
CHASSIS ELECTRICAL

Click on the applicable bookmark to selected the required model year.

CHASSIS ELECTRICAL

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54109000297

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FRONT SEAT (HEATED SEAT)
..... Refer to GROUP 52A

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..... Refer to GROUP 52B

HEATER Refer to GROUP 55

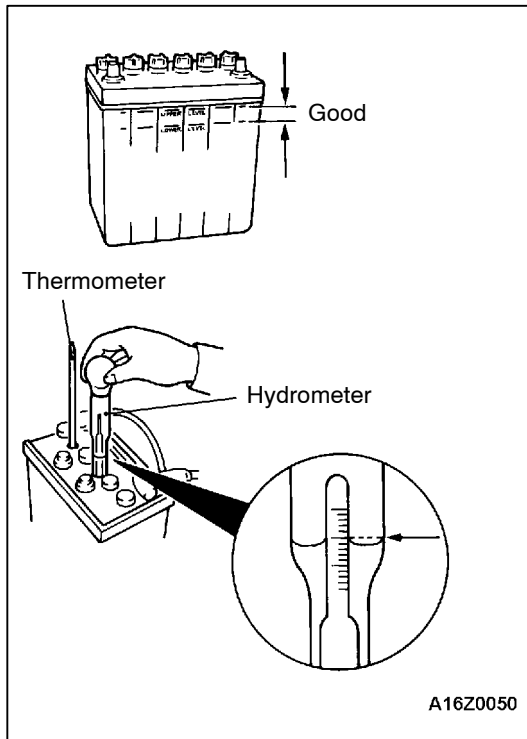
AIR CONDITIONER
..... Refer to GROUP 55

BATTERY

54100030028

SERVICE SPECIFICATION

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



ON-VEHICLE SERVICE

54100090064

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

54100110029

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.

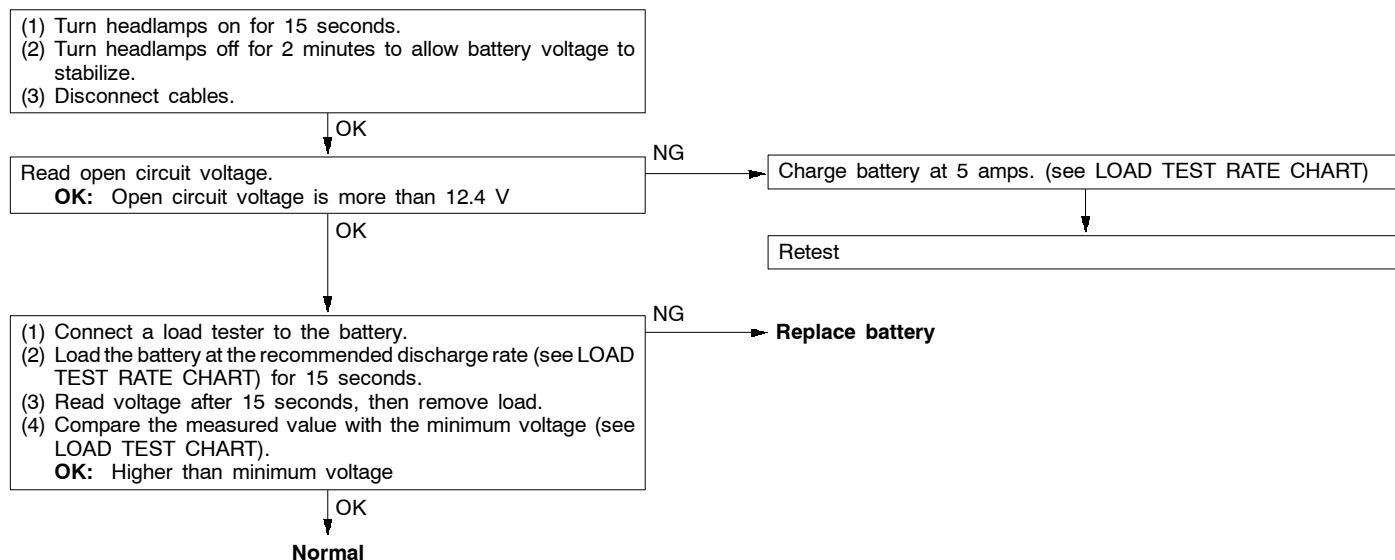
Caution

- (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

54100120237

TEST STEP



LOAD TEST RATE CHART

Battery type	75D26R	80D26R	95D31R
Charging time when fully discharged h [5-amp rated current charging]	12	12	14
Load test (Amps)	240	290	310

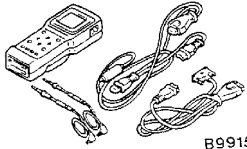
LOAD TEST CHART

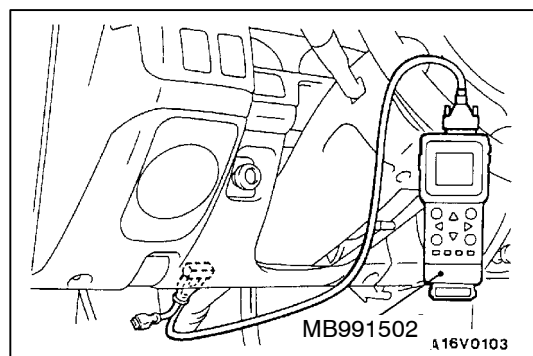
Temperature °C	21 and above	16	10	4	-1	-7	-12	-18
Minimum voltage V	9.6	9.5	9.4	9.3	9.1	8.9	8.7	8.5

IGNITION SWITCH AND IMMOBILIZER SYSTEM

54300060528

SPECIAL TOOL

Tool	Number	Name	Use
	MB991502	MUT-II sub assembly	<ul style="list-style-type: none"> ETACS-ECU input signal checking Immobilizer system check (Diagnosis display using the MUT-II) Registration of the ID code Resetting the code to the factory setting <4D5> Change of the password



TROUBLESHOOTING

Ignition Switch

54300700185

DIAGNOSIS FUNCTION

INPUT SIGNAL INSPECTION POINTS

1. Connect the MUT-II to the diagnosis connector.
2. If buzzer of the MUT-II sounds once when a switch is operated (ON/OFF), the ETACS-ECU input signal for that switch circuit system is normal.

INSPECTION CHART FOR TROUBLE SYMPTOMS

54300720747

Trouble symptoms		Inspection procedure	Reference page
Communication with MUT-II is impossible.	Communication with all systems is impossible.	1	54-8
	Communication with one-shot pulse input signal only is impossible.	2	54-8
Ignition key hole illumination lamp system	Even if the driver's side door is opened, the key hole illumination lamp does not illuminate.	3	54-9
	The key hole illumination lamp remains illuminated.	4	54-9

INSPECTION PROCEDURE FOR TROUBLE SYMPTOMS

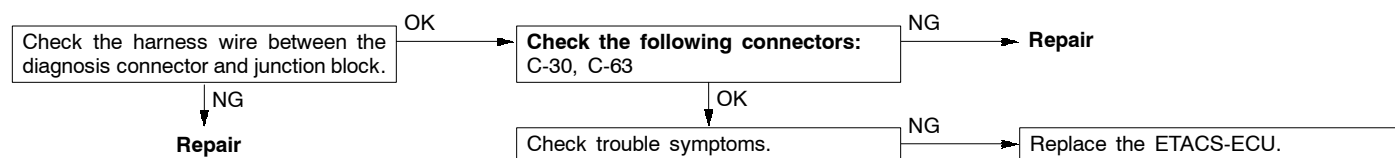
Inspection Procedure 1

Communication with MUT-II is impossible. (Communication with all systems is impossible.)	Probable cause
The cause is probably a defective power supply system (including earth) for the diagnosis line.	<ul style="list-style-type: none"> • Malfunction of connector • Malfunction of harness wire

Refer to GROUP 13A – Troubleshooting.

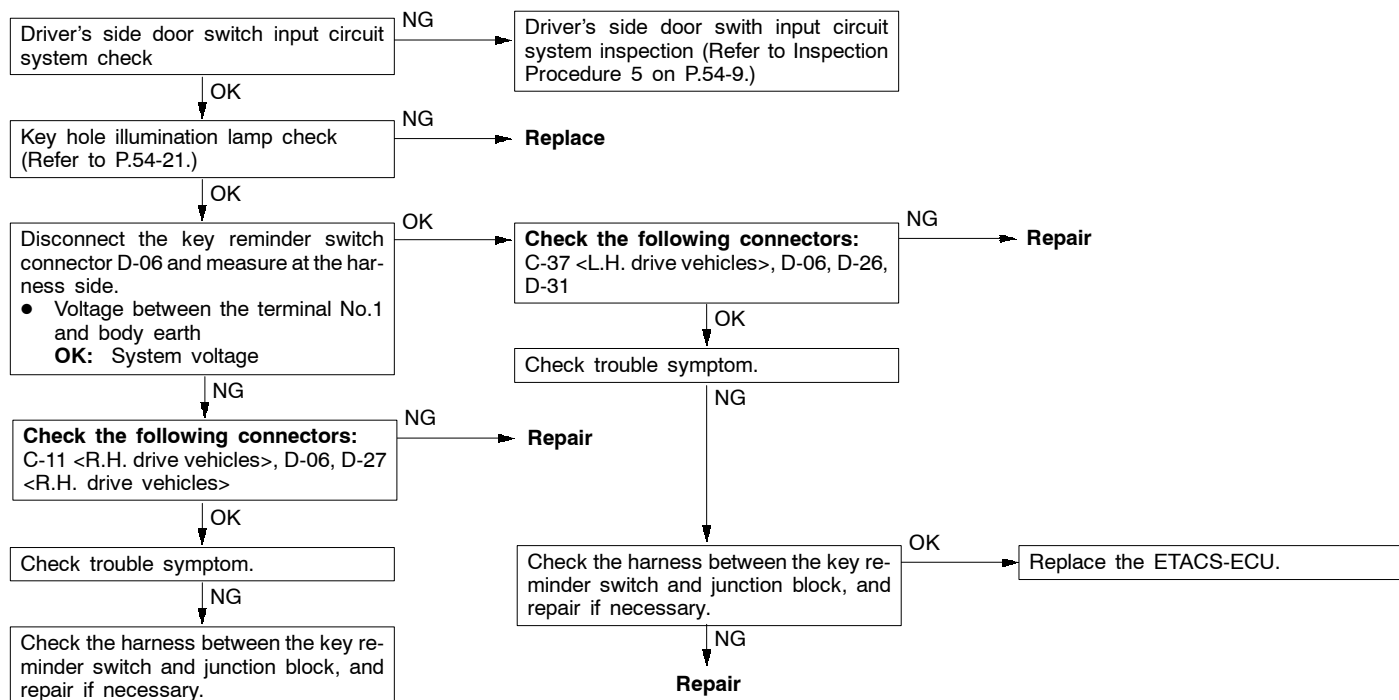
Inspection Procedure 2

Communication with MUT-II is impossible. (Communication with the one-shot pulse input signal only is impossible.)	Probable cause
The cause is probably a defective one-shot pulse input circuit system of the diagnosis line.	<ul style="list-style-type: none"> • Malfunction of connector • Malfunction of harness wire • Malfunction of ETACS-ECU



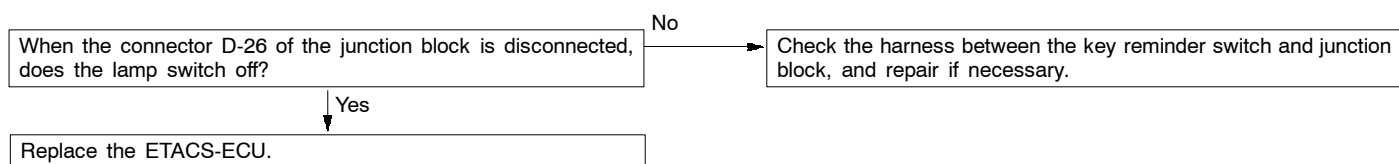
Inspection Procedure 3

Even if the driver's side door is opened, the key hole illumination lamp does not illuminate.	Probable cause
The cause is probably a defective key hole illumination lamp circuit system or a defective driver's side door switch input circuit system.	<ul style="list-style-type: none"> • Malfunction of driver's side door switch • Malfunction of key hole illumination lamp • Malfunction of harness or connector • Malfunction of ETACS-ECU



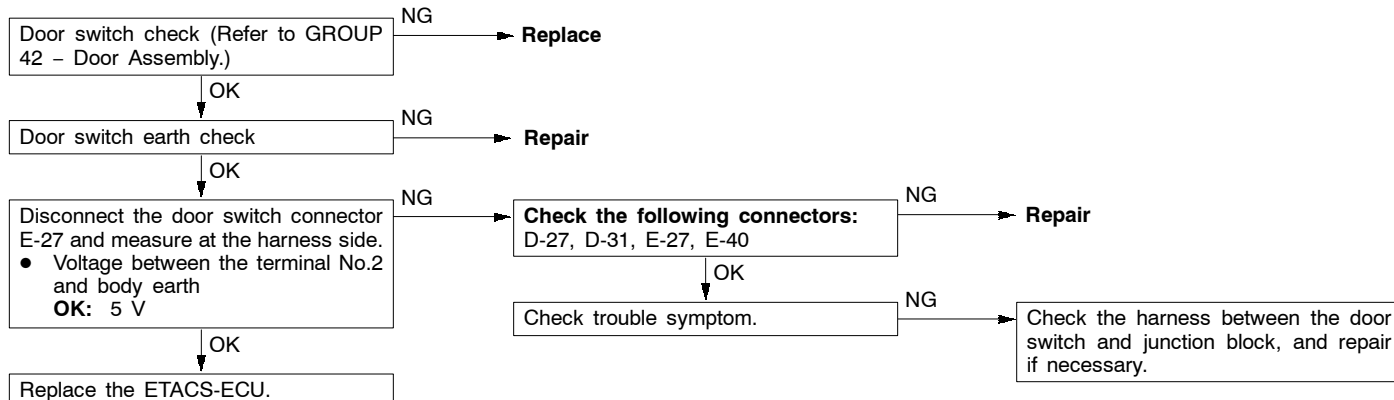
Inspection Procedure 4

Key hole illumination lamp remains illuminated.	Probable cause
The cause is probably a short harness or a defective ETACS-ECU.	<ul style="list-style-type: none"> • Malfunction of harness • Malfunction of ETACS-ECU



Inspection Procedure 5

Driver's side door switch input circuit system check



Immobilizer System

54300690130

Caution

1. The encrypted code should always be re-registered when replacing the immobilizer-ECU. <6G7>
2. If the immobilizer-ECU has been replaced, you will need to re-register the ignition key encrypted codes and to reset the code for the fuel cut valve controller to the factory setting. <4D5>
3. If the immobilizer-ECU has been replaced with a new part, the password (vehicle secret code) which has been stored in the immobilizer-ECU for each vehicle will be replaced by the password (secret code) specified by the customer.

STANDARD FLOW OF DIAGNOSIS TROUBLESHOOTING

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

DIAGNOSIS FUNCTION

54300700192

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 <6G7>

54300710119

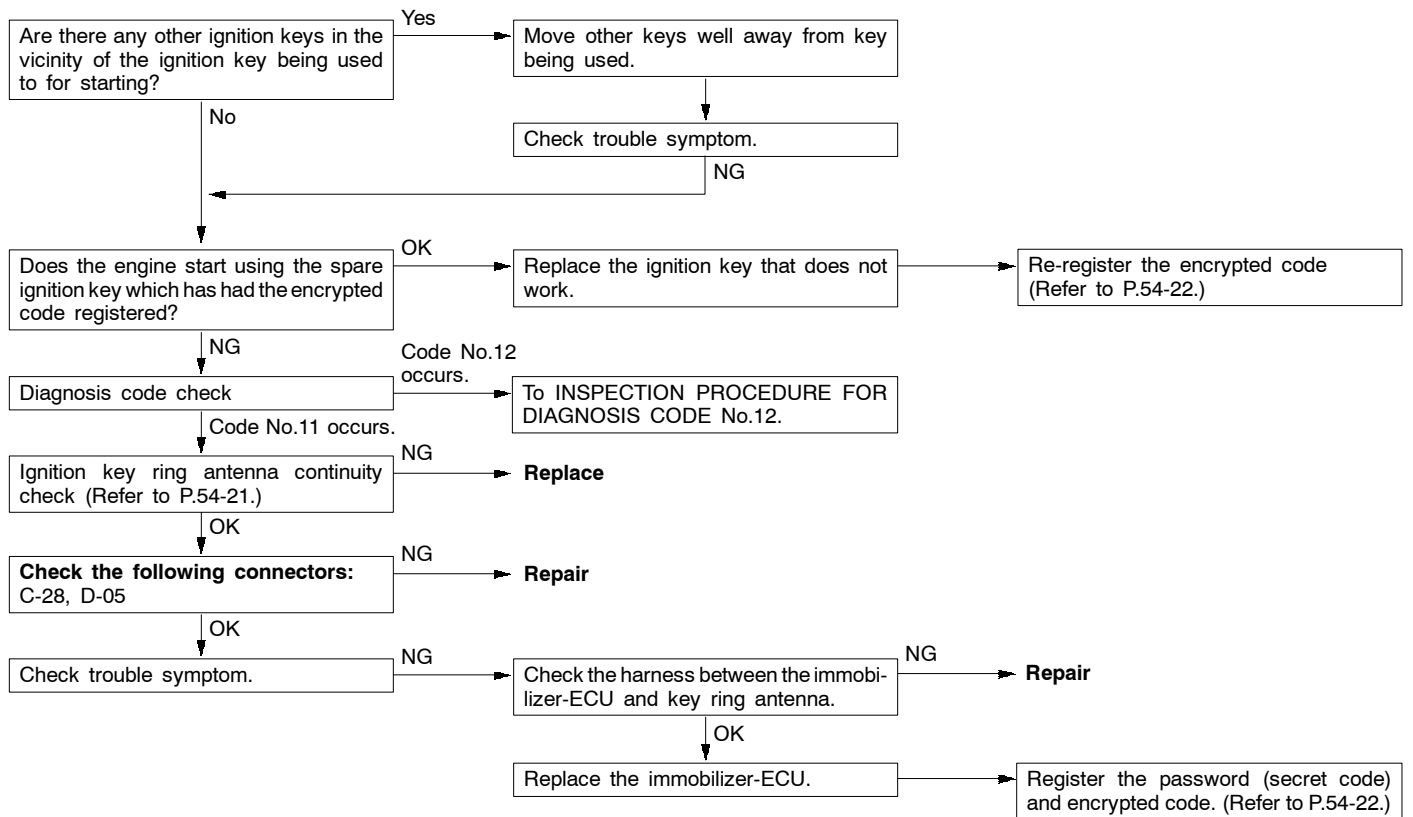
Diagnosis code No.	Inspection items	Reference page
11	Transponder communication system or radio interference of encrypted code	54-11
12	Encrypted code are not the same or are not registered	54-11

NOTE

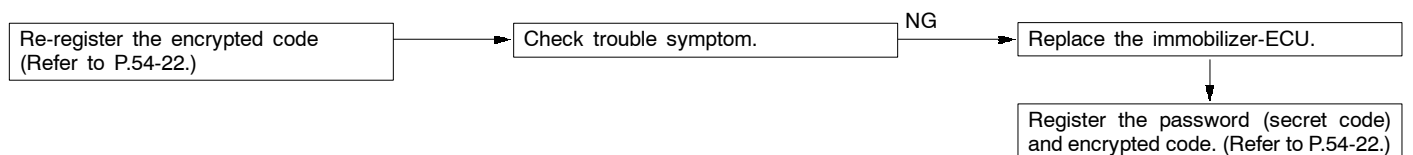
Diagnosis code is not recorded.

