCM and CCM. 2)Lift-up the vehicle or set the vehicle on free rollers. **CAUTION:** **On AWD models, raise all wheels off ground.** 3)Start the engine. 4)Turn the cruise control main switch to ON. 5)Move selector lever to D and slowly increase vehicle speed to 50 km/h (31 MPH). 6)Turn the cruise control command switch to ON. 7)Measure the voltage between TCM and chassis ground. ***Connector & terminal*** ***(B55) No. 22 (+) — Chassis ground (−):*** Is the measured value less than the specified value?	1 V	Go to step **4.**	Check cruise control command switch circuit. <Ref. to CC-7, INSPECTION, Cruise Control Command Switch.>
4	**CHECK FOR POOR CONTACT.** Check for poor contact in TCM connector. Is there poor contact in TCM connector?	There is poor contact.	Repair poor contact in TCM connector.	Replace the TCM. <Ref. to AT-71, Transmission Control Module (TCM).>

BW:DTC P0604 — INTERNAL CONTROL MODULE RANDOM ACCESS MEMORY (RAM) ERROR —

- **DTC DETECTING CONDITION:**
  - Immediately at fault recognition
- **TROUBLE SYMPTOM:**
  - Engine does not start.
  - Engine stalls

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to EN(H4DOTC)-49, OPERATION, Clear Memory Mode.> and INSPECTION MODE <Ref. to EN(H4DOTC)-41, Inspection Mode.>.

- **WIRING DIAGRAM:**



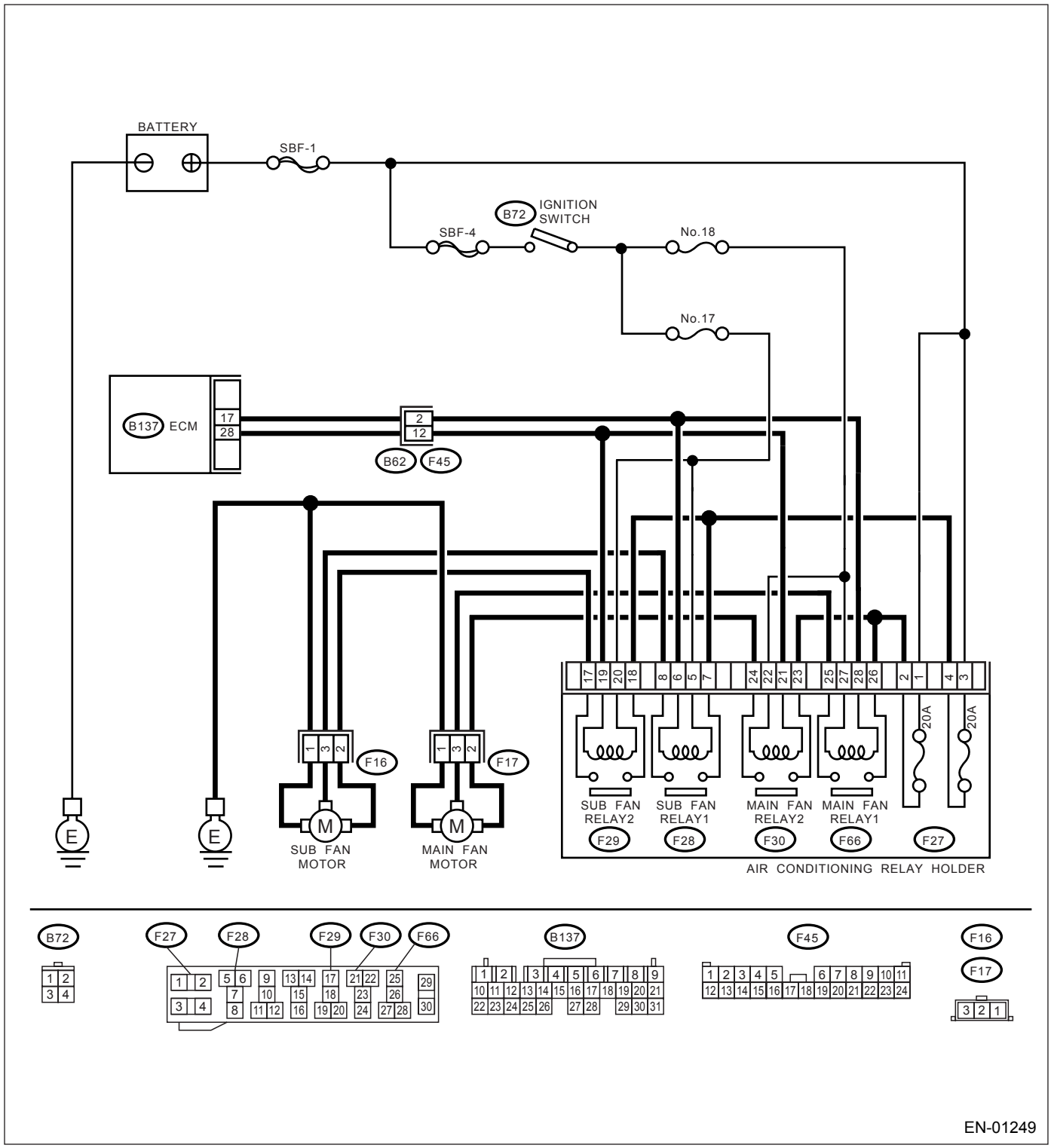
	Step	Check	Yes	No
1	**CHECK FOR OTHER DIAGNOSTIC TROUBLE CODE (DTC) ON DISPLAY.** Does the Subaru Select Monitor or OBD-II general scan tool indicate DTC P0604?	DTC P0604 is indicated.	Replace the ECM. <Ref. to FU(H4DOTC)-50, Engine Control Module.>	There was a temporary poor contact.

BX:DTC P0691 — COOLING FAN 1 CONTROL CIRCUIT LOW —

- **DTC DETECTING CONDITION:**
  - Fault occurs in two consecutive driving cycles
- **TROUBLE SYMPTOM:**
  - Radiator fan does not operate properly.
  - Overheating

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to EN(H4DOTC)-49, OPERATION, Clear Memory Mode.> and INSPECTION MODE <Ref. to EN(H4DOTC)-41, OPERATION, Inspection Mode.>.

- **WIRING DIAGRAM:**



	Step	Check	Yes	No
1	**CHECK OUTPUT SIGNAL FROM ECM.** 1)Turn ignition switch to OFF. 2)Connect the test mode connector. 3)Turn ignition switch to ON. 4)While operating the radiator fan relay, measure voltage between ECM terminal and ground. NOTE: Radiator fan relay operation can be executed using Subaru Select Monitor. For the procedure, refer to "Compulsory Valve Operation Check Mode". <Ref. to EN(H4DOTC)-33, Subaru Select Monitor.> ***Connector & terminal*** ***(B137) No. 17 (+) — Chassis ground (−):*** ***(B137) No. 28 (+) — Chassis ground (−):*** Does the measured value change within the specified range?	0 — 10 V	Repair poor contact in ECM connector.	Go to step **2.**
2	**CHECK FOR SHORT CIRCUIT TO GROUND IN RADIATOR FAN RELAY CONTROL CIRCUIT.** 1)Turn ignition switch to OFF. 2)Disconnect the connector from ECM. 3)Measure the resistance of harness between ECM connector and chassis ground. ***Connector & terminal*** ***(B137) No. 17 (+) — Chassis ground (−):*** ***(B137) No. 28 (+) — Chassis ground (−):*** Is the measured value less than the specified value?	10 Ω	Repair short circuit to ground in radiator fan relay control circuit.	Go to step **3.**
3	**CHECK POWER SUPPLY FOR RELAY.** 1)Remove main fan relay 1 and main fan relay 2 from A/C relay holder. 2)Turn ignition switch to ON. 3)Measure the voltage between fuse and relay box (F/B) connector and chassis ground. ***Connector & terminal*** ***(F66) No. 27 (+) — Chassis ground (−):*** ***(F30) No. 22 (+) — Chassis ground (−):*** Is the measured value more than the specified value?	10 V	Go to step **4.**	Repair open circuit in harness between ignition switch and fuse and relay box (F/B) connector.
4	**CHECK MAIN FAN RELAY.** 1)Turn ignition switch to OFF. 2)Measure the resistance between main fan relay terminals. ***Terminal*** ***No. 27 — No. 28: (Main fan relay 1)*** ***No. 22 — No. 21: (Main fan relay 2)*** Is the measured value within the specified range?	87 — 107 Ω	Go to step **5.**	Replace the main fan relay.

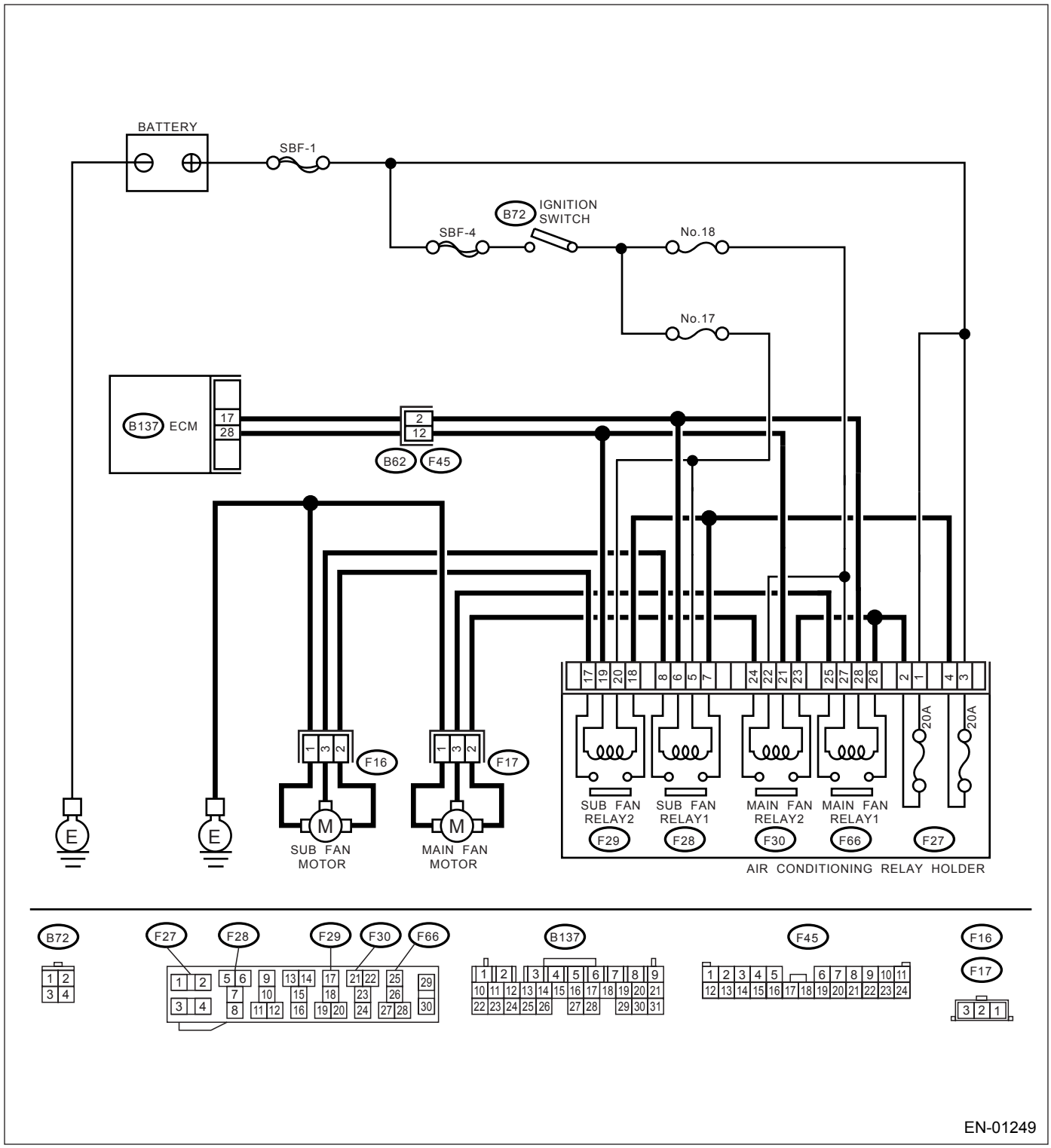
	Step	Check	Yes	No
5	**CHECK FOR OPEN CIRCUIT IN MAIN FAN RELAY CONTROL CIRCUIT.** Measure the resistance of harness between ECM and main fan relay connector. ***Connector & terminal*** ***(B137) No. 17 — (F66) No. 28:*** ***(B137) No. 28 — (F30) No. 21:*** Is the measured value less than the specified value?	1 Ω	Go to step **6.**	Repair harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between ECM and fan relay connector • Poor contact in coupling connector
6	**CHECK FOR POOR CONTACT.** Check for poor contact in ECM or fan relay connector. Is there poor contact in ECM or fan relay connector?	There is poor contact.	Repair poor contact in ECM or fan relay connector.	Contact SOA (distributor) service.

BY:DTC P0692 — COOLING FAN 1 CONTROL CIRCUIT HIGH —

- **DTC DETECTING CONDITION:**
  - Fault occurs in two consecutive driving cycles
- **TROUBLE SYMPTOM:**
  - Radiator fan does not operate properly.
  - Overheating

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to EN(H4DOTC)-49, OPERATION, Clear Memory Mode.> and INSPECTION MODE <Ref. to EN(H4DOTC)-41, Inspection Mode.>.

- **WIRING DIAGRAM:**



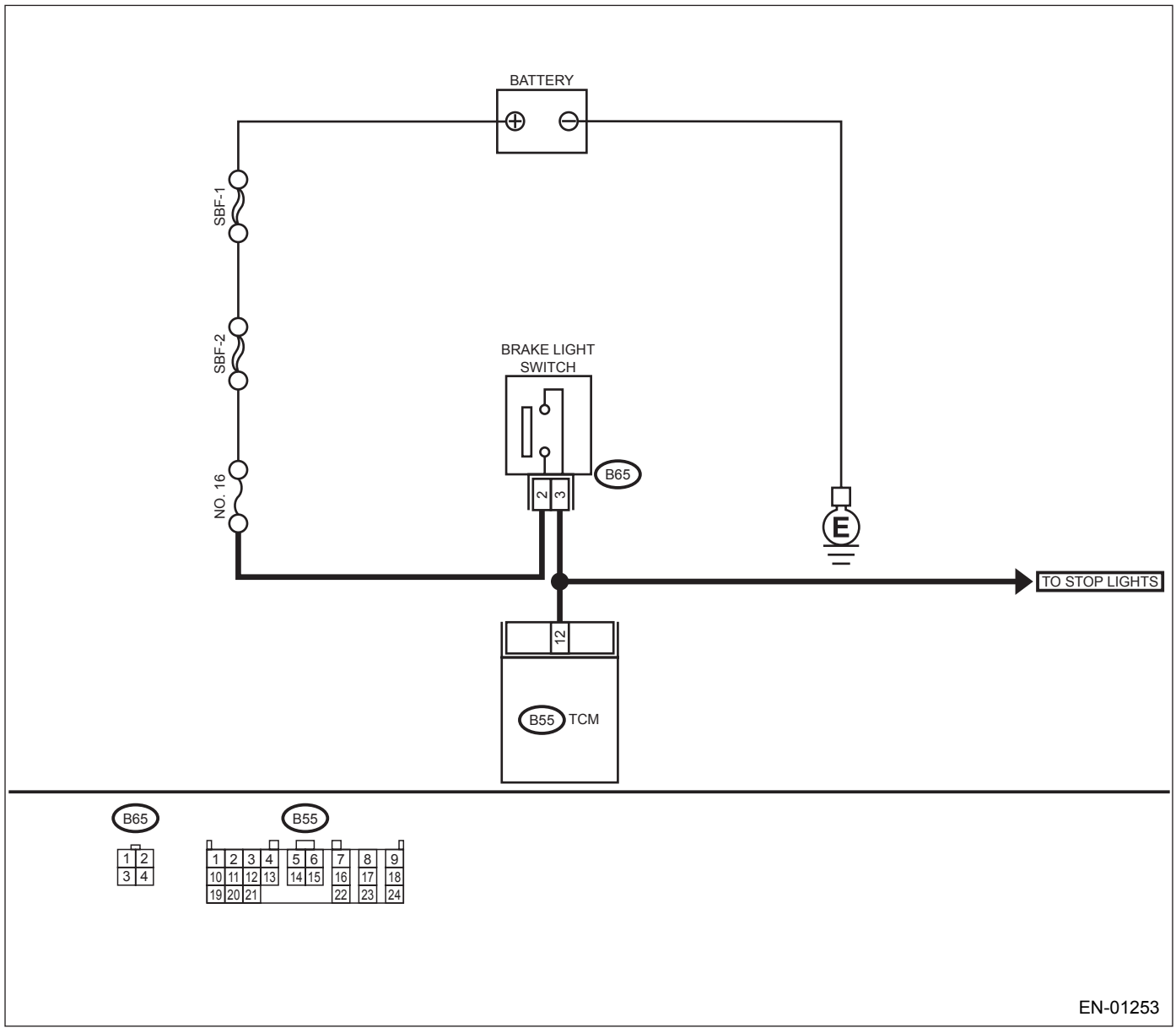
	Step	Check	Yes	No
1	**CHECK OUTPUT SIGNAL FROM ECM.** 1)Turn ignition switch to OFF. 2)Connect the test mode connector. 3)Turn ignition switch to ON. 4)While operating the radiator fan relay, measure voltage between ECM and chassis ground. NOTE: Radiator fan relay operation can be executed using Subaru Select Monitor. For the procedure, refer to "Compulsory Valve Operation Check Mode". <Ref. to EN(H4DOTC)-50, Compulsory Valve Operation Check Mode.> ***Connector & terminal*** ***(B137) No. 17 (+) — Chassis ground (−):*** ***(B137) No. 28 (+) — Chassis ground (−):*** Does the measured value change within the specified range?	0 — 10 V	The MIL may light up, however, the circuit is returned to the normal status at the moment. In this case, repair poor contact in ECM connector.	Go to step **2.**
2	**CHECK FOR SHORT CIRCUIT IN RADIATOR FAN RELAY CONTROL CIRCUIT.** 1)Turn ignition switch to OFF. 2)Remove fan relay 1, fan relay 2 and fan mode relay. 3)Disconnect the test mode connector. 4)Turn ignition switch to ON. 5)Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B137) No. 17 (+) — Chassis ground (−):*** ***(B137) No. 28 (+) — Chassis ground (−):*** Is the measured value more than the specified value?	10 V	Repair short circuit to battery in radiator fan relay control circuit. After repair, replace the ECM. <Ref. to FU(H4DOTC)-50, Engine Control Module.>	Go to step **3.**
3	**CHECK MAIN FAN RELAY.** 1)Turn ignition switch to OFF. 2)Remove the main fan relay. 3)Measure the resistance between main fan relay terminals. ***Terminal*** ***No. 25 — No. 26: (Main fan relay 1)*** ***No. 23 — No. 24: (Main fan relay 2)*** Is the measured value less than the specified value?	1 Ω	Replace fan relay and ECM. <Ref. to FU(H4DOTC)-50, Engine Control Module.>	Go to step **4.**
4	**CHECK SUB FAN RELAY.** 1)Remove the sub fan relay. 2)Measure the resistance between sub fan relay terminals. ***Terminal*** ***No. 7 — No. 8: (Sub fan relay 1)*** ***No. 17 — No. 18: (Sub fan relay 2)*** Is the measured value less than the specified value?	1 Ω	Replace fan relay and ECM. <Ref. to FU(H4DOTC)-50, Engine Control Module.>	Go to step **5.**
5	**CHECK FOR POOR CONTACT.** Check for poor contact in ECM connector.	Is there poor contact in ECM connector?	Repair poor contact in ECM connector.	Replace the ECM. <Ref. to FU(H4DOTC)-50, Engine Control Module.>

BZ:DTC P0703 — TORQUE CONVERTER/BRAKE SWITCH "B" CIRCUIT —

- **DTC DETECTING CONDITION:**
  - Fault occurs in two consecutive driving cycles

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to EN(H4DOTC)-49, OPERATION, Clear Memory Mode.> and INSPECTION MODE <Ref. to EN(H4DOTC)-41, Inspection Mode.>.

- **WIRING DIAGRAM:**



Step		Check	Yes	No
1	**CHECK OPERATION OF BRAKE LIGHT.** Does the brake light illuminate when depressing the brake pedal?	LED comes on.	Go to step **2.**	Repair or replace the brake light circuit.

	Step	Check	Yes	No
2	**CHECK HARNESS BETWEEN TCM AND BRAKE LIGHT SWITCH CONNECTOR.** 1)Disconnect the connectors from TCM and brake light switch. 2)Measure the resistance of harness between TCM and brake light switch connector. ***Connector & terminal*** ***(B55) No. 12 — (B65) No. 3:*** Is the measured value less than the specified value?	1 Ω	Go to step **3.**	Repair or replace the harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between TCM and brake light switch connector • Poor contact in TCM connector • Poor contact in brake light switch connector
3	**CHECK HARNESS BETWEEN TCM AND BRAKE LIGHT SWITCH CONNECTOR.** Measure the resistance of harness between TCM and chassis ground. ***Connector & terminal*** ***(B55) No. 12 — Chassis ground:*** Is the measured value more than the specified value?	1 MΩ	Go to step **4.**	Repair short circuit to ground in harness between TCM and brake light switch connector.
4	**CHECK INPUT SIGNAL FOR TCM.** 1)Connect the connectors to TCM and brake light switch. 2)Measure the voltage between TCM and chassis ground. ***Connector & terminal*** ***(B55) No. 12 (+) — Chassis ground (−):*** Is the measured value less than the specified value when the brake pedal is released?	1 V	Go to step **5.**	Adjust or replace the brake light switch. <Ref. to LI-7, STOP LIGHT SWITCH, INSPECTION, Stop Light System.>
5	**CHECK INPUT SIGNAL FOR TCM.** Measure the voltage between TCM and chassis ground. ***Connector & terminal*** ***(B55) No. 12 (+) — Chassis ground (−):*** Is the measured value more than the specified value when the brake pedal is depressed?	10 V	Go to step **6.**	Adjust or replace the brake light switch. <Ref. to LI-7, STOP LIGHT SWITCH, INSPECTION, Stop Light System.>
6	**CHECK FOR POOR CONTACT.** Check for poor contact in TCM connector. Is there poor contact in TCM connector?	There is poor contact.	Repair poor contact in TCM connector.	Replace the TCM. <Ref. to AT-71, Transmission Control Module (TCM).>

CA:DTC P0731 — GEAR 1 INCORRECT RATIO —

NOTE:
For the diagnostic procedure, refer to DTC P0734. <Ref. to EN(H4DOTC)-298, DTC P0734 — GEAR 4 INCORRECT RATIO —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

CB:DTC P0732 — GEAR 2 INCORRECT RATIO —

NOTE:
For the diagnostic procedure, refer to DTC P0734. <Ref. to EN(H4DOTC)-298, DTC P0734 — GEAR 4 INCORRECT RATIO —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

CC:DTC P0733 — GEAR 3 INCORRECT RATIO —

NOTE:
For the diagnostic procedure, refer to DTC P0734. <Ref. to EN(H4DOTC)-298, DTC P0734 — GEAR 4 INCORRECT RATIO —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

CD:DTC P0734 — GEAR 4 INCORRECT RATIO —

- **DTC DETECTING CONDITION:**
  - Fault occurs in two consecutive driving cycles
- **TROUBLE SYMPTOM:**
  - Shift point too high or too low; engine brake not effected in “3” range; excessive shift shock; excessive “tight corner braking”

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to EN(H4DOTC)-49, OPERATION, Clear Memory Mode.> and INSPECTION MODE <Ref. to EN(H4DOTC)-41, Inspection Mode.>.

- **WIRING DIAGRAM:**

	Step	Check	Yes	No
1	**CHECK FOR OTHER DIAGNOSTIC TROUBLE CODE (DTC) ON DISPLAY.** Is any other DTC displayed?	Other DTC is displayed.	Inspect the relevant DTC using the “List of Diagnostic Trouble Codes (DTC)”. <Ref. to EN(H4DOTC)-81, List of Diagnostic Trouble Codes (DTC).>	Go to step **2.**
2	**CHECK THROTTLE POSITION SENSOR CIRCUIT.** Check throttle position sensor circuit. <Ref. to AT-54, DTC 31 THROTTLE POSITION SENSOR, Diagnostic Procedure with Diagnostic Trouble Code (DTC).> Is there any trouble in throttle position sensor circuit?	There is a fault.	Repair or replace the throttle position sensor circuit.	Go to step **3.**
3	**CHECK FRONT VEHICLE SPEED SENSOR.** Inspect the front vehicle speed sensor circuit. <Ref. to AT-61, DTC 33 FRONT VEHICLE SPEED SENSOR, Diagnostic Procedure with Diagnostic Trouble Code (DTC).> Is there any trouble in front vehicle speed sensor circuit?	There is a fault.	Repair or replace the front vehicle speed sensor circuit.	Go to step **4.**
4	**CHECK TORQUE CONVERTER TURBINE SPEED SENSOR CIRCUIT.** Check torque converter turbine speed sensor circuit. <Ref. to AT-66, DTC 36 TORQUE CONVERTER TURBINE SPEED SENSOR, Diagnostic Procedure with Diagnostic Trouble Code (DTC).> Is there any trouble in torque converter turbine speed sensor circuit?	There is a fault.	Repair or replace the torque converter turbine speed sensor circuit.	Go to step **5.**
5	**CHECK FOR POOR CONTACT.** Check for poor contact in TCM connector. Is there poor contact in TCM connector?	There is poor contact.	Repair poor contact in TCM connector.	Go to step **6.**
6	**CHECK FOR MECHANICAL TROUBLE.** Check for mechanical trouble in automatic transmission. Is there any mechanical trouble in automatic transmission?	There is mechanical trouble.	Repair or replace the automatic transmission. <Ref. to AT-32, INSPECTION, Road Test.>	Replace the TCM. <Ref. to AT-71, Transmission Control Module (TCM).>

CE:DTC P0741 — TORQUE CONVERTER CLUTCH CIRCUIT PERFORMANCE OR STUCK OFF —

- **DTC DETECTING CONDITION:**
  - Fault occurs in two consecutive driving cycles
- **TROUBLE SYMPTOM:**
  - No lockup (after engine warm-up)
  - No shift or excessive tight corner “braking”

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to EN(H4DOTC)-49, OPERATION, Clear Memory Mode.> and INSPECTION MODE <Ref. to EN(H4DOTC)-41, Inspection Mode.>.

	Step	Check	Yes	No
1	**CHECK FOR OTHER DIAGNOSTIC TROUBLE CODE (DTC) ON DISPLAY.** Is any other DTC displayed?	Other DTC is displayed.	Inspect the relevant DTC using the “List of Diagnostic Trouble Codes (DTC)”. <Ref. to EN(H4DOTC)-81, List of Diagnostic Trouble Codes (DTC).>	Go to step **2.**
2	**CHECK LOCKUP DUTY SOLENOID CIRCUIT.** Check lockup duty solenoid circuit. <Ref. to AT-104, DTC 77 LOCK-UP DUTY SOLENOID, Diagnostic Procedure with Diagnostic Trouble Code (DTC).> Is there any trouble in lockup duty solenoid circuit?	There is a fault.	Repair or replace the lockup duty solenoid circuit.	Go to step **3.**
3	**CHECK THROTTLE POSITION SENSOR CIRCUIT.** Check throttle position sensor circuit. <Ref. to AT-54, DTC 31 THROTTLE POSITION SENSOR, Diagnostic Procedure with Diagnostic Trouble Code (DTC).> Is there any trouble in throttle position sensor circuit?	There is a fault.	Repair or replace the throttle position sensor circuit.	Go to step **4.**
4	**CHECK TORQUE CONVERTER TURBINE SPEED SENSOR CIRCUIT.** Check torque converter turbine speed sensor circuit. <Ref. to AT-66, DTC 36 TORQUE CONVERTER TURBINE SPEED SENSOR, Diagnostic Procedure with Diagnostic Trouble Code (DTC).> Is there any trouble in torque converter turbine speed sensor circuit?	There is a fault.	Repair or replace the torque converter turbine speed sensor circuit.	Go to step **5.**
5	**CHECK ENGINE SPEED INPUT CIRCUIT.** Check engine speed input circuit. <Ref. to AT-44, DTC 11 ENGINE SPEED SIGNAL, Diagnostic Procedure with Diagnostic Trouble Code (DTC).> Is there any trouble in engine speed input circuit?	There is a fault.	Repair or replace the engine speed input circuit.	Go to step **6.**

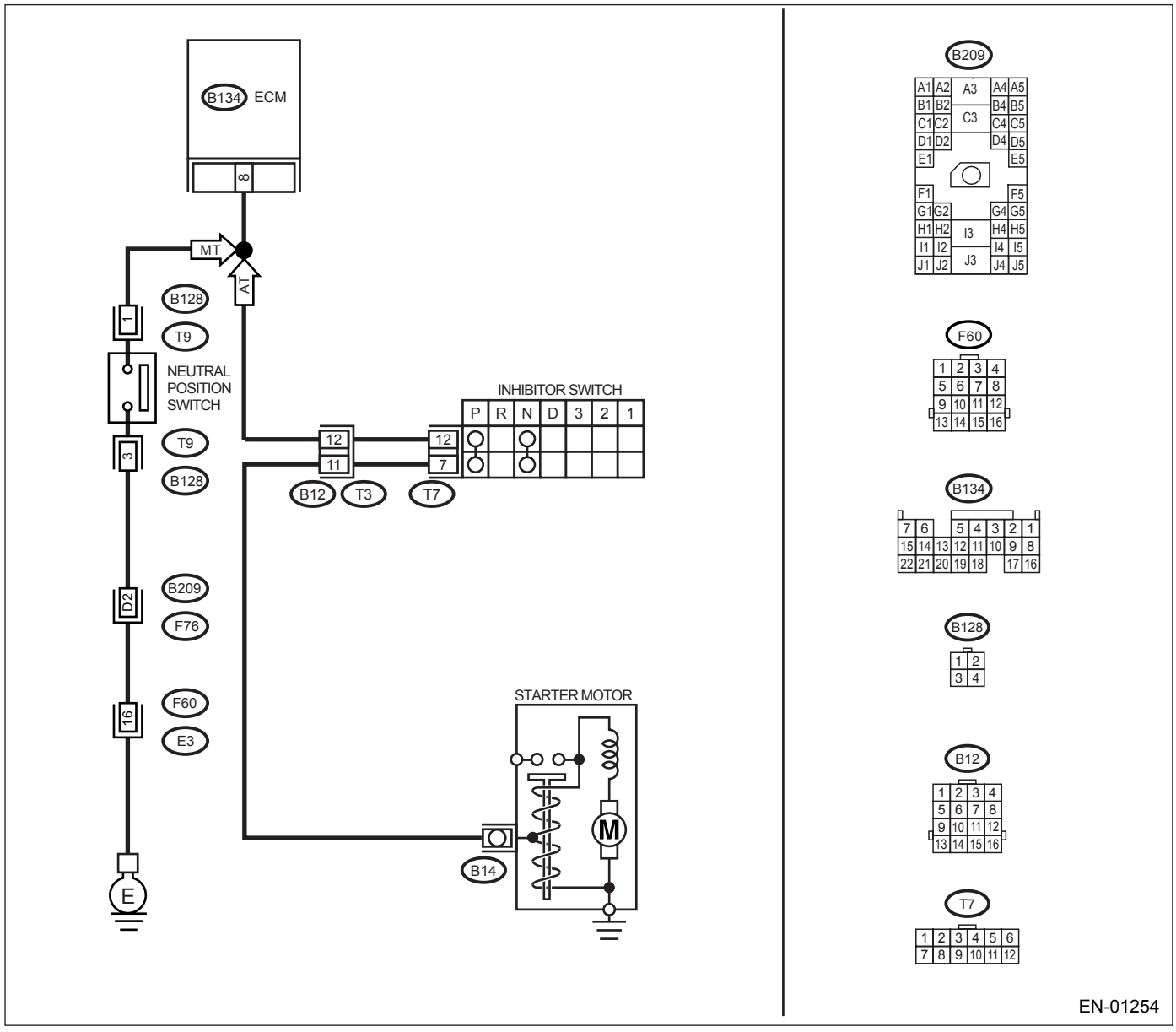
	Step	Check	Yes	No
6	**CHECK INHIBITOR SWITCH CIRCUIT.** Check inhibitor switch circuit. <Ref. to AT-127, CHECK INHIBITOR SWITCH., Diagnostic Procedure for No-Diagnostic Trouble Code (DTC).> Is there any trouble in inhibitor switch circuit?	There is a fault.	Repair or replace the inhibitor switch circuit.	Go to step **7.**
7	**CHECK BRAKE LIGHT SWITCH CIRCUIT.** Check brake light switch circuit. <Ref. to AT-125, CHECK BRAKE SWITCH., Diagnostic Procedure for No-Diagnostic Trouble Code (DTC).> Is there any trouble in brake light switch circuit?	There is a fault.	Repair or replace the brake light switch circuit.	Go to step **8.**
8	**CHECK ATF TEMPERATURE SENSOR CIRCUIT.** Check ATF temperature sensor circuit. <Ref. to AT-50, DTC 27 ATF TEMPERATURE SENSOR, Diagnostic Procedure with Diagnostic Trouble Code (DTC).> Is there any trouble in ATF temperature sensor circuit?	There is a fault.	Repair or replace the ATF temperature sensor circuit.	Go to step **9.**
9	**CHECK FOR POOR CONTACT.** Check for poor contact in TCM connector. Is there poor contact in TCM connector?	There is poor contact.	Repair poor contact in TCM connector.	Go to step **10.**
10	**CHECK FOR MECHANICAL TROUBLE.** Check for mechanical trouble in automatic transmission. Is there any mechanical trouble in automatic transmission?	There is mechanical trouble.	Repair or replace the automatic transmission. <Ref. to AT-32, INSPECTION, Road Test.>	Replace the TCM. <Ref. to AT-71, Transmission Control Module (TCM).>

CF:DTC P0851 — NEUTRAL SWITCH INPUT CIRCUIT LOW (AT) —

- **DTC DETECTING CONDITION:**
  - Fault occurs in two consecutive driving cycles
- **TROUBLE SYMPTOM:**
  - Erroneous idling

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to EN(H4DOTC)-49, OPERATION, Clear Memory Mode.> and INSPECTION MODE <Ref. to EN(H4DOTC)-41, OPERATION, Inspection Mode.>.

- **WIRING DIAGRAM:**



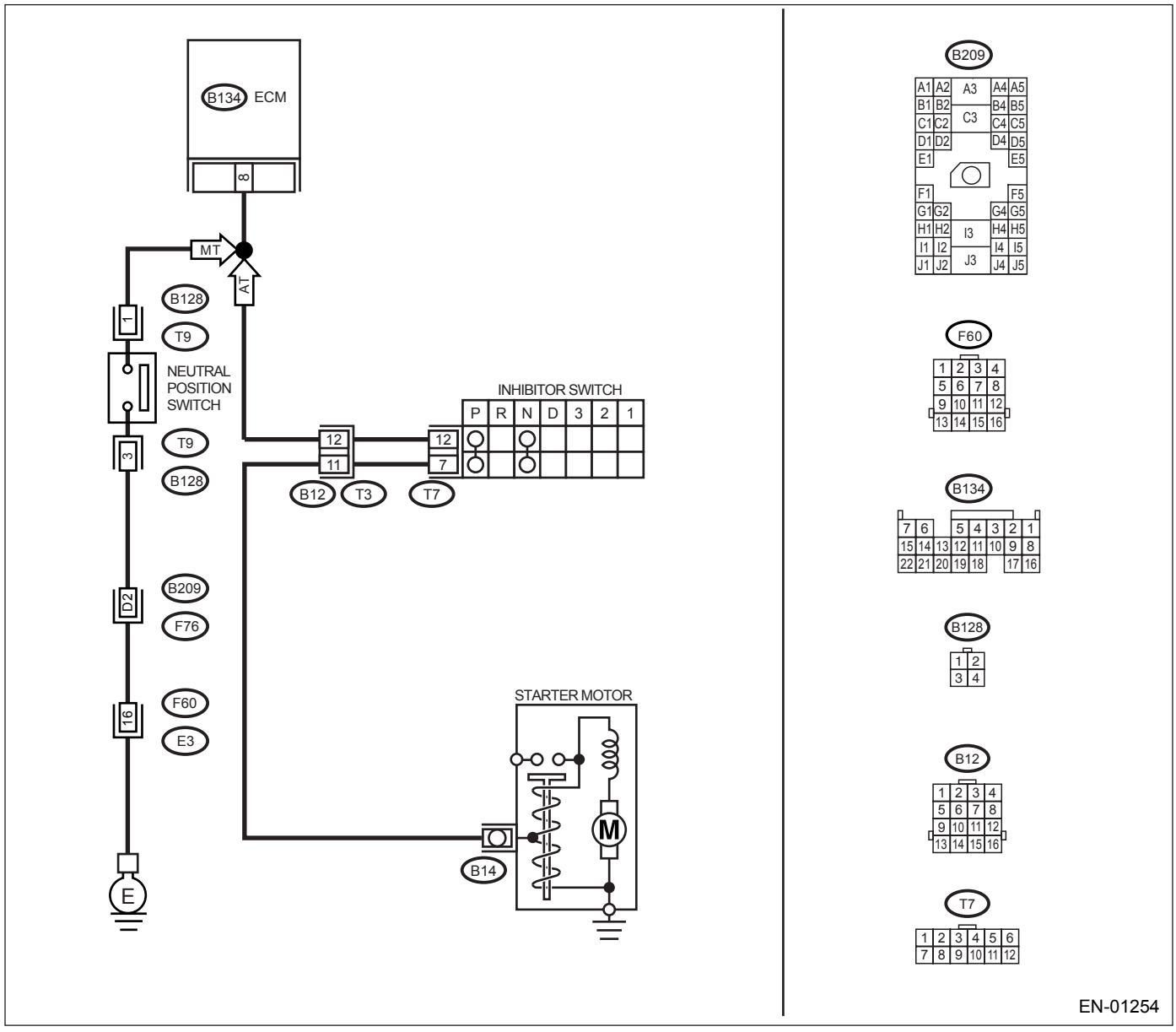
	Step	Check	Yes	No
1	**CHECK IF DTC P0705 IS INDICATED ON DISPLAY.** Is DTC P0705 indicated?	DTC P0705 is indicated.	Inspect DTC P0705 using "List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H4DOTC)-81, List of Diagnostic Trouble Codes (DTC).>	Go to step **2.**
2	**CHECK INPUT SIGNAL FOR ECM.** 1)Turn ignition switch to ON. 2)Place the select lever to other than "N" and "P" positions. 3)Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B134) No. 8 (+) — Chassis ground (−):*** Is the measured value within the specified range?	4.5 — 5.5 V	The MIL may light up, however, the circuit is returned to the normal status at the moment.	Go to step **3.**
3	**CHECK HARNESS BETWEEN ECM AND TRANSMISSION HARNESS CONNECTOR.** 1)Turn ignition switch to OFF. 2)Disconnect the connectors from ECM and transmission harness connector (T3). 3)Measure the resistance of harness between ECM connector and chassis ground. ***Connector & terminal*** ***(B134) No. 8 — Chassis ground:*** Is the measured value more than the specified value?	1 MΩ	Go to step **4.**	Repair short circuit to ground in harness between ECM and transmission harness connector.
4	**CHECK TRANSMISSION HARNESS CONNECTOR.** 1)Disconnect the connector from inhibitor switch. 2)Measure the resistance of harness between transmission harness connector and engine ground. ***Connector & terminal*** ***(T3) No. 12 — Engine ground:*** Is the measured value more than the specified value?	1 MΩ	Go to step **5.**	Repair short circuit to ground in harness between transmission harness connector and inhibitor switch connector.
5	**CHECK INHIBITOR SWITCH.** Measure the resistance between inhibitor switch connector receptacle terminals with selector lever in a position other than"N". ***Terminal*** ***No. 7 — No. 12:*** Is the measured value more than the specified value?	1 MΩ	Go to step **6.**	Replace the inhibitor switch. <Ref. to AT-48, Inhibitor Switch.>
6	**CHECK SELECTOR CABLE CONNECTION.** Is there any fault in selector cable connection to inhibitor switch?	There is a fault.	Repair selector cable connection. <Ref. to CS-30, INSPECTION, Select Cable.>	Contact SOA (distributor) service. NOTE: Inspection by DTM is required, because probable cause is deterioration of multiple parts.

CG:DTC P0851 — NEUTRAL SWITCH INPUT CIRCUIT LOW (MT) —

- **DTC DETECTING CONDITION:**
  - Fault occurs in two consecutive driving cycles
- **TROUBLE SYMPTOM:**
  - Erroneous idling

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to EN(H4DOTC)-49, OPERATION, Clear Memory Mode.> and INSPECTION MODE <Ref. to EN(H4DOTC)-41, OPERATION, Inspection Mode.>.

- **WIRING DIAGRAM:**



	Step	Check	Yes	No
1	**CHECK INPUT SIGNAL FOR ECM.** 1)Turn ignition switch to ON. 2)Place the shift lever in neutral. 3)Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B134) No. 8 (+) — Chassis ground (−):*** Is the measured value more than the specified value?	10 V	Go to step **2.**	Go to step **4.**
2	**CHECK INPUT SIGNAL FOR ECM.** 1)Place the shift lever in a position other than neutral. 2)Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B134) No. 8 (+) — Chassis ground (−):*** Is the measured value less than the specified value?	1 V	Go to step **3.**	Go to step **4.**
3	**CHECK FOR POOR CONTACT.** Check for poor contact in ECM connector. Is there poor contact in ECM connector?	There is poor contact.	Repair poor contact in ECM connector.	Contact SOA (distributor) service.
4	**CHECK NEUTRAL POSITION SWITCH.** 1)Turn ignition switch to OFF. 2)Disconnect the connector from transmission harness. 3)Place the shift lever in neutral. 4)Measure the resistance between transmission harness and connector terminals. ***Connector & terminal*** ***(T9) No. 1 — No. 3:*** Is the measured value more than the specified value?	1 M Ω	Go to step **5.**	Repair short circuit in transmission harness or replace neutral position switch.
5	**CHECK NEUTRAL POSITION SWITCH.** 1)Place the shift lever in a position other than neutral. 2)Measure the resistance between transmission harness connector terminals. Is the measured value less than the specified value?	1 Ω	Go to step **6.**	Repair short circuit in transmission harness or replace neutral position switch.
6	**CHECK HARNESS BETWEEN ECM AND NEUTRAL POSITION SWITCH CONNECTOR.** Measure the resistance between ECM and chassis ground. ***Connector & terminal*** ***(B134) No. 8 — Chassis ground:*** Is the measured value more than the specified value?	1 MΩ	Go to step **7.**	Repair short circuit to ground in harness between ECM and transmission harness connector.
7	**CHECK HARNESS BETWEEN ECM AND NEUTRAL POSITION SWITCH CONNECTOR.** 1)Disconnect the connector from ECM. 2)Measure the resistance of harness between ECM and transmission harness connector. ***Connector & terminal*** ***(B134) No. 8 — (B128) No. 1:*** Is the measured value less than the specified value?	1 Ω	Go to step **8.**	Repair open circuit in harness between ECM and transmission harness connector.

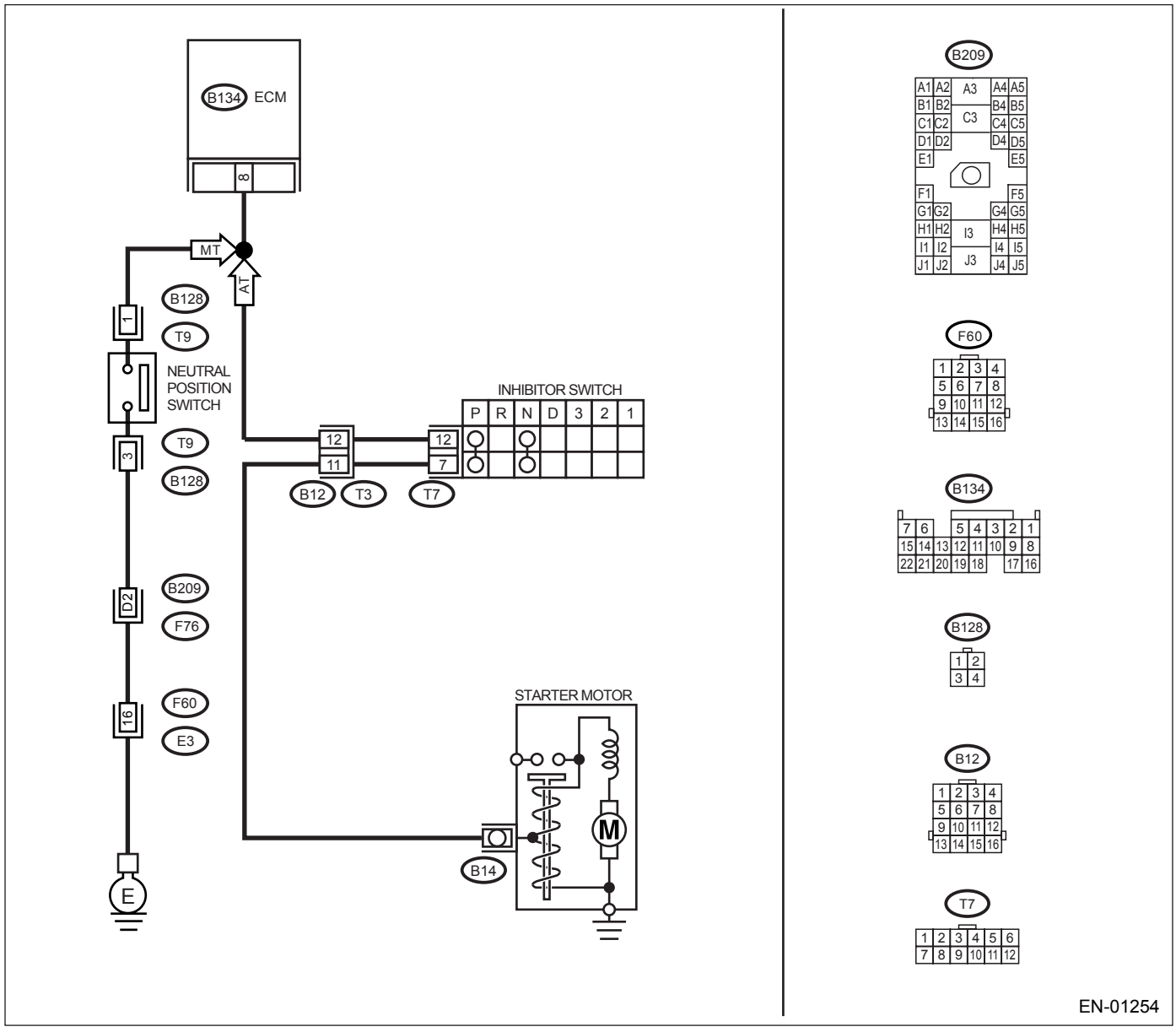
	Step	Check	Yes	No
8	**CHECK HARNESS BETWEEN ECM AND NEUTRAL POSITION SWITCH CONNECTOR.** Measure the resistance of harness between transmission harness connector and engine ground. ***Connector & terminal*** ***(B128) No. 1 — Engine ground:*** Is the measured value less than the specified value?	5 Ω	Go to step **9.**	Repair open circuit between transmission harness connector and engine ground terminal.
9	**CHECK FOR POOR CONTACT.** Check for poor contact in transmission harness connector. Is there poor contact in transmission harness connector?	There is poor contact.	Repair poor contact in transmission harness connector.	Contact SOA (distributor) service.

CH:DTC P0852 — NEUTRAL SWITCH INPUT CIRCUIT HIGH (AT) —

- **DTC DETECTING CONDITION:**
  - Fault occurs in two consecutive driving cycles
- **TROUBLE SYMPTOM:**
  - Erroneous idling

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to EN(H4DOTC)-49, OPERATION, Clear Memory Mode.> and INSPECTION MODE <Ref. to EN(H4DOTC)-41, OPERATION, Inspection Mode.>.

- **WIRING DIAGRAM:**



	Step	Check	Yes	No
1	**CHECK IF DTC P0705 IS INDICATED ON DISPLAY.** Is DTC P0705 indicated?	DTC P0705 is indicated.	Inspect DTC P0705 using "List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H4DOTC)-81, List of Diagnostic Trouble Codes (DTC).>	Go to step **2.**
2	**CHECK INPUT SIGNAL FOR ECM.** 1)Turn ignition switch to ON. 2)Measure the voltage between ECM and chassis ground with the selector lever in "N" and "P" positions. ***Connector & terminal*** ***(B134) No. 8 (+) — Chassis ground (−):*** Is the measured value less than the specified value?	1 V	Go to step **3.**	Go to step **5.**
3	**CHECK INPUT SIGNAL FOR ECM.** Measure the voltage between ECM and chassis ground with the selector lever in positions other than "N" and "P" positions. ***Connector & terminal*** ***(B134) No. 8 (+) — Chassis ground (−):*** Is the measured value within the specified range?	4.5 — 5.5 V	Go to step **4.**	Go to step **5.**
4	**CHECK FOR POOR CONTACT.** Check for poor contact in ECM connector. Is there poor contact in ECM connector?	There is poor contact.	Repair poor contact in ECM connector.	Contact SOA (distributor) service. NOTE: Inspection by DTM is required, because probable cause is deterioration of multiple parts.
5	**CHECK INPUT SIGNAL FOR ECM.** Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B134) No. 8 (+) — Chassis ground (−):*** Is the measured value more than the specified value?	10 V	Repair short circuit to battery in harness between ECM and inhibitor switch connector.	Go to step **6.**
6	**CHECK HARNESS BETWEEN ECM AND INHIBITOR SWITCH CONNECTOR.** 1)Turn ignition switch to OFF. 2)Disconnect the connectors from ECM and inhibitor switch. 3)Measure the resistance of harness between ECM and inhibitor switch connector. ***Connector & terminal*** ***(B134) No. 8 — (T7) No. 12:*** Is the measured value less than the specified value?	1 Ω	Go to step **7.**	Repair harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between ECM and inhibitor switch connector • Poor contact in coupling connector • Poor contact in inhibitor switch connector • Poor contact in ECM connector

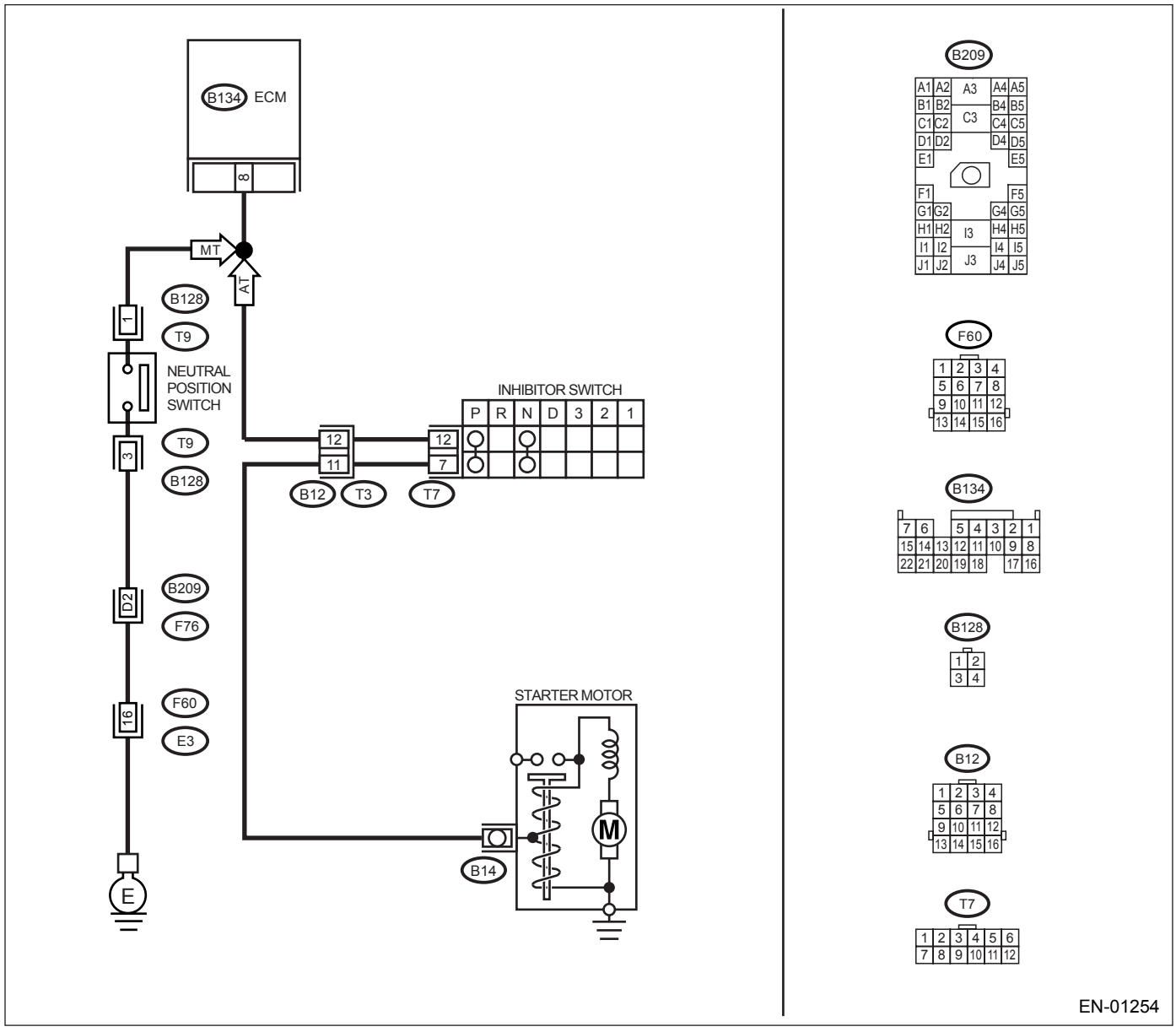
	Step	Check	Yes	No
7	**CHECK INHIBITOR SWITCH GROUND LINE.** Measure the resistance of harness between inhibitor switch connector and engine ground. ***Connector & terminal*** ***(T7) No. 7 — Engine ground:*** Is the measured value less than the specified value?	5 Ω	Go to step **8.**	Repair open circuit in harness between inhibitor switch connector and starter motor ground line. NOTE: In this case, repair the following: • Open circuit in harness between inhibitor switch connector and starter motor ground line • Poor contact in starter motor connector • Poor contact in starter motor ground • Starter motor
8	**CHECK INHIBITOR SWITCH.** Measure the resistance between inhibitor switch connector receptacle's terminals with the selector lever in "N" and "P" positions. ***Terminal*** ***No. 7 — No. 12:*** Is the measured value less than the specified value?	1 Ω	Go to step **9.**	Replace the inhibitor switch. <Ref. to AT-48, Inhibitor Switch.>
9	**CHECK SELECTOR CABLE CONNECTION.** Is there any fault in selector cable connection to inhibitor switch?	There is a fault.	Repair selector cable connection. <Ref. to CS-30, INSPECTION, Select Cable.>	Contact SOA (distributor) service. NOTE: Inspection by DTM is required, because probable cause is deterioration of multiple parts.

CI: DTC P0852 — NEUTRAL SWITCH INPUT CIRCUIT HIGH (MT) —

- **DTC DETECTING CONDITION:**
  - Fault occurs in two consecutive driving cycles
- **TROUBLE SYMPTOM:**
  - Erroneous idling

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to EN(H4DOTC)-49, OPERATION, Clear Memory Mode.> and INSPECTION MODE <Ref. to EN(H4DOTC)-41, OPERATION, Inspection Mode.>.

- **WIRING DIAGRAM:**



	Step	Check	Yes	No
1	**CHECK INPUT SIGNAL FOR ECM.** 1)Turn ignition switch to ON. 2)Place the shift lever in a position other than neutral. 3)Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B134) No. 8 (+) — Chassis ground (−):*** Is the measured value less than the specified value?	1 V	Go to step **2.**	Go to step **4.**
2	**CHECK INPUT SIGNAL FOR ECM.** 1)Place the shift lever in neutral. 2)Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B134) No. 8 (+) — Chassis ground (−):*** Is the measured value more than the specified value?	10 V	Go to step **3.**	Go to step **4.**
3	**CHECK FOR POOR CONTACT.** Check for poor contact in ECM connector. Is there poor contact in ECM connector?	There is poor contact.	Repair poor contact in ECM connector.	Contact SOA (distributor) service.
4	**CHECK INPUT SIGNAL FOR ECM.** 1)Disconnect the connector from ECM. 2)Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B134) No. 8 (+) — Chassis ground (−):*** Is the measured value more than the specified value?	10 V	Repair short circuit to battery in harness between ECM and transmission harness connector.	Go to step **5.**
5	**CHECK HARNESS BETWEEN ECM AND TRANSMISSION HARNESS CONNECTOR.** 1)Turn ignition switch to OFF. 2)Disconnect the connectors from ECM and transmission harness connector (T9). 3)Measure the resistance of harness between ECM and neutral switch connector. ***Connector & terminal*** ***(B134) No. 8 — (B128) No. 1:*** Is the measured value less than the specified value?	1 Ω	Go to step **6.**	Repair harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between ECM and transmission harness connector • Poor contact in transmission harness connector • Poor contact in ECM connector
6	**CHECK NEUTRAL POSITION SWITCH GROUNDING LINE.** Measure the resistance of harness between transmission harness connector and engine ground. ***Connector & terminal*** ***(B128) No. 3 — Engine ground:*** Is the measured value less than the specified value?	5 Ω	Go to step **7.**	Repair open circuit in neutral position switch grounding line.

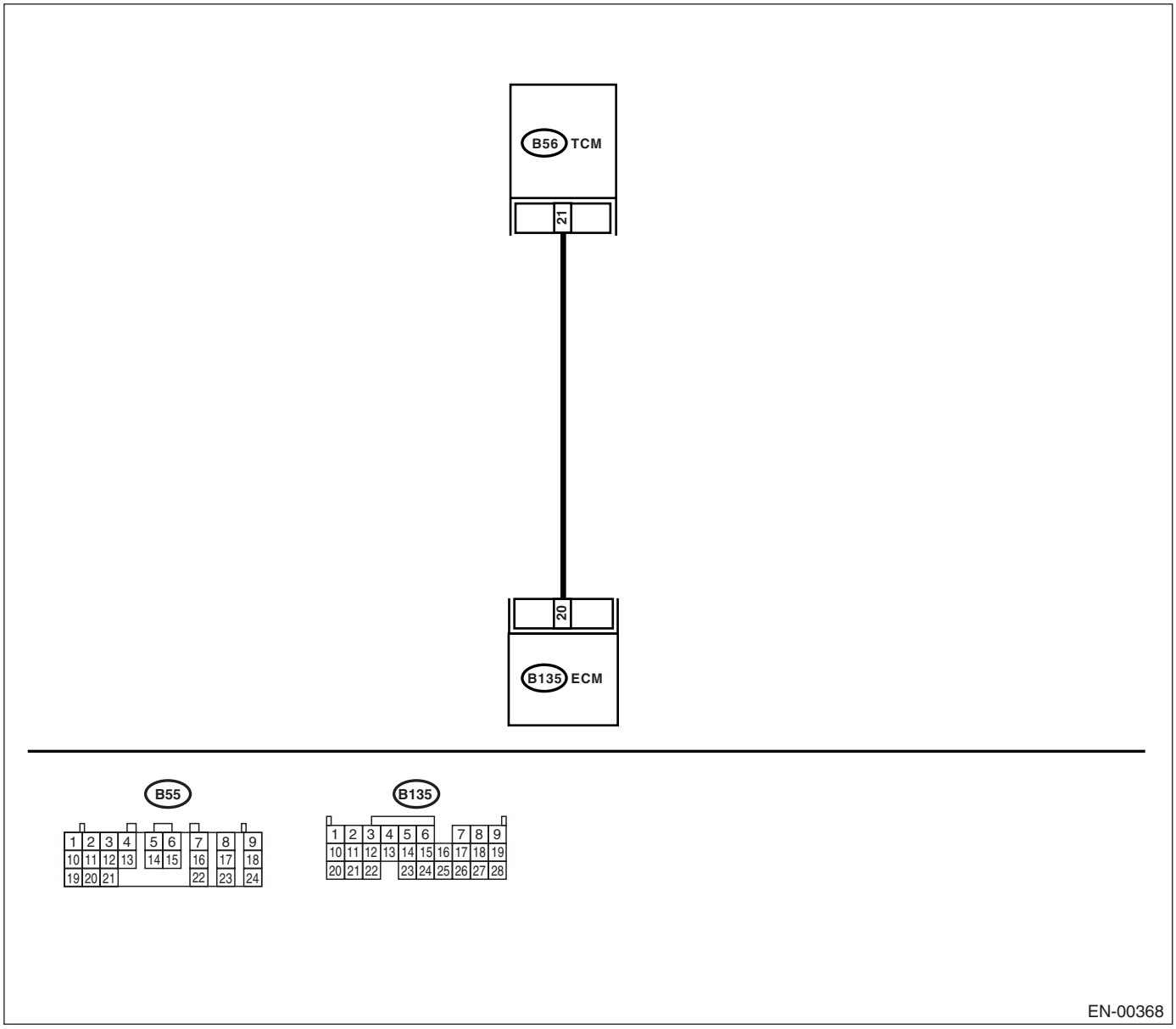
	Step	Check	Yes	No
7	**CHECK NEUTRAL POSITION SWITCH.** 1)Place the shift lever in a position other than neutral. 2)Measure the resistance between transmission harness connector receptacle terminals. ***Terminal*** ***No. 1 — No. 3:*** Is the measured value less than the specified value?	1 Ω	Go to step **8.**	Replace the neutral position switch.
8	**CHECK FOR POOR CONTACT.** Check for poor contact in transmission harness connector. Is there poor contact in transmission harness connector?	There is poor contact.	Repair poor contact in transmission harness connector.	Contact SOA (distributor) service.

CJ:DTC P0864 — TCM COMMUNICATION CIRCUIT RANGE/PERFORMANCE —

- **DTC DETECTING CONDITION:**
  - Fault occurs in two consecutive driving cycles

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to EN(H4DOTC)-49, OPERATION, Clear Memory Mode.> and INSPECTION MODE <Ref. to EN(H4DOTC)-41, Inspection Mode.>.

- **WIRING DIAGRAM:**



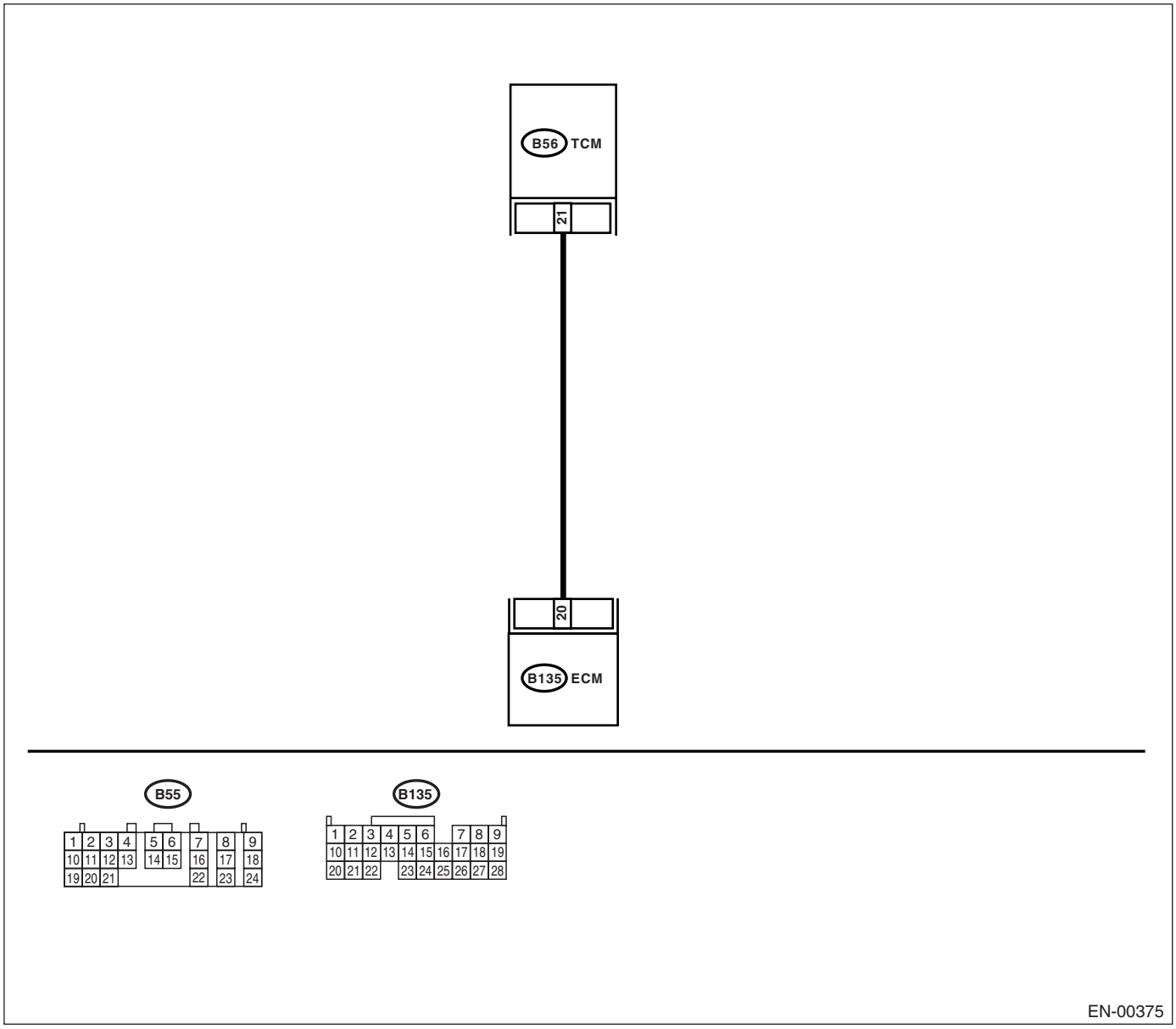
	Step	Check	Yes	No
1	**CHECK DRIVING CONDITION.** 1)Start and warm-up the engine until the radiator fan operates for a complete cycle. 2)Drive the vehicle. Is the AT shift control functioning properly?	Functioning properly.	Go to step **2.**	Replace the TCM. <Ref. to AT-71, Transmission Control Module (TCM).>
2	**CHECK ACCESSORY.** Is a car phone or CB installed on the vehicle?	Installed.	Repair grounding line of car phone or CB system.	Replace the TCM. <Ref. to AT-71, Transmission Control Module (TCM).>

CK:DTC P0865 — AT DIAGNOSIS INPUT SIGNAL CIRCUIT LOW INPUT —

- **DTC DETECTING CONDITION:**
  - Fault occurs in two consecutive driving cycles

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to EN(H4DOTC)-49, OPERATION, Clear Memory Mode.> and INSPECTION MODE <Ref. to EN(H4DOTC)-41, Inspection Mode.>.

- **WIRING DIAGRAM:**



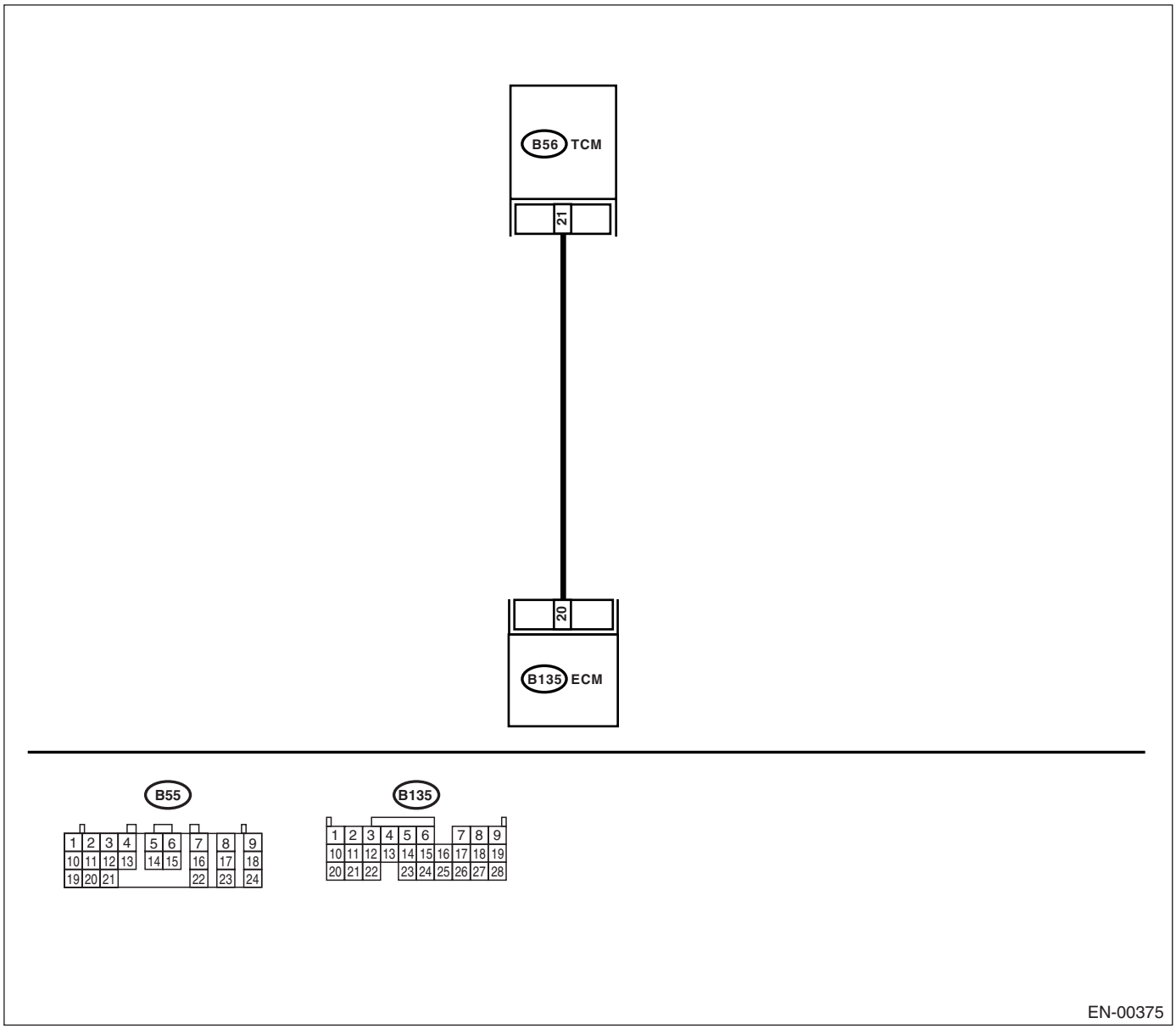
	Step	Check	Yes	No
1	**CHECK HARNESS BETWEEN ECM AND TCM CONNECTOR.** 1)Turn ignition switch to ON. 2)Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B135) No. 20 (+) — Chassis ground (−):*** Is the measured value less than the specified value?	1 V	Go to step **2.**	The MIL may light up, however, the circuit is returned to the normal status at the moment. NOTE: In this case, repair the following: • Poor contact in ECM connector • Poor contact in TCM connector
2	**CHECK HARNESS BETWEEN ECM AND TCM CONNECTOR.** 1)Turn ignition switch to OFF. 2)Disconnect the connector from ECM and TCM. 3)Measure the resistance of harness between ECM and chassis ground. ***Connector & terminal*** ***(B135) No. 20 — Chassis ground:*** Is the measured value less than the specified value?	10 Ω	Repair short circuit to ground in harness between ECM and TCM connector.	Go to step **3.**
3	**CHECK OUTPUT SIGNAL FOR ECM.** 1)Connect the connector to ECM. 2)Turn ignition switch to ON. 3)Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B135) No. 20 (+) — Chassis ground (−):*** Is the measured value more than the specified value?	5 V	Go to step **4.**	Repair poor contact in ECM connector.
4	**CHECK DTC FOR AUTOMATIC TRANSMISSION.** Read the DTC for automatic transmission. <Ref. to AT-24, Read Diagnostic Trouble Code (DTC).> Is the DTC for automatic transmission indicated?	DTC for automatic transmission is indicated.	Inspect DTC for automatic transmission. <Ref. to AT-44, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>	Replace the TCM. <Ref. to AT-71, Transmission Control Module (TCM).>

CL:DTC P0866 — AT DIAGNOSIS INPUT SIGNAL CIRCUIT HIGH INPUT —

- **DTC DETECTING CONDITION:**
  - Fault occurs in two consecutive driving cycles

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to EN(H4DOTC)-49, OPERATION, Clear Memory Mode.> and INSPECTION MODE <Ref. to EN(H4DOTC)-41, Inspection Mode.>.

- **WIRING DIAGRAM:**



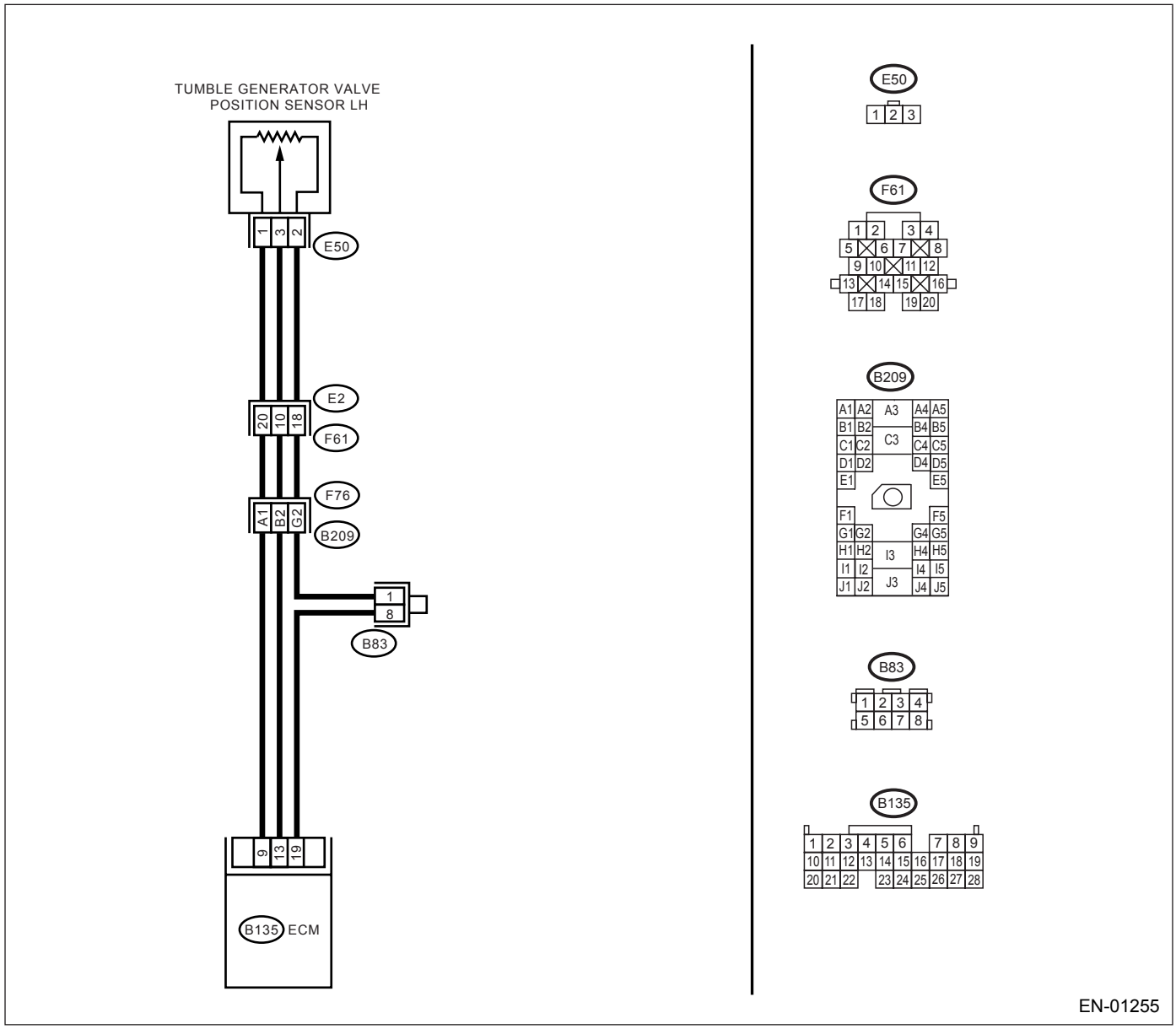
	Step	Check	Yes	No
1	**CHECK HARNESS BETWEEN ECM AND TCM CONNECTOR.** 1)Turn ignition switch to ON. 2)Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B135) No. 20 (+) — Chassis ground (−):*** Is the measured value more than the specified value?	10 V	Repair short circuit to battery in harness between ECM and TCM connector. After repair, replace the ECM. <Ref. to FU(H4DOTC)-50, Engine Control Module.>	Go to step **2.**
2	**CHECK HARNESS BETWEEN ECM AND TCM CONNECTOR.** Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B135) No. 20 (+) — Chassis ground (−):*** Is the measured value more than the specified value?	4 V	Go to step **5.**	Go to step **3.**
3	**CHECK HARNESS BETWEEN ECM AND TCM CONNECTOR.** Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B135) No. 20 (+) — Chassis ground (−):*** Is the measured value less than the specified value?	1 V	Repair poor contact in ECM connector.	Go to step **4.**
4	**CHECK OUTPUT SIGNAL FROM ECM.** Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B135) No. 20 (+) — Chassis ground (−):*** Does the voltage variance stay within the specified range while monitoring the value on a voltmeter?	1 V — 4 V	The MIL may light up, however, the circuit is returned to the normal status at the moment. NOTE: In this case, repair the following: • Poor contact in ECM connector • Poor contact in TCM connector	Contact SOA (distributor) service. NOTE: Inspection by DTM is required, because probable cause is deterioration of multiple parts.
5	**CHECK HARNESS BETWEEN ECM AND TCM CONNECTOR.** Measure the voltage between TCM and chassis ground. ***Connector & terminal*** ***(B56) No. 20 (+) — Chassis ground (−):*** Is the measured value more than the specified value?	4 V	Go to step **6.**	Repair open circuit in harness between ECM and TCM connector.
6	**CHECK FOR POOR CONTACT.** Check for poor contact in TCM connector. Is there poor contact in TCM connector?	There is poor contact.	Repair poor contact in TCM connector.	Check TCM power supply line and grounding line.

CM: DTC P1086 — TUMBLE GENERATED VALVE POSITION SENSOR 2 CIRCUIT LOW —

- **DTC DETECTING CONDITION:**
  - Immediately at fault recognition
- **TROUBLE SYMPTOM:**
  - Erroneous idling
  - Engine stalls
  - Poor driving performance

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to EN(H4DOTC)-49, OPERATION, Clear Memory Mode.> and INSPECTION MODE <Ref. to EN(H4DOTC)-41, Inspection Mode.>.

- **WIRING DIAGRAM:**



	Step	Check	Yes	No
1	**CHECK CURRENT DATA.** 1)Start the engine. 2)Read the data of throttle position sensor signal using Subaru Select Monitor or OBD-II general scan tool. Is the measured value less than the specified value? NOTE: •Subaru Select Monitor For detailed operation procedures, refer to READ CURRENT DATA FOR ENGINE. <Ref. to EN(H4DOTC)-33, Subaru Select Monitor.> •OBD-II general scan tool For detailed operation procedures, refer to the OBD-II General Scan Tool Instruction Manual.	0.1 V	Go to step **2.**	The MIL may light up, however, the circuit is returned to the normal status at the moment. A temporary poor contact of the connector may be the cause. NOTE: In this case, repair the following: • Poor contact in throttle position sensor connector • Poor contact in ECM connector • Poor contact in coupling connector
2	**CHECK INPUT SIGNAL FOR ECM.** Measure the voltage between ECM connector and chassis ground while throttle valve is fully closed. ***Connector & terminal*** ***(B135) No. 9 (+) — Chassis ground (−):*** Is the measured value more than the specified value?	4.5 V	Go to step **4.**	Go to step **3.**
3	**CHECK INPUT SIGNAL FOR ECM.** Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B135) No. 9 (+) — Chassis ground (−):*** Does the voltage variance exceed the specified value while monitoring the voltmeter and shaking the ECM harness and connector ?	4.5 V	Repair poor contact in ECM connector.	Contact SOA (distributor) service. NOTE: Inspection by DTM is required, because probable cause is deterioration of multiple parts.
4	**CHECK INPUT SIGNAL FOR ECM.** Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B135) No. 13 (+) — Chassis ground (−):*** Is the measured value less than the specified value?	0.1 V	Go to step **6.**	Go to step **5.**
5	**CHECK INPUT SIGNAL FOR ECM. (USING SUBARU SELECT MONITOR.)** Measure the voltage between ECM connector and chassis ground. Does the voltage variance exceed the specified value while monitoring the Subaru Select Monitor and shaking the ECM harness and connector ?	0.1 V	Repair poor contact in ECM connector.	Go to step **6.**

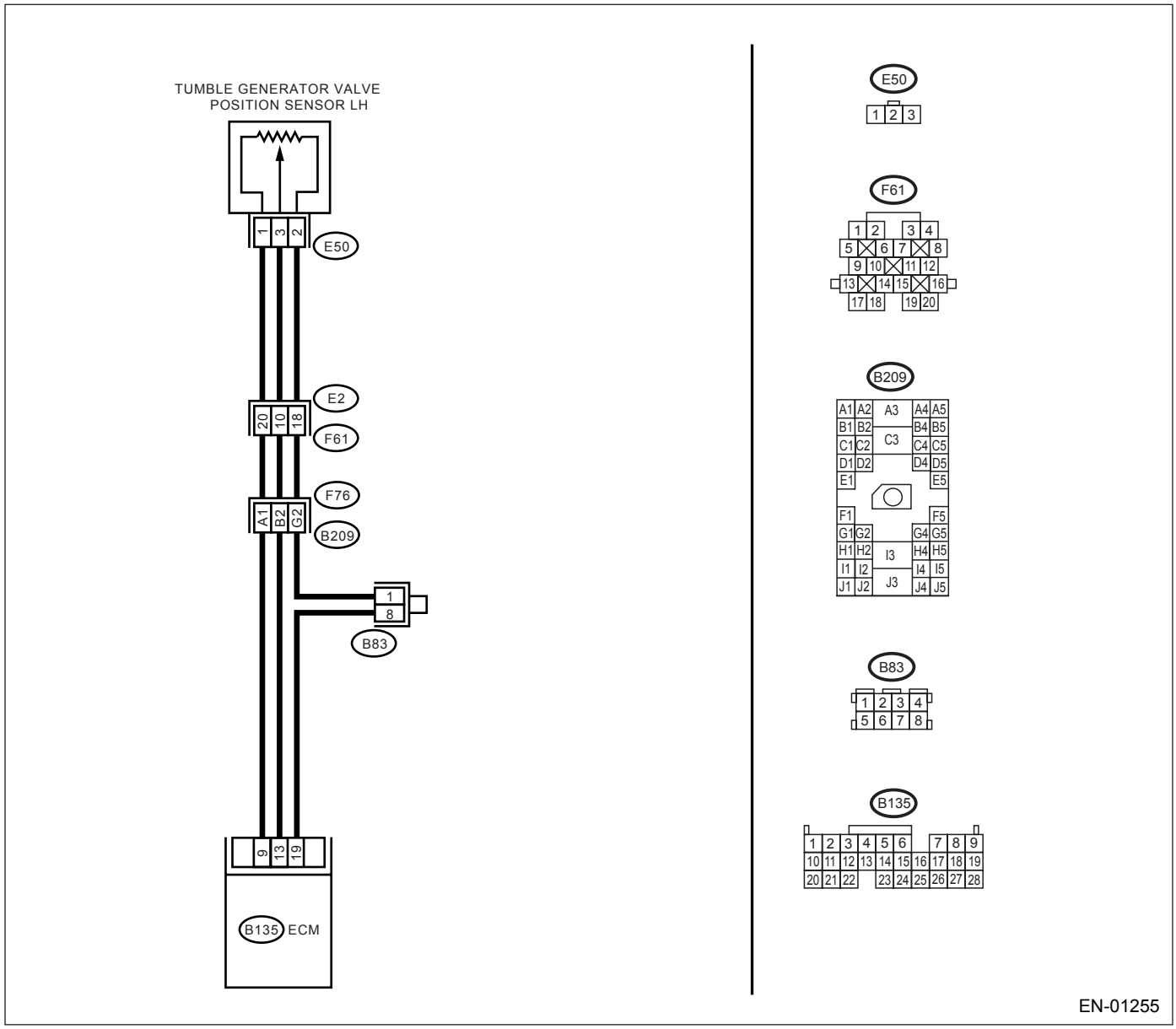
	Step	Check	Yes	No
6	**CHECK HARNESS BETWEEN ECM AND TUMBLE GENERATOR VALVE POSITION SENSOR CONNECTOR.** 1)Turn ignition switch to OFF. 2)Disconnect the connector from tumble generator valve position sensor. 3)Turn ignition switch to ON. 4)Measure the voltage between tumble generator valve position sensor connector and engine ground. ***Connector & terminal*** ***(E50) No. 1 (+) — Engine ground (−):*** Is the measured value more than the specified value?	4.5 V	Go to step **7.**	Repair harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between tumble generator valve position sensor and ECM connector • Poor contact in tumble generator valve position sensor connector • Poor contact in ECM connector • Poor contact in coupling connector • Poor contact in joint connector
7	**CHECK HARNESS BETWEEN ECM AND TUMBLE GENERATOR VALVE POSITION SENSOR CONNECTOR.** 1)Turn ignition switch to OFF. 2)Measure the resistance of harness between ECM connector and tumble generator valve position sensor connector. ***Connector & terminal*** ***(B135) No. 13 — (E50) No. 3:*** Is the measured value less than the specified value?	1 Ω	Go to step **8.**	Repair harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between tumble generator valve position sensor and ECM connector • Poor contact in ECM connector • Poor contact in tumble generator valve position sensor connector • Poor contact in coupling connector
8	**CHECK HARNESS BETWEEN ECM AND TUMBLE GENERATOR VALVE POSITION SENSOR CONNECTOR.** Measure the resistance of harness between tumble generator valve position sensor connector and engine ground. ***Connector & terminal*** ***(E50) No. 3 — Engine ground:*** Is the measured value less than the specified value?	10 Ω	Repair short circuit to ground in harness between tumble generator valve position sensor and ECM connector.	Go to step **9.**
9	**CHECK FOR POOR CONTACT.** Check for poor contact in tumble generator valve position sensor connector. Is there poor contact in tumble generator valve position sensor connector?	There is poor contact.	Repair poor contact in tumble generator valve position sensor connector.	Replace the tumble generator valve position sensor. <Ref. to FU(H4DOTC)-43, Tumble Generator Valve Position Sensor.>

CN:DTC P1087 — TUMBLE GENERATED VALVE POSITION SENSOR 2 CIRCUIT HIGH —

- **DTC DETECTING CONDITION:**
  - Immediately at fault recognition
- **TROUBLE SYMPTOM:**
  - Erroneous idling
  - Engine stalls
  - Poor driving performance

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to EN(H4DOTC)-49, OPERATION, Clear Memory Mode.> and INSPECTION MODE <Ref. to EN(H4DOTC)-41, Inspection Mode.>.

- **WIRING DIAGRAM:**



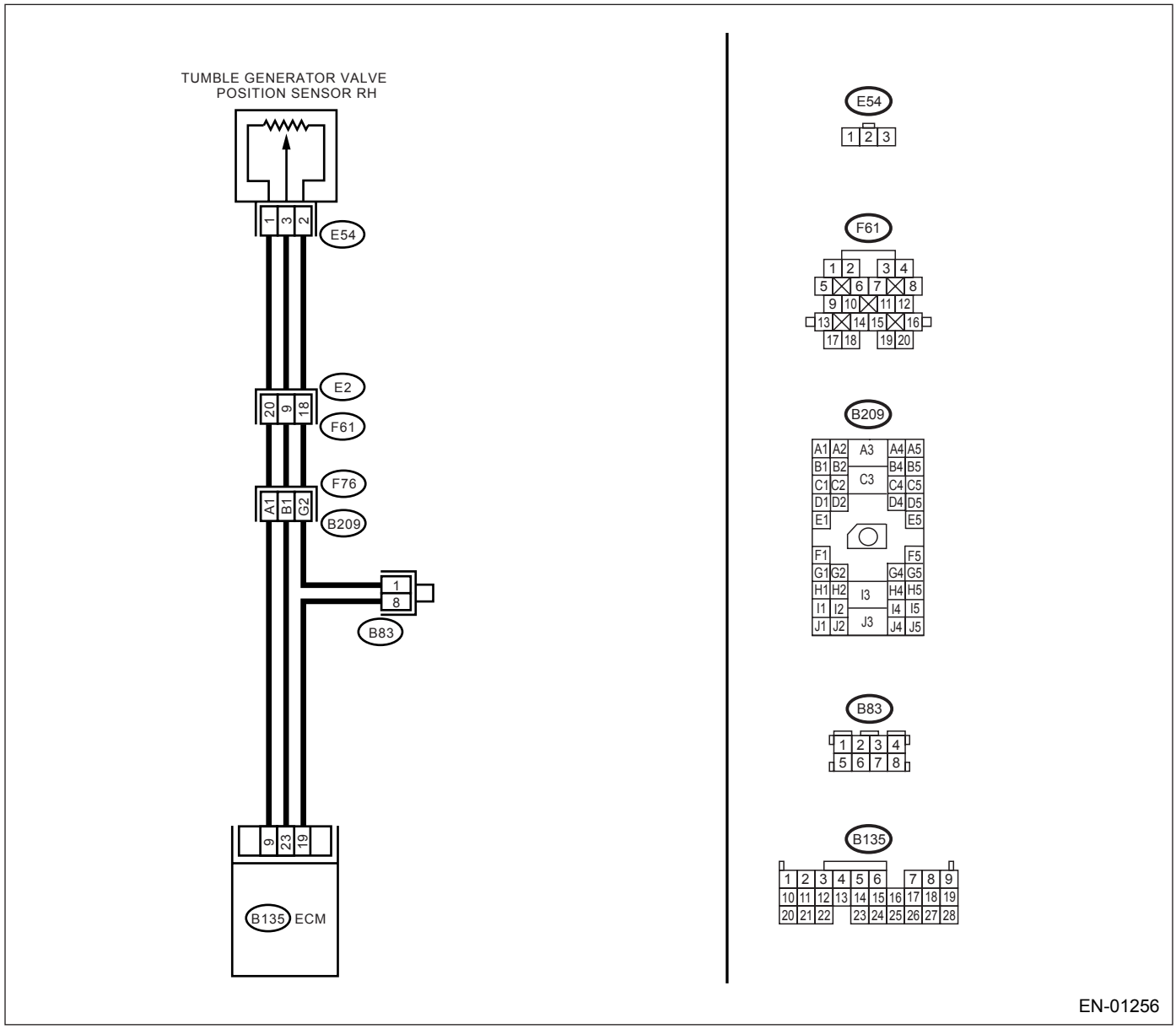
	Step	Check	Yes	No
1	**CHECK CURRENT DATA.** 1)Start the engine. 2)Read the data of throttle position sensor signal using Subaru Select Monitor or OBD-II general scan tool. Is the measured value more than the specified value? NOTE: •Subaru Select Monitor For detailed operation procedures, refer to READ CURRENT DATA FOR ENGINE. <Ref. to EN(H4DOTC)-33, Subaru Select Monitor.> •OBD-II general scan tool For detailed operation procedures, refer to the OBD-II General Scan Tool Instruction Manual.	4.9 V	Go to step **2.**	The MIL may light up, however, the circuit is returned to the normal status at the moment. A temporary poor contact of the connector may be the cause. NOTE: In this case, repair the following: • Poor contact in tumble generator valve position sensor connector • Poor contact in ECM connector • Poor contact in coupling connector
2	**CHECK HARNESS BETWEEN TUMBLE GENERATOR VALVE POSITION SENSOR CONNECTOR AND ECM CONNECTOR.** 1)Turn ignition switch to OFF. 2)Disconnect the connectors from throttle position sensor. 3)Measure the resistance of harness between throttle position sensor connector and engine ground. ***Connector & terminal*** ***(E50) No. 2 — Engine ground:*** Is the measured value less than the specified value?	5 Ω	Go to step **3.**	Repair harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between tumble generator valve position sensor and ECM connector • Poor contact in coupling connector • Poor contact in joint connector
3	**CHECK HARNESS BETWEEN THROTTLE POSITION SENSOR AND ECM CONNECTOR.** 1)Turn ignition switch to ON. 2)Measure the voltage between throttle position sensor connector and engine ground. ***Connector & terminal*** ***(E50) No. 3 (+) — Engine ground (−):*** Is the measured value more than the specified value?	4.9 V	Repair short circuit to battery in harness between tumble generator valve position sensor and ECM connector. After repair, replace the ECM. <Ref. to FU(H4DOTC)-50, Engine Control Module.>	Replace the tumble generator valve position sensor. <Ref. to FU(H4DOTC)-43, Tumble Generator Valve Position Sensor.>

CO: DTC P1088 — TUMBLE GENERATED VALVE POSITION SENSOR 1 CIRCUIT LOW —

- **DTC DETECTING CONDITION:**
  - Immediately at fault recognition
- **TROUBLE SYMPTOM:**
  - Erroneous idling
  - Engine stalls
  - Poor driving performance

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to EN(H4DOTC)-49, OPERATION, Clear Memory Mode.> and INSPECTION MODE <Ref. to EN(H4DOTC)-41, Inspection Mode.>.

- **WIRING DIAGRAM:**



	Step	Check	Yes	No
1	**CHECK CURRENT DATA.** 1)Start the engine. 2)Read the data of tumble generator valve position sensor signal using Subaru Select Monitor or OBD-II general scan tool. Is the measured value less than the specified value? NOTE: •Subaru Select Monitor For detailed operation procedures, refer to READ CURRENT DATA FOR ENGINE. <Ref. to EN(H4DOTC)-33, Subaru Select Monitor.> •OBD-II general scan tool For detailed operation procedures, refer to the OBD-II General Scan Tool Instruction Manual.	0.1 V	Go to step **2.**	The MIL may light up, however, the circuit is returned to the normal status at the moment. A temporary poor contact of the connector may be the cause. NOTE: In this case, repair the following: • Poor contact in tumble generator valve position sensor connector • Poor contact in ECM connector • Poor contact in coupling connector
2	**CHECK INPUT SIGNAL FOR ECM.** Measure the voltage between ECM connector and chassis ground while throttle valve is fully closed. ***Connector & terminal*** ***(B135) No. 9 (+) — Chassis ground (−):*** Is the measured value more than the specified value?	4.5 V	Go to step **4.**	Go to step **3.**
3	**CHECK INPUT SIGNAL FOR ECM.** Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B135) No. 9 (+) — Chassis ground (−):*** Does the voltage variance exceed the specified value while monitoring the voltmeter and shaking the ECM harness and connector ?	4.5 V	Repair poor contact in ECM connector.	Contact SOA (distributor) service. NOTE: Inspection by DTM is required, because probable cause is deterioration of multiple parts.
4	**CHECK INPUT SIGNAL FOR ECM.** Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B135) No. 23 (+) — Chassis ground (−):*** Is the measured value less than the specified value?	0.1 V	Go to step **6.**	Go to step **5.**
5	**CHECK INPUT SIGNAL FOR ECM. (USING SUBARU SELECT MONITOR.)** Measure the voltage between ECM connector and chassis ground. Does the voltage variance exceed the specified value while monitoring the Subaru Select Monitor and shaking the ECM harness and connector ?	0.1 V	Repair poor contact in ECM connector.	Go to step **6.**

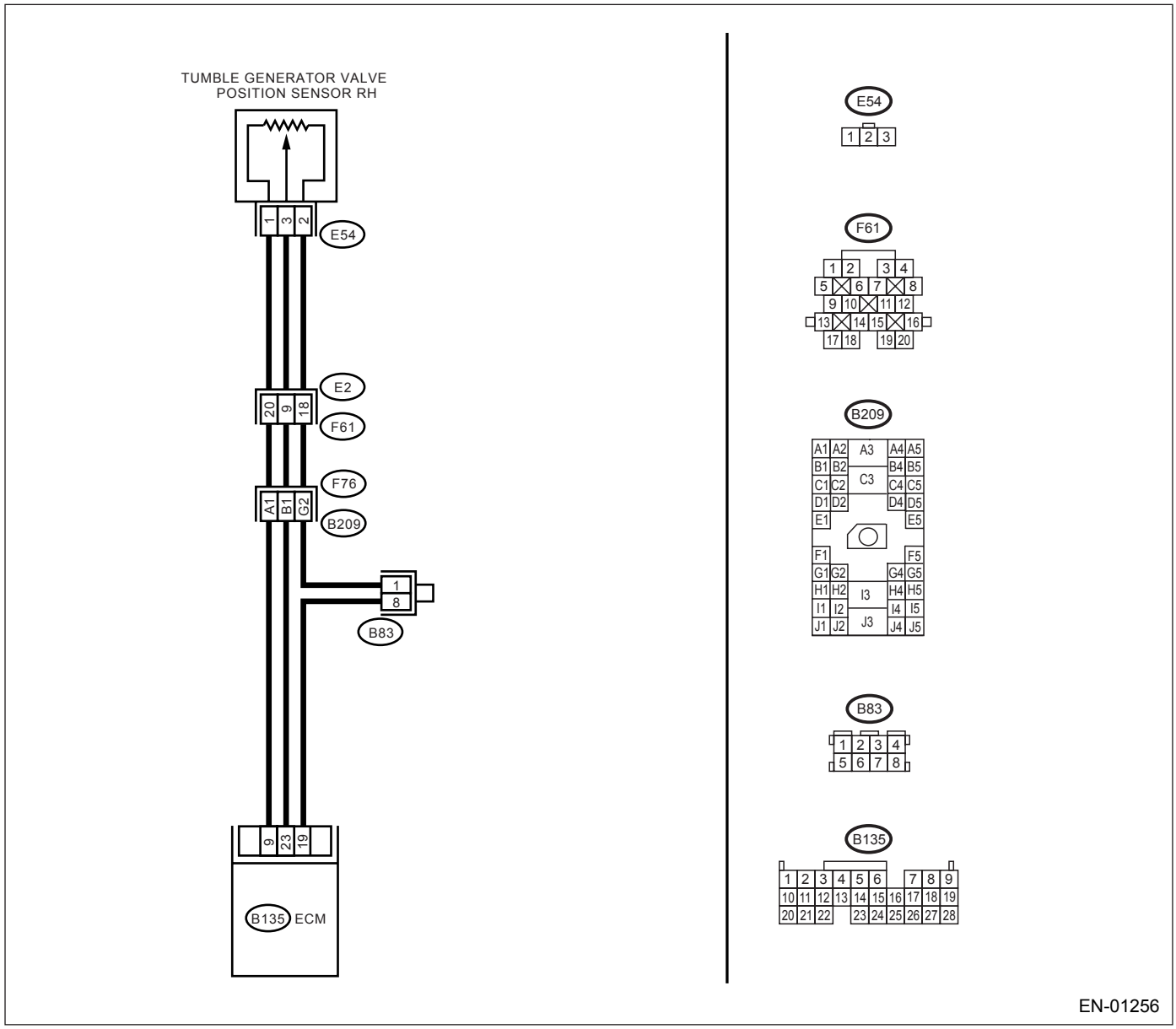
	Step	Check	Yes	No
6	**CHECK HARNESS BETWEEN ECM AND TUMBLE GENERATOR VALVE POSITION SENSOR CONNECTOR.** 1)Turn ignition switch to OFF. 2)Disconnect the connectors from throttle position sensor. 3)Turn ignition switch to ON. 4)Measure the voltage between throttle position sensor connector and engine ground. ***Connector & terminal*** ***(E54) No. 1 (+) — Engine ground (−):*** Is the measured value more than the specified value?	4.5 V	Go to step **7.**	Repair harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between tumble generator valve position sensor and ECM connector • Poor contact in throttle position sensor connector • Poor contact in ECM connector • Poor contact in coupling connector • Poor contact in joint connector
7	**CHECK HARNESS BETWEEN ECM AND TUMBLE GENERATOR VALVE POSITION SENSOR CONNECTOR.** 1)Turn ignition switch to OFF. 2)Measure the resistance of harness between ECM connector and throttle position sensor connector. ***Connector & terminal*** ***(B135) No. 23 — (E54) No. 3:*** Is the measured value less than the specified value?	1 Ω	Go to step **8.**	Repair harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between tumble generator valve position sensor and ECM connector • Poor contact in ECM connector • Poor contact in tumble generator valve position sensor connector • Poor contact in coupling connector
8	**CHECK HARNESS BETWEEN ECM AND THROTTLE POSITION SENSOR CONNECTOR.** Measure the resistance of harness between tumble generator valve position sensor connector and engine ground. ***Connector & terminal*** ***(E54) No. 3 — Engine ground:*** Is the measured value less than the specified value?	10 Ω	Repair short circuit to ground in harness between tumble generator valve position sensor and ECM connector.	Go to step **9.**
9	**CHECK FOR POOR CONTACT.** Check for poor contact in tumble generator valve position sensor connector. Is there poor contact in tumble generator valve position sensor connector?	There is poor contact.	Repair poor contact in tumble generator valve position sensor connector.	Replace the tumble generator valve position sensor. <Ref. to FU(H4DOTC)-43, Tumble Generator Valve Position Sensor.>

CP:DTC P1089 — TUMBLE GENERATED VALVE POSITION SENSOR 1 CIRCUIT HIGH —

- **DTC DETECTING CONDITION:**
  - Immediately at fault recognition
- **TROUBLE SYMPTOM:**
  - Erroneous idling
  - Engine stalls
  - Poor driving performance

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to EN(H4DOTC)-49, OPERATION, Clear Memory Mode.> and INSPECTION MODE <Ref. to EN(H4DOTC)-41, Inspection Mode.>.

- **WIRING DIAGRAM:**



	Step	Check	Yes	No
1	**CHECK CURRENT DATA.** 1)Start the engine. 2)Read the data of tumble generator valve position sensor signal using Subaru Select Monitor or OBD-II general scan tool. Is the measured value more than the specified value? NOTE: •Subaru Select Monitor For detailed operation procedures, refer to READ CURRENT DATA FOR ENGINE. <Ref. to EN(H4DOTC)-33, Subaru Select Monitor.> •OBD-II general scan tool For detailed operation procedures, refer to the OBD-II General Scan Tool Instruction Manual.	4.9 V	Go to step **2.**	The MIL may light up, however, the circuit is returned to the normal status at the moment. A temporary poor contact of the connector may be the cause. NOTE: In this case, repair the following: • Poor contact in tumble generator valve position sensor connector • Poor contact in ECM connector • Poor contact in coupling connector
2	**CHECK HARNESS BETWEEN TUMBLE GENERATOR VALVE POSITION SENSOR CONNECTOR AND ECM CONNECTOR.** 1)Turn ignition switch to OFF. 2)Disconnect the connectors from throttle position sensor. 3)Measure the resistance of harness between tumble generator valve position sensor connector and engine ground. ***Connector & terminal*** ***(E54) No. 2 — Engine ground:*** Is the measured value less than the specified value?	5 Ω	Go to step **3.**	Repair harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between tumble generator valve position sensor and ECM connector • Poor contact in coupling connector • Poor contact in joint connector
3	**CHECK HARNESS BETWEEN TUMBLE GENERATOR VALVE POSITION SENSOR CONNECTOR AND ECM CONNECTOR.** 1)Turn ignition switch to ON. 2)Measure the voltage between throttle position sensor connector and engine ground. ***Connector & terminal*** ***(E54) No. 3 (+) — Engine ground (−):*** Is the measured value more than the specified value?	4.9 V	Repair short circuit to battery in harness between tumble generator valve position sensor and ECM connector. After repair, replace the ECM. <Ref. to FU(H4DOTC)-50, Engine Control Module.>	Replace the tumble generator valve position sensor. <Ref. to FU(H4DOTC)-43, Tumble Generator Valve Position Sensor.>

CQ:DTC P1090 — TUMBLE GENERATED VALVE SYSTEM 1 (VALVE OPEN) —

- **DTC DETECTING CONDITION:**
  - Immediately at fault recognition

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to EN(H4DOTC)-49, OPERATION, Clear Memory Mode.> and INSPECTION MODE <Ref. to EN(H4DOTC)-41, Inspection Mode.>.

	Step	Check	Yes	No
1	**CHECK FOR OTHER DIAGNOSTIC TROUBLE CODE (DTC) ON DISPLAY.** Is any other DTC displayed?	Other DTC is displayed.	Inspect the relevant DTC using the “List of Diagnostic Trouble Codes (DTC)”. <Ref. to EN(H4DOTC)-81, List of Diagnostic Trouble Codes (DTC).>	Go to step **2.**
2	**CHECK TUMBLE GENERATOR VALVE RH.** 1)Remove tumble generator valve assembly. 2)Check the tumble generator valve body. Does the tumble generator valve move smoothly? (not dirty nor clogged with foreign particles)	Moves smoothly.	Replace the tumble generator valve assembly. <Ref. to FU(H4DOTC)-41, Tumble Generator Valve Assembly.>	Clean the tumble generator valve.

CR:DTC P1091 — TUMBLE GENERATED VALVE SYSTEM 1 (VALVE CLOSE) —

- **DTC DETECTING CONDITION:**
  - Immediately at fault recognition

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to EN(H4DOTC)-49, OPERATION, Clear Memory Mode.> and INSPECTION MODE <Ref. to EN(H4DOTC)-41, Inspection Mode.>.

	Step	Check	Yes	No
1	**CHECK FOR OTHER DIAGNOSTIC TROUBLE CODE (DTC) ON DISPLAY.** Is any other DTC displayed?	Other DTC is displayed.	Inspect the relevant DTC using the “List of Diagnostic Trouble Codes (DTC)”. <Ref. to EN(H4DOTC)-81, List of Diagnostic Trouble Codes (DTC).>	Go to step **2.**
2	**CHECK TUMBLE GENERATOR VALVE RH.** 1)Remove tumble generator valve assembly. 2)Check the tumble generator valve body. Does the tumble generator valve move smoothly? (not dirty nor clogged with foreign particles)	Moves smoothly.	Replace the tumble generator valve assembly. <Ref. to FU(H4DOTC)-41, Tumble Generator Valve Assembly.>	Clean the tumble generator valve.

CS:DTC P1092 — TUMBLE GENERATED VALVE SYSTEM 2 (VALVE OPEN) —

- **DTC DETECTING CONDITION:**
  - Immediately at fault recognition

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to EN(H4DOTC)-49, OPERATION, Clear Memory Mode.> and INSPECTION MODE <Ref. to EN(H4DOTC)-41, Inspection Mode.>.

	Step	Check	Yes	No
1	**CHECK FOR OTHER DIAGNOSTIC TROUBLE CODE (DTC) ON DISPLAY.** Is any other DTC displayed?	Other DTC is displayed.	Inspect the relevant DTC using the "List of Diagnostic Trouble Codes (DTC)". <Ref. to EN(H4DOTC)-81, List of Diagnostic Trouble Codes (DTC).>	Go to step **2.**
2	**CHECK TUMBLE GENERATOR VALVE RH.** 1)Remove tumble generator valve assembly. 2)Check the tumble generator valve body. Does the tumble generator valve move smoothly? (not dirty nor clogged with foreign particles)	Moves smoothly.	Replace the tumble generator valve assembly. <Ref. to FU(H4DOTC)-41, Tumble Generator Valve Assembly.>	Clean the tumble generator valve.

CT:DTC P1093 — TUMBLE GENERATED VALVE SYSTEM 2 (VALVE CLOSE) —

- **DTC DETECTING CONDITION:**
  - Immediately at fault recognition

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to EN(H4DOTC)-49, OPERATION, Clear Memory Mode.> and INSPECTION MODE <Ref. to EN(H4DOTC)-41, Inspection Mode.>.

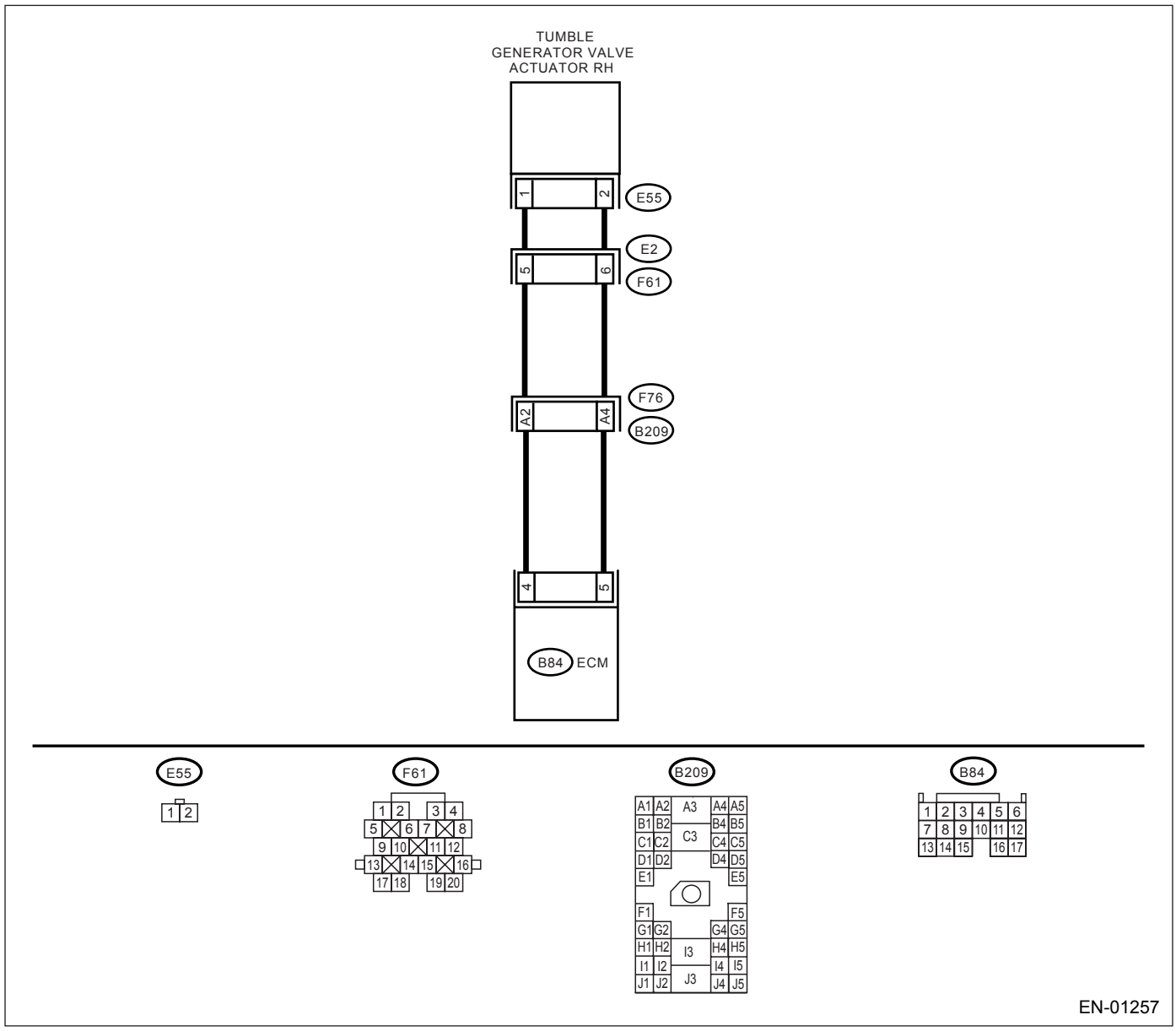
	Step	Check	Yes	No
1	**CHECK FOR OTHER DIAGNOSTIC TROUBLE CODE (DTC) ON DISPLAY.** Is any other DTC displayed?	Other DTC is displayed.	Inspect the relevant DTC using the "List of Diagnostic Trouble Codes (DTC)". <Ref. to EN(H4DOTC)-81, List of Diagnostic Trouble Codes (DTC).>	Go to step **2.**
2	**CHECK TUMBLE GENERATOR VALVE RH.** 1)Remove tumble generator valve assembly. 2)Check the tumble generator valve body. Does the tumble generator valve move smoothly? (not dirty nor clogged with foreign particles)	Moves smoothly.	Replace the tumble generator valve assembly. <Ref. to FU(H4DOTC)-41, Tumble Generator Valve Assembly.>	Clean the tumble generator valve.

CU:DTC P1094 — TUMBLE GENERATED VALVE SIGNAL 1 CIRCUIT MALFUNCTION (OPEN) —

- **DTC DETECTING CONDITION:**
  - Immediately at fault recognition

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to EN(H4DOTC)-49, OPERATION, Clear Memory Mode.> and INSPECTION MODE <Ref. to EN(H4DOTC)-41, Inspection Mode.>.

