CHASSIS ELECTRICAL

Click on the applicable bookmark to selected the required model year

CHASSIS ELECTRICAL

CONTENTS

54109000303

CONTINUED ON NEXT PAGE

WARNINGS REGARDING SERVICING OF SUPPLEMENTAL RESTRAINT SYSTEM (SRS) EQUIPPED VEHICLES

WARNING!

(1) Improper service or maintenance of any component of the SRS, or any SRS-related component, can lead to personal injury or death to service personnel (from inadvertent firing of the air bag) or to the driver and passenger (from rendering the SRS inoperative).
(2) Service or maintenance of any SRS component or SRS-related component must be performed only at an authorized MITSUBISHI dealer.
(3) MITSUBISHI dealer personnel must thoroughly review this manual, and especially its GROUP 52B – Supplemental Restraint System (SRS) before beginning any service or maintenance of any component of the SRS or any SRS-related component.

NOTE

The SRS includes the following components: SRS-ECU, SRS warning lamp, air bag module, clock spring and interconnecting wiring. Other SRS-related components (that may have to be removed/installed in connection with SRS service or maintenance) are indicated in the table of contents by an asterisk (*).

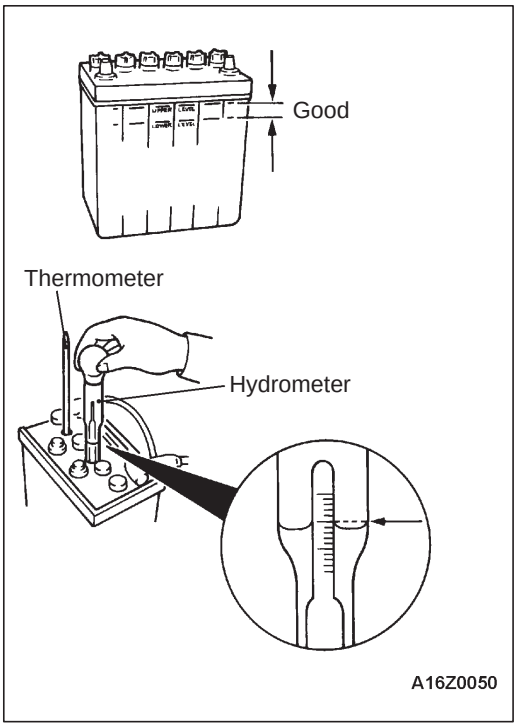
CONTINUED ON NEXT PAGE

BATTERY

54100030028

SERVICE SPECIFICATION

Item	Specification
Specific gravity of the battery fluid	1.220 – 1.290 [20°C]



ON-VEHICLE SERVICE

54100090071

FLUID LEVEL AND SPECIFIC GRAVITY CHECK

1. Inspect whether or not the battery fluid is between the UPPER LEVEL and LOWER LEVEL marks.
2. Use a hydrometer and thermometer to check the specific gravity of the battery fluid.

   Standard value: 1.220 – 1.290 [20°C]

   The specific gravity of the battery fluid varies with the temperature, so use the following formula to calculate the specific gravity for 20°C. Use the calculated value to determine whether or not the specific gravity is satisfactory.

   D20=Dt+0.0007 (t–20)

   D20: Specific gravity of the battery fluid calculated for 20°C.

   Dt: Actually measured specific gravity

   t: Actually measured temperature

CHARGING

54100110173

1. When charging a battery while still installed in the vehicle, disconnect the battery cables to prevent damage to electrical parts.
2. The current normally used for charging a battery should be approximately 1/10th of the battery capacity.
3. When performing a quick-charging due to lack of time, etc., the charging current should never exceed the battery capacity as indicated in amperes.
4. Determining if charging is completed.
   (1) If the specific gravity of the battery fluid reaches 1.250 – 1.290 and remains constant for at least one hour.
   (2) If the voltage of each cell reaches 2.5 – 2.8 V and remains constant for at least one hour.

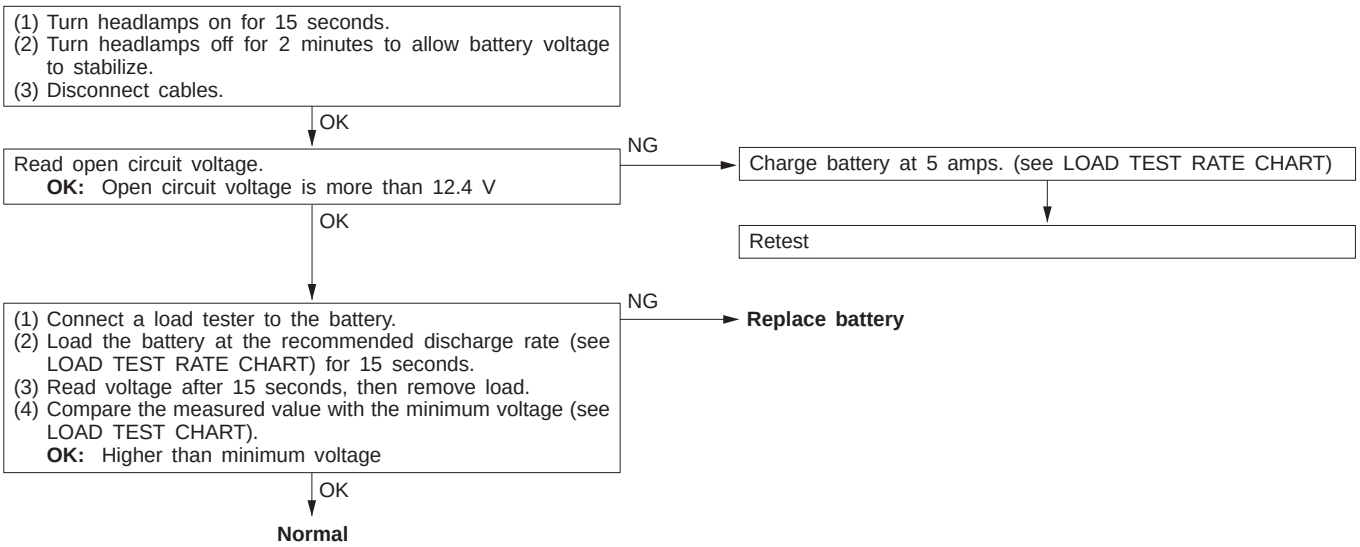
Caution

(1) Be careful since the battery fluid level may rise during charging.
(2) Keep all sources of fire away while charging because there is a danger of explosion.
(3) Be careful not to do anything that could generate sparks while charging.
(4) When charging is completed, replace the battery caps, pour clean water over the battery to remove any sulfuric acid and dry.

BATTERY TESTING PROCEDURE

54100120244

TEST STEP



LOAD TEST RATE CHART

Battery type	55530	56216	56638	55044
Charging time when fully discharged h [5-amp rated current charging]	10	11	11	8
Load test (Amps)	170	210	210	190

LOAD TEST CHART

Temperature °C	21 and above	16	10	4	–1	–7	–12	–18
Minimum voltage V	9.6	9.5	9.4	9.3	9.1	8.9	8.7	8.5

IGNITION SWITCH AND IMMOBILIZER SYSTEM 54300060511

SPECIAL TOOL

Tool	Number	Name	Use
	MB991502	MUT-II sub assembly	● Immobilizer system check (Diagnosis display using the MUT-II) ● Registration of the ID code

TROUBLESHOOTING 54300070651

Caution
The ID code should always be re-registered when replacing the immobilizer-ECU.

STANDARD FLOW OF DIAGNOSIS TROUBLESHOOTING

Refer to GROUP 00 – How To Use Troubleshooting/Inspection Service Points.

DIAGNOSIS FUNCTION

DIAGNOSIS CODES CHECK

Refer to GROUP 00 – How To Use Troubleshooting/Inspection Service Points.

ERASING DIAGNOSIS CODES

Refer to GROUP 00 – How To Use Troubleshooting/Inspection Service Points.

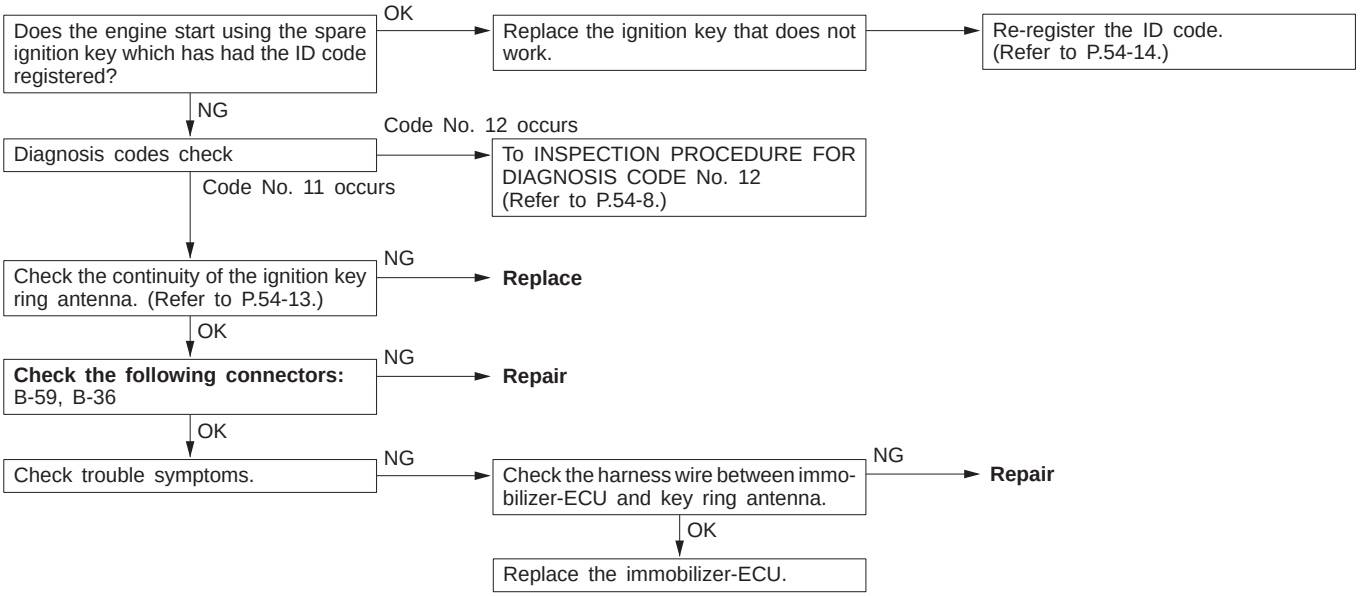
Caution
The diagnosis codes which result from disconnecting the battery cables cannot be erased.

INSPECTION CHART FOR DIAGNOSIS CODES

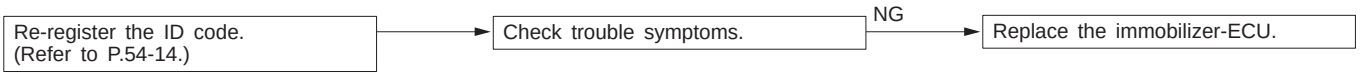
Diagnosis code No.	Inspection items	Reference page
11	Transponder communication system	54-8
12	ID code are not the same or are not registered	54-8

INSPECTION PROCEDURE FOR DIAGNOSIS CODES

Code No. 11 Transponder communication system	Probable cause
The ID code of the transponder is not sent to the immobilizer-ECU immediately after the ignition switch is turned to the ON position.	● Malfunction of the transponder ● Malfunction of the ignition key ring antenna ● Malfunction of harness or connector ● Malfunction of the immobilizer-ECU



Code No. 12 ID code are not the same or are not registered	Probable cause
The ID code which is sent from the transponder is not the same as the ID code which is registered in the immobilizer-ECU.	● The ID code in the ignition key being used has not been properly registered. ● Malfunction of the immobilizer-ECU



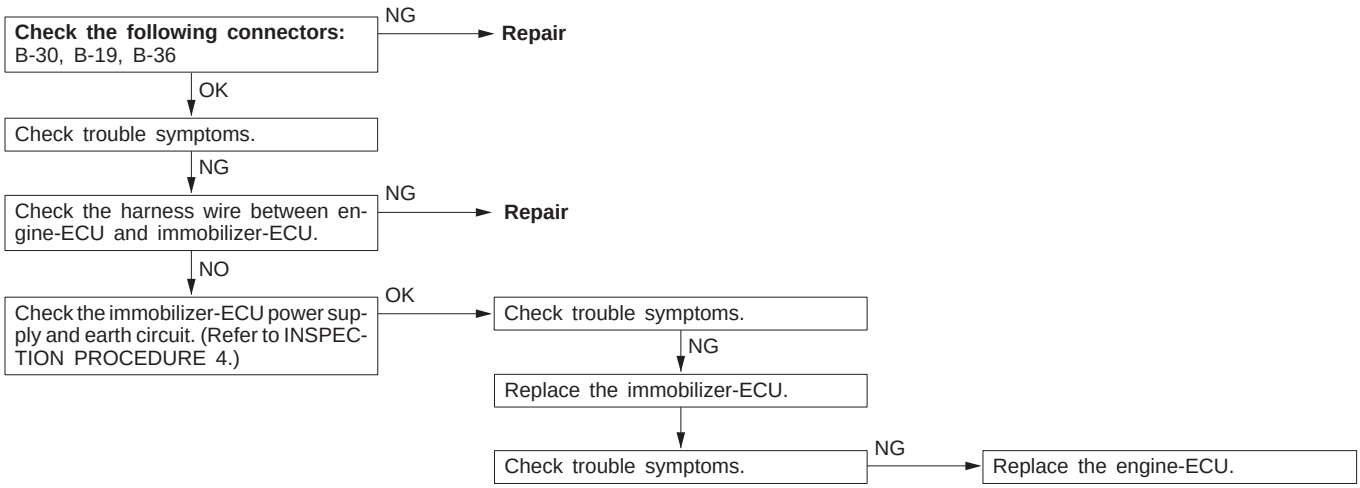
INSPECTION CHART FOR TROUBLE SYMPTOMS

Trouble symptom	Inspection procedure No.	Reference page
Communication with MUT-II is impossible.	–	GROUP 13A, 13B – Troubleshooting
Diagnosis code No. 54 has been generated by the engine-ECU.	1	54-9
ID code cannot be registered using the MUT-II.	2	54-10
Engine does not start (Cranking but no initial combustion).	3	54-10
Malfunction of the immobilizer-ECU power supply and earth circuit	4	54-11

INSPECTION PROCEDURE FOR TROUBLE SYMPTOMS

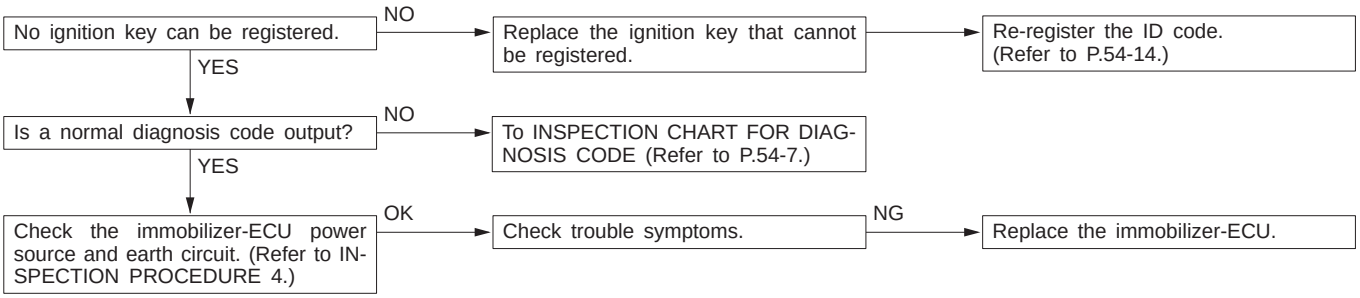
Inspection Procedure 1

Diagnosis code No. 54 has been generated by the engine-ECU.	**Probable cause**
There is a problem with communication between the engine-ECU and the immobilizer-ECU.	• Malfunction of harness or connector • Malfunction of the immobilizer-ECU • Malfunction of the engine-ECU



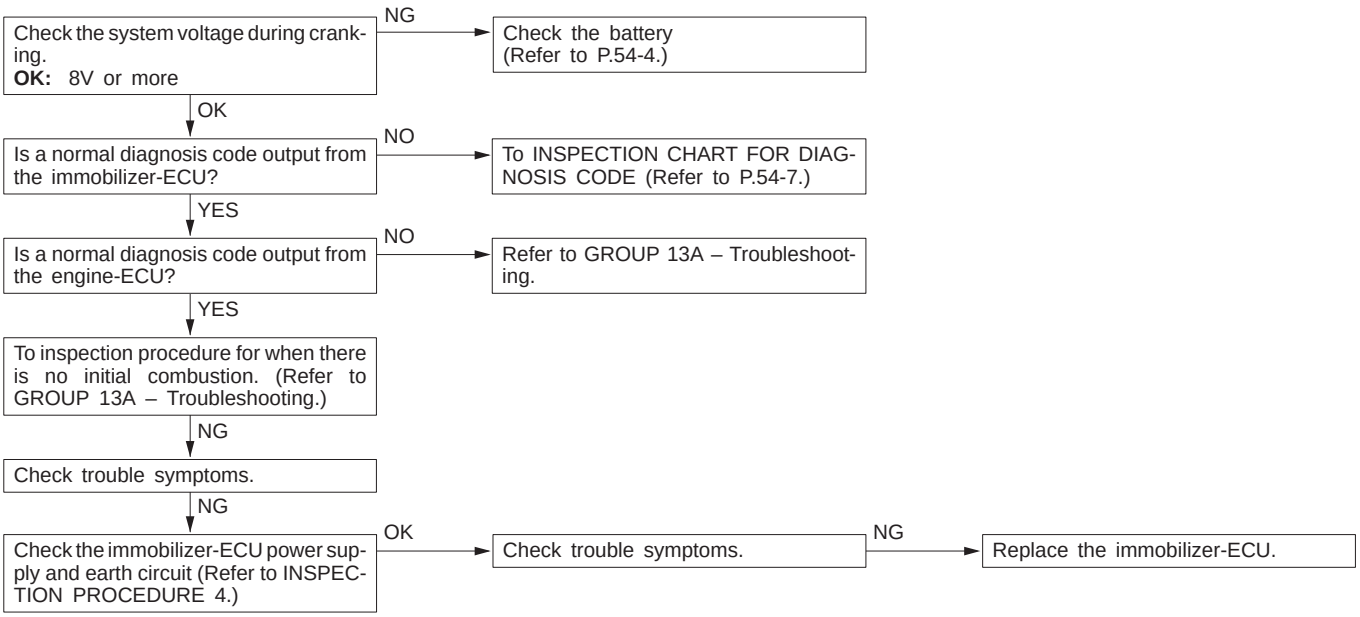
Inspection Procedure 2

ID code cannot be registered using the MUT-II.	Probable cause
The cause is probably that there is no ID code registered in the immobilizer-ECU, or there is a malfunction of the immobilizer-ECU.	● Malfunction of the transponder ● Malfunction of the ignition key ring antenna ● Malfunction of harness or connector ● Malfunction of the immobilizer-ECU



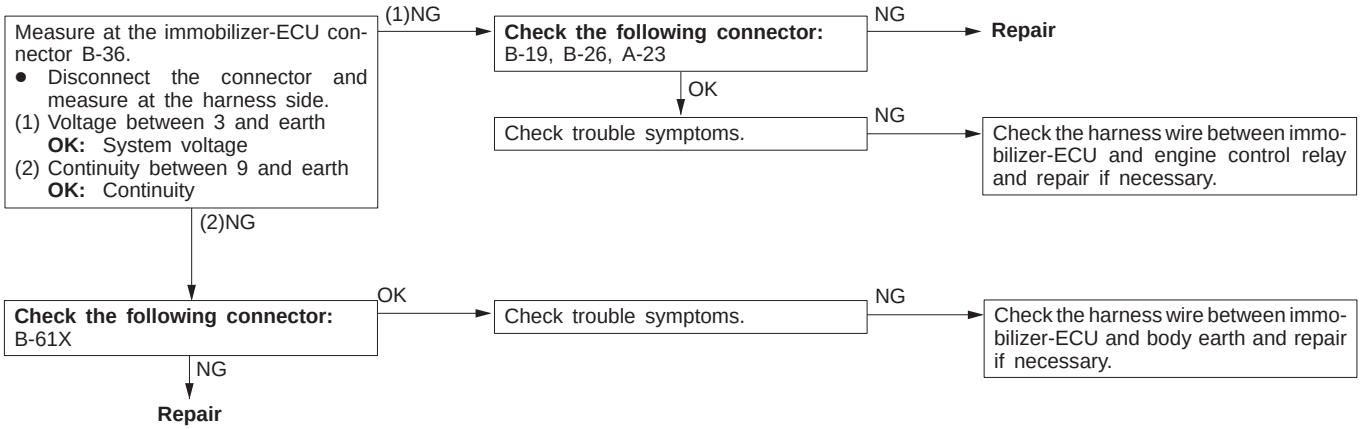
Inspection Procedure 3

Engine does not start (cranking but no initial combustion).	Probable cause
If the fuel injectors are not operating, there might be a problem with the MPI system in addition to a malfunction of the immobilizer system. It is normal for this to occur if an attempt is made to start the engine using a key that has not been properly registered.	● Malfunction of the MPI system ● Malfunction of the immobilizer-ECU



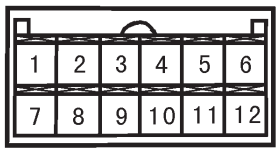
Inspection Procedure 4

Malfunction of the immobilizer-ECU power supply and earth circuit



CHECK AT IMMOBILIZER-ECU

TERMINAL VOLTAGE CHECK CHART



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Terminal No.	Signal	Checking requirements	Terminal voltage
1	Ignition key ring antenna	–	–
2	–	–	–
3	Immobilizer-ECU power supply	Ignition switch: ON	System voltage
4, 5	–	–	–
6	Engine-ECU	–	–
7	Ignition key ring antenna	–	–
8	–	–	–
9	Immobilizer-ECU earth	Always	0V
10 – 12	–	–	–

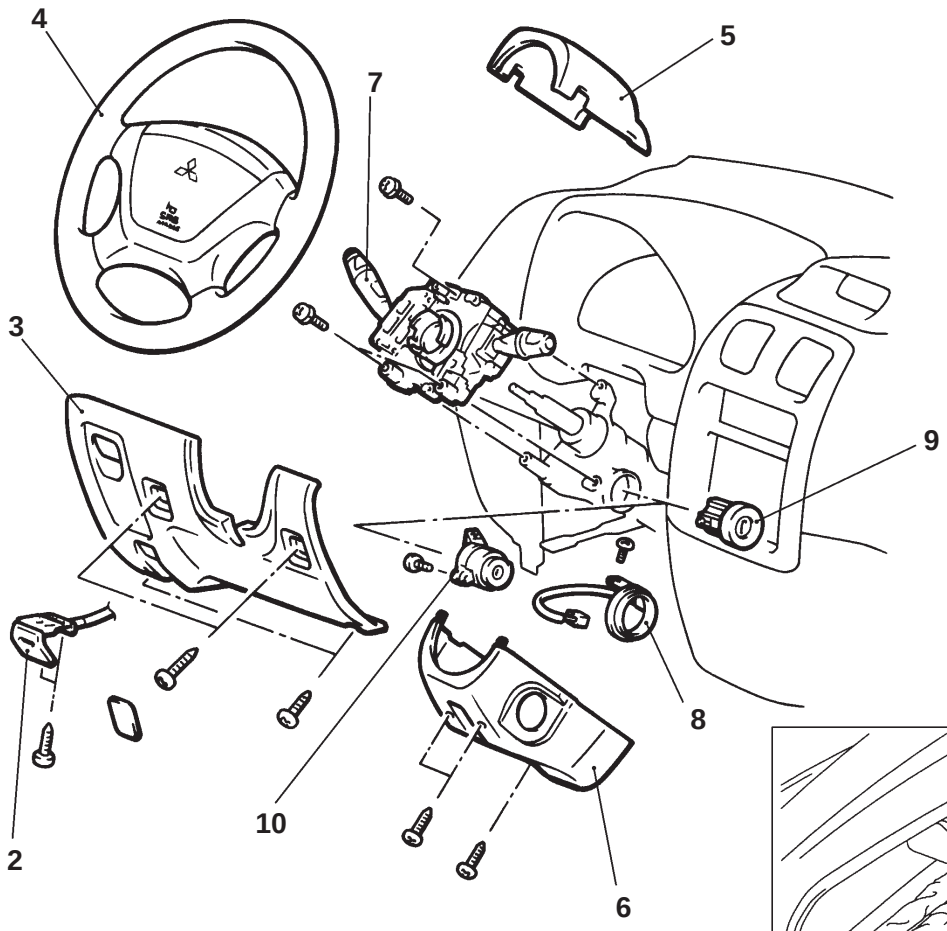
IGNITION SWITCH AND IMMOBILIZER SYSTEM

54300210442

REMOVAL AND INSTALLATION

Caution: SRS

Before removal of air bag module and clock spring, refer to GROUP 52B – Service Precautions and Air Bag Module and Clock Spring.



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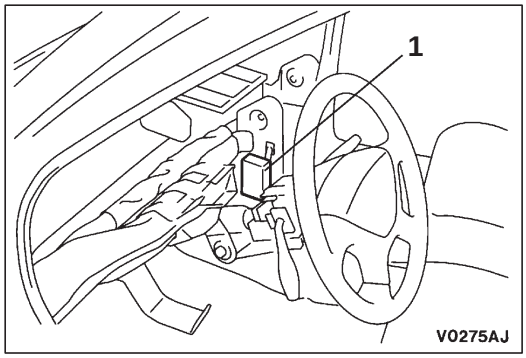


Immobilizer-ECU removal steps

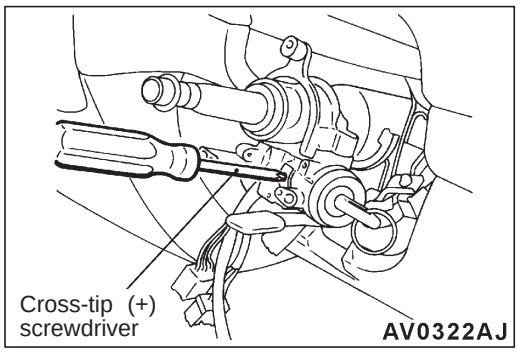
- Instrument panel (Refer to GROUP 52A.)

1. Immobilizer-ECU

Ignition switch and ignition key ring antenna removal steps

2. Hood lock release handle
3. Instrument under cover (Refer to GROUP 52A – Instrument Panel.)
4. Steering wheel (Refer to GROUP 37A.)
5. Column cover, upper
6. Column cover, lower
7. Column switch (Refer to GROUP 37A – Steering Wheel and Shaft.)
8. Ignition key ring antenna
9. Steering lock cylinder
10. Ignition switch

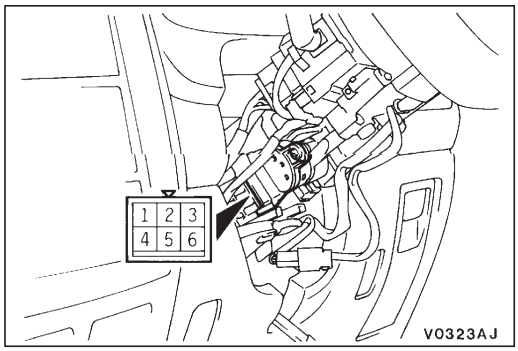
◀A▶



REMOVAL SERVICE POINTS

◀A▶ STEERING LOCK CYLINDER REMOVAL

1. Insert the key in the steering lock cylinder and turn it to the “ACC” position.
2. Using a cross-tip (+) screwdriver (small) or a similar tool, push the lock pin of the steering lock cylinder inward and then pull the steering lock cylinder toward you.



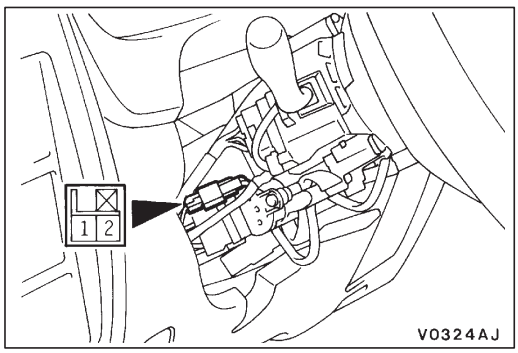
INSPECTION

54300220308

IGNITION SWITCH CONTINUITY CHECK

1. Remove the column cover lower and upper.
2. Disconnect the wiring connector from the ignition switch.
3. Operate the switch, and check the continuity between the terminals.

Ignition key position	Terminal No.					
	1	2	3	4	5	6
LOCK						
ACC	○					○
ON	○	○		○		○
START	○	○	○		○	



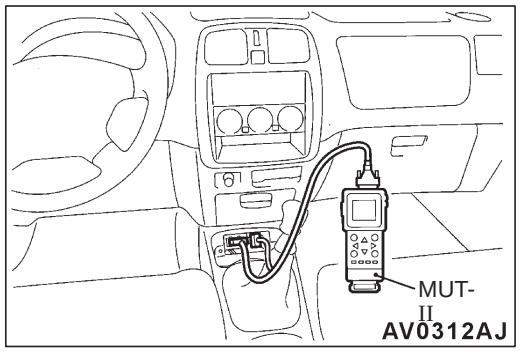
IGNITION KEY RING ANTENNA CONTINUITY CHECK

Use a circuit tester to check the continuity between the terminals.

ID CODE REGISTRATION METHOD 54300870060

If using an ignition key that has just been newly purchased, or if the immobilizer-ECU has been replaced, you will need to register the ID codes for each ignition key being used into the immobilizer-ECU. (A maximum of eight different ID codes can be registered.)
Moreover, when the immobilizer-ECU has been replaced, you will need to use the MUT-II to register the ID number that the user specifies into the immobilizer-ECU. (Refer to the MUT-II instruction manual for instructions on using the MUT-II.)

Caution
If registering of the ID codes is carried out all previously-registered codes will be erased. Accordingly, you should have ready all of the ignition keys that have already been registered.



1. Connect the MUT-II to the diagnosis connector.

   Caution
   Connection and disconnection of the MUT-II should always be carried out with the ignition switch in the OFF position.
2. Use the ignition key that is to be registered to turn the ignition switch to the ON position.
3. Use the MUT-II to register the ID code. If you are registering two or more codes, use the next key to be registered to turn the ignition switch to the ON position without disconnecting the MUT-II.
4. Disconnect the MUT-II. This completes the registration operation.

COMBINATION METERS

54300030277

SERVICE SPECIFICATIONS

Items			Standard value
Speedometer indication error km/h(mph)		40 (20)	40 – 48 (20 – 25)
		80 (40)	80 – 92 (40 – 47)
		120 (60)	120 – 136 (60 – 69)
		160 (80)	160 – 180 (80 – 91)
		– (100)	– (100 – 114)
Tachometer indication error r/min	Vehicles with MPI	700	±100
		3,000	±150
		5,000	±250
		6,000	±300
	Vehicles with GDI	700	±100
		3,000	+225, –100
		5,000	+325, –125
		7,000	+400, –100
Fuel gauge unit resistance Ω	Float point F		7.9 – 14.6
	Float point E		107.9 – 118.9
Fuel gauge unit float height mm	A (Float point F)		142.4
	B (Float point E)		28
Engine coolant temperature gauge unit resistance (at 70°C) Ω			104 ± 13.5

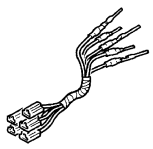
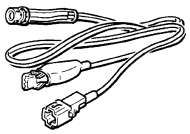
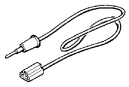
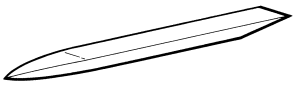
SEALANT

54300050037

Items	Specified sealant	Remark
Engine coolant temperature gauge unit threaded portion	3M Adhesive nut locking No. 4171 or equivalent	Drying sealant

SPECIAL TOOLS

54300060108

Tool	Number	Name	Use
A  B  C  D  C991223	MB991223 A: MB991219 B: MB991220 C: MB991221 D: MB991222	Harness set A: Test harness B: LED harness C: LED harness adapter D: Probe	● Fuel gauge simple check A: Connector pin contact pressure check B: Power circuit check C: Power circuit check D: Commercial tester connection
	MB990784	Ornament remover	Removal of meter hood

TROUBLESHOOTING

54300070668

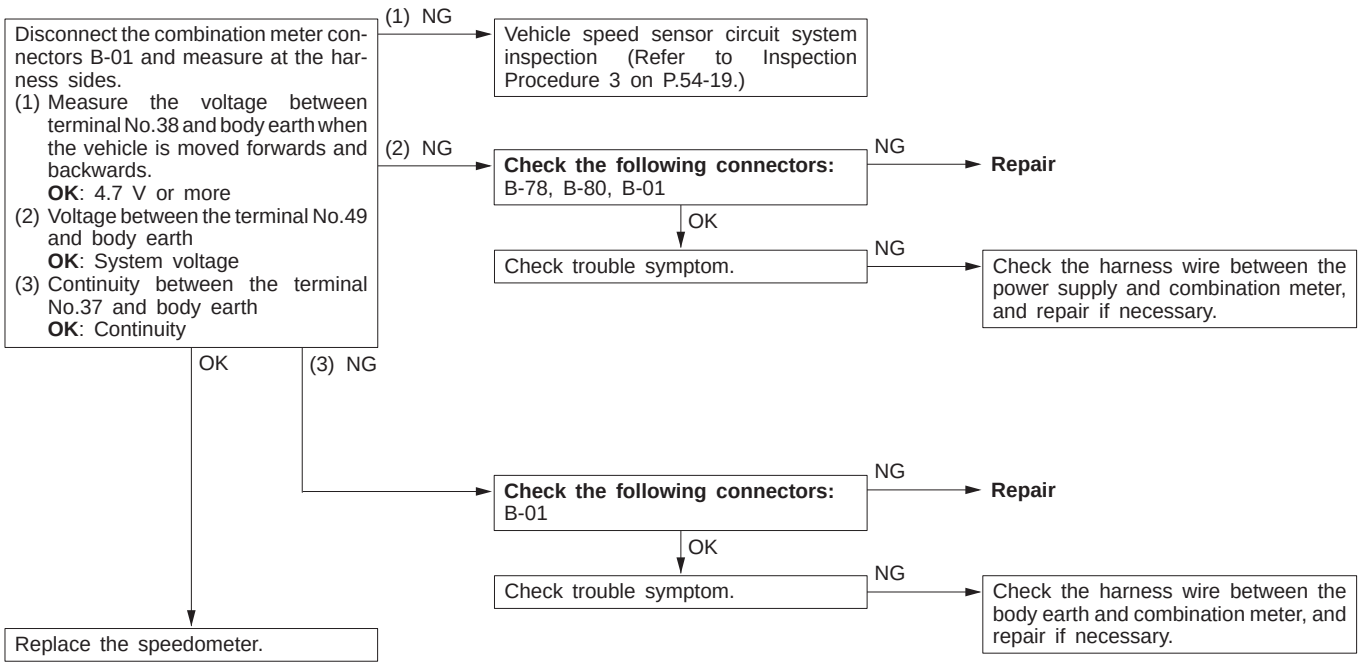
INSPECTION CHART FOR TROUBLE SYMPTOMS

Trouble symptom	Inspection procedure	Reference page
Speedometer does not work.	1	54-17
Tachometer does not work.	2	54-18
Fuel gauge does not operate.	4	54-20
Engine coolant temperature gauge does not operate.	5	54-21

INSPECTION PROCEDURE FOR TROUBLE SYMPTOMS

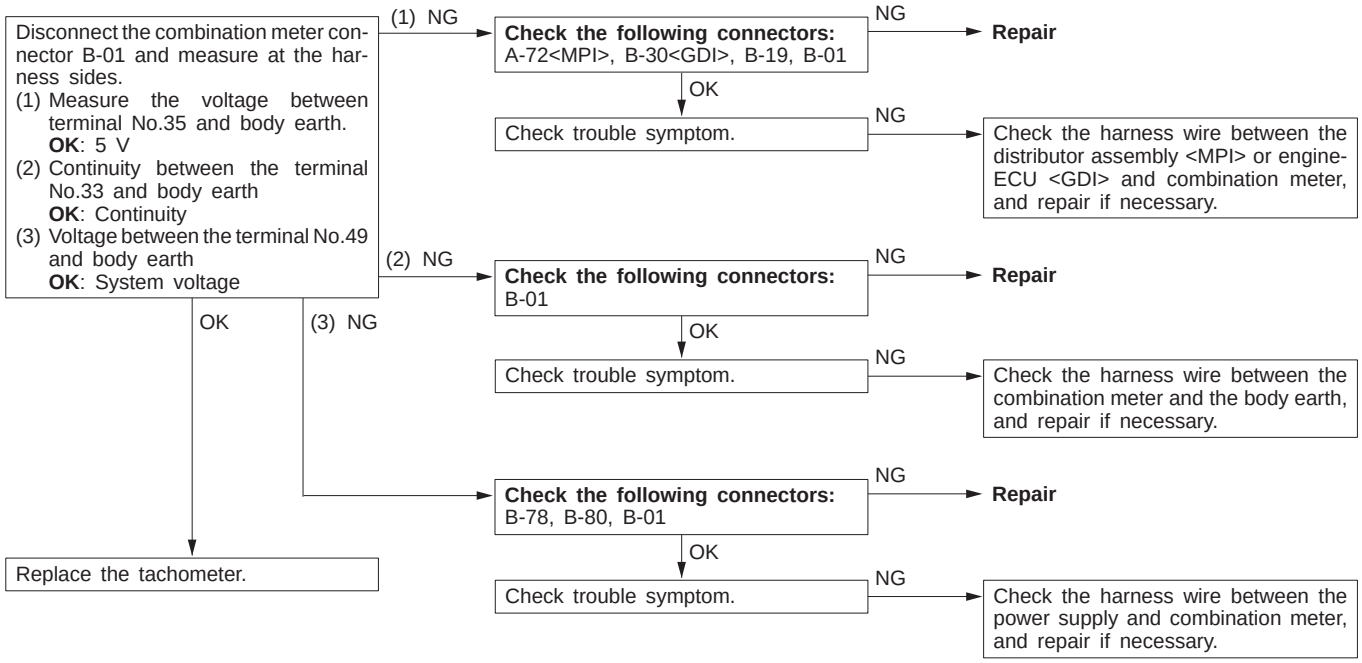
Inspection Procedure 1

Speedometer does not work.	Probable cause
The cause may be a defective vehicle speed sensor circuit system or a defective speedometer. Vehicle speed sensor is co-used among the engine-ECU and A/T-ECU.	• Malfunction of vehicle speed sensor • Malfunction of speedometer • Malfunction of harness or connector



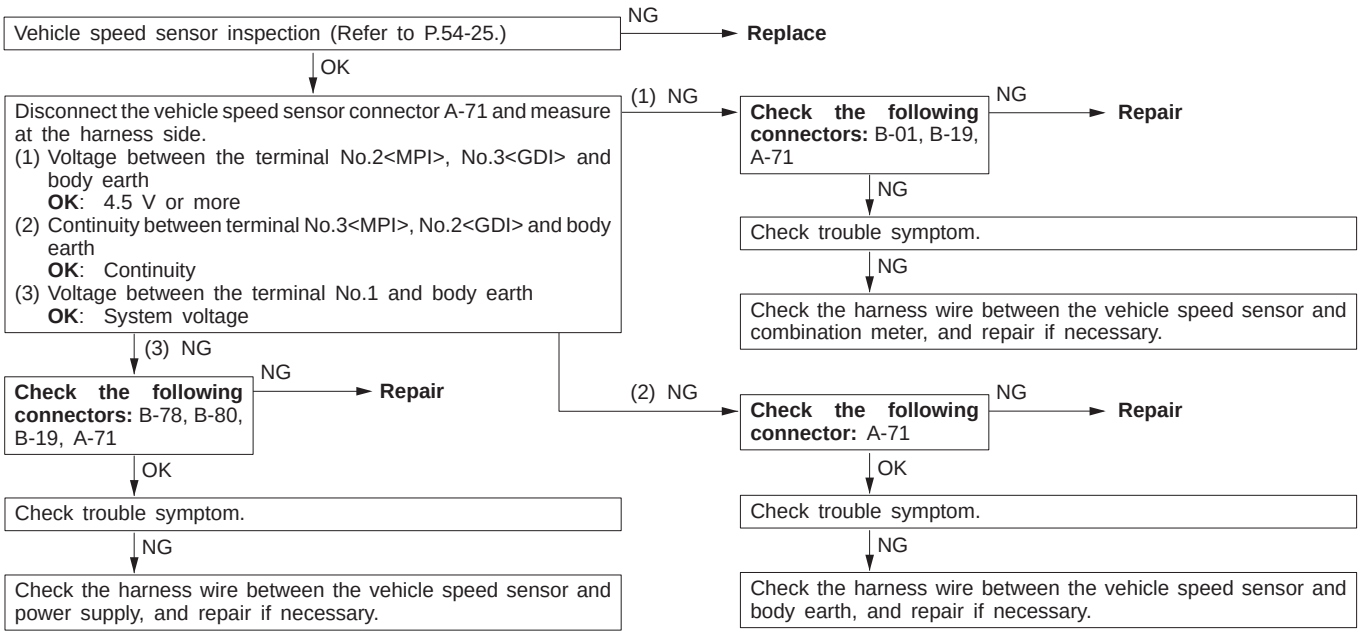
Inspection Procedure 2

Tachometer does not work.	Probable cause
The ignition signal may not be input from the engine, or there may be a malfunction in the power supply or earth circuit.	• Malfunction of tachometer • Malfunction of harness or connector



Inspection Procedure 3

Vehicle speed sensor circuit system inspection



Inspection Procedure 4

Fuel gauge does not operate.	Probable cause
If speedometer and tachometer operate normally, the harness from power supply to combination meter is normal.	• Malfunction of fuel gauge unit • Malfunction of fuel gauge • Malfunction of harness or connector

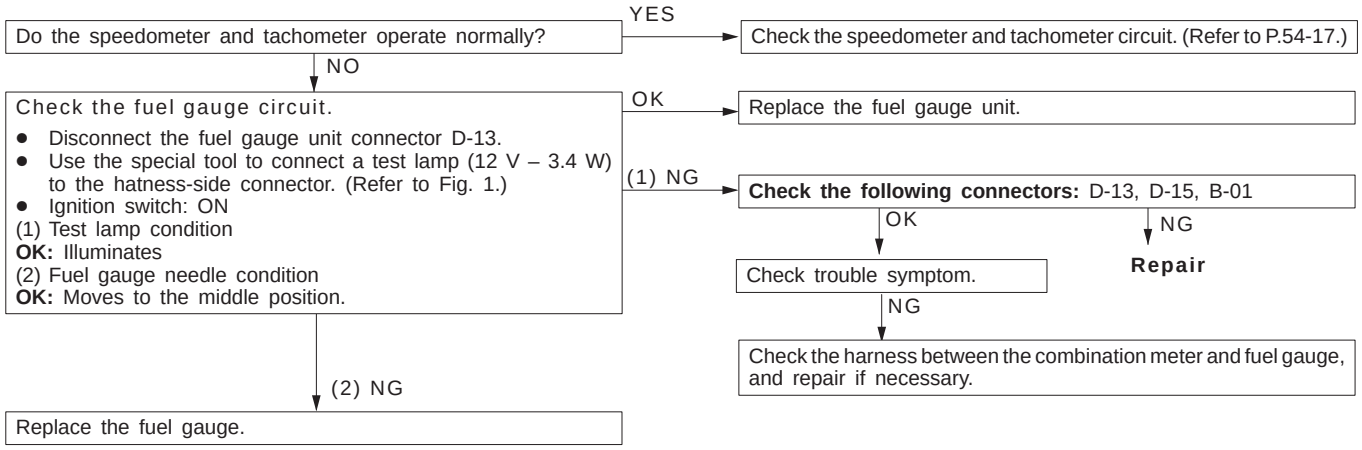
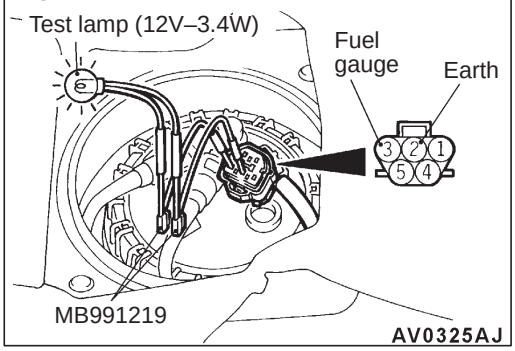


Fig. 1



Inspection Procedure 5

Engine coolant temperature gauge does not operate.	Probable cause
If speedometer and tachometer operate normally, the harness from power supply to combination meter is normal.	• Malfunction of engine coolant temperature gauge unit • Malfunction of engine coolant temperature gauge • Malfunction of harness or connector

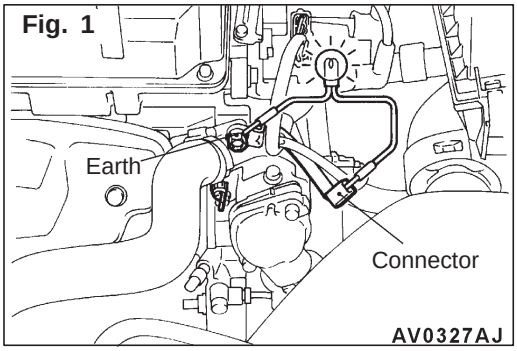
Do the speedometer and tachometer operate normally?
- YES → Check the speedometer and tachometer circuit. (Refer to P.54-17.)
- NO ↓

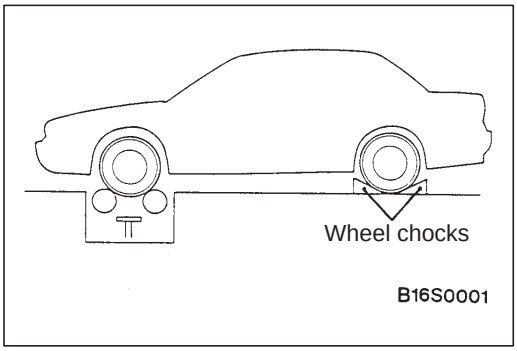
Check the engine coolant temperature gauge circuit.
- Disconnect the engine coolant temperature gauge unit connector A-77.
- Use the special tool to connect a test lamp (12 V – 3.4 W) to the hatness-side connector. (Refer to Fig. 1.)
- Ignition switch: ON

(1) Test lamp condition
OK: Illuminates
(2) Engine coolant temperature gauge needle condition
OK: Moves to the middle position.

- OK → Replace the engine coolant temperature gauge unit.
- (1) NG → **Check the following connectors:** A-77, B-19, B-01
  - OK → Check trouble symptom.
    - NG → Check the harness between the combination meter and engine coolant temperature gauge, and repair if necessary.
  - NG → **Repair**
- (2) NG → Replace the engine coolant temperature gauge.

Fig. 1





ON-VEHICLE SERVICE

54300090220

SPEEDOMETER CHECK

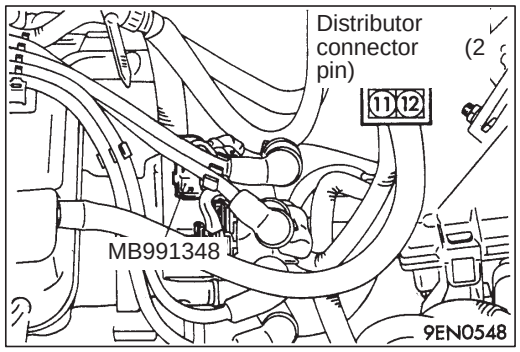
1. Adjust the pressure of the tyres to the specified level. (Refer to GROUP 31 – Service Specifications.)
2. Set the vehicle onto a speedometer tester and use wheel chocks to hold the rear wheels.

3. Check if the speedometer indicator range is within the standard values.

Caution
Do not operate the clutch suddenly. Do not increase/decrease speed rapidly while testing.

Standard values:

Standard indication km/h (mph)	Allowable range km/h (mph)
40 (20)	40 – 48 (20 – 25)
80 (40)	80 – 92 (40 – 47)
120 (60)	120 – 136 (60 – 69)
160 (80)	160 – 180 (80 – 91)
– (100)	– (100 – 114)



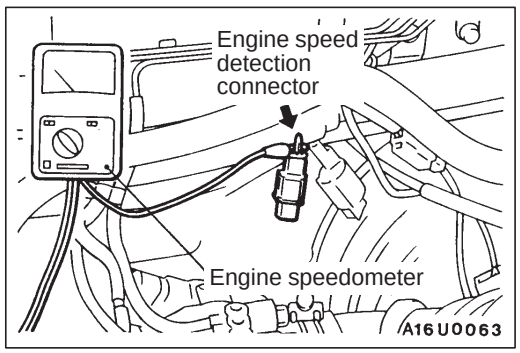
TACHOMETER CHECK

54300100237

<MPI>

1. Disconnect the distributor connector (2-pin), and connect the special tool in between. All terminals should be connected.
2. Connect a primary voltage-detection type of tachometer to terminal (12) of the distributor connector.
3. Compare the readings of the engine speedometer and the tachometer at every engine speed, and check if the variations are within the standard values.

Standard values:
700 r/min: ±100 r/min
3,000 r/min: ±150 r/min
5,000 r/min: ±250 r/min
6,000 r/min: ±300 r/min



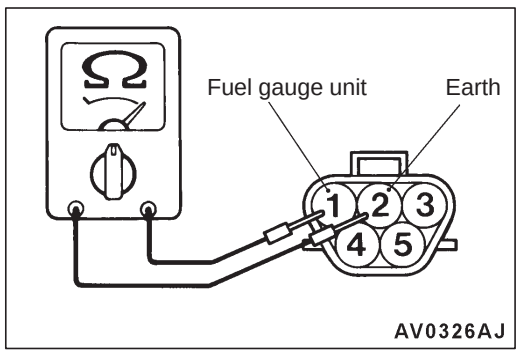
<GDI>

1. Insert a paper clip in the engine speed detection connector from the harness side, and attach the engine speedometer.

NOTE
For tachometer check, use of a fluxmeter-type engine speedometer is recommended. (Because a fluxmeter only needs to be clipped to the high tension cable.)

2. Compare the readings of the engine speedometer and the tachometer at every engine speed, and check if the variations are within the standard values.

Standard values:
700 r/min : ±100 r/min
3,000 r/min : +225 r/min, –100 r/min
5,000 r/min : +325 r/min, –125 r/min
7,000 r/min : +400 r/min, –100 r/min



FUEL GAUGE UNIT CHECK

54300120370

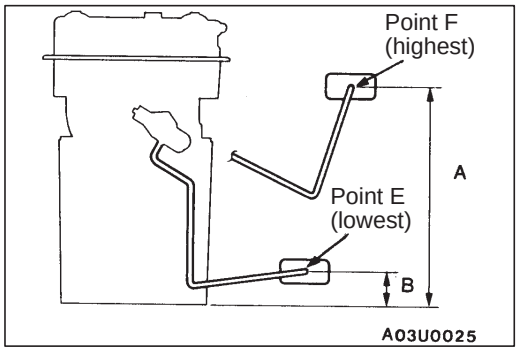
Remove the fuel gauge unit from the fuel tank.
(Refer to GROUP 13C.)

FUEL GAUGE UNIT RESISTANCE

1. Check that resistance value between the fuel gauge terminal and earth terminal is at standard value when fuel gauge unit float is at point F (highest) and point E (lowest).

   Standard value:
   Point F: 7.9 – 14.6 Ω
   Point E: 107.9 – 118.9 Ω

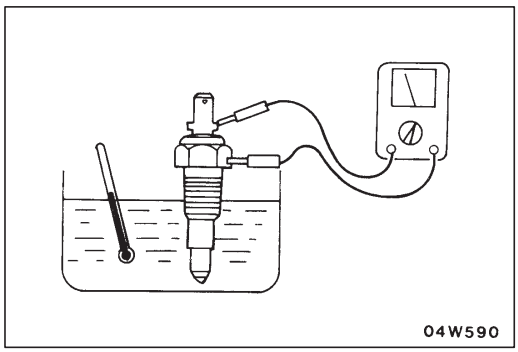
2. Check that resistance value changes smoothly when float moves slowly between point F (highest) and point E (lowest).



FUEL GAUGE UNIT FLOAT HEIGHT

Move float and measure the height A at point F (highest) and B at point E (lowest) with float arm touching stopper.

Standard value:
A: 142.4 mm
B: 28 mm

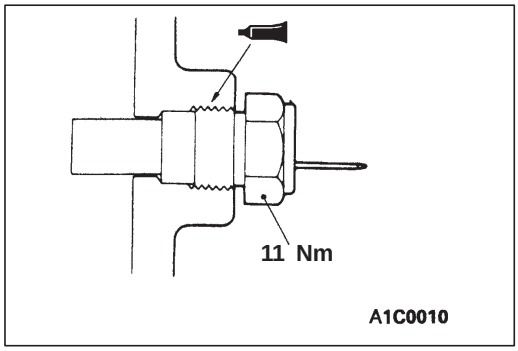


ENGINE COOLANT TEMPERATURE GAUGE UNIT CHECK

54300150041

1. Bleed the engine coolant. (Refer to GROUP 14 – On-vehicle Service.)
2. Remove the engine coolant temperature gauge unit.
3. Immerse the unit in 70°C water to measure the resistance.

   Standard value: 104 ± 13.5 Ω



4. After checking, apply the specified adhesive around the thread of engine coolant temperature gauge unit.

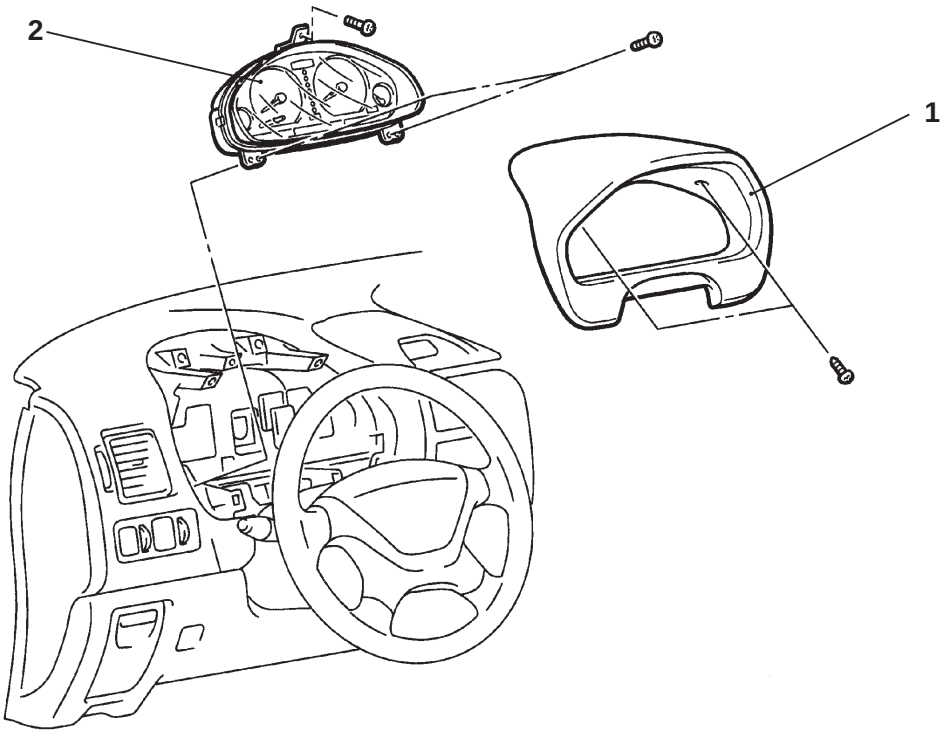
   Specified sealant:
   3M Adhesive Nut Locking No. 4171 or equivalent

5. Add engine coolant. (Refer to GROUP 14 – On-vehicle Service.)

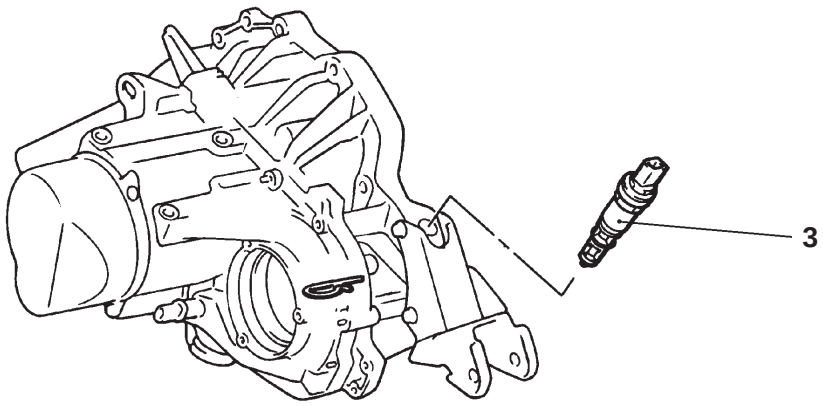
COMBINATION METERS

54300290255

REMOVAL AND INSTALLATION



W0266AJ



W0265AJ

00009510

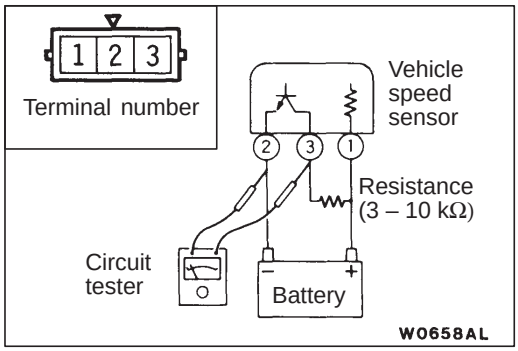
Removal steps

1. Meter hood
▶A◀ 2. Combination meter
3. Speed sensor

INSTALLATION SERVICE POINT

▶A◀ COMBINATION METER INSTALLATION

Install the combination meter, and then connect the battery cables. Turn on the ignition switch. The speedometer needle and tachometer needle move from 0 position to maximum position, and return to 0 position. Due to this, combination meter will be initialized.



INSPECTION

54300300194

VEHICLE SPEED SENSOR INSPECTION

1. Lift up the vehicle.
2. Remove the vehicle speed sensor, and then connect the vehicle speed sensor and a resistance (3 – 10 kΩ) as shown in the illustration.
3. Use a circuit tester to check that the voltage between terminal 2 and terminal 3 changes when turning a shaft of the vehicle speed sensor (4 pulses per each one turn).

HEADLAMP AND FRONT TURN-SIGNAL LAMP

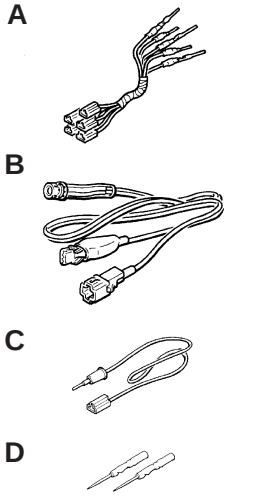
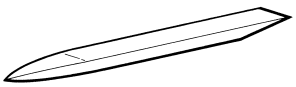
54200030052

SERVICE SPECIFICATIONS

Items		Standard value	Limit
Headlamp aiming for low beam	Vertical direction	60 mm below horizontal (H)	–
	Horizontal direction	Position where the 15° sloping section intersects the vertical line (V)	–
Headlamp intensity cd		–	30,000 or more

SPECIAL TOOLS

54200060099

Tool	Number	Name	Use
A B C D  C991223	MB991223 A: MB991219 B: MB991220 C: MB991221 D: MB991222	Harness set A: Test harness B: LED harness C: LED harness adapter D: Probe	● Making voltage and resistance measurements during troubleshooting A: Connector pin contact pressure inspection B: Power circuit inspection C: Power circuit inspection D: Commercial tester connection
	MB990784	Ornament remover	Removal of switch garnish

TROUBLESHOOTING

54200070573

The special tool (MB991223) should always be used to measure voltages and resistances when carrying out troubleshooting.