INSPECTION PROCEDURE FOR DIAGNOSIS CODES <6G7>

Code No.11 Transponder communication system or radio interference of encrypted code	Probable cause
<ul style="list-style-type: none"> The encrypted code of the transponder is not sent to the immobilizer-ECU immediately after the ignition switch is turned to ON position. If the engine is started while several ignition keys are in the vicinity, then interference between the different keys may occur, which will cause this code to be generated. 	<ul style="list-style-type: none"> Radio interference of encrypted code Malfunction of transponder Malfunction of ignition key ring antenna Malfunction of harness or connector Malfunction of immobilizer-ECU



Code No.12 Encrypted codes are not the same or 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.	<ul style="list-style-type: none"> The encrypted code in the ignition key being used has not been properly registered. Malfunction of immobilizer-ECU



INSPECTION CHART FOR DIAGNOSIS CODES <4D5>

54300710126

Diagnosis code No.	Inspection items	Reference page
11*	Transponder communication system or radio interference of encrypted code	54-11
12*	Encrypted codes are not the same or not registered	54-11
21	Communication system between fuel cut valve controller and immobilizer-ECU	54-12
22	Malfunction of fuel cut valve controller system	54-13
23*	Identification codes are not identical	54-13

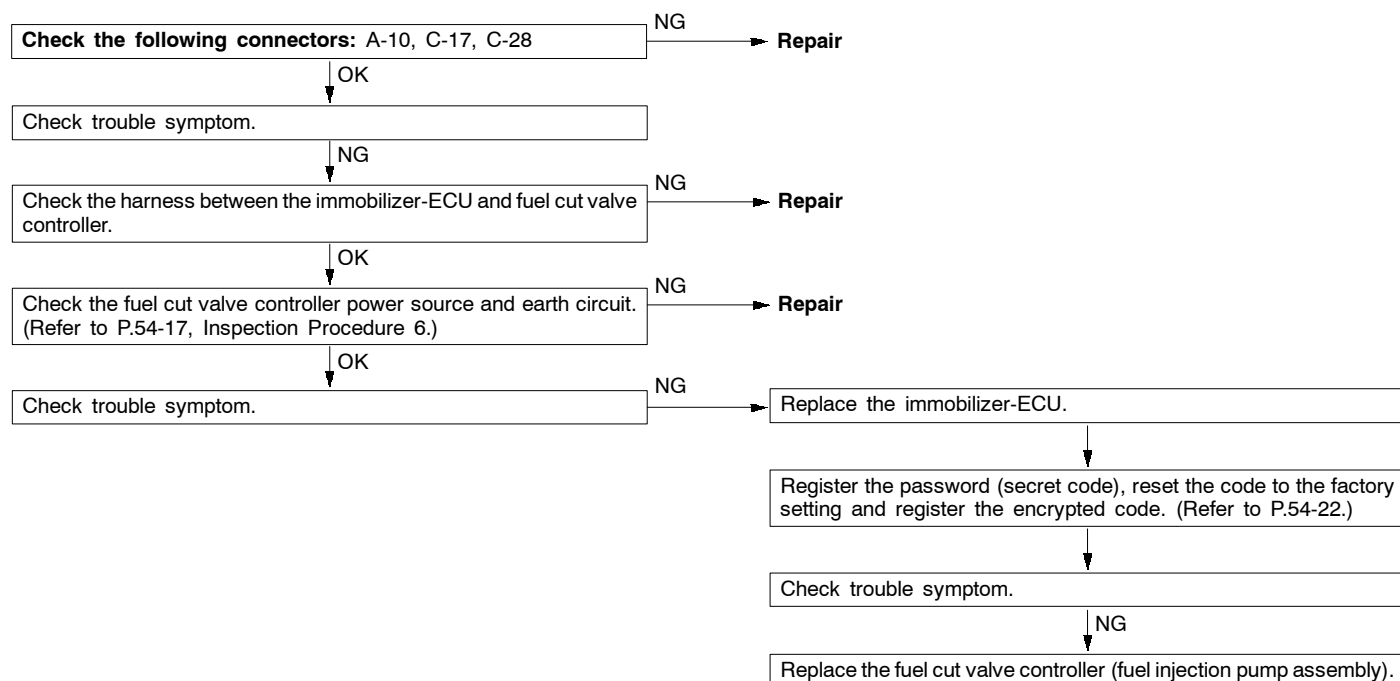
NOTE

*: diagnosis code Nos. 11, 12, 23 are recorded.

INSPECTION PROCEDURE FOR DIAGNOSIS CODES <4D5>

For diagnosis code numbers other than those listed below, refer to “INSPECTION PROCEDURE FOR DIAGNOSIS CODES <6G7>”.

Code No.21 Communication system between fuel cut valve controller and immobilizer-ECU	Probable cause
The confirmation code is not sent from the fuel cut valve controller within the specified time after the ignition key is turned to ON or, an incorrect code is sent.	<ul style="list-style-type: none"> Malfunction of harness or connector Malfunction of fuel cut valve controller Malfunction of immobilizer-ECU



Code No.22 Malfunction of fuel cut valve controller system	Probable cause
The cause is probably a malfunction of the fuel cut valve controller.	<ul style="list-style-type: none"> Malfunction of fuel cut valve controller

Check the fuel cut valve controller power source and earth circuit.
(Refer to P.54-17, Inspection Procedure 6.)

OK

Check trouble symptom.

NG

Replace the fuel cut valve controller (fuel injection pump assembly).

Code No.23 Identification codes are not identical	Probable cause
The identification code received from the immobilizer-ECU is not identical to the identification code that has been recorded in the fuel cut valve controller.	<ul style="list-style-type: none"> Resetting the code to the factory setting is not made using the MUT-II Malfunction of fuel cut valve controller

Use the MUT-II to reset the code to the factory setting.
(Refer to P.54-23.)



Check trouble symptom.

NG

Replace the fuel cut valve controller (fuel injection pump assembly).



Check trouble symptom.

NG

Replace the immobilizer-ECU.



Register the password (secret code), reset the code to the factory setting and register the encrypted code. (Refer to P.54-22.)

INSPECTION CHART FOR TROUBLE SYMPTOMS

54300720754

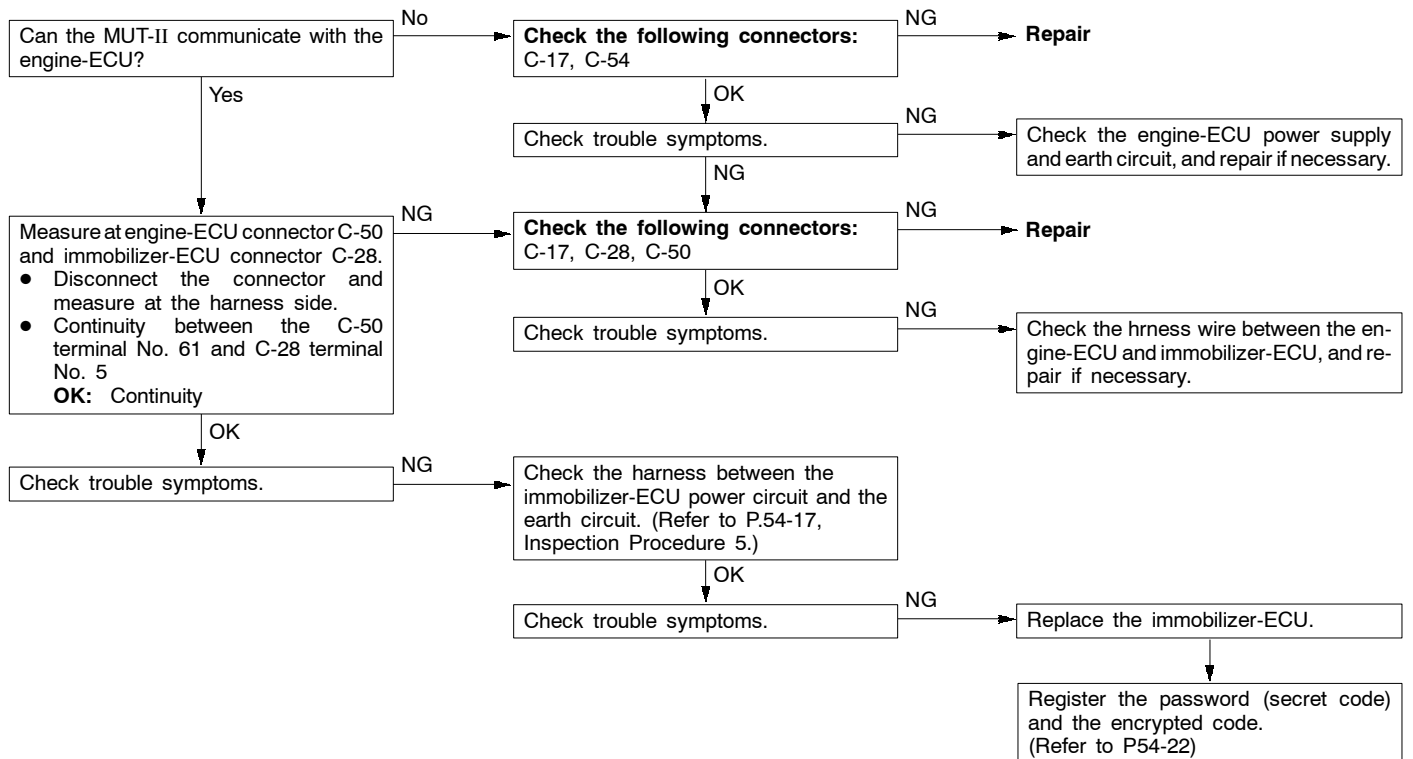
Trouble symptom	Inspection procedure No.	Reference page
Communication with MUT-II is impossible	1	54-14
Encrypted code cannot be registered using the MUT-II	2	54-15
Engine does not start (Cranking but no initial combustion). <6G7>	3	54-15
Engine does not start (Cranking but no initial combustion). <4D5>	4	54-16
Malfunction of the immobilizer-ECU power source and earth circuit	5	54-17
Malfunction of the fuel cut valve controller power source and earth circuit <4D5>	6	54-17

INSPECTION PROCEDURE FOR TROUBLE SYMPTOMS

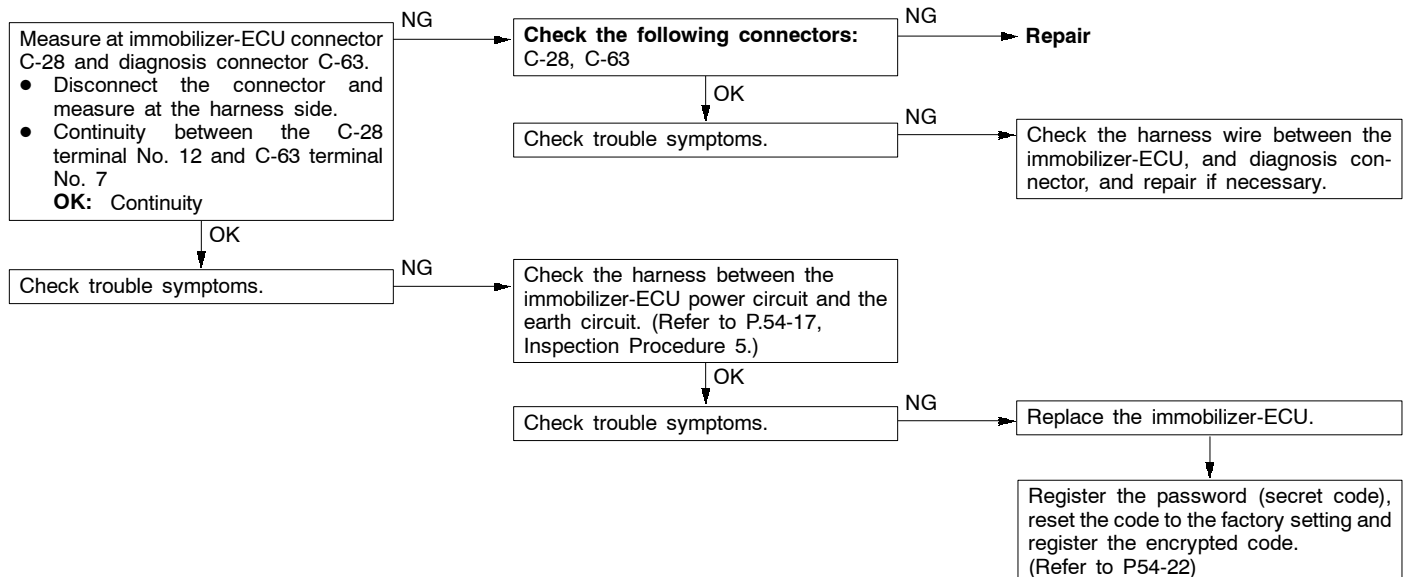
Inspection Procedure 1

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.	<ul style="list-style-type: none"> Malfunction of diagnosis line Malfunction of harness or connector Malfunction of immobilizer-ECU

<6G7>

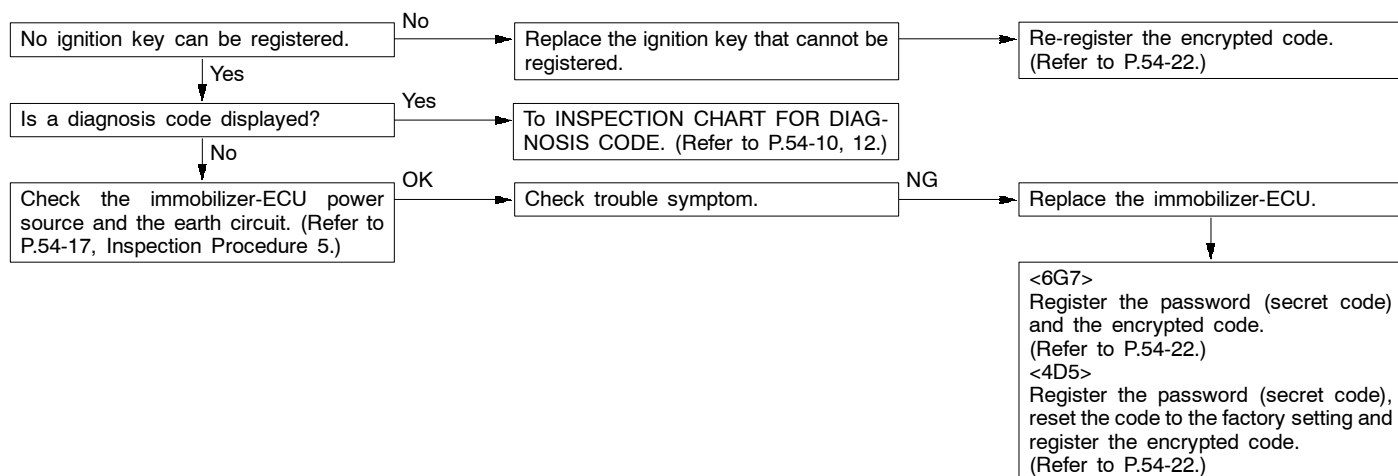


<4D5>



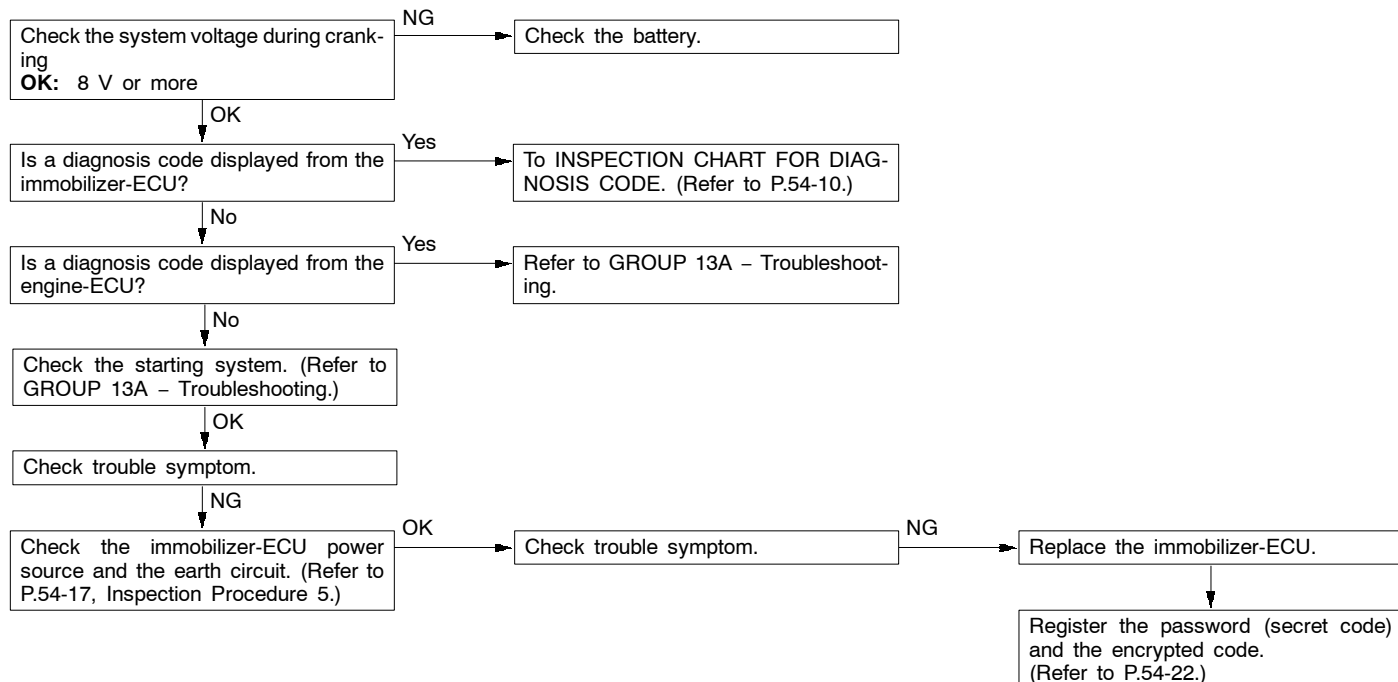
Inspection Procedure 2

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.	<ul style="list-style-type: none"> • Malfunction of transponder • Malfunction of ignition key ring antenna • Malfunction of harness or connector • Malfunction of immobilizer-ECU



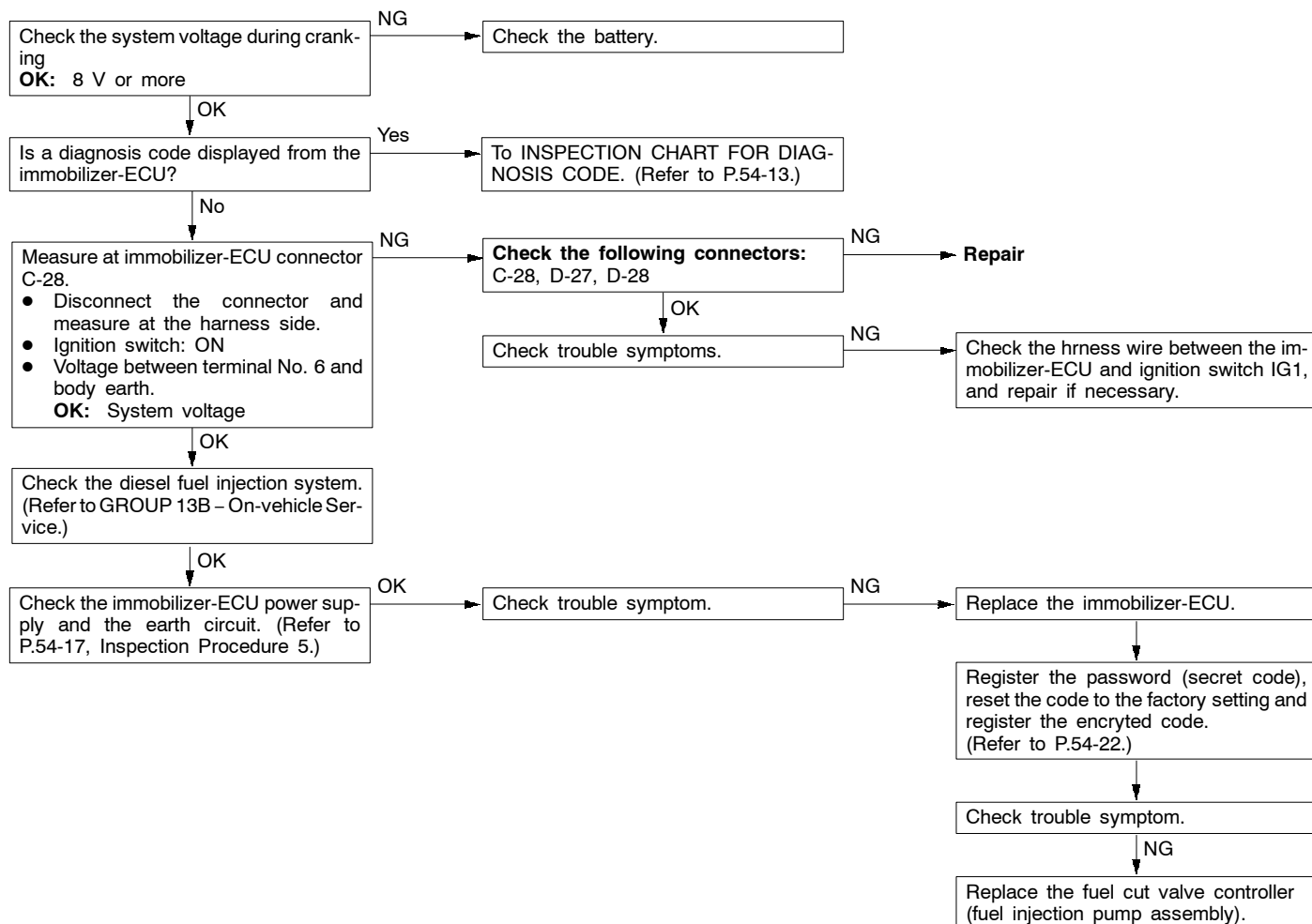
Inspection Procedure 3

Engine does not start (Cranking but no initial combustion). <6G7>	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.	<ul style="list-style-type: none"> • Malfunction of MPI system • Malfunction of immobilizer-ECU