- **WIRING DIAGRAM:**



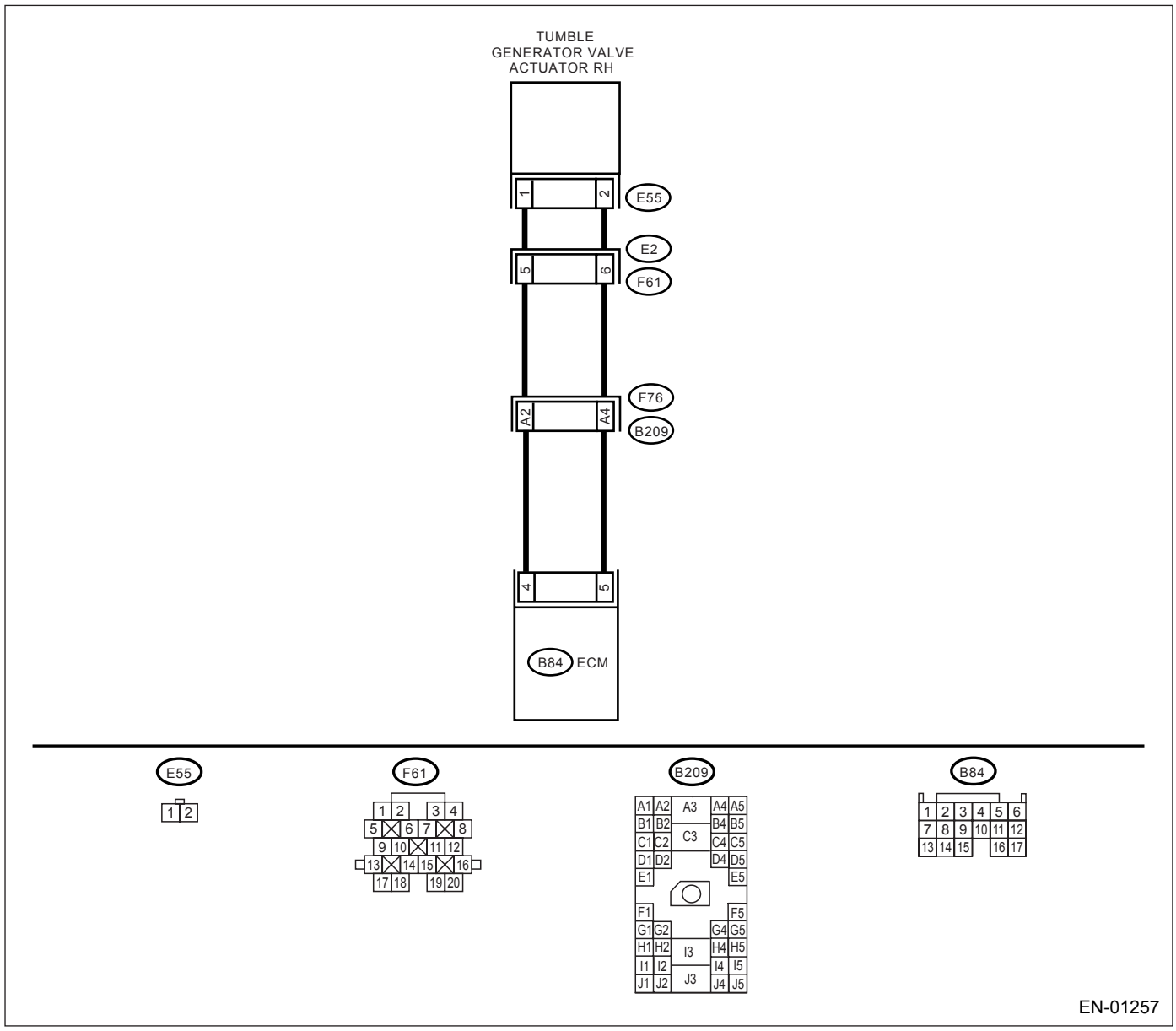
	Step	Check	Yes	No
1	**CHECK HARNESS BETWEEN ECM AND TUMBLE GENERATOR VALVE ACTUATOR CONNECTOR.** 1)Turn ignition switch to OFF. 2)Disconnect connectors from tumble generator valve and ECM connector. 3)Measure the resistance between tumble generator valve actuator and ECM connector. ***Connector & terminal*** ***(E55) No. 1 — (B84) No. 4:*** ***(E55) No. 2 — (B84) No. 5:*** Is the measured value less than the specified value?	1 Ω	Go to step **2.**	Repair open circuit in between ECM and tumble generator valve connector. NOTE: In this case, repair the following: • Open circuit in harness between ECM and tumble generator valve actuator connector • Poor contact in coupling connector
2	**CHECK FOR POOR CONTACT.** Check for poor contact in tumble generator valve actuator connector. Is there poor contact in tumble generator valve actuator connector?	There is poor contact.	Repair poor contact in tumble generator valve actuator connector.	Replace the tumble generator valve actuator. <Ref. to FU(H4DOTC)-42, Tumble Generator Valve Actuator.>

CV:DTC P1095 — TUMBLE GENERATED VALVE SIGNAL 1 CIRCUIT MALFUNCTION (SHORT) —

- **DTC DETECTING CONDITION:**
  - Immediately at fault recognition

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to EN(H4DOTC)-49, OPERATION, Clear Memory Mode.> and INSPECTION MODE <Ref. to EN(H4DOTC)-41, Inspection Mode.>.

- **WIRING DIAGRAM:**



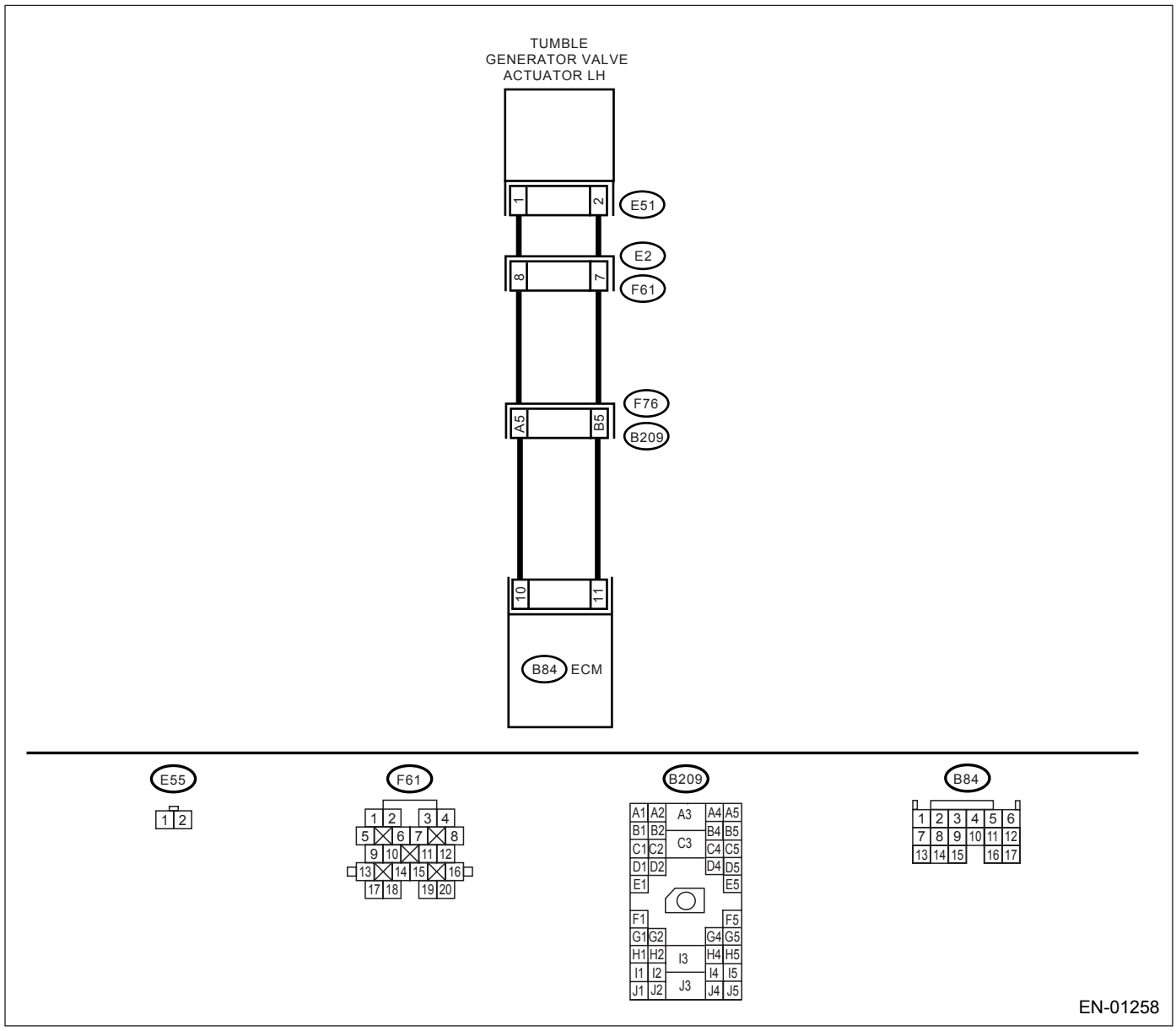
	Step	Check	Yes	No
1	**CHECK HARNESS BETWEEN ECM AND TUMBLE GENERATOR VALVE ACTUATOR CONNECTOR.** 1)Turn ignition switch to OFF. 2)Disconnect the connector from tumble generator valve connector. 3)Measure the voltage between tumble generator valve actuator and chassis ground. ***Connector & terminal*** ***(E55) No. 1 (+) — Chassis ground (−):*** ***(E55) No. 2 (+) — Chassis ground (−):*** Is the measured value less than the specified value?	5 V	Replace the tumble generator valve actuator. <Ref. to FU(H4DOTC)-42, Tumble Generator Valve Actuator.>	Repair short circuit to battery in between ECM and tumble generator valve actuator.

CW:DTC P1096 — TUMBLE GENERATED VALVE SIGNAL 2 CIRCUIT MALFUNCTION (OPEN) —

- **DTC DETECTING CONDITION:**
  - Immediately at fault recognition

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to EN(H4DOTC)-49, OPERATION, Clear Memory Mode.> and INSPECTION MODE <Ref. to EN(H4DOTC)-41, Inspection Mode.>.

- **WIRING DIAGRAM:**



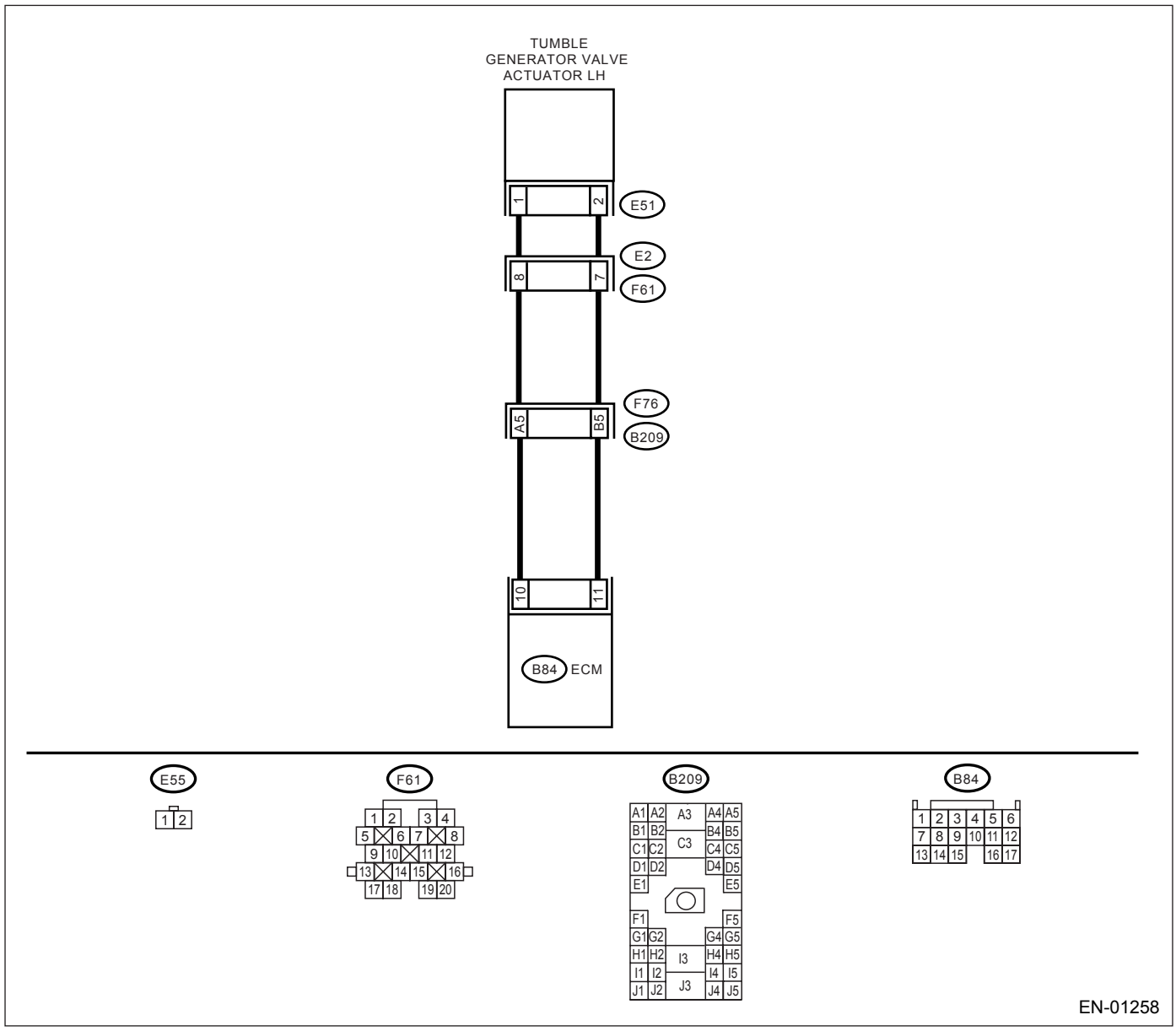
	Step	Check	Yes	No
1	**CHECK HARNESS BETWEEN ECM AND TUMBLE GENERATOR VALVE ACTUATOR CONNECTOR.** 1)Turn ignition switch to OFF. 2)Disconnect connectors from tumble generator valve and ECM connector. 3)Measure the resistance between tumble generator valve actuator and ECM connector. ***Connector & terminal*** ***(E51) No. 1 — (B84) No. 10:*** ***(E51) No. 2— (B84) No. 11:*** Is the measured value less than the specified value?	1 Ω	Go to step **2.**	Repair open circuit in between ECM and tumble generator valve connector. NOTE: In this case, repair the following: • Open circuit in harness between ECM and tumble generator valve actuator connector • Poor contact in coupling connector
2	**CHECK FOR POOR CONTACT.** Check for poor contact in tumble generator valve actuator connector. Is there poor contact in tumble generator valve actuator connector?	There is poor contact.	Repair poor contact in tumble generator valve actuator connector.	Replace the tumble generator valve actuator. <Ref. to FU(H4DOTC)-42, Tumble Generator Valve Actuator.>

CX:DTC P1097 — TUMBLE GENERATED VALVE SIGNAL 2 CIRCUIT MALFUNCTION (SHORT) —

- **DTC DETECTING CONDITION:**
  - Immediately at fault recognition

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to EN(H4DOTC)-49, OPERATION, Clear Memory Mode.> and INSPECTION MODE <Ref. to EN(H4DOTC)-41, Inspection Mode.>.

- **WIRING DIAGRAM:**



	Step	Check	Yes	No
1	**CHECK HARNESS BETWEEN ECM AND TUMBLE GENERATOR VALVE ACTUATOR CONNECTOR.** 1)Turn ignition switch to OFF. 2)Disconnect the connector from tumble generator valve connector. 3)Measure the voltage between tumble generator valve actuator and chassis ground. ***Connector & terminal*** ***(E51) No. 1 (+) — Chassis ground (−):*** ***(E51) No. 2 (+) — Chassis ground (−):*** Is the measured value less than the specified value?	5 V	Replace the tumble generator valve actuator. <Ref. to FU(H4DOTC)-42, Tumble Generator Valve Actuator.>	Repair short circuit to battery in between ECM and tumble generator valve actuator.

CY:DTC P1110 — ATMOSPHERIC PRESSURE SENSOR CIRCUIT MALFUNCTION (LOW INPUT) —

- **DTC DETECTING CONDITION:**
  - Immediately at fault recognition

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to EN(H4DOTC)-49, OPERATION, Clear Memory Mode.> and INSPECTION MODE <Ref. to EN(H4DOTC)-41, Inspection Mode.>.

	Step	Check	Yes	No
1	**CHECK FOR OTHER DIAGNOSTIC TROUBLE CODE (DTC) ON DISPLAY.** Does the Subaru Select Monitor or OBD-II general scan tool indicate DTC P1110?	DTC P1110 is indicated.	Replace the ECM. <Ref. to FU(H4DOTC)-50, Engine Control Module.> NOTE: The barometric pressure sensor is incorporated in the ECM.	There was a temporary poor contact.

CZ:DTC P1111 — ATMOSPHERIC PRESSURE SENSOR CIRCUIT MALFUNCTION (HIGH INPUT) —

- **DTC DETECTING CONDITION:**
  - Immediately at fault recognition

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to EN(H4DOTC)-49, OPERATION, Clear Memory Mode.> and INSPECTION MODE <Ref. to EN(H4DOTC)-41, Inspection Mode.>.

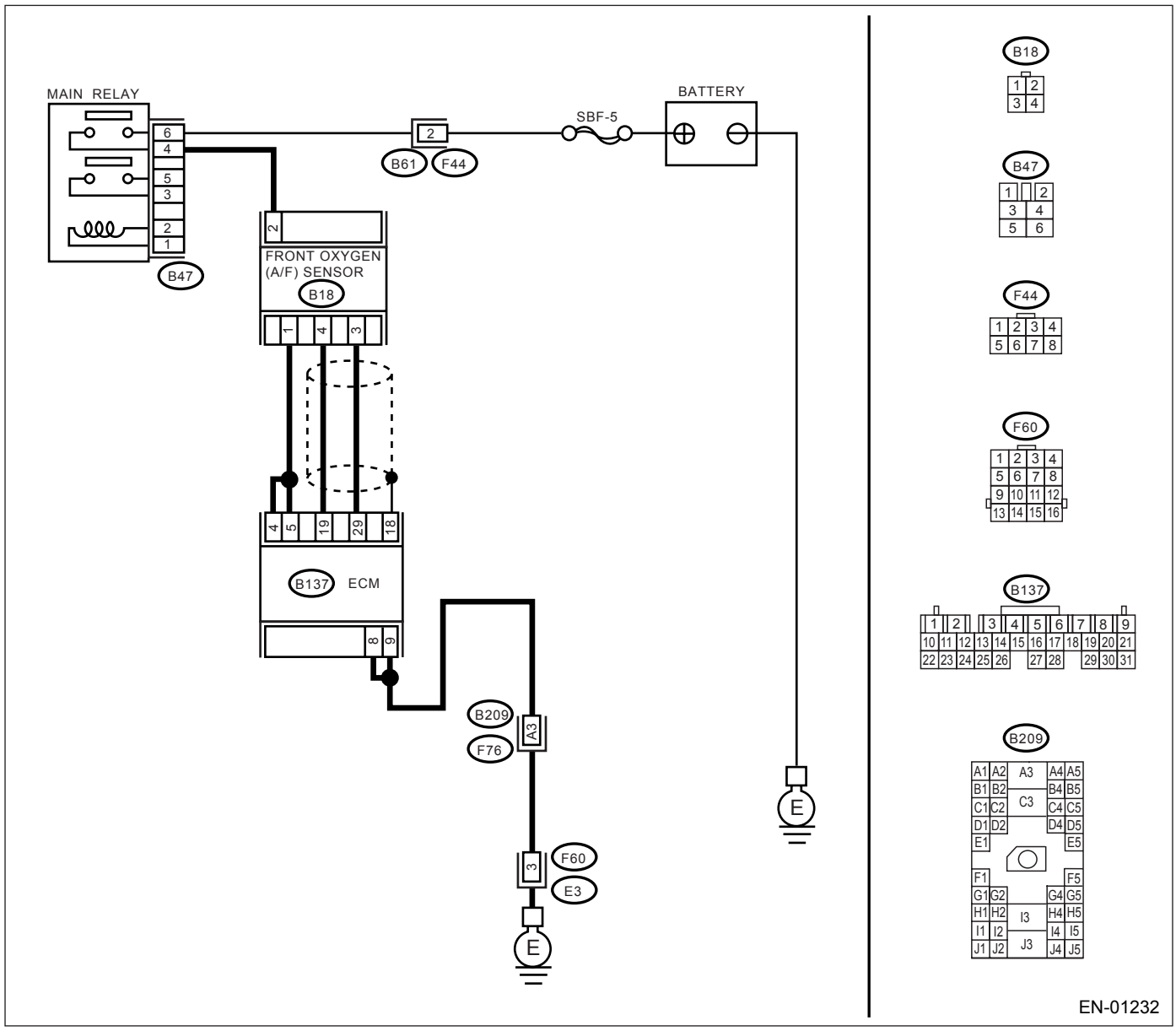
	Step	Check	Yes	No
1	**CHECK FOR OTHER DIAGNOSTIC TROUBLE CODE (DTC) ON DISPLAY.** Does the Subaru Select Monitor or OBD-II general scan tool indicate DTC P1111?	DTC P1111 is indicated.	Replace the ECM. <Ref. to FU(H4DOTC)-50, Engine Control Module.> NOTE: The barometric pressure sensor is incorporated in the ECM.	There was a temporary poor contact.

DA: DTC P1134 — A/F SENSOR MICRO-COMPUTER PROBLEM —

- **DTC DETECTING CONDITION:**
  - Immediately at fault recognition

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to EN(H4DOTC)-49, OPERATION, Clear Memory Mode.> and INSPECTION MODE <Ref. to EN(H4DOTC)-41, Inspection Mode.>.

- **WIRING DIAGRAM:**



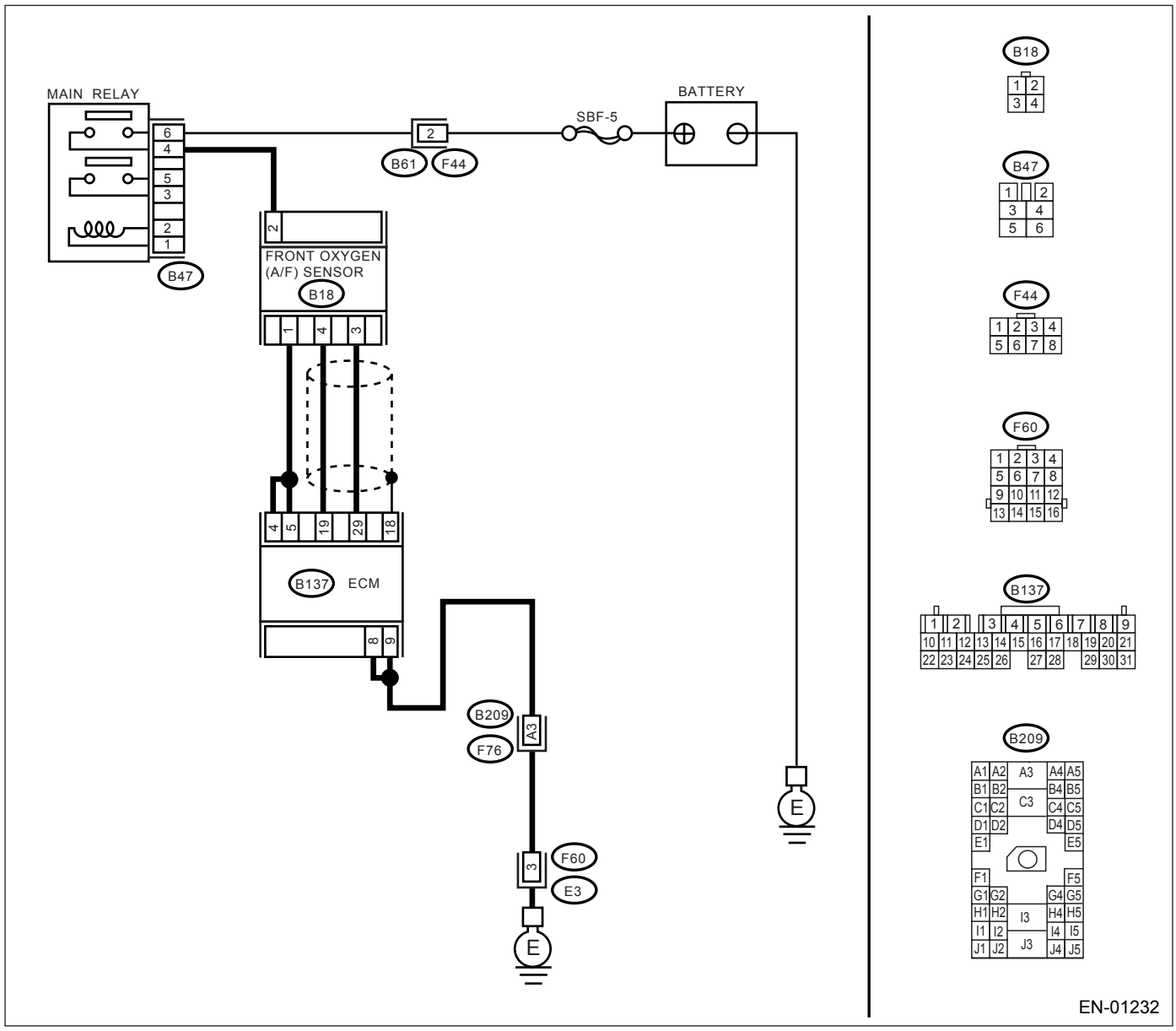
Step		Check	Yes	No
1	**CHECK FOR OTHER DIAGNOSTIC TROUBLE CODE (DTC) ON DISPLAY.** Does the Subaru Select Monitor or OBD-II general scan tool indicate DTC P1134?	DTC P1134 is indicated.	Replace the ECM. <Ref. to FU(H4DOTC)-50, Engine Control Module.>	There was a temporary poor contact.

DB:DTC P1152 — O_2 SENSOR CIRCUIT RANGE/PERFORMANCE (LOW) (BANK1 SENSOR1) —

- **DTC DETECTING CONDITION:**
  - Fault occurs in two consecutive driving cycles

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to EN(H4DOTC)-49, OPERATION, Clear Memory Mode.> and INSPECTION MODE <Ref. to EN(H4DOTC)-41, Inspection Mode.>.

- **WIRING DIAGRAM:**



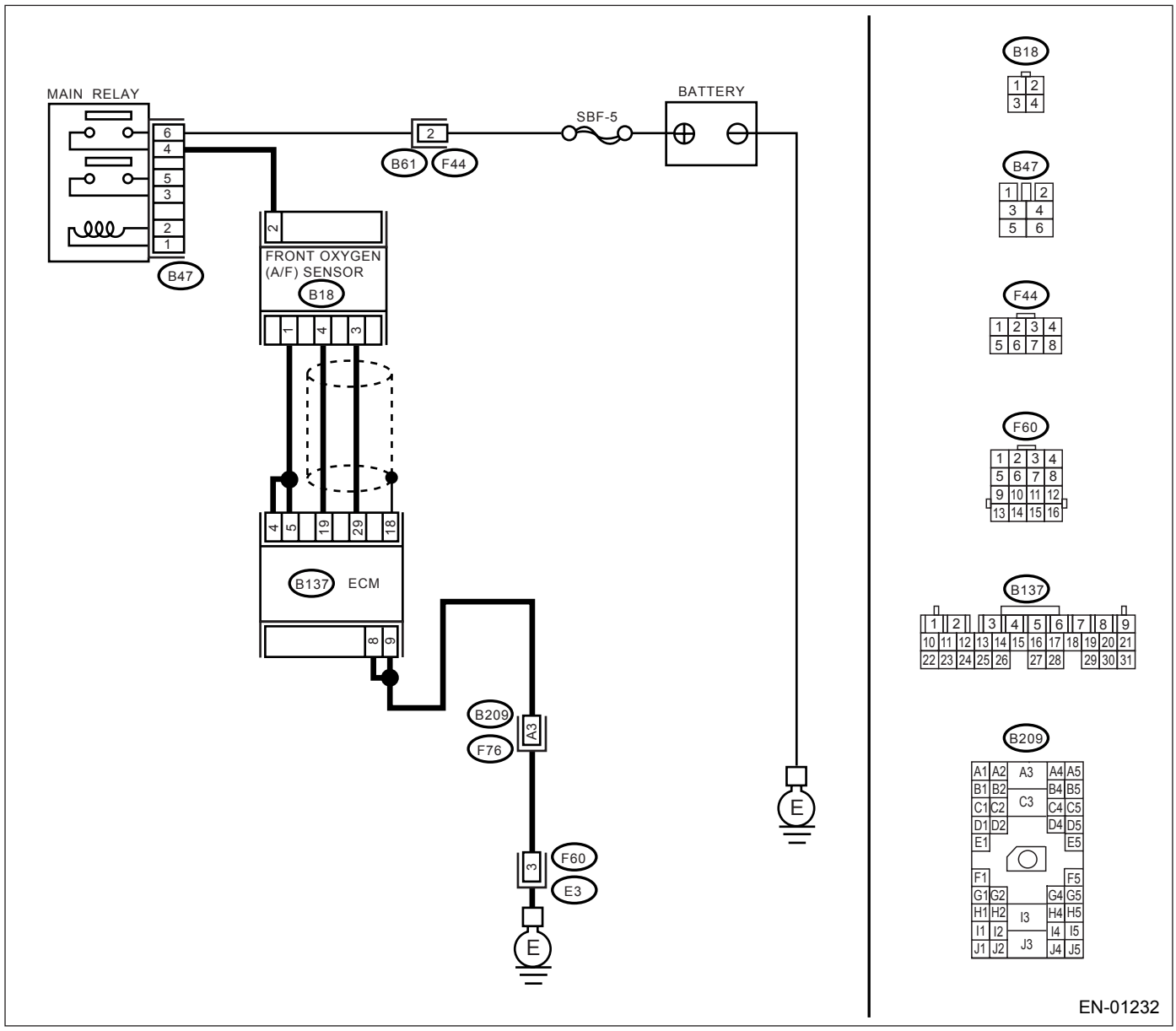
	Step	Check	Yes	No
1	**CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR CONNECTOR.** 1)Turn ignition switch to OFF. 2)Disconnect the connector from ECM and front oxygen (A/F) sensor connector. 3)Measure the resistance of harness between ECM and front oxygen (A/F) sensor connector. ***Connector & terminal*** ***(B137) No. 29 — (B18) No. 3:*** ***(B137) No. 19 — (B18) No. 4:*** Is the measured value less than the specified value?	1 Ω	Go to step **2.**	Repair harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between ECM and front oxygen (A/F) sensor connector • Poor contact in front oxygen (A/F) sensor connector • Poor contact in ECM connector
2	**CHECK FOR POOR CONTACT.** Check for poor contact in front oxygen (A/F) sensor connector. Is there poor contact in front oxygen (A/F) sensor connector?	There is poor contact.	Repair poor contact in front oxygen (A/F) sensor connector.	Replace the front oxygen (A/F) sensor. <Ref. to FU(H4DOTC)-45, Front Oxygen (A/F) Sensor.>

DC:DTC P1153 — O_2 SENSOR CIRCUIT RANGE/PERFORMANCE (HIGH) (BANK1 SENSOR1) —

- **DTC DETECTING CONDITION:**
  - Fault occurs in two consecutive driving cycles

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to EN(H4DOTC)-49, OPERATION, Clear Memory Mode.> and INSPECTION MODE <Ref. to EN(H4DOTC)-41, Inspection Mode.>.

- **WIRING DIAGRAM:**



	Step	Check	Yes	No
1	**CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR CONNECTOR.** 1)Turn ignition switch to OFF. 2)Disconnect the connector from ECM. 3)Measure the resistance of harness between ECM connector and chassis ground. ***Connector & terminal*** ***(B137) No. 19 — Chassis ground:*** Is the measured value more than the specified value?	10 Ω	Go to step **2.**	Repair the short circuit to ground in harness between ECM and front oxygen (A/F) sensor connector.
2	**CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR CONNECTOR.** Measure the resistance of harness between ECM connector and chassis ground. ***Connector & terminal*** ***(B137) No. 29 — Chassis ground:*** Is the measured value more than the specified value?	10 Ω	Go to step **3.**	Repair the short circuit to ground in harness between ECM and front oxygen (A/F) sensor connector.
3	**CHECK OUTPUT SIGNAL FOR ECM.** 1)Connect the connector to ECM. 2)Turn ignition switch to ON. 3)Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B137) No. 19 (+) — Chassis ground (−):*** Is the measured value more than the specified value?	4.5 V	Go to step **4.**	Go to step **5.**
4	**CHECK OUTPUT SIGNAL FOR ECM.** Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B137) No. 19 (+) — Chassis ground (−):*** Is the measured value more than the specified value?	10 V	Repair the short circuit to battery in harness between ECM and front oxygen (A/F) sensor connector. After repair, replace the ECM. <Ref. to FU(H4DOTC)-50, Engine Control Module.>	Repair poor contact in ECM connector.
5	**CHECK OUTPUT SIGNAL FOR ECM.** Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B137) No. 29 (+) — Chassis ground (−):*** Is the measured value more than the specified value?	4.95 V	Go to step **6.**	Replace the front oxygen (A/F) sensor. <Ref. to FU(H4DOTC)-45, Front Oxygen (A/F) Sensor.>

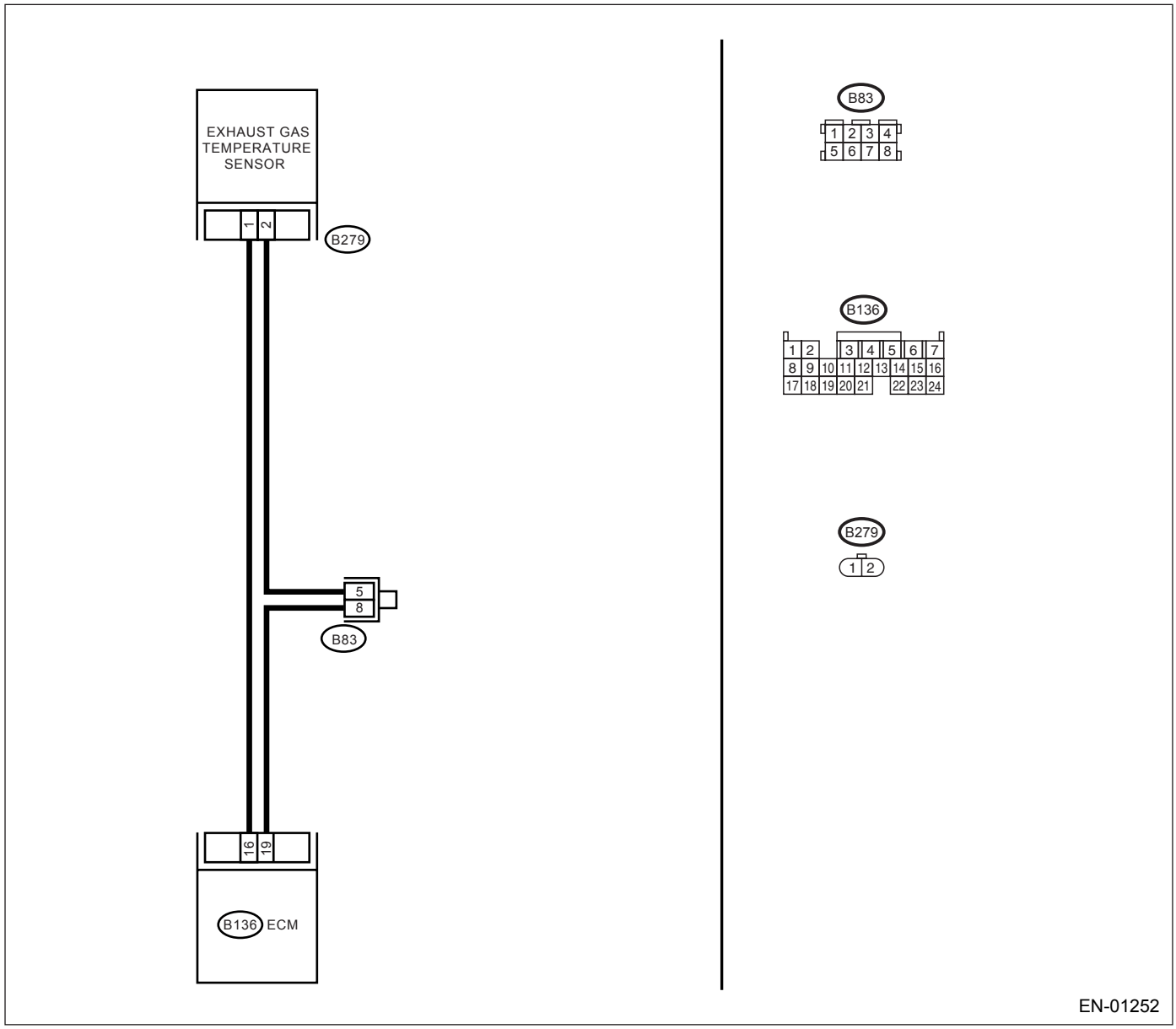
	Step	Check	Yes	No
6	**CHECK OUTPUT SIGNAL FOR ECM.** Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B137) No. 29 (+) — Chassis ground (−):*** Is the measured value more than the specified value?	10 V	Repair the short circuit to battery in harness between ECM and front oxygen (A/F) sensor connector. After repair, replace the ECM. <Ref. to FU(H4DOTC)-50, Engine Control Module.>	Repair poor contact in ECM connector.

DD:DTC P1301 — MISFIRE DITECTED (HIGH TEMPERATURE EXHAUST GAS) —

- **DTC DETECTING CONDITION:**
  - Immediately at fault recognition
- **TROUBLE SYMPTOM:**
  - Erroneous idling
  - Engine stalls
  - Poor driving performance

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to EN(H4DOTC)-49, OPERATION, Clear Memory Mode.> and INSPECTION MODE <Ref. to EN(H4DOTC)-41, Inspection Mode.>.

- **WIRING DIAGRAM:**



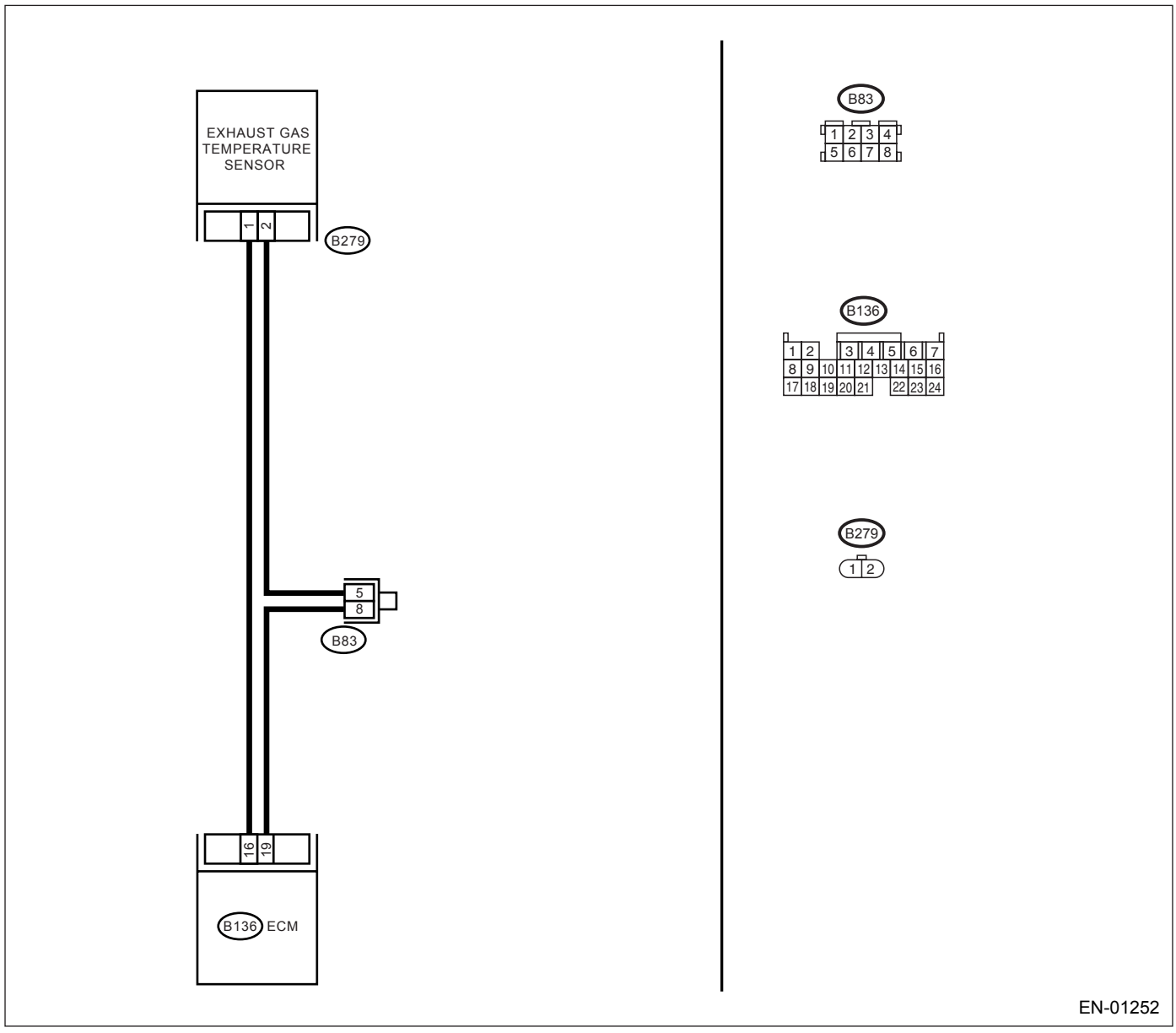
	Step	Check	Yes	No
1	**CHECK DIAGNOSTIC TROUBLE CODE (DTC).** Carry out troubleshooting for DTC P0301, P0302, P0303 or P0304. <Ref. to EN(H4DOTC)-81, List of Diagnostic Trouble Codes (DTC).> Does a fault which need repair or replacement exist?	Exists.	Repair or replace faulty parts and replace the pre-catalytic converter.	Contact SOA (distributor) service. NOTE: Inspection by DTM is required, because probable cause is deterioration of multiple parts.

DE:DTC P1312 — EXHAUST GAS TEMPERATURE SENSOR MALFUNCTION —

- **DTC DETECTING CONDITION:**
  - Immediately at fault recognition

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to EN(H4DOTC)-49, OPERATION, Clear Memory Mode.> and INSPECTION MODE <Ref. to EN(H4DOTC)-41, Inspection Mode.>.

- **WIRING DIAGRAM:**



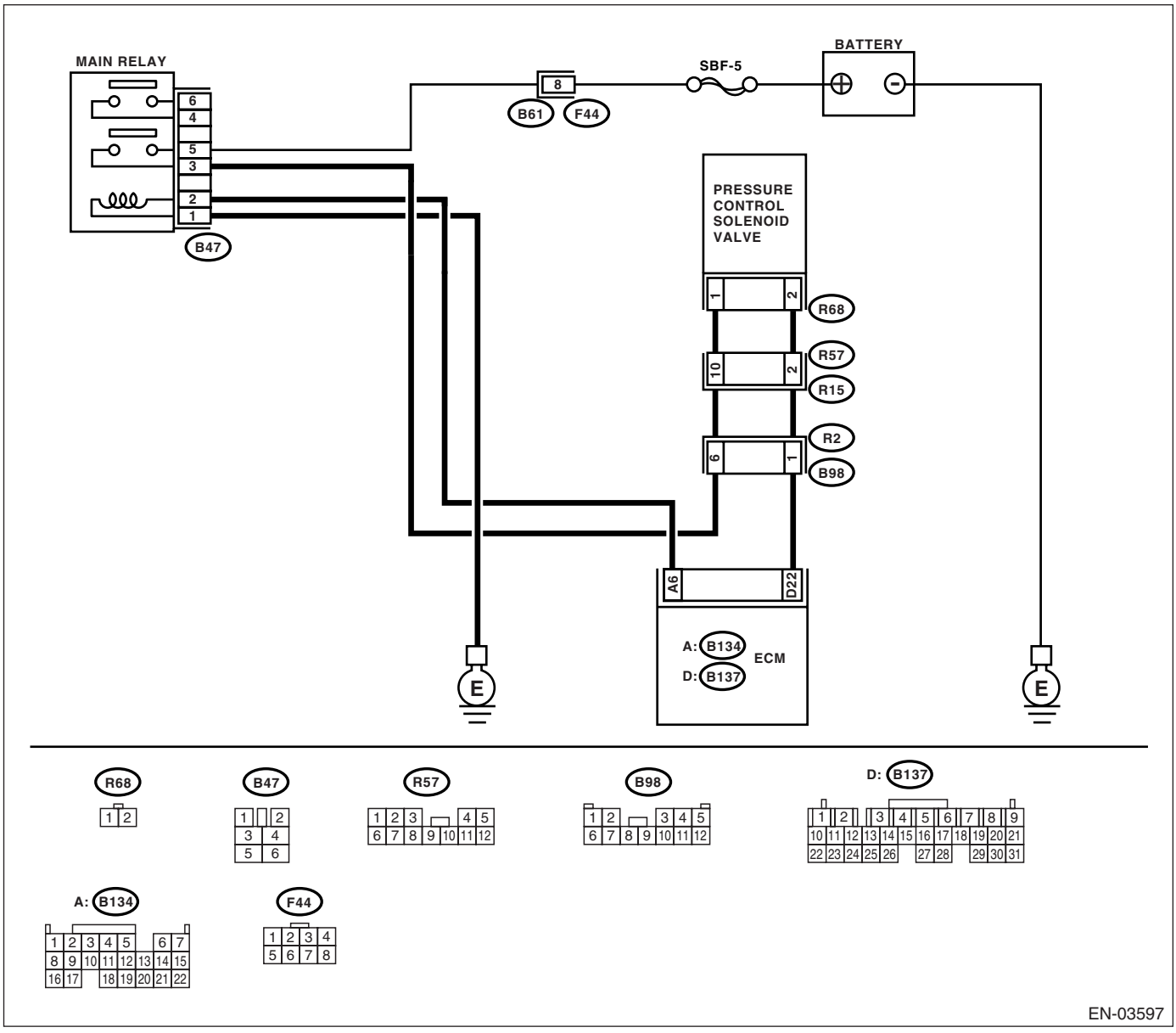
	Step	Check	Yes	No
1	**CHECK FOR OTHER DIAGNOSTIC TROUBLE CODE (DTC) ON DISPLAY.** Is any other DTC displayed?	Other DTC is displayed.	Inspect the relevant DTC using the “List of Diagnostic Trouble Codes (DTC)”. <Ref. to EN(H4DOTC)-81, List of Diagnostic Trouble Codes (DTC).> NOTE: In this case, it is not necessary to inspect DTC P1312.	Replace the exhaust gas temperature sensor. <Ref. to FU(H4DOTC)-49, Exhaust Temperature Sensor.>

DF:DTC P1400 — FUEL TANK PRESSURE CONTROL SOLENOID VALVE CIRCUIT LOW —

- **DTC DETECTING CONDITION:**
  - Fault occurs in two consecutive driving cycles

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to EN(H4DOTC)-49, OPERATION, Clear Memory Mode.> and INSPECTION MODE <Ref. to EN(H4DOTC)-41, OPERATION, Inspection Mode.>.

- **WIRING DIAGRAM:**



	Step	Check	Yes	No
1	**CHECK OUTPUT SIGNAL FROM ECM.** 1)Turn ignition switch to ON. 2)Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B137) No. 22 (+) — Chassis ground (−):*** Is the measured value more than the specified value?	10 V	Go to step **2.**	Go to step **3.**
2	**CHECK FOR POOR CONTACT.** Check for poor contact in ECM connector. Is there poor contact in ECM connector?	There is poor contact.	Repair poor contact in ECM connector.	Contact with SOA (distributor) service. NOTE: Inspection by DTM is required, because probable cause is deterioration of multiple parts.
3	**CHECK HARNESS BETWEEN PRESSURE CONTROL SOLENOID VALVE AND ECM CONNECTOR.** 1)Turn ignition switch to OFF. 2)Disconnect the connectors from pressure control solenoid valve and ECM. 3)Measure the resistance of harness between pressure control solenoid valve connector and chassis ground. ***Connector & terminal*** ***(R68) No. 2 — Chassis ground:*** Is the measured value less than the specified value?	10 Ω	Repair short circuit to ground in harness between ECM and pressure control solenoid valve connector.	Go to step **4.**
4	**CHECK HARNESS BETWEEN PRESSURE CONTROL SOLENOID VALVE AND ECM CONNECTOR.** Measure the resistance of harness between ECM and pressure control solenoid valve connector. ***Connector & terminal*** ***(B137) No. 22 — (R68) No. 2:*** Is the measured value less than the specified value?	1 Ω	Go to step **5.**	Repair harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between ECM and pressure control solenoid valve connector • Poor contact in coupling connector
5	**CHECK PRESSURE CONTROL SOLENOID VALVE.** Measure the resistance between pressure control solenoid valve terminals. ***Terminal*** ***No. 1 — No. 2:*** Is the measured value within the specified range?	10 — 100 Ω	Go to step **6.**	Replace the pressure control solenoid valve. <Ref. to EC(H4DOTC)-13, Pressure Control Solenoid Valve.>

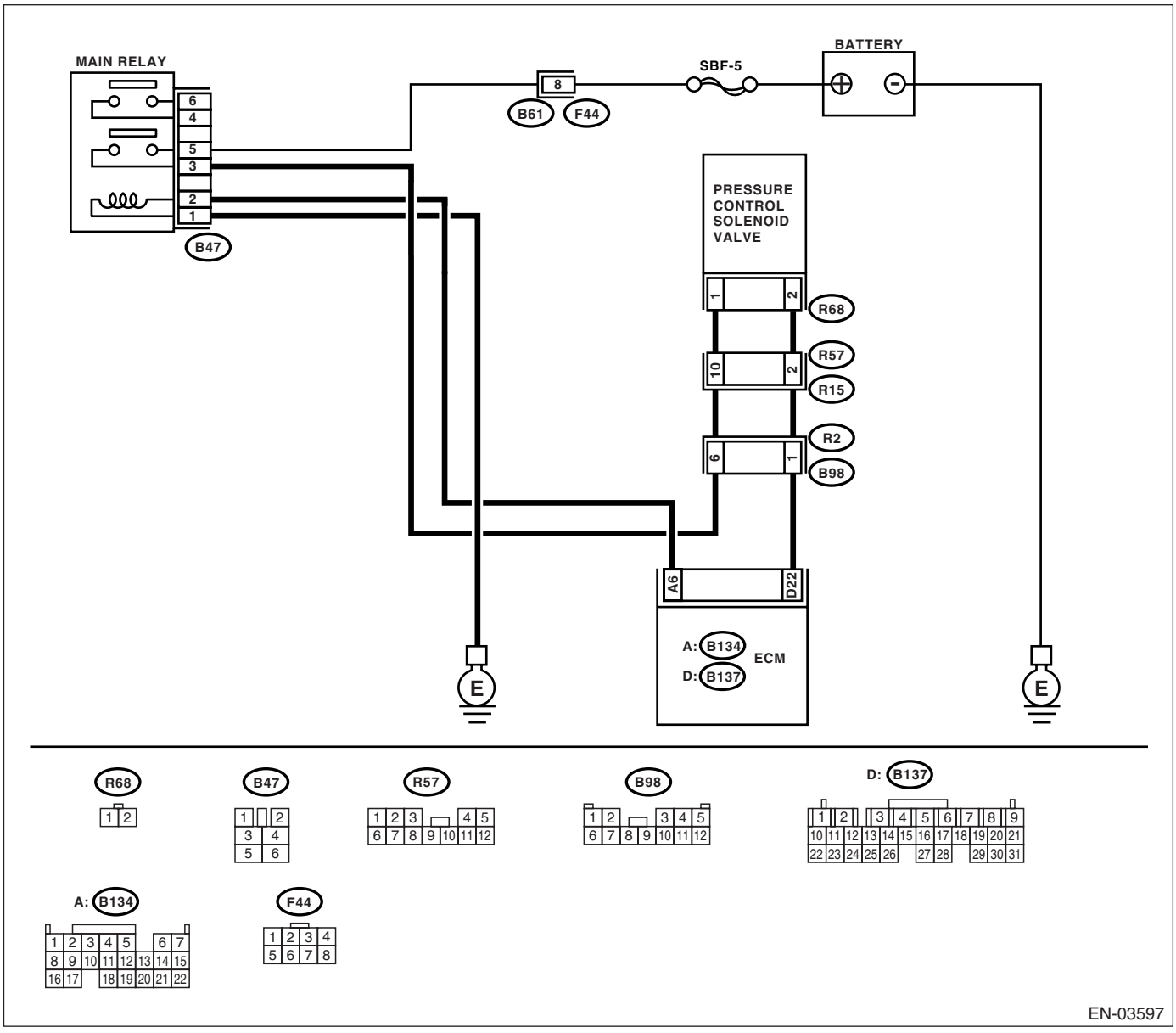
	Step	Check	Yes	No
6	**CHECK POWER SUPPLY TO PRESSURE CONTROL SOLENOID VALVE.** 1)Turn ignition switch to ON. 2)Measure the voltage between pressure control solenoid valve and chassis ground. ***Connector & terminal*** ***(R68) No. 1 (+) — Chassis ground (−):*** Is the measured value more than the specified value?	10 V	Go to step **7.**	Repair harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between main relay and pressure control solenoid valve connector • Poor contact in coupling connector • Poor contact in main relay connector
7	**CHECK FOR POOR CONTACT.** Check for poor contact in pressure control solenoid valve connector. Is there poor contact in pressure control solenoid valve connector?	There is poor contact.	Repair poor contact in pressure control solenoid valve connector.	Contact with SOA (distributor) service. NOTE: Inspection by DTM is required, because probable cause is deterioration of multiple parts.

DG:DTC P1420 — FUEL TANK PRESSURE CONTROL SOL. VALVE CIRCUIT HIGH —

- **DTC DETECTING CONDITION:**
  - Fault occurs in two consecutive driving cycles

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to EN(H4DOTC)-49, OPERATION, Clear Memory Mode.> and INSPECTION MODE <Ref. to EN(H4DOTC)-41, OPERATION, Inspection Mode.>.

- **WIRING DIAGRAM:**



	Step	Check	Yes	No
1	**CHECK INPUT SIGNAL FOR ECM.** 1)Turn ignition switch to OFF. 2)Connect the test mode connector at the lower portion of instrument panel (on the driver's side). 3)Turn ignition switch to ON. 4)While operating the pressure control solenoid valve, measure voltage between ECM and chassis ground. NOTE: Pressure control solenoid valve operation can be executed using Subaru Select Monitor. For the procedure, refer to "Compulsory Valve Operation Check Mode". <Ref. to EN(H4DOTC)-50, Compulsory Valve Operation Check Mode.> ***Connector & terminal*** ***(B137) No. 22 (+) — Chassis ground (−):*** Does the measured value change within the specified range?	0 — 10 V	Go to step **2.**	The MIL may light up, however, the circuit is returned to the normal status at the moment. In this case, repair poor contact in ECM connector.
2	**CHECK INPUT SIGNAL FOR ECM.** 1)Turn ignition switch to ON. 2)Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B137) No. 22 (+) — Chassis ground (−):*** Is the measured value more than the specified value?	10 V	Go to step **4.**	Go to step **3.**
3	**CHECK FOR POOR CONTACT.** Check for poor contact in ECM connector. Is there poor contact in ECM connector?	There is poor contact.	Repair poor contact in ECM connector.	Replace the ECM. <Ref. to FU(H4DOTC)-50, Engine Control Module.>
4	**CHECK HARNESS BETWEEN PRESSURE CONTROL SOLENOID VALVE AND ECM CONNECTOR.** 1)Turn ignition switch to OFF. 2)Disconnect the connector from pressure control solenoid valve. 3)Turn ignition switch to ON. 4)Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B137) No. 22 (+) — Chassis ground (−):*** Is the measured value more than the specified value?	10 V	Repair short circuit to battery in harness between ECM and pressure control solenoid valve connector. After repair, replace the ECM. <Ref. to FU(H4DOTC)-50, Engine Control Module.>	Go to step **5.**
5	**CHECK PRESSURE CONTROL SOLENOID VALVE.** 1)Turn ignition switch to OFF. 2)Measure the resistance between pressure control solenoid valve terminals. ***Terminal*** ***No. 1 — No. 2:*** Is the measured value less than the specified value?	1 Ω	Replace the pressure control solenoid valve <Ref. to EC(H4DOTC)-13, Pressure Control Solenoid Valve.> and the ECM <Ref. to FU(H4DOTC)-50, Engine Control Module.>.	Go to step **6.**

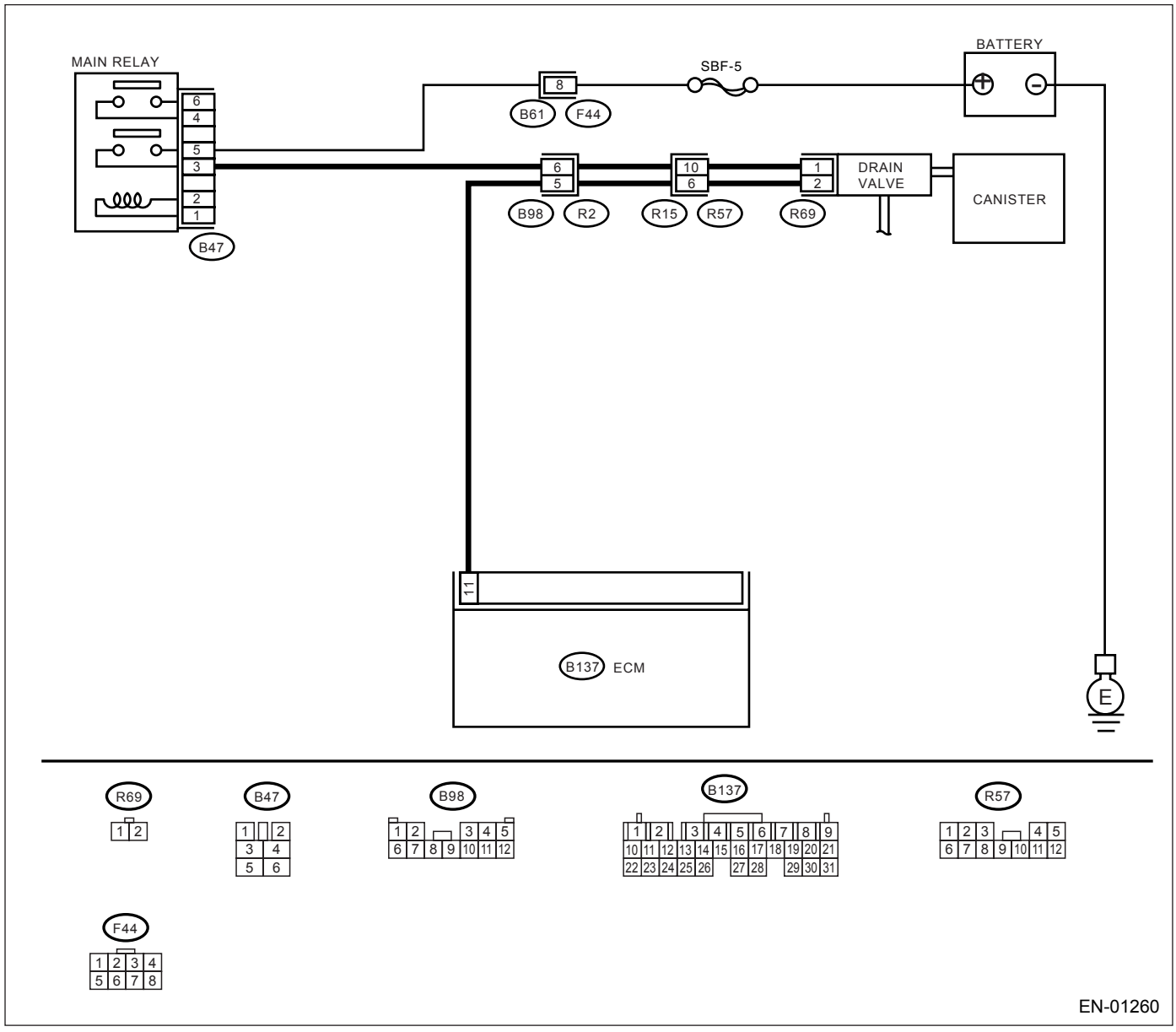
	Step	Check	Yes	No
6	**CHECK FOR POOR CONTACT.** Check for poor contact in ECM connector. Is there poor contact in ECM connector?	There is poor contact.	Repair poor contact in ECM connector.	Replace the ECM. <Ref. to FU(H4DOTC)-50, Engine Control Module.>

DH:DTC P1443 — VENT CONTROL SOLENOID VALVE FUNCTION PROBLEM —

- **DTC DETECTING CONDITION:**
  - Immediately after fault occurrence
- **TROUBLE SYMPTOM:**
  - Improper fuel supply

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to EN(H4DOTC)-49, OPERATION, Clear Memory Mode.> and INSPECTION MODE <Ref. to EN(H4DOTC)-41, OPERATION, Inspection Mode.>.

- **WIRING DIAGRAM:**



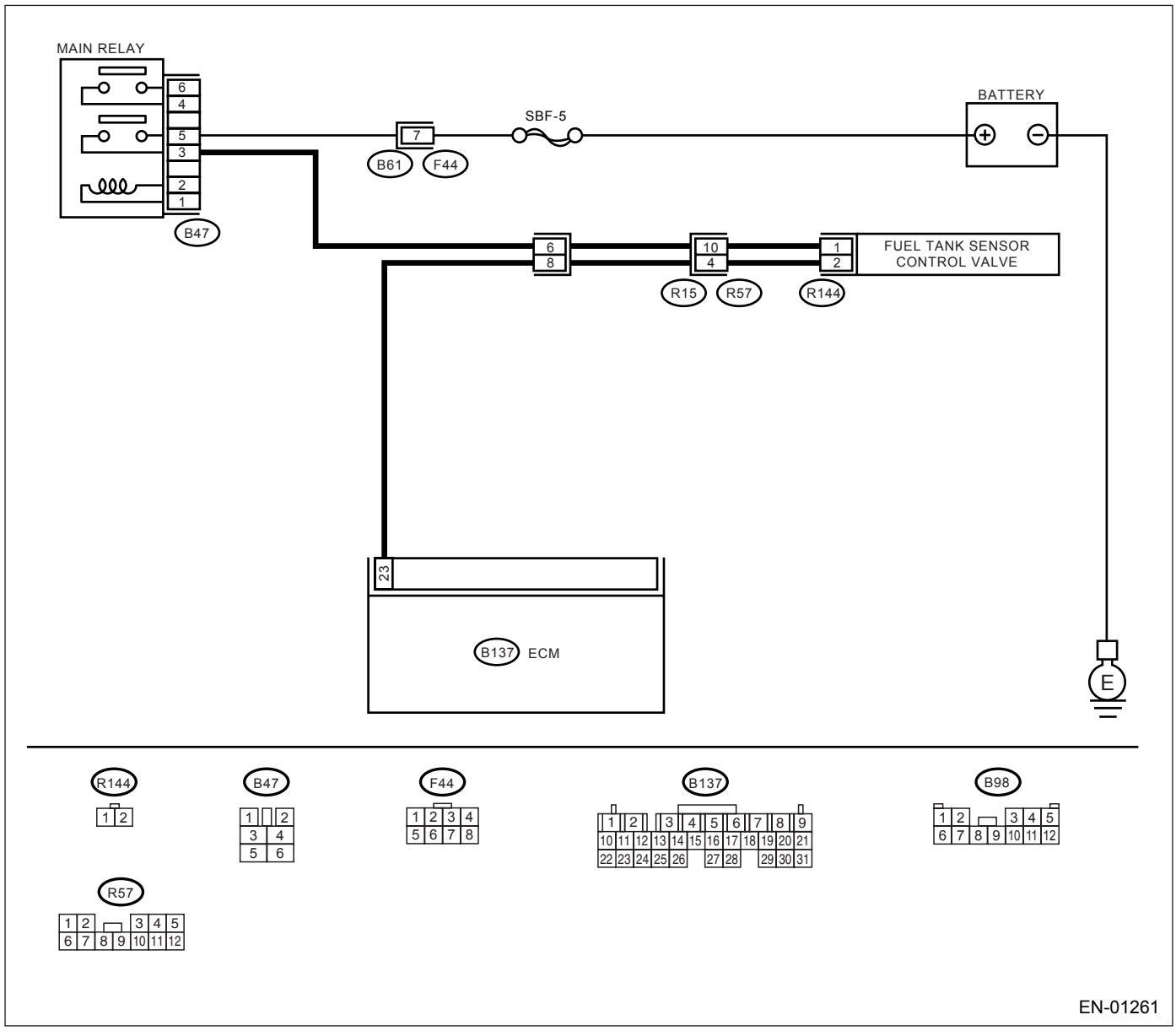
	Step	Check	Yes	No
1	**CHECK FOR OTHER DTC ON DISPLAY.** Is any other DTC displayed?	Other DTC is displayed.	Inspect the relevant DTC using "List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H4DOTC)-81, List of Diagnostic Trouble Codes (DTC).>	Go to step **2.**
2	**CHECK VENT LINE HOSES.** Check the following items. •Clogging of vent hoses between canister and drain valve •Clogging of vent hose between drain valve and air filter •Clogging of drain filter Is there a fault in vent line?	There is a fault.	Repair or replace faulty parts.	Go to step **3.**
3	**CHECK DRAIN VALVE OPERATION.** 1)Turn ignition switch to OFF. 2)Connect the test mode connector at the lower portion of instrument panel (on the driver's side). 3)Turn ignition switch to ON. 4)Operate the drain valve. Does the drain valve operate? NOTE: Drain valve operation can also be executed using Subaru Select Monitor. For the procedure, refer to "Compulsory Valve Operation Check Mode". <Ref. to EN(H4DOTC)-50, Compulsory Valve Operation Check Mode.>	Starter operates.	Contact with SOA (distributor) service. NOTE: Inspection by DTM is required, because probable cause is deterioration of multiple parts.	Replace the drain valve. <Ref. to EC(H4DOTC)-19, Drain Valve.>

DI: DTC P1446 — FUEL TANK SENSOR CONTROL VALVE CIRCUIT LOW —

- **DTC DETECTING CONDITION:**
  - Fault occurs in two consecutive driving cycles

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to EN(H4DOTC)-49, OPERATION, Clear Memory Mode.> and INSPECTION MODE <Ref. to EN(H4DOTC)-41, OPERATION, Inspection Mode.>.

- **WIRING DIAGRAM:**



	Step	Check	Yes	No
1	**CHECK OUTPUT SIGNAL FROM ECM.** 1)Turn ignition switch to ON. 2)Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B137) No. 23 (+) — Chassis ground (−):*** Is the measured value more than the specified value?	10 V	Go to step **2.**	Go to step **3.**
2	**CHECK FOR POOR CONTACT.** Check for poor contact in ECM connector. Is there poor contact in ECM connector?	There is poor contact.	Repair poor contact in ECM connector.	The MIL may light up, however, the circuit is returned to the normal status at the moment. (However, the possibility of poor contact still remains.)j NOTE: In this case, repair the following: • Poor contact in fuel tank sensor control valve connector • Poor contact in ECM connector • Poor contact in coupling connector
3	**CHECK HARNESS BETWEEN FUEL TANK SENSOR CONTROL VALVE AND ECM CONNECTOR.** 1)Turn ignition switch to OFF. 2)Disconnect the connectors from fuel tank sensor control valve and ECM. 3)Measure the resistance of harness between fuel tank sensor control valve connector and chassis ground. ***Connector & terminal*** ***(R144) No. 2 — Chassis ground:*** Is the measured value more than the specified value?	1 MΩ	Go to step **4.**	Repair short circuit to ground in harness between ECM and fuel tank sensor control valve connector.
4	**CHECK HARNESS BETWEEN FUEL TANK SENSOR CONTROL VALVE AND ECM CONNECTOR.** Measure the resistance of harness between ECM and fuel tank sensor control valve connector. ***Connector & terminal*** ***(B137) No. 23 — (R144) No. 2:*** Is the measured value less than the specified value?	1 Ω	Go to step **5.**	Repair harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between ECM and fuel tank sensor control valve connector • Poor contact in coupling connector

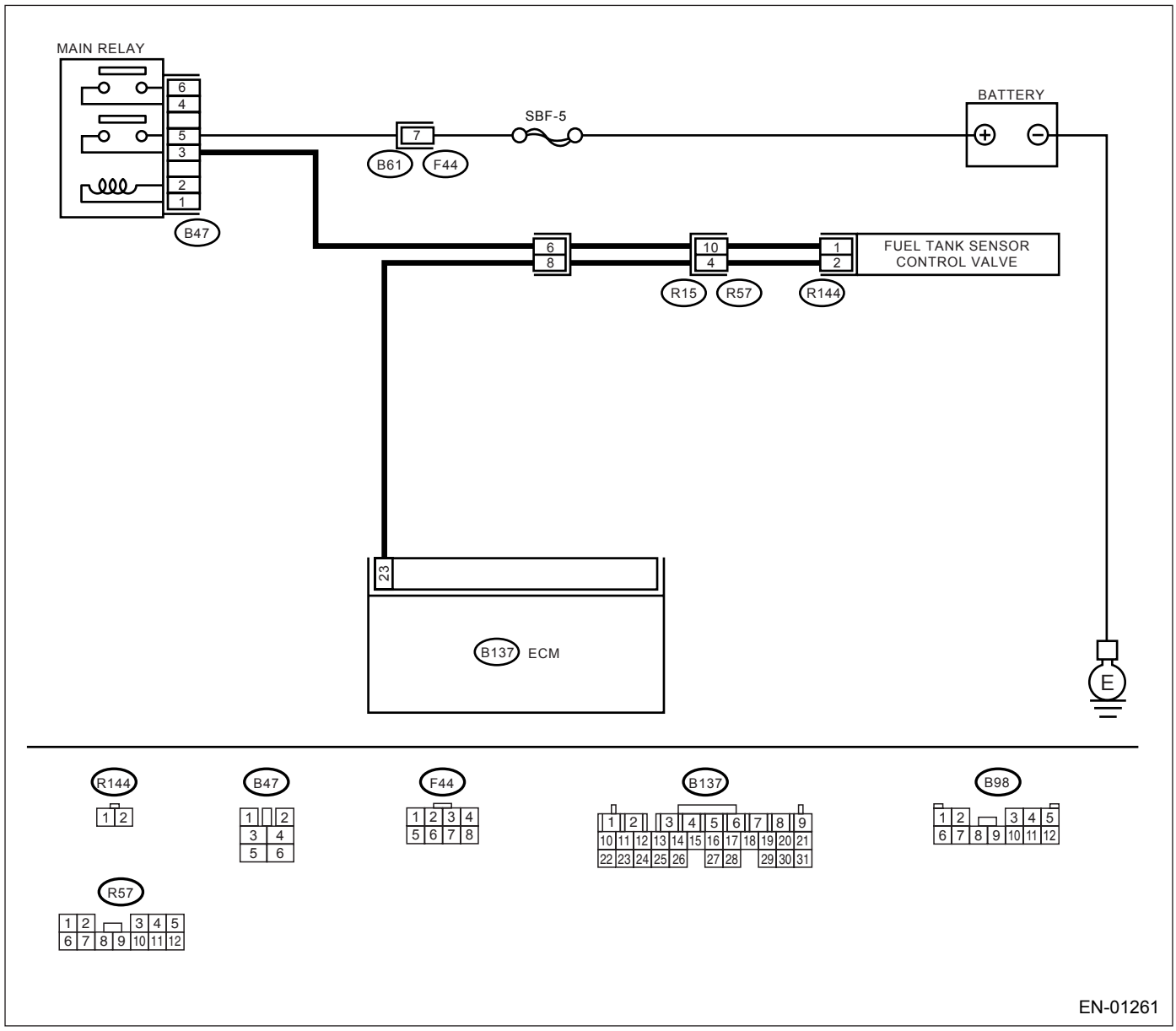
	Step	Check	Yes	No
5	**CHECK FUEL TANK SENSOR CONTROL VALVE.** Measure the resistance between fuel tank sensor control valve terminals. ***Terminal*** ***No. 1 — No. 2:*** Is the measured value within the specified range?	10 — 100 Ω	Go to step **6.**	Replace the fuel tank sensor control valve. <Ref. to EC(H4DOTC)-19, Drain Valve.>
6	**CHECK POWER SUPPLY TO FUEL TANK SENSOR CONTROL VALVE.** 1)Turn ignition switch to ON. 2)Measure the voltage between fuel tank sensor control valve and chassis ground. ***Connector & terminal*** ***(R144) No. 1 (+) — Chassis ground (−):*** Is the measured value more than the specified value?	10 V	Go to step **7.**	Repair harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between main relay and fuel tank sensor control valve • Poor contact in coupling connector • Poor contact in main relay connector
7	**CHECK FOR POOR CONTACT.** Check for poor contact in fuel tank sensor control valve connector. Is there poor contact in fuel tank sensor control valve connector?	There is poor contact.	Repair poor contact in fuel tank sensor control valve connector.	Contact with SOA (distributor) service. NOTE: Inspection by DTM is required, because probable cause is deterioration of multiple parts.

DJ:DTC P1447 — FUEL TANK SENSOR CONTROL VALVE CIRCUIT HIGH —

- **DTC DETECTING CONDITION:**
  - Fault occurs in two consecutive driving cycles

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to EN(H4DOTC)-49, OPERATION, Clear Memory Mode.> and INSPECTION MODE <Ref. to EN(H4DOTC)-41, OPERATION, Inspection Mode.>.

- **WIRING DIAGRAM:**



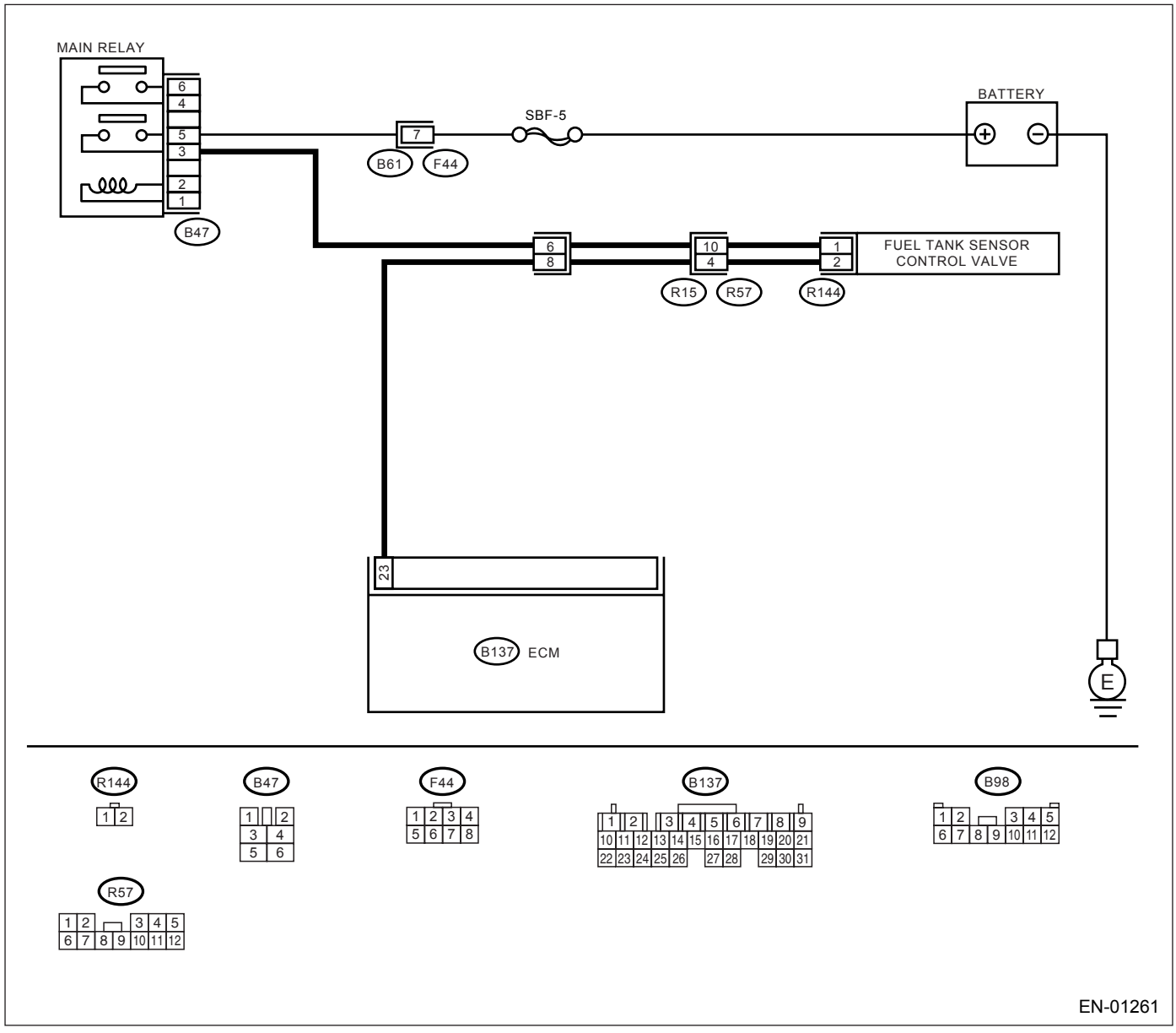
	Step	Check	Yes	No
1	**CHECK OUTPUT SIGNAL FROM ECM.** 1)Turn ignition switch to ON. 2)Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B137) No. 23 (+) — Chassis ground (−):*** Is the measured value more than the specified value?	10 V	Go to step **3.**	Go to step **2.**
2	**CHECK FOR POOR CONTACT.** Check for poor contact in ECM connector. Is there poor contact in ECM connector?	There is poor contact.	Repair poor contact in ECM connector.	Replace the ECM. <Ref. to FU(H4DOTC)-50, Engine Control Module.>
3	**CHECK HARNESS BETWEEN FUEL TANK SENSOR CONTROL VALVE AND ECM CONNECTOR.** 1)Turn ignition switch to OFF. 2)Disconnect the connector from fuel tank sensor control valve. 3)Turn ignition switch to ON. 4)Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B137) No. 23 (+) — Chassis ground (−):*** Is the measured value more than the specified value?	10 V	Repair short circuit to battery in harness between ECM and fuel tank sensor control valve connector. After repair, replace the ECM. <Ref. to FU(H4DOTC)-50, Engine Control Module.>	Go to step **4.**
4	**CHECK FUEL TANK SENSOR CONTROL VALVE.** 1)Turn ignition switch to OFF. 2)Measure the resistance between fuel tank sensor control valve terminals. ***Terminal*** ***No. 1 — No. 2:*** Is the measured value less than the specified value?	1 Ω	Replace the fuel tank sensor control valve <Ref. to EC(H4DOTC)-12, Fuel Tank Sensor Control Valve.> and the ECM <Ref. to FU(H4DOTC)-50, Engine Control Module.>.	Go to step **5.**
5	**CHECK FOR POOR CONTACT.** Check for poor contact in ECM connector. Is there poor contact in ECM connector?	There is poor contact.	Repair poor contact in ECM connector.	Replace the ECM. <Ref. to FU(H4DOTC)-50, Engine Control Module.>

DK:DTC P1448 — FUEL TANK SENSOR CONTROL VALVE RANGE/PERFORMANCE —

- **DTC DETECTING CONDITION:**
  - Fault occurs in two consecutive driving cycles

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to EN(H4DOTC)-49, OPERATION, Clear Memory Mode.> and INSPECTION MODE <Ref. to EN(H4DOTC)-41, OPERATION, Inspection Mode.>.

- **WIRING DIAGRAM:**



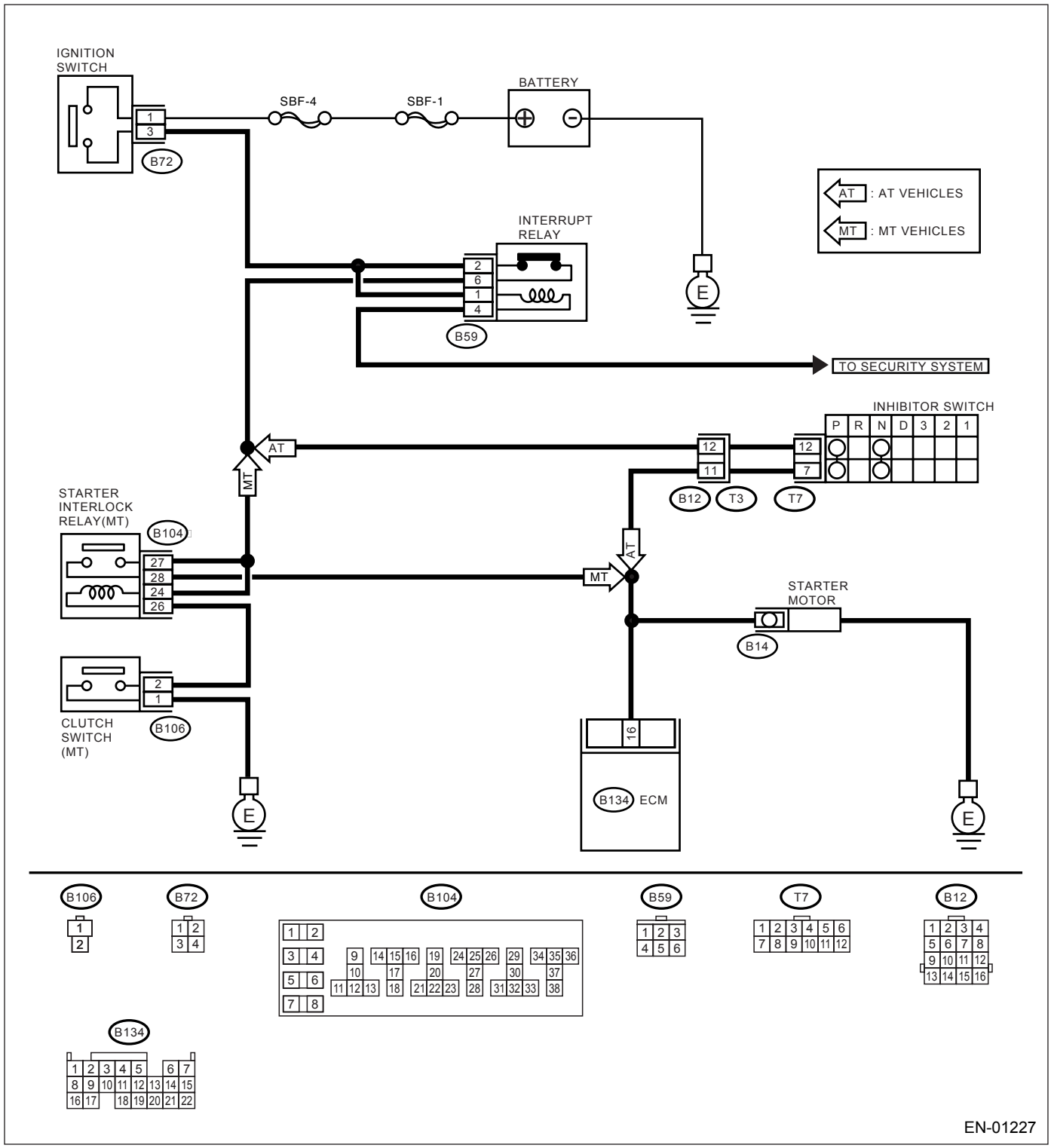
	Step	Check	Yes	No
1	**CHECK FOR OTHER DTC ON DISPLAY.** Is any other DTC displayed?	Other DTC is displayed.	Inspect the relevant DTC using the “List of Diagnostic Trouble Codes (DTC)”. <Ref. to EN(H4DOTC)-81, List of Diagnostic Trouble Codes (DTC).>	Go to step **2.**
2	**CHECK FUEL FILLER CAP.** 1)Turn ignition switch to OFF. 2)Open the fuel flap. Is the fuel filler cap tightened securely?	Cap is tightened securely.	Go to step **3.**	Tighten fuel filler cap securely.
3	**CHECK EVAPORATIVE EMISSION LINE.** Is there any trouble in evaporative emission line? NOTE: Check the following items. •Disconnection, leakage and clogging of hoses between fuel tank pressure sensor and fuel tank. •Disconnection, leakage and clogging of hoses and pipes between fuel filler pipe and fuel tank.	There is trouble in evaporative emission line.	Repair the hoses and pipes.	Replace the fuel tank pressure sensor.

DL:DTC P1518 — STARTER SWITCH CIRCUIT LOW INPUT —

- **DTC DETECTING CONDITION:**
  - Fault occurs in two consecutive driving cycles
- **TROUBLE SYMPTOM:**
  - Failure of engine to start

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to EN(H4DOTC)-49, OPERATION, Clear Memory Mode.> and INSPECTION MODE <Ref. to EN(H4DOTC)-41, Inspection Mode.>.

- **WIRING DIAGRAM:**



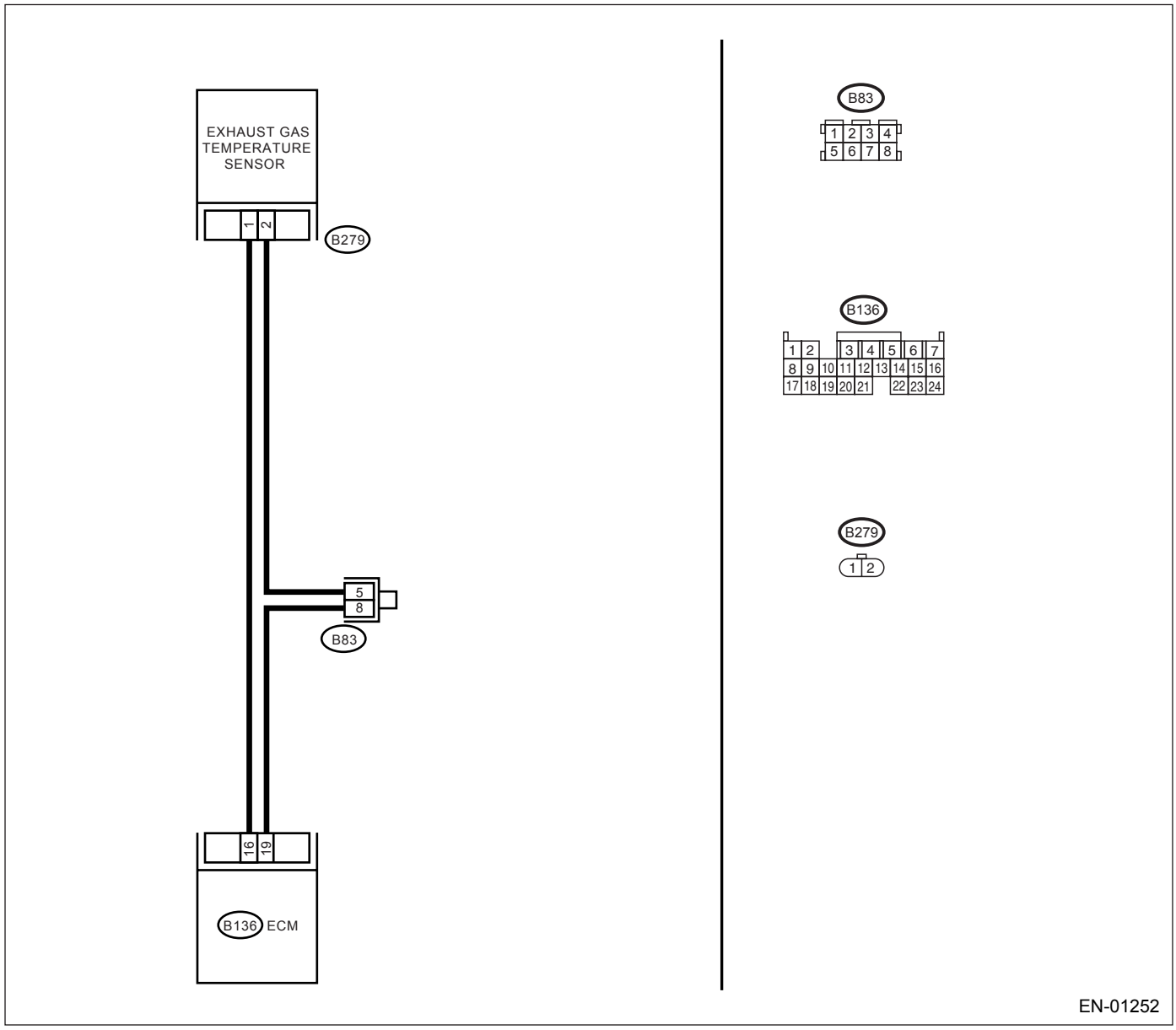
	Step	Check	Yes	No
1	**CHECK OPERATION OF STARTER MOTOR.** Does the starter motor operate when ignition switch is turned to ST?	Starter operates.	Repair harness and connector. NOTE: In this case, repair the following: • Open or short circuit to ground in harness between ECM and starter motor connector. • Poor contact in ECM connector	Check starter motor circuit. <Ref. to EN(H4DOTC)-62, STARTER MOTOR CIRCUIT, Diagnostics for Engine Starting Failure.>

DM:DTC P1544 — EXHAUST GAS TEMPERATURE TOO HIGH —

- **DTC DETECTING CONDITION:**
  - Immediately at fault recognition
- **TROUBLE SYMPTOM:**
  - Erroneous idling
  - Poor driving performance

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to EN(H4DOTC)-49, OPERATION, Clear Memory Mode.> and INSPECTION MODE <Ref. to EN(H4DOTC)-41, Inspection Mode.>.

- **WIRING DIAGRAM:**



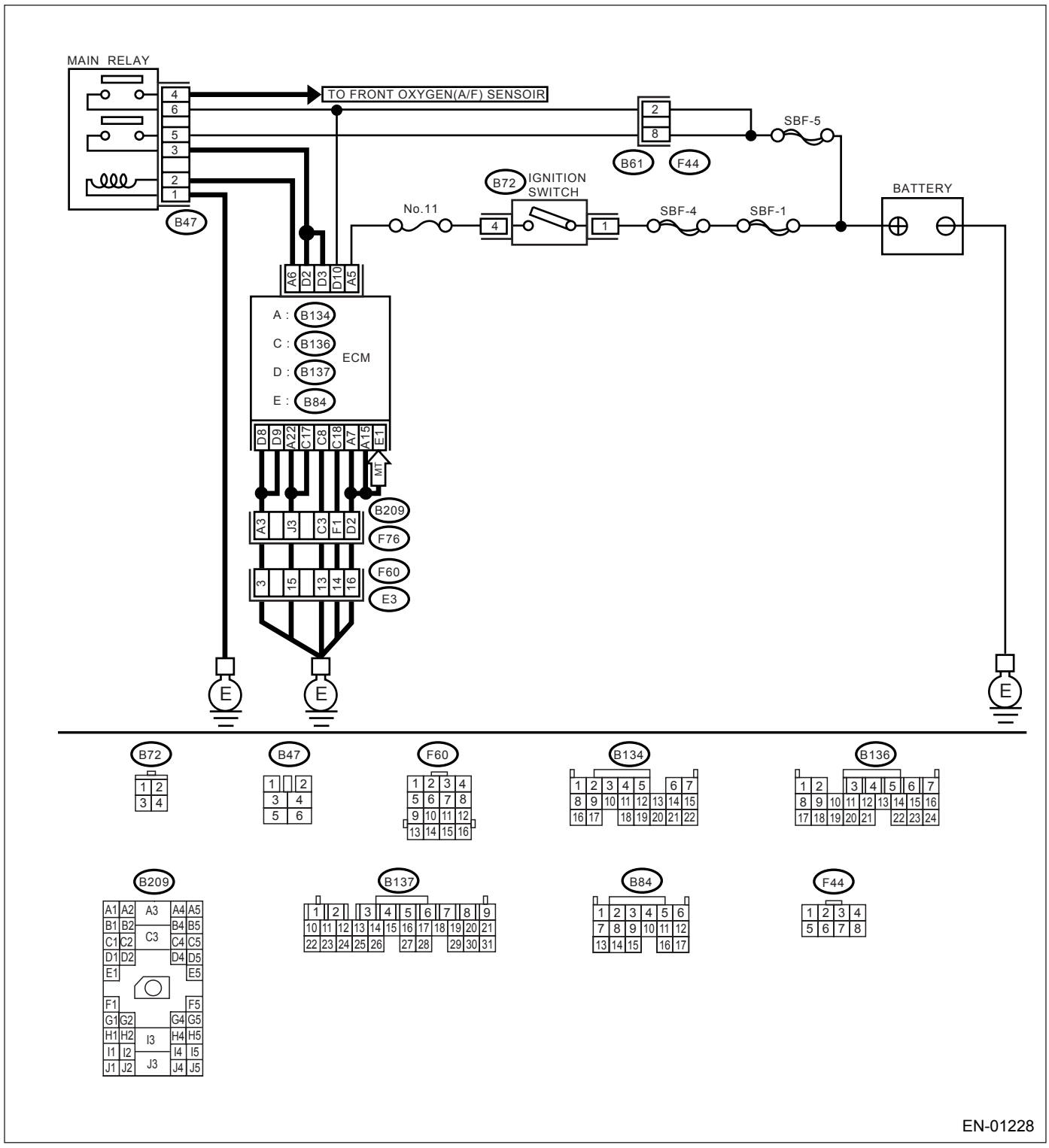
	Step	Check	Yes	No
1	**CHECK FOR OTHER DIAGNOSTIC TROUBLE CODE (DTC) ON DISPLAY.** Is any other DTC displayed?	Other DTC is displayed.	Inspect the relevant DTC using the “List of Diagnostic Trouble Codes (DTC)”. <Ref. to EN(H4DOTC)-81, List of Diagnostic Trouble Codes (DTC).> NOTE: In this case, it is not necessary to inspect DTC P1544.	Go to step **2.**
2	**CHECK EXHAUST SYSTEM.** Check exhaust system parts. NOTE: Check the following items. •Loosened installation of exhaust manifold. •Crack or hole in exhaust manifold •Loosened installation of front oxygen (A/F) sensor Is there a fault in exhaust system?	There is a fault.	Repair or replace faulty parts and replace the pre-catalytic converter.	Contact SOA (distributor) service. NOTE: Inspection by DTM is required, because probable cause is deterioration of multiple parts.

DN:DTC P1560 — BACK-UP VOLTAGE CIRCUIT MALFUNCTION —

- **DTC DETECTING CONDITION:**
  - Immediately at fault recognition

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to EN(H4DOTC)-49, OPERATION, Clear Memory Mode.> and INSPECTION MODE <Ref. to EN(H4DOTC)-41, Inspection Mode.>.

- **WIRING DIAGRAM:**



EN-01228

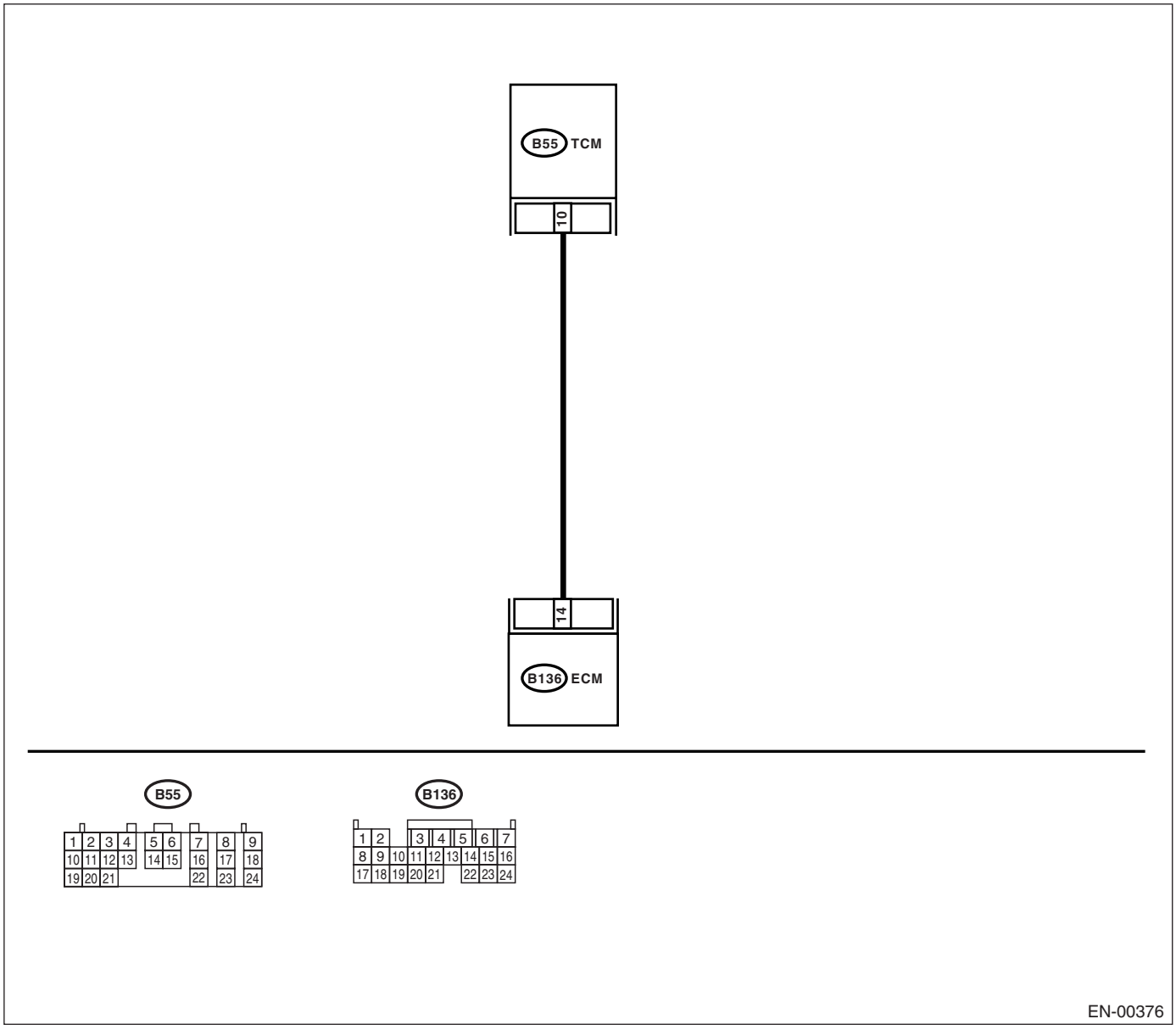
	Step	Check	Yes	No
1	**CHECK INPUT SIGNAL FOR ECM.** 1)Turn ignition switch to OFF. 2)Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B137) No. 10 (+) — Chassis ground (−):*** Is the measured value more than the specified value?	10 V	Repair poor contact in ECM connector.	Go to step **2.**
2	**CHECK HARNESS BETWEEN ECM AND MAIN FUSE BOX CONNECTOR.** 1)Disconnect the connector from ECM. 2)Measure the resistance of harness between ECM and chassis ground. ***Connector & terminal*** ***(B137) No. 10 — Chassis ground:*** Is the measured value less than the specified value?	10 Ω	Repair short circuit to ground in harness between ECM connector and battery terminal.	Go to step **3.**
3	**CHECK FUSE SBF-5.** Is the fuse blown?	Fuse is blown out.	Replace the fuse.	Repair harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between ECM and battery • Poor contact in ECM connector • Poor contact in battery terminal

DO:DTC P1698 — ENGINE TORQUE CONTROL CUT SIGNAL CIRCUIT MALFUNCTION (LOW INPUT) —

- **DTC DETECTING CONDITION:**
  - Fault occurs in two consecutive driving cycles

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to EN(H4DOTC)-49, OPERATION, Clear Memory Mode.> and INSPECTION MODE <Ref. to EN(H4DOTC)-41, Inspection Mode.>.

- **WIRING DIAGRAM:**



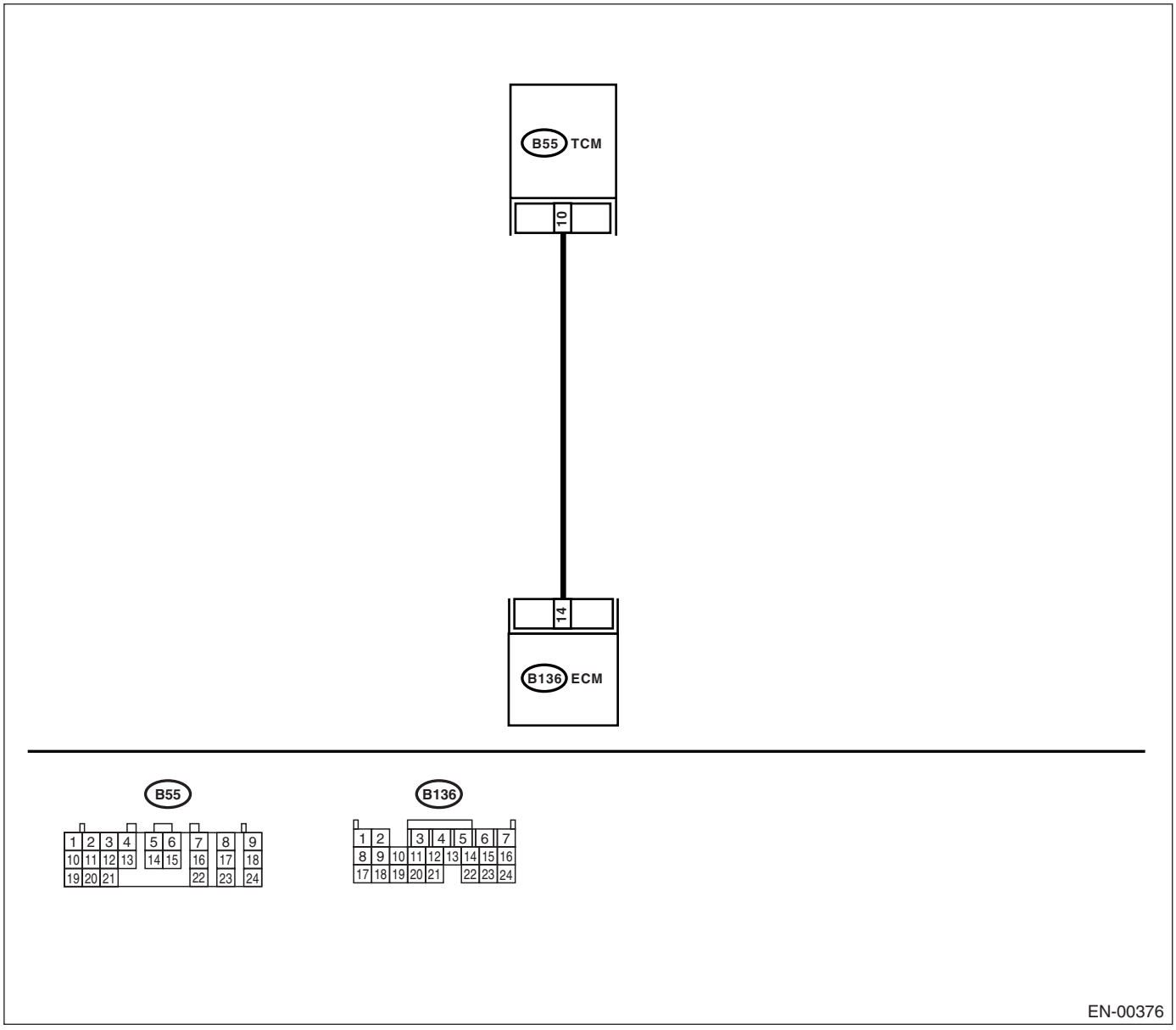
	Step	Check	Yes	No
1	**CHECK OUTPUT SIGNAL FROM ECM.** 1)Start and warm-up the engine. 2)Turn ignition switch to OFF. 3)Turn ignition switch to ON. 4)Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B136) No. 14 (+) — Chassis ground (−):*** Is the measured value more than the specified value?	3 V	Repair poor contact in ECM connector.	Go to step **2.**
2	**CHECK HARNESS BETWEEN ECM AND TCM CONNECTOR.** 1)Turn ignition switch to OFF. 2)Disconnect the connector from ECM and TCM. 3)Measure the resistance of harness between ECM and chassis ground. ***Connector & terminal*** ***(B136) No. 14 — Chassis ground:*** Is the measured value less than the specified value?	10 Ω	Repair short circuit to ground in harness between ECM and TCM connector.	Go to step **3.**
3	**CHECK HARNESS BETWEEN ECM AND TCM CONNECTOR.** Measure the resistance of harness between ECM and TCM connector. ***Connector & terminal*** ***(B136) No. 14 — (B55) No. 20:*** Is the measured value less than the specified value?	1 Ω	Repair poor contact in ECM or TCM connector.	Repair open circuit in harness between ECM and TCM connector.

DP:DTC P1699 — ENGINE TORQUE CONTROL CUT SIGNAL CIRCUIT MALFUNCTION (HIGH INPUT) —

- **DTC DETECTING CONDITION:**
  - Fault occurs in two consecutive driving cycles

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to EN(H4DOTC)-49, OPERATION, Clear Memory Mode.> and INSPECTION MODE <Ref. to EN(H4DOTC)-41, Inspection Mode.>.

- **WIRING DIAGRAM:**



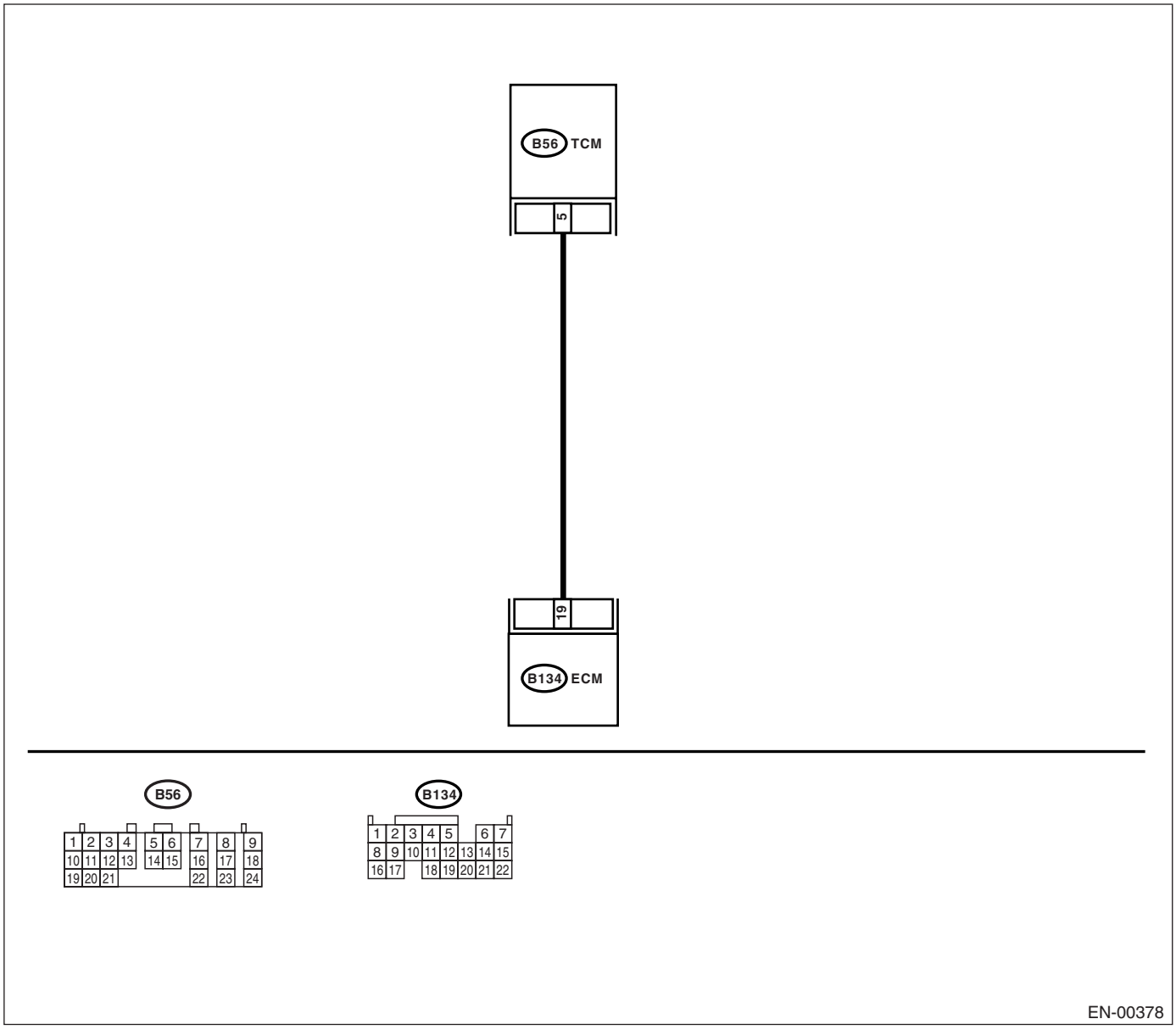
	Step	Check	Yes	No
1	**CHECK OUTPUT SIGNAL FROM ECM.** 1)Start and warm-up the engine. 2)Turn ignition switch to OFF. 3)Disconnect the connector from TCM. 4)Turn ignition switch to ON. 5)Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B136) No. 14 (+) — Chassis ground (−):*** Is the measured value less than the specified value?	3 V	Go to step **2.**	Repair short circuit to battery in harness between ECM and TCM connector. After repair, replace the ECM. <Ref. to FU(H4DOTC)-50, Engine Control Module.>
2	**CHECK HARNESS BETWEEN ECM AND TCM CONNECTOR.** 1)Turn ignition switch to OFF. 2)Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B136) No. 14 (+) — Chassis ground (−):*** Does the voltage variance exceed the specified value while monitoring the voltmeter and shaking the ECM harness and connector ?	10 V	Repair short circuit to battery in harness between ECM and TCM connector. After repair, replace the ECM. <Ref. to FU(H4DOTC)-50, Engine Control Module.>	Contact SOA (distributor) service. NOTE: Inspection by DTM is required, because probable cause is deterioration of multiple parts.

DQ:DTC P1711 — ENGINE TORQUE CONTROL SIGNAL #1 CIRCUIT MALFUNCTION —

- **DTC DETECTING CONDITION:**
  - Fault occurs in two consecutive driving cycles
- **TROUBLE SYMPTOM:**
  - Excessive shift shock

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to EN(H4DOTC)-49, OPERATION, Clear Memory Mode.> and INSPECTION MODE <Ref. to EN(H4DOTC)-41, Inspection Mode.>.

- **WIRING DIAGRAM:**



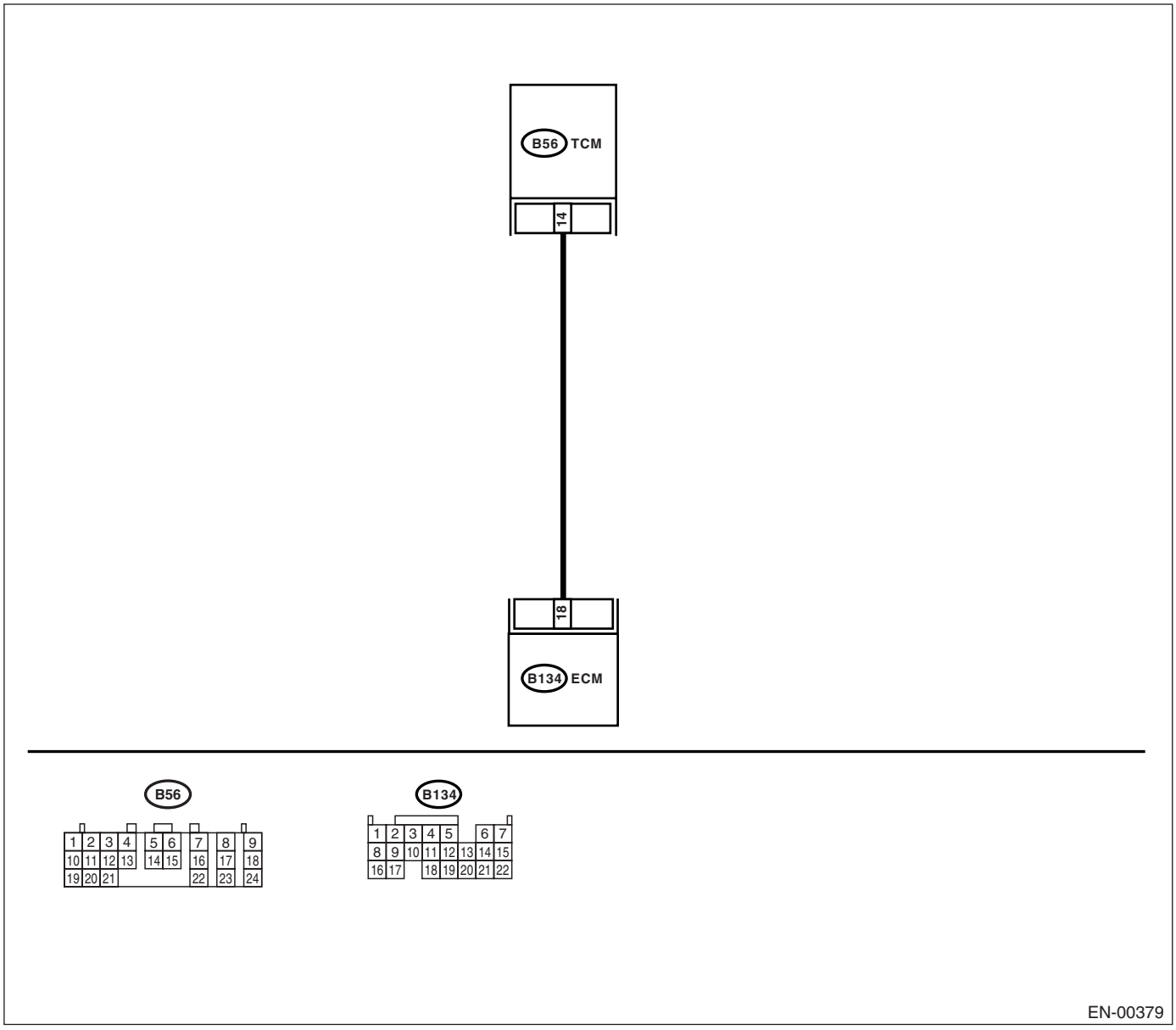
	Step	Check	Yes	No
1	**CHECK INPUT SIGNAL FOR ECM.** 1)Turn ignition switch to ON. 2)Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B134) No. 19 (+) — Chassis ground (−):*** Is the measured value more than the specified value?	4.5 V	Go to step **2.**	Go to step **4.**
2	**CHECK INPUT SIGNAL FOR ECM.** Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B134) No. 19 (+) — Chassis ground (−):*** Is the measured value more than the specified value?	10 V	Repair short circuit to battery in harness between ECM and TCM connector.	Go to step **3.**
3	**CHECK FOR POOR CONTACT.** Check for poor contact in ECM connector. Is there poor contact in ECM connector?	There is poor contact.	Repair poor contact in ECM connector.	Replace the ECM. <Ref. to FU(H4DOTC)-50, Engine Control Module.>
4	**CHECK HARNESS BETWEEN ECM AND TCM CONNECTOR.** 1)Turn ignition switch to OFF. 2)Disconnect the connector from ECM and TCM. 3)Measure the resistance of harness between ECM and TCM connector. ***Connector & terminal*** ***(B134) No. 19 — (B56) No. 5:*** Is the measured value less than the specified value?	1 Ω	Go to step **5.**	Repair open circuit in harness between ECM and TCM connector.
5	**CHECK HARNESS BETWEEN ECM AND TCM CONNECTOR.** Measure the resistance of harness between ECM and chassis ground. ***Connector & terminal*** ***(B134) No. 19 — Chassis ground:*** Is the measured value less than the specified value?	10 Ω	Repair short circuit to ground in harness between ECM and TCM connector.	Go to step **6.**
6	**CHECK FOR POOR CONTACT.** Check for poor contact in TCM connector. Is there poor contact in TCM connector?	There is poor contact.	Repair poor contact in TCM connector.	Replace the TCM. <Ref. to AT-71, Transmission Control Module (TCM).>

DR:DTC P1712 — ENGINE TORQUE CONTROL SIGNAL #2 CIRCUIT MALFUNCTION —

- **DTC DETECTING CONDITION:**
  - Fault occurs in two consecutive driving cycles
- **TROUBLE SYMPTOM:**
  - Excessive shift shock

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to EN(H4DOTC)-49, OPERATION, Clear Memory Mode.> and INSPECTION MODE <Ref. to EN(H4DOTC)-41, Inspection Mode.>.