INSPECTION CHART FOR TROUBLE SYMPTOMS

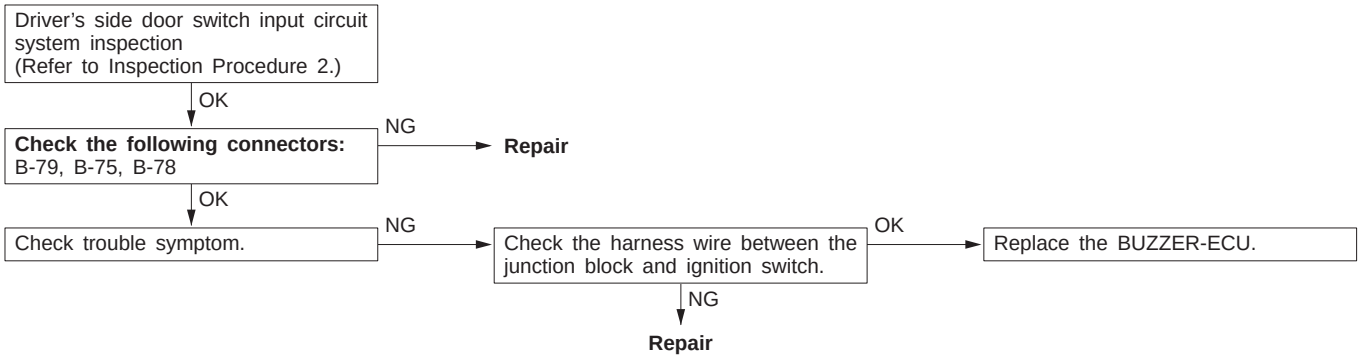
Trouble symptoms	Inspection procedure	Reference page
The lighting monitor buzzer doesn't sound under the following conditions while tail lamps or headlamps illuminate. ● When the ignition switch is turned to OFF and the driver's side door is open.	1	54-27
Headlamp leveling does not occur when the headlamp leveling switch is operated.	3	54-28

Trouble symptoms	Inspection procedure	Reference page
The headlamps do not illuminate when the vehicle is in the following condition and the ignition switch is at the ON position. However, the headlamps illuminate when the lighting switch is moved to the HEAD position. <Vehicles with daytime running lamp system> ● Lighting switch: OFF ● Passing switch: OFF	4	54-29
The headlamps do not switch off when the vehicle is in the following condition and the lighting switch is moved to the TAIL position. <Vehicles with daytime running lamp system> ● Ignition switch: OFF ● Passing switch: OFF	5	54-30

INSPECTION PROCEDURE FOR TROUBLE SYMPTOMS

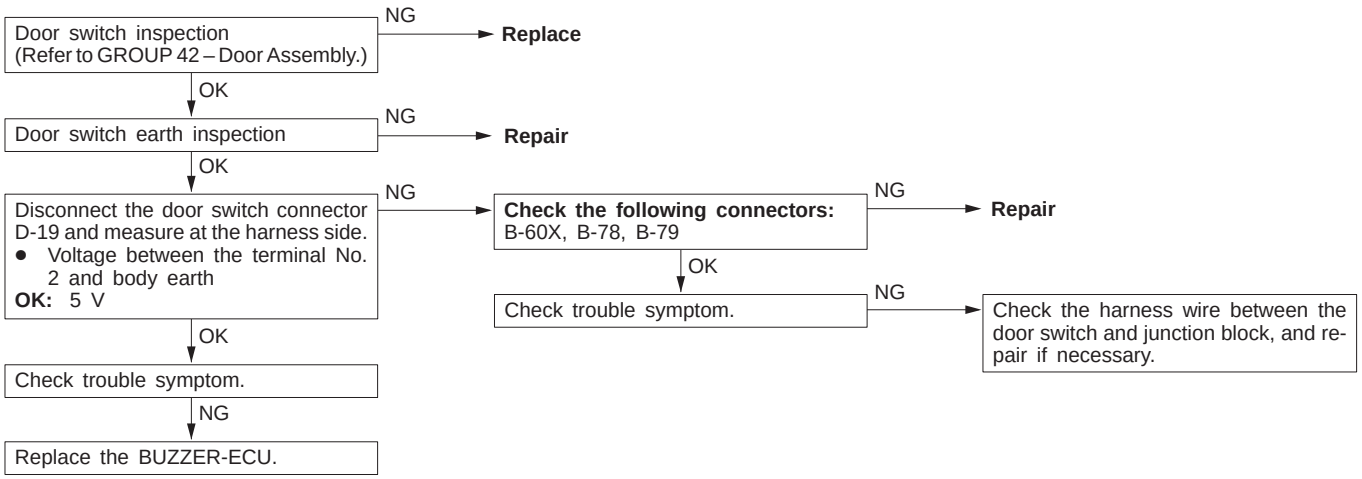
Inspection Procedure 1

The ignition switch is turned to the OFF position and the driver's side door is opened while the tail lamps or headlamps are operating, but the light reminder warning buzzer does not sound.	**Probable cause**
The cause is probably a defective lighting switch input circuit system or a defective driver's side door switch input circuit system.	● Malfunction of driver's side door switch ● Malfunction of harness or connector ● Malfunction of BUZZER-ECU



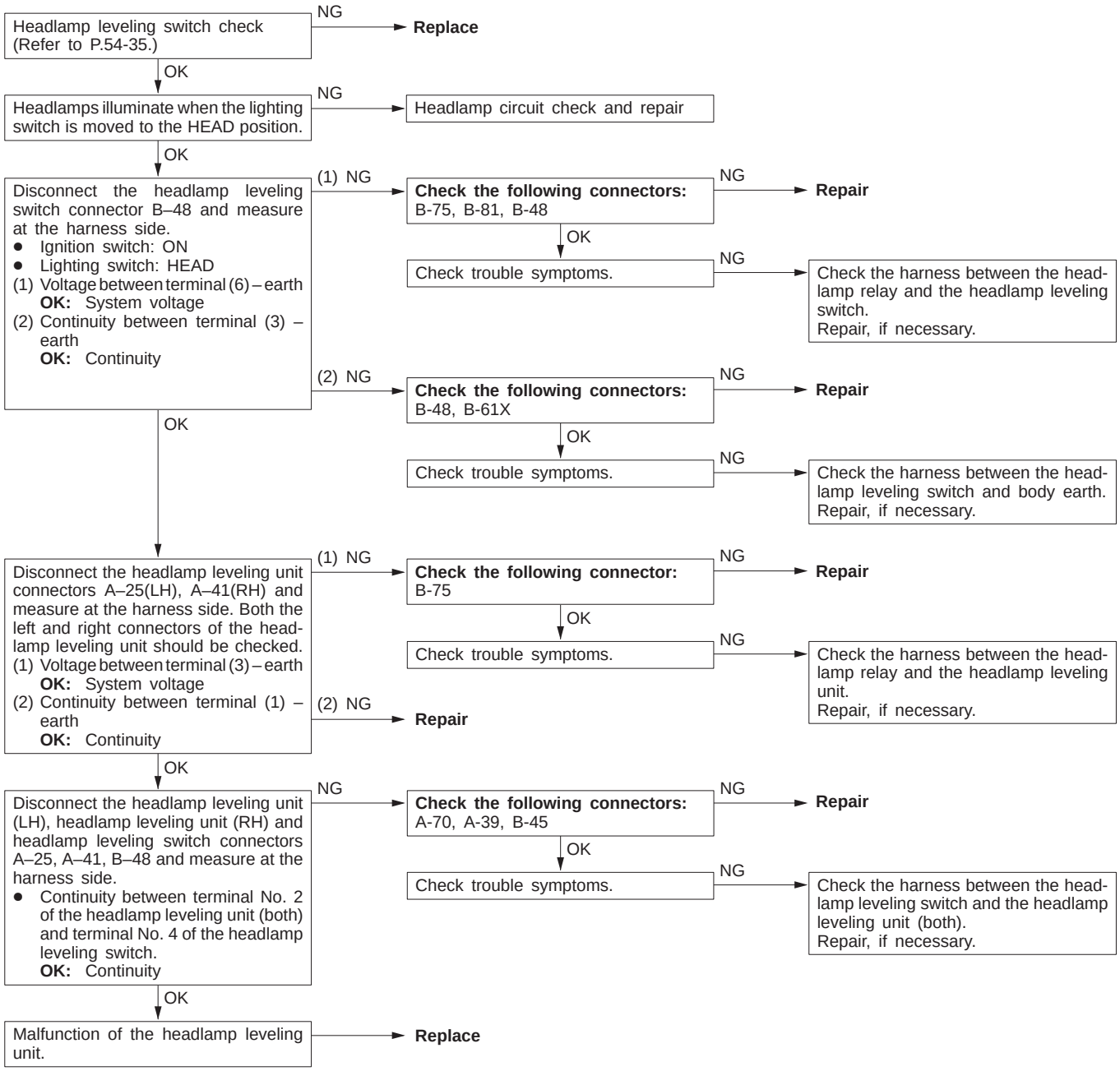
Inspection Procedure 2

Driver's side door switch input circuit system inspection



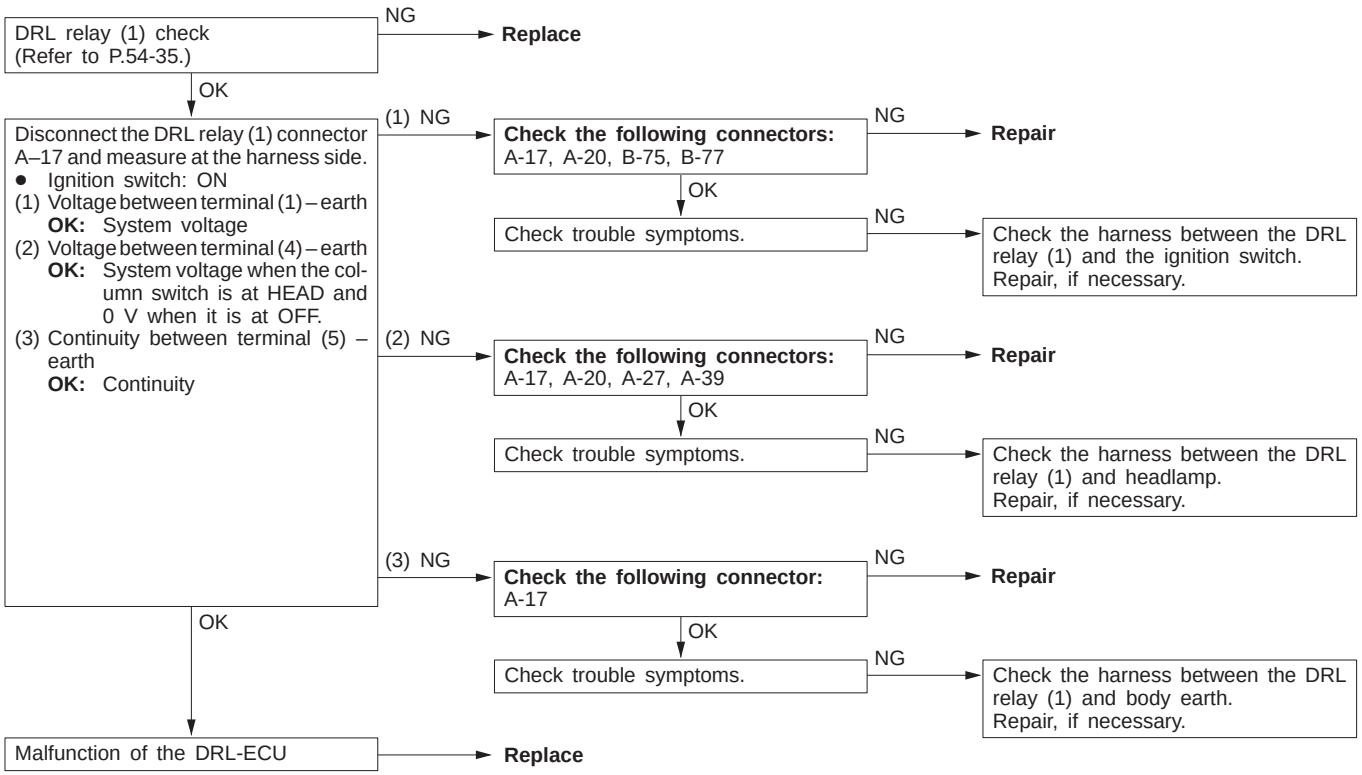
Inspection Procedure 3

Headlamp leveling does not occur when the headlamp leveling switch is operated.	Probable cause
The cause is probably a malfunction of the headlamp leveling switch circuit system or a malfunction of the headlamp leveling unit circuit system. If there is a blown fuse, there may also be a short-circuit in a harness.	• Malfunction of fuse • Malfunction the headlamp leveling switch • Malfunction of connector • Malfunction of harness • Malfunction of the headlamp leveling unit



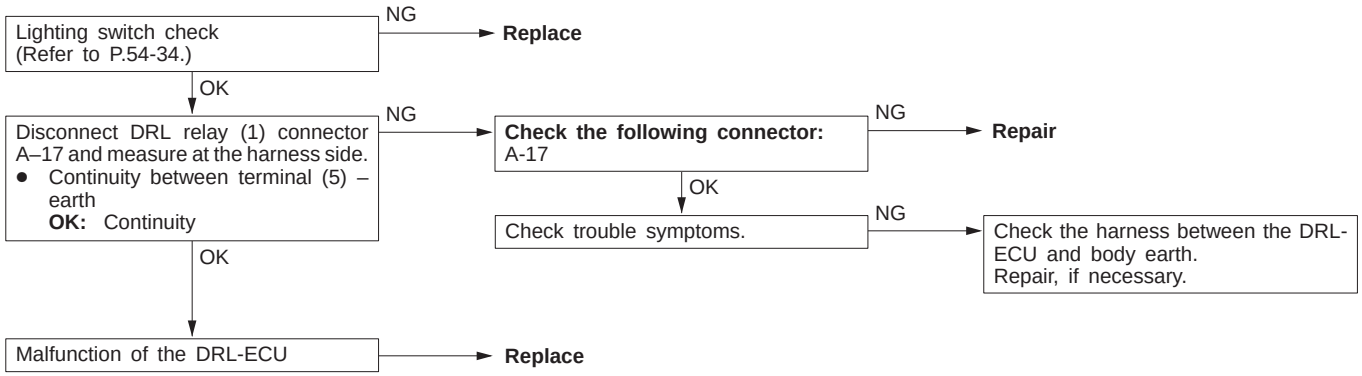
Inspection Procedure 4

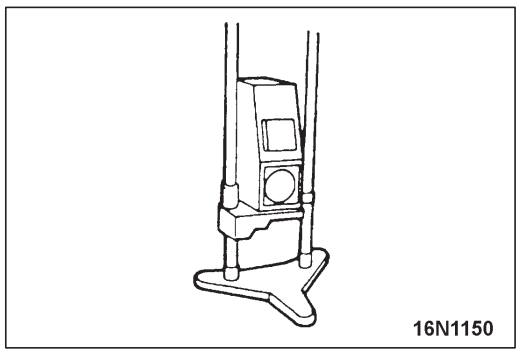
The headlamps do not illuminate when the vehicle is in the following condition and the ignition switch is moved to the ON position. However, they illuminate when the lighting switch is moved to the HEAD position. <Vehicles with daytime running lamp> ● **Lighting switch: OFF** ● **Passing switch: OFF**	**Probable cause**
The cause is probably a malfunction of the daytime running lamp control unit (DRL-ECU) circuit system. If there is a blown fuse, there may also be a short-circuit in a harness.	● Malfunction of fuse ● Malfunction of connector ● Malfunction of harness ● Malfunction of the DRL relay (1) ● Malfunction of the DRL-ECU



Inspection Procedure 5

The headlamps do not switch off when the vehicle is in the following condition and the lighting switch is moved to the TAIL position. <Vehicles with daytime running lamp> ● **Ignition switch: OFF** ● **Passing switch: OFF**	**Probable cause**
The cause is probably a malfunction of the daytime running lamp control unit (DRL-ECU) circuit system. If there is a blown fuse, there may also be a short-circuit in a harness.	● Malfunction of fuse ● Malfunction of connector ● Malfunction of harness ● Malfunction of the tail lamp relay ● Malfunction of the DRL-ECU





ON-VEHICLE SERVICE

54200090272

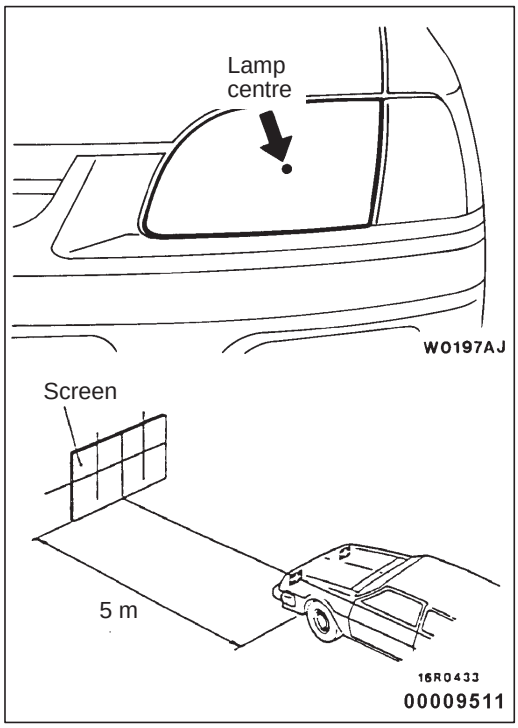
HEADLAMP AIMING

<USING A BEAM SETTING EQUIPMENT>

1. The headlamps should be aimed with the proper beam setting equipment, and in accordance with the equipment manufacture's instructions.

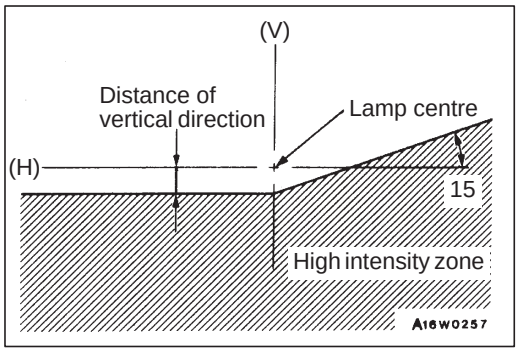
   NOTE
   If there are any regulations pertinent to the aiming of headlamps in the area where the vehicle is to be used, adjust so as to meet those requirements.

2. Alternately turn the adjusting screw to adjust the headlamp aiming. (Refer to P.54-31.)



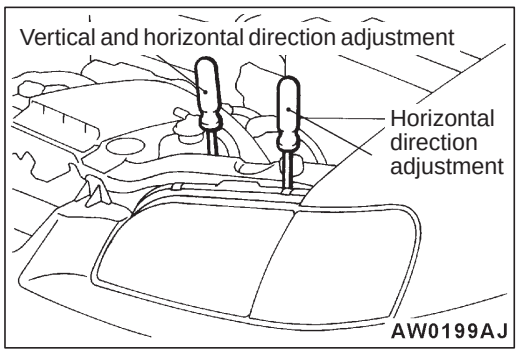
<USING A SCREEN>

1. Inflate the tyres to the specified pressures and there should be no other load in the vehicles other than driver or substituted weight of approximately 75 kg placed in driver's position.
2. Set the distance between the screen and the centre marks of the headlamps as shown in the illustration.



3. Check if the beam shining onto the screen is at the standard value.

   Standard value:
   (Vertical direction)
   60 mm below horizontal (H)
   (Horizontal direction)
   Position where the 15° sloping section intersects the vertical line (V)



4. Alternately turn the adjusting screw to adjust the headlamp aiming.

   Caution
   Be sure to adjust the aiming adjustment screw in the tightening direction.

INTENSITY MEASUREMENT 54200100036

Using a photometer, and following its manufacture's instruction manual, measure the headlamp intensity and check to be sure that the limit value is satisfied.

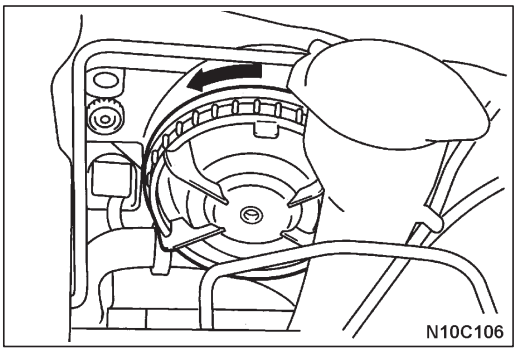
Limit: 30,000 cd or more

NOTE
1. When measuring the intensity, maintain an engine speed of 2,000 r/min, with the battery in the charging condition.
2. There may be special local regulations pertaining to headlamp intensity, be sure to make any adjustments necessary to satisfy such regulations.
3. If an illuminometer is used to make the measurements, convert its values to photometer values by using the following formula.

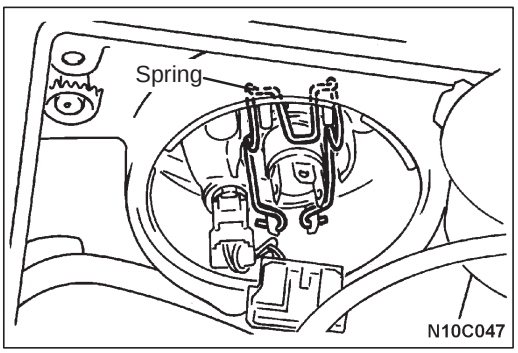
   $I = Er^2$ Where:
   I=intensity (cd)
   E=illumination (lux)
   r=distance (m) from headlamps to illuminometer

BULB REPLACEMENT 54200130288

<Headlamp Bulb>



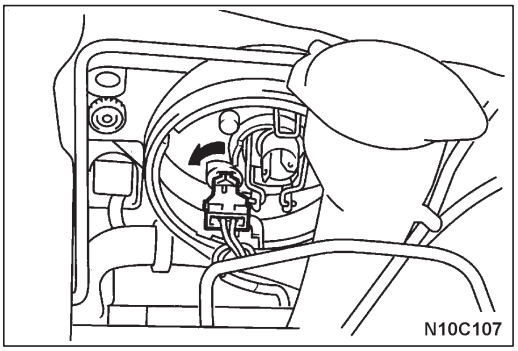
1. Remove the sealing cover by turning it anti-clockwise and disconnect the connector.



2. Unhook the spring which secures the bulb, and then remove the bulb.

   Caution
   Do not touch the surface of the bulb with hands or dirty gloves. If the surface does does become dirty, clean it with alcohol or thinner, and let it dry thoroughly before installing.

<Position Lamp Bulb>



1. Remove the sealing cover by turning it anti-clockwise.
2. Remove the lamp socket by turning it anti-clockwise, then pull out the bulb from the socket.

HEADLAMP AND FRONT TURN-SIGNAL LAMP

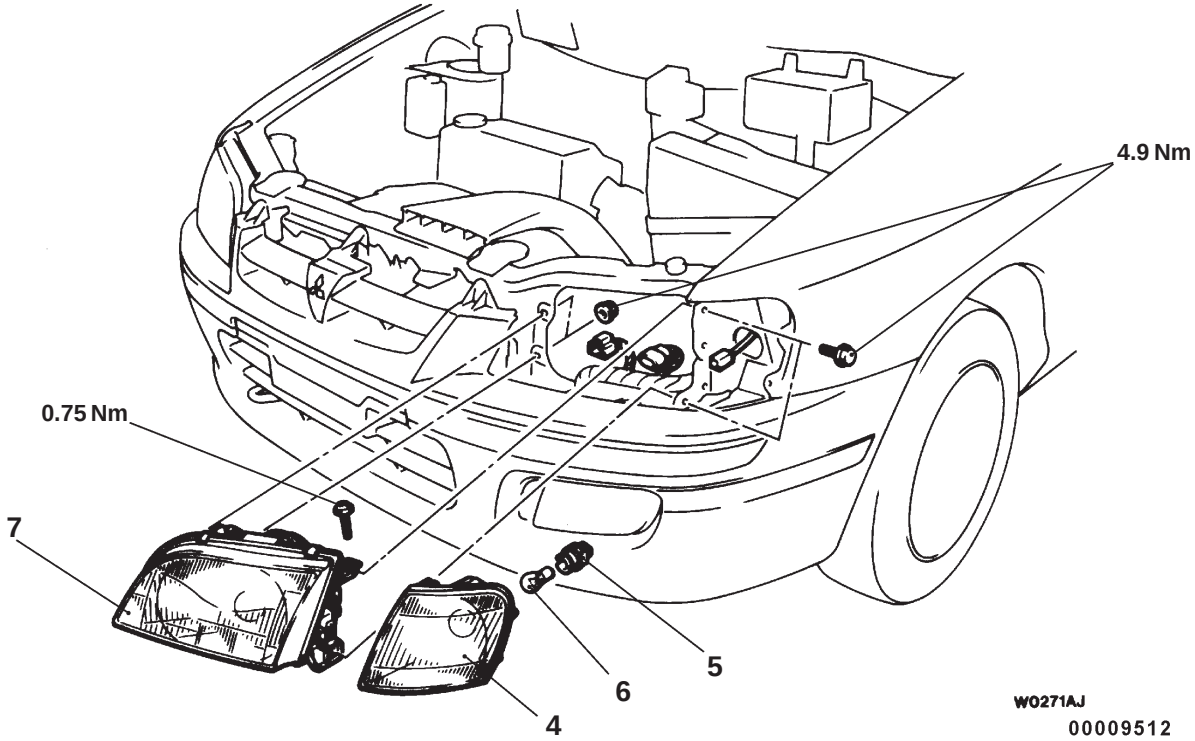
54200240240

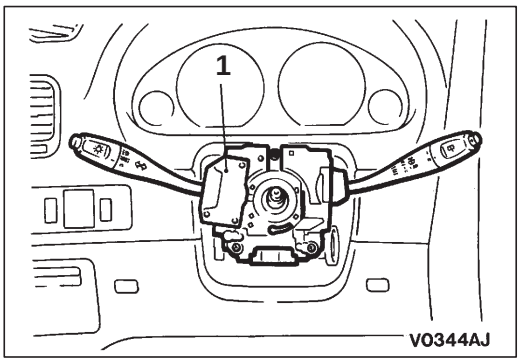
REMOVAL AND INSTALLATION

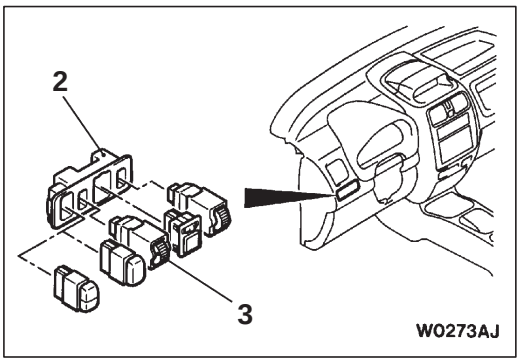
CAUTION: SRS

Before removal of air bag module and clock spring, refer to GROUP 52B – Service Precautions and Air Bag Module and Clock Spring.

Pre-removal and Post-installation Operation
- Removal and installation of radiator reserve tank (When replacing only left side headlamp).







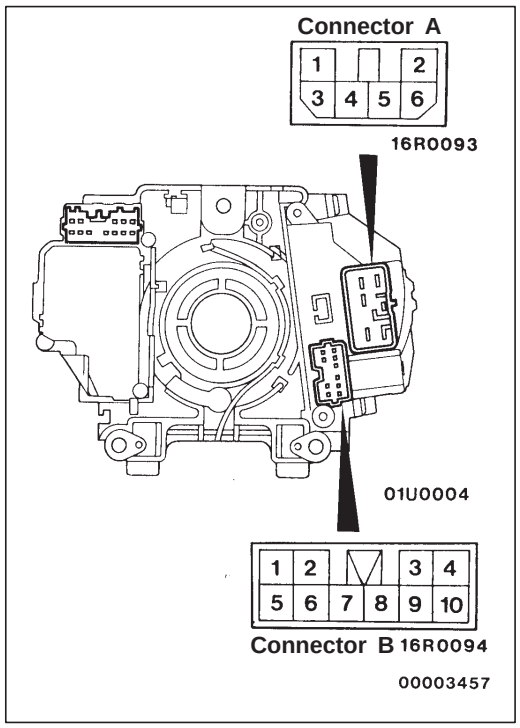
1. Column switch <Lighting switch and dimmer/passing switch> (Refer to GROUP 37A – Steering Wheel and Shaft.)

Headlamp leveling switch removal steps

2. Switch garnish
3. Headlamp leveling switch

Headlamp removal steps

4. Front turn-signal lamp
5. Socket
6. Bulb
7. Headlamp



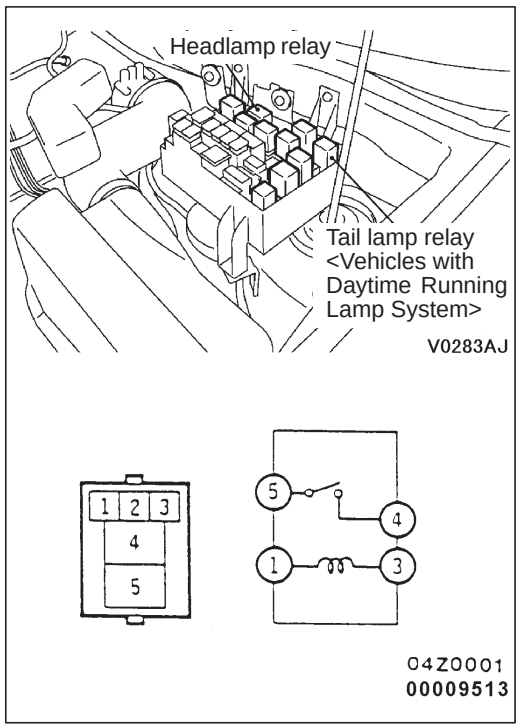
INSPECTION

54200250083

LIGHTING SWITCH, DIMMER/PASSING SWITCH AND TURN-SIGNAL LAMP SWITCH CHECK

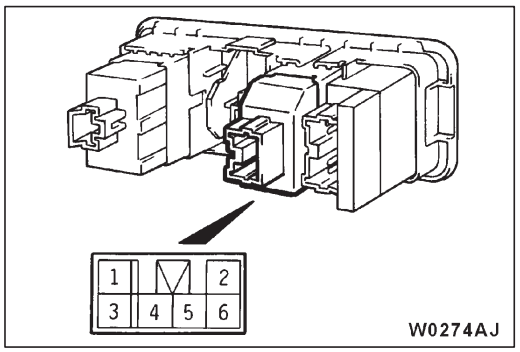
Switch position		Connector A–terminal No.					Connector B–terminal No.					
		1	2	3	4	6	3	5	6	7	8	9
LIGHTING SWITCH	OFF											
	TAIL							○	○	○		
	HEAD	○				○		○	○	○		
DIMMER/ PASSING SWITCH	LOWER			○	○							
	UPPER				○	○						
	PASSING	○	○	○	○ *1 ○ *2	○						
TURN-SIGNAL LAMP SWITCH	RH										○	○
	OFF											
	LH						○			○	○	

NOTE
1. *1 indicates continuity when the dimmer switch is in the lower position.
2. *2 indicates continuity when the dimmer switch is in the upper position.



HEADLAMP RELAY AND TAIL LAMP RELAY CHECK

Battery voltage	Terminal No.			
	1	3	4	5
Supplied	⊕	⊖	○	○
Not supplied	○	○		

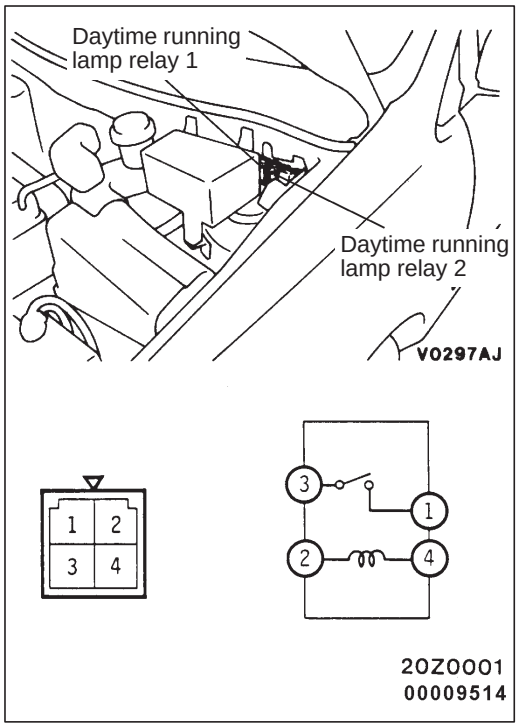


HEADLAMP LEVELING SWITCH CHECK

Check the resistance between the terminals when the headlamp leveling switch is operated.

Standard value:

Resistance measurement terminal No.	Switch position				
	0	1	2	3	4
Between 3 and 4 Ω	1,235	1,114	977	862	747
Between 4 and 6 Ω	548	669	806	921	1,036
Between 3 and 6 Ω	1,003				



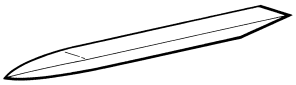
DAYTIME RUNNING LAMP RELAY 1 AND 2 CHECK

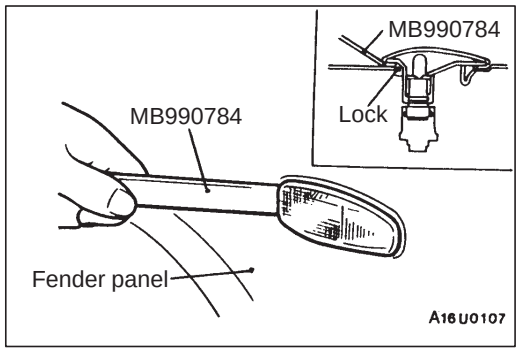
Battery voltage	Terminal No.			
	1	2	3	4
Supplied	○	⊕	○	⊖
Not supplied		○		○

SIDE TURN-SIGNAL LAMP

54200060105

SPECIAL TOOL

Tool	Number	Name	Use
	MB990784	Ornament remover	Removal of side turn-signal lamp

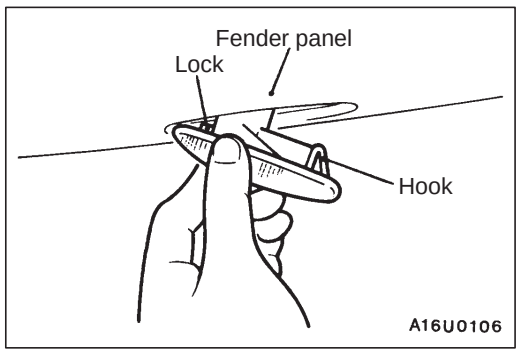


REMOVAL SERVICE POINT

54200330022

SIDE TURN-SIGNAL LAMP REMOVAL

Use a special tool to remove the lock from the fender panel, and then remove the side turn-signal lamp.



INSTALLATION SERVICE POINT

SIDE TURN-SIGNAL LAMP INSTALLATION

1. Fit the lock into the fender panel.
2. Push the side turn-signal lamp into the fender, and secure it with the hook.

FRONT FOG LAMP

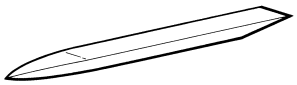
54200030069

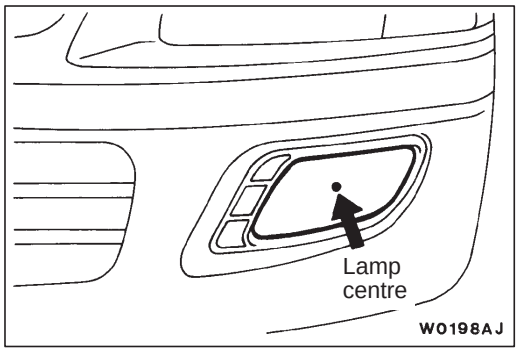
SERVICE SPECIFICATIONS

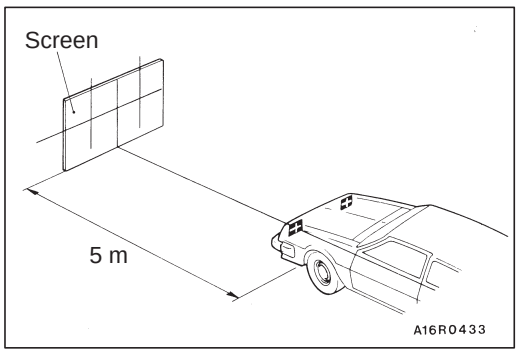
Items		Standard value
Front fog lamp aiming	Vertical direction	100 mm below horizontal (H)
	Horizontal direction	Parallel to direction of vehicle travel

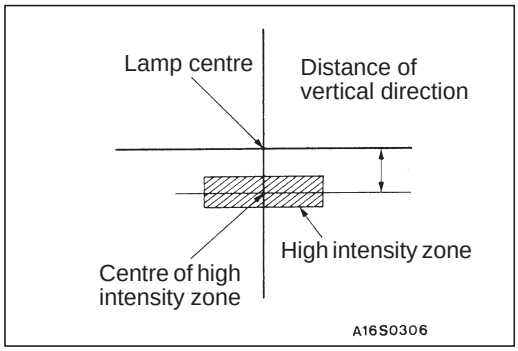
SPECIAL TOOL

54200060112

Tool	Number	Name	Use
	MB990784	Ornament remover	Removal of switch garnish







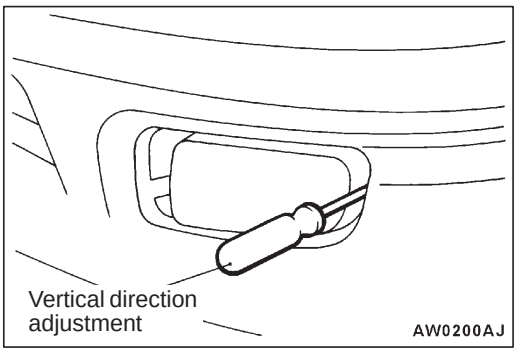
ON-VEHICLE SERVICE

54200110206

FRONT FOG LAMP AIMING

1. Measure the centre of the fog lamps, as shown in the illustration.
2. Set the distance between the screen and the centre of the fog lamps as shown in the illustration.
3. Inflate the tyres to the specified pressures and there should be no other load in the vehicles other than driver or substituted weight of approximately 75 kg placed in the driver's position.
4. With the engine running at 2,000 r/min, aim the fog lamp.
5. Check if the beam shining onto the screen is at the standard value.

Standard value:
(Vertical direction)
100 mm below horizontal (H)
(Horizontal direction)
Parallel to direction of vehicle travel

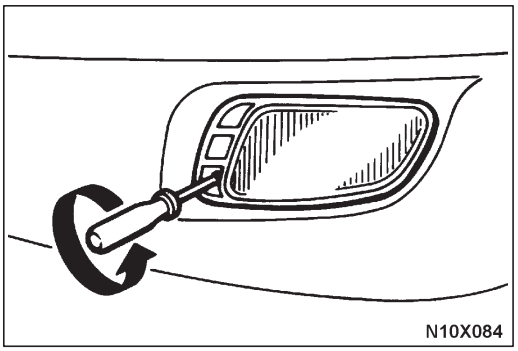


NOTE
The horizontal direction is non-adjustable. If the deviation of the light beam axis exceeds the standard value, check to be sure that the mounting location or some other point is not defective.

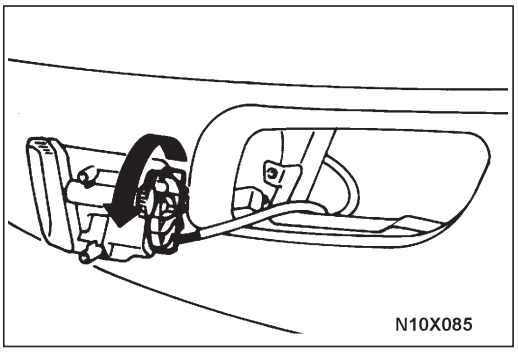
Caution
When making the aiming adjustment, be sure to mask those lamps which are not being adjusted.

BULB REPLACEMENT

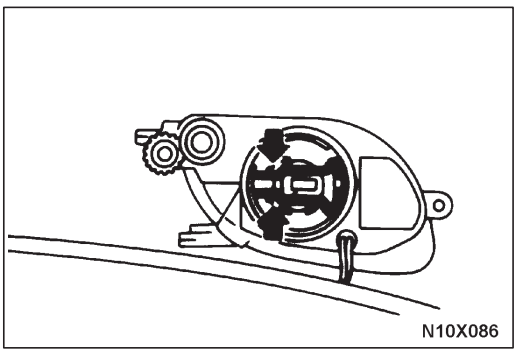
54200130295



1. Remove the fog lamp cover.
2. Disconnect the connector which is secured to the fog lamp bracket.



3. Remove the fog lamp unit.
4. Undo the fog lamp rear cover.



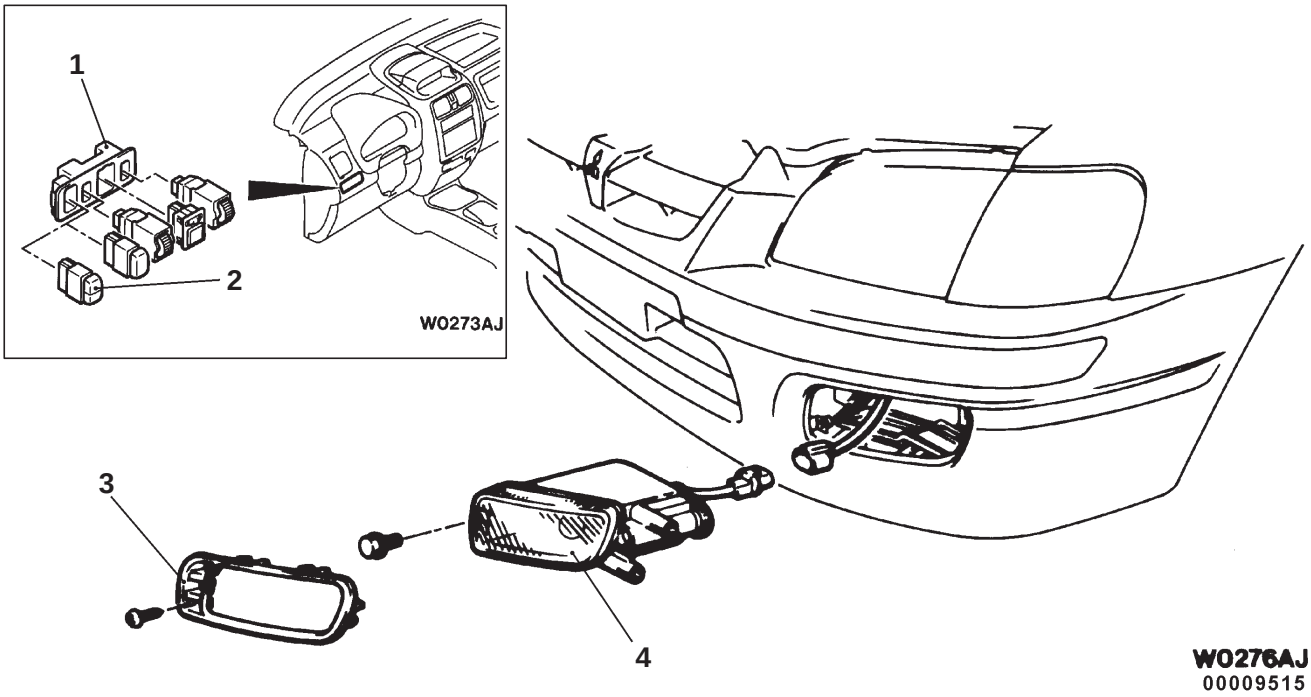
5. Unhook the spring which secures the bulb and then remove the bulb.

Caution
Do not touch the surface of the bulb with hands or dirty gloves. If the surface does become dirty, clean it with alcohol or thinner, and let it dry thoroughly before installing.

FRONT FOG LAMP

54200150253

REMOVAL AND INSTALLATION

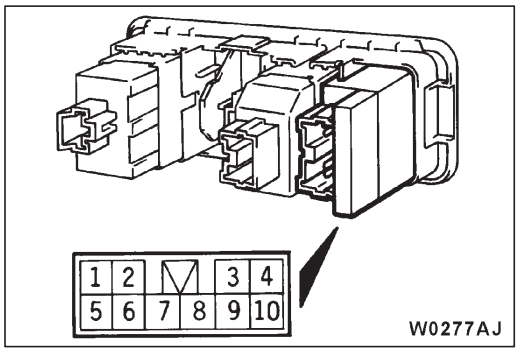


Front fog lamp switch removal steps

1. Switch garnish
2. Front fog lamp switch

Front fog lamp removal steps

3. Fog lamp cover
4. Front fog lamp assembly



INSPECTION

54200160089

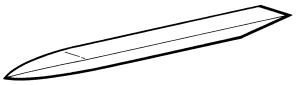
FRONT FOG LAMP SWITCH CONTINUITY CHECK

Switch position	Terminal No.						
	6		7	4	5	3	10
OFF		ILL					
ON		ILL					

REAR COMBINATION LAMP

54200060587

SPECIAL TOOL

Tool	Number	Name	Use
	MB990784	Ornament remover	Removal of switch garnish

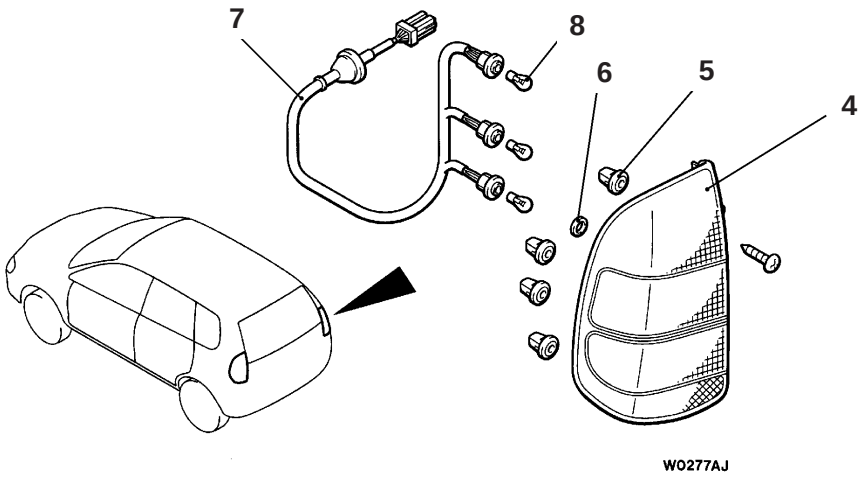
REAR COMBINATION LAMP

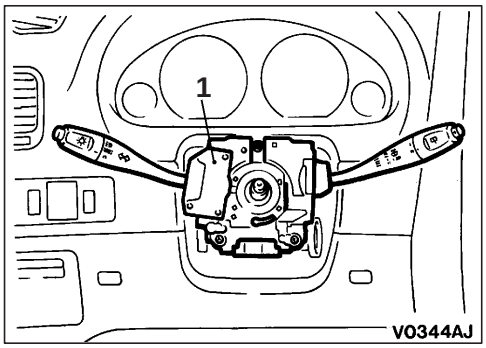
54200450131

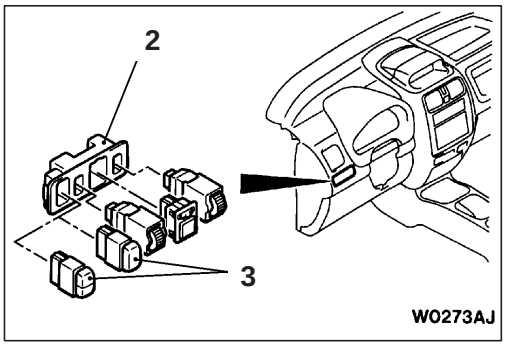
REMOVAL AND INSTALLATION

Caution: SRS

Before removal of air bag module and clock spring, refer to GROUP 52B – SRS Service Precautions and Air Bag Module and Clock Spring.







00009516

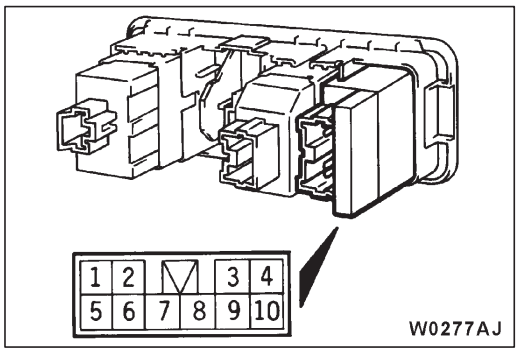
1. Column switch <Lighting switch and turn-signal lamp switch> (Refer to GROUP 37A – Steering Wheel and Shaft.)

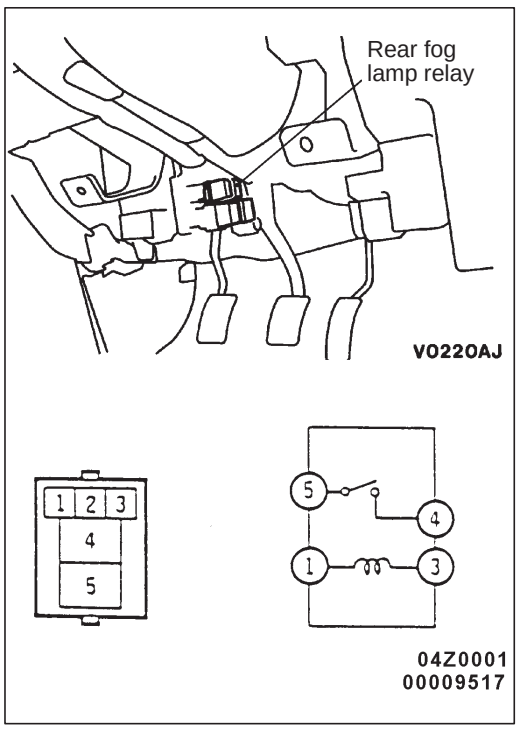
Rear fog lamp switch removal steps

2. Switch garnish
3. Rear fog lamp switch

Rear combination lamp removal steps

4. Rear combination lamp assembly
5. Grommet
6. Packing
7. Socket assembly
8. Bulb





INSPECTION

54200460066

REAR FOG LAMP SWITCH CHECK

Switch position	Terminal No.						
	1	10	2	5	6		7
OFF						ILL	
ON						ILL	

REAR FOG LAMP RELAY CHECK

Battery voltage	Terminal No.			
	1	3	4	5
Supplied	⊕	⊖		
Not supplied				

LIGHTING SWITCH AND TURN-SIGNAL LAMP SWITCH CHECK

Refer to P.54-34.

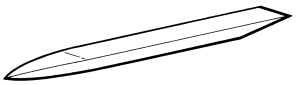
TAIL LAMP RELAY CHECK <Vehicles with Daytime Running Lamp System>

Refer to P.54-34.

RHEOSTAT

54200060136

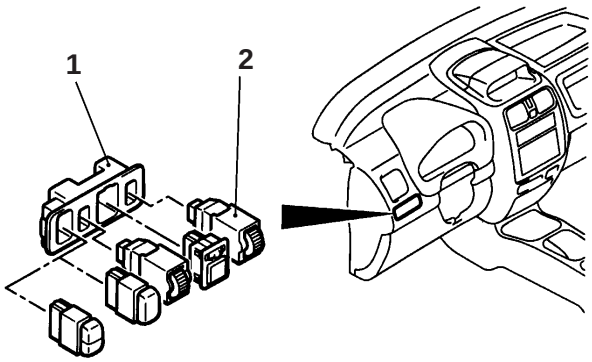
SPECIAL TOOL

Tool	Number	Name	Use
	MB990784	Ornament remover	Removal of switch garnish

RHEOSTAT

54200600147

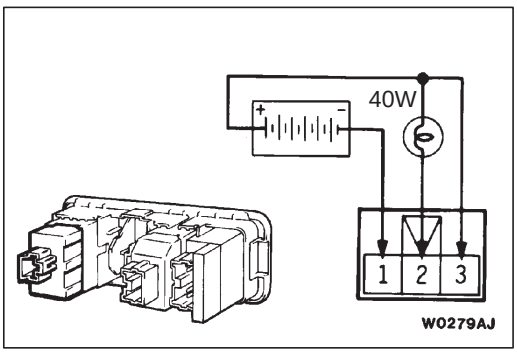
REMOVAL AND INSTALLATION



AW0273AJ

Removal steps

1. Switch garnish
2. Rheostat



W0279AJ

INSPECTION

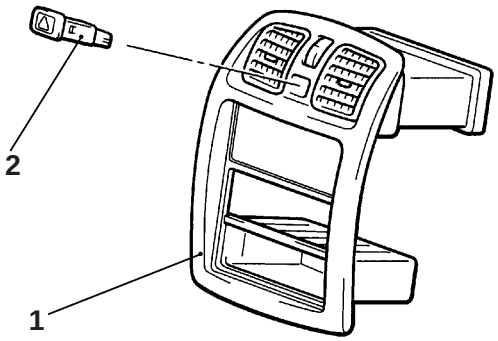
54200610218

1. Connect the battery and the test bulb (40W) as shown in the illustration.
2. Operate the rheostat, and if the brightness changes smoothly without switching off, then the rheostat function is normal.

HAZARD WARNING LAMP SWITCH

54200660190

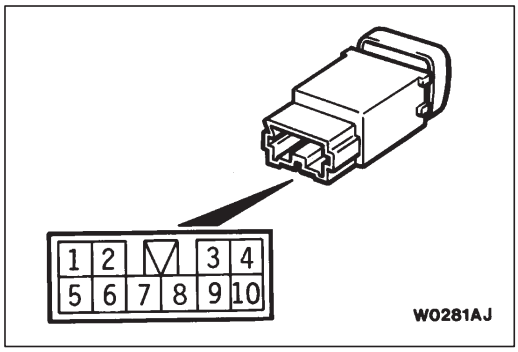
REMOVAL AND INSTALLATION



AW0280AJ

Removal steps

1. Center panel assembly (Refer to GROUP 52A – Instrument Panel.)
2. Hazard warning lamp switch



W0281AJ

INSPECTION

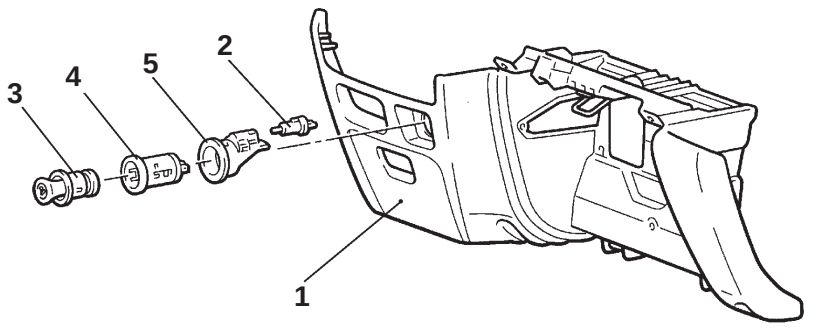
54200670216

Switch position	Terminal No.									
	1	2		3	5	6	7	8	9	10
OFF			ILL							
ON			ILL							

CIGARETTE LIGHTER

54300560196

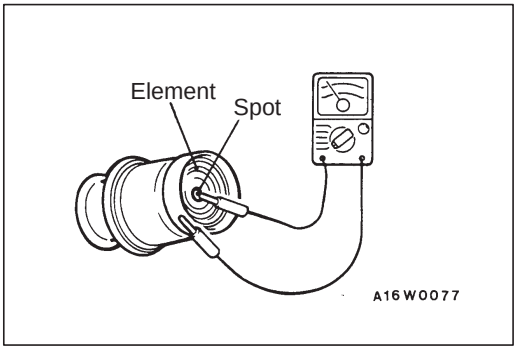
REMOVAL AND INSTALLATION



AW0282AJ

Removal steps

1. Floor console assembly (Refer to GROUP 52A – Floor Console.)
2. Bulb
3. Plug
4. Socket
5. Socket case



INSPECTION

54300570038

- Take out the plug, and check for a worn edge on the element spot connection, and for shreds of tobacco or other material on the element.
- Using a circuit tester, check the continuity of the element.

CAUTIONS FOR USE OF THE CIGARETTE LIGHTER SOCKET AS AUXILIARY POWER SOURCE

1. When using a “plug-in” type of accessory, do not use anything with a load of more than 120W.
2. It is recommended that only the lighter be inserted in the receptacle.
   Use of “plug-in” type accessories may damage the receptacle and result in poor retention of the lighter.
3. The specified load should be strictly observed, because overloaded cord burns the ignition switch and harness.

RADIO AND TAPE PLAYER

54400070036

TROUBLESHOOTING

QUICK-REFERENCE TROUBLESHOOTING CHART

Items	Problem symptom	Relevant chart
Noise	Noise appears at certain places when travelling (AM).	A–1
	Noise appears at certain places when travelling (FM).	A–2
	Mixed with noise, only at night (AM).	A–3
	Broadcasts can be heard but both AM and FM have a lot of noise.	A–4
	There is more noise either on AM or on FM.	A–5
	There is noise when starting the engine.	A–6
	Some noise appears when there is vibration or shocks during travelling.	A–7
	Noise sometimes appears on FM during travelling.	A–8
	Ever-present noise.	A–9
Radio	When switch is set to ON, no power is available.	B–1
	No sound from one speaker.	B–2
	There is noise but no reception for both AM and FM or no sound from AM, or no sound from FM.	B–3
	Insufficient sensitivity.	B–4
	Distortion on AM or on both AM and FM.	B–5
	Distortion on FM only.	B–6
	Too few automatic select stations.	B–7
	Insufficient memory (preset stations are erased).	B–8

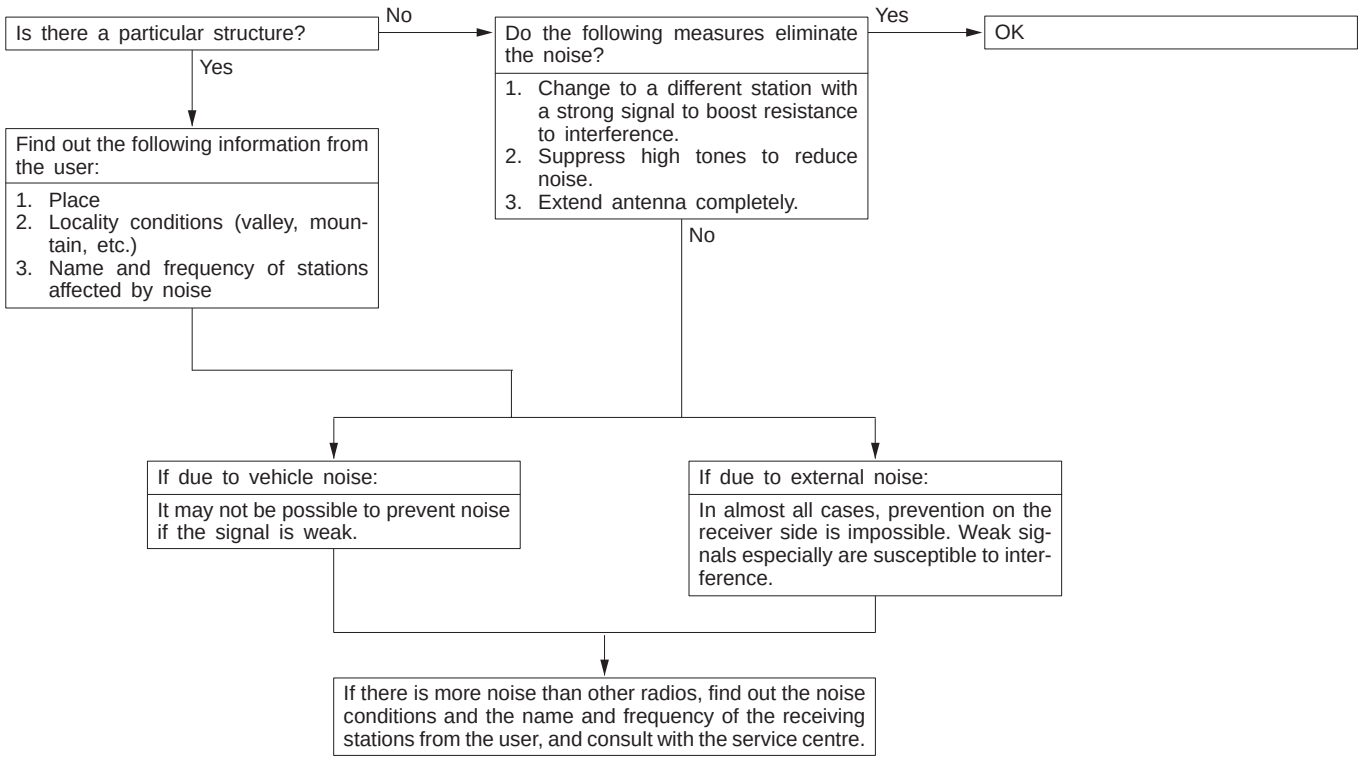
NOTE
Refer to problem symptoms of AM radio for MW radio.

Items	Problem symptom	Relevant chart
Tape player	Cassette tape will not be inserted.	C–1
	No sound.	C–2
	No sound from one speaker.	C–3
	Sound quality is poor, or sound is weak.	C–4
	Cassette tape will not be ejected.	C–5
	Uneven revolution. Tape speed is fast or slow.	C–6
	Faulty auto reverse.	C–7
	Tape gets caught in mechanism.	C–8

CHART

A. NOISE

A–1 Noise appears at certain places when travelling (AM).



A–2 Noise appears at certain places when travelling (FM).

Do the following measures eliminate the noise?
- Change to a different station with a strong signal to boost resistance to interference.
- Suppress high tones to reduce noise.
- Extend antenna completely.

Yes → OK

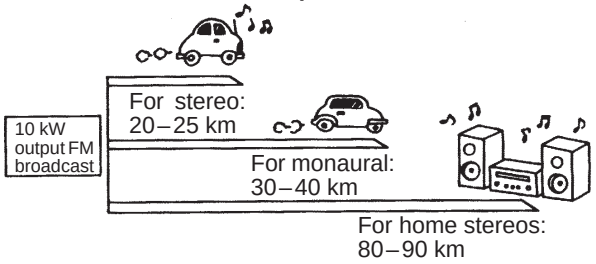
No ↓

If there is more noise than other radios, find out the noise conditions and the name and frequency of the receiving stations from the user, and consult with the service centre.

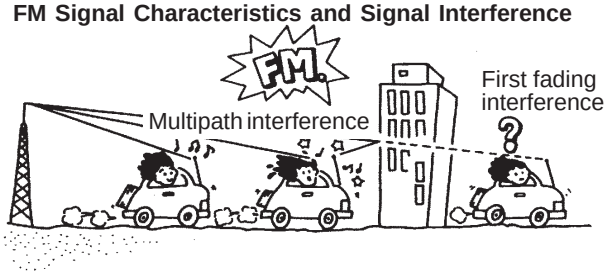
NOTE
About FM waves:
FM waves have the same properties as light, and can be deflected and blocked. Wave reception is not possible in the shadow of obstructions such as buildings or mountains.

1. The signal becomes weak as the distance from the station's transmission antenna increases. Although this may vary according to the signal strength of the transmitting station and intervening geographical formation or buildings, the area of good reception is approx. 20–25 km for stereo reception, and 30–40 km for monaural reception.
2. The signal becomes weak when an area of shadow from the transmitting antenna (places where there are obstructions such as mountains or buildings between the antenna and the car), and noise will appear. <This is called first fading, and gives a steady buzzing noise.>
3. If a direct signal hits the antenna at the same time as a signal reflected by obstructions such as mountains or buildings, interference of the two signals will generate noise. During travelling, noise will appear each time the vehicle's antenna passes through this kind of obstructed area. The strength and interval of the noise varies according to the signal strength and the conditions of deflection. <This is called multipath noise, and is a repetitious buzzing.>
4. Since FM stereo transmission and reception has a weaker field than monaural, it is often accompanied by a hissing noise.