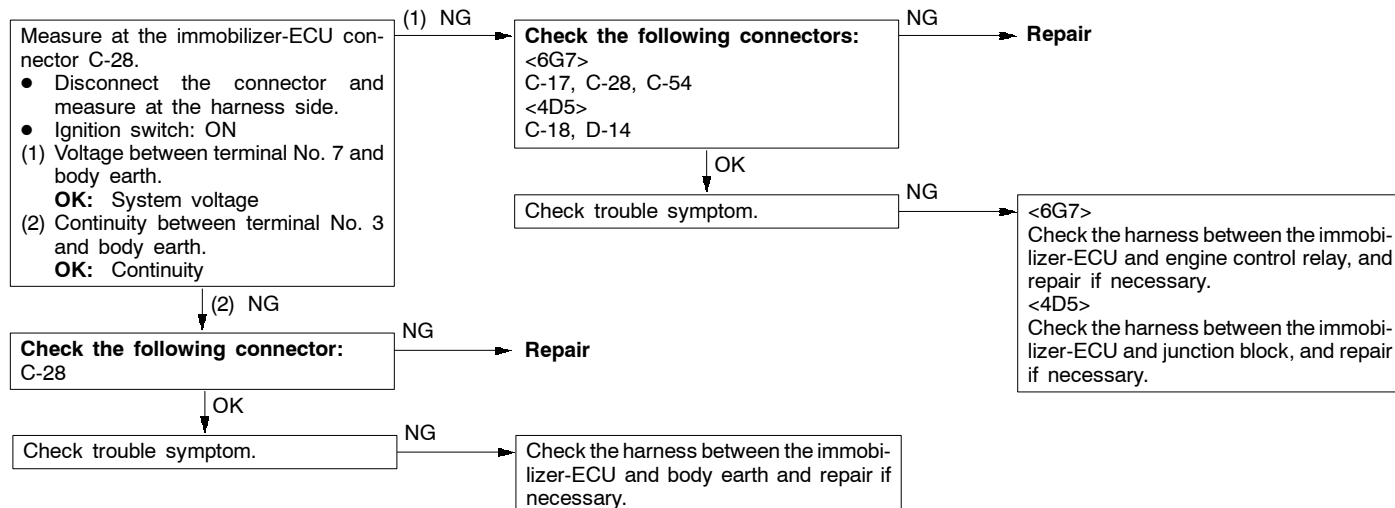


Inspection Procedure 4

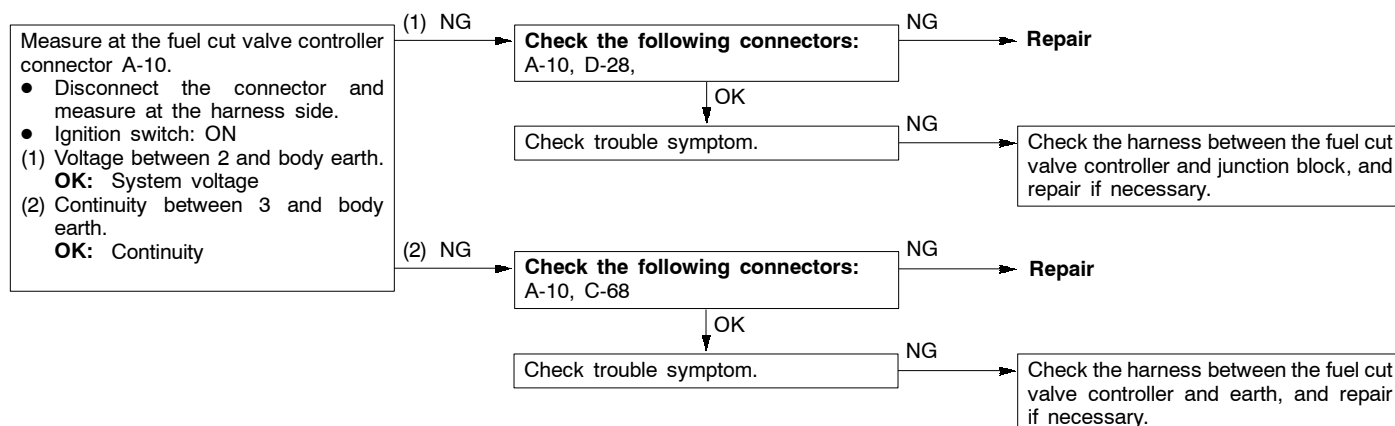
Engine does not start (Cranking but no initial combustion). <4D5>	Probable cause
<p>If no fuel injection, there might be a problem with the fuel injection system in addition to a malfunction of the immobilizer system.</p> <p>It is normal for this to occur if an attempt is made to start the engine using a key that has not been properly registered.</p>	<ul style="list-style-type: none"> • Malfunction of diesel fuel injection system • Malfunction of immobilizer-ECU



Inspection Procedure 5

Malfunction of the immobilizer-ECU power source and earth circuit

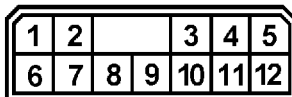
Inspection Procedure 6

**Malfunction of the fuel cut valve controller power source and earth circuit
<4D5>**

CHECK AT IMMOBILIZER-ECU

54300760053

Terminal Voltage Check Chart



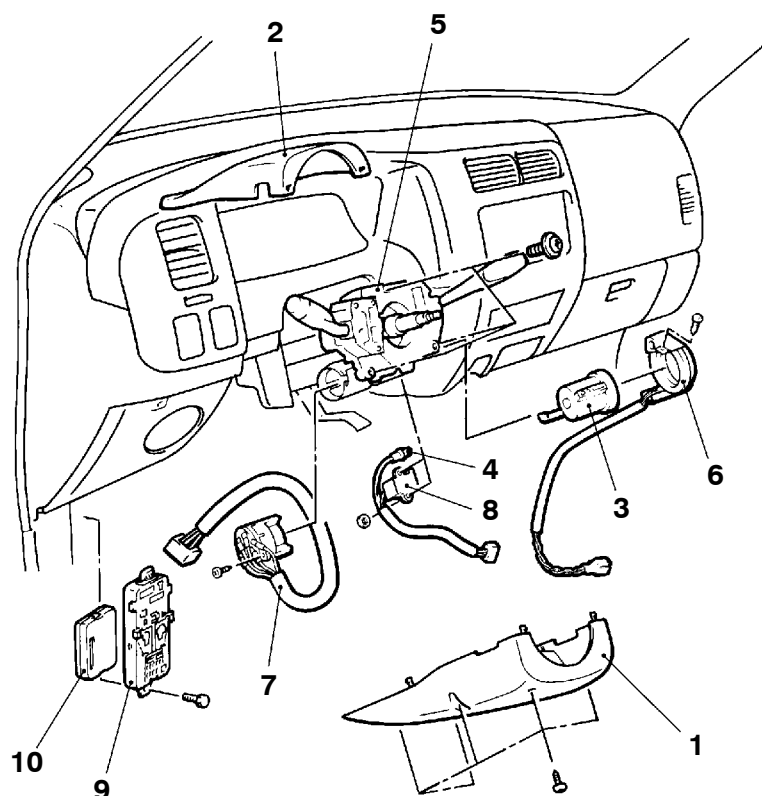
20F0191

Terminal No.	Signal	Checking requirements	Terminal voltage
3	Immobilizer-ECU earth	Always	0 V
6	Ignition switch-IG <4D5>	Ignition switch: OFF	0 V
		Ignition switch: ON	System voltage
7	Immobilizer-ECU power supply <6G7>	Always	System voltage
	Immobilizer-ECU power supply <4D5>	Ignition switch: OFF or approx. 5 or more seconds after switch has been turned from ON to OFF.	0 V
		Ignition switch: ON or within approx. 5 seconds after switch has been turned from ON to OFF.	System voltage

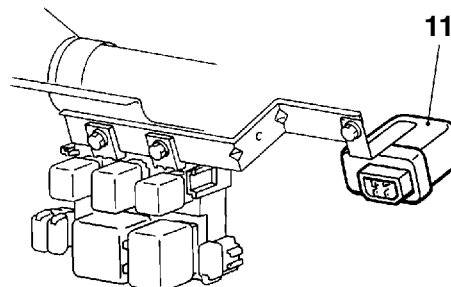
IGNITION SWITCH AND IMMOBILIZER SYSTEM

54300210367

REMOVAL AND INSTALLATION

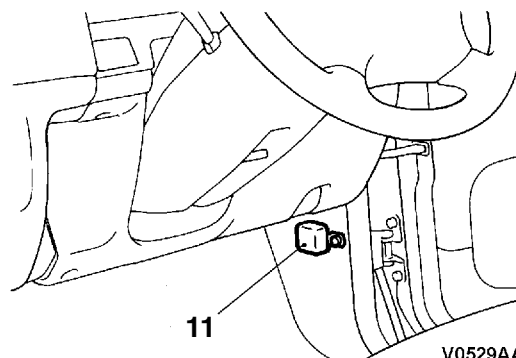
W0228AA
00009158

<L.H. drive vehicles>



W0340AA

<R.H. drive vehicles>



V0529AA

Steering lock cylinder and key hole illumination lamp removal steps

- Driver's side under cover or knee protector assembly (Refer to GROUP 52A – Instrument Panel.)

1. Column cover, lower
2. Column cover, upper
3. Steering lock cylinder
4. Key hole illumination lamp

Ignition switch, key reminder switch and ignition key ring antenna removal steps

- Steering wheel (Refer to GROUP 37A – Steering Wheel and Shaft.)
- Clock spring (Refer to GROUP 52B – Air Bag Module and Clock Spring.)
- Driver's side under cover or knee protector assembly (Refer to GROUP 52A – Instrument Panel.)

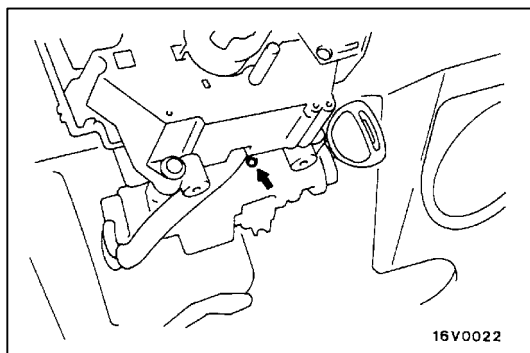
1. Column cover, lower
2. Column cover, upper
5. Column switch assembly
6. Ignition key ring antenna
7. Ignition switch
8. Key reminder switch

ETACS-ECU removal steps

- Driver's side under cover or knee protector assembly (Refer to GROUP 52A – Instrument Panel.)
9. Junction block
 10. ETACS-ECU

Immobilizer-ECU removal steps

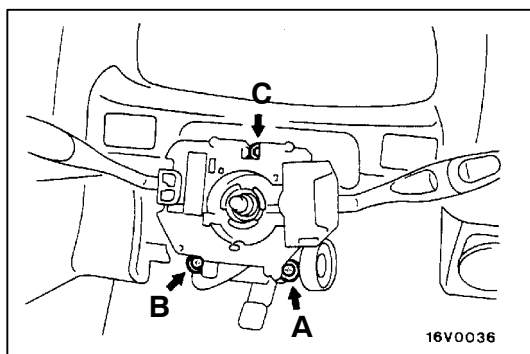
- Front scuff plate and cowl side trim <driver's side> (Refer to GROUP 52A – Trims.)
11. Immobilizer-ECU



REMOVAL SERVICE POINT

◀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.

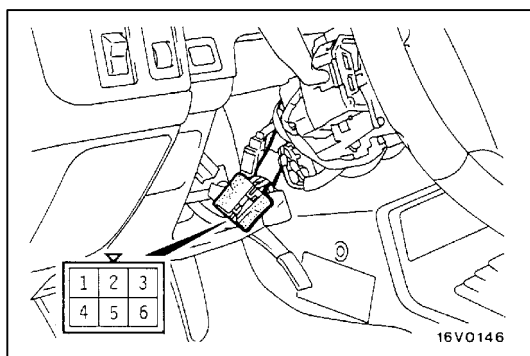


INSTALLATION SERVICE POINT

▶A◀ COLUMN SWITCH ASSEMBLY INSTALLATION

Tighten the column switch assembly mounting screws to the specified torque in the order of A, B and C.

Tightening torque: 25 Nm



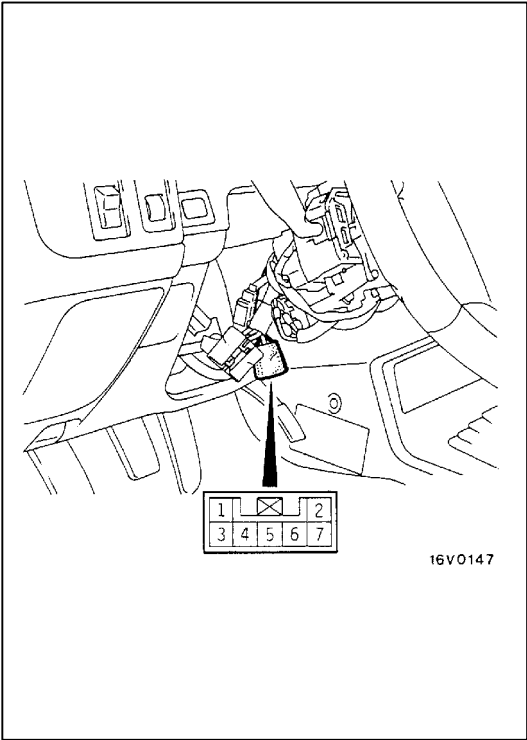
INSPECTION

54300220285

IGNITION SWITCH CONTINUITY CHECK

1. Remove the driver's side under cover or knee protector assembly.
2. Remove the column cover lower and upper.
3. Disconnect the wiring connector from the ignition switch.
4. Operate the switch and check the continuity between the terminals.

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

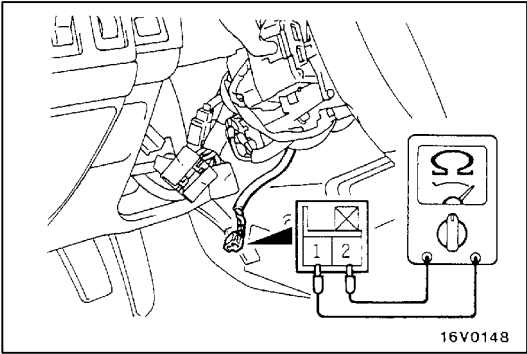


KEY REMINDER SWITCH CONTINUITY CHECK

54300770094

1. Remove the driver’s side under cover or knee protector assembly.
2. Remove the column cover lower and upper.
3. Disconnect the wiring connector from the key reminder switch.
4. Check the continuity between the terminal when the ignition key is pulled out of and inserted into the steering lock cylinder.

Ignition key position	Terminal No.				
	1	ILL	2	4	6
Pulled out					
Inserted					



IGNITION KEY RING ANTENNA CONTINUITY CHECK

54300930027

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

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

54300810086

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

Replacement part	6G7	4D5	
	Encrypted code registration	Encrypted code registration	Resetting the code to the factory setting
Ignition key	Necessary	Necessary	Not necessary
Ignition key ring antenna	Not necessary	Not necessary	Not necessary
Immobilizer-ECU	Necessary	Necessary	Necessary
Engine-ECU <6G7>*	Necessary	–	–
Fuel cut valve controller (fuel injection pump) <4D5>	–	Not necessary	Not necessary (New part) Necessary (Used part)

NOTE

*: If the engine-ECU is replaced, the immobilizer-ECU and ignition key should be replaced together with it.

Each engine-ECU has encrypted code for immobilizer-ECU, and the encrypted code is registered in the immobilizer-ECU.

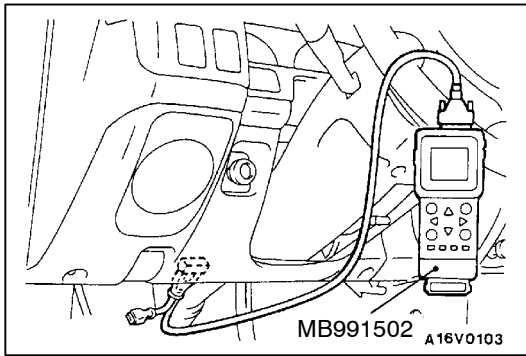
Encrypted Code Registration Method

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 input the vehicle secret code and to register the password (secret code) that the user specifies into the immobilizer-ECU. (Refer to the “MUT-II REFERENCE MANUAL” or “MUT-II OPERATING INSTRUCTIONS”)

Caution

Because registering of the encrypted codes is carried out after all previously-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 off the ignition switch before connecting or disconnecting of the MUT-II.

2. Check that the diagnosis code No.54 is not being generated by the engine-ECU. If it is being generated check according to the Troubleshooting Procedures.

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. To register the second or subsequent key, leave the MUT-II connected and remove the first registered key. Within 5 seconds insert the key to be registered and turn on the ignition switch.

NOTE

After 5 seconds have elapsed, the key registration must be repeated from the beginning because the key registration mode terminates.

5. This complete the registration operation. Turn the ignition switch OFF and leave it for approx. 10 seconds.
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.

Resetting the code to the factory setting <4D5>

Refer to the "MUT-II REFERENCE MANUAL" or "MUT-II OPERATING INSTRUCTIONS" on handling the MUT-II.

NOTE

Resetting the code to the factory setting refers to the process of clearing the identification code which has been recorded in the fuel cut valve controller and switching the controller to learning mode. After this resetting is carried out, the identification code in the immobilizer-ECU will be recorded in the controller the next time the ignition switch is turned to the ON.

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

Caution

Turn off the ignition switch before connecting or disconnecting of the MUT-II.

2. Turn on the ignition switch.
3. Use the MUT-II to reset the code to the factory setting.

NOTE

Approximately 16 minutes are required to complete resetting the code to the factory setting.

4. Disconnect the MUT-II

COMBINATION METERS

54300030260

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	6G7	700	±100
		3,000	±150
		5,000	±250
		6,000	±300
	4D5	700	±100
		3,000	±150
		4,750	±160
		5,000	±250
Fuel gauge unit resistance Ω	Float point F		1 – 5
	Float point E		103 – 117
Fuel gauge unit float height mm	A (Float point F)		16
	B (Float point E)		219.5
Engine coolant temperature gauge unit resistance (at 70 °C) Ω			104 ± 13.5
Fuel gauge resistance Ω	Power supply and earth		250 ± 25
	Power supply and fuel gauge		91 ± 9.1
	Fuel gauge and earth		159 ± 15.9
Engine coolant temperature gauge resistance Ω	Power supply and earth		179 ± 17.9
	Power supply and engine coolant temperature gauge		54 ± 5.4
	Engine coolant temperature gauge and earth		233 ± 23.3

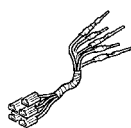
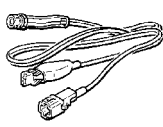


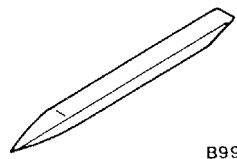
SEALANT

54300050075

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

SPECIAL TOOLS

54300060504

Tool	Number	Name	Use
<p>A</p>  <p>B</p>  <p>C</p>  <p>D</p>  <p>C991223</p>	<p>MB991223</p> <p>A: MB991219</p> <p>B: MB991220</p> <p>C: MB991221</p> <p>D: MB991222</p>	<p>Harness set</p> <p>A: Test harness</p> <p>B: LED harness</p> <p>C: LED harness adapter</p> <p>D: Probe</p>	<ul style="list-style-type: none"> Fuel gauge check Engine coolant temperature gauge check <4D5> <p>A: Connector pin contact pressure check</p> <p>B: Power circuit check</p> <p>C: Power circuit check</p> <p>D: Commercial tester connection</p>
 <p>B990784</p>	MB990784	Ornament remover	Removal of meter bezel assembly