- **WIRING DIAGRAM:**



	Step	Check	Yes	No
1	**CHECK INPUT SIGNAL FOR ECM.** 1)Turn ignition switch to ON. 2)Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B134) No. 18 (+) — Chassis ground (−):*** Is the measured value more than the specified value?	4.5 V	Go to step **2.**	Go to step **4.**
2	**CHECK INPUT SIGNAL FOR ECM.** Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B134) No. 18 (+) — Chassis ground (−):*** Is the measured value more than the specified value?	10 V	Repair short circuit to battery in harness between ECM and TCM connector.	Go to step **3.**
3	**CHECK FOR POOR CONTACT.** Check for poor contact in ECM connector. Is there poor contact in ECM connector?	There is poor contact.	Repair poor contact in ECM connector.	Replace the ECM. <Ref. to FU(H4DOTC)-50, Engine Control Module.>
4	**CHECK HARNESS BETWEEN ECM AND TCM CONNECTOR.** 1)Turn ignition switch to OFF. 2)Disconnect the connector from ECM and TCM. 3)Measure the resistance of harness between ECM and TCM connector. ***Connector & terminal*** ***(B134) No. 18 — (B56) No. 4:*** Is the measured value less than the specified value?	1 Ω	Go to step **5.**	Repair open circuit in harness between ECM and TCM connector.
5	**CHECK HARNESS BETWEEN ECM AND TCM CONNECTOR.** Measure the resistance of harness between ECM and chassis ground. ***Connector & terminal*** ***(B134) No. 18 — Chassis ground:*** Is the measured value less than the specified value?	10 Ω	Repair short circuit to ground in harness between ECM and TCM connector.	Go to step **6.**
6	**CHECK FOR POOR CONTACT.** Check for poor contact in TCM connector. Is there poor contact in TCM connector?	There is poor contact.	Repair poor contact in TCM connector.	Replace the TCM. <Ref. to AT-71, Transmission Control Module (TCM).>

20.General Diagnostic Table

A: INSPECTION

1. ENGINE

NOTE:
Malfunction of parts other than those listed is also possible. <Ref. to ME(H4DOTC)-91, Engine Trouble in General.>

Symptom	Problem parts
1. Engine stalls during idling.	1) Idle air control solenoid valve 2) Pressure sensor 3) Mass air flow & intake air temperature sensor 4) Ignition parts (*1) 5) Engine coolant temperature sensor (*2) 6) Crankshaft position sensor (*3) 7) Camshaft position sensor (*3) 8) Fuel injection parts (*4)
2. Rough idling	1) Idle air control solenoid valve 2) Pressure sensor 3) Mass air flow & intake air temperature sensor 4) Engine coolant temperature sensor (*2) 5) Ignition parts (*1) 6) Air intake system (*5) 7) Fuel injection parts (*4) 8) Throttle position sensor 9) Crankshaft position sensor (*3) 10) Camshaft position sensor (*3) 11) Oxygen sensor 12) Fuel pump and fuel pump relay
3. Engine does not return to idle.	1) Idle air control solenoid valve 2) Engine coolant temperature sensor 3) Accelerator cable (*6) 4) Throttle position sensor 5) Pressure sensor 6) Mass air flow sensor
4. Poor acceleration	1) Pressure sensor 2) Mass air flow & intake air temperature sensor 3) Throttle position sensor 4) Fuel injection parts (*4) 5) Fuel pump and fuel pump relay 6) Engine coolant temperature sensor (*2) 7) Crankshaft position sensor (*3) 8) Camshaft position sensor (*3) 9) A/C switch and A/C cut relay 10) Engine torque control signal circuit 11) Ignition parts (*1)
5. Engine stalls or engine sags or hesitates at acceleration.	1) Pressure sensor 2) Mass air flow & intake air temperature sensor 3) Engine coolant temperature sensor (*2) 4) Crankshaft position sensor (*3) 5) Camshaft position sensor (*3) 6) Purge control solenoid valve 7) Fuel injection parts (*4) 8) Throttle position sensor 9) Fuel pump and fuel pump relay

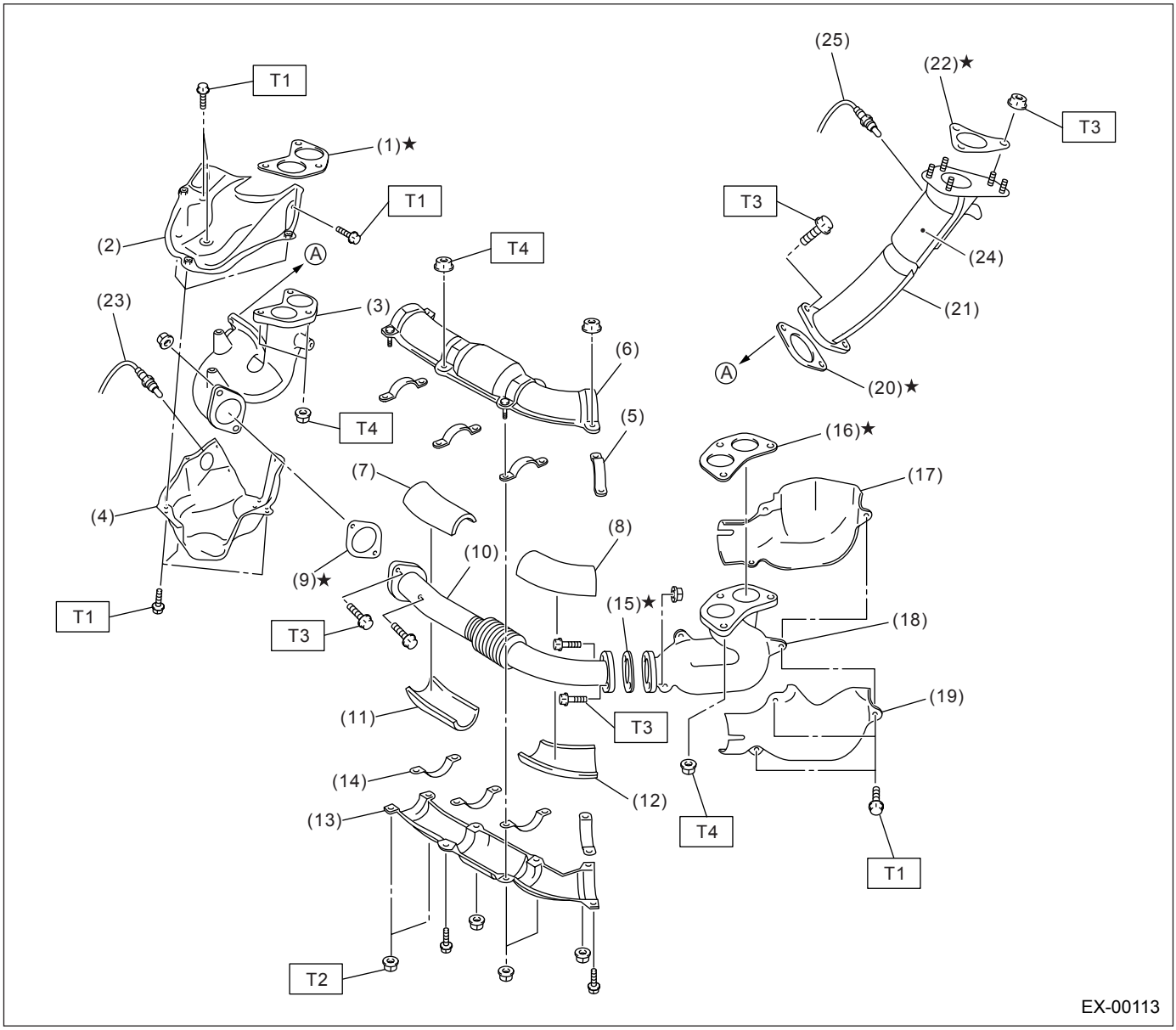
Symptom	Problem parts
6. Surging	1) Pressure sensor 2) Mass air flow & intake air temperature sensor 3) Engine coolant temperature sensor (*2) 4) Crankshaft position sensor (*3) 5) Camshaft position sensor (*3) 6) Fuel injection parts (*4) 7) Throttle position sensor 8) Fuel pump and fuel pump relay
7. Spark knock	1) Pressure sensor 2) Mass air flow & intake air temperature sensor 3) Engine coolant temperature sensor 4) Knock sensor 5) Fuel injection parts (*4) 6) Fuel pump and fuel pump relay
8. After burning in exhaust system	1) Pressure sensor 2) Mass air flow & intake air temperature sensor 3) Engine coolant temperature sensor (*2) 4) Fuel injection parts (*4) 5) Fuel pump and fuel pump relay

*1: Check ignition coil & ignitor assembly and spark plug.
*2: Indicate the symptom occurring only in cold temperatures.
*3: Ensure the secure installation.
*4: Check fuel injector, fuel pressure regulator and fuel filter.
*5: Inspect for air leak in air intake system.
*6: Adjust accelerator cable.

1. General Description

A: COMPONENT

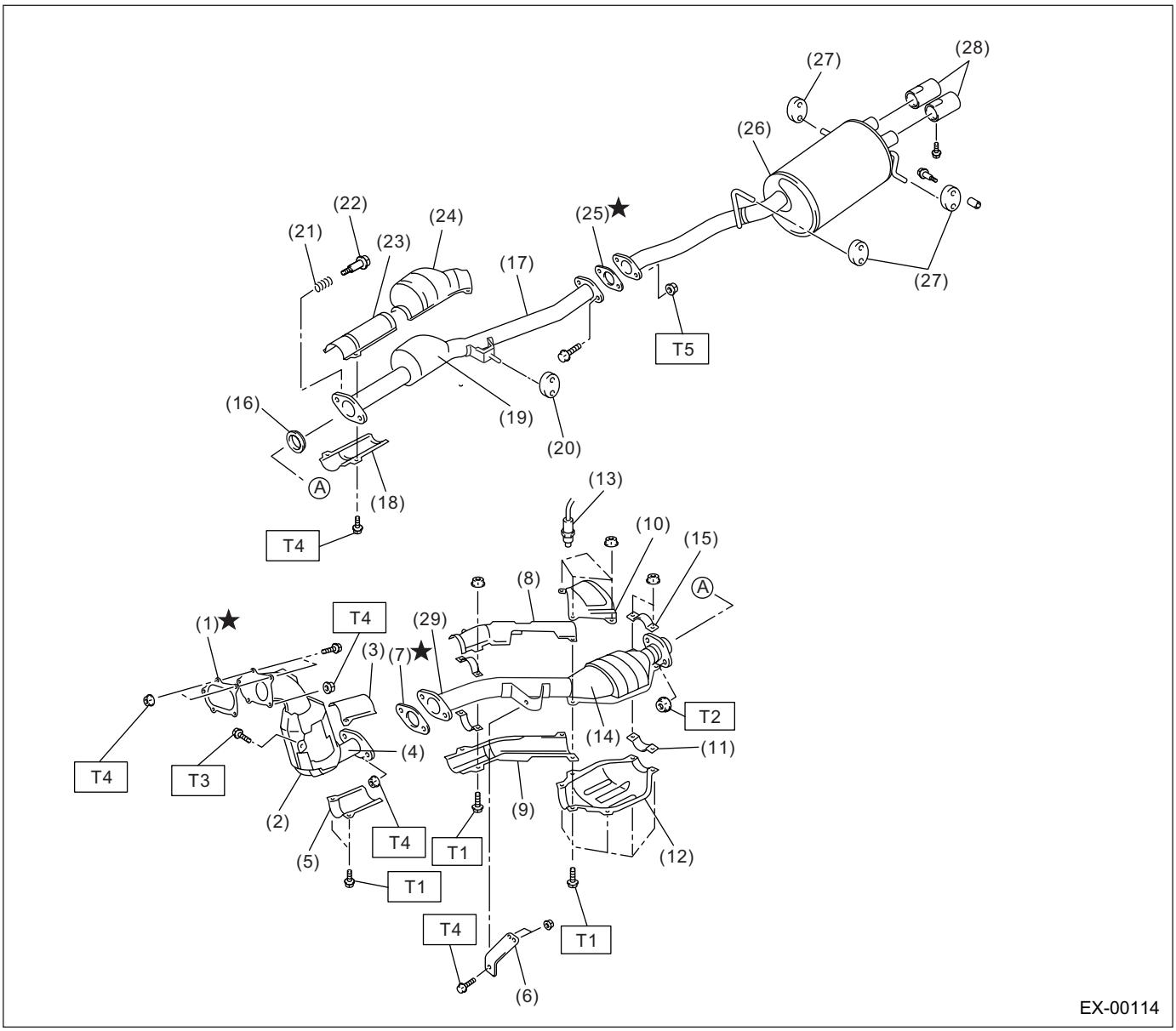
1. FRONT EXHAUST PIPE



(1) Gasket
(2) Upper exhaust manifold cover (RH)
(3) Exhaust manifold (RH)
(4) Lower exhaust manifold cover (RH)
(5) Front exhaust pipe upper clamp
(6) Front exhaust pipe upper cover
(7) Front exhaust pipe upper insulator (RH)
(8) Front exhaust pipe upper insulator (LH)
(9) Gasket
(10) Front exhaust pipe
(11) Front exhaust pipe lower insulator (RH)
(12) Front exhaust pipe lower insulator (LH)
(13) Front exhaust pipe lower cover
(14) Front exhaust pipe lower clamp
(15) Gasket
(16) Gasket
(17) Upper exhaust manifold cover (LH)
(18) Exhaust manifold (LH)
(19) Lower exhaust manifold cover (LH)
(20) Gasket
(21) Turbocharger joint pipe
(22) Gasket
(23) Front oxygen (A/F) sensor
(24) Precatalytic converter
(25) Exhaust temperature sensor

Tightening torque: N·m (kgf-m, ft-lb)
T1: 19 (1.9, 13.7)
T2: 25 (2.5, 18.1)
T3: 35 (3.6, 26.0)
T4: 40 (4, 28.9)

2. CENTER AND REAR EXHAUST PIPE, AND MUFFLER



(1) Gasket
(2) Front catalytic converter
(3) Upper center pipe cover (Front)
(4) Center exhaust pipe (Front)
(5) Lower center pipe cover (Front)
(6) Bracket
(7) Gasket
(8) Upper center pipe cover (Rear)
(9) Lower center pipe cover (Rear)
(10) Upper rear catalytic converter cover
(11) Lower clamp
(12) Lower rear catalytic converter cover
(13) Rear oxygen sensor
(14) Rear catalytic converter
(15) Upper clamp
(16) Gasket
(17) Rear exhaust pipe
(18) Lower rear exhaust pipe cover (Front)
(19) Chamber
(20) Cushion
(21) Spring
(22) Bolt
(23) Upper rear exhaust pipe cover (Front)
(24) Upper rear exhaust pipe cover (Rear)
(25) Gasket
(26) Muffler
(27) Cushion
(28) Muffler cutter
(29) Center exhaust pipe (Rear)

Tightening torque: N·m (kgf-m, ft-lb)
T1: 13 (1.3, 9.6)
T2: 18 (1.8, 13.0)
T3: 30 (3.1, 22.4)
T4: 35 (3.6, 26.0)
T5: 48 (4.9, 35.4)

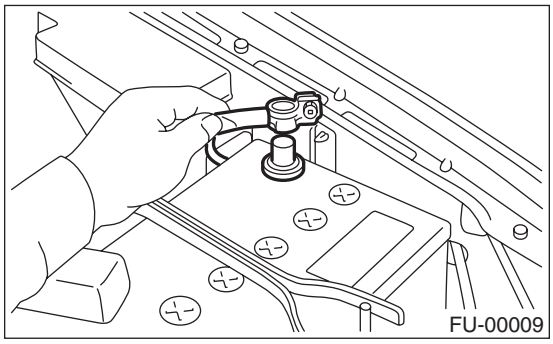
B: CAUTION

• Wear working clothing, including a cap, protective goggles, and protective shoes during operation.
• Remove contamination including dirt and corrosion before removal, installation or disassembly.
• Keep the disassembled parts in order and protect them from dust or dirt.
• Before removal, installation or disassembly, be sure to clarify the failure. Avoid unnecessary removal, installation, disassembly, and replacement.
• Be careful not to burn your hands, because each part on the vehicle is hot after running.
• Be sure to tighten fasteners including bolts and nuts to the specified torque.
• Place shop jacks or safety stands at the specified points.
• Before disconnecting electrical connectors of sensors or units, be sure to disconnect the negative terminal from battery.

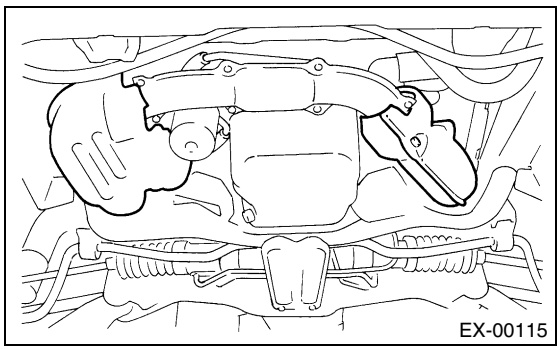
2. Front Exhaust Pipe

A: REMOVAL

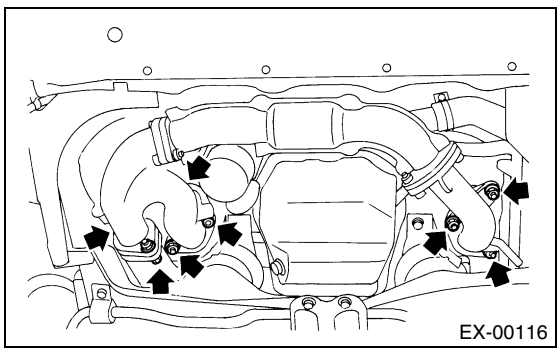
1) Disconnect the ground terminal from battery.



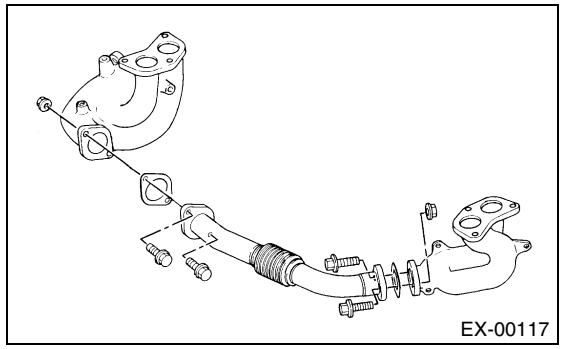
2) Remove the front oxygen (A/F) sensor. <Ref. to FU(H4DOTC)-45, REMOVAL, Front Oxygen (A/F) Sensor.>
3) Remove the under cover.
4) Remove the lower exhaust manifold cover (RH).
5) Remove the lower and upper exhaust manifold covers (LH).



6) Remove the bolts and nuts which hold the front exhaust pipe assembly to turbocharger joint pipe.
7) While holding the front exhaust pipe assembly with one hand, remove the nuts which hold the front exhaust pipe assembly to cylinder head exhaust port.



8) Remove the front exhaust pipe assembly.
9) Remove the covers from exhaust manifold and front exhaust pipe.
10) Separate the front exhaust pipe from exhaust manifolds.

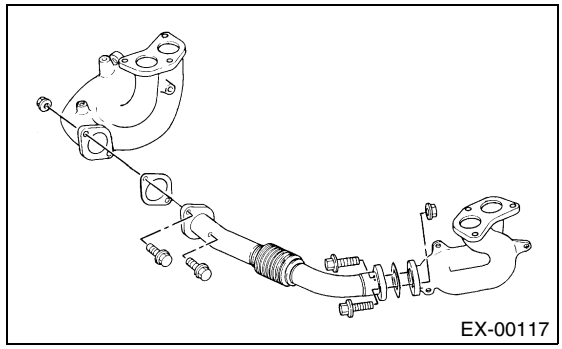


B: INSTALLATION

CAUTION:
Replace the gaskets with new ones.

1) Assemble the front exhaust pipe and exhaust manifolds.

Tightening torque:
35 N·m (3.6 kgf-m, 26.0 ft-lb)



2) Install the front exhaust pipe covers.

Tightening torque:
25 N·m (2.5 kgf-m, 18.1 ft-lb)

3) Install the upper exhaust manifold cover (RH).

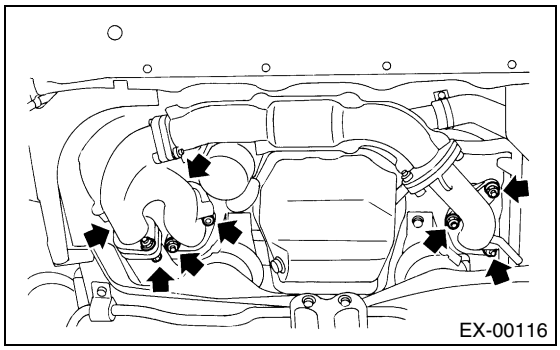
Tightening torque:
19 N·m (1.9 kgf-m, 13.7 ft-lb)

4) Install the front exhaust pipe assembly.

Tightening torque:
35 N·m (3.6 kgf-m, 26.0 ft-lb)

5) Connect the exhaust manifold (RH) to turbocharger joint pipe.

Tightening torque:
35 N·m (3.6 kgf-m, 26.0 ft-lb)

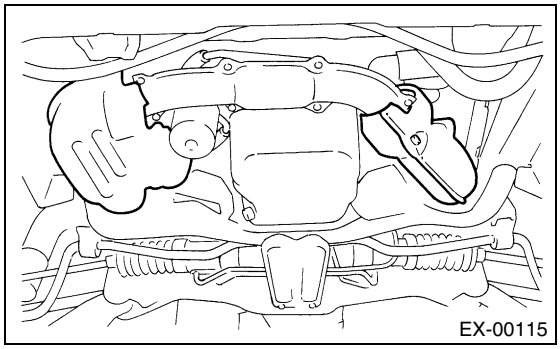


6) Install the upper and lower exhaust manifold covers (LH).

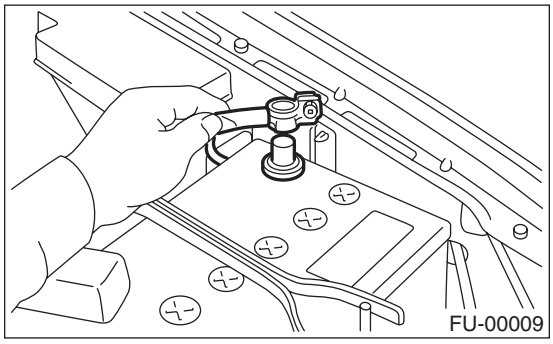
Tightening torque:
19 N·m (1.9 kgf-m, 13.7 ft-lb)

7) Install the lower exhaust manifold cover (RH).

Tightening torque:
19 N·m (1.9 kgf-m, 13.7 ft-lb)



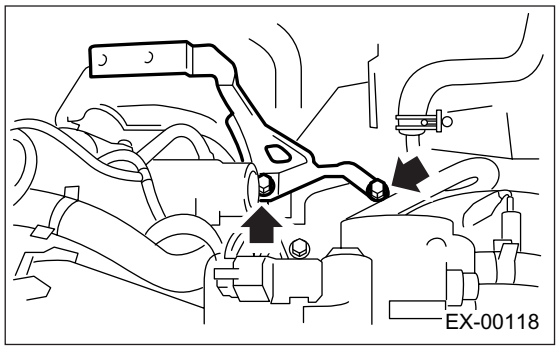
8) Install the front oxygen (A/F) sensor. <Ref. to FU(H4DOTC)-46, INSTALLATION, Front Oxygen (A/F) Sensor.>
9) Install the under cover.
10) Connect the battery ground terminal to battery.



3. Center Exhaust Pipe

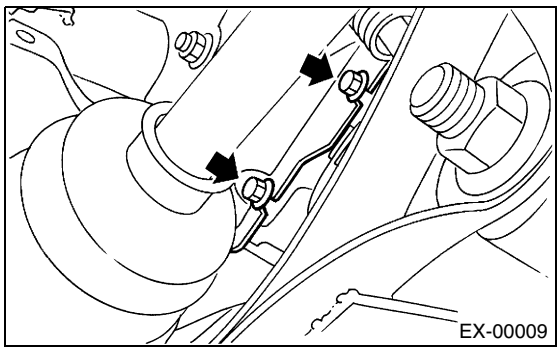
A: REMOVAL

1) Set the vehicle on the lift.
2) Disconnect the ground terminal from battery.
3) Remove the intercooler. <Ref. to IN(H4DOTC)-11, REMOVAL, Intercooler.>
4) Remove the intercooler bracket.

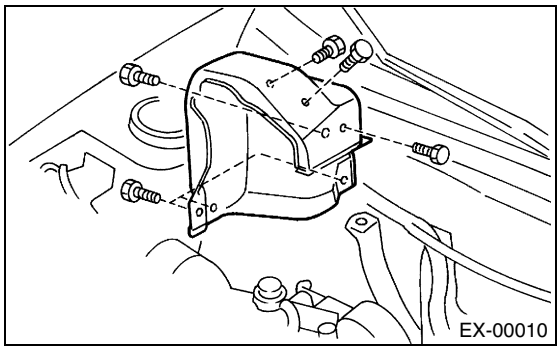


5) Lift-up the vehicle.
6) Remove the under cover.
7) Remove the bolts which install the lower side of turbocharger upper cover.

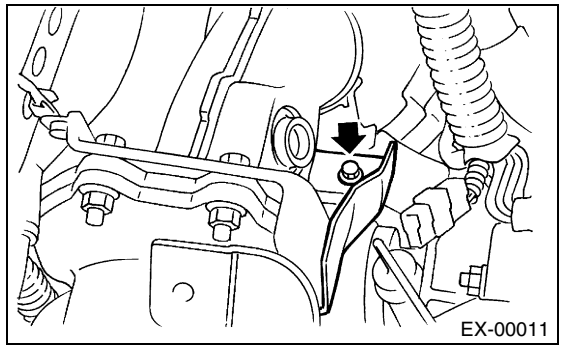
CAUTION:
Be careful, the turbocharger and exhaust pipe are hot.



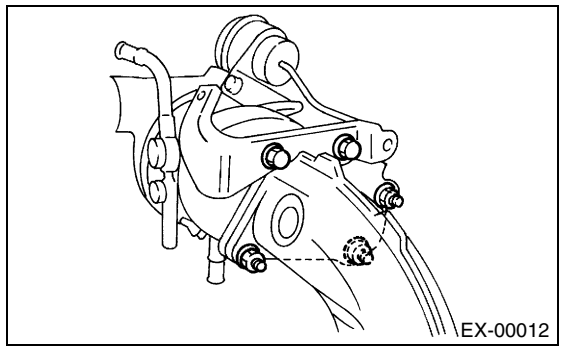
8) Lower the vehicle.
9) Remove the turbocharger upper cover.



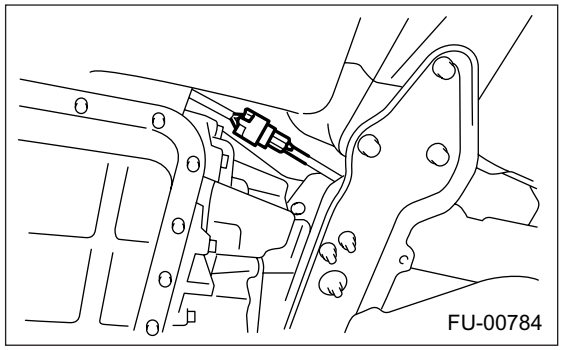
10) Remove the bolts which install the lower upper side of turbocharger upper cover, and remove it.



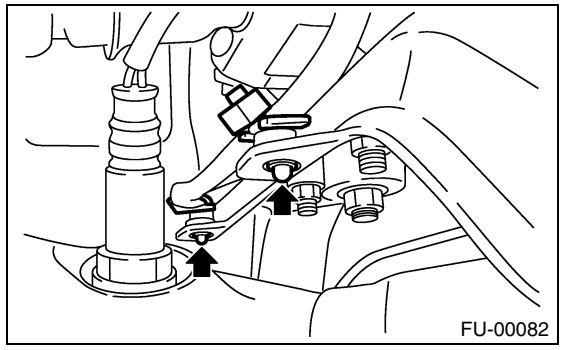
11) Separate the center exhaust pipe from turbocharger.



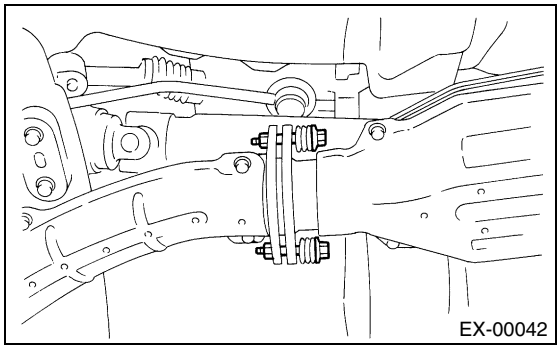
12) Lift-up the vehicle.
13) Disconnect the connector from rear oxygen sensor.



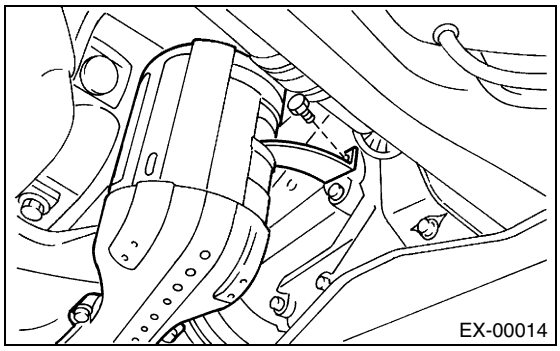
14) Vertically draw out clip from crossmember.



15) Separate the center exhaust pipe from rear exhaust pipe.

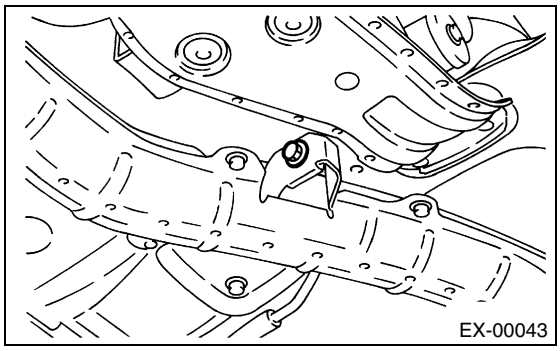


16) Remove the bolt which holds center exhaust pipe bracket to transmission.

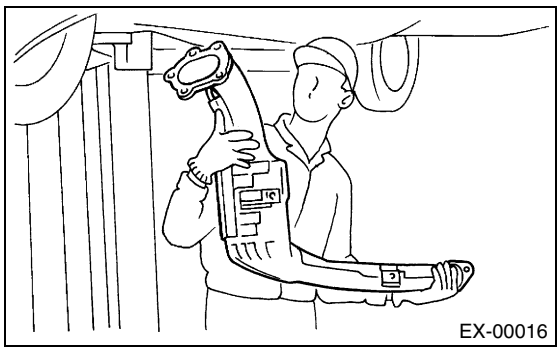


17) Remove the intercooler bracket.
18) Remove the bolt which holds center exhaust pipe to hanger bracket.

CAUTION:
Be careful not to pull down the center exhaust pipe.



19) Remove the center exhaust pipe.

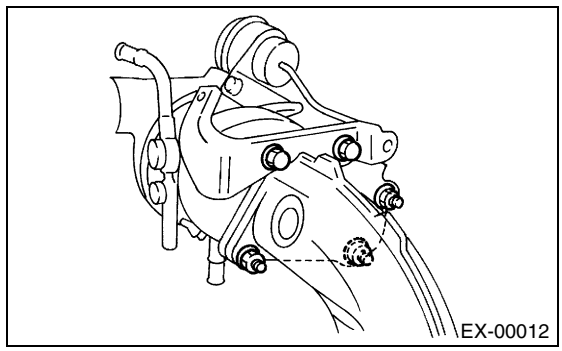


B: INSTALLATION

CAUTION:
Replace the gaskets with new ones.

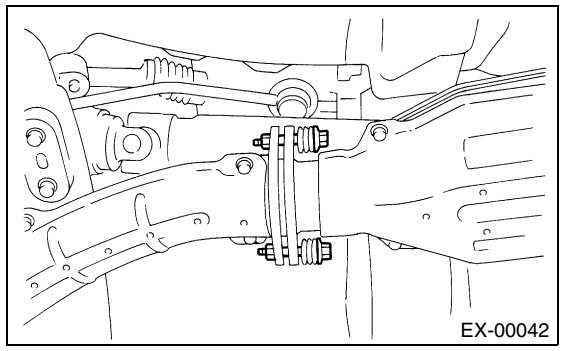
1) Install the center exhaust pipe and temporarily tighten the bolt which holds center exhaust pipe to hanger bracket.
2) Temporarily tighten the bolt which holds the center pipe to transmission.
3) Connect the center exhaust pipe to turbocharger.

Tightening torque:
35 N·m (3.6 kgf-m, 26.0 ft-lb)

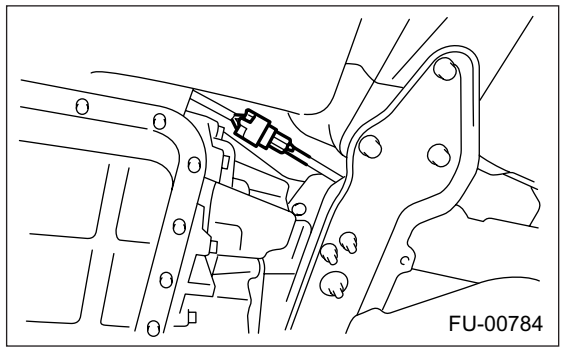


4) Install the center exhaust pipe to rear exhaust pipe.

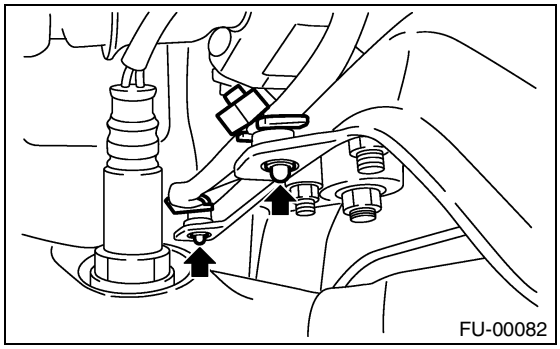
Tightening torque:
18 N·m (1.8 kgf-m, 13.0 ft-lb)



5) Connect the connector to rear oxygen sensor.

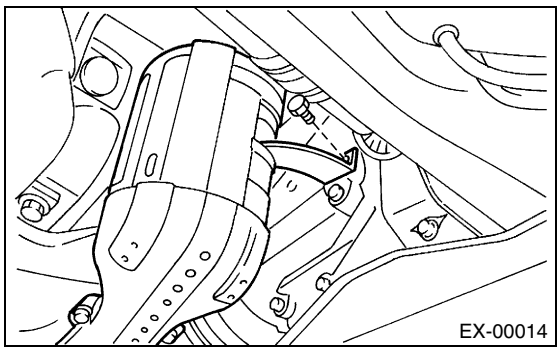


6) Secure clip on the crossmember.



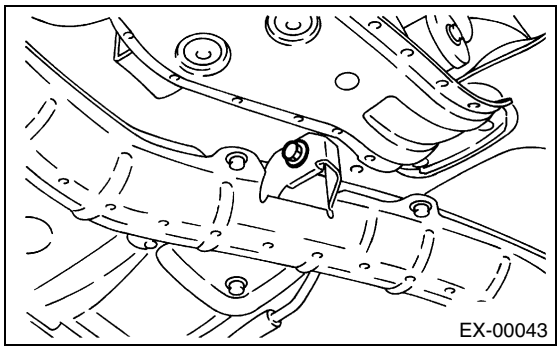
7) Tighten the bolt which holds the center exhaust pipe bracket to transmission.

Tightening torque:
30 N·m (3.1 kgf-m, 22.4 ft-lb)



8) Tighten the bolt which holds the center exhaust pipe to hanger bracket.

Tightening torque:
35 N·m (3.6 kgf-m, 26.0 ft-lb)



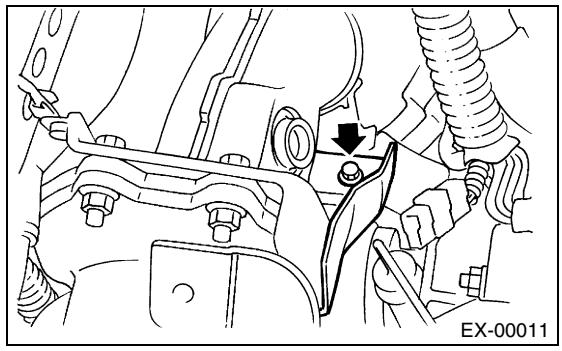
9) Tighten the bolts which hold the intercooler bracket.

Tightening torque:
35 N·m (3.6 kgf-m, 26.0 ft-lb)

10) Lower the vehicle.

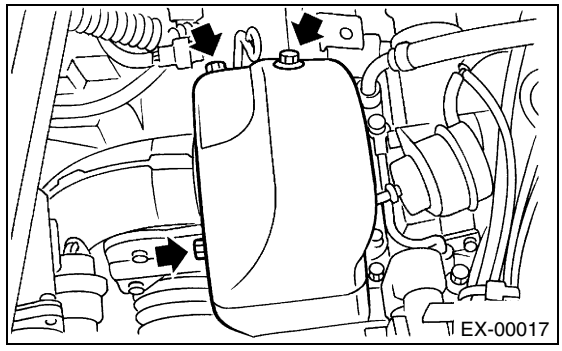
11) Place the turbocharger lower cover, and tighten the bolts which install the upper side of lower cover.

Tightening torque:
7.4 N·m (0.75 kgf-m, 5.4 ft-lb)



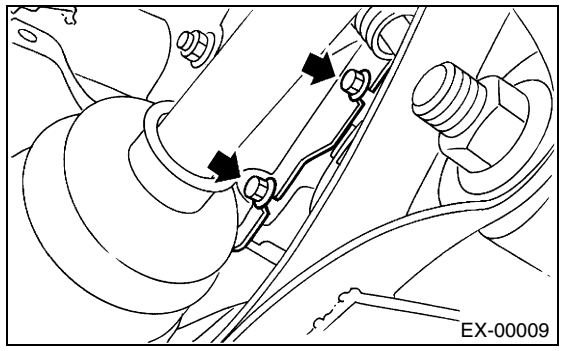
12) Place the turbocharger upper cover, and tighten the bolts which install the upper side of upper cover.

Tightening torque:
7.4 N·m (0.75 kgf-m, 5.4 ft-lb)



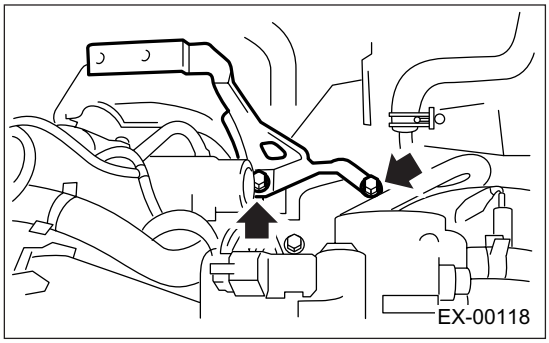
13) Lift-up the vehicle.
14) Tighten the bolts which install the under side of turbocharger upper cover.

Tightening torque:
7.4 N·m (0.75 kgf-m, 5.4 ft-lb)



15) Install the under cover.
16) Lower the vehicle.

17) Install the intercooler bracket.

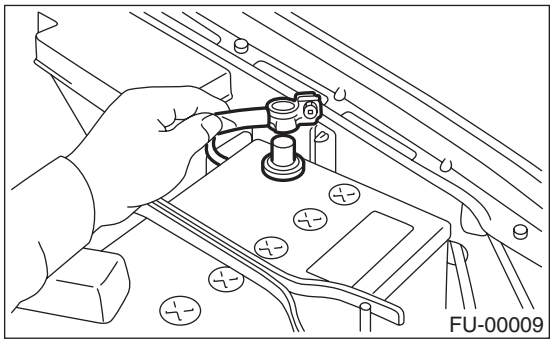


18) Install the intercooler. <Ref. to IN(H4DOTC)-12, INSTALLATION, Intercooler.>

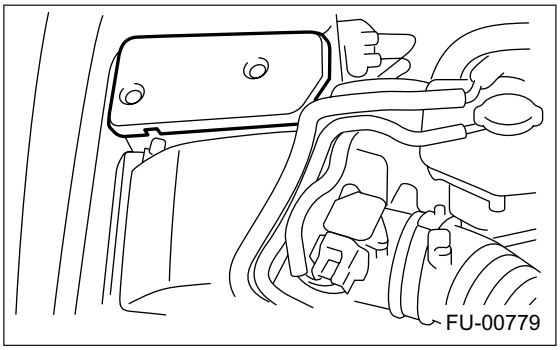
4. Joint Pipe

A: REMOVAL

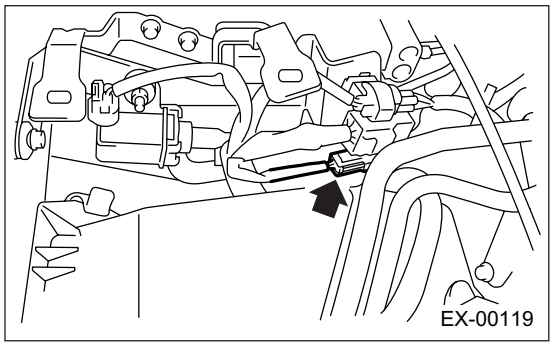
1) Disconnect the ground terminal from battery.



2) Remove the solenoid valve cover.



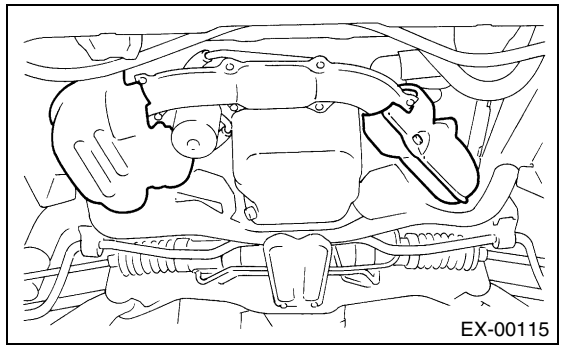
3) Disconnect the exhaust temperature sensor connector.



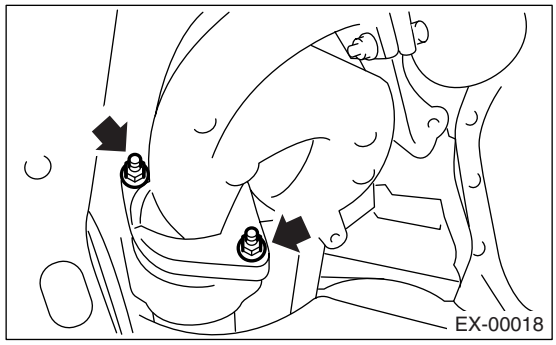
4) Remove the front oxygen (A/F) sensor. <Ref. to FU(H4DOTC)-45, REMOVAL, Front Oxygen (A/F) Sensor.>

5) Remove the under cover.

6) Remove the lower exhaust manifold cover (RH).



7) Remove the nuts which hold the front exhaust manifold to joint pipe.



8) Remove the center exhaust pipe. <Ref. to EX(H4DOTC)-8, REMOVAL, Center Exhaust Pipe.>

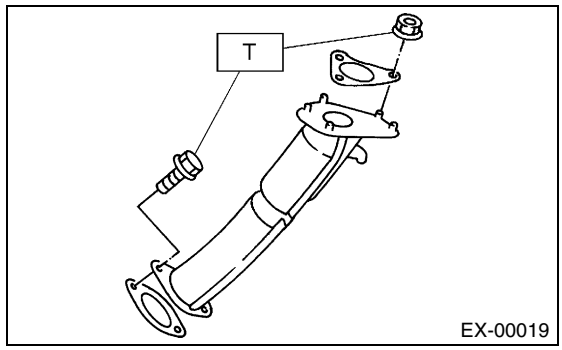
9) Remove the turbocharger. <Ref. to IN(H4DOTC)-13, REMOVAL, Turbocharger.>

10) Take off the joint pipe in the upward direction.

B: INSTALLATION

Install in the reverse order of removal.

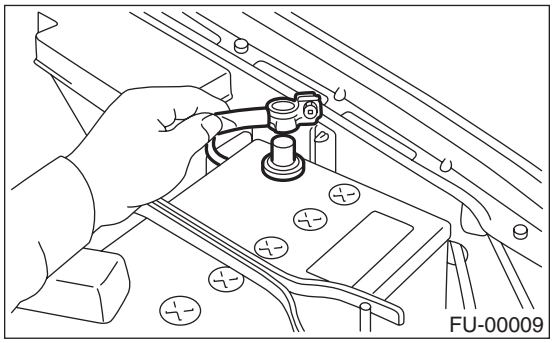
Tightening torque:
T: 35 N·m (3.6 kgf-m, 26.0 ft-lb)



5. Rear Exhaust Pipe

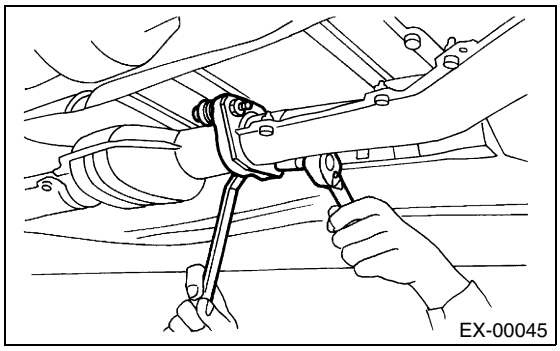
A: REMOVAL

1) Disconnect the ground terminal from battery.



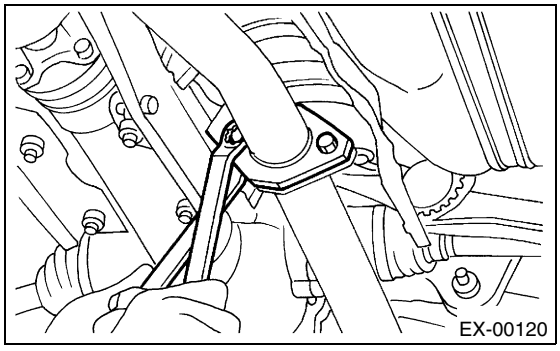
2) Lift up the vehicle.
3) Separate the rear exhaust pipe from center exhaust pipe.

CAUTION:
Be careful, the exhaust pipe is hot.



4) Separate the rear exhaust pipe from muffler.

CAUTION:
Be careful not to pull down the rear exhaust pipe.



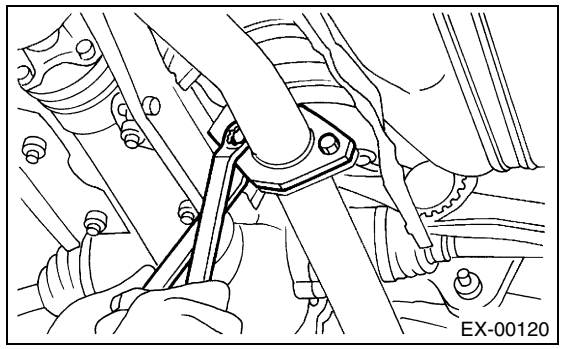
5) Remove the rear exhaust pipe.

B: INSTALLATION

CAUTION:
Replace the gaskets with new ones.

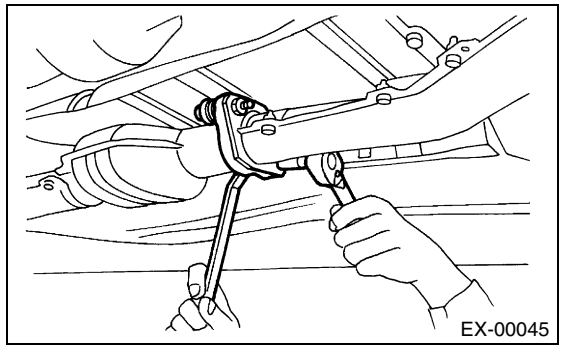
1) Install the rear exhaust pipe to muffler.

Tightening torque:
48 N·m (4.9 kgf-m, 35.4 ft-lb)

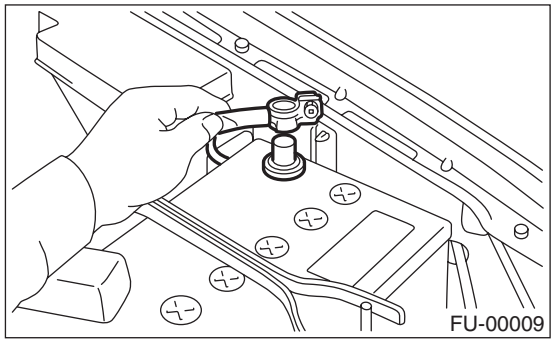


2) Install the rear exhaust pipe to center exhaust pipe.

Tightening torque:
18 N·m (1.8 kgf-m, 13.0 ft-lb)



3) Lower the vehicle.
4) Connect the battery ground terminal to battery.



C: INSPECTION

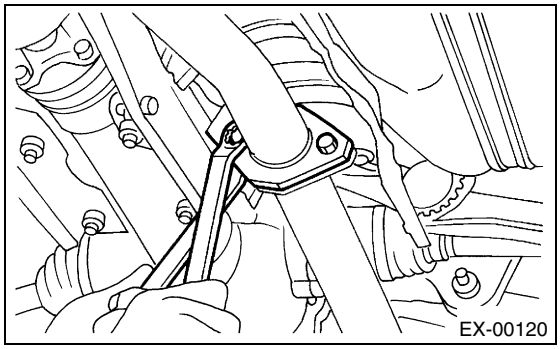
1) Make sure there are no exhaust leaks from connections and welds.
2) Make sure there are no holes or rusting.
3) Make sure the cushion rubber is not worn or cracked.

6. Muffler

A: REMOVAL

1) Separate the muffler from rear exhaust pipe.

CAUTION:
Be careful, the exhaust pipe is hot.

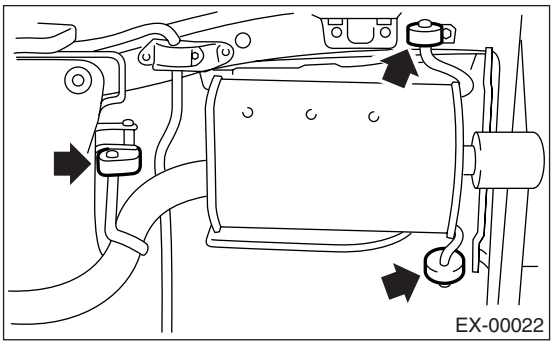


2) Remove the rubber cushions, and detach muffler.

CAUTION:
Be careful not to drop the muffler during removal.

NOTE:
To facilitate removal, apply a coat of SUBARU CRC to the mating area of rubber cushions in advance.

SUBARU CRC (Part No. 004301003)

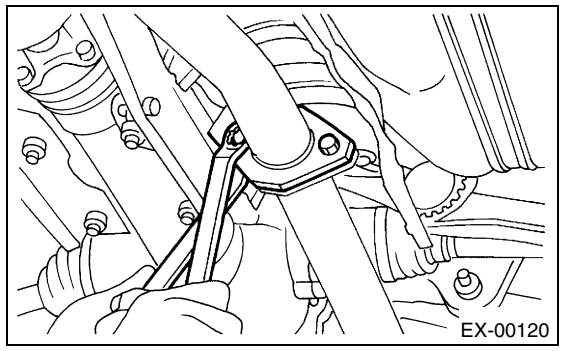


B: INSTALLATION

1) Install in the reverse order of removal.

CAUTION:
Replace the gasket with a new one.

Tightening torque:
48 N·m (4.9 kgf-m, 35.4 ft-lb)



C: INSPECTION

1) Make sure there are no exhaust leaks from connections and welds.
2) Make sure there are no holes or rusting.
3) Make sure the cushion rubber is not worn or cracked.

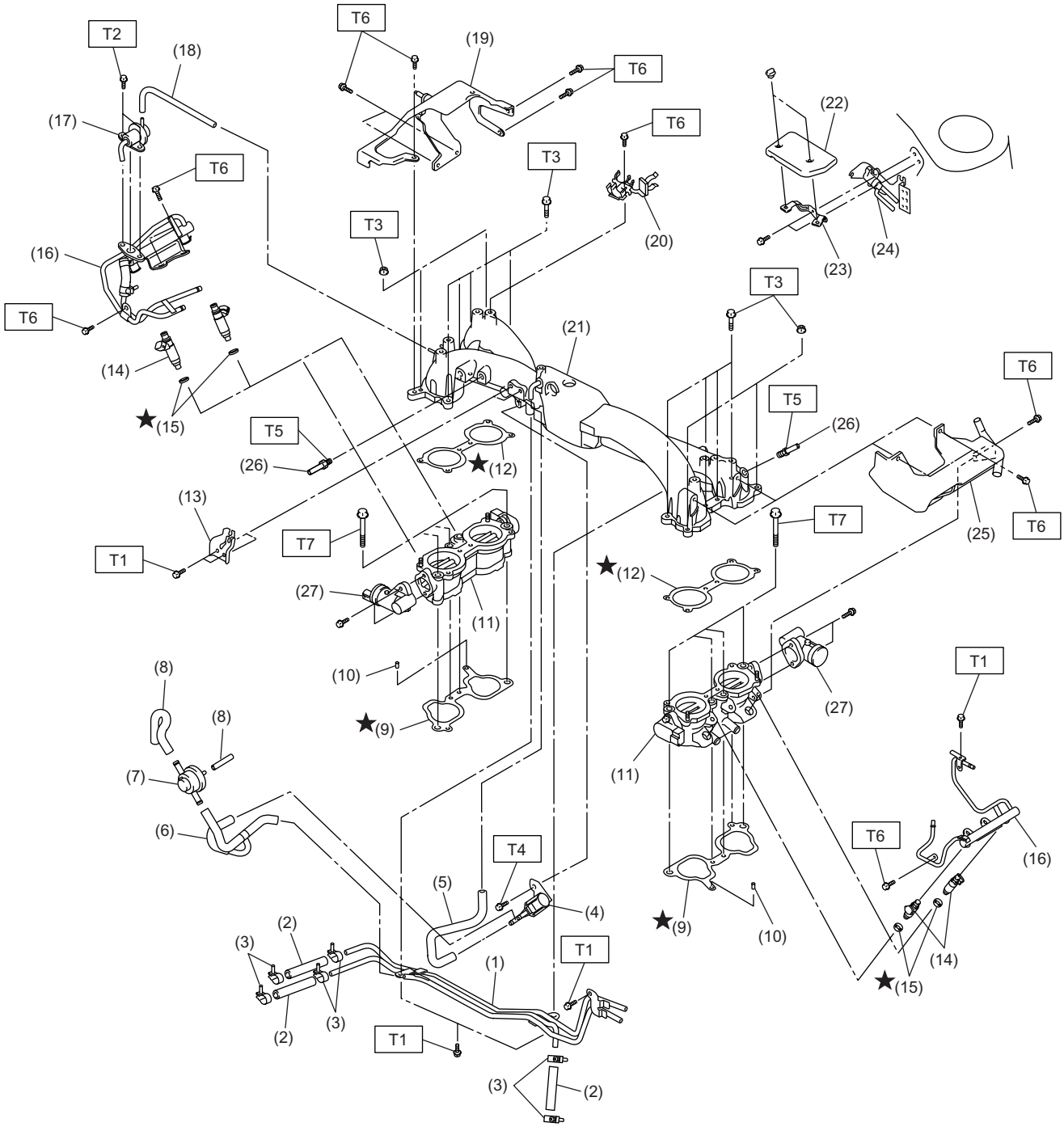
1. General Description

A: SPECIFICATIONS

Fuel tank	Capacity	60 ℓ (15.9 US gal, 13.2 Imp gal)
	Location	Under rear seat
Fuel pump	Type	Impeller
	Shutoff discharge pressure	450 — 677 kPa (4.59 — 6.9 kg/cm^2, 65.27 — 98.2 psi)
	Discharge flow	More than 130 ℓ (34.3 US gal, 28.6 Imp gal)/h [12 V at 300 kPa (3.06 kg/cm^2, 43.5 psi)]
Fuel filter		Cartridge type

B: COMPONENT

1. INTAKE MANIFOLD



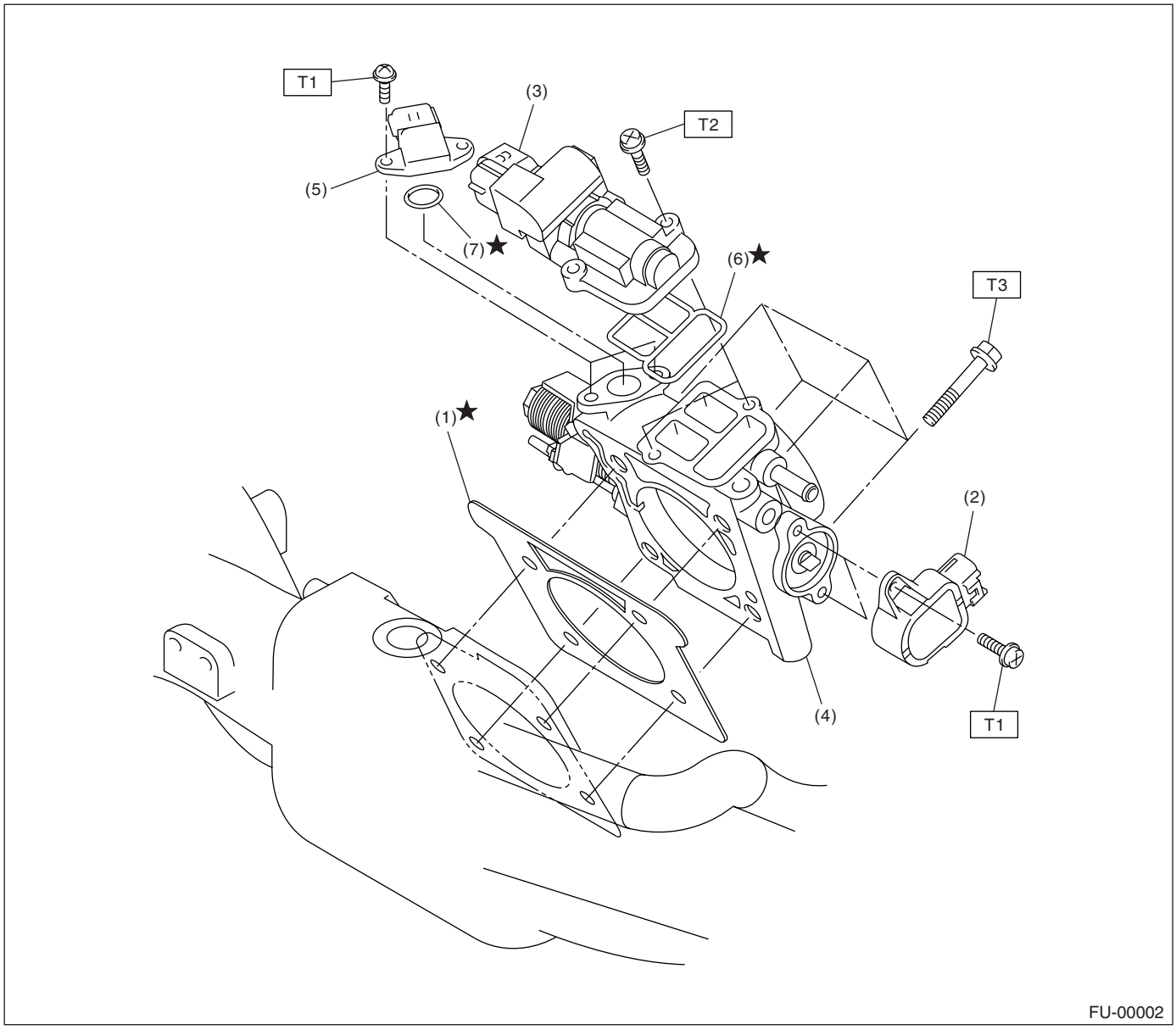
FU-00775

(1) Fuel pipe ASSY
(2) Fuel hose
(3) Clip
(4) Purge control solenoid valve
(5) Vacuum hose
(6) Vacuum control hose
(7) Purge valve
(8) Purge hose
(9) Intake manifold gasket
(10) Guide pin
(11) Tumble generator valve ASSY
(12) Tumble generator valve gasket
(13) Accelerator cable bracket
(14) Fuel injector
(15) Insulator
(16) Fuel injector pipe
(17) Pressure regulator
(18) Pressure regulator hose
(19) Fuel pipe protector RH
(20) Blow-by hose stay
(21) Intake manifold
(22) Solenoid valve cover
(23) Solenoid valve cover stay
(24) Wastegate control solenoid valve ASSY
(25) Fuel pipe protector LH
(26) Nipple
(27) Tumble generator valve actuator

Tightening torque: N·m (kgf-m, ft-lb)

T1: 4.9 (0.5, 3.6)
T2: 6.4 (0.65, 4.7)
T3: 8.25 (0.84, 6.1)
T4: 16 (1.6, 11.8)
T5: 17 (1.73, 12.5)
T6: 19 (1.94, 13.7)
T7: 25 (2.5, 18.1)

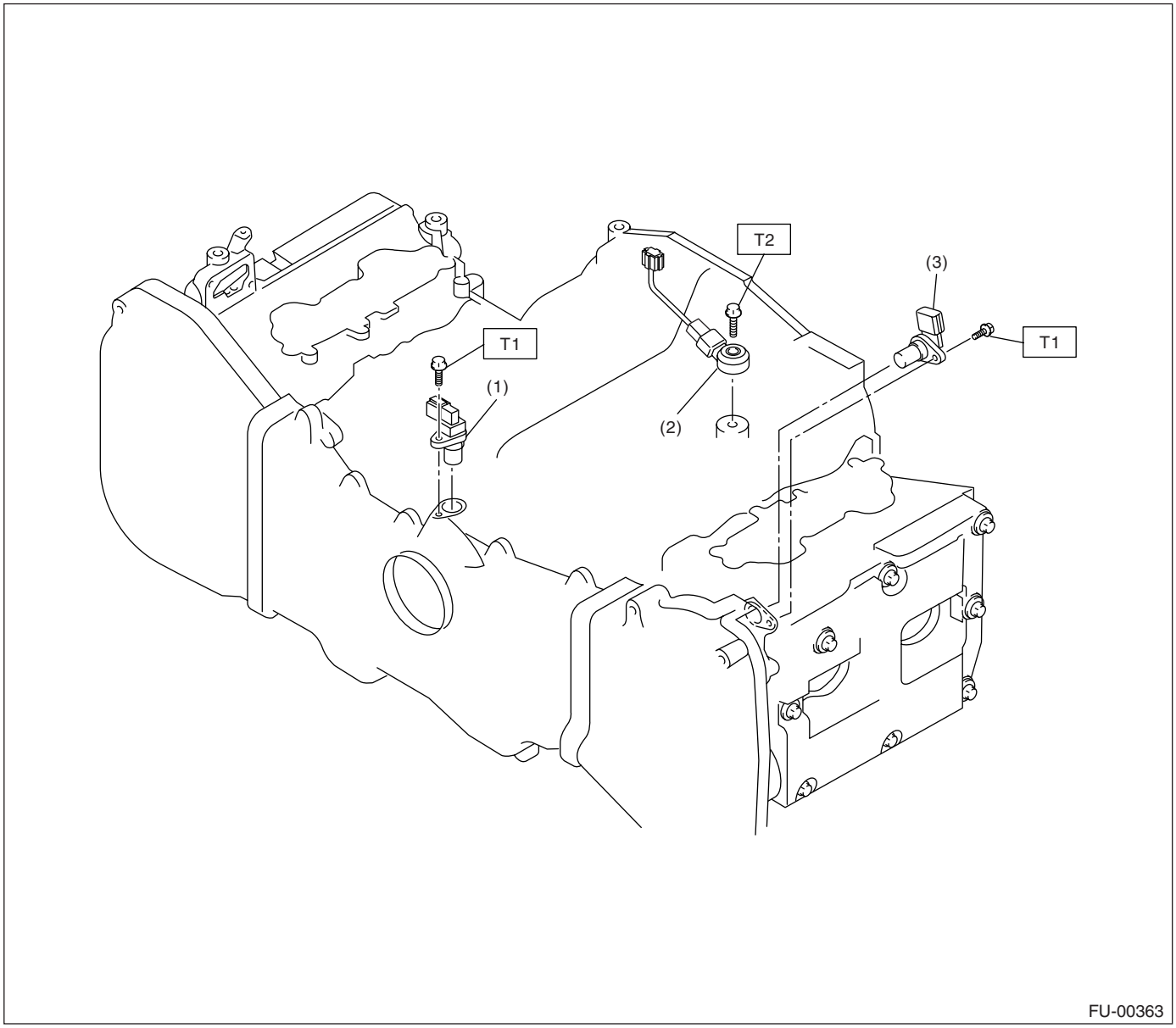
2. AIR INTAKE SYSTEM



(1)	Gasket	(5)	Pressure sensor
(2)	Throttle position sensor	(6)	Gasket
(3)	Idle air control solenoid valve	(7)	O-ring
(4)	Throttle body		

Tightening torque: N·m (kgf-m, ft-lb)
T1: 1.6 (0.16, 1.2)
T2: 2.8 (0.29, 2.1)
T3: 22 (2.2, 15.9)

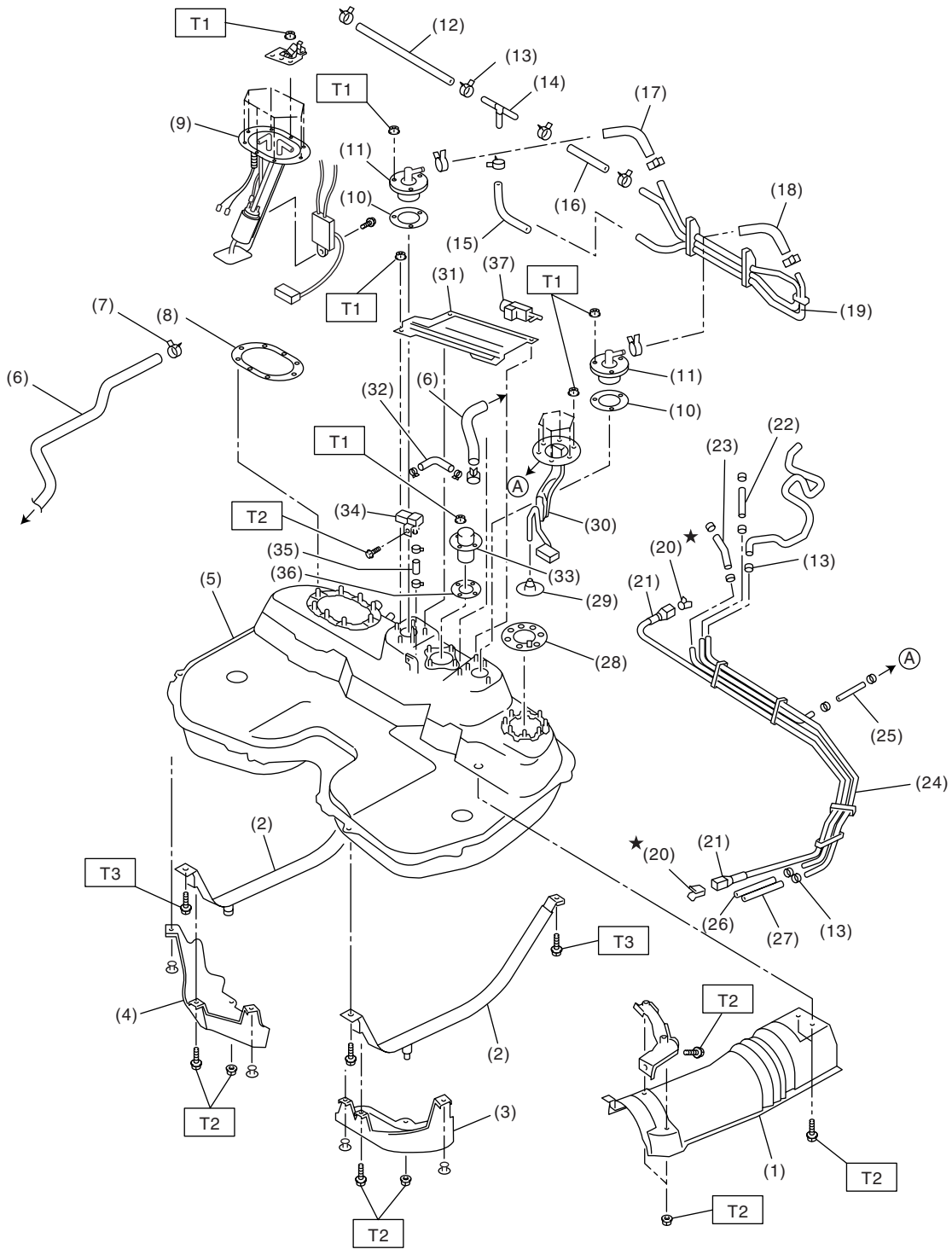
3. CRANKSHAFT POSITION, CAMSHAFT POSITION AND KNOCK SENSORS



(1) Crankshaft position sensor
(2) Knock sensor
(3) Camshaft position sensor

Tightening torque: N·m (kgf-m, ft-lb)
T1: 6.4 (0.65, 4.7)
T2: 24 (2.4, 17.4)

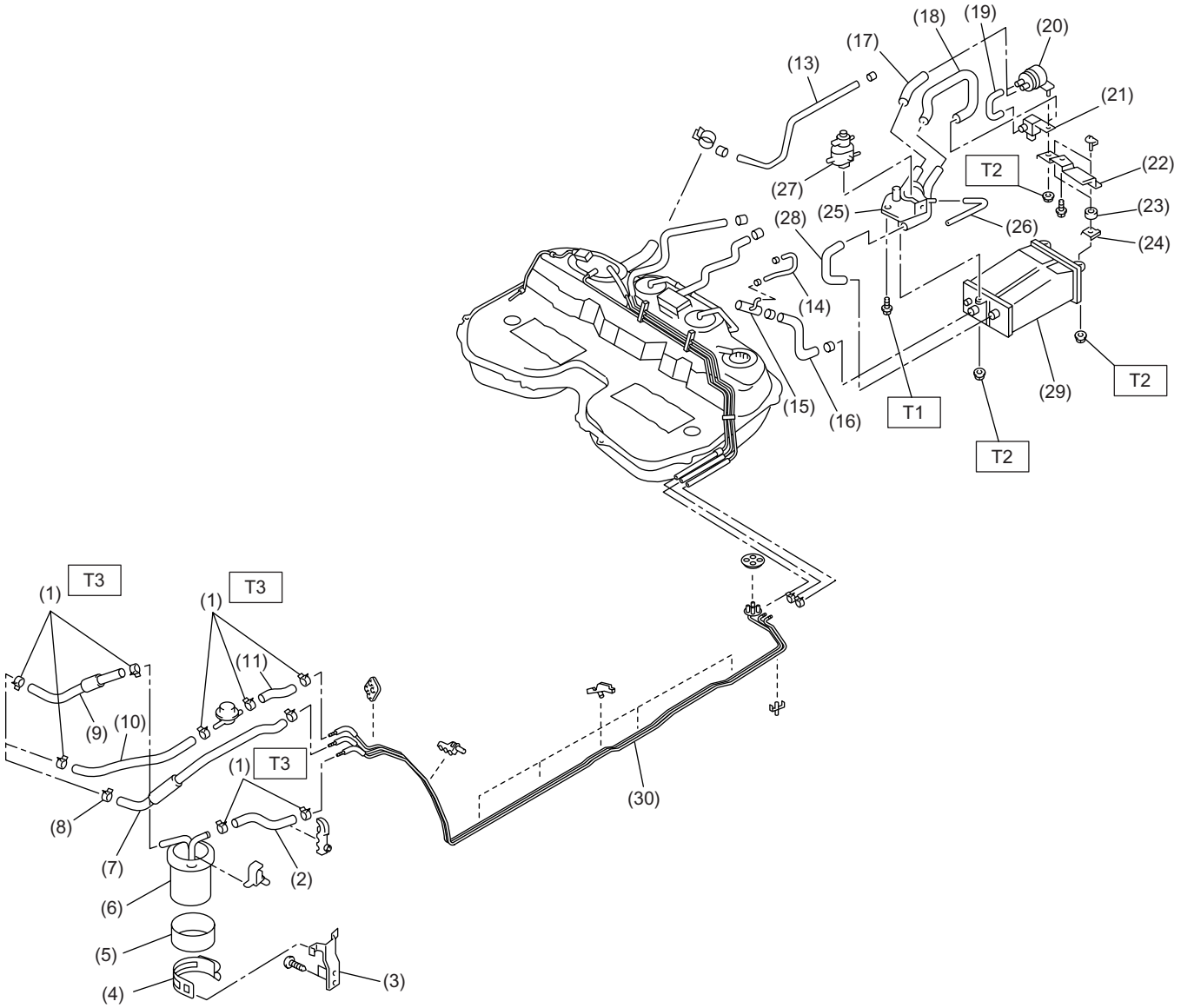
4. FUEL TANK


T1
(12)
(13)
(14)
(17)
(9)
(11)
(10)
(16)
(18)
(15)
(37)
(31)
(19)
(7)
(8)
(6)
(32)
(22)
(23)
(34)
(30)
(20)
(35)
(36)
(33)
(29)
(21)
(5)
(28)
(25)
(24)
(2)
(26)
(27)
(4)
(3)
(1)
T2
T3
A
FU-00249

(1) Heat shield cover
(2) Fuel tank band
(3) Protector LH
(4) Protector RH
(5) Fuel tank
(6) Canister hose A
(7) Clamp
(8) Fuel damper
(9) Fuel pump ASSY
(10) Fuel cut valve gasket
(11) Fuel cut valve
(12) Evaporation hose A
(13) Clip
(14) Joint pipe
(15) Evaporation hose C
(16) Evaporation hose B
(17) Evaporation hose D
(18) Evaporation hose E
(19) Evaporation pipe ASSY
(20) Retainer
(21) Quick connector
(22) Jet pump hose A
(23) Fuel return hose A
(24) Fuel pipe ASSY
(25) Jet pump hose B
(26) Fuel return hose B
(27) Evaporation hose F
(28) Fuel sub level sensor gasket
(29) Jet pump filter
(30) Fuel sub level sensor
(31) Protector cover
(32) Vent valve hose
(33) Vent valve
(34) Fuel tank pressure sensor
(35) Fuel tank pressure sensor hose
(36) Vent valve gasket
(37) Fuel tank sensor control valve

Tightening torque: N·m (kgf-m, ft-lb)
T1: 4.4 (0.45, 3.3)
T2: 7.4 (0.75, 5.4)
T3: 33 (3.4, 25)

5. FUEL LINE

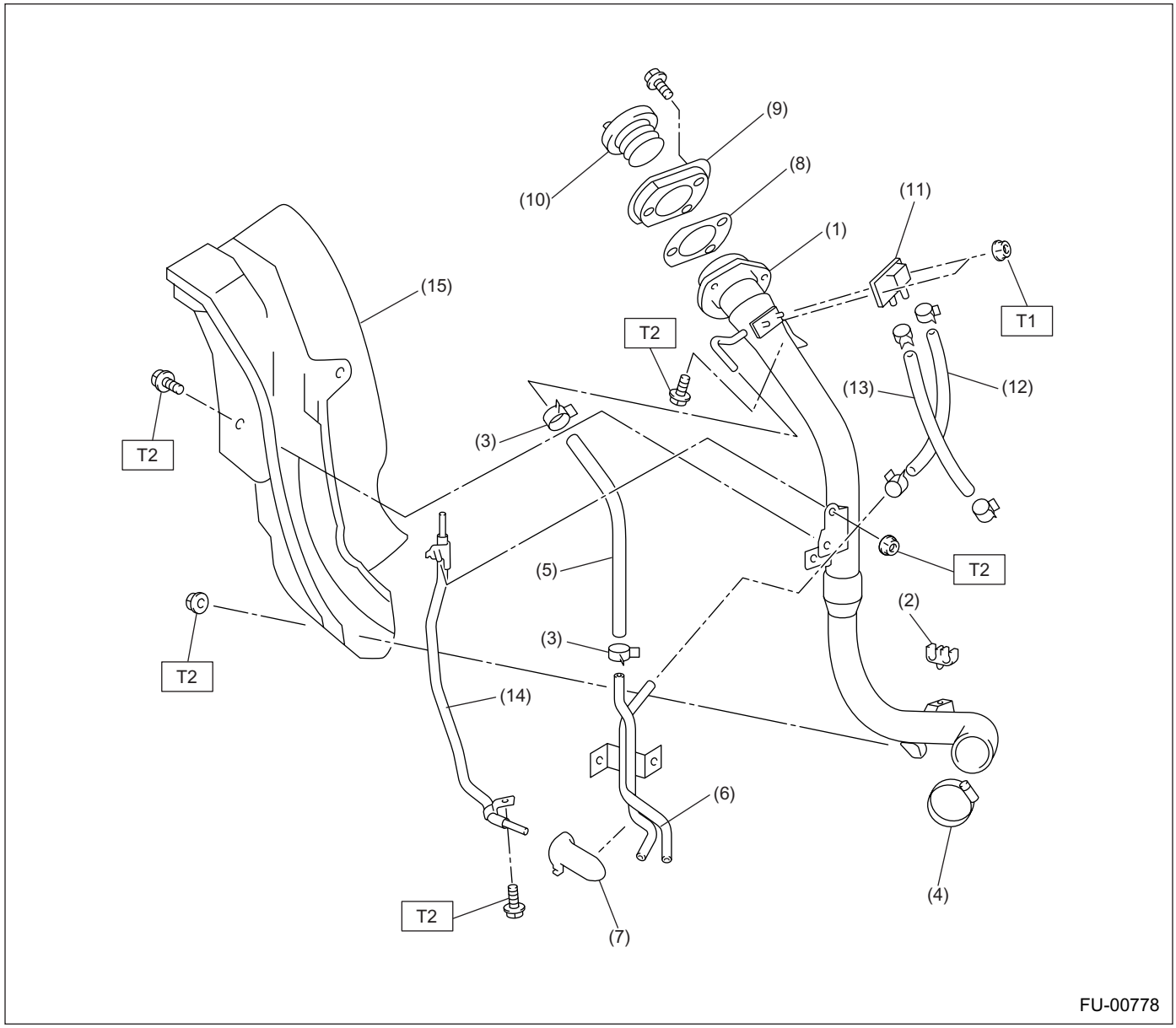


FU-00777

(1) Clamp
(2) Fuel delivery hose A
(3) Fuel filter bracket
(4) Fuel filter holder
(5) Fuel filter cup
(6) Fuel filter
(7) Evaporation hose
(8) Clip
(9) Fuel delivery hose B
(10) Fuel return hose A
(11) Fuel return hose B
(12) Fuel damper
(13) Evaporation hose J
(14) Evaporation hose K
(15) Joint pipe
(16) Canister hose A
(17) Air filter hose A
(18) Drain valve hose
(19) Air filter hose B
(20) Drain filter
(21) Drain valve
(22) Canister upper bracket
(23) Cushion rubber
(24) Canister lower bracket
(25) Canister holder
(26) Evaporation hose L
(27) Pressure control solenoid valve
(28) Canister hose B
(29) Canister
(30) Fuel pipe ASSY

Tightening torque: N·m (kgf-m, ft-lb)
T1: 25 (2.5, 18.1)
T2: 23 (2.3, 16.6)
T3: 1.25 (0.13, 0.94)

6. FUEL FILLER PIPE



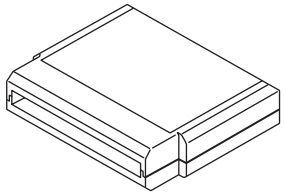
(1) Fuel filler pipe ASSY
(2) Evaporation hose holder
(3) Clip
(4) Clamp
(5) Evaporation hose A
(6) Evaporation pipe
(7) Evaporation pipe holder
(8) Filler pipe packing
(9) Filler ring
(10) Filler cap
(11) Shut valve
(12) Evaporation hose B
(13) Evaporation hose C
(14) Joint pipe
(15) Fuel filler pipe protector

Tightening torque: N·m (kgf-m, ft-lb)
T1: 4.4 (0.45, 3.3)
T2: 7.5 (0.76, 5.5)

C: CAUTION

- Wear working clothing, including a cap, protective goggles, and protective shoes during operation.
- Remove contamination including dirt and corrosion before removal, installation or disassembly.
- Keep the disassembled parts in order and protect them from dust or dirt.
- Before removal, installation or disassembly, be sure to clarify the failure. Avoid unnecessary removal, installation, disassembly, and replacement.
- Be careful not to burn your hands, because each part on the vehicle is hot after running.
- Be sure to tighten fasteners including bolts and nuts to the specified torque.
- Place shop jacks or safety stands at the specified points.
- Before disconnecting electrical connectors of sensors or units, be sure to disconnect negative terminal from battery.
- Place “NO FIRE” signs near the working area.
- Be careful not to spill fuel on the floor.

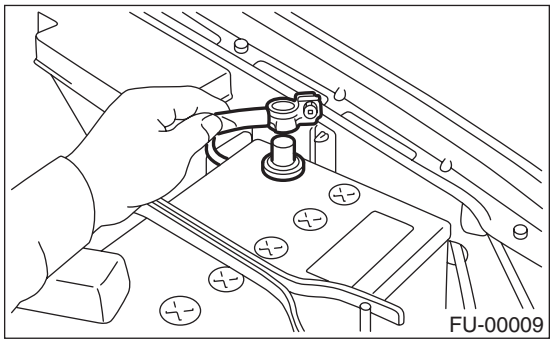
D: PREPARATION TOOL

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST24082AA210	24082AA210 (Newly adopted tool)	CARTRIDGE	Troubleshooting for electrical system.
 ST22771AA030	22771AA030	SELECT MONITOR KIT	Troubleshooting for electrical systems. • English: 22771AA030 (Without printer) • German: 22771AA070 (Without printer) • French: 22771AA080 (Without printer) • Spanish: 22771AA090 (Without printer)

2. Throttle Body

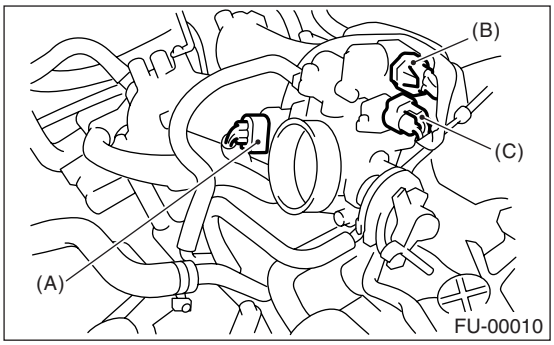
A: REMOVAL

1) Disconnect the battery ground cable.

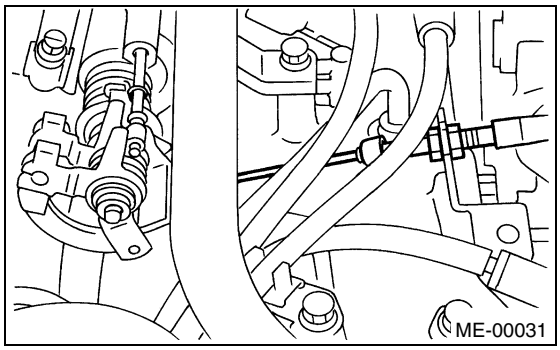


2) Remove the intercooler. <Ref. to IN(H4DOTC)-11, REMOVAL, Intercooler.>

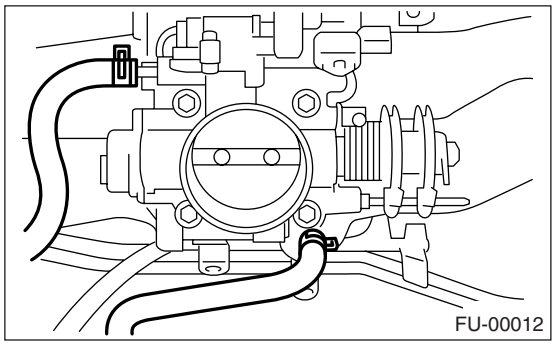
3) Disconnect the connector from the throttle position sensor (A) and idle air cotrol solenoid valve (B) and pressure sensor (C).



4) Disconnect the accelerator cable.



5) Disconnect the engine coolant hoses from the throttle body.



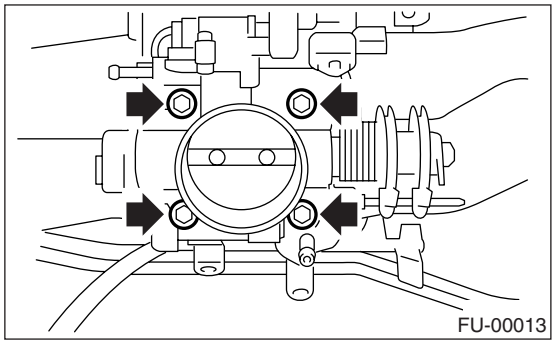
6) Remove the bolts which secure the throttle body to intake manifold.

B: INSTALLATION

Install in the reverse order of removal.

NOTE:
Always use a new gasket.

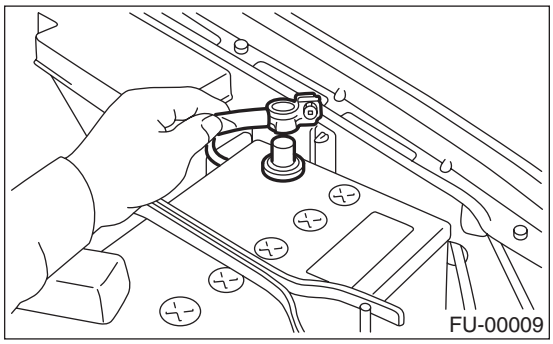
Tightening torque:
22 N·m (2.2 kgf-m, 15.9 ft-lb)



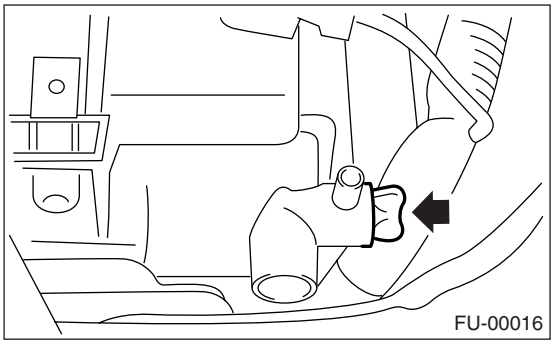
3. Intake Manifold

A: REMOVAL

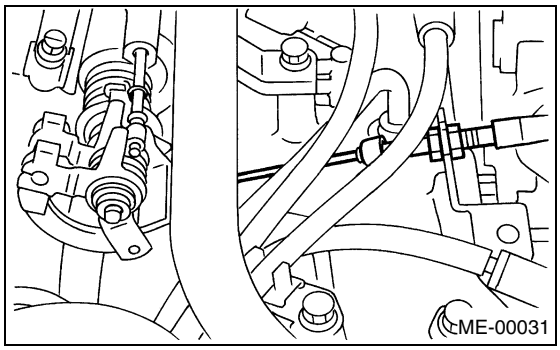
1) Release the fuel pressure. <Ref. to FU(H4DOTC)-54, RELEASING OF FUEL PRESSURE, OPERATION, Fuel.>
2) Open the fuel filler lid and remove the fuel filler cap.
3) Disconnect the battery ground cable.



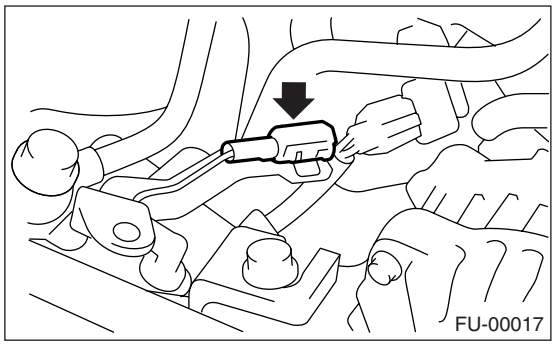
4) Lift up the vehicle.
5) Remove the under cover.
6) Drain the coolant about 3.0 ℓ (3.2 US qt, 2.6 Imp qt).



7) Remove the air cleaner upper cover and air intake boot. <Ref. to IN(H4DOTC)-7, REMOVAL, Air Cleaner.>
8) Remove the air cleaner element.
9) Remove the intercooler. <Ref. to IN(H4DOTC)-11, REMOVAL, Intercooler.>
10) Disconnect the accelerator cable.

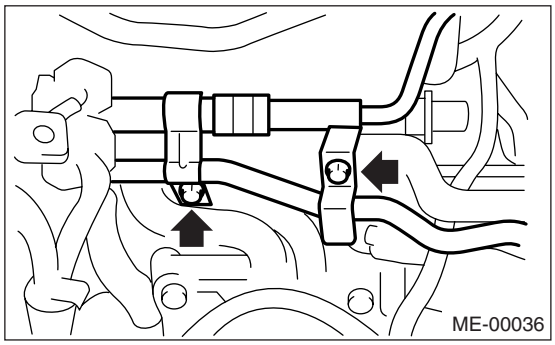


11) Remove the coolant filler tank. <Ref. to CO(H4SO)-52, REMOVAL, Coolant Filler Tank.>
12) Remove the power steering pump.
(1) Remove the front side V-belt.
<Ref. to ME(H4DOTC)-44, REMOVAL, V-belt.>
(2) Disconnect the power steering switch connector.

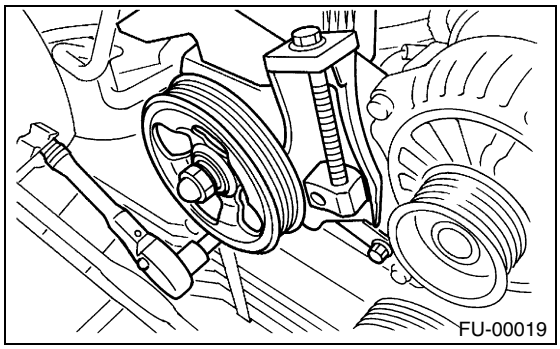


(3) Remove the bolts which secure the power steering pipe brackets to the intake manifold.

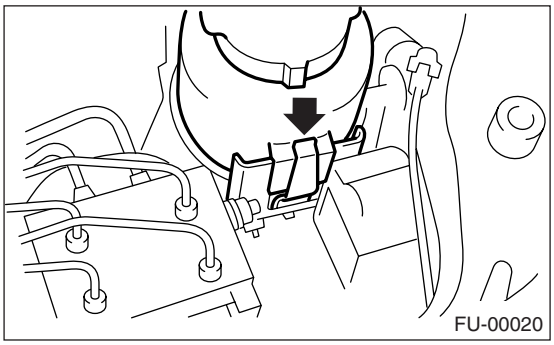
NOTE:
Do not disconnect the power steering hose.



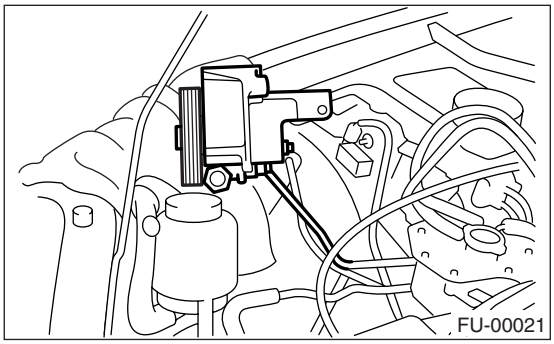
(4) Remove the bolts which secure the power steering pump bracket.



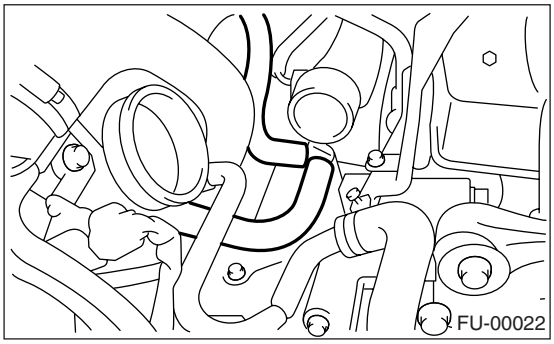
(5) Remove the power steering tank from the bracket by pulling it upward.



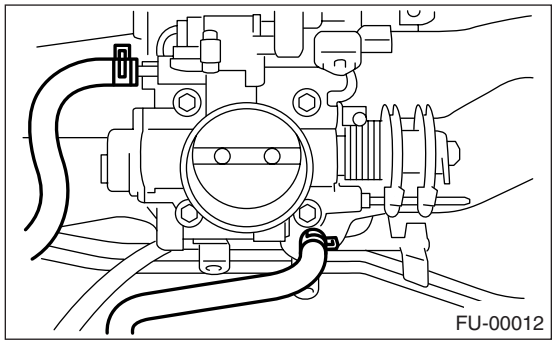
(6) Place the power steering pump on the right side wheel apron.



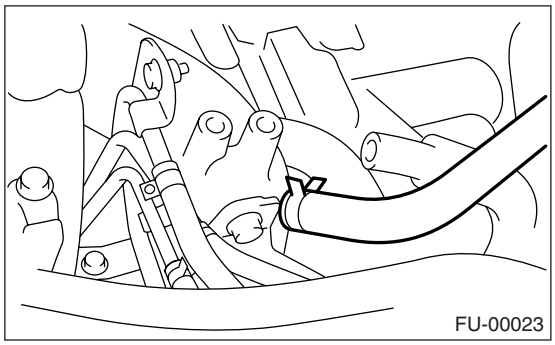
13) Disconnect the emission hose from the PCV valve.



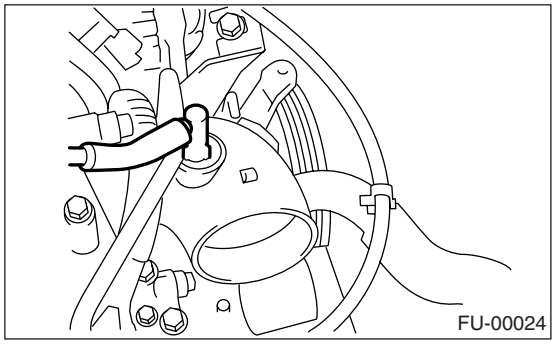
14) Disconnect the engine coolant hoses from the throttle body.



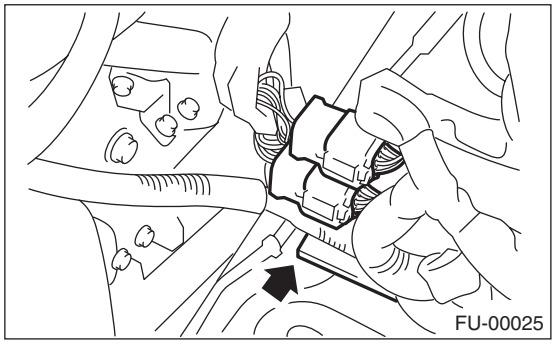
15) Disconnect the brake booster hose.

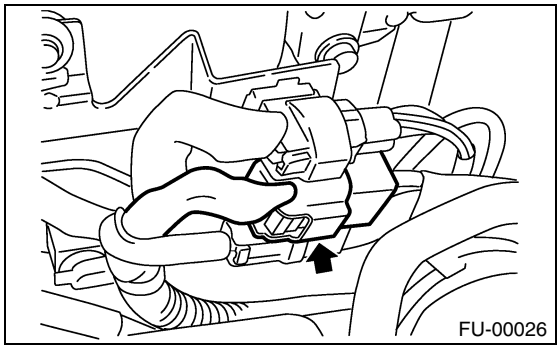


16) Disconnect the pressure hose from the intake duct.

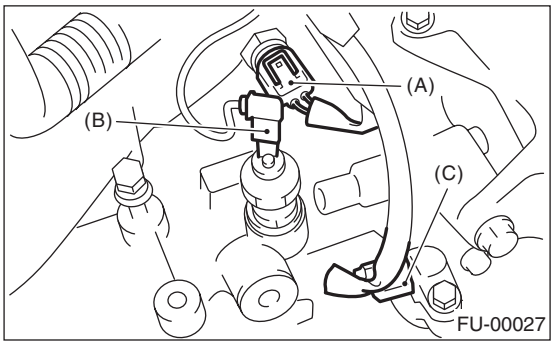


17) Disconnect the engine harness connectors from the bulkhead harness connectors.

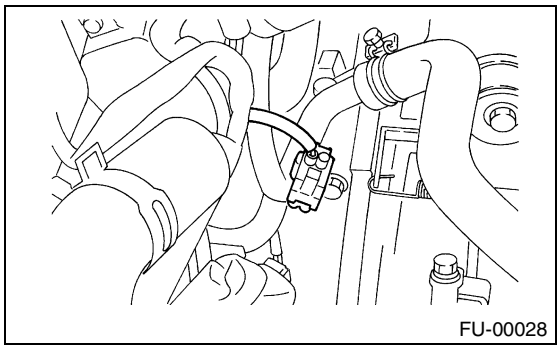




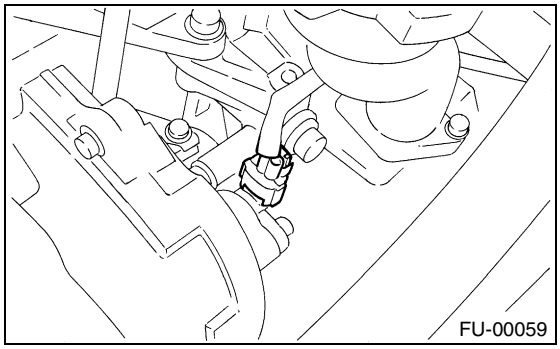
18) Disconnect the connectors from the engine coolant temperature sensor (A), oil pressure switch (B) and crankshaft position sensor (C).



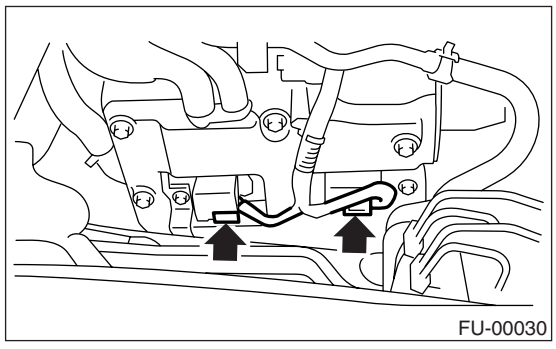
19) Disconnect the knock sensor connector.



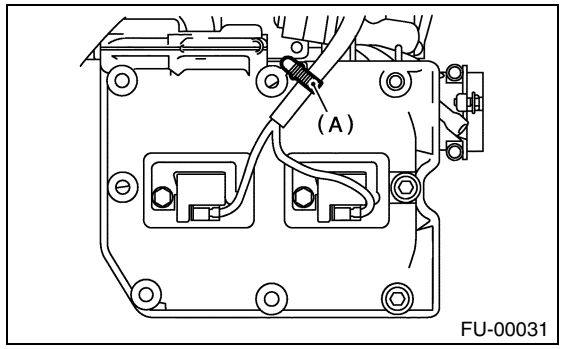
20) Disconnect the connector from the camshaft position sensor.



21) Disconnect the connector from the ignition coil.

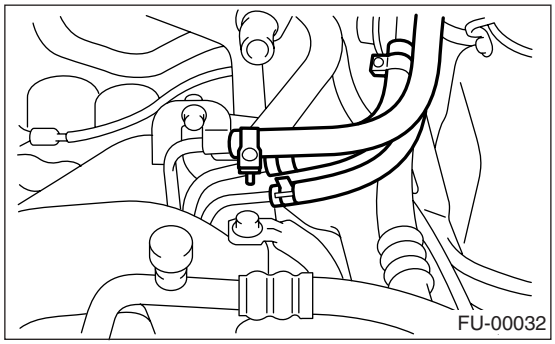


22) Disconnect the engine harness fixed by clip (A) from the bracket.

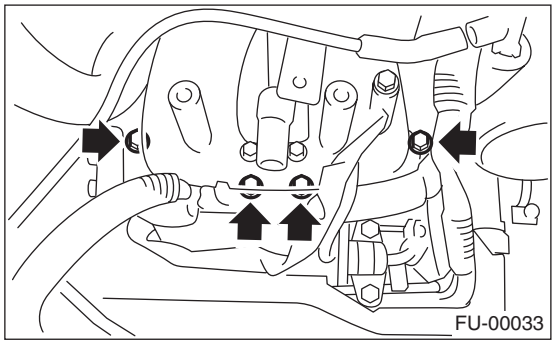


23) Disconnect the fuel delivery hose, return hose and evaporation hose.

CAUTION:
- **Do not spill fuel.**
- **Catch fuel from hoses in a container or cloth.**



24) Remove the bolts which secure the intake manifold to the cylinder heads.



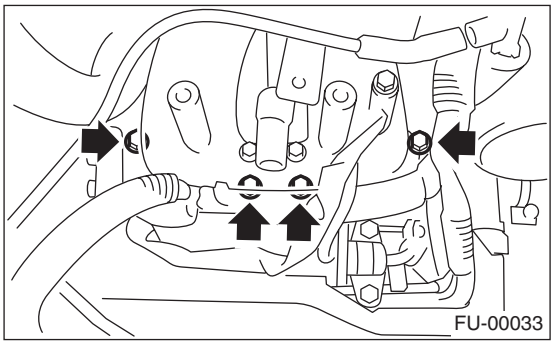
25) Remove the intake manifold.

B: INSTALLATION

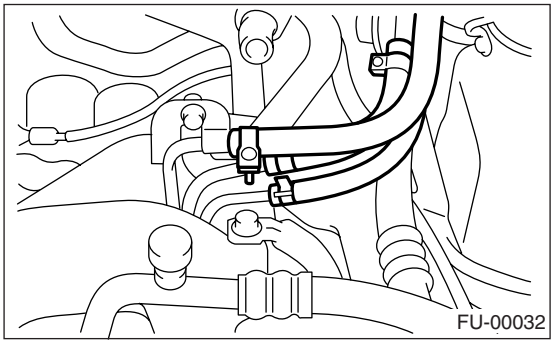
1) Install the intake manifold onto cylinder heads.

NOTE:
Always use new gaskets.

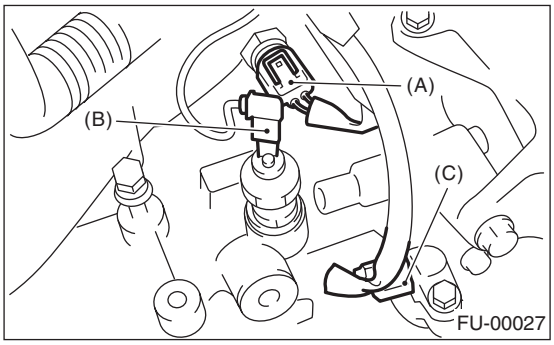
Tightening torque:
25 N·m (2.5 kgf-m, 18.1 ft-lb)



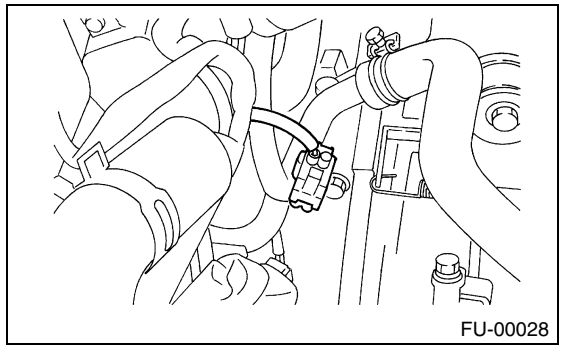
2) Connect the fuel delivery hose, return hose, and evaporation hose.



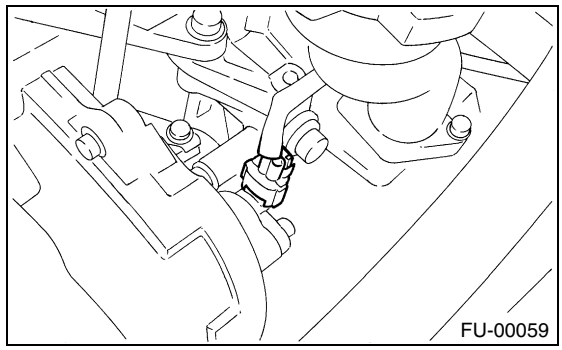
3) Connect the connector to the oil pressure switch (B), crankshaft position sensor (C) and engine coolant temperature sensor (A).



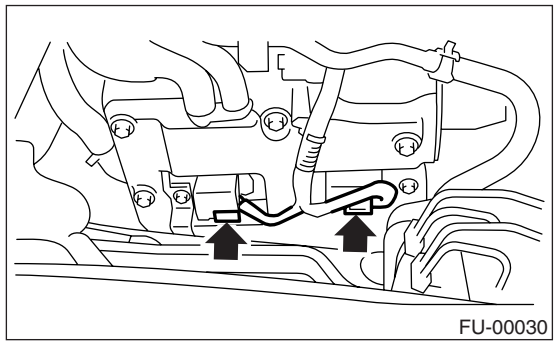
4) Connect the connector to the knock sensor.



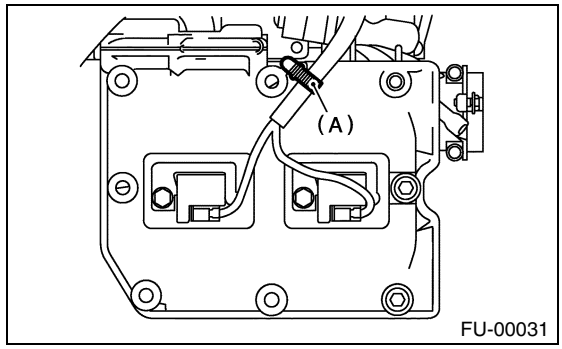
5) Connect the connector to the camshaft position sensor.



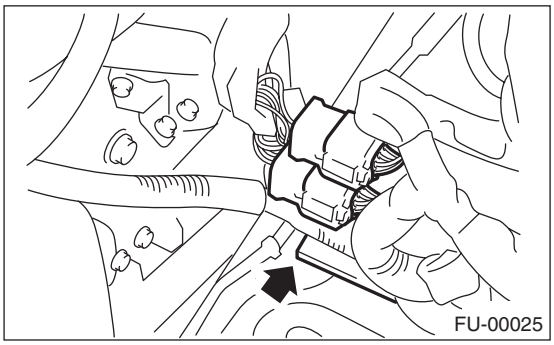
6) Connect the connector to the ignition coil.

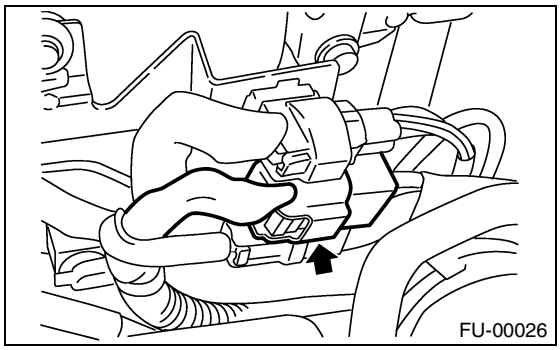


7) Connect the engine harness with clip (A) to the bracket.

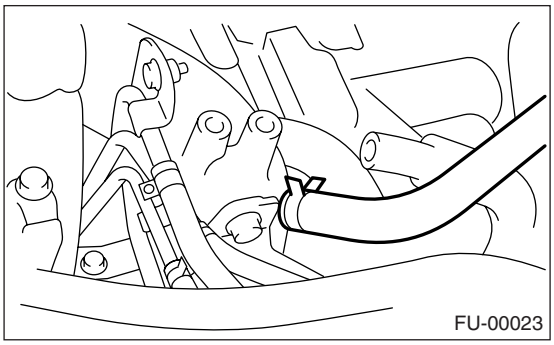


8) Connect the engine harness connector to the bulkhead harness connectors.

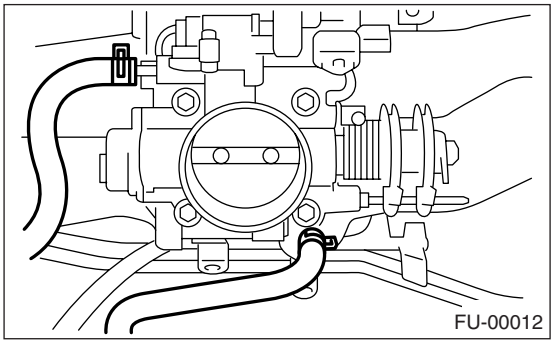




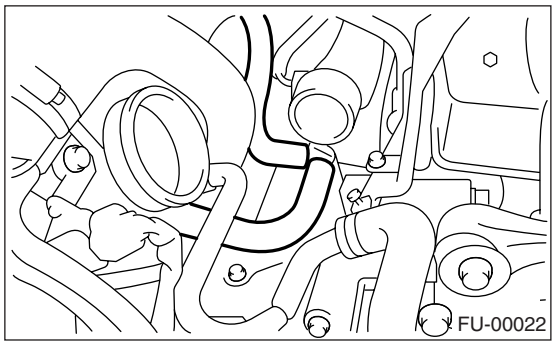
9) Connect the brake booster vacuum hose.



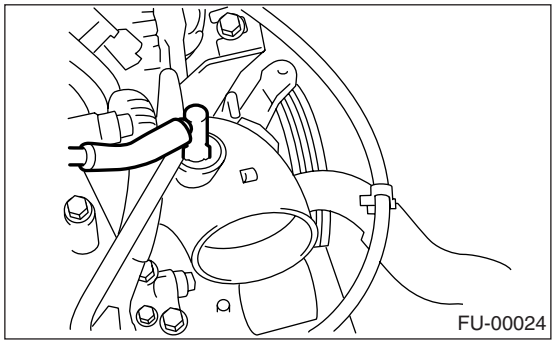
10) Connect the engine coolant hoses to the throttle body.



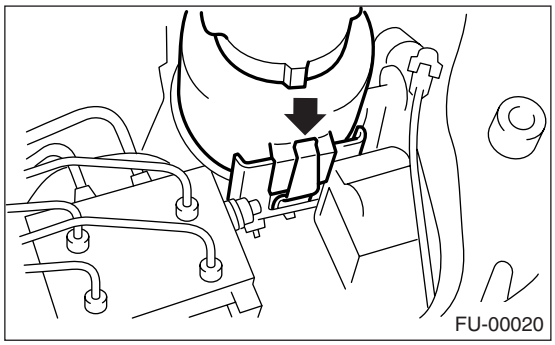
11) Connect the emission hose to the PCV valve.



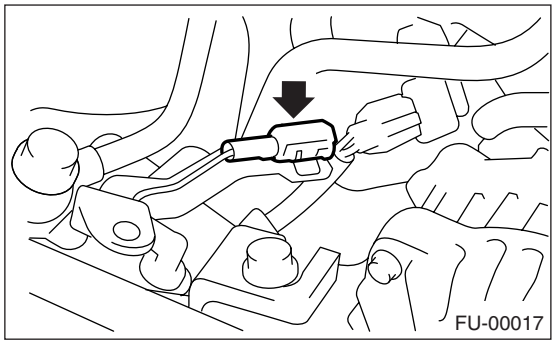
12) Connect the pressure hose to the intake duct.



13) Install the power steering pump.
(1) Install the power steering tank on the bracket.

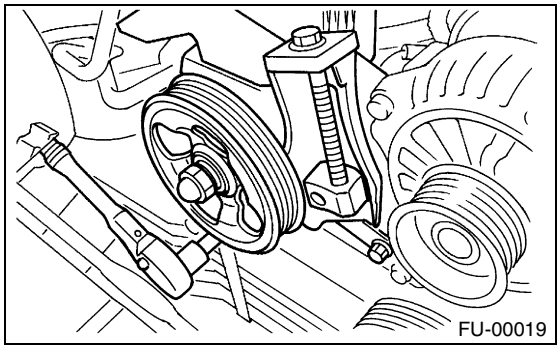


(2) Connect the connector to the power steering pump switch.

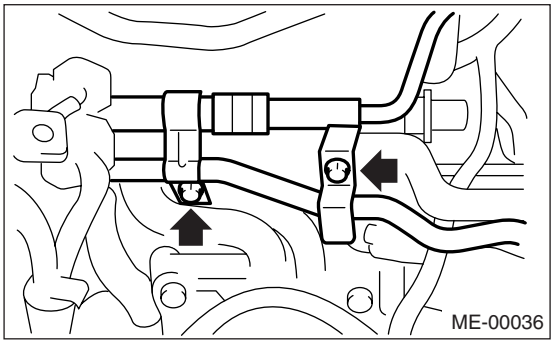


(3) Install the power steering pump, and tighten the bolts.

Tightening torque:
22 N·m (2.2 kgf-m, 15.9 ft-lb)

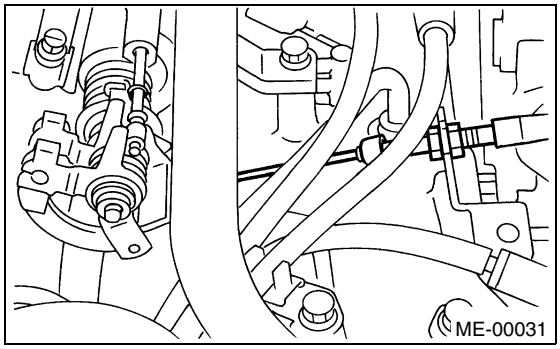


(4) Install the power steering pipe brackets on the right side intake manifold.

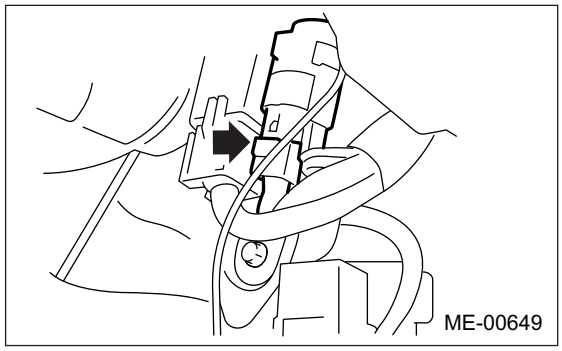


(5) Install the front side V-belt.
<Ref. to ME(H4DOTC)-44, REMOVAL, V-belt.>

14) Install the cooler filler tank. <Ref. to CO(H4SO)-52, INSTALLATION, Coolant Filler Tank.>
15) Connect the accelerator cable.



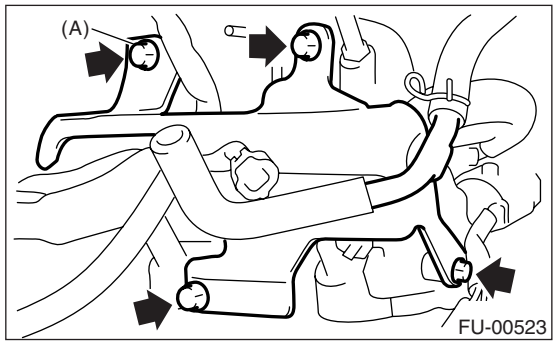
16) Install the intercooler. <Ref. to IN(H4DOTC)-12, INSTALLATION, Intercooler.>
17) Install the air cleaner element.
18) Install the air cleaner upper cover and air intake duct as a unit. <Ref. to IN(H4DOTC)-7, INSTALLATION, Air Cleaner.>
19) Connect the connector to the fuel pump relay.



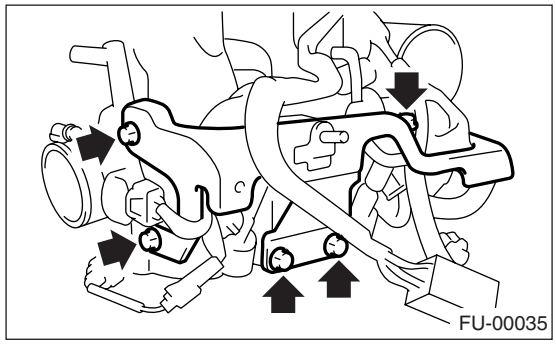
20) Connect the battery ground cable.
21) Lift up the vehicle.
22) Install the under cover.
23) Fill the coolant. <Ref. to CO(H4SO)-29, FILLING OF ENGINE COOLANT, Engine Coolant.>

C: DISASSEMBLY

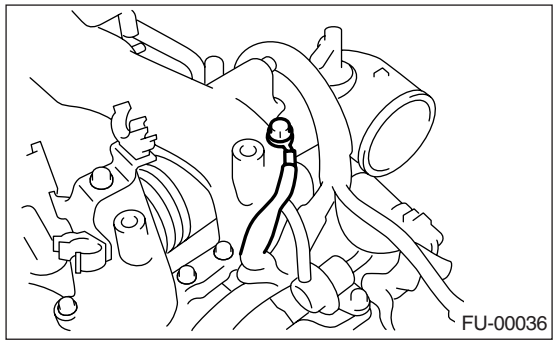
1) Remove the fuel pipe protector LH.