FM Broadcast Good Reception Areas



FM Signal Characteristics and Signal Interference

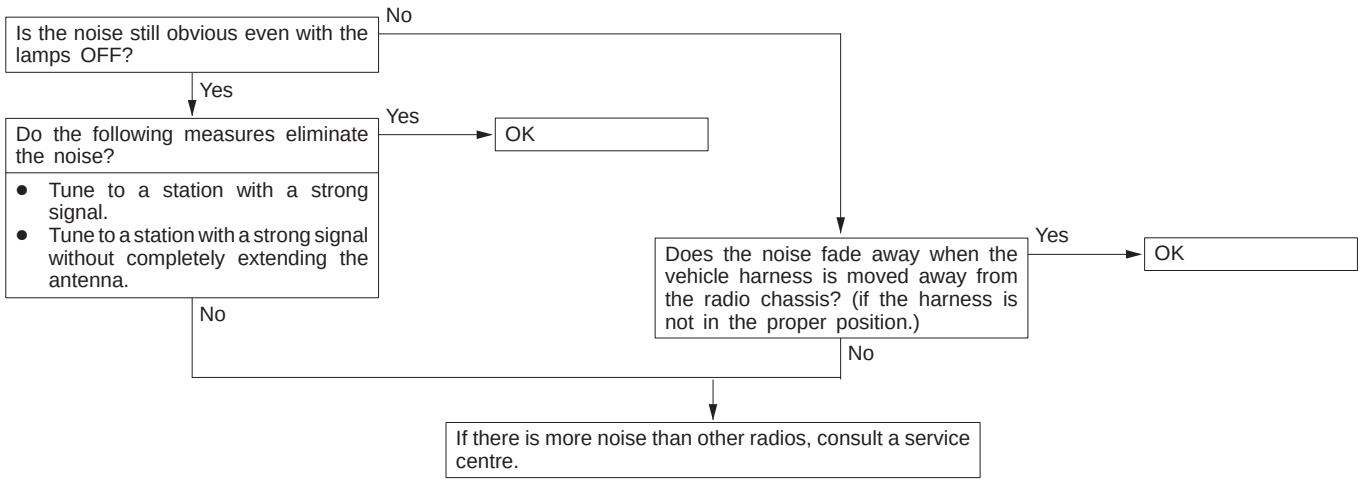


16W0268

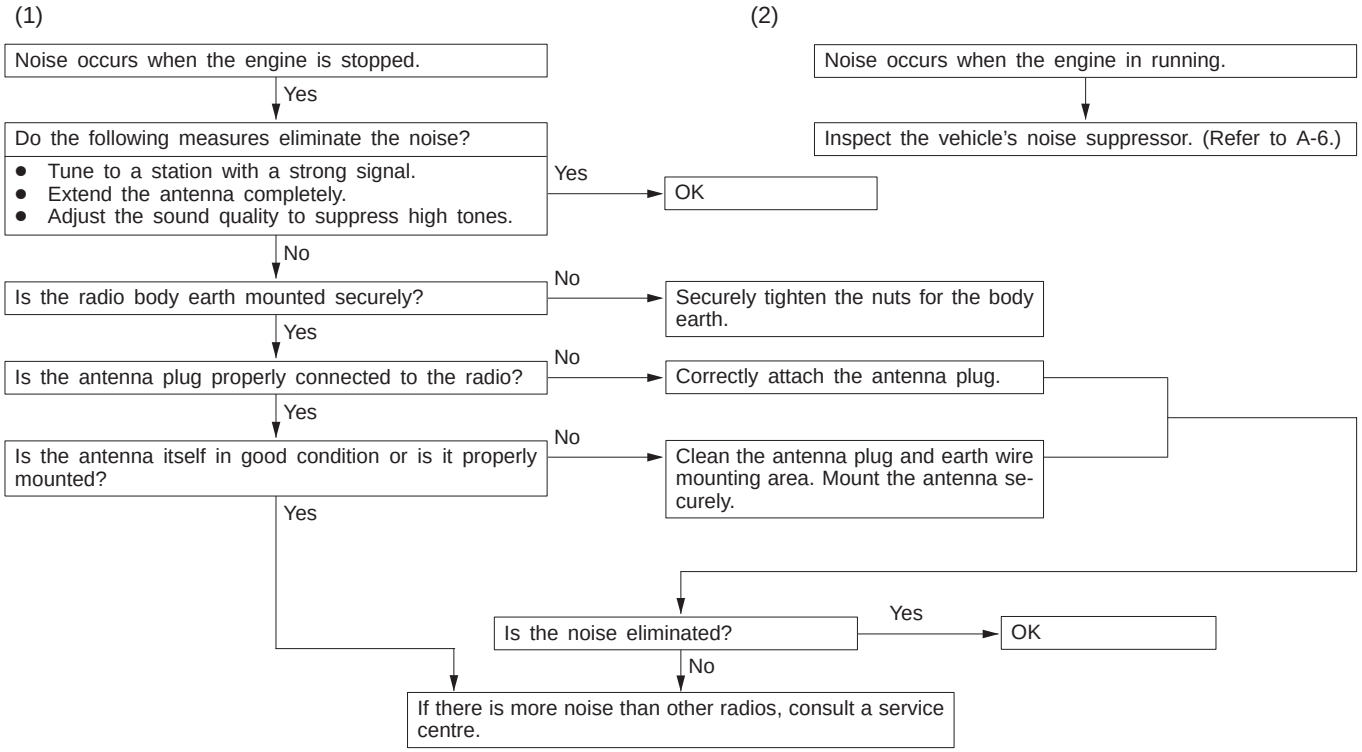
A–3 Mixed with noise, only at night (AM).

The following factors can be considered as possible causes of noise appearing at night.

1. Factors due to signal conditions: Due to the fact that long-distance signals are more easily received at night, even stations that are received without problem during the day may experience interference in a general worsening of reception conditions. The weaker a station is the more susceptible it is to interference, and a change to a different station or the appearance of a beating sound* may occur.
   Beat sound*: Two signals close in frequency interfere with each other, creating a repetitious high-pitched sound. This sound is generated not only by sound signals but by electrical waves as well.
2. Factors due to vehicle noise: Alternator noise may be a cause.



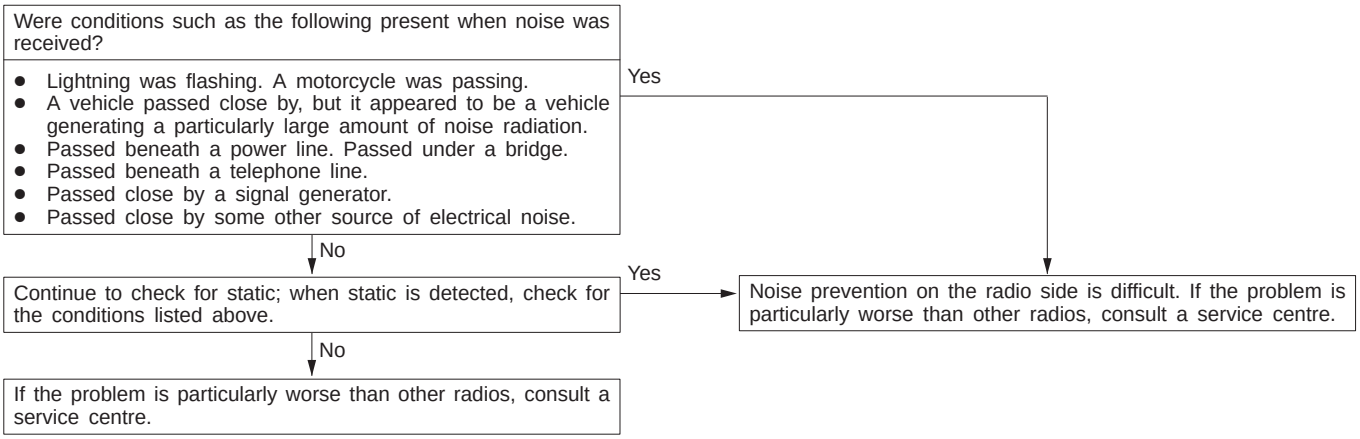
A-4 Broadcasts can be heard but both AM and FM have a lot of noise.



NOTE
About noise encountered during FM reception only. Due to differences in FM and AM systems, FM is not as susceptible as AM to interference from engines, power lines, lightning, etc. On the other hand, there are cases due to the characteristics of FM waves of noise or distortion generated by typical noise interference (first fading and multipath). (Refer to A–2.)
<Noise (hissing) occurs in weak signal areas such as mountainous regions, but this is not due to a problem with the radio.>

A–5 There is more noise either on AM or on FM.

1. There is much noise only on AM.
   Due to differences in AM and FM systems, AM is more susceptible to noise interference.



2. There is much noise only on FM.
   Due to differences in FM and AM systems, FM is not as susceptible as AM to interference from engines, power lines, lightning, etc. On the other hand, there are cases due to the characteristics of FM waves of noise or distortion generated by typical noise interference (first fading and multipath). (Refer to A–2) <Noise (hissing) occurs in weak signal areas such as mountainous regions, but this is not due to a problem with the radio.>

A–6 There is noise when starting the engine.

Noise type Sounds are in parentheses ( ).	Conditions	Cause	Remedy
AM, FM: Ignition noise (Popping, snapping, cracking, buzzing)	● Increasing the engine speed causing the popping sound to speed up, and volume decreases. ● Disappears when the ignition switch is turned to ACC.	● Mainly due to the spark plugs. ● Due to the engine noise.	● Check or replace the earth cable. (Refer to Fig. 1 on P.54-52.) ● Check or replace the noise capacitor.
Other electrical components	–	Noise may appear as electrical components become older.	Repair or replace electrical components.
Static electricity (Cracking, crinkling)	● Disappears when the vehicle is completely stopped. ● Severe when the clutch is engaged.	Occurs when parts or wiring move for some reason and contact metal parts of the body.	Return parts or wiring to their proper position.
	● Various noises are produced depending on the body part of the vehicle.	Due to detachment from the body of the front hood, bumpers, exhaust pipe and muffler, suspension, etc.	Tighten the mounting bolts securely. Cases where the problem is not eliminated by a single response to one area are common, due to several body parts being imperfectly earthed.

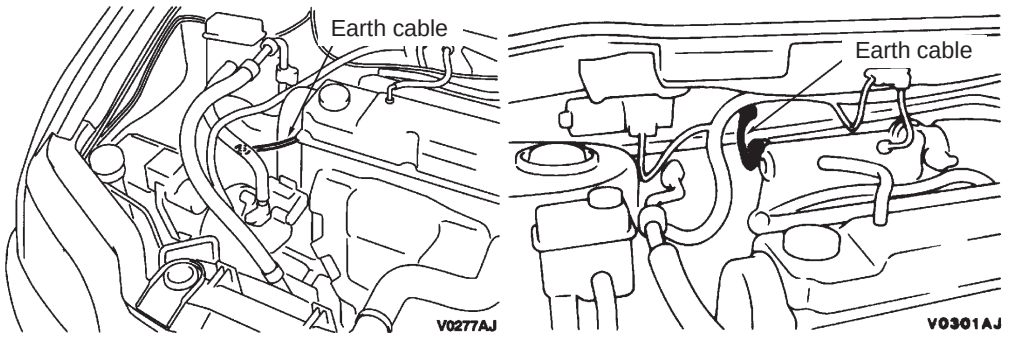
Caution

1. **Connecting a high tension cable to the noise filter may destroy the noise filter and should never be done.**
2. **Check that there is no external noise. Since failure caused by this may result in misdiagnosis due to inability to identify the noise source, this operation must be performed.**
3. **Noise prevention should be performed by suppressing strong sources of noise step by step.**

NOTE

1. Capacitor
   The capacitor does not pass D.C. current, but as the number of waves increases when it passes A.C. current, impedance (resistance against A.C.) decreases, and current flow is facilitated. A noise suppressing condenser which takes advantage of this property is inserted between the power line for the noise source and the earth. This suppresses noise by earthing the noise component (A.C. or pulse signal) to the body of the vehicle.
2. Coil
   The coil passes D.C. current, but impedance rises as the number of waves increases relative to the A.C. current. A noise suppressing coil which takes advantage of this property is inserted into the power line for the noise source, and works by preventing the noise component from flowing or radiating out of the line.

Fig. 1



A–7 Some noise appears when there is vibration or shocks during travelling.

Are connectors properly connected?
- No → Ensure proper connection.
- Yes ↓

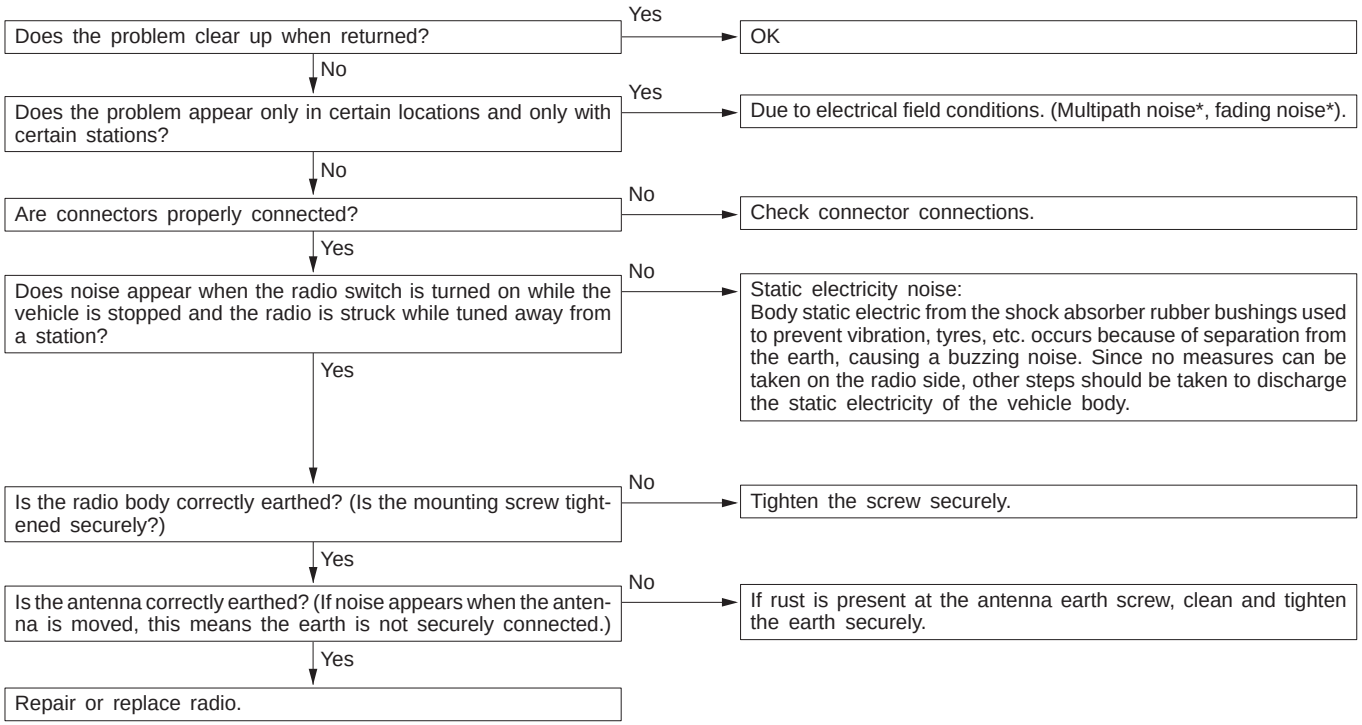
Does noise appear when the radio switch is turned on while the vehicle is stopped and the radio is struck while tuned away from a station?
- No → Static electricity noise: Body static electric from the shock absorber rubber bushings used to prevent vibration, tyres, etc. occurs because of separation from the earth, causing a buzzing noise. Since no measures can be taken on the radio side, other steps should be taken to discharge the static electricity of the vehicle body.
- Yes ↓

Is the radio correctly earthed? (Is the mounting screw tightened securely?)
- No → Tighten the screw securely.
- Yes ↓

Is the antenna correctly earthed? (If noise appears when the antenna is moved, this means the earth is not securely connected.)
- No → If rust is present at the antenna earth screw, clean and tighten the earth securely.
- Yes ↓

Repair or replace radio.

A–8 Noise sometimes appears on FM during travelling.



* About multipath noise and fading noise
Because the frequency of FM waves is extremely high, it is highly susceptible to effects from geological formations and buildings. These effects disrupt the broadcast signal and obstruct reception in several ways.

- Multipath noise
  This describes the echo that occurs when the broadcast signal is reflected by a large obstruction and enters the receiver with a slight time delay relative to the direct signal (repetitious buzzing).
- Fading noise
  This is a buzzing noise that occurs when the broadcast beam is disrupted by obstructing objects and the signal strength fluctuates intricately within a narrow range.

A–9 Ever-present noise.

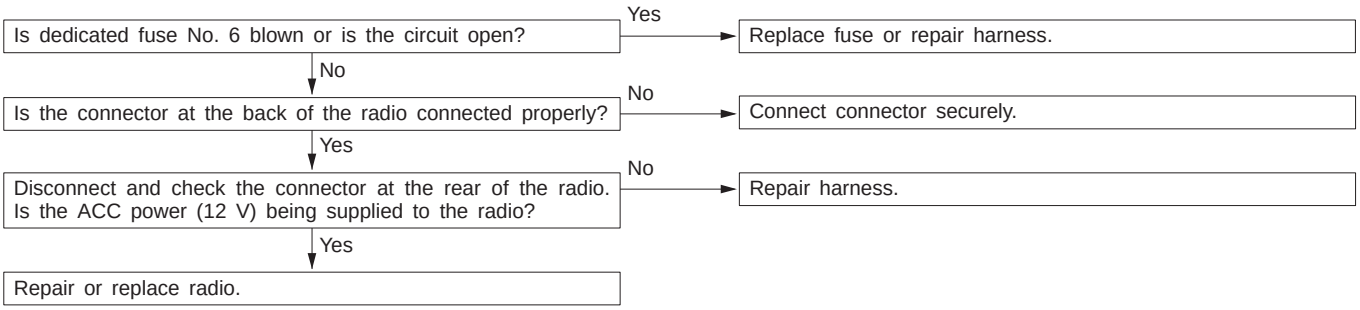
Noise is often created by the following factors, and often the radio is OK when it is checked individually.

- Travelling conditions of the vehicle
- Terrain of area travelled through
- Surrounding buildings
- Signal conditions
- Time period

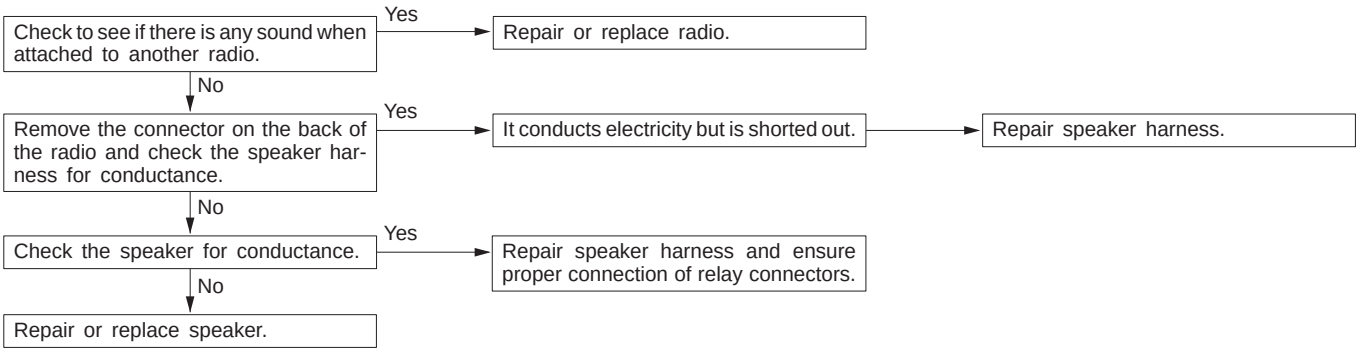
For this reason, if there are still problems with noise even after the measures described in steps A–1 to A–8 have been taken, get information on the factors listed above as well as determining whether the problem occurs with AM or FM, the station names, frequencies, etc., and contact a service centre.

B. RADIO

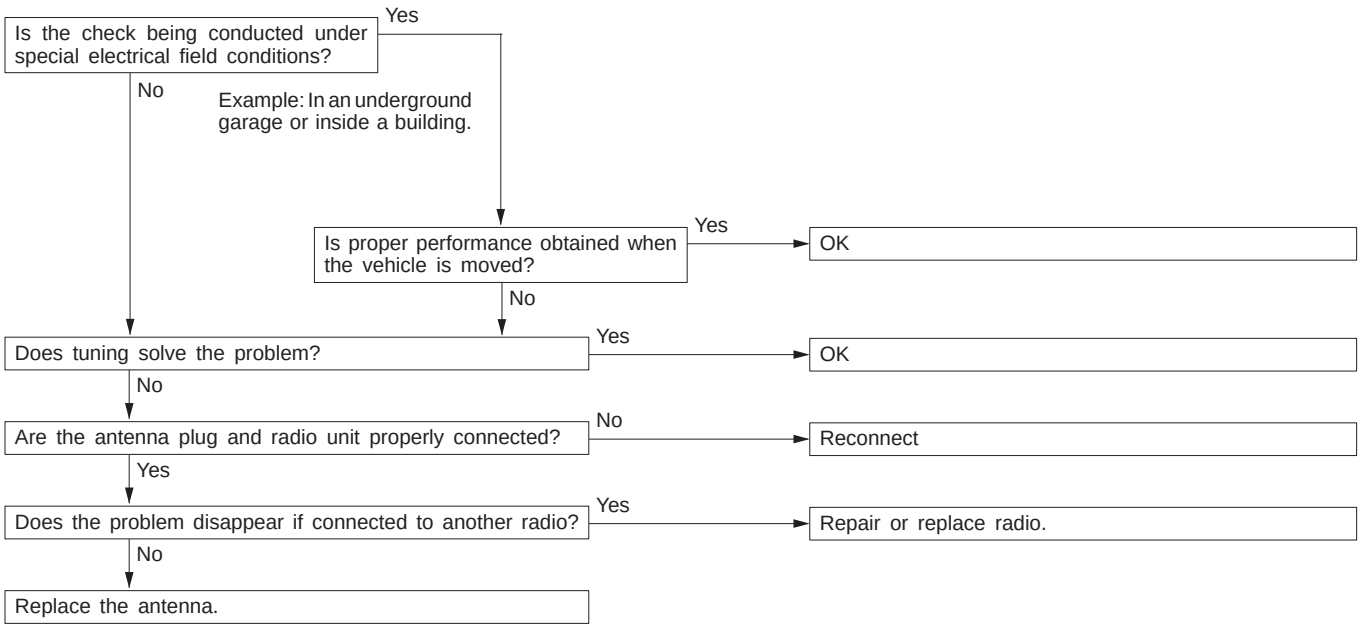
B–1 No power is supplied when the switch is set to ON.



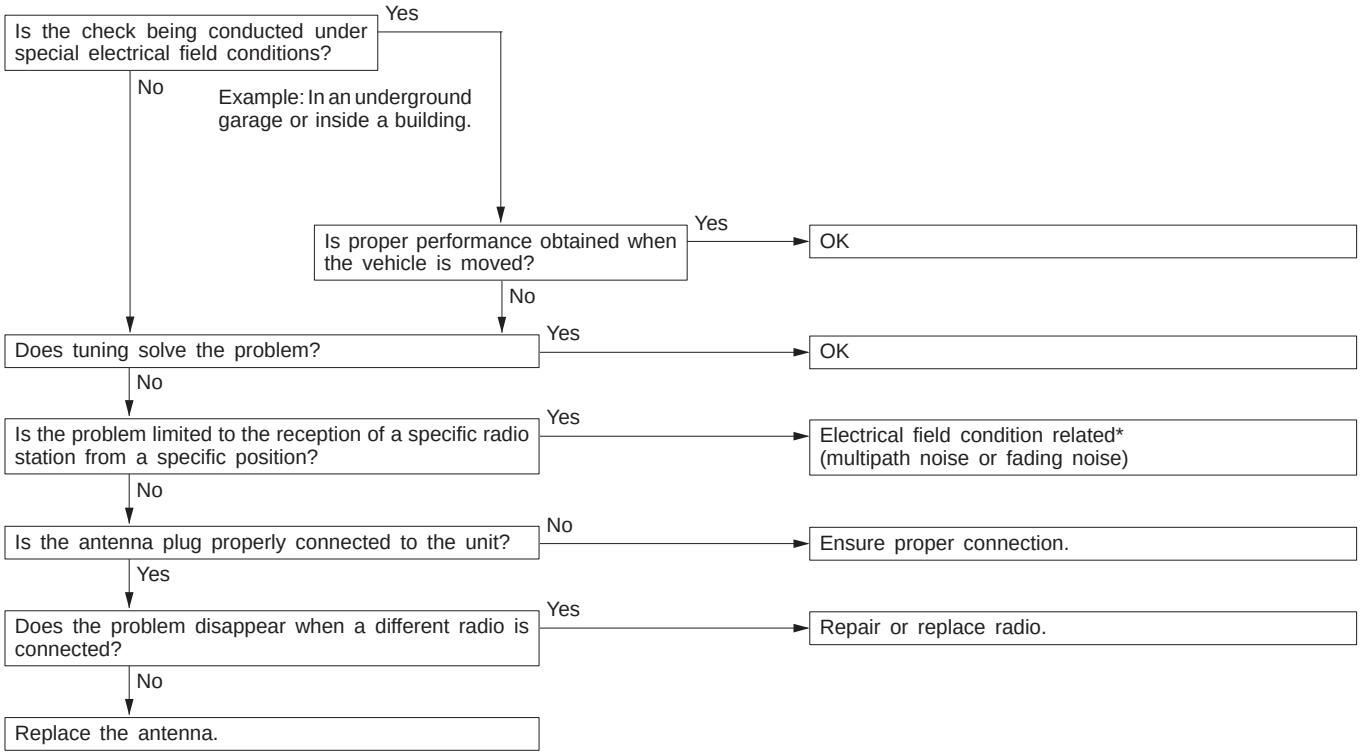
B–2 No sound from one speaker.



B–3 There is noise but no reception for both AM and FM or no sound from AM, or no sound from FM.

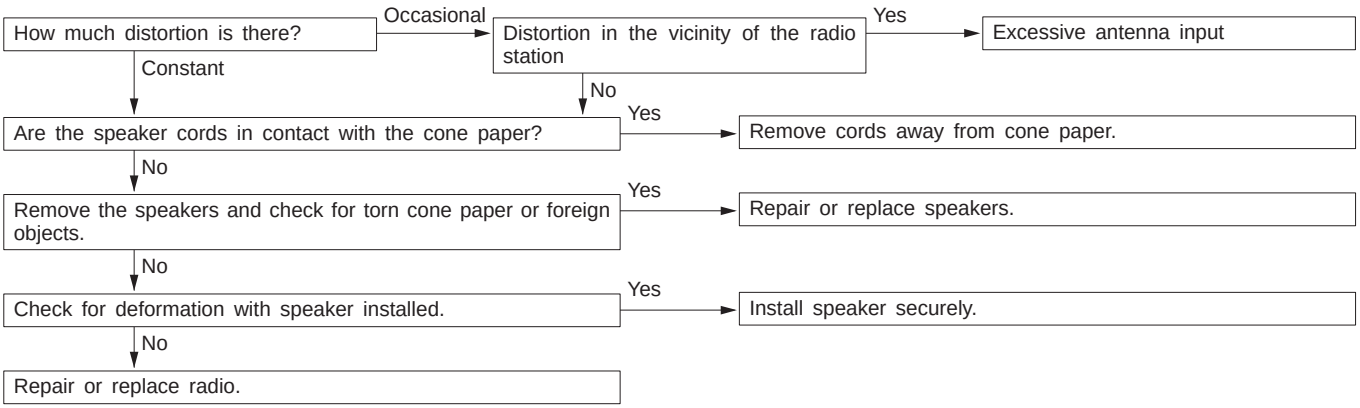


B–4 Insufficient sensitivity.

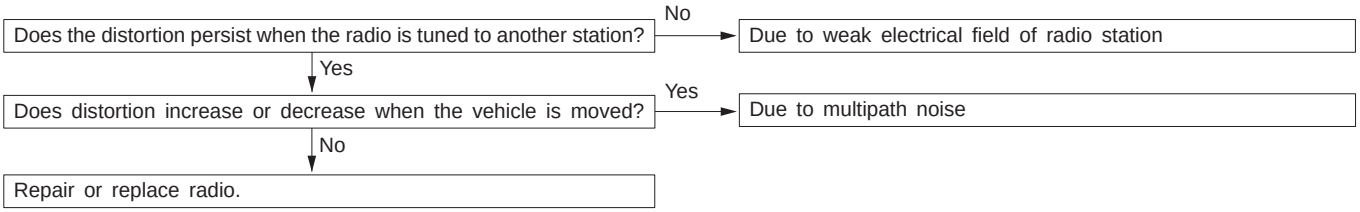


* For multipath noise and fading noise problems, refer to P. 54-53.

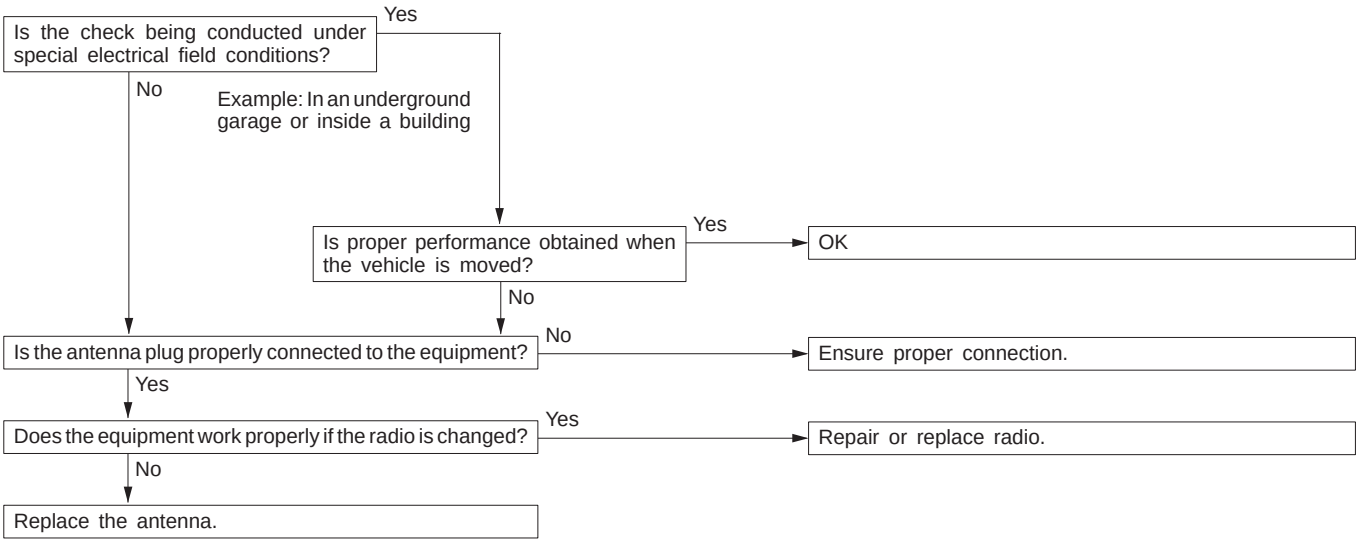
B–5 Distortion on AM or on both AM and FM.



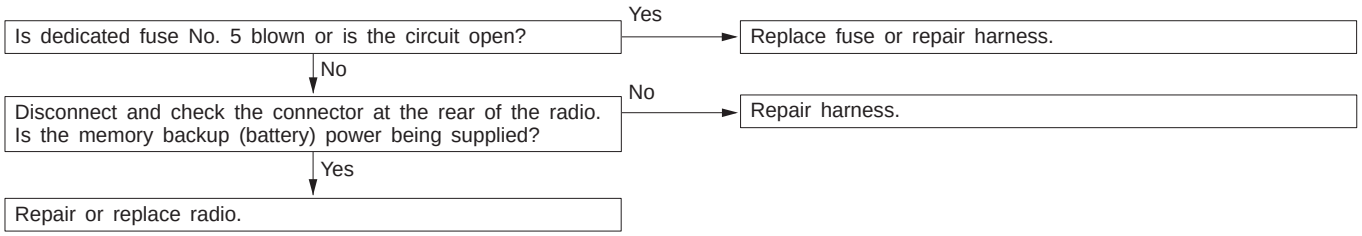
B–6 Distortion on FM only



B–7 Too few automatic select stations.

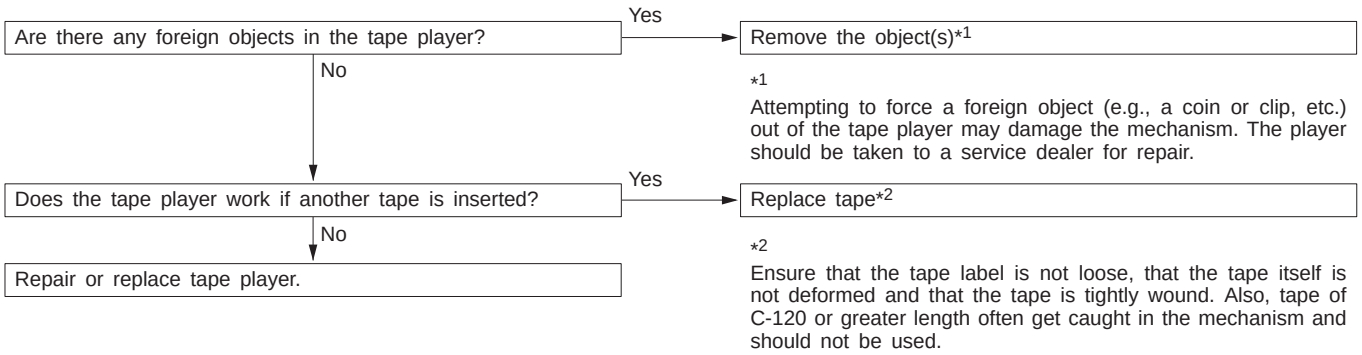


B–8 Insufficient memory (preset stations are erased).



C. TAPE PLAYER

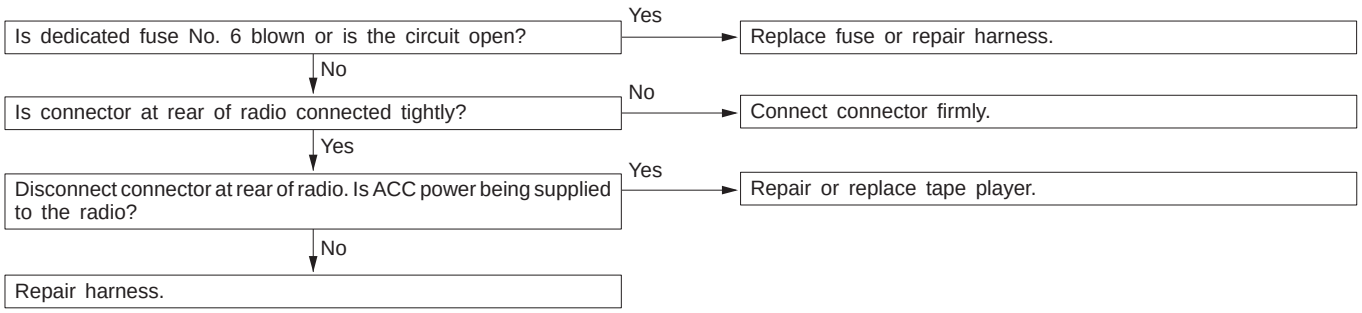
C–1 Cassette tape will not be inserted.



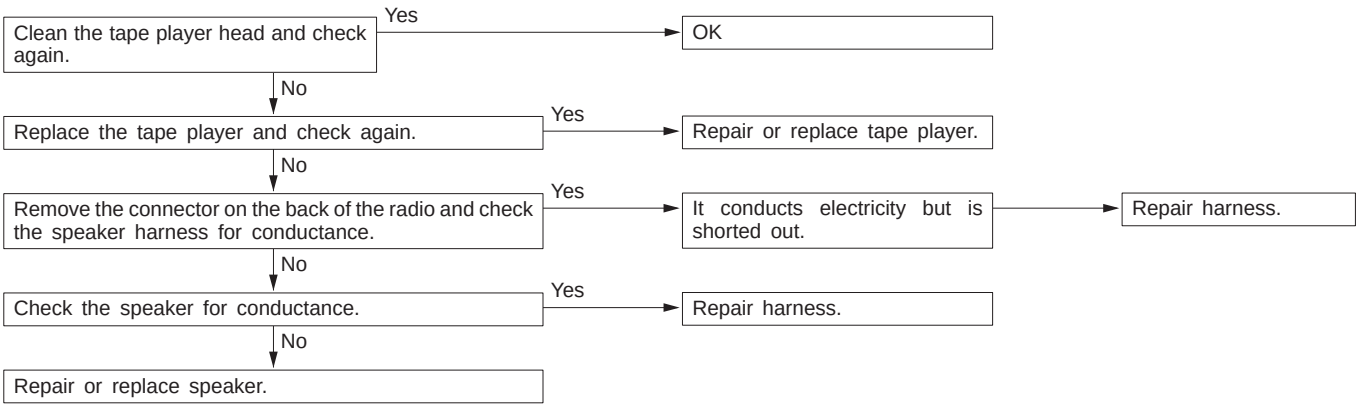
*1
Attempting to force a foreign object (e.g., a coin or clip, etc.) out of the tape player may damage the mechanism. The player should be taken to a service dealer for repair.

*2
Ensure that the tape label is not loose, that the tape itself is not deformed and that the tape is tightly wound. Also, tape of C-120 or greater length often get caught in the mechanism and should not be used.

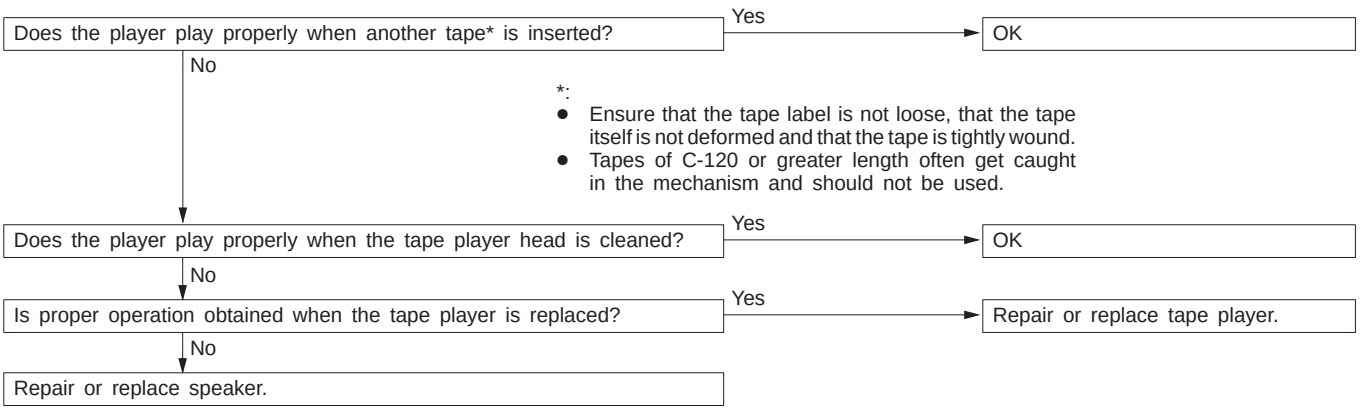
C–2 No sound (even after a tape has been inserted).



C–3 No sound from one speaker.



C–4 Sound quality is poor, or sound is weak.



C–5 Cassette tape will not be ejected.

The problems covered here are all the result of the use of a bad tape (deformed or not properly tightened) or of a malfunction of the tape player itself. Malfunctions involving the tape becoming caught in the mechanism and ruining the case are also possible, and attempting to force the tape out of the player can cause damage to the mechanism. The player should be taken to a service dealer for repair.

C–6 Uneven revolution. Tape speed is fast or slow.

Does the player play OK if the tape*1 is changed?
- Yes → OK
- No

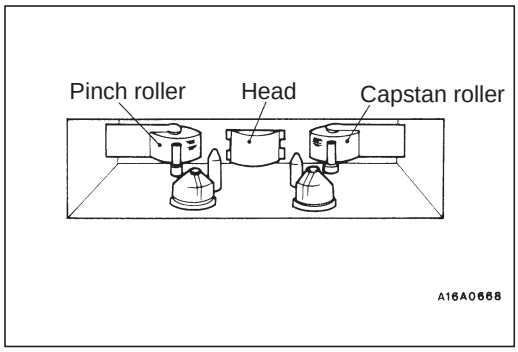
*1
Ensure that the tape label is not loose, that the tape itself is not deformed and that the tape is tightly wound. Also, tape of C-120 or greater length often get caught in the mechanism and should not be used.

Are there any foreign objects *2 inside the tape player?
- Yes → Remove foreign object(s).
- No

*2
Attempting to force a foreign object (e.g., a coin or clip, etc.) out of the tape player may damage the mechanism. The player should be taken to a service dealer for repair.

Is the head or capstan roller dirty? (Refer to the illustration below.)
- Yes → Clean.
- No

Repair or replace tape player.



C–7 Faulty auto reverse.

Does the player play OK if the tape* is changed?
- Yes → OK
- No

*:
- Ensure that the tape label is not loose, that the tape itself is not deformed and that the tape is tightly wound.
- Tapes of C-120 or greater length often get caught in the mechanism and should not be used.

Does the problem only occur while the vehicle is being driven?
- No → Repair or replace tape player.
- Yes

Is the tape player properly installed to the vehicle?
- No → Ensure tape player installation.
- Yes

Repair or replace tape player.

C–8 Tape gets caught in mechanism*1.

*1
When the tape is caught in the mechanism, the case may not eject. When this occurs, do not try to force the tape out as this may damage the tape player mechanism. Take the cassette to a service dealer for repair.

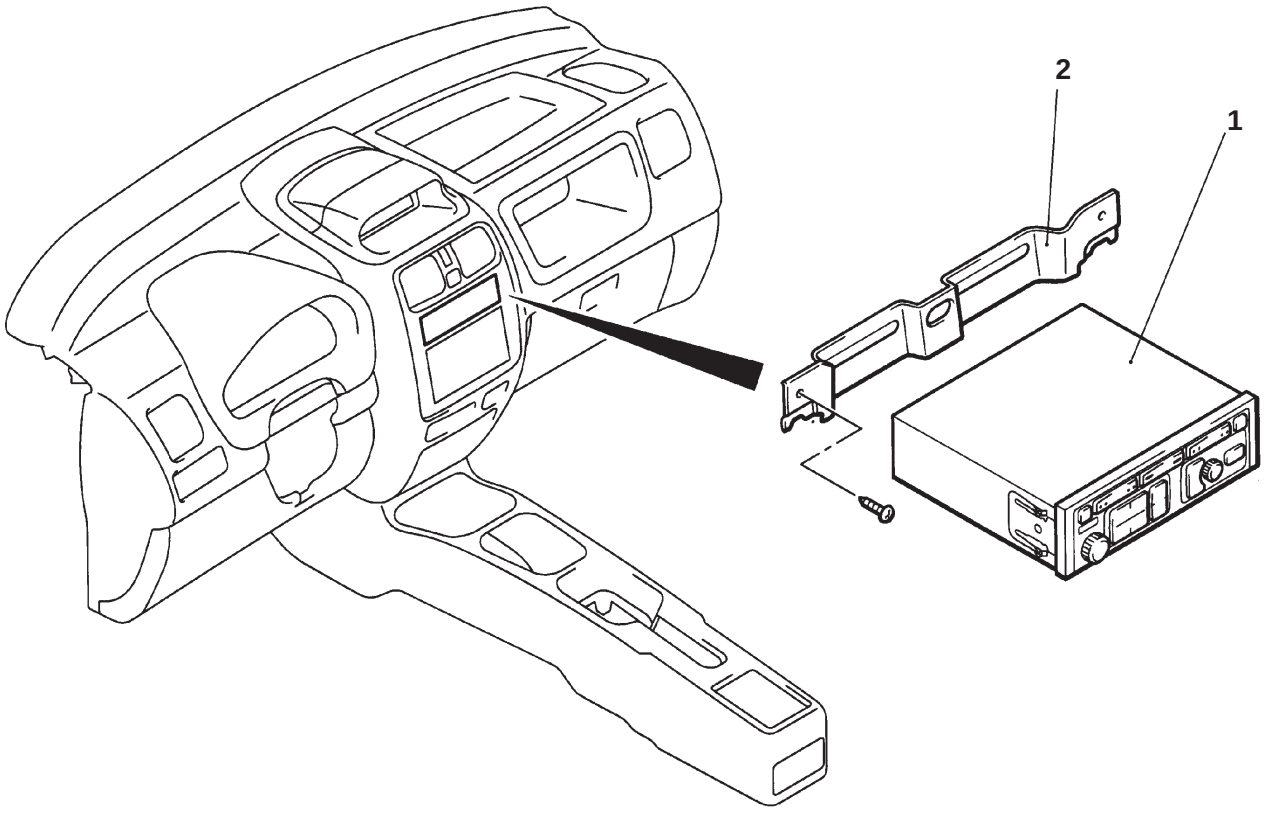
Does the player play OK if the tape*2 is changed?
- Yes → Tape used is bad.
- No → Repair or replace tape player.

*2
Ensure that the tape label is not loose, that the tape itself is not deformed and that the tape is tightly wound. Also, tapes of C-120 or greater length often get caught in the mechanism and should not be used.

RADIO AND TAPE PLAYER

54400140188

REMOVAL AND INSTALLATION



AW0284AJ

Removal steps

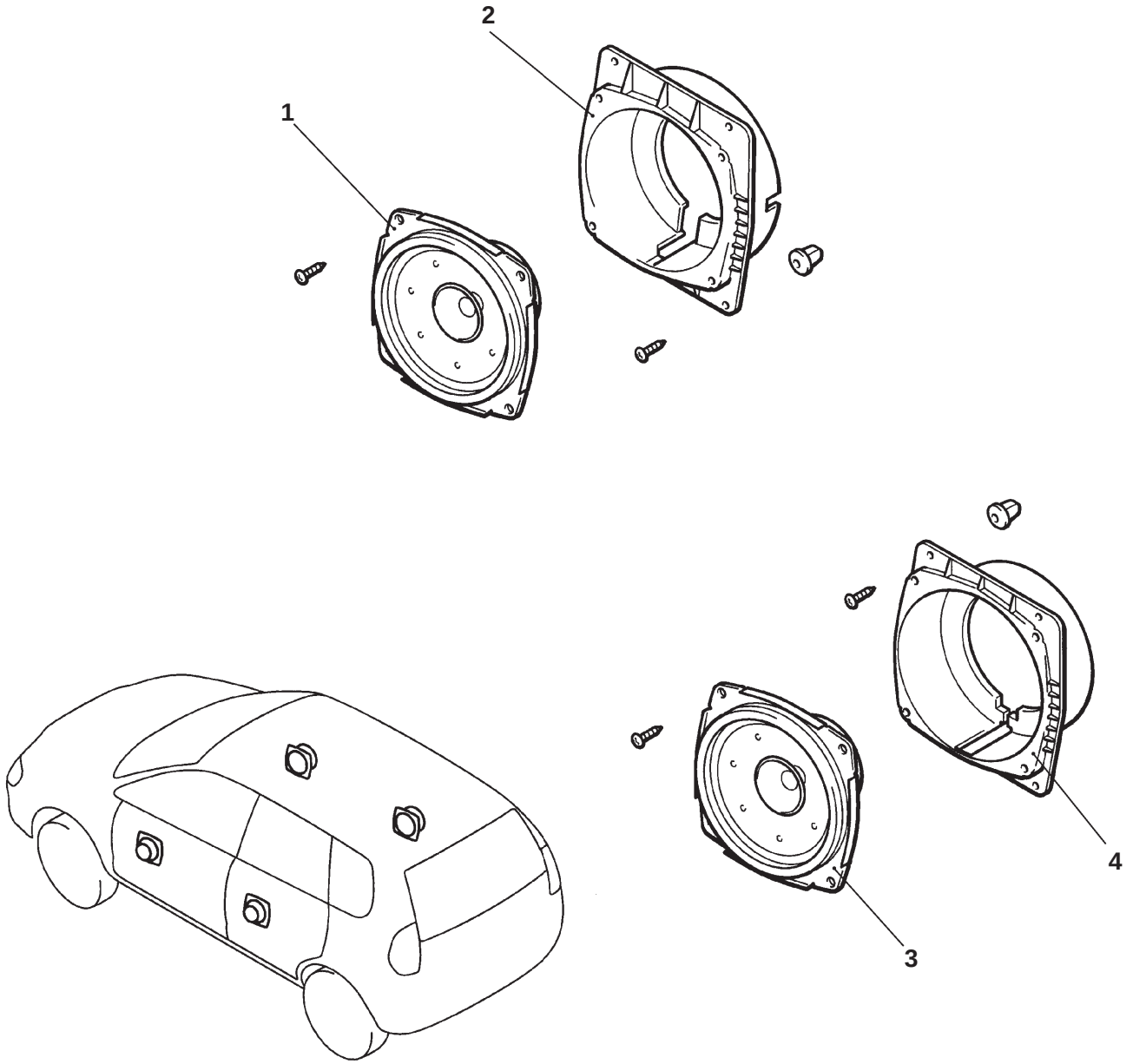
- Centre panel assembly (Refer to GROUP 52A – Instrument Panel.)

1. Radio and tape player
2. Radio bracket

SPEAKER

54400260365

REMOVAL AND INSTALLATION



AW0285AJ

Front speaker removal steps

- Front door trim
  (Refer to GROUP 42.)

1. Speaker
2. Speaker cover

Rear speaker removal steps

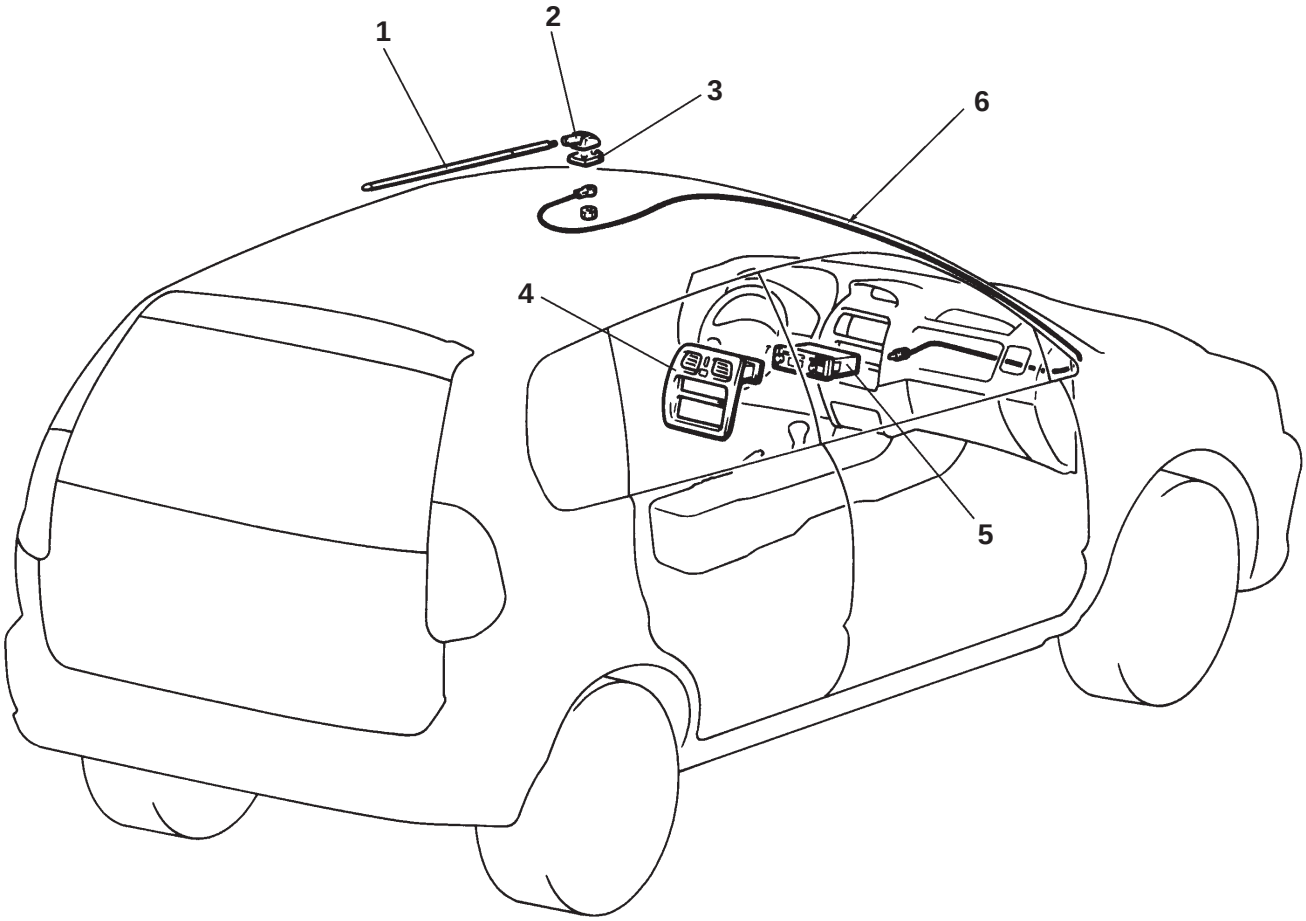
- Rear door trim
  (Refer to GROUP 42.)

3. Speaker
4. Speaker cover

ANTENNA

54400290357

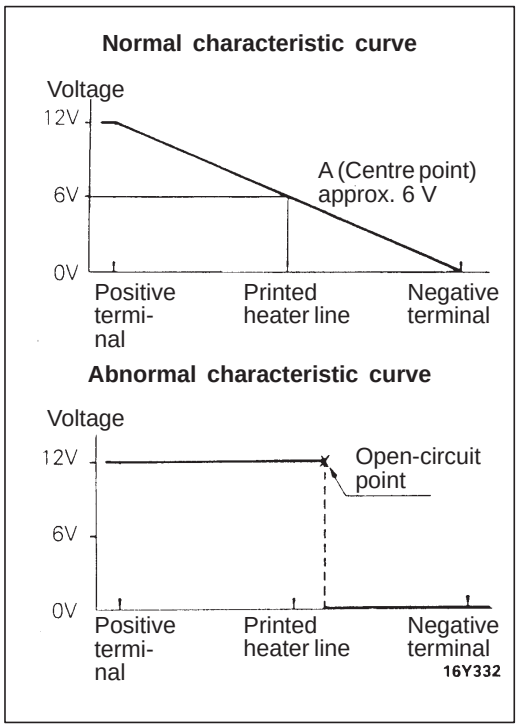
REMOVAL AND INSTALLATION



AW0286AJ

Removal steps

1. Pole
2. Antenna base
3. Base
- Cowl side trim, front pillar trim (Refer to GROUP 52A.)
- Headlining
4. Center panel assembly (Refer to GROUP 52A – Instrument Panel.)
5. Radio and tape player
6. Antenna feeder cable



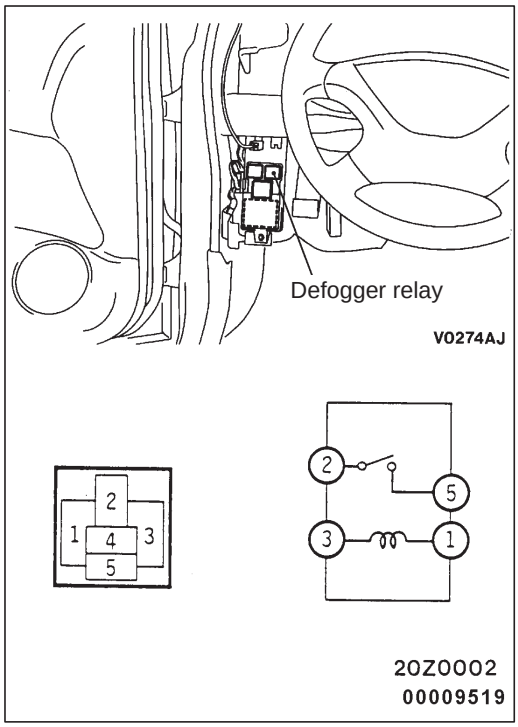
REAR WINDOW DEFOGGER

54300180163

ON-VEHICLE SERVICE

PRINTED-HEATER LINE CHECK

(1) Run engine at 2,000 r/min. Check heater element with battery at full.
(2) Turn ON rear window defogger switch. Measure heater element voltage with circuit tester at rear window glass centre A.
Condition is good if it indicates about 6V.
(3) If 12 V is indicated at A, there is a break in the negative terminals from A.
Move test bar slowly to negative terminal to detect where voltage changes suddenly (0V).
(4) If 0 V is indicated at A, there is a break in the positive terminals from A. Defect where the voltage changes suddenly (12 V) in the same method described above.



REAR WINDOW DEFOGGER RELAY CONTINUITY CHECK

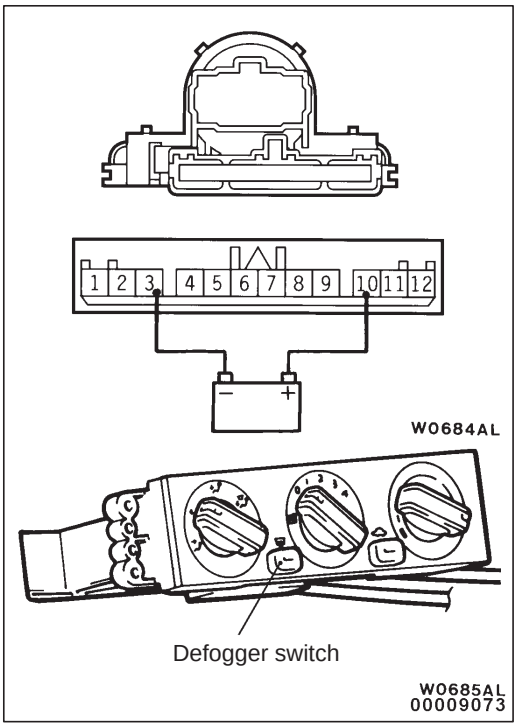
Battery voltage	Terminal No.			
	1	2	3	5
Power is not supplied	○		○	
Power is supplied	⊕		⊖	
		○		○

REAR WINDOW DEFOGGER SWITCH

54300620207

REMOVAL AND INSTALLATION

Refer to GROUP 55 – Heater Control.



INSPECTION

54300630071

DEFOGGER SWITCH CONTINUITY CHECK

Switch position	Terminal No.				
	3	10	–	11	12
OFF			IND		
ON			IND		

NOTE
Turn on the defogger switch, and then check that there is continuity between the terminals 3 and 12 for 9 to 13 minutes and after it, the defogger switch is turned off.

MULTI CENTER DISPLAY

54600070025

TROUBLESHOOTING

NOTES WITH REGARD TO SERVICE PROCEDURES

1. Before removing the battery

The multi center display has a large amount of data stored in memory which the user enters over time. When the terminals are disconnected from the battery, the memory which stores this data is affected as shown in the table below. Accordingly, it is necessary to make sure that you take notes of important information before disconnecting the battery.

Function	Input function	When battery is disconnected
Radio function	Channels which are selected during a search	Disappear after a few seconds
	Preset channels	Do not disappear
Navigation function	Current location	
	Recommended route	
	Destination	
	Route search conditions	
	Sensor initialization data	
	Language selection setting	
	Guidance volume setting	
Data search function, data display and input functions	Registered location names	
	Past destinations	
	Average fuel consumption, average speed, cruising range	Disappear after a few seconds
Clock display function	Current time	
Vehicle model settings for travel data	Setting details for vehicle model	
Monitor backlight luminance setting	Luminance setting value	

2. Notes on trouble diagnosis relating to the overall system

(1) If a problem occurs which seems like all of the functions have developed an abnormality simultaneously, the cause is most likely a communication abnormality between the various systems. Thus you should use the communication checking service function in the trouble diagnosis service functions in order to verify the cause.

(2) If the above is not the problem, check the connections of the related harness connectors. If a malfunctioning location is discovered, repair it and then re-check the trouble symptoms.
(3) If there are no abnormalities in the harness connections, check the harnesses themselves. If there are no abnormalities in the harnesses, replace the relevant unit. Make a note of any error codes and service function data generated at this time.

NOTE
If the cause of the problem seems to be related to system communication, carry out troubleshooting.

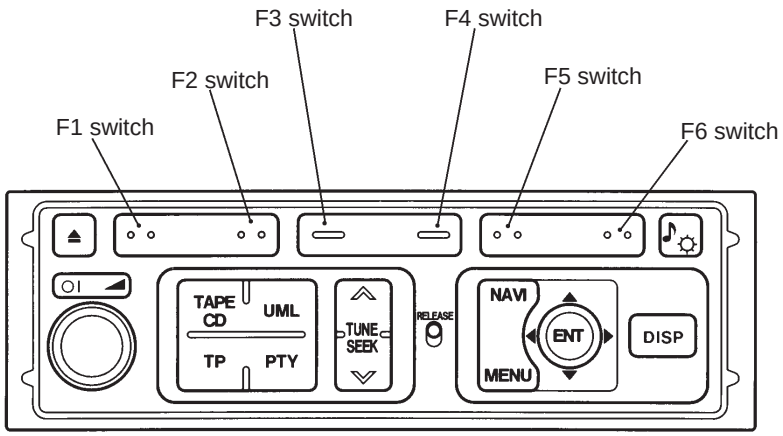
3. Notes on trouble diagnosis when only specific functions are abnormal

(1) If only certain functions are showing an abnormality, use the audio checking function of the service functions to check the hardware switches.
(2) If the switch functions are normal, check the connections of the related harness connectors. If a malfunctioning location is discovered, repair it and then re-check the trouble symptoms.
(3) If there are no abnormalities in the harness connections, check the harnesses themselves. If there are no abnormalities in the harnesses, replace the unit which controls that function.

4. Notes on trouble diagnosis of the navigation function

(1) The vehicle positioning accuracy of the navigation function is limited because of the principle of operation which it uses. Because of this, the system may be operating normally even though customers might be reporting a problem.
Before carrying out troubleshooting, get as much information as possible from the customer regarding things such as usage conditions and driving locations. If it is possible to judge from this that the problem is not caused by a system abnormality, explain the principle of operation used by the navigation function and how to utilize it effectively.
(2) If you find that there is a system abnormality, check according to the Inspection Chart Classified by Trouble Symptoms in the Troubleshooting section.