TROUBLESHOOTING

54300720761

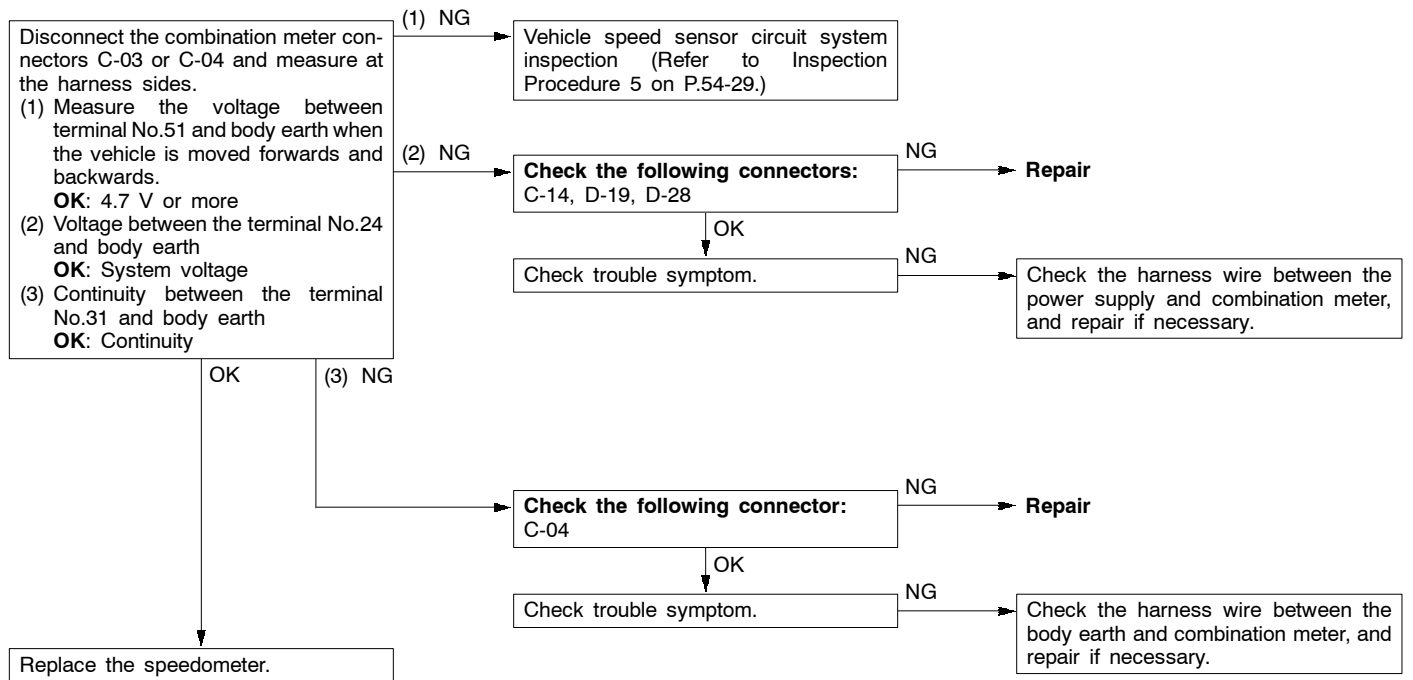
INSPECTION CHART FOR TROUBLE SYMPTOMS

Trouble symptom	Inspection procedure	Reference page
Speedometer does not work.	1	54-26
Tachometer does not work.	2	54-26
Fuel gauge does not work.	3	54-27
Engine coolant temperature gauge does not work.	4	54-27

INSPECTION PROCEDURE FOR TROUBLE SYMPTOMS

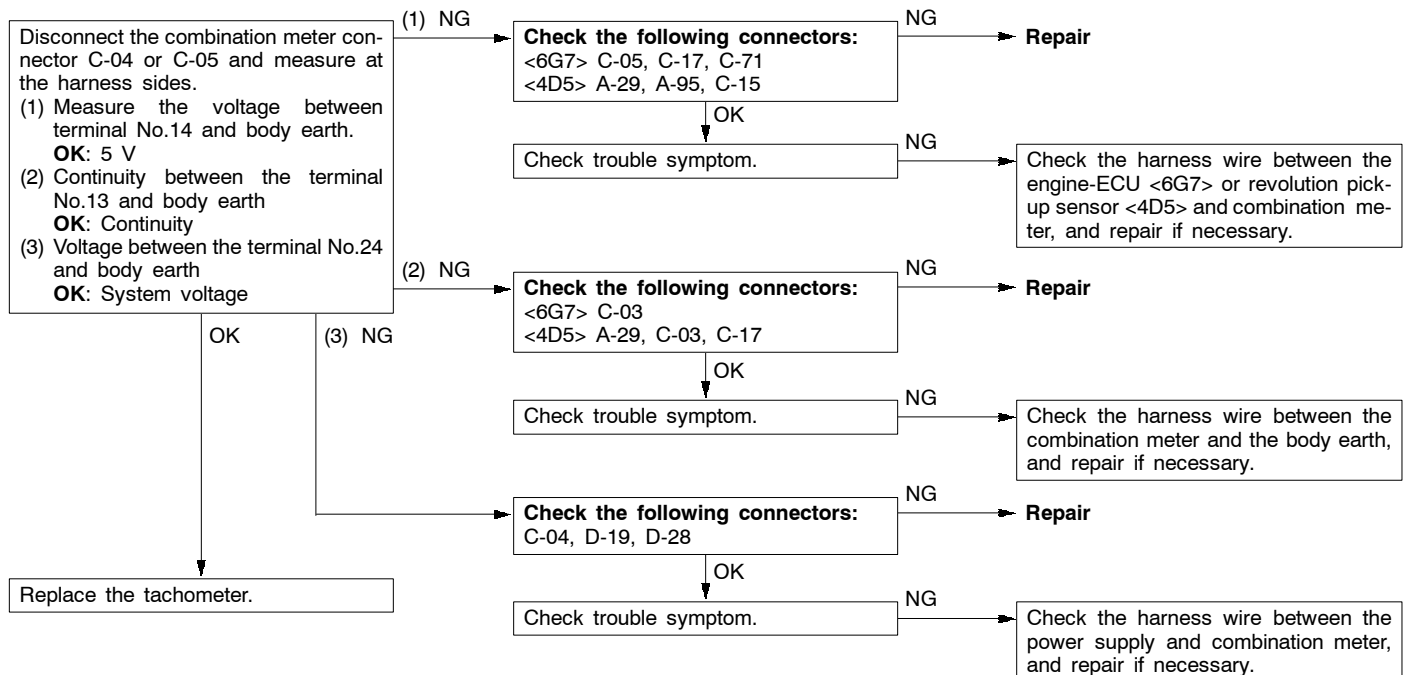
Inspection Procedure 1

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.	<ul style="list-style-type: none"> Malfunction of vehicle speed sensor Malfunction of speedometer Malfunction of harness or connector



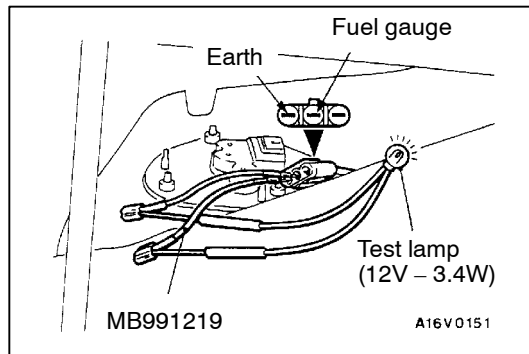
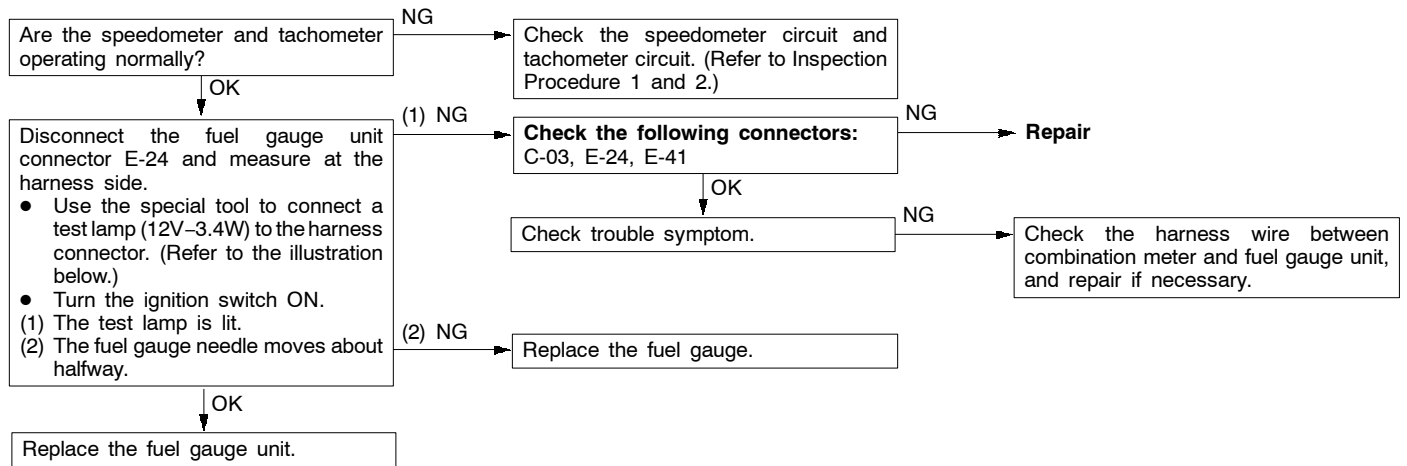
Inspection Procedure 2

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.	<ul style="list-style-type: none"> Malfunction of tachometer Malfunction of harness or connector



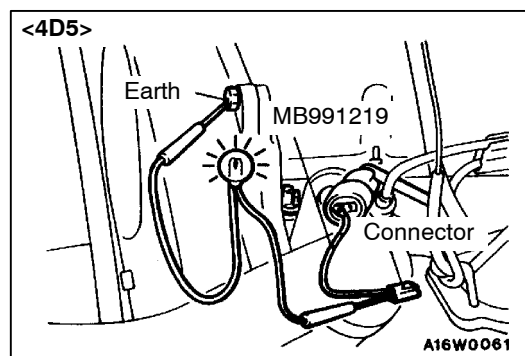
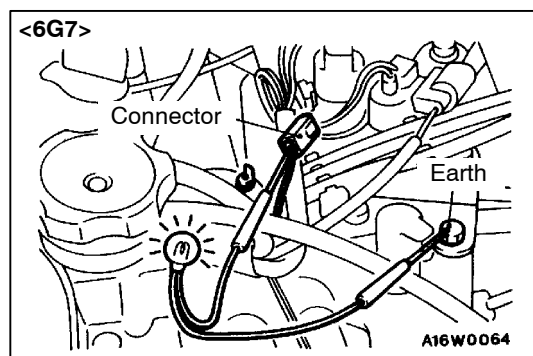
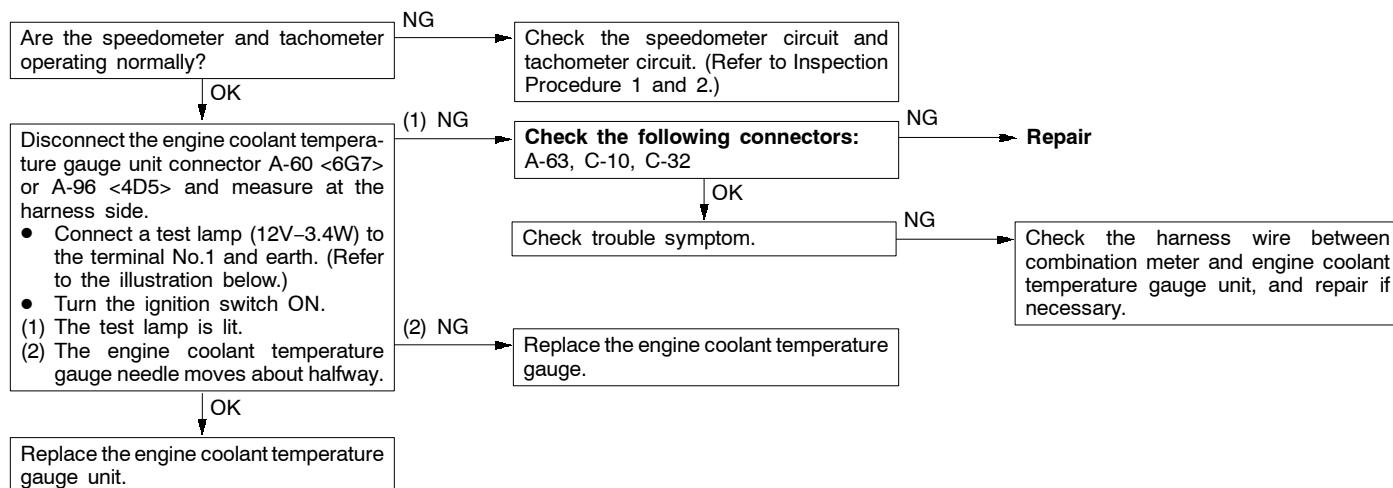
Inspection Procedure 3

Fuel gauge does not work.	Probable cause
If the speedometer and tachometer are normal, the circuit from the ignition switch (IG ₁) to the combination meter is normal.	<ul style="list-style-type: none"> • Malfunction of the fuel gauge unit • Malfunction of the fuel gauge • Malfunction of the harness wire or connector



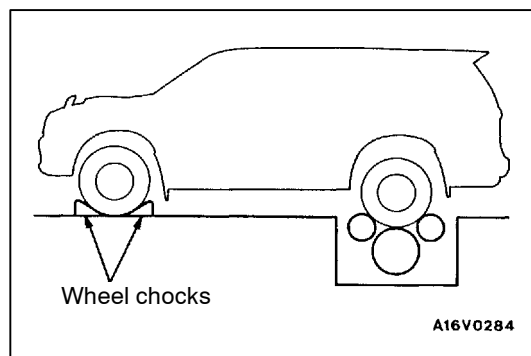
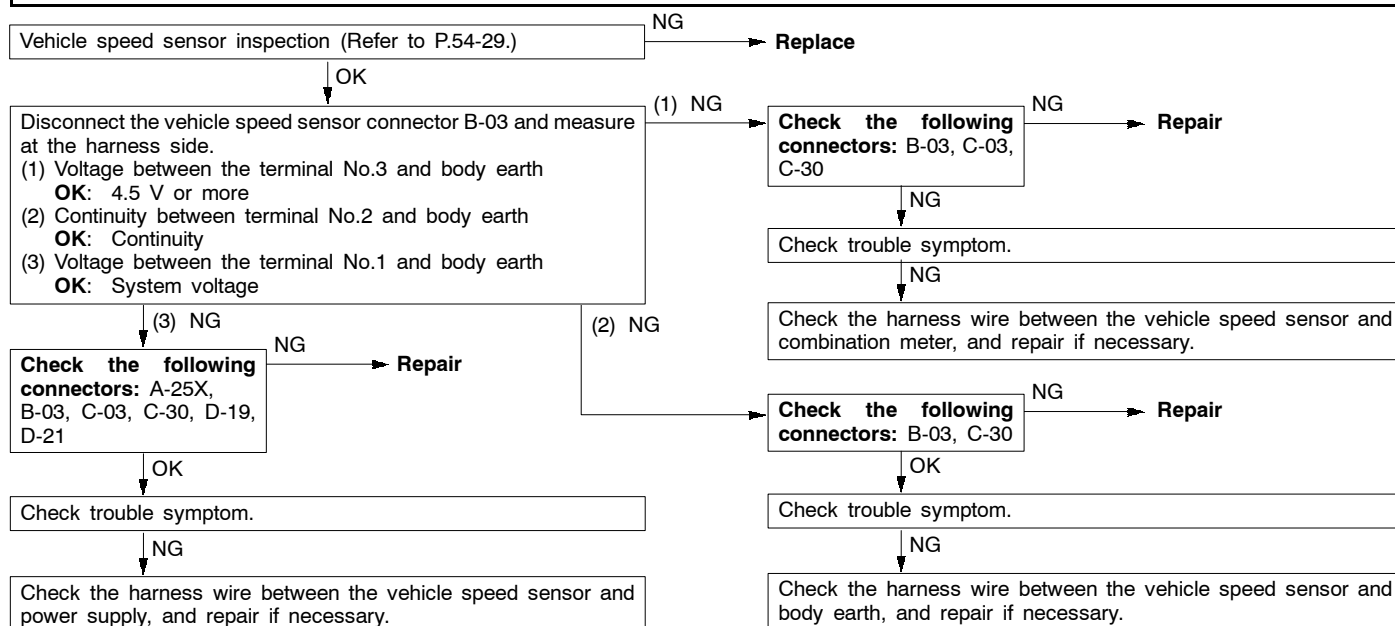
Inspection Procedure 4

Engine coolant temperature gauge does not work.	Probable cause
If the speedometer and tachometer are normal, the circuit from the ignition switch (IG ₁) to the combination meter is normal.	<ul style="list-style-type: none"> • Malfunction of the engine coolant temperature gauge unit • Malfunction of the engine coolant temperature gauge • Malfunction of the harness wire or connector



Inspection Procedure 5

Vehicle speed sensor circuit system inspection



ON-VEHICLE SERVICE

SPEEDOMETER CHECK

54300090213

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

Caution**Place the transfer shift lever to 2H position.**

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 value:**

Standard indication (mph)	km/h	Allowance 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

54300100220

<6G7>

1. Connect the MUT-II to the diagnosis connector (16-pin).

Caution

Make certain that the ignition switch is OFF when the MUT-II is connected or disconnected.

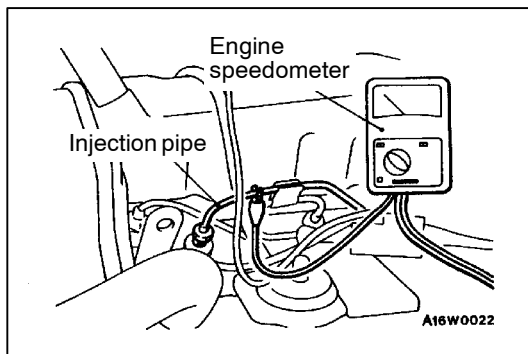
2. Start the engine and run.
3. Select the item No.22 of the MUT-II Service Data.
4. Compare the readings of the engine speedometer and the tachometer at every engine speed, and check if the variations are within the standard value.

Standard value:

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

NOTE

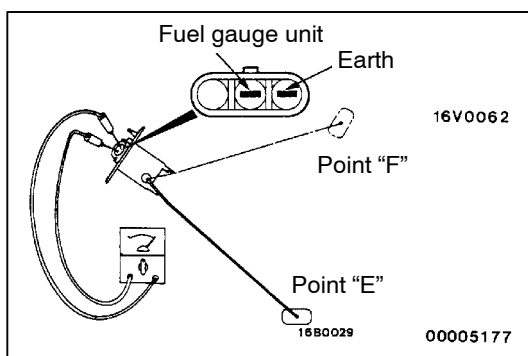
For tachometer inspection, use of a fluxmeter-type engine speedometer is recommended. (Because a fluxmeter only needs to be clipped to the high tension cable.)

**<4D5>**

1. Connect the engine speedometer to the injection pipe.
2. Compare the readings of the engine speedometer and the tachometer at every engine speed, and check if the variation are within the standard values.

Standard value:

700 r/min: ± 100 r/min
 3,000 r/min: ± 150 r/min
 4,750 r/min: ± 160 r/min
 5,000 r/min: ± 250 r/min

**FUEL GAUGE UNIT CHECK**

54300120363

Remove the fuel gauge unit from the fuel tank.

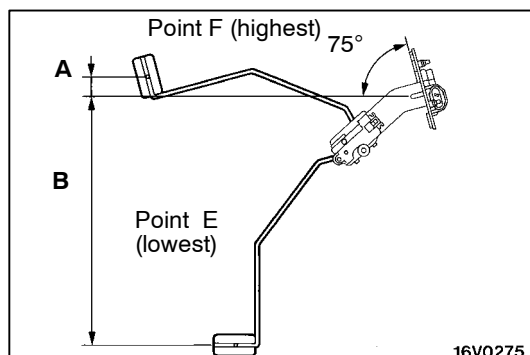
FUEL GAUGE UNIT RESISTANCE

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: 1 – 5 Ω
 Point E: 103 – 117 Ω

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

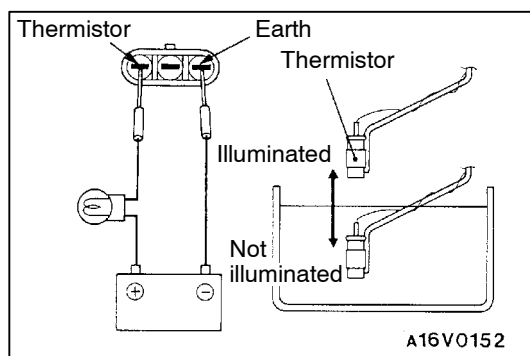
**FUEL GAUGE UNIT FLOAT HEIGHT**

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: 16 mm

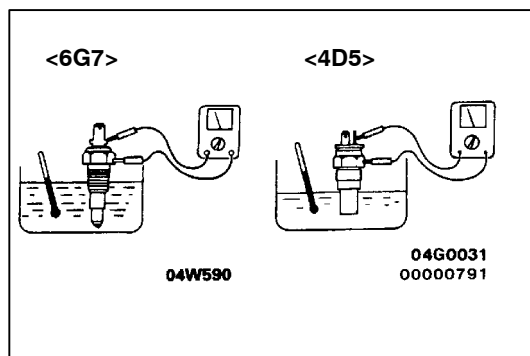
B: 219.5 mm

**THERMISTOR**

1. Connect fuel gauge unit (thermistor) to battery via test lamp (12 V – 3.4 W). Immerse in water.
2. Condition is good if lamp goes off when the thermistor is immersed in water and goes on when it is taken out of water.

Caution

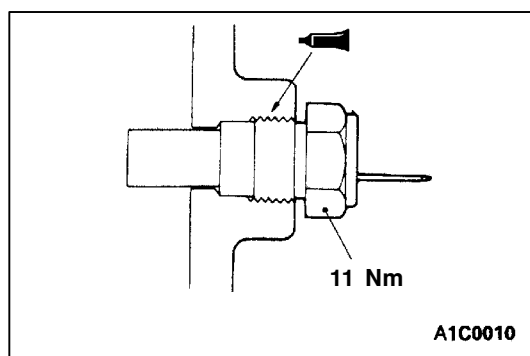
After finishing this test, wipe the unit, dry and install it in the fuel tank.