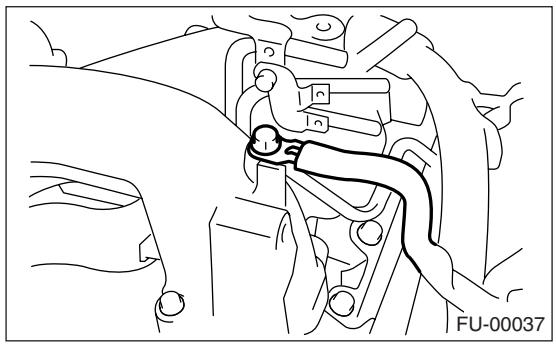


2) Remove the fuel pipe protector RH.



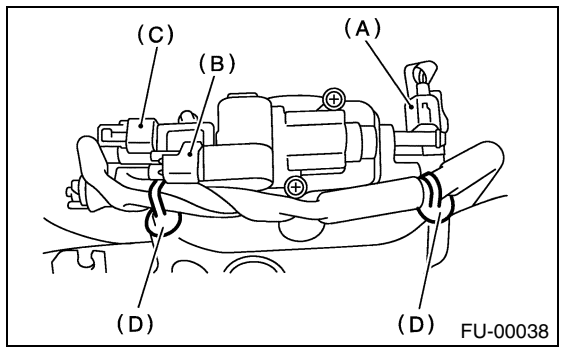
3) Remove the engine ground terminal from the intake manifold.



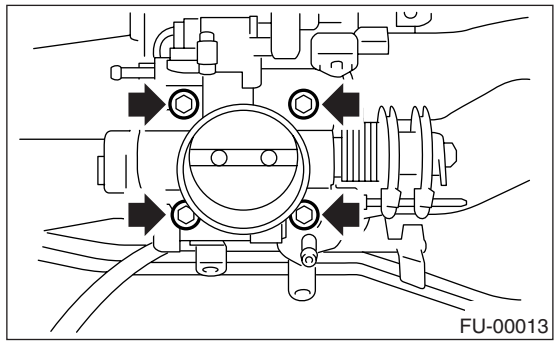


4) Disconnect the connector from the throttle position sensor (A), idle air control solenoid valve (B) and pressure sensor (C).

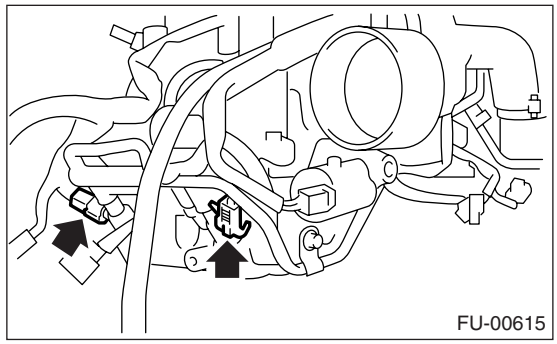
5) Disconnect the engine harness fixed by clip (D) from the intake manifold.



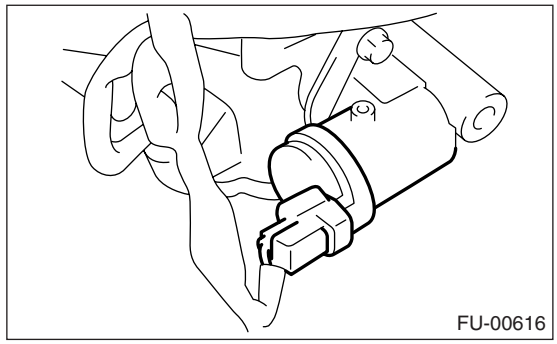
6) Remove the throttle body from the intake manifold.



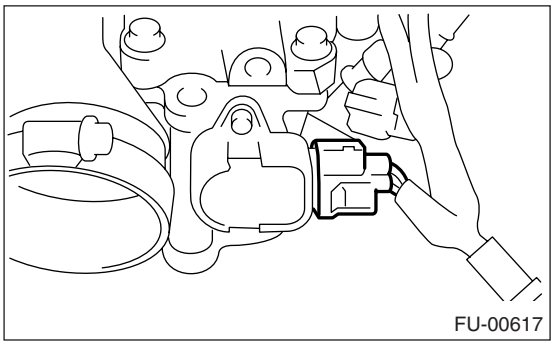
7) Disconnect the connector from the fuel injector.



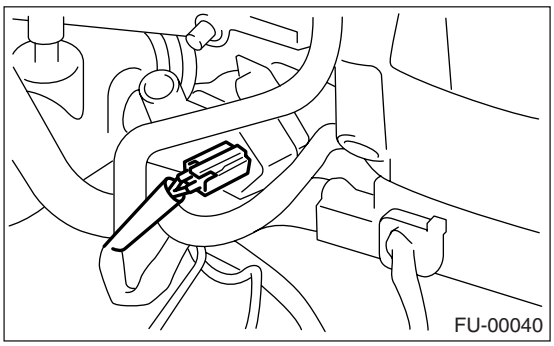
8) Disconnect the connector from the tumble generator valve actuator.



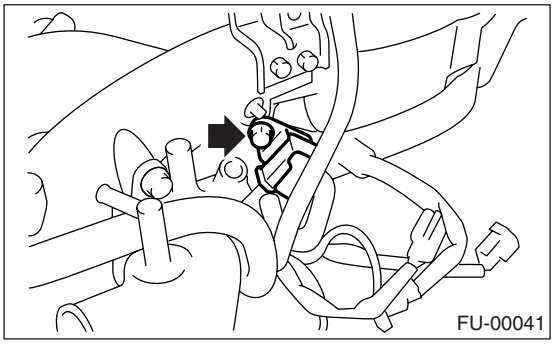
9) Disconnect the connector from the tumble generator valve sensor.



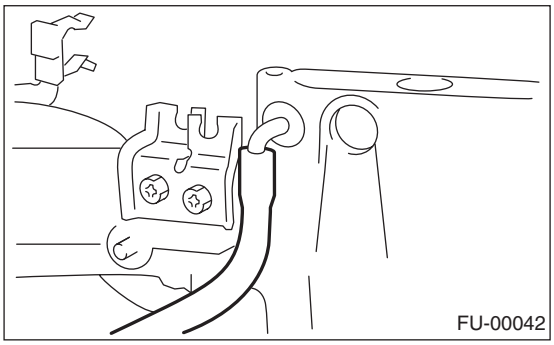
10) Disconnect the connector from the purge control solenoid valve.



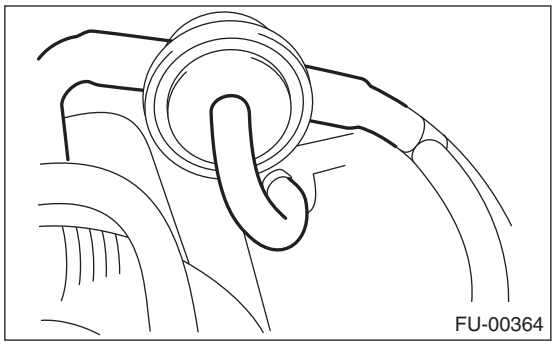
11) Remove the purge control solenoid valve.



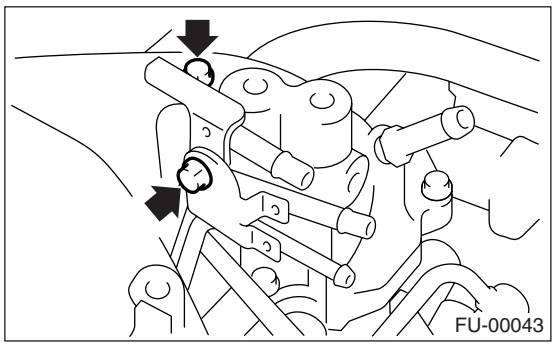
12) Disconnect the evaporation hose from the intake manifold.



13) Disconnect the evaporation hoses from the purge valve.

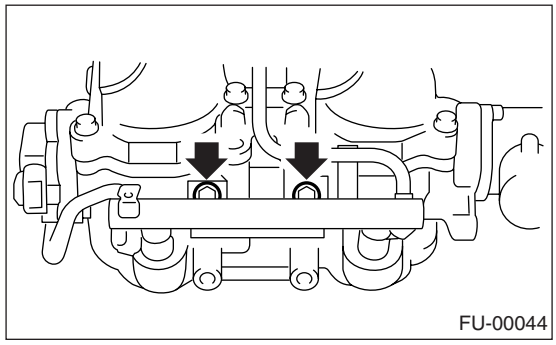


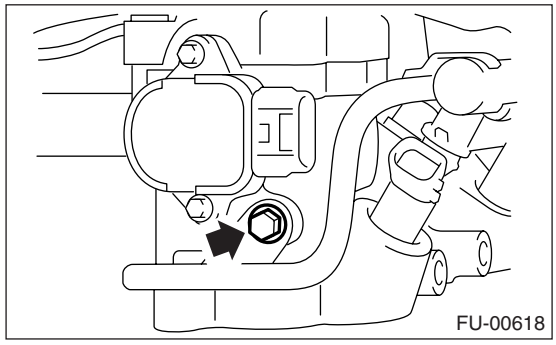
14) Remove the two bolts which hold the fuel pipes on the left side of intake manifold.



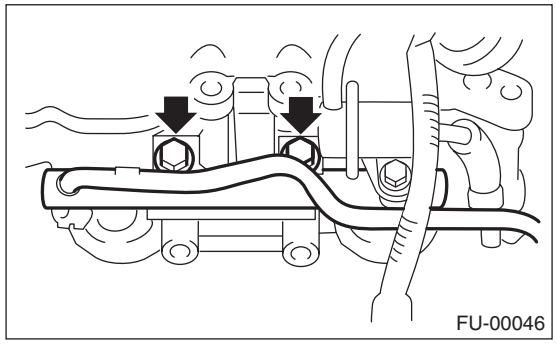
15) Remove the bolt which hold the fuel injector pipe onto intake manifold.

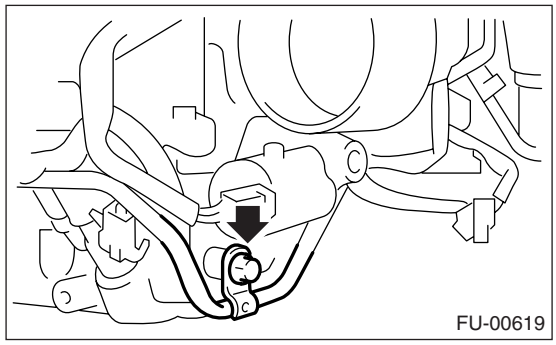
- LH SIDE



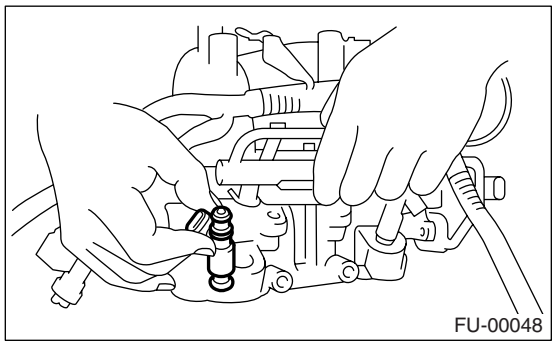


- RH SIDE

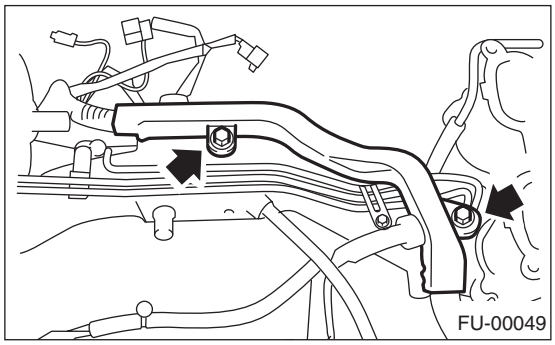




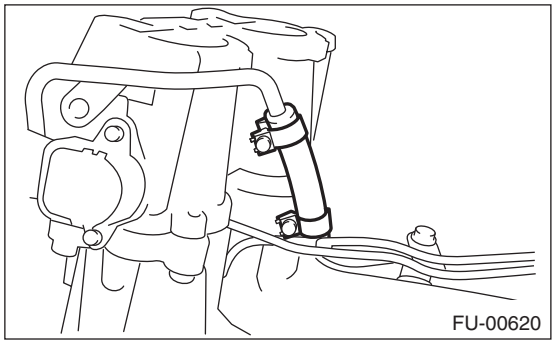
16) Remove the fuel injector.



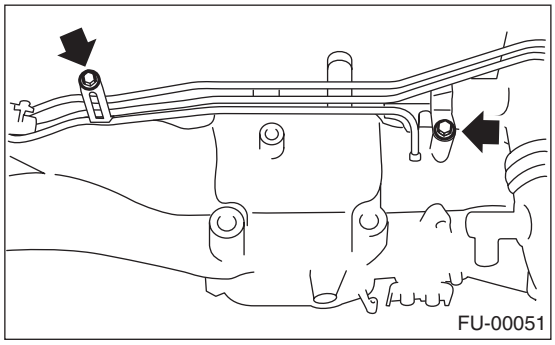
17) Remove the harness bracket which hold the engine harness onto intake manifold.



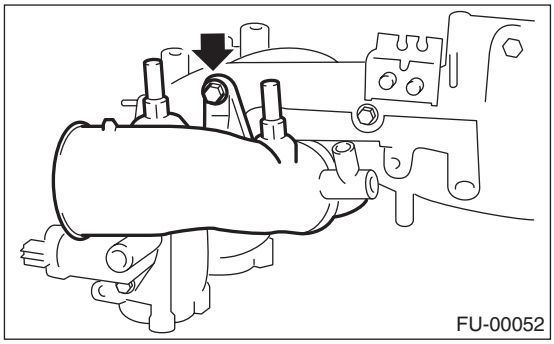
18) Remove the engine harness from the intake manifold.
19) Loosen the clamp which holds the front left side fuel hose to injector pipe and remove the pipe from clamp.



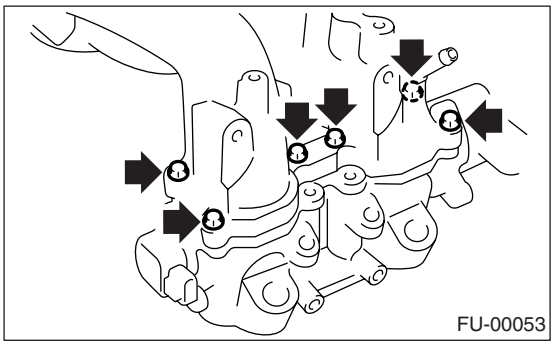
20) Remove the fuel injector pipe LH.
21) Remove the bolts which installs the fuel pipe on intake manifold.



22) Remove the fuel pipe assembly and pressure regulator, from the intake manifold.
23) Remove the intake duct from the intake manifold.



24) Remove the tumble generator valve assembly from the intake manifold.

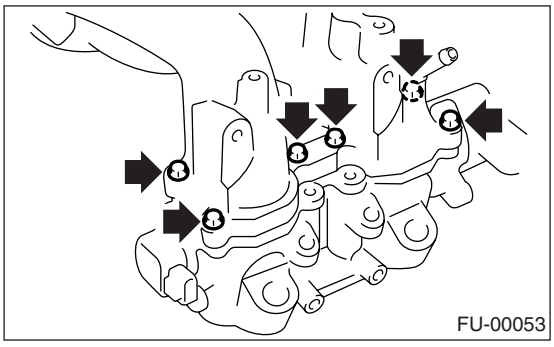


D: ASSEMBLY

NOTE:
Replace the gasket with a new one.

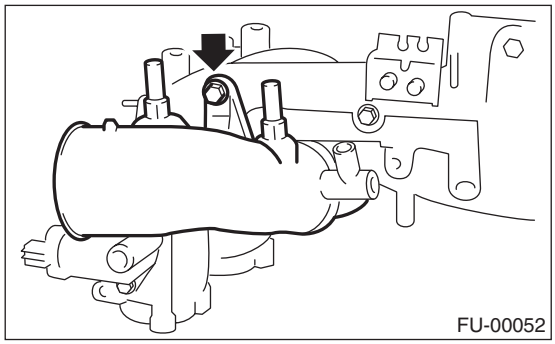
1) Install the tumble generator valve assembly to the intake manifold.

Tightening torque:
8.25 N·m (0.84 kgf-m, 6.1 ft-lb)



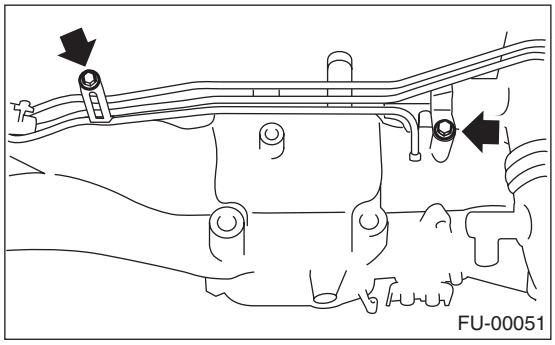
2) Install the air intake duct to the intake manifold.

Tightening torque:
19 N·m (1.94 kgf-m, 13.7 ft-lb)

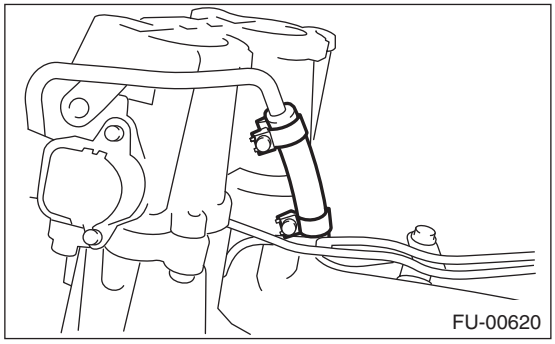


3) Install the fuel pipe assembly and pressure regulator, to the intake manifold.

Tightening torque:
4.9 N·m (0.5 kgf-m, 3.6 ft-lb)



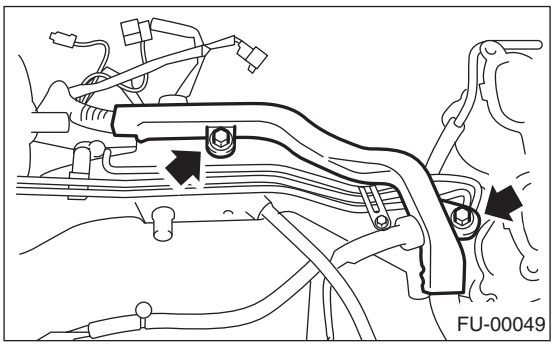
4) Install the fuel injector pipe LH.
5) Connect the left side fuel hose to injector pipe, and tighten the clamp screw.



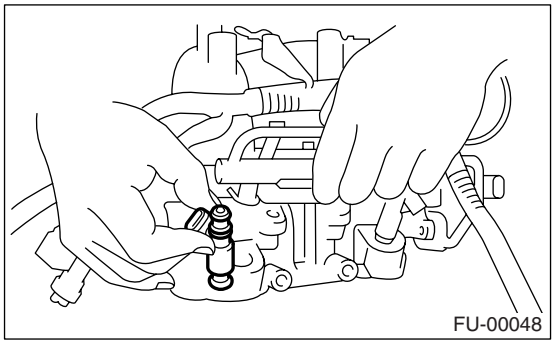
6) Install the engine harness to the intake manifold.

7) Install the harness bracket which hold the engine harness onto intake manifold.

Tightening torque:
19 N·m (1.94 kgf-m, 13.7 ft-lb)



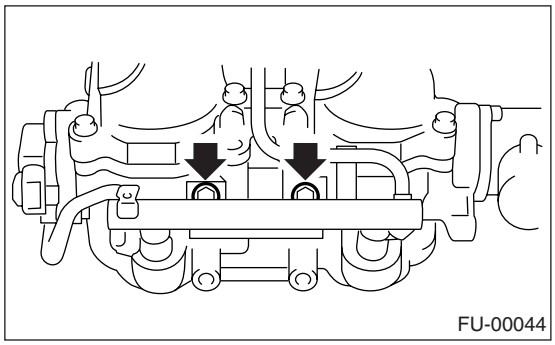
8) Install the fuel injector.

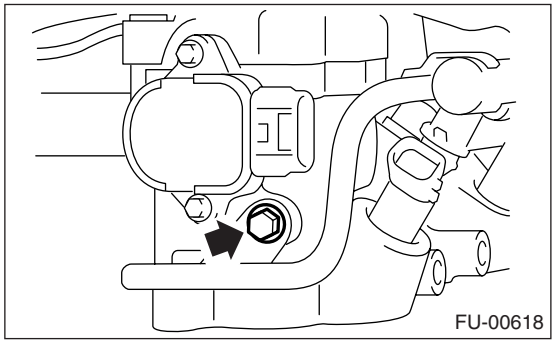


9) Tighten the bolt which install the fuel injector pipe onto intake manifold.

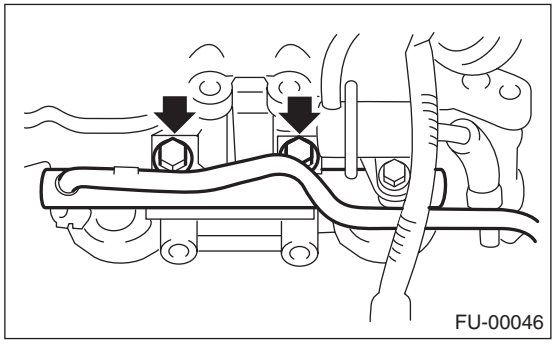
Tightening torque:
19 N·m (1.94 kgf-m, 13.7 ft-lb)

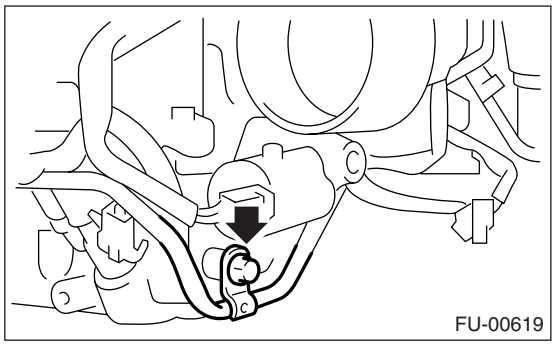
- LH SIDE





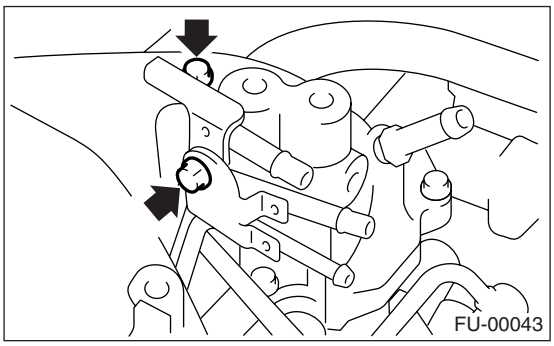
- RH SIDE





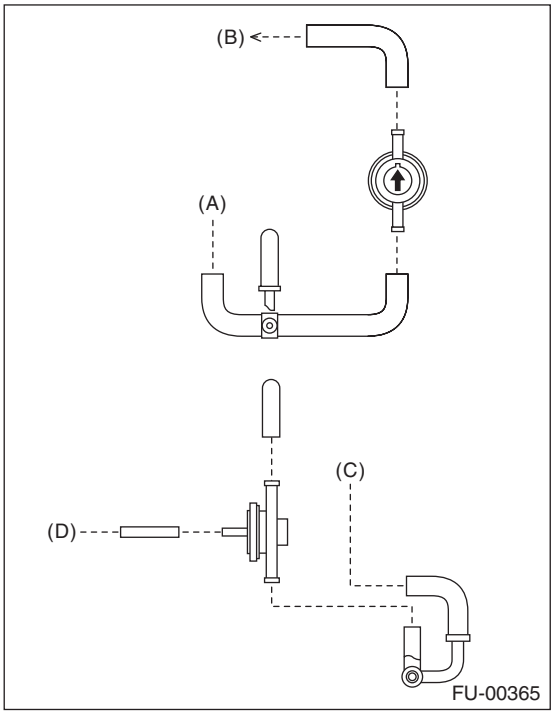
10) Tighten the two bolts which install the fuel pipes on the left side of intake manifold.

Tightening torque:
4.9 N·m (0.5 kgf-m, 3.6 ft-lb)



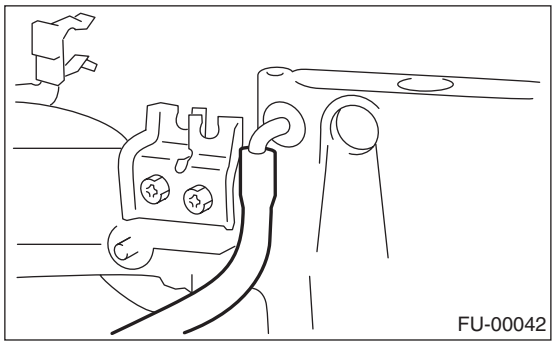
11) Connect the evaporation hoses to the purge valve.

CAUTION:
Carefully connect the evaporation hoses.



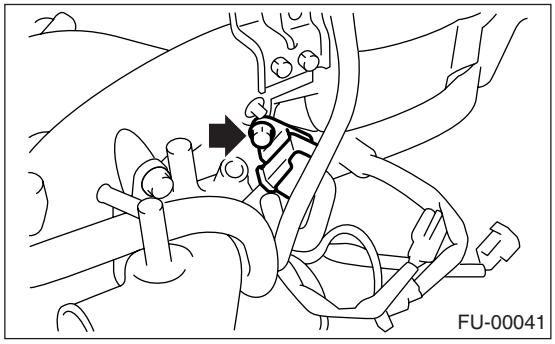
(A) To fuel pipe ASSY
(B) To intake duct
(C) To purge control solenoid valve
(D) To intake manifold

12) Connect the evaporation hose to the intake manifold.



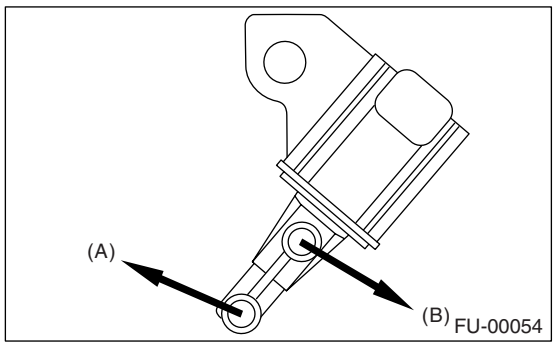
13) Install the purge control solenoid valve.

Tightening torque:
16 N·m (1.6 kgf-m, 11.8 ft-lb)



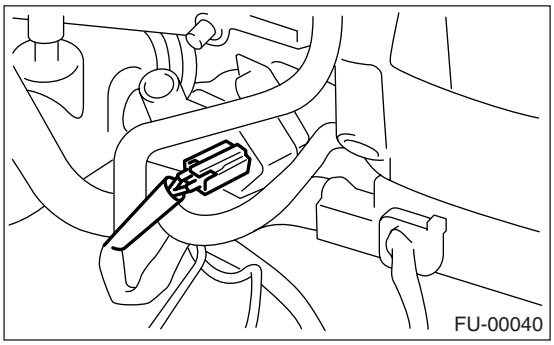
14) Connect the hoses to the purge control solenoid valve.

CAUTION:
Carefully connect the evaporation hoses.

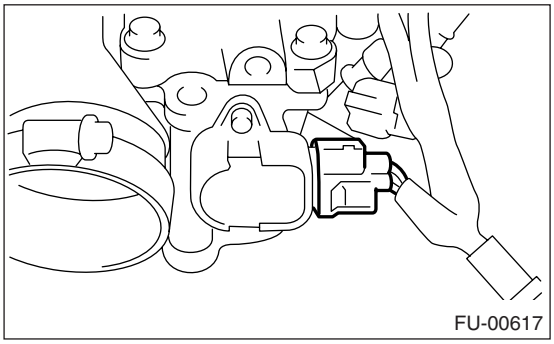


(A) To intake manifold
(B) To purge valve

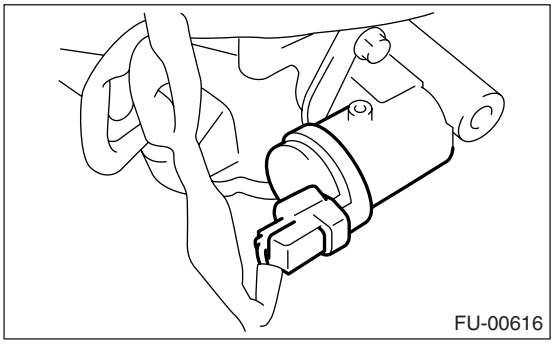
15) Connect the connector to the purge control solenoid valve.



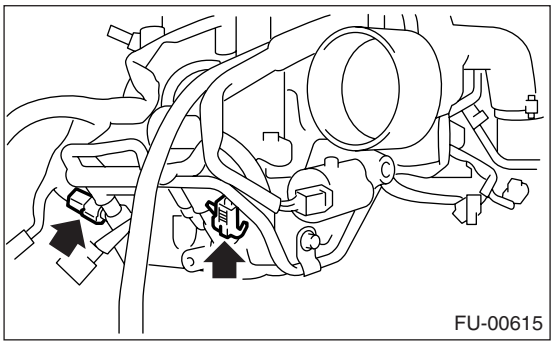
16) Connect the connector to the tumble generator valve sensor.



17) Connect the connector to the tumble generator valve actuator.



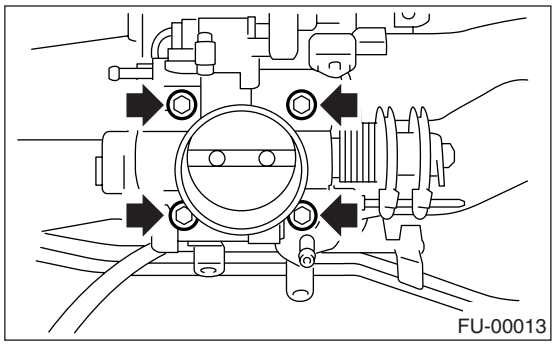
18) Connect the connector to the fuel injector.



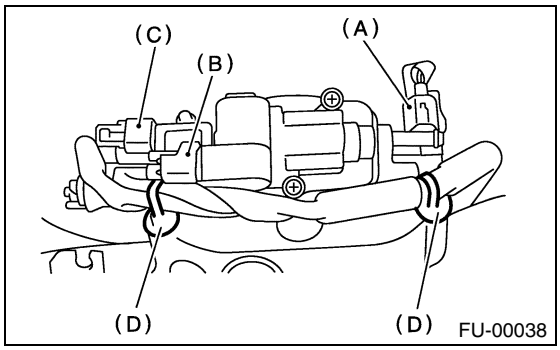
19) Install the throttle body to the intake manifold.

NOTE:
Replace gasket with a new one.

Tightening torque:
22 N·m (2.2 kgf-m, 15.9 ft-lb)

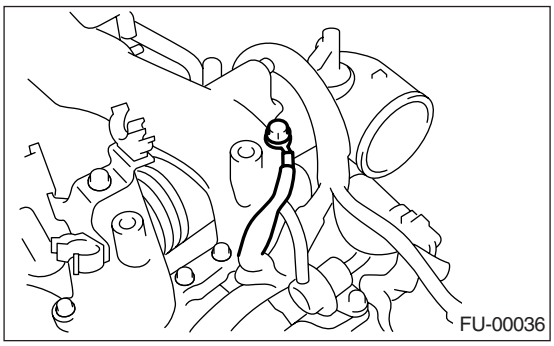


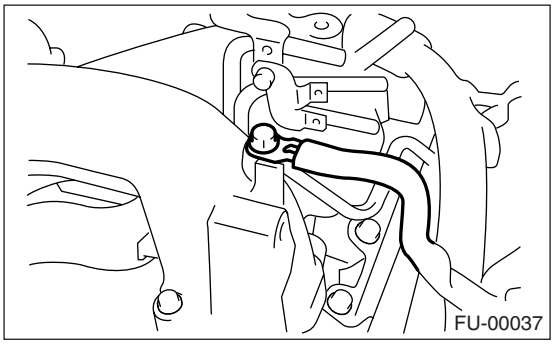
20) Connect the connector to the throttle position sensor (A), idle air control solenoid valve (B) and pressure sensor (C).
21) Connect the engine harness with clip (D) to the intake manifold.



22) Install the engine ground terminal to the intake manifold.

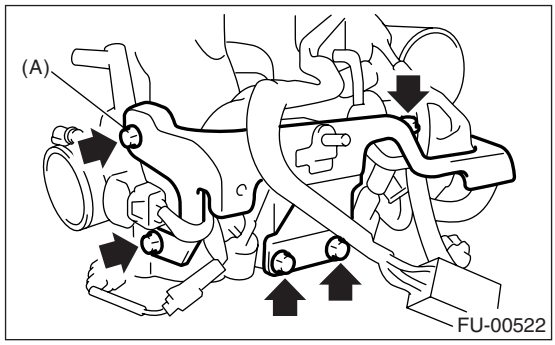
Tightening torque:
19 N·m (1.94 kgf-m, 13.7 ft-lb)





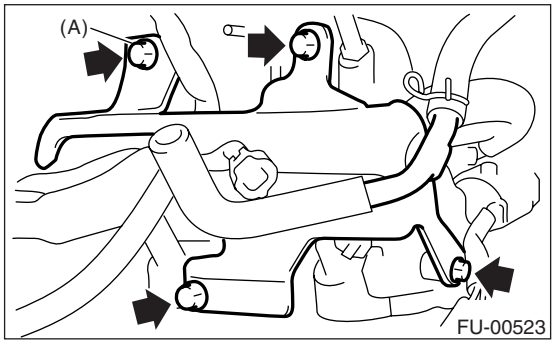
23) Install the fuel pipe protector RH.

Tightening torque:
19 N·m (1.94 kgf-m, 13.7 ft-lb)



24) Install the fuel pipe protector LH.

Tightening torque:
19 N·m (1.94 kgf-m, 13.7 ft-lb)



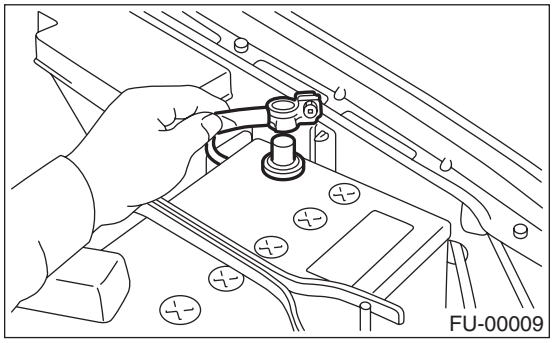
E: INSPECTION

Make sure the fuel pipe and fuel hoses are not cracked and that connections are tight.

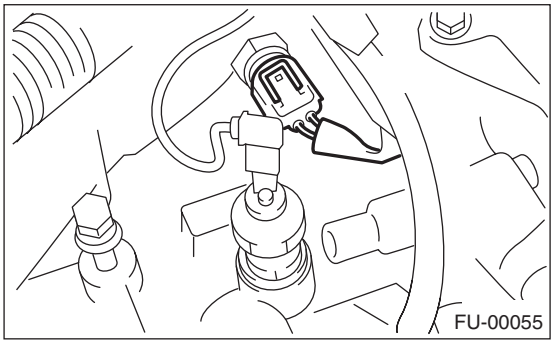
4. Engine Coolant Temperature Sensor

A: REMOVAL

1) Disconnect the battery ground cable.



2) Remove the generator <Ref. to SC(H4SO)-13, REMOVAL, Generator.>
3) Drain the coolant.<Ref. to CO(H4SO)-29, DRAINING OF ENGINE COOLANT, REPLACEMENT, Engine Coolant.>
4) Disconnect the connector from the engine coolant temperature sensor.



5) Remove the engine coolant temperature sensor.

B: INSTALLATION

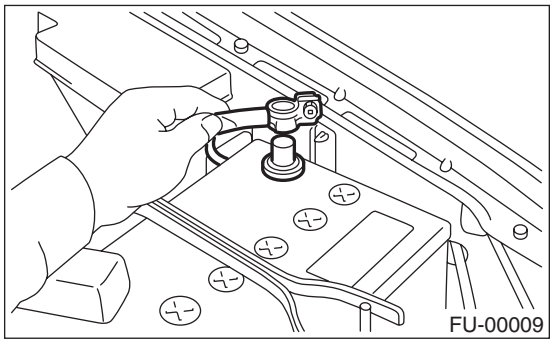
Install in the reverse order of removal.

Tightening torque:
18 N·m (1.8 kgf-m, 13.3 ft-lb)

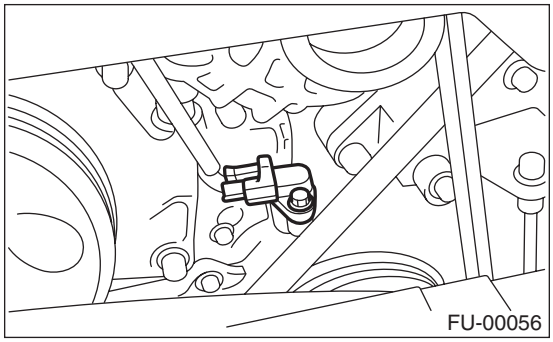
5. Crankshaft Position Sensor

A: REMOVAL

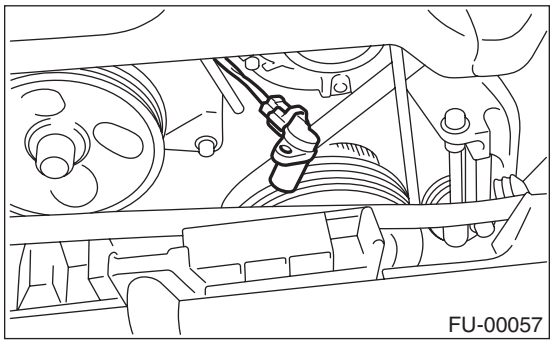
1) Disconnect the battery ground cable.



2) Remove the bolt which install the crankshaft position sensor to cylinder block.



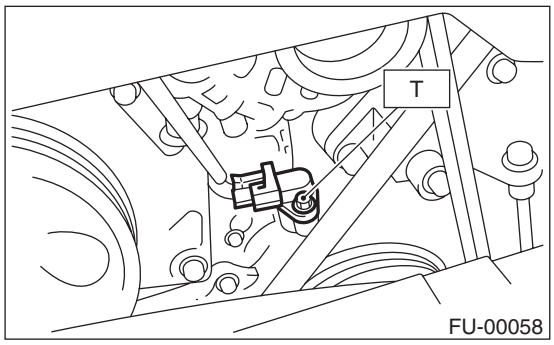
3) Remove the crankshaft position sensor, and disconnect the connector from it.



B: INSTALLATION

Install in the reverse order of removal.

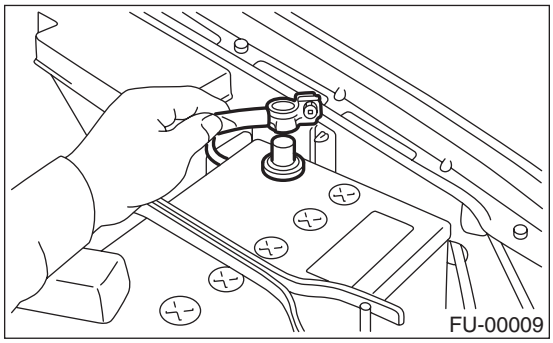
Tightening torque:
T: 6.4 N·m (0.65 kgf-m, 4.7 ft-lb)



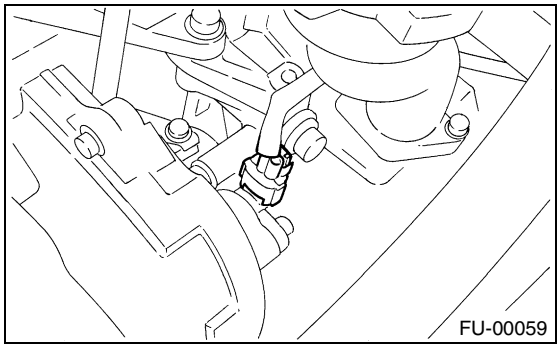
6. Camshaft Position Sensor

A: REMOVAL

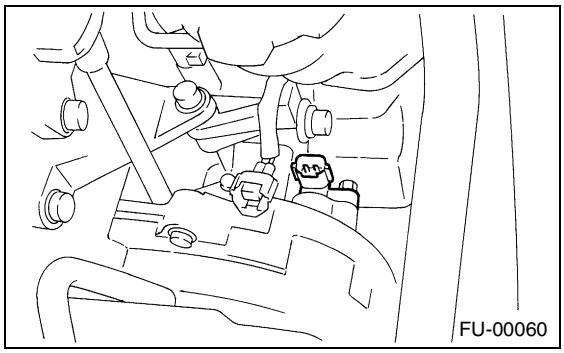
1) Disconnect the battery ground cable.



2) Disconnect the connector from the camshaft position sensor.



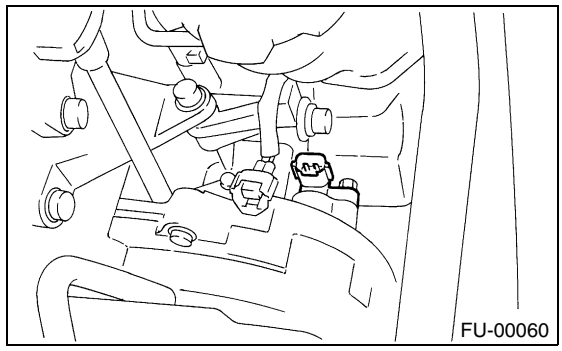
3) Remove the hcamshaft position sensor from the camshaft support LH.



B: INSTALLATION

Install in the reverse order of removal.

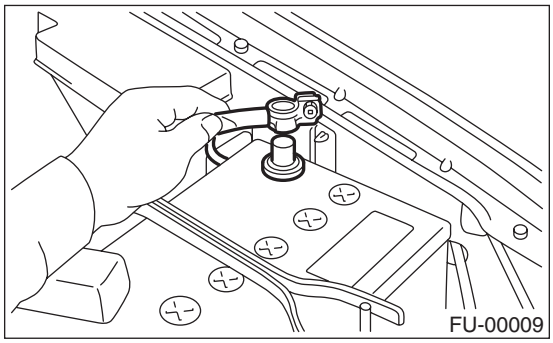
Tightening torque:
T: 6.4 N·m (0.65 kgf-m, 4.7 ft-lb)



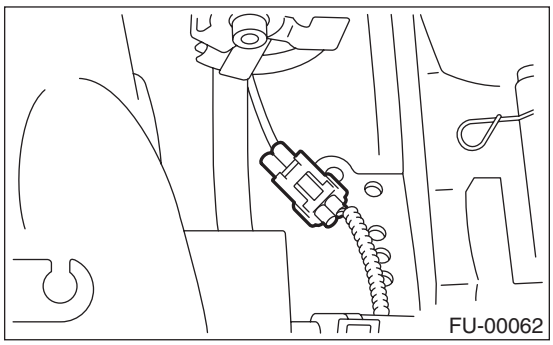
7. Knock Sensor

A: REMOVAL

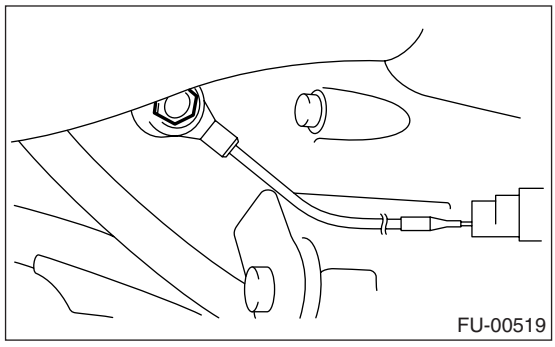
1) Disconnect the battery ground cable.



2) Remove the intercooler. <Ref. to IN(H4DOTC)-11, REMOVAL, Intercooler.>
3) Disconnect the knock sensor connector.



4) Remove the knock sensor from the cylinder block.

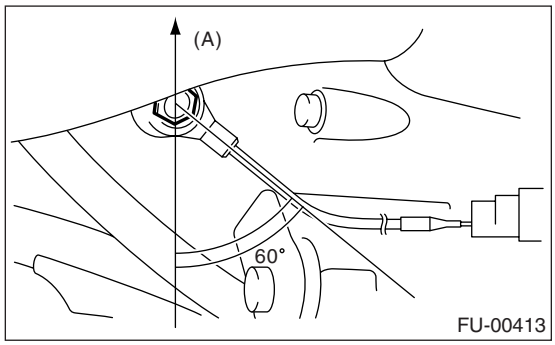


B: INSTALLATION

1) Install the knock sensor to the cylinder block.

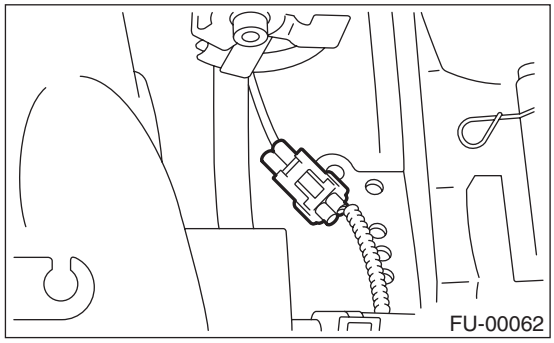
Tightening torque:
24 N·m (2.4 kgf-m, 17.4 ft-lb)

NOTE:
The extraction area of the knock sensor cord must be positioned at a 60° angle relative to the engine rear.

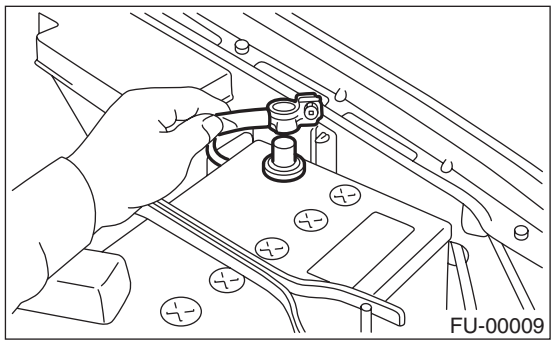


(A) Front side

2) Connect the knock sensor connector.



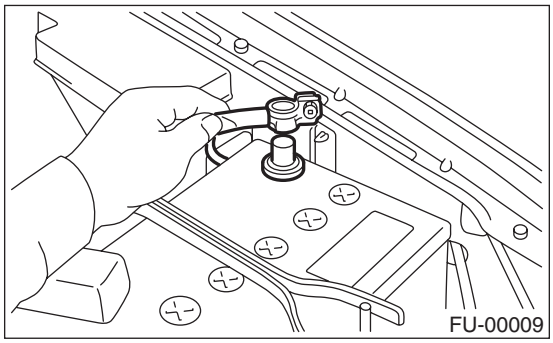
3) Install the intercooler. <Ref. to IN(H4DOTC)-12, INSTALLATION, Intercooler.>
4) Connect the battery ground cable.



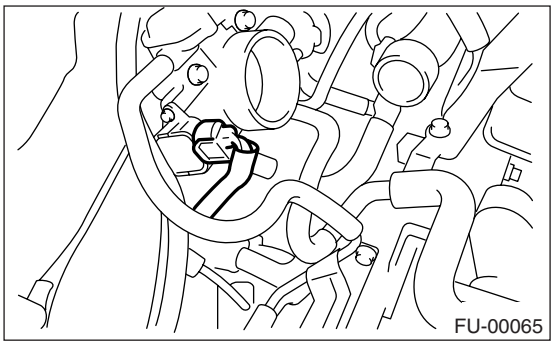
8. Throttle Position Sensor

A: REMOVAL

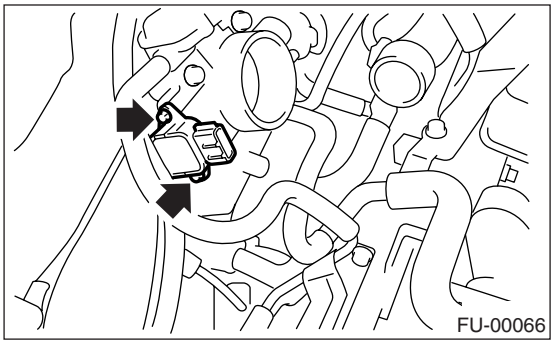
1) Disconnect the battery ground cable.



2) Remove the intercooler. <Ref. to IN(H4DOTC)-11, REMOVAL, Intercooler.>
3) Disconnect the connector from the throttle position sensor.



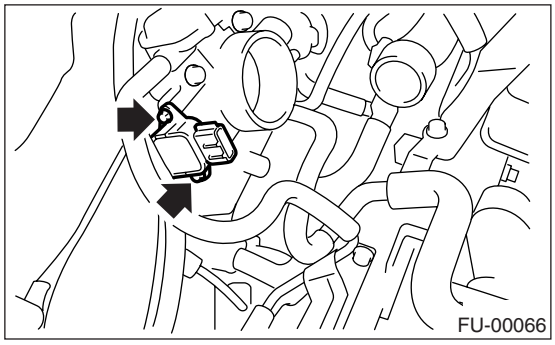
4) Remove the throttle position sensor holding screws, and remove it.



B: INSTALLATION

Install in the reverse order of removal.

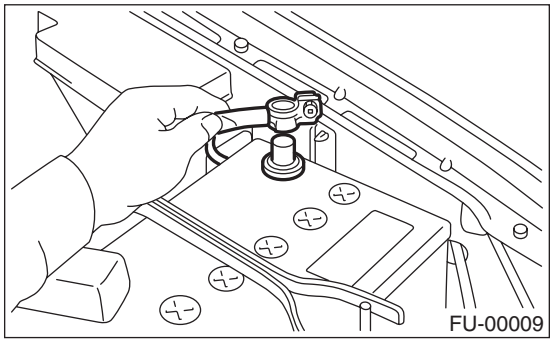
Tightening torque:
1.6 N·m (0.16 kgf-m, 1.2 ft-lb)



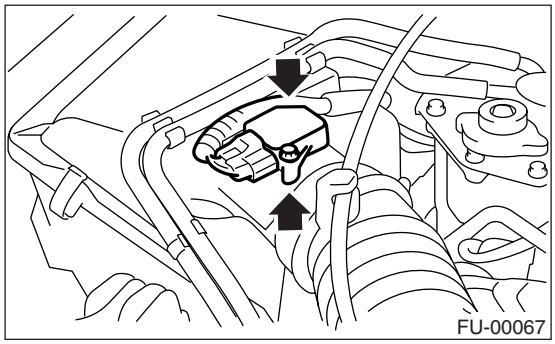
9. Mass Air Flow and Intake Air Temperature Sensor

A: REMOVAL

1) Disconnect the battery ground cable.



2) Disconnect the connector mass air flow and intake air temperature sensor.
3) Remove the mass air flow and intake air temperature sensor.



B: INSTALLATION

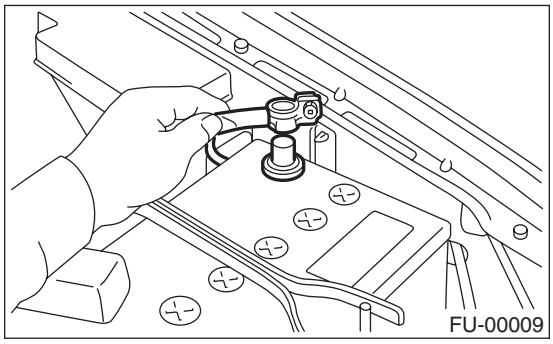
Install in the reverse order of removal.

Tightening torque:
7.5 N·m (0.76 kgf-m, 5.5 ft-lb)

10.Pressure Sensor

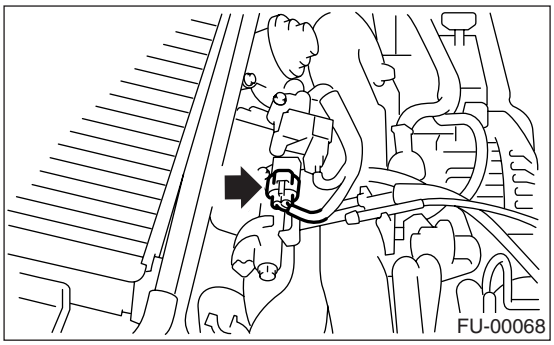
A: REMOVAL

1) Disconnect the battery ground cable.



2) Remove the idle air control solenoid valve. <Ref. to FU(H4DOTC)-36, REMOVAL, Idle Air Control Solenoid Valve.>

3) Disconnect the connectors from pressure sensor.



4) Remove the pressure sensor from the throttle body.

B: INSTALLATION

Install in the reverse order of removal.

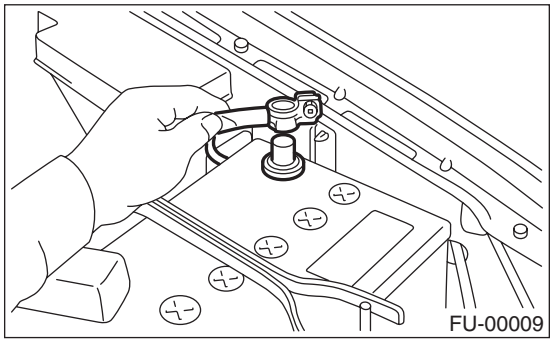
NOTE:
Replace the O-ring for the pressure sensor with new ones.

Tightening torque:
1.6 N·m (0.16 kgf-m, 1.2 ft-lb)

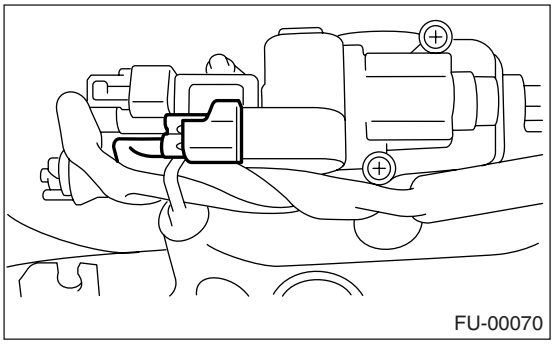
11.Idle Air Control Solenoid Valve

A: REMOVAL

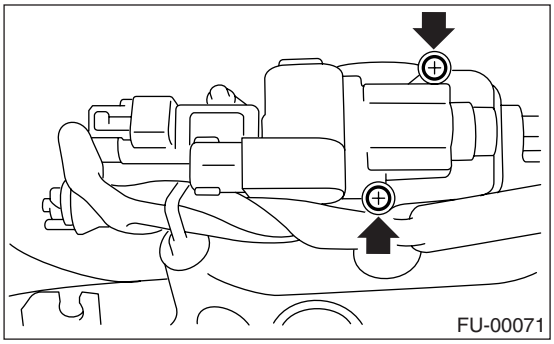
1) Disconnect the battery ground cable.



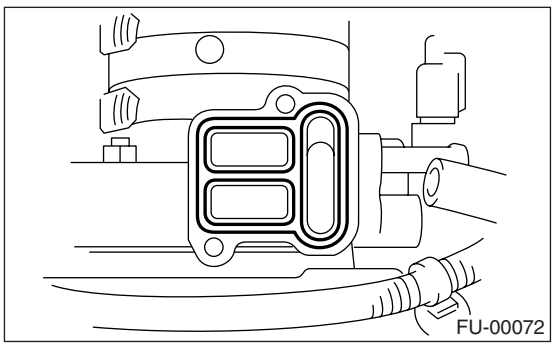
2) Disconnect the connector from the idle air control solenoid valve.



3) Remove the idle air control solenoid valve from the throttle body.



4) Remove the gasket from throttle body.

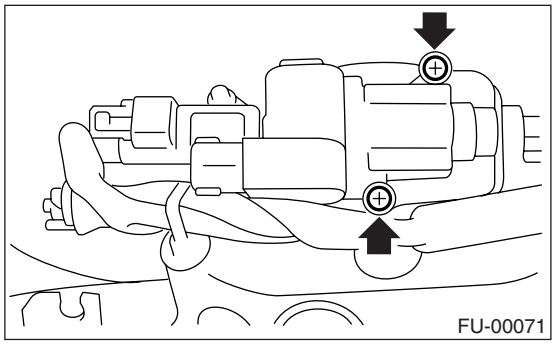


B: INSTALLATION

Install in the reverse order of removal.

NOTE:
Always use a new gasket.

Tightening torque:
2.8 N·m (0.29 kgf-m, 2.1 ft-lb)

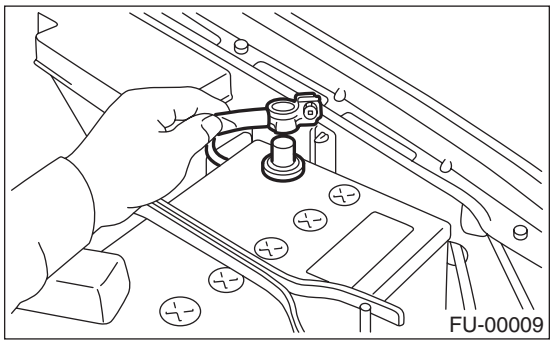


12.Fuel Injector

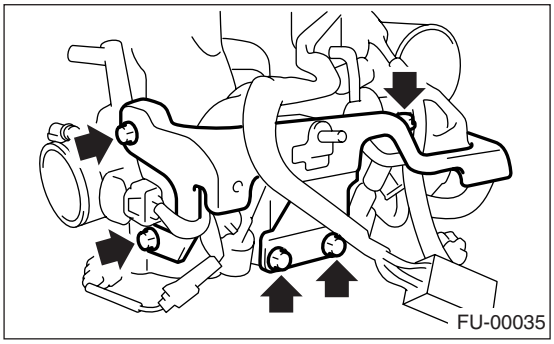
A: REMOVAL

1. RH SIDE

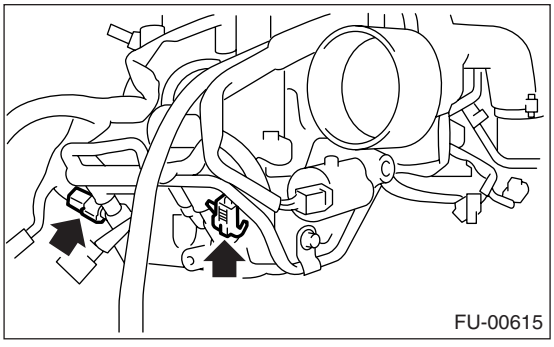
1) Lower the fuel pressure. <Ref. to FU(H4DOTC)-54, RELEASING OF FUEL PRESSURE, OPERATION, Fuel.>
2) Open the fuel filler flap lid and remove fuel filler cap.
3) Disconnect the ground cable from battery.



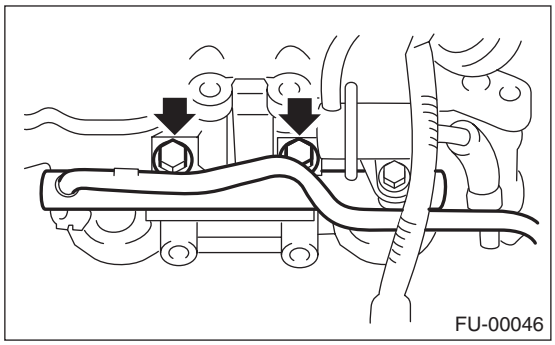
4) Remove the intake manifold. <Ref. to FU(H4DOTC)-15, REMOVAL, Intake Manifold.>
5) Remove the fuel pipe protector RH.

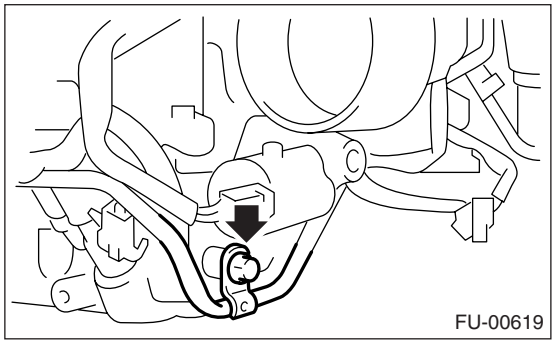


6) Disconnect the connector from the fuel injector.

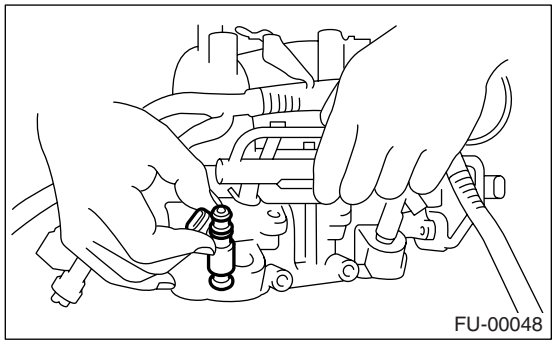


7) Remove the bolts which hold the injector pipe to intake manifold.



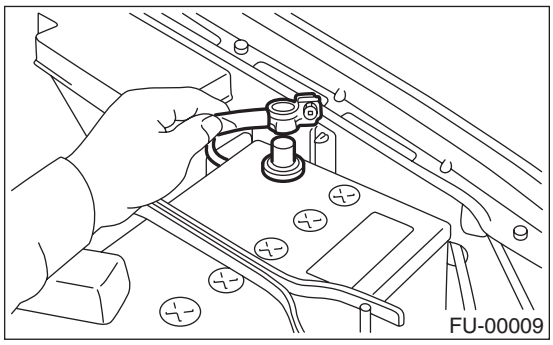


8) Remove the fuel injector while lifting up the fuel injector pipe.

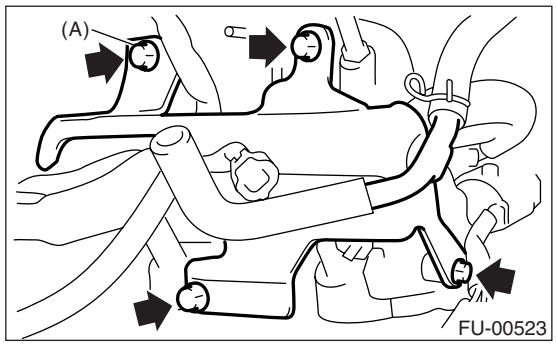


2. LH SIDE

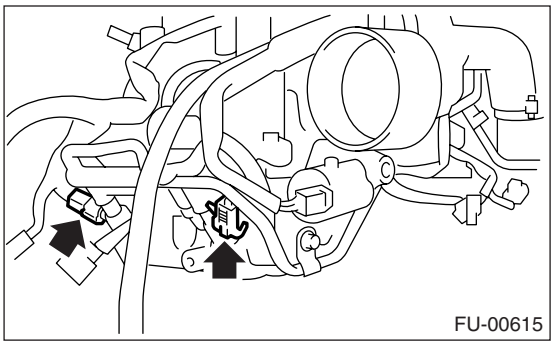
1) Lower the fuel pressure. <Ref. to FU(H4DOTC)-54, RELEASING OF FUEL PRESSURE, OPERATION, Fuel.>
2) Open the fuel filler flap lid and remove fuel filler cap.
3) Disconnect the ground cable from battery.



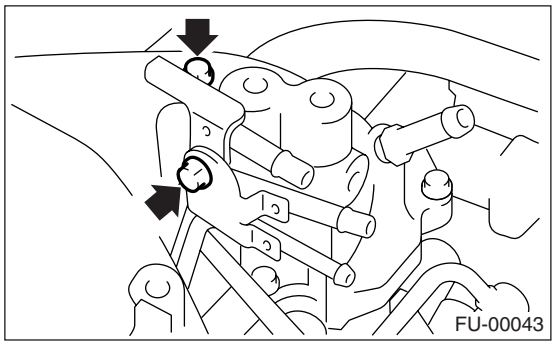
4) Remove the intake manifold. <Ref. to FU(H4DOTC)-15, REMOVAL, Intake Manifold.>
5) Remove the fuel pipe protector LH.

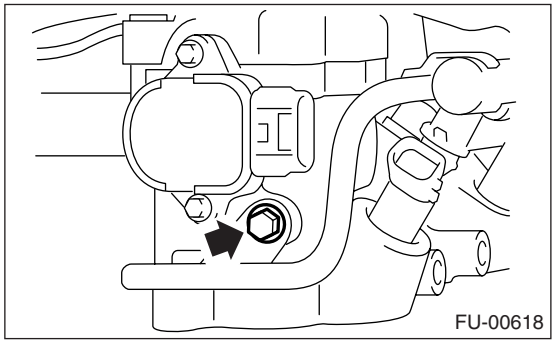


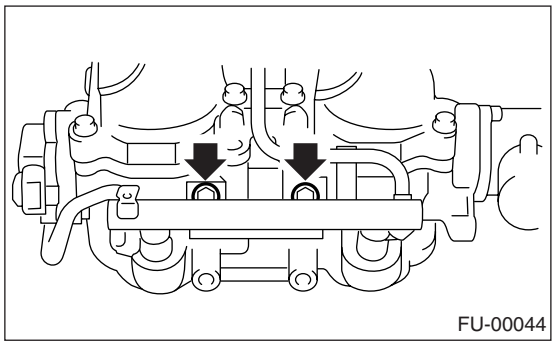
6) Disconnect the connector from the fuel injector.



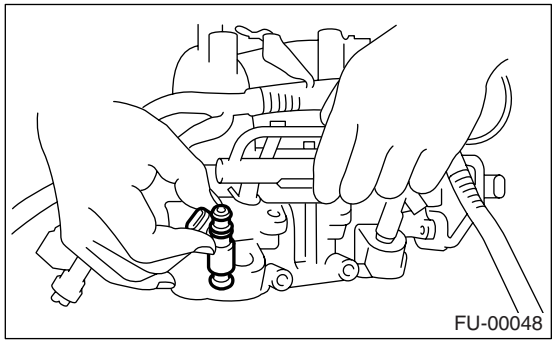
7) Remove the bolts which hold the injector pipe to intake manifold.







8) Remove the fuel injector while lifting up the fuel injector pipe.

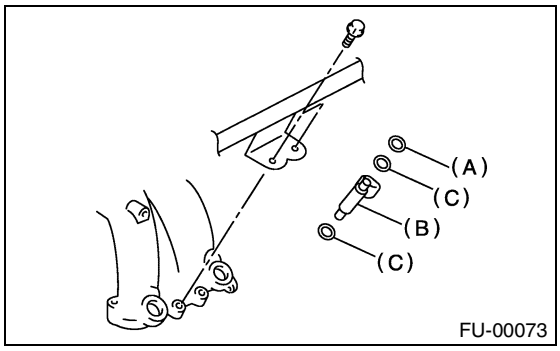


B: INSTALLATION

1. RH SIDE

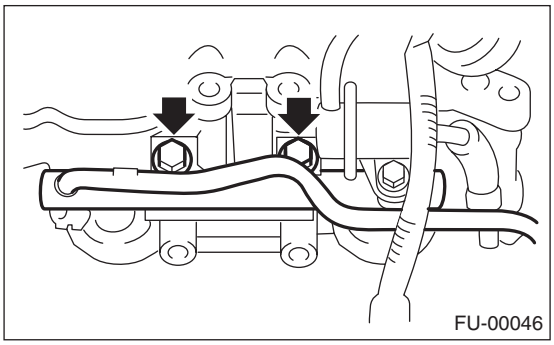
Install in the reverse order of removal.

NOTE:
Replace the O-ring and insulators with new ones.

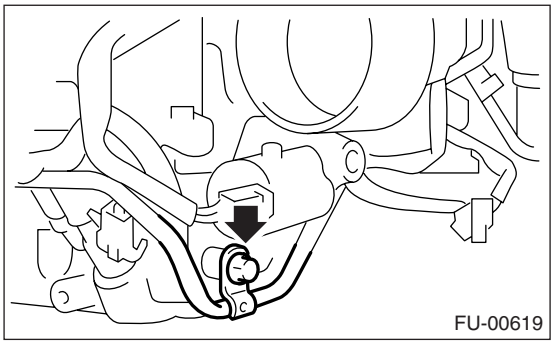


(A) O-ring
(B) Fuel injector
(C) Insulator

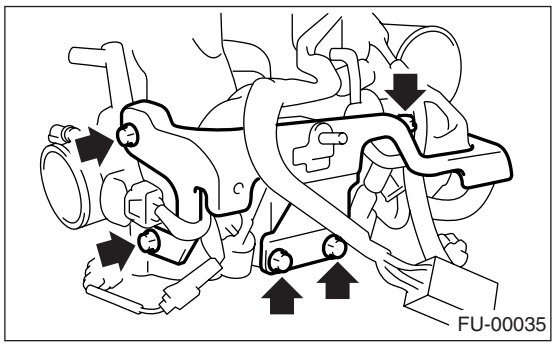
Tightening torque:
19 N·m (1.94 kgf-m, 13.7 ft-lb)



Tightening torque:
19 N·m (1.94 kgf-m, 13.7 ft-lb)



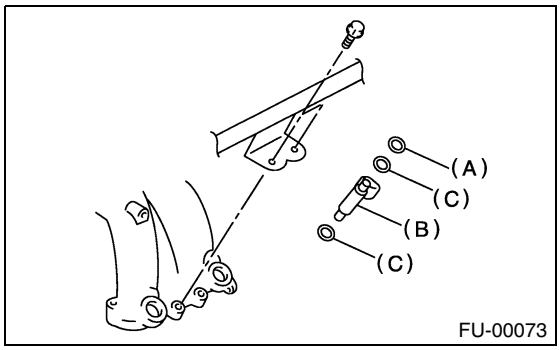
Tightening torque:
19 N·m (1.94 kgf-m, 13.7 ft-lb)



2. LH SIDE

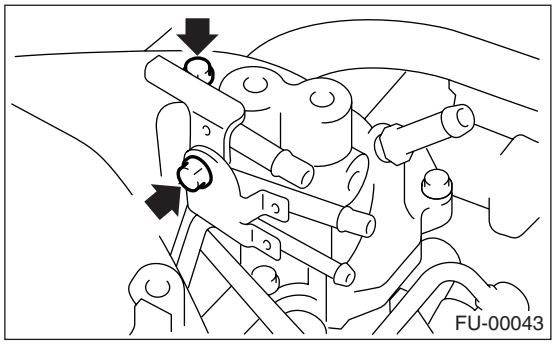
Install in the reverse order of removal.

NOTE:
Replace the O-ring and insulators with new ones.

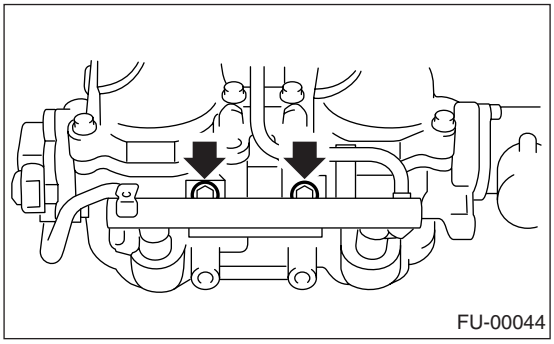


(A) O-ring
(B) Fuel injector
(C) Insulator

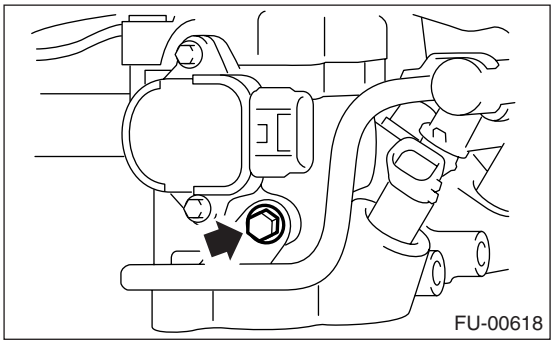
Tightening torque:
4.9 N·m (0.5 kgf-m, 3.6 ft-lb)



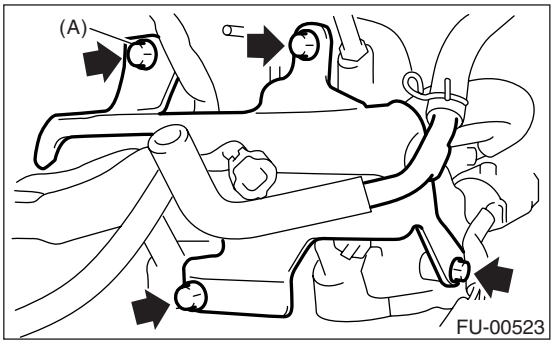
Tightening torque:
19 N·m (1.94 kgf-m, 13.7 ft-lb)



Tightening torque:
19 N·m (1.94 kgf-m, 13.7 ft-lb)



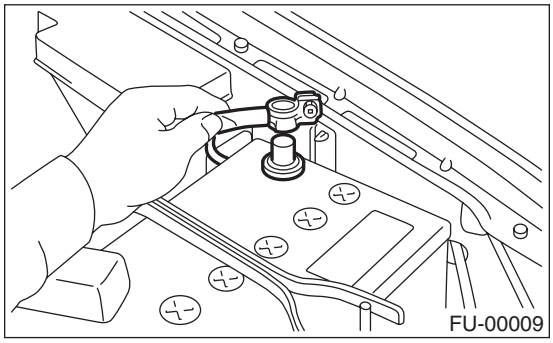
Tightening torque:
19 N·m (1.94 kgf-m, 13.7 ft-lb)



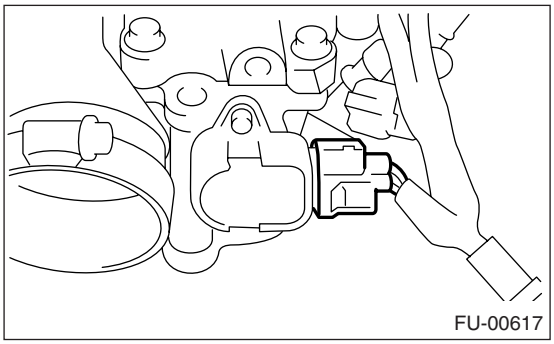
13. Tumble Generator Valve Assembly

A: REMOVAL

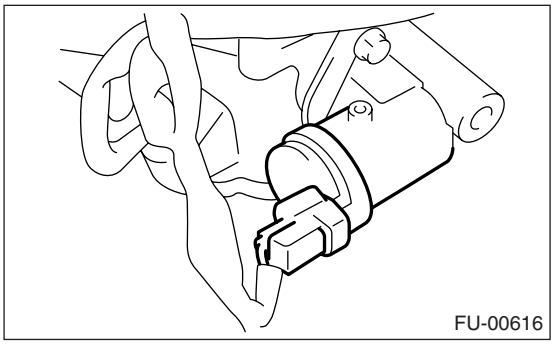
1) Disconnect the battery ground cable.



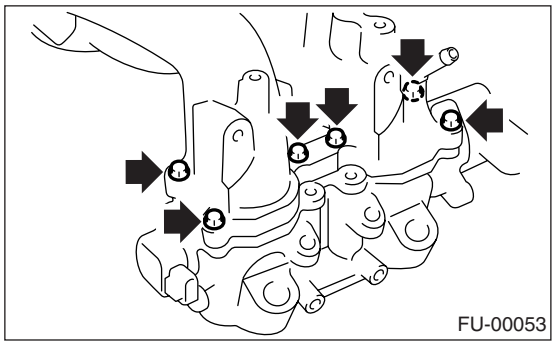
2) Remove the intake manifold. <Ref. to FU(H4DOTC)-15, REMOVAL, Intake Manifold.>
3) Disconnect the connector from the tumble generator valve sensor.



4) Disconnect the connector from the tumble generator valve actuator.



5) Remove the fuel injector. <Ref. to FU(H4DOTC)-37, REMOVAL, Fuel Injector.>
6) Remove the tumble generator valve body from the intake manifold.

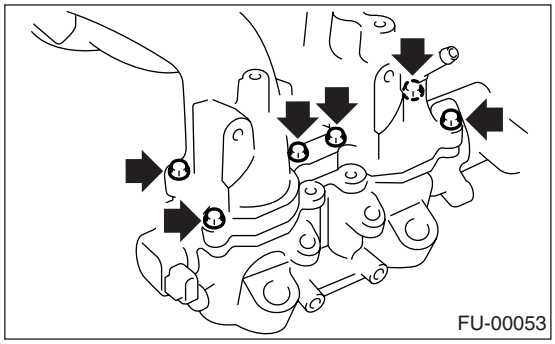


B: INSTALLATION

Install in the reverse order of removal.

NOTE:
Always use new gaskets.

Tightening torque:
8.25 N·m (0.84 kgf-m, 6.1 ft-lb)

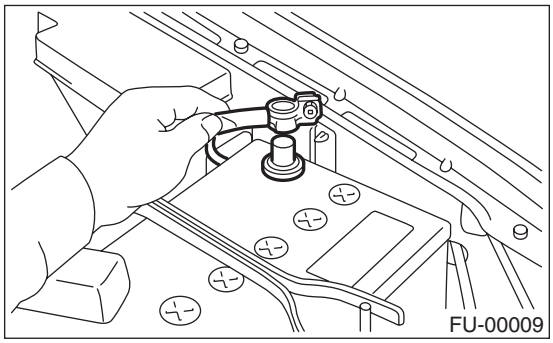


14.Tumble Generator Valve Actuator

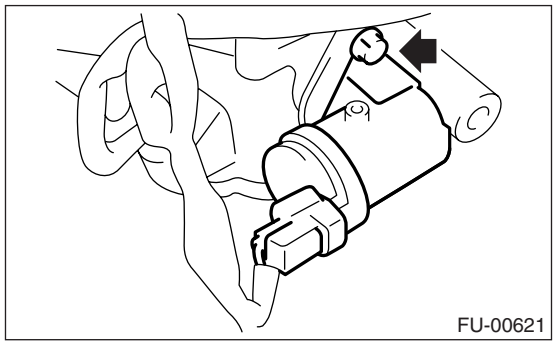
A: REMOVAL

1. RH SIDE

1) Lower the fuel pressure. <Ref. to FU(H4DOTC)-54, RELEASING OF FUEL PRESSURE, OPERATION, Fuel.>
2) Open the fuel filler lid and remove the fuel filler cap.
3) Disconnect the ground cable from battery.

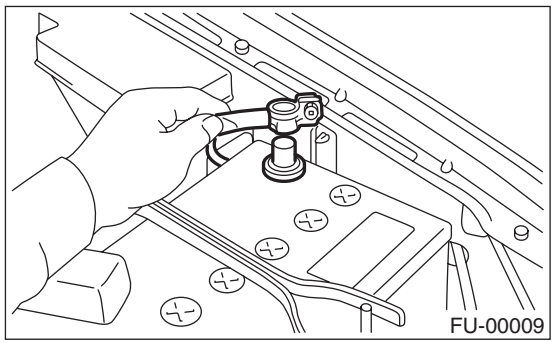


4) Remove the intake manifold. <Ref. to FU(H4DOTC)-15, REMOVAL, Intake Manifold.>
5) Disconnect the connector from tumble generator valve actuator RH.
6) Remove tumble generator valve RH.

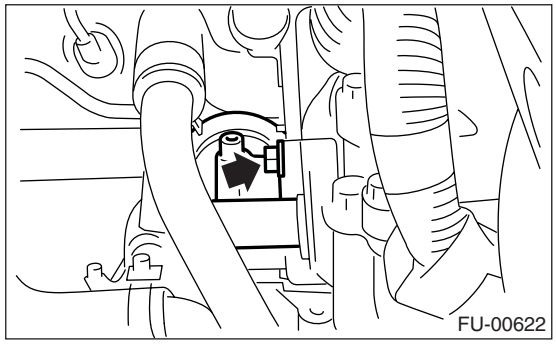


2. LH SIDE

1) Lower the fuel pressure. <Ref. to FU(H4DOTC)-54, RELEASING OF FUEL PRESSURE, OPERATION, Fuel.>
2) Open the fuel filler lid and remove the fuel filler cap.
3) Disconnect the ground cable from battery.



4) Disconnect the connector from tumble generator valve LH.
5) Remove tumble generator valve actuator LH.



B: INSTALLATION

1. RH SIDE

Install in the reverse order of removal.

2. LH SIDE

Install in the reverse order of removal.

15. Tumble Generator Valve Position Sensor

A: SPECIFICATIONS

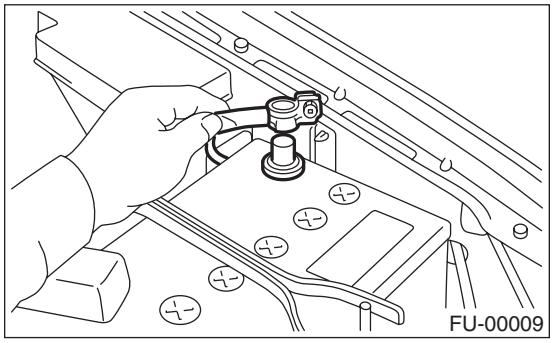
Never remove the tumble generator valve position sensor from the tumble generator valve assembly. If removed, it cannot be calibrated.

For Removal and Installation, refer to “Tumble Generator Valve Assembly”.<Ref. to FU(H4DOTC)-41, REMOVAL, Tumble Generator Valve Assembly.><Ref. to FU(H4DOTC)-41, INSTALLATION, Tumble Generator Valve Assembly.>

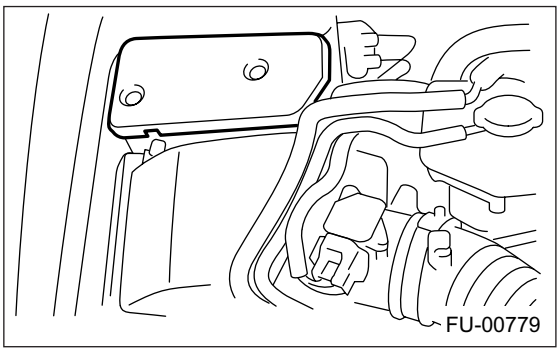
16. Wastegate Control Solenoid Valve

A: REMOVAL

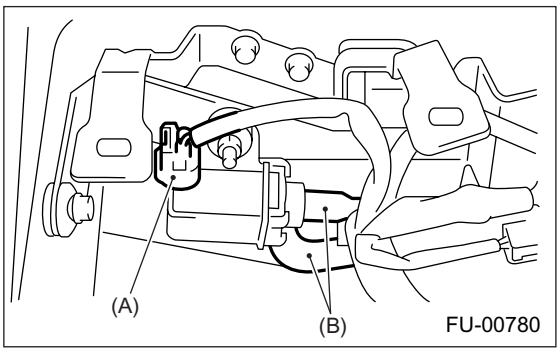
1) Disconnect the battery ground cable.



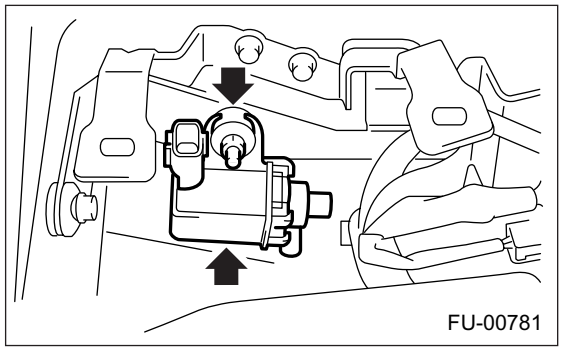
2) Remove the solenoid valve cover.



3) Disconnect the connector (A) from the wastegate control solenoid valve.
4) Disconnect the pressure hoses (B) from the wastegate control solenoid valve.



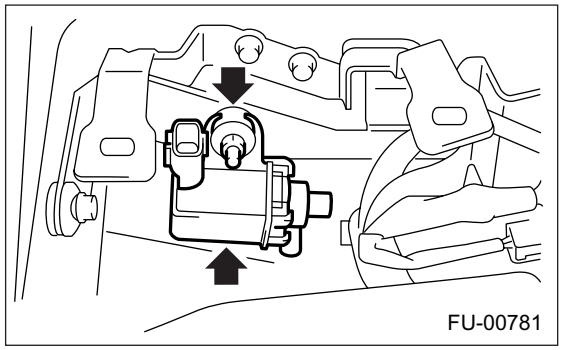
5) Remove the wastegate control solenoid valve from the bracket



B: INSTALLATION

Install in the reverse order of removal.

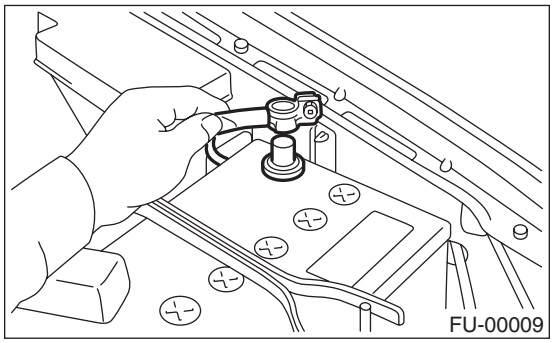
Tightening torque:
6.4 N·m (0.65 kgf-m, 4.7 ft-lb)



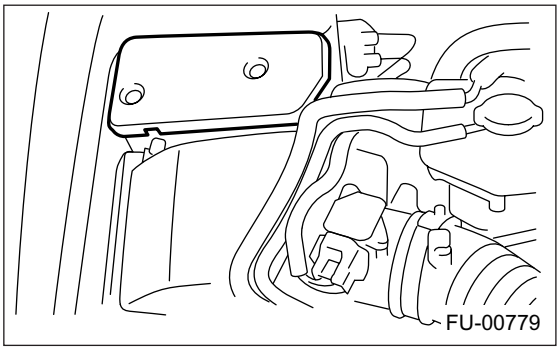
17.Front Oxygen (A/F) Sensor

A: REMOVAL

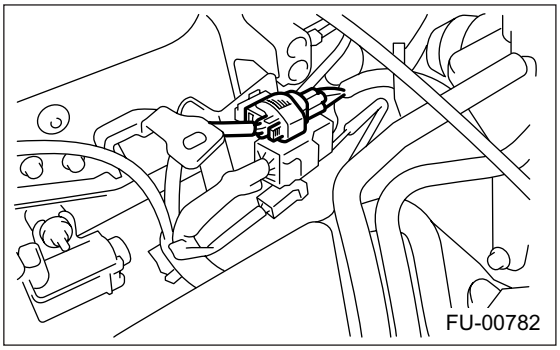
1) Disconnect the battery ground cable.



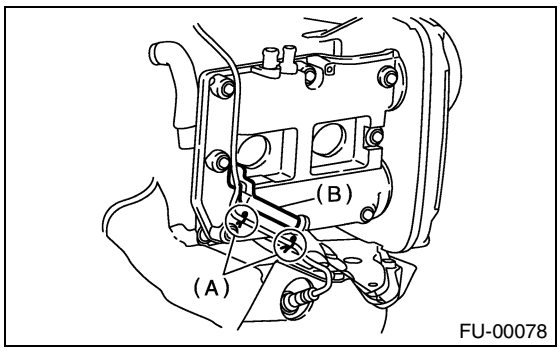
2) Remove the solenoid valve cover.



3) Disconnect the connector from the front oxygen (A/F) sensor.



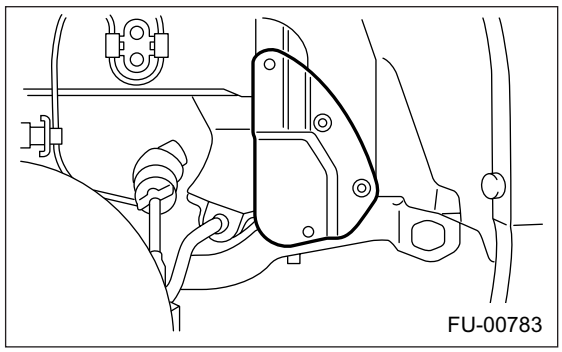
4) Disconnect the engine harness fixed by clip (A) from the bracket (B).



5) Remove the front right side wheel.

6) Lift-up the vehicle.

7) Remove the service hole cover.

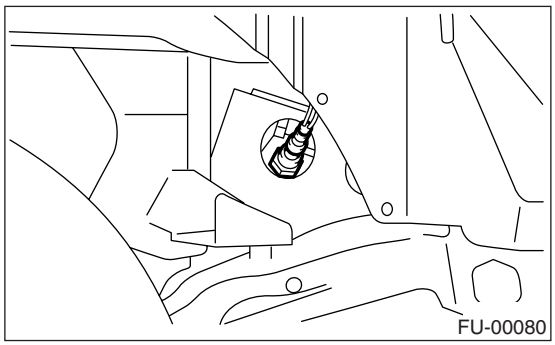


8) Apply SUBARU CRC or its equivalent to the threaded portion of front oxygen (A/F) sensor, and leave it for one minute or more.

SUBARU CRC (Part No. 004301003)

9) Remove the front oxygen (A/F) sensor.

CAUTION:
When removing the oxygen (A/F) sensor, wait until exhaust pipe cools, otherwise it will damage exhaust pipe.



B: INSTALLATION

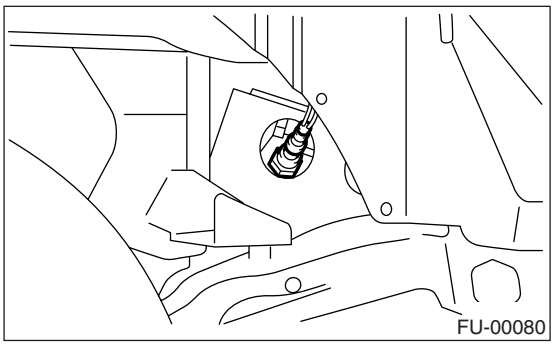
1) Before installing front oxygen (A/F) sensor, apply the anti-seize compound only to the threaded portion of front oxygen (A/F) sensor to make the next removal easier.

Anti-seize compound:
SS-30 by JET LUBE

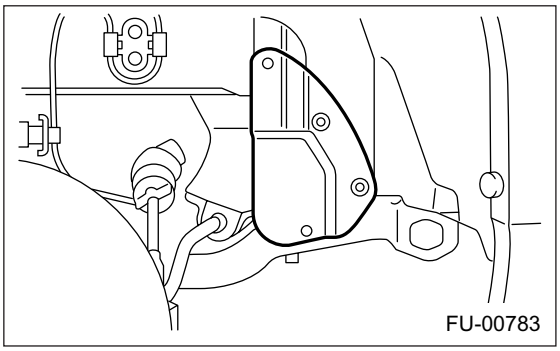
CAUTION:
Never apply anti-seize compound to protector of front oxygen (A/F) sensor.

2) Install the front oxygen (A/F) sensor.

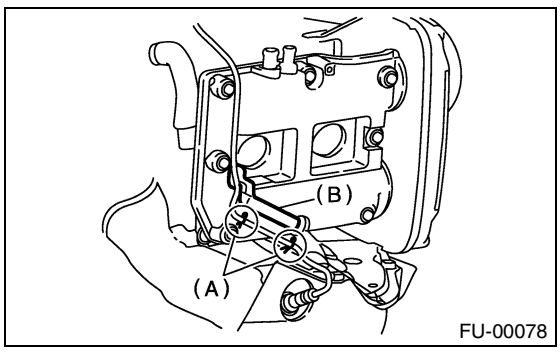
Tightening torque:
21N·m (2.1 kgf-m, 15.2 ft-lb)


FU-00080

3) Install the service hole cover.

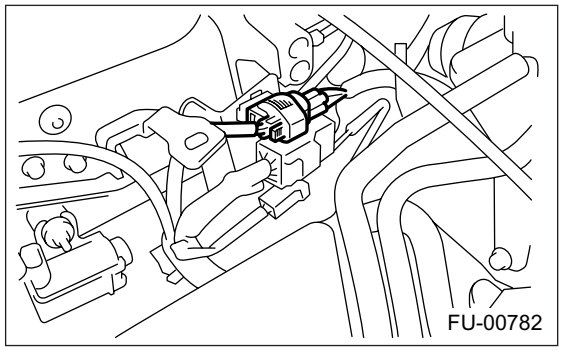

FU-00783

4) Lower the vehicle.
5) Install the front right side wheel.
6) Connect the engine harness with clip (A) to the bracket (B).

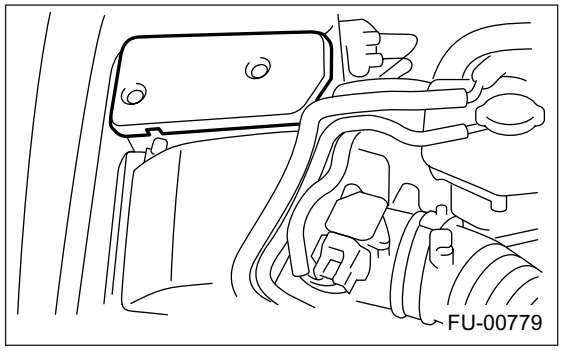


FU-00078

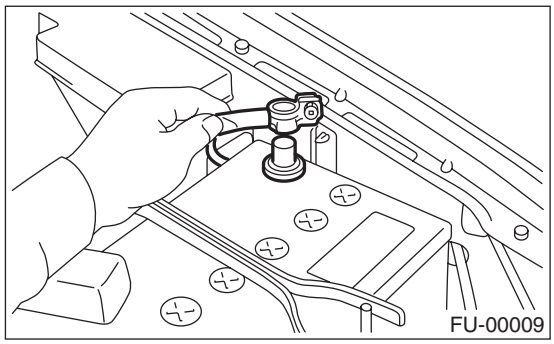
7) Connect the connector of front oxygen (A/F) sensor.


FU-00782

8) Install the solenoid valve cover.


FU-00779

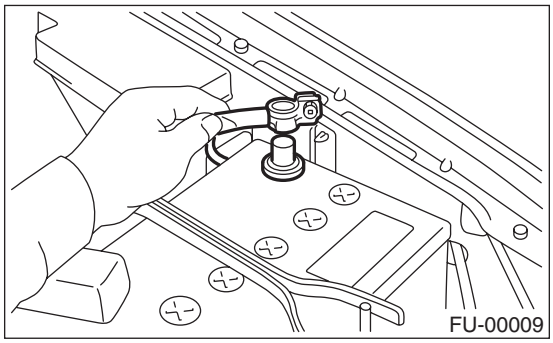
9) Connect the battery ground cable.


FU-00009

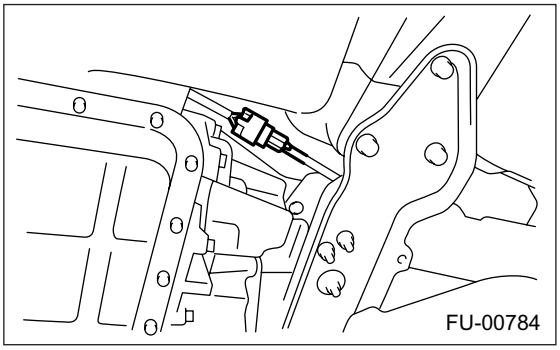
18.Rear Oxygen Sensor

A: REMOVAL

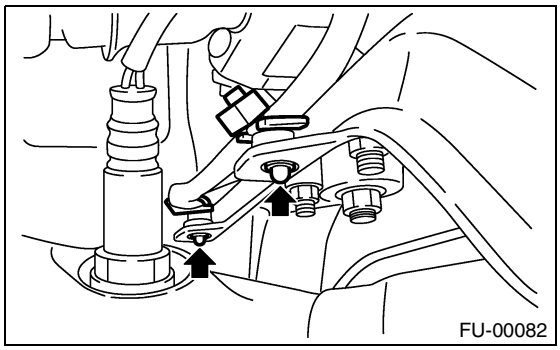
1) Disconnect the battery ground cable.



2) Lift-up the vehicle.
3) Disconnect the connector from the rear oxygen sensor.



4) Remove the clip by pulling out from the upper side of crossmember.

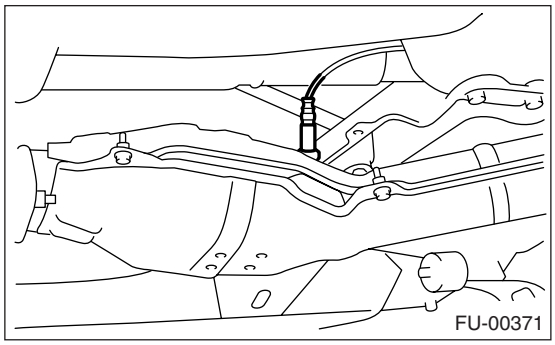


5) Apply SUBARU CRC or its equivalent to the threaded portion of rear oxygen sensor, and leave it for one minute or more.

SUBARU CRC (Part No. 004301003)

6) Remove the rear oxygen sensor.

CAUTION:
When removing the oxygen sensor, wait until exhaust pipe cools, otherwise it will damage exhaust pipe.



B: INSTALLATION

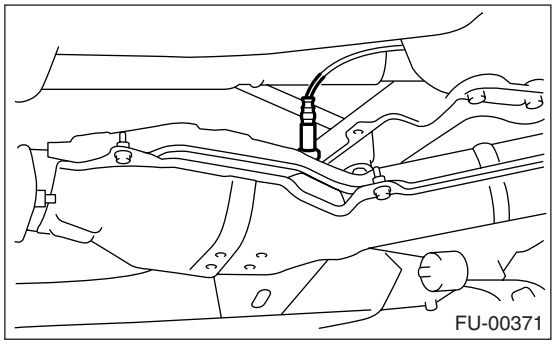
1) Before installing rear oxygen sensor, apply the anti-seize compound only to the threaded portion of rear oxygen sensor to make the next removal easier.

CAUTION:
Never apply anti-seize compound to protector of rear oxygen sensor.

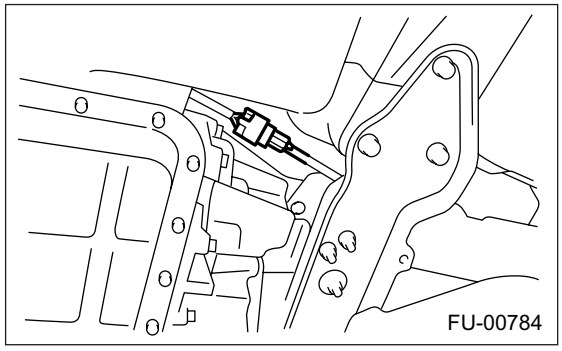
Anti-seize compound:
SS-30 by JET LUBE

2) Install the rear oxygen sensor.

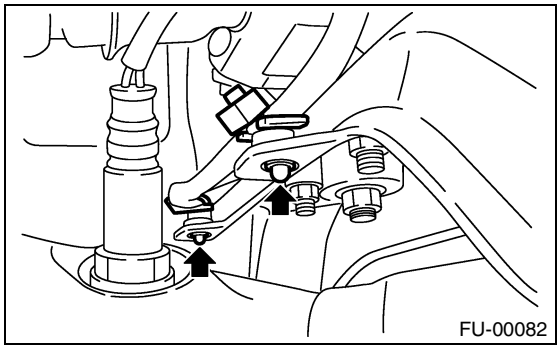
Tightening torque:
21 N·m (2.1 kgf-m, 15.2 ft-lb)



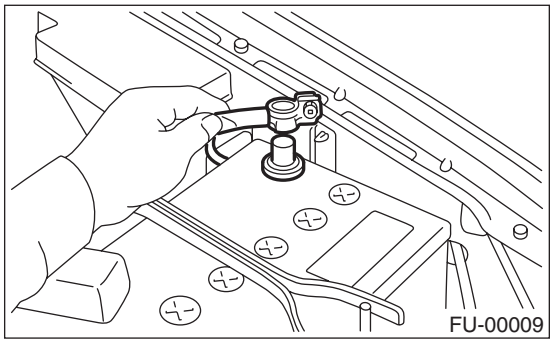
3) Connect the connector to the rear oxygen sensor.



4) Connect the clip to the crossmember.



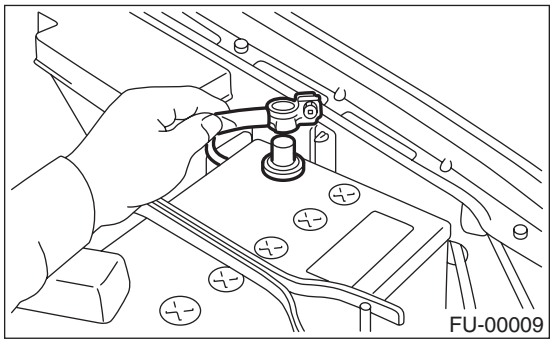
5) Lower the vehicle.
6) Connect the battery ground cable.



19.Exhaust Temperature Sensor

A: REMOVAL

1) Disconnect the battery ground cable.

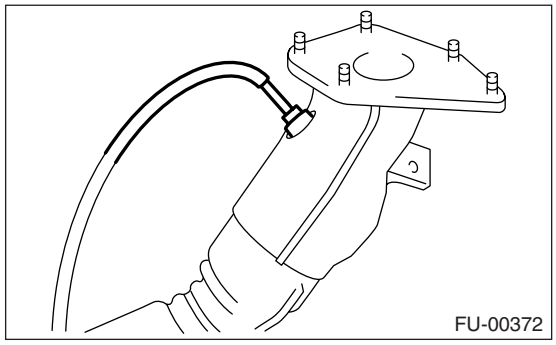


2) Remove the joint pipe. <Ref. to EX(H4DOTC)-12, REMOVAL, Joint Pipe.>
3) Apply SUBARU CRC or its equivalent to the threaded portion of exhaust temperature sensor, and leave it for one minute or more.

SUBARU CRC (Part No. 004301003)

4) Remove the exhaust temperature sensor.

CAUTION:
When removing the oxygen sensor, wait until exhaust pipe cools, otherwise it will damage exhaust pipe.



B: INSTALLATION

1) Before installing exhaust temperature sensor, apply the anti-seize compound only to the threaded portion of rear oxygen sensor to make the next removal easier.

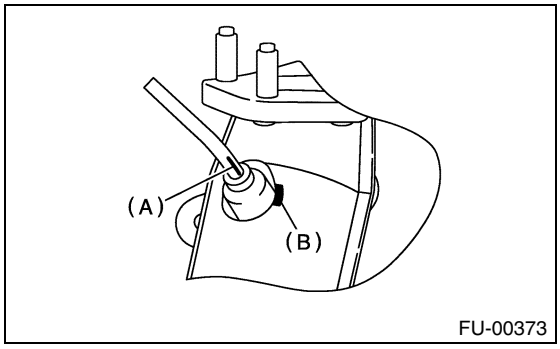
CAUTION:
Never apply anti-seize compound to protector of exhaust temperature sensor.

Anti-seize compound:
SS-30 by JET LUBE

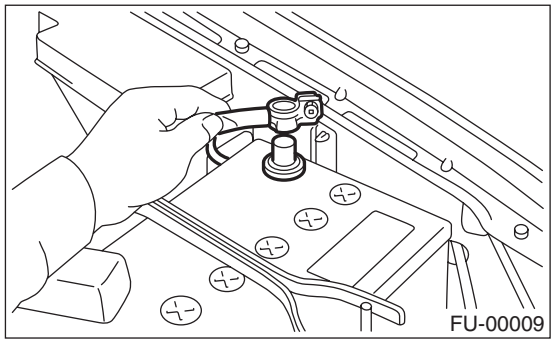
2) Install the exhaust temperature sensor.

NOTE:
Align the marking (A) of exhaust temperature sensor to the marking (B) of joint pipe, and tighten the screws.

Tightening torque:
21 N·m (2.1 kgf-m, 15.2 ft-lb)



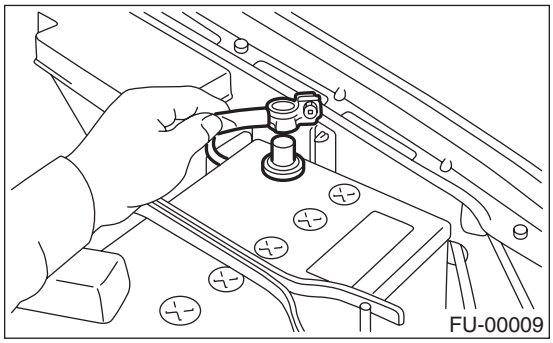
3) Install the joint pipe <Ref. to EX(H4DOTC)-12, INSTALLATION, Joint Pipe.>.
4) Connect the battery ground cable.



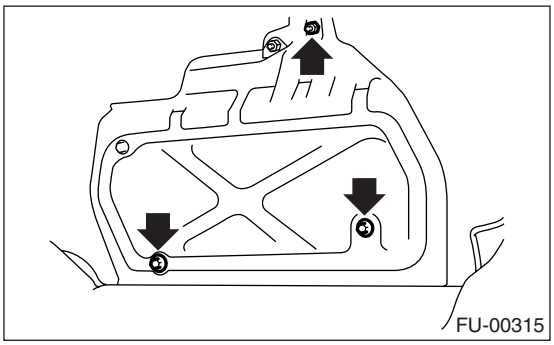
20.Engine Control Module

A: REMOVAL

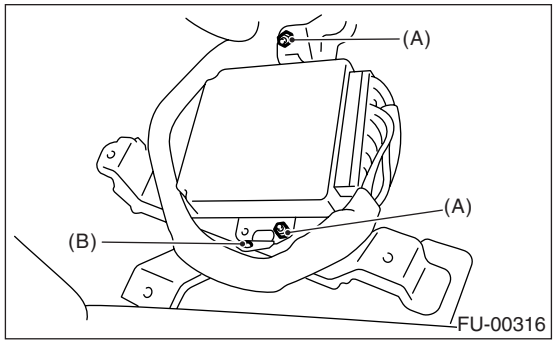
1) Disconnect the battery ground cable.



2) Remove the lower inner trim of the passenger side.
<Ref. to EI-47, REMOVAL, Lower Inner Trim.>
3) Detach the floor mat of the front passenger seat.
4) Remove the protect cover.



5) Remove the nuts (A) which hold ECM to the bracket.
6) Remove the clip (B) from the bracket.



7) Disconnect the ECM connectors and take out the ECM.

B: INSTALLATION

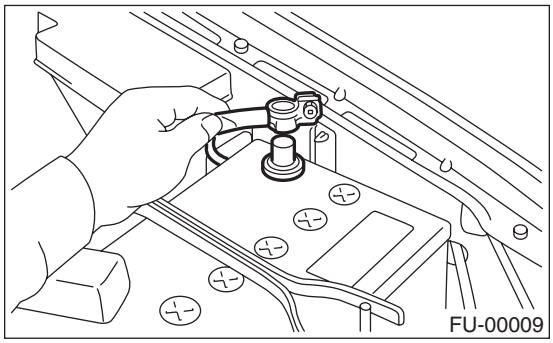
Install in the reverse order of removal.

CAUTION:
When replacing ECM, be careful not to use the wrong spec. ECM to avoid any damage to the fuel injection system.

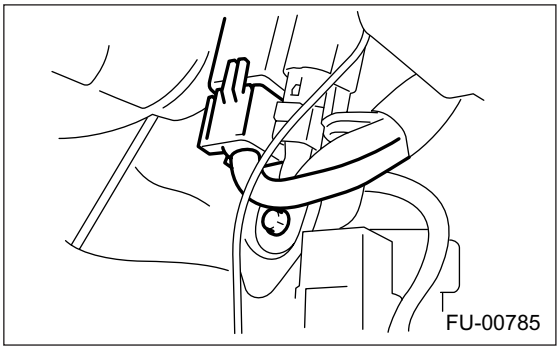
21.Main Relay

A: REMOVAL

1) Disconnect the battery ground cable.



2) Remove the passenger's side front side sill cover.
3) Remove the bolt which holds the main relay bracket on the body.
4) Disconnect the connectors from the main relay.



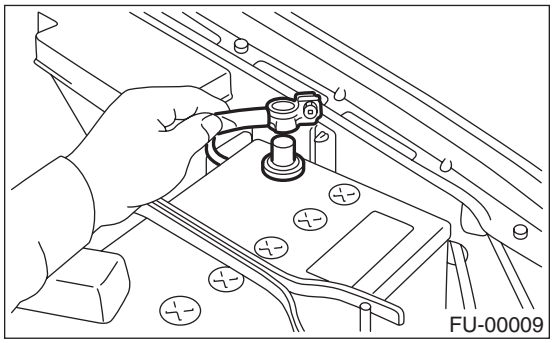
B: INSTALLATION

Install in the reverse order of removal.

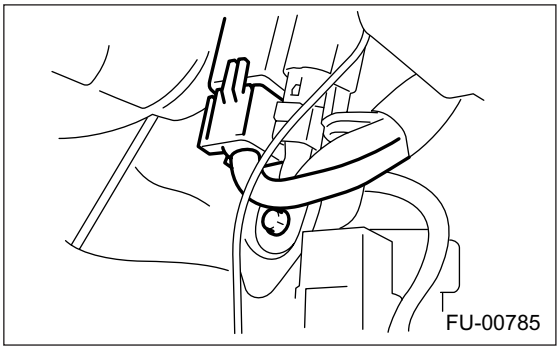
22.Fuel Pump Relay

A: REMOVAL

1) Disconnect the battery ground cable.



2) Remove the passenger's side front side sill cover.
3) Remove the bolt which holds fuel pump relay bracket on the body.
4) Disconnect the connector from the fuel pump relay.



5) Remove the fuel pump relay from the mounting bracket.

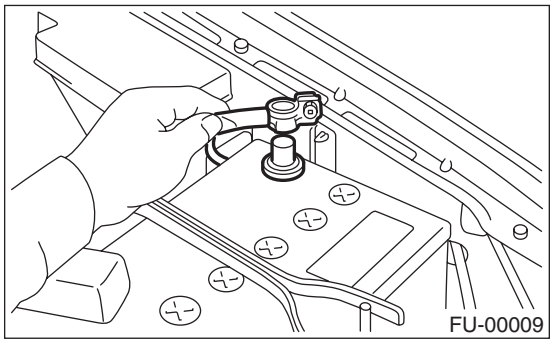
B: INSTALLATION

Install in the reverse order of removal.

23.Fuel Pump Controller

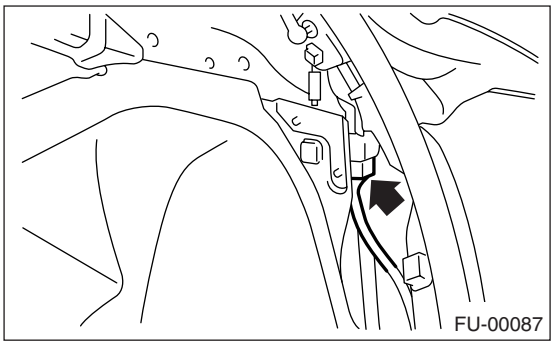
A: REMOVAL

1) Disconnect the battery ground cable.

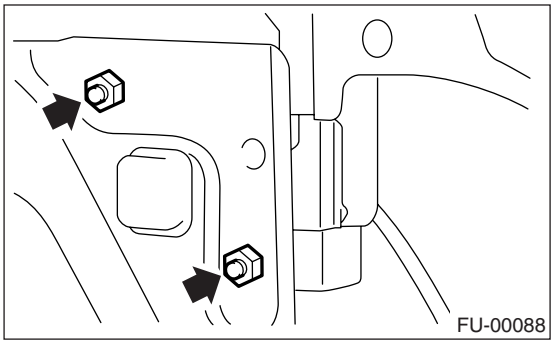


2) Remove the rear quarter trim. <Ref. to EI-48, REMOVAL, Rear Quarter Trim.>

3) Disconnect the connector from the fuel pump control unit.



4) Remove the fuel pump control unit.



B: INSTALLATION

Install in the reverse order of removal.

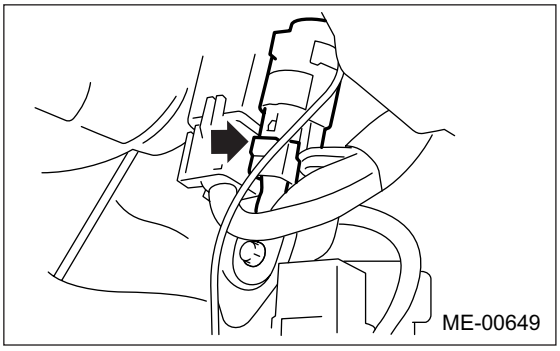
24.Fuel

A: OPERATION

1. RELEASING OF FUEL PRESSURE

WARNING:
- **Place "NO FIRE" signs near the working area.**
- **Be careful not to spill fuel on the floor.**

1) Disconnect the connector from the fuel pump relay.

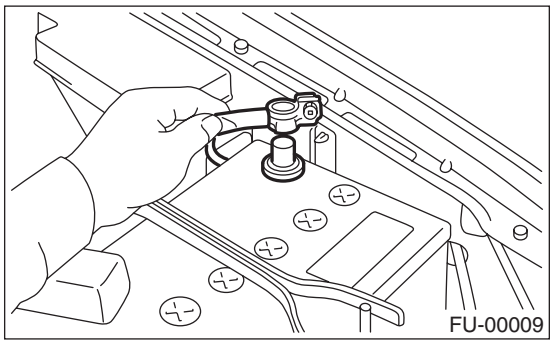


2) Start the engine and run it until it stalls.
3) After the engine stalls, crank it for five more seconds.
4) Turn the ignition switch to OFF.

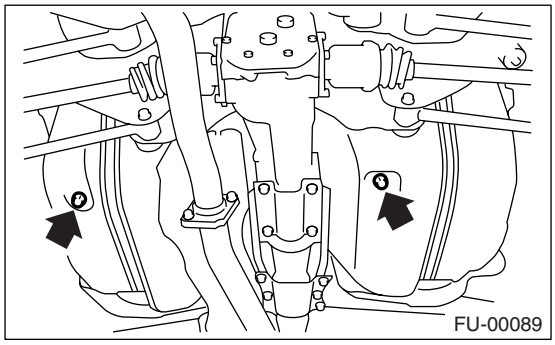
2. DRAINING FUEL

WARNING:
- **Place "NO FIRE" signs near the working area.**
- **Be careful not to spill fuel on the floor.**

1) Set the vehicle on the lift.
2) Disconnect the battery ground cable.

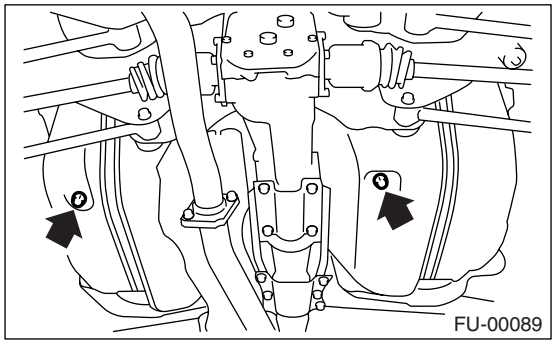


3) Lift-up the vehicle.
4) Drain the fuel from the fuel tank.
Set a container under the vehicle and remove drain plug from the fuel tank.



5) Tighten the fuel drain plug.