MITSUBISHI MULTI COMMUNICATION SYSTEM DISPLAY PANEL

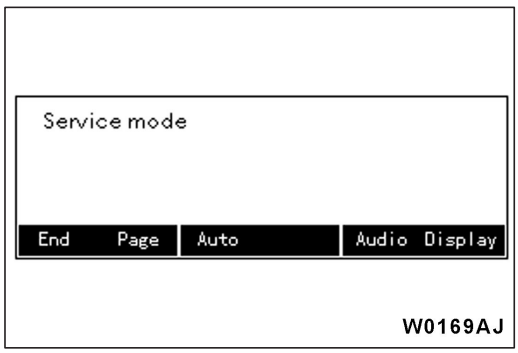


AV0273AJ

TROUBLE DIAGNOSIS SERVICE FUNCTIONS

The Multi Center Display is equipped with the following trouble diagnosis service functions.

Function	Contents
Diagnosis function	During normal use, this function constantly monitors the system communication lines, and displays an error if it finds any abnormalities.
CD-ROM checking function	This function displays a message if it cannot read the CD-ROM or if no CD-ROM is inserted.
Service functions	There are five checking modes available: monitor checking, audio checking, automatic checking by mode, self-diagnosis and diagnosis recording.
1. Monitor checking	This mode checks that the image display function is operating normally.
2. Audio checking	This mode checks that the speakers and operating switches of the audio system are all working normally.
3. Automatic diagnosis by mode	In this mode, wiring and communication checking, audio checking, sensor checking and vehicle signal checking are carried out continuously.
4. Self-diagnosis	This mode includes functions such as wiring and communication checking, sensor checking, vehicle signals and version data checking.
● Wiring and communication checking	This checks system communication between all units.
● Sensor checking	This checks all of the sensors that are necessary to the navigation system.
● Vehicle signals	This displays the current vehicle signal condition.
● Version data	This displays the version numbers for each unit in the Multi Center Display.
5. Diagnosis recording	This mode displays error codes from communication checking. (Error codes are erased when the ignition switch is turned to OFF.)

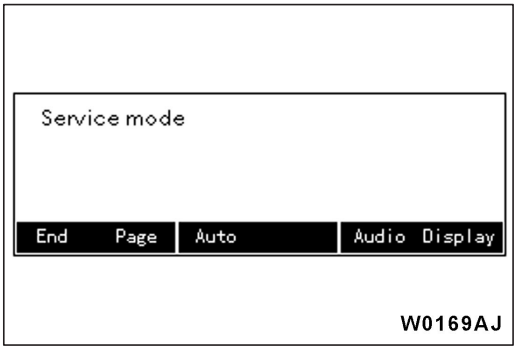


1. ACTIVATING AND ENDING SERVICE MODE

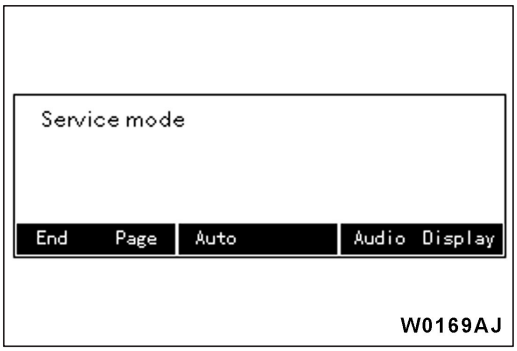
(1) Activating service mode can be carried out by turning the ignition switch to the ON position while pressing the DISP switch on the audio unit and the F6 switch. (Continue pressing each switch for at least 5 seconds after turning the ignition switch to ON.)

(2) If the special CD-ROM has been inserted into the navigation unit but the program has not been set up, the program will then be loaded from the CD-ROM. Service mode can be used once this process is completed.

NOTE
The special CD-ROM is a map CD-ROM which a distributor vends.

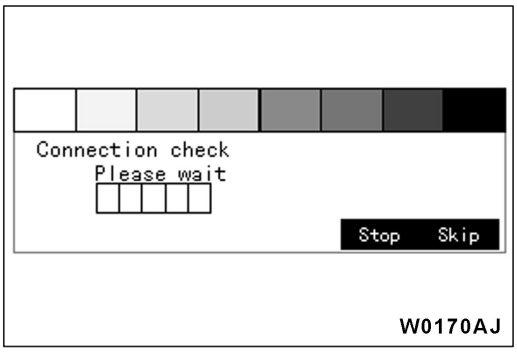


(3) If the F1 switch is pressed at the service mode initial screen, service mode will be ended and the screen will change to navigation mode.

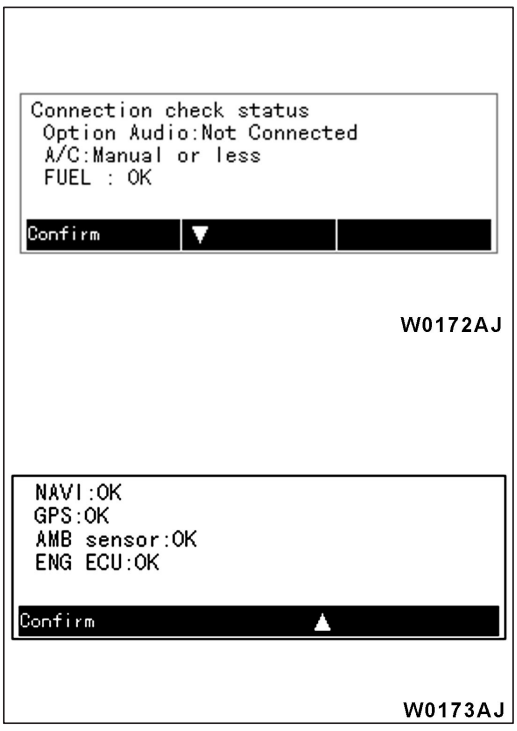


2. AUTOMATIC DIAGNOSIS BY MODE

(1) If the F3 switch is pressed at the service mode screen, automatic diagnosis by mode will start.

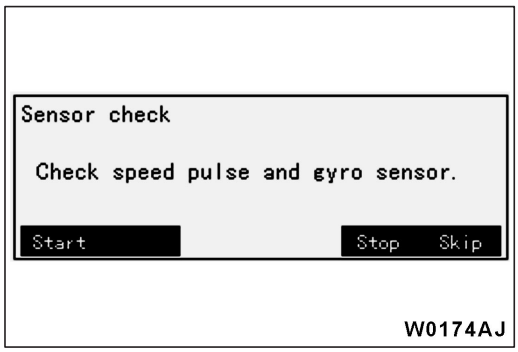


(2) A colored bar will appear on the screen of the Multi Center Display unit, and all units which are connected to the navigation unit will be checked during this time.

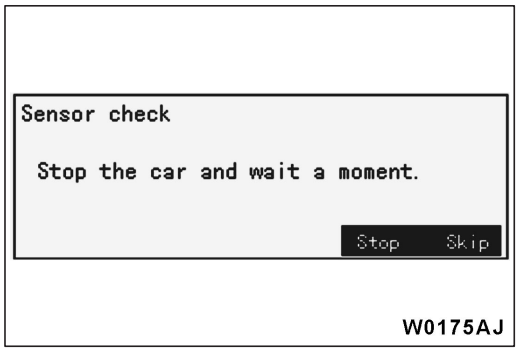


(3) Once the transmission checking is completed, the results of the wiring and transmission checking will appear on the screen.
After checking the results, press the F1 switch to proceed to the next check. The next check will start when the switch is pressed.

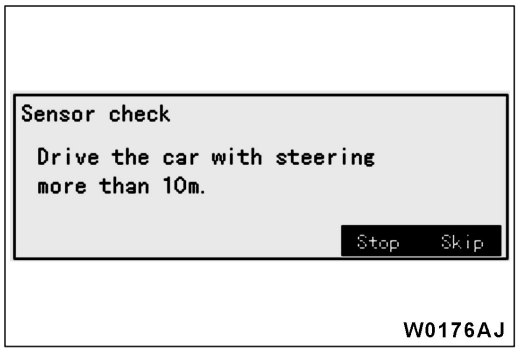
NOTE
1) If the fuel gauge and the engine-ECU are checked while the ignition switch is at ACC, an error will be generated, but this is not a sign of an abnormality.
2) If checking is carried out while the fuel tank is full or the while ignition switch is at ACC, the fuel gauge may be shown to be not connected, but this is not a sign of an abnormality.



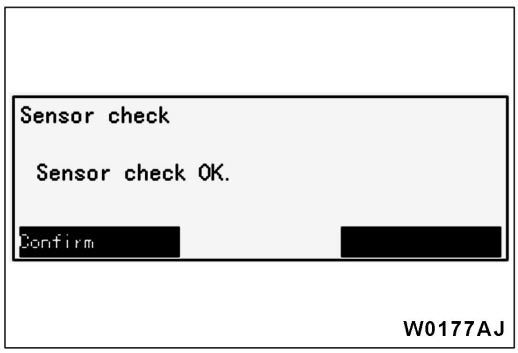
(4) The next mode is the sensor checking mode. Press the F1 switch to start sensor checking.
If you would like to proceed to the next checking operation without carrying out sensor checking, press the F6 switch.



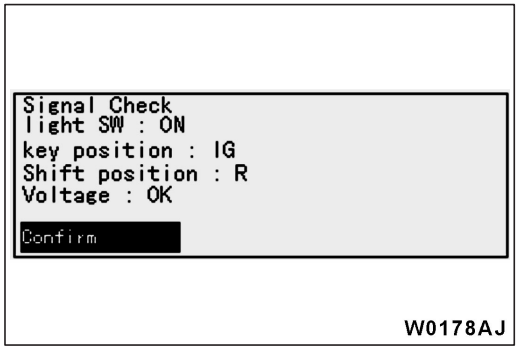
(5) When sensor checking starts, the gyro output will be checked first while the vehicle is stopped, so make sure that the vehicle is stopped for this check.
If the vehicle is moving when the sensor checking starts, the vehicle speed sensor will be shown as defective.
Follow the guidance message on the multi center display.



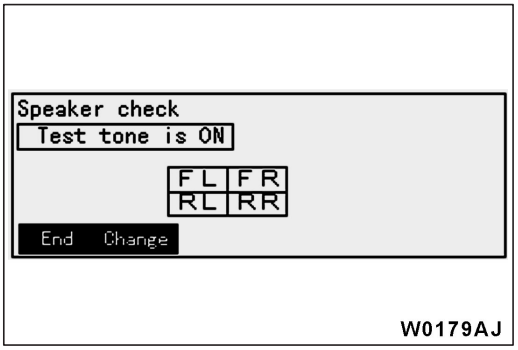
(6) Next, drive the vehicle for approximately 10 meters while changing the running direction in order to check the vehicle speed pulse and the gyro sensor output. The sensor checking will then be completed. If there is an open circuit in the vehicle speed sensor, sensor checking will not complete even after the vehicle has travelled more than 10 meters. In this case, press the F5 switch to stop checking.
If the vehicle does not move or there is an open circuit in vehicle speed sensor, the vehicle speed sensor will be shown as defective.



(7) When sensor checking is completed, the check results will appear on the screen. After checking the results, press the F1 switch to proceed to the next check.

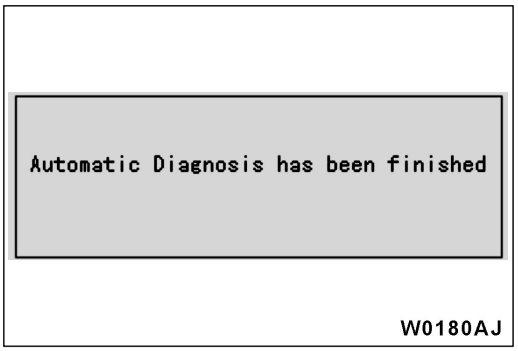


(8) The next mode is the vehicle signal checking mode. The lighting switch condition, ignition key position, shift lever selection (R or a position other than R) and the power supply voltage drop will be appear on the screen. Check that the details displayed match the actual vehicle signals, and then press the F1 switch.
If the vehicles does not move or there is an open circuit in vehicle speed sensor, the vehicle speed sensor will be shown as defective.



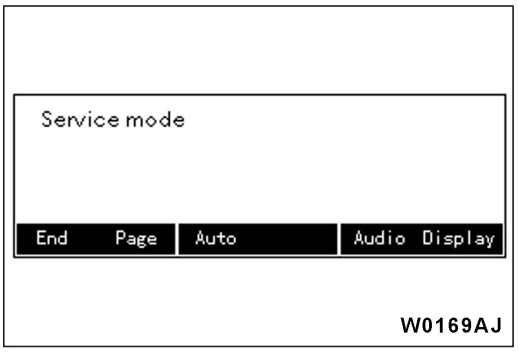
W0179AJ

(9) The next mode is speaker checking mode. The test sound will be output alternately from each speaker each time the F2 switch is pressed.
At the early mass production, sometimes radio sound will be output. This is not a sign of abnormality.



W0180AJ

(10) Press the F1 switch to end service mode. The screen will change to navigation mode.

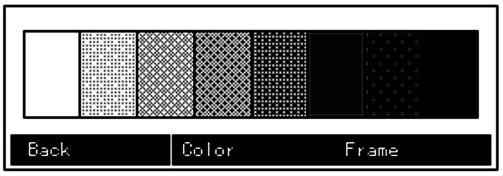


W0169AJ

3. MONITOR CHECKING

(1) If the F6 switch is pressed at the service mode initial screen, monitor checking will start.

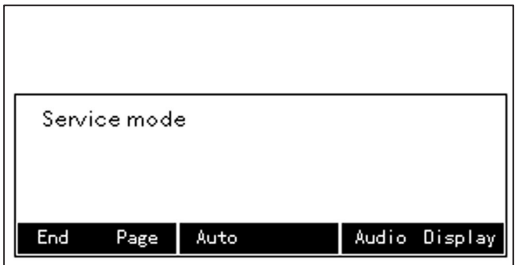
W0181AJ



W0182AJ

W0183AJ

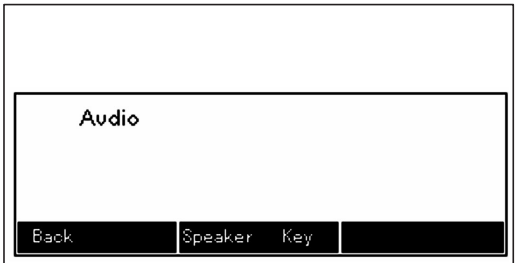
(2) A colored bar will appear on the screen.
Press a function switch to change to another screen. The screen will return to the service mode initial screen if the F1 switch is pressed.



W0169AJ

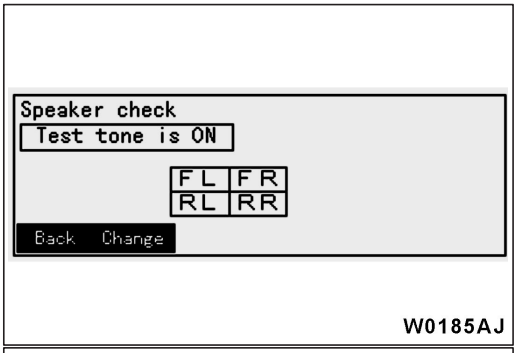
4. AUDIO CHECKING

(1) If the F5 switch is pressed at the service mode initial screen, the audio checking menu screen will appear.



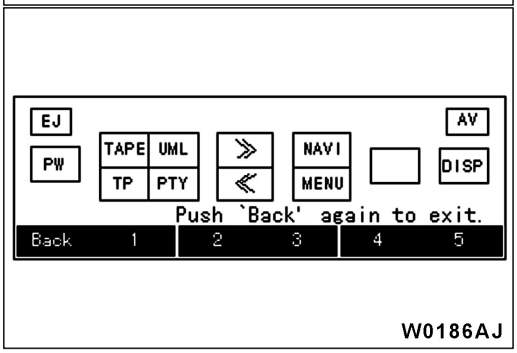
W0184AJ

(2) Next, press the function switches to carry out audio checking.



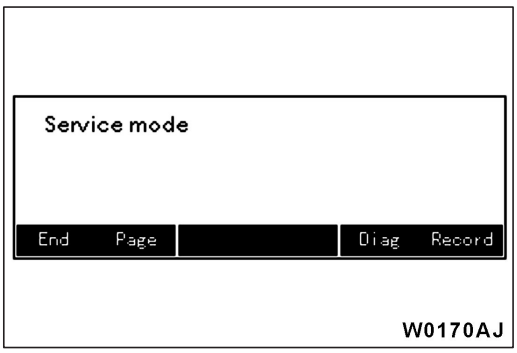
W0185AJ

(3) Press the F3 switch to display the speaker checking screen. The test sound will be output alternately from each speaker each time the F2 switch is pressed.
Press the F1 switch to end speaker checking and return to the audio checking menu screen.
At the early mass production, sometimes radio sound will be output. This is not a sign of abnormality.



W0186AJ

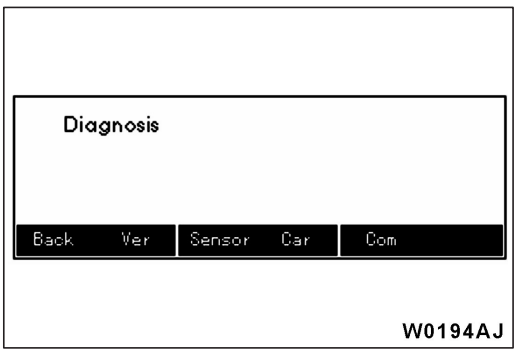
(4) Press F4 to display the audio key checking screen. When one of the audio switches is pressed, the screen display color for that switch should change. This indicates that this particular switch system is working normally.
Press the F1 switch to check the operation of the F1 switch.
Press the F1 switch once more to return to the audio checking menu screen.



W0170AJ

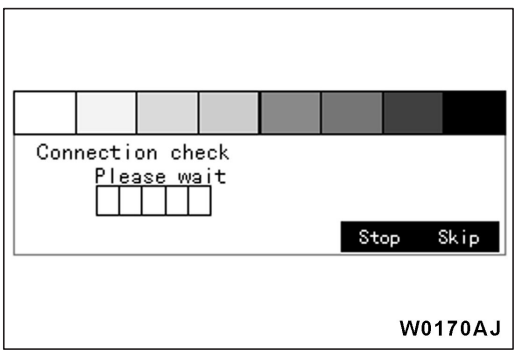
5. SELF-DIAGNOSIS

(1) If the F5 switch is pressed at the service mode initial screen, the self-diagnosis menu screen will appear.



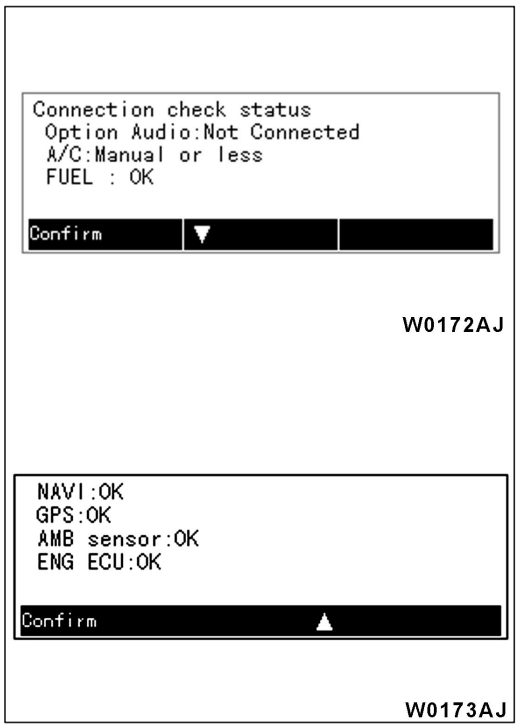
W0194AJ

(2) Next, use the function switches to carry out self-diagnosis.

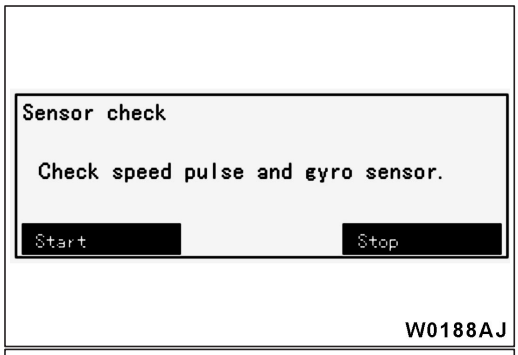


W0170AJ

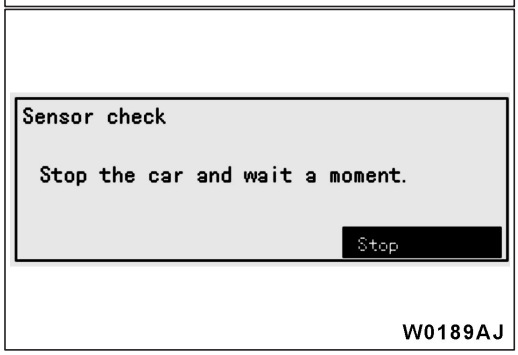
(3) When the F5 switch is pressed, self-diagnosis for the wiring is carried out.
A colored bar will appear on the screen of the Multi Center Display unit, and all units which are connected to the navigation unit will be checked during this time.



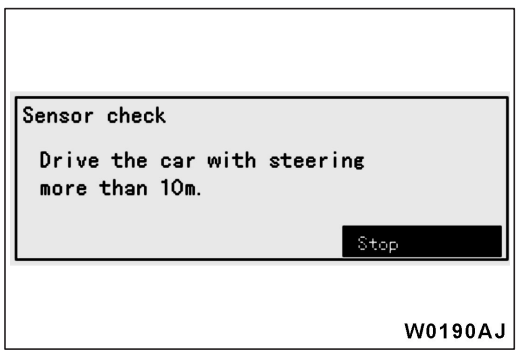
(4) Once the transmission checking is completed, the results of checking will appear on the screen.
After checking the results, press the F1 switch to return to the self-diagnosis menu screen.



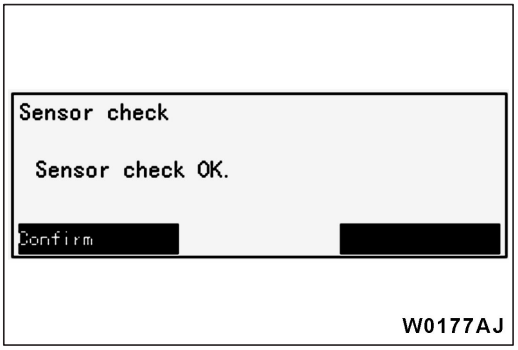
(5) If the F6 switch is pressed at the self-diagnosis menu screen, sensor checking will start.
Press the F1 switch to start sensor checking.
If you would like to return to the self-diagnosis menu screen without carrying out sensor checking, press the F5 switch.



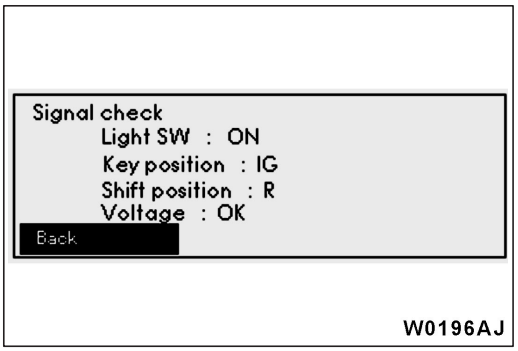
(6) When sensor checking starts, the gyro output will be checked first while the vehicle is stopped, so make sure that the vehicle is stopped for this check.
If the vehicle is moving when the sensor checking starts, the vehicle speed sensor will be shown as defective.
Follow the guidance message on the multi center display.



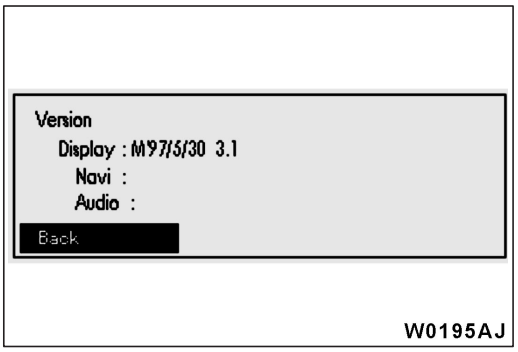
(7) Next, drive the vehicle for approximately 10 meters while changing the running direction in order to check the vehicle speed pulse and the gyro sensor output. The sensor checking will then be completed. If there is an open circuit in the vehicle speed sensor, sensor checking will not complete even after the vehicle has travelled more than 10 meters. In this case, press the F5 switch to stop checking.
If the vehicle does not move or there is an open circuit in vehicle speed sensor, the vehicle speed sensor will be shown as defective.



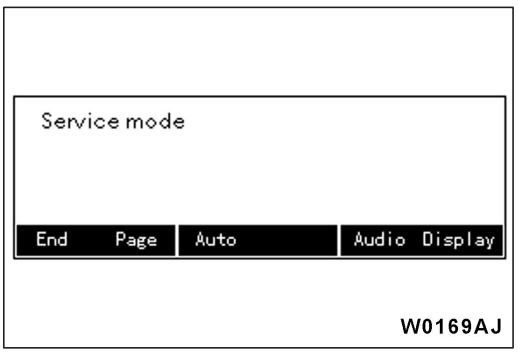
(8) When sensor checking is completed, the check results will appear on the screen. After checking the results, press the F1 switch to return to the self-diagnosis menu screen.



(9) If the F6 switch is pressed at the self-diagnosis menu screen, vehicle signal checking will start.
The lighting switch condition, ignition key position, shift lever selection (R or a position other than R) and the power supply voltage drop will be appear on the screen.
Press the F1 switch to return to the self-diagnosis menu screen.

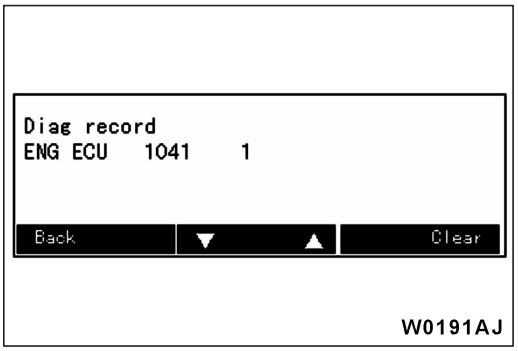


If the F2 switch is pressed at the self-diagnosis menu screen, version data self-diagnosis will be carried out, and the check results will appear on the screen.
Press the F1 switch to return to the self-diagnosis menu screen.

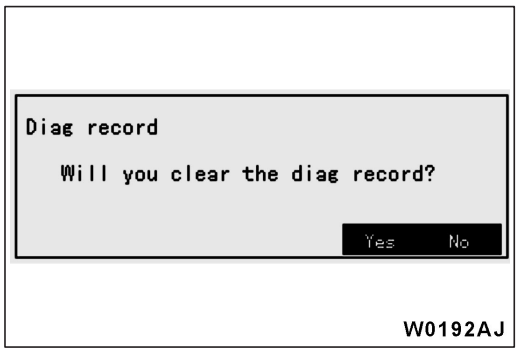


6. DIAGNOSIS RECORDING

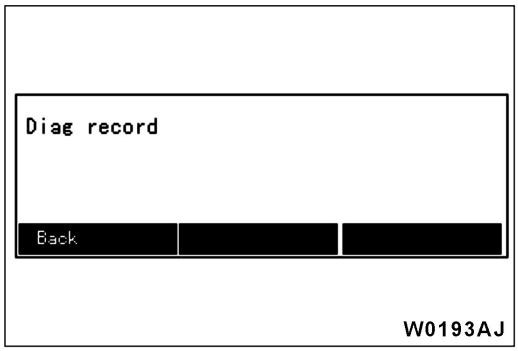
(1) If the F6 switch is pressed at the service mode initial screen, the diagnosis recording screen will appear.
(2) Press the F1 switch to return to the service mode initial screen.



(3) Press the F6 switch to clear any error codes which may still be remaining from diagnosis recording.
When this is done, the clearing confirmation screen will appear. If it is okay to continue with the clear, press the F5 switch. To cancel clearing, press the F6 switch.
If the F6 switch is pressed, the screen will return to the diagnosis recording screen.



(4) If the F5 switch is pressed, all past error codes will be cleared, and the screen will return to the diagnosis recording screen. The Clear button will not be displayed at this time.



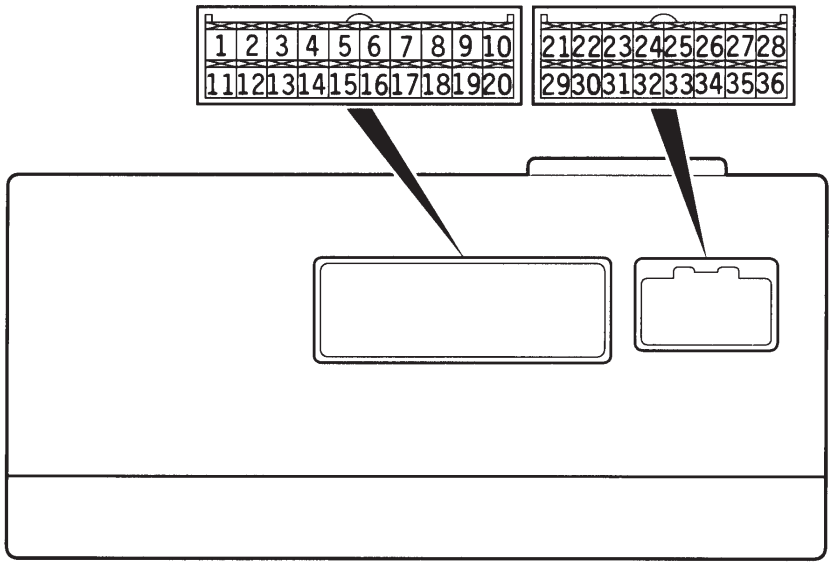
(5) Press the F1 switch to return to the service mode initial screen.

7. ERROR CODE TABLE

Error Code No.	Error Details	Detection Method (Reference)	Reference Page
1011	Ambient temperature sensor not connected during diagnosis	Connection checking	54-90
1021	Fuel gauge not connected during diagnosis	Connection checking	54-91
1031	GPS abnormality during diagnosis	Connection checking	54-91
1041	Engine-ECU not connected during diagnosis	Connection checking	54-91
1051	SWS not connected during diagnosis (This error does not occur when correct car type is set)	Connection checking	54-91
1091	CD drive too hot during diagnosis	Connection checking	54-91
1092 – 1096	CD drive abnormality during diagnosis	Connection checking	54-92
10A1, 10B1	Memory of navigation unit abnormality during diagnosis	Connection checking	54-92
20D1, 30D1	Vehicle speed pulse abnormality during diagnosis	Sensor checking	54-92
20E1, 20E2, 30E1, 30E2	Gyro level abnormality during diagnosis	Sensor checking	54-92

MAIN UNIT TERMINAL VOLTAGES

1. MULTI CENTER DISPLAY UNIT



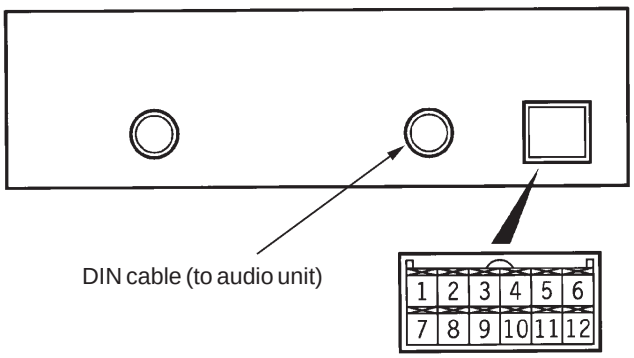
W0278AJ

Terminal No.	Input/ Output	Signal Symbol	Terminal Voltage (V)	Harness Problem		Trouble Symptom Resulting from Harness Problem
				Open Circuit	Short-circuit	
1	Input	G+SYTNC (AUDIO)	–	○	○	Noise display (random dot pattern)
2	Input	B+SYNC (AUDIO)	–	○	○	Blue, white, cyan and magenta do not appear in RGB screen.
3, 4	–	–	–	–	–	–
5	Input	ISOK	Hi: Battery voltage Lo: 0 – 1	○	○	MUT-II cannot be used to check engine-ECU.
6	–	–	–	–	–	–
7	Input/ Output	M–DATA (AUDIO)	Hi: 4 – 5 Lo: 0 – 1	○	○	Buzzer sounds 30 seconds after the power turned to on. Nighttime illumination does not appear for any navigation system.
8	Input/ Output	M–CLOCK (AUDIO)	Hi: 4 – 5 Lo: 0 – 1	○	○	Buzzer sounds 30 seconds after the power turned to on. Nighttime illumination does not appear for any navigation system.
9, 10	–	–	–	–	–	–
11	–	SHIELD–GND	–	–	–	–
12	–	–	–	–	–	–
13	Input	R+SYNC (AUDIO)	–	○	○	Red, white, yellow and magenta do not appear in RGB screen.

Terminal No.	Input/ Output	Signal Symbol	Terminal Voltage (V)	Harness Problem		Trouble Symptom Resulting from Harness Problem
				Open Circuit	Short-circuit	
14	–	–	–	–	–	–
15	Input/ Output	K	Hi: Battery voltage Lo: 0 – 1	○	○	Values on Trip information screen (average speed, fuel consumption and cruising distance) are abnormal. Wiring and communication error. Communication is not possible between the engine-ECU and the MUT-II.
16	–	–	–	–	–	–
17	Input/ Output	M–BUSY (AUDIO)	Hi: 4 – 5 Lo: 0 – 1	○	–	Screen display does not appear.
				–	○	Buzzer sounds 30 seconds after the power turned to on. Nighttime illumination does not appear for any navigation system.
18	–	SHIELD–GND	–	–	–	–
19 – 21	–	–	–	–	–	–
22	Input	PS–R	Hi: Battery voltage Lo: 0 – 1	○	○	Current location is not correct when reversing.
23	Input	EX–TEMP	0 – 5	○	○	Outside air temperature does not appear.
24	Input	ILL+	Hi: Battery voltage Lo: 0 – 1	○	–	Nighttime illumination does not appear for any navigation system units.
				–	○	Blown multipurpose fuse.
25	Input	ACC (ACC power supply)	Battery voltage	○	–	Screen display does not appear.
				–	○	Blown multipurpose fuse.
26	Input	+B	Battery voltage	○	–	Screen display does not appear.
				–	○	Blown multipurpose fuse.
27	Input	VSS	Hi: 4 – 5 Lo: 0 – 1	○	–	No effect.
28	–	GND (Ground)	–	○	–	Screen display does not appear.
29, 30	–	–	–	–	–	–
31	–	GND–TEMP	–	○	○	Outside air temperature does not appear.
32	–	–	–	–	–	–
33	Input	FUEL GAUGE	0 – 3	○	○	Abnormal cruising distance display.
34, 35	–	–	–	–	–	–

Terminal No.	Input/ Output	Signal Symbol	Terminal Voltage (V)	Harness Problem		Trouble Symptom Resulting from Harness Problem
				Open Circuit	Short-circuit	
36	Input	IG1	Battery voltage	○	–	Communication with engine-ECU is not possible. Driving data values displayed are abnormal.
				–	○	Communication with engine-ECU is not possible. Driving data values displayed are abnormal. Blown multipurpose fuse.

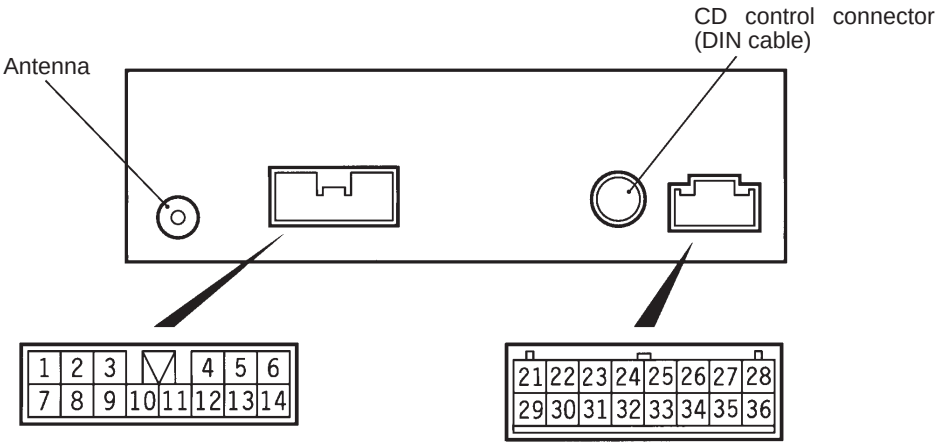
2. NAVIGATION UNIT



AV0845AE

Terminal No.	Input/ Output	Signal Symbol	Terminal Voltage (V)	Harness Problem		Trouble Symptom Resulting from Harness Problem
				Open Circuit	Short-circuit	
1 – 3	–	–	–	–	–	–
4	Input	VEHICLE SPEED PULSE	Voltage should change when wheels are turning. Hi: 4 – 5 Lo: 0 – 1	○	○	Compass display does not change when not following a route. Guide does not appear when following a route.
5	Input	+BATTERY	Battery voltage	○	–	Navigation does not operate.
				–	○	Blown fuse in +B system.
6	Input	ACCESSORY	Battery voltage	○	–	Navigation does not operate.
				–	○	Blown fuse in ACC system.
7 – 11	–	–	–	–	–	–
12	–	GND	–	○	–	Navigation sometimes does not operate.

3. AUDIO UNIT



BV0846AE

Terminal No.	Input/ Output	Signal Symbol	Terminal Voltage (V)	Harness Problem		Trouble Symptom Resulting from Harness Problem
				Open Circuit	Short-circuit	
1	Output	SPEAKER RR (+)	0 – Battery voltage (AC)	○	–	No sound is output from rear right speaker.
				–	○	No sound is output from rear left and right speakers.
2	Output	SPEAKER RL (+)	0 – Battery voltage (AC)	○	–	No sound is output from rear left speaker.
				–	○	No sound is output from rear left and right speakers.
3	Output	ANTENNA +B (Radio antenna amplifier power supply)	Hi: 10 or more Lo: 0 – 1	○	○	Low radio sensitivity.
4	–	–	–	–	–	–
5	Output	SPEAKER FL (+)	0 – Battery voltage (AC)	○	–	No sound is output from front left speaker.
				–	○	No sound is output from front left and right speakers.
6	Output	SPEAKER FR (+)	0 – Battery voltage (AC)	○	–	No sound is output from front right speaker.
				–	○	No sound is output from front left and right speakers.
7	Output	SPEAKER RR (–)	0 – Battery voltage (AC)	○	–	No sound is output from rear right speaker.
				–	○	No sound is output from rear left and right speakers.

Terminal No.	Input/ Output	Signal Symbol	Terminal Voltage (V)	Harness Problem		Trouble Symptom Resulting from Harness Problem
				Open Circuit	Short-circuit	
8	Output	SPEAKER RL (–)	0 – Battery voltage (AC)	○	–	No sound is output from rear left speaker.
				–	○	No sound is output from rear left and right speakers.
9	–	–	–	–	–	–
10	Input	ACC (ACC power supply) (Battery voltage)	Battery voltage	○	–	Audio power supply does not turn on.
				–	○	Blown multipurpose fuse.
11	Input	+B (Battery voltage)	Battery voltage	○	–	Cassette is not ejected when ACC power turned off. Contents of memory are cleared.
				–	○	Blown multipurpose fuse.
12	Input	ILL (–)	–	–	–	–
13	Output	SPEAKER FL (–)	0 – Battery voltage (AC)	○	–	No sound is output from front left speaker.
				–	○	No sound is output from front left and right speakers.
14	Output	SPEAKER FR (–)	0 – Battery voltage (AC)	○	–	No sound is output from front right speaker.
				–	○	No sound is output from front left and right speakers.
21	Input/ Output	M–DATA	Hi: 4 or more Lo: 1 or less	○	○	Panel switches cannot be operated.
22	Input/ Output	M–SCK	Hi: 4 or more Lo: 1 or less	○	○	Panel switches cannot be operated.
23	Input	TELEPHONE MUTE	Hi: 4 or more Lo: 1 or less	–	–	–
24	Output	G+SYNC	0 – 5	○	○	Abnormal navigation screen color.
25	Output	B+SYNC	0 – 5	○	○	Abnormal navigation screen color.
26 – 28	–	–	–	–	–	–
29	Input/ Output	M–BUSY	Hi: 4 or more Lo: 1 or less	○	○	Panel switches cannot be operated.
30	–	SHIELD EARTH (M–BUS)	–	–	–	–

Terminal No.	Input/ Output	Signal Symbol	Terminal Voltage (V)	Harness Problem		Trouble Symptom Resulting from Harness Problem
				Open Circuit	Short-circuit	
31	–	–	–	–	–	–
32	–	SHIELD EARTH	–	–	–	–
33	–	–	–	–	–	–
34	Output	R+SYNC	0 – 5	○	○	Abnormal navigation screen color.
35, 36	–	–	–	–	–	–

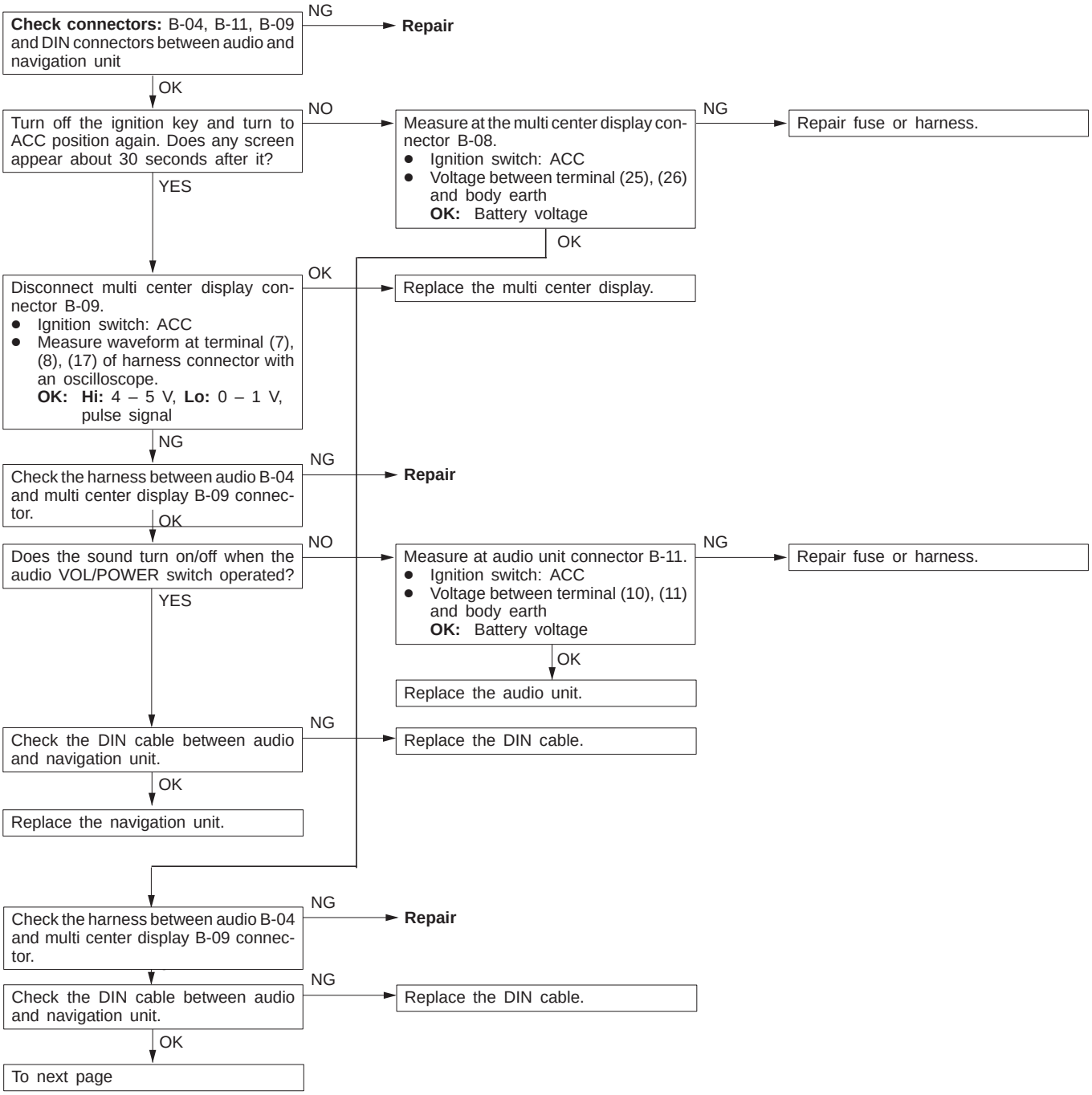
INSPECTION CHART CLASSIFIED BY TROUBLE SYMPTOMS

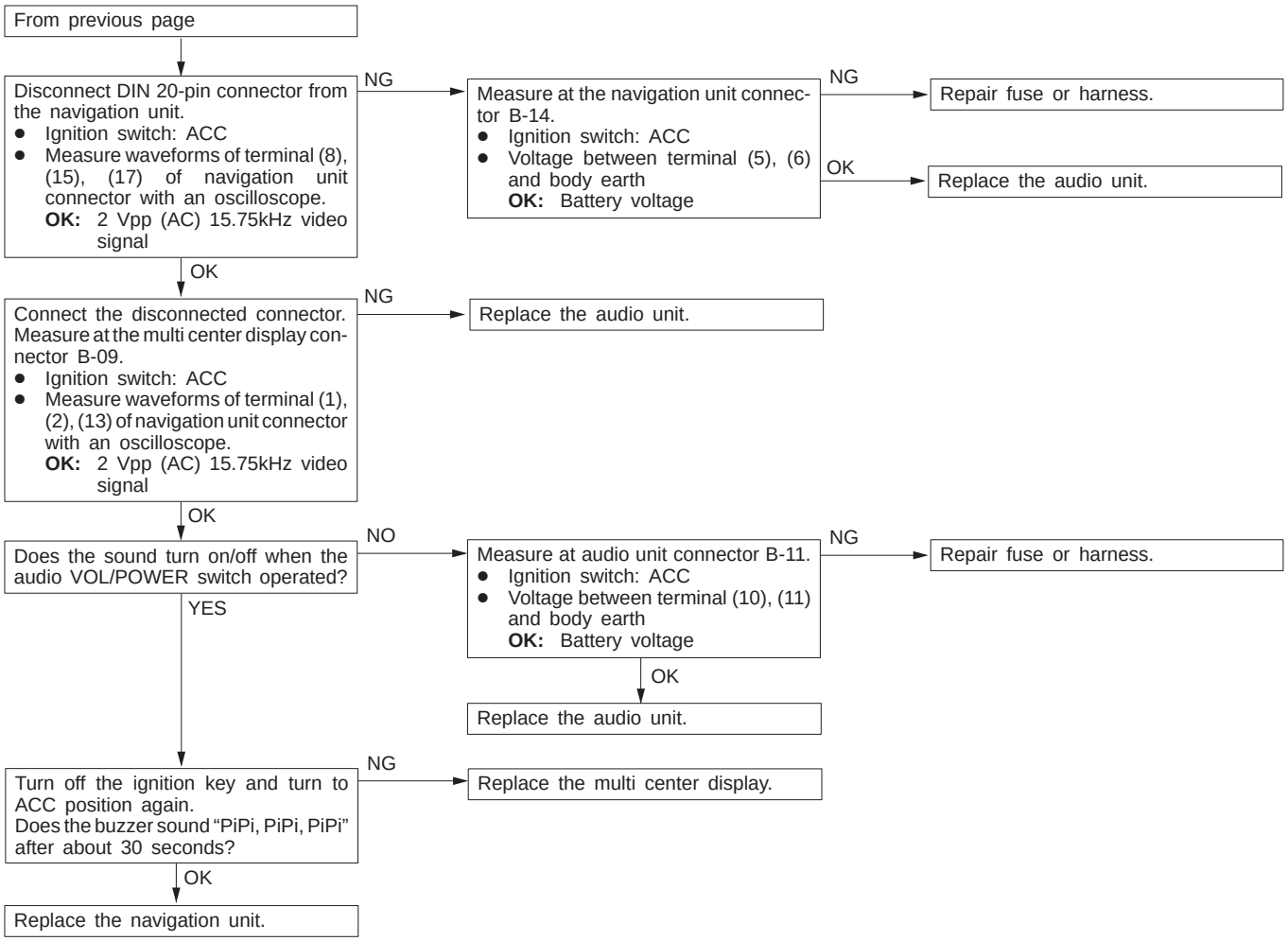
Related Unit	Trouble Symptom	Inspection Procedure No.	Reference Page
Malfunction of navigation unit, multi center display, audio unit and related sensor, harness	TAPE/CD, UML switches do not work. No display appears after the ignition key is turned to ACC.	1	54-82
	TAPE/CD, UML switches do not work. (Display appears.)	2	54-84
	No display appears after the ignition key is turned to ACC, but TAPE/CD, UML switches can be operative.	3	54-85
	CD changer screen display does not appear when TAPE/CD switch is operated.	4	54-86
	GPS reception is not possible.	5	54-86
	Outside air temperature data is not displayed.	6	54-86
	Abnormal driving data display ● Abnormal average fuel consumption (momentary fuel consumption) and average speed displays. ● Abnormal cruising distance displays	7	54-87
	Daytime/nighttime display mode does not change in conjunction with lighting switch operations.	8	54-88
	Display moves about. Screen colours do not match correctly.	9	54-88
	Compass display does not rotate , or guidance does not appear when following a route.	10	54-89
	One of the following messages appears during navigation mode. ● The CD drive has failure condition. Check and reload the disc, please. ● Wrong disc is in the CD drive. Insert a map disc, please. ● No disc is in the CD drive. Insert a map disc please. ● A music disc is in the CD-drive.	11	54-89

INSPECTION PROCEDURES FOR EACH TROUBLE SYMPTOM

INSPECTION PROCEDURE 1

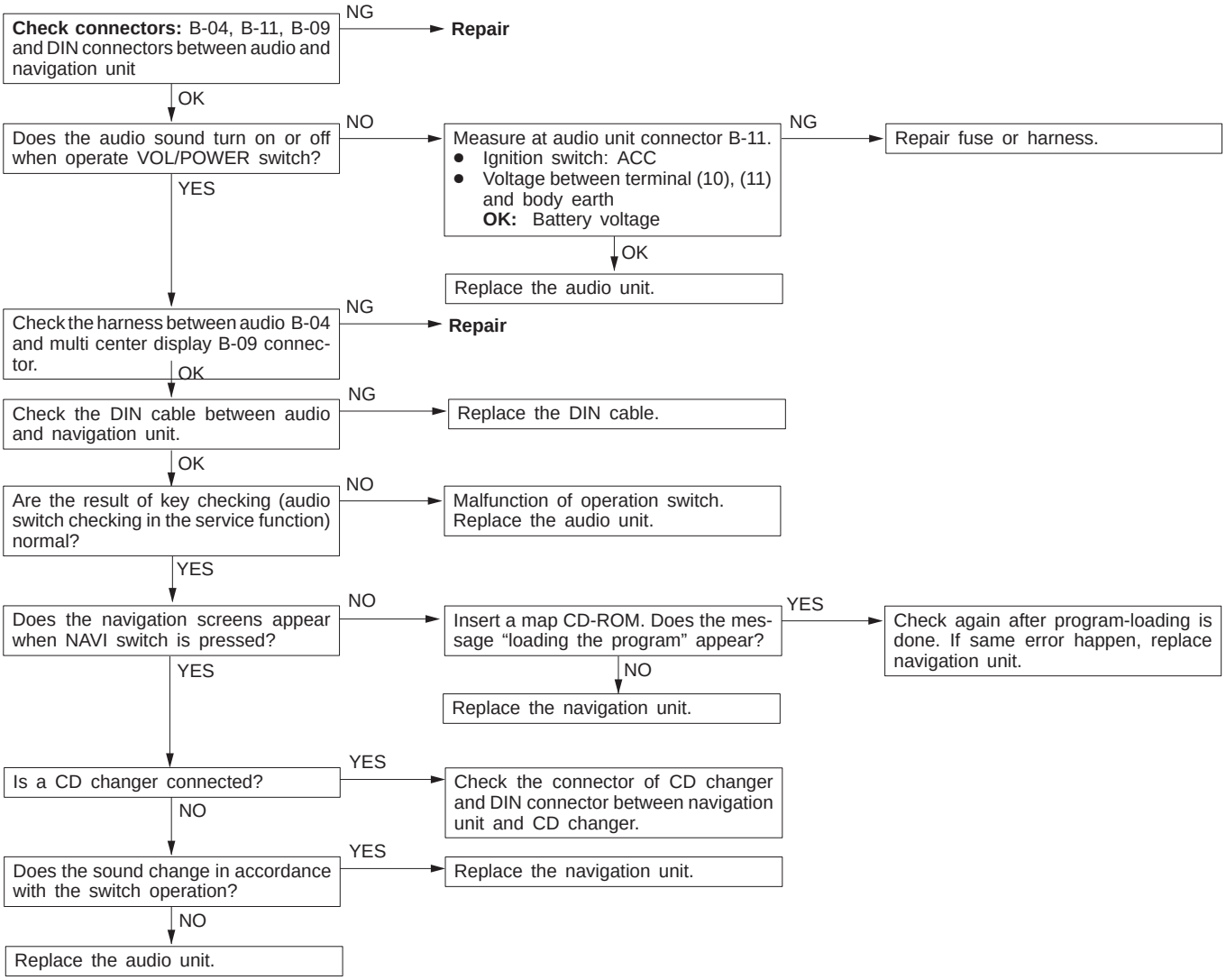
TAPE/CD, UML switches do not work. No display appears after the ignition key is turned to ACC.




From previous page
Disconnect DIN 20-pin connector from the navigation unit.
● Ignition switch: ACC
● Measure waveforms of terminal (8), (15), (17) of navigation unit connector with an oscilloscope.
OK: 2 Vpp (AC) 15.75kHz video signal
NG
Measure at the navigation unit connector B-14.
● Ignition switch: ACC
● Voltage between terminal (5), (6) and body earth
OK: Battery voltage
NG
Repair fuse or harness.
OK
Replace the audio unit.
OK
Connect the disconnected connector. Measure at the multi center display connector B-09.
● Ignition switch: ACC
● Measure waveforms of terminal (1), (2), (13) of navigation unit connector with an oscilloscope.
OK: 2 Vpp (AC) 15.75kHz video signal
NG
Replace the audio unit.
OK
Does the sound turn on/off when the audio VOL/POWER switch operated?
NO
Measure at audio unit connector B-11.
● Ignition switch: ACC
● Voltage between terminal (10), (11) and body earth
OK: Battery voltage
NG
Repair fuse or harness.
OK
Replace the audio unit.
YES
Turn off the ignition key and turn to ACC position again.
Does the buzzer sound “PiPi, PiPi, PiPi” after about 30 seconds?
NG
Replace the multi center display.
OK
Replace the navigation unit.

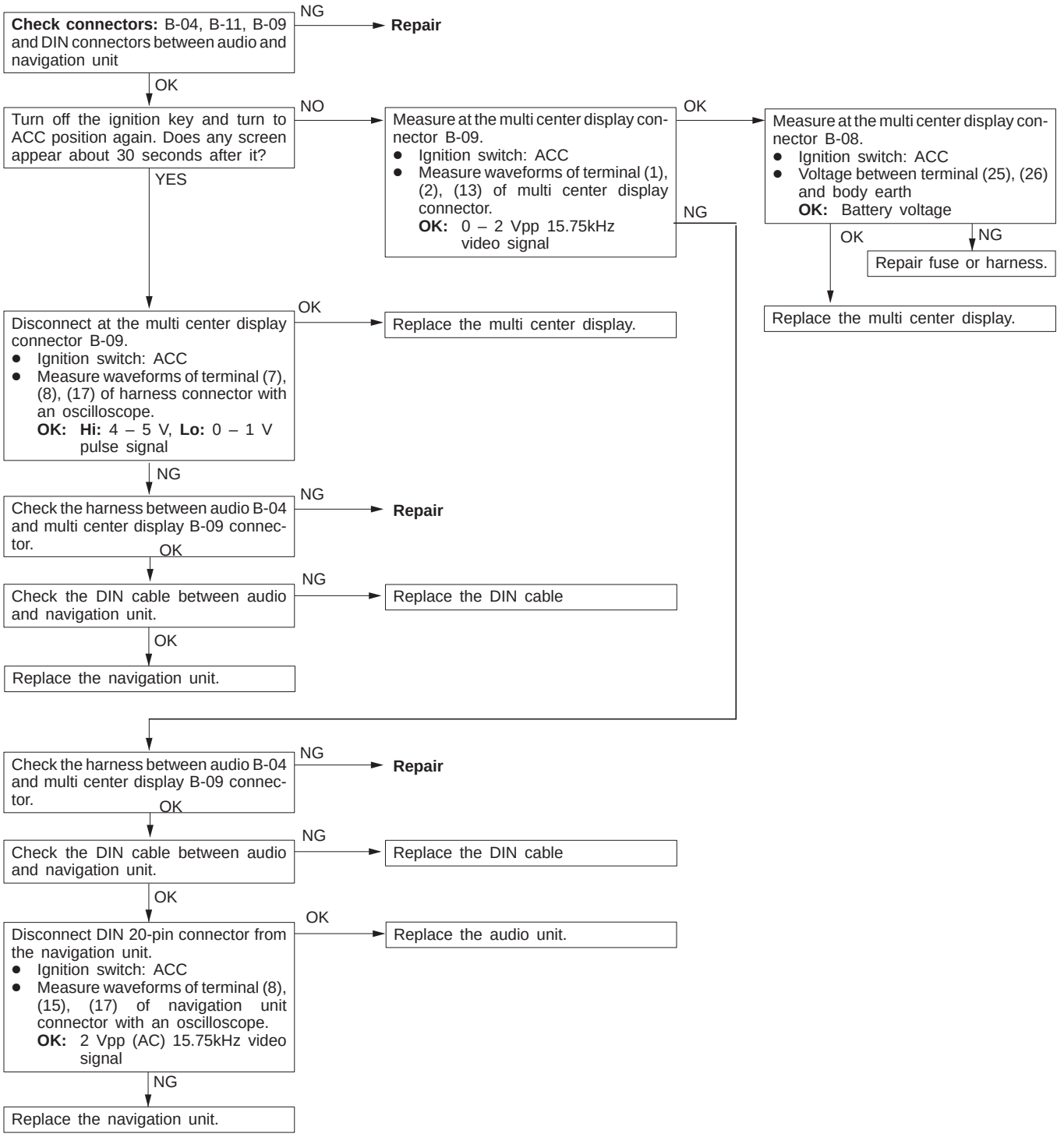
INSPECTION PROCEDURE 2

TAPE/CD, UML switches do not work. (Display appears.)



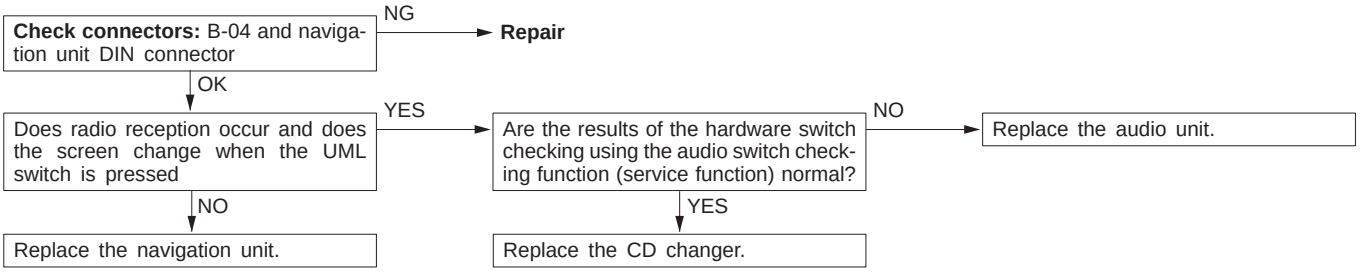
INSPECTION PROCEDURE 3

No display appears after the ignition key is turned to ACC, but TAPE/CD, UML switches can be operative.



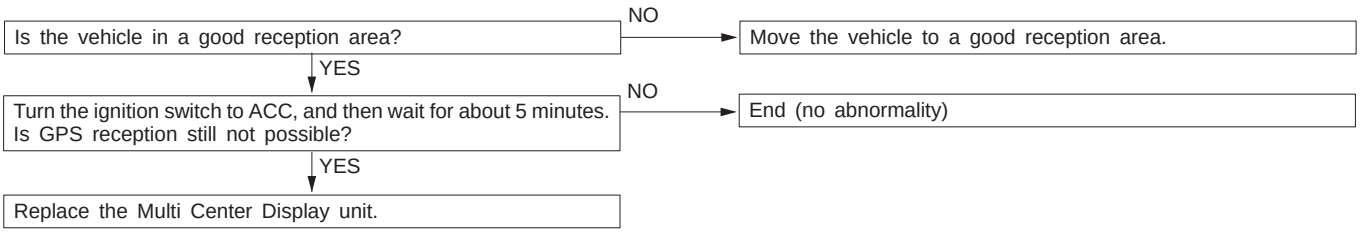
INSPECTION PROCEDURE 4

CD changer screen displays do not appear when TAPE/CD switches are operated.