**ENGINE COOLANT TEMPERATURE GAUGE UNIT CHECK**

54300150287

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:

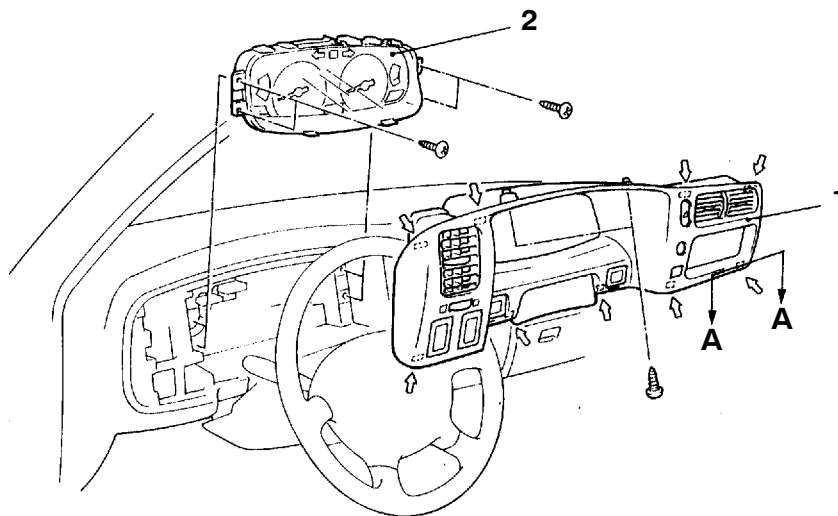
3M Adhesive Nut Locking No. 4171 or equivalent

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

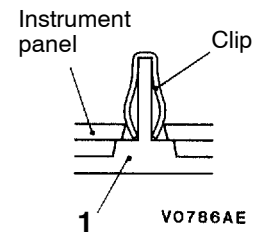
COMBINATION METERS

54300290248

REMOVAL AND INSTALLATION



Section A – A



NOTE

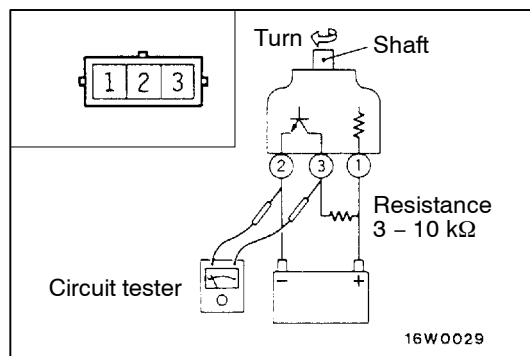
↔ : metal clip position

T0280AA

00009159

Removal steps

1. Meter bezel assembly
2. Combination meter

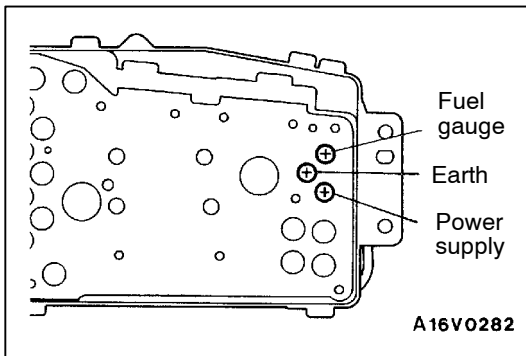


INSPECTION

54300640173

VEHICLE SPEED SENSOR CHECK

1. Remove the vehicle speed sensor and connect a 3 – 10 kΩ resistance as shown in the illustration.
2. Turn the shaft of the vehicle speed sensor and check that there is voltage between terminals 2 – 3. (1 turn = 4 pulses)

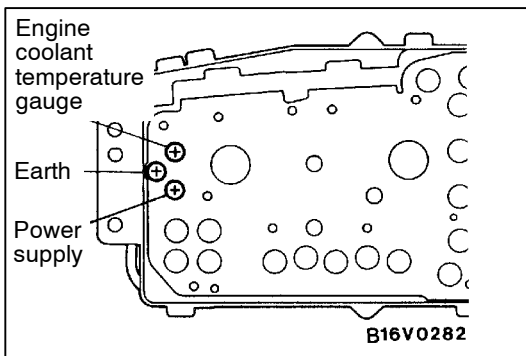
**FUEL GAUGE RESISTANCE CHECK**

54300300187

1. Remove the power supply tightening screw.
2. Use a circuit tester to measure the resistance value between the terminals.

Standard value:**Power supply – Earth:** $250 \pm 25 \Omega$ **Power supply – Fuel gauge:** $91 \pm 9.1 \Omega$ **Fuel gauge – Earth:** $159 \pm 15.9 \Omega$ **Caution**

When inserting the testing probe into the power supply terminal, be careful not to touch the printed board.

**ENGINE COOLANT TEMPERATURE GAUGE RESISTANCE CHECK**

1. Remove the power supply tightening screw.
2. Use a circuit tester to measure the resistance value between the terminals.

Standard value:**Power supply – Earth:** $179 \pm 17.9 \Omega$ **Power supply – Engine coolant temperature gauge:** $54 \pm 5.4 \Omega$ **Engine coolant temperature gauge – Earth:** $233 \pm 23.3 \Omega$ **Caution**

When inserting the testing probe into the power supply terminal, be careful not to touch the printed board.

MULTI-METER

54300720778

TROUBLESHOOTING

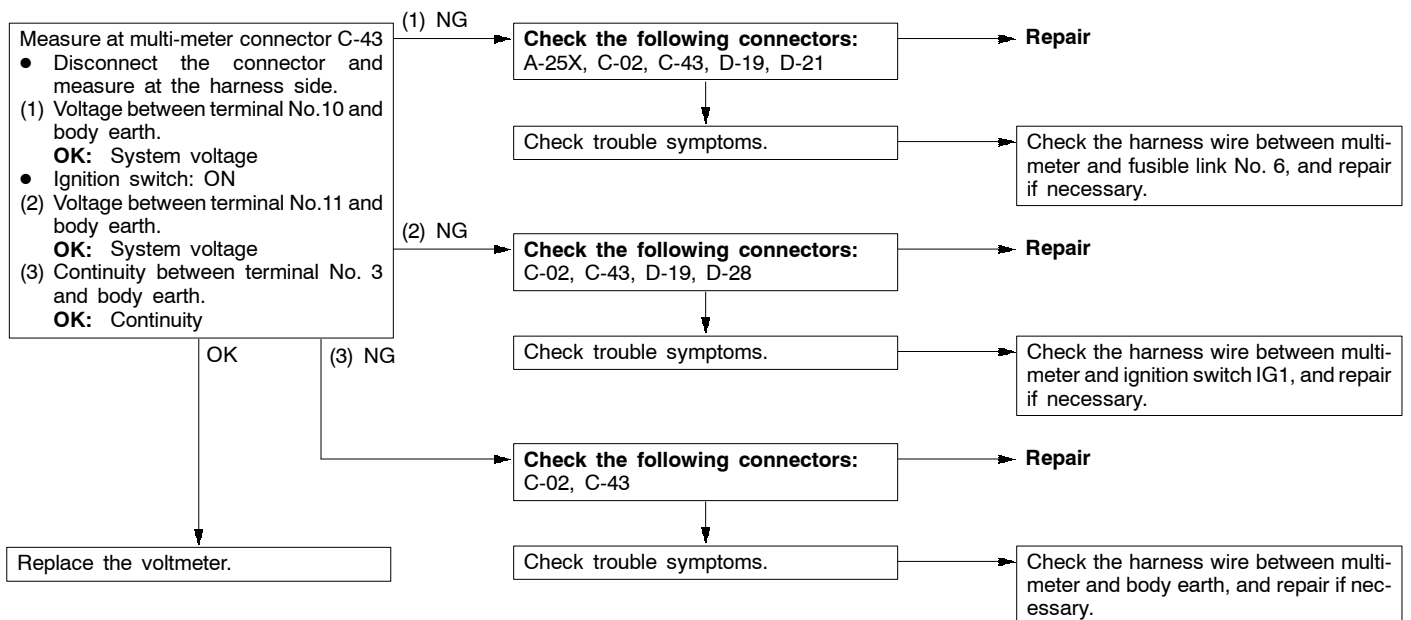
INSPECTION CHART FOR TROUBLE SYMPTOMS

Trouble symptom	Inspection procedure	Reference page
Voltmeter does not work.	1	54-34
Oil pressure gauge does not work.	2	54-35
Bearing indicator is off when moving forward. (for electronic compass)	3	54-36
Vehicle magnetic compensation cannot be made. (for electronic compass)	4	54-36
Discrepancy between the actual outside temperature and displayed temperature.	5	54-36
Display is hard to see or no display appears.	6	54-37

INSPECTION PROCEDURE FOR TROUBLE SYMPTOMS

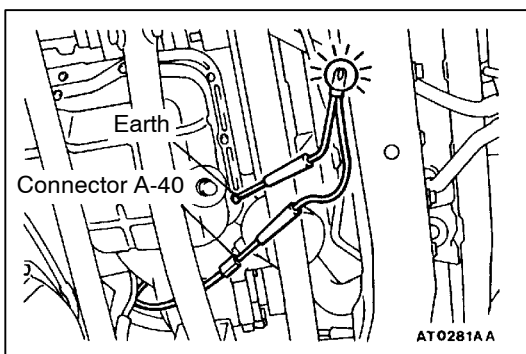
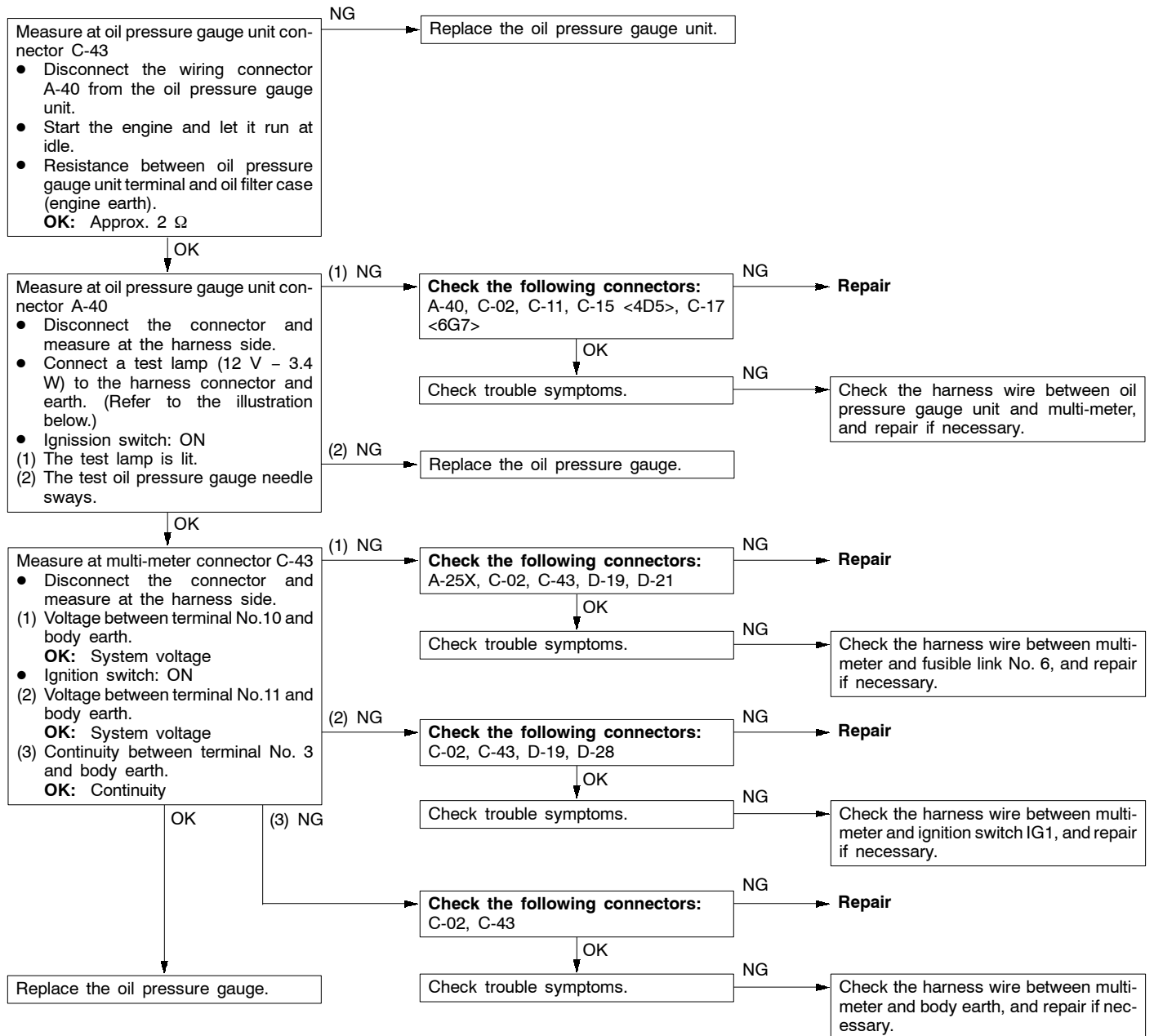
Inspection Procedure 1

Voltmeter does not work.	Probable cause
The ignition switch circuit system, the body earth circuit system, the power circuit system or the voltmeter may be defective.	<ul style="list-style-type: none"> Malfunction of the voltmeter Malfunction of the harness wire or connector



Inspection Procedure 2

Oil pressure gauge does not work.	Probable cause
The oil pressure gauge unit, the oil pressure unit circuit system. The ignition switch circuit system, the body earth circuit system, the multi-meter power circuit system or the oil pressure gauge may be defective.	<ul style="list-style-type: none"> • Malfunction of the oil pressure gauge unit • Malfunction of the oil pressure gauge • Malfunction of the harness wire or connector



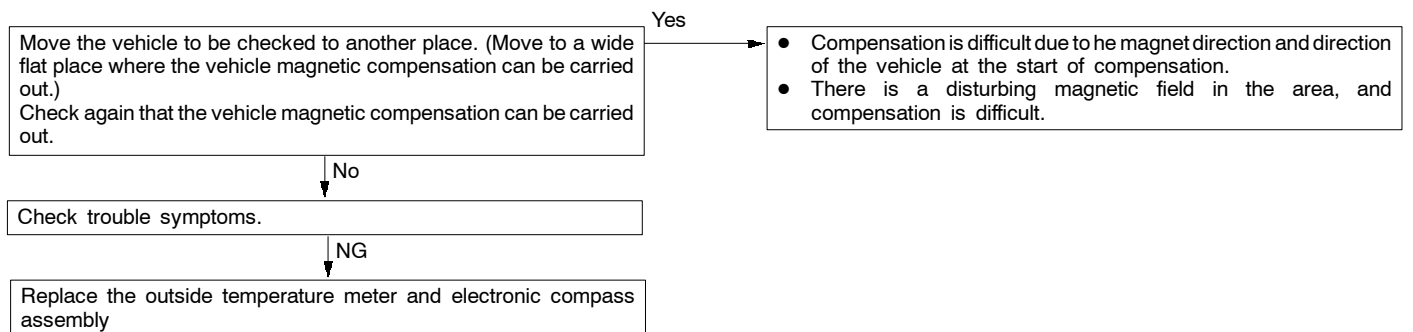
Inspection Procedure 3

Bearing indicator is off when moving forward. (for electric compass)	Probable cause
The vehicle magnetism tends to be disturbed particularly at such places as tunnel, railway crossing, area along railway, elevated road, urban above subway, etc. if disturbed, the driving direction marker will fluctuate.	<ul style="list-style-type: none"> The vehicle magnetic compensation failed

Vehicle magnetic compensation. (Refer to P.54-38)

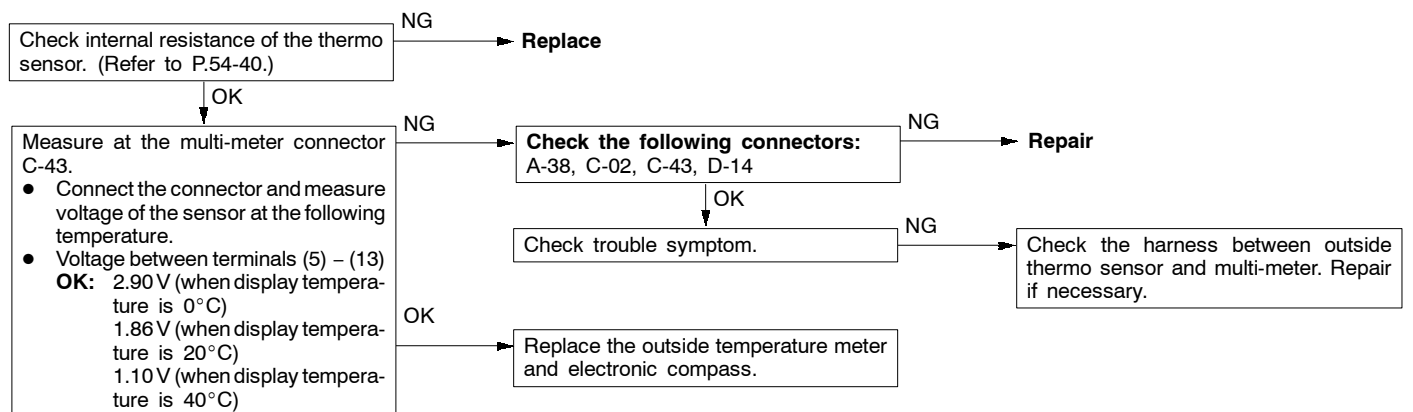
Inspection Procedure 4

Vehicle magnetic compensation cannot be made. (for electronic compass)	Probable cause
The multi-meter (outside temperature meter of the electronic compass) may be defective.	<ul style="list-style-type: none"> Malfunction of the multi-meter (outside temperature meter and electronic compass)



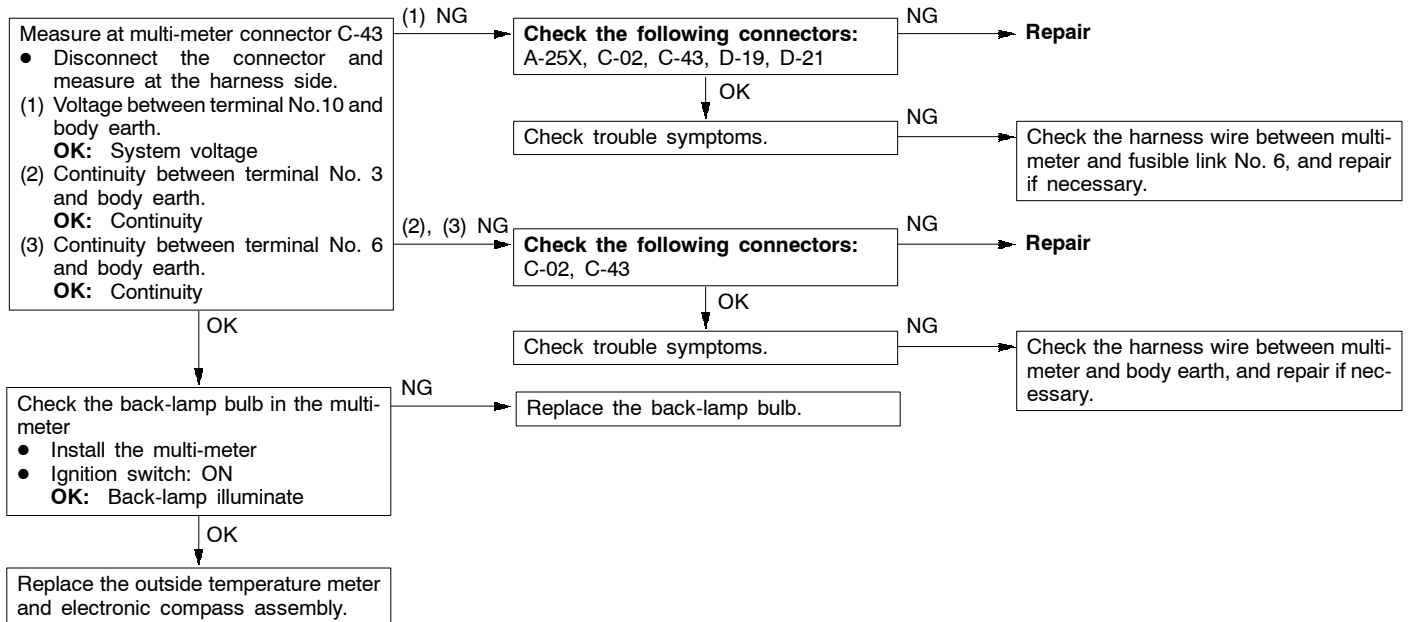
Inspection Procedure 5

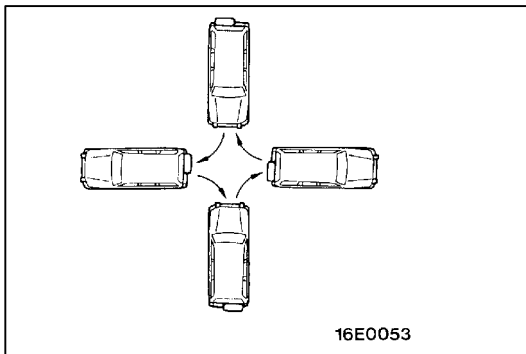
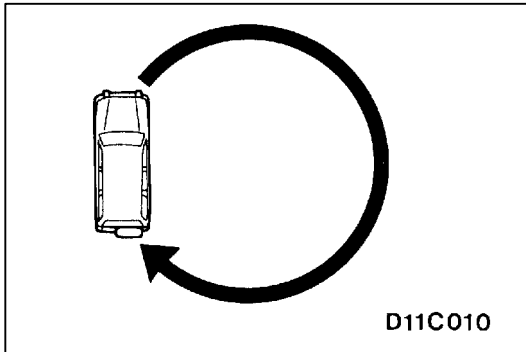
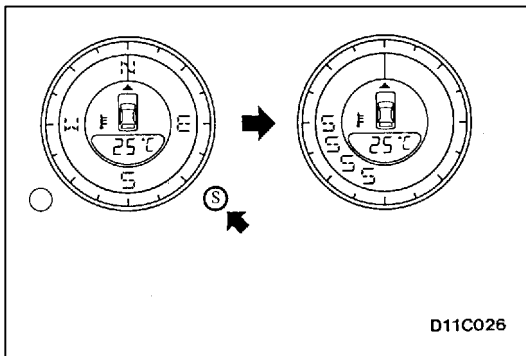
Discrepancy between the actual outside temperature and displayed temperature.	Probable cause
The outside thermo sensor, multi-meter (outside temperature meter and electronic compass), harness, or connector may be defective.	<ul style="list-style-type: none"> Malfunction of the outside thermo sensor Malfunction of the multi-meter (outside temperature meter and electronic compass) Malfunction of the harness or connector



Inspection Procedure 6

Display is hard to see or no display appears.	Probable cause
The The multi-meter (outside temperature meter of the electronic compass), harness, or connector may be defective.	<ul style="list-style-type: none"> • Malfunction of the multi-meter (outside temperature meter and electronic compass) • Blown back-lamp • Malfunction of the harness wire and connector





ON-VEHICLE SERVICE

54300970029

VEHICLE MAGNETIC COMPENSATION

1. When the vehicle magnetic compensation switch (S) is pressed, "S" will display on the full scale. When pressed down longer (0.5 second or more), the "S" display will move to the right turn or left turn, and the magnetic compensation mode will be entered.