Tightening torque:
26 N·m (2.65 kgf-m, 19.2 ft-lb)

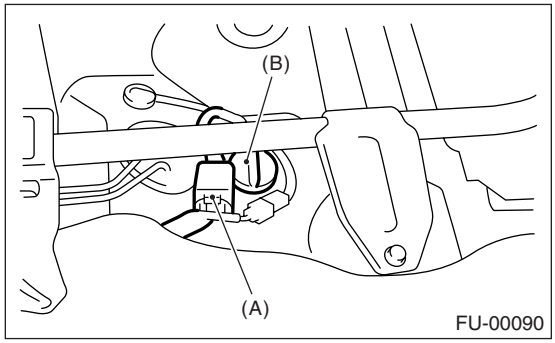


25.Fuel Tank

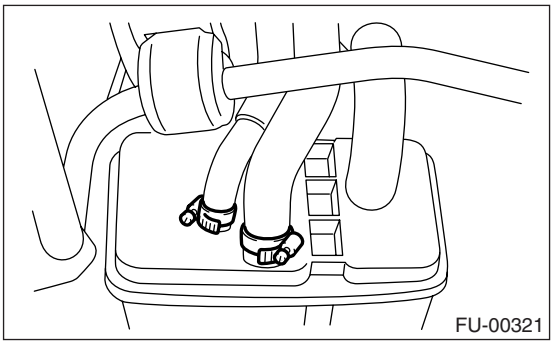
A: REMOVAL

WARNING:
- **Place "NO FIRE" signs near the working area.**
- **Be careful not to spill fuel on the floor.**

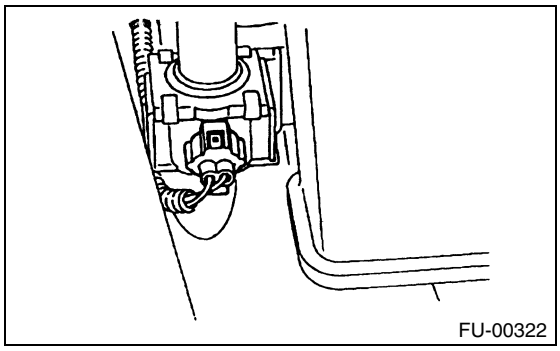
1) Set the vehicle on the lift.
2) Lower the fuel pressure. <Ref. to FU(H4DOTC)-54, RELEASING OF FUEL PRESSURE, OPERATION, Fuel.>
3) Drain the fuel from the fuel tank. <Ref. to FU(H4DOTC)-54, DRAINING FUEL, OPERATION, Fuel.>
4) Remove the rear seat.
5) Disconnect the connector (A) of fuel tank cord to the rear harness.
6) Push the grommet (B) which holds the fuel tank cord on floor panel into under the body.



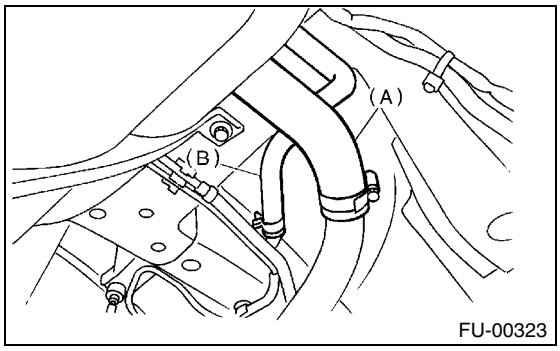
7) Remove the rear crossmember. <Ref. to RS-20, REMOVAL, Rear Crossmember.>
8) Move the clamp, and disconnect the evaporation hose from canister.



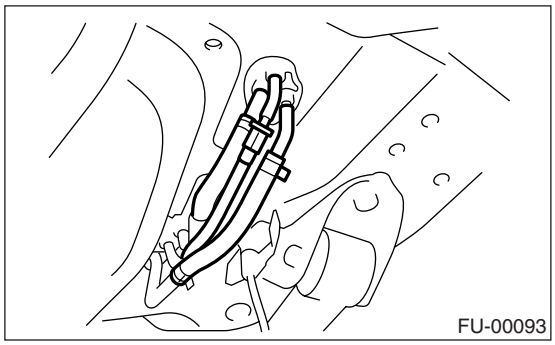
9) Disconnect the connector from the pressure control solenoid valve.
10) Disconnect the connector from the drain valve.



11) Loosen the clamp and disconnect the fuel filler hose (A) and air vent hose (B) from fuel filler pipe and air vent pipe.

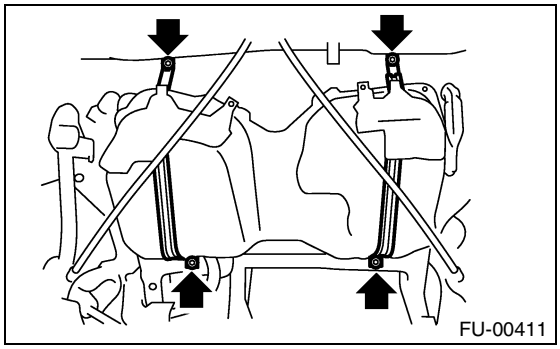


12) Move the clips, and disconnect the quick connector. <Ref. to FU(H4DOTC)-71, REMOVAL, Fuel Delivery, Return and Evaporation Lines.>
13) Disconnect the fuel hoses.



14) Support the fuel tank with transmission jack, remove the bolts from bands and dismount the fuel tank from vehicle.

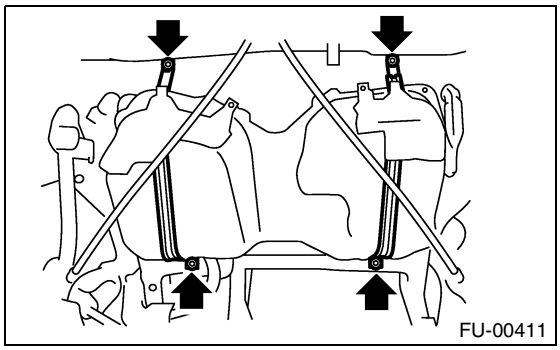
WARNING:
A helper is required to perform this work.



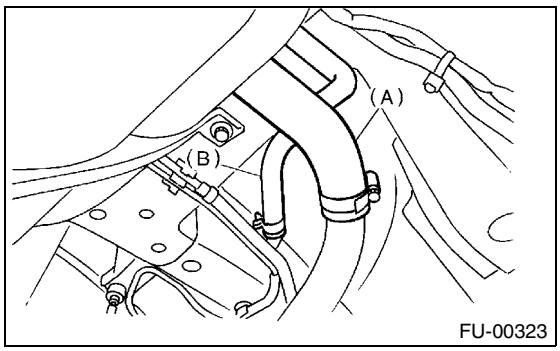
B: INSTALLATION

1) Support the fuel tank with transmission jack and push the fuel tank harness into the access hole with grommet.
2) Set the fuel tank and temporarily tighten the bolts of fuel tank bands.

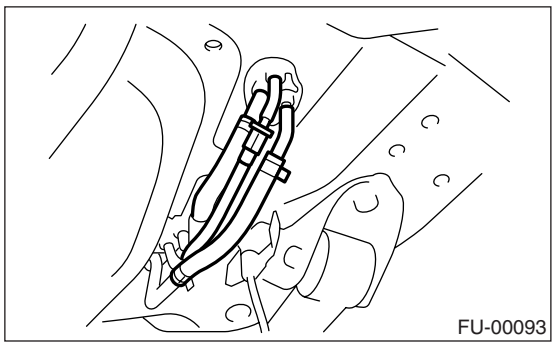
WARNING:
A helper is required to perform this work.



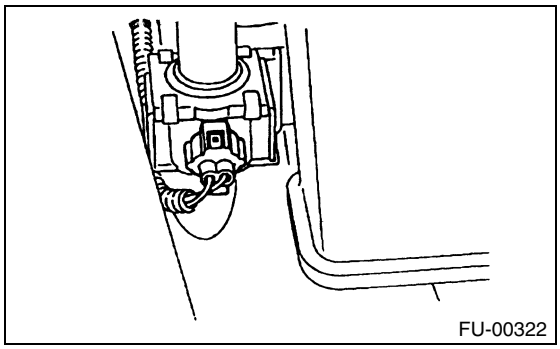
3) Connect the fuel filler hose and air vent hose.



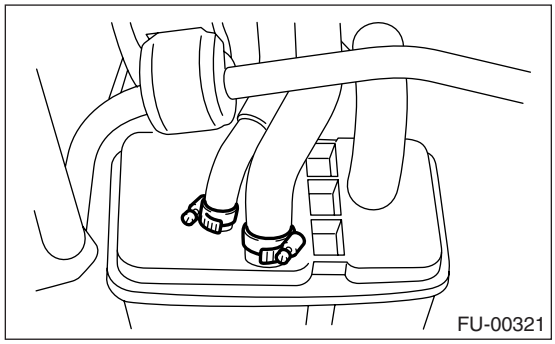
4) Connect the fuel hoses, and hold them with clips and quick connector. <Ref. to FU(H4DOTC)-72, INSTALLATION, Fuel Delivery, Return and Evaporation Lines.>



5) Connect the connector to the drain valve.

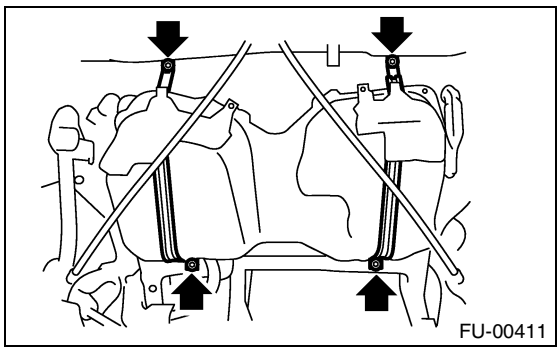


6) Connect the connector to the pressure control solenoid valve.
7) Connect the evaporation hose to the canister, and hold them with clamp.

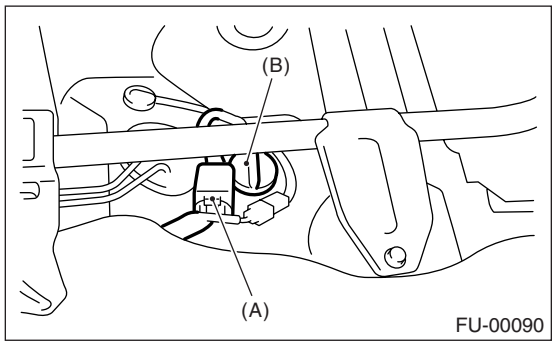


8) Tighten the band mounting bolts.

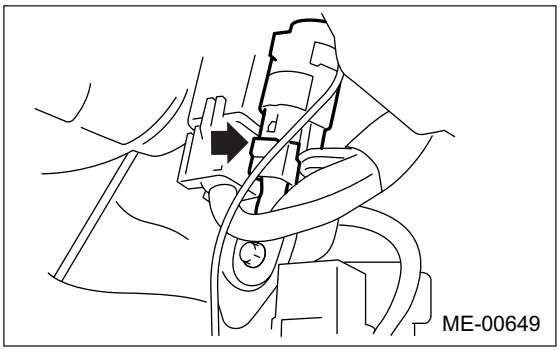
Tightening torque:
33 N·m (3.4 kgf-m, 25 ft-lb)



9) Install the rear crossmember. <Ref. to RS-20, INSTALLATION, Rear Crossmember.>
10) Connect the connector (A) to the fuel tank cord and plug the service hole with gromment (B).



11) Set the rear seat and floor mat.
12) Connect the connector to the fuel pump relay.



C: INSPECTION

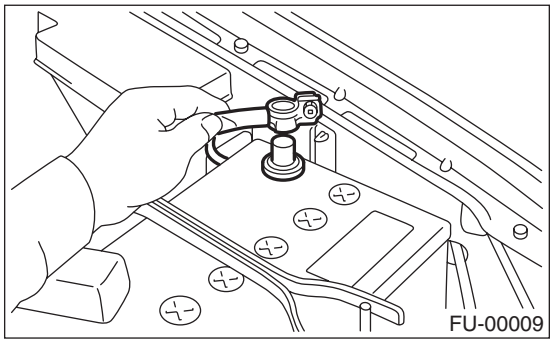
1) Make sure there are no cracks, holes, or other damage on the fuel tank.
2) Make sure that the fuel hoses and fuel pipes are not cracked and that connections are tight.

26.Fuel Filler Pipe

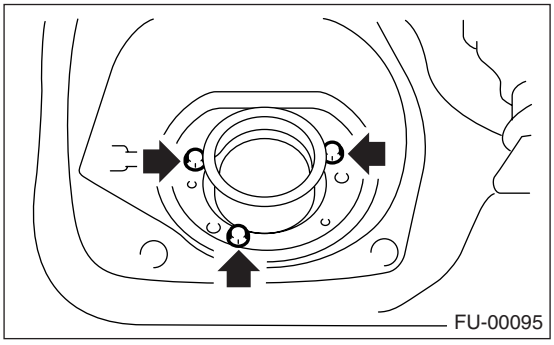
A: REMOVAL

WARNING:
- **Place "NO FIRE" signs near the working area.**
- **Be careful not to spill fuel on the floor.**

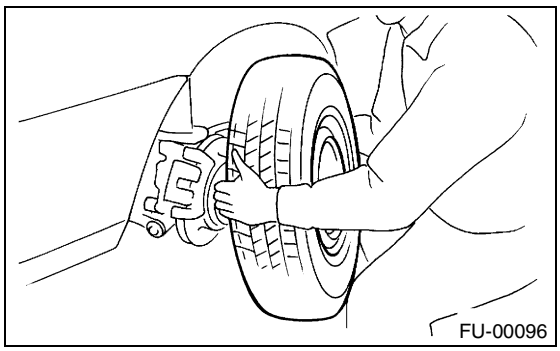
1) Lower the fuel pressure. <Ref. to FU(H4DOTC)-54, RELEASING OF FUEL PRESSURE, OPERATION, Fuel.>
2) Open the fuel filler flap lid and remove the filler cap.
3) Disconnect the battery ground cable.



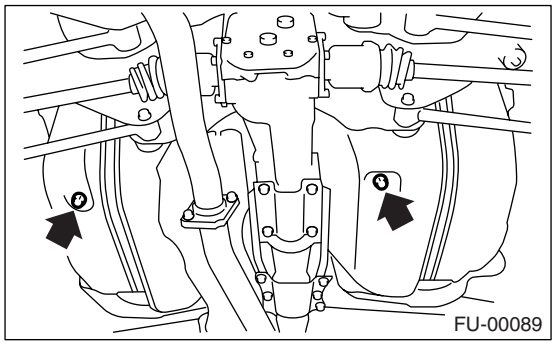
4) Remove the screws holding packing in place.



5) Lift-up the vehicle.
6) Remove the rear right side wheel nuts.
7) Remove the rear right side wheel.

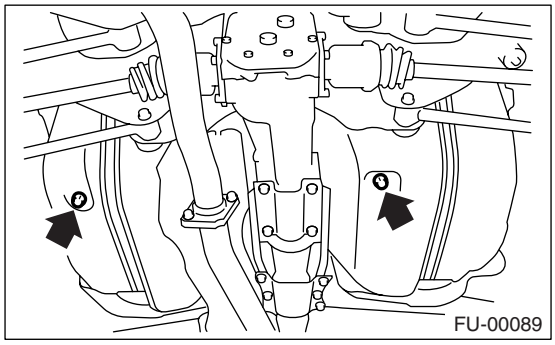


8) Drain the fuel from fuel tank. Set a container under the vehicle and remove the drain plug from fuel tank.

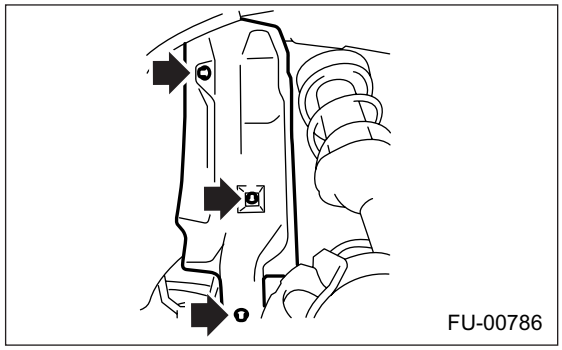


9) Tighten the fuel drain plug and then install the front right side tank cover.

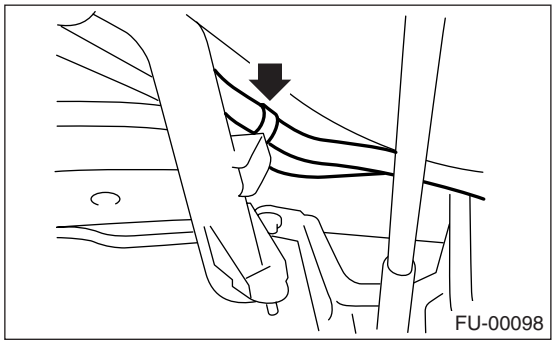
Tightening torque:
26 N·m (2.65 kgf-m, 19.2 ft-lb)



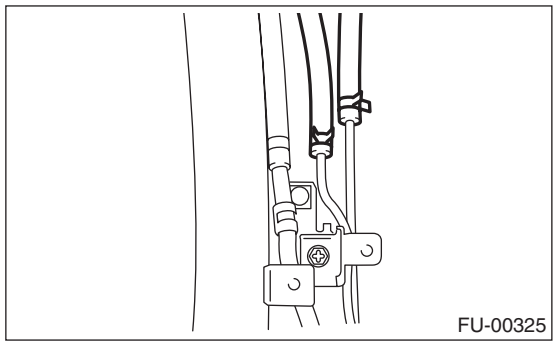
10) Remove the fuel filler pipe protector.



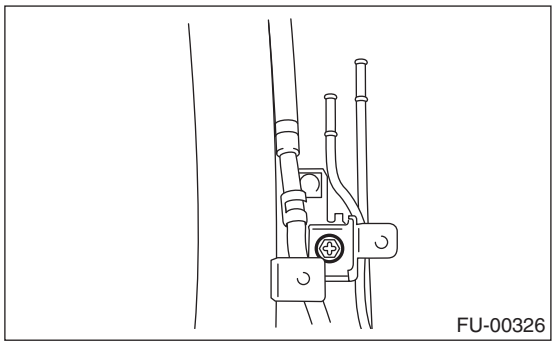
11) Separate the evaporation hoses from the clip of fuel filler pipe.



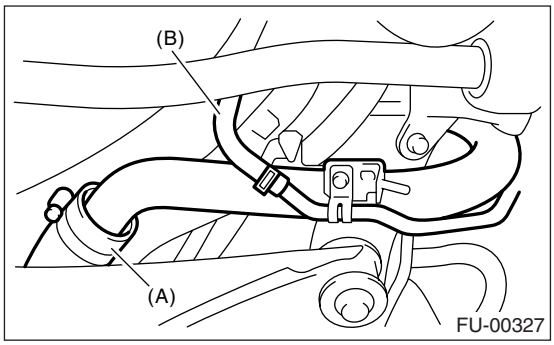
12) Disconnect the evaporation hoses from the pipes.



13) Remove the bolts which hold fuel filler pipe bracket on the body.

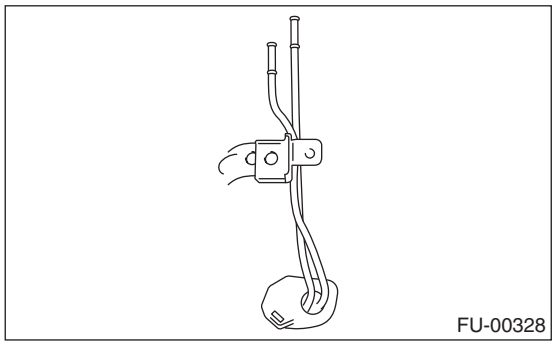


14) Loosen the clamp and separate the fuel filler hose (A) from fuel filler pipe.
15) Move the clip and separate the evaporation hose (B).



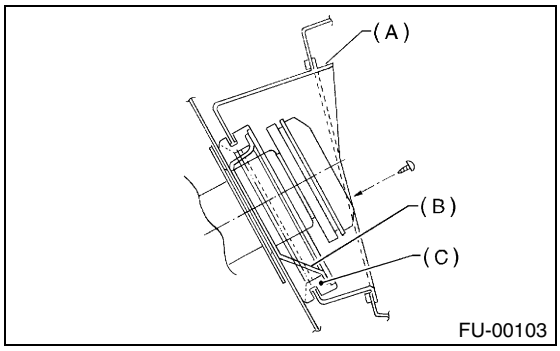
16) Remove the fuel filler pipe to under side of the vehicle.

17) Remove the air vent pipe together with clip from the body.



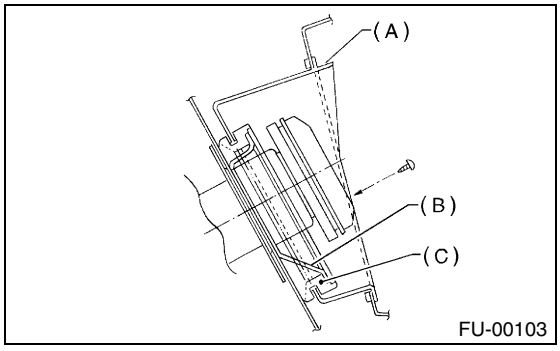
B: INSTALLATION

1) Hold the fuel filler flap open.
2) Set the fuel saucer (A) with rubber packing (C) and insert the fuel filler pipe into the hole from the inner side of apron.

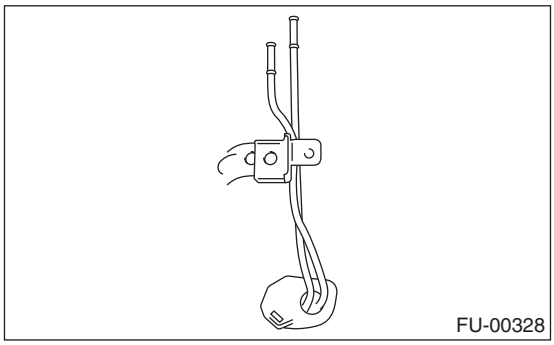


3) Align the holes in fuel filler pipe neck and set the cup (B), and tighten the screws.

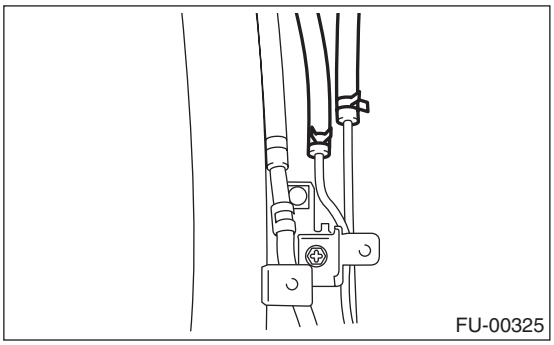
NOTE:
If edges of rubber packing are folded toward the inside, straighten it with a screwdriver.



4) Install the evaporation pipes.

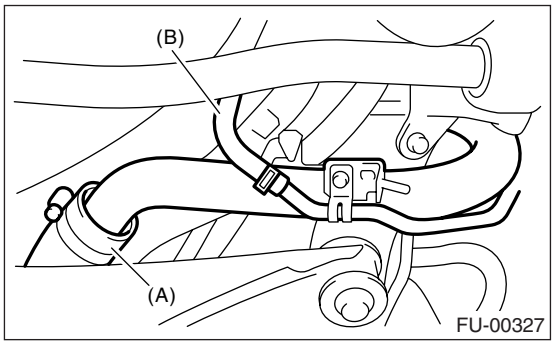


5) Connect the evaporation hose to pipes.



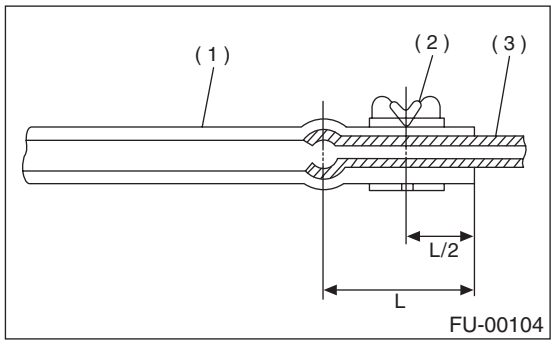
6) Insert the fuel filler hose (A) approximately 35 to 40 mm (1.38 to 1.57 in) over the lower end of fuel filler pipe and tighten the clamp.

CAUTION:
Do not allow clips to touch air vent hose (B) and rear suspension crossmember.



7) Insert the air vent hose approximately 25 to 30 mm (0.98 to 1.18 in) into the lower end of air vent pipe and hold clip.

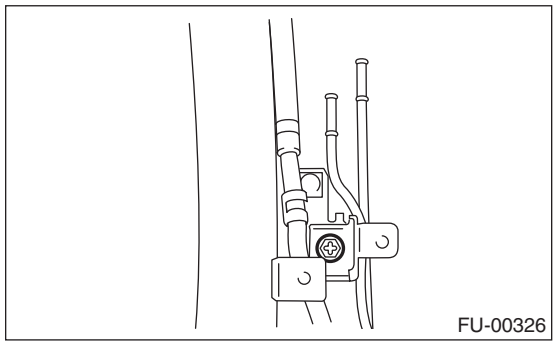
L = 27.5±2.5 mm (1.083±0.098 in)



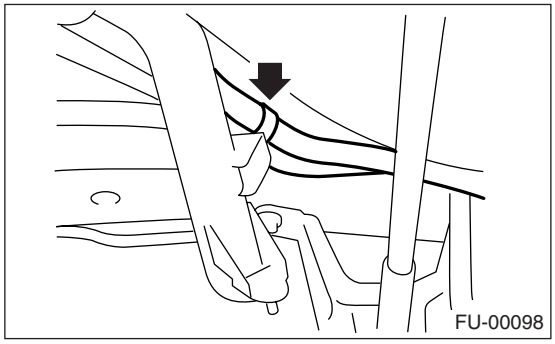
(1) Hose
(2) Clip
(3) Pipe

8) Tighten the bolt which holds fuel filler pipe bracket on the body.

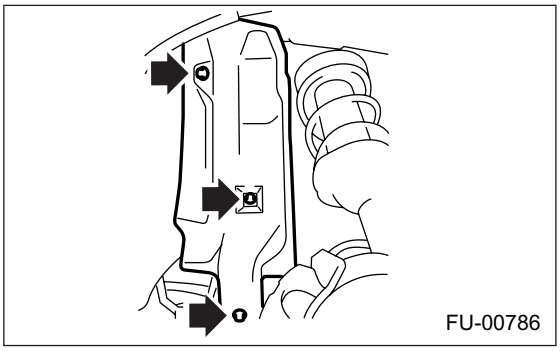
Tightening torque:
7.4 N·m (0.75 kgf-m, 5.4 ft-lb)



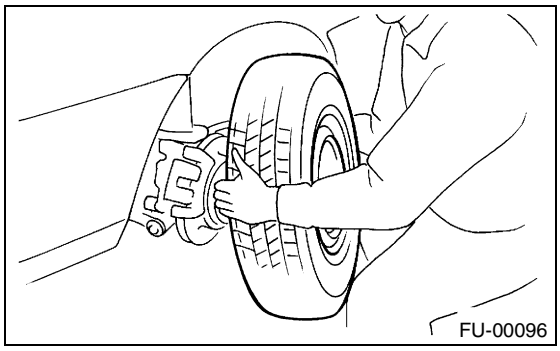
9) Tighten the bolts which hold evaporation hoses onto the clip of fuel filler pipe.



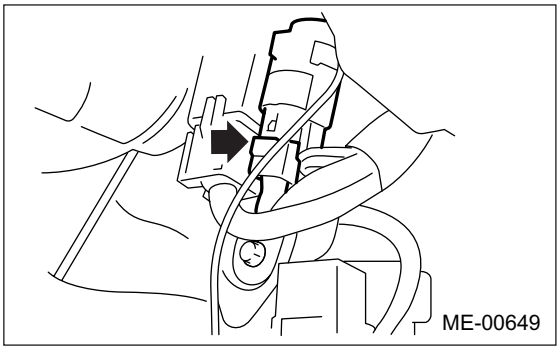
10) Install the fuel filler pipe protector.



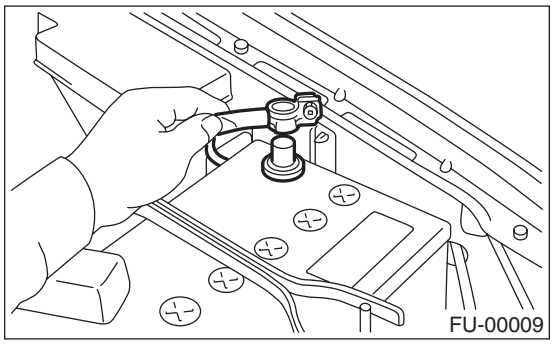
11) Install the rear right wheel.



12) Lower the vehicle.
13) Tighten the wheel nuts.
14) Connect the connector to the fuel pump relay.

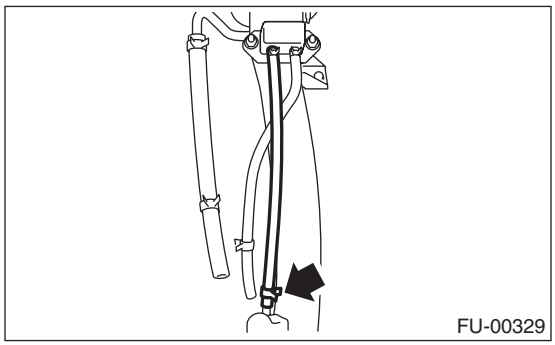


15) Connect the battery ground terminal.

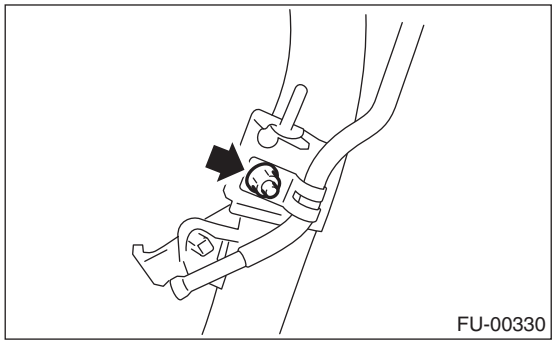


C: DISASSEMBLY

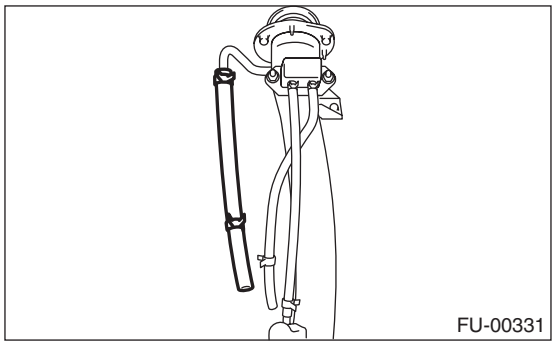
1) Move the clip, and disconnect the evaporation hose from joint pipe.



2) Remove the bolt which installs the joint pipe on fuel filler pipe.



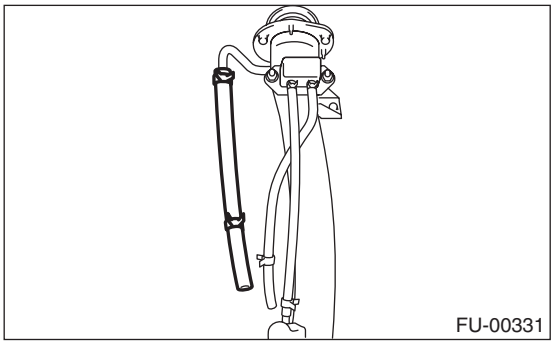
3) Disconnect the evaporation hose from the fuel filler pipe.



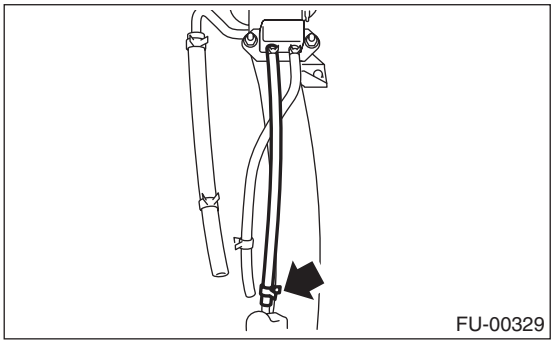
4) Remove the shut valve from the fuel filler pipe. <Ref. to EC(H4DOTC)-18, REMOVAL, Shut Valve.>

D: ASSEMBLY

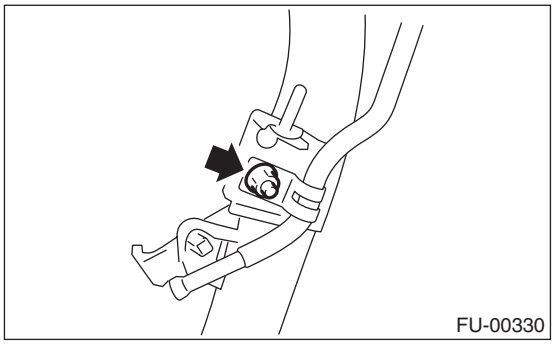
1) Install the shut valve on the fuel filler pipe. <Ref. to EC(H4DOTC)-18, INSTALLATION, Shut Valve.>
2) Connect the evaporation hose to the fuel filler pipe.



3) Connect the evaporation hose to the evaporation pipe.



4) Install the evaporation pipe to the fuel filler pipe.



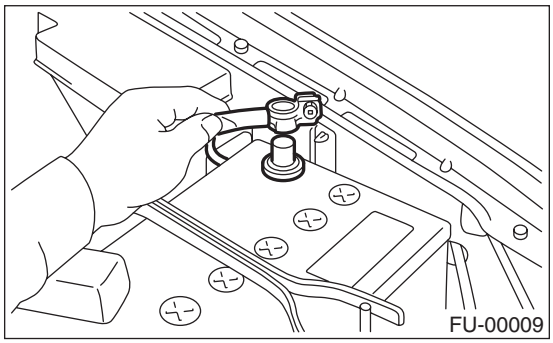
27.Fuel Pump

A: REMOVAL

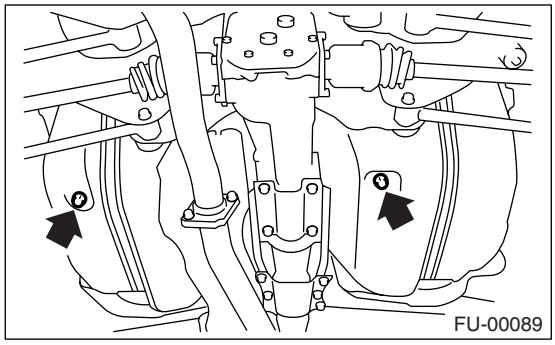
WARNING:
- **Place "NO FIRE" signs near the working area.**
- **Be careful not to spill fuel on the floor.**

NOTE:
Fuel pump assembly consists of fuel pump and fuel level sensor.

1) Lower the fuel pressure. <Ref. to FU(H4DOTC)-54, RELEASING OF FUEL PRESSURE, OPERATION, Fuel.>
2) Open the fuel filler flap lid and remove the fuel filler cap.
3) Disconnect the battery ground cable.

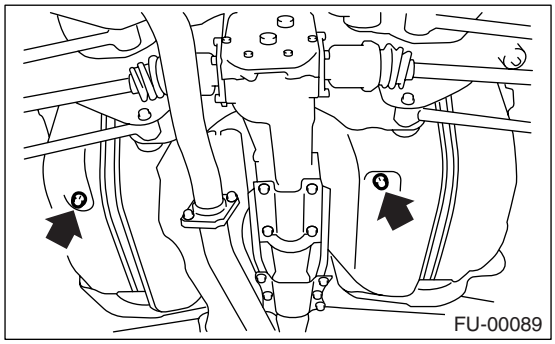


4) Lift-up the vehicle.
5) Drain the fuel from fuel tank. Set a container under the vehicle and remove the drain plug from fuel tank.

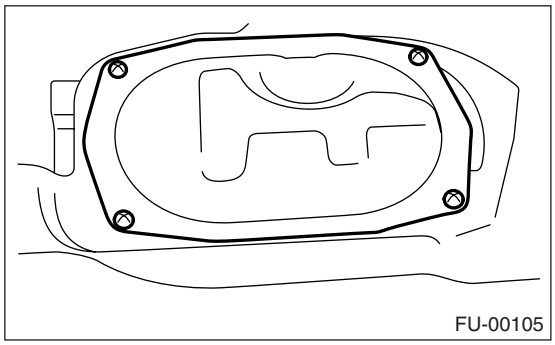


6) Tighten the fuel drain plug.

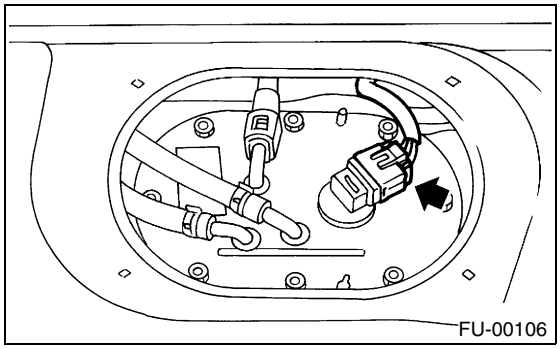
Tightening torque:
26 N·m (2.65 kgf-m, 19.2 ft-lb)



7) Raise the rear seat and turn the floor mat up.
8) Remove the access hole lid.

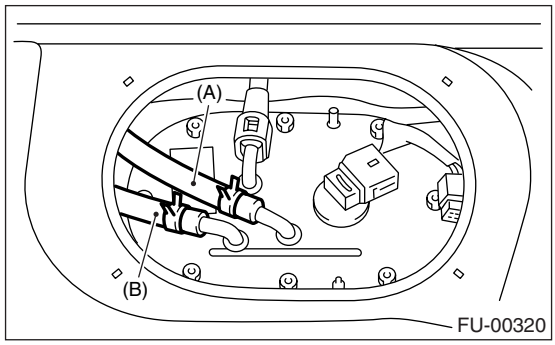


9) Disconnect the connector from the fuel pump.

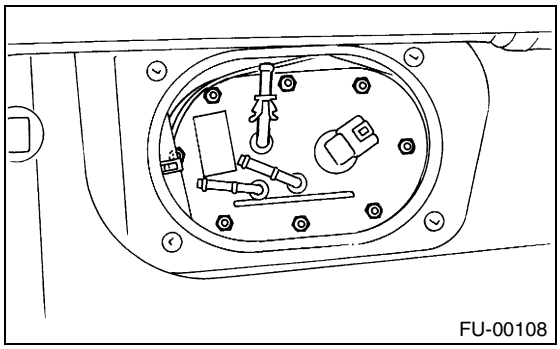


10) Disconnect the quick connector and then disconnect the fuel delivery hose (A). <Ref. to FU(H4DOTC)-71, Fuel Delivery, Return and Evaporation Lines.>

11) Move the clips, and then disconnect the fuel return hose (A) and jet pump hose (B).



12) Remove the nuts which install the fuel pump assembly onto fuel tank.

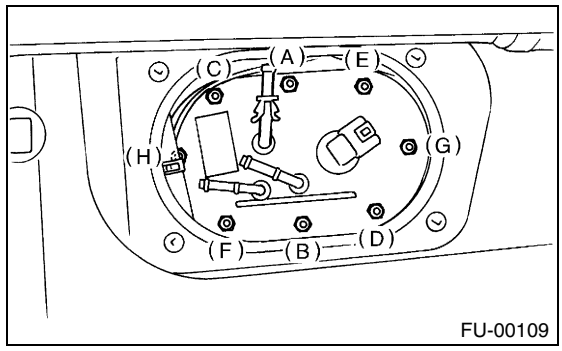


13) Take off the fuel pump assembly from the fuel tank.

B: INSTALLATION

Install in the reverse order of removal. Do the following:
(1) Always use new gaskets.
(2) Ensure the sealing portion is free from fuel or foreign particles before installation.
(3) Tighten the nuts in alphabetical sequence shown in figure to specified torque.

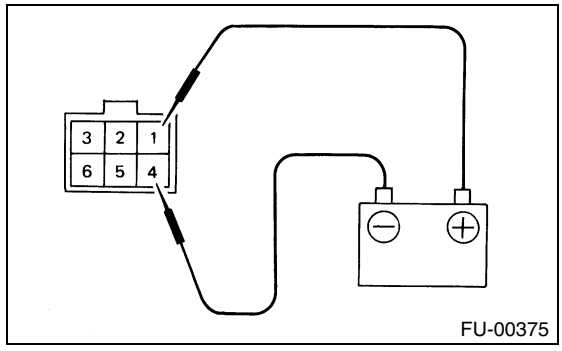
Tightening torque:
4.4 N·m (0.45 kgf-m, 3.3 ft-lb)



C: INSPECTION

Connect the lead harness to the connector terminal of fuel pump and apply battery power supply to check whether the pump operate.

WARNING:
• Wipe off the fuel completely.
• Keep battery as far apart from fuel pump as possible.
• Be sure to turn the battery supply ON and OFF on the battery side.
• Do not run fuel pump for a long time under non-load condition.



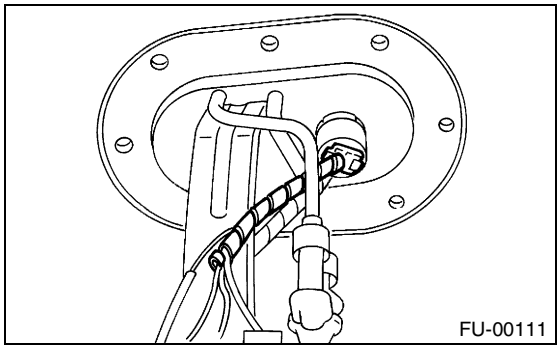
28.Fuel Level Sensor

A: REMOVAL

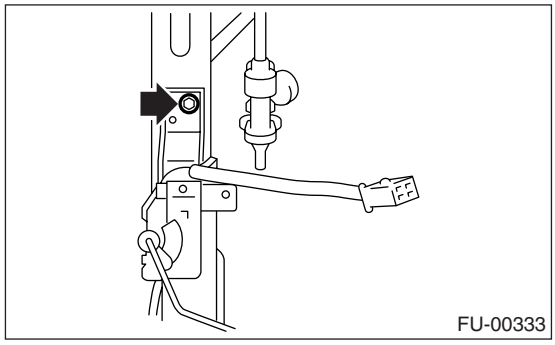
WARNING:
- **Place "NO FIRE" signs near the working area.**
- **Be careful not to spill fuel on the floor.**

NOTE:
Fuel level sensor is built in fuel pump assembly.

1) Remove the fuel pump assembly. <Ref. to FU(H4DOTC)-63, REMOVAL, Fuel Pump.>
2) Disconnect the connector from the fuel pump bracket.



3) Remove the bolt which installs the fuel level sensor on mounting bracket.



B: INSTALLATION

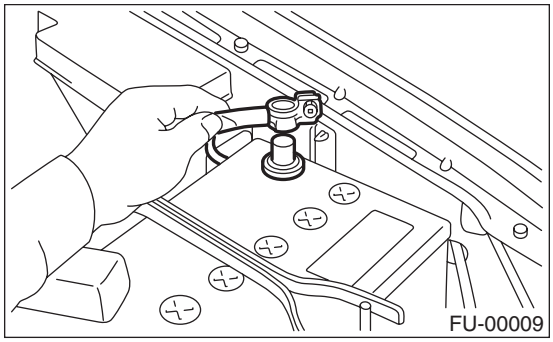
Install in the reverse order of removal.

29.Fuel Sub Level Sensor

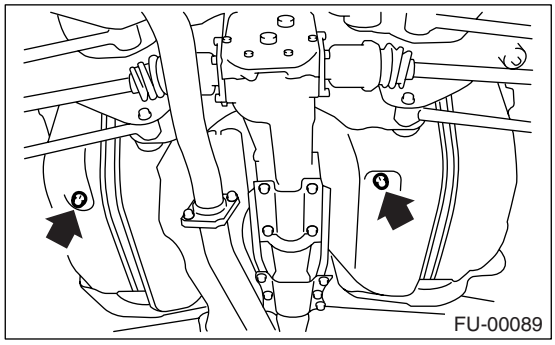
A: REMOVAL

WARNING:
- **Place "NO FIRE" signs near the working area.**
- **Be careful not to spill fuel on the floor.**

1) Disconnect the battery ground cable.

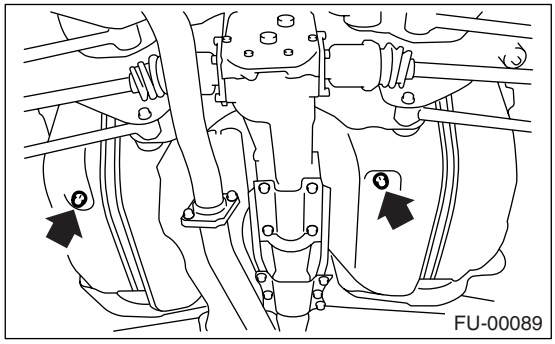


2) Lift-up the vehicle.
3) Drain the fuel from the fuel tank. Set a container under the vehicle and remove drain plug from fuel tank.

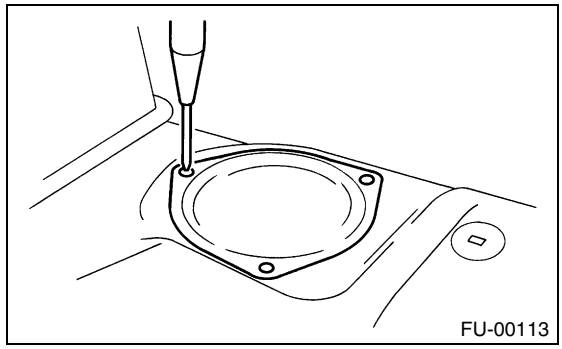


4) Tighten the fuel drain plug.

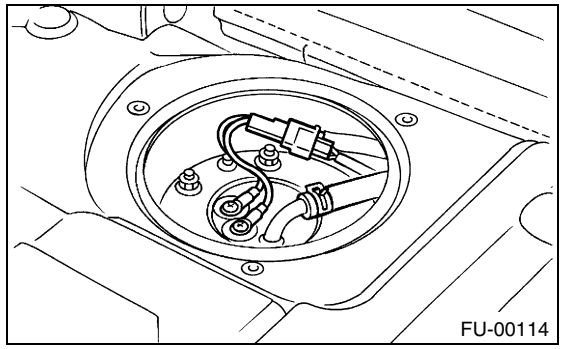
Tightening torque:
26 N·m (2.65 kgf-m, 19.2 ft-lb)



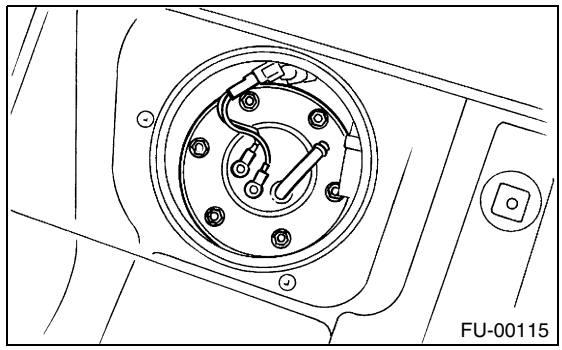
5) Remove the rear seat.
6) Remove the service hole cover.



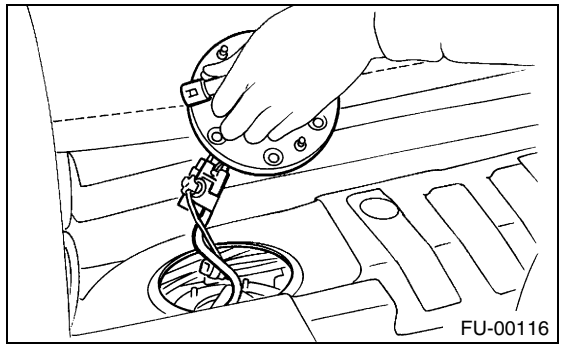
7) Disconnect the connector from the fuel sub meter.
8) Disconnect the fuel jet pump hose.



9) Remove the bolts which install the fuel sub meter unit on fuel tank.



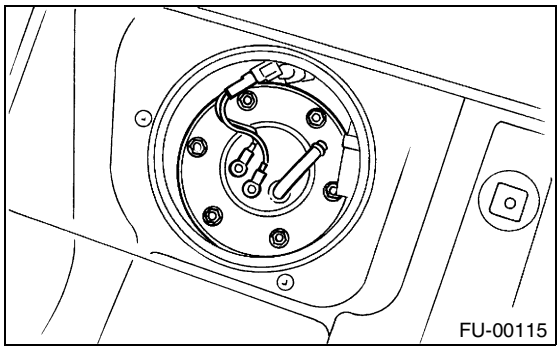
10) Remove the fuel sub meter unit.



B: INSTALLATION

Install in the reverse order of removal.

Tightening torque:
4.4 N·m (0.45 kgf-m, 3.3 ft-lb)

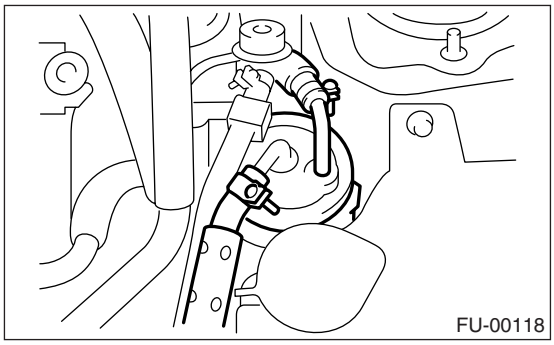


30.Fuel Filter

A: REMOVAL

WARNING:
- **Place "NO FIRE" signs near the working area.**
- **Be careful not to spill fuel on the floor.**

1) Lower the fuel pressure. <Ref. to FU(H4DOTC)-54, RELEASING OF FUEL PRESSURE, OPERATION, Fuel.>
2) Disconnect the fuel delivery hoses from the fuel filter.



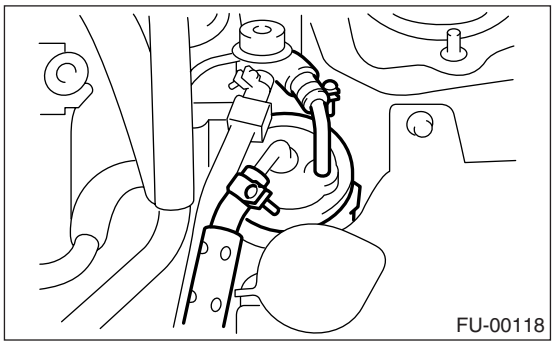
3) Remove the filter from the holder.

B: INSTALLATION

CAUTION:
- **If fuel hoses are damaged at the connecting portion, replace it with a new one.**
- **If clamps are badly damaged, replace with new ones.**

1) Install in the reverse order of removal.
2) Tighten the hose clamp screws.

Tightening torque:
1.25 N·m (0.13 kgf-m, 0.94 ft-lb)



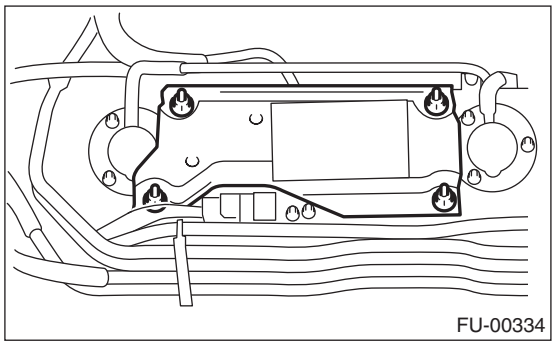
C: INSPECTION

1) Check the inside of fuel filter for dirt and water sediment.
2) If it is clogged, or if replacement interval has been reached, replace it.
3) If water is found in it, shake and expel the water from the inlet port.

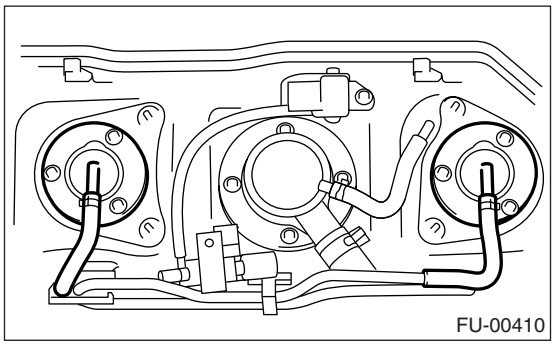
31.Fuel Cut Valve

A: REMOVAL

1) Remove the fuel tank. <Ref. to FU(H4DOTC)-55, REMOVAL, Fuel Tank.>
2) Remove the protect cover.


FU-00334

3) Move the clip and disconnect the evaporation hose from fuel cut valve.

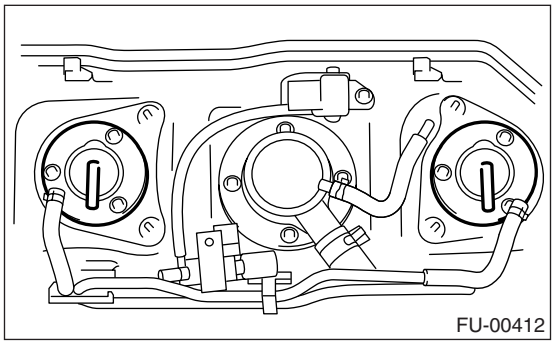

FU-00410

4) Remove the bolts which install the fuel cut valve.

B: INSTALLATION

Install in the reverse order of removal.

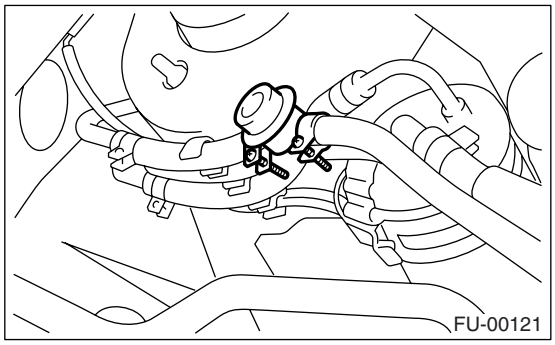
Tightening torque:
4.4 N·m (0.45 kgf-m, 3.3 ft-lb)


FU-00412

32.Fuel Damper Valve

A: REMOVAL

1) Lower the fuel pressure. <Ref. to FU(H4DOTC)-54, RELEASING OF FUEL PRESSURE, OPERATION, Fuel.>
2) Remove the fuel damper valve from the fuel return line.



B: INSTALLATION

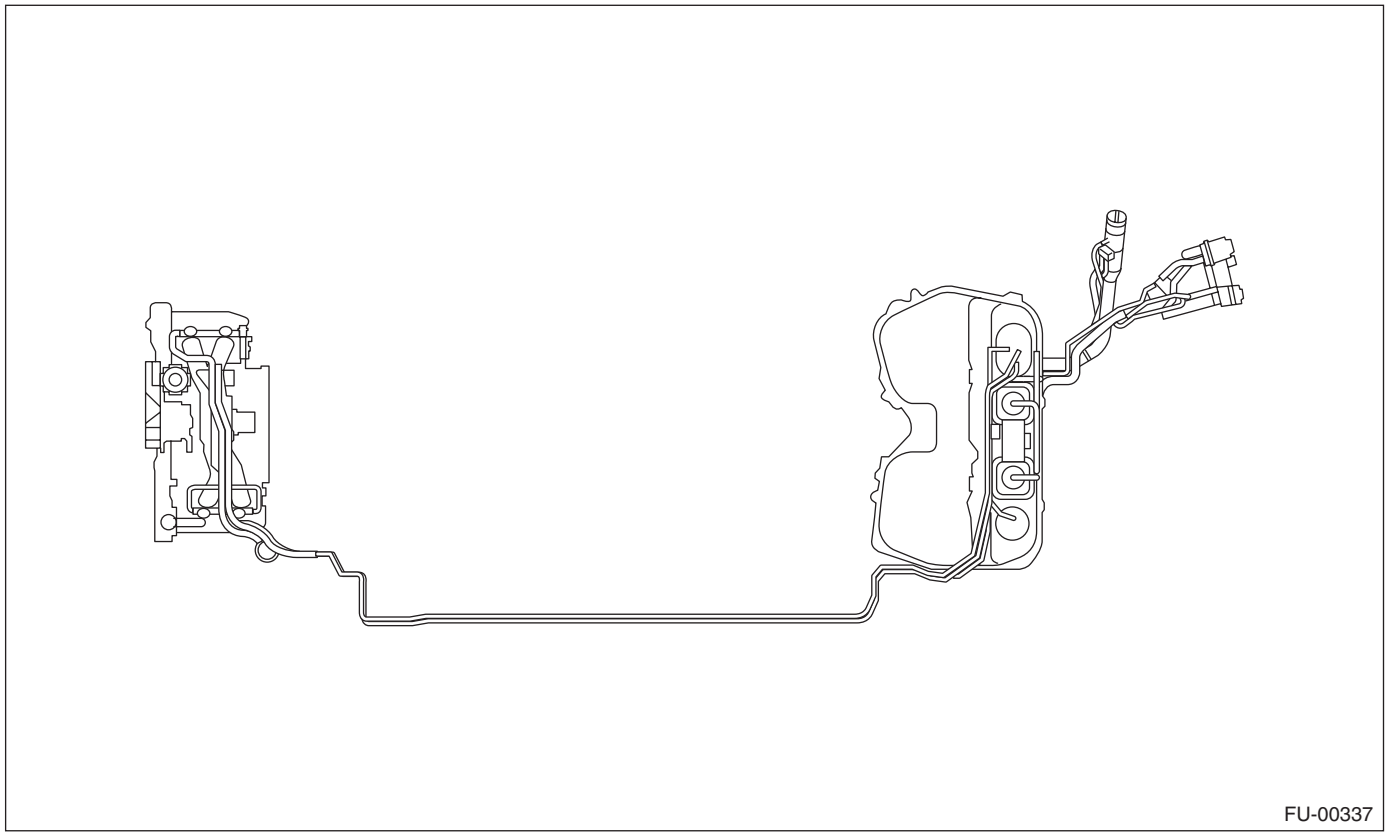
Install in the reverse order of removal.

Tightening torque:
1.25 N·m (0.13 kgf-m, 0.94 ft-lb)

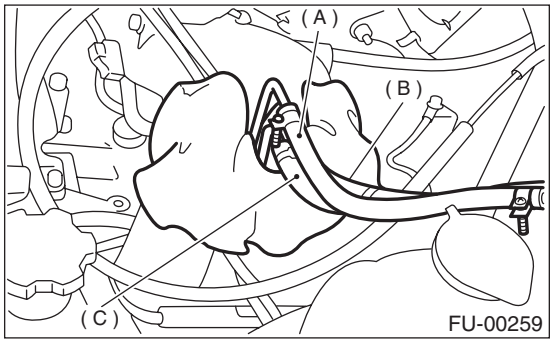
33. Fuel Delivery, Return and Evaporation Lines

A: REMOVAL

1) Set the vehicle on the lift.
2) Lower the fuel pressure. <Ref. to FU(H4DOTC)-54, RELEASING OF FUEL PRESSURE, OPERATION, Fuel.>
3) Open the fuel filler flap lid and remove the fuel filler cap.
4) Remove the floor mat. <Ref. to EI-56, REMOVAL, Floor Mat.>
5) Remove the fuel delivery pipes and hoses, fuel return pipes and hoses, evaporation pipes and hoses.


FU-00337

6) In engine compartment, detach the fuel delivery hose(A), return hose(B) and evaporation hose(C).

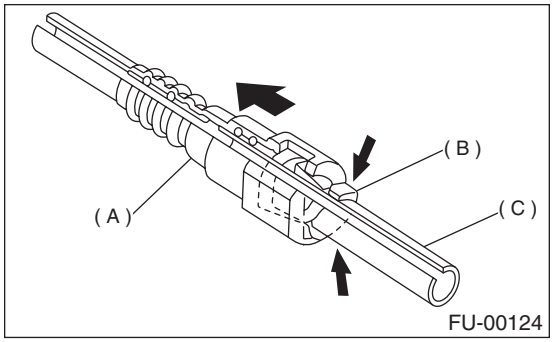


FU-00259

7) Lift-up the vehicle.

8) Separate the quick connector on the fuel delivery and return line.
(1) Clean the pipe and connector, if they are covered with dust.
(2) Hold the connector (A) and push retainer (B) down.
(3) Pull out the connector (A) from retainer (B).

CAUTION:
Replace retainer with new ones.

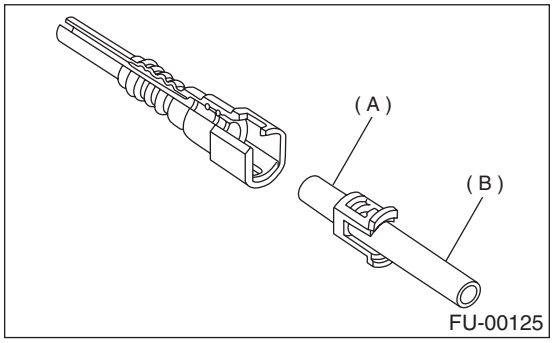


(A) Connector
(B) Retainer
(C) Pipe

B: INSTALLATION

1) Connect the quick connector on the fuel delivery line.

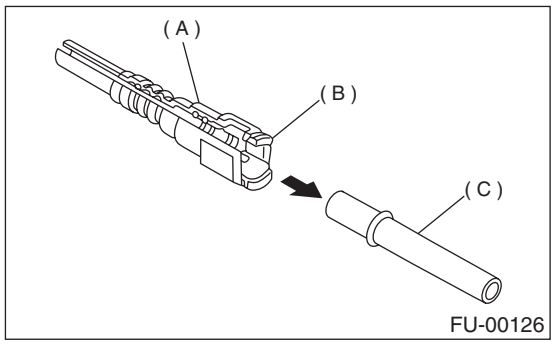
CAUTION:
• Always use a new retainer.
• Make sure that the connected portion is not damaged or has dust. If necessary, clean seal surface of pipe.



(A) Seal surface
(B) Pipe

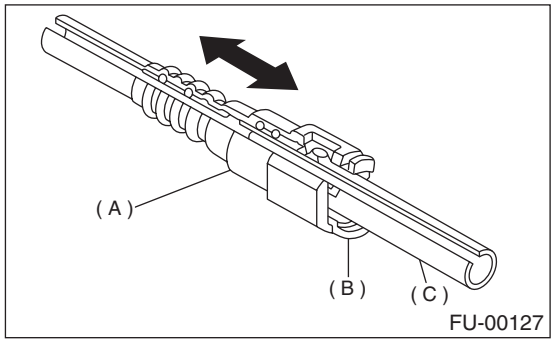
(1) Set the new retainer (B) to connector (A).
(2) Push the pipe into the connector completely.

NOTE:
At this time, two clicking sounds are heard.



(A) Connector
(B) Retainer
(C) Pipe

CAUTION:
• Pull the connector to ensure it is connected securely.
• Ensure the two retainer pawls are engaged in their mating positions in the connector.
• Be sure to inspect hoses and their connections for any leakage of fuel.

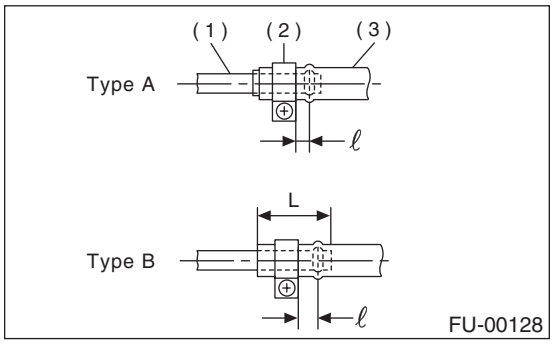


(A) Connector
(B) Retainer
(C) Pipe

2) Connect the fuel delivery hose to the pipe with an overlap of 20 to 25 mm (0.79 to 0.98 in).
Type A: When the fitting length is specified.
Type B: When the fitting length is not specified.

ℓ : 2.5±1.5 mm (0.098±0.059 in)

L: 22.5±2.5 mm (0.886±0.098 in)



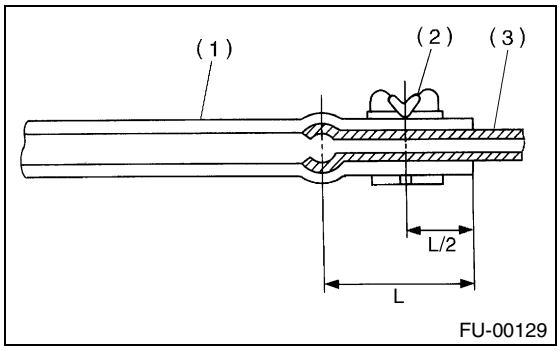
(1) Fitting
(2) Clamp
(3) Hose

3) Connect the return hose and evaporation hose to the pipe by approx. 15 mm (0.59 in) from the hose end.

Fuel return hose:
L = 22.5±2.5 mm (0.885±0.098 in)

Fuel evaporation hose:
L = 17.5±2.5 mm (0.689±0.098 in)

CAUTION:
Be sure to inspect hoses and their connections for any leakage of fuel.



(1) Hose
(2) Clip
(3) Pipe

C: INSPECTION

1) Make sure that there are no cracks on the fuel pipes and fuel hoses.
2) Make sure that the fuel pipe and fuel hose connections are tight.

34. Fuel System Trouble in General

A: INSPECTION

Trouble and possible cause			Corrective action
1. Insufficient fuel supply to the injector			
1)	Fuel pump will not operate.		
	❍	Defective terminal contact.	Inspect connections, especially ground, and tighten securely.
	❍	Trouble in electromagnetic or electronic circuit parts.	Replace fuel pump.
2)		Lowering of fuel pump function.	Replace fuel pump.
3)		Clogged dust or water in the fuel filter.	Replace fuel filter, clean or replace fuel tank.
4)		Clogged or bent fuel pipe or hose.	Clean, correct or replace fuel pipe or hose.
5)		Air is mixed in the fuel system.	Inspect or retighten each connection part.
6)		Clogged or bent breather tube or pipe.	Clean, correct or replace air breather tube or pipe.
7)		Damaged diaphragm of pressure regulator.	Replace.
2. Leakage or blow out fuel			
1)		Loosened joints of the fuel pipe.	Retightening.
2)		Cracked fuel pipe, hose and fuel tank.	Replace.
3)		Defective welding part on the fuel tank.	Replace.
4)		Defective drain packing of the fuel tank.	Replace.
5)		Clogged or bent air breather tube or air vent tube.	Clean, correct or replace air breather tube or air vent tube.
3. Gasoline smell inside of compartment			
1)		Loose joints at air breather tube, air vent tube and fuel filler pipe.	Retightening.
2)		Defective packing air tightness on the fuel saucer.	Correct or replace packing.
3)		Cracked fuel separator.	Replace separator.
4)		Inoperative fuel pump modulator or circuit.	Replace.
4. Defective fuel meter indicator			
1)		Defective operation of fuel level sensor.	Replace.
2)		Defective operation of fuel meter.	Replace.
5. Noise			
1)		Large operation noise or vibration of fuel pump.	Replace.

NOTE:

• When the vehicle is left unattended for an extended period of time, water may accumulate in the fuel tank.

To prevent water condensation.

(1) Top off the fuel tank or drain the fuel completely.

(2) Drain the water condensation from the fuel filter.

• Refilling the fuel tank.

Refill the fuel tank while there is still some fuel left in the tank.

• Protecting the fuel system against freezing and water condensation.

(3) Cold areas

In snow-covered areas, mountainous areas, skiing areas, etc. where ambient temperatures drop below 0°C (32°F) throughout the winter season, use an anti-freeze solution in the cooling system. Refueling will also complement the effect of anti-freeze solution each time the fuel level drops to about one-half. After the winter season, drain the water which may have accumulated in the fuel filter and fuel tank in the manner same as that described under Affected areas below.

(4) Affected areas

When the water condensation is notched in the fuel filter, drain the water from both the fuel filter and fuel tank or use a water removing agent (or anti-freeze solution) in the fuel tank.

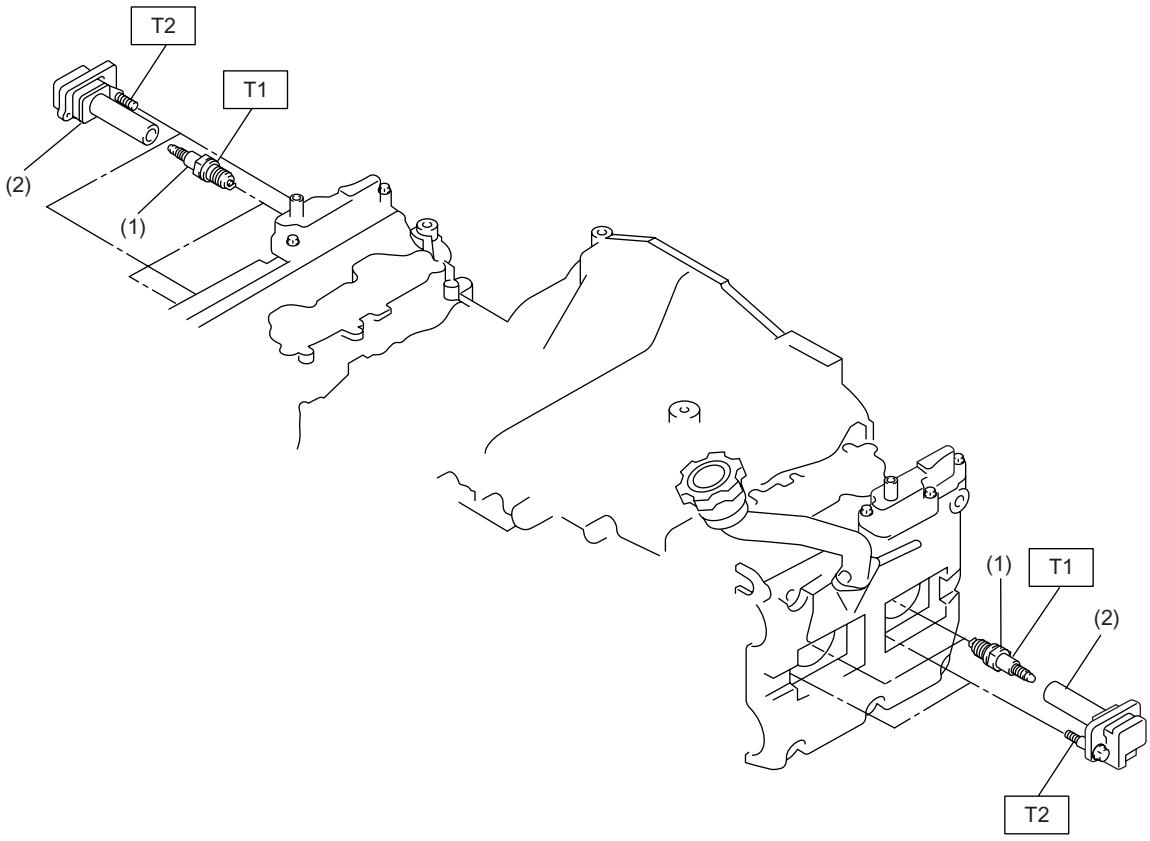
• Observe the instructions, notes, etc., indicated on the label affixed to the anti-freeze solution (water removing agent) container before use.

1. General Description

A: SPECIFICATIONS

Item			Designation
Ignition coil and ignitor assembly	Model		FK0140
	Manufacturer		DIAMOND
Spark plug	Type and manufacturer		PFR6G: NGK
	Thread size	mm	14, P = 1.25
	Spark gap	mm (in)	0.7 — 0.8 (0.028 — 0.031)

B: COMPONENT



(1) Spark plug
(2) Ignition coil and ignitor ASSY

Tightening torque: N·m (kgf-m, ft-lb)
T1: 21 (2.1, 15)
T2: 16 (1.6, 11.7)

C: CAUTION

- Wear working clothing, including a cap, protective goggles, and protective shoes during operation.
- Remove contamination including dirt and corrosion before removal, installation or disassembly.
- Keep the disassembled parts in order and protect them from dust or dirt.
- Before removal, installation or disassembly, be sure to clarify the failure. Avoid unnecessary removal, installation, disassembly, and replacement.
- Be careful not to burn your hands, because each part on the vehicle is hot after running.
- Be sure to tighten fasteners including bolts and nuts to the specified torque.
- Place shop jacks or safety stands at the specified points.
- Before disconnecting electrical connectors of sensors or units, be sure to disconnect the negative terminal from battery.

2. Spark Plug

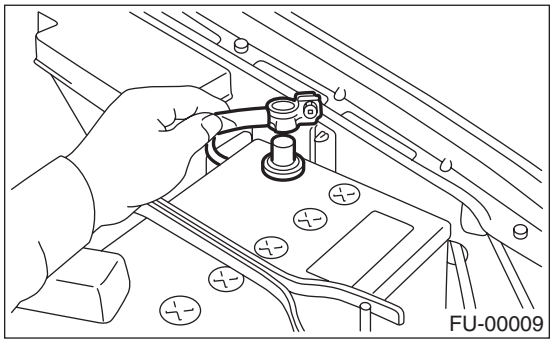
A: REMOVAL

CAUTION:
All spark plugs installed on an engine, must be of the same heat range.

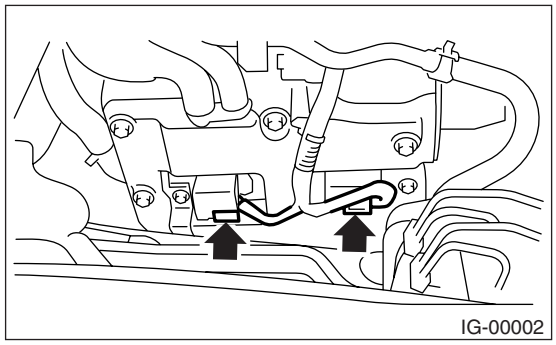
Spark plug:
NGK: PFR6G

1. RH SIDE

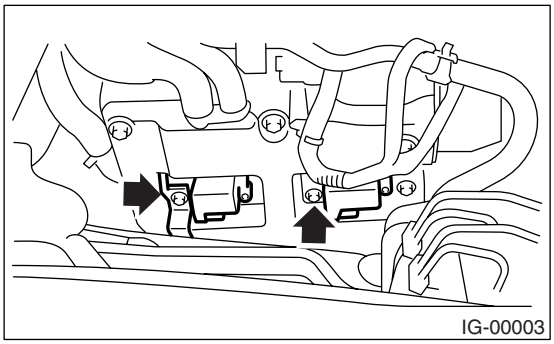
1) Disconnect the ground terminal from battery.



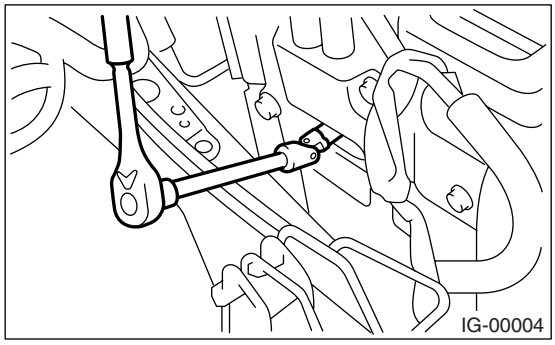
2) Remove the air cleaner lower case. <Ref. to IN(H4DOTC)-7, REMOVAL, Air Cleaner.>
3) Disconnect the connector from ignition coil.



4) Remove the ignition coil.

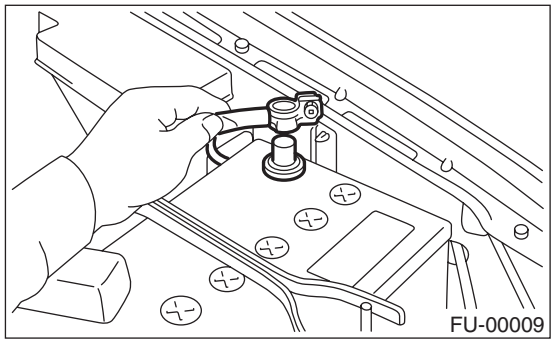


5) Remove the spark plugs with the spark plug sockets.

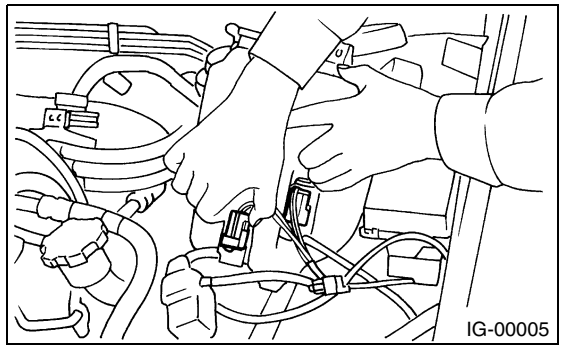


2. LH SIDE

1) Disconnect the battery terminals, and then remove the battery and battery carrier.

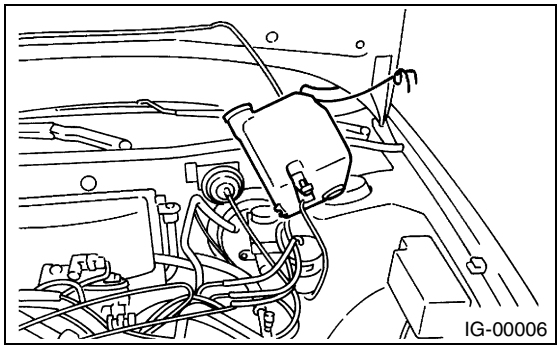


2) Disconnect the washer motor connector.

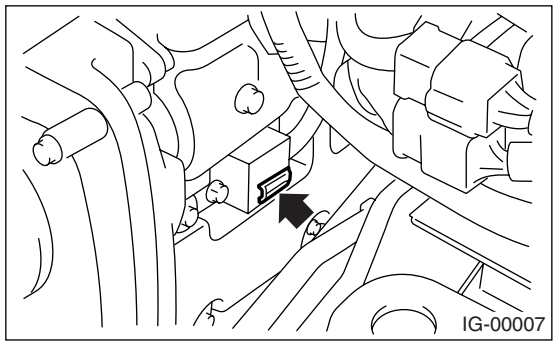


3) Disconnect the rear window glass washer hose from washer motor, then plug connection with a suitable cap.

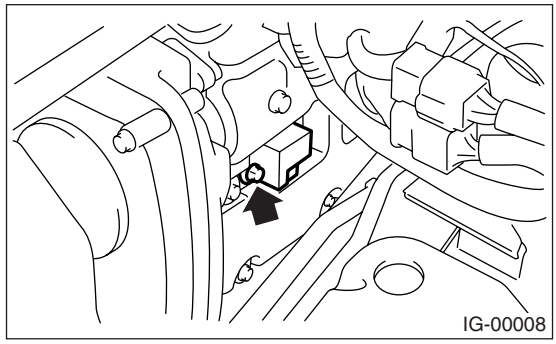
4) Remove the two bolts which hold the washer tank, then take the tank away from the working area.



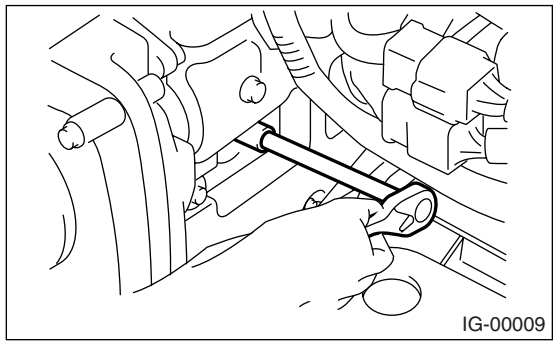
5) Disconnect the connector from ignition coil.



6) Remove the ignition coil.



7) Remove the spark plug with the spark plug sockets.



B: INSTALLATION

1. RH SIDE

1) Install in the reverse order of removal.

Tightening torque (Spark plug):
21 N·m (2.1 kgf-m, 15 ft-lb)

Tightening torque (Ignition coil):
16 N·m (1.63 kgf-m, 11.8 ft-lb)

CAUTION:
The above torque should be only applied to new spark plugs without oil on their threads. In case their threads are lubricated, the torque should be reduced by approximately 1/3 of the specified torque in order to avoid over-stressing.

2. LH SIDE

1) Install in the reverse order of removal.

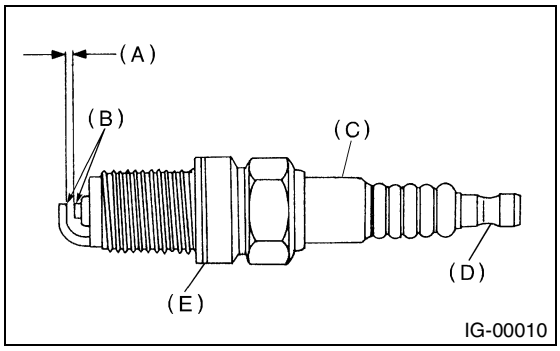
Tightening torque (Spark plug):
21 N·m (2.1 kgf-m, 15 ft-lb)

Tightening torque (Ignition coil):
16 N·m (1.63 kgf-m, 11.8 ft-lb)

CAUTION:
The above torque should be only applied to new spark plugs without oil on their threads. In case their threads are lubricated, the torque should be reduced by approximately 1/3 of the specified torque in order to avoid over-stressing.

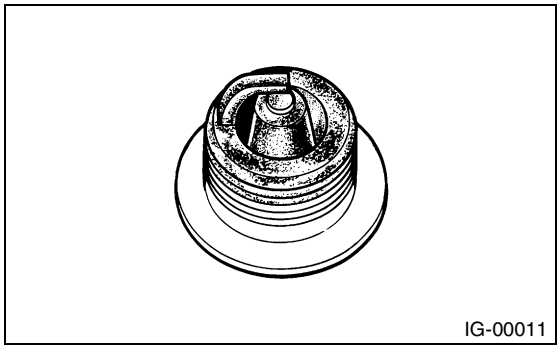
C: INSPECTION

Check the electrodes and inner and outer porcelain of plugs, noting the type of deposits and the degree of electrode erosion.

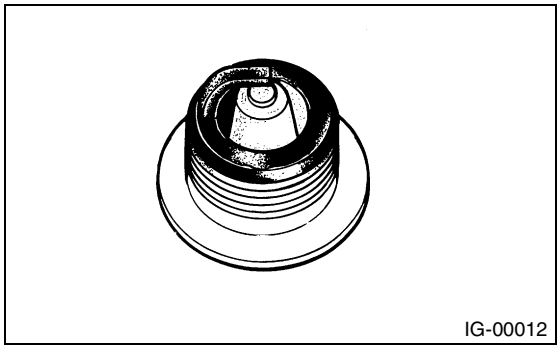


(A) Electrode gap
(B) Carbon accumulation or wear
(C) Cracks
(D) Damage
(E) Damaged gasket

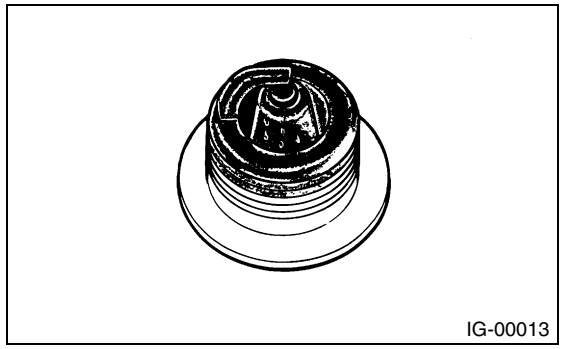
1) Normal:
Brown to grayish-tan deposits and slight electrode wear indicate correct spark plug heat range.



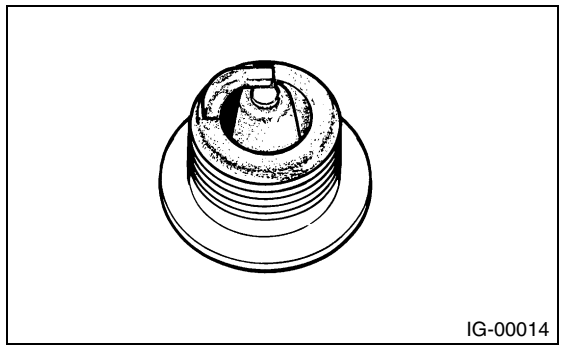
2) Carbon fouled:
Dry fluffy carbon deposits on insulator and electrode are mostly caused by slow speed driving in city, weak ignition, too rich fuel mixture, dirty air cleaner, etc.
It is advisable to replace with plugs having hotter heat range.



3) Oil fouled:
Wet black deposits show excessive oil entrance into combustion chamber through worn rings and pistons or excessive clearance between valve guides and stems. If the same condition remains after repair, use a hotter plug.



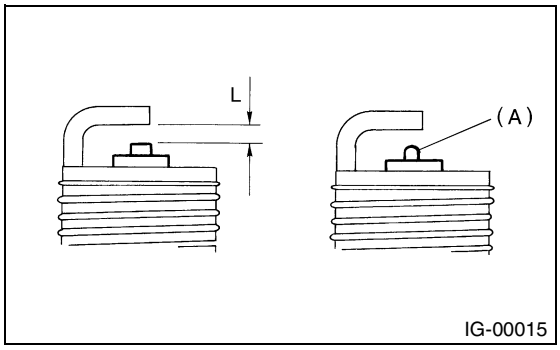
4) Overheating:
White or light gray insulator with black or gray brown spots and bluish burnt electrodes indicate engine overheating. Moreover, the appearance results from incorrect ignition timing, loose spark plugs, wrong selection of fuel, hotter range plug, etc. It is advisable to replace with plugs having colder heat range.



D: ADJUSTMENT

Clean the spark plugs in a sand blast type cleaner. Avoid excessive blasting. Clean and remove the carbon or oxide deposits, but do not wear away porcelain.
If deposits are too stubborn, replace the plugs.
After cleaning the spark plugs, recondition the firing surface of electrodes with file. Then correct the spark plug gap using a gap gauge.

Spark plug gap: L
0.7 — 0.8 mm (0.028 — 0.031 in)



NOTE:
Replace with a new spark plug if this area (A) is worn to “ball” shape.

3. Ignition Coil and Ignitor Assembly

A: REMOVAL

Direct ignition type has been adopted.
Refer to the “Spark Plug Removal” for removal procedure. <Ref. to IG(H4DOTC)-4, REMOVAL, Spark Plug.>

B: INSTALLATION

Install in the reverse order of removal.

Tightening torque:
16 N·m (1.63 kgf-m, 11.8 ft-lb)

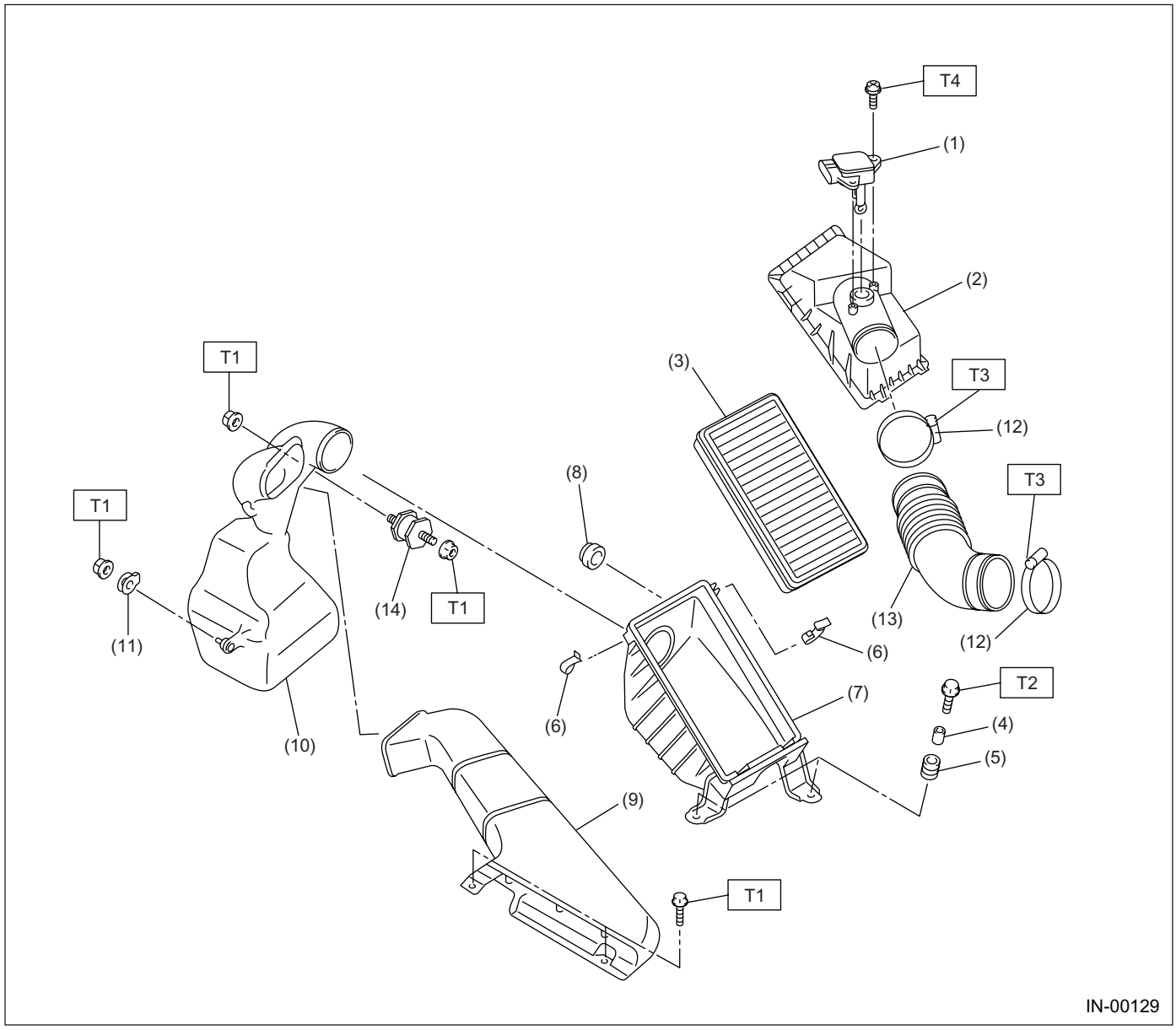
C: INSPECTION

Ignitor is integrated with the coil. Therefore resistance cannot be measured.

1. General Description

A: COMPONENT

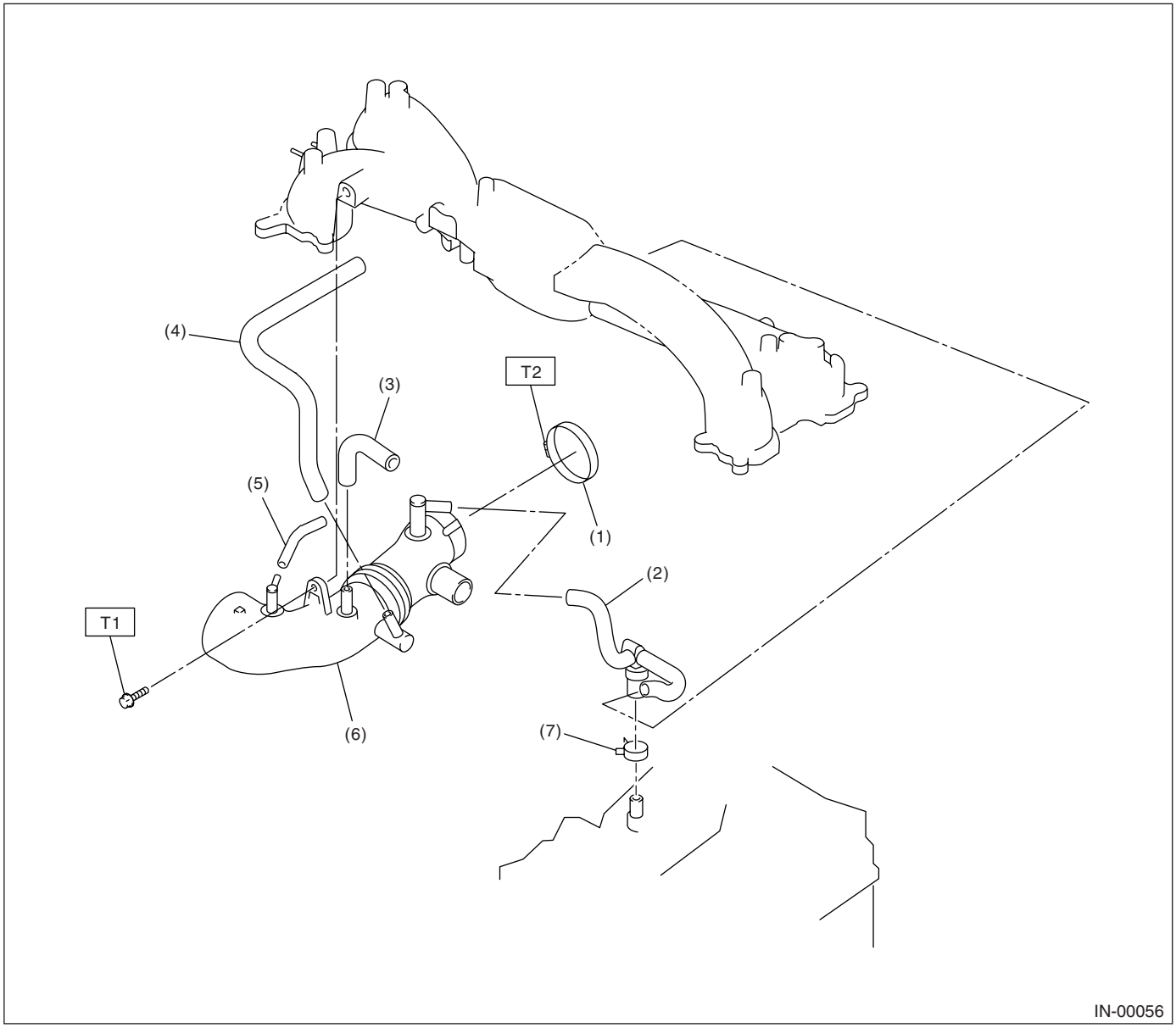
1. AIR CLEANER



(1) Mass air flow and intake air temperature sensor
(2) Air cleaner upper cover
(3) Air cleaner element
(4) Spacer
(5) Bush
(6) Clip
(7) Air cleaner lower case
(8) Cushion rubber
(9) Air intake duct
(10) Resonator chamber ASSY
(11) Cushion rubber
(12) Clamp
(13) Air intake boot
(14) Cushion

Tightening torque: N·m (kgf-m, ft-lb)
T1: 7.5 (0.76, 5.5)
T2: 33 (3.4, 25)
T3: 2.5 (0.25, 1.8)
T4: 1.7 (0.17, 1.2)

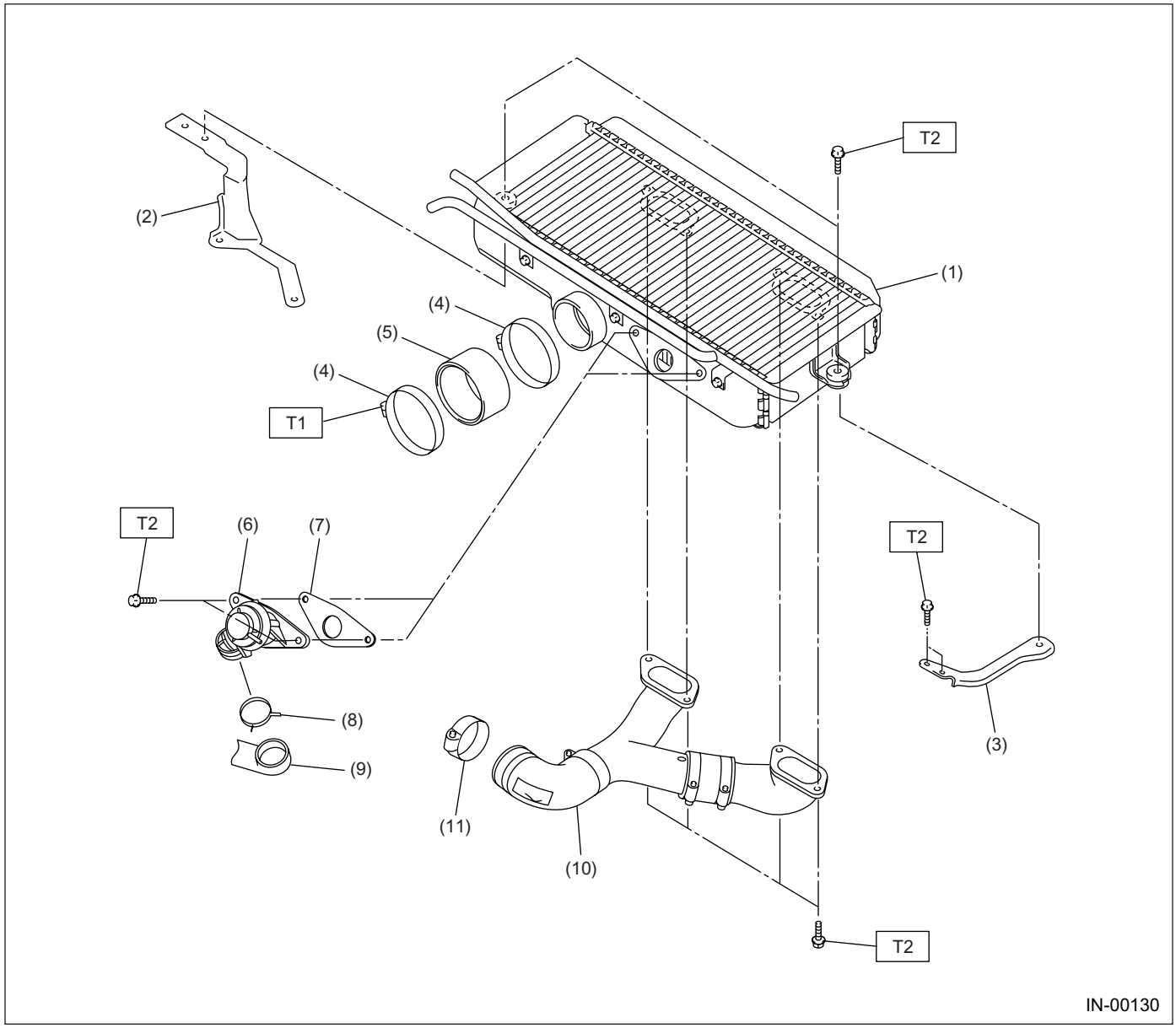
2. INTAKE DUCT



(1) Clamp
(2) PCV hose ASSY
(3) Air by-pass hose A
(4) Air by-pass hose B
(5) Air by-pass hose C
(6) Intake duct
(7) Clamp

Tightening torque: N·m (kgf-m, ft-lb)
T1: 19 (1.9, 13.7)
T2: 3 (0.3, 2.2)

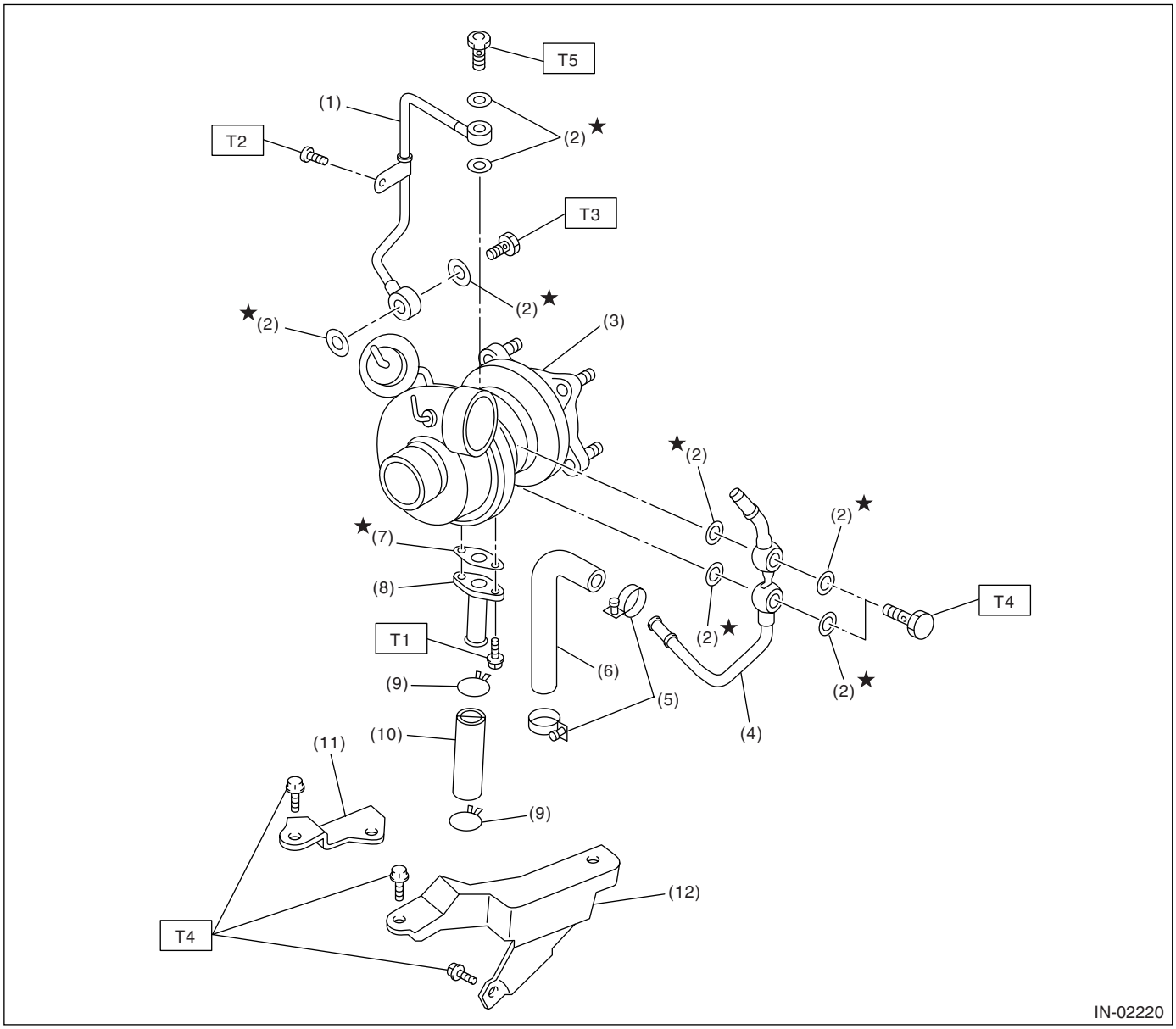
3. INTERCOOLER



(1) Intercooler
(2) Intercooler bracket RH
(3) Intercooler bracket LH
(4) Clamp
(5) Air intake duct
(6) Air by-pass valve
(7) Gasket
(8) Clamp
(9) Air by-pass hose A
(10) Intercooler duct
(11) Clamp

Tightening torque: N·m (kgf-m, ft-lb)
T1: 3 (0.22, 1.6)
T2: 16 (1.6, 11.7)

4. TURBOCHARGER



(1) Oil inlet pipe
(2) Metal gasket
(3) Turbocharger
(4) Water pipe
(5) Clamp
(6) Engine coolant hose
(7) Gasket
(8) Oil outlet pipe
(9) Clip
(10) Oil outlet hose
(11) Turbocharger bracket RH
(12) Turbocharger bracket LH

Tightening torque: N·m (kgf-m, ft-lb)
T1: 4.4 (0.45, 3.3)
T2: 4.9 (0.50, 3.6)
T3: 29 (3.0, 21.7)
T4: 33 (3.4, 24.6)
T5: 16 (1.6, 11.7)

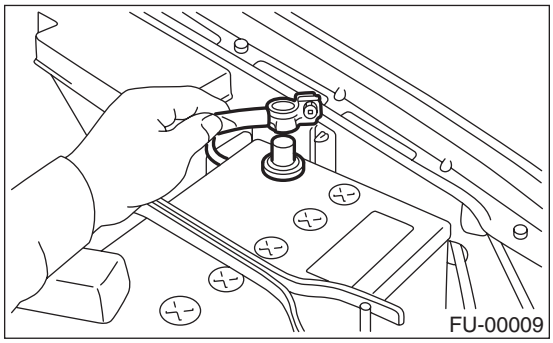
B: CAUTION

- Wear working clothing, including a cap, protective goggles, and protective shoes during operation.
- Remove contamination including dirt and corrosion before removal, installation or disassembly.
- Keep the disassembled parts in order and protect them from dust or dirt.
- Before removal, installation or disassembly, be sure to clarify the failure. Avoid unnecessary removal, installation, disassembly, and replacement.
- Be careful not to burn your hands, because each part on the vehicle is hot after running.
- Be sure to tighten fasteners including bolts and nuts to the specified torque.
- Place shop jacks or safety stands at the specified points.
- Before disconnecting electrical connectors of sensor or units, be sure to disconnect negative terminal from battery.

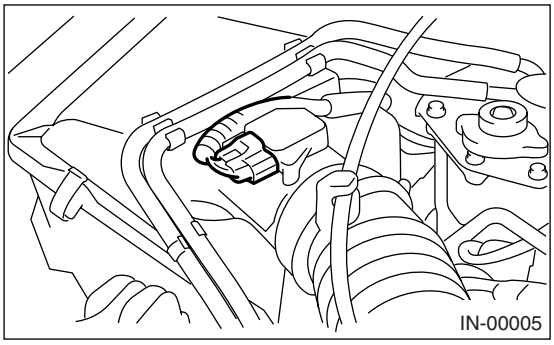
2. Air Cleaner

A: REMOVAL

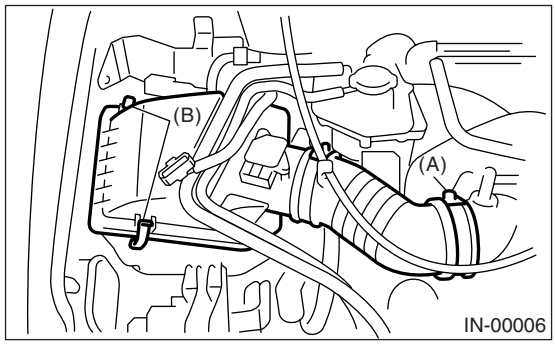
1) Disconnect the ground terminal from battery.



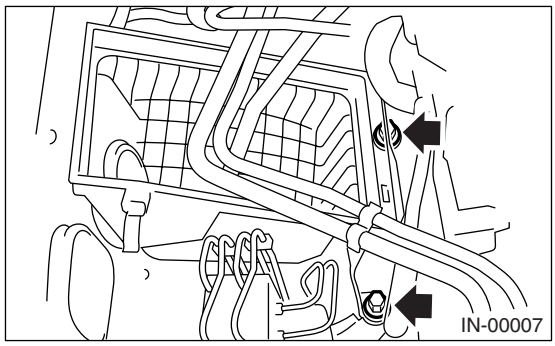
2) Disconnect the connector from mass air flow sensor.



3) Loosen the clamp (A) which connects air intake boot to intake duct.
4) Remove the two clips (B) from air cleaner upper cover.



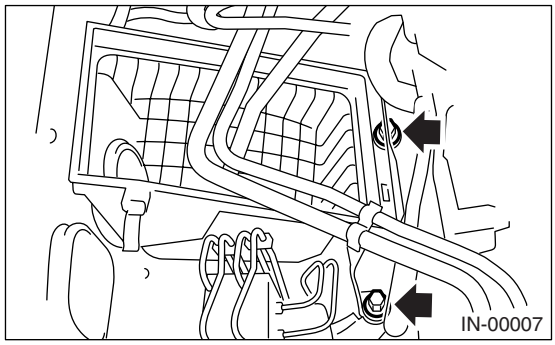
5) Remove the air cleaner upper cover.
6) Remove the air cleaner element.
7) Remove the air cleaner lower case.



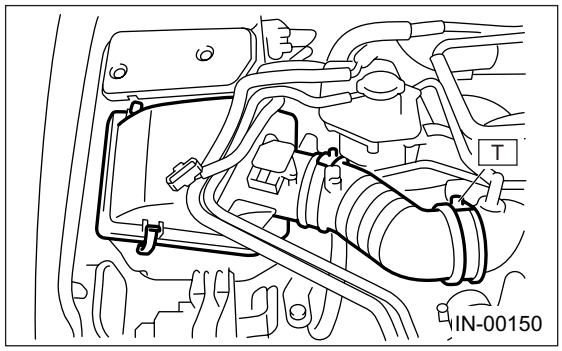
B: INSTALLATION

Install in the reverse order of removal.

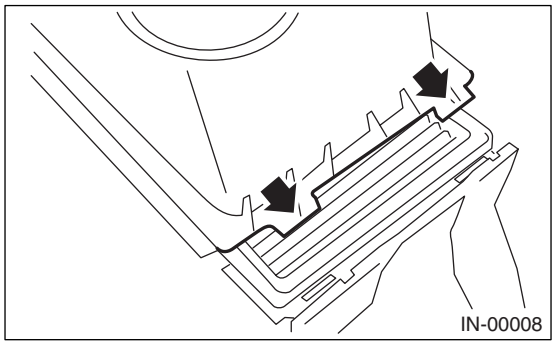
Tightening torque:
33 N·m (3.4 kgf-m, 25 ft-lb)



Tightening torque:
2.5 N·m (0.25 kgf-m,1.8 ft-lb)



CAUTION:
Before installing the air cleaner upper cover, align holes with protruding portions of air cleaner lower case, then secure the upper cover to lower case.



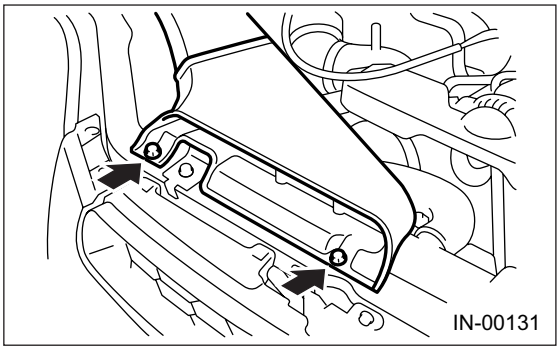
C: INSPECTION

Replace if excessively damaged or dirty.

3. Air Intake Duct

A: REMOVAL

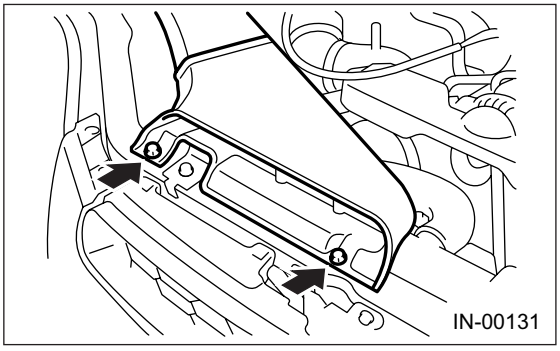
1) Remove the bolts which install air intake duct on the front side of body.



B: INSTALLATION

Install in the reverse order of removal.

Tightening torque:
7.5 N·m (0.76 kgf-m, 5.5 ft-lb)



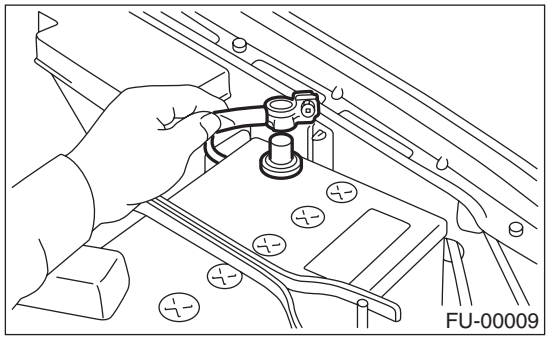
C: INSPECTION

1) Inspect for cracks and loose connections.
2) Inspect that no foreign objects are mixed in the air intake duct.

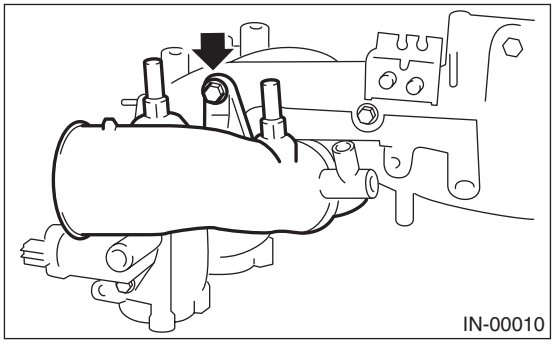
4. Intake Duct

A: REMOVAL

1) Disconnect the ground terminal from battery.



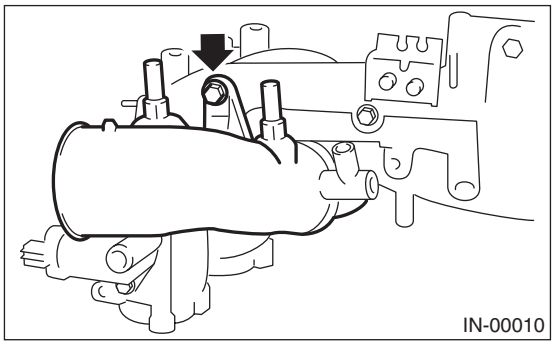
2) Remove the intake manifold. <Ref. to FU(H4DOTC)-15, REMOVAL, Intake Manifold.>
3) Remove the sensor, engine harness, and fuel pipe attached to the intake manifold. <Ref. to FU(H4DOTC)-21, DISASSEMBLY, Intake Manifold.>
4) Remove the intake duct from intake manifold.



B: INSTALLATION

Install in the reverse order of removal.

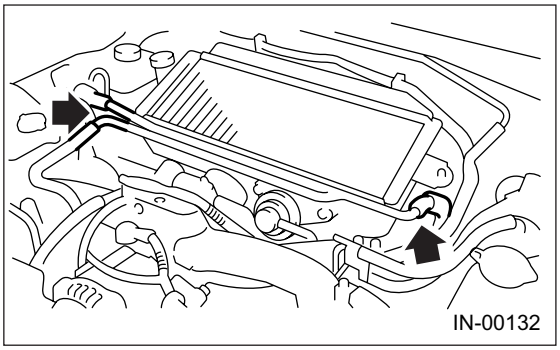
Tightening torque:
19 N·m (1.9 kgf-m, 13.7 ft-lb)



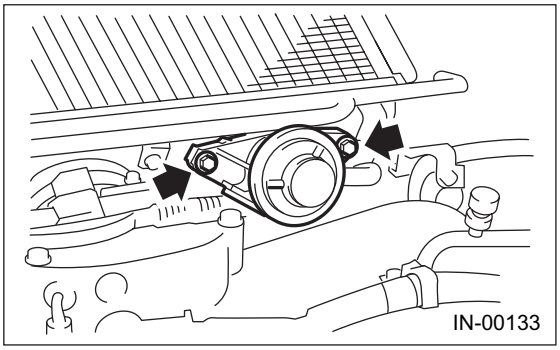
5. Intercooler

A: REMOVAL

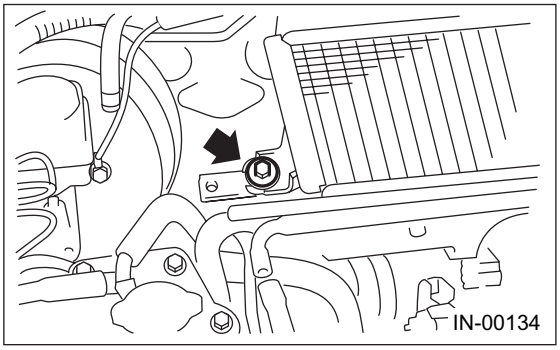
1) Disconnect the air by-pass hoses from intercooler.

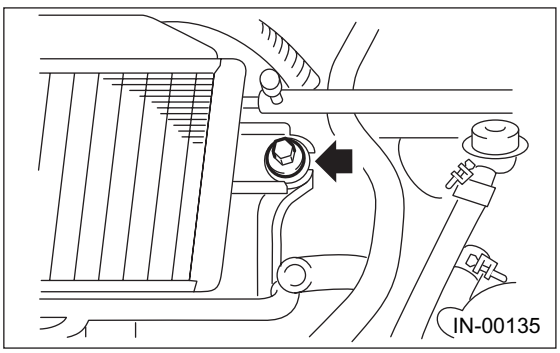


2) Separate the air by-pass valve from intercooler.