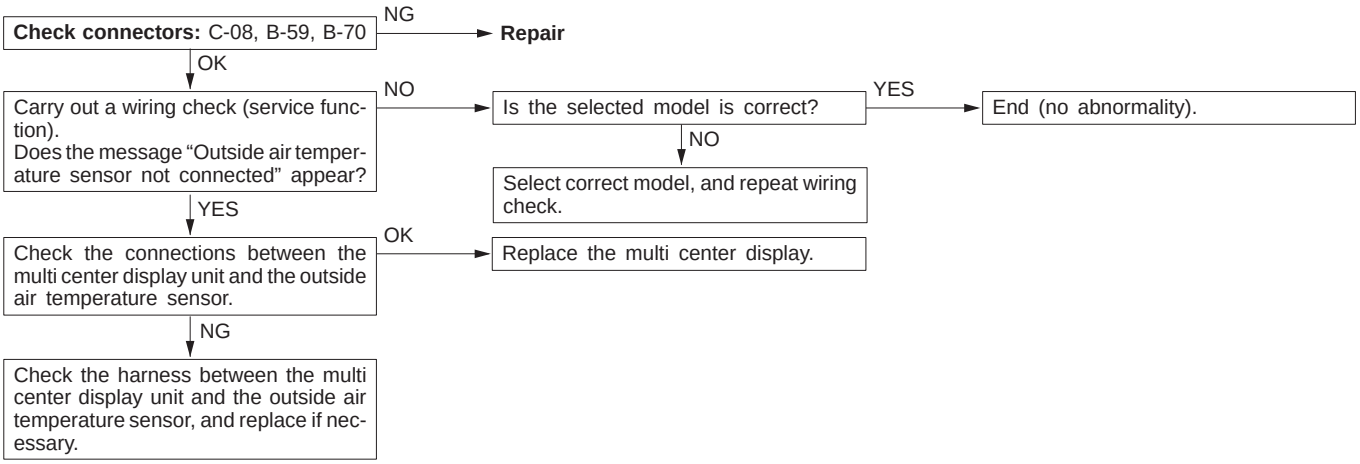
INSPECTION PROCEDURE 5

GPS reception is not possible.



INSPECTION PROCEDURE 6

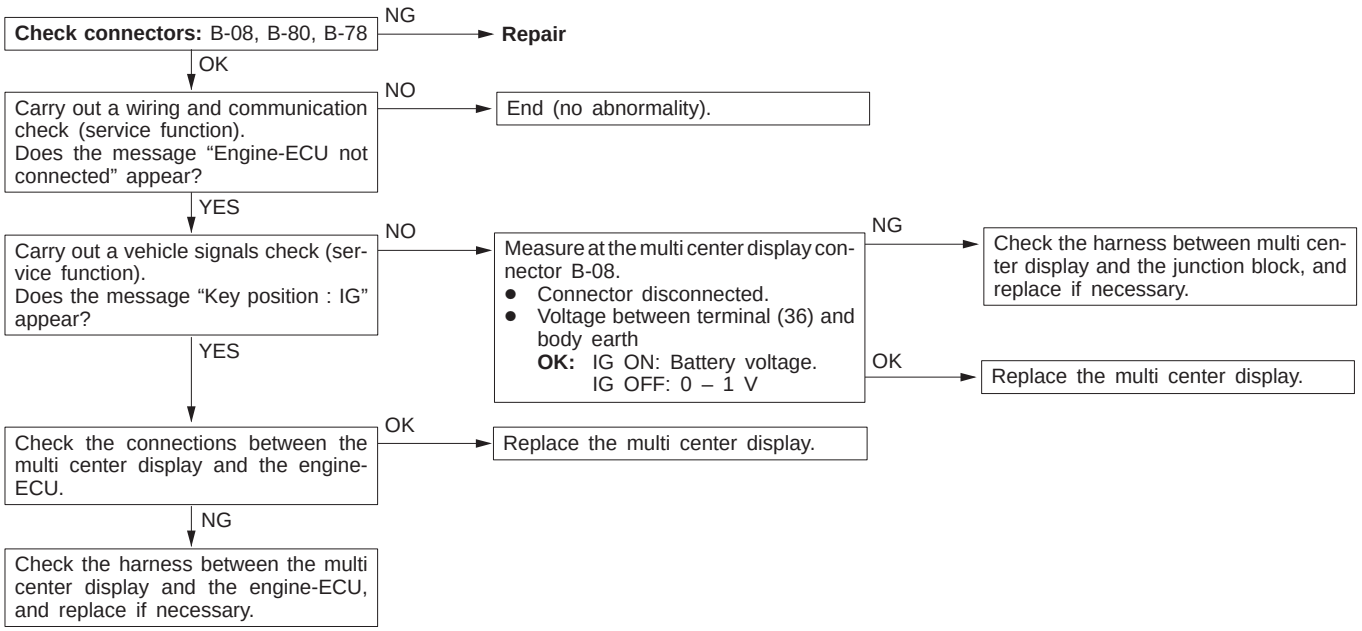
Outside air temperature data is not displayed.



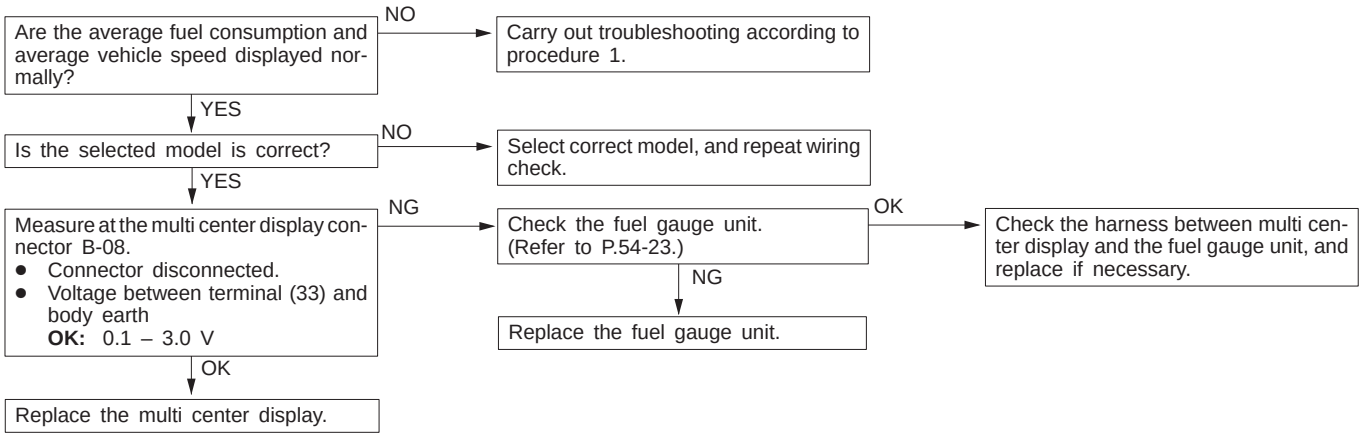
INSPECTION PROCEDURE 7

Abnormal driving data displays.
- Abnormal average fuel consumption (momentary fuel consumption) and average speed displays.
- Abnormal cruising distance displays.

1. When average fuel consumption (momentary fuel consumption) and average speed displays are abnormal.

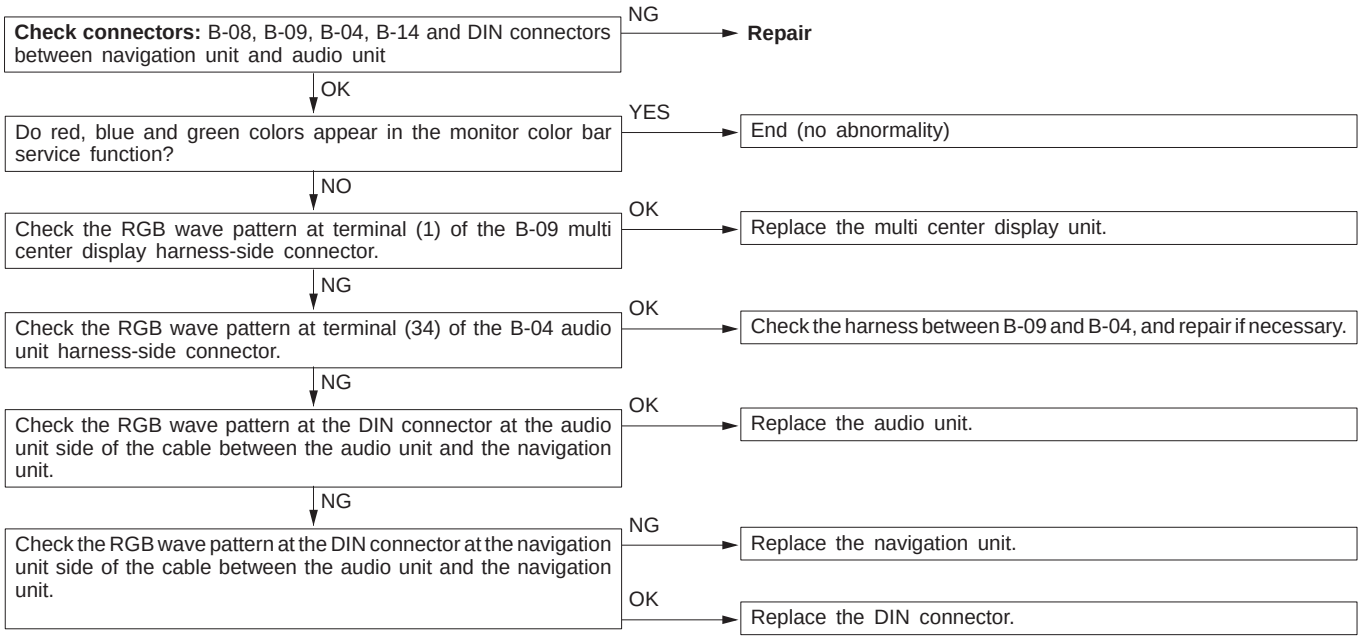


2. When cruising distance display is abnormal.



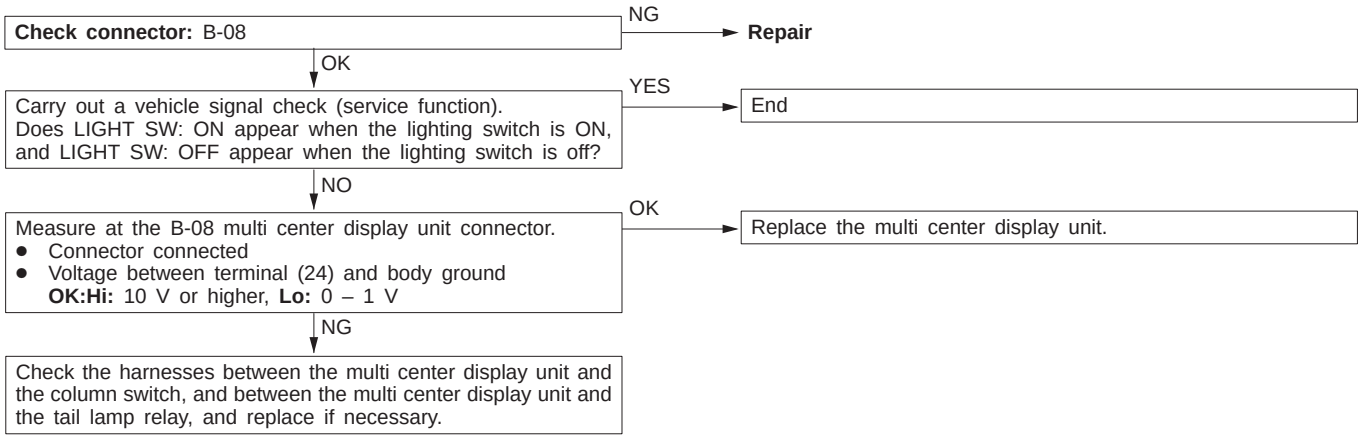
INSPECTION PROCEDURE 8

Display moves about.
Screen colors do not match correctly.



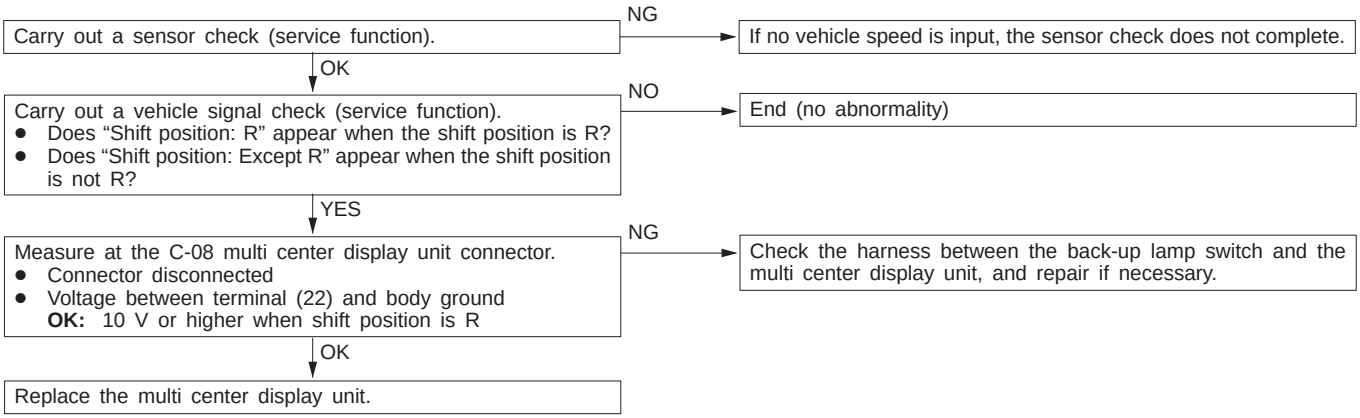
INSPECTION PROCEDURE 9

Daytime/nighttime display mode does not change in conjunction with lighting switch operations.



INSPECTION PROCEDURE 10

Compass display does not change when not following a route, or guide does not appear when searching for and following a route.

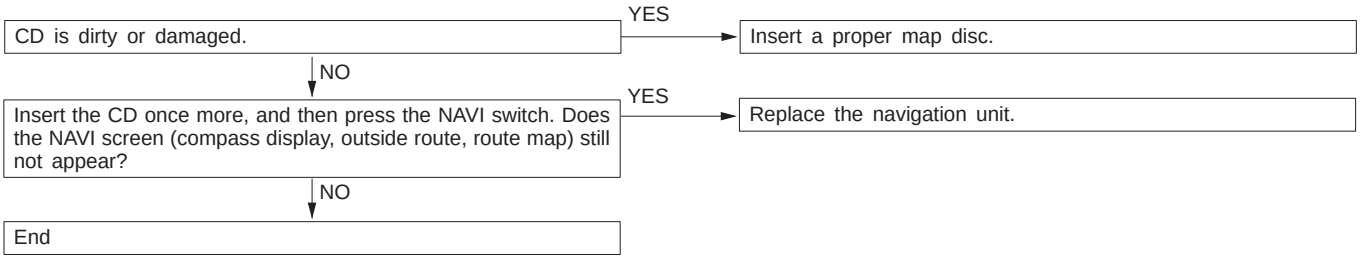


INSPECTION PROCEDURE 11

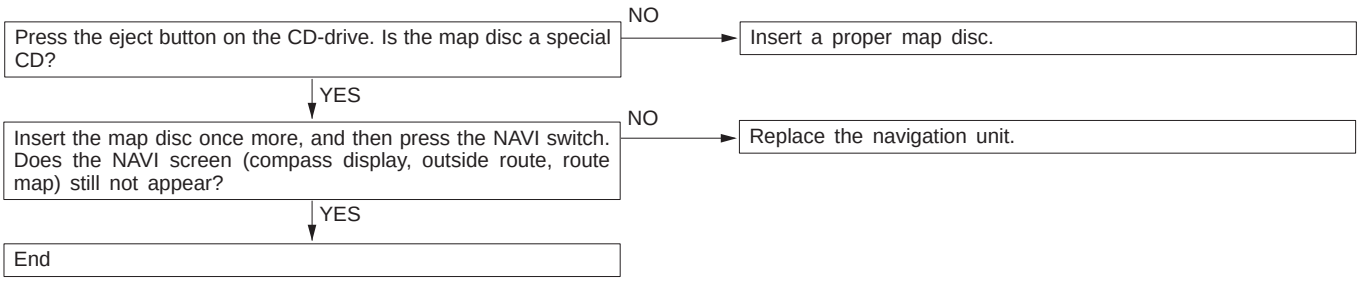
One of the following messages appears during navigation mode.

- The CD-drive has failure condition. Confirm and reload the disc, please.
- Wrong disc is in the CD-drive. Insert a map disc, please.
- No disc is in the CD-drive. Insert a map disc, please.
- A music disc is in the CD-drive.

1. **“The CD-drive has failure condition. Confirm and reload the disc, please.” or “Wrong disc is in the CD-drive. Insert a map disc, please.” appears.**



2. **“No disc is in the CD-drive. Insert a map disc, please.” or “A music disc is in the CD-drive” appears.**

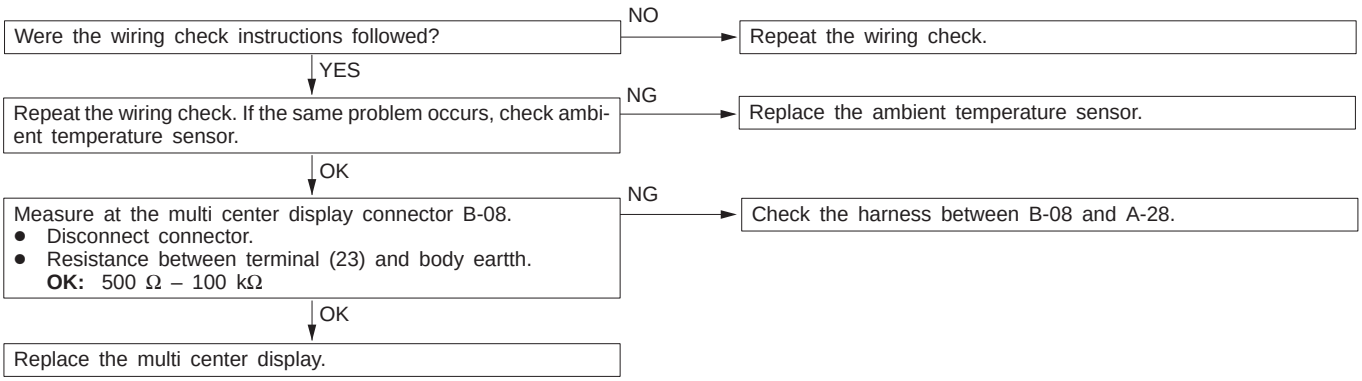


ERROR CODE TABLE <ACCORDING TO SCREEN DISPLAY>

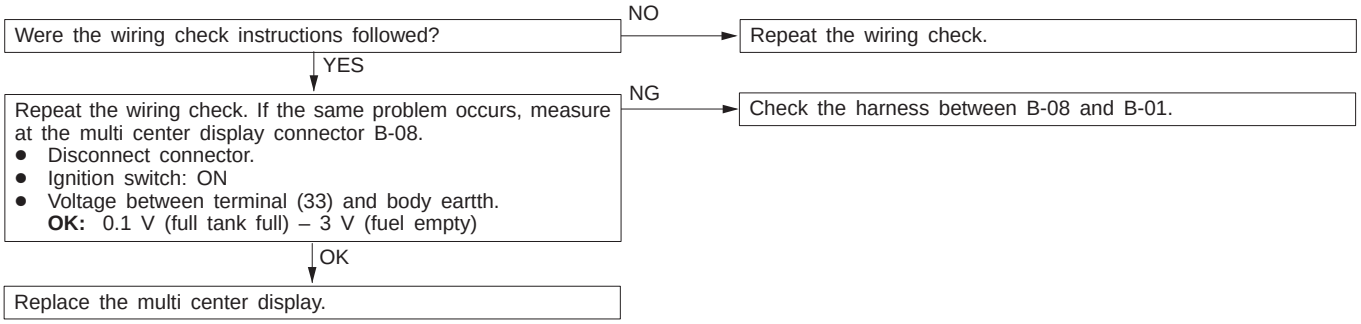
Error Code No.	Error Details	Detection Method (Reference)	Reference Page
1011	Ambient temperature sensor not connected during diagnosis	Connection checking	54-90
1021	Fuel gauge not connected during diagnosis	Connection checking	54-91
1031	GPS abnormality during diagnosis	Connection checking	54-91
1041	Engine-ECU not connected during diagnosis	Connection checking	54-91
1051	SWS not connected during diagnosis (This error does not occur when correct car type is set)	Connection checking	54-91
1091	CD drive too hot during diagnosis	Connection checking	54-91
1092 – 1096	CD drive abnormality during diagnosis	Connection checking	54-92
10A1, 10B1	Memory of navigation unit abnormality during diagnosis	Connection checking	54-92
20D1, 30D1	Vehicle speed pulse abnormality during diagnosis	Sensor checking	54-92
20E1, 20E2, 30E1, 30E2	Gyro level abnormality during diagnosis	Sensor checking	54-92

INSPECTION PROCEDURES FOR EACH ERROR CODE <ACCORDING TO SCREEN DISPLAY>

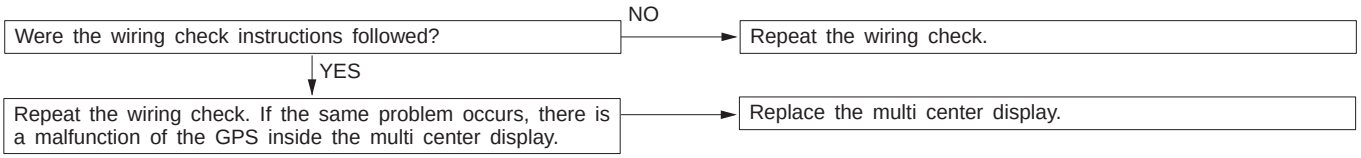
Error Code No. 1011



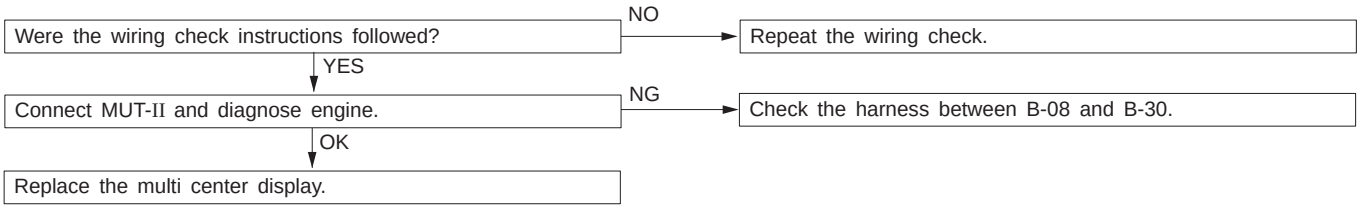
Error Code No. 1021



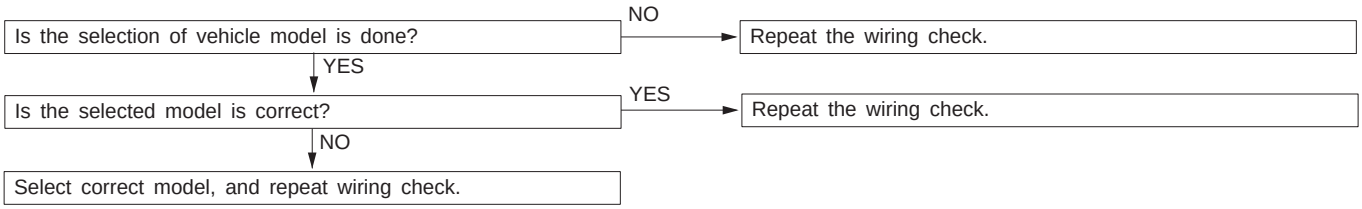
Error Code No. 1031



Error Code No. 1041



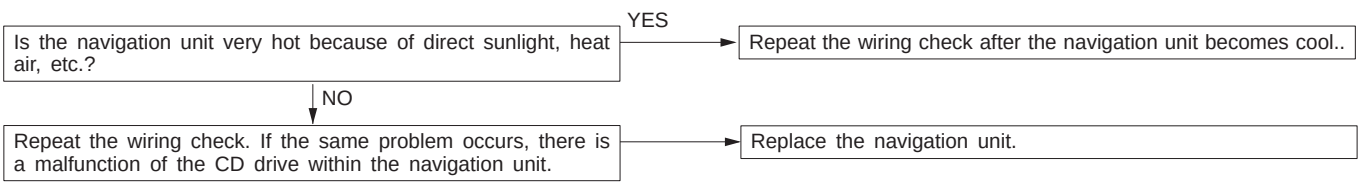
Error Code No. 1051



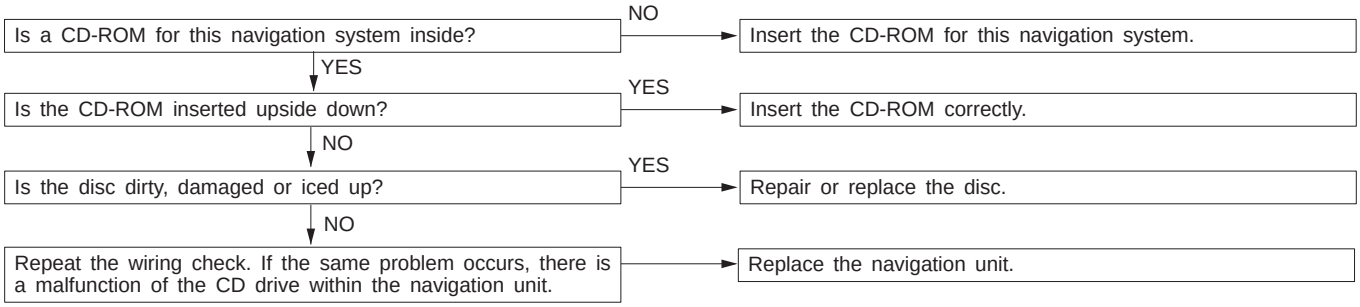
How to confirm model selection is correctly done.

(1) Press “DISP” switch to get trip information display.
(2) If “Please set your car type” message appears, the vehicle model is not set. Select the correct vehicle model from the list.
(3) If trip information display appears normally, the vehicle model is set already. Press RESET (F1) switch and keep until the vehicle setting display appears. Current setting of vehicle model will appear on the display.

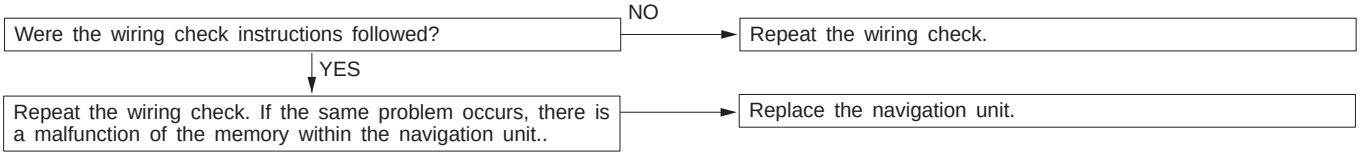
Error Code No. 1091



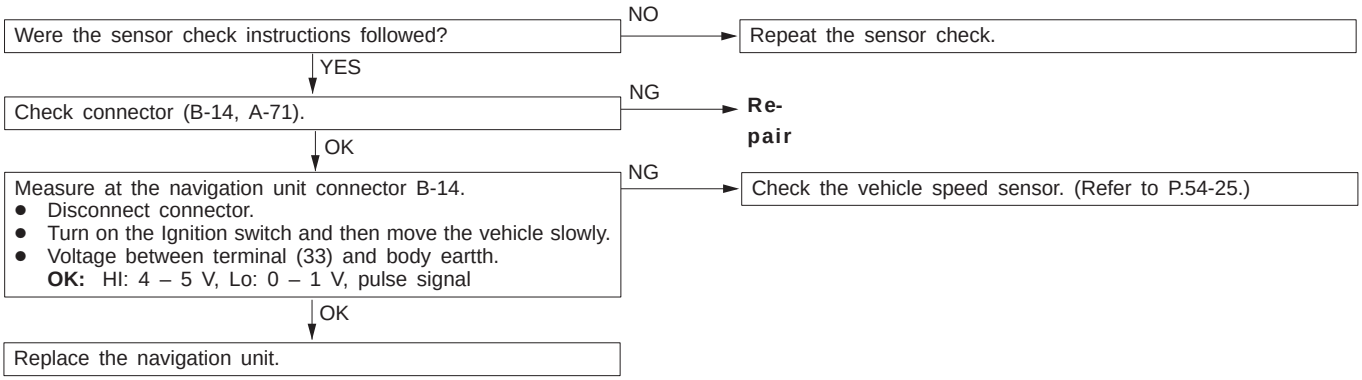
Error Code No. 1092, 1093, 1094, 1095, 1096



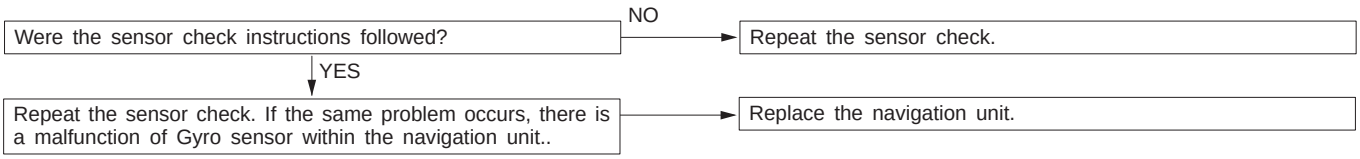
Error Code No. 10A1, 10B1



Error Code No. 20D1, 30D1



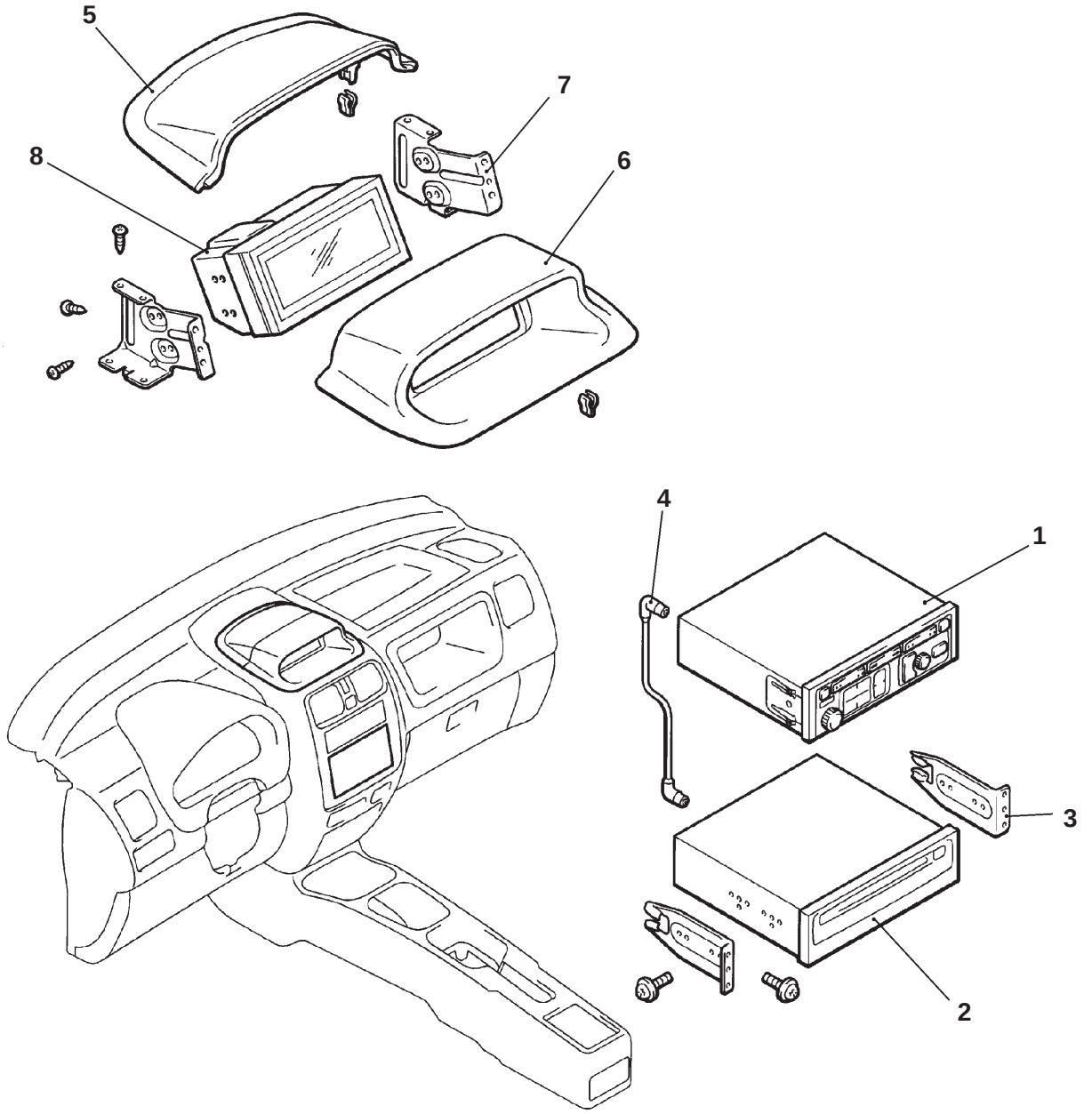
Error Code No. 20E1, 20E2, 30E1, 30E2



MULTI CENTER DISPLAY

54400140188

REMOVAL AND INSTALLATION



AW0272AJ

Navigation unit removal steps

- Centre panel assembly (Refer to GROUP 52A – Instrument Panel.)

1. Radio and tape player
2. Navigation unit
3. Radio bracket
4. DIN cable

Multi center display removal steps

5. Multi center display cover
6. Multi center display hood
7. Multi center display bracket
8. Multi center display

NOTES

GROUP 54
CHASSIS ELECTRICAL

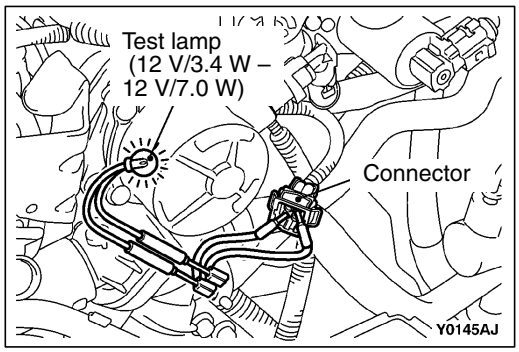
COMBINATION METER <F9Q1>

OUTLINE OF CHANGE

- Inspection procedures for the tachometer have been added in vehicles with F9Q1 engine.
- The change in the mounting position for the engine coolant temperature gauge to correspond to the adoption of the F9Q1 engine has been communicated. Other troubleshooting procedures are the same as for vehicles with petrol engine.

SERVICE SPECIFICATIONS

Item		Standard value
Tachometer display error r/min	When engine speed is 700 r/min	± 120
	When engine speed is 2,000 r/min	– 175 + 225
	When engine speed is 3,000 r/min	– 175 + 300
	When engine speed is 4,000 r/min	– 225 + 375
	When engine speed is 5,000 r/min	– 225 + 425
	When engine speed is 6,000 r/min	– 225 + 475



TROUBLESHOOTING

Troubleshooting procedures other than the engine coolant temperature gauge unit mounting position are the same as for vehicles with petrol engine. Refer to the '99 SPACE START Workshop Manual (BASIC) (Pub. No. CMXE99E1).

ON-VEHICLE SERVICE

TACHOMETER CHECK

1. Insert a paper clip (Gem clip) into the harness-side engine speed sensor terminal and connect it to an engine tachometer.
2. Compare the engine speedometer reading at various engine speeds with the tachometer reading, and check that the error is within the standard range.

Standard value:

Engine speed r/min	Tachometer display error r/min
700	± 120
2,000	– 175 + 225
3,000	– 175 + 300
4,000	– 225 + 375
5,000	– 225 + 425
6,000	– 225 + 475

SERVICE BULLETIN

MITSUBISHI MOTORS

QUALITY INFORMATION ANALYSIS
OVERSEAS SERVICE DEPT. MITSUBISHI MOTORS CORPORATION

SERVICE BULLETIN	**No.:** MSB-00E54-504		
	Date: 2000-12-30	**<Model>**	**<M/Y>**
Subject: RECTIFICATION TO DESCRIPTION OF MULTI CENTRE DISPLAY		(EC)SPACE STAR (DG0A)	99-10
Group: CHASSIS ELECTRICAL	**Draft No.:** 00AL011514	(EC)SPACE RUNNER(N60)	99-10
CORRECTION	**INTERNATIONAL CAR ADMINISTRATION OFFICE**	(EC)SPACE WAGON(N80, N90)	99-10
	Tomoaki Nitta T.NITTA - PROJECT LEADER AFTER SALES SERVICE & CS PROMOTION		

1. Description:

The descriptions of the multi centre display have been rectified as detailed below.

2. Applicable Manuals:

Manual	Pub. No.	Language	Page(s)
'99 SPACE STAR Technical Information Manual	IMXE99E1		7-12 to 15
'99 SPACE RUNNER/SPACE WAGON Technical Information Manual	PYDE9802		7-14 to 17
'99 SPACE STAR Workshop Manual Chassis	CMXE99E1	(English)	54-65, 92
	CMXS99E1	(Spanish)	
	CMXF99E1	(French)	
	CMXG99E1	(German)	
	CMXD99E1	(Dutch)	
	CMXW99E1	(Swedish)	
	CMXI99E1	(Italian)	
'99 SPACE RUNNER/SPACE WAGON Workshop Manual Chassis	PWDE9803	(English)	54-80, 106
	PWDS9804	(Spanish)	
	PWDF9805	(French)	
	PWDG9806	(German)	
	PWDD9807	(Dutch)	
	PWDW9808	(Swedish)	

3. Details:

~~MULTI DISPLAY~~ <Incorrect> **MULTI CENTRE DISPLAY** <Correct>

A multi-coloured LCD <vehicles with navigation system> or black and white LCD <vehicles without navigation system> (display area: 124.8 x 42.3 mm) has been installed at the upper centre of the instrument panel on all vehicles as a multi centre display. This multi centre display can show navigation (optional), running data, audio, ambient air temperature, clock time, etc.

Item	Content
Navigation (Optional)	• Destination setting from names of streets and facilities • Guidance for right and left turns at intersections (audio guidance and arrow display on panel) • Display of distance remaining to destination and of direction to destination. • Switchover between priority on expressways or general roads. • Automatic repeat search when vehicle gets lost from route. • Switchover of audio and display language (English, German, Dutch, French, Italian, Spanish and Swedish) • Up to 100 locations can be registered. • Music CDs can be played. • Version upgrade by map CD-ROM exchange
Running information	• Display of average vehicle speed • Selective display of average fuel consumption and instantaneous fuel consumption. • Display of distance that can be traveled.
Audio	• Display of audio operational status • RDS (traffic information) can also be displayed
~~Ambient~~ temperature display	• Regular ~~ambient~~ temperature
Clock time display	• Regular clock time display

<Correct> **Re-route** <Incorrect>

<Correct> **<Vehicles with navigation system>**

<Incorrect> <Incorrect> **Location** <Correct>

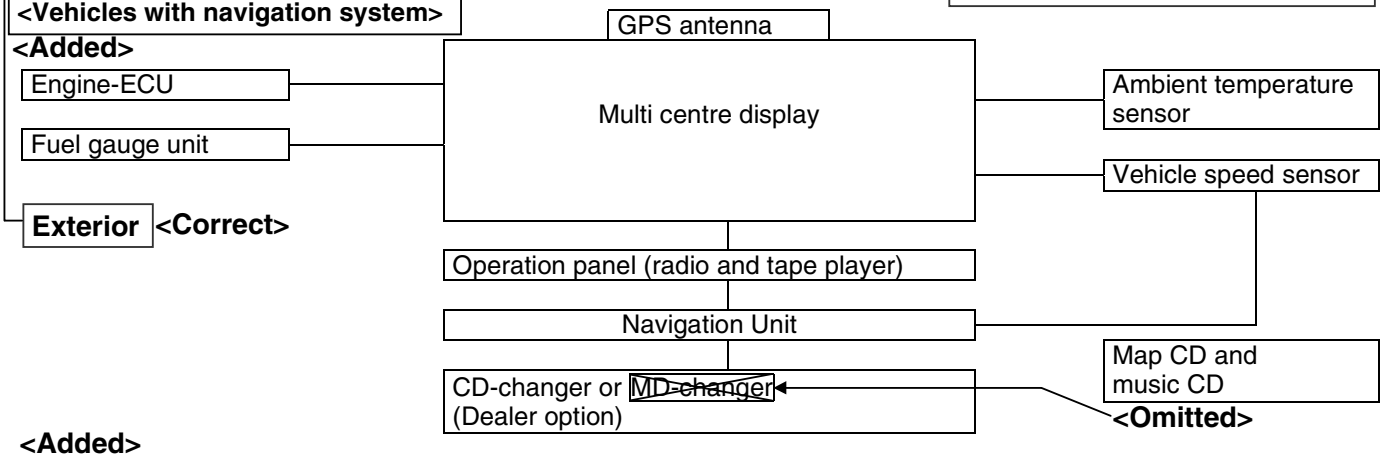
<Incorrect> <Incorrect> <Correct> **Exterior**

<Correct>
- Selectable motorway priority

SYSTEM DIAGRAM

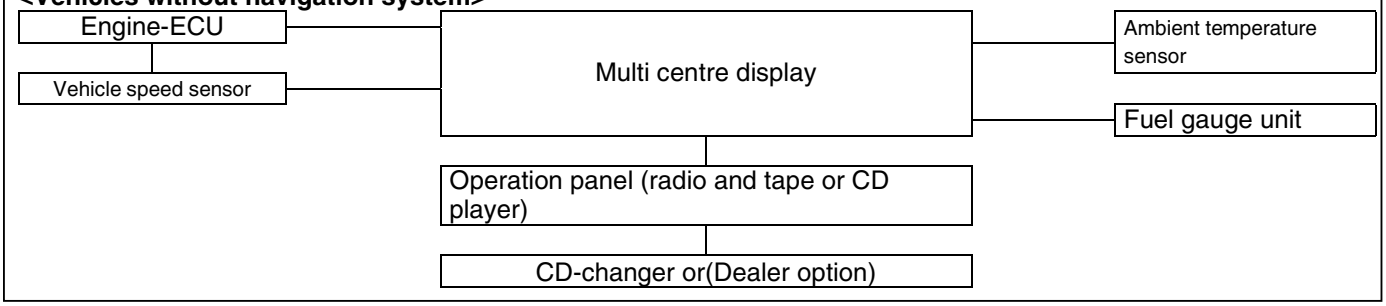
<Vehicles with navigation system>

<Added>



<Added>

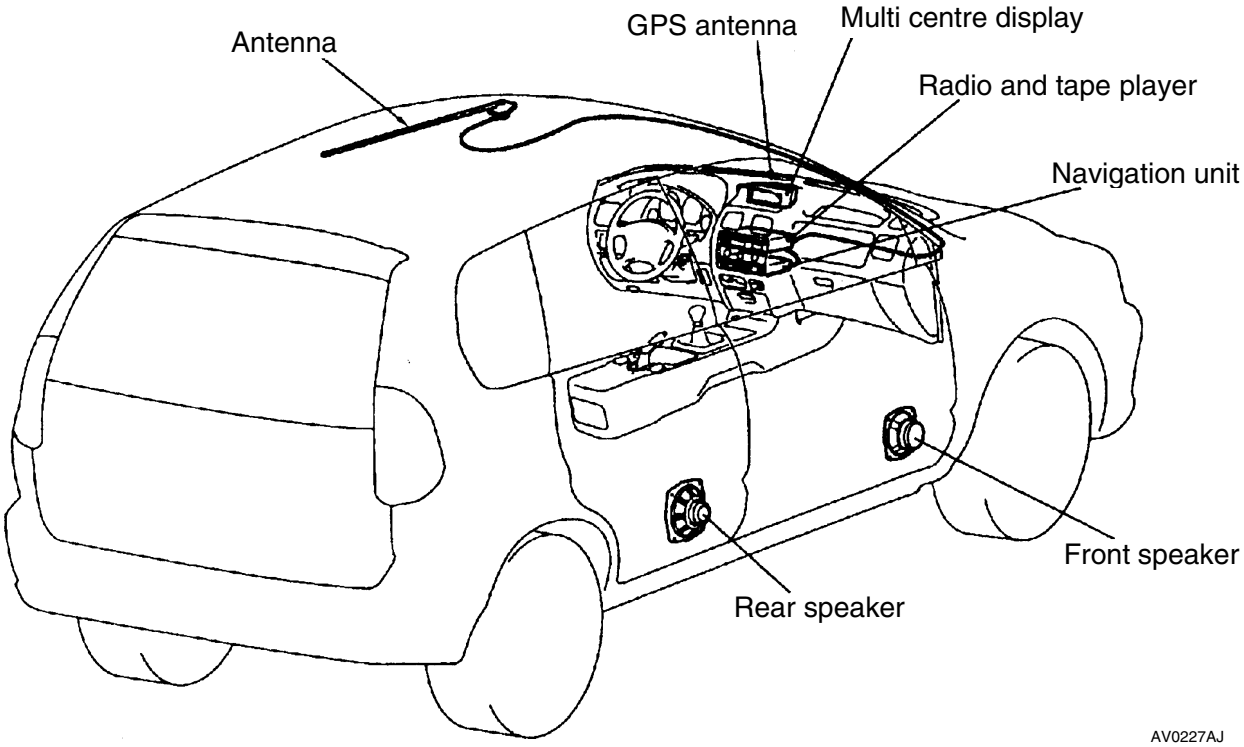
<Vehicles without navigation system>



Running information <Vehicles without navigation system>	• Selective display of instant fuel consumption, average fuel consumption, driving range and average speed <Vehicles with genuine radio and tape or CD player> • Display of instantaneous fuel consumption <Vehicles without genuine radio and tape or CD-player>

<Added>

CONSTRUCTION DIAGRAM



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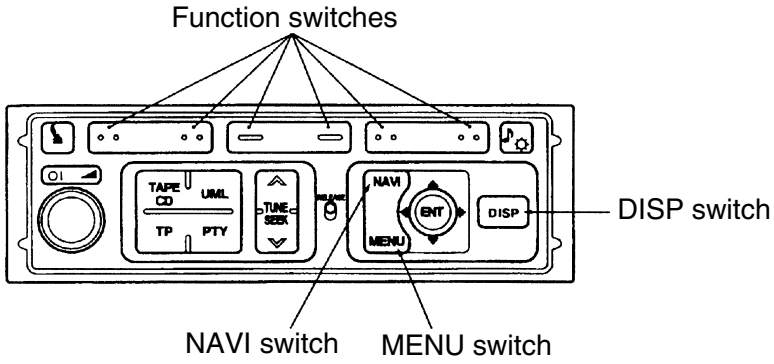
<Vehicles with navigation system>



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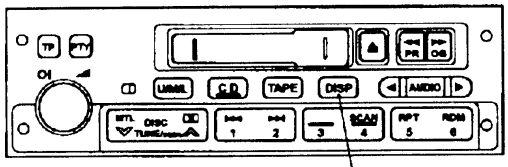
<Vehicles without navigation system

Radio and tape player



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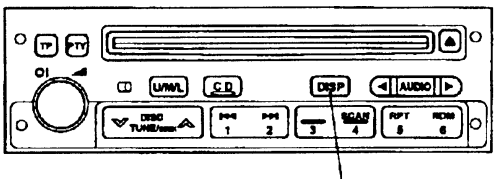
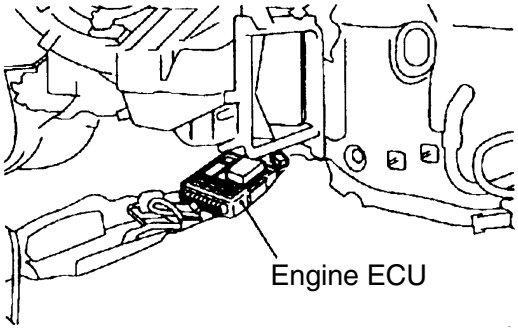
Radio and CD player



AY0002AJ



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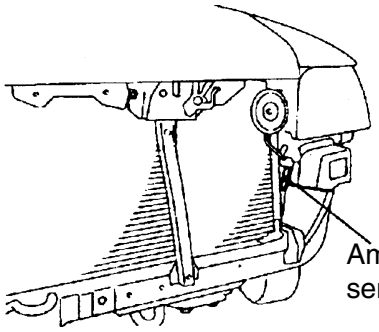
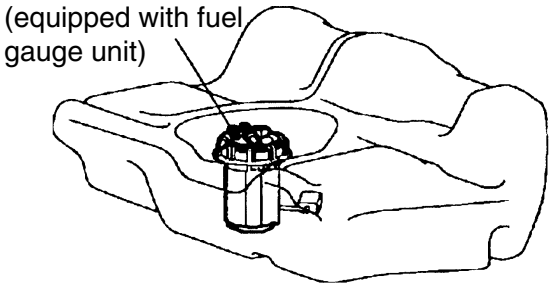
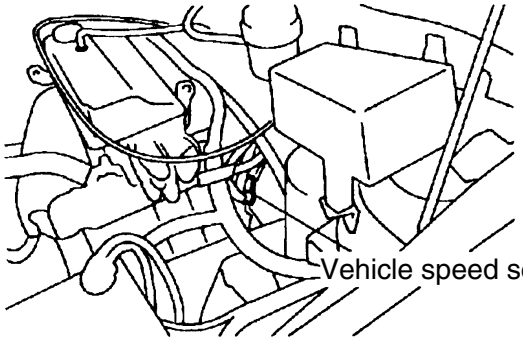


BV0306AJ



AY0008AJ



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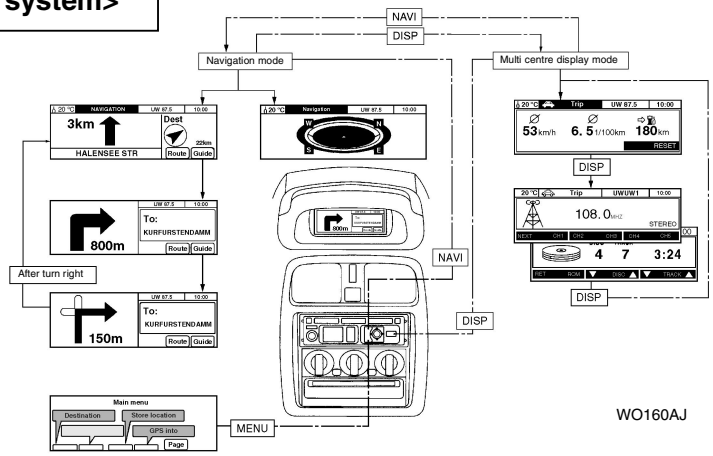
BASIC OPERATION

All the audio unit switches are used for such things as multi centre display or navigation mode operation. When the MENU switch is pressed, Main Menu is displayed. Thereafter, the display can be changed with each of the function switches.
The multi centre display mode is established by pressing the DISP switch. Thereafter, display is switched between trip computer and audio state (radio or CD) each time the DISP switch is pressed.

Press the NAVI switch to establish the navigation mode. Then each type of navigation mode operation can be performed.
The navigation mode is established by pressing the NAVI switch during multi centre display mode, and multi centre display mode is restored by pressing the INFO switch during navigation mode.

<Vehicles with navigation system>

<Added>

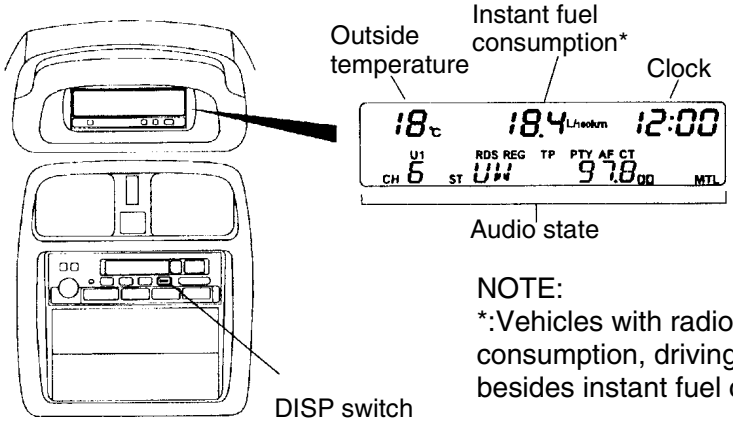


<Added>

<Vehicles without navigation system>

On the multi centre display are shown the outside temperature, instant fuel consumption, clock time and audio state. In the case of vehicles with radio and tape or CD player, further-more, the average fuel consumption, driving range and average speed are indicated selectively in the place of the instant fuel consumption. (For switching, the DISP switch of the radio and tape or CD player is used.)

When the ignition switch is turned ON, the display shows the 4 items sequentially (instant fuel consumption, average fuel consumption, driving range, average speed) and returned to the original display that shown before the ignition switch was last turned OFF.



NOTE:
*:Vehicles with radio and tape or CD player, average fuel consumption, driving range and average speed can be displayed besides instant fuel consumption.

NAVIGATION SYSTEM <Option>

The current position of the vehicle and its direction of travel are calculated using an independent navigation method and the Global Positioning System. The independent navigation method calculates the current vehicle position and the direction of travel using a vehicle speed sensor and the earth's magnetic field sensor. The earth's magnetic field sensor is built into the Multi Center Display.

The earth's magnetic fields sensor is constructed by placing an induction coil in the core of a strong ring shaped magnet and then wrapping the magnet with magnetism detection coils for the vehicle front and rear directions and right and left side directions. The relationship between the magnetic force created by the induction coil and the earth's magnetic field induces electricity in the various detection coils, which is used to detect the vehicle's direction of travel. The earth's magnetic field is the magnetism that is generated by the earth itself. The earth's magnetic field flows in the approximate direction of south to north, but its strength is much less than that of a general magnet and the direction and strength of the magnetic field varies in different locations.

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~~In particular, the earth's magnetic field is disrupted by tunnels, railway crossings, along railways, on elevated roads, by buildings lined streets, and above subways, etc.~~ The Global Positioning System (GPS) was created using satellites developed and is operated by the US Department of Defense. As of August 1994, the system had 24 satellites positioned in circular orbits at a height of 20,000 km which continuously broadcast orbital signals and the signal broadcast time as they circle the earth.

The multi centre display has a built-in GPS antenna that can catch the signals from at least four GPS satellites, which signals are used to calculate the three-dimensional position (longitude, latitude, elevation) of the vehicle using the time difference of the arriving signals. The multi centre display combines the current position calculated from the Global Positioning System and the current position calculated from the independent navigation system to determine the true position of the vehicle by mutually compensating the two calculated positions. The current position of the vehicle found using the above method and the CD-ROM map data contained in the navigation unit are used for navigation functions, such as route guidance.

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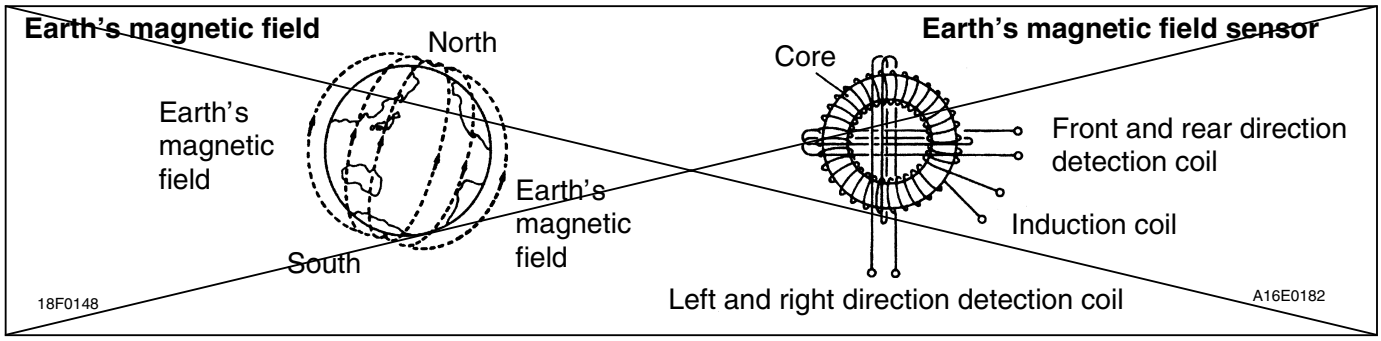
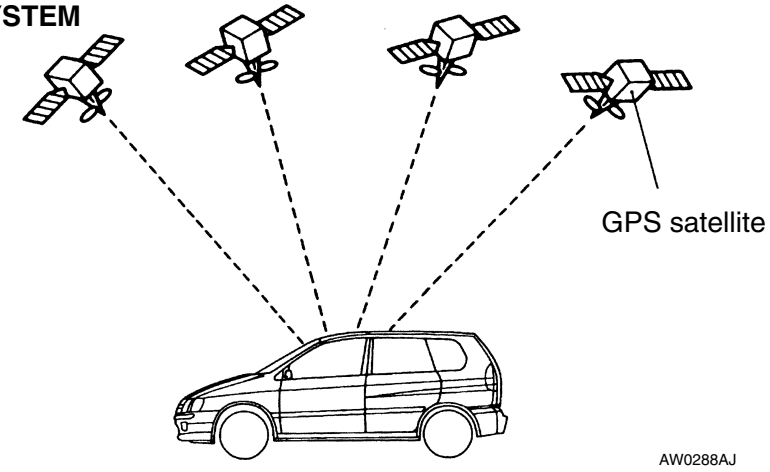


GLOBAL POSITIONING SYSTEM



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RUNNING INFORMATION

Instant Fuel Consumption

Indicates every 2 seconds an instant fuel consumption rate calculated from the amount of fuel consumed for a certain instant (sent from engine ECU) and the distance traveled for that instant (calculated from vehicle speed data).

NOTE
This indicator shows "- - -" or "0.0" when the fuel supply is cut off or when the vehicle is stationary.

Unit for indication	Indicated range	Calculation formula	Indication during fuel supply cut	Indication when vehicle is stationary
L/100 km	0.0 –30.0	Amount of fuel consumed for a certain instant [L] ÷ Distance traveled for that instant [km] ÷ 100	0.0	_ _ _
Km/L	3.0 –99.9	Distance traveled for a certain instant [km] ÷ Amount of fuel consumed for that instant [L]	_ _ _	0.0
mpg	10.0 –99.9	(Distance traveled for a certain instant [km] ÷ 1.609) ÷ (Amount of fuel consumed for that instant [L] ÷ 4.546)	_ _ _	0.0

Average Fuel Consumption

Indicates every 0.5-sec. an average fuel consumption rate calculated from the total amount of fuel consumed (sum total of the amounts of fuel consumed for a certain instant after the last resetting, informed in succession from the engine ECU) and the total distance traveled (registered after last resetting).

NOTE
This indicator shows " - - -" until valid data become available after the last resetting.

Unit for indication	Indicated range	Calculation formula
L/100 km	0.0 –30.0	Total amount of fuel consumed [L] ÷ Total distance traveled [km] ÷ 100
Km/L	3.0 –99.9	Total distance travelled [km] ÷ Sum total of amounts of fuel consumed for a certain instant [L]
mpg	10.0 –99.9	(Total distance traveled [km] ÷ 1.609) (Sum to tal of amounts of fuel consumed for a certain instant [L] ÷ 4.546)

Drive Range

Indicates the distance still travelable calculated from the fuel level detected by the fuel gauge sensor and the average fuel consumption during the period after connecting the battery to the earth.

1. If the driving range calculated is less than 50 km (30 miles if the indication in mile is selected), the indicator flashes and the buzzer sounds for 5 seconds. 5 seconds of indicator flashing and buzzer sounding will also take place when the alarmed values given in the table below are reached, regardless of indication mode selected.
2. The calculation of the remaining amount of fuel is made when the vehicle is stationary and the fuel level is stabilized.
3. When the fuel level is varied more than 15 L suddenly, the system considers that tanking up has been carried out, resetting the display.
4. The indicator shows "- - - " until valid data become available after the last resetting.

Unit for indication	Indicates range	Calculation formula	Alarmed value
Km	0 –1990	Fuel level detected [L] × Average fuel consumption [km/L]	50, 25, 10
miles	0 - 1990	Fuel level detected [L] × Average fuel consumption [km/L] ÷ 1.609	30, 15, 10

Average Speed

Indicates every 8 seconds an average vehicle speed calculated from the cumulative vehicle speed (sum total of vehicle speed data sent from engine-ECU in succession) and the number of vehicle speed data read-out times (total number of times after the last resetting).

NOTE

1. The vehicle speed data exceeding 255 km/h (158 mph) is considered invalid and omitted from the calculation.
2. The indicator shows " - - -" until a valid data becomes available after resetting.

Unit for indication	Indicated range	Calculation formula
Km/h	0 - 254	Cumulative vehicle speed [km/h] × Number of vehicle speed data read-out times
mph	0 - 157	(Cumulative vehicle speed [km/h] ÷ 1.609) × Number of vehicle speed data read-out times.

EXTERIOR TEMPERATURE DISPLAY

- Indicates the outside air temperature detected by the ambient temperature sensor if it is within the range form –40 °C to 70°C. If the detected temperature is lower than –40 °C or higher than 70°C the display indicates "LO°C" or "HI °C" respectively. When the sensor is judged faulty, it indicates "EE °C".
- The indication update is carried out by 1°C every 60 seconds for temperature rises and every 4 seconds for temperature falls. However, it is not carried out during driving at a speed lower that 20 km/h (12 mph) and for the first 30 seconds after the vehicle speed exceeds 20 km/h (12 mph).
- When the ignition switch is turned to ACC again within one hour after it was turned OFF, the system compares the temperature stored in the memory just before ignition OFF with the temperature detected by the sensor and displays the lower temperature. In the case that more than one hour has elapsed, it indicates the temperature detected by the sensor.
- When the exterior temperature falls from 4°C to 3°C, the indication flashes and the buzzer sounds for 5 seconds to warn the driver that the road surface may freeze. Such indicator and buzzer operations are also performed when the ignition switch is turned from OFF to ACC with the exterior temperature between -5°C and 3°C.

MULTI CENTRE DISPLAY

A multi-colour LCD (Liquid Crystal Display) <vehicles with navigation system> or black-and-white LCD <vehicles without navigation system> (display area:124.8 × 42.3 mm) has been installed at the upper centre of the instrument panel on all vehicles as a multi centre display. This multi centre display can show navigation (optional), running data, audio, ambient air temperature, clock time, etc.