2. The compensation will be completed automatically when the vehicle is slowly steered 360° or more.

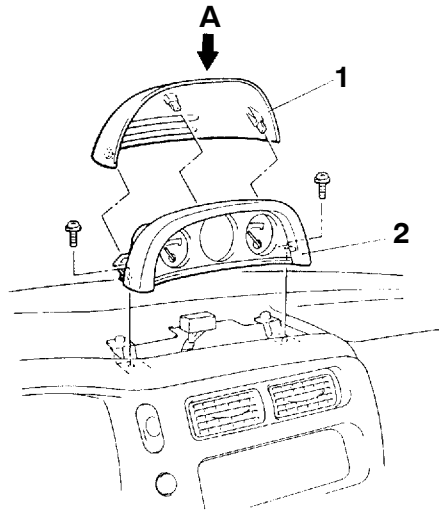
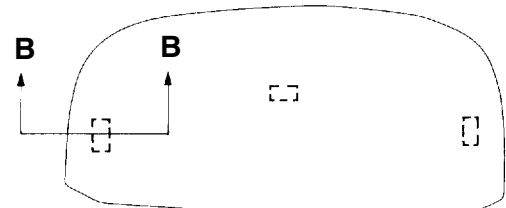
NOTE

- The compensation can be carried out by steering to the right or to the left.
- The "S" display speed will increase as the compensation degree advances.

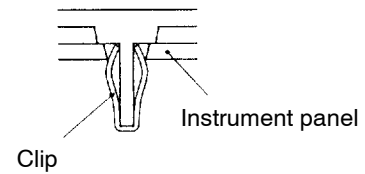
3. If there is not enough space to steer the vehicle, rotate the vehicle once without turning the handle.
4. After compensation is completed, the forward direction will be displayed.

MULTI-METER

54300390054

REMOVAL AND INSTALLATIONT0282AA
00009160**View A**

W0200AA

Section B - B

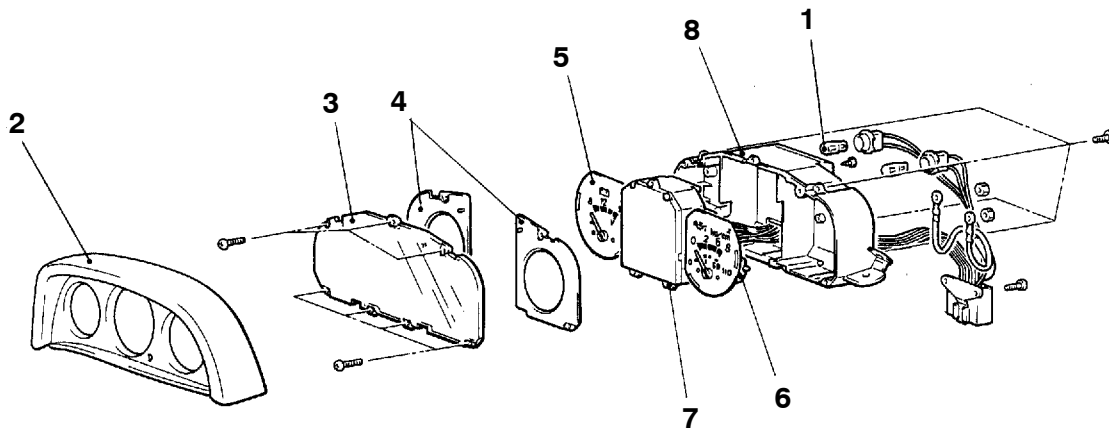
V0786AE

Removal steps

1. Multi-meter panel
2. Multi-meter

DISASSEMBLY AND REASSEMBLY

54300410064



BT0283AA

Disassembly steps

1. Bulb
2. Meter garnish
3. Meter glass
4. Window plate
5. Oil pressure gauge
6. Voltmeter
7. Electronic compass
8. Meter case

OUTSIDE THERMO SENSOR

54300030123

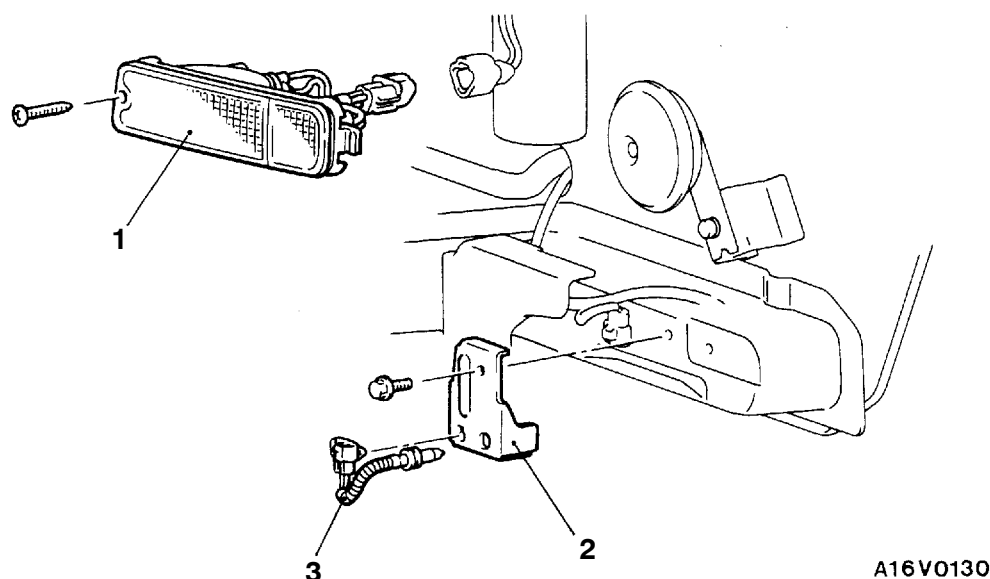
SERVICE SPECIFICATIONS

Items	Standard value	
Internal resistance of outside thermo sensor Ω	At 20°C	Approx. 1,200
	At 40°C	Approx. 500

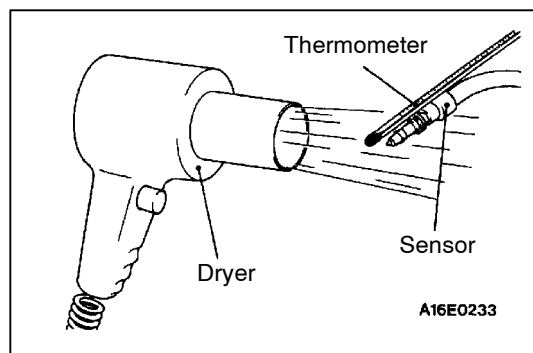
OUTSIDE THERMO SENSOR

54300950030

REMOVAL AND INSTALLATION



1. Front turn-signal lamp (L.H.)
2. Bracket
3. Outside thermo sensor



INSPECTION

54300960019

OUTSIDE THERMO SENSOR INTERNAL RESISTANCE CHECK

Check the internal resistance of the outside thermo sensor are at the standard values at temperatures of 20°C and 40°C.

Standard value:

Approx. 1,200 Ω (at 20°C)

Approx. 500 Ω (at 40°C)

HEADLAMP AND FRONT COMBINATION LAMP

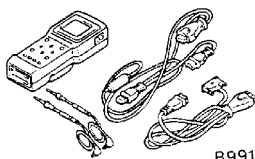

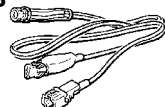


54200030267

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

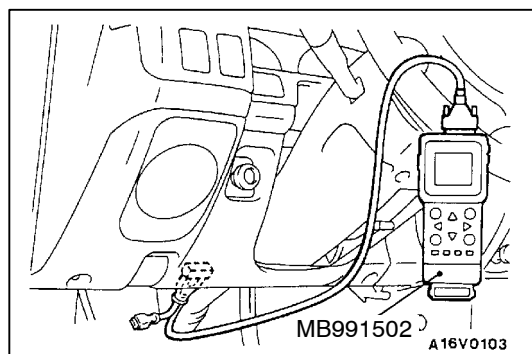
54200060570

Tool	Number	Name	Use
 B991502	MB991502	MUT-II sub assembly	ETACS-ECU input signal checking
<p>A</p>  <p>B</p>  <p>C</p>  <p>D</p>  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

TROUBLESHOOTING

54200900100

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



DIAGNOSIS FUNCTION

INPUT SIGNAL INSPECTION POINTS

1. Connect the MUT-II to the diagnosis connector.
2. If buzzer of the MUT-II sounds once when a switch is operated (ON/OFF), the ETACS-ECU input signal for that switch circuit system is normal.

INSPECTION CHART FOR TROUBLE SYMPTOMS

54200910226

Trouble symptoms		Inspection procedure	Reference page
Communication with MUT-II is impossible.	Communication with all systems is impossible.	1	54-43
	Communication with one-shot pulse input signal only is impossible.	2	54-43
The lighting monitor buzzer doesn't sound under the following conditions while tail lamps or headlamps illuminate. <ul style="list-style-type: none"> • When the ignition switch is turned to OFF and the driver's side door is open. 		3	54-43
Headlamp leveling does not occur when the headlamp leveling switch is operated.		5	54-44
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> <ul style="list-style-type: none"> • Lighting switch: OFF • Passing switch: OFF 		6	54-45
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> <ul style="list-style-type: none"> • Ignition switch: OFF • Passing switch: OFF 		7	54-46

INSPECTION PROCEDURE FOR TROUBLE SYMPTOMS

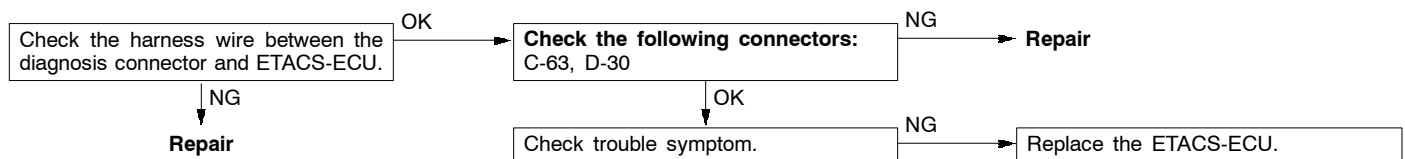
Inspection Procedure 1

Communication with MUT-II is impossible. (Communication with all systems is impossible.)	Probable cause
The cause is probably a defective power supply system (including earth) for the diagnosis line.	<ul style="list-style-type: none"> • Malfunction of connector • Malfunction of harness wire

Refer to GROUP 13A – Troubleshooting.

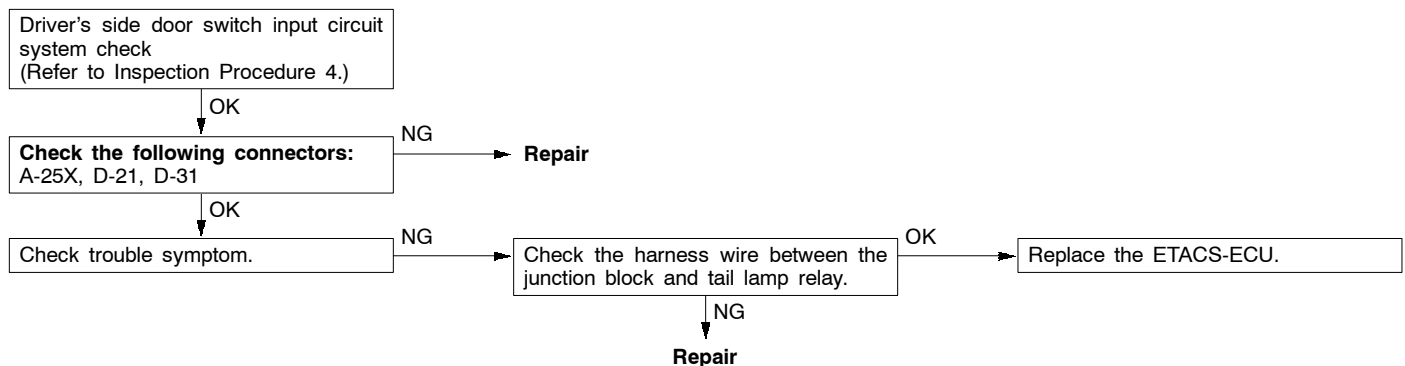
Inspection Procedure 2

Communication with MUT-II is impossible. (Communication with the one-shot pulse input signal only is impossible.)	Probable cause
The cause is probably a defective one-shot pulse input circuit system of the diagnosis line.	<ul style="list-style-type: none"> • Malfunction of connector • Malfunction of harness wire • Malfunction of ETACS-ECU



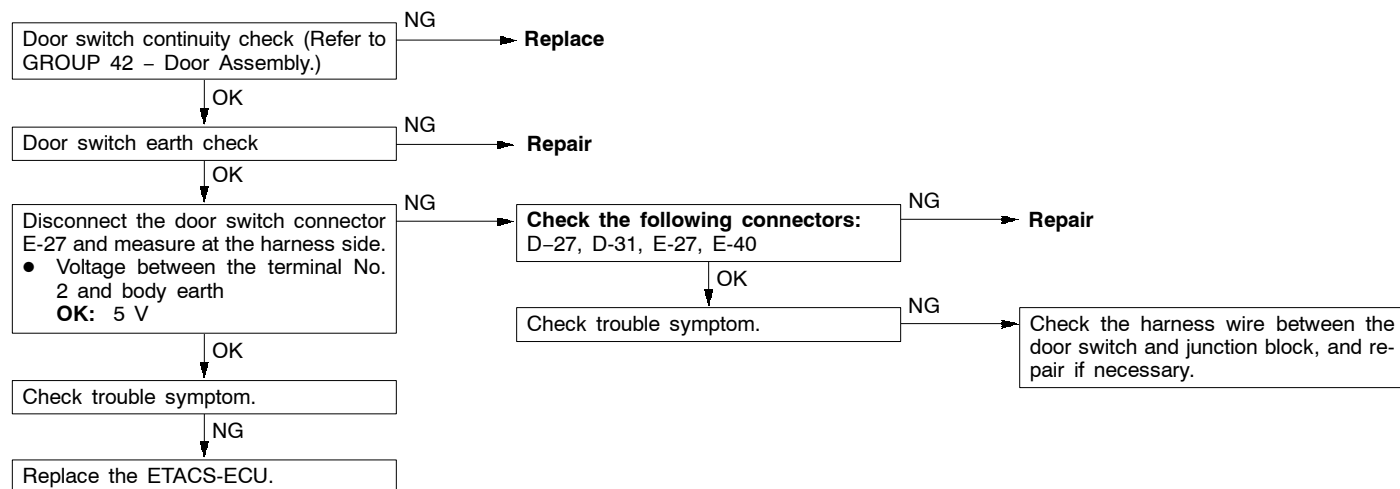
Inspection Procedure 3

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.	<ul style="list-style-type: none"> • Malfunction of driver's side door switch • Malfunction of harness or connector • Malfunction of ETACS-ECU