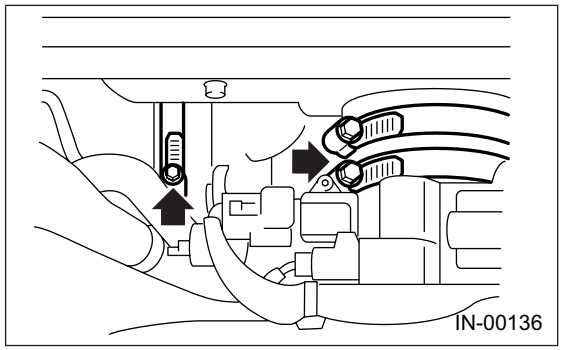
3) Remove the bolts which secure intercooler to bracket.





4) Separate the intercooler air duct from turbocharger.

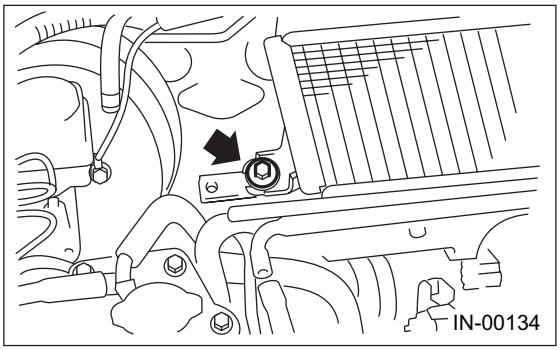
5) Separate the intercooler from throttle body.

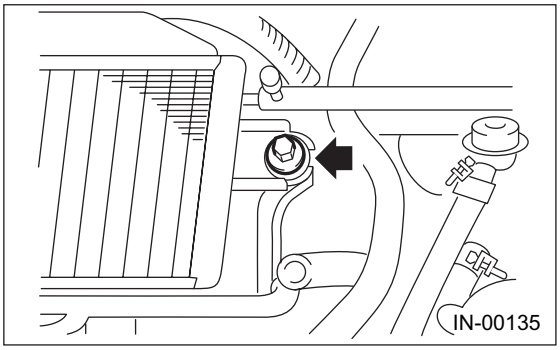


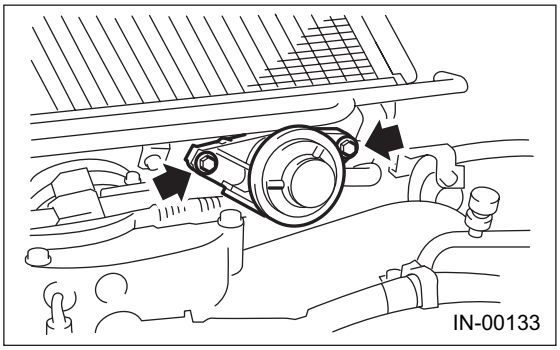
B: INSTALLATION

Install in the reverse order of removal.

Tightening torque:
16 N·m (1.6 kgf-m, 11.7 ft-lb)

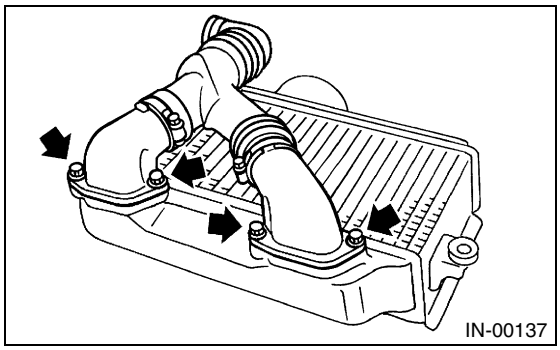






C: DISASSEMBLY

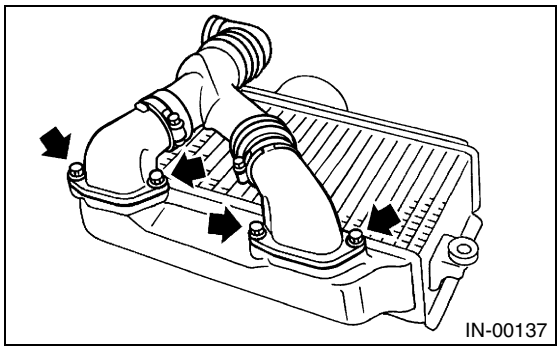
Remove the intercooler ducts from intercooler.



D: ASSEMBLY

Assemble in the reverse order of disassembly.

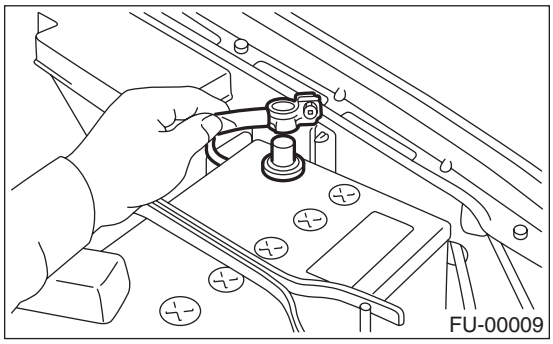
Tightening torque:
16 N·m (1.6 kgf-m, 11.7 ft-lb)



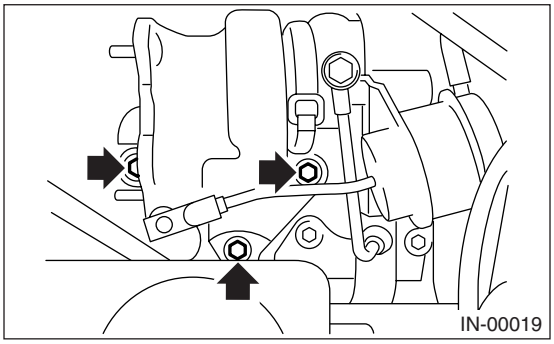
6. Turbocharger

A: REMOVAL

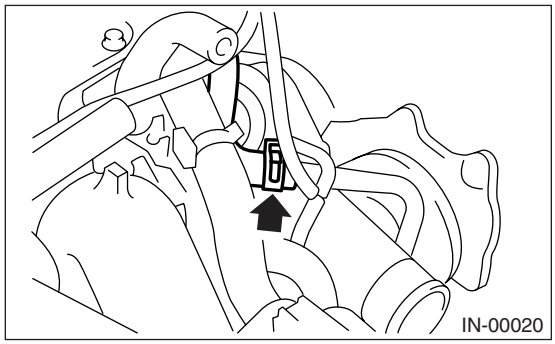
1) Set the vehicle on the lift.
2) Disconnect the ground terminal from battery.



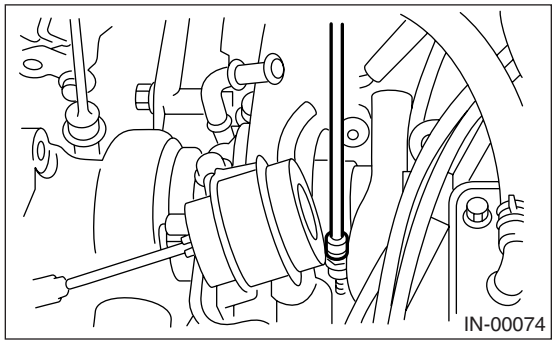
3) Remove the center exhaust pipe. <Ref. to EX(H4DOTC)-8, REMOVAL, Center Exhaust Pipe.>
4) Lower the vehicle.
5) Separate the turbocharger joint pipe from turbocharger.



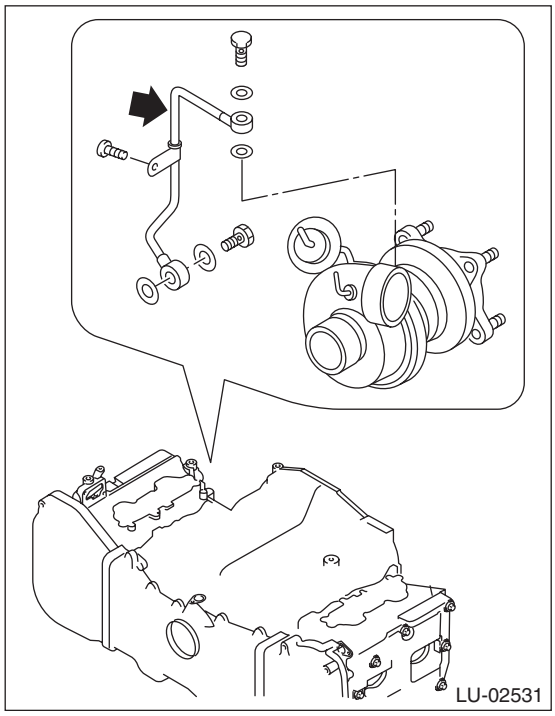
6) Disconnect the engine coolant hose which is connected to coolant filler tank.



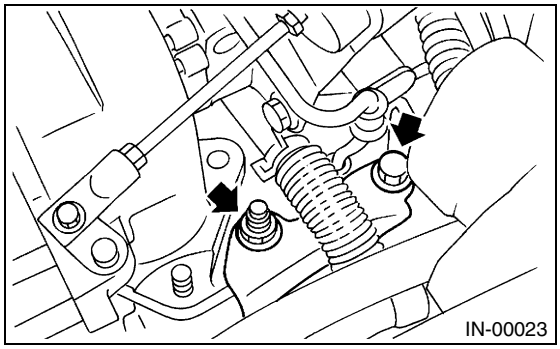
7) Loosen the clamp which secures turbocharger to air inlet duct.



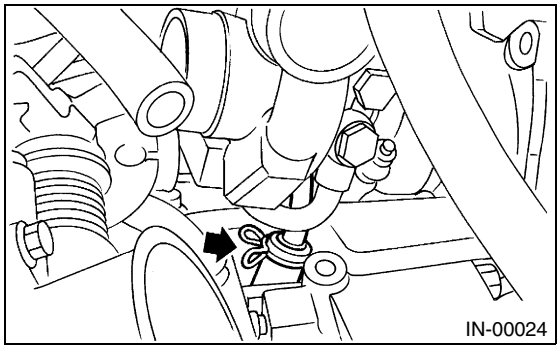
8) Remove the bolt which secures bracket of oil pipe to turbocharger.
9) Remove the oil inlet pipe from turbocharger.



10) Remove the turbocharger bracket.



11) Disconnect the oil outlet hose from pipe.

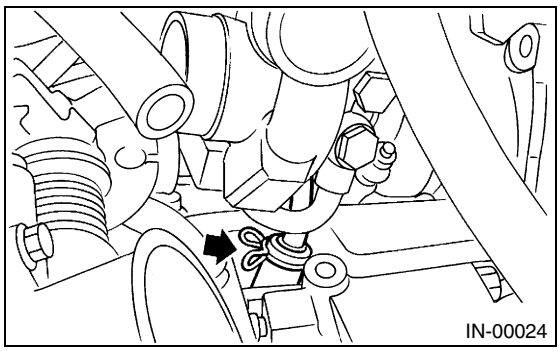


12) Take out the turbocharger from engine compartment.

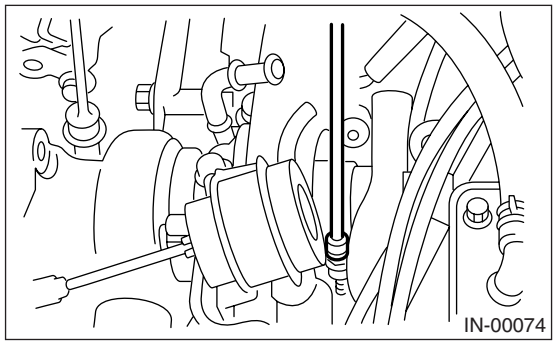
B: INSTALLATION

CAUTION:
When replacing the turbocharger, check the filter part of union screw for clogging. <Ref. to LU(H4SO)-22, INSPECTING UNION SCREW WITH FILTER, INSPECTION, Oil Pipe.>

1) Connect the oil outlet hose to outlet pipe.

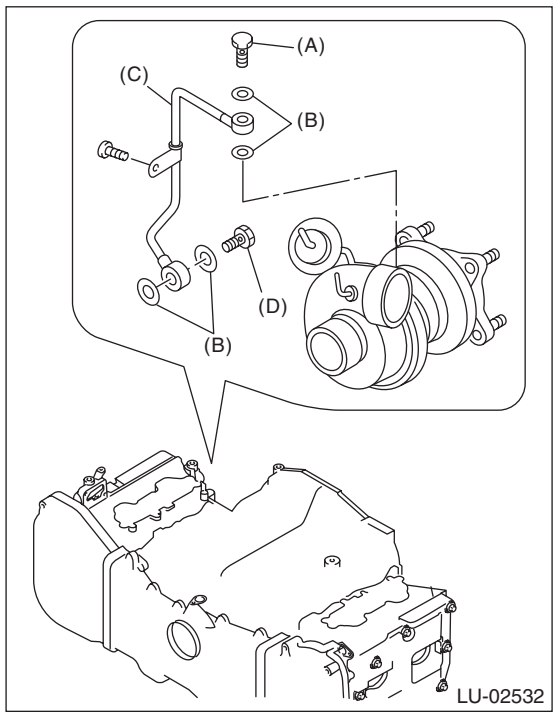


2) Install the turbocharger to air intake duct.



3) Temporarily install the oil pipe.

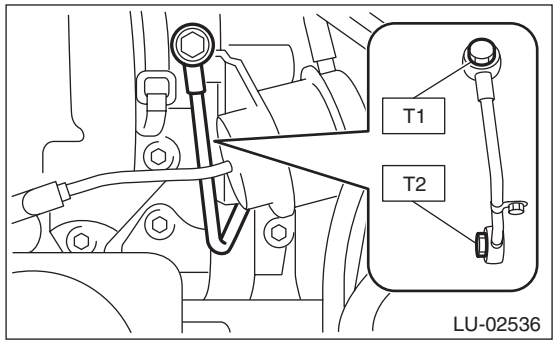
NOTE:
- Make sure not to mix up the union screws with filter and without filter as their installation positions are different.
- Use a new gasket.



(A) Union screw without filter (without protrusion)
(B) Gasket
(C) Oil inlet pipe
(D) Union screw with filter (with protrusion)

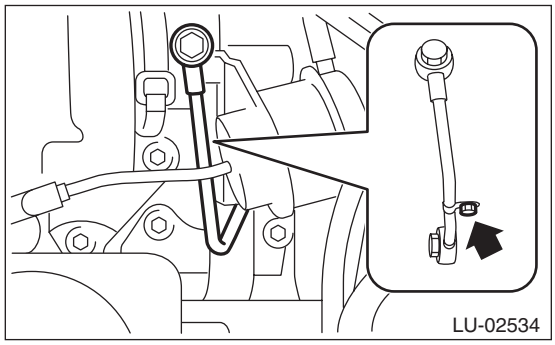
4) Tighten the union screws of oil inlet pipe.

Tightening torque:
T1: 16 N·m (1.6 kgf-m, 11.6 ft-lb)
T2: 29 N·m (3.0 kgf-m, 21.7 ft-lb)



5) Tighten the bolts which hold the oil inlet pipe stay to the turbocharger.

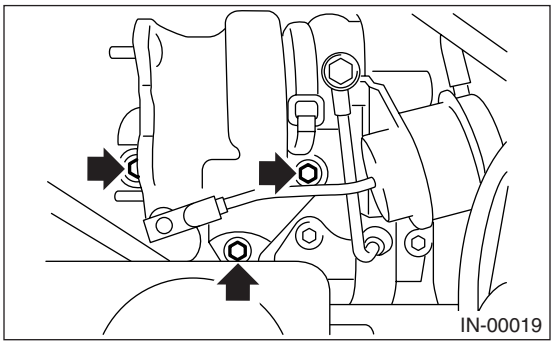
Tightening torque:
4.9 N·m (0.50 kgf-m, 3.6 ft-lb)



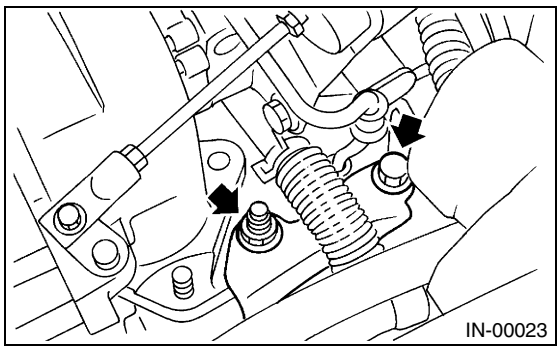
6) Install the joint pipe to turbocharger.

NOTE:
Replace the gasket with a new one.

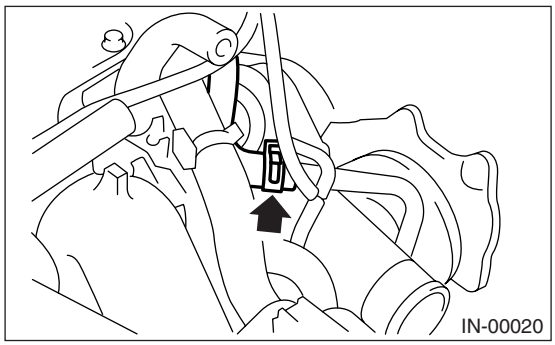
Tightening torque:
30 N·m (3.1 kgf-m, 22.4 ft-lb)



7) Install the turbocharger bracket.



8) Connect the engine coolant hose which is connected to coolant filler tank.



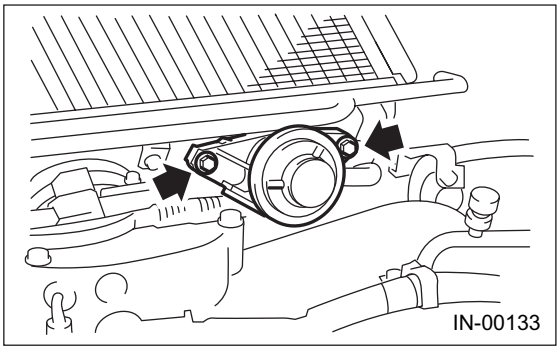
9) Lift-up the vehicle.

10) Install the center exhaust pipe. <Ref. to EX(H4DOTC)-9, INSTALLATION, Center Exhaust Pipe.>

7. Air By-pass Valve

A: REMOVAL

1) Remove the air by-pass valve from intercooler.

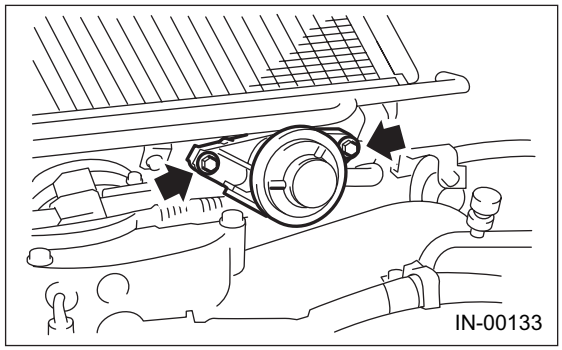


2) Disconnect the air by-pass hoses from air by-pass valve.

B: INSTALLATION

Install in the reverse order of removal.

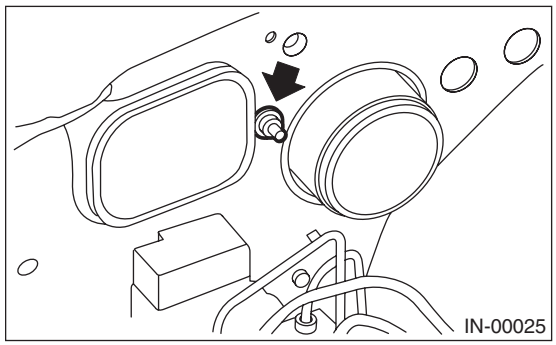
Tightening torque:
16 N·m (1.6 kgf-m, 11.7 ft-lb)



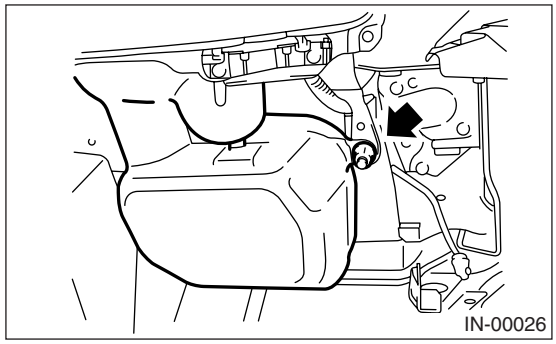
8. Resonator Chamber

A: REMOVAL

1) Set the vehicle on a lift.
2) Remove the air intake duct. <Ref. to IN(H4DOTC)-9, REMOVAL, Air Intake Duct.>
3) Remove the air cleaner lower case. <Ref. to IN(H4DOTC)-7, REMOVAL, Air Cleaner.>
4) Remove the resonator chamber mounting bolt on the right of engine compartment.



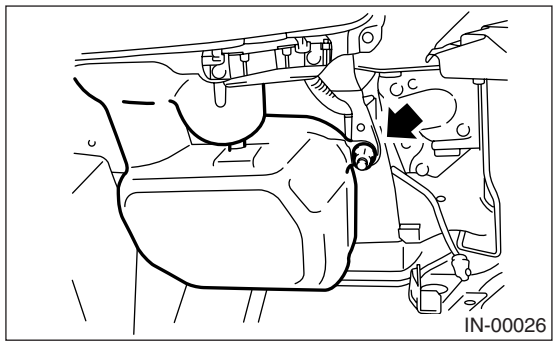
5) Remove the front right tire, and lift the vehicle.
6) Remove the front mudguard RH.
7) Remove the resonator chamber from the inside front fender.

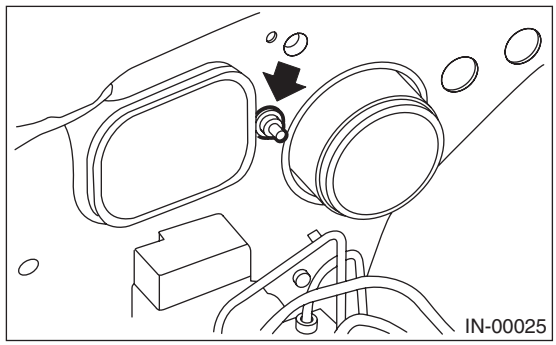


B: INSTALLATION

Install in the reverse order of removal.

Tightening torque:
7.5 N·m (0.76 kgf-m, 5.5 ft-lb)





C: INSPECTION

Inspect for cracks and loose connections. Check that no foreign objects are mixed in the resonator chamber.

1. General Description

A: GENERAL DESCRIPTION

Description of turbo models are included in LU (H4SO) section. <Ref. to LU(H4SO)-2, General Description.>

1. General Description

A: SPECIFICATIONS

Engine	Type			Horizontally opposed, liquid cooled, 4-cylinder, 4-stroke gasoline engine	
	Valve arrangement			Belt driven, double overhead camshaft, 4-valve/cylinder	
	Bore x Stroke		mm (in)	92 x 75 (3.62 x 2.95)	
	Piston displacement		cm^3 (cu in)	1,994 (121.67)	
	Compression ratio			8.0	
	Compression pressure (at 200 — 300 rpm)		kPa (kgf/cm^2, psi)	981 — 1,177 (10 — 12, 142 — 171)	
	Number of piston rings			Pressure ring: 2, Oil ring: 1	
	Intake valve timing	Opening		10° BTDC	
		Closing		50° ABDC	
	Exhaust valve timing	Opening		53° BBDC	
		Closing		7° ATDC	
	Valve clearance	Intake	mm (in)	0.20±0.02 (0.0079±0.0008)	
		Exhaust	mm (in)	0.25±0.02 (0.0098±0.0008)	
	Idling speed [At neutral position]		rpm	MT	750±100 (No load) 800±150 (A/C switch ON)
				AT	750±100 (No load) 825±150 (A/C switch ON)
	Firing order			1 → 3 → 2 → 4	
	Ignition timing		BTDC/rpm	12°±3°/750 rpm	

NOTE:
STD: Standard I.D.: Inner Diameter O.D.: Outer Diameter OS: Oversize US: Undersize

Belt tensioner adjuster	Protrusion of adjuster rod			5.2 — 6.2 mm (0.205 — 0.244 in)
Belt tensioner	Spacer O.D.			17.955 — 17.975 mm (0.7069 — 0.7077 in)
	Tensioner bush I.D.			18.0 — 18.08 mm (0.7087 — 0.7118 in)
	Clearance between spacer and bush		STD	0.025 — 0.125 mm (0.0010 — 0.0049 in)
			Limit	0.175 mm (0.0069 in)
	Side clearance of spacer		STD	0.2 — 0.55 mm (0.0079 — 0.0217 in)
			Limit	0.81 mm (0.0319 in)
Camshaft	Bend limit			0.020 mm (0.00079 in)
	Thrust clearance		STD	0.015 — 0.070 mm (0.0006 — 0.0028 in)
			Limit	0.10 mm (0.0039 in)
	Cam lobe height	Intake	STD	46.25 — 46.35 mm (1.821 — 1.825 in)
			Limit	46.15 mm (1.817 in)
		Exhaust	STD	46.15 — 46.25 mm (1.817 — 1.821 in)
			Limit	46.05 mm (1.813 in)
	Jounal O.D.	STD	Front	37.946 — 37.963 mm (1.4939 — 1.4946 in)
			Center rear	29.946 — 29.963 mm (1.1790 — 1.1796 in)
	Oil clearance		STD	0.037 — 0.072 mm (0.0015 — 0.0028 in)
			Limit	0.10 mm (0.0039 in)
Cylinder head	Surface warpage limit			0.05 mm (0.0020 in)
	Surface grinding limit			0.3 mm (0.012 in)
	Standard height			127.5 mm (5.02 in)
Valve seat	Refacing angle			90°
	Contacting width	Intake	STD	1.0 mm (0.039 in)
			Limit	1.7 mm (0.067 in)
		Exhaust	STD	1.5 mm (0.059 in)
			Limit	2.2 mm (0.087 in)
Valve guide	Inner diameter			6.000 — 6.012 mm (0.2362 — 0.2367 in)
	Protrusion above head			15.8 — 16.2 mm (0.622 — 0.638 in)
Valve	Head edge thickness	Intake	STD	1.2 mm (0.047 in)
			Limit	0.8 mm (0.031 in)
		Exhaust	STD	1.5 mm (0.059 in)
			Limit	0.8 mm (0.031 in)
	Stem diameter		Intake	5.955 — 5.970 mm (0.2344 — 0.2350 in)
			Exhaust	5.945 — 5.960 mm (0.2341 — 0.2346 in)
	Stem oil clearance	STD	Intake	0.030 — 0.057 mm (0.0012 — 0.0022 in)
			Exhaust	0.040 — 0.067 mm (0.0016 — 0.0026 in)
		Limit	—	0.15 mm (0.0059 in)
	Overall length		Intake	104.4 mm (4.110 in)
			Exhaust	104.7 mm (4.122 in)
Valve spring	Free length			44.67 mm (1.7587 in)
	Squareness			2.5°, 2.0 mm (0.079 in)
	Tension/spring height			205 — 236 N (20.9 — 24.1 kgf, 46.1 — 53.1 lb)/ 36.0 mm (1.417 in) 485 — 536 N (49.5 — 54.7 kgf, 109.1 — 120.5 lb)/ 26.6mm (1.047 in)

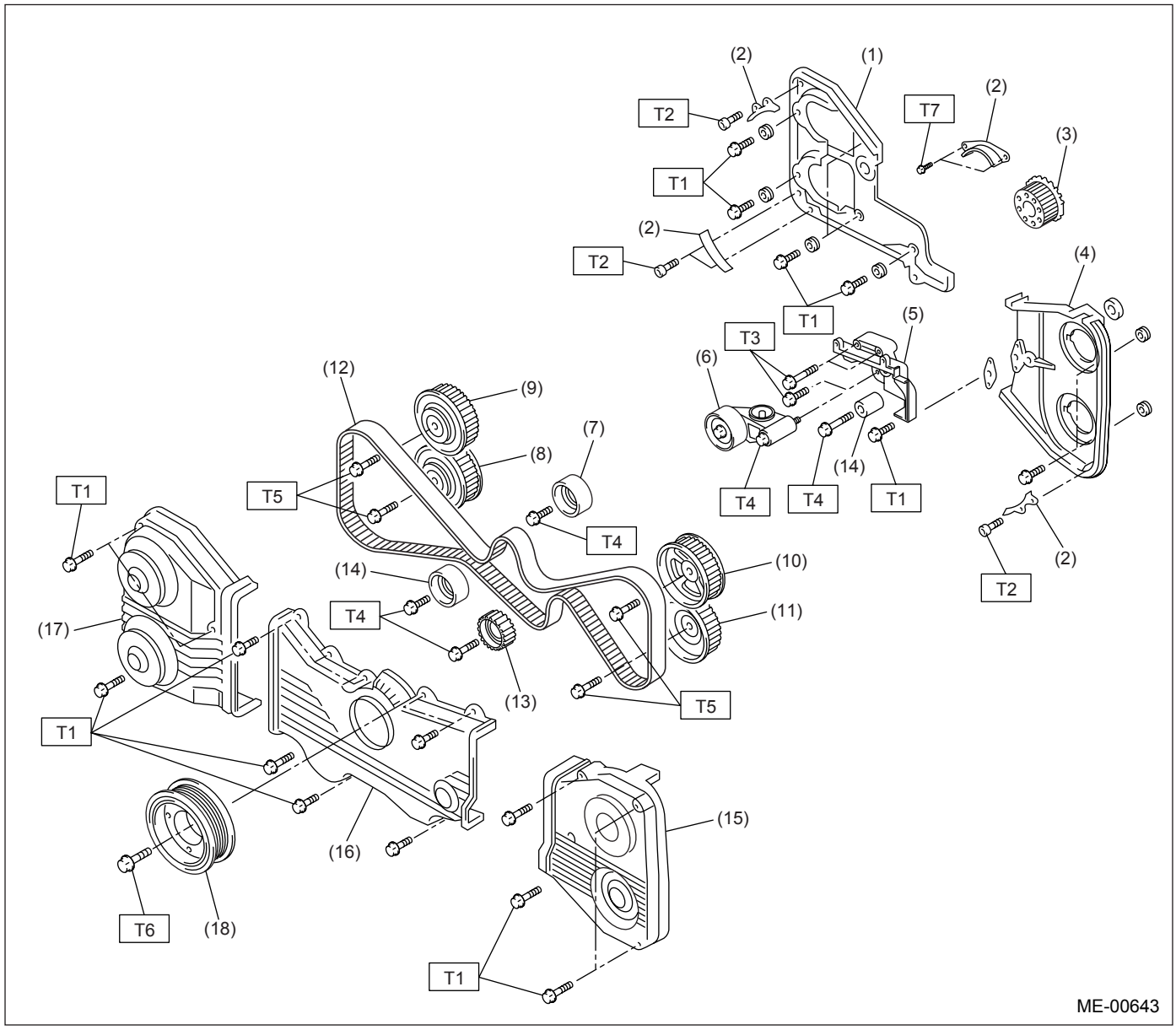
Cylinder block	Surface warpage limit (mating with cylinder head)			0.05 mm (0.0020 in)
	Surface grinding limit			0.1 mm (0.004 in)
	Cylinder bore	STD	A	92.005 — 92.015 mm (3.6222 — 3.6226 in)
			B	91.995 — 92.005 mm (3.6218 — 3.6222 in)
	Taper		STD	0.015 mm (0.0006 in)
			Limit	0.050 mm (0.0020 in)
	Out-of-roundness		STD	0.010 mm (0.0004 in)
			Limit	0.050 mm (0.0020 in)
	Piston clearance		STD	0.010 — 0.030 mm (0.0004 — 0.0012 in)
			Limit	0.050 mm (0.0020 in)
	Enlarging (boring) limit			0.5 mm (0.020 in)
Piston	Outer diameter	STD	A	91.985 — 91.995 mm (3.6214 — 3.6218 in)
			B	91.975 — 91.985 mm (3.6211 — 3.6214 in)
		0.25 mm (0.0098 in) OS		92.225 — 92.235 mm (3.6309 — 3.6313 in)
		0.50 mm (0.0197 in) OS		92.475 — 92.485 mm (3.6407 — 3.6411 in)
Piston pin	Standard clearance between piston pin and hole in piston		STD	0.004 — 0.008 mm (0.0002 — 0.0003 in)
			Limit	0.020 mm (0.0008 in)
	Degree of fit			Piston pin must be fitted into position with thumb at 20°C (68°F).
Piston ring	Piston ring gap	Top ring	STD	0.20 — 0.25 mm (0.0079 — 0.0098 in)
			Limit	1.0 mm (0.039 in)
		Second ring	STD	0.35 — 0.50 mm (0.0138 — 0.0197 in)
			Limit	1.0 mm (0.039 in)
		Oil ring	STD	0.20 — 0.50 mm (0.0079 — 0.0197 in)
			Limit	1.5 mm (0.059 in)
	Clearance between piston ring and piston ring groove	Top ring	STD	0.055 — 0.090 mm (0.0022 — 0.0035 in)
			Limit	0.15 mm (0.0059 in)
		Second ring	STD	0.030 — 0.070 mm (0.0012 — 0.0028 in)
			Limit	0.15 mm (0.0059 in)
Connecting rod	Bend twist per 100 mm (3.94 in) in length		Limit	0.10 mm (0.0039 in)
	Side clearance		STD	0.070 — 0.330 mm (0.0028 — 0.0130 in)
			Limit	0.4 mm (0.016 in)
Connecting rod bearing	Oil clearance		STD	0.020 — 0.046 mm (0.0008 — 0.0018 in)
			Limit	0.05 mm (0.0020 in)
	Thickness at center portion		STD	1.486 — 1.498 mm (0.0585 — 0.0590 in)
			0.03 mm (0.0012 in) US	1.504 — 1.512 mm (0.0592 — 0.0595 in)
			0.05 mm (0.0020 in) US	1.514 — 1.522 mm (0.0596 — 0.0599 in)
			0.25 mm (0.0098 in) US	1.614 — 1.622 mm (0.0635 — 0.0639 in)
Connecting rod bushing	Clearance between piston pin and bushing		STD	0 — 0.022 mm (0 — 0.0009 in)
			Limit	0.030 mm (0.0012 in)

Crankshaft	Bend limit			0.035 mm (0.0014 in)
	Crank pin and crank journal	Out-of-roundness		0.020 mm (0.0008 in) or less
		Grinding limit		0.25 mm (0.0098 in)
	Crank pin outer diameter		STD	51.984 — 52.000 mm (2.0466 — 2.0472)
			0.03 mm (0.0012 in) US	51.954 — 51.970 mm (2.0454 — 2.0461)
			0.05 mm (0.0020 in) US	51.934 — 51.950 mm (2.0447 — 2.0453)
			0.25 mm (0.0098 in) US	51.734 — 51.750 mm (2.0368 — 2.0374)
	Crank journal outer diameter	#1, #3, #5	STD	59.992 — 60.008 mm (2.3619 — 2.3625 in)
			0.03 mm (0.0012 in) US	59.962 — 59.978 mm (2.3607 — 2.3613 in)
			0.05 mm (0.0020 in) US	59.942 — 59.958 mm (2.3599 — 2.3605 in)
			0.25 mm (0.0098 in) US	59.742 — 59.758 mm (2.3520 — 2.3527 in)
		#2, #4	STD	59.992 — 60.008 mm (2.3619 — 2.3625 in)
			0.03 mm (0.0012 in) US	59.962 — 59.978 mm (2.3607 — 2.3613 in)
			0.05 mm (0.0020 in) US	59.942 — 59.958 mm (2.3599 — 2.3605 in)
			0.25 mm (0.0098 in) US	59.742 — 59.758 mm (2.3520 — 2.3527 in)
	Thrust clearance		STD	0.030 — 0.115 mm (0.0012 — 0.0045 in)
			Limit	0.25 mm (0.0098 in)
	Oil clearance	#1	STD	0.003 — 0.030 mm (0.0001 — 0.0012 in)
			Limit	0.040 mm (0.0016 in)
		#2	STD	0.012 — 0.033 mm (0.0005 — 0.0013 in)
			Limit	0.045 mm (0.0018 in)
		#3	STD	0.003 — 0.030 mm (0.0001 — 0.0012 in)
			Limit	0.040 mm (0.0016 in)
		#4	STD	0.012 — 0.033 mm (0.0005 — 0.0013 in)
			Limit	0.045 mm (0.0018 in)
		#5	STD	0.010 — 0.031 mm (0.0004 — 0.0012 in)
			Limit	0.040 mm (0.0016 in)

Crankshaft bearing	Crankshaft bearing thickness	#1, #3	STD	1.998 — 2.011 mm (0.0787 — 0.0792 in)
			0.03 mm (0.0012 in) US	2.017 — 2.020 mm (0.0794 — 0.0795 in)
			0.05 mm (0.0020 in) US	2.027 — 2.030 mm (0.0798 — 0.0799 in)
			0.25 mm (0.0098 in) US	2.127 — 2.130 mm (0.0837 — 0.0839 in)
		#2, #4, #5	STD	2.000 — 2.013 mm (0.0787 — 0.0793 in)
			0.03 mm (0.0012 in) US	2.019 — 2.022 mm (0.0795 — 0.0796 in)
			0.05 mm (0.0020 in) US	2.029 — 2.032 mm (0.0799 — 0.0800 in)
			0.25 mm (0.0098 in) US	2.129 — 2.132 mm (0.0838 — 0.0839 in)

B: COMPONENT

1. TIMING BELT

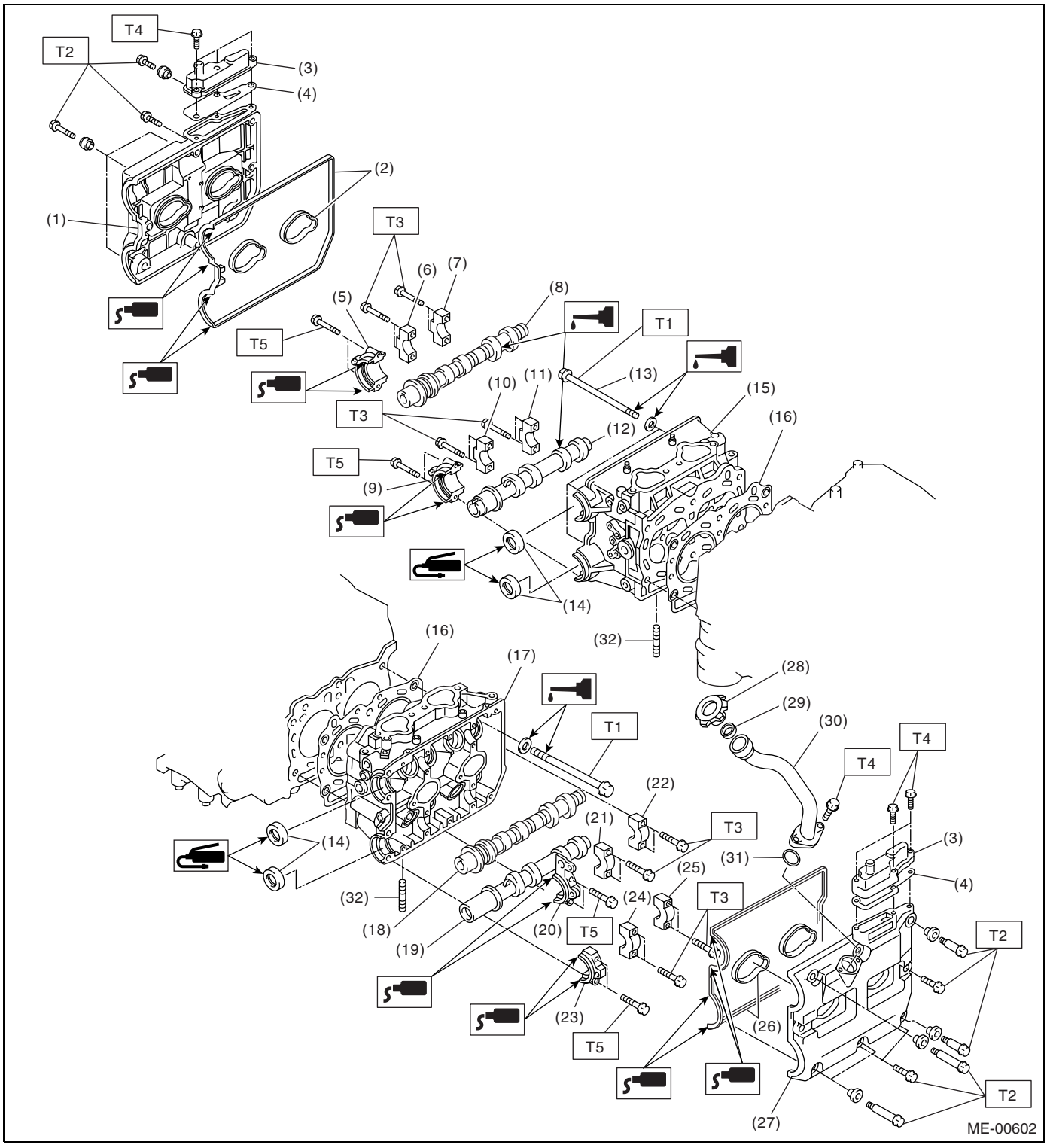


(1) Right-hand belt cover No. 2
(2) Timing belt guide (MT vehicles only)
(3) Crankshaft sprocket
(4) Left-hand belt cover No. 2
(5) Tensioner bracket
(6) Automatic belt tension adjuster ASSY
(7) Belt idler
(8) Right-hand exhaust camshaft sprocket
(9) Right-hand intake camshaft sprocket
(10) Left-hand intake camshaft sprocket
(11) Left-hand exhaust camshaft sprocket
(12) Timing belt
(13) Belt idler No. 2
(14) Belt idler
(15) Left-hand belt cover
(16) Front belt cover
(17) Right-hand belt cover
(18) Crankshaft pulley

Tightening torque: N·m (kgf-m, ft-lb)

T1: 5 (0.5, 3.6)
T2: 6.4 (0.65, 4.7)
T3: 25 (2.5, 18.1)
T4: 39 (4.0, 28.9)
T5: 98 (10, 72.4)
T6: <Ref. to ME(H4DOTC)-46, INSTALLATION, Crankshaft Pulley.>
T7: 10 (1.0, 7)

2. CYLINDER HEAD AND CAMSHAFT

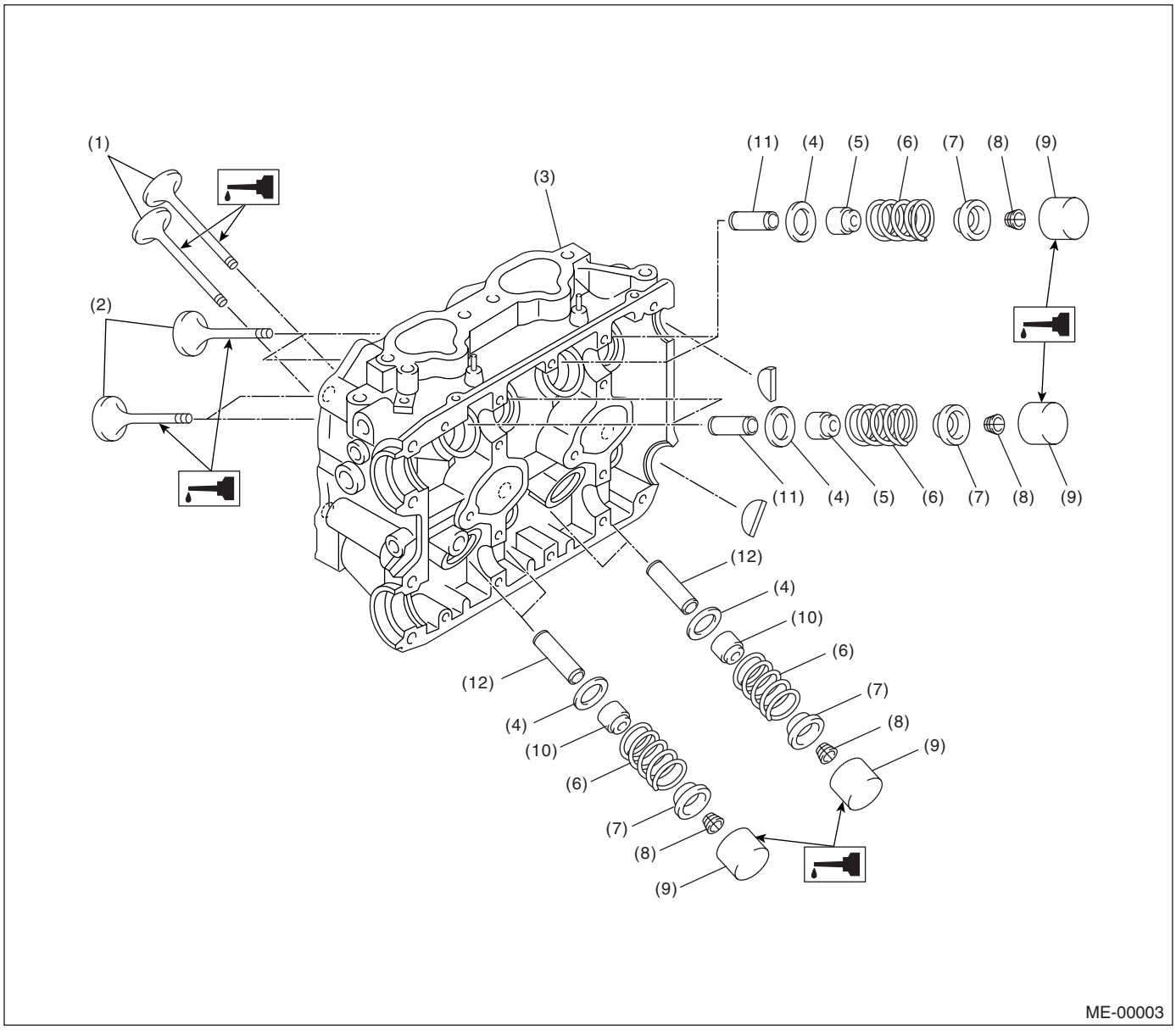


(1) Rocker cover (RH)
(2) Rocker cover gasket (RH)
(3) Oil separator cover
(4) Gasket
(5) Intake camshaft cap (Front RH)
(6) Intake camshaft cap (Center RH)
(7) Intake camshaft cap (Rear RH)
(8) Intake camshaft (RH)
(9) Exhaust camshaft cap (Front RH)
(10) Exhaust camshaft cap (Center RH)
(11) Exhaust camshaft cap (Rear RH)
(12) Exhaust camshaft (RH)
(13) Cylinder head bolt
(14) Oil seal
(15) Cylinder head (RH)
(16) Cylinder head gasket (RH)
(17) Cylinder head (LH)
(18) Intake camshaft (LH)
(19) Exhaust camshaft (LH)
(20) Intake camshaft cap (Front LH)
(21) Intake camshaft cap (Center LH)
(22) Intake camshaft cap (Rear LH)
(23) Exhaust camshaft (Front LH)
(24) Exhaust camshaft cap (Center LH)
(25) Exhaust camshaft cap (Rear LH)
(26) Rocker cover gasket (LH)
(27) Rocker cover (LH)
(28) Oil filler cap
(29) Gasket
(30) Oil filler duct
(31) O-ring
(32) Stud bolt

Tightening torque: N·m (kgf-m, ft-lb)

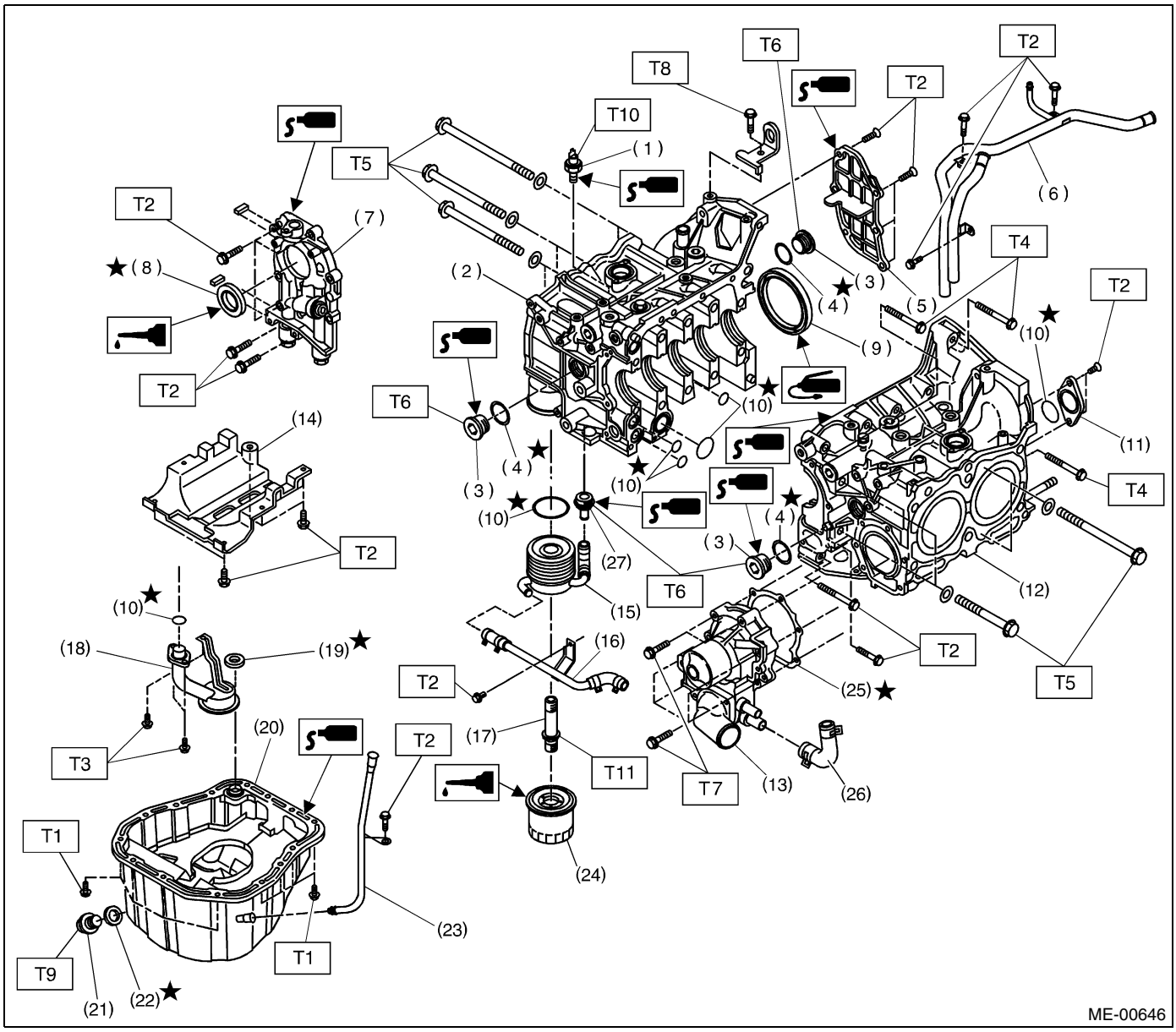
T1: <Ref. to ME(H4DOTC)-64, INSTALLATION, Cylinder Head Assembly.>
T2: 5 (0.5, 3.6)
T3: 20 (2.0, 14.8)
T4: 6.4 (0.65, 4.7)
T5: 10 (1.0, 7)

3. CYLINDER HEAD AND VALVE ASSEMBLY



(1) Exhaust valve
(2) Intake valve
(3) Cylinder head
(4) Valve spring seat
(5) Intake valve oil seal
(6) Valve spring
(7) Retainer
(8) Retainer key
(9) Valve lifter
(10) Exhaust valve oil seal
(11) Intake valve guide
(12) Exhaust valve guide

4. CYLINDER BLOCK

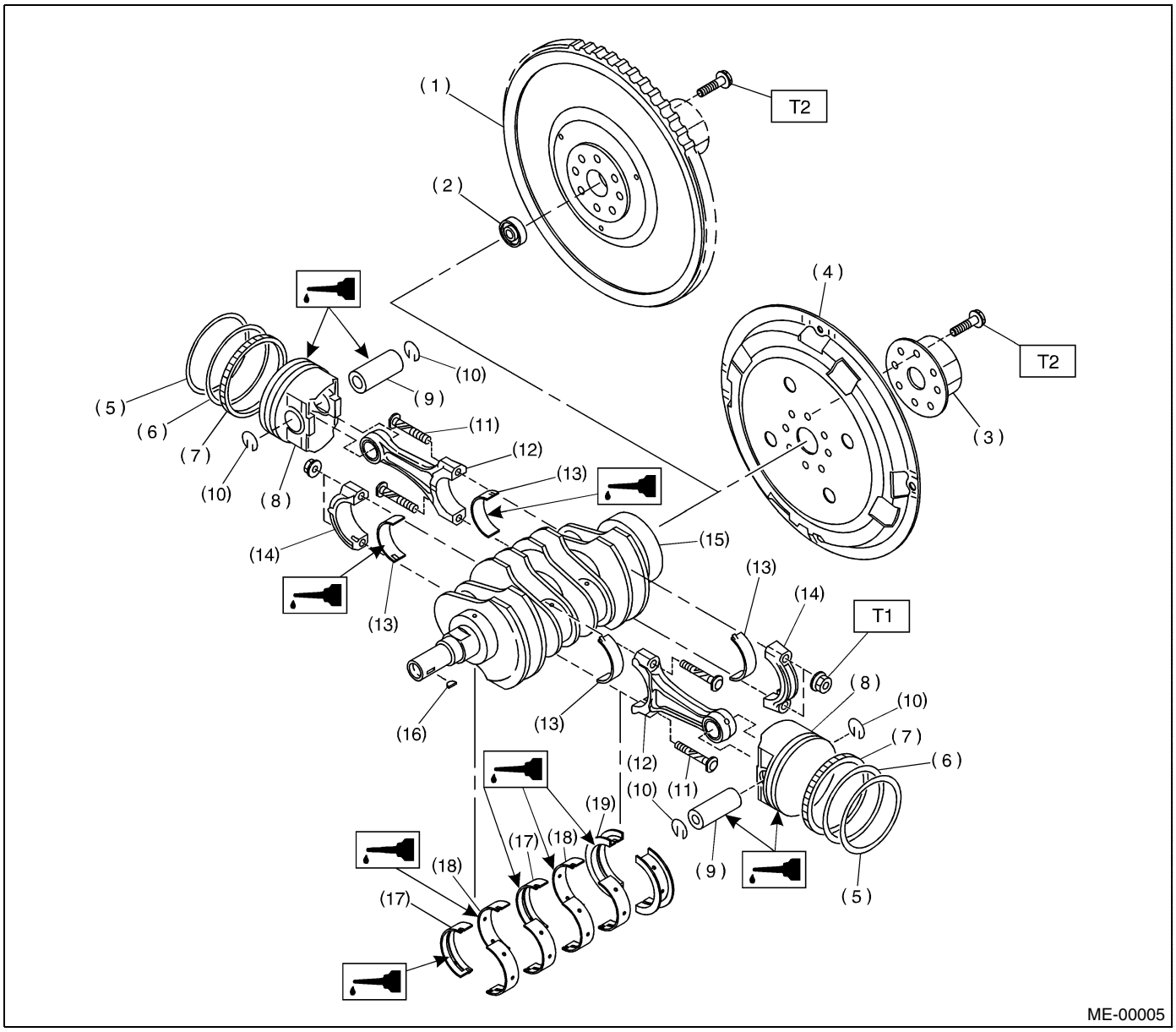


(1) Oil pressure switch
(2) Cylinder block (RH)
(3) Service hole plug
(4) Gasket
(5) Oil separator cover
(6) Water by-pass pipe
(7) Oil pump
(8) Front oil seal
(9) Rear oil seal
(10) O-ring
(11) Service hole cover
(12) Cylinder block (LH)
(13) Water pump
(14) Baffle plate
(15) Oil cooler
(16) Waster by-pass pipe
(17) Connector
(18) Oil strainer
(19) Gasket
(20) Oil pan
(21) Drain plug
(22) Metal gasket
(23) Oil level gauge guide
(24) Oil filter
(25) Gasket
(26) Water pump hose
(27) Plug

Tightening torque: N·m (kgf-m, ft-lb)

T1: 5 (0.5, 3.6)
T2: 6.4 (0.65, 4.7)
T3: 10 (1.0, 7)
T4: 25 (2.5, 18.1)
T5: <Ref. to ME(H4DOTC)-74, INSTALLATION, Cylinder Block.>
T6: 70 (7.0, 50.6)
T7: First 12 (1.2, 8.7)
Second 12 (1.2, 8.7)
T8: 16 (1.6, 11.6)
T9: 44 (4.5, 33)
T10: 25 (2.5, 18.1)
T11: 55 (5.5, 40)

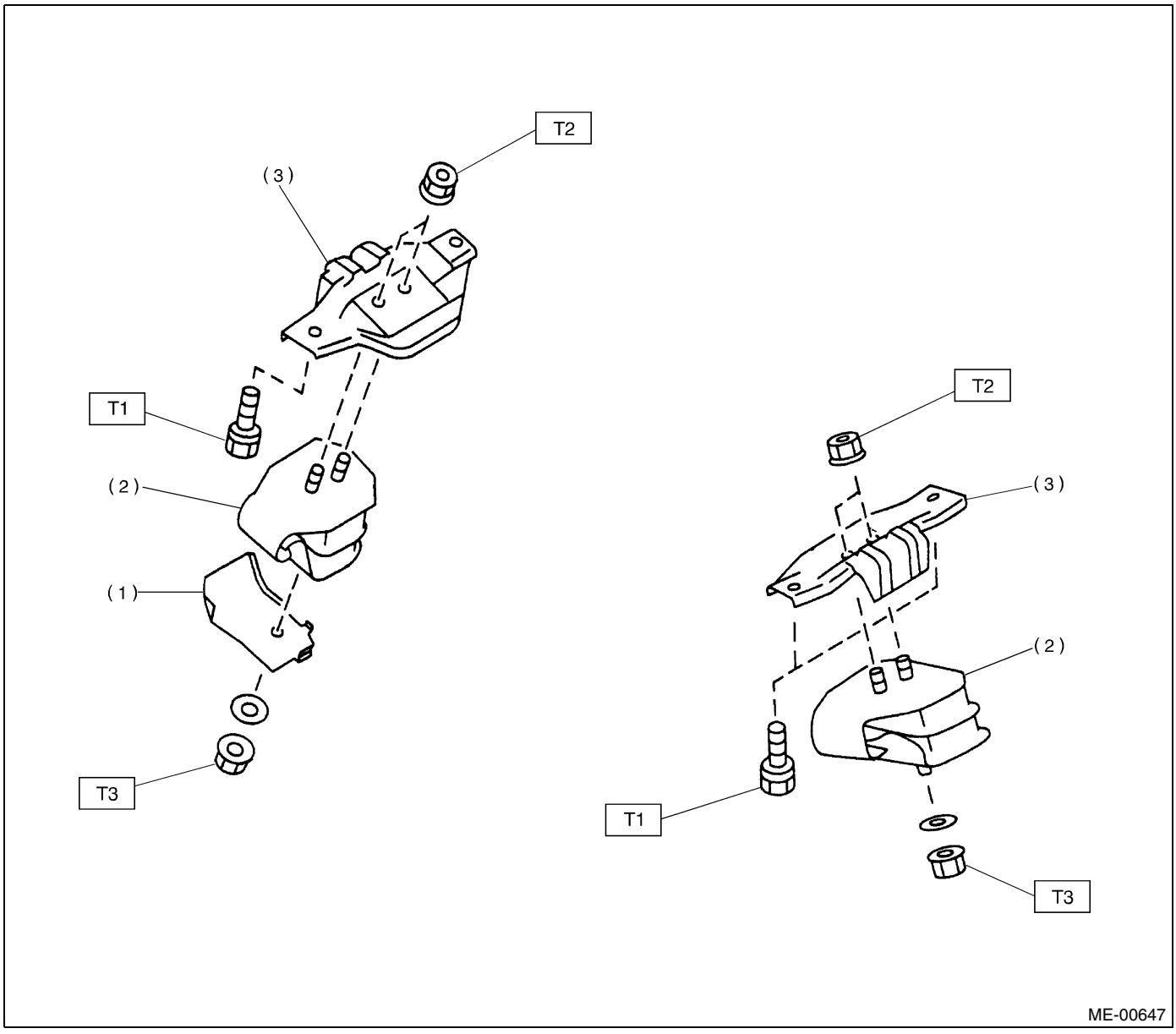
5. CRANKSHAFT AND PISTON



(1) Flywheel (MT vehicles only)
(2) Ball bearing (MT vehicles only)
(3) Reinforcement (AT vehicles only)
(4) Drive plate (AT vehicles only)
(5) Top ring
(6) Second ring
(7) Oil ring
(8) Piston
(9) Piston pin
(10) Circlip
(11) Connecting rod bolt
(12) Connecting rod
(13) Connecting rod bearing
(14) Connecting rod cap
(15) Crankshaft
(16) Woodruff key
(17) Crankshaft bearing #1, #3
(18) Crankshaft bearing #2, #4
(19) Crankshaft bearing #5

Tightening torque: N·m (kgf-m, ft-lb)
T1: 45 (4.55, 32.9)
T2: 72 (7.3, 52.8)

6. ENGINE MOUNTING



(1) Heat shield cover
(2) Front cushion rubber
(3) Front engine mounting bracket

Tightening torque: N·m (kgf-m, ft-lb)
T1: 34 (3.5, 25.3)
T2: 42 (4.3, 30.9)
T3: 83 (8.5, 61)

C: CAUTION

• Wear working clothing, including a cap, protective goggles, and protective shoes during operation.
• Remove contamination including dirt and corrosion before removal, installation or disassembly.
• Keep the disassembled parts in order and protect them from dust or dirt.
• Before removal, installation or disassembly, be sure to clarify the failure. Avoid unnecessary removal, installation, disassembly, and replacement.
• Be careful not to burn your hands, because each part in the vehicle is hot after running.
• Be sure to tighten fasteners including bolts and nuts to the specified torque.
• Place shop jacks or safety stands at the specified points.
• Before disconnecting electrical connectors of sensors or units, be sure to disconnect the negative terminal from battery.
• All parts should be thoroughly cleaned, paying special attention to the engine oil passages, pistons and bearings.
• Rotating parts and sliding parts such as piston, bearing and gear should be coated with oil prior to assembly.
• Be careful not to let oil, grease or coolant contact the timing belt, clutch disc and flywheel.
• All removed parts, if to be reused, should be reinstalled in the original positions and directions.
• Bolts, nuts and washers should be replaced with new ones as required.
• Even if necessary inspections have been made in advance, proceed with assembly work while making rechecks.
• Remove or install the engine in an area where chain hoists, lifting devices, etc. are available for ready use.
• Be sure not to damage coated surfaces of body panels with tools or stain seats and windows with coolant or oil. Place a cover over fenders, as required, for protection.
• Prior to starting work, prepare the following:
Service tools, clean cloth, containers to catch coolant and oil, wire ropes, chain hoist, transmission jacks, etc.
• Lift-up or lower the vehicle when necessary. Make sure to support the correct positions.

D: PREPARATION TOOL

1. SPECIAL TOOLS

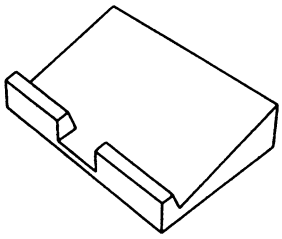
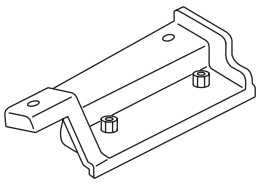
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-498267600	498267600	CYLINDER HEAD TABLE	• Used for replacing valve guides. • Used for removing and installing valve springs.
 ST-498457000	498457000	ENGINE STAND ADAPTER RH	Used with ENGINE STAND (499817000).

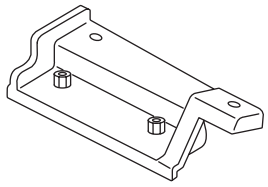
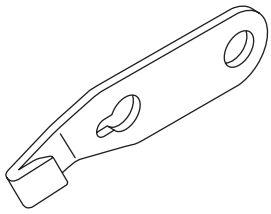
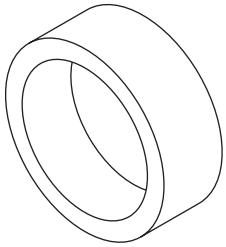
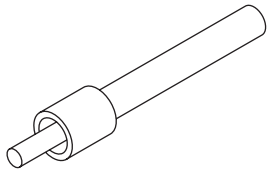
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-498457100	498457100	ENGINE STAND ADAPTER LH	Used with ENGINE STAND (499817000).
 ST-498497100	498497100	CRANKSHAFT STOPPER	Used for stopping rotation of flywheel when loosening and tightening crankshaft pulley bolt, etc.
 ST-398744300	398744300	PISTON GUIDE	Used for installing piston in cylinder for 2000 cc engine.
 ST-498857100	498857100	VALVE OIL SEAL GUIDE	Used for press-fitting of intake and exhaust valve guide oil seals.

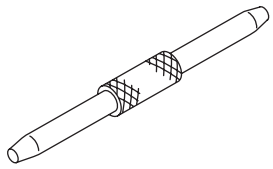
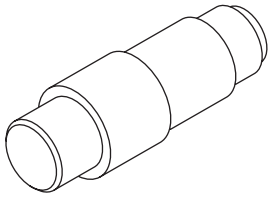
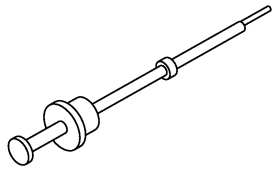
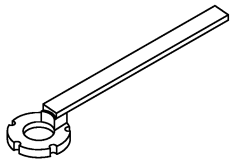
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-499017100	499017100	PISTON PIN GUIDE	Used for installing piston pin, piston and connecting rod.
 ST-499037100	499037100	CONNECTING ROD BUSHING REMOVER & INSTALLER	Used for removing and installing connecting rod bushing.
 ST-499097600	499097600	PISTON PIN REMOVER ASSY	Used for removing piston pin.
 ST-499207400	499207400	CAMSHAFT SPROCKET WRENCH	Used for removing and installing camshaft sprocket.

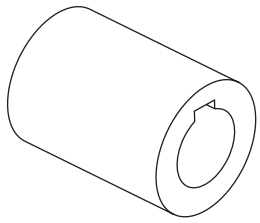
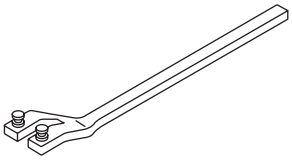
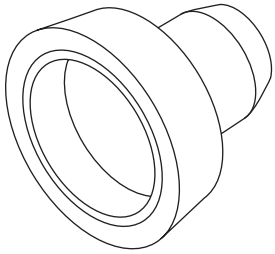
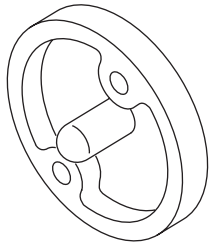
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-499987500	499987500	CRANKSHAFT SOCKET	Used for rotating crankshaft.
 ST18231AA010	18231AA010	CAMSHAFT SPROCKET WRENCH	Used for removing and installing camshaft sprocket.(Intake camshaft sprocket LH)
 ST-499587200	499587200	CRANKSHAFT OIL SEAL INSTALLER	• Used for installing crankshaft oil seal. • Used with CRANKSHAFT OIL SEAL GUIDE (499597100).
 ST-499597100	499597100	CRANKSHAFT OIL SEAL GUIDE	• Used for installing crankshaft oil seal. • Used with CRANKSHAFT OIL SEAL INSTALLER (499587200).

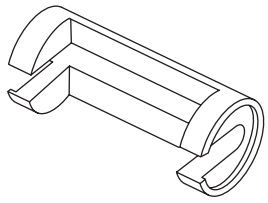
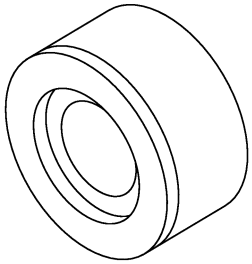
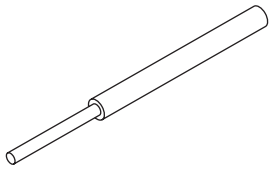
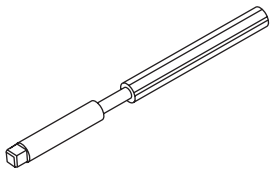
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-499718000	499718000	VALVE SPRING REMOVER	Used for removing and installing valve spring.
 ST18251AA020	18251AA020	VALVE GUIDE ADJUSTER	Used for installing intake and exhaust valve guides.
 ST-499767200	499767200	VALVE GUIDE REMOVER	Used for removing valve guides.
 ST-499767400	499767400	VALVE GUIDE REAMER	Used for reaming valve guides.

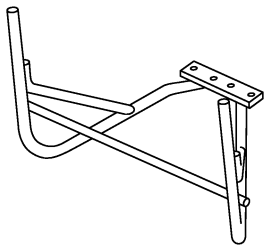
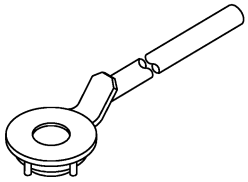
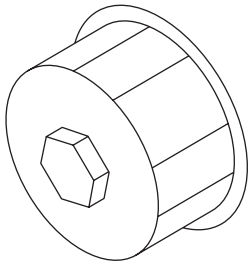
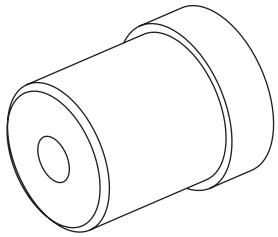
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-499817000	499817000	ENGINE STAND	• Stand used for engine disassembly and assembly. • Used with ENGINE STAND ADAPTER RH (498457000) & LH (498457100).
 ST-499977400	499977400 (499977300 can also be used.)	CRANK PULLEY WRENCH	Used for stopping rotation of crankshaft pulley when loosening and tightening crankshaft pulley bolts.
 ST-498547000	498547000	OIL FILTER WRENCH	Used for removing and installing oil filter.
 ST-499587100	499587100	OIL SEAL INSTALLER	Used for installing oil pump oil seal.

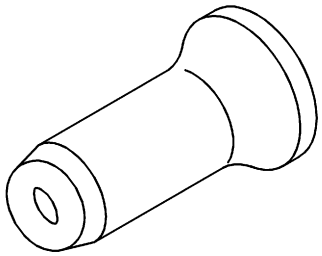
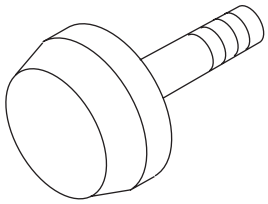
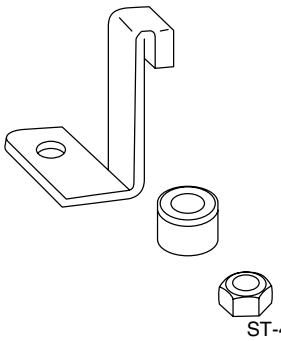
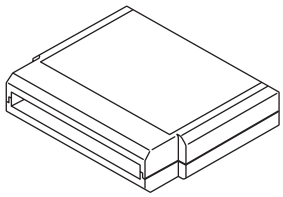
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-499587600	499587600	OIL SEAL INSTALLER	Used for installing camshaft oil seal for DOHC engine.
 ST-499597200	499597200	OIL SEAL GUIDE	• Used for installing camshaft oil seal for DOHC engine. • Used with OIL SEAL GUIDE (499587600).
 ST-498277200	498277200	STOPPER SET	Used for installing automatic transmission assembly to engine.

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST24082AA210	24082AA210 (Newly adopted tool)	CARTRIDGE	Troubleshooting for electrical systems.
 ST22771AA030	22771AA030	SELECT MONITOR KIT	Troubleshooting for electrical systems. • English: 22771AA030 (Without printer) • German: 22771AA070 (Without printer) • French: 22771AA080 (Without printer) • Spanish: 22771AA090 (Without printer)

2. GENERAL PURPOSE TOOLS

TOOL NAME	REMARKS
Compression Gauge	Used for measuring compression.
Timing Light	Used for measuring ignition timing.

E: PROCEDURE

It is possible to conduct the following service procedures with engine on the vehicle, however, the procedures described in this section are based on the condition that the engine is removed from the vehicle.

- V-belt
- Timing Belt
- Camshaft
- Cylinder Head

2. Compression

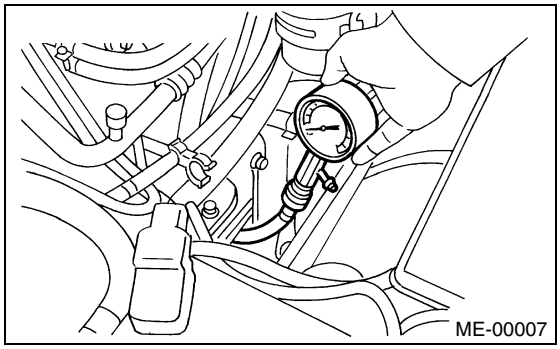
A: INSPECTION

CAUTION:
After warming-up, engine becomes very hot. Be careful not to burn yourself during measurement.

1) After warming-up the engine, turn the ignition switch to OFF.
2) Make sure that the battery is fully charged.
3) Release fuel pressure. <Ref. to FU(H4DOTC)-54, RELEASING OF FUEL PRESSURE, OPERATION, Fuel.>
4) Remove all the spark plugs. <Ref. to IG(H4DOTC)-4, REMOVAL, Spark Plug.>
5) Fully open the throttle valve.
6) Check the starter motor for satisfactory performance and operation.
7) Hold the compression gauge tight against the spark plug hole.

CAUTION:
When using a screw-in type compression gauge, the screw (put into cylinder head spark plug hole) should be less than 18 mm (0.71 in) long.

8) Crank the engine by means of the starter motor, and read the maximum value on the gauge when the pointer is steady.



9) Perform at least two measurements per cylinder, and make sure that the values are correct.

Compression (350 rpm and fully open throttle):
Standard;
981 — 1,177 kPa (10 — 12 kgf/cm^2, 142 — 171 psi)
Limit;
834 kPa (8.5 kgf/cm^2, 121 psi)
Difference between cylinders;
49 kPa (0.5 kgf/cm^2, 7 psi)

3. Idle Speed

A: INSPECTION

1) Before checking the idle speed, check the following:
   (1) Ensure the air cleaner element is free from clogging, ignition timing is correct, spark plugs are in good condition, and that hoses are connected properly.
   (2) Ensure the malfunction indicator light (CHECK ENGINE light) does not illuminate.
2) Warm-up the engine.
3) Stop the engine, and turn the ignition switch to OFF.
4) Insert the cartridge to the SUBARU SELECT MONITOR.
5) Connect the SUBARU SELECT MONITOR to the data link connector.
6) Turn the ignition switch to ON, and SUBARU SELECT MONITOR switch to ON.
7) Select {2. Each System Check} in Main Menu.
8) Select {Engine Control System} in Selection Menu.
9) Select {1. Current Data Display & Save} in Engine Control System Diagnosis.
10) Select {1.12 Data Display} in Data Display Menu.
11) Start the engine, and read engine idle speed.
12) Check the idle speed when unloaded. (With headlights, heater fan, rear defroster, radiator fan, air conditioning, etc. OFF)

Idle speed (No load and gears in neutral:
750±100 rpm

13) Check the idle speed when loaded. (Turn the air conditioning switch to "ON" and operate the compressor for at least one minute before measurement.)

Idle speed [A/C "ON", no load and gears in neutral]:
800±150 rpm (MT model)
825±150 rpm (AT model)

CAUTION:
Never rotate the idle adjusting screw. If the idle speed is out of specifications, refer to General On-board Diagnosis Table under "Engine Control System". <Ref. to EN(H4DOTC)-2, Basic Diagnostic Procedure.>

4. Ignition Timing

A: INSPECTION

1) Before checking the ignition timing speed, check the following:
   (1) Ensure the air cleaner element is free from clogging, spark plugs are in good condition, and that hoses are connected properly.
   (2) Ensure the malfunction indicator light (CHECK ENGINE light) does not illuminate.
2) Warm-up the engine.
3) Stop the engine, and turn the ignition switch to OFF.
4) Insert the cartridge to the SUBARU SELECT MONITOR.
5) Connect the SUBARU SELECT MONITOR to the data link connector.
6) Turn the ignition switch to ON, and SUBARU SELECT MONITOR switch to ON.
7) Select {2. Each System Check} in Main Menu.
8) Select {Engine Control System} in Selection Menu.
9) Select {1. Current Data Display & Save} in Engine Control System Diagnosis.
10) Select {1.12 Data Display} in Data Display Menu.
11) Start the engine, at idle speed and check the ignition timing.

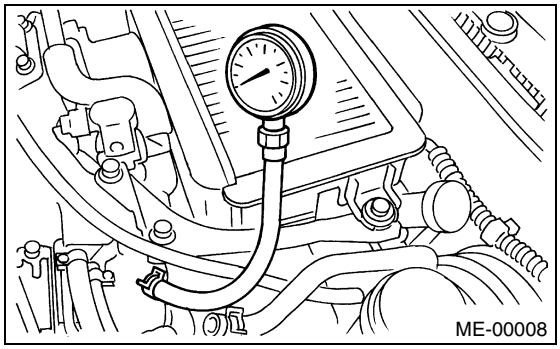
Ignition timing [BTDC/rpm]:
12°±3°/750

If the timing is not correct, check the ignition control system. Refer to Engine Control System. <Ref. to EN(H4DOTC)-2, Basic Diagnostic Procedure.>

5. Intake Manifold Vacuum

A: INSPECTION

1) Warm-up the engine.
2) Disconnect the brake vacuum hose and install the vacuum gauge to the hose fitting on the manifold.
3) Keep the engine at the idle speed and read the vacuum gauge indication.
By observing the gauge needle movement, the internal condition of the engine can be diagnosed as described below.



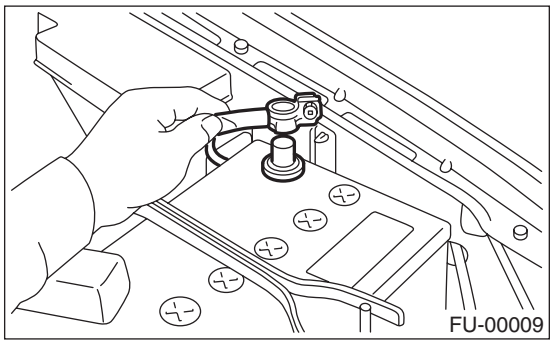
Vacuum pressure (at idling, A/C "OFF"):
Less than −60.0 kPa (−450 mmHg, −17.72 in-Hg)

Diagnosis of engine condition by measurement of manifold vacuum	
Vacuum gauge indication	Possible engine condition
1. Needle is steady but lower than normal position. This tendency becomes more evident as engine temperature rises.	Leakage around intake manifold gasket or disconnection or damaged vacuum hose
2. When engine speed is reduced slowly from higher speed, needle stops temporarily when it is lowering or becomes steady above normal position.	Back pressure too high, or exhaust system clogged
3. Needle intermittently drops to position lower than normal position.	Leakage around cylinder
4. Needle drops suddenly and intermittently from normal position.	Sticky valves
5. When engine speed is gradually increased, needle begins to vibrate rapidly at certain speed, and then vibration increases as engine speed increases.	Weak or broken valve springs
6. Needle vibrates above and below normal position in narrow range.	Defective ignition system or throttle chamber idle adjustment

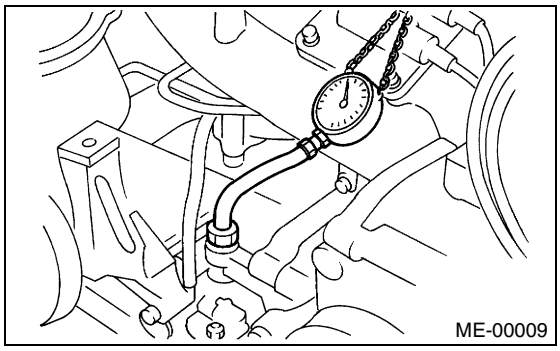
6. Engine Oil Pressure

A: INSPECTION

1) Remove the oil pressure switch from engine cylinder block. <Ref. to LU(H4SO)-20, REMOVAL, Oil Pressure Switch.>
2) Connect the oil pressure gauge hose to cylinder block.
3) Connect the battery ground terminal to battery.



4) Start the engine, and measure oil pressure.



Oil pressure:
98 kPa (1.0 kg/cm^2, 14 psi) or more at 800 rpm
294 kPa (3.0 kg/cm^2, 43 psi) or more at 5,000 rpm

CAUTION:
• If the oil pressure is out of specification, check oil pump, oil filter and lubrication line. <Ref. to LU(H4SO)-26, INSPECTION, Engine Lubrication System Troubles.>
• If the oil pressure warning light is turned ON and oil pressure is in specification, replace the oil pressure switch. <Ref. to LU(H4SO)-26, INSPECTION, Engine Lubrication System Troubles.>

NOTE:
The specified data is based on an engine oil temperature of 80°C (176°F).

5) After measuring the oil pressure, install the oil pressure switch. <Ref. to LU(H4SO)-20, INSTALLATION, Oil Pressure Switch.>

Tightening torque:
25 N·m (2.5 kgf-m, 18.1 ft-lb)

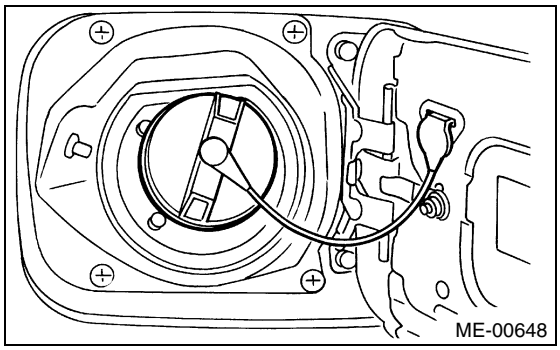
7. Fuel Pressure

A: INSPECTION

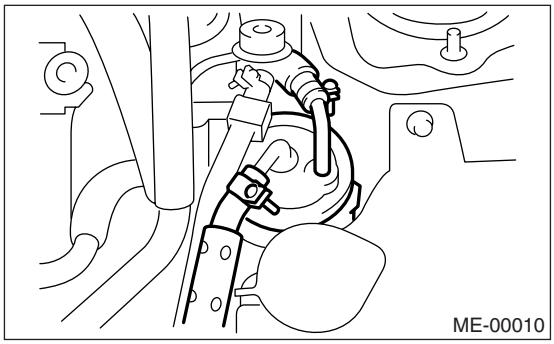
WARNING:
Before removing the fuel pressure gauge, release the fuel pressure.

NOTE:
If out of specification, check or replace the pressure regulator and pressure regulator vacuum hose.

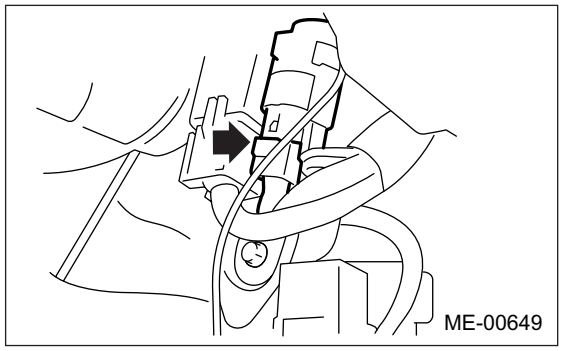
1) Release the fuel pressure. <Ref. to FU(H4DOTC)-54, RELEASING OF FUEL PRESSURE, OPERATION, Fuel.>
2) Open the fuel flap lid, and remove the fuel filler cap.



3) Disconnect the fuel delivery hoses from fuel filter, and connect the fuel pressure gauge.

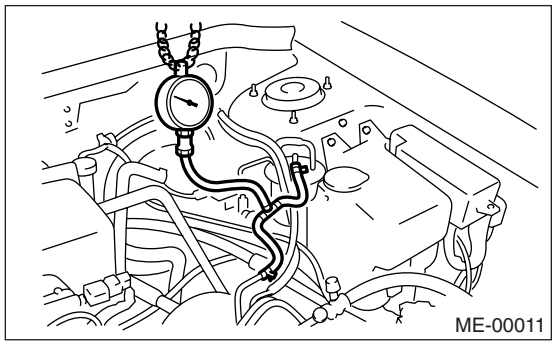


4) Connect the connector of fuel pump relay.



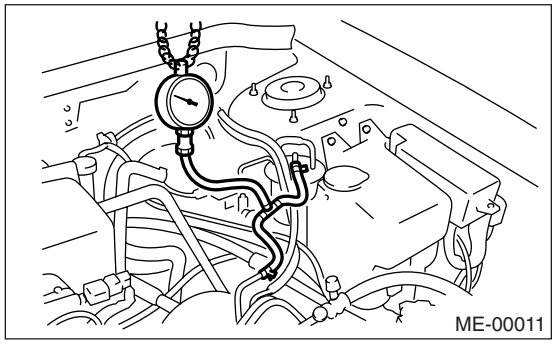
5) Start the engine.
6) Measure fuel pressure while disconnecting the pressure regulator vacuum hose from intake manifold.

Fuel pressure:
Standard; 284 — 314 kPa (2.9 — 3.2 kgf/cm^2, 41 — 46 psi)



7) After connecting the pressure regulator vacuum hose, measure fuel pressure.

Fuel pressure:
Standard; 230 — 260 kPa (2.35 — 2.65 kgf/cm^2, 33 — 38 psi)



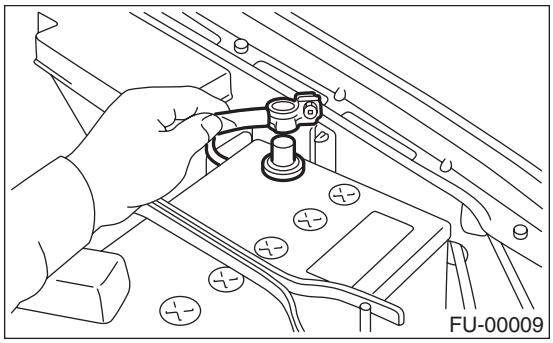
NOTE:
The fuel pressure gauge registers 10 to 20 kPa (0.1 to 0.2 kgf/cm^2, 1 to 3 psi) higher than standard values during high-altitude operations.

8. Valve Clearance

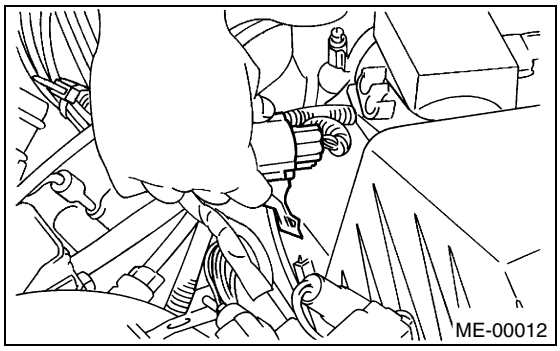
A: INSPECTION

CAUTION:
Inspection and adjustment of valve clearance should be performed while engine is cold.

1) Set the vehicle onto the lift.
2) Disconnect the ground terminal from battery.

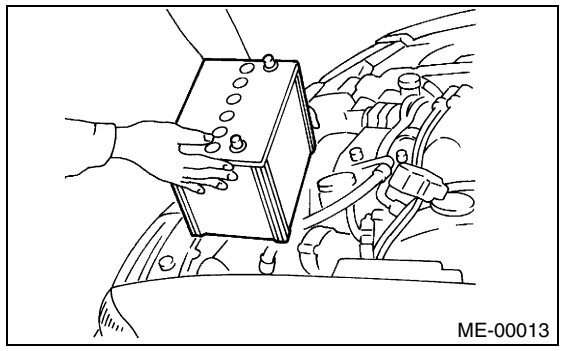


3) Remove the air intake duct. <Ref. to IN(H4DOTC)-9, REMOVAL, Air Intake Duct.>
4) Remove one bolt which secures the timing belt cover (RH).
5) Lift-up the vehicle.
6) Remove the under cover.
7) Loosen the remaining bolts which secure the timing belt cover (RH), then remove the belt cover.
8) Lower the vehicle.
9) When inspecting #1 and #3 cylinders:
   (1) Pull out the engine harness connector with bracket from air cleaner upper cover.

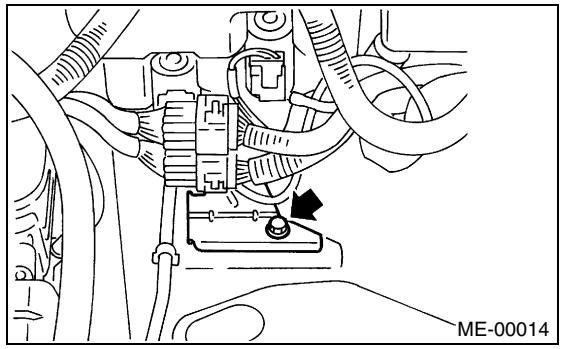


   (2) Remove the air cleaner case. <Ref. to IN(H4DOTC)-7, REMOVAL, Air Cleaner.>
   (3) Disconnect the spark plug cords from spark plugs (#1 and #3 cylinders).
   (4) Place a suitable container under the vehicle.
   (5) Disconnect the PCV hose from rocker cover (RH).
   (6) Remove the bolts, then remove the rocker cover (RH).

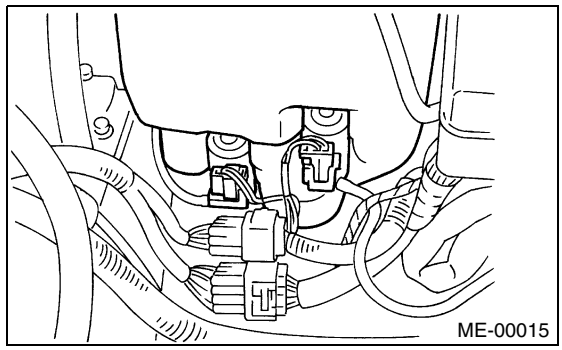
10) When inspecting #2 and #4 cylinders:
   (1) Disconnect the battery terminal, and then remove the battery and battery carrier.



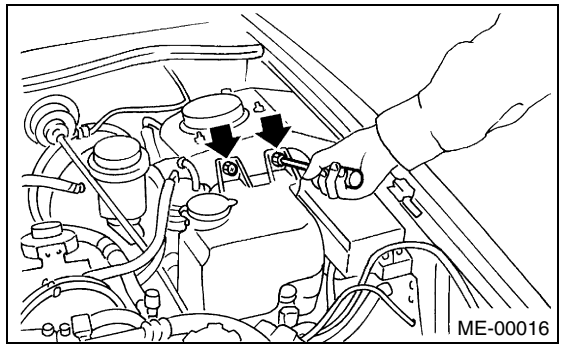
   (2) Remove the bolt which secures the engine harness bracket onto body.



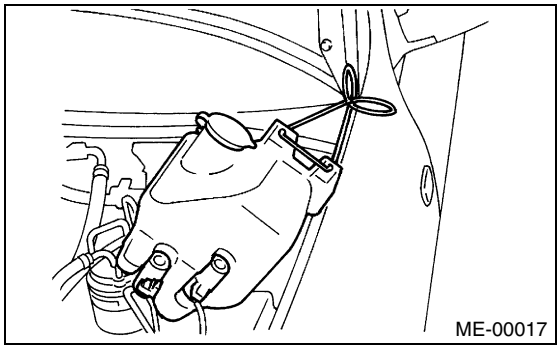
   (3) Disconnect the washer motor connectors.



   (4) Remove the washer tank mounting bolts.



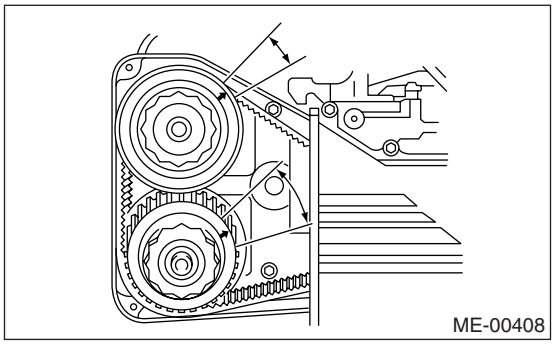
(5) Move the washer tank upward.



(6) Disconnect the spark plug cords from spark plugs (#2 and #4 cylinders).
(7) Place a suitable container under the vehicle.
(8) Disconnect the PCV hose from rocker cover (LH).
(9) Remove the bolts, then remove the rocker cover (LH).

11) Turn the crankshaft pulley clockwise until arrow mark on the camshaft sprocket is set to position shown in the figure.

NOTE:
Rotate the crankshaft using a socket wrench.

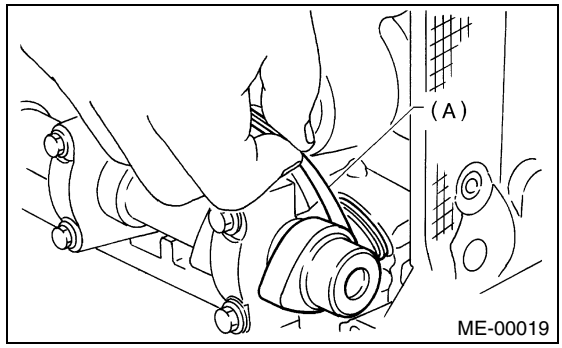


12) Measure #1 cylinder intake valve and #3 cylinder exhaust valve clearance by using thickness gauge (A).

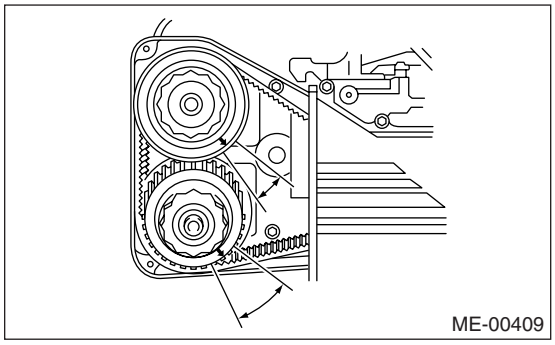
CAUTION:
• Insert the thickness gauge in as horizontal a direction as possible with respect to the shim.
• Measure the exhaust valve clearances while lifting-up the vehicle.

Valve clearance:
Intake: 0.20±0.02 mm (0.0079±0.0008 in)
Exhaust: 0.25±0.02 mm (0.0098±0.0008 in)

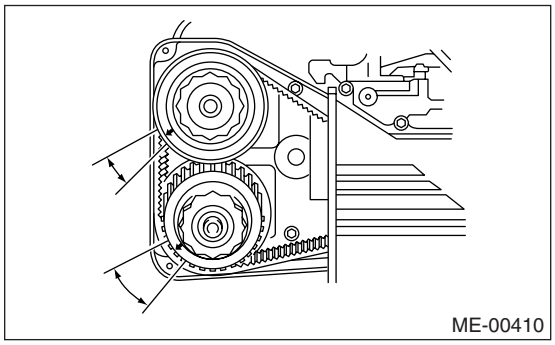
NOTE:
If the measured value is not within specification, take notes of the value in order to adjust the valve clearance later on.



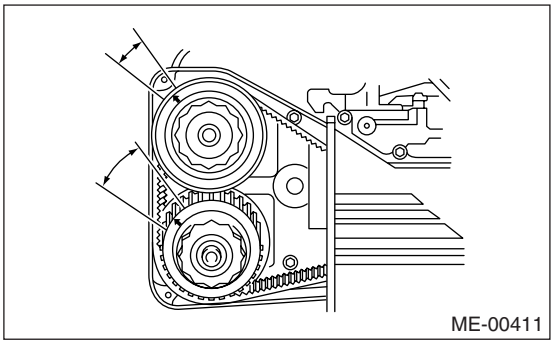
13) If necessary, adjust the valve clearance. <Ref. to ME(H4DOTC)-30, ADJUSTMENT, Valve Clearance.>
14) Further turn the crankshaft pulley clockwise.
Using the same procedures described previously, then measure valve clearances again.
(1) Set the arrow mark on camshaft sprocket to position shown in the figure, and measure #2 cylinder exhaust valve and #3 cylinder intake valve clearances.



(2) Set the arrow mark on camshaft sprocket to position shown in the figure, and measure #2 cylinder intake valve and #4 cylinder exhaust valve clearances.

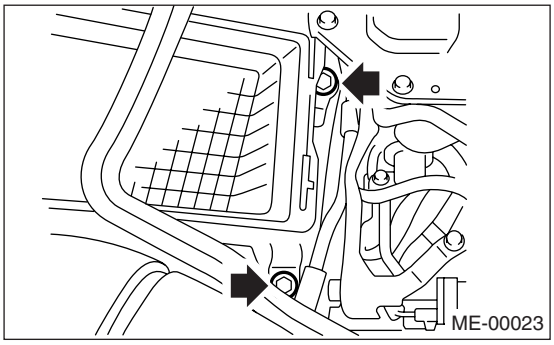


(3) Set the arrow mark on camshaft sprocket to position shown in the figure, and measure #1 cylinder exhaust valve and #4 cylinder intake valve clearances.


ME-00411

15) After inspection, install the related parts in the reverse order of removal.

Tightening torque:
32 N·m (3.3 kgf-m, 24 ft-lb)

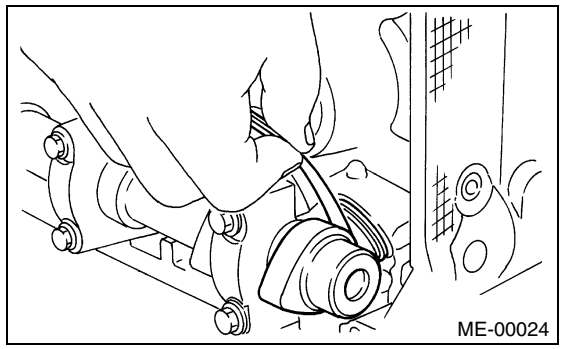

ME-00023

B: ADJUSTMENT

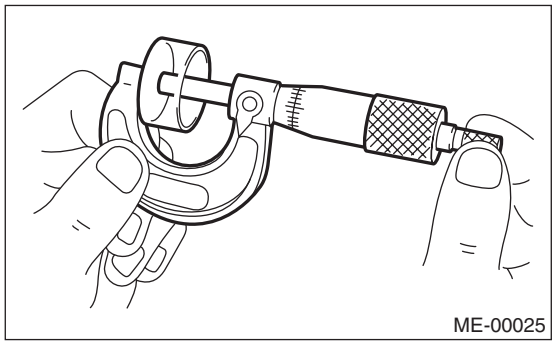
CAUTION:
Adjustment of valve clearance should be performed while engine is cold.

1) Measure all valve clearances. <Ref. to ME(H4DOTC)-28, INSPECTION, Valve Clearance.>

NOTE:
Record each valve clearance after it has been measured.


ME-00024

2) Remove the camshaft.<Ref. to ME(H4DOTC)-59, REMOVAL, Camshaft.>
3) Remove the valve lifter.
4) Measure the thickness of valve lifter with a micrometer.


ME-00025

5) Based on the measured valve clearance and valve lifter thickness, obtain the correct amount of shims from the following table.
6) Set the correct amount of shims to the valve lifter.

Unit: mm
Intake valve:S =(V + T) − 0.20 Exhaust valve:S =(V + T) − 0.25
S: Thickness of valve lifter V: Measured valve clearance T: Thickness of shims

Part No.	Thickness mm (in)
13228 AB101	4.68 (0.1843)
13228 AB111	4.69 (0.1846)
13228 AB121	4.70 (0.1850)
13228 AB131	4.71 (0.1854)
13228 AB141	4.72 (0.1858)
13228 AB151	4.73 (0.1862)
13228 AB161	4.74 (0.1866)
13228 AB171	4.75 (0.1870)
13228 AB181	4.76 (0.1874)
13228 AB191	4.77 (0.1878)
13228 AB201	4.78 (0.1882)
13228 AB211	4.79 (0.1886)
13228 AB221	4.80 (0.1890)
13228 AB231	4.81 (0.1894)
13228 AB241	4.82 (0.1898)
13228 AB251	4.83 (0.1902)
13228 AB261	4.84 (0.1906)
13228 AB271	4.85 (0.1909)
13228 AB281	4.86 (0.1913)
13228 AB291	4.87 (0.1917)
13228 AB301	4.88 (0.1921)
13228 AB311	4.89 (0.1925)
13228 AB321	4.90 (0.1929)
13228 AB331	4.91 (0.1933)
13228 AB341	4.92 (0.1937)
13228 AB351	4.93 (0.1941)
13228 AB361	4.94 (0.1945)
13228 AB371	4.95 (0.1949)
13228 AB381	4.96 (0.1953)
13228 AB391	4.97 (0.1957)
13228 AB401	4.98 (0.1961)
13228 AB411	4.99 (0.1965)
13228 AB421	5.00 (0.1969)
13228 AB431	5.01 (0.1972)
13228 AB441	5.02 (0.1976)
13228 AB451	5.03 (0.1980)
13228 AB461	5.04 (0.1984)
13228 AB471	5.05 (0.1988)
13228 AB481	5.06 (0.1992)
13228 AB491	5.07 (0.1996)
13228 AB501	5.08 (0.2000)
13228 AB511	5.09 (0.2004)
13228 AB521	5.10 (0.2008)
13228 AB531	5.11 (0.2012)
13228 AB541	5.12 (0.2016)
13228 AB551	5.13 (0.2020)
13228 AB561	5.14 (0.2024)
13228 AB571	5.15 (0.2028)
13228 AB581	5.16 (0.2031)
13228 AB591	5.17 (0.2035)
13228 AB601	5.18 (0.2039)

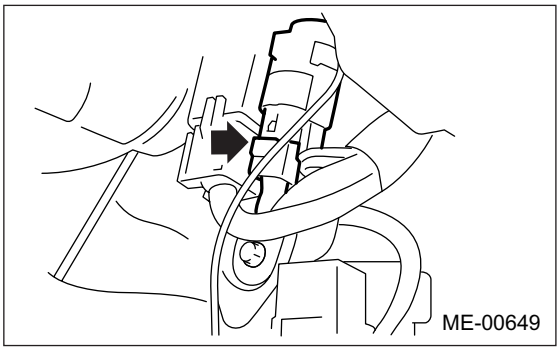
Part No.	Thickness mm (in)
13228 AB611	5.19 (0.2043)
13228 AB621	5.20 (0.2047)
13228 AB631	5.21 (0.2051)
13228 AB641	5.22 (0.2055)
13228 AB651	5.23 (0.2059)
13228 AB661	5.24 (0.2063)
13228 AB671	5.25 (0.2067)
13228 AB681	5.26 (0.2071)
13228 AB691	5.27 (0.2075)
13228 AB701	4.38 (0.1724)
13228 AB711	4.40 (0.1732)
13228 AB721	4.42 (0.1740)
13228 AB731	4.44 (0.1748)
13228 AB741	4.46 (0.1756)
13228 AB751	4.48 (0.1764)
13228 AB761	4.50 (0.1771)
13228 AB771	4.52 (0.1780)
13228 AB781	4.54 (0.1787)
13228 AB791	4.56 (0.1795)
13228 AB801	4.58 (0.1803)
13228 AB811	4.60 (0.1811)
13228 AB821	4.62 (0.1819)
13228 AB831	4.64 (0.1827)
13228 AB841	4.66 (0.1835)
13228 AB851	5.29 (0.2083)
13228 AB861	5.31 (0.2091)
13228 AB871	5.33 (0.2098)
13228 AB881	5.35 (0.2106)
13228 AB891	5.37 (0.2114)
13228 AB901	5.39 (0.2122)
13228 AB911	5.41 (0.2126)
13228 AB921	5.43 (0.2138)
13228 AB931	5.45 (0.2146)
13228 AB941	5.47 (0.2154)
13228 AB951	5.49 (0.2161)
13228 AB961	5.51 (0.2169)
13228 AB971	5.53 (0.2177)
13228 AB981	5.55 (0.2185)
13228 AB991	5.57 (0.2193)
13228 AC001	5.59 (0.2201)
13228 AC011	5.61 (0.2209)
13228 AC021	5.63 (0.2217)
13228 AC031	5.65 (0.2224)

7) Inspect all valves for clearance again at this stage. If the valve clearance is not correct, repeat the procedure over again from the first step.
8) After inspection, install the related parts in the reverse order of removal.

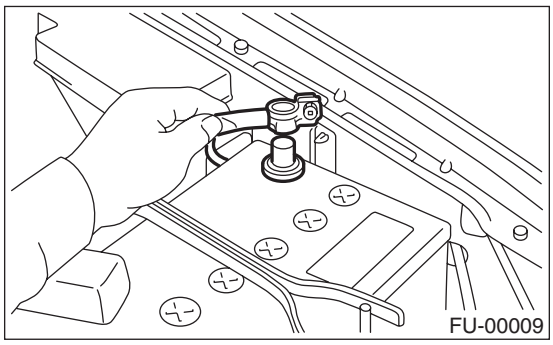
9. Engine Assembly

A: REMOVAL

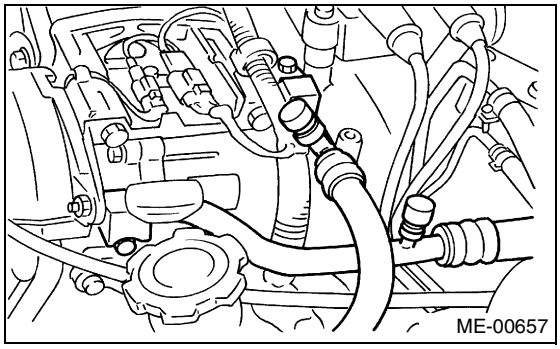
1) Set the vehicle on lift arms.
2) Open the front hood fully and support with stay.
3) Raise the rear seat, and turn the floor mat up.
4) Release the fuel pressure.
   (1) Disconnect the fuel pump relay connector.



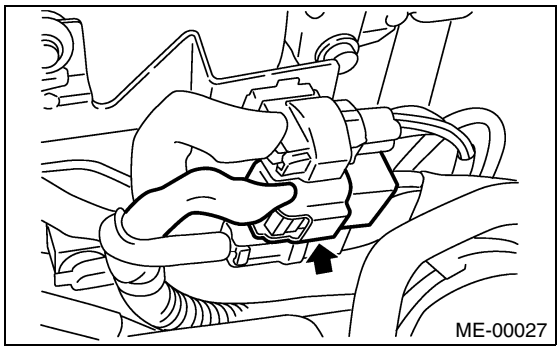
   (2) Start the engine, and run until stalls.
   (3) After the engine stalls, crank it for five seconds more.
   (4) Turn the ignition switch to “OFF”.
5) Remove the filler cap.
6) Disconnect the ground terminal from battery.



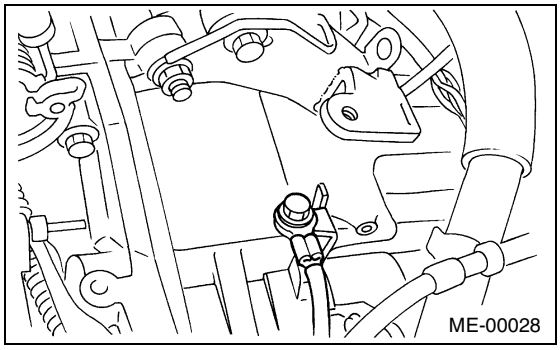
7) Remove the radiator from vehicle. <Ref. to CO(H4SO)-38, REMOVAL, Radiator.>
8) Remove the coolant filler tank. <Ref. to CO(H4SO)-52, REMOVAL, Coolant Filler Tank.>
9) Collect refrigerant, and remove the pressure hoses.
   (1) Place and connect the attachment hose to the refrigerant recycle system.
   (2) Collect the refrigerant from A/C system.
   (3) Disconnect the A/C pressure hoses from A/C compressor.



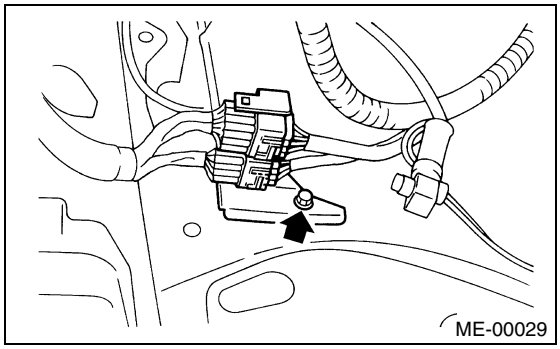
10) Remove the intercooler. <Ref. to IN(H4DOTC)-11, REMOVAL, Intercooler.>
11) Disconnect the following connectors and cable.
   (1) Engine harness connector



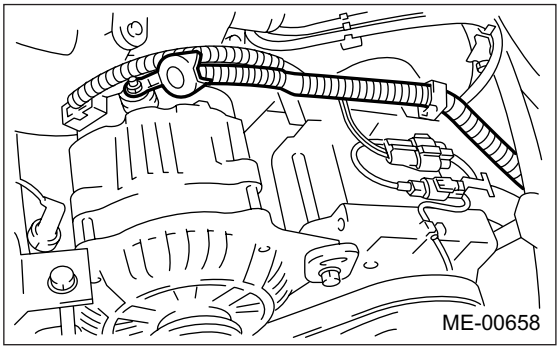
   (2) Engine ground terminal



(3) Engine harness connector

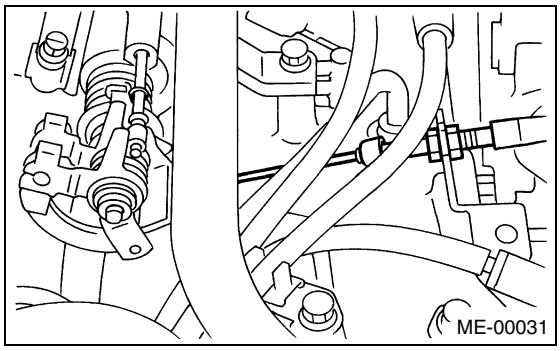


(4) Generator connector, terminal and A/C compressor connectors

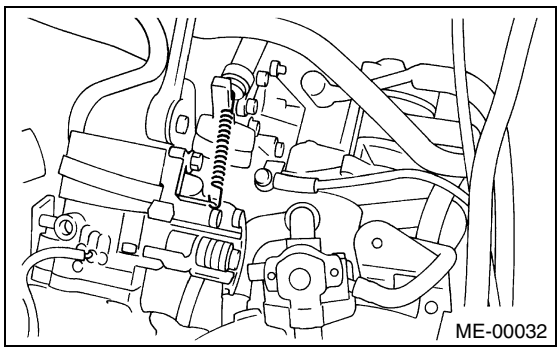


(A) A/C compressor connector
(B) Generator connector and terminal

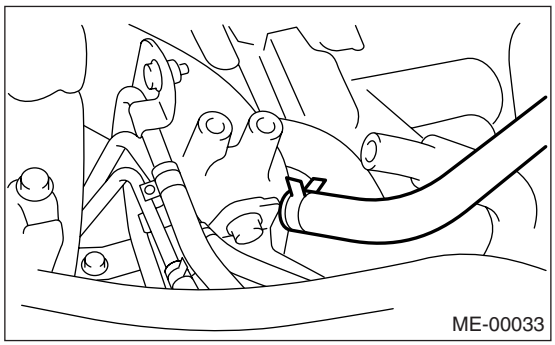
(5) Accelerator cable



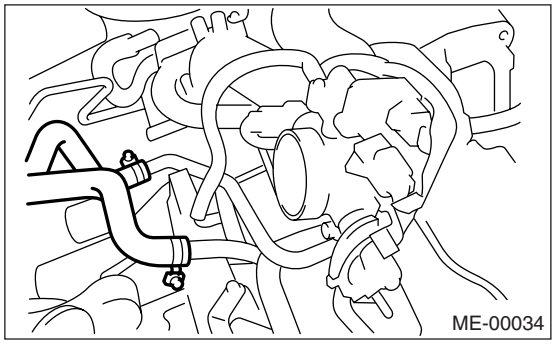
(6) Clutch release spring



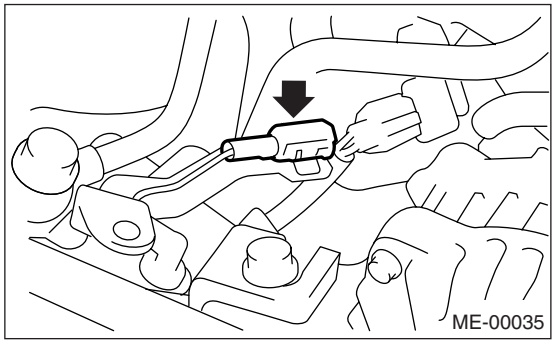
12) Disconnect the following hoses.
(1) Brake booster vacuum hose



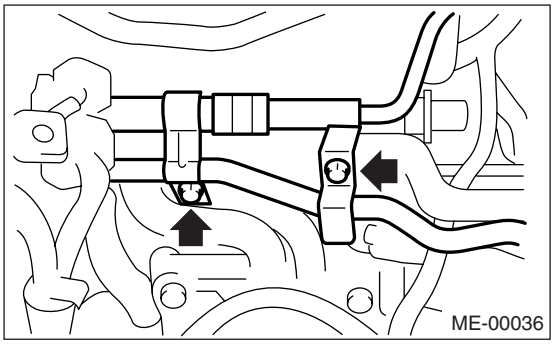
(2) Heater inlet outlet hose



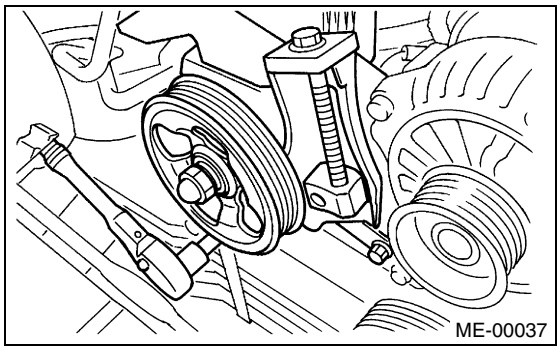
13) Remove the power steering pump from bracket.
(1) Loosen lock bolt and slider bolt, and remove the front side V-belt. <Ref. to ME(H4DOTC)-44, FRONT SIDE BELT, REMOVAL, V-belt.>
(2) Disconnect the power steering switch connector.



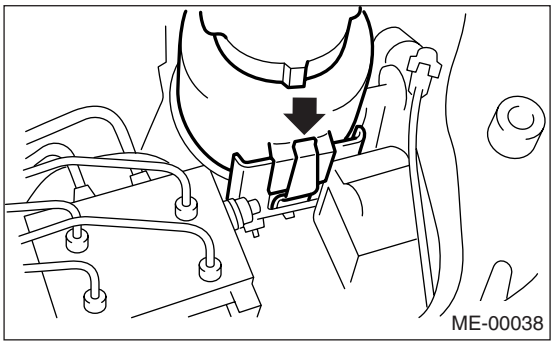
(3) Remove the pipe with bracket from intake manifold.



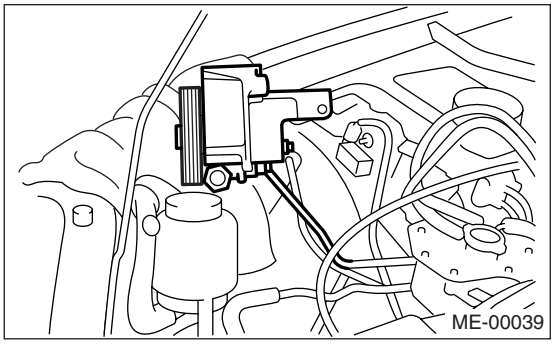
(4) Remove the power steering pump from engine.