Item	Content
Navigation (Optional)	• Destination setting from names of streets and facilities • Guidance for right and left turns at intersections (audio guidance and arrow display on panel) • Display of distance remaining to destination and of direction to destination. • Switchover between priority on expressways or general roads • Automatic repeat search when vehicle gets lost from route. • Switchover of audio and display language (English, German, Dutch, French, Italian, Spanish and Swedish) • Up to 100 locations can be registered. • Music CDs can be played. • Version upgrade by map CD-ROM exchange.
Running information	• Display of average vehicle speed. • Selective display of average fuel consumption and instantaneous fuel consumption. • Display of distance that can be traveled.
Audio	• Display of audio operational status. • RSD (Radio Data System) (traffic information) can also be displayed.
Ambient temperature display	• Regular ambient temperature
Clock time display	• Regular clock time display.

<Correct>
• Selectable motorway priority

<Incorrect>

<Correct>
Re-route

<Incorrect>

<Correct>
<Vehicles with navigation>

<Incorrect>

<Incorrect>

location

<Correct>

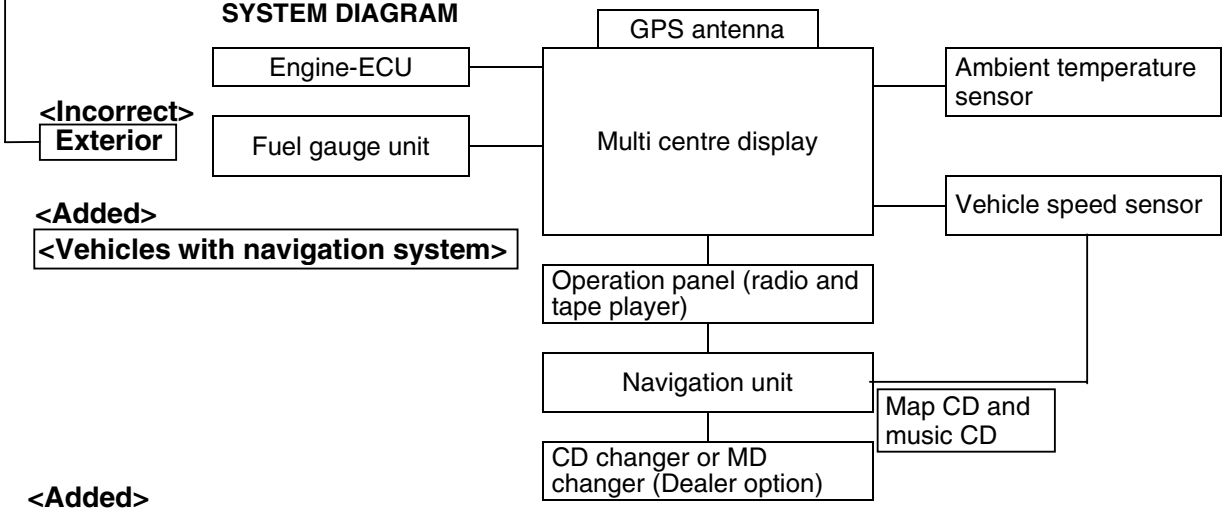
<Incorrect>

<Incorrect>

<Incorrect>
Exterior

<Correct>

SYSTEM DIAGRAM



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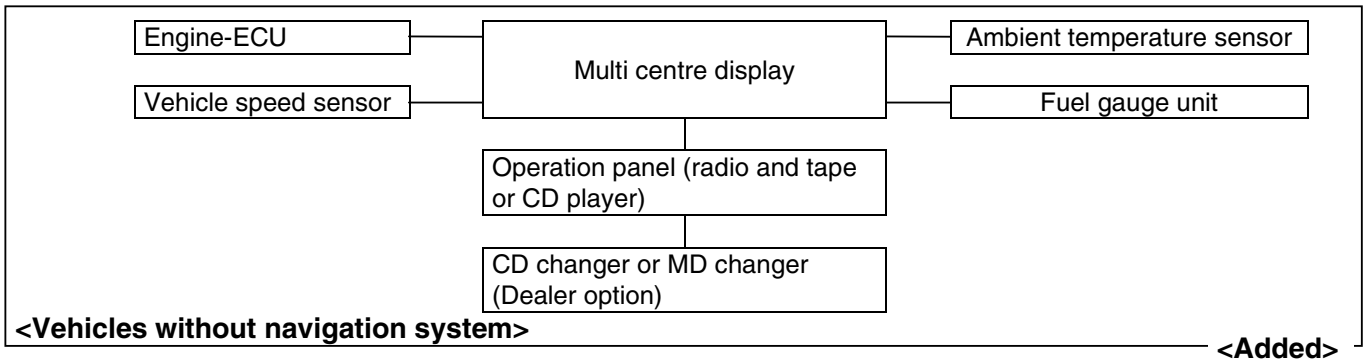

<Vehicles without navigation system>

<Added>

Running information <Vehicle without navigation system>	• Selective display of instant fuel consumption, average fuel consumption, driving range and average speed <Vehicles with genuine radio and tape or CD player> • Display of instantaneous fuel consumption <Vehicles without genuine radio and tape or CD player>

CONSTRUCTION DIAGRAM

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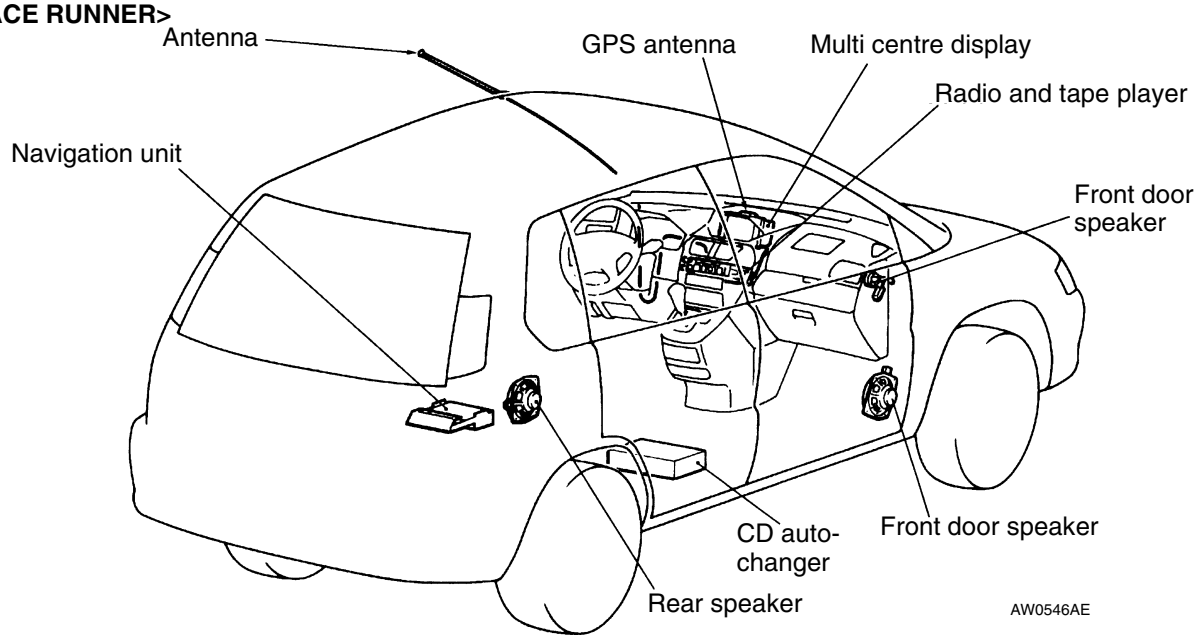

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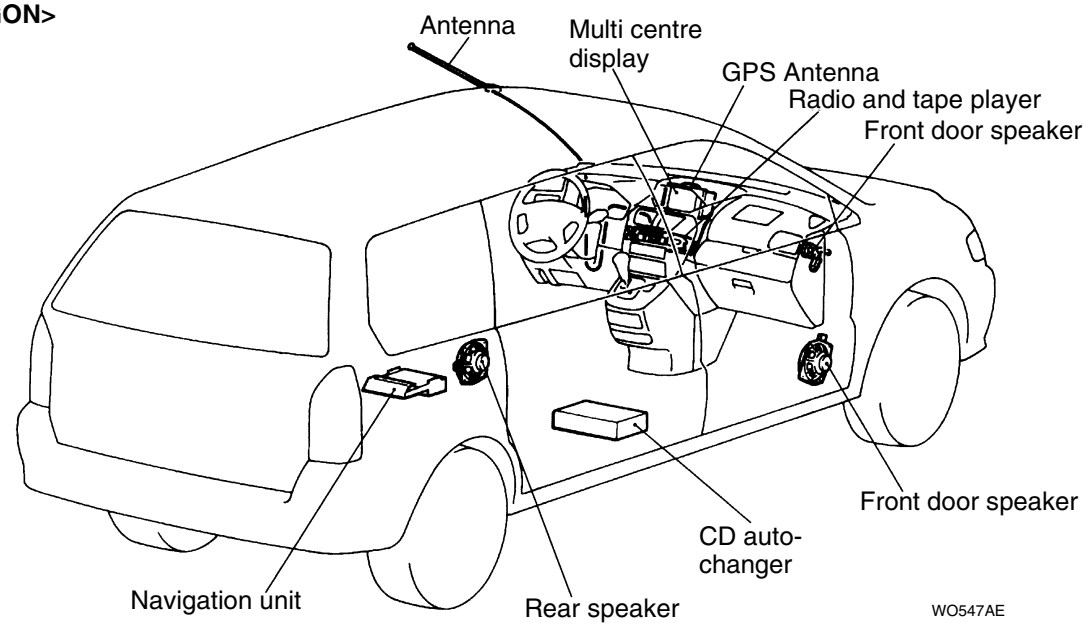

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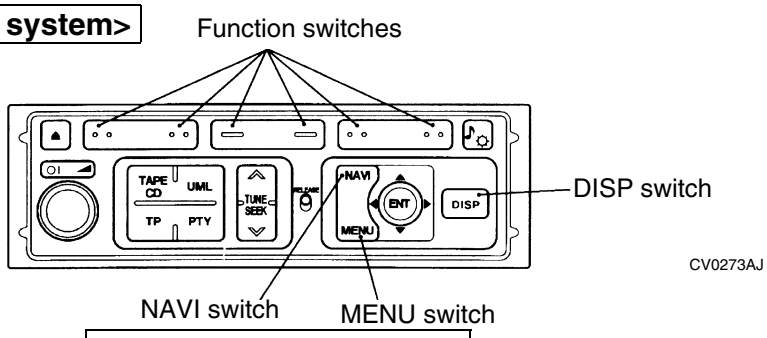
<Vehicles with navigation system>



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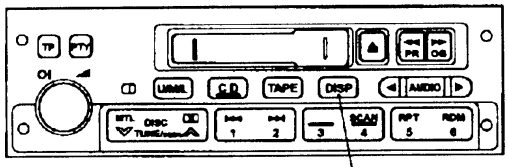
<Vehicles with navigation system>

Radio and tape player



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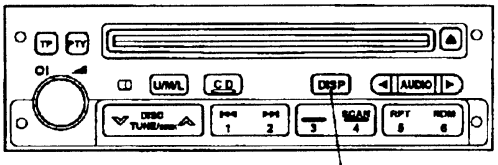
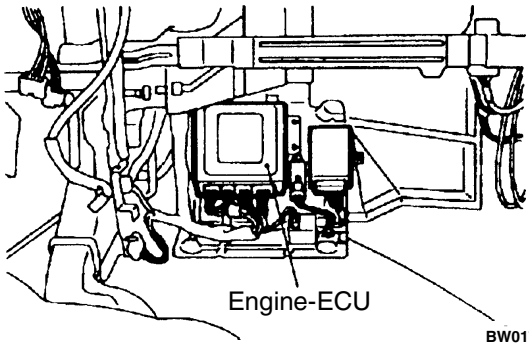
Radio and CD player



AY0002AJ



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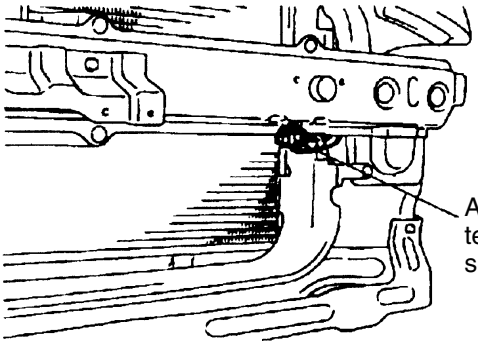

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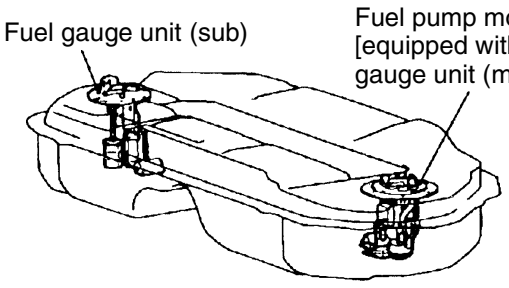

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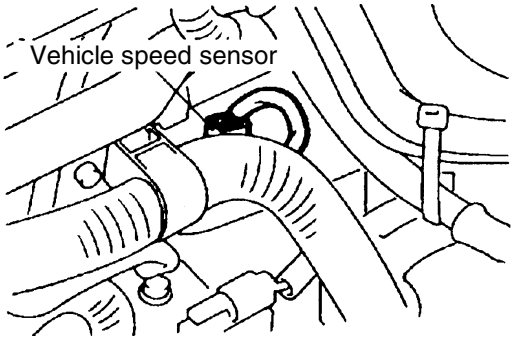


BV0242AE

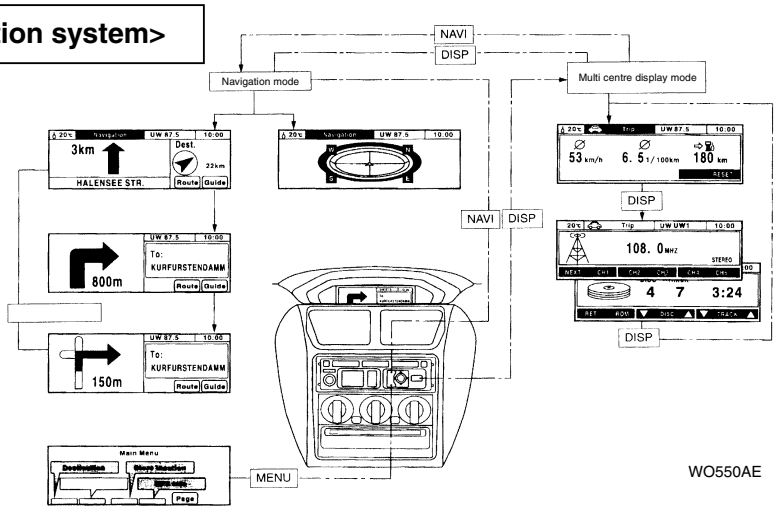
BASIC OPERATION

All the audio unit switches are used for such things as multi centre display or navigation mode operation. When the MENU switch is pressed, Main Menu is displayed. Thereafter, the display can be changed with each of the function switches.
The multi centre display mode is established by pressing the DISP switch. Thereafter, display is switched between trip computer and audio state (radio or CD) each time the DISP switch is pressed.

Press the NAVI switch to establish the navigation mode. Then each type of navigation mode operation can be performed.
The navigation mode is established by pressing the NAVI switch during multi centre display mode, and multi centre display mode is restored by pressing the INFO switch during navigation mode.

<Vehicles with navigation system>

<Added>

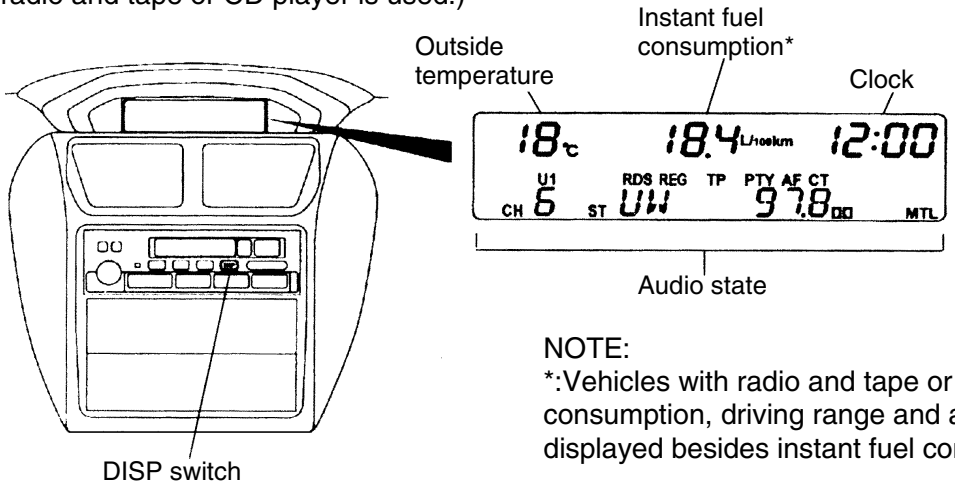


<Added>

<Vehicles without navigation system>

On the multi centre display are shown the outside temperature instant fuel consumption, clock time and audio state. In the case of vehicles with radio and tape or CD player, furthermore, the average fuel consumption, driving range and average speed are indicated selectively in the place of the instant fuel consumption. (For switching, the DISP switch of the radio and tape or CD player is used.)

When the ignition switch is turned ON, the display shows the 4 items sequentially (instant fuel consumption, average fuel consumption average fuel consumption driving range, average speed) and returned to the original display that shown before the ignition switch was last turned OFF.



NOTE:
*:Vehicles with radio and tape or CD player, average fuel consumption, driving range and average speed can be displayed besides instant fuel consumption.

NAVIGATION SYSTEM <Option>

The current position of the vehicle and its direction of travel are calculated using an independent navigation method and the Global Positioning System. The independent navigation method calculates the current vehicle position and the direction of travel using a vehicle speed sensor and the earth's magnetic field sensor. The earth's magnetic field sensor is built into the Multi Center Display.

The earth's magnetic fields sensor is constructed by placing an induction coil in the core of a strong ring shaped magnet and then wrapping the magnet with magnetism detection coils for the vehicle front and rear directions and right and left side directions. The relationship between the magnetic force created by the induction coil and the earth's magnetic field induces electricity in the various detection coils, which is used to detect the vehicle's direction of travel. The earth's magnetic field is the magnetism that is generated by the earth itself. The earth's magnetic field flows in the approximate direction of south to north, but its strength is much less than that of a general magnet and the direction and strength of the magnetic field varies in different locations.

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In particular, the earth's magnetic field is disrupted by tunnels, railway crossings, along railways, on elevated roads, by buildings lined streets, and above subways, etc. The Global Positioning System (GPS) was created using satellites developed and is operated by the US Department of Defense. As of August 1994, the system had 24 satellites positioned in circular orbits at a height of 20,000 km which continuously broadcast orbital signals and the signal broadcast time as they circle the earth.

The multi centre display has a built-in GPS antenna that can catch the signals from at least four GPS satellites, which signals are used to calculate the three-dimensional position (longitude, latitude, elevation) of the vehicle using the time difference of the arriving signals. The multi centre display combines the current position calculated from the Global Positioning System and the current position calculated from the independent navigation system to determine the true position of the vehicle by mutually compensating the two calculated positions. The current position of the vehicle found using the above method and the CD-ROM map data contained in the navigation unit are used for navigation functions, such as route guidance.

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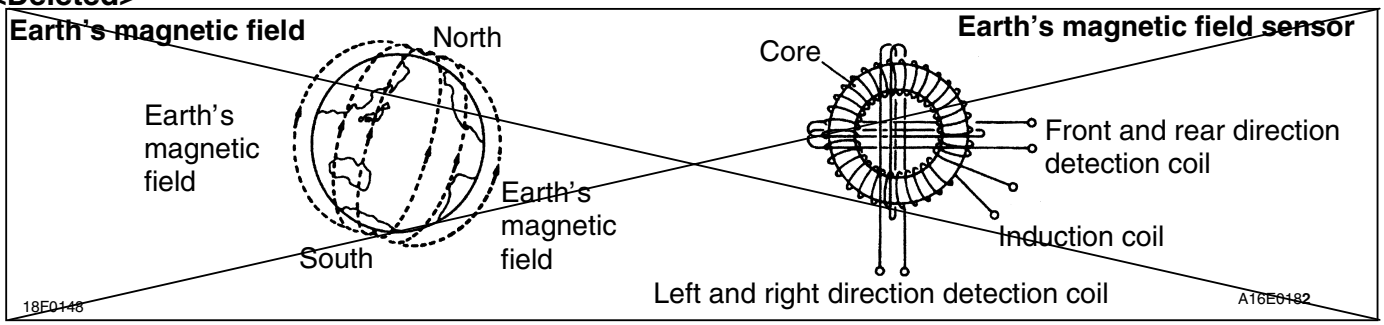
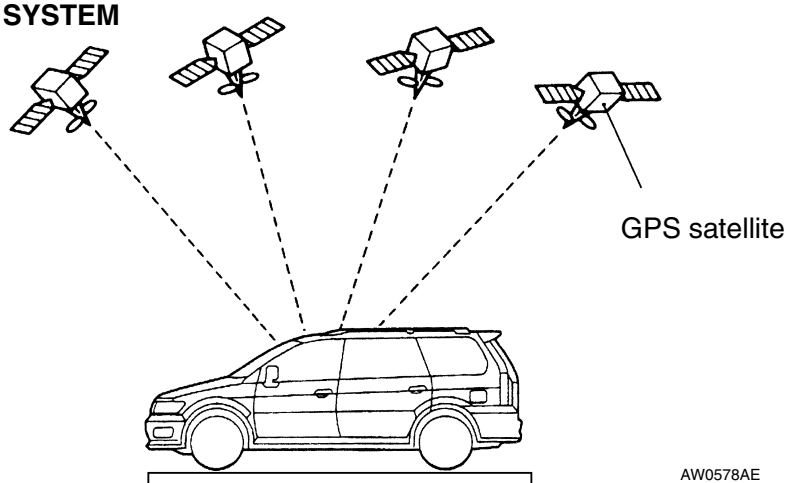


GLOBAL POSITIONING SYSTEM



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RUNNING INFORMATION

Instant Fuel Consumption

Indicates every 2 seconds an instant fuel consumption rate calculated from the amount of fuel consumed for a certain instant (sent from engine ECU) and the distance traveled for that instant (calculated from vehicle speed data).

NOTE
This indicator shows "- - -" or "0.0" when the fuel supply is cut off or when the vehicle is stationary.

Unit for indication	Indicated range	Calculation formula	Indication during fuel supply cut	Indication when vehicle is stationary
L/100 km	0.0 –30.0	Amount of fuel consumed for a certain instant [L] ÷ Distance traveled for that instant [km] ÷ 100	0.0	_ _ _
Km/L	3.0 –99.9	Distance traveled for a certain instant [km] ÷ Amount of fuel consumed for that instant [L]	_ _ _	0.0
mpg	10.0 –99.9	(Distance traveled for a certain instant [km] ÷ 1.609) ÷ (Amount of fuel consumed for that instant [L] ÷ 4.546)	_ _ _	0.0

Average Fuel Consumption

Indicates every 0.5 sec. an average fuel consumption rate calculated from the total amount of fuel consumed (sum total of the amounts of fuel consumed for a certain instant after the last resetting, informed in succession from the engine ECU) and the total distance traveled (registered after last resetting).

NOTE
This indicator shows " - - -" until valid data become available after the last resetting.

Unit for indication	Indicated range	Calculation formula
L/100 km	0.0 –30.0	Total amount of fuel consumed [L] ÷ Total distance traveled [km] ÷ 100
Km/L	3.0 –99.9	Total distance traveled [km] ÷ Sum total of amounts of fuel consumed for a certain instant [L]
mpg	10.0 –99.9	(Total distance traveled [km] ÷ 1.609) (Sum to tal of amounts of fuel consumed for a certain instant [L] ÷ 4.546)

Drive Range

Indicates the distance still travelable calculated from the fuel level detected by the fuel gauge sensor and the average fuel consumption during the period after connecting the battery to the earth.

1. If the driving range calculated is less than 50 km (30 miles if the indication in mile is selected), the indicator flashes and the buzzer sounds for 5 seconds. 5 seconds of indicator flashing and buzzer sounding will also take place when the alarmed values given in the table below are reached, regardless of indication mode selected.
2. The calculation of the remaining amount of fuel is made when the vehicle is stationary and the fuel level is stabilized.
3. When the fuel level is varied more than 15 L suddenly, the system considers that tanking up has been carried out, resetting the display.
4. The indicator shows "- - - " until valid data become available after the last resetting.

Unit for indication	Indicates range	Calculation formula	Alarmed value
Km	0 –1990	Fuel level detected [L] × Average fuel consumption [km/L]	50, 25, 10
miles	0 - 1990	Fuel level detected [L] × Average fuel consumption [km/L] ÷ 1.609	30, 15, 10

Average Speed

Indicates every 8 seconds an average vehicle speed calculated from the cumulative vehicle speed (sum total of vehicle speed data sent from engine-ECU in succession) and the number of vehicle speed data read-out times (total number of times after the last resetting).

NOTE

1. The vehicle speed data exceeding 255 km/h (158 mph) is considered invalid and omitted from the calculation.
2. The indicator shows " - - -" until a valid data becomes available after resetting.

Unit for indication	Indicated range	Calculation formula
Km/h	0 - 254	Cumulative vehicle speed [km/h] × Number of vehicle speed data read-out times
mph	0 - 157	(Cumulative vehicle speed [km/h] ÷ 1.609) × Number of vehicle speed data read-out times.

EXTERIOR TEMPERATURE DISPLAY

- Indicates the outside air temperature detected by the ambient temperature sensor if it is within the range form -40 °C to 70°C. If the detected temperature is lower than -40 °C or higher than 70°C the display indicates "LO°C" or "HI °C" respectively. When the sensor is judged faulty, it indicates "EE °C".
- The indication update is carried out by 1°C every 60 seconds for temperature rises and every 4 seconds for temperature falls. However, it is not carried out during driving at a speed lower that 20 km/h (12 mph) and for the first 30 seconds after the vehicle speed exceeds 20 km/h (12 mph).
- When the ignition switch is turned to ACC again within one hour after it was turned OFF, the system compares the temperature stored in the memory just before ignition OFF with the temperature detected by the sensor and display the lower temperature. In the case that more than one hour has elapsed, it indicates the temperature detected by the sensor.
- When the exterior temperature falls from 4°C to 3°C, the indication flashes and the buzzer sounds for 5 seconds to warn the driver that the road surface may freeze. Such indicator and buzzer operations are also performed when the ignition switch is turned from OFF to ACC with the exterior temperature between -5°C and 3°C.

MULTI CENTER DISPLAY <Added>

54600070025

TROUBLESHOOTING <Vehicles with navigation system>

NOTES WITH REGARD TO SERVICE PROCEDURES

1. Before removing the battery

The multi center display has a large amount of data stored in memory which the user enters over time. When the terminals are disconnected from the battery, the memory, which stores this data, is affected as shown in the table below. Accordingly, it is necessary to make sure that you take notes of important information before disconnecting the battery.

Function	Input function	When battery is disconnected
Radio function	Channels which are selected during a search	Disappear after a few seconds
	Preset channels	Do not disappear
Navigation function	Current location	
	Recommended route	
	Destination	
	Route search conditions	
	Sensor initialization data	
	Language selection setting	
	Guidance volume setting	
Data search function, data display and input functions	Registered location names	
	Past destinations	
	Average fuel consumption, average speed, cruising range	Disappear after a few seconds
Clock display function	Current time	
Vehicle model settings for travel data	Setting details for vehicle model	
Monitor backlight luminance setting	Luminance setting value	

2. Notes on trouble diagnosis relating to the overall system

(1) If a problem occurs which seems like all of the functions have developed an abnormality simultaneously, the cause is most likely a communication abnormality between the various systems. Thus you should use the communication checking service function in the trouble diagnosis service functions in order to verify the cause.

Error Code No. 1092, 1093, 1094, 1095, 1096

Is a CD-ROM for this navigation system inside?
- NO → Insert the CD-ROM for this navigation system.
- YES ↓

Is the CD-ROM inserted upside down?
- YES → Insert the CD-ROM correctly.
- NO ↓

Is the disc dirty, damaged or iced up?
- YES → Repair or replace the disc.
- NO ↓

Repeat the wiring check. If he same problem occurs, there is a malfunction of the CD drive within the navigation unit. → Replace the navigation unit.

Error Code No. 10A1, 10B1

Were the wiring check instructions followed?
- NO → Repeat the wiring check.
- YES ↓

Repeat the wiring check. If the same problem occurs, there is a malfunction of the memory within the navigation unit. → Replace the navigation unit.

Error Code No. 20D1, 30D1

Were the sensor check instructions followed?
- NO → Repeat the sensor check.
- YES ↓

Check connector (B-14, A-17).
- NG → **Repair**
- OK ↓

Measure at the navigation unit connector B-14.
- Disconnect connector
- Turn on the Ignition switch and then move the vehicle slowly.
- Voltage between terminal (33) and body earth.
  OK: HI: 4 –5 V, Lo: 0 –1 V, pulse signal

NG → Check the vehicle speed sensor. (Refer to P.54-25.)

OK ↓

Replace the navigation unit.

Error Code No. 20E1, 20E2, 30E1,30E2

Were the sensor check instructions followed?
- NO → Repeat the sensor check.
- YES ↓

Repeat the sensor check. If the same problem occurs, there is a malfunction of Gyro sensor within the navigation unit. → Replace the navigation unit.

Followed by next page

TROUBLESHOOTING <Vehicles without navigation system>

NOTES WITH REGARD TO SERVICE PROCEDURES

1. Before removing the battery

The audio system has a large amount of data stored in memory, which the user enters over time. When the terminals are disconnected form the battery, the memory which stores this data is affected as shown in the table below. Accordingly, it is necessary to make sure that you take notes of important information before disconnecting the battery.

Function	Input function/memory	When battery is disconnected
Radio	Channels which are selected during a search	Disappear after a few seconds
	Pre-set channels	
Tone/Balance	Position set on Bass, Treble, Balance and Fader	
Clock set on display	Current time	Keep a data for approx. one hour
Brightness set for display	Position set on display	
Unit set for trip computer	Km or mile, L/100km or mpg or km/L	
Average speed on display	Average speed after reset	
Average fuel consumption on display	Average fuel consumption after reset	
Cruising range on display	Cruising range, fuel economy	
Outside temperature on display	A temperature after the ignition switch is turned to OFF (LOCK)	Keep a data for approx. one hour If the engine is hot, the multi center display might show high temperature when the display unit is reconnected after one hour.

2. Diagnosis Function for Audio System

Audio system has the following diagnosis function.

Function	Contents
Speaker diagnosis function	This function checks if the speakers are all working normally on the audio system or not.
Service functions	There are the following 9 diagnosis modes available. (1) Model name and vehicle type (2) Segment check. (illuminate) (3) Segment check. (only back-lamp) (4-7) ¼ segment check. (8) Temperature sensor and fuel gauge unit signal check. (9) Clock and connected components check.

3. Speaker Connection Diagnosis

Outline
- This diagnosis function checks whether the more than one-wired speakers are normally connected to the audio unit and the speaker wiring is pinched in the vehicle.
- The test tone sounds from an applicable speaker according to the display (FL, FR, RL, RR).

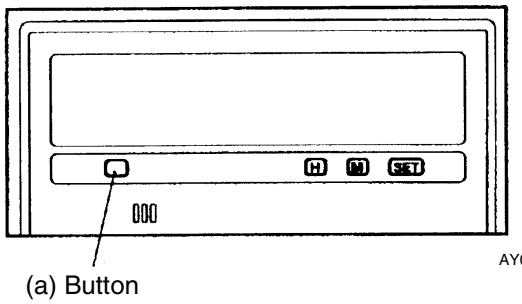
Function explanation
To diagnose speaker connections, follow the procedure below to enter the mode.
1. Entry to test mode
   (1) Turn the ignition switch to ACC.
   (2) Turn off the power supply switch of the audio unit.
   (3) Press the "CH1" button.
   (4) Press the "Automatic tuning in down button."
   (5) Press the "Automatic tuning in up button."
   (6) Press the "CH6" button. Then the audio unit will enter the test mode.

   NOTE
   The above operation must be finished within 60 seconds after the power supply switch is turned off (if 60 seconds have passed, the operation is invalid).
   If you fail in the operation, you must push the power supply switch twice to reset the unit. Then repeat the steps above from step (1).

   (7) The test tone will sound at a constant interval. If you want to change an applicable speaker, you should press the "CH6" button.

2. Canceling the test mode
   The test mode will be cancelled by one of the operations below.
   - Press any button (except the "CH6" button). In addition, if a mode button (UW/MW/LW, CD, TAPE) is pressed, the audio unit will enter an applicable function after cancelling the test mode.
   - Turn the ignition switch to OFF(LOCK).

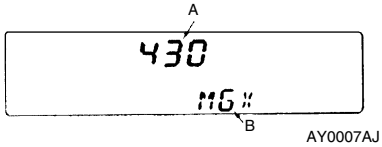
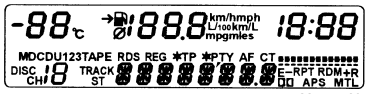
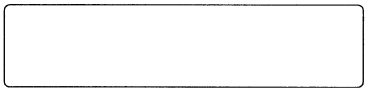
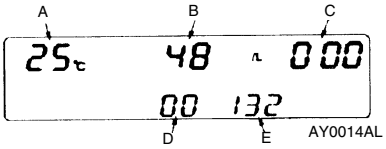
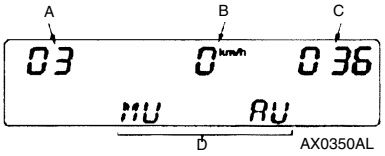
4. Service Mode For Multi Center Display
1. Enter and terminate the service mode.
   (1) To enter the service mode, turn the ignition switch to LOCK (OFF).
   (2) Turn the ignition switch to ON while pressing the (A) button, then press the "H" button twice keeping the (A) button depressed.
   (3) Press the "SET" button.
   (4) Then the multi center display will enter the service mode.
   The operation modes alternate each time the "SET" button is pressed.
   (5) To terminate the service mode, press any button other than the "SET" button.

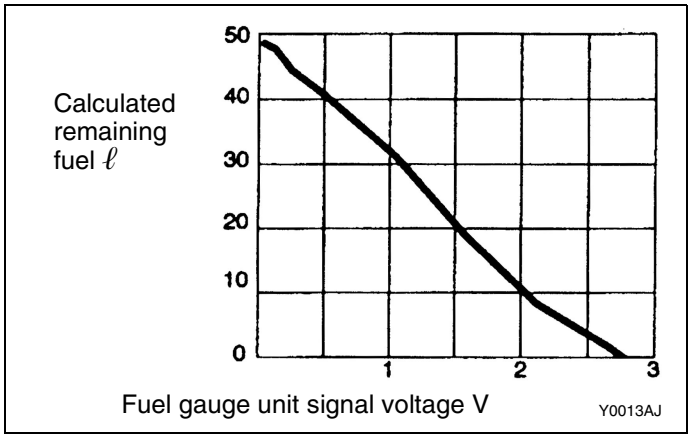


AY0004AJ

(a) Button

2. Service mode menu and check procedure.
The service mode display changes by pressing “SET” button by following order. (Next to No.9, the function returns to No.1 and repeats the sequence from No.1.)

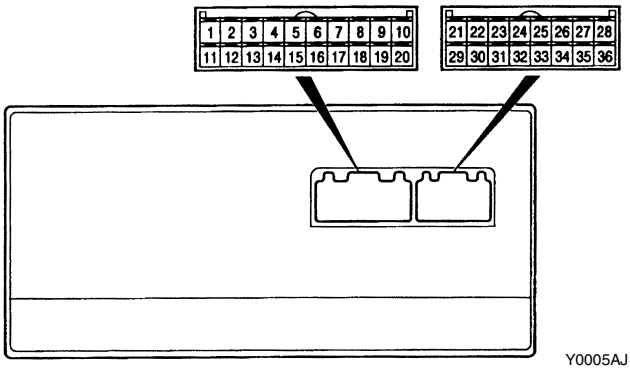
No.	Mode and display	Displayed contents	Unit	Checking item
1	Model name and vehicle type  AY0007AJ	A. Display model	Code	Confirm the display model code. (“430” is displayed for this vehicle model.)
		B. Vehicle type	Code	Confirm the vehicle type. (“MGX” is displayed for this vehicle type.)
2	Segment check (illuminate)  X0346AL	All segment illuminated	-	Check defect segments.
3	Segment check. (only back-lamp)  X0347AL	Back-lamp only. (all segment off)	-	Check damage, dust etc
4-7	¼ segment check.  X0348AL	Each ¼ segment illuminate. (4 different displays appear. The left figure shows the first display.)	-	Check short circuit.
8	Temperature sensor and fuel gauge unit signal check.  AY0014AL	A. Calculated outside temperature	°C	Check the displayed value.
		B. Calculated remaining fuel	ℓ	Check the displayed value. *2
		C. Consumed fuel quantity since	ℓ	Check the displayed value.
		D. Fuel gauge unit signal voltage	V*1	Check the displayed value. *2
		E. IG voltage	V*1	Check the displayed value. (Battery positive voltage)
9	Clock and connected components check.  AX0350AL	A. Voltage of MUT-II detection input	%	Connect: more than 80, Disconnect: less than 50.
		B. Calculated vehicle speed.	Km/h	Check the displayed value
		C. Clock	Sec	Confirm operating.
		D. Connecting components	Name	Confirm connected components. (‘MU”: MUT-II, “AU”: audio.)



NOTE
*1: The indication is made in 0.1V step.
*2: The relationship between the calculated remaining fuel and fuel gauge unit signal voltage is as shown in the graph at left.

MAIN UNIT TERMINAL VOLTAGES

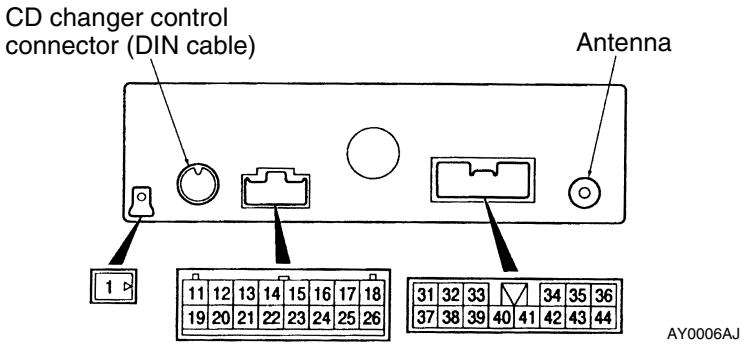
1. MULTI CENTER DISPLAY UNIT



Terminal No.	Input/ Output	Signal Symbol	Terminal Voltage (V)	Harness Problem		Trouble Symptom Resulting from Harness Problem
				Open circuit	Short circuit	
1-4	-	-	-	-	-	-
5	Input	ISOK	Hi: System voltage Lo: 0 - 1	O	O	MUT-II cannot be used to check engine-ECU
6	-	-	-	-	-	-
7	Input/ Output	M-DATA (AUDIO)	Hi: 4 - 5 Lo: 0 - 1	O	O	Audio display does not appear. Panel switch cannot be operated for audio unit. Nighttime illumination does not appear for audio unit.
8	Input/ Output	M-CLOCK (AUDIO)	Hi: 4 - 5 Lo: 0 - 1	O	O	Audio display does not appear. Panel switch cannot be operated for audio unit. Nighttime illumination does not appear for audio unit.
9-14	-	-	-	-	-	-
15	Input/ Output	K	Hi: System voltage Lo: 0 - 1	O	O	Values on Trip information screen (instant fuel consumption, average fuel consumption, driving range and average speed) are abnormal. Communication is not possible between the engine-ECU and the MUT-II
16	-	-	-	-	-	-
17	Input/ Output	M-BUSY (AUDIO)	Hi: 4 - 5 Lo: 0 - 1	O	O	Audio display does not appear. Panel switch cannot be operated for audio unit. Nighttime illumination does not appear for audio unit.

Terminal No.	Input/ Output	Signal Symbol	Terminal voltage (V)	Harness problem		Trouble Symptom Resulting from Harness Problem
				Open circuit	Short circuit	
18	-	SHIELD-GND	-	-	-	-
19-22	-	-	-	-	-	-
23	Input	EX-TEMP		○	○	Outside air temperature does not appear
24	Input	ILL+	Hi: System voltage Lo: 0 - 1	○	-	Nighttime illumination does not appear for any navigation system units
				-	○	Blown multipurpose fuse.
25	Input	ACC (ACC power supply)	System voltage	○	-	Screen display does not appear
				-	○	Blown multipurpose fuse
26	Input	+B	System voltage	○	-	Screen display does not appear
				-	○	Blown multipurpose fuse
27	-	-	-	-	-	-
28	-	GND (ground)	-	○	-	Screen display does not appear
29,30	-	-	-	-	-	-
31	-	GND-TEMP	-	○	○	Outside air temperature does not appear
32	-	ILL-	-	-	-	-
33	Input	FUEL GAUGE	-	○	○	Abnormal cruising distance display
34,35	-	-	-	-	-	-
36	Input	IG1	System voltage	○	-	Communication with engine-ECU is not possible. Driving data values displayed are abnormal
				-	○	Communication with engine-ECU is not possible. Driving data values displayed are abnormal. Blown multipurpose fuse

2. AUDIO UNIT



Terminal No.	Input/ Output	Signal Symbol	Terminal voltage (V)	Harness problem		Trouble Symptom Resulting from Harness Problem
				Open circuit	Short circuit	
1	-	GND (ground)	-	-	-	-
11	Input/ Output	M-DATA	Hi: 4 or more Lo: 1 or less	○	○	Panel switches cannot be operated.
12	Input/ Output	M-SCK	Hi: 4 or more Lo: 1 or less	○	○	Panel switches cannot be operated.
13-18	-	-	-	-	-	-
19	Input/ Output	M-BUSY	Hi: 4 or more Lo: 1 or less	○	○	Panel switches cannot be operated.
20	-	SHIELD EARTH (M-BUS)	-	-	-	-
21-26	-	-	-	-	-	-
31	Output	SPEAKER RR (+)	0- System voltage (AC)	○	-	No sound is output form rear left speaker.
				-	○	No sound is output form rear right speaker.
32	Output	SPEAKER RL (+)	0- System voltage (AC)	○	-	No sound is output form rear left speaker.
				-	○	No sound is output form rear left and right speaker.
33	-	-	-	-	-	-

Terminal No.	Input/ Output	Signal Symbol	Terminal voltage (V)	Harness problem		Trouble Symptom Resulting from Harness Problem
				Open circuit	Short circuit	
34	Input	ILL(+)	HI: system voltage Lo: 0 -1	○	-	Night-time illumination does not appear for audio unit.
				-	○	Blown multipurpose fuse
35	Output	SPEAKER FL (+)	0 –System voltage (AC)	○	-	No sound is output from front left speaker.
				-	○	No sound is output from front left and right speakers.
36	Output	SPEAKER FR (+)	0 –System voltage (AC)	○	-	No sound is output from front right speaker
				-	○	No sound is output from front left and right speakers.
37	Output	SPEAKER RR (+)	0 –System voltage (AC)	○	-	No sound is output from rear right speaker
				-	○	
38	Output	SPEAKER RL (-)	0 –System voltage (AC)	○	-	The rear left speaker does not sound.
				-	○	The rear left and right speakers do not sound.
39	-	-	-	-	-	-
40	Input	ACC (ACC power supply) (System voltage)	System voltage	○	-	The audio unit power supply does not turn on.
				-	○	Blown multipurpose fuse
41	Input	+B (System voltage)	System voltage	○	-	Cassette or CD is not ejected when the ignition switch is at ACC. The memory are cleared.
				-	○	Blown multipurpose fuse.
42	-	ILL(-)	-	-	-	-
43	Output	SPEAKER FL (-)	0 –System voltage (AC)	○	-	The front left speaker does not sound.
				-	○	The front left and right speakers do not sound
44	Output	SPEAKER FR (-)	0 –System voltage (AC)	○	-	The front right speaker does not sound.
				-	○	The front left and right speakers do not sound

INSPECTION CHART CLASSIFIED BY TROUBLE SYMPTOMS

Related Unit	Trouble symptom	Inspection Procedure No.	Reference Page
Malfunction of multi center display	No display appears after the ignition key is turned to ACC.	1	54-92-8
	TAPE, CD and UML switches do not work.	2	54-92-9
	CD changer do not work	3	54-92-9
	Outside temperature data is not displayed. /Outside temperature data is abnormal.	4	54-92-10
	Abnormal driving data display • Abnormal instant fuel consumption, average fuel consumption and average speed displays. • Abnormal driving range displays.	5	54-92-10
	No illumination of audio button.	6	54-92-11
	Dim display	7	54-92-11
	Clock runs fast or slow	8	54-92-12

INSPECTION PROCEDURES FOR EACH TROUBLE SYMPTOM

INSPECTION PROCEDURE 1

No display appears after the ignition key is turned to ACC.

Check the connector: B-08
NG → **Repair**
↓OK

Measure at multi center display connector B-08
- Ignition switch: ACC
- Voltage between terminal (25), (26) and body earth.
  OK: System voltage

NG → Repair the fuse and the harness.
↓OK

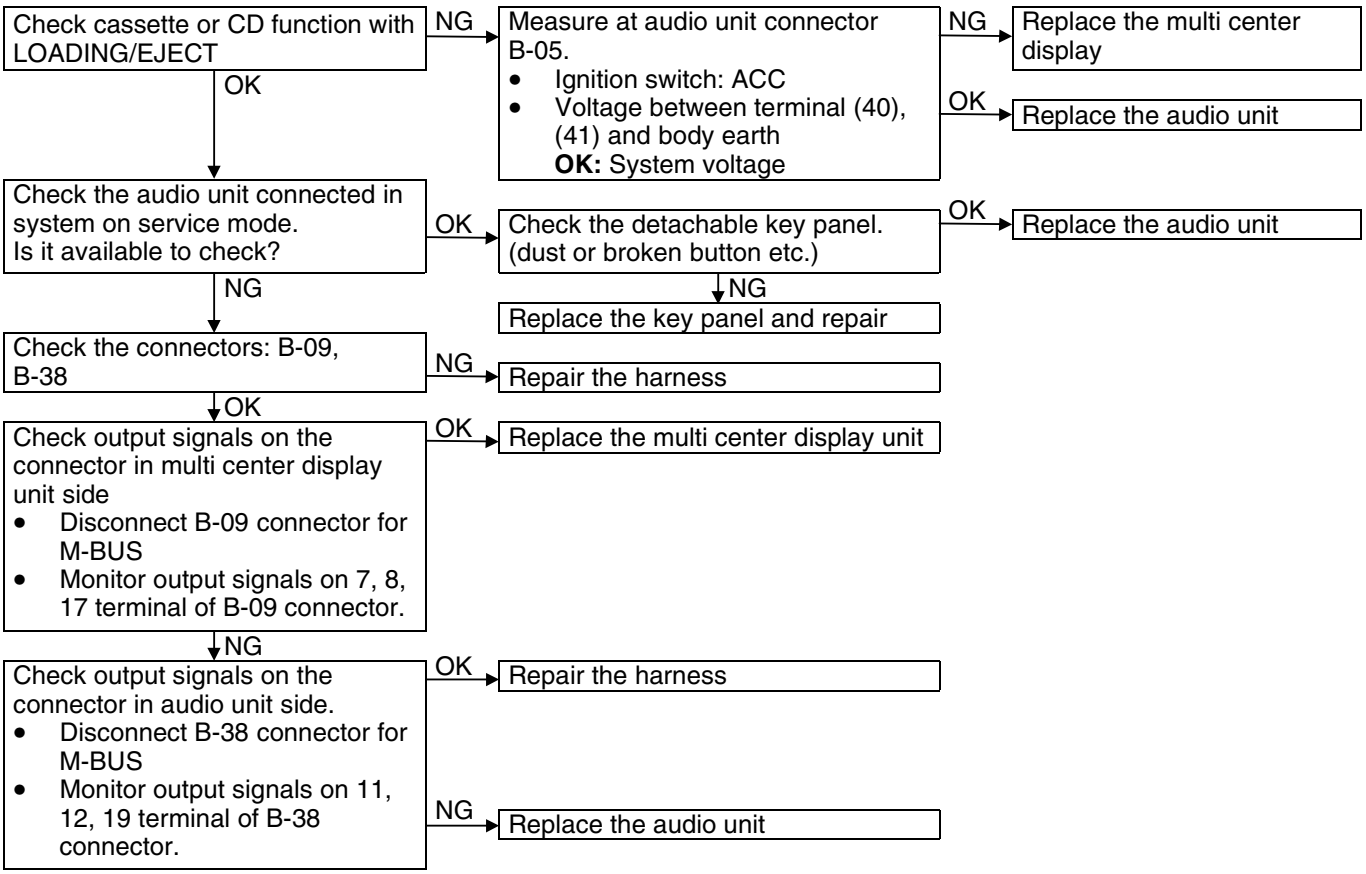
Measure at multi center display connector B-08
- Check continuity between terminal (28) and body earth.
  OK: Continuity exists

NG → Repair the harness.
↓OK

Replace the multi center unit

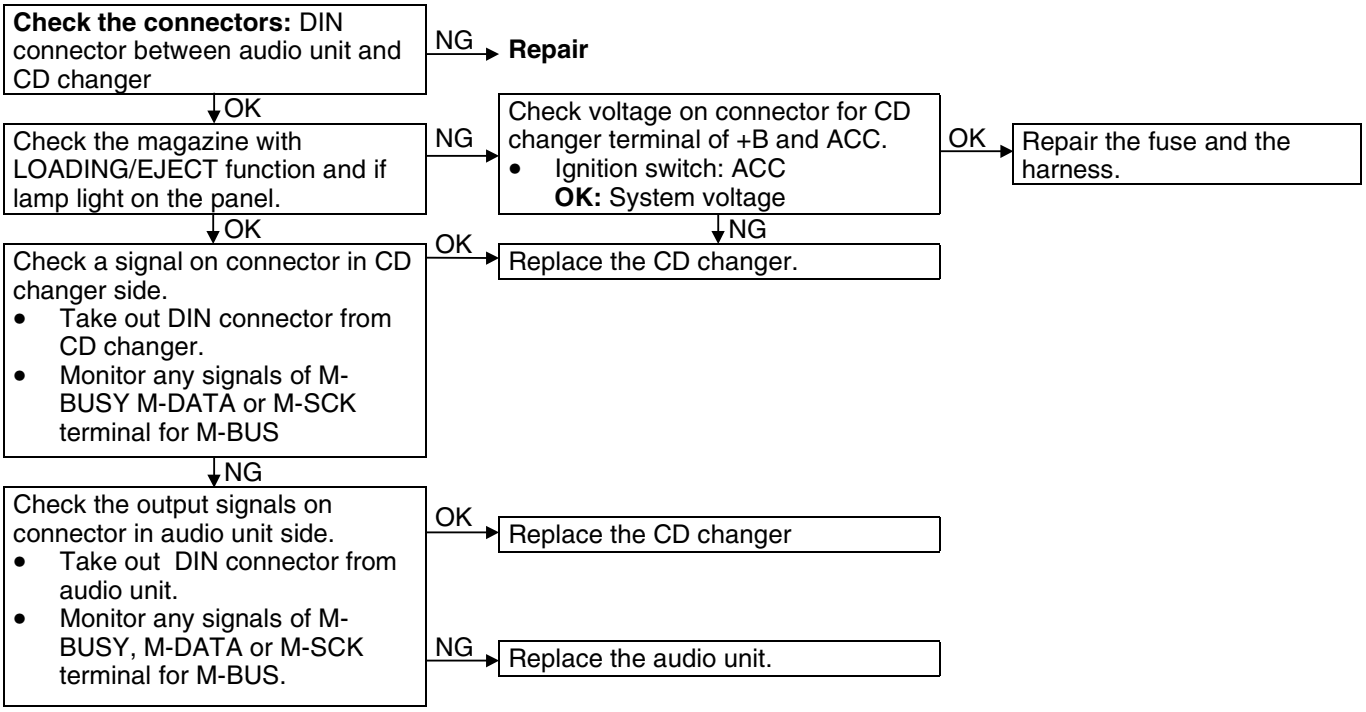
INSPECTION PROCEDURE 2

TAPE, CD and UML switches do not work



INSPECTION PROCEDURE 3

CD changer do not work.



INSPECTION PROCEDURE 4

Outside air temperature data is not displayed. /Outside air temperature data is abnormal.

Check the connector: B-08
- NG → **Repair**
- OK ↓

Does the multi center display unit show the vehicle identifications correctly?
- NO → Replace the multi center display unit
- YES ↓

Does the service mode show outside air temperature correctly?
- YES → End (no abnormality)

If the vehicle is driven in places where outside temperature varies much, an incorrect temperature may be displayed. In that case, drive the vehicle for a while so that the display shows a correct temperature.

In addition, if the engine is hot after the battery is replaced or the multi-center display unit is reinstalled, an incorrect temperature may be displayed

- NO ↓

Check the harness between the multi center display and the outside temperature sensor
- NG → **Repair**
- OK ↓

Replace the outside temperature sensor.
- OK → End
- NG ↓

Replace the multi center display unit.

INSPECTION PROCEDURE 5

Abnormal driving data displays,
- Abnormal instant fuel consumption, average fuel consumption and average speed displays.
- Abnormal driving range displays.

1. When instant fuel consumption, average fuel consumption and average speed are abnormal.

Check the connectors: B-08
- NG → **Repair**
- OK ↓

Check the multi center display unit connected into system on service mode.
Does MU light on the display?
- YES → Check a voltage on (5) terminal of B-09 connector after B-09 connector shall be out.
  - Ignition switch: ON
  - **OK:** Low (0-1V)
  - **NG:** More than 80% of system voltage
  - NG → Check the harness
    Disconnect MUT-II
  - OK ↓
- NO ↓

Measure at multi center display connector B-08
- Connector disconnected.
- Voltage between terminal (36) and body earth
  OK: Ignition switch ON: System voltage
  NG: ignition switch OFF:0-1V
- NG → Check the harness between multi center display unit and junction block, and replace if necessary.
- OK ↓

Check the connections between the multi center display unit and the engine ECU.
- OK → Replace the Multi center display unit.
- NG ↓

Check the harness between the multi center display unit and the engine-ECU, and Replace if necessary.

2. When driving range display is abnormal.

Are the average fuel consumption and average vehicle speed displayed normally?
- NG → Carry out troubleshooting according to procedure 5.1.
- OK ↓

Does the service mode show fuel amount correctly?
- YES → End (no abnormality)
  An inaccurate fuel amount may be displayed for a while after refuelling. In addition, it depends on road and driving conditions whether an accurate fuel amount is displayed.
- NO ↓

Measure at multi center display connector B-08
- Connector disconnected.
- Voltage between terminal (33) and body earth
  OK: 0.1 –3.0 V

- NG → Check the harness between multi center display unit and the fuel gauge unit, and Replace if necessary.
  Relative unit: Combination meter, fuel gauge unit
- OK ↓

Replace the multi center display unit.

INSPECTION PROCEDURE 6

No illumination for audio buttons light on.

Check if the brightness of display changes when the lighting switch is on or off.
- NO → Measure at multi center display connector B-08
  - Connector disconnected.
  - Voltage between terminal (24) and body earth.
    OK: System voltage (ILL ON), 0 –1 V (ILL OFF)
  - OK → Replace the multi center display
  - NG → Repair the fuse and the harness
- YES ↓

Check the function for TAPE, CD and UML.
- NO → Carry out troubleshooting according to procedure 2.
- YES ↓

Measure at the audio unit connector B-05.
- Connector disconnected.
- Rheostat: Max
- Voltage between terminal (42) and body earth.
  OK: Low (0 –3 V)

- OK → Replace the audio unit.
- NG → Repair the harness.

INSPECTION PROCEDURE 7

Dim display

Check if the brightness of display to change when the lighting switch is on or off.
- NO → Measure at multi center display connector B-08
  - Connector disconnected.
  - Voltage between terminal (24) and body earth.
    OK: System voltage (ILL OFF), 0 –1 V (ILL OFF)
  - OK → Replace the multi center display
  - NG → Repair the fuse and the harness
- YES ↓

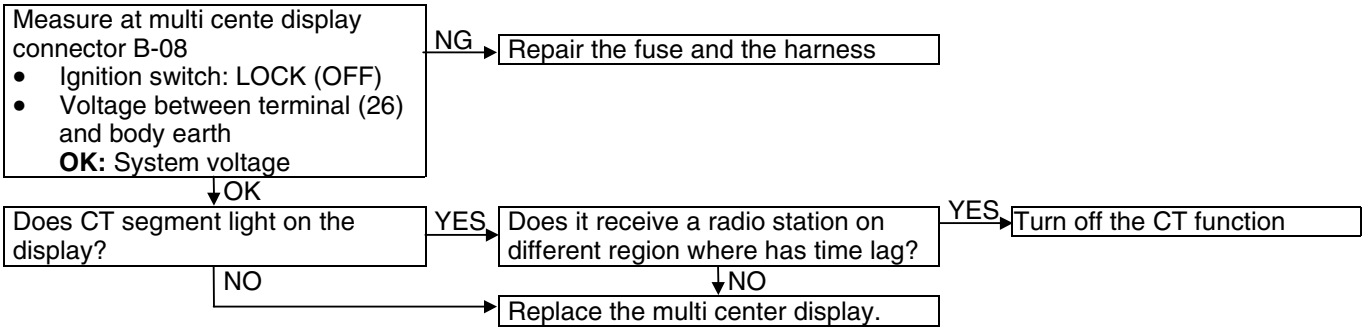
Check the setting position for brightness on display, is it correct?
- NO → Adjust brightness of display on setting mode
- YES ↓

Measure at the audio unit connector B-08.
- Connector disconnected.
- Rheostat: Max
- Voltage between terminal (32) and body earth.
  OK: Low (0 –3 V)

- OK → Replace the multi center display unit
- NG → Repair the harness.

INSPECTION PROCEDURE 8

Clock runs fast or slow/indicate different time.



MULTI CENTER DISPLAY <Added>

54600070025

TROUBLESHOOTING <Vehicles with navigation system>

NOTES WITH REGARD TO SERVICE PROCEDURES

1. Before removing the battery

The multi center display has a large amount of data stored in memory which the user enters over time. When the terminals are disconnected from the battery, the memory which stores this data is affected as shown in the table below. Accordingly, it is necessary to make sure that you take notes of important information before disconnecting the battery.

Function	Input function	When battery is disconnected
Radio function	Channels which are selected during a search	Disappear after a few seconds
	Preset channels	Do not disappear
Navigation function <Vehicles with navigation system>	Current location	
	Recommended route.	
	Destination	
	Route search conditions	
	Sensor initialization data	
	Language selection setting	
	Guidance volume setting	
Data search function, data display and input functions	Registered location names	
	Past destinations	
	Average fuel consumption, average speed, cruising range	Disappear after a few seconds
Clock display function	Current time	
Vehicle model settings for travel data	Setting details for vehicle model	
Monitor backlight luminance setting	Luminance setting value	

2. Notes on trouble diagnosis relating to the overall system.

(1) If a problem occurs which seems like all of the functions have developed an abnormality simultaneously, the cause is most likely a communication abnormality between the various systems. Thus you should use the communication checking service function in the trouble diagnosis functions in order to verify the cause.

Error Code No. 1091

Is the navigation unit very hot because of direct sunlight, heat, air, etc.? — YES → Repeat the wiring check after the navigation unit becomes cool.

↓ NO

Repeat the wiring check. If the same problem occurs, there is a malfunction of the CD drive within the navigation unit. → Replace the navigation unit

Error Code No. 1092, 1093, 1094, 1095, 1096

Is a CD-ROM for this navigation system inside? — NO → Insert the CD-ROM for this navigation system.

↓ YES

Is the CD-ROM inserted upside down? — YES → Insert the CD-ROM correctly.

↓ NO

Is the disc dirty, damaged or iced up? — YES → Repair or replace the disc.

↓ NO

Repeat the wiring check. If the same problem occurs, there is a malfunction of the CD drive within the navigation unit. → Replace the navigation unit.

Error Code No. 10A1, 10B1

Were the wiring check instructions followed? — NO → Repeat the wiring check.

↓ YES

Repeat the wiring check. If the same problem occurs, there is a malfunction of the memory within the navigation unit. → Replace the navigation unit.

Error Code No. 20D1, 30D1

Were the sensor check instructions followed? — NO → Repeat the sensor check.

↓ YES

Check the following connectors: B-57, B-47, B-102, B-14, A-81, A-85, A-86 — NG → **Repair**

↓ OK

Measure at the navigation unit connector B-57
- Disconnect connector.
- Turn on the Ignition switch and then move the vehicle slowly.
- Voltage between terminal (4) and body earth.
  OK: HI: 4 –5 V, Lo: 0 –1 V, pulse signal

NG → Check the vehicle speed sensor. (Refer to P.54-25.)

↓ OK

Replace the navigation unit.

Error Code No. 20E1, 20E2, 30E1, 30E2

Were the sensor check instructions followed? — NO → Repeat the sensor check

↓ YES

Repeat the sensor check. If the same problem occurs, there is a malfunction of Gyro sensor within the navigation unit. → Replace the navigation unit.

<The following are additional pages>

TROUBLESHOOTING <Vehicles without navigation system>

NOTES WITH REGARD TO SERVICE PROCEDURES

1. Before removing the battery

The audio system has a large amount of data stored in memory, which the user enters over time. When the terminals are disconnected from the battery, the memory, which stores this data, is affected as shown in the table blow. Accordingly, it is necessary to make sure that you take notes of important information before disconnecting the battery.

Function	Input function/memory	When battery is disconnected
Radio	Channels which are selected during a search	Disappear after a few seconds
	Preset channels.	
Tone/Balance	Position set on Bass, Treble, Balance and Fader	
Clock set on display	Current time	Keep a data for approx. one hour
Brightness set for display.	Position set on display	
Unit set for trip computer.	km or mile, L/100km or mpg or km/L	
Average speed on display.	Average speed after reset	
Average fuel consumption on display.	Average fuel consumption after reset	
Cruising range on display.	Cruising range, fuel economy	
Outside temperature on display.	A temperature after the ignition switch is turned to OFF (LOCK).	Keep a data for approx. one hour. If the engine is hot, the multi center display might show high temperature when the display unit is reconnected after one hour.