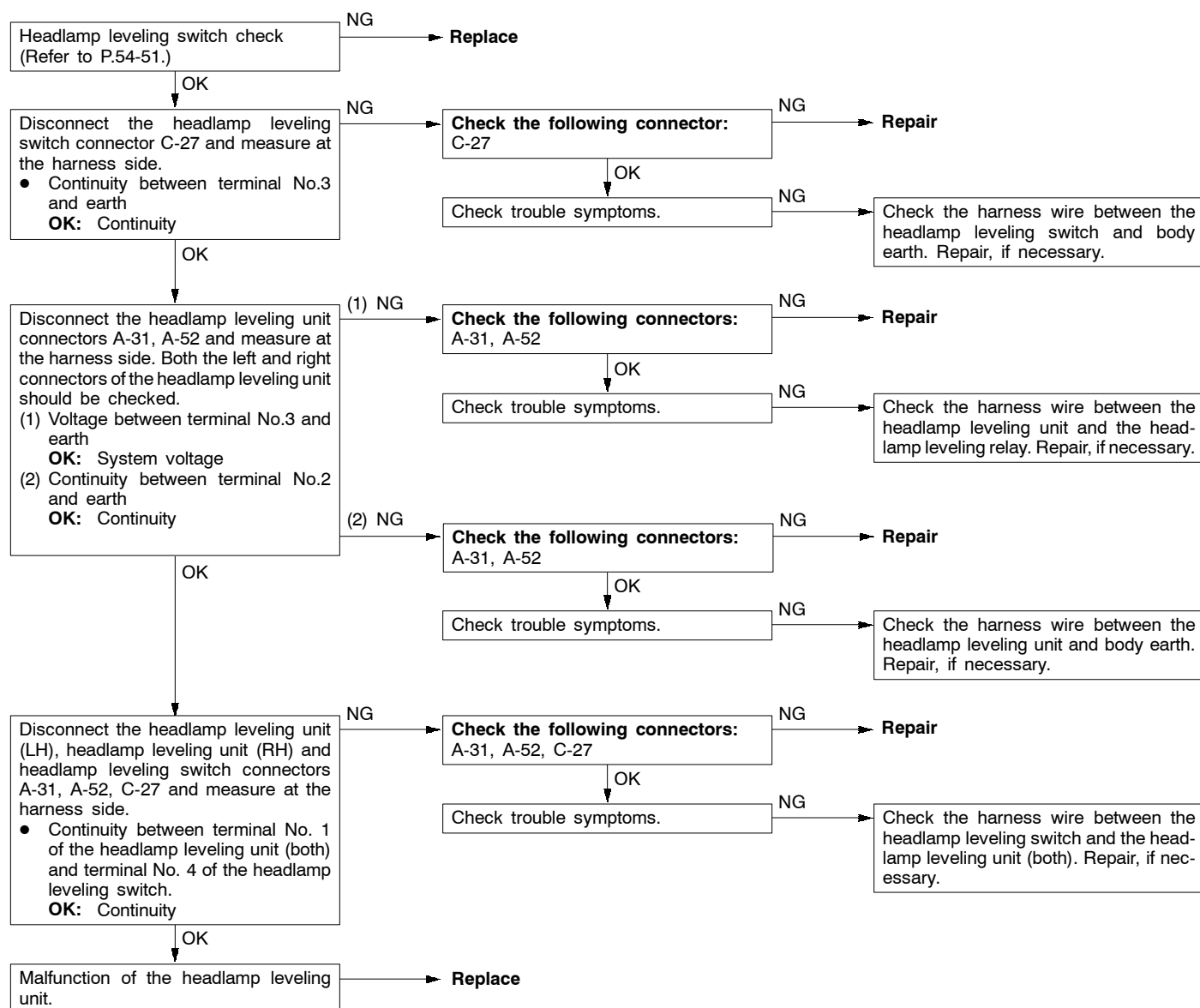
Inspection Procedure 4

Driver's side door switch input circuit system check



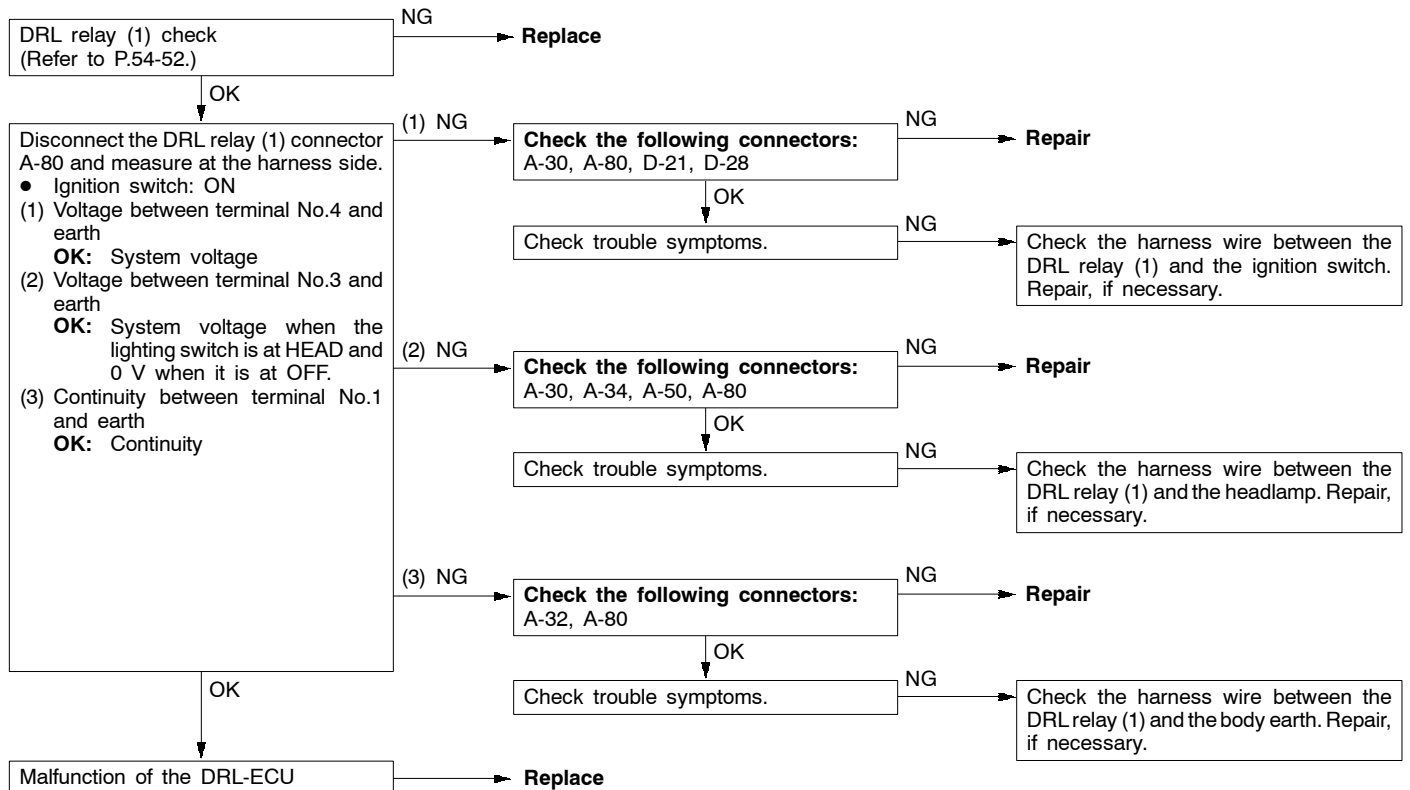
Inspection procedure 5

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.	<ul style="list-style-type: none"> • Malfunction of fuse • Malfunction the headlamp leveling switch • Malfunction of connector • Malfunction of harness wire • Malfunction of the headlamp leveling unit



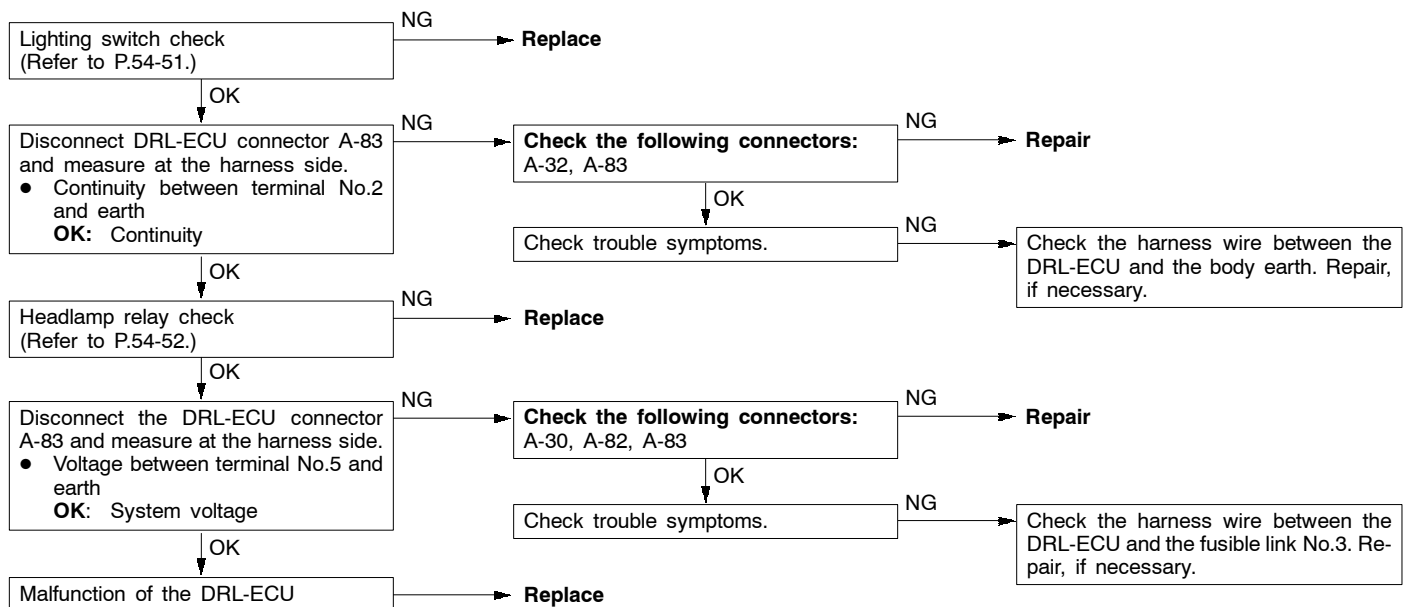
Inspection procedure 6

<p>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></p> <ul style="list-style-type: none"> ● Lighting switch: OFF ● Passing switch: OFF 	<p>Probable cause</p>
<p>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.</p>	<ul style="list-style-type: none"> ● Malfunction of fuse ● Malfunction of connector ● Malfunction of harness wire ● Malfunction of the DRL relay (1) ● Malfunction of the DRL-ECU



Inspection procedure 7

<p>The headlamps do not switch off when the vehicle is in the following condition and the lighting switch is moved to the TAIL position.</p> <p><Vehicles with daytime running lamp></p> <ul style="list-style-type: none"> ● Ignition switch: OFF ● Passing switch: OFF 	<p>Probable cause</p>
<p>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.</p>	<ul style="list-style-type: none"> ● Malfunction of fuse ● Malfunction of connector ● Malfunction of harness wire ● Malfunction of the tail lamp relay ● Malfunction of the DRL-ECU



ON-VEHICLE SERVICE

HEADLAMP AIMING

<USING A BEAMSETTING EQUIPMENT>

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

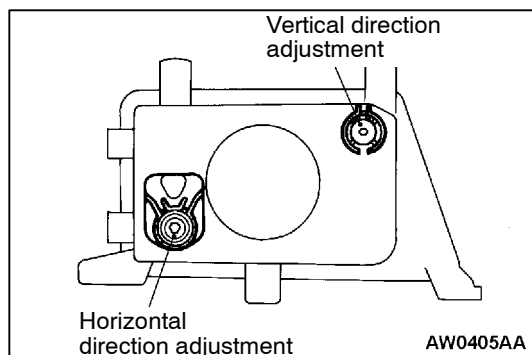
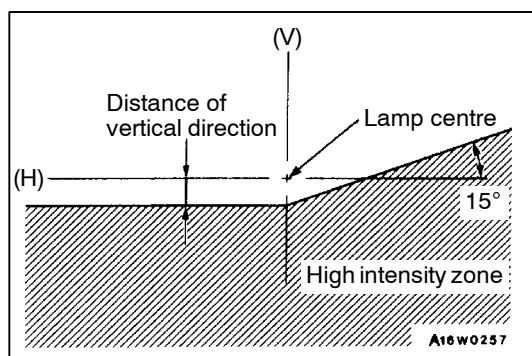
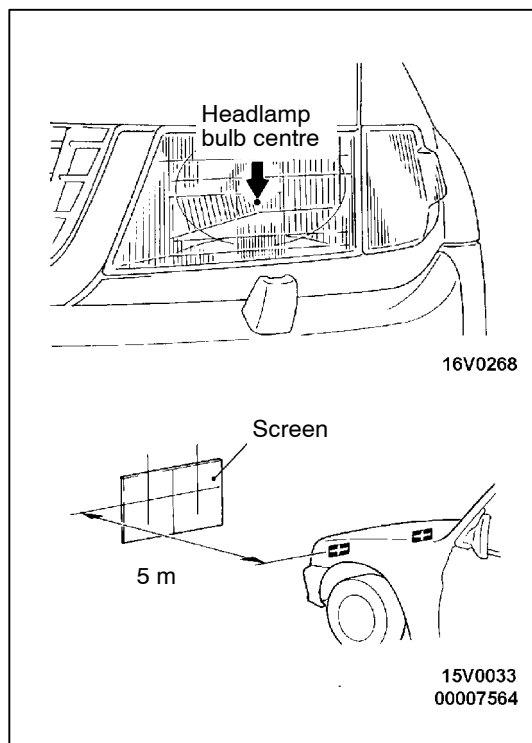
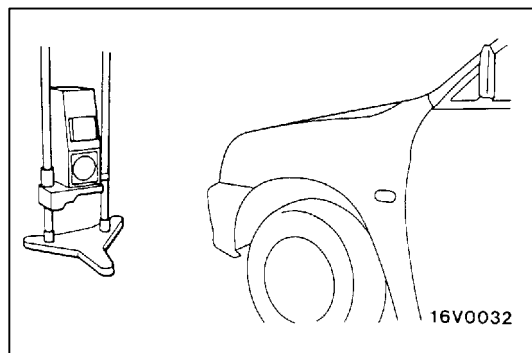
NOTE

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.

<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. Put the headlamp leveling switch in "0" position.
3. Set the distance between the screen and the centre of the headlamps as shown in the illustration.



4. 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)

NOTE

Illustration is for L.H. drive vehicles. For R.H. drive vehicles, beam pattern is symmetrical.

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

INTENSITY MEASUREMENT

54200100074

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

54200130264

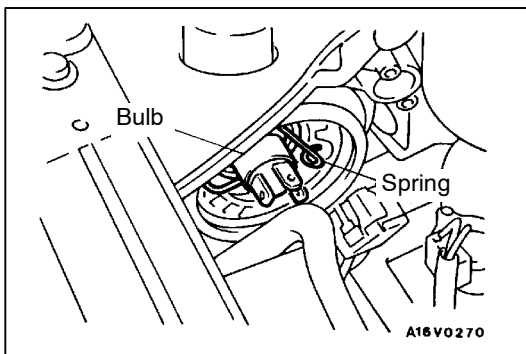
<Headlamp Bulb>

1. Disconnect the connector.
2. Remove the socket cover.

3. 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.



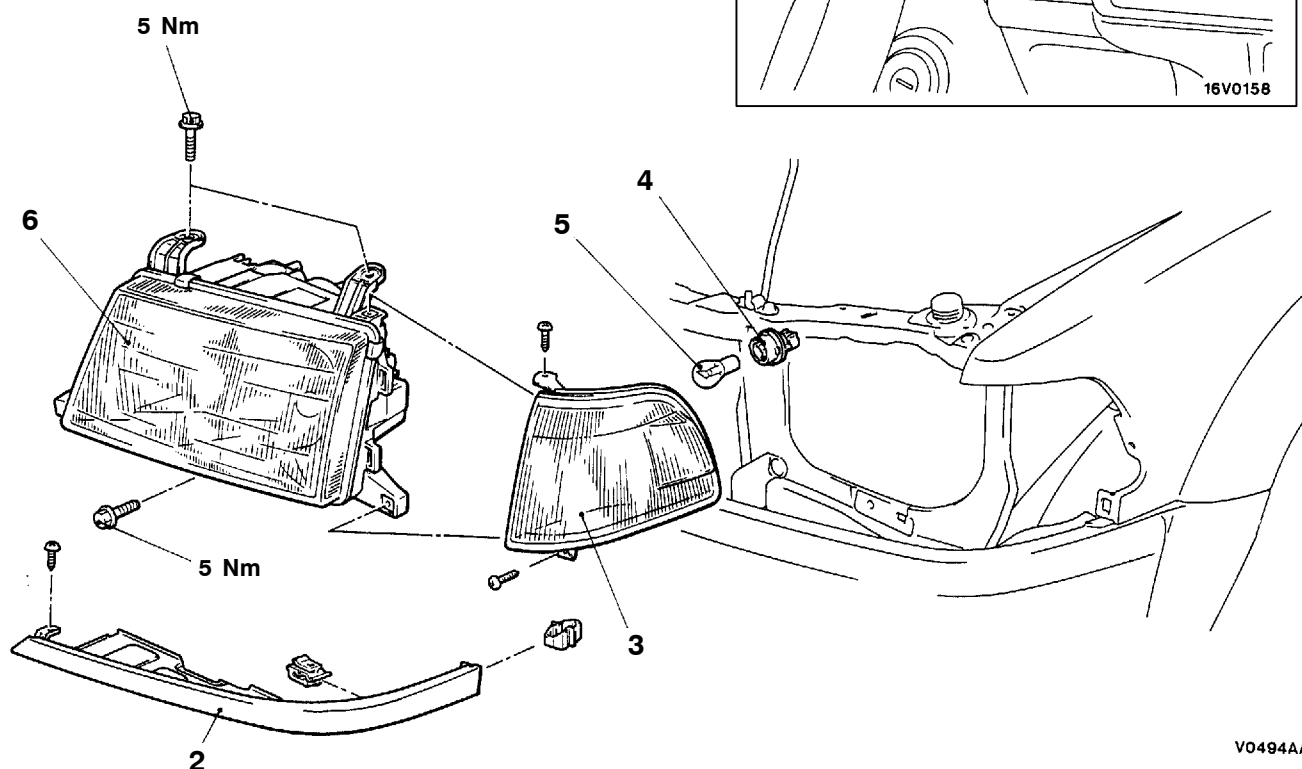
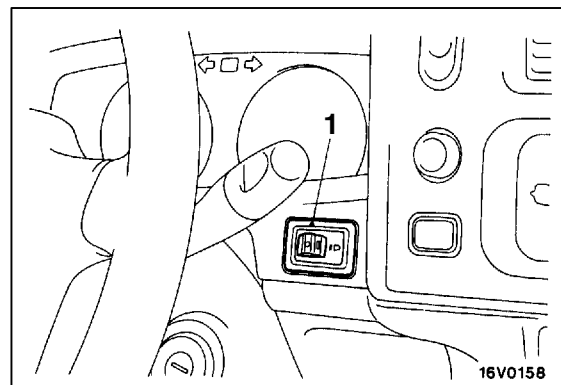
HEADLAMP AND FRONT COMBINATION LAMP

54200270065

REMOVAL AND INSTALLATION

Post-installation operation

- Headlamp aiming adjustment (Refer to P.54-48.)



V0494AA

00009161

NOTE

For removal and installation of the column switch assembly (lighting switch, dimmer/passing switch), refer to GROUP 37A – Steering Wheel and Shaft.

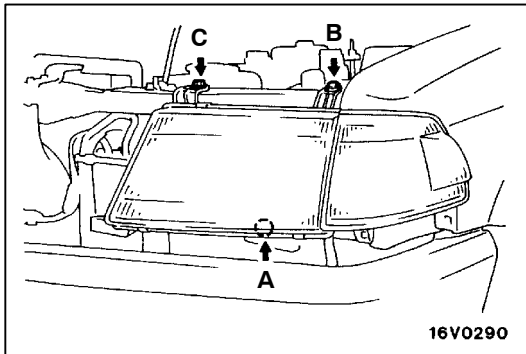
1. Headlamp leveling switch

Headlamp and front combination lamp removal steps

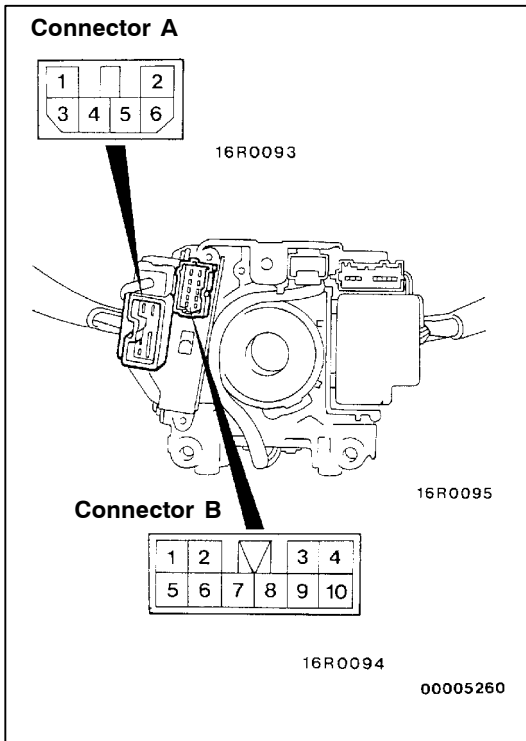
- Radiator grille (Refer to GROUP 51 – Grille, Moulding and Garnish)

2. Grille filler panel
3. Front combination lamp
4. Bulb socket
5. Bulb
6. Headlamp



**INSTALLATION SERVICE POINT****►A◀ HEADLAMP INSTALLATION**

Tighten the mounting bolts in A, B, C order.

**INSPECTION**

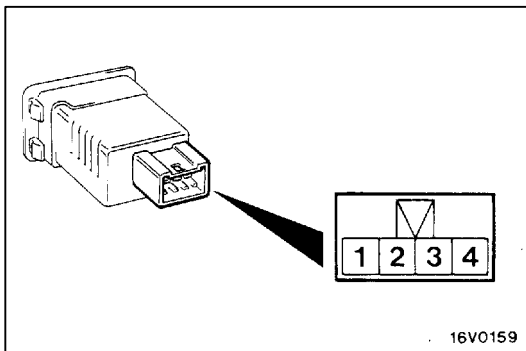
54200800127

LIGHTING SWITCH AND DIMMER/PASSING SWITCH CONTINUITY CHECK

Switch position		Connector A– terminal No.					Connector B– terminal No.		
		1	2	3	4	6	5	6	7
LIGHTING SWITCH	OFF								
	TAIL						○	○	○
	HEAD	○					○	○	○
DIMMER/ PASSING SWITCH	LOWER			○	○				
	UPPER				○	○			
	PASSING	○	○			○			
				○	○	○			
						○			

NOTE

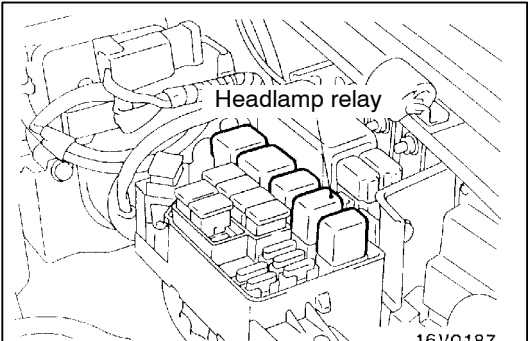
- *1 indicates continuity when the dimmer switch is in the lower position.
- *2 indicates continuity when the dimmer switch is in the upper position.

**HEADLAMP LEVELING SWITCH CHECK**

54200810038

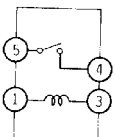
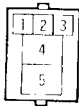
Check the resistance between the terminals when the headlamp leveling switch is operated.