(5) Remove the power steering tank from the bracket by pulling it upward.



(6) Place the power steering pump on the right side wheel apron.

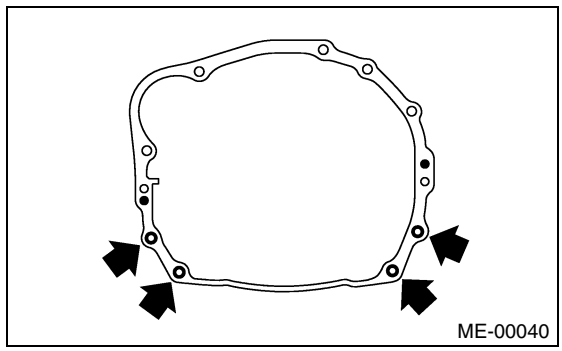


14) Lift-up the vehicle.

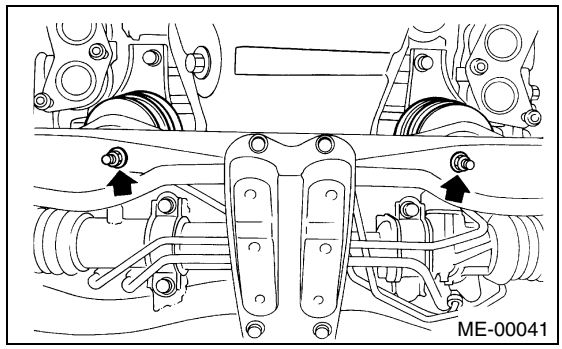
15) Remove the ATF cooler pipe from frame. (AT vehicles)

16) Remove the center exhaust pipe. <Ref. to EX(H4DOTC)-8, REMOVAL, Center Exhaust Pipe.>

17) Remove the nuts which hold lower side of transmission to engine.



18) Remove the nuts which install the front cushion rubber onto front crossmember.

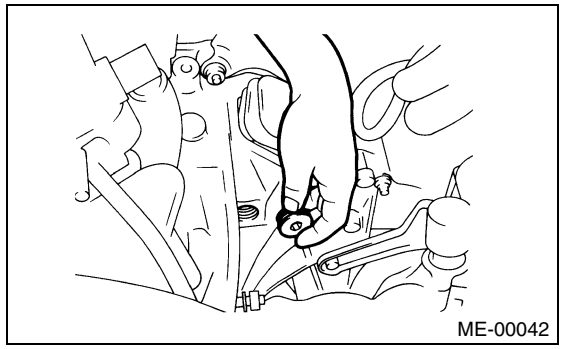


19) Lower the vehicle.

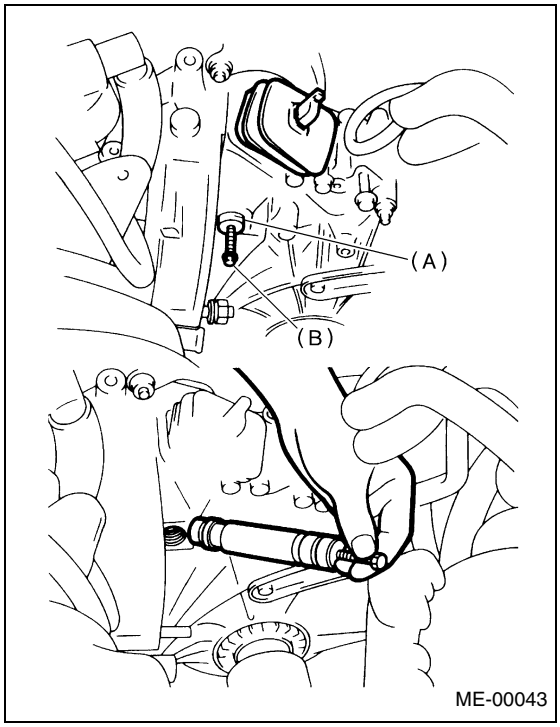
20) Separate the clutch release fork from release bearing. (MT vehicles)

(1) Remove the clutch operating cylinder from transmission.

(2) Remove the plug using a 10 mm hexagon wrench.



(3) Screw the 6 mm dia. bolt into release fork shaft, and remove it.



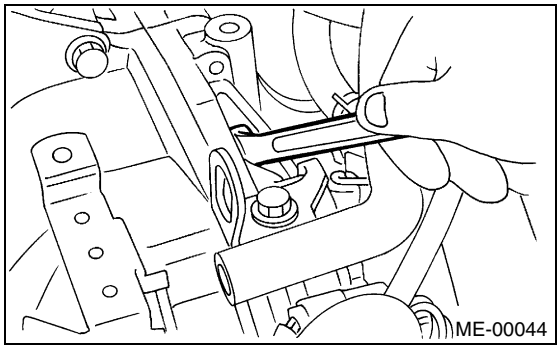
(A) Shaft
(B) Bolt

(4) Raise the release fork and unfasten the release bearing tabs to free release fork.

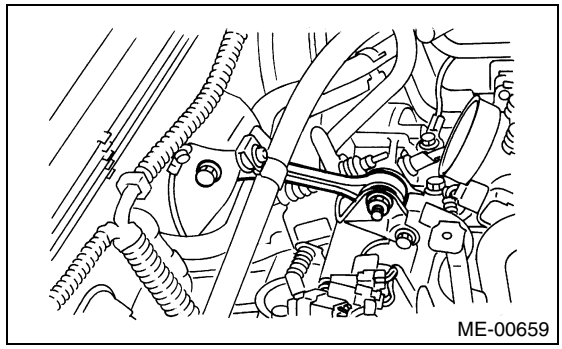
CAUTION:
Step (4) is required to prevent interference with engine when removing the engine from transmission.

21) Separate the torque converter clutch from drive plate. (AT vehicles)
(1) Lower the vehicle.
(2) Remove the service hole plug.
(3) Remove the bolts which hold torque converter clutch to drive plate.
(4) Remove the other bolts while rotating the engine using ST.

ST 499977400 CRANK PULLEY WRENCH

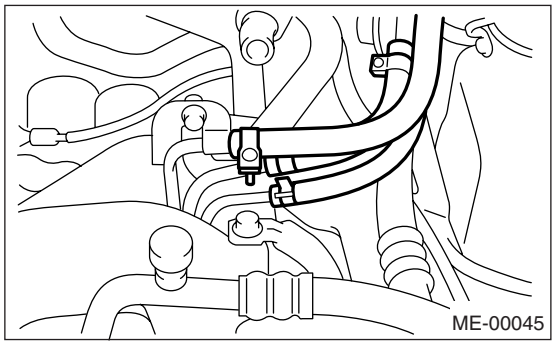


22) Remove the pitching stopper.

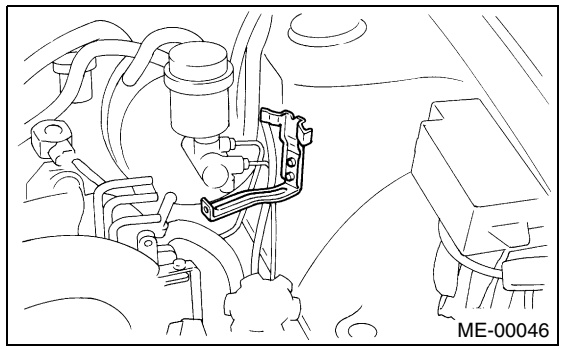


23) Disconnect the fuel delivery hose, return hose and evaporation hose.

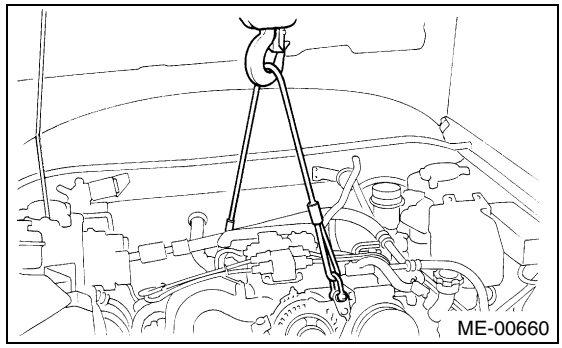
CAUTION:
• Catch fuel from hose into container.
• Disconnect the hose with its end wrapped with cloth to prevent fuel from splashing.



24) Remove the fuel filter and bracket.

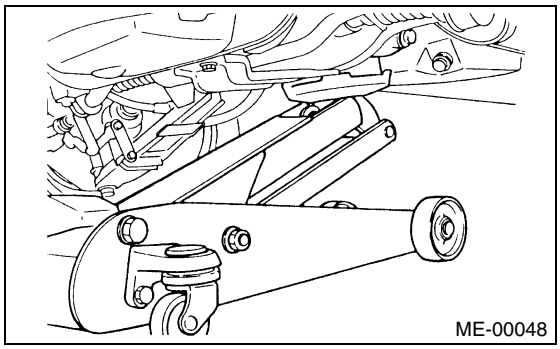


25) Support the engine with a lifting device and wire ropes.



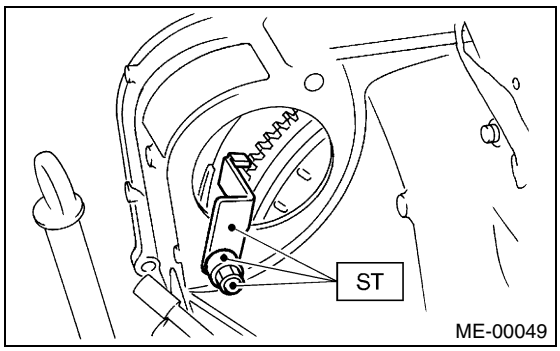
26) Support the transmission with a garage jack.

CAUTION:
Before moving the engine away from transmission, check to be sure no work has been overlooked. Doing this is very important in order to facilitate re-installation and because transmission lowers under its own weight.


ME-00048

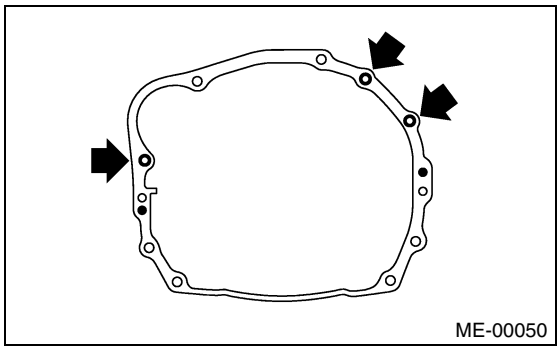
27) Separation of engine and transmission.
(1) Remove the starter. <Ref. to SC(H4SO)-7, REMOVAL, Starter.>
(2) Install the ST to torque converter clutch case. (AT vehicles)

ST 498277200 STOPPER SET



ME-00049

(3) Remove the bolts which hold right upper side of transmission to engine.


ME-00050

28) Remove the engine from vehicle.
(1) Slightly raise the engine.
(2) Raise the transmission with garage jack.
(3) Move the engine horizontally until the mainshaft is withdrawn from clutch cover.
(4) Slowly move the engine away from engine compartment.

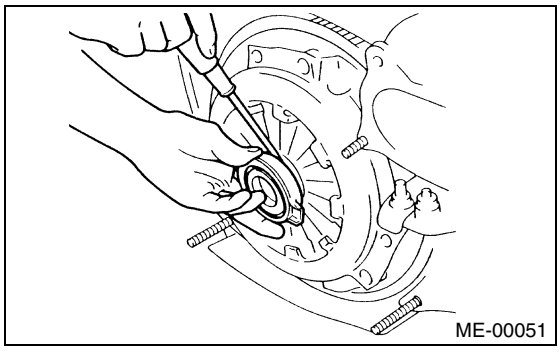
CAUTION:
Be careful not to damage adjacent parts or body panels with crank pulley, oil pressure gauge, etc.

29) Remove the front cushion rubbers.

B: INSTALLATION

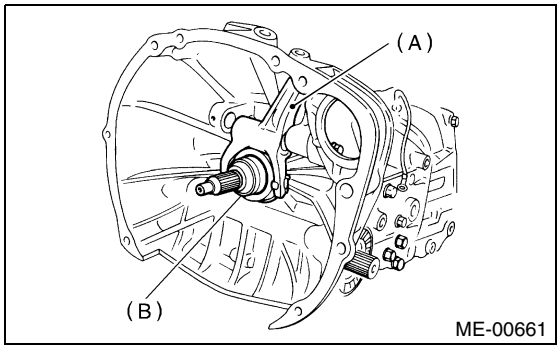
1) Install the clutch release fork and bearing onto transmission. (MT vehicles)

(1) Remove the release bearing from clutch cover with flat type screw driver.



(2) Install the release bearing on transmission.

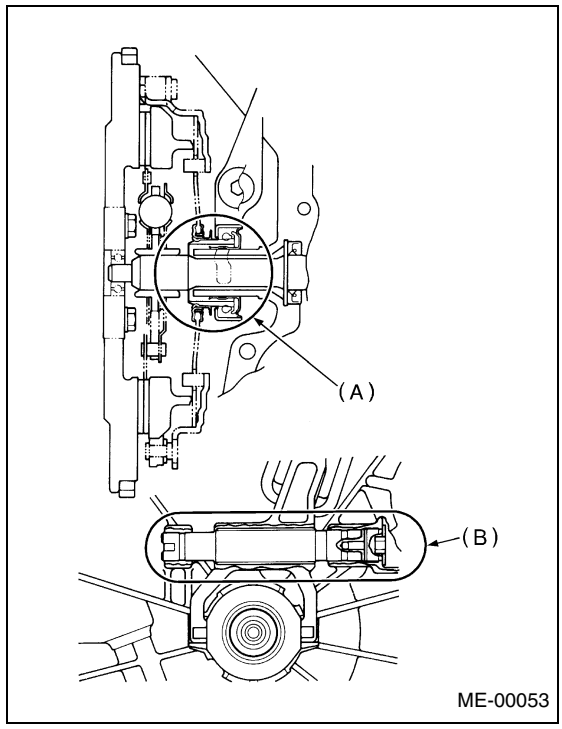
(3) Install the release fork into release bearing tab.



(A) Release fork
(B) Release bearing

(4) Apply grease to the specified points.

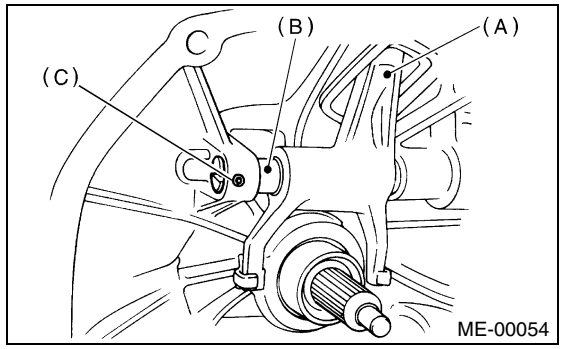
- Spline FX2200
- Shaft SUNLIGHT 2



(A) Spline (FX2200)
(B) Shaft (SUNLIGHT 2)

(5) Insert the release fork shaft into release fork.

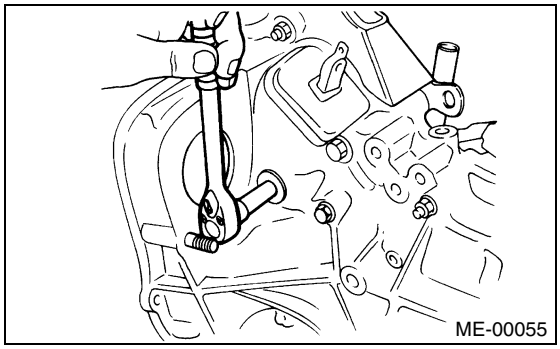
CAUTION:
Make sure the cutout portion of release fork shaft contacts spring pin.



(A) Release fork
(B) Release shaft
(C) Spring pin

(6) Tighten the plug.

Tightening torque:
44 N·m (4.5 kgf-m, 32.5 ft-lb)



2) Install the front cushion rubbers to engine.

Tightening torque:
34 N·m (3.5 kgf-m, 25.3 ft-lb)

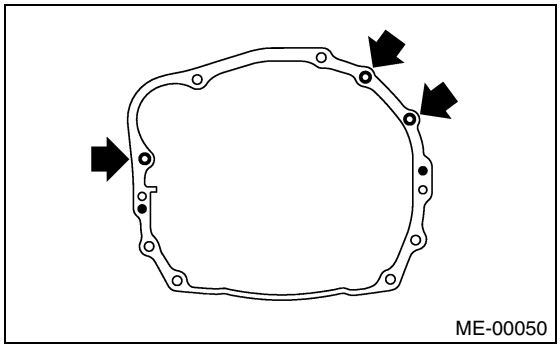
3) Install the engine onto transmission.
(1) Position the engine in engine compartment and align it with transmission.

CAUTION:
Be careful not to damage adjacent parts or body panels with crank pulley, oil pressure gauge, etc.

(2) Apply a small amount of grease to splines of mainshaft. (MT vehicles)

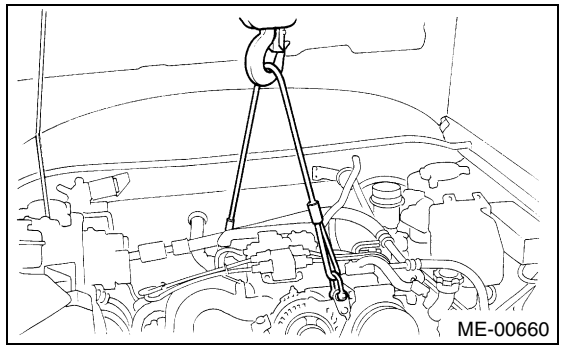
4) Tighten the bolts which hold right upper side of transmission to engine.

Tightening torque:
50 N·m (5.1 kgf-m, 36.9 ft-lb)



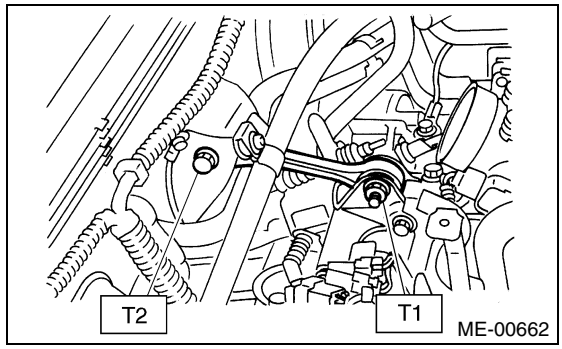
5) Remove the lifting device and wire ropes.

6) Remove the garage jack.



7) Install the pitching stopper.

Tightening torque:
T1: 50 N·m (5.1 kgf-m, 37 ft-lb)
T2: 58 N·m (5.9 kgf-m, 43 ft-lb)



8) Remove the ST from torque converter clutch case. (AT vehicles)

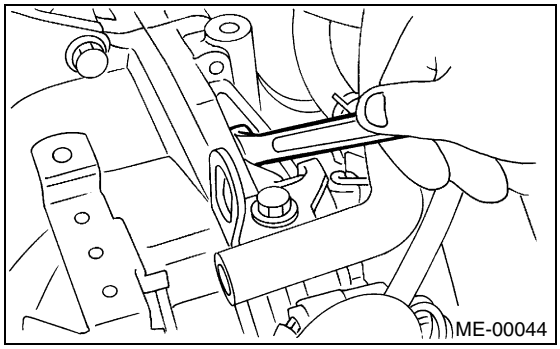
NOTE:
Be careful not to drop the ST into the torque converter clutch case when removing ST.
ST 498277200 STOPPER SET

9) Install the starter. <Ref. to SC(H4SO)-7, INSTALLATION, Starter.>

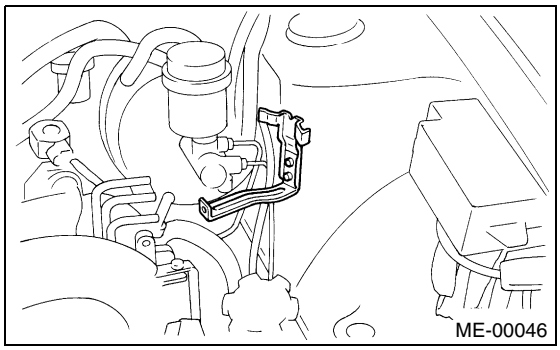
10) Install the torque converter clutch onto drive plate. (AT vehicles)
(1) Tighten the bolts which hold torque converter clutch to drive plate.
(2) Tighten other bolts while rotating the engine by using ST.

CAUTION:
Be careful not to drop bolts into the torque converter clutch housing.
ST 499977300 CRANK PULLEY WRENCH

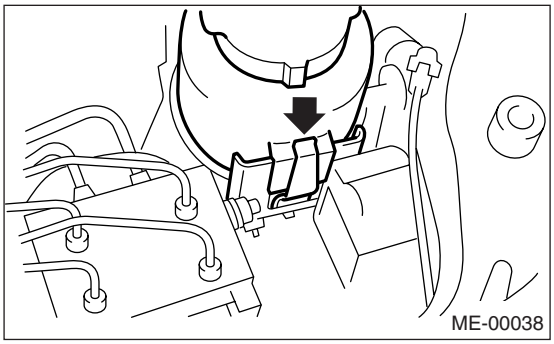
Tightening torque:
25 N·m (2.5 kgf-m, 18.1 ft-lb)



(3) Clog the service hole with plug.
11) Install the fuel filter and bracket.

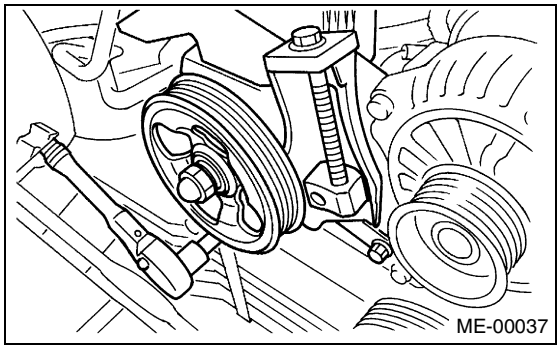


12) Install the power steering pump on bracket.
(1) Install the power steering tank on bracket.

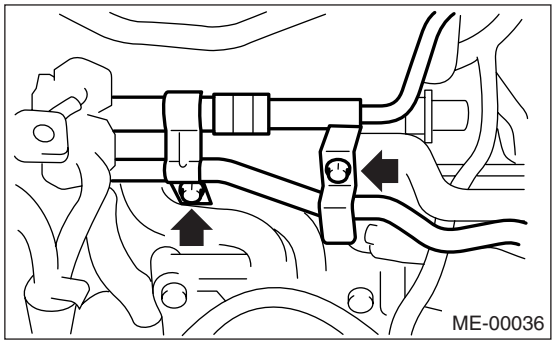


(2) Install the power steering pump.

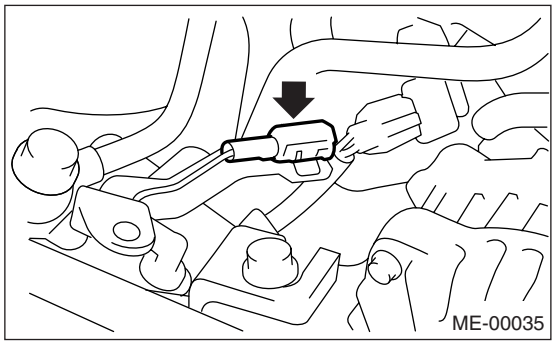
Tightening torque:
20.1 N·m (2.05 kgf-m, 14.8 ft-lb)



(3) Install the power steering pipe bracket on right side intake manifold, and install the spark plug codes.



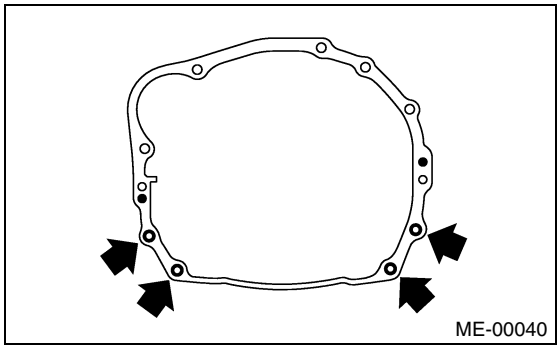
(4) Connect the power steering switch connector.



(5) Install the front side V-belt, and adjust it. <Ref. to ME(H4DOTC)-44, FRONT SIDE BELT, INSTALLATION, V-belt.>
13) Lift-up the vehicle.

14) Tighten the nuts which hold lower side of transmission to engine.

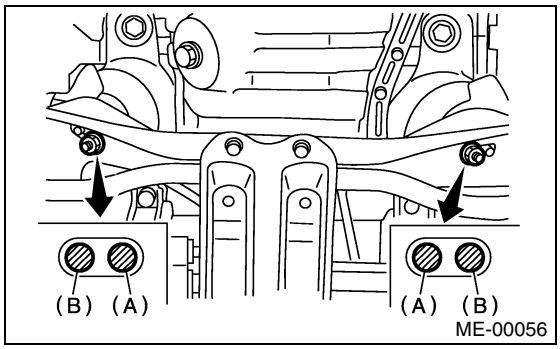
Tightening torque:
50 N·m (5.1 kgf-m, 36.9 ft-lb)



15) Tighten the nuts which install the front cushion rubber onto crossmember.

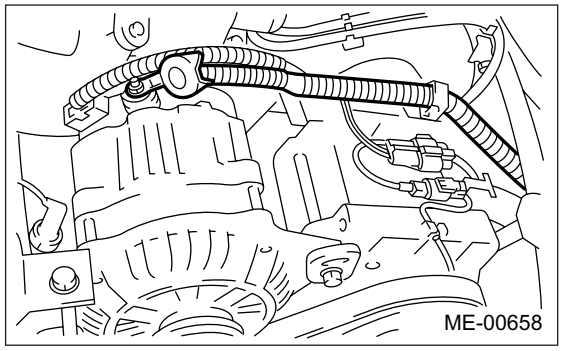
Tightening torque:
83 N·m (8.5 kgf-m, 61 ft-lb)

CAUTION:
Make sure the front cushion rubber mounting bolts (A) and locator (B) are securely installed.



16) Install the ATF cooler pipe to frame. (AT vehicles)
17) Install the center exhaust pipe.
<Ref. to EX(H4DOTC)-9, INSTALLATION, Center Exhaust Pipe.>
18) Lower the vehicle.
19) Connect the following hoses:
(1) Fuel delivery hose, return hose and evaporation hose
(2) Heater inlet and outlet hoses
(3) Brake booster vacuum hose
20) Connect the following connectors and terminals:
(1) Engine ground terminal
(2) Engine harness connectors
(3) Generator connector
(4) Generator terminal

Tightening torque:
5.88 N·m (0.60 kgf-m, 4.34 ft-lb)



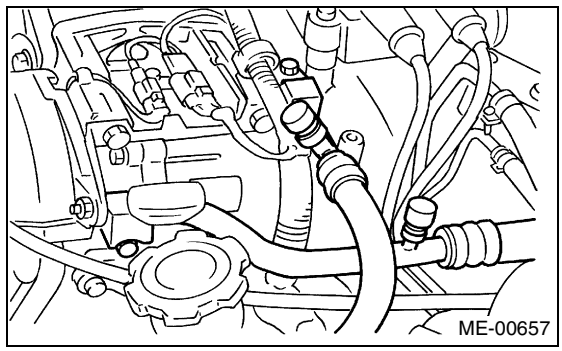
(5) A/C compressor connectors
21) Connect the following cables:
(1) Accelerator cable
(2) Clutch release spring

CAUTION:
After connecting each cable, adjust them.

22) Install the air intake system.
(1) Install the intercooler. <Ref. to IN(H4DOTC)-12, INSTALLATION, Intercooler.>
(2) Install the air cleaner element and air cleaner upper cover.
(3) Install the engine harness connector bracket.
(4) Install the filler hose to air cleaner case.
23) Install the A/C pressure hoses.

CAUTION:
Use new O-rings.

Tightening torque:
25 N·m (2.5 kgf-m, 18.1 ft-lb)



24) Install the radiator. <Ref. to CO(H4SO)-42, INSTALLATION, Radiator.>
25) Install the coolant filler tank. <Ref. to CO(H4SO)-52, INSTALLATION, Coolant Filler Tank.>
26) Install the window washer tank.
27) Install the battery in the vehicle, and connect cables.
28) Fill coolant.

<Ref. to CO(H4SO)-29, FILLING OF ENGINE COOLANT, REPLACEMENT, Engine Coolant.>
29) Charge the A/C system with refrigerant.
<Ref. to AC-17, OPERATION, Refrigerant Charging Procedure.>
30) Remove the front hood stay, and close the front hood.
31) Take off the vehicle from lift arms.

10.Engine Mounting

A: REMOVAL

1) Remove the engine assembly. <Ref. to ME(H4DOTC)-32, REMOVAL, Engine Assembly.>
2) Remove the engine mounting from engine assembly.

B: INSTALLATION

Install in the reverse order of removal.

Tightening torque:
Engine mounting;
34 N·m (3.5 kgf-m, 25.3 ft-lb)

C: INSPECTION

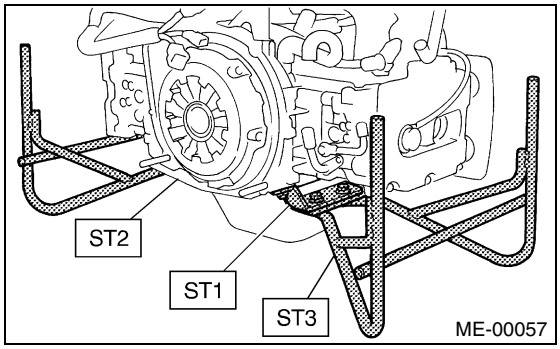
Make sure there are no cracks or other damage.

11.Preparation for Overhaul

A: PROCEDURE

1) After removing the engine from the body, secure it in the ST shown below.

ST1	498457000	ENGINE STAND ADAPTER RH
ST2	498457100	ENGINE STAND ADAPTER LH
ST3	499817000	ENGINE STAND



2) In this section the procedures described under each index are all connected and stated in order. It will be the complete procedure for overhauling of the engine itself when you go through all steps in the process.

Therefore, in this section, to conduct the particular procedure within the flow of a section, you need to go back and conduct the procedure described previously in order to do that particular procedure.

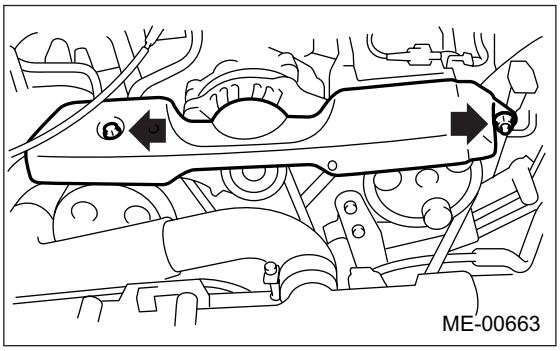
12.V-belt

A: REMOVAL

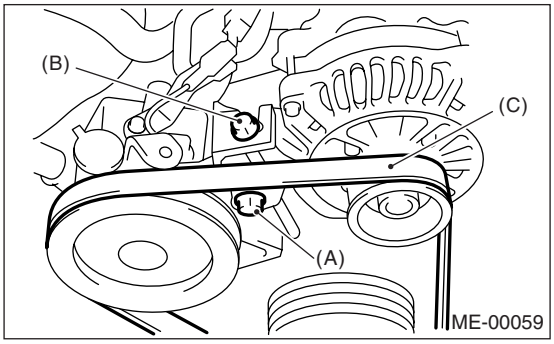
1. FRONT SIDE BELT

NOTE:
Perform the following procedures 1) to 4) with the engine installed to the body.

1) Remove the V-belt cover.

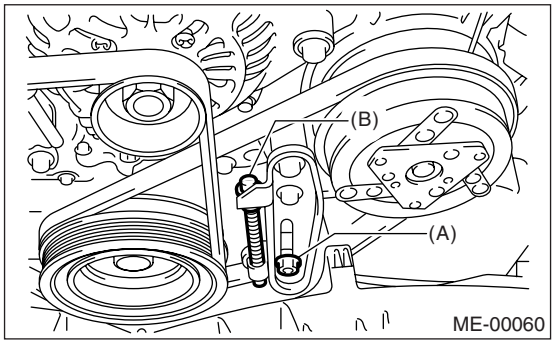


2) Loosen the lock bolt (A).
3) Loosen the slider bolt (B).
4) Remove the front side belt (C).

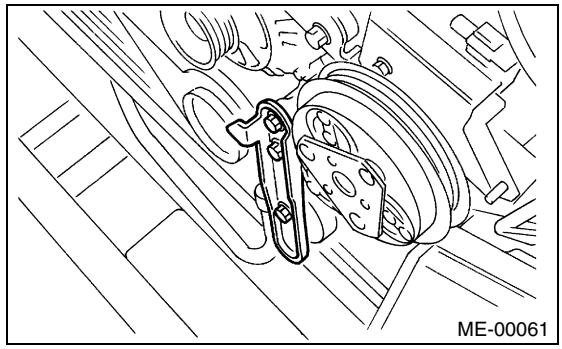


2. REAR SIDE BELT

1) Loosen the lock nut (A).
2) Loosen the slider bolt (B).



3) Remove the A/C belt.
4) Remove the A/C belt tensioner.



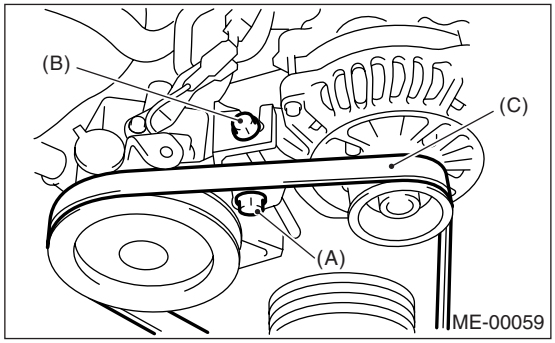
B: INSTALLATION

1. FRONT SIDE BELT

CAUTION:
Wipe off any oil or water on the belt and pulley.

1) Install a belt, and tighten the slider bolt so as to obtain the specified belt tension <Ref. to ME(H4DOTC)-45, INSPECTION, V-belt.>
2) Tighten the lock bolt (A)
3) Tighten the slider bolt (B).

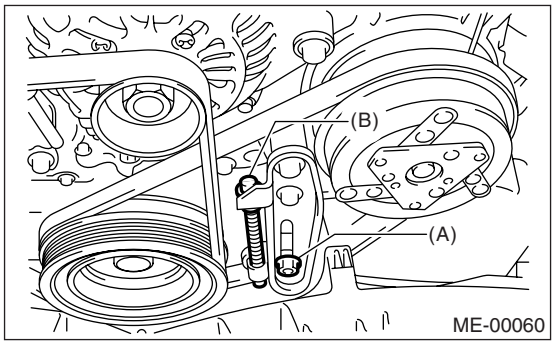
Tightening torque:
Lock bolt through bolt:
25 N·m (2.5 kgf-m, 18 ft-lb)
Slider bolt:
8 N·m (0.8 kgf-m, 5.5 ft-lb)



2. REAR SIDE BELT

1) Install a belt, and tighten the slider bolt (B) so as to obtain the specified belt tension. <Ref. to ME(H4DOTC)-45, INSPECTION, V-belt.>
2) Tighten the lock nut (A).

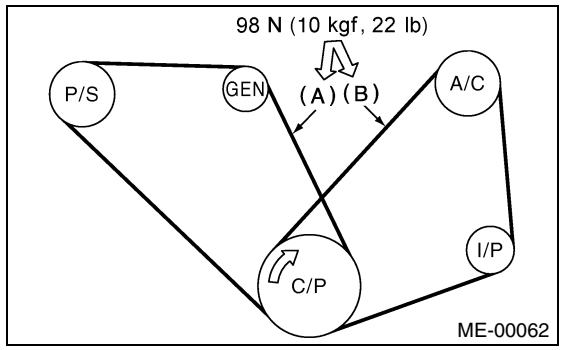
Tightening torque:
Lock nut (A);
22.6 N·m (2.3 kgf-m, 16.6 ft-lb)



C: INSPECTION

1) Replace the belts, if cracks, fraying or wear is found.
2) Check the drive belt tension and adjust it if necessary by changing generator installing position and/or idler pulley installing position.

Belt tension
(A)
replaced: 7 — 9 mm (0.276 — 0.354 in)
reused: 9 — 11 mm (0.354 — 0.433 in)
(B)*
replaced: 7.5 — 8.5 mm (0.295 — 0.335 in)
reused: 9.0 — 10.0 mm (0.354 — 0.394 in)
****: With Air conditioner***

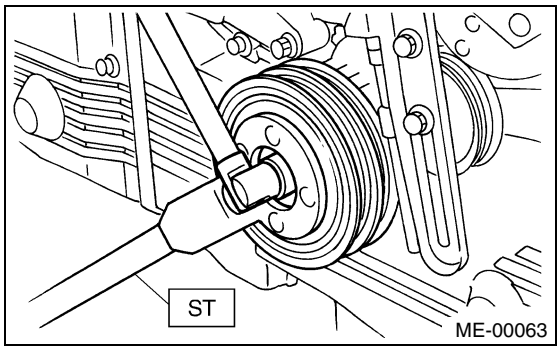


C/P	Crankshaft pulley
GEN	Generator
P/S	Power steering oil pump pulley
A/C	Air conditioning compressor pulley
I/P	Idler pulley

13.Crankshaft Pulley

A: REMOVAL

1) Remove the V-belt. <Ref. to ME(H4DOTC)-44, REMOVAL, V-belt.>
2) Remove the crankshaft pulley bolt. To lock crankshaft, use ST.
ST 499977400 CRANK PULLEY WRENCH

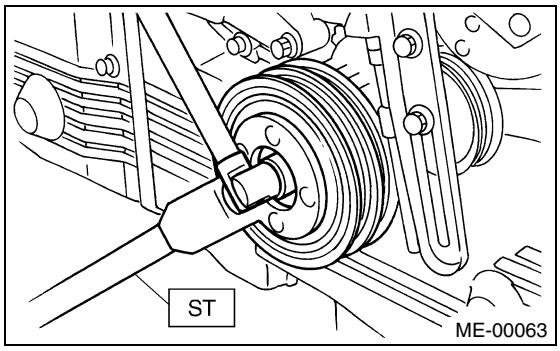


3) Remove the crankshaft pulley.

B: INSTALLATION

1) Install the crankshaft pulley.
2) Install the pulley bolt.
To lock the crankshaft, use ST.
ST 499977400 CRANK PULLEY WRENCH
(1) Clean the crankshaft pulley thread using an air gun.
(2) Apply engine oil to the crankshaft pulley bolt seat and thread.
(3) Tighten the bolts temporarily with tightening torque of 44 N·m (4.5 kgf-m, 33 ft-lb).
(4) Tighten the crankshaft pulley bolts.

Tightening torque:
127 N·m (13 kgf-m, 94.0 ft-lb)



3) Confirm that the tightening angle of the crankshaft pulley bolt is 45 degrees or more. If less than 45 degrees, conduct the following procedures (1) through (4).

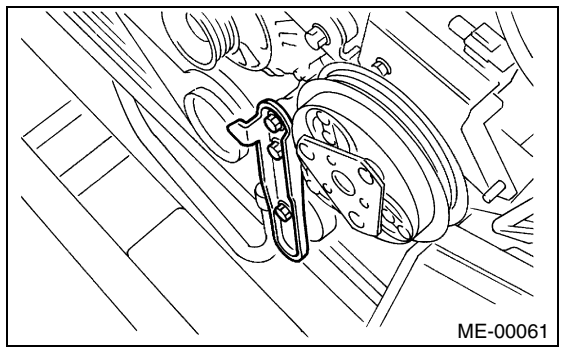
CAUTION:
If the tightening angle of crankshaft pulley bolt is less than 45 degrees, the bolt should be damaged. In this case, the bolt must be replaced.
(1) Replace the crankshaft pulley bolts and clean them.

Crankshaft pulley bolt:
12369AA011

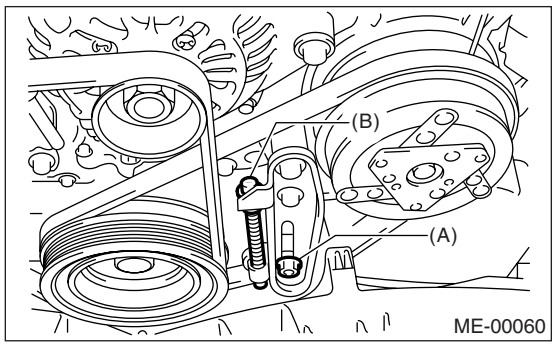
(2) Clean the crankshaft thread using an air gun.
(3) Tighten the bolts temporarily with tightening torque of 44 N·m (4.5 kgf-m, 33 ft-lb).
(4) Tighten the crankshaft pulley bolts for a further angle of 45 — 60 degrees.

CAUTION:
Conduct the tightening procedures by confirming the turning angle of the crankshaft pulley bolt referring to the gauge indicated on the belt cover.

4) Install the A/C belt tensioner.



5) Instal the V-belt. <Ref. to ME(H4DOTC)-44, FRONT SIDE BELT, INSTALLATION, V-belt.>



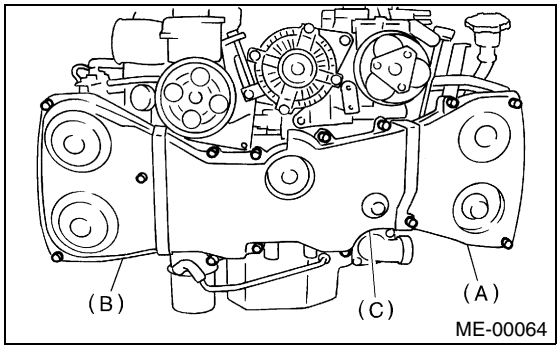
C: INSPECTION

1) Make sure the V-belt is not worn or otherwise damaged.
2) Check the tension of the belt. <Ref. to ME(H4DOTC)-45, INSPECTION, V-belt.>

14.Belt Cover

A: REMOVAL

1) Remove the V-belt. <Ref. to ME(H4DOTC)-44, REMOVAL, V-belt.>
2) Remove the crankshaft pulley. <Ref. to ME(H4DOTC)-46, REMOVAL, Crankshaft Pulley.>
3) Remove the left-hand belt cover (A).
4) Remove the right-hand belt cover (B).
5) Remove the front belt cover (C).



B: INSTALLATION

1) Install the front belt cover (C).

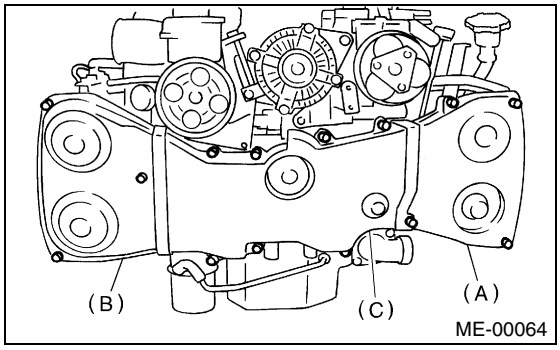
Tightening torque:
5 N·m (0.5 kgf-m, 3.6 ft-lb)

2) Install the right-hand belt cover (B).

Tightening torque:
5 N·m (0.5 kgf-m, 3.6 ft-lb)

3) Install the left-hand belt cover (A).

Tightening torque:
5 N·m (0.5 kgf-m, 3.6 ft-lb)



4) Install the crankshaft pulley. <Ref. to ME(H4DOTC)-46, INSTALLATION, Crankshaft Pulley.>
5) Install the V-belt. <Ref. to ME(H4DOTC)-44, INSTALLATION, V-belt.>

C: INSPECTION

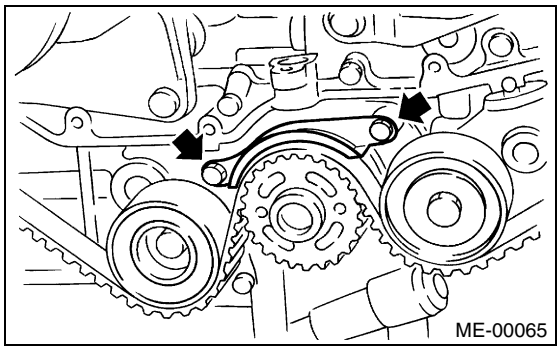
Make sure the cover is not damaged.

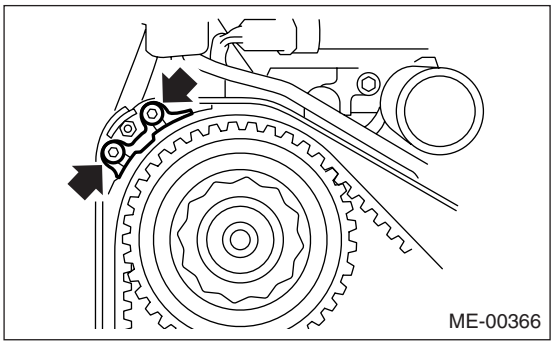
15.Timing Belt Assembly

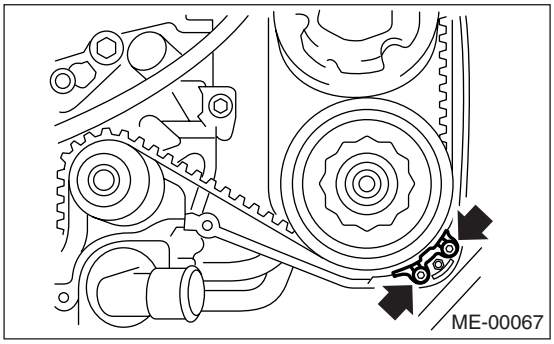
A: REMOVAL

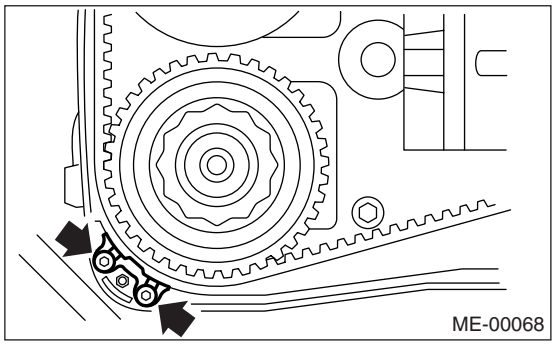
1. TIMING BELT

1) Remove the V-belt. <Ref. to ME(H4DOTC)-44, REMOVAL, V-belt.>
2) Remove the crankshaft pulley. <Ref. to ME(H4DOTC)-46, REMOVAL, Crankshaft Pulley.>
3) Remove the belt cover. <Ref. to ME(H4DOTC)-47, REMOVAL, Belt Cover.>
4) Remove the timing belt guides. (MT vehicle)


ME-00065

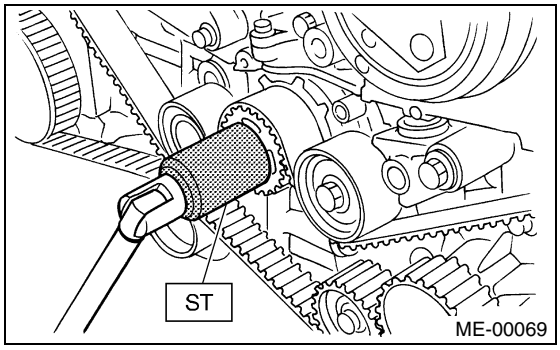

ME-00366


ME-00067


ME-00068

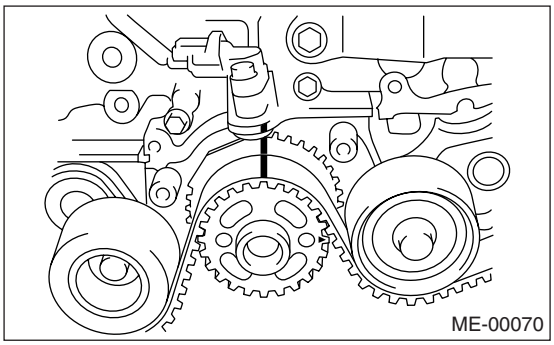
5) If the alignment mark and/or arrow mark (which indicates rotation direction) on timing belt fade away, put new marks before removing the timing belt as follows:
   (1) Turn the crankshaft using ST, and align alignment marks on crankshaft sprocket, left-hand intake camshaft sprocket, left-hand exhaust camshaft sprocket, right-hand intake camshaft sprocket and right hand exhaust camshaft sprocket with notches of belt cover and cylinder block.

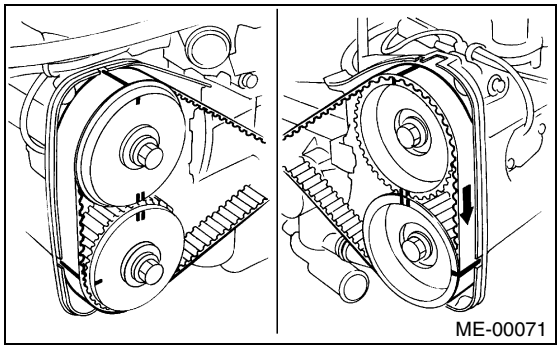
ST 499987500 CRANKSHAFT SOCKET



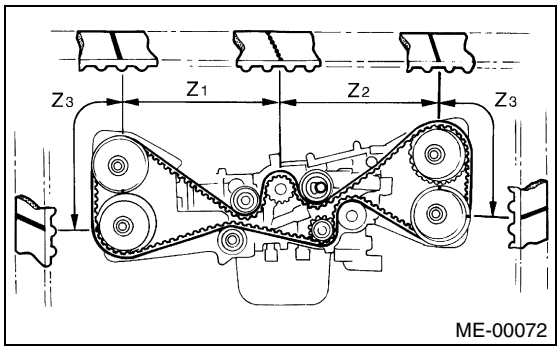
ME-00069

(2) Using white paint, put alignment and/or arrow marks on the timing belts in relation to the sprockets.


ME-00070

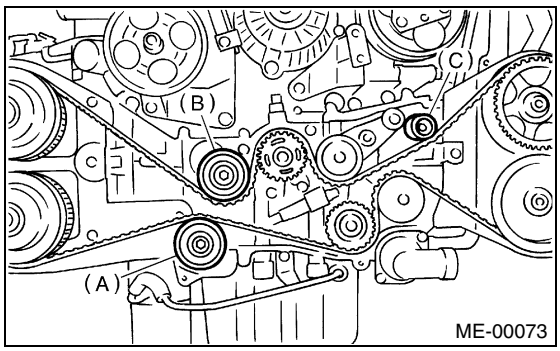

ME-00071

Z_1: 54.5 tooth length
Z_2: 51 tooth length
Z_3: 28 tooth length



ME-00072

6) Remove the belt idler (A).



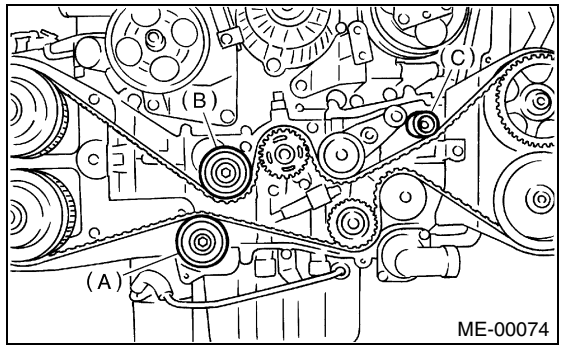
ME-00073

7) Remove the timing belt.

CAUTION:
After the timing belt has been removed, never rotate the intake and exhaust, camshaft sprocket. If the camshaft sprocket is rotated, the intake and exhaust valve heads strike together and valve stems are bent.

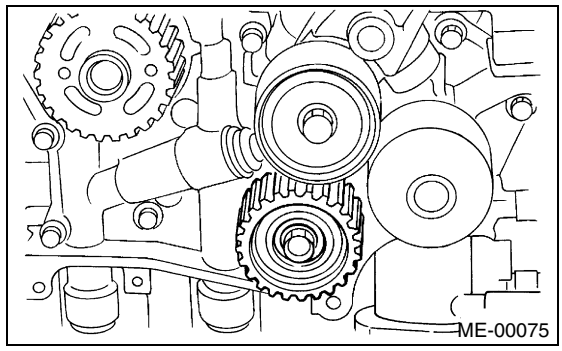
2. BELT IDLER AND AUTOMATIC BELT TENSION ADJUSTER ASSEMBLY

1) Remove the belt idler (B) and (C).

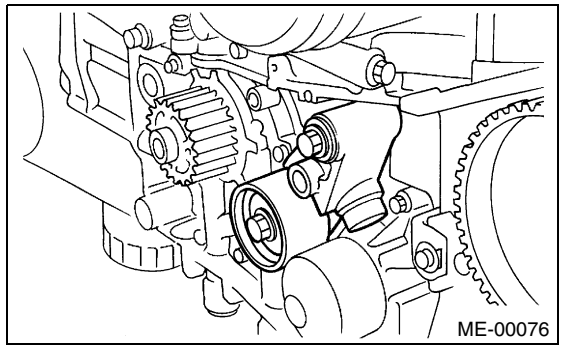


ME-00074

2) Remove the belt idler No. 2.


ME-00075

3) Remove the automatic belt tension adjuster assembly.


ME-00076

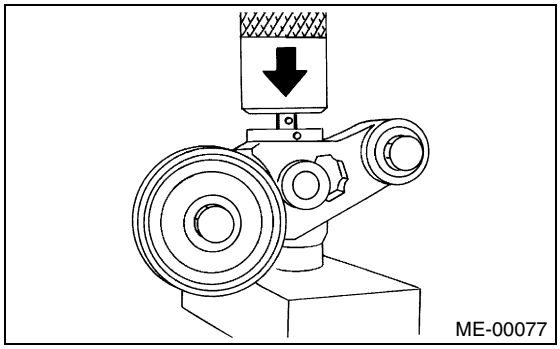
B: INSTALLATION

1. AUTOMATIC BELT TENSION ADJUSTER ASSEMBLY AND BELT IDLER

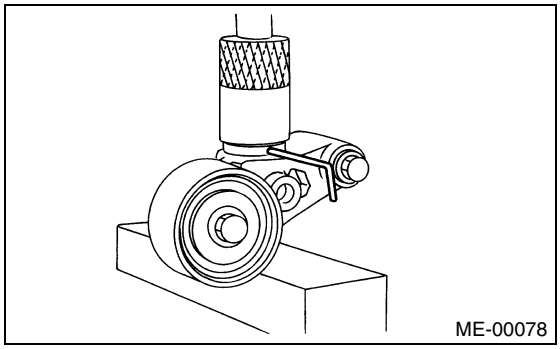
1) Preparation for installation of automatic belt tension adjuster assembly:

CAUTION:
• Always use a vertical type pressing tool to move the adjuster rod down.
• Do not use a lateral type vise.
• Push the adjuster rod vertically.
• Be sure to slowly move the adjuster rod down applying a pressure of 294 N (30 kgf, 66 lb).
• Press-in the push adjuster rod gradually taking more than three minutes.
• Do not allow press pressure to exceed 9,807 N (1,000 kgf, 2,205 lb).
• Press the adjuster rod as far as the end surface of the cylinder. Do not press the adjuster rod into the cylinder. Doing so may damage the cylinder.
• Do not release the press pressure until stopper pin is completely inserted.

(1) Attach the automatic belt tension adjuster assembly to the vertical pressing tool.
(2) Slowly move the adjuster rod down with a pressure of 294 N (30 kgf, 66 lb) until the adjuster rod is aligned with the stopper pin hole in the cylinder.

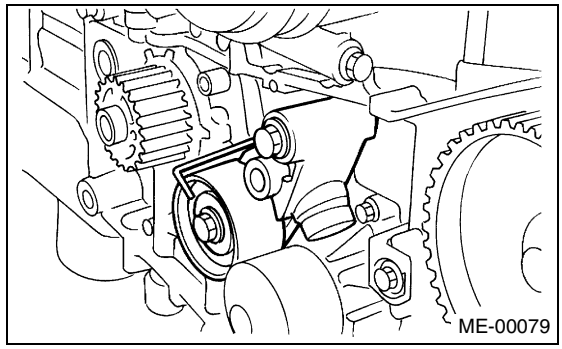

ME-00077

(3) With a 2 mm (0.08 in) dia. stopper pin or a 2 mm (0.08 in) (nominal) dia. hex bar wrench inserted into the stopper pin hole in the cylinder, secure the adjuster rod.


ME-00078

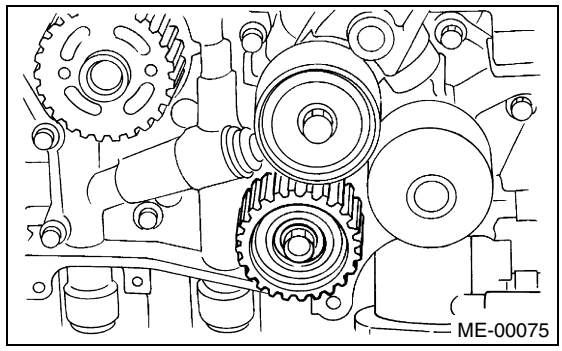
2) Install the automatic belt tension adjuster assembly.

Tightening torque:
39 N·m (4.0 kgf-m, 28.9 ft-lb)


ME-00079

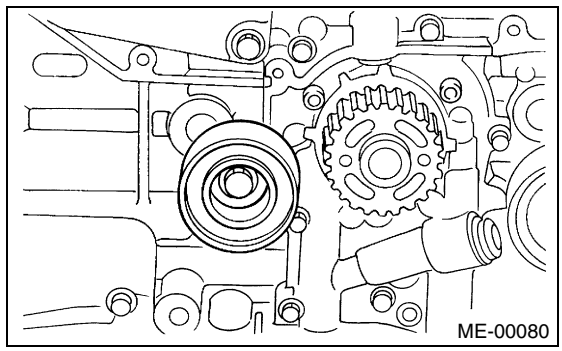
3) Install the belt idler No. 2.

Tightening torque:
39 N·m (4.0 kgf-m, 28.9 ft-lb)


ME-00075

4) Install the belt idler.

Tightening torque:
39 N·m (4.0 kgf-m, 28.9 ft-lb)

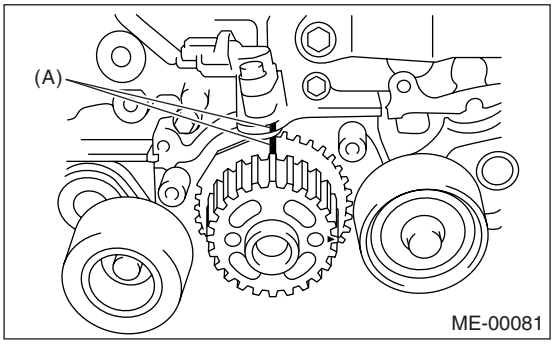

ME-00080

2. TIMING BELT

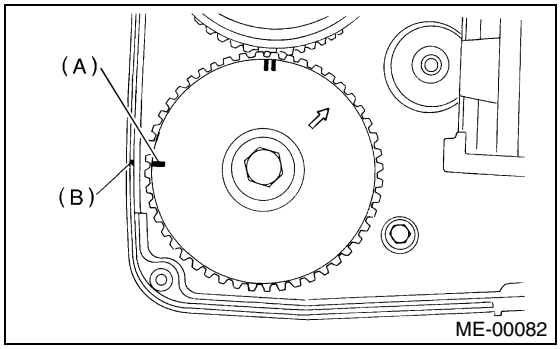
1) Preparation for installation of automatic belt tension adjuster assembly. <Ref. to ME(H4DOTC)-50, AUTOMATIC BELT TENSION ADJUSTER ASSEMBLY AND BELT IDLER, Timing Belt Assembly.>

2) Crankshaft and camshaft sprocket alignment.

(1) Align mark (A) on the crankshaft sprocket with mark on the oil pump cover at cylinder block.

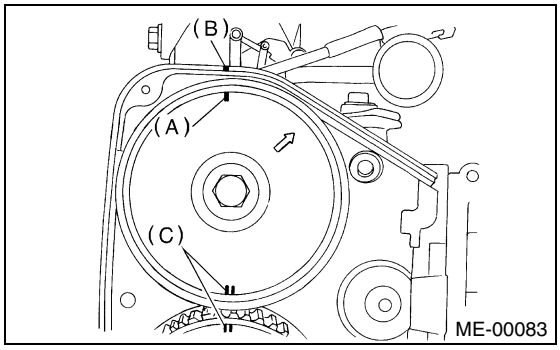


(2) Align single line mark (A) on the right-hand exhaust camshaft sprocket with notch (B) on belt cover.

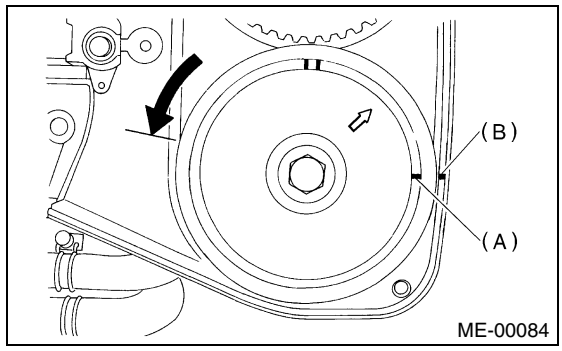


(3) Align single line mark (A) on the right-hand intake camshaft sprocket with notch (B) on belt cover.

(Make sure double lines (C) on intake camshaft and exhaust camshaft sprockets are aligned.)

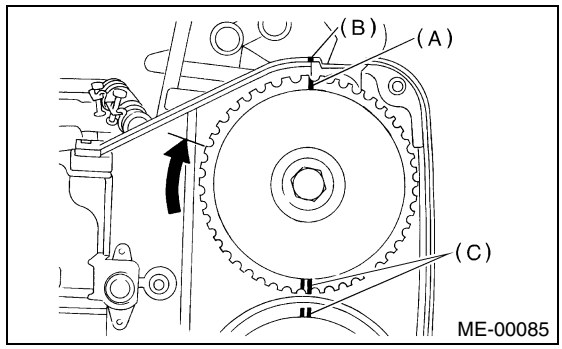


(4) Align single line mark (A) on left-hand exhaust camshaft sprocket with notch (B) on belt cover by turning the sprocket counterclockwise (as viewed from front of engine).



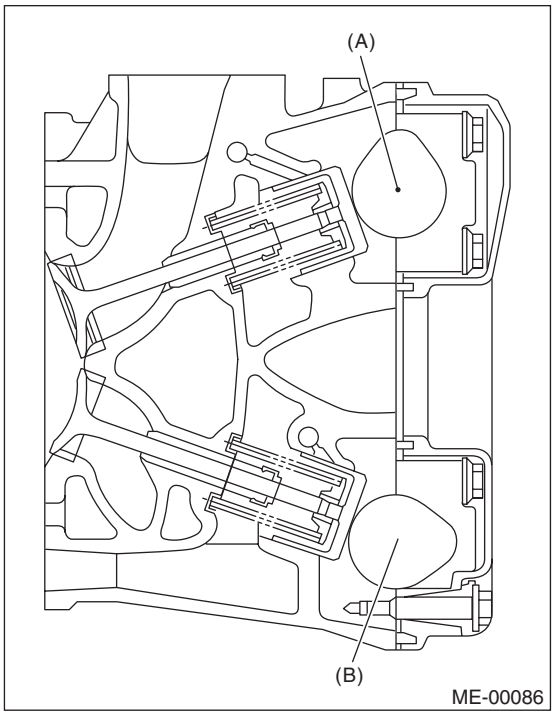
(5) Align single line mark (A) on left-hand intake camshaft sprocket with notch (B) on belt cover by turning the sprocket clockwise (as viewed from front of engine).

Ensure double lines (C) on intake and exhaust camshaft sprockets are aligned.



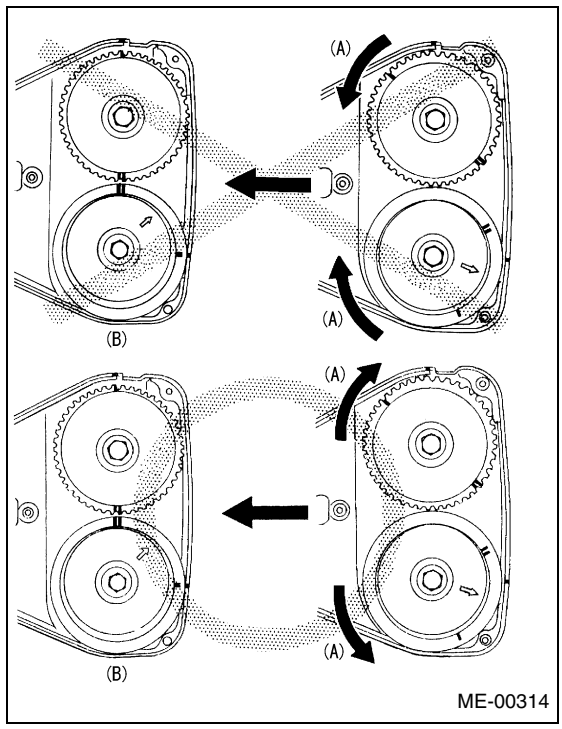
(6) Ensure camshaft and crankshaft sprockets are positioned properly.

CAUTION:
• Intake and exhaust camshafts for this DOHC engine can be independently rotated with the timing belts removed. As can be seen from the figure, if the intake and exhaust valves are lifted simultaneously, their heads will interfere with each other, resulting in bent valves.



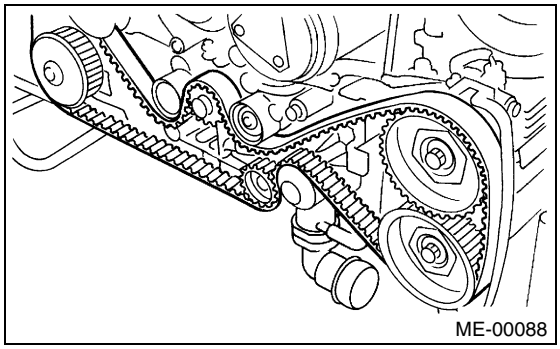
(A) Intake camshaft
(B) Exhaust camshaft

• When the timing belts are not installed, four camshafts are held at the "zero-lift" position, where all cams on camshafts do not push the intake and exhaust valves down. (Under this condition, all valves remain unlifted.)
• When the camshafts are rotated to install the timing belts, #2 intake and #4 exhaust cam of left-hand camshafts are held to push their corresponding valves down. (Under this condition, these valves are held lifted.) Right-side camshafts are held so that their cams do not push valves down.
• Left-hand camshafts must be rotated from the "zero-lift" position to the position where the timing belt is to be installed at as small an angle as possible, in order to prevent mutual interference of intake and exhaust valve heads.
• Do not allow the camshafts to rotate in the direction shown in the figure as this causes both intake and exhaust valves to lift simultaneously, resulting in interference with their heads.



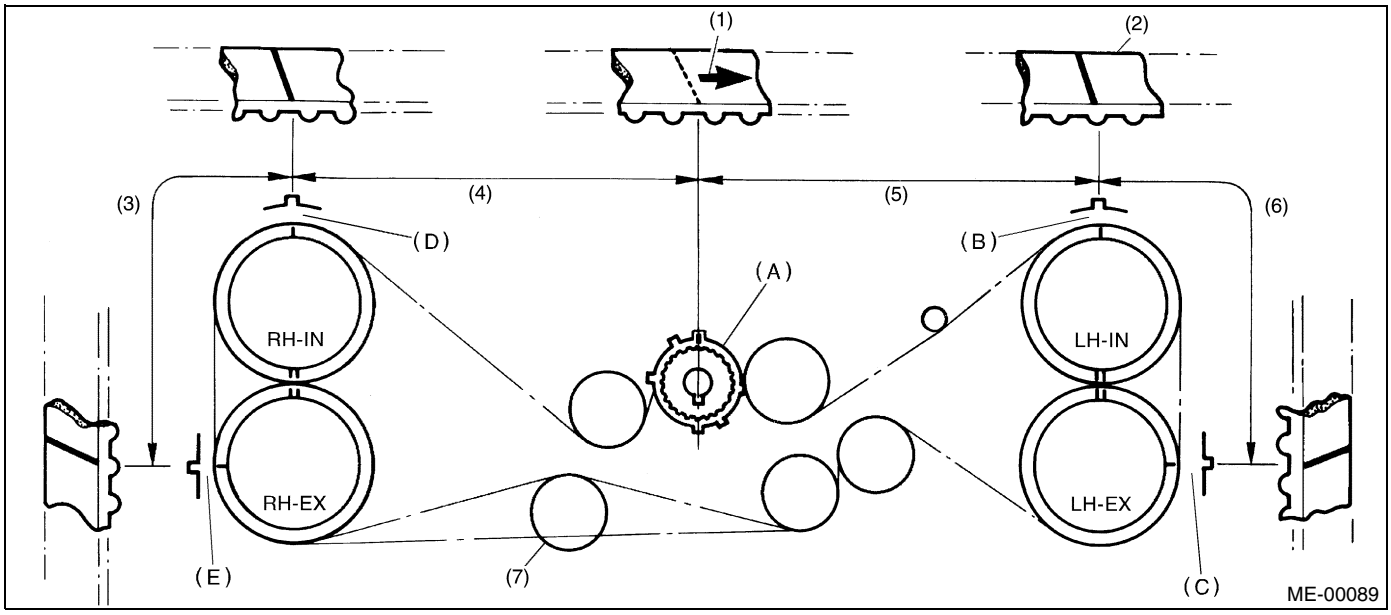
(A) Rotate direction
(B) Timing belt set position

3) Installation of timing belt:



Align the alignment mark on the timing belt with marks on the sprockets in the alphabetical order shown in the figure. While aligning marks, position the timing belt properly.

CAUTION:
• Disengagement of more than three timing belt teeth may result in interference between the valve and piston.
• Ensure the belt's rotating direction is correct.

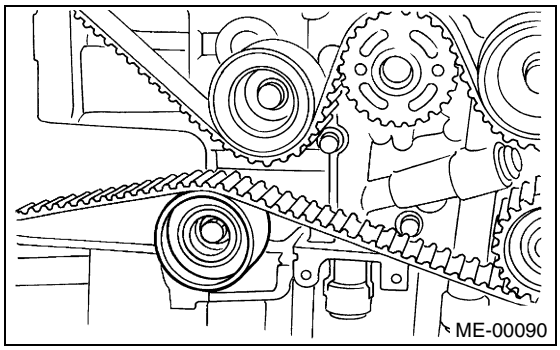


(1)	Arrow mark	(4)	54.5 tooth length	(7)	Install last
(2)	Timing belt	(5)	51 tooth length		
(3)	28 tooth length	(6)	28 tooth length		

4) Install the belt idlers.

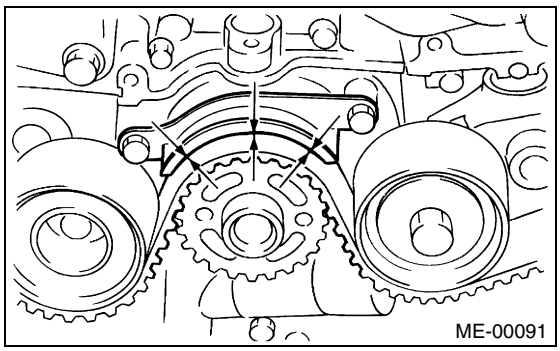
Tightening torque:
39 N·m (4.0 kgf-m, 28.9 ft-lb)

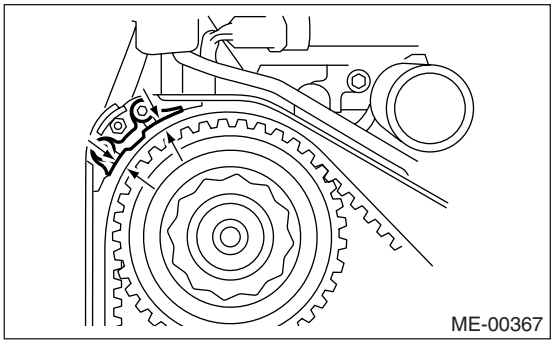
CAUTION:
Make sure that the marks on the timing belt and sprockets are aligned.

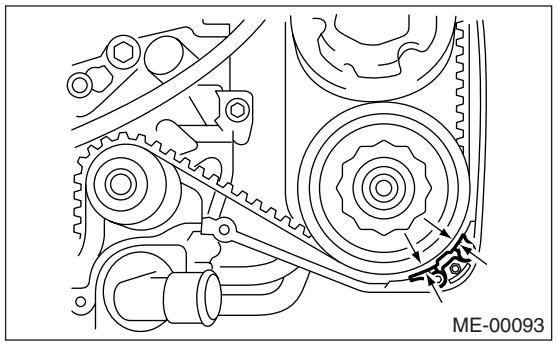


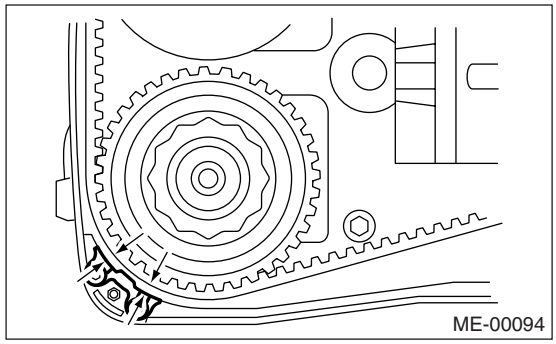
5) After ensuring that the marks on the timing belt and sprockets are aligned, remove the stopper pin from tensioner adjuster.
6) Install the timing belt guide. (MT vehicle)
(1) Temporarily tighten the bolts.
(2) Check and adjust clearance between the timing belt and timing belt guide.

Clearance:
1.0±0.5 mm (0.039±0.020 in)



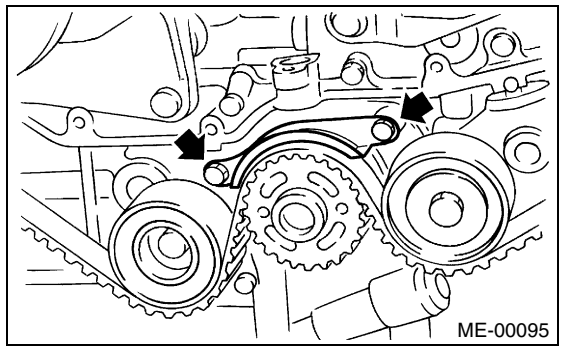


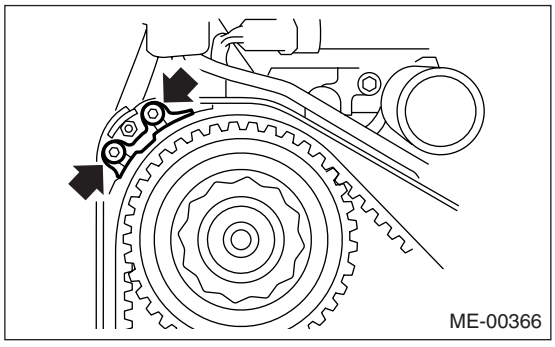


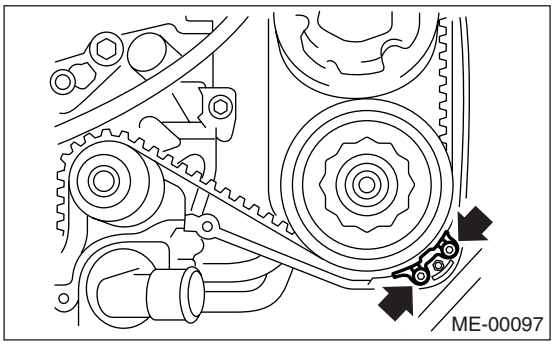


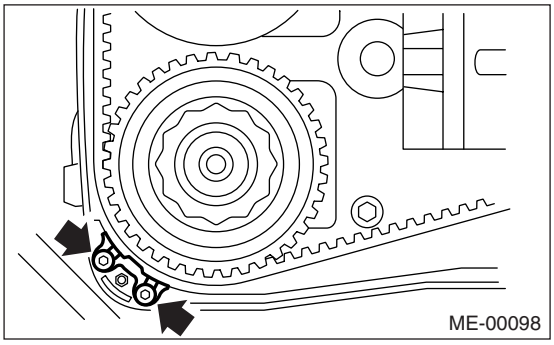
(3) Tighten the remaining bolts.

Tightening torque:
9.8 N·m (1.0 kgf-m, 7.2 ft-lb)









7) Install the belt cover. <Ref. to ME(H4DOTC)-47, INSTALLATION, Belt Cover.>
8) Install the crankshaft pulley. <Ref. to ME(H4DOTC)-46, REMOVAL, Crankshaft Pulley.>
9) Install the V-belt. <Ref. to ME(H4DOTC)-44, INSTALLATION, V-belt.>

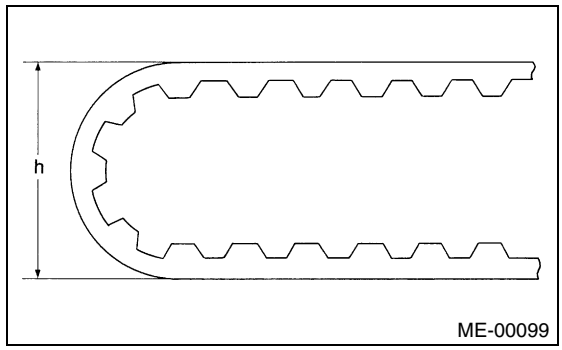
C: INSPECTION

1. TIMING BELT

1) Check the timing belt teeth for breaks, cracks, and wear. If any fault is found, replace the belt.
2) Check the condition of back side of belt; if any crack is found, replace the belt.

CAUTION:
• Be careful not to let oil, grease or coolant contact the belt. Remove quickly and thoroughly if this happens.
• Do not bend the belt sharply.

Bending radius: h
60 mm (2.36 in) or more



2. AUTOMATIC BELT TENSION ADJUSTER

1) Visually check the oil seals for leaks, and rod ends for abnormal wear or scratches. If necessary, replace the automatic belt tension adjuster assembly.

CAUTION:
Slight traces of oil at rod's oil seal does not indicate the a problem.

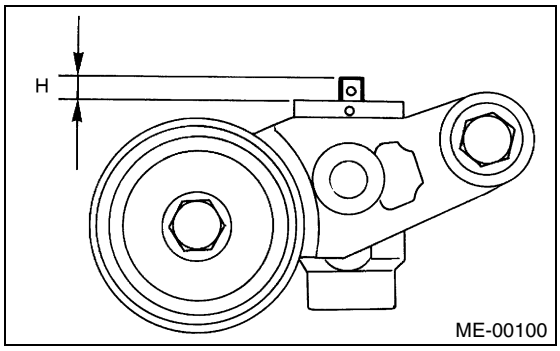
2) Check that the adjuster rod does not move when a pressure of 294 N (30 kgf, 66 lb) is applied to it. This is to check adjuster rod stiffness.
3) If the adjuster rod is not stiff and moves freely when applying 294 N (30 kgf, 66 lb), check it using the following procedures:
(1) Slowly press the adjuster rod down to the end surface of the cylinder. Repeat this motion 2 or 3 times.
(2) With the adjuster rod moved all the way up, apply a pressure of 294 N (30 kgf, 66 lb) to it. Check the adjuster rod stiffness.
(3) If the the adjuster rod is not stiff and moves down, replace the automatic belt tension adjuster assembly with a new one.

CAUTION:
• Always use a vertical type pressing tool to move the adjuster rod down.
• Do not use a lateral type vise.

• Push the adjuster rod vertically.
• Press-in the push adjuster rod gradually taking more than three minutes.
• Do not allow press pressure to exceed 9,807 N (1,000 kgf, 2,205 lb).
• Press the adjuster rod as far as the end surface of the cylinder. Do not press the adjuster rod into the cylinder. Doing so may damage the cylinder.

4) Measure the extension of rod beyond the body. If it is not within specifications, replace with a new one.

Rod extension: H
5.7±0.5 mm (0.224±0.020 in)



3. BELT TENSION PULLEY

1) Check the mating surfaces of timing belt and contact point of adjuster rod for abnormal wear or scratches. Replace the belt tension pulley if faulty.
2) Check the belt tension pulley for smooth rotation. Replace if noise or excessive play is noted.
3) Check the belt tension pulley for grease leakage.

4. BELT IDLER

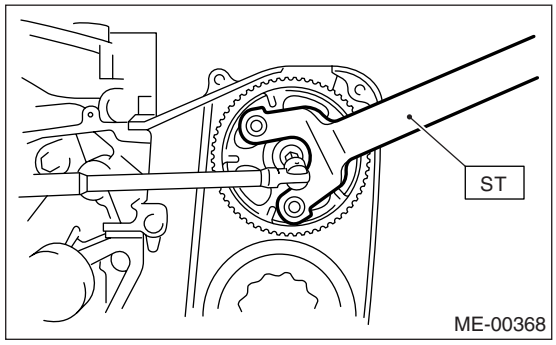
1) Check the idler for smooth rotation. Replace if noise or excessive play is noted.
2) Check the outer contacting surfaces of idler pulley for abnormal wear and scratches.
3) Check the idler for grease leakage.

16.Camshaft Sprocket

A: REMOVAL

1) Remove the V-belt. <Ref. to ME(H4DOTC)-44, REMOVAL, V-belt.>
2) Remove the crankshaft pulley. <Ref. to ME(H4DOTC)-46, REMOVAL, Crankshaft Pulley.>
3) Remove the belt cover. <Ref. to ME(H4DOTC)-47, REMOVAL, Belt Cover.>
4) Remove the timing belt assembly. <Ref. to ME(H4DOTC)-48, REMOVAL, Timing Belt Assembly.>
5) Remove the camshaft position sensor. <Ref. to FU(H4DOTC)-31, REMOVAL, Camshaft Position Sensor.>
6) Remove the camshaft sprockets. To lock the camshaft, use ST.

ST	18231AA010	CAMSHAFT SPROCKET WRENCH (Intake LH)
ST	499207400	CAMSHAFT SPROCKET WRENCH (Except intake LH)



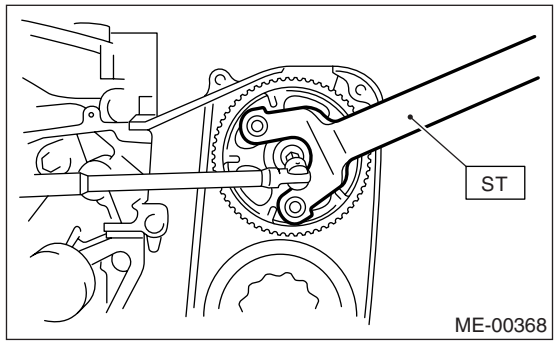
B: INSTALLATION

1) Install the camshaft sprocket No. 1. and No. 2. To lock camshaft, use ST.

ST	18231AA010	CAMSHAFT SPROCKET WRENCH (Intake LH)
ST	499207400	CAMSHAFT SPROCKET WRENCH (Except intake LH)

Tightening torque:
98 N·m (10 kgf-m, 72.4 ft-lb)

CAUTION:
Do not confuse left and right side intake camshaft sprockets during installation. The intake camshaft sprocket LH is identified by a projection used to monitor camshaft position sensor.



2) Install the camshaft position sensor. <Ref. to FU(H4DOTC)-31, INSTALLATION, Camshaft Position Sensor.>
3) Install the timing belt assembly. <Ref. to ME(H4DOTC)-50, INSTALLATION, Timing Belt Assembly.>
4) Install the belt cover. <Ref. to ME(H4DOTC)-47, INSTALLATION, Belt Cover.>
5) Install the crankshaft pulley. <Ref. to ME(H4DOTC)-46, INSTALLATION, Crankshaft Pulley.>
6) Install the V-belt. <Ref. to ME(H4DOTC)-44, INSTALLATION, V-belt.>

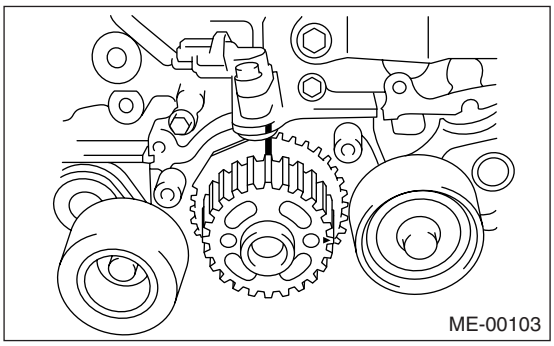
C: INSPECTION

1) Check the sprocket teeth for abnormal wear and scratches.
2) Make sure there is no free play between sprocket and key.
3) Check the crankshaft sprocket notch used for sensor for damage and contamination of foreign matter.

17.Crankshaft Sprocket

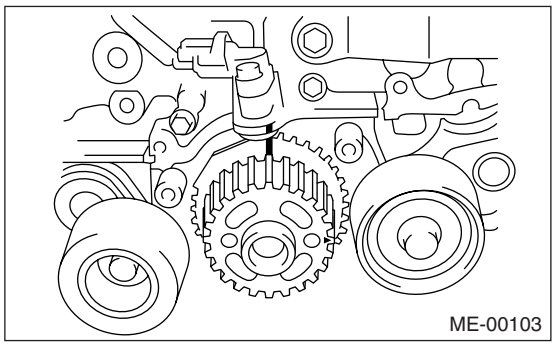
A: REMOVAL

1) Remove the V-belt. <Ref. to ME(H4DOTC)-44, REMOVAL, V-belt.>
2) Remove the crankshaft pulley. <Ref. to ME(H4DOTC)-46, REMOVAL, Crankshaft Pulley.>
3) Remove the belt cover. <Ref. to ME(H4DOTC)-47, REMOVAL, Belt Cover.>
4) Remove the timing belt assembly. <Ref. to ME(H4DOTC)-48, REMOVAL, Timing Belt Assembly.>
5) Remove the camshaft sprocket. <Ref. to ME(H4DOTC)-57, REMOVAL, Camshaft Sprocket.>
6) Remove the crankshaft sprocket.



B: INSTALLATION

1) Install the crankshaft sprocket.



2) Install the camshaft sprocket. <Ref. to ME(H4DOTC)-57, INSTALLATION, Camshaft Sprocket.>
3) Install the timing belt assembly. <Ref. to ME(H4DOTC)-50, INSTALLATION, Timing Belt Assembly.>
4) Install the belt cover. <Ref. to ME(H4DOTC)-47, INSTALLATION, Belt Cover.>
5) Install the crankshaft pulley. <Ref. to ME(H4DOTC)-46, INSTALLATION, Crankshaft Pulley.>
6) Install the V-belt. <Ref. to ME(H4DOTC)-44, INSTALLATION, V-belt.>

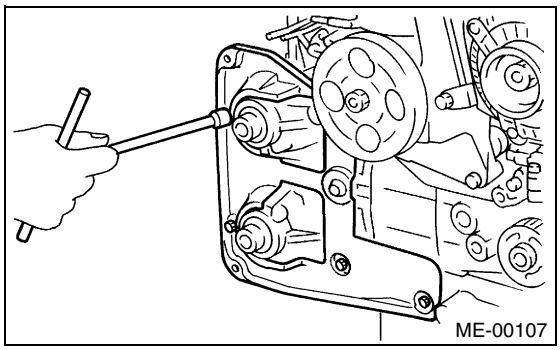
C: INSPECTION

1) Check the sprocket teeth for abnormal wear and scratches.
2) Make sure there is no free play between sprocket and key.
3) Check the crankshaft sprocket notch used for sensor for damage and contamination of foreign matter.

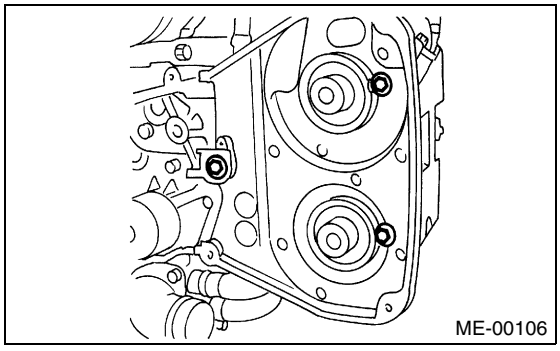
18.Camshaft

A: REMOVAL

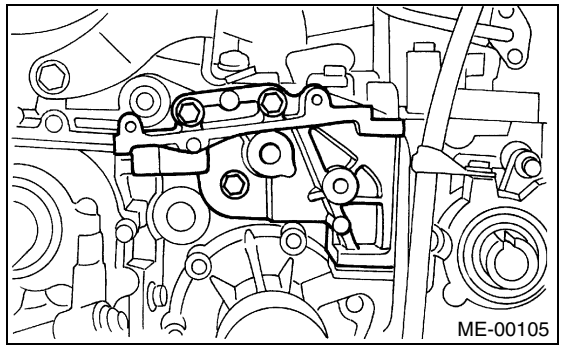
1) Remove the V-belt. <Ref. to ME(H4DOTC)-44, INSTALLATION, V-belt.>
2) Remove the crankshaft pulley. <Ref. to ME(H4DOTC)-46, REMOVAL, Crankshaft Pulley.>
3) Remove the belt cover. <Ref. to ME(H4DOTC)-47, REMOVAL, Belt Cover.>
4) Remove the timing belt assembly. <Ref. to ME(H4DOTC)-48, REMOVAL, Timing Belt Assembly.>
5) Remove the camshaft sprocket. <Ref. to ME(H4DOTC)-57, REMOVAL, Camshaft Sprocket.>
6) Remove the crankshaft sprocket. <Ref. to ME(H4DOTC)-58, REMOVAL, Crankshaft Sprocket.>
7) Remove the right-hand belt cover No.2.


ME-00107

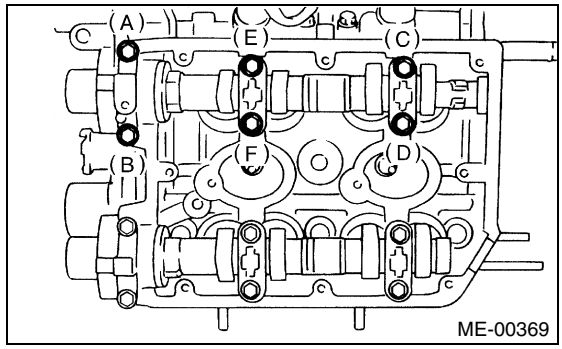
8) Remove the left-hand belt cover No. 2.


ME-00106

9) Remove the tensioner bracket.

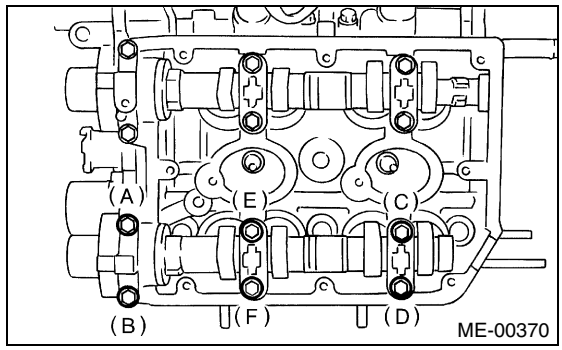

ME-00105

10) Remove the oil level gauge guide. (LH side only)
11) Remove the spark plug cord.
12) Remove the rocker cover and gasket.
13) Loosen the intake camshaft cap bolts equally, a little at a time in alphabetical sequence shown in the figure.



ME-00369

14) Remove the camshaft caps and intake camshaft.
15) Loosen the exhaust camshaft cap bolts equally, a little at a time in alphabetical sequence shown in the figure.



ME-00370

16) Remove the camshaft caps and exhaust camshaft.

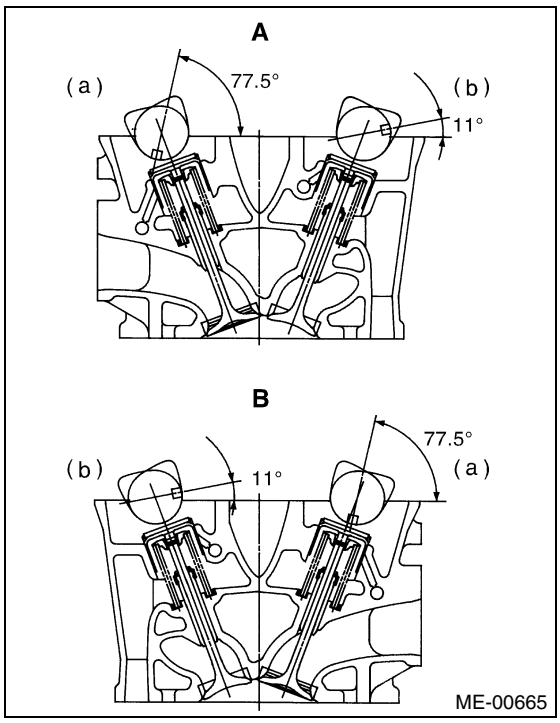
CAUTION:
Arrange camshaft caps in order so that they can be installed in their original positions.

17) Similarly, remove the right-hand camshafts and related parts.

B: INSTALLATION

1) Camshaft installation:
Apply engine oil to the cylinder head at camshaft bearing location before installing the camshaft. Install the camshaft so that each valves is close to or in contact with “base circle” of cam lobe.

CAUTION:
• When the camshafts are positioned as shown in the figure, camshafts need to be rotated at a minimum to align with the timing belt during installation.
• Right-hand camshaft need not be rotated when set at the position shown in the figure.
Left-hand intake camshaft: Rotate 80° clockwise.
Left-hand exhaust camshaft: Rotate 45° counterclockwise.

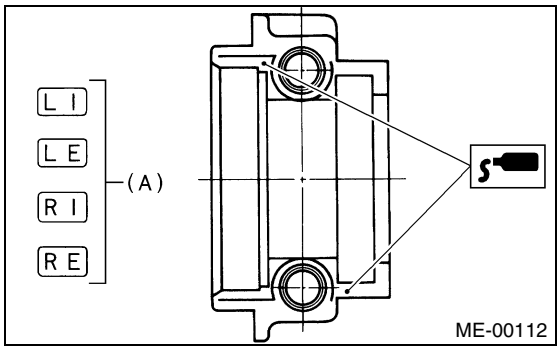


A Left side cylinder head
B Right side cylinder head
(a) Intake camshaft
(b) Exhaust camshaft

2) Camshaft cap installation:
(1) Apply fluid packing sparingly to the cap mating surface.

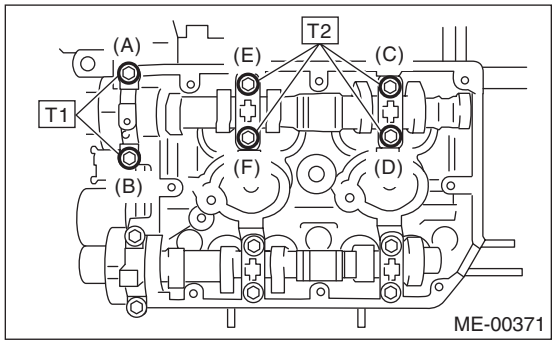
CAUTION:
Do not apply fluid packing excessively. Failure to do so may cause excess packing to come out and flow toward oil seal, resulting in oil leaks.

Fluid packing:
THREE BOND 1215 (Part No. 004403007) or equivalent



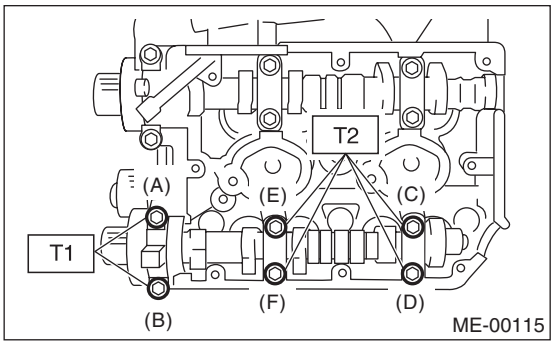
(2) Apply engine oil to cap bearing surface and install the cap on camshaft as shown by identification mark (A).
(3) Gradually tighten the cap in at least two stages in alphabetical sequence shown in the figure, and then tighten to specified torque.

Tightening torque:
T1: 10 N·m (1.0 kgf-m, 7.2 ft-lb)
T2: 20 N·m (2.0 kgf-m, 14.5 ft-lb)



(4) Similarly, tighten the cap on exhaust side.
After tightening the cap, ensure the camshaft rotates only slightly while holding it at “base” circle.

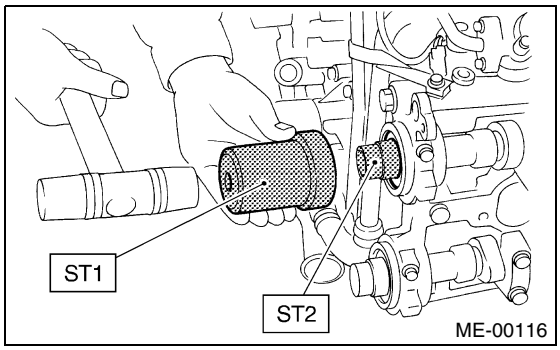
Tightening torque:
T1: 10 N·m (1.0 kgf-m, 7.2 ft-lb)
T2: 20 N·m (2.0 kgf-m, 14.5 ft-lb)



3) Camshaft oil seal installation:
Apply grease to the new oil seal lips and press onto the front end of camshaft by using ST1 and ST2.

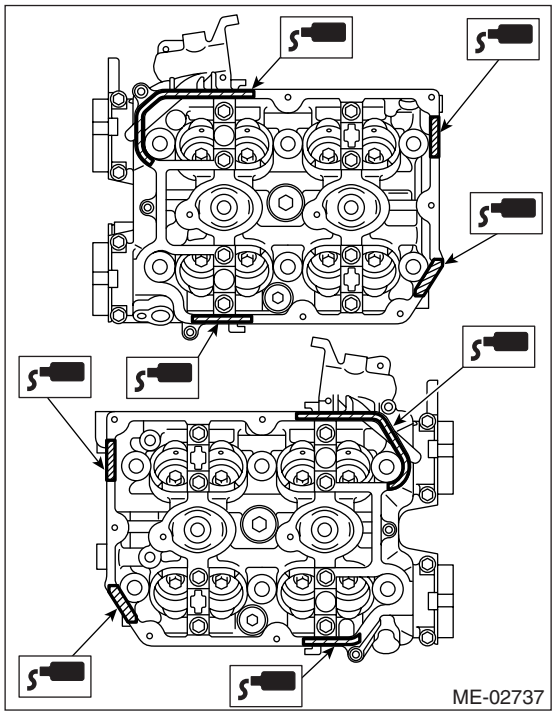
CAUTION:
Use a new oil seal.

ST1 499587600 OIL SEAL INSTALLER
ST2 499597200 OIL SEAL GUIDE



4) Rocker cover installation:
(1) Install the gasket on rocker cover.
Install the peripheral gasket and ignition coil gasket.
(2) Apply fluid packing to the specified point of cylinder head.

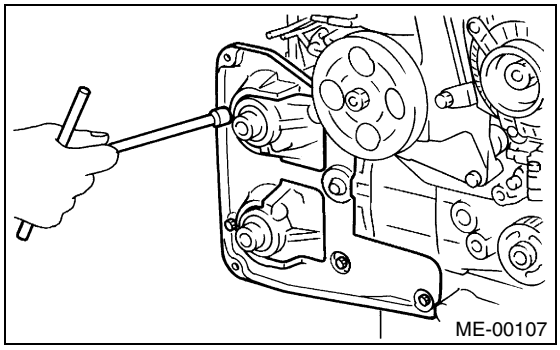
Fluid packing:
THREE BOND 1215 (Part No. 004403007) or equivalent



(3) Install the rocker cover on cylinder head.
Ensure the gasket is properly positioned during installation.

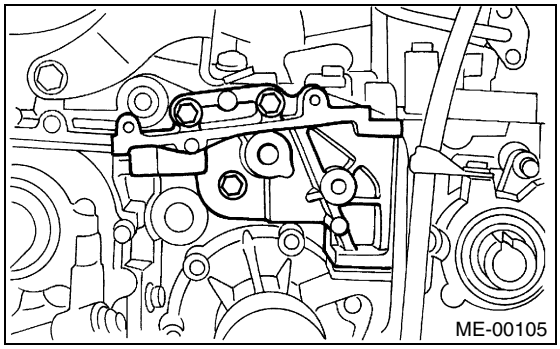
5) Install the spark plug cord.
6) Similarly, install the parts on right-hand side.
7) Install the right-hand belt cover No. 2.

Tightening torque:
5 N·m (0.5 kgf-m, 3.6 ft-lb)



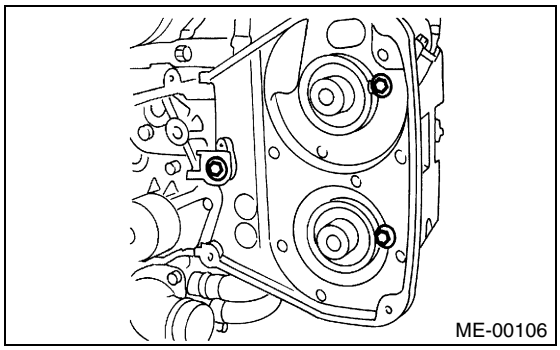
8) Install the tensioner bracket.

Tightening torque:
25 N·m (2.5 kgf-m, 18.1 ft-lb)



9) Install the left-hand belt cover No. 2.

Tightening torque:
5 N·m (0.5 kgf-m, 3.6 ft-lb)

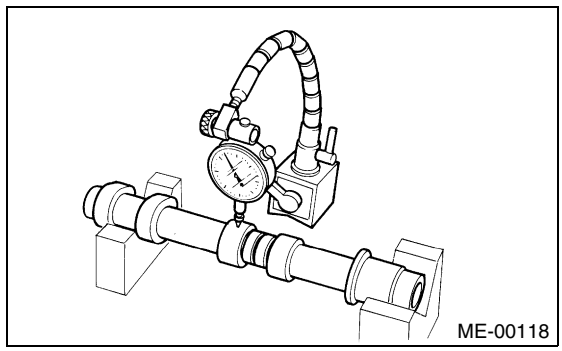


10) Install the crankshaft sprocket. <Ref. to ME(H4DOTC)-58, INSTALLATION, Crankshaft Sprocket.>
11) Install the camshaft sprockets. <Ref. to ME(H4DOTC)-57, INSTALLATION, Camshaft Sprocket.>
12) Install the timing belt assembly. <Ref. to ME(H4DOTC)-50, INSTALLATION, Timing Belt Assembly.>
13) Install the belt cover. <Ref. to ME(H4DOTC)-47, INSTALLATION, Belt Cover.>
14) Install the crankshaft pulley. <Ref. to ME(H4DOTC)-46, INSTALLATION, Crankshaft Pulley.>
15) Install the V-belt. <Ref. to ME(H4DOTC)-44, INSTALLATION, V-belt.>

C: INSPECTION

1) Measure the bend, and repair or replace if necessary.

Limit:
0.020 mm (0.00079 in)

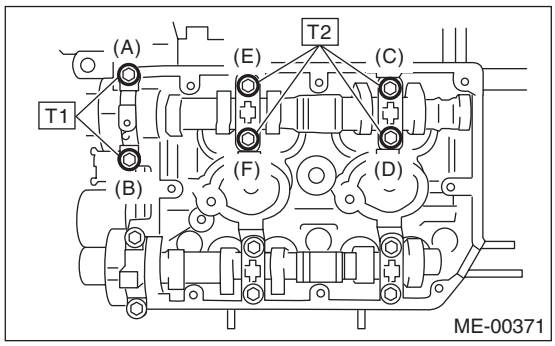


2) Check the journal for damage and wear. Replace if faulty.
3) Measure the outside diameter of camshaft journal. If the jounal diameter is not as specified, check the oil clearance.

	Camshaft journal	
	Front	Center, rear
Standard	37.946 — 37.9635 mm (1.4939 — 1.4946 in)	29.946 — 29.963 mm (1.1790 — 1.1796 in)

4) Measurement of the camshaft journal oil clearance:
(1) Clean the bearing caps and camshaft journals.
(2) Place the camshafts on the cylinder head. (Without installing the valve rocker.)
(3) Place a plastigauge across each of the camshaft jounals.
(4) Gradually tighten the cap in at least two stages in alphabetical sequence shown in the figure, and then tighten to specified torque.

Tightening torque:
T1: 10 N·m (1.0 kgf-m, 7.2 ft-lb)
T2: 20 N·m (2.0 kgf-m, 14.5 ft-lb)

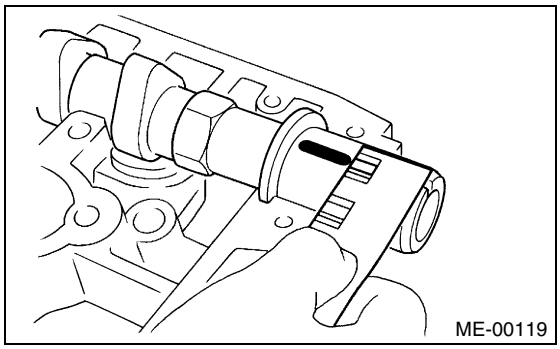


CAUTION:
Do not turn the camshaft.

(5) Remove the bearing caps.
(6) Measure the widest point of the plastigauge on each journal.
If the oil clearance exceeds the limit, replace the camshaft. If necessary, replace the camshaft caps and cylinder head as a set.

Standard:
0.037 — 0.072 mm (0.0015 — 0.0028 in)

Limit:
0.10 mm (0.0039 in)

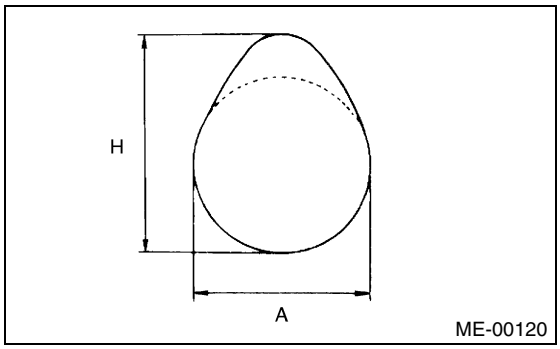

ME-00119

(7) Completely remove the plastigauge.
5) Check the cam face condition; remove the minor faults by grinding with oil stone. Measure the cam height H; replace if the limit has been exceeded.

Cam height: H
Standard:
Intake:
46.25 — 46.35 mm (1.821 — 1.825 in)
Exhaust:
46.15 — 46.25 mm (1.817 — 1.821 in)

Limit:
Intake:
46.15 mm (1.817 in)
Exhaust:
46.05 mm (1.813 in)

Cam base circle diameter A:
37.0 mm (1.457 in)

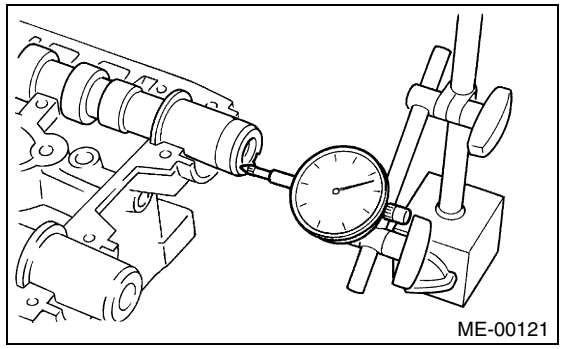


ME-00120

6) Measure the thrust clearance of camshaft with dial gauge. If the clearance exceeds the limit, replace the caps and cylinder head as a set. If necessary replace the camshaft.

Standard:
0.015 — 0.070 mm (0.0006 — 0.0028 in)

Limit:
0.1 mm (0.004 in)

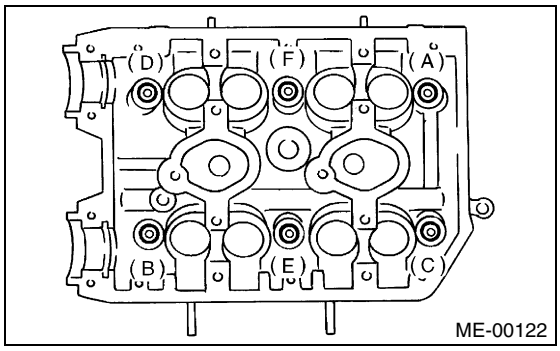

ME-00121

19.Cylinder Head Assembly

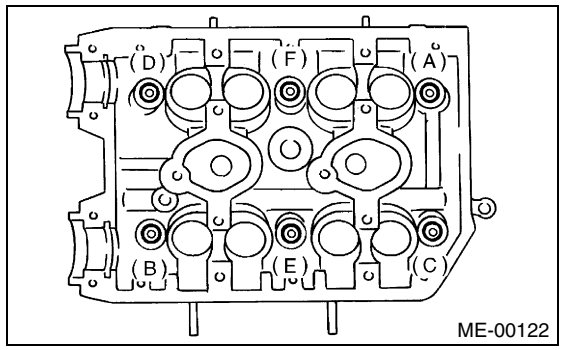
A: REMOVAL

1) Remove the V-belt. <Ref. to ME(H4DOTC)-44, REMOVAL, V-belt.>
2) Remove the crankshaft pulley. <Ref. to ME(H4DOTC)-46, REMOVAL, Crankshaft Pulley.>
3) Remove the belt cover. <Ref. to ME(H4DOTC)-47, REMOVAL, Belt Cover.>
4) Remove the timing belt assembly. <Ref. to ME(H4DOTC)-48, REMOVAL, Timing Belt Assembly.>
5) Remove the camshaft sprocket. <Ref. to ME(H4DOTC)-57, REMOVAL, Camshaft Sprocket.>
6) Remove the intake manifold. <Ref. to FU(H4DOTC)-15, REMOVAL, Intake Manifold.>
7) Remove the bolt which installs the A/C compressor bracket on cylinder head.
8) Remove the camshaft. <Ref. to ME(H4DOTC)-59, REMOVAL, Camshaft.>
9) Remove the cylinder head bolts in alphabetical sequence shown in the figure.

CAUTION:
Leave bolts (A) and (D) engaged by three or four threads to prevent the cylinder head from falling.



10) While tapping the cylinder head with a plastic hammer, separate it from cylinder block.
Remove the bolts (A) and (D) to remove the cylinder head.



11) Remove the cylinder head gasket.

CAUTION:
Do not scratch the mating surface of cylinder head and cylinder block.

12) Similarly, remove the right side cylinder head.

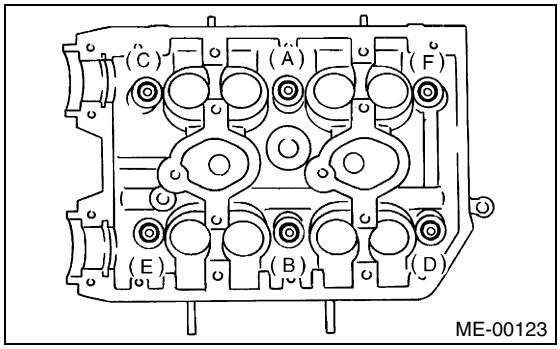
B: INSTALLATION

1) Install the cylinder head and gaskets on cylinder block.

CAUTION:
- **Use new cylinder head gaskets.**
- **Be careful not to scratch the mating surface of cylinder head and cylinder block.**

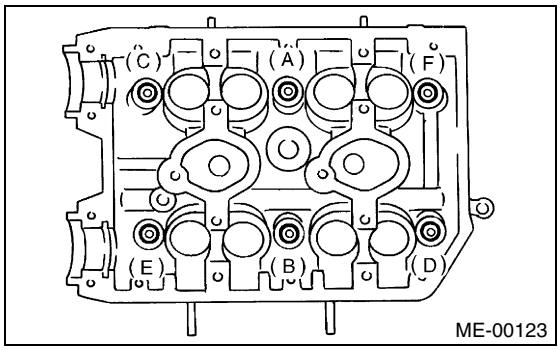
2) Tighten the cylinder head bolts.
   (1) Apply a coat of engine oil to washers and bolt threads.
   (2) Tighten all bolts to 29 N·m (3.0 kgf-m, 22 ft-lb) in alphabetical sequence.
   (3) Retighten all bolts to 69 N·m (7.0 kgf-m, 51 ft-lb) in alphabetical sequence.
   (4) Back off all bolts by 180° first, then back them off a further 180°, in the reverse sequence they were tightened.
   (5) Tighten all bolts to 39 N·m (4.0 kgf-m, 29 ft-lb) in alphabetical sequence.
   (6) Tighten all bolts 80 — 90° in alphabetical sequence.
   (7) Tighten all bolts a further 40 — 45° in alphabetical sequence.

NOTE:
Do not tighten bolts for more than 45°.



(8) Tighten bolt (A) and (B) a further 40 — 45°.

NOTE:
Make sure the sum of retightening angles in previous steps has not exceeded 90°.



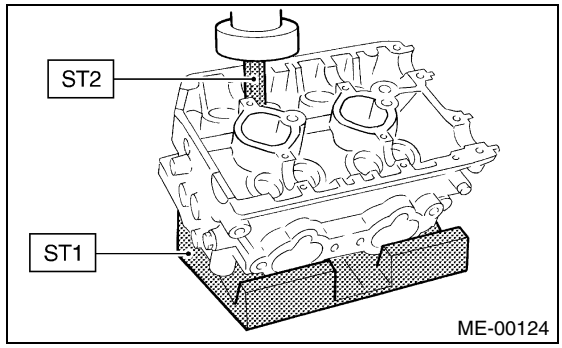
3) Install the camshaft. <Ref. to ME(H4DOTC)-60, INSTALLATION, Camshaft.>
4) Install the A/C compressor bracket on cylinder head.
5) Install the intake manifold. <Ref. to FU(H4DOTC)-18, INSTALLATION, Intake Manifold.>
6) Install the camshaft sprocket. <Ref. to ME(H4DOTC)-57, INSTALLATION, Camshaft Sprocket.>
7) Install the timing belt assembly. <Ref. to ME(H4DOTC)-50, INSTALLATION, Timing Belt Assembly.>
8) Install the belt cover. <Ref. to ME(H4DOTC)-47, INSTALLATION, Belt Cover.>
9) Install the crankshaft pulley. <Ref. to ME(H4DOTC)-46, INSTALLATION, Crankshaft Pulley.>
10) Install the V-belt. <Ref. to ME(H4DOTC)-44, INSTALLATION, V-belt.>

C: DISASSEMBLY

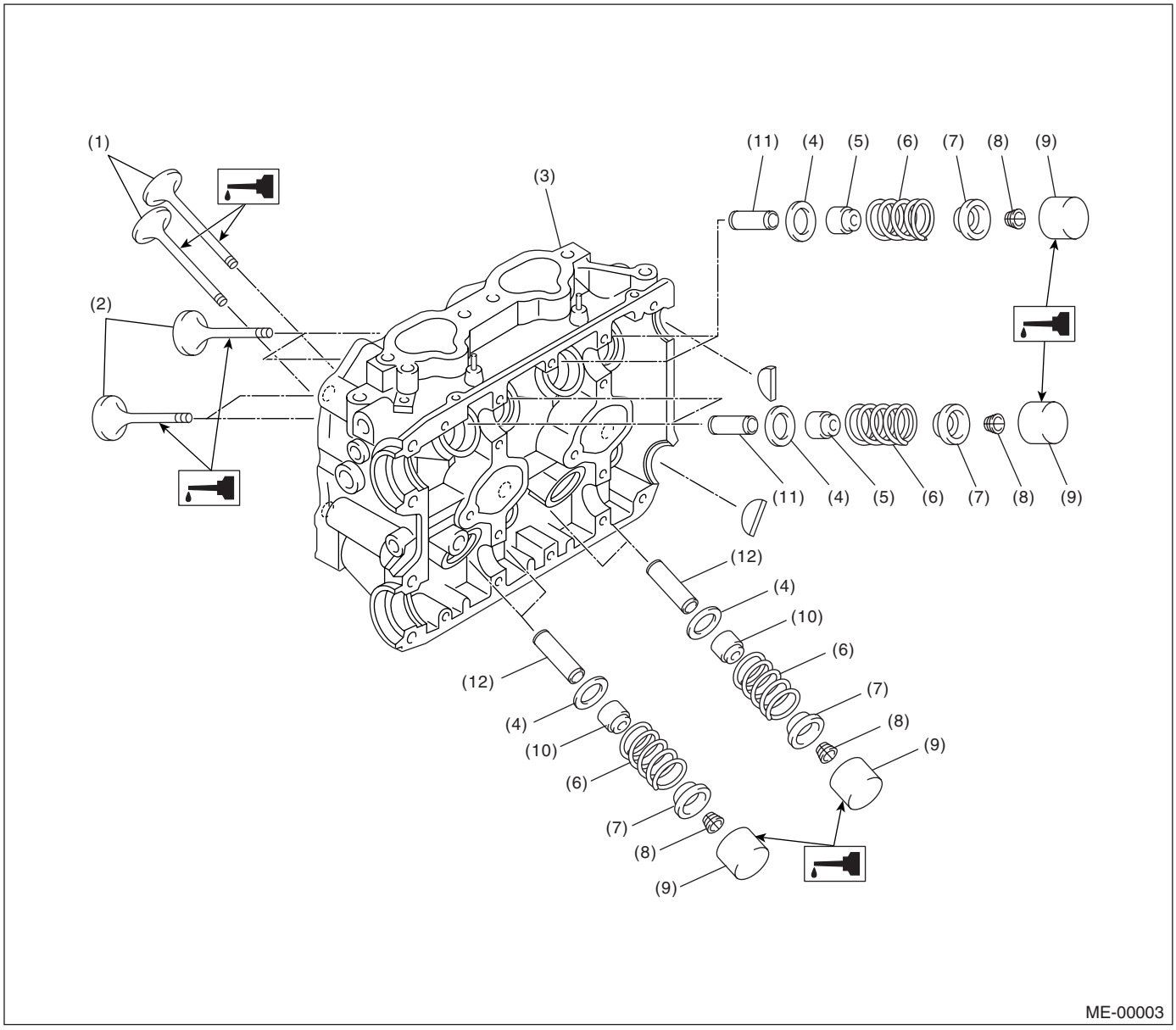
1) Remove the valve shims and valve lifters.
2) Compress the valve spring and remove the valve spring retainer key. Remove each valve and valve spring.