2. Diagnosis Function for Audio System

Audio system has the following diagnosis function.

Function	Contents
Speaker diagnosis function	This function checks if the speakers are all working normally on the audio system or not.
Service functions	There are the following 9 diagnosis modes available. (1) Model name and vehicle type. (2) Segment check. (illuminate) (3) Segment check. (only back-lamp) (4-7) ¼ segment check. (8) Temperature sensor and fuel gauge unit signal check. (9) Clock and connected components check.

3. Speaker Connection Diagnosis

Outline
- This diagnosis function checks whether the more than one wired speakers are normally connected to the audio unit and the speaker wiring is pinched in the vehicle.
- The test tone sounds from an applicable speaker according to the display (FL, FR, RL, RR).

Function explanation
To diagnose speaker connections, follow the procedure below to enter the mode.
1. Entry to test mode
   (1) Turn the ignition switch to ACC.
   (2) Turn off the power supply switch of the audio unit.
   (3) Press the "CH1" button.
   (4) Press the "Automatic tuning in down button."
   (5) Press the "Automatic tuning in up button."
   (6) Press the "CH6" button. Then the audio unit will enter the test mode.

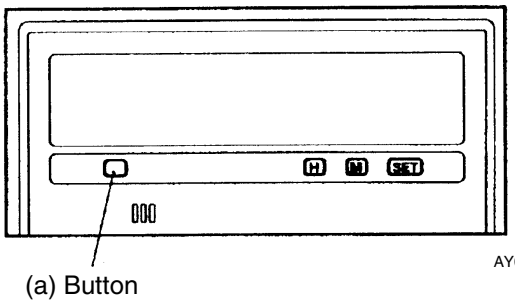
   NOTE
   The above operation must be finished within 60 seconds after the power supply switch is turned off (if 60 seconds have passed, the operation is invalid).
   If you fail in the operation, you must push the power supply switch twice to reset the unit. Then repeat the steps above from step (1).

   (7) The test tone will sound at a constant interval. If you want to change an applicable speaker, you should press the "CH6" button.

2. Canceling the test mode
   The test mode will be cancelled by one of the operations below.
   - Press any button (except the "CH6" button). In addition, if a mode button (UW/MW/LW, CD, TAPE) is pressed, the audio unit will enter an applicable function after canceling the test mode.
   - Turn the ignition switch to OFF(LOCK).

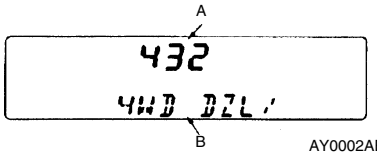
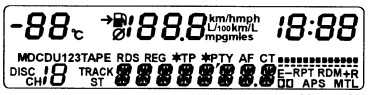
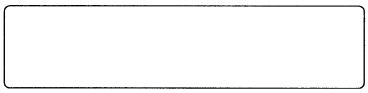
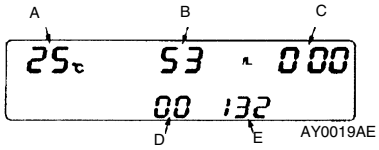
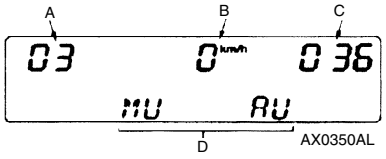
4. Service Mode For Multi Center Display
1. Enter and terminate the service mode

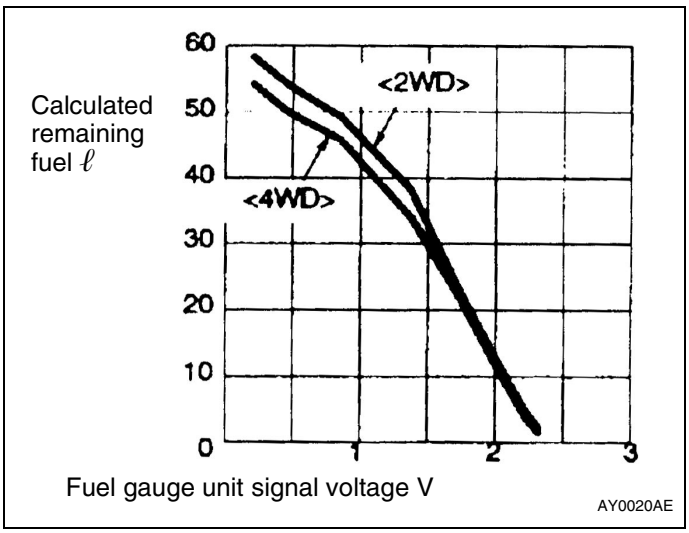
   (1) To enter the service mode, turn the ignition switch to LOCK (OFF)
   (2) Turn the ignition switch to ON while pressing the (A) button, then press the "H" button twice keeping the (A) button depressed.
   (3) Press the "SET" button.
   (4) Then the multi center display will enter the service mode
   The operation modes alternate each time the "SET" button is pressed.
   (6) To terminate the service mode, press any button other than the "SET" button.



AY0004AJ
(a) Button

2. Service mode menu and check procedure.
   The service mode display changes by pressing “SET” button by following order. (Next to No.9, the function returns to No.1 and repeats the sequence from No.1.)

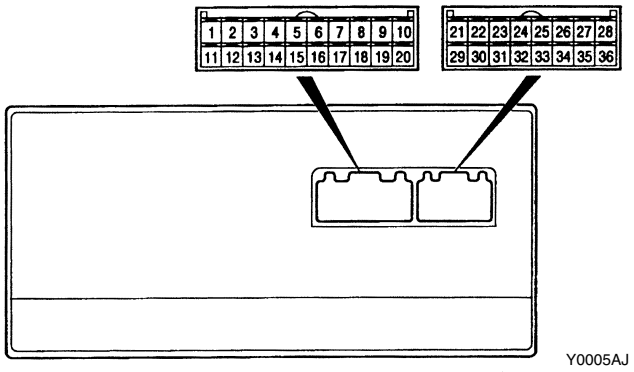
No.	Mode and display	Displayed contents	Unit	Checking item
1	Model name and vehicle type  AY0002AE	A. Display model	Code	Confirm the display model code. (“432” is displayed for this vehicle model.)
		B. Vehicle type	Code	Conform the vehicle type. (“2WD DZL/” <2WD> or “4WD DZL/” <4WD> is displayed for this vehicle type.)
2	Segment check (illuminate)  X0346AL	All segment illuminated	-	Check defect segments.
3	Segment check. (only back-lamp)  X0347AL	Back-lamp only. (All segment off)	-	Check damage, dust etc
4-7	¼ segment check.  X0348AL	Each ¼ segment illuminate. (4 different displays appear. The left figure shows the first display.)	-	Check short circuit.
8	Temperature sensor and fuel gauge unit signal check.  AY0019AE	A. Calculated outside temperature	°C	Check the displayed value.
		B. Calculated remaining fuel	ℓ	Check the displayed value. *2
		C. Consumed fuel quantity since	ℓ	Check the displayed value.
		D. Fuel gauge unit signal voltage	V*1	Check the displayed value. *2
		E. IG voltage	V*1	Check the displayed value. (Battery positive voltage)
9	Clock and connected components check.  AX0350AL	A. Voltage of MUT-II detection input	%	Connect: more than 80, Disconnect: less than 50.
		B. Calculated vehicle speed.	Km/h	Check the displayed value
		C. Clock	Sec	Confirm operating.
		D. Connecting components	Name	Confirm connected components. (‘MU”: MUT-II, “AU”: audio.)



NOTE
*1: The indication is made in 0.1V step.
*2: The relationship between the calculated remaining fuel and fuel gauge unit signal voltage is as shown in the graph at left.

MAIN UNIT TERMINAL VOLTAGES

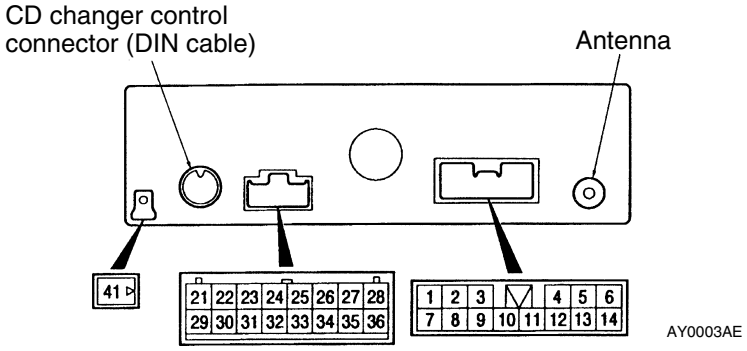
3. MULTI CENTER DISPLAY UNIT



Terminal No.	Input/ Output	Signal Symbol	Terminal Voltage (V)	Harness Problem		Trouble Symptom Resulting from Harness Problem
				Open circuit	Short circuit	
1-4	-	-	-	-	-	-
5	Input	ISOK	Hi: System voltage Lo: 0 - 1	O	O	MUT-II cannot be used to check engine-ECU
6	-	-	-	-	-	-
7	Input/ Output	M-DATA (AUDIO)	Hi: 4 - 5 Lo: 0 - 1	O	O	Audio display does not appear. Panel switch cannot be operated for audio unit. Nighttime illumination dose not appear for audio unit.
8	Input/ Output	M-CLOCK (AUDIO)	Hi: 4 - 5 Lo: 0 - 1	O	O	Audio display does not appear. Panel switch cannot be operated for audio unit. Nighttime illumination dose not appear for audio unit.
9-14	-	-	-	-	-	-
15	Input/ Output	K	Hi: System voltage Lo: 0 - 1	O	O	Values on Trip information screen (instant fuel consumption, average fuel consumption, driving range and average speed) are abnormal. Communication is not possible between the engine-ECU and the MUT-II
16	-	-	-	-	-	-
17	Input/ Output	M-BUSY (AUDIO)	Hi: 4 - 5 Lo: 0 - 1	O	O	Audio display does not appear. Panel switch cannot be operated for audio unit. Nighttime illumination does not appear for audio unit.

Terminal No.	Input/ Output	Signal Symbol	Terminal voltage (V)	Harness problem		Trouble Symptom Resulting from Harness Problem
				Open circuit	Short circuit	
18	-	SHIELD-GND	-	-	-	-
19-22	-	-	-	-	-	-
23	Input	EX-TEMP		○	○	Outside air temperature does not appear
24	Input	ILL+	Hi: System voltage Lo: 0 - 1	○	-	Nighttime illumination does not appear for any navigation system units
				-	○	Blown multipurpose fuse.
25	Input	ACC (ACC power supply)	System voltage	○	-	Screen display does not appear
				-	○	Blown multipurpose fuse
26	Input	+B	System voltage	○	-	Screen display does not appear
				-	○	Blown multipurpose fuse
27	-	-	-	-	-	-
28	-	GND (ground)	-	○	-	Screen display does not appear
29,30	-	-	-	-	-	-
31	-	GND-TEMP	-	○	○	Outside air temperature does not appear
32	-	ILL-	-	-	-	-
33	Input	FUEL GAUGE	-	○	○	Abnormal cruising distance display
34,35	-	-	-	-	-	-
36	Input	IG1	System voltage	○	-	Communication with engine-ECU is not possible. Driving data values displayed are abnormal
				-	○	Communication with engine-ECU is not possible. Driving data values displayed are abnormal. Blown multipurpose fuse

2. AUDIO UNIT



Terminal No.	Input/ Output	Signal Symbol	Terminal voltage (V)	Harness problem		Trouble Symptom Resulting from Harness Problem
				Open circuit	Short circuit	
1	Output	SPEAKER RR (+)	0- System voltage (AC)	○	-	No sound is output from rear right speakers.
				-	○	No sound is output from rear left and right speaker.
2	Output	SPEAKER RL (+)	0- System voltage (AC)	○	-	No sound is output from rear left speaker.
				-	○	No sound is output from rear left and right speakers.
3	-	-	-	-	-	-
4	Input	ILL (+)	Hi: System voltage Lo: 0 - 1	○	-	Nighttime illumination does not appear for audio unit
				-	○	Blown multipurpose fuse
5	Output	SPEAKER FL (+)	0- System voltage (AC)	○	-	No sound is output from front left speaker.
				-	○	No sound is output from front left and right speakers.
6	Output	SPEAKER FR (+)	0- System voltage (AC)	○	-	No sound is output from front right speaker.
				-	○	No sound is output from front left and right speakers.
7	Output	SPEAKER RR (-)	0- System voltage (AC)	○	-	No sound is output from rear right speaker.
				-	○	No sound is output from rear left and right speakers.
8	Output	SPEAKER RL (-)	0- System voltage (AC)	○	-	The rear left speaker does not sound
				-	○	The rear left and right speakers do not sound

Terminal No.	Input/ Output	Signal Symbol	Terminal voltage (V)	Harness problem		Trouble Symptom Resulting from Harness Problem
				Open circuit	Short circuit	
9	-	-	-	-	-	-
10	Input	ACC (ACC power supply) (System voltage)	System voltage	○	-	The audio unit power supply does not turn on.
				-	○	Blown multipurpose fuse.
11	Input	+B (System voltage)	System voltage	○	-	Cassette or CD is not ejected when the ignition switch is at ACC. The memory is cleared.
				-	○	Blown multipurpose fuse.
12	-	ILL (-)	-	-	-	-
13	Output	SPEAKER FL (-)	0 - System voltage (AC)	○	-	The front left speaker does not sound.
				-	○	The front left and right speakers do not sound.
14	Output	SPEAKER FR (-)	0 - System voltage (AC)	○	-	The front right speaker does not sound.
				-	○	The front left and right speakers do not sound.
21	Input/ Output	M-DATA	Hi: 4 or more Lo: 1 or less	○	○	Panel switches can not be operated.
22	Input/ Output	M-SCK	Hi: 4 or more Lo: 1 or less	○	○	Panel switches cannot be operated.
23-28	-	-	-	-	-	-
29	Input/ Output	M-BUSY	Hi: 4 or more Lo: 1 or less	○	○	Panel switches cannot be operated.
30	-	SHIELD EARTH (M-BUS)	-	-	-	-
31-36	-	-	-	-	-	-
41	-	GND (Ground)	-	-	-	-

INSPECTION CHART CLASSIFIED BY TROUBLE SYMPTOMS

Related Unit	Trouble symptom	Inspection Procedure No.	Reference Page
Malfunction of multi-center display	No display appears after the ignition key is turned to ACC.	1	54-106-8
	TAPE, CD and UML switches do not work.	2	54-106-9
	CD changer do not work.	3	54-106-9
	Outside temperature data is not displayed. /Outside temperature data is abnormal	4	54-106-10
	Abnormal driving data display • Abnormal instant fuel consumption, average fuel consumption and average speed displays. • Abnormal driving range displays	5	54-106-10
	No illumination of audio button	6	54-106-11
	Dim display	7	54-106-11
	Clock runs fast or slow	8	54-106-12

INSPECTION PROCEDURE FOR EACH TROUBLE SYMPTOM

INSPECTION PROCEDURE 1

No display appears after the ignition key is turned to ACC.

Check the connector: B-03
NG → **Repair**
↓OK

Measure at multi center display connector B-03
- Ignition switch: ACC
- Voltage between terminal (25), (26) and body earth
  OK: System voltage

NG → Repair the fuse and the harness.
↓OK

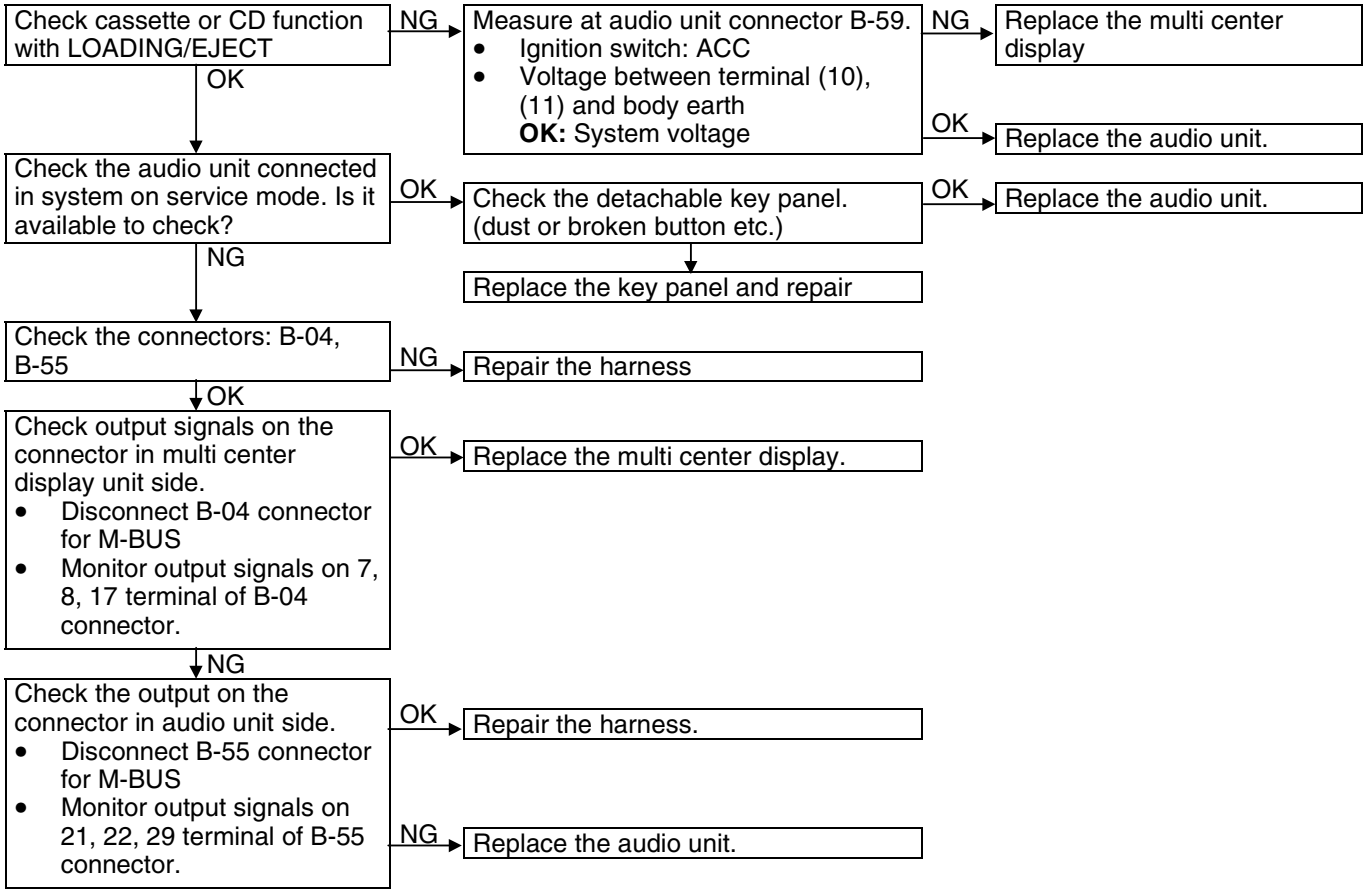
Measure at multi center display connector B-03
- Check continuity between terminal (28) and body earth.
  OK: Continuity exist

NG → Repair the harness
↓OK

Replace the multi center display unit.

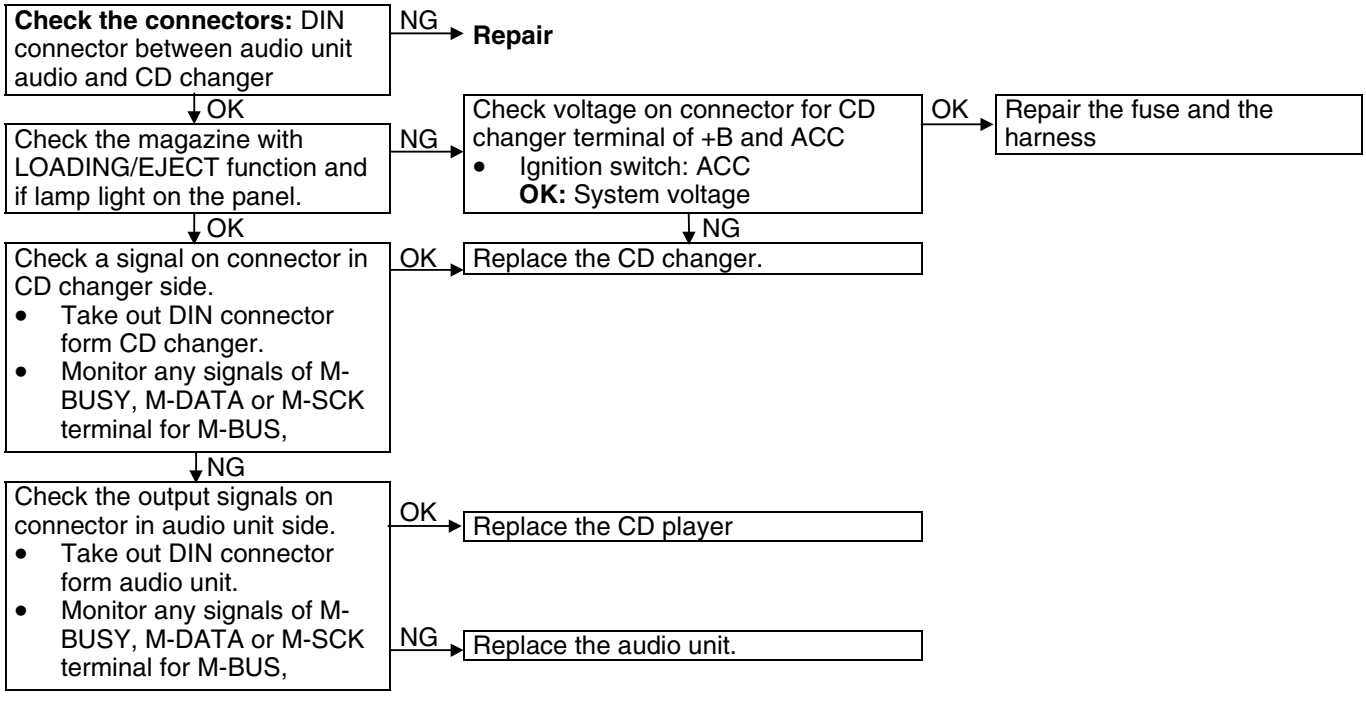
INSPECTION PROCEDURE 2

TAPE, CD and UML switches do not work



INSPECTION PROCEDURE 3

CD changer does not work.



INSPECTION PROCEDURE 4

Outside air temperature data is not displayed. /Outside air temperature data is abnormal.

Check the connector: B-03
- NG → **Repair**
- OK ↓

Does the multi center display unit show the vehicle identifications correctly?
- NO → Replace the multi center display unit
- YES ↓

Does the service mode show outside air temperature correctly?
- YES → End (no abnormality)

If the vehicle is driven in places where outside temperature varies much, an incorrect temperature may be displayed. In that case, drive the vehicle for a while so that the display shows a correct temperature.

In addition, if the engine is hot after the battery is replaced or the multi-center display unit is reinstalled, an incorrect temperature may be displayed

- NO ↓

Check the harness between the multi center display and the outside temperature sensor
- NG → **Repair**
- OK ↓

Replace the outside temperature sensor.
- OK → End
- NG ↓

Replace the multi center display unit.

INSPECTION PROCEDURE 5

Abnormal driving data displays,
- Abnormal instant fuel consumption, average fuel consumption and average speed displays.
- Abnormal driving range displays.

1. When instant fuel consumption, average fuel consumption and average speed are abnormal.

Check the connectors: B-03
- NG → **Repair**
- OK ↓

Check the multi center display unit connected into system on service mode.
Does MU light on the display
- YES → Check a voltage on (5) terminal of B-04 connector after B-04 connector shall be out.
  - Ignition switch: ON
  - **OK:** Low (0-1V)
  - **NG:** More than 80% of system voltage
    - NG → Check the harness
      Disconnect MUT-II
    - OK ←
- NO ↓

Measure at multi center display connector B-03
- Connector disconnected.
- Voltage between terminal (36) and body earth
  OK: Ignition switch ON: System voltage
  NG: ignition switch OFF:0-1V
- NG → Check the harness between multi center display unit and junction block, and replace if necessary.
- OK ↓

Check the connections between the multi center display unit and the engine ECU.
- OK → Replace the Multi center display unit
- NG ↓

Check the harness between the multi center display unit and the engine-ECU, and Replace if necessary.

2. When driving range display is abnormal.

Outside air temperature data is not displayed. /Outside air temperature data is abnormal.

Are the average fuel consumption and average vehicle speed displayed normally?
- NG → Carry out troubleshooting according to procedure 5.1.
- OK ↓

Does the service mode show fuel amount correctly?
- YES → End (no abnormality)
  An inaccurate fuel amount may be displayed for a while after refuelling. In addition, it depends on road and driving conditions whether an accurate fuel amount is displayed.
- NO ↓

Measure at multi center display connector B-03
- Connector disconnected.
- Voltage between terminal (33) and body earth
  OK: 0.1 –3.0 V

NG → Check the harness between multi center display unit and the fuel gauge unit, and Replace if necessary.
Relative unit: Combination meter, fuel gauge unit

OK ↓

Replace the multi center display unit.

INSPECTION PROCEDURE 6

No illumination for audio buttons light on.

Check if the brightness of display changes when the lighting switch is on or off.
- NO → Measure at multi center display connector B-03
  - Connector disconnected.
  - Voltage between terminal (24) and body earth.
    OK: System voltage (ILL ON), 0 –1 V (ILL OFF)
  - OK → Replace the multi center display
  - NG → Repair the fuse and the harness
- YES ↓

Check the function for TAPE, CD and UML.
- NO → Carry out troubleshooting according to procedure 2.
- YES ↓

Measure at the audio unit connector B-59.
- Connector disconnected.
- Rheostat: Max
- Voltage between terminal (12) and body earth.
  OK: Low (0 –3 V)

OK → Replace the audio unit.

NG → Repair the harness.

INSPECTION PROCEDURE 7

Dim display

Check if the brightness of display changes when the lighting switch is on or off.
- NO → Measure at multi center display connector B-03
  - Connector disconnected.
  - Voltage between terminal (24) and body earth.
    OK: System voltage (ILL ON), 0 –1 V (ILL OFF)
  - OK → Replace the multi center display
  - NG → Repair the fuse and the harness
- YES ↓

Check the setting position for brightness on display, is it correct?
- NO → Adjust brightness of display on setting mode
- YES ↓

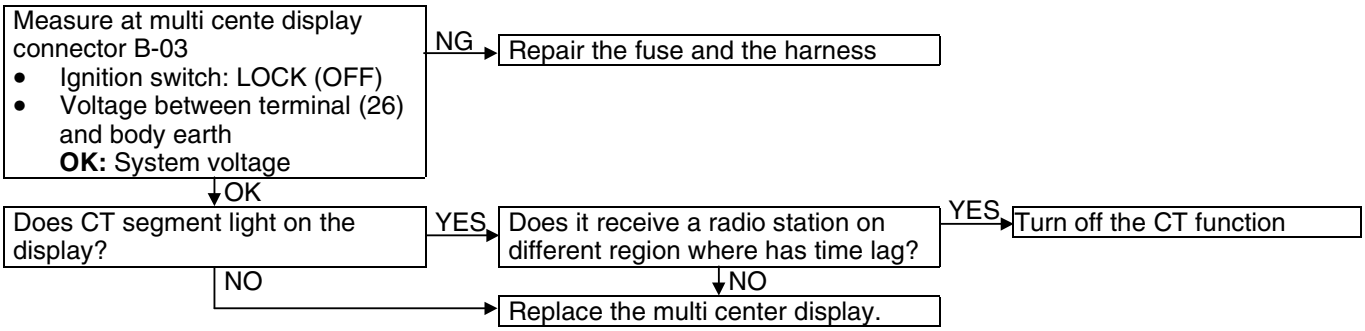
Measure at the multi center display connector B-03.
- Connector disconnected.
- Rheostat: Max
- Voltage between terminal (32) and body earth.
  OK: Low (0 –3 V)

OK → Replace the multi center display unit

NG → Repair the harness.

INSPECTION PROCEDURE 8

Clock runs fast or slow/indicate different time.



CHASSIS ELECTRICAL

CONTENTS

GENERAL

OUTLINE OF CHANGES

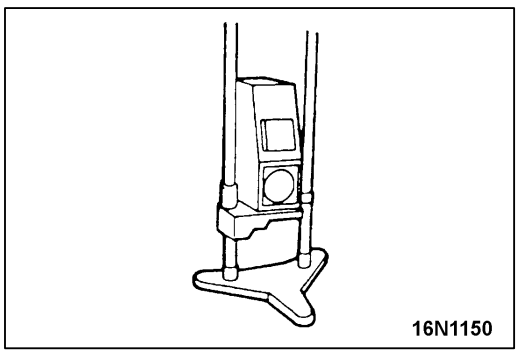
The following service procedures have been changed due to the following changes. The other service procedures are the same as before.

- The headlamps have been changed.
- The front fog lamps have been changed.
- The shape of the rear combination lamps has been changed.

HEADLAMP AND FRONT TURN-SIGNAL LAMP

SERVICE SPECIFICATIONS

Item		Standard value	Limit
Headlamp aiming for low beam	Vertical direction	60 mm below horizontal (H)	–
	Horizontal direction	Position where the 15° sloping section intersects the vertical line (V)	–
Headlamp intensity cd		–	30,000 or more



ON-VEHICLE SERVICE

HEADLAMP AIMING

<USING A BEAM SETTING EQUIPMENT>

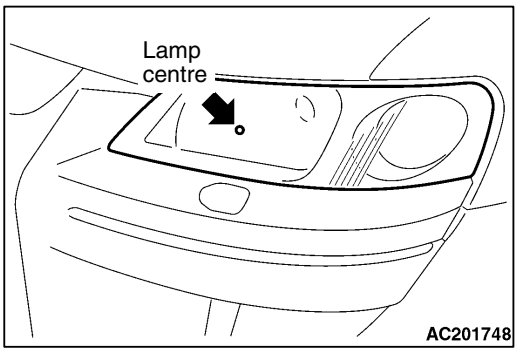
1. The headlamps should be aimed with the proper beam setting equipment, and in accordance with the equipment manufacture's instructions.

   NOTE
   If there are any regulations pertinent to the aiming of headlamps in the area where the vehicle is to be used, adjust so as to meet those requirements.

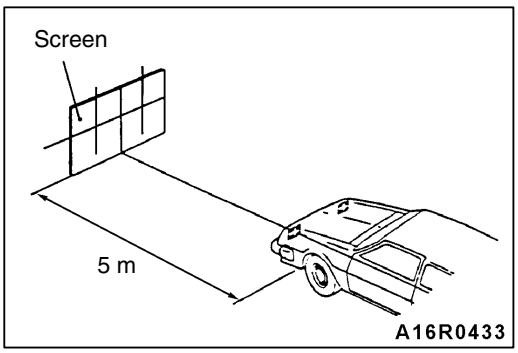
2. Alternately turn the adjusting screw to adjust the headlamp aiming. (Refer to P.54-3.)

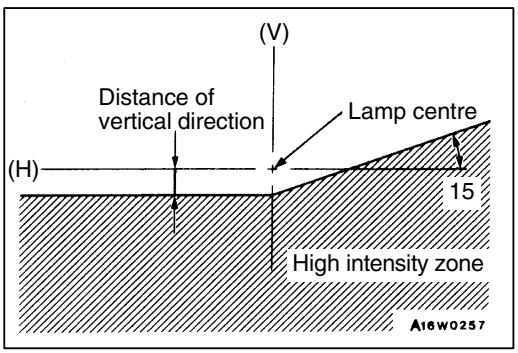
<USING A SCREEN>

1. Inflate the tyres to the specified pressures and there should be no other load in the vehicles other than driver or substituted weight of approximately 75 kg placed in driver's position.



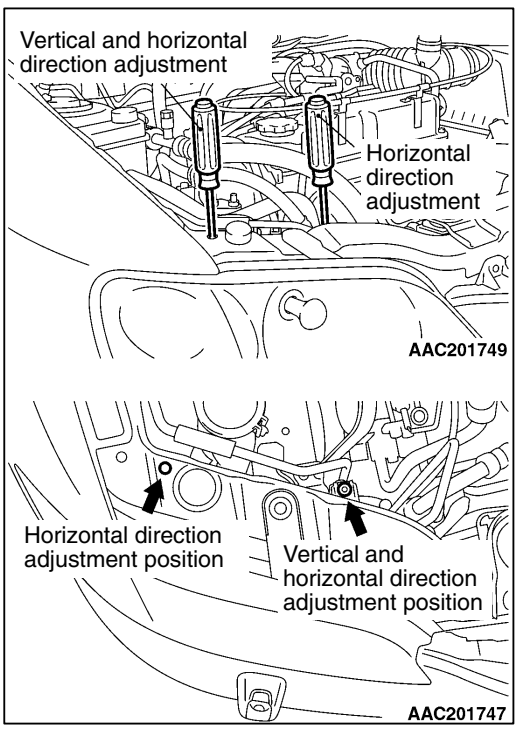
2. Set the distance between the screen and the centre marks of the headlamps as shown in the illustration.





3. Check if the beam shining onto the screen is at the standard value.

Standard value:
(Vertical direction)
60 mm below horizontal (H)
(Horizontal direction)
Position where the 15° sloping section intersects the vertical line (V)



4. Alternately turn the adjusting screw to adjust the headlamp aiming.

Caution
Be sure to adjust the aiming adjustment screw in the tightening direction.

INTENSITY MEASUREMENT

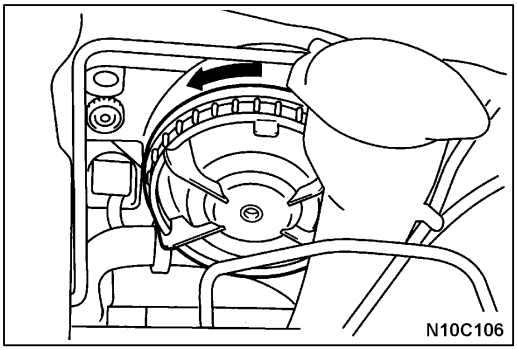
Using a photometer, and following its manufacture's instruction manual, measure the headlamp intensity and check to be sure that the limit value is satisfied.

Limit: 30,000 cd or more

NOTE

1. When measuring the intensity, maintain an engine speed of 2,000 r/min, with the battery in the charging condition.
2. There may be special local regulations pertaining to headlamp intensity, be sure to make any adjustments necessary to satisfy such regulations.
3. If an illuminometer is used to make the measurements, convert its values to photometer values by using the following formula.

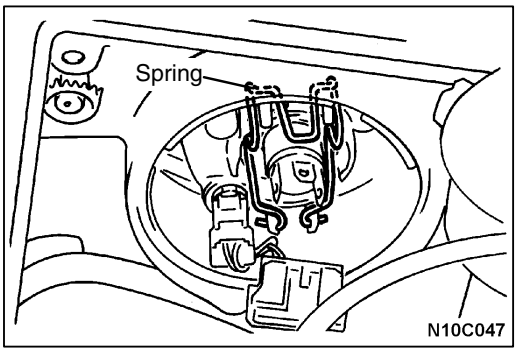
   $I = Er^2$ Where:
   I=intensity (cd)
   E=illumination (lux)
   r=distance (m) from headlamps to illuminometer



BULB REPLACEMENT

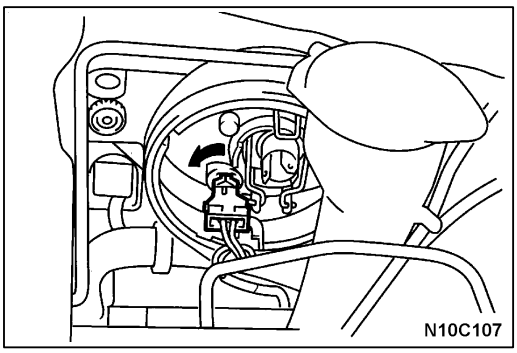
<Headlamp Bulb>

1. Remove the sealing cover by turning it anti-clockwise and disconnect the connector.



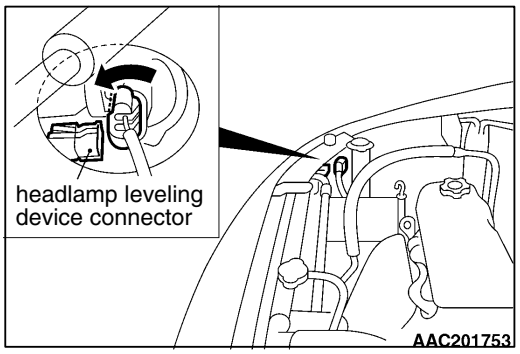
2. Unhook the spring which secures the bulb, and then remove the bulb.

   Caution
   Do not touch the surface of the bulb with hands or dirty gloves. If the surface does become dirty, clean it with alcohol or thinner, and let it dry thoroughly before installing.



<Position Lamp Bulb>

1. Remove the sealing cover by turning it anti-clockwise.
2. Remove the lamp socket by turning it anti-clockwise, then pull out the bulb from the socket.



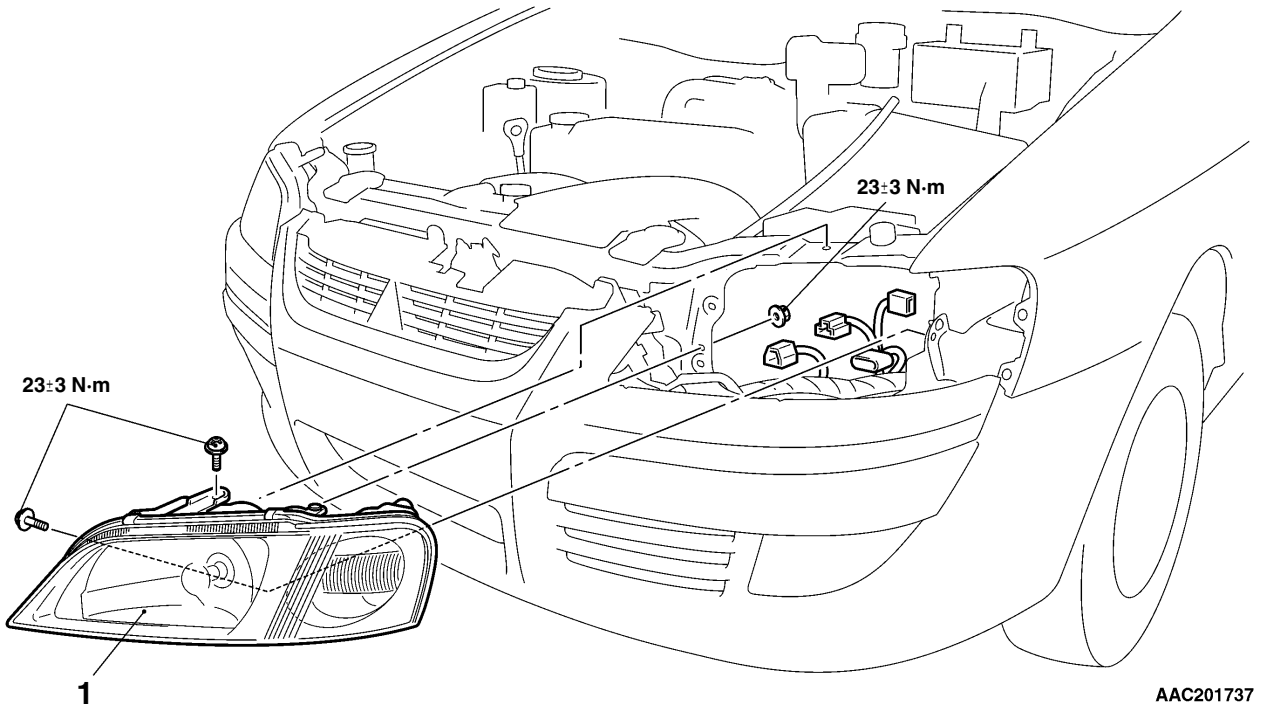
<Front Turn-signal Lamp Bulb>

1. Remove the headlamp leveling device connector while holding it.
2. Turn the lamp socket anticlockwise and pull it out to remove the lamp bulb.

HEADLAMP AND FRONT TURN-SIGNAL LAMP

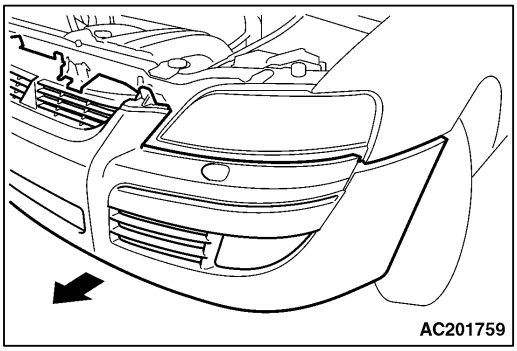
REMOVAL AND INSTALLATION

Pre-removal and Post-installation Operation
- Removal and Installation of Radiator Reserve Tank (When replacing only left side headlamp).



Headlamp removal steps
- Front bumper installation bolt and clip (Refer to GROUP 51 – Front Bumper.)

◀A▶ 1. Headlamp



REMOVAL SERVICE POINT

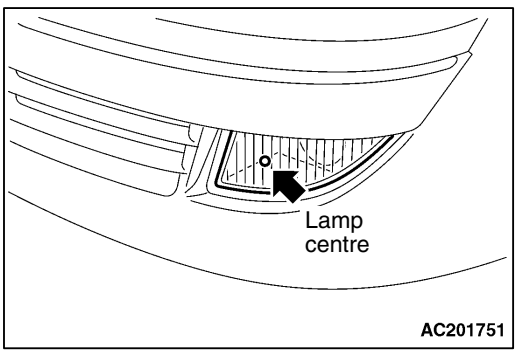
◀A▶ HEADLAMP REMOVAL

1. Remove the front bumper assembly mounting bolt and clips.
2. Pull the front bumper towards the arrow while removing the headlamp.

FRONT FOG LAMP

SERVICE SPECIFICATIONS

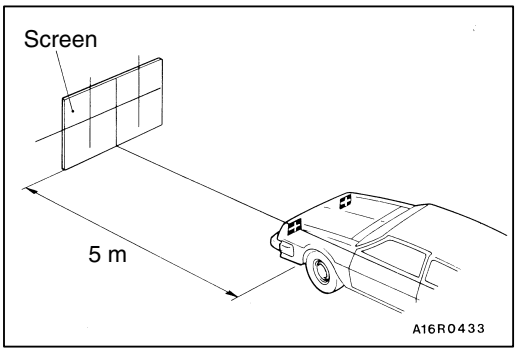
Item		Standard value
Front fog lamp aiming	Vertical direction	100 mm below horizontal (H)
	Horizontal direction	Parallel to direction of vehicle travel



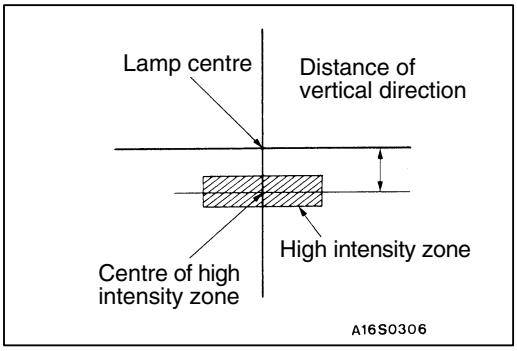
ON-VEHICLE SERVICE

FRONT FOG LAMP AIMING

1. Measure the centre of the fog lamps, as shown in the illustration.

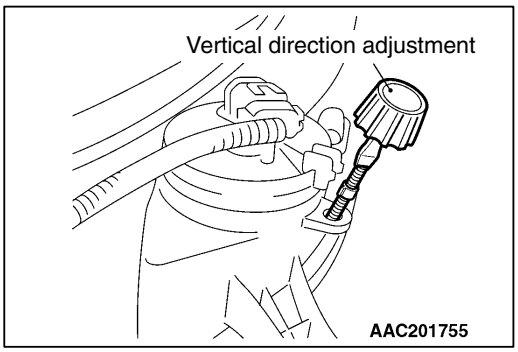


2. Set the distance between the screen and the centre of the fog lamps as shown in the illustration.
3. Inflate the tyres to the specified pressures and there should be no other load in the vehicles other than driver or substituted weight of approximately 75 kg placed in the driver's position.
4. With the engine running at 2,000 r/min, aim the fog lamp.



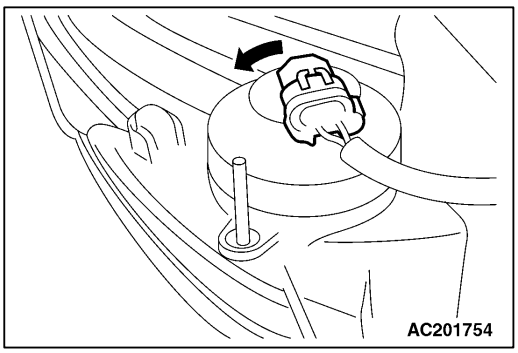
5. Check if the beam shining onto the screen is at the standard value.

Standard value:
(Vertical direction)
100 mm below horizontal (H)
(Horizontal direction)
Parallel to direction of vehicle travel



NOTE
The horizontal direction is non-adjustable. If the deviation of the light beam axis exceeds the standard value, check to be sure that the mounting location or some other point is not defective.

Caution
When making the aiming adjustment, be sure to mask those lamps which are not being adjusted.



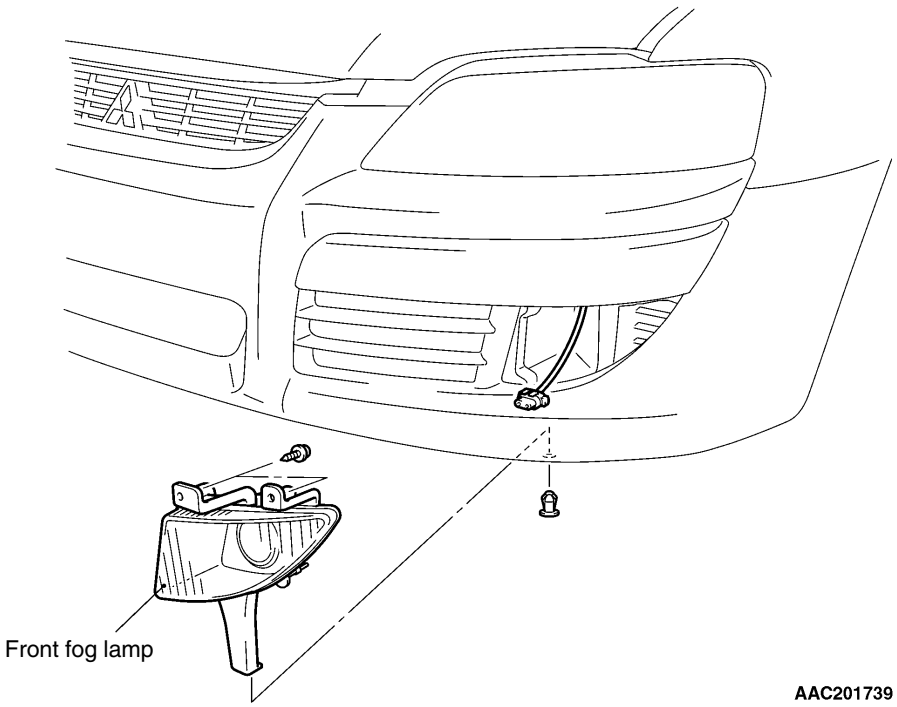
BULB REPLACEMENT

Turn the lamp socket anticlockwise and pull it out and remove the lamp bulb.

Caution

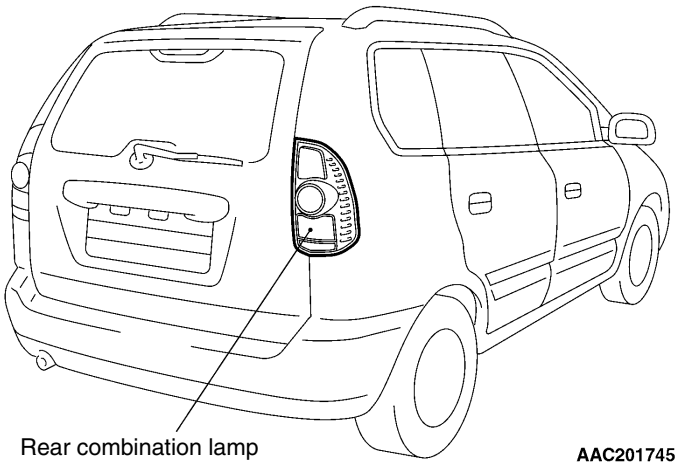
Do not touch the surface of the bulb with hands or dirty gloves. If the surface does become dirty, clean it with alcohol or thinner, and let it dry thoroughly before installing.

FRONT FOG LAMP



REAR COMBINATION LAMP

REAR COMBINATION LAMP



SERVICE BULLETIN

PUBLICATION GROUP, AFTER SALES SERVICE DEP.
MITSUBISHI MOTOR SALES EUROPE BV

SERVICE BULLETIN	**No.:** ESB-00E54-509	
	Date: 2001-07-03	**<Model>** / **<M/Y>**
Subject: OMISSION OF DESCRIPTIONS OF IMMOBILIZER SYSTEM		(EC)CARISMA(DA) 00-01 (EC)SPACE STAR (DG0A) 01-01
Group: CHASSIS ELECTRICAL	**Draftno:** 00CH101109	
CORRECTION	O. Kai - E.V.P. & G.M. After Sales Service Dept.	

1. Description:

On Carisma and Space Star (new generation), omission of descriptions of the immobilizer system has been rectified.

2. Applicable Manuals:

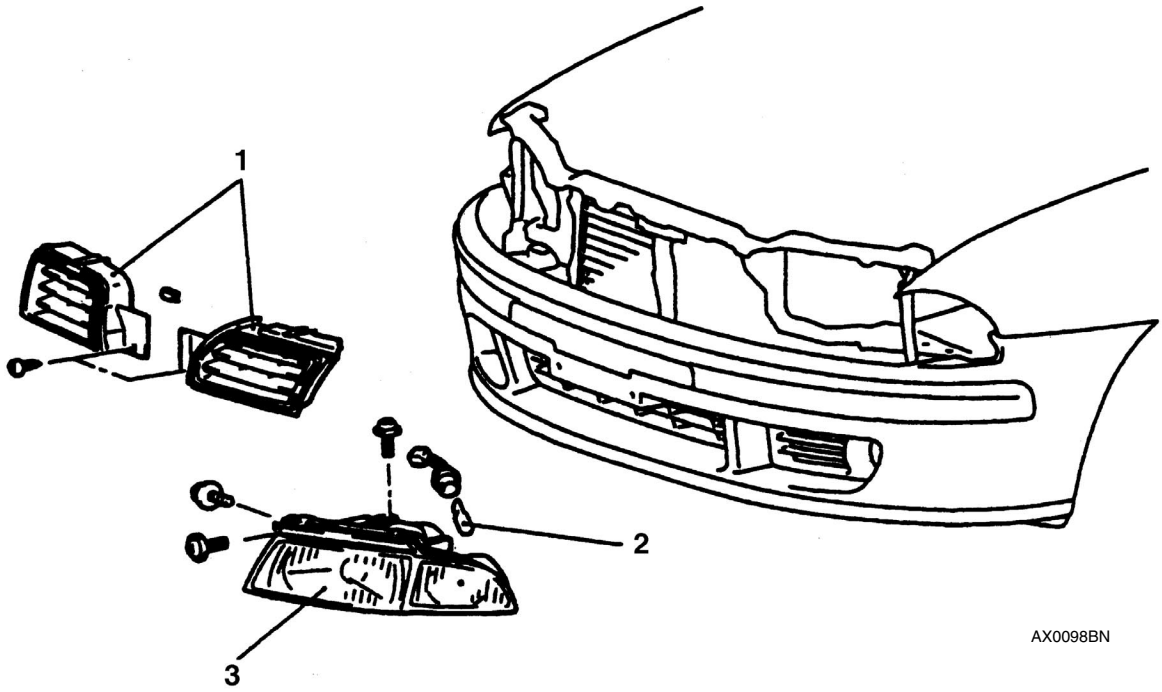
Manual	Pub. No.	Language	Page(s)
2000 CARISMA Workshop Manual chassis SUPPLEMENT	PWDE9502-D	(English)	54-2
	PWDS9503-D	(Spanish)	
	PWDF9504-D	(French)	
	PWDG9505-D	(German)	
	PWDD9506-D	(Dutch)	
	PWDW9507-D	(Swedish)	
	PWDI96E1-D	(Italian)	
2001 SPACE STAR Workshop Manual chassis SUPPLEMENT	CMXE99E1-A	(English)	54-1
	CMXS99E1-A	(Spanish)	
	CMXF99E1-A	(French)	
	CMXG99E1-A	(German)	
	CMXD99E1-A	(Dutch)	
	CMXW99E1-A	(Swedish)	
	CMXI99E1-A	(Italian)	
2001 SPACE STAR Information Manual chassis SUPPLEMENT	IMXE99E1-A	(English)	7-1

GENERAL
OUTLINE CHANGES
- The service procedure has been revised as the headlamp and the front turn-signal lamp have been unified.
- The service procedure has been revised due to the change in the rear combination lamp.
- The service procedure has been revised due to the change in the rear window defogger switch <Vehicles with manual air conditioner>.
- The service procedure has been added as the multi center display has been introduced. Furthermore, the multi center display is the same as for SPACE STAR and SPACE WAGON.
- The SRS warning lamp bulb inside the combination meter has been changed from 1.4 W to 0.84 W.

11 pages added here (next page and after).

HEADLAMP
REMOVAL AND INSTALLATION

Pre-removal and Post-Installation Operation
- Removal and installation of radiator reserve tank and battery (When replacing only left side headlamp).



Removal steps
1. Radiator grille (Refer to GROUP 51)
2. Front turn-signal lamp bulb
3. Headlamp assembly

CHASSIS ELECTRICAL – GENERAL INFORMATION

GENERAL INFORMATION

IMMOBILIZER SYSTEM

The immobilizer system consists of the ignition key, the key ring antenna, the immobilizer-ECU, and the engine-ECU<GDI, MPI M/T>, engine-A/T-ECU<MPI A/T> or fuel cut valve controller<DIESEL>. The ignition key has a built-in transponder as the oscillator. The key ring antenna is installed on the steering lock key cylinder. Only the registered ignition key permits the engine to start, therefore, the engine can never be start by means of a forged key or by connecting the if ignition wiring directly. The system is significantly sage and reliable against theft. In addition, the driver has only to turn the ignition switch to the ”ON” position to activate the immobilizer system. If the ignition key is lost or another ignition key is added, all the key must be registered again by using the scan tool MB991502 (MUT-II) for security reasons.

CONSTRUCION DIAGRAM

The system prevents the engine from being started deviously to protect the vehicle from theft, The operation is as follows.

1. When the ignition switch is turned ”ON” position, the engine-ECU<GDI>, MPI M/T, engine-A/T-ECU<MPI> A/T> or fuel cut valve controller <DIESEL> sends a requirement for the encrypted code to the immobilizer-ECU(at this time, the engine is remobilezed).
2. When the immobilizer-ECU receives the requirement form the engine-ECU<GDI, MPI M/T>, engine-A/T> or fuel cut valve controller <DIESEL> transponder inside the ignition key via the antenna. The energised transponder sends the encrypted code back to the immobilizer-ECU via the antenna.
3. The immobilizer-ECU judges the encrypted code with its code logic in itself, If they are identical, the immobilizer-ECU sends the encrypted code to the engine-ECU<GDI, MPI M/T>, engine-A/T-ECU,MPI A/T> or fuel cut valve controller <DIESEL>.
4. If the engine-ECU<GDI, MPI M/T>< engine A/T-ECU<MPI A/T> or fuel cut valve controller <DIESEL> can not receive the encrypted code, the engine will be immobilized.

DISPOSITION WHEN REPLACING IMMOBILIZER SYSTEM RELATED PARTS

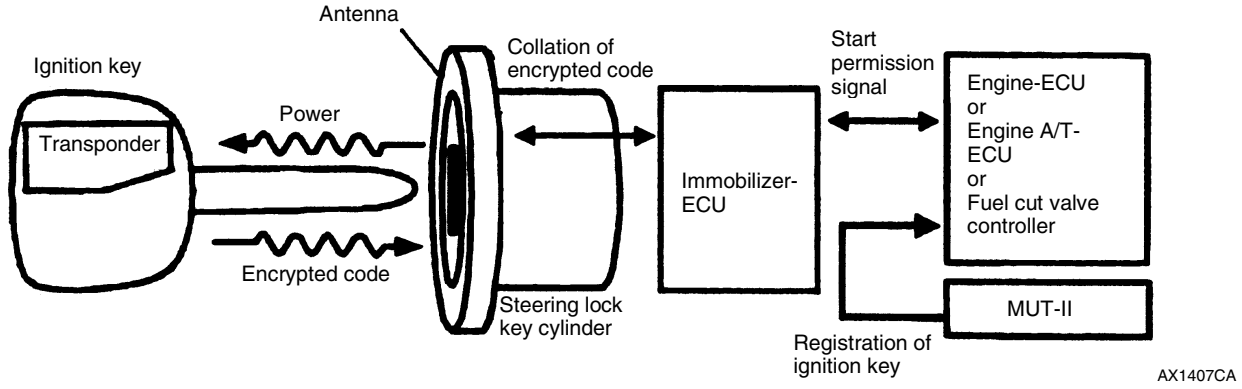
The replacing immobilizer system related parts is as follows. When the ignition key is re-registered with the MUT-II, the originally registered ignition key registration key registration information will be lost.

<PETROL>

	Engine-ECU <GDI,MPI M/T> Engine-A/T-ECU <MPI A/T>	Immobilizer-ECU	Ignition key
When replacing engine-ECU <GDI, MPI M/T>, engine-A/T-ECU <MPI A/T>	-	Replacement required	Replacement and re-registration are required.
When rewriting engine-ECU <GDI, MPI M/T>, engine-A/T-ECU <MPI A/T>	-	Replacement not required	Replacement not required, re-registration not required.
When replacing immobilizer-ECU	Replacement not required (Initialization is required.)	-	Replacement not required, registration are required
When adding ignition key newly	Replacement not required	Replacement not required	Register ignition key to be added and re-register all other ignition keys.
When ignition key is lost	Replacement not required	Replacement not required	Re-register all other ignition keys except the lost one.

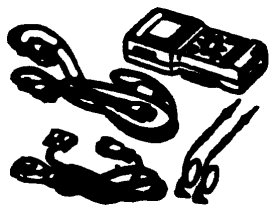
<DIESEL>

	Fuel cut valve controller	Immobilizer-ECU	Ignition key
When replacing Fuel cut valve controller	-	Replacement required	Replacement not required, re-registration not required.
When replacing immobilizer-ECU	Replacement not required (Initialization is required.)	-	Replacement and re-registration are required.
When adding ignition key newly	Replacement not required	Replacement not required	Register ignition key to be added and re-register all other ignition keys
When ignition key is lost	Replacement not required	Replacement not required	Re-register all other ignition keys except the lost one.



IGNITION SWITCH AND IMMOBILIZER SYSTEM

SPECIAL TOOL

Tool	Number	Name	Use
	MB991502	MUT-II sub assembly	• Immobilizer system check (Diagnosis display using the MUT-II) • Registration of the encrypted code

TROUBLESHOOTING

Caution
The encrypted code should always be re-registered when replacing the immobilizer-ECU.

STANDARD FLOW OF DIAGNOSIS TROUBLESHOOTING

Refer to Basic Manual.

DIAGNOSIS FUNCTION

DIAGNOSIS CODES CHECK

Refer to Basic Manual.

ERASING DIAGNOSIS CODES

Refer to Basic Manual.

Caution
The diagnosis codes which result form disconnecting the battery cables cannot be erased.