ST1 498267600 CYLINDER HEAD TABLE
ST2 499718000 VALVE SPRING REMOVER

CAUTION:
• Keep the removed parts in order for re-installing in their original positions.
• Mark each valve to prevent confusion.
• Use extreme care not to damage the lips of the intake valve oil seals and exhaust valve oil seals.



D: ASSEMBLY



(1) Exhaust valve
(2) Intake valve
(3) Cylinder head
(4) Valve spring seat
(5) Intake valve oil seal
(6) Valve spring
(7) Retainer
(8) Retainer key
(9) Valve lifter
(10) Exhaust valve oil seal
(11) Intake valve guide
(12) Exhaust valve guide

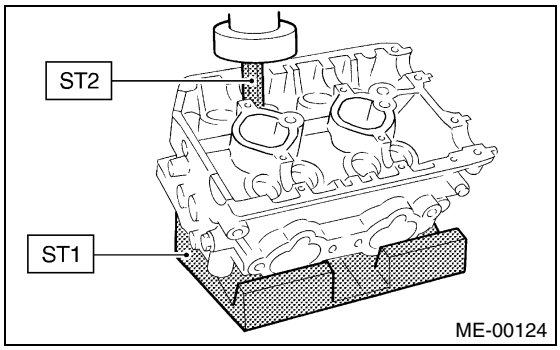
1) Installation of valve spring and valve:
(1) Coat the stem of each valve with engine oil and insert the valve into valve guide.

CAUTION:
When inserting the valve into valve guide, use special care not to damage the oil seal lip.

(2) Set the cylinder head on ST1.
(3) Install the valve spring and retainer using ST2.

ST1 498267600 CYLINDER HEAD TABLE
ST2 499718000 VALVE SPRING REMOVER

CAUTION:
Be sure to install the valve springs with their close-coiled end facing the seat on the cylinder head.



(4) Compress the valve spring and fit the valve spring retainer key.
(5) After installing, tap the valve spring retainers lightly with wooden hammer for better seating.

2) Apply oil to the surface of the valve lifter and valve shim.
3) Install the valve lifter and valve shim.

E: INSPECTION

1. CYLINDER HEAD

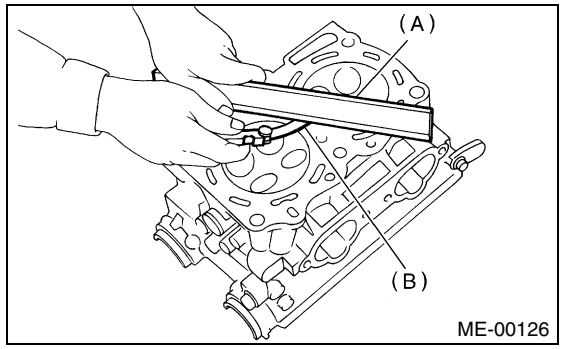
1) Make sure that no crack or other damage exists. In addition to visual inspection, inspect the important areas by means of red check.
2) Measure the warping of the cylinder head surface that mates with crankcase by using a straight edge (A) and thickness gauge (B).
If the warping exceeds 0.05 mm (0.0020 in), regrind the surface with a surface grinder.

Warping limit:
0.05 mm (0.0020 in)

Grinding limit:
0.3 mm (0.012 in)

Standard height of cylinder head:
127.5 mm (5.02 in)

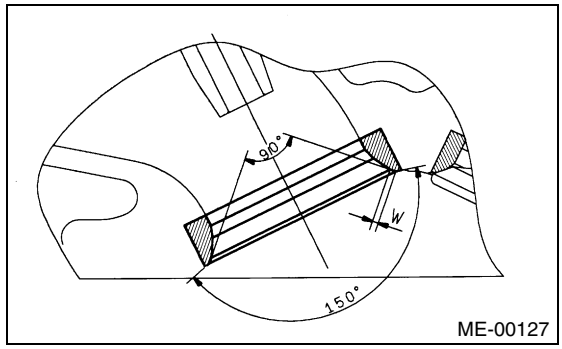
CAUTION:
Uneven torque for the cylinder head nuts can cause warping. When reassembling, pay special attention to the torque so as to tighten evenly.



2. VALVE SEAT

Inspect the intake and exhaust valve seats, and correct the contact surfaces with valve seat cutter if they are defective or when valve guides are replaced.

Valve seat width: W
Intake
Standard
1.0 mm (0.039 in)
Limit
1.7 mm (0.067 in)
Exhaust
Standard
1.5 mm (0.059 in)
Limit
2.2 mm (0.087 in)



3. VALVE GUIDE

1) Check the clearance between valve guide and stem. The clearance can be checked by measuring the outside diameter of valve stem and the inside diameter of valve guide with outside and inside micrometers respectively.

Clearance between the valve guide and valve stem:
Standard
Intake
0.030 — 0.057 mm (0.0012 — 0.0022 in)
Exhaust
0.040 — 0.067 mm (0.0016 — 0.0026 in)
Limit
0.15 mm (0.0059 in)

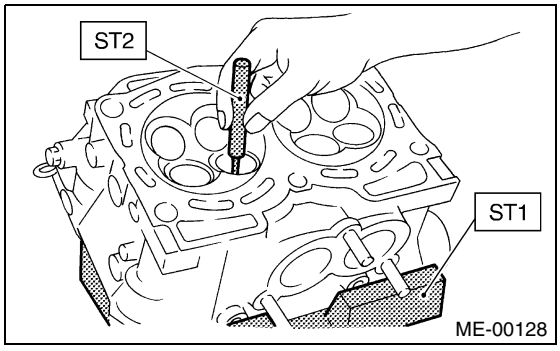
2) If the clearance between valve guide and stem exceeds the limit, replace the valve guide or valve itself whichever shows greater amount of wear. See the following procedure for valve guide replacement.

Valve guide inner diameter:
6.000 — 6.012 mm (0.2362 — 0.2367 in)

Valve stem outer diameters:
Intake
5.955 — 5.970 mm (0.2362 — 0.2367 in)
Exhaust
5.945 — 5.960 mm (0.2341 — 0.2346 in)

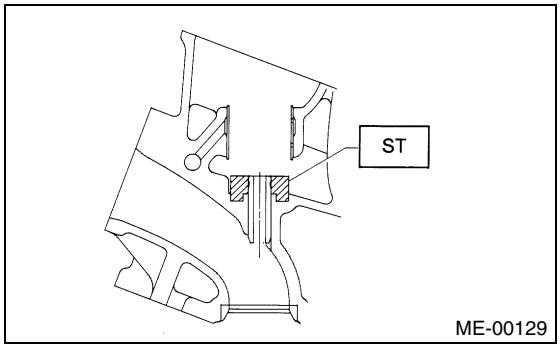
(1) Place the cylinder head on ST1 with the combustion chamber upward so that valve guides enter the holes in ST1.
(2) Insert the ST2 into valve guide and press it down to remove the valve guide.

ST1 498267600 CYLINDER HEAD TABLE
ST2 499767200 VALVE GUIDE REMOVER



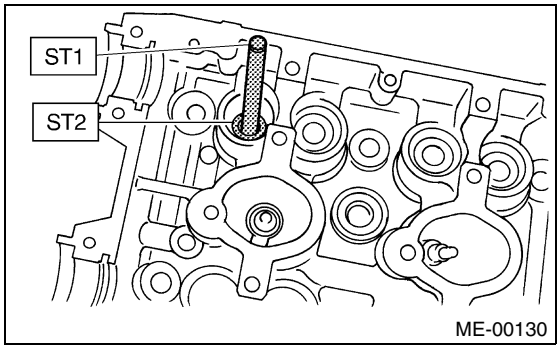
(3) Turn the cylinder head upside down and place ST as shown in the figure.

ST 18251AA020 VALVE GUIDE ADJUSTER



(4) Before installing a new valve guide, make sure that neither scratches nor damages exist on the inside surface of the valve guide holes in cylinder head.
(5) Put a new valve guide, coated with sufficient oil, in cylinder, and insert ST1 into valve guide. Press in until the valve guide upper end is flush with the upper surface of ST2.

ST1 499767200 VALVE GUIDE REMOVER
ST2 18251AA020 VALVE GUIDE ADJUSTER



(6) Check the valve guide protrusion.

Valve guide protrusion: L
15.8 — 16.2 mm (0.622 — 0.638 in)

(7) Ream the inside of valve guide with ST. Gently rotate the reamer clockwise while pressing it lightly into the valve guide, and return it also rotating clockwise. After reaming, clean the valve guide to remove chips.

ST 499767400 VALVE GUIDE REAMER

CAUTION:
• Apply engine oil to the reamer when reaming.
• If the inner surface of the valve guide is torn, the edge of the reamer should be slightly ground with an oil stone.
• If the inner surface of the valve guide becomes lustrous and the reamer does not chips, use a new reamer or remedy the reamer.

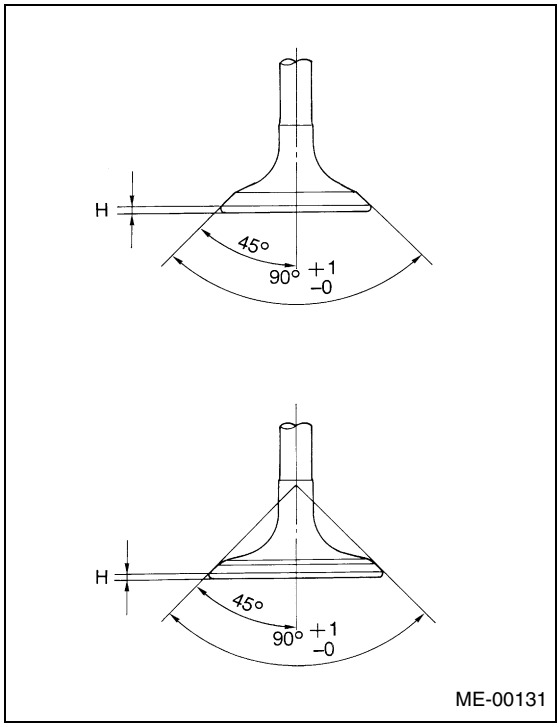
(8) Recheck the contact condition between valve and valve seat after replacing the valve guide.

4. INTAKE AND EXHAUST VALVE

1) Inspect the flange and stem of valve, and replace if damaged, worn, or deformed, or if "H" is less than the specified limit.

H:
Intake
Standard
1.2 mm (0.047 in)
Limit
0.8 mm (0.031 in)
Exhaust
Standard
1.5 mm (0.059 in)
Limit
0.8 mm (0.031 in)

Valve overall length:
Intake
104.4 mm (4.110 in)
Exhaust
104.7 mm (4.122 in)

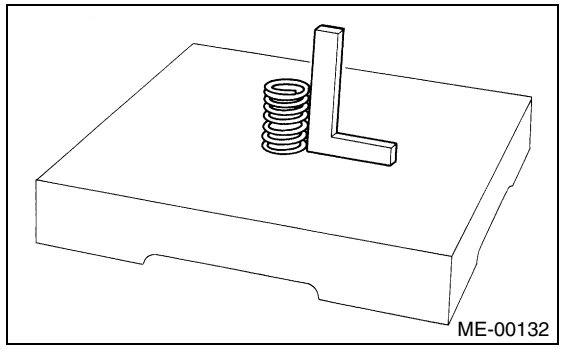


2) Put a small amount of grinding compound on the seat surface and lap the valve and seat surface. Install a new intake valve oil seal after lapping.

5. VALVE SPRINGS

1) Check the valve springs for damage, free length, and tension. Replace the valve spring if it is not within specifications presented in the table.
2) To measure the squareness of the valve spring, stand the spring on a surface plate and measure its deflection at the top using a try square.

	Valve spring
Free length	44.67 mm (1.7587 in)
Tension/spring height	220.7±15.7 N (22.5 ± 1.6 kgf, 49.6±3.5 lb)/36.0 mm (1.417 in)
	510.9±25.5 N (52.1±2.6 kgf, 114.9±5.7 lb)/26.6 mm (1.047 in)
Squareness	2.5°, 2.0 mm (0.079 in)



6. INTAKE AND EXHAUST VALVE OIL SEAL

Replace the oil seal with a new one, if the lip is damaged or spring out of place, or when the surfaces of intake valve and valve seat are reconditioned or intake valve guide is replaced.

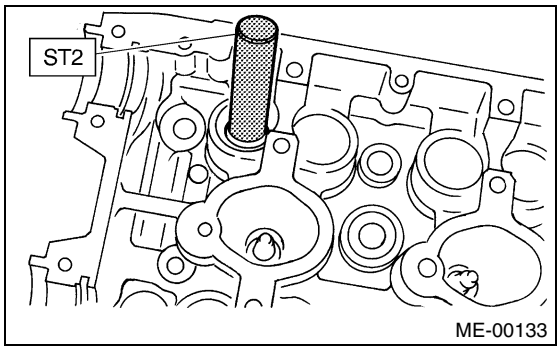
1) Place the cylinder head on ST1.
2) Press in the oil seal to the specified dimension indicated in the figure by using ST2.

ST1 498267600 CYLINDER HEAD TABLE
ST2 498857100 VALVE GUIDE REMOVER

CAUTION:
• Apply engine oil to oil seal before force-fitting.
• Differentiate between the intake valve oil seal and exhaust valve oil seal by noting their difference in color.

Color of rubber part:
Intake [Black]
Exhaust [Brown]

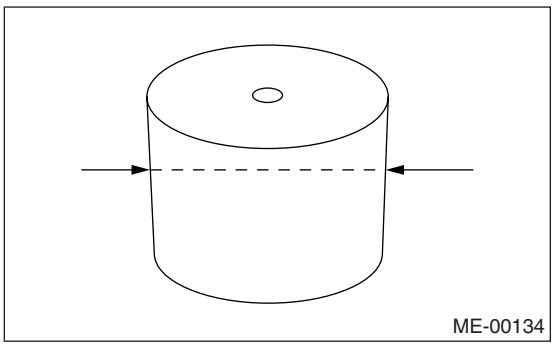
Color of spring part:
Intake [Silver]
Exhaust [Silver]



7. VALVE LIFTER

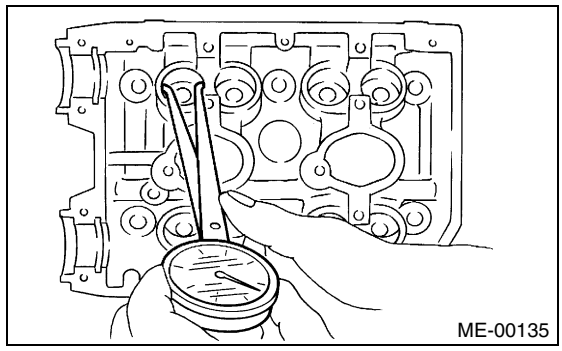
1) Check the valve lifter visually.
2) Measure the outer diameter of valve lifter.

Outer diameter:
34.959 — 34.975 mm (1.3763 — 1.3770 in)



3) Measure the inner diameter of valve lifter mating part on cylinder head.

Inner diameter:
34.994 — 35.016 mm (1.3777 — 1.3786 in)



CAUTION:
If difference between outer diameter of valve lifter and inner diameter of valve lifter mating part is over the limit, replace the cylinder head.

Standard:
0.019 — 0.057 mm (0.0007 — 0.0022 in)

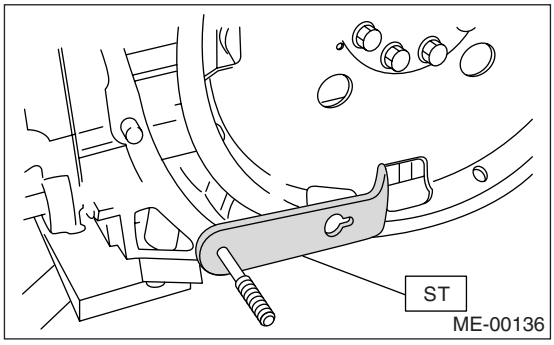
Limit:
0.100 mm (0.0039 in)

20.Cylinder Block

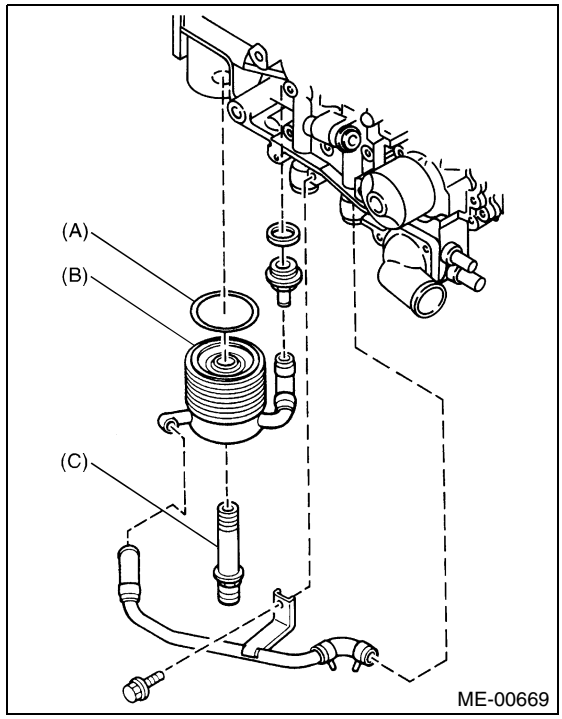
A: REMOVAL

NOTE:
Before conducting this procedure, drain the engine oil completely if applicable.

1) Remove the intake manifold. <Ref. to FU(H4DOTC)-15, REMOVAL, Intake Manifold.>
2) Remove the V-belt. <Ref. to ME(H4DOTC)-44, REMOVAL, V-belt.>
3) Remove the crankshaft pulley. <Ref. to ME(H4DOTC)-46, REMOVAL, Crankshaft Pulley.>
4) Remove the belt cover. <Ref. to ME(H4DOTC)-47, REMOVAL, Belt Cover.>
5) Remove the timing belt assembly. <Ref. to ME(H4DOTC)-48, REMOVAL, Timing Belt Assembly.>
6) Remove the camshaft sprocket. <Ref. to ME(H4DOTC)-57, REMOVAL, Camshaft Sprocket.>
7) Remove the crankshaft sprocket. <Ref. to ME(H4DOTC)-58, REMOVAL, Crankshaft Sprocket.>
8) Remove the generator and A/C compressor with their brackets.
9) Remove the cylinder head assembly. <Ref. to ME(H4DOTC)-64, REMOVAL, Cylinder Head Assembly.>
10) Remove the clutch disc and cover. (MT vehicles) <Ref. to CL-11, REMOVAL, Clutch Disc and Cover.>
11) Remove the flywheel. (MT vehicles) <Ref. to CL-14, REMOVAL, Flywheel.>
12) Remove the drive plate. (AT vehicles)
Using the ST, lock crankshaft.
ST 498497100 CRANKSHAFT STOPPER



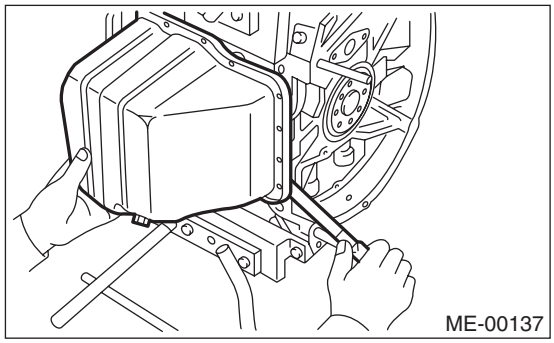
13) Remove the oil separator cover.
14) Remove the water by-pass pipe for heater.
15) Remove the oil filter.
16) Remove the oil cooler.



(A) Gasket
(B) Oil cooler
(C) Oil cooler connector

17) Removal of oil pan:
(1) Turn the cylinder block with #2 and #4 piston sides facing upward.
(2) Remove the bolts which secure oil pan to cylinder block.
(3) Insert a oil pan cutter blade between cylinder block-to-oil pan clearance and remove the oil pan.

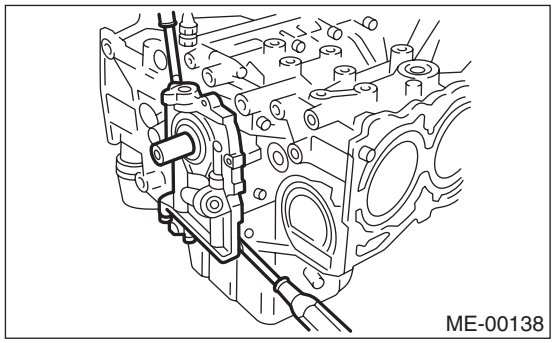
CAUTION:
Do not use a screwdriver or similar tool in place of oil pan cutter.

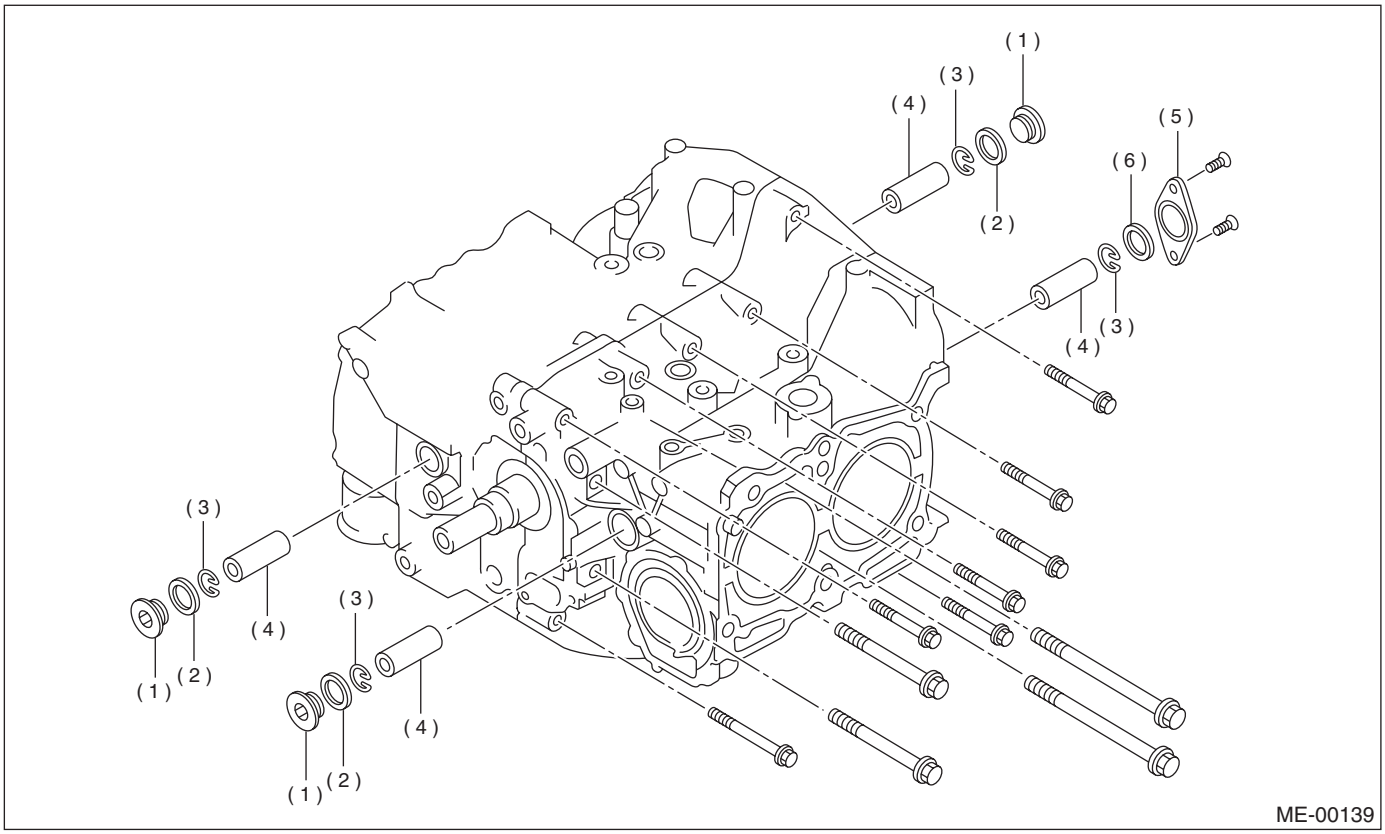


18) Remove the oil strainer stay.
19) Remove the oil strainer.
20) Remove the baffle plate.
21) Remove the water pipes.
22) Remove the water pump.

23) Remove the oil pump from cylinder block.
Use a flat-bladed screwdriver as shown in the figure when removing the oil pump.

CAUTION:
Be careful not to scratch the mating surface of cylinder block and oil pump.

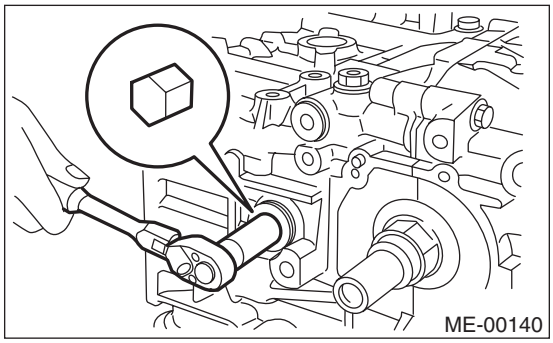

ME-00138



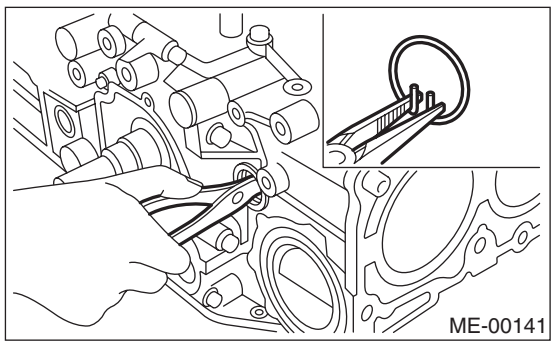
ME-00139

(1) Service hole plug
(2) Gasket
(3) Circlip
(4) Piston pin
(5) Service hole cover
(6) O-ring

24) Remove the service hole cover and service hole plugs using the hexagon wrench [14 mm (0.55 in)].

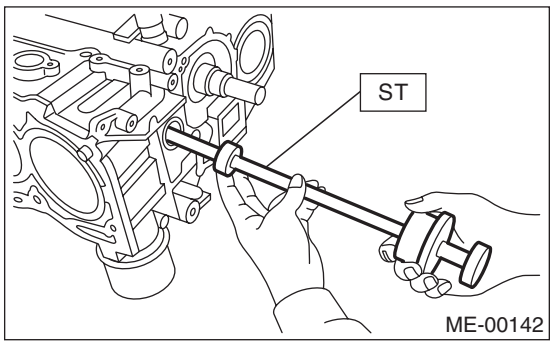

ME-00140

25) Rotate the crankshaft to bring #1 and #2 pistons to bottom dead center position, then remove the piston circlip through service hole of #1 and #2 cylinders.


ME-00141

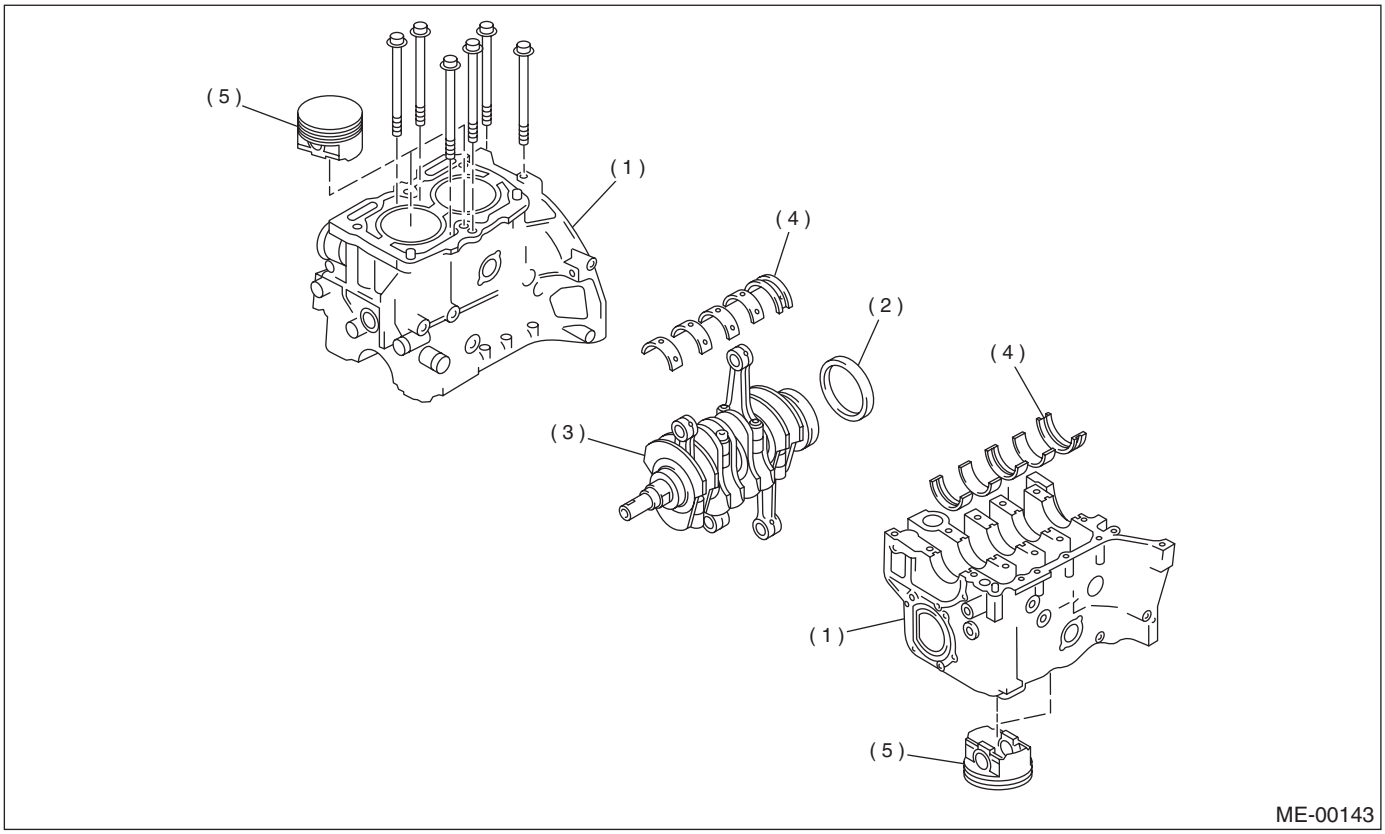
26) Draw out the piston pin from #1 and #2 pistons using ST.
ST 499097600 PISTON PIN REMOVER

CAUTION:
Be careful not to confuse the original combination of piston, piston pin and cylinder.



27) Similarly remove the piston pins from #3 and #4 pistons.
28) Remove the bolts which connect cylinder block on the side of #2 and #4 cylinders.
29) Back off the bolts which connect cylinder block on the side of #1 and #3 cylinders two or three turns.
30) Set up the cylinder block so that #1 and #3 cylinders are on the upper side, then remove the cylinder block connecting bolts.
31) Separate the left-hand and right-hand cylinder blocks.

CAUTION:
When separating the cylinder block, do not allow the connecting rod to fall and damage the cylinder block.



(1) Cylinder block
(2) Rear oil seal
(3) Crankshaft
(4) Crankshaft bearing
(5) Piston

32) Remove the rear oil seal.
33) Remove the crankshaft together with connecting rod.
34) Remove the crankshaft bearings from cylinder block using a hammer handle.

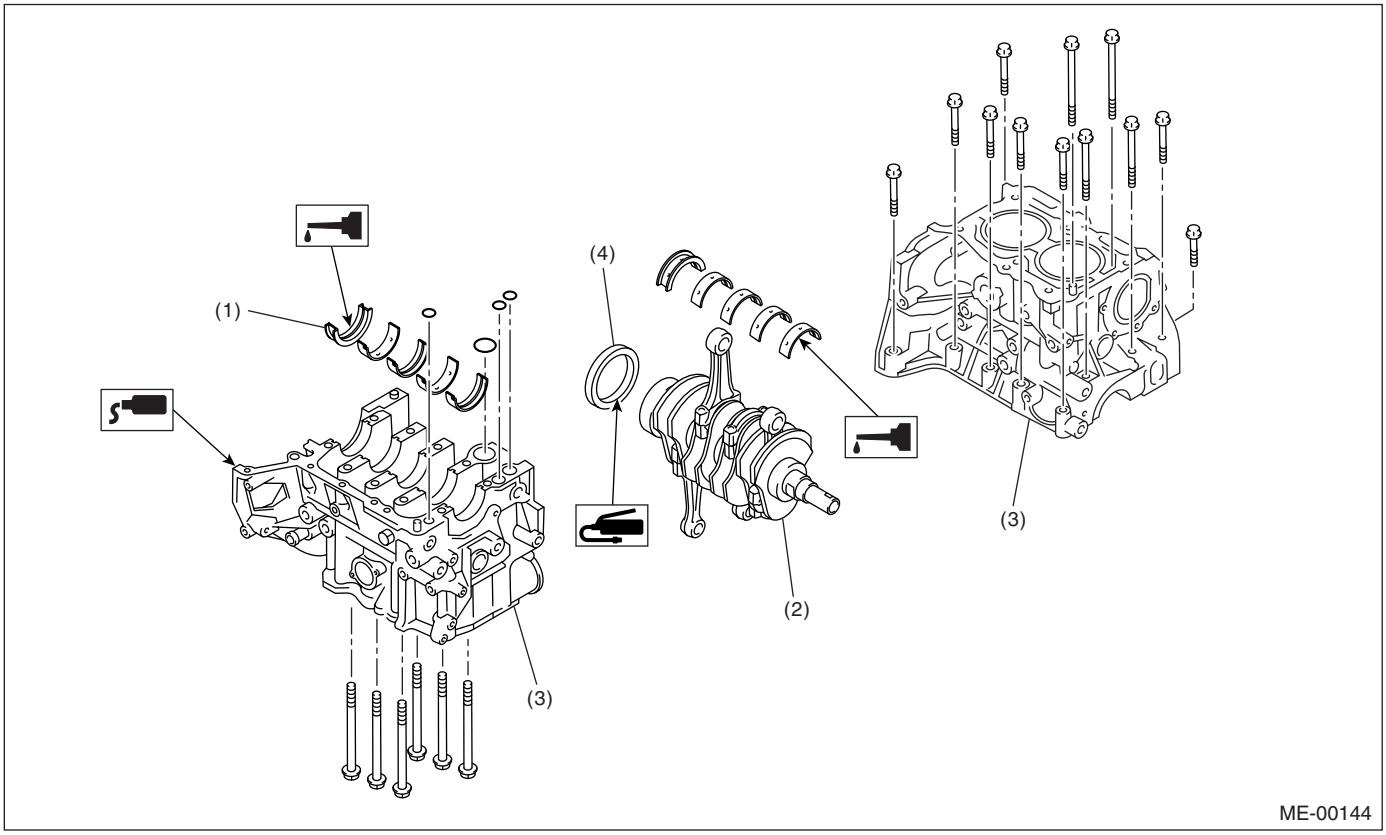
CAUTION:
Do not confuse the combination of crankshaft bearings.

Press the bearing at the end opposite to locking lip.

35) Draw out each piston from cylinder block using a wooden bar or hammer handle.

CAUTION:
Do not confuse the combination of piston and cylinder.

B: INSTALLATION



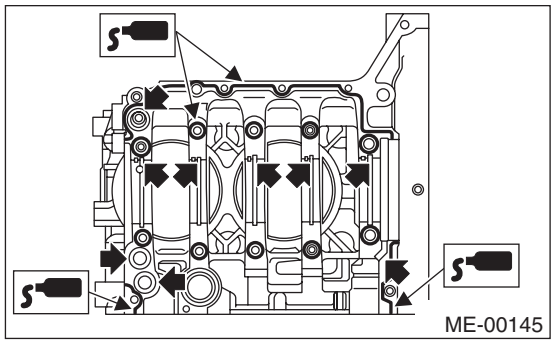
(1) Crankshaft bearing
(2) Crankshaft
(3) Cylinder block
(4) Rear oil seal

CAUTION:
Remove oil in the mating surface of bearing and cylinder block before installation. Also apply a coat of engine oil to crankshaft pins.

1) Position the crankshaft on the #2 and #4 cylinder block.
2) Apply fluid packing to the mating surface of #1 and #3 cylinder block, and position it on #2 and #4 cylinder block.

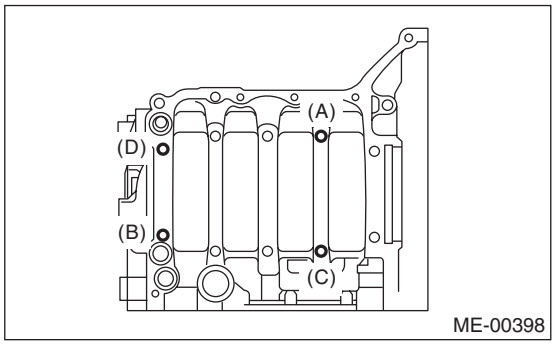
Fluid packing:
THREE BOND 1215 (Part No. 004403007) or equivalent

CAUTION:
Do not allow fluid packing to jut into O-ring grooves, oil passages, bearing grooves, etc.



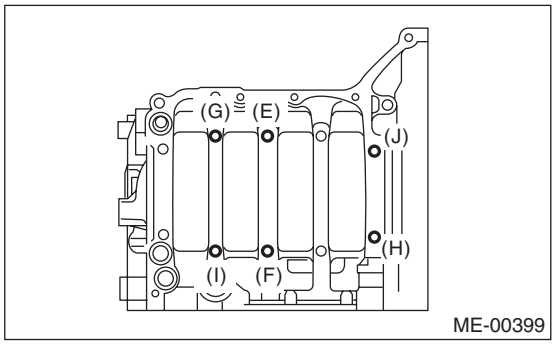
3) Tighten the 10 mm cylinder block connecting bolts in alphabetical sequence shown in the figure (LH side).

Tightening torque:
15 N·m (1.5 kgf-m, 10.8 ft-lb)

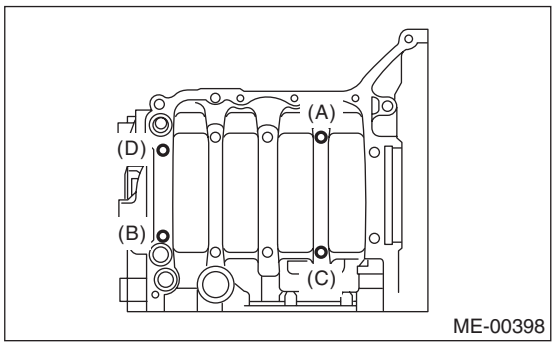


4) Tighten the 10 mm cylinder block connecting bolts in alphabetical sequence shown in the figure (RH side).

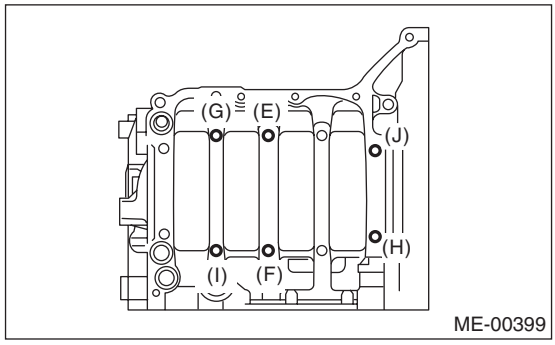
Tightening torque:
15 N·m (1.5 kgf-m, 10.8 ft-lb)



5) Tighten LH side bolts (A) — (D) for a further 90° in alphabetical order.

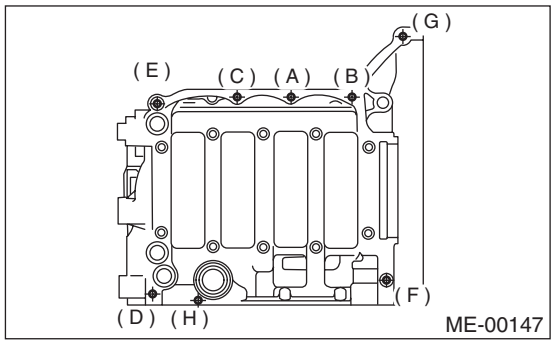


6) Tighten RH side bolts (E) — (J) for a further 90° in alphabetical order.

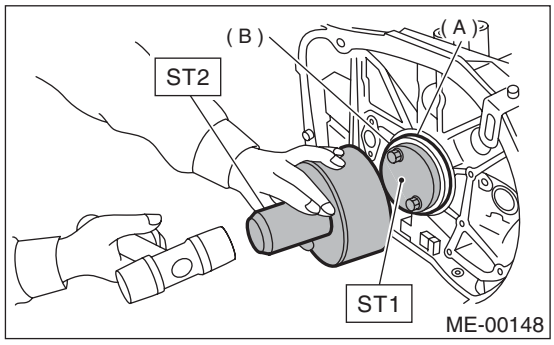


7) Tighten the 8 mm and 6 mm cylinder block connecting bolts in alphabetical sequence shown in the figure.

Tightening torque:
(A) — (G): 25 N·m (2.5 kgf-m, 18.1 ft-lb)
(H): 6.4 N·m (0.65 kgf-m, 4.7 ft-lb)



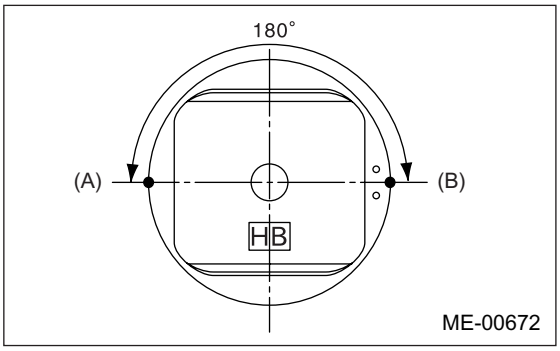
8) Install the rear oil seal using ST1 and ST2.
ST1 499597100 OIL SEAL GUIDE
ST2 499587200 OIL SEAL INSTALLER



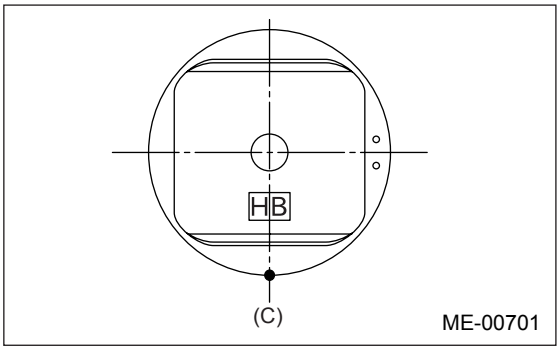
(A) Rear oil seal
(B) Flywheel attaching bolt

9) Position the top ring gap at (A) or (B) in the figure.

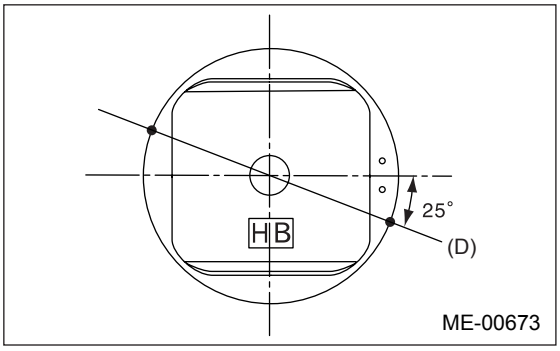
10) Position the second ring gap at 180° apart from the top ring gap.



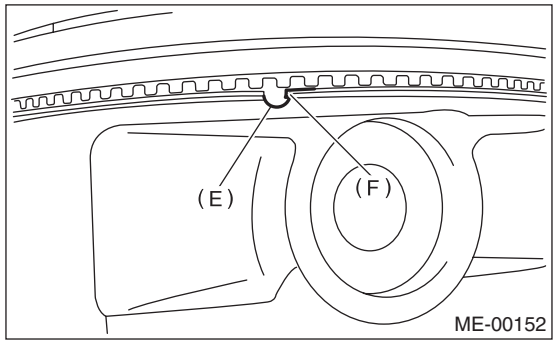
11) Position the expander gap at (C) in the figure.



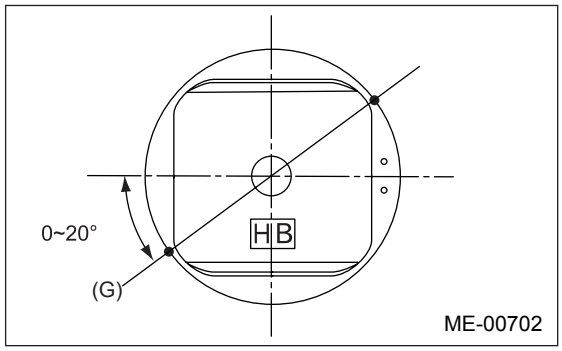
12) Position the lower rail gap at (D) in the figure.



13) Align the lower rail rotation stopper (F) with the hole (E) in the side of piston.



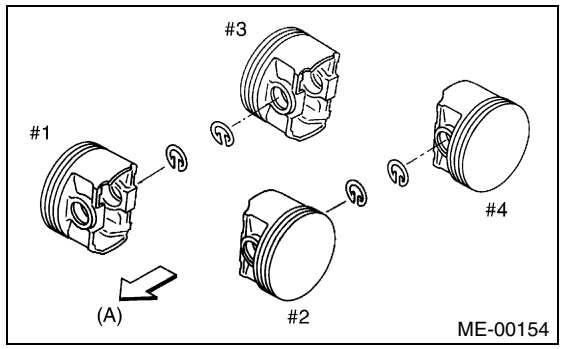
14) Position the upper rail gap at (G) in the figure.



NOTE:
- Ensure the ring gaps do not face the same direction.
- Ensure ring gaps are not within the piston skirt area.

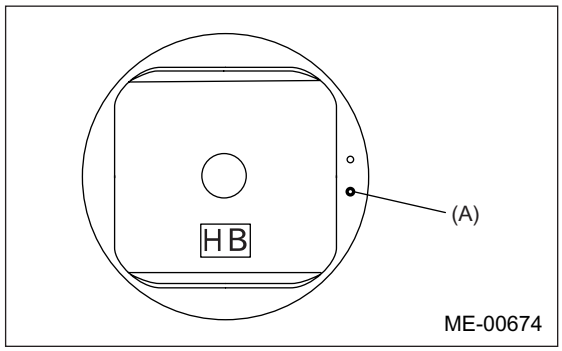
15) Installing the circlip:
Install the circlips in piston holes located opposite of the service holes in cylinder block, when positioning all pistons in the corresponding cylinders.

NOTE:
Use new circlips.

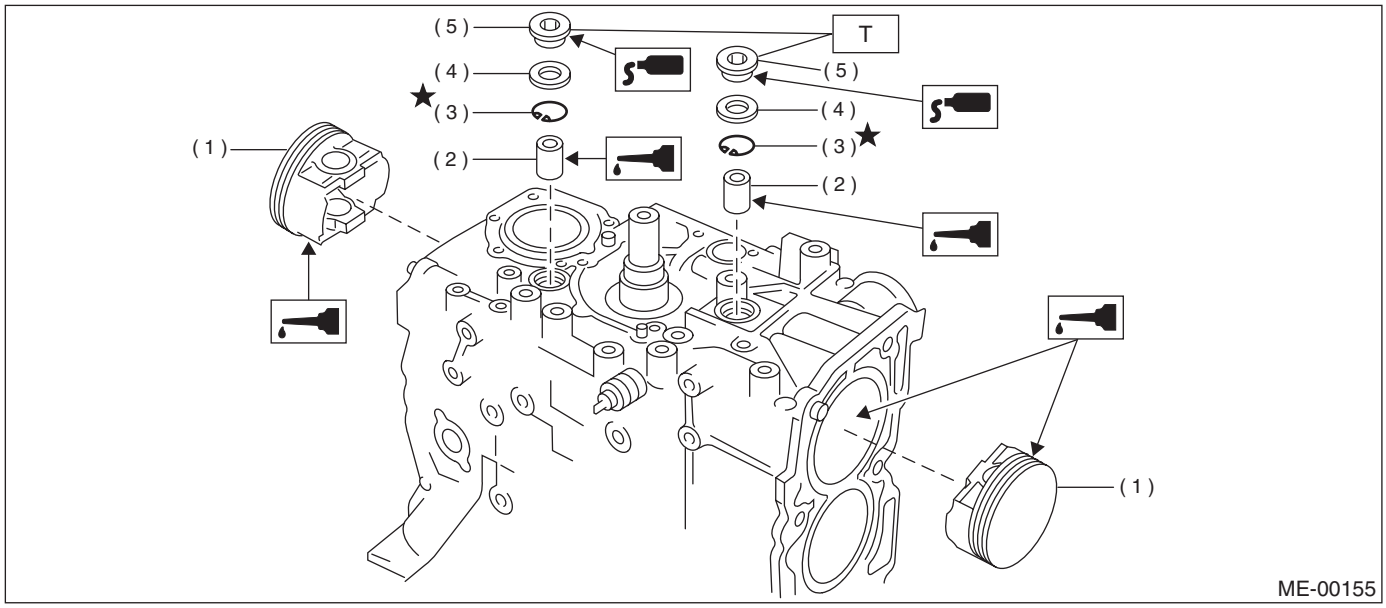


(A) Front side

CAUTION:
Piston front mark faces towards the front of the engine.



(A) Front mark



(1) Piston
(2) Piston pin
(3) Circlip
(4) Gasket
(5) Service hole plug

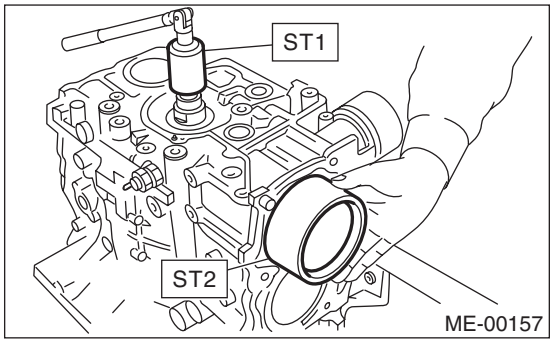
Tightening torque: N·m (kgf-m, ft-lb)
T: 70 (7.0, 50.6)

16) Installing the piston:
(1) Turn the cylinder block so that #1 and #2 cylinders face upward.
(2) Using ST1, turn the crankshaft so that #1 and #2 connecting rods are set at bottom dead center.

ST1 499987500 CRANKSHAFT SOCKET

(3) Apply a coat of engine oil to the pistons and cylinders and insert pistons in their cylinders using ST2.

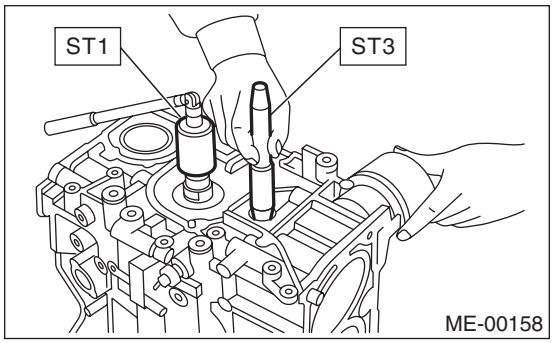
ST2 398744300 PISTON GUIDE



17) Installing piston pin:
(1) Insert ST3 into service hole to align piston pin hole with connecting rod small end.

CAUTION:
Apply a coat of engine oil to ST3 before insertion.

ST3 499017100 PISTON PIN GUIDE

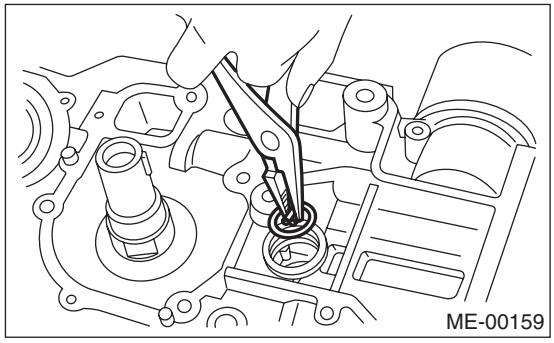


(2) Apply a coat of engine oil to the piston pin and insert piston pin into piston and connecting rod through service hole.

(3) Install the circlip using ST.

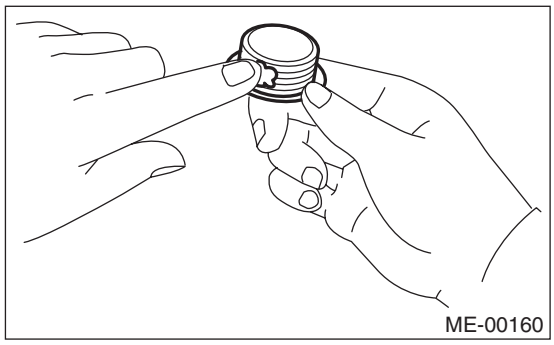
ST 499897200 PISTON SNAP RING PLIERS

CAUTION:
Use new circlips.



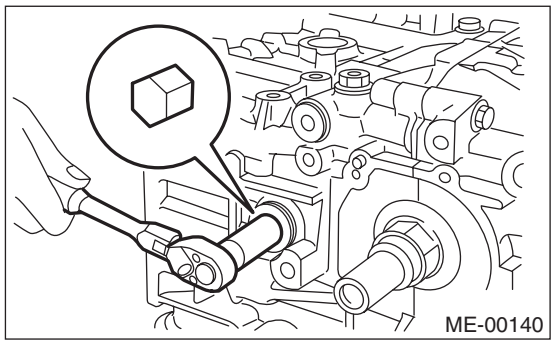
(4) Apply fluid packing around the service hole plug.

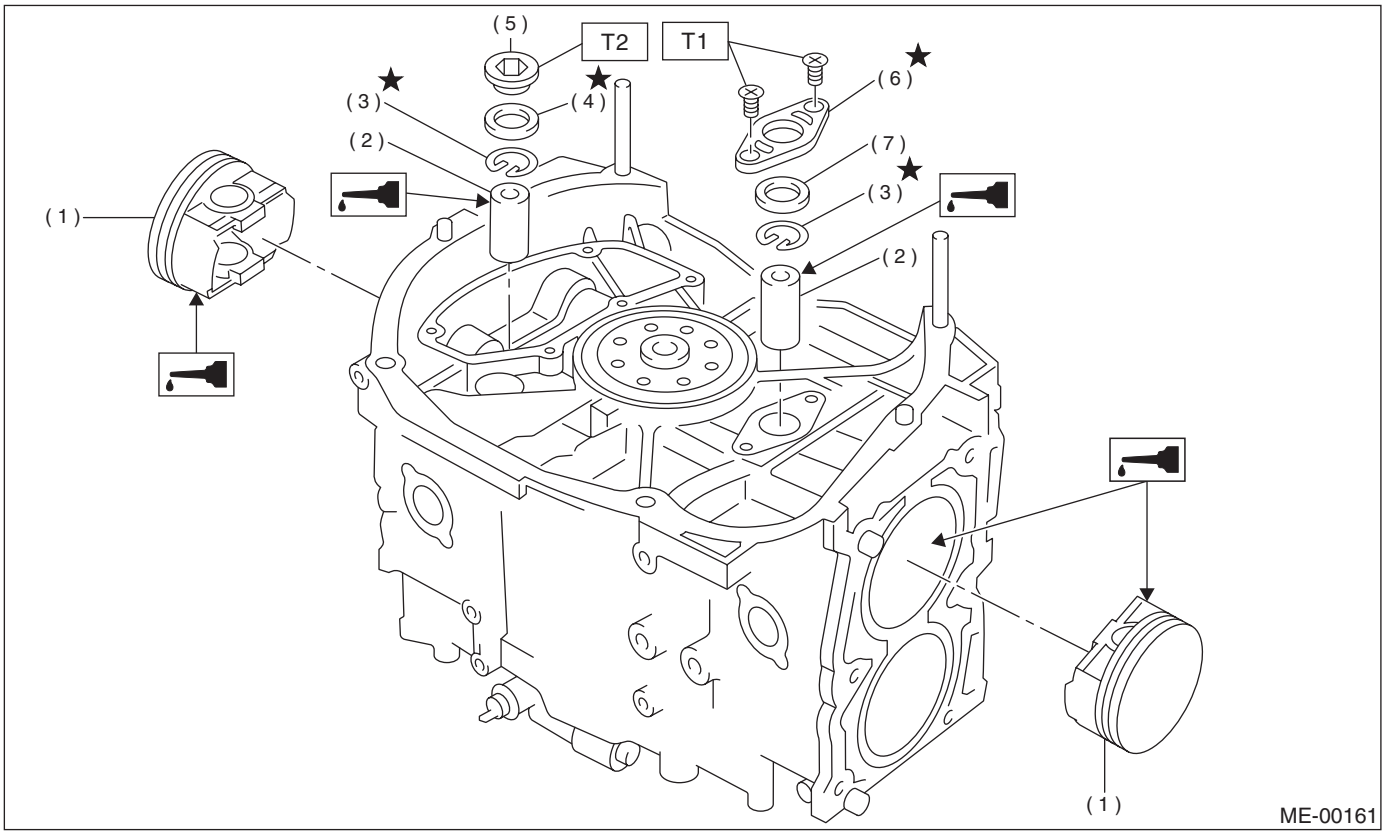
Fluid packing:
THREE BOND 1215 (Part No. 004403007) or equivalent



(5) Install the service hole plug and gasket.

CAUTION:
Use a new gasket.





(1) Piston
(2) Piston pin
(3) Circlip
(4) Gasket
(5) Service hole plug
(6) Service hole cover
(7) O-ring

Tightening torque: N·m (kgf-m, ft-lb)
T1: 6.4 (0.65, 4.7)
T2: 70 (7.0, 50.6)

(6) Turn the cylinder block so that #3 and #4 cylinders face upward. Using the same procedures as used for #1 and #2 cylinders, install the pistons and piston pins.

18) Install the water pipe.
19) Install the baffle plate.

Tightening torque:
6.4 N·m (0.65 kgf-m, 4.7 ft-lb)

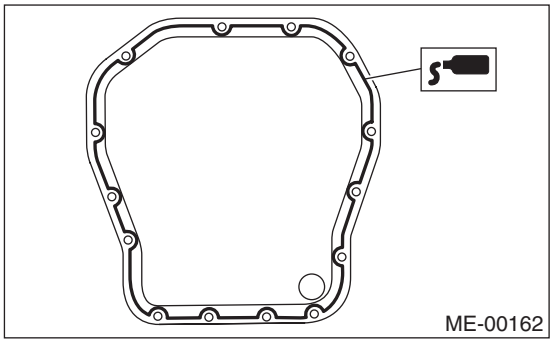
20) Install the oil strainer and O-ring

Tightening torque:
10 N·m (1.0 kgf-m, 7 ft-lb)

21) Install the oil strainer stay.

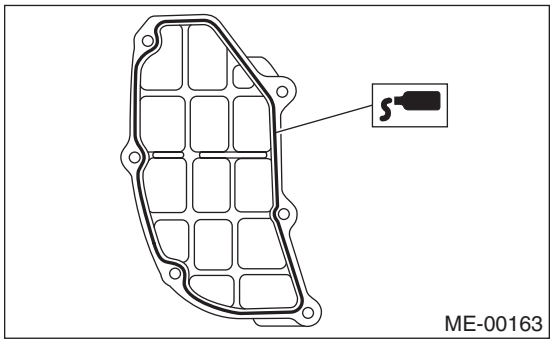
22) Apply fluid packing to matching surfaces and install the oil pan.

Fluid packing:
THREE BOND 1215 (Part No. 004403007) or equivalent



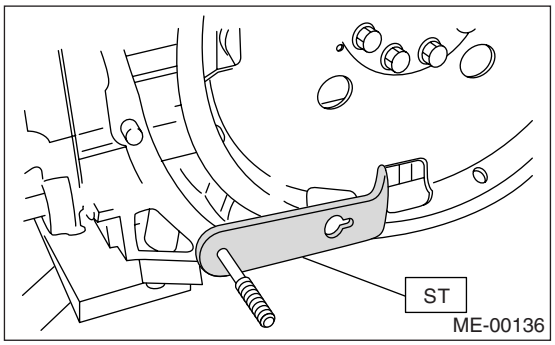
23) Apply fluid packing to matching surfaces and install the oil separator cover.

Fluid packing:
THREE BOND 1215 (Part No. 004403007) or equivalent

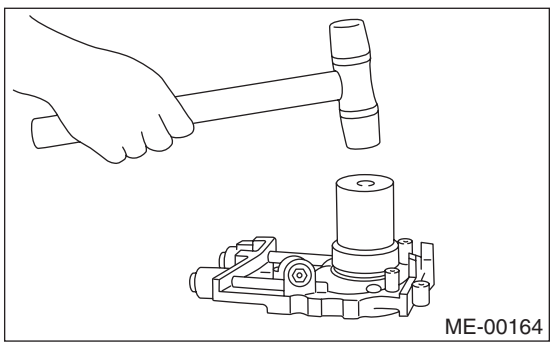


24) Install the drive plate. (AT vehicles)
To lock the crankshaft, use ST.
ST 498497100 CRANKSHAFT STOPPER

Tightening torque:
72 N·m (7.3 kgf-m, 52.8 ft-lb)



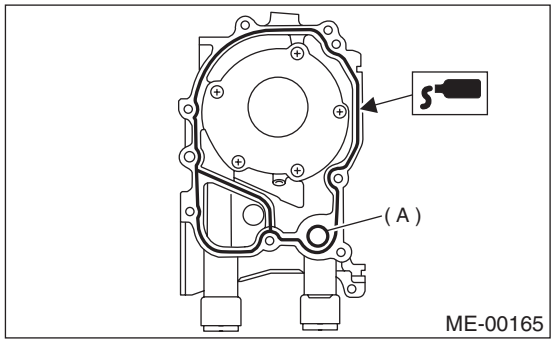
25) Install the flywheel. (MT vehicles) <Ref. to CL-14, INSTALLATION, Flywheel.>
26) Install the clutch disc and cover. (MT vehicles) <Ref. to CL-11, INSTALLATION, Clutch Disc and Cover.>
27) Installation of oil pump:
(1) Discard the front oil seal after removal. Replace with a new one using ST.
ST 499587100 OIL SEAL INSTALLER



28) Install the water pump and gasket.

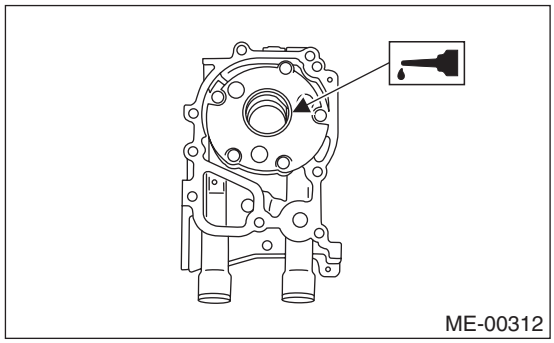
(2) Apply fluid packing to the matching surface of oil pump.

Fluid packing:
THREE BOND 1215 (Part No. 004403007) or equivalent



(A) O-ring

(3) Apply a coat of engine oil to the inside of the oil seal.



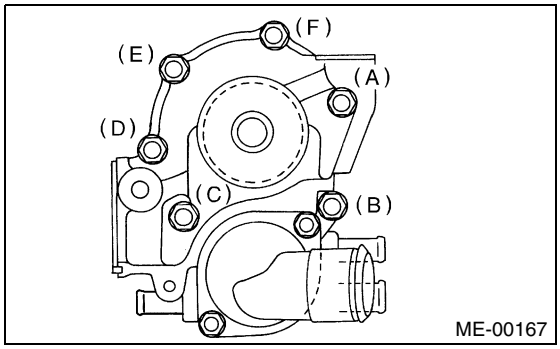
(4) Install the oil pump on cylinder block. Be careful not to damage the oil seal during installation.

Tightening torque:
6.4 N·m (0.65 kgf-m, 4.7 ft-lb)

CAUTION:
• Do not forget to install the O-ring and seal when installing the oil pump.
• Align the flat surface of oil pump's inner rotor with crankshaft before installation.

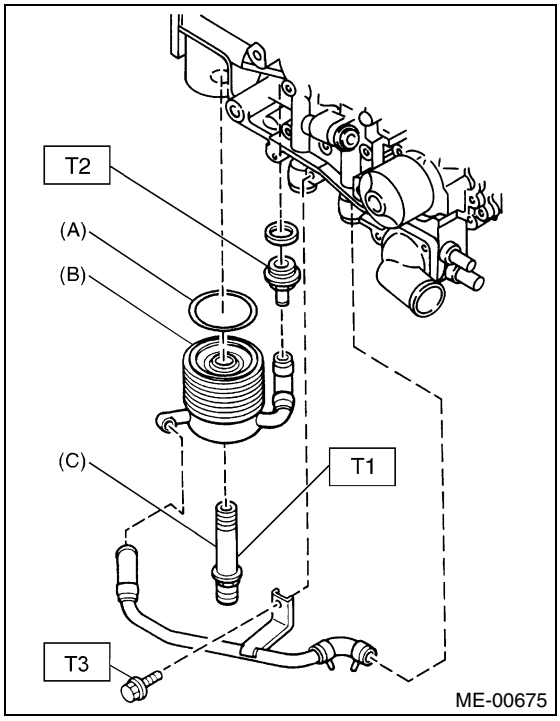
Tightening torque:
First; 12 N·m (1.2 kgf-m, 8.7 ft-lb)
Second; 12 N·m (1.2 kgf-m, 8.7 ft-lb)

CAUTION:
- **Be sure to use a new gasket.**
- **When installing the water pump, tighten bolts in two stages in alphabetical sequence as shown in the figure.**



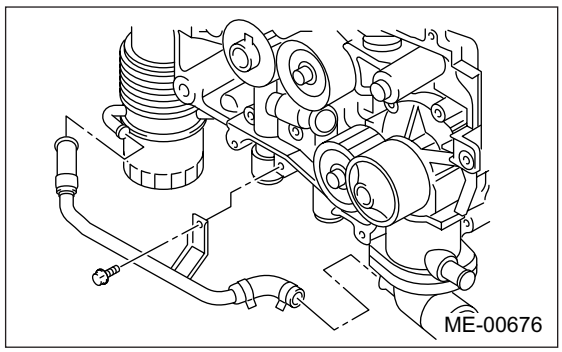
29) Install the water by-pass pipe for heater.
30) Install the oil cooler.

Tightening torque:
T1: 55 N·m (5.5 kgf-m, 40 ft-lb)
T2: 70 N·m (7.0 kgf-m, 50.6 ft-lb)
T3: 6.4 N·m (0.65 kgf-m, 4.7 ft-lb)



(A) O-ring
(B) Oil cooler
(C) Connector

31) Install the oil filter using ST.
ST 498547000 OIL FILTER WRENCH
32) Install the water by-pass pipe between oil cooler and water pump.

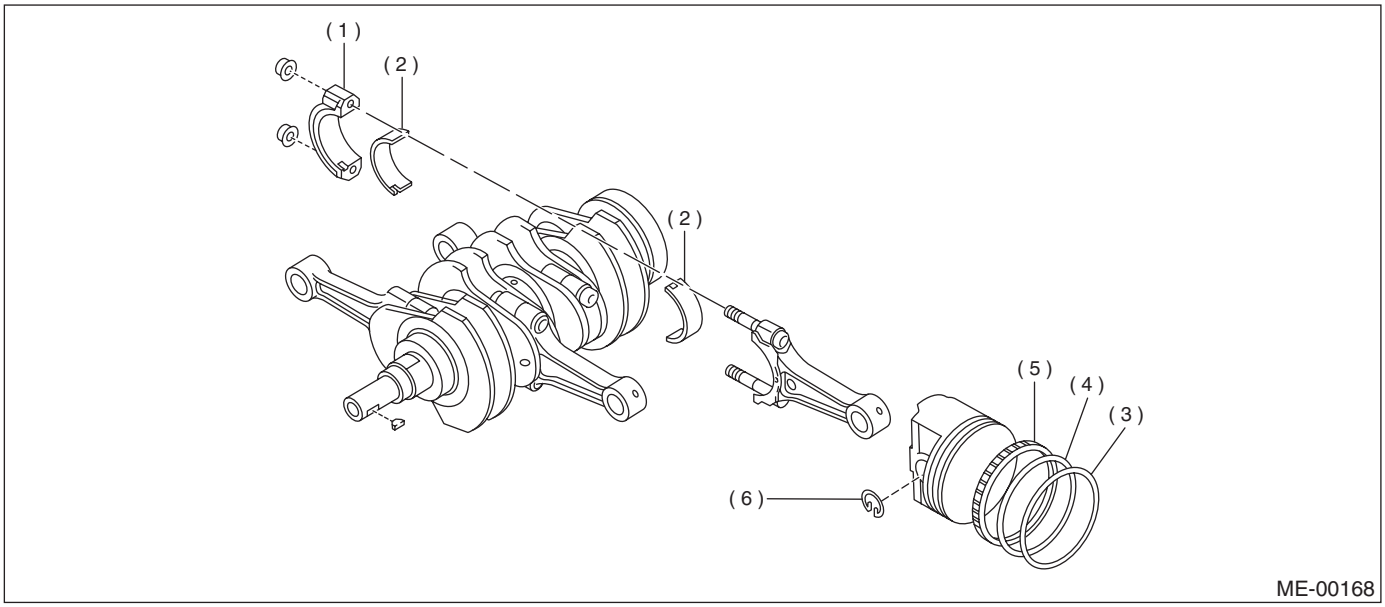


33) Install the water pipe.

NOTE:
Always use a new O-ring.

34) Install the cylinder head assembly. <Ref. to ME(H4DOTC)-64, INSTALLATION, Cylinder Head Assembly.>
35) Install the oil level gauge guide and tighten the attaching bolt (left side only).
36) Install the rocker cover.
37) Install the crankshaft sprocket. <Ref. to ME(H4DOTC)-58, INSTALLATION, Crankshaft Sprocket.>
38) Install the camshaft sprocket. <Ref. to ME(H4DOTC)-57, INSTALLATION, Camshaft Sprocket.>
39) Install the timing belt assembly. <Ref. to ME(H4DOTC)-50, INSTALLATION, Timing Belt Assembly.>
40) Install the belt cover. <Ref. to ME(H4DOTC)-47, INSTALLATION, Belt Cover.>
41) Install the crankshaft pulley. <Ref. to ME(H4DOTC)-46, INSTALLATION, Crankshaft Pulley.>
42) Install the generator and A/C compressor brackets on cylinder head.
43) Install the V-belt. <Ref. to ME(H4DOTC)-44, INSTALLATION, V-belt.>
44) Install the intake manifold. <Ref. to FU(H4DOTC)-15, REMOVAL, Intake Manifold.>

C: DISASSEMBLY



(1) Connecting rod cap
(2) Connecting rod bearing
(3) Top ring
(4) Second ring
(5) Oil ring
(6) Circlip

1) Remove the connecting rod cap.
2) Remove the connecting rod bearing.

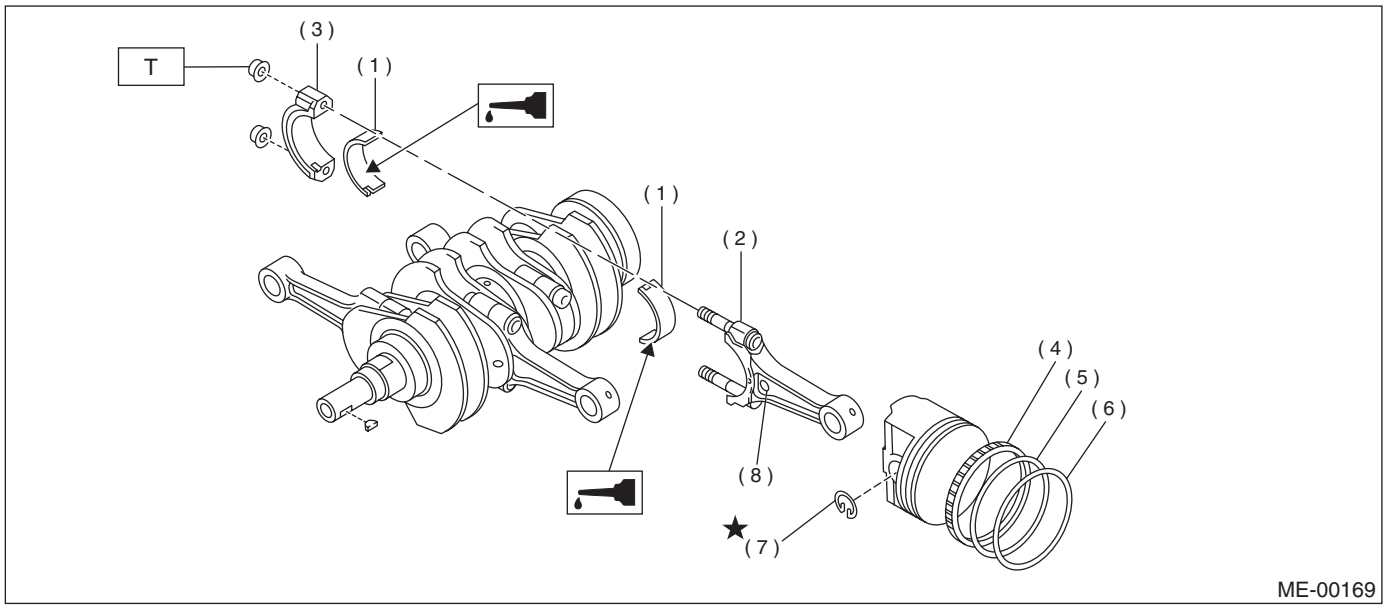
CAUTION:
Arrange the removed connecting rod, connecting rod cap and bearing in order to prevent confusion.

3) Remove the piston rings using the piston ring expander.
4) Remove the oil ring by hand.

CAUTION:
Arrange the removed piston rings in proper order to prevent confusion.

5) Remove the circlip.

D: ASSEMBLY



(1) Connecting rod bearing
(2) Connecting rod
(3) Connecting rod cap
(4) Oil ring
(5) Second ring
(6) Top ring
(7) Circlip
(8) Side mark

Tightening torque: N·m (kgf-m, ft-lb)
T: 44.6 (4.55, 32.9)

1) Install the connecting rod bearings on connecting rods and connecting rod caps.

CAUTION:
Apply oil to the surfaces of the connecting rod bearings.

2) Install the connecting rod on crankshaft.

CAUTION:
Position each connecting rod with the side marked facing forward.

3) Install the connecting rod cap with connecting rod nut.
Ensure the arrow on connecting rod cap faces the front during installation.

CAUTION:
• Each the connecting rod has its own mating cap. Make sure that they are assembled correctly by checking their matching number.
• When tightening the connecting rod nuts, apply oil on the threads.

4) Install the oil ring spacer, upper rail and lower rail in this order by hand. Then install the second ring and top ring with a piston ring expander.

2. CYLINDER AND PISTON

1) The cylinder bore size is stamped on the cylinder block's front upper surface.

CAUTION:
Measurement should be performed at a temperature of 20°C (68°F).

NOTE:
Standard sized pistons are classified into two grades, “A” and “B”. These grades should be used as a guide line in selecting a standard piston.

Standard diameter:
A: 92.005 — 92.015 mm (3.6222 — 3.6226 in)
B: 91.995 — 92.005 mm (3.6218 — 3.6222 in)

E: INSPECTION

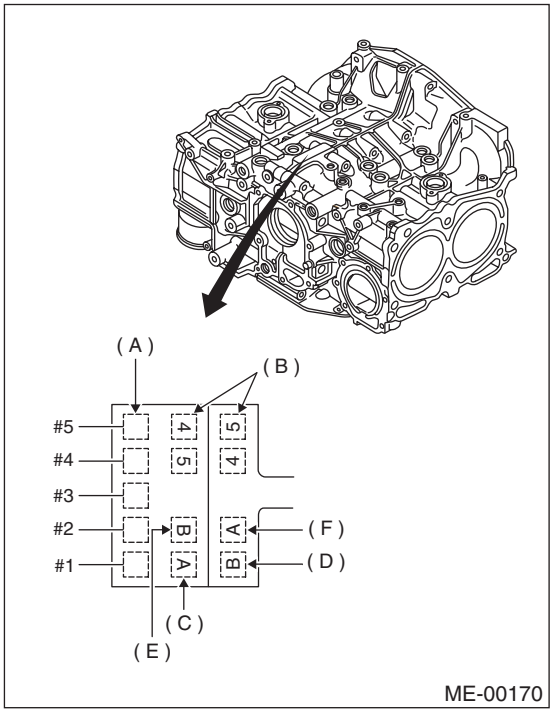
1. CYLINDER BLOCK

1) Visually check for cracks and damage. Especially, inspect the important parts by means of red lead check.
2) Check the oil passages for clogging.
3) Inspect the crankcase surface that mates with cylinder head for warping by using a straight edge, and correct by grinding if necessary.

Warping limit:
0.05 mm (0.0020 in)

Grinding limit:
0.1 mm (0.004 in)

Standard height of cylinder block:
201.0 mm (7.91 in)



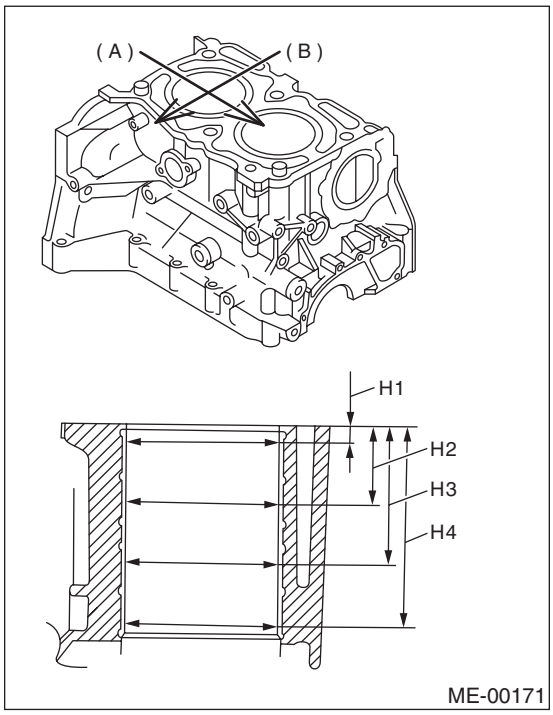
(A) Main journal size mark
(B) Cylinder block RH-LH combination mark
(C) #1 cylinder bore size mark
(D) #2 cylinder bore size mark
(E) #3 cylinder bore size mark
(F) #4 cylinder bore size mark

2) How to measure the inner diameter of each cylinder:
Measure the inner diameter of each cylinder in both the thrust and piston pin directions at the heights shown in the figure, using a cylinder bore gauge.

CAUTION:
Measurement should be performed at a temperature of 20°C (68°F).

Taper:
Standard
0.015 mm (0.0006 in)
Limit
0.050 mm (0.0020 in)

Out-of-roundness:
Standard
0.010 mm (0.0004 in)
Limit
0.050 mm (0.0020 in)



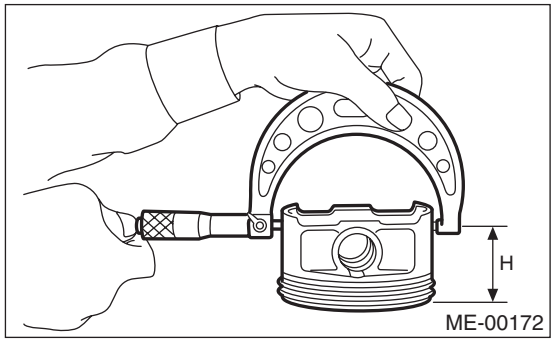
(A) Piston pin direction
(B) Thrust direction
H1: 10 mm (0.39 in)
H2: 45 mm (1.77 in)
H3: 80 mm (3.15 in)
H4: 115 mm (4.53 in)

3) When the piston is to be replaced due to general or cylinder wear, determine a suitable sized piston by measuring the piston clearance.
4) How to measure the outer diameter of each piston:
Measure the outer diameter of each piston at the height shown in the figure. (Thrust direction)

CAUTION:
Measurement should be performed at a temperature of 20°C (68°F).

Piston grade point H:
38.7 mm (1.524 in)

Piston outer diameter:
Standard
A: 91.985 — 91.995 mm (3.6214 — 3.6218 in)
B: 91.975 — 91.985 mm (3.6211 — 3.6214 in)
0.25 mm (0.0098 in) oversize
92.225 — 92.235 mm (3.6309 — 3.6313 in)
0.50 mm (0.0197 in) oversize
92.475 — 92.485 mm (3.6407 — 3.6411 in)



5) Calculate the clearance between cylinder and piston.

CAUTION:
Measurement should be performed at a temperature of 20°C (68°F).

Cylinder to piston clearance at 20°C (68°F):
Standard
0.010 — 0.030 mm (0.0004 — 0.0012 in)
Limit
0.050 mm (0.0020 in)

6) Boring and honing:
(1) If the value of taper, out-of-roundness, or cylinder-to-piston clearance measured exceeds the specified limit or if there is any damage on the cylinder wall, rebore it to use an oversize piston.

CAUTION:
When any of the cylinders needs reboring, all other cylinders must be bored at the same time, and use oversize pistons. Do not perform boring on one cylinder only, nor use an oversize piston for one cylinder only.

(2) If the cylinder inner diameter exceeds the limit after boring and honing, replace the crankcase.

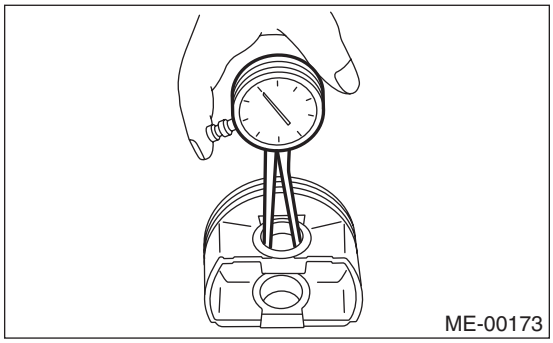
CAUTION:
Immediately after reboring, the cylinder diameter may differ from its real diameter due to temperature rise. Thus, pay attention to this when measuring the cylinder diameter.

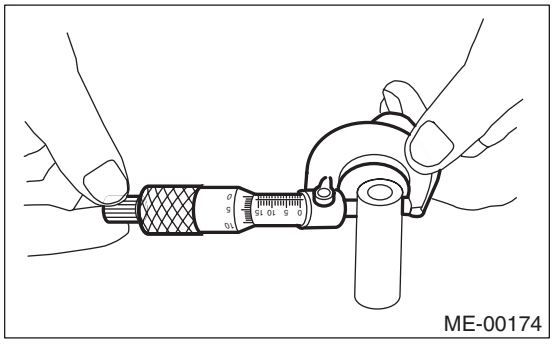
Limit of cylinder enlarging (boring):
0.5 mm (0.020 in)

3. PISTON AND PISTON PIN

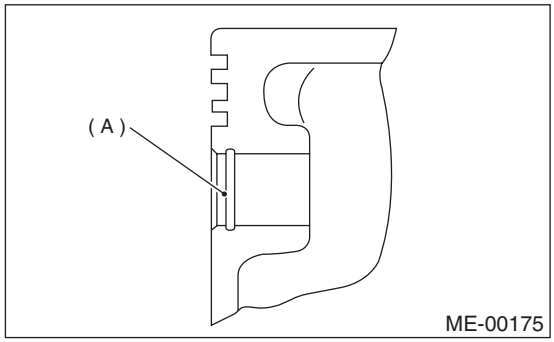
1) Check the pistons and piston pins for damage, cracks, and wear and the piston ring grooves for wear and damage. Replace if defective.
2) Measure the piston-to-cylinder clearance at each cylinder. <Ref. to ME(H4DOTC)-84, CYLINDER AND PISTON, INSPECTION, Cylinder Block.> If any of the clearances is not within specification, replace the piston or bore the cylinder to use an oversize piston.
3) Make sure that the piston pin can be inserted into the piston pin hole with a thumb at 20°C (68°F). Replace if defective.

Standard clearance between piston pin and hole in piston:
Standard
0.004 — 0.008 mm (0.0002 — 0.0003 in)
Limit
0.020 mm (0.0008 in)


ME-00173


ME-00174

4) Check the circlip installation groove on the piston for burr (A). If necessary, remove burr from the groove so that the piston pin can lightly move.



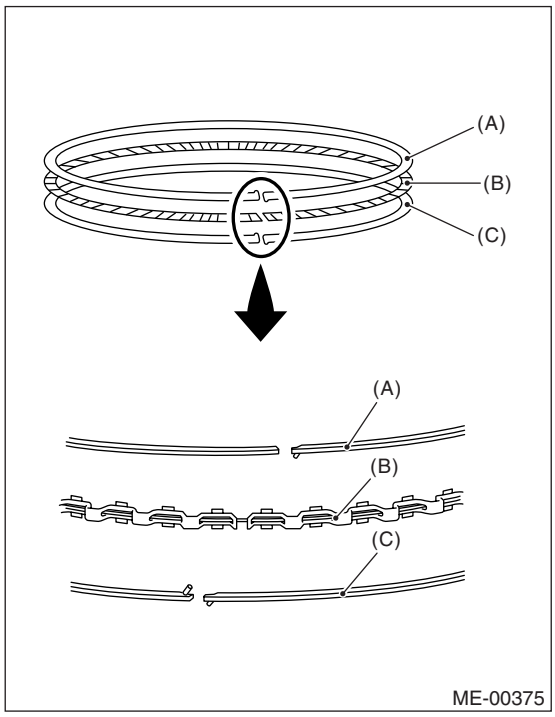
ME-00175

5) Check the piston pin circlip for distortion, cracks and wear.

4. PISTON RING

1) If the piston ring is broken, damaged, or worn, or if its tension is insufficient, or when the piston is replaced, replace the piston ring with a new one of the same size as the piston.

NOTE:
• The mark is indicated on the end of the top ring and second ring. When installing the rings to the piston, face this mark upward.
• The oil ring consists of an upper rail, expander and a lower rail. When installing to the piston, be careful to face the rails to the correct direction.

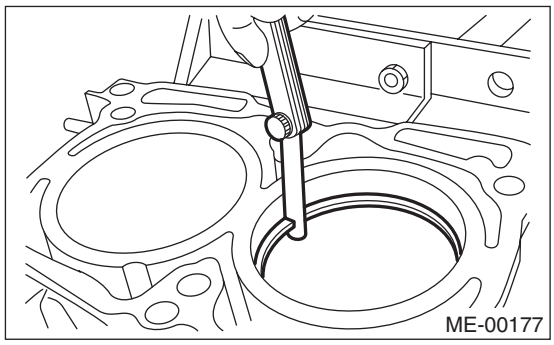


(A) Upper rail
(B) Expander
(C) Lower rail

2) Squarely place the piston ring and oil ring in cylinder, and measure the piston ring gap with a thickness gauge.

Unit: mm (in)

		Standard	Limit
Piston ring gap	Top ring	0.20 — 0.25 (0.0079 — 0.0098)	1.0 (0.039)
	Second ring	0.35 — 0.50 (0.0138 — 0.0197)	1.0 (0.039)
	Oil ring rail	0.20 — 0.50 (0.0079 — 0.0197)	1.5 (0.059)

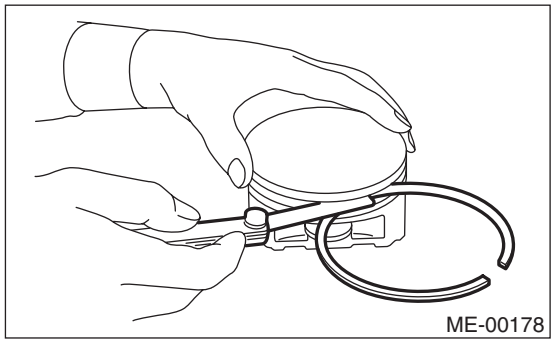


3) Measure the clearance between piston ring and piston ring groove with a thickness gauge.

CAUTION:
Before measuring the clearance, clean the piston ring groove and piston ring.

Unit: mm (in)

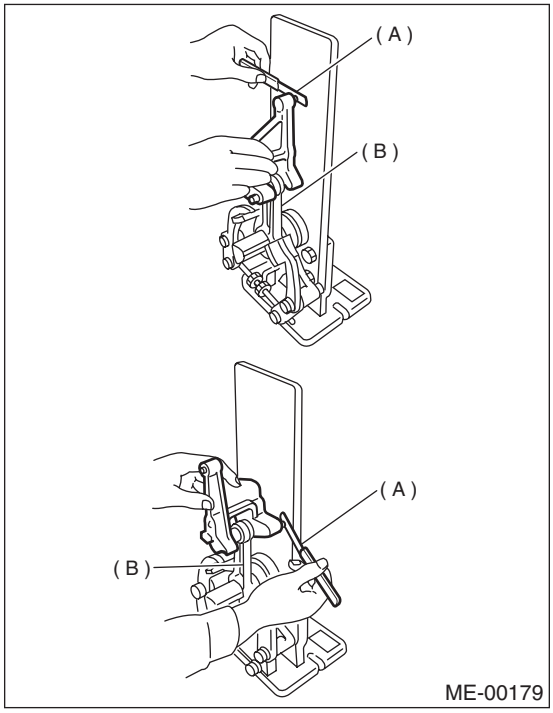
		Standard	Limit
Clearance between piston ring and piston ring groove	Top ring	0.055 — 0.090 (0.0022 — 0.0035)	0.15 (0.0059)
	Second ring	0.030 — 0.070 (0.0012 — 0.0028)	0.15 (0.0059)



5. CONNECTING ROD

1) Replace the connecting rod, if the large or small end thrust surface is damaged.
2) Check for bend or twist using a connecting rod aligner. Replace the connecting rod if the bend or twist exceeds the limit.

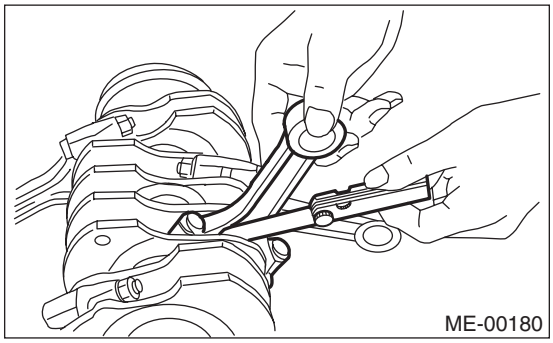
Limit of bend or twist per 100 mm (3.94 in) in length:
0.10 mm (0.0039 in)



(A) Thickness gauge
(B) Connecting rod

3) Install the connecting rod fitted with bearing to crankshaft and measure the side clearance (thrust clearance). Replace the connecting rod if the side clearance exceeds the specified limit.

Connecting rod side clearance:
Standard
0.070 — 0.330 mm (0.0028 — 0.0130 in)
Limit
0.4 mm (0.016 in)



4) Inspect the connecting rod bearing for scar, peeling, seizure, melting, wear, etc.
5) Measure the oil clearance on individual connecting rod bearings by means of plastigauge. If any oil clearance is not within specification, replace the defective bearing with a new one of standard size or undersize as necessary. (See the table below.)

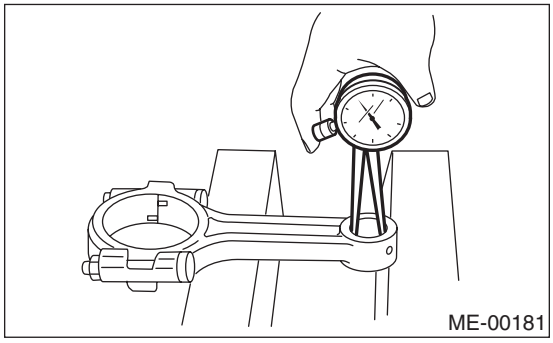
Connecting rod oil clearance:
Standard
0.020 — 0.046 mm (0.0008 — 0.0018 in)
Limit
0.05 mm (0.0020 in)

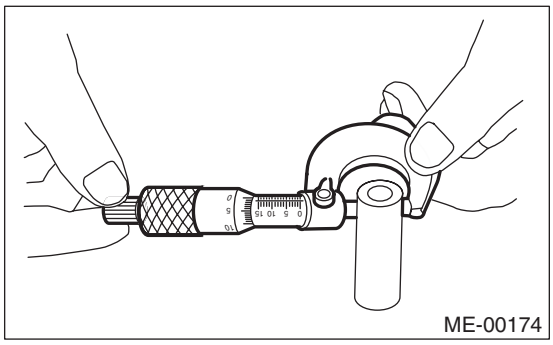
Unit: mm (in)

Bearing	Bearing size (Thickness at center)	Outer diameter of crank pin
Standard	1.486 — 1.498 (0.0585 — 0.0590)	51.984 — 52.000 (2.0466 — 2.0472)
0.03 (0.0012) undersize	1.504 — 1.512 (0.0592 — 0.0596)	51.954 — 51.970 (2.0454 — 2.0461)
0.05 (0.0020) undersize	1.514 — 1.522 (0.0596 — 0.0599)	51.934 — 51.950 (2.0447 — 2.0453)
0.25 (0.0098) undersize	1.614 — 1.622 (0.0635 — 0.0639)	51.734 — 51.750 (2.0368 — 2.0374)

6) Inspect the bushing at connecting rod small end, and replace if worn or damaged. Also measure the piston pin clearance at the connecting rod small end.

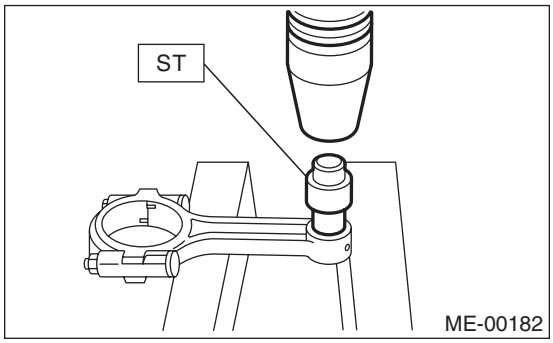
Clearance between piston pin and bushing:
Standard
0 — 0.022 mm (0 — 0.0009 in)
Limit
0.030 mm (0.0012 in)


ME-00181


ME-00174

7) Replacement procedure is as follows:
(1) Remove the bushing from connecting rod with ST and press.
(2) Press the bushing with ST after applying oil on the periphery of bushing.

ST 499037100 CONNECTING ROD BUSHING REMOVER AND INSTALLER



ME-00182

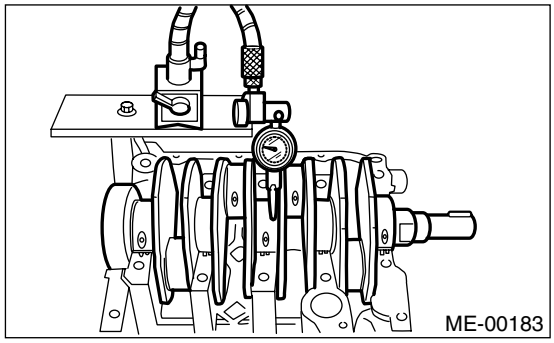
(3) Make two 3 mm (0.12 in) holes in bushing. Ream the inside of bushing.
(4) After completion of reaming, clean the bushing to remove chips.

6. CRANKSHAFT AND CRANKSHAFT BEARING

1) Clean the crankshaft completely and check for cracks by means of red lead check etc., and replace if defective.
2) Measure the crankshaft bend, and correct or replace if it exceeds the limit.

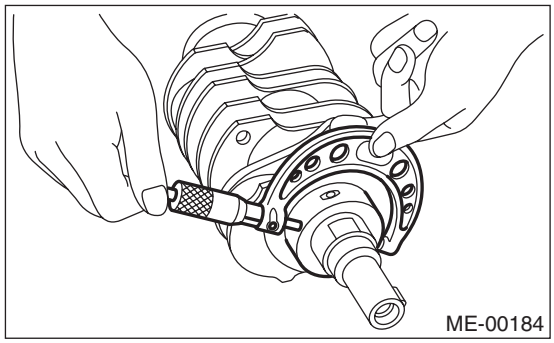
CAUTION:
If a suitable V-block is not available, install #1 and #5 crankshaft bearing on cylinder block, position crankshaft on these bearings and measure the crankshaft bend using a dial gauge.

Crankshaft bend limit:
0.035 mm (0.0014 in)


ME-00183

3) Inspect the crank journal and crank pin for wear. If they are not within the specifications, replace the bearing with a suitable (undersize) one, and replace or recondition crankshaft as necessary. When grinding the crank journal or crank pin, finish them to the specified dimensions according to the undersize bearing to be used.

Crank pin and crank journal:
Out-of-roundness
0.020 mm (0.0008 in) or less
Taper limit
0.07 mm (0.0028 in)
Grinding limit
0.250 mm (0.0098 in)


ME-00184

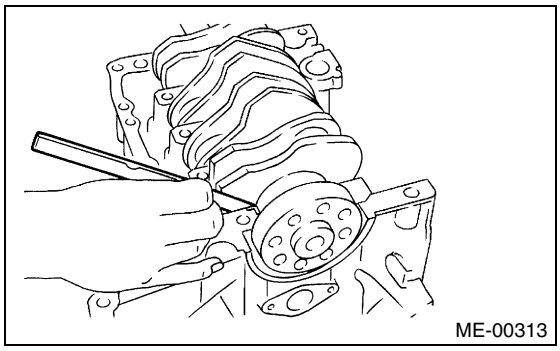
Unit: mm (in)

		Crank journal diameter		Crank pin diameter
		#1, #3, #5	#2, #4	
Standard	Journal O.D.	59.992 — 60.008 (2.3619 — 2.3625)	59.992 — 60.008 (2.3619 — 2.3625)	51.984 — 52.000 (2.0466 — 2.0472)
	Bearing size (Thickness at center)	1.998 — 2.011 (0.0787 — 0.0792)	2.000 — 2.013 (0.0787 — 0.0793)	1.486 — 1.498 (0.0585 — 0.0590)
0.03 (0.0012) undersize	Journal O.D.	59.962 — 59.978 (2.3607 — 2.3613)	59.962 — 59.978 (2.3607 — 2.3613)	51.954 — 51.970 (2.0454 — 2.0461)
	Bearing size (Thickness at center)	2.017 — 2.020 (0.0794 — 0.0795)	2.019 — 2.022 (0.0795 — 0.0796)	1.504 — 1.512 (0.0592 — 0.0595)
0.05 (0.0020) undersize	Journal O.D.	59.942 — 59.958 (2.3599 — 2.3605)	59.942 — 59.958 (2.3599 — 2.3605)	51.934 — 51.950 (2.0447 — 2.0453)
	Bearing size (Thickness at center)	2.027 — 2.030 (0.0798 — 0.0799)	2.029 — 2.032 (0.0799 — 0.0800)	1.514 — 1.522 (0.0596 — 0.0599)
0.25 (0.0098) undersize	Journal O.D.	59.742 — 59.758 (2.3520 — 2.3527)	59.742 — 59.758 (2.3520 — 2.3527)	51.734 — 51.750 (2.0368 — 2.0374)
	Bearing size (Thickness at center)	2.127 — 2.130 (0.0837 — 0.0839)	2.129 — 2.132 (0.0838 — 0.0839)	1.614 — 1.622 (0.0635 — 0.0639)

O.D.: Outer Diameter

4) Measure the thrust clearance of crankshaft at center bearing. If the clearance exceeds the limit, replace the bearing.

Crankshaft thrust clearance:
Standard
0.030 — 0.115 mm (0.0012 — 0.0045 in)
Limit
0.25 mm (0.0098 in)


ME-00313

5) Inspect individual crankshaft bearings for signs of flaking, seizure, melting, and wear.

6) Measure the oil clearance on each crankshaft bearing by means of plastigauge. If the measurement is not within the specification, replace the defective bearing with an undersize one, and replace or recondition the crankshaft as necessary.

Unit: mm (in)

Crankshaft oil clearance		
#1	Standard	0.003 — 0.030 (0.0001 — 0.0012)
	Limit	0.040 (0.0016)
#2	Standard	0.012 — 0.033 (0.0005 — 0.0013)
	Limit	0.045 (0.0018)
#3	Standard	0.003 — 0.030 (0.0001 — 0.0012)
	Limit	0.040 (0.0016)
#4	Standard	0.012 — 0.033 (0.0005 — 0.0013)
	Limit	0.045 (0.0018)
#5	Standard	0.010 — 0.031 (0.0004 — 0.0012)
	Limit	0.040 (0.0016)

21.Engine Trouble in General

A: INSPECTION

NOTE:
"RANK" shown in the chart refers to the possibility of reason for the trouble in order ("Very often" to "Rarely")

A — Very often
B — Sometimes
C — Rarely

TROUBLE	PROBLEM PARTS, ETC.	POSSIBLE CAUSE	RANK
1. Engine will not start.			
1) Starter does not turn.	• Starter	• Defective battery-to-starter harness	B
		• Defective starter switch	C
		• Defective inhibitor switch or neutral switch	C
		• Defective starter	B
	• Battery	• Poor terminal connection	A
		• Run-down battery	A
		• Defective charging system	B
	• Friction	• Seizure of crankshaft and connecting rod bearing	C
		• Seized camshaft	C
		• Seized or stuck piston and cylinder	C
2) Initial combustion does not occur.	• Starter	• Defective starter	C
	• Engine control system <Ref. to EN(H4DOTC)-2, Basic Diagnostic Procedure.>		A
	• Fuel line	• Defective fuel pump and relay	A
		• Lack of or insufficient fuel	B
	• Belt	• Defective	B
		• Defective timing	B
	• Compression	• Incorrect valve clearance	C
		• Loosened spark plugs or defective gasket	C
		• Loosened cylinder head bolts or defective gasket	C
		• Improper valve seating	C
		• Defective valve stem	C
		• Worn or broken valve spring	B
		• Worn or stuck piston rings, cylinder and piston	C
		• Incorrect valve timing	B
		• Improper engine oil (low viscosity)	B
3) Initial combustion occur.	• Engine control system <Ref. to EN(H4DOTC)-2, Basic Diagnostic Procedure.>		A
	• Intake system	• Defective intake manifold gasket	B
		• Defective throttle body gasket	B
	• Fuel line	• Defective fuel pump and relay	C
		• Clogged fuel line	C
		• Lack of or insufficient fuel	B
	• Belt	• Defective	B
		• Defective timing	B
	• Compression	• Incorrect valve clearance	C
		• Loosened spark plugs or defective gasket	C
		• Loosened cylinder head bolts or defective gasket	C
		• Improper valve seating	C
		• Defective valve stem	C
		• Worn or broken valve spring	B
		• Worn or stuck piston rings, cylinder and piston	C
		• Incorrect valve timing	B
		• Improper engine oil (low viscosity)	B

TROUBLE	PROBLEM PARTS, ETC.	POSSIBLE CAUSE	RANK
4) Engine stalls after initial combustion.	• Engine control system <Ref. to EN(H4DOTC)-2, Basic Diagnostic Procedure.>		A
	• Intake system	• Loosened or cracked intake duct	B
		• Loosened or cracked PCV hose	C
		• Loosened or cracked vacuum hose	C
		• Defective intake manifold gasket	B
		• Defective throttle body gasket	B
		• Dirty air cleaner element	C
	• Fuel line	• Clogged fuel line	C
		• Lack of or insufficient fuel	B
	• Belt	• Defective	B
		• Defective timing	B
	• Compression	• Incorrect valve clearance	C
		• Loosened spark plugs or defective gasket	C
		• Loosened cylinder head bolts or defective gasket	C
		• Improper valve seating	C
		• Defective valve stem	C
		• Worn or broken valve spring	B
		• Worn or stuck piston rings, cylinder and piston	C
		• Incorrect valve timing	B
		• Improper engine oil (low viscosity)	B
2. Rough idle and engine stall	• Engine control system <Ref. to EN(H4DOTC)-2, Basic Diagnostic Procedure.>		A
	• Intake system	• Loosened or cracked intake duct	A
		• Loosened or cracked PCV hose	A
		• Loosened or cracked vacuum hose	A
		• Defective intake manifold gasket	B
		• Defective throttle body gasket	B
		• Defective PCV valve	C
		• Loosened oil filler cap	B
		• Dirty air cleaner element	C
	• Fuel line	• Defective fuel pump and relay	C
		• Clogged fuel line	C
		• Lack of or insufficient fuel	B
	• Belt	• Defective timing	C
	• Compression	• Incorrect valve clearance	B
		• Loosened spark plugs or defective gasket	B
		• Loosened cylinder head bolts or defective gasket	B
		• Improper valve seating	B
		• Defective valve stem	C
		• Worn or broken valve spring	B
		• Worn or stuck piston rings, cylinder and piston	B
		• Incorrect valve timing	A
		• Improper engine oil (low viscosity)	B
	• Lubrication system	• Incorrect oil pressure	B
		• Defective rocker cover gasket	C
	• Cooling system	• Overheating	C
	• Others	• Malfunction of evaporative emission control system	A
		• Stuck or damaged throttle valve	B
		• Accelerator cable out of adjustment	C

TROUBLE	PROBLEM PARTS, ETC.	POSSIBLE CAUSE	RANK
3. Low output, hesitation and poor acceleration	• Engine control system <Ref. to EN(H4DOTC)-2, Basic Diagnostic Procedure.>		A
	• Intake system	• Loosened or cracked intake duct	A
		• Loosened or cracked PCV hose	A
		• Loosened or cracked vacuum hose	B
		• Defective intake manifold gasket	B
		• Defective throttle body gasket	B
		• Defective PCV valve	B
		• Loosened oil filler cap	B
		• Dirty air cleaner element	A
	• Fuel line	• Defective fuel pump and relay	B
		• Clogged fuel line	B
		• Lack of or insufficient fuel	C
	• Belt	• Defective timing	B
	• Compression	• Incorrect valve clearance	B
		• Loosened spark plugs or defective gasket	B
		• Loosened cylinder head bolts or defective gasket	B
		• Improper valve seating	B
		• Defective valve stem	C
		• Worn or broken valve spring	B
		• Worn or stuck piston rings, cylinder and piston	C
		• Incorrect valve timing	A
		• Improper engine oil (low viscosity)	B
	• Lubrication system	• Incorrect oil pressure	B
	• Cooling system	• Overheating	C
		• Over cooling	C
	• Others	• Malfunction of evaporative emission control system	A
4. Surging	• Engine control system <Ref. to EN(H4DOTC)-2, Basic Diagnostic Procedure.>		A
	• Intake system	• Loosened or cracked intake duct	A
		• Loosened or cracked PCV hose	A
		• Loosened or cracked vacuum hose	A
		• Defective intake manifold gasket	B
		• Defective throttle body gasket	B
		• Defective PCV valve	B
		• Loosened oil filler cap	B
		• Dirty air cleaner element	B
	• Fuel line	• Defective fuel pump and relay	B
		• Clogged fuel line	B
		• Lack of or insufficient fuel	C
	• Belt	• Defective timing	B
	• Compression	• Incorrect valve clearance	B
		• Loosened spark plugs or defective gasket	C
		• Loosened cylinder head bolts or defective gasket	C
		• Improper valve seating	C
		• Defective valve stem	C
		• Worn or broken valve spring	C
		• Worn or stuck piston rings, cylinder and piston	C
		• Incorrect valve timing	A
		• Improper engine oil (low viscosity)	B
	• Cooling system	• Overheating	B
	• Others	• Malfunction of evaporative emission control system	C

TROUBLE	PROBLEM PARTS, ETC.	POSSIBLE CAUSE	RANK
5. Engine does not return to idle.	• Engine control system <Ref. to EN(H4DOTC)-2, Basic Diagnostic Procedure.>		A
	• Intake system	• Loosened or cracked vacuum hose	A
	• Others	• Stuck or damaged throttle valve	A
		• Accelerator cable out of adjustment	B
6. Dieseling (Run-on)	• Engine control system <Ref. to EN(H4DOTC)-2, Basic Diagnostic Procedure.>		A
	• Cooling system	• Overheating	B
	• Others	• Malfunction of evaporative emission control system	B
7. After burning in exhaust system	• Engine control system <Ref. to EN(H4DOTC)-2, Basic Diagnostic Procedure.>		A
	• Intake system	• Loosened or cracked intake duct	C
		• Loosened or cracked PCV hose	C
		• Loosened or cracked vacuum hose	B
		• Defective PCV valve	B
		• Loosened oil filler cap	C
	• Belt	• Defective timing	B
	• Compression	• Incorrect valve clearance	B
		• Loosened spark plugs or defective gasket	C
		• Loosened cylinder head bolts or defective gasket	C
		• Improper valve seating	B
		• Defective valve stem	C
		• Worn or broken valve spring	C
		• Worn or stuck piston rings, cylinder and piston	C
		• Incorrect valve timing	A
	• Lubrication system	• Incorrect oil pressure	C
	• Cooling system	• Over cooling	C
	• Others	• Malfunction of evaporative emission control system	C
8. Knocking	• Engine control system <Ref. to EN(H4DOTC)-2, Basic Diagnostic Procedure.>		A
	• Intake system	• Loosened oil filler cap	B
	• Belt	• Defective timing	B
	• Compression	• Incorrect valve clearance	C
		• Incorrect valve timing	B
	• Cooling system	• Overheating	A
9. Excessive engine oil consumption	• Intake system	• Loosened or cracked PCV hose	A
		• Defective PCV valve	B
		• Loosened oil filler cap	C
	• Compression	• Defective valve stem	A
		• Worn or stuck piston rings, cylinder and piston	A
	• Lubrication system	• Loosened oil pump attaching bolts and defective gasket	B
		• Defective oil filter o-ring	B
		• Defective crankshaft oil seal	B
		• Defective rocker cover gasket	B
		• Loosened oil drain plug or defective gasket	B
		• Loosened oil pan fitting bolts or defective oil pan	B

TROUBLE	PROBLEM PARTS, ETC.	POSSIBLE CAUSE	RANK
10. Excessive fuel consumption	• Engine control system <Ref. to EN(H4DOTC)-2, Basic Diagnostic Procedure.>		A
	• Intake system	• Dirty air cleaner element	A
	• Belt	• Defective timing	B
	• Compression	• Incorrect valve clearance	B
		• Loosened spark plugs or defective gasket	C
		• Loosened cylinder head bolts or defective gasket	C
		• Improper valve seating	B
		• Defective valve stem	C
		• Worn or broken valve spring	C
		• Worn or stuck piston rings, cylinder and piston	B
		• Incorrect valve timing	B
	• Lubrication system	• Incorrect oil pressure	C
	• Cooling system	• Over cooling	C
	• Others	• Accelerator cable out of adjustment	B

22.Engine Noise

A: INSPECTION

Type of sound	Condition	Possible cause
Regular clicking sound	Sound increases as engine speed increases.	• Valve mechanism is defective. • Incorrect valve clearance • Worn valve rocker • Worn camshaft • Broken valve spring
Heavy and dull clank	Oil pressure is low.	• Worn crankshaft main bearing • Worn connecting rod bearing (big end)
	Oil pressure is normal.	• Loose flywheel mounting bolts • Damaged engine mounting
High-pitched clank (Spark knock)	Sound is noticeable when accelerating with an overload.	• Ignition timing advanced • Accumulation of carbon inside combustion chamber • Wrong spark plug • Improper gasoline
Clank when engine speed is medium (1,000 to 2,000 rpm).	Sound is reduced when fuel injector connector of noisy cylinder is disconnected. (NOTE*)	• Worn crankshaft main bearing • Worn bearing at crankshaft end of connecting rod
Knocking sound when engine is operating under idling speed and engine is warm	Sound is reduced when fuel injector connector of noisy cylinder is disconnected. (NOTE*)	• Worn cylinder liner and piston ring • Broken or stuck piston ring • Worn piston pin and hole at piston end of connecting rod
	Sound is not reduced if each fuel injector connector is disconnected in turn. (NOTE*)	• Unusually worn valve lifter • Worn cam gear • Worn camshaft journal bore in crankcase
Squeaky sound	—	• Insufficient generator lubrication
Rubbing sound	—	• Defective generator brush and rotor contact
Gear scream when starting engine	—	• Defective ignition starter switch • Worn gear and starter pinion
Sound like polishing glass with a dry cloth	—	• Loose drive belt • Defective water pump shaft
Hissing sound	—	• Loss of compression • Air leakage in air intake system, hoses, connections or manifolds
Timing belt noise	—	• Loose timing belt • Belt contacting case/adjacent part
Valve tappet noise	—	• Incorrect valve clearance

NOTE*:
When disconnecting the fuel injector connector, Malfunction Indicator Light (CHECK ENGINE light) illuminates and trouble code is stored in ECM memory.
Therefore, carry out the CLEAR MEMORY MODE <Ref. to EN(H4DOTC)-49, OPERATION, Clear Memory Mode.> and INSPECTION MODE <Ref. to EN(H4DOTC)-41, OPERATION, Inspection Mode.> after connecting the fuel injector connector.

1. General Description

A: GENERAL DESCRIPTION

Description of turbo models are included in SP (H4SO) section. <Ref. to SP(H4SO)-2, General Description.>

1. General Description

A: GENERAL DESCRIPTION

Description of turbo models are included in SC (H4SO) section. <Ref. to SC(H4SO)-2, General Description.>