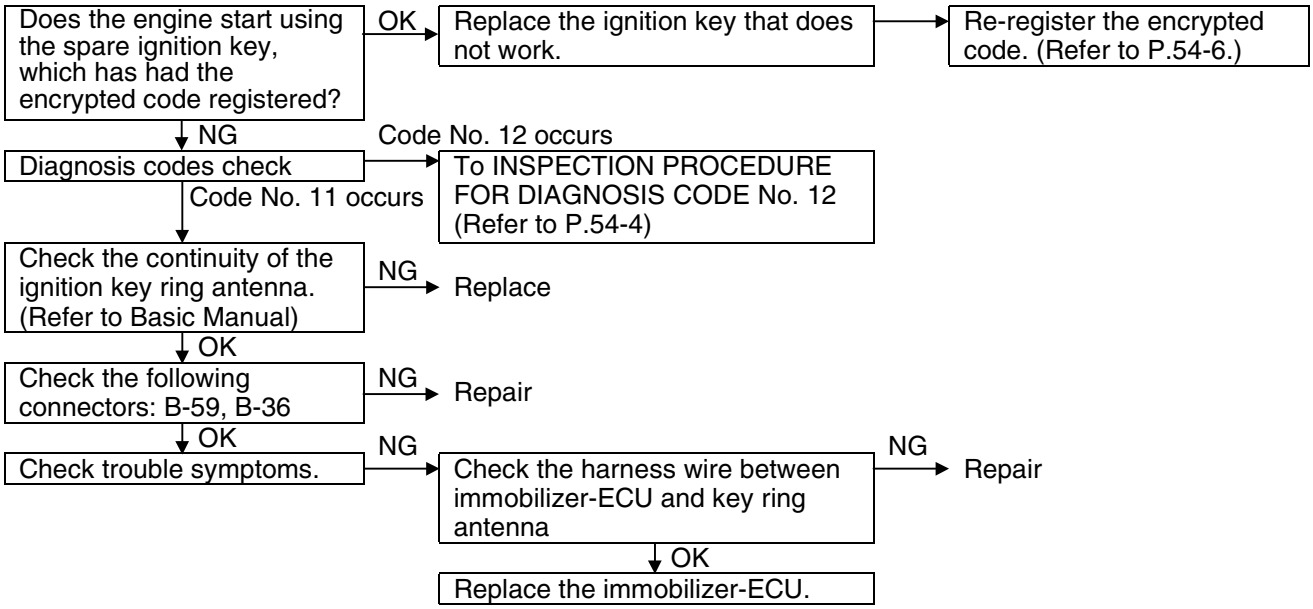
INSPECTION CHART FOR DIAGNOSIS CODES <Petrol-powered vehicles>

Diagnosis code No.	Inspection items	Reference page
11	Transponder communication system	54-4
12	Encrypted code are not the same or are not registered	54-4
33	Starting prevention system activated due to incorrect operation	54-4

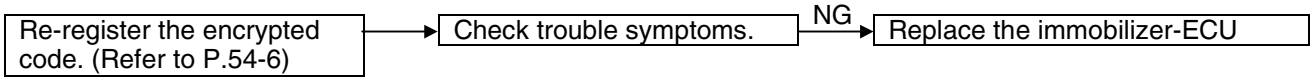
CHASSIS ELECTRICAL – Ignition Switch and Immobilizer System

INSPECTION PROCEDURE FOR DIAGNOSIS CODES

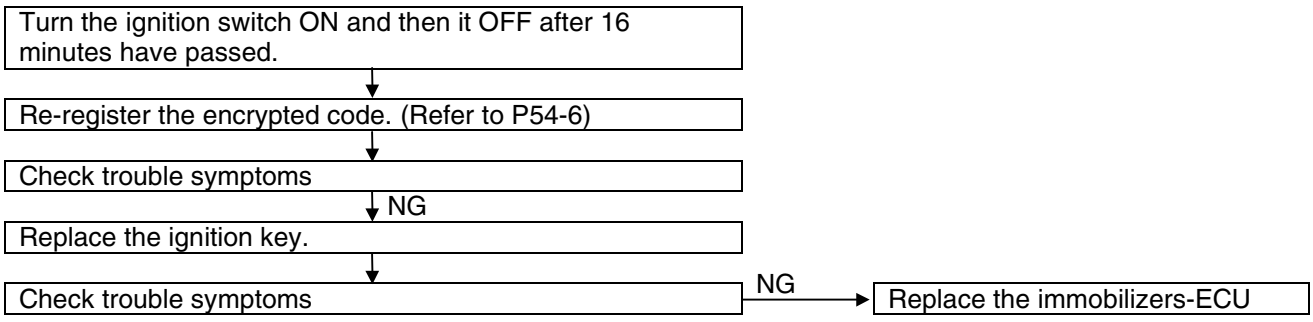
Code No. 11 Transponder communication system	Probable cause
The encrypted code of the transponder is not send to the immobilizer-ECU immediately after the ignition switch is turned to the ON position.	• Malfunction of the transponder • Malfunction of the ignition key ring antenna • Malfunction of harness or connector • Malfunction of the immobilizer-ECU



Code No. 12 Encrypted code are not the same or are not registered	Probable cause
The encrypted code which is sent from the transponder is not the same as the encrypted code which is registered in the immobilizer-ECU.	• The encrypted code in the ignition key being used has not been properly registered. • Malfunction of the immobilizer-ECU.



Code No.33 Starting prevention system activated due to incorrect operation	Probable cause
If the transponder encrypted code mismatches five times in succession, this code will be output. This code can be cancelled by turning the ignition switch ON, and then turning it OFF after 16 minutes have passed.	• Malfunction of the immobilizer-ECU • Malfunction of the transponder



INSPECTION CHART FOR TROUBLE SYMPTOMS

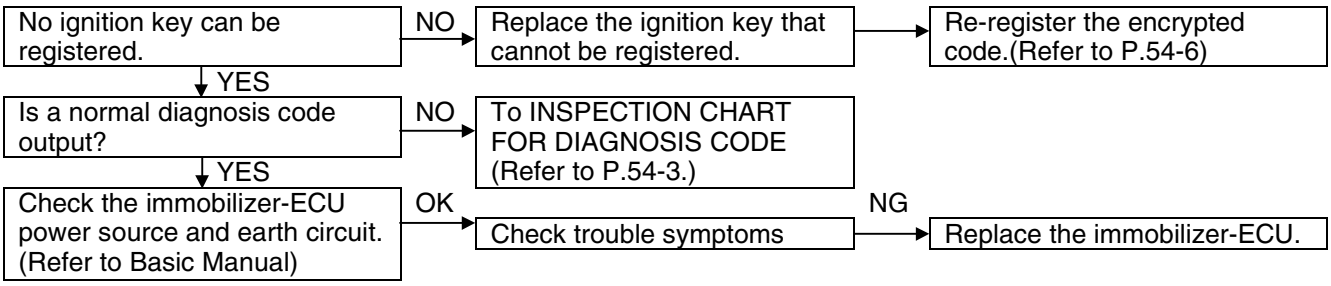
Trouble symptom	Inspection procedure No.	Reference page
Communication with MUT-II is impossible.	-	GROUP 13A, 13B – Troubleshooting
Diagnosis code No. 54 has been generated by the engine-ECU.	1	-
Encrypted code cannot be registered using the MUT-II.	2	54-5
Engine does not start (Cranking but not initial combustion).	3	-
Malfunction of the immobilizer-EC U power supply and earth circuit.	4	-

NOTE
Refer to the Basic Manual for the Inspection procedure N0.1, 2 and 4.

INSPECTION PROCEDURE FOR TROUBLE SYMPTOMS

Inspection Procedure 2

Encrypted code cannot be registered using the MUT-II.	Probable cause
The cause is probably that there is no encrypted code registered in the immobilizer-ECU, or there is a malfunction of the immobilizer-ECU.	• Malfunction of the transponder • Malfunction of the ignition key ring antenna • Malfunction of harness or connector • Malfunction of the immobilizer-ECU



CHASSIS ELECTRICAL – Ignition Switch and Immobilizer System

ENCRYPTED CODE REGISTRATION METHOD AND RESETTING THE CODE TO THE FACTORY SETTING

Register the encrypted code in the immobilizer-ECU and then reset the code to the factory setting after parts have been replaced.

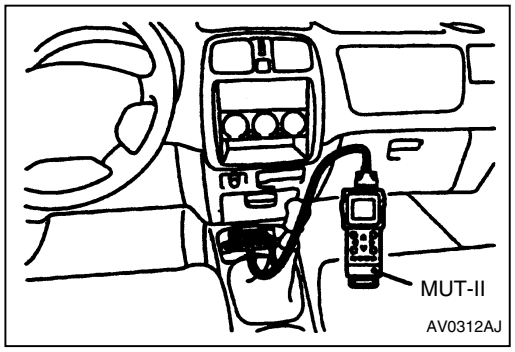
Replacement part	Encrypted code
Ignition key	Necessary
Ignition key ring antenna and immobilizer-ECU	Necessary
Engine-ECU*	Necessary

NOTE
*:If the engine-ECU is replaced, the ignition key ring antenna and immobilizer-ECU and ignition key should be replaced together with it. Each engine-ECU has an individual information for immobilizer-ECU, and the individual information is registered in the immobilizer-ECU.

ENCRYPTED CODE REGISTRATION METHOD

If using an ignition key that has just been newly purchased, or if the immobilizer-ECU has been replaced, you will need to register the encrypted codes for each ignition key being used into the immobilizer-ECU. (A maximum of eight different encrypted codes can be registered.)
Moreover, when the immobilizer-ECU has been replaced, you will need to use the MUT-II to register the password that the user specifies into the immobilizer-ECU.
(Refer to the MUT-II instruction manual for instructions on using the MUT-II.)

Caution
Because registering of the encrypted codes is carried out after all preciously-registered codes have been erased, you should have ready all of the ignition keys that have already been registered.



1. Connect the MUT-II to the diagnosis connector.

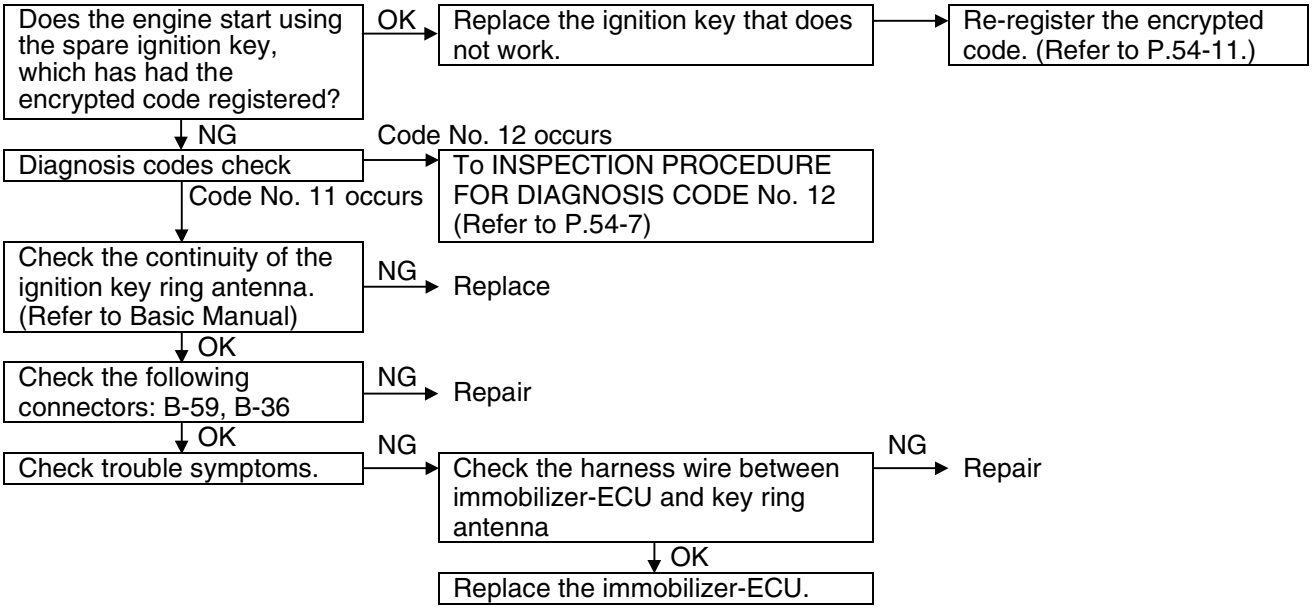
   Caution
   Turn the ignition switch to the LOCK (OFF) before connecting or disconnecting of the MUT-II.
2. Check that diagnosis code No.54 is not set by the engine-ECU. If it is set, check according to the Troubleshooting Procedures. (Refer to GROUP 13A – Troubleshooting.)
3. Use the ignition key that is to be registered to turn on the ignition switch.
4. Use the MUT-II to register the encrypted code. If you are registering two or more codes, use the next key to the registered to turn on the ignition switch without disconnecting the MUT-II.
5. Turn the ignition switch to the LOCK (OFF) position.
6. Check that the engine can be started with each of the ignition keys.
7. Check the diagnosis output from the engine-ECU, and erase code No.54 if it appears. (Refer to GROUP 13A – Troubleshooting.)
8. Disconnect the MUT-II. This completes the registration operation.

INSPECTION CHART FOR DIAGNOSIS CODES <Diesel-powered vehicles>

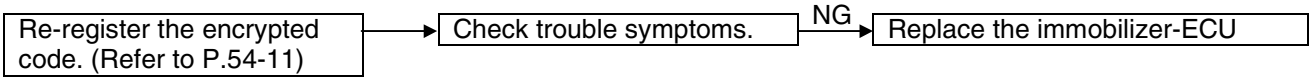
Diagnosis code No.	Inspection items	Reference page
11	Transponder communication system	54-7
12	Encrypted code are not the same or are not registered	54-7
33	Starting prevention system activated due to incorrect operation	54-8

INSPECTION PROCEDURE FOR DIAGNOSIS CODES

Code No. 11 Transponder communication system	**Probable cause**
The encrypted code of the transponder is not send to the immobilizer-ECU immediately after the ignition switch is turned to the ON position.	• Malfunction of the transponder • Malfunction of the ignition key ring antenna • Malfunction of harness or connector • Malfunction of the immobilizer-ECU

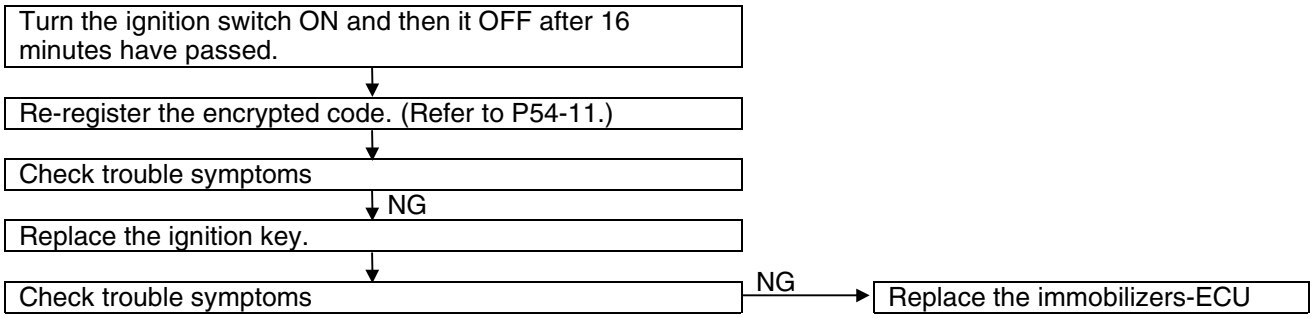


Code No. 12 Encrypted code are not the same or are not registered	**Probable cause**
The encrypted code which is sent from the transponder is not the same as the encrypted code which is registered in the immobilizer-ECU.	• The encrypted code in the ignition key being used has not been properly registered. • Malfunction of the immobilizer-ECU.



CHASSIS ELECTRICAL – Ignition Switch and Immobilizer System

Code No.33 Starting prevention system activated due to incorrect operation	Probable cause
If the transponder encrypted code mismatches five times in succession, this code will be output. This code can be cancelled by turning the ignition switch ON, and then turning it OFF after 16 minutes have passed.	• Malfunction of the immobilizer-ECU • Malfunction of the transponder



INSPECTION CHART FOR TROUBLE SYMPTOMS

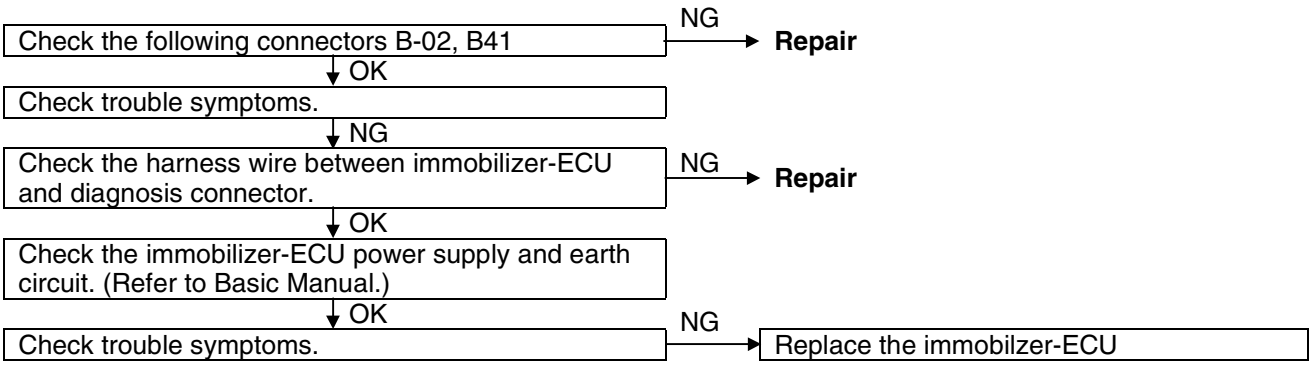
Trouble symptom	Inspection procedure No.	Reference page
Communication with MUT-II is impossible	1	54-9
Encrypted code cannot be registered using the MUT-II.	2	54-9
Engine does not start (Cranking but no initial combustion)	3	54-10
Malfunction of the immobilizer-ECU power supply and earth circuit*	-	-

NOTE
For the inspection procedures marked by *, refer to the Basic manual.

INSPECTION PROCEDURE FOR TROUBLE SYMPTOMS

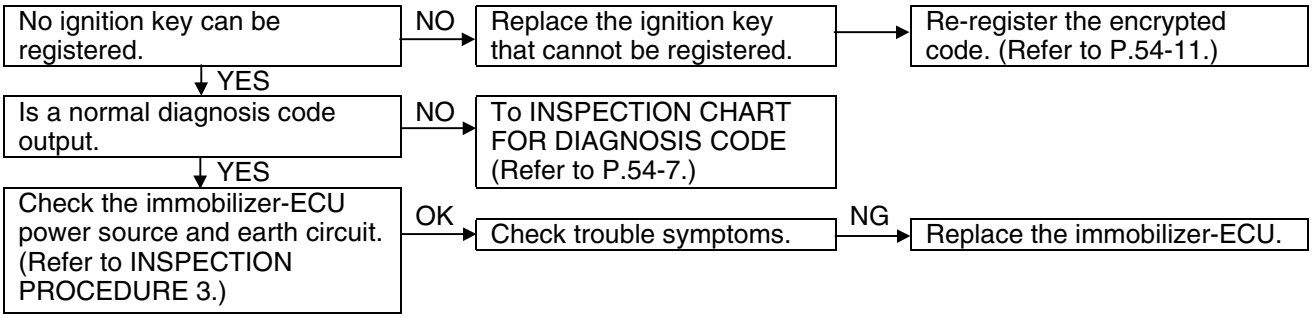
Inspection Procedure 1

Communication with MUT-II is impossible	Probable cause
The cause is probably that a malfunction of the diagnosis line or the immobilizer-ECU is not functioning	• Malfunction of the diagnosis line • Malfunction of harness or connector • Malfunction of the immobilizer-ECU



Inspection procedure 2

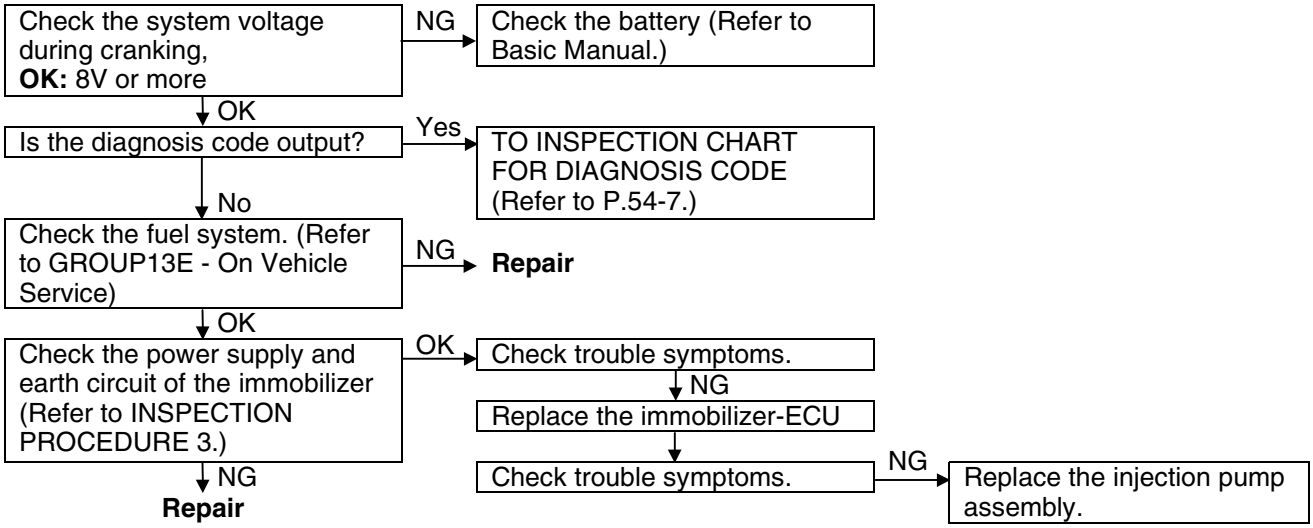
Encrypted code cannot be registered using the MUT-II	Probable cause
The cause is probably that there is no encrypted code registered in the immobilizer-ECU, or there is a malfunction of the immobilizer-ECU.	• Malfunction of the transponder • Malfunction of the ignition key ring antenna • Malfunction of harness or connector • Malfunction of the immobilizer-ECU



CHASSIS ELECTRICAL – Ignition Switch and Immobilizer System

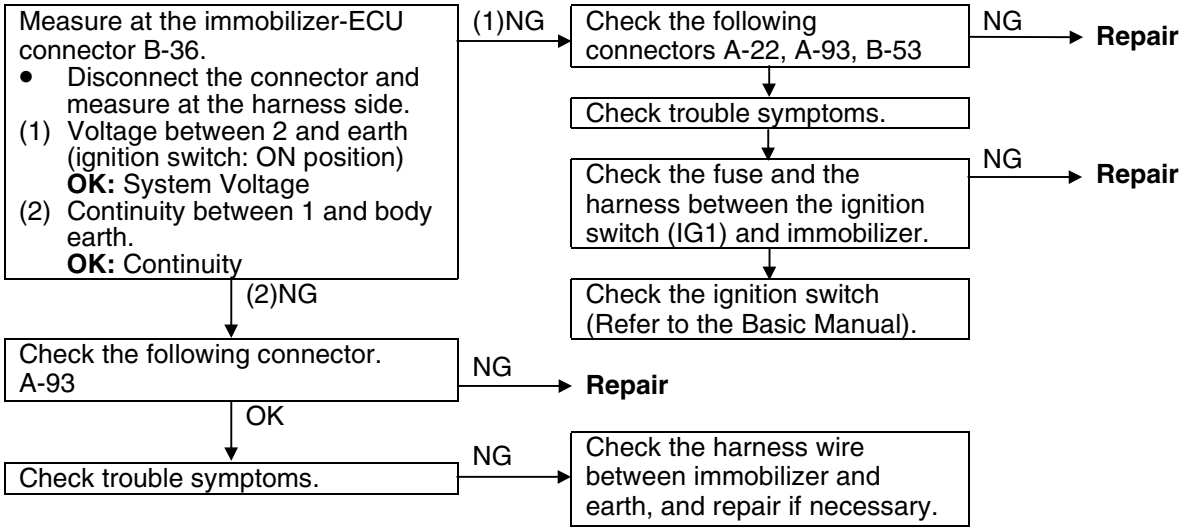
Inspection procedure 3

Engine does not start (cranking but no initial combustion).	Probable cause
If the fuel injectors are not operating, there might be a problem with the fuel system in addition to a malfunction of the immobilizer system. It is normal for this to occur if an attempt is made to start the engine using a key that has not been properly registered	• Malfunction of the fuel system • Malfunction of the immobilizer-ECU



Inspection Procedure 4

Check the power supply and earth circuit of the immobilizer



ENCRYPTED CODE REGISTRATION METHOD AND RESETTING THE CODE TO THE FACTORY SETTING

Register the encrypted code in the immobilizer-ECU and then reset the code to the factory setting after parts have been replaced.

Replacement part	Encrypted code
Ignition key	Necessary
Ignition key ring antenna and immobilizer-ECU	Necessary
Engine-ECU*	Necessary

NOTE

*: If the engine-ECU is replaced, the ignition key ring antenna and immobilizer-ECU and ignition key should be replaced together with it. Each engine-ECU has an individual information for immobilizer-ECU, and the individual information is registered in the immobilizer-ECU.

ENCRYPTED CODE REGISTRATION METHOD

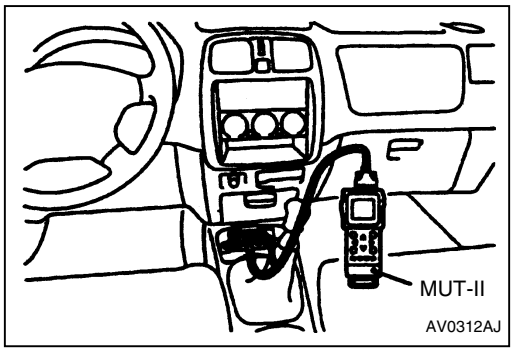
If using an ignition key that has just been newly purchased, or if the immobilizer-ECU has been replaced, you will need to register the encrypted codes for each ignition key being used into the immobilizer-ECU. (A maximum of eight different encrypted codes can be registered.)

Moreover, when the immobilizer-ECU has been replaced, you will need to use the MUT-II to register the password that the user specifies into the immobilizer-ECU.

(Refer to the MUT-II instruction manual for instructions on using the MUT-II.)

Caution

Because registering of the encrypted codes is carried out after all preciously-registered codes have been erased, you should have ready all of the ignition keys that have already been registered.



1. Connect the MUT-II to the diagnosis connector.

   Caution

   Turn the ignition switch to the LOCK (OFF) before connecting or disconnecting of the MUT-II.

2. Check that diagnosis code No.54 is not set by the engine-ECU. If it is set, check according to the Troubleshooting Procedures. (Refer to GROUP 13A – Troubleshooting.)
3. Use the ignition key that is to be registered to turn on the ignition switch.
4. Use the MUT-II to register the encrypted code. If you are registering two or more codes, use the next key to the registered to turn on the ignition switch without disconnecting the MUT-II.
5. Turn the ignition switch to the LOCK (OFF) position.
6. Check that the engine can be started with each of the ignition keys.
7. Check the diagnosis output from the engine-ECU, and erase code No.54 if it appears. (Refer to GROUP 13A – Troubleshooting.)
8. Disconnect the MUT-II. This completes the registration operation.

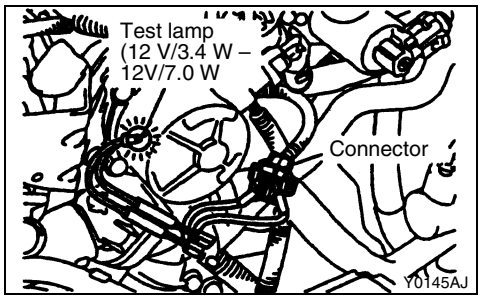
GROUP 54
CHASSIS ELECTRICAL

9 pages added here (next page and after).

COMBINATION METER <F9Q1>
OUTLINE CHANGES
- Inspection procedures for the tachometer have been added in vehicles with F9Q1 engine.
- The change in the mounting position for the engine coolant temperature gauge to correspond to the adoption of the F9Q1 engine has been communicated. Other troubleshooting procedures are the same as for vehicles with petrol engine.

SERVICE SPECIFICATIONS

Item		Standard value
Tachometer display error r/min	When engine speed is 700 r/min	± 120
	When engine speed is 2,000 r/min	-175 +225
	When engine speed is 3,000 r/min	-175 +300
	When engine speed is 4,000 r/min	-225 +375
	When engine speed is 5,000 r/min	-225 +425
	When engine speed is 6,00 r/min	-225 +475

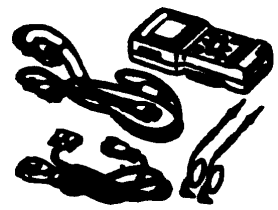


TROUBLESHOOTING
Troubleshooting procedures other than the engine coolant temperature gauge unit mounting position are the same as for vehicles with petrol engine. Refer to the '99 SPACE START Workshop Manual (BASIC) (Pub. No. CMXE99E1).

ON-VEHICLE SERVICE
TACHOMETER CHECK
1. Insert a paper clip (Gem clip) into the harness-side engine speed sensor terminal and connect it to an engine tachometer.
2. Compare the engine speedometer reading at various engine speeds with the tachometer reading, and check that the error is within the standard range.

IGNITION SWITCH AND IMMOBILIZER SYSTEM

SPECIAL TOOL

Tool	Number	Name	Use
	MB991502	MUT-II sub assembly	• Immobilizer system check (Diagnosis display using the MUT-II) • Registration of the encrypted code

TROUBLESHOOTING

Caution
The encrypted code should always be re-registered when replacing the immobilizer-ECU.

STANDARD FLOW OF DIAGNOSIS TROUBLESHOOTING

Refer to Basic Manual.

DIAGNOSIS FUNCTION

DIAGNOSIS CODES CHECK

Refer to Basic Manual.

ERASING DIAGNOSIS CODES

Refer to Basic Manual.

Caution
The diagnosis codes which result form disconnecting the battery cables cannot be erased.

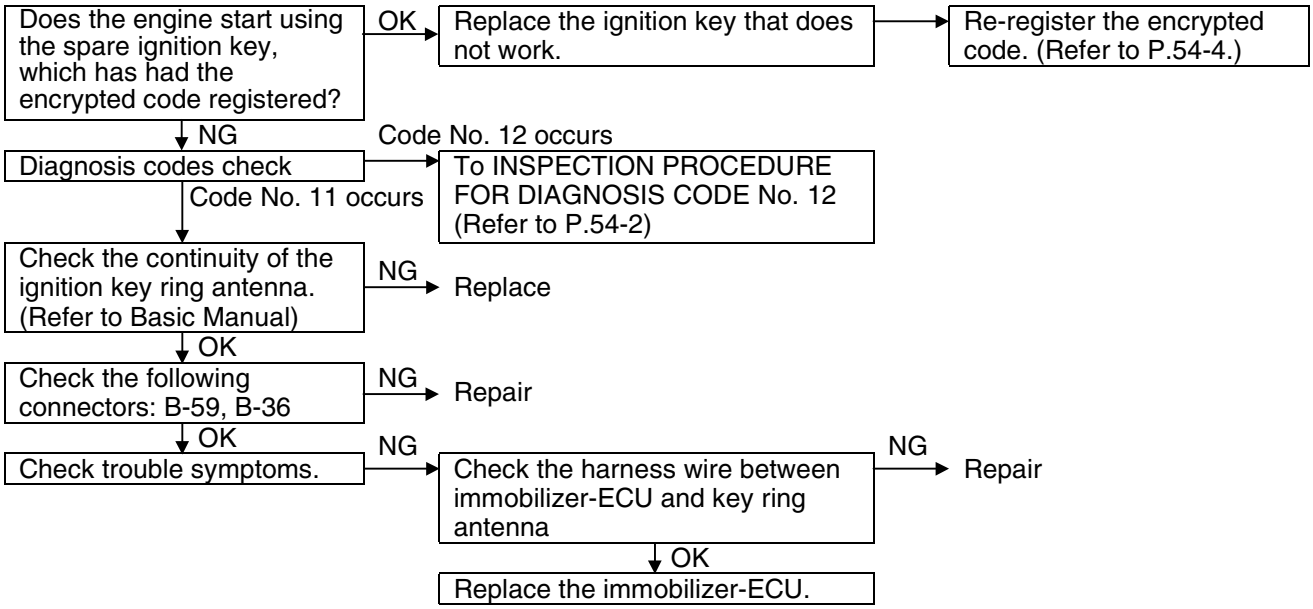
INSPECTION CHART FOR DIAGNOSIS CODES <Petrol-powered vehicles>

Diagnosis code No.	Inspection items	Reference page
11	Transponder communication system	54-2
12	Encrypted code are not the same or are not registered	54-2
33	Starting prevention system activated due to incorrect operation	54-2

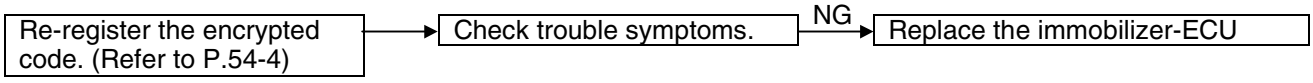
CHASSIS ELECTRICAL – Ignition Switch and Immobilizer System

INSPECTION PROCEDURE FOR DIAGNOSIS CODES

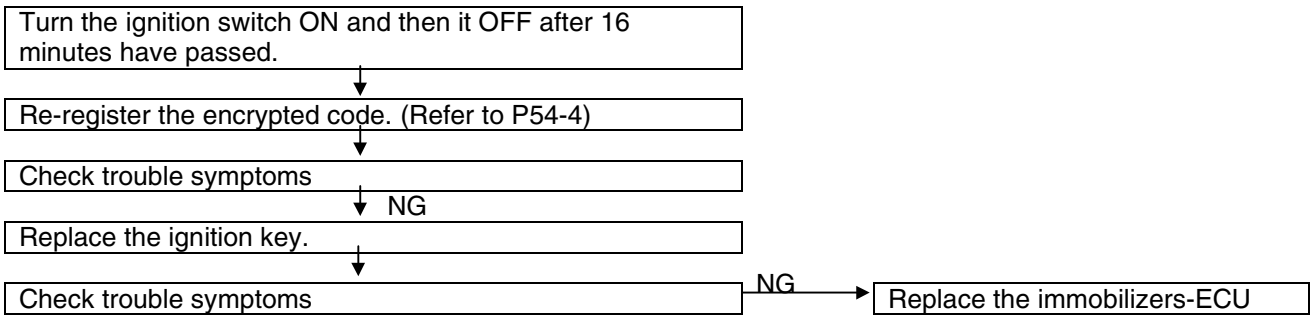
Code No. 11 Transponder communication system	Probable cause
The encrypted code of the transponder is not send to the immobilizer-ECU immediately after the ignition switch is turned to the ON position.	• Malfunction of the transponder • Malfunction of the ignition key ring antenna • Malfunction of harness or connector • Malfunction of the immobilizer-ECU



Code No. 12 Encrypted code are not the same or are not registered	Probable cause
The encrypted code which is sent from the transponder is not the same as the encrypted code which is registered in the immobilizer-ECU.	• The encrypted code in the ignition key being used has not been properly registered. • Malfunction of the immobilizer-ECU.



Code No.33 Starting prevention system activated due to incorrect operation	Probable cause
If the transponder encrypted code mismatches five times in succession, this code will be output. This code can be cancelled by turning the ignition switch ON, and then turning it OFF after 16 minutes have passed.	• Malfunction of the immobilizer-ECU • Malfunction of the transponder



INSPECTION CHART FOR TROUBLE SYMPTOMS

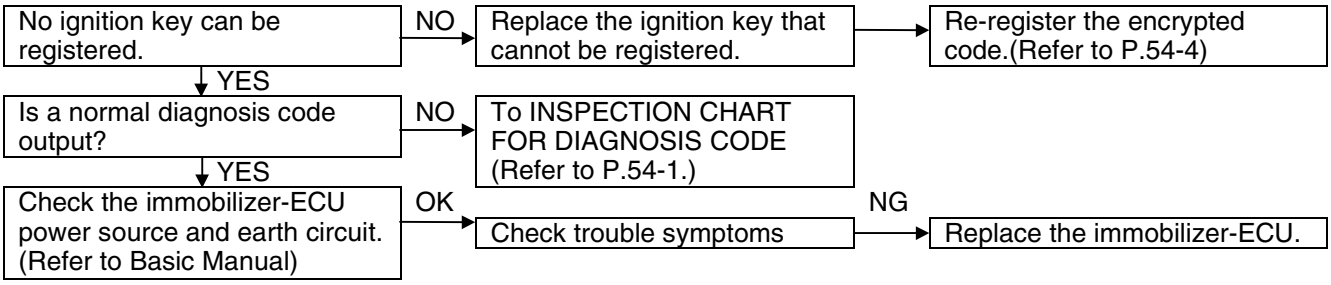
Trouble symptom	Inspection procedure No.	Reference page
Communication with MUT-II is impossible.	-	GROUP 13A, 13B – Troubleshooting
Diagnosis code No. 54 has been generated by the engine-ECU.	1	-
Encrypted code cannot be registered using the MUT-II.	2	54-3
Engine does not start (Cranking but not initial combustion).	3	-
Malfunction of the immobilizer-ECU power supply and earth circuit.	4	-

NOTE
Refer to the Basic Manual for the Inspection procedure N0.1, 2 and 4.

INSPECTION PROCEDURE FOR TROUBLE SYMPTOMS

Inspection Procedure 2

Encrypted code cannot be registered using the MUT-II.	Probable cause
The cause is probably that there is no encrypted code registered in the immobilizer-ECU, or there is a malfunction of the immobilizer-ECU.	• Malfunction of the transponder • Malfunction of the ignition key ring antenna • Malfunction of harness or connector • Malfunction of the immobilizer-ECU



CHASSIS ELECTRICAL – Ignition Switch and Immobilizer System

ENCRYPTED CODE REGISTRATION METHOD AND RESETTING THE CODE TO THE FACTORY SETTING

Register the encrypted code in the immobilizer-ECU and then reset the code to the factory setting after parts have been replaced.

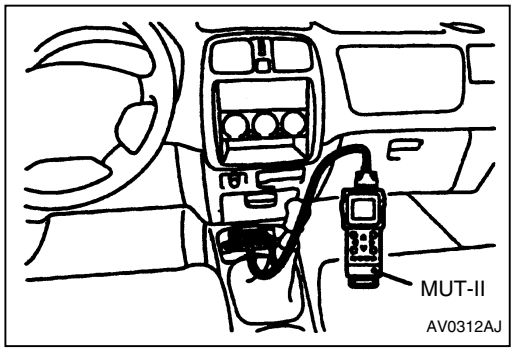
Replacement part	Encrypted code
Ignition key	Necessary
Ignition key ring antenna and immobilizer-ECU	Necessary
Engine-ECU*	Necessary

NOTE
*:If the engine-ECU is replaced, the ignition key ring antenna and immobilizer-ECU and ignition key should be replaced together with it. Each engine-ECU has an individual information for immobilizer-ECU, and the individual information is registered in the immobilizer-ECU.

ENCRYPTED CODE REGISTRATION METHOD

If using an ignition key that has just been newly purchased, or if the immobilizer-ECU has been replaced, you will need to register the encrypted codes for each ignition key being used into the immobilizer-ECU. (A maximum of eight different encrypted codes can be registered.)
Moreover, when the immobilizer-ECU has been replaced, you will need to use the MUT-II to register the password that the user specifies into the immobilizer-ECU.
(Refer to the MUT-II instruction manual for instructions on using the MUT-II.)

Caution
Because registering of the encrypted codes is carried out after all preciously-registered codes have been erased, you should have ready all of the ignition keys that have already been registered.



1. Connect the MUT-II to the diagnosis connector.

   Caution
   Turn the ignition switch to the LOCK (OFF) before connecting or disconnecting of the MUT-II.

2. Check that diagnosis code No.54 is not set by the engine-ECU. If it is set, check according to the Troubleshooting Procedures. (Refer to GROUP 13A – Troubleshooting.)
3. Use the ignition key that is to be registered to turn on the ignition switch.
4. Use the MUT-II to register the encrypted code. If you are registering two or more codes, use the next key to the registered to turn on the ignition switch without disconnecting the MUT-II.
5. Turn the ignition switch to the LOCK (OFF) position.
6. Check that the engine can be started with each of the ignition keys.
7. Check the diagnosis output from the engine-ECU, and erase code No.54 if it appears. (Refer to GROUP 13A – Troubleshooting.)
8. Disconnect the MUT-II. This completes the registration operation.

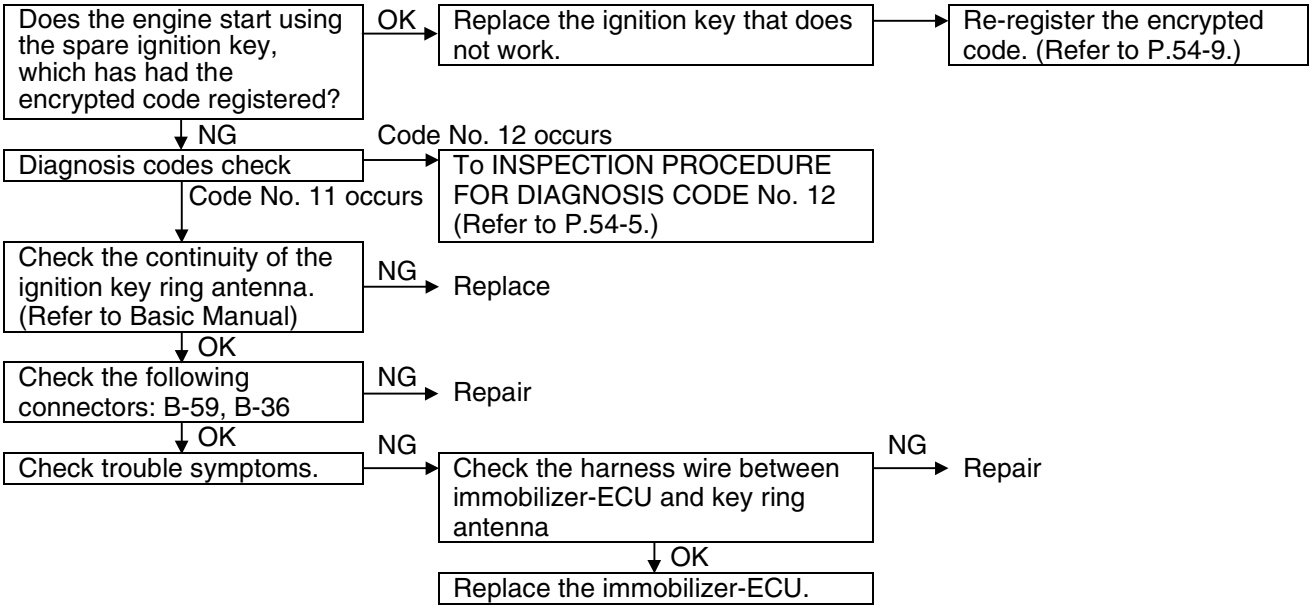
CHASSIS ELECTRICAL – Ignition Switch and Immobilizer System

INSPECTION CHART FOR DIAGNOSIS CODES <Diesel-powered vehicles>

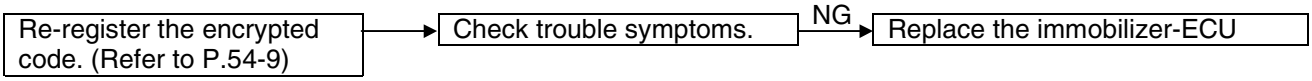
Diagnosis code No.	Inspection items	Reference page
11	Transponder communication system	54-5
12	Encrypted code are not the same or are not registered	54-5
33	Starting prevention system activated due to incorrect operation	54-6

INSPECTION PROCEDURE FOR DIAGNOSIS CODES

Code No. 11 Transponder communication system	**Probable cause**
The encrypted code of the transponder is not send to the immobilizer-ECU immediately after the ignition switch is turned to the ON position.	• Malfunction of the transponder • Malfunction of the ignition key ring antenna • Malfunction of harness or connector • Malfunction of the immobilizer-ECU

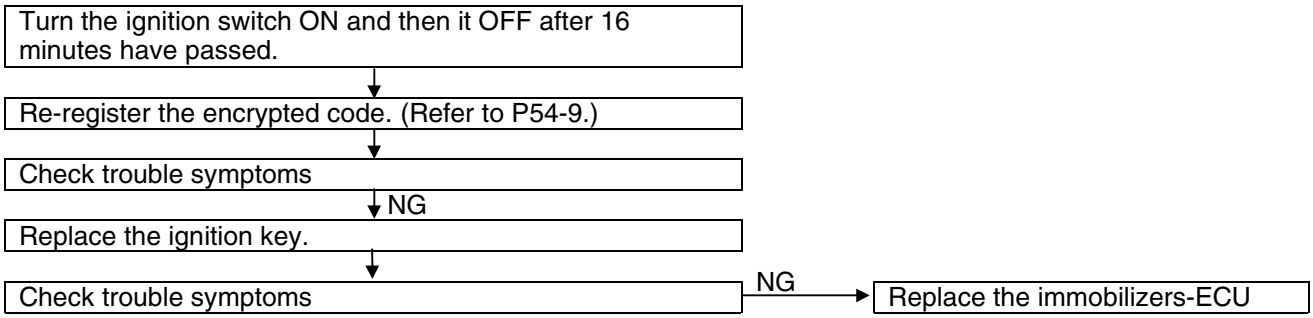


Code No. 12 Encrypted code are not the same or are not registered	**Probable cause**
The encrypted code which is sent from the transponder is not the same as the encrypted code which is registered in the immobilizer-ECU.	• The encrypted code in the ignition key being used has not been properly registered. • Malfunction of the immobilizer-ECU.



CHASSIS ELECTRICAL – Ignition Switch and Immobilizer System

Code No.33 Starting prevention system activated due to incorrect operation	Probable cause
If the transponder encrypted code mismatches five times in succession, this code will be output. This code can be cancelled by turning the ignition switch ON, and then turning it OFF after 16 minutes have passed.	• Malfunction of the immobilizer-ECU • Malfunction of the transponder



INSPECTION CHART FOR TROUBLE SYMPTOMS

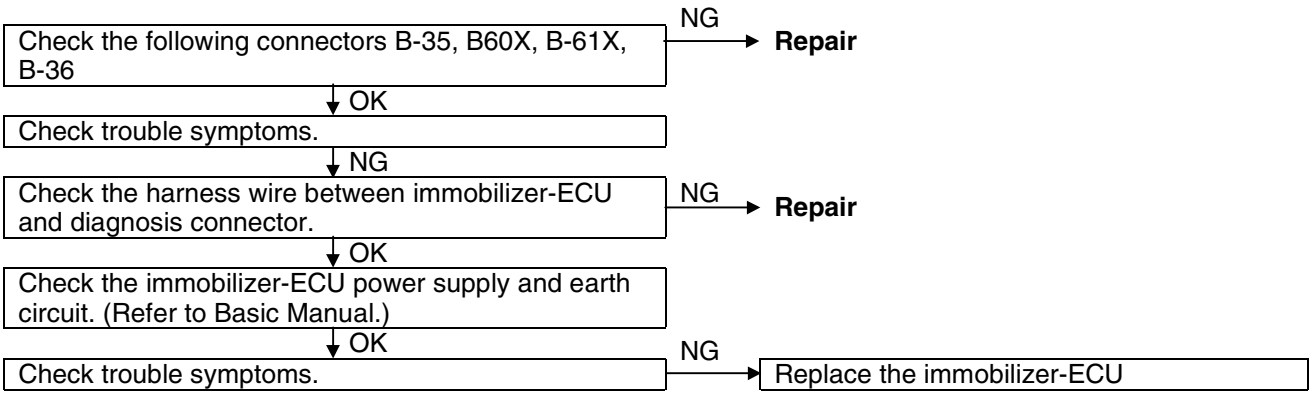
Trouble symptom	Inspection procedure No.	Reference page
Communication with MUT-II is impossible	1	54-7
Encrypted code cannot be registered using the MUT-II.	2	54-7
Engine does not start (Cranking but no initial combustion)	3	54-8
Malfunction of the immobilizer-ECU power supply and earth circuit*	-	-

NOTE
For the inspection procedures marked by *, refer to the Basic manual.

INSPECTION PROCEDURE FOR TROUBLE SYMPTOMS

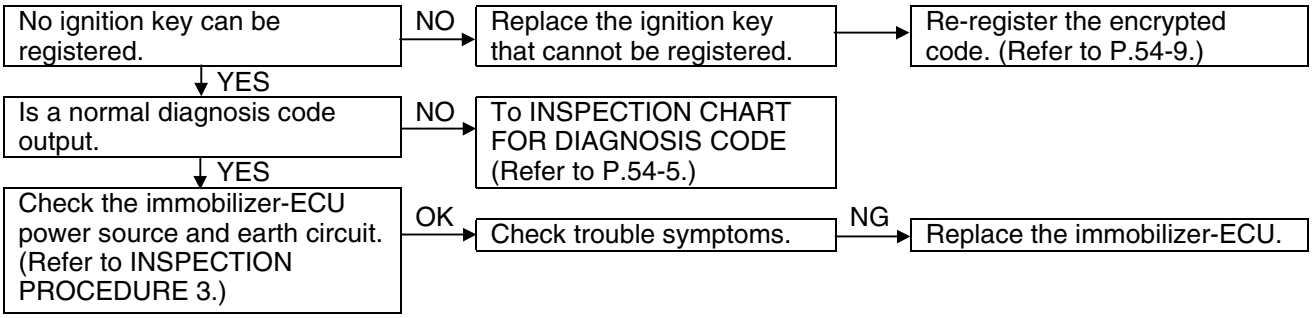
Inspection Procedure 1

Communication with MUT-II is impossible	Probable cause
The cause is probably that a malfunction of the diagnosis line or the immobilizer-ECU is not functioning	• Malfunction of the diagnosis line • Malfunction of harness or connector • Malfunction of the immobilizer-ECU



Inspection procedure 2

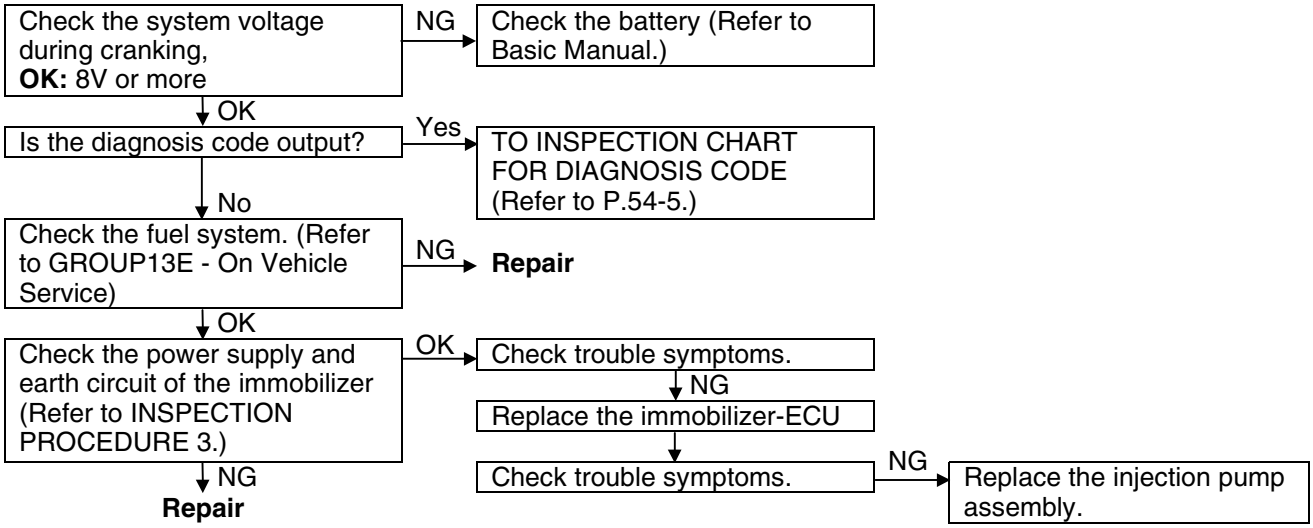
Encrypted code cannot be registered using the MUT-II	Probable cause
The cause is probably that there is no encrypted code registered in the immobilizer-ECU, or there is a malfunction of the immobilizer-ECU.	• Malfunction of the transponder • Malfunction of the ignition key ring antenna • Malfunction of harness or connector • Malfunction of the immobilizer-ECU



CHASSIS ELECTRICAL – Ignition Switch and Immobilizer System

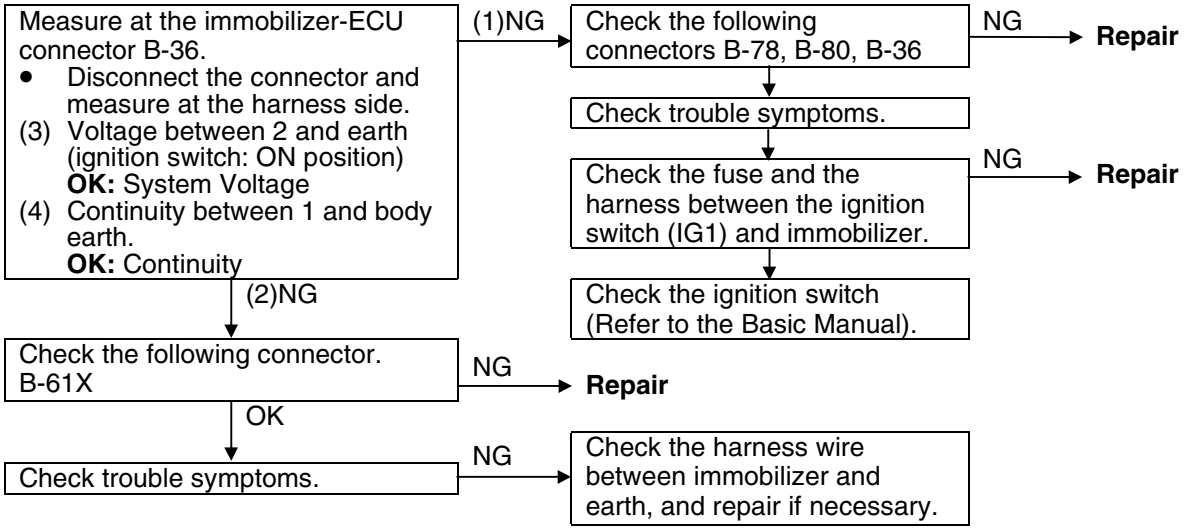
Inspection procedure 3

Engine does not start (cranking but no initial combustion).	Probable cause
If the fuel injectors are not operating, there might be a problem with the fuel system in addition to a malfunction of the immobilizer system. It is normal for this to occur if an attempt is made to start the engine using a key that has not been properly registered	• Malfunction of the fuel system • Malfunction of the immobilizer-ECU



Inspection Procedure 4

Check the power supply and earth circuit of the immobilizer



ENCRYPTED CODE REGISTRATION METHOD AND RESETTING THE CODE TO THE FACTORY SETTING

Register the encrypted code in the immobilizer-ECU and then reset the code to the factory setting after parts have been replaced.

Replacement part	Encrypted code
Ignition key	Necessary
Ignition key ring antenna and immobilizer-ECU	Necessary
Engine-ECU*	Necessary

NOTE

*: If the engine-ECU is replaced, the ignition key ring antenna and immobilizer-ECU and ignition key should be replaced together with it. Each engine-ECU has an individual information for immobilizer-ECU, and the individual information is registered in the immobilizer-ECU.

ENCRYPTED CODE REGISTRATION METHOD

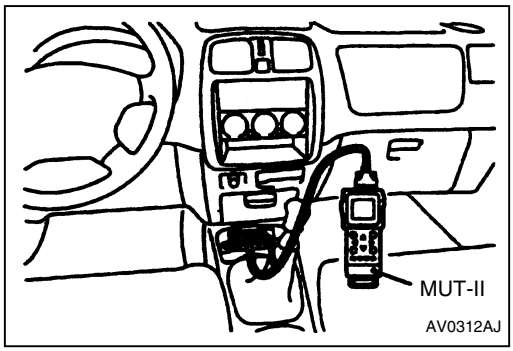
If using an ignition key that has just been newly purchased, or if the immobilizer-ECU has been replaced, you will need to register the encrypted codes for each ignition key being used into the immobilizer-ECU. (A maximum of eight different encrypted codes can be registered.)

Moreover, when the immobilizer-ECU has been replaced, you will need to use the MUT-II to register the password that the user specifies into the immobilizer-ECU.

(Refer to the MUT-II instruction manual for instructions on using the MUT-II.)

Caution

Because registering of the encrypted codes is carried out after all preciously-registered codes have been erased, you should have ready all of the ignition keys that have already been registered.



1. Connect the MUT-II to the diagnosis connector.

   Caution

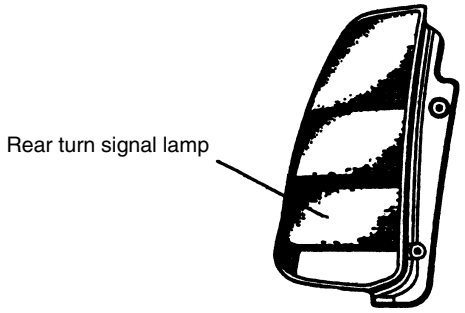
   Turn the ignition switch to the LOCK (OFF) before connecting or disconnecting of the MUT-II.

2. Check that diagnosis code No.54 is not set by the engine-ECU. If it is set, check according to the Troubleshooting Procedures. (Refer to GROUP 13A – Troubleshooting.)
3. Use the ignition key that is to be registered to turn on the ignition switch.
4. Use the MUT-II to register the encrypted code. If you are registering two or more codes, use the next key to the registered to turn on the ignition switch without disconnecting the MUT-II.
5. Turn the ignition switch to the LOCK (OFF) position.
6. Check that the engine can be started with each of the ignition keys.
7. Check the diagnosis output from the engine-ECU, and erase code No.54 if it appears. (Refer to GROUP 13A – Troubleshooting.)
8. Disconnect the MUT-II. This completes the registration operation.

GROUP 7
EQUIPMENT

The following two pages added here.

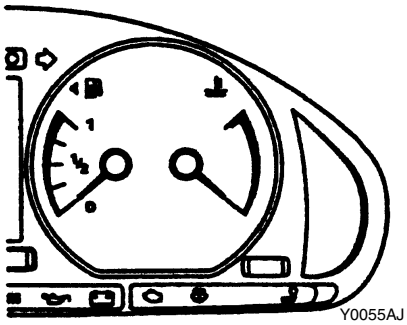
LIGHTS
EXTERIOR LAMPS
The transparent lens is adopted to the rear turn signal lamp lens in the rear combination lamp to make the lamp look more attractive.



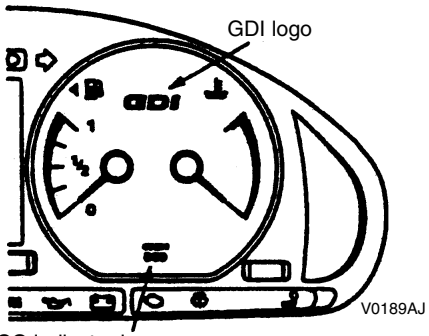
Y0018AJ

COMBINATION METER <F9QT>
The combination meter without the GDI logotype and the GDI ECO indicator lamp is selected for the vehicle mounted with F9QT engine

<Vehicle mounted with F9QT engine and without tachometer>

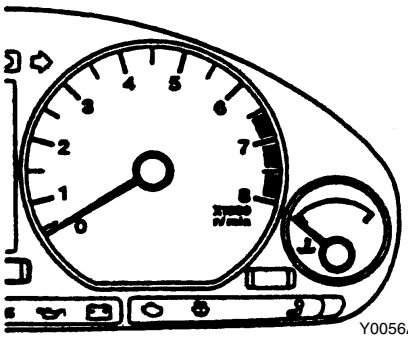

Y0055AJ

<Vehicle mounted with gasoline engine and without tachometer>

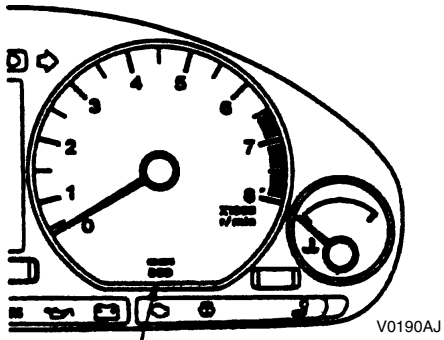


V0189AJ

<Vehicle mounted with F9QT engine and with tachometer>


Y0056AJ

<Vehicle mounted with gasoline engine and with tachometer>



V0190AJ

IMMOBILIZER SYSTEM

The immobilizer system consists of the ignition key, the key ring antenna, the immobilizer-ECU, and the engine-ECU<GDI, MPI M/T>, engine-A/T-ECU<MPI A/T> or fuel cut valve controller <DIESEL>. The ignition key ring antenna is installed on the steering lock key cylinder. Only the registered ignition key permits the engine to start, therefore, the engine can never be start by means of a forged key or by connecting the ignition wiring directly. The system is significantly safe and reliable against theft. In addition, the driver has only to turn the ignition switch to the ”ON” position to activate the immobilizer system. If the ignition key is lost or another ignition key is added, all the key must be registered again by using the scan tool MBH991502 (MUT-II) for security reasons.

CONSTRUCION DIAGRAM

The system prevents the engine from being started deviously to protect the vehicle from theft, The operation is as follows.

1. When the ignition switch is turned ”ON” position, the engine-ECU<GDI>, MPI M/T, engine-A/TECU<MPI> A/T> or fuel cut valve controller <DIESEL> sends a requirement for the encrypted code to the immobilizer-ECU(at this time, the engine is remobilized).
2. When the immobilizer-ECU receives the requirement form the engine-ECU<GDI, MPI M/T>, engine-A/T-ECU<MPI A/T> or fuel cut valve controller <DIESEL> transponder inside the ignition key via the antenna. The energized transponder sends the encrypted code back to the immobilizer-ECU via the antenna.
3. The immobilizer-ECU judges the encrypted code with its code logic in itself, If they are identical, the immobilizer-ECU sends the encrypted code to the engine-ECU<GDI, MPI M/T>, engine-A/T-ECU,MPI A/T> or fuel cut valve controller <DIESEL>.
4. If the engine-ECU<GDI, MPI M/T>< engine A/T-ECU<MPI A/T> or fuel cut valve controller <DIESEL> can not receive the encrypted code, the engine will be immobilized.

DISPOSITION WHEN REPLACING IMMOBILIZER SYSTEM RELATED PARTS

The replacing immobilizer system related parts is as follows. When the ignition key is re-registered with the MUT-II, the originally registered ignition key registration key registration information will be lost.

<PETROL>

	Engine-ECU <GDI,MPI M/T> Engine-A/T-ECU <MPI A/T>	Immobilizer-ECU	Ignition key
When replacing engine-ECU <GDI, MPI M/T>, engine-A/T-ECU <MPI A/T>	-	Replacement required	Replacement and re-registration are required.
When rewriting engine-ECU <GDI, MPI M/T>, engine-A/T-ECU <MPI A/T>	-	Replacement not required	Replacement not required, re-registration not required.
When replacing immobilizer-ECU	Replacement not required (Initialization is required.)	-	Replacement not required, registration are required
When adding ignition key newly	Replacement not required	Replacement not required	Register ignition key to be added and re-register all other ignition keys.
When ignition key is lost	Replacement not required	Replacement not required	Re-register all other ignition keys except the lost one.

<DIESEL>

	Fuel cut valve controller	Immobilizer-ECU	Ignition key
When replacing Fuel cut valve controller	-	Replacement required	Replacement not required, re-registration not required.
When replacing immobilizer-ECU	Replacement not required (Initialization is required.)	-	Replacement and re-registration are required.
When adding ignition key newly	Replacement not required	Replacement not required	Register ignition key to be added and re-register all other ignition keys
When ignition key is lost	Replacement not required	Replacement not required	Re-register all other ignition keys except the lost one.