Switch position	0	1	2	3	4
Resistance measurement between terminal No.3 and 4 Ω	120	300	620	1,100	2,000



Headlamp relay

16V0187



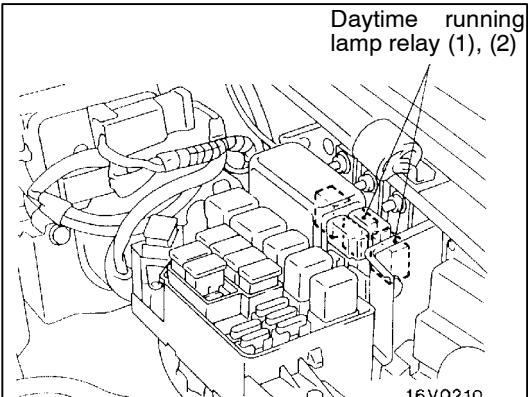
04Z0001

00009162

HEADLAMP RELAY

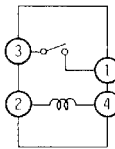

54200820161

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



Daytime running lamp relay (1), (2)

16V0210



20Z0001

00009163

DAYTIME RUNNING LAMP RELAY (1) AND (2)
CONTINUITY CHECK

54200830041

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

FRONT FOG LAMP

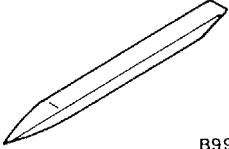
54200030069

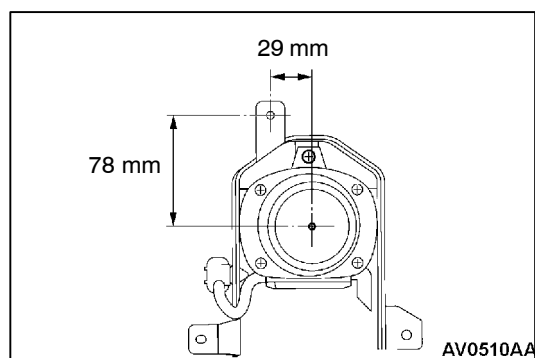
SERVICE SPECIFICATIONS

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

SPECIAL TOOL

54200060464

Tool	Number	Name	Use
 B990784	MB990784	Ornament remover	Removal of switch garnish

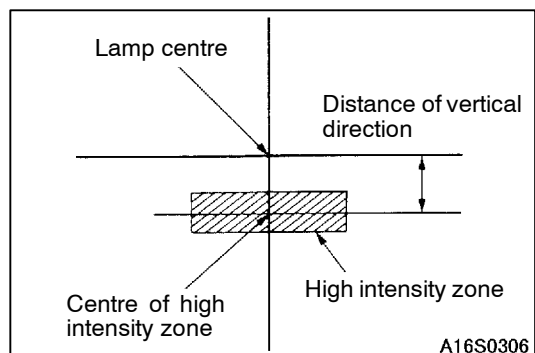
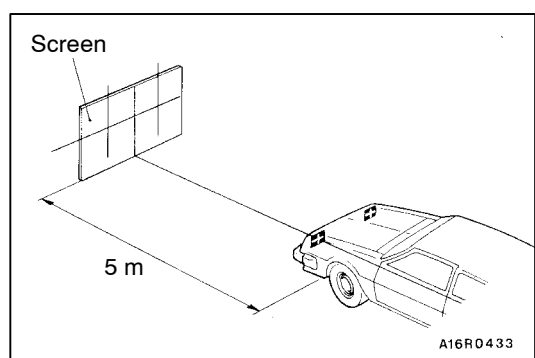


ON-VEHICLE SERVICE

54200110190

FRONT FOG LAMP AIMING

1. Measure the centre of the fog lamps, 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.

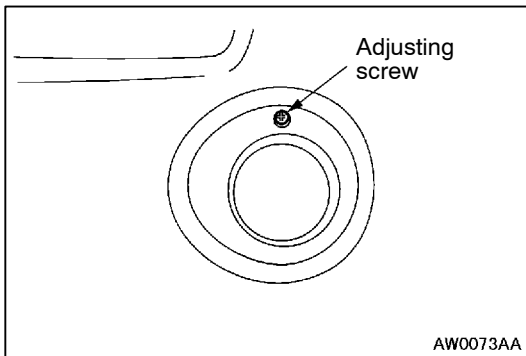
Standard value:

(Vertical direction)

100 mm below horizontal (H)

(Horizontal direction)

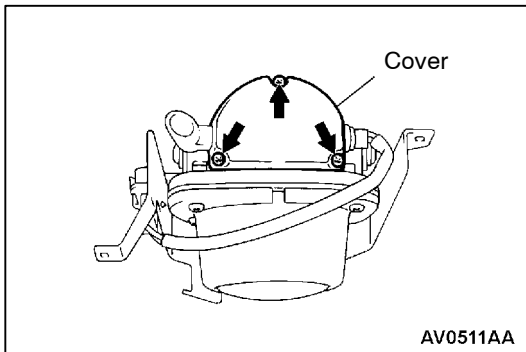
Parallel to direction of vehicle travel

**NOTE**

The horizontal direction is non-adjustable. If 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.

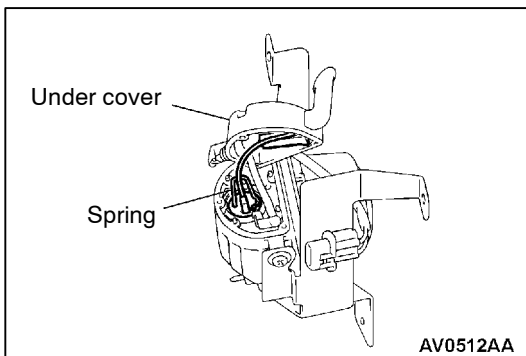
Caution

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

**BULB REPLACEMENT**

54200130271

1. Remove the fog lamp.
2. Remove the screws shown in the illustration, then remove the under cover.



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

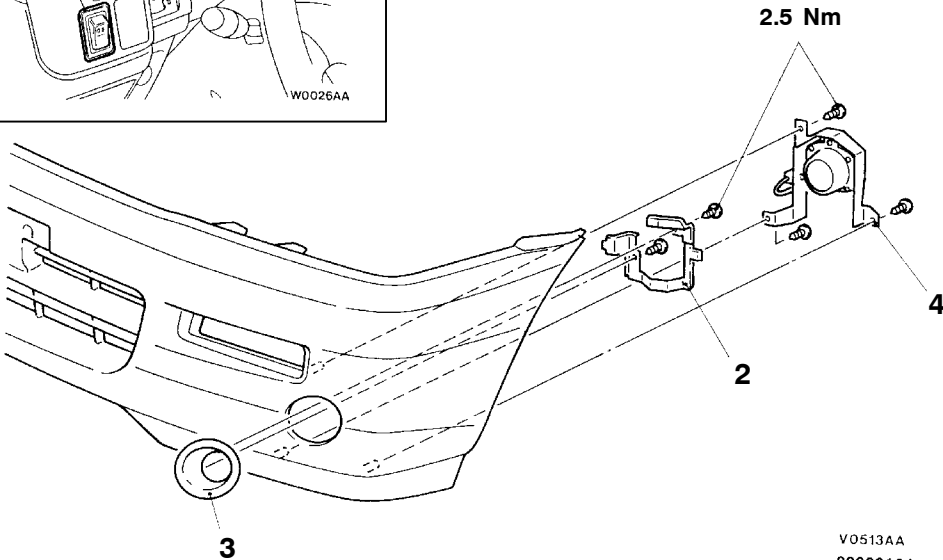
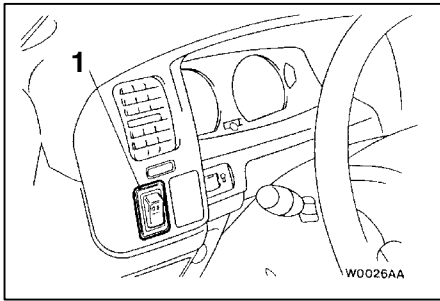
Caution

- 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.
- If the under cover is not attached properly, the lens might become cloudy or water might penetrate inside the lamp unit. Always be sure to install the under cover securely.

FRONT FOG LAMP

54200150246

REMOVAL AND INSTALLATION



1. Fog lamp switch

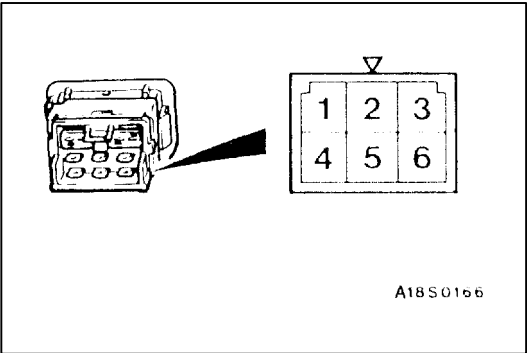
Fog lamp removal steps

- Front bumper (Refer to GROUP 51.)

2. Fog lamp bracket

3. Fog lamp bezel

4. Fog lamp



INSPECTION

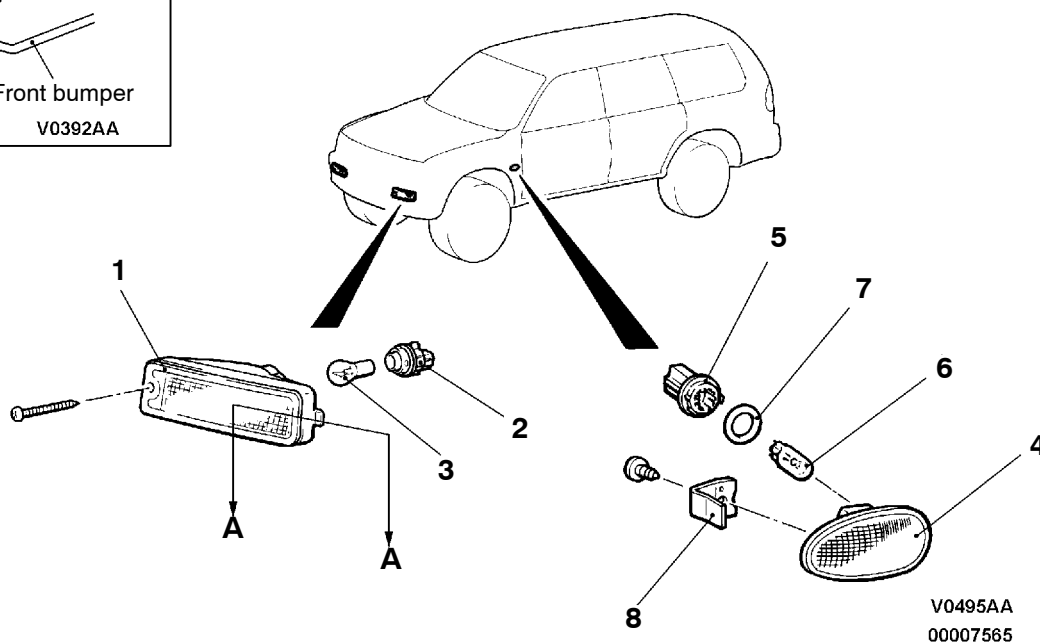
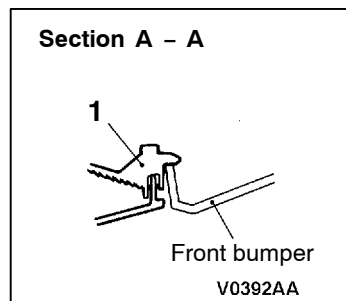
54200740115

FOG LAMP SWITCH CONTINUITY CHECK

Switch position	Terminal No.						
	1	2	3	IND	4	5	6
OFF			○	⦿			○
ON	○	○	○	⦿	○	○	○

TURN-SIGNAL LAMP

REMOVAL AND INSTALLATION



NOTE

For removal and installation of the column switch assembly (turn-signal switch), refer to GROUP 37A – Steering Wheel and Shaft.

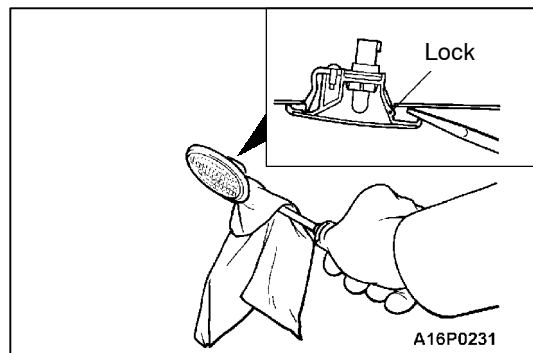
Front turn-signal lamp removal steps

1. Front turn-signal lamp
2. Bulb socket
3. Bulb



Side turn-signal lamp removal steps

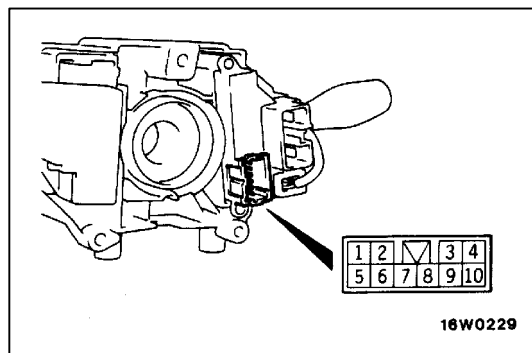
4. Side turn-signal lamp
5. Bulb socket
6. Bulb
7. Packing
8. Hook



REMOVAL SERVICE POINT

◀A▶ SIDE TURN-SIGNAL LAMP REMOVAL

Use a flat-tipped screw driver or similar tool to remove the lock from the fender panel, and then remove the side turn-signal lamp.

**INSPECTION**

54200760173

TURN-SIGNAL LAMP SWITCH CONTINUITY CHECK

Switch position	Terminal No.		
	3	8	9
L.H.	○	○	
OFF			
R.H.		○	○

REAR COMBINATION LAMP

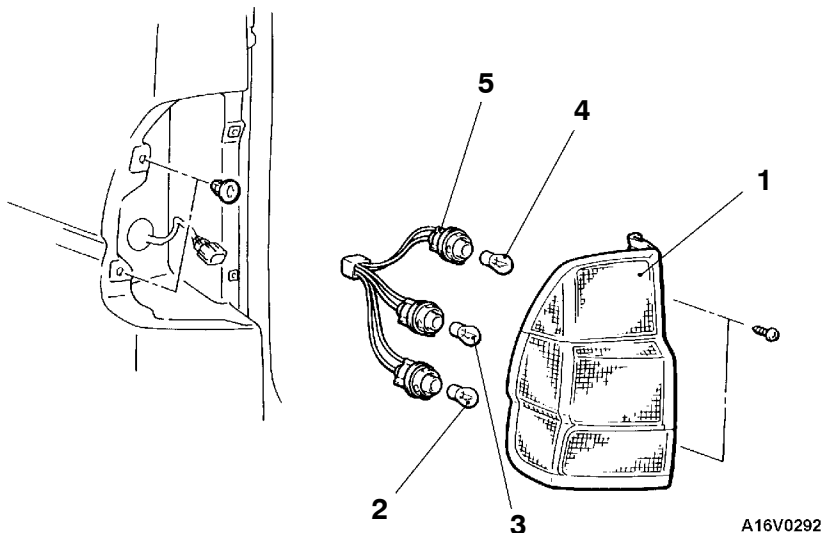
54200070566

TROUBLESHOOTING

Refer to P.54-42.

**REAR COMBINATION LAMP
REMOVAL AND INSTALLATION**

54200390204

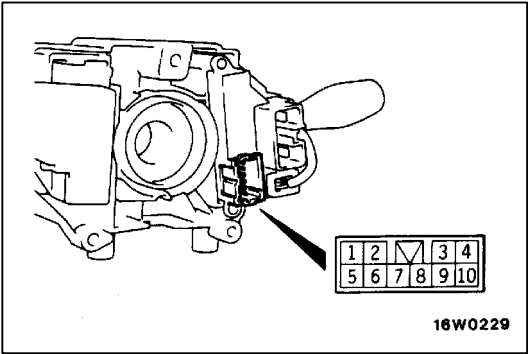
**NOTE**

For removal and installation of the column switch assembly lighting switch, dimmer/passing switch and turn-signal switch, refer to GROUP 37A – Steering Wheel and Shaft.

Removal steps

1. Rear combination lamp
2. Bulb (For back-up lamp)
3. Bulb (For tail and stop lamp)

4. Bulb (For turn-signal lamp)
5. Bulb socket assembly



INSPECTION

54200760180

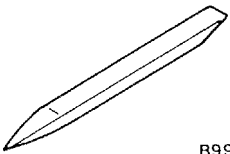
LIGHTING SWITCH AND TURN-SIGNAL LAMP SWITCH CONTINUITY CHECK

Switch position		Terminal No.				
		3	5	7	8	9
LIGHTING SWITCH	OFF					
	TAIL		○	○		
TURN-SIGNAL LAMP SWITCH	R.H.				○	○
	OFF					
	L.H.	○			○	

REAR FOG LAMP

54200060334

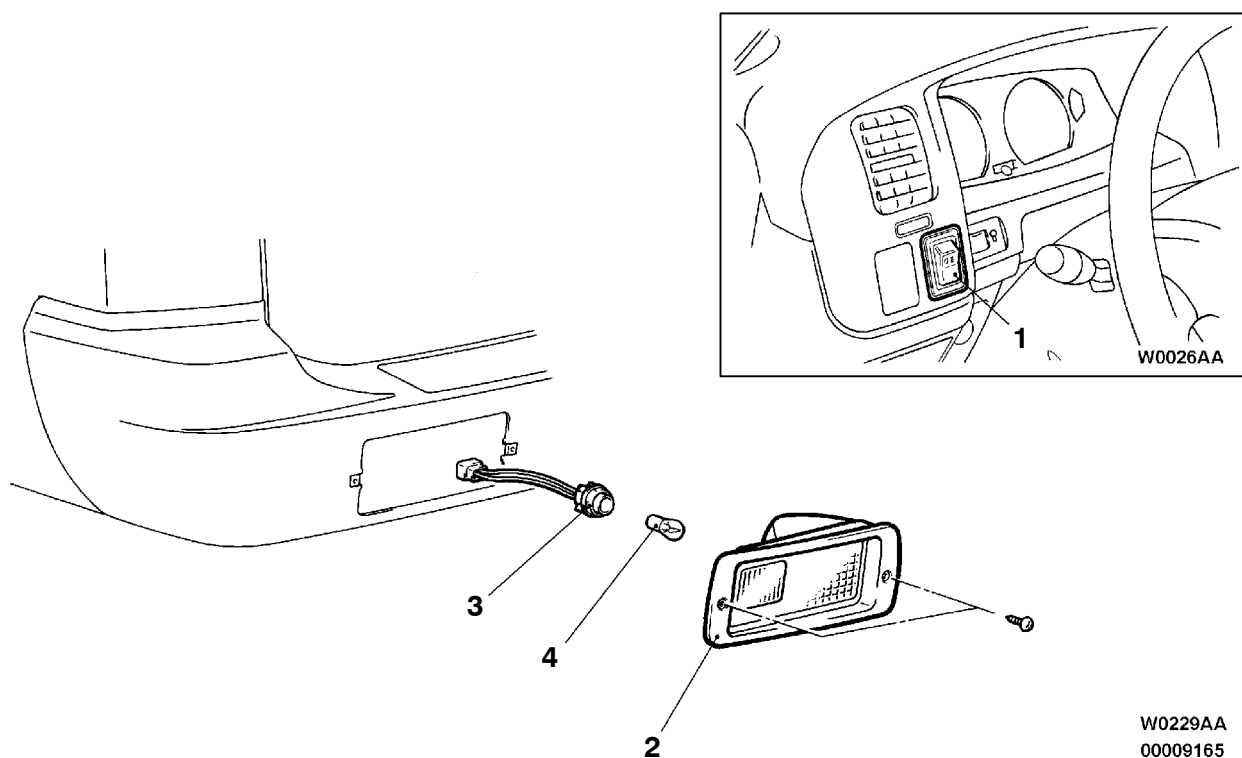
SPECIAL TOOL

Tool	Number	Name	Use
 B990784	MB990784	Ornament remover	Fog lamp switch removal

REAR FOG LAMP

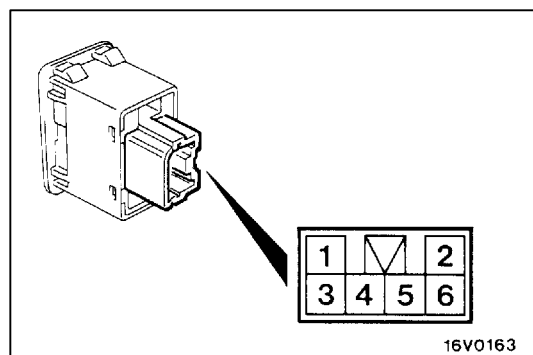
54200980029

REMOVAL AND INSTALLATION



1. Rear fog lamp switch
Rear fog lamp removal steps
 2. Rear fog lamp









3. Bulb
 4. Bulb socket

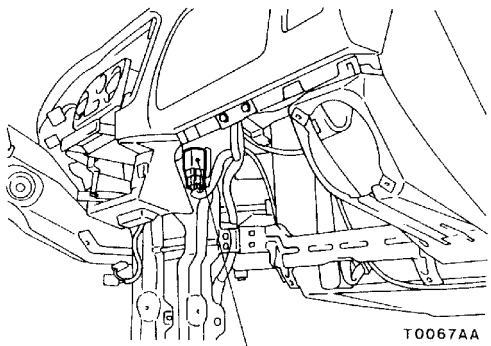


INSPECTION

54200920021

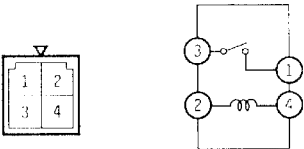
REAR FOG LAMP SWITCH CONTINUITY CHECK

Switch position	Terminal No.				
	1	2	ILL	3	6
OFF					
ON					



T0067AA

Rear fog lamp relay









20Z0001

00009166

REAR FOG LAMP RELAY CONTINUITY CHECK

54200930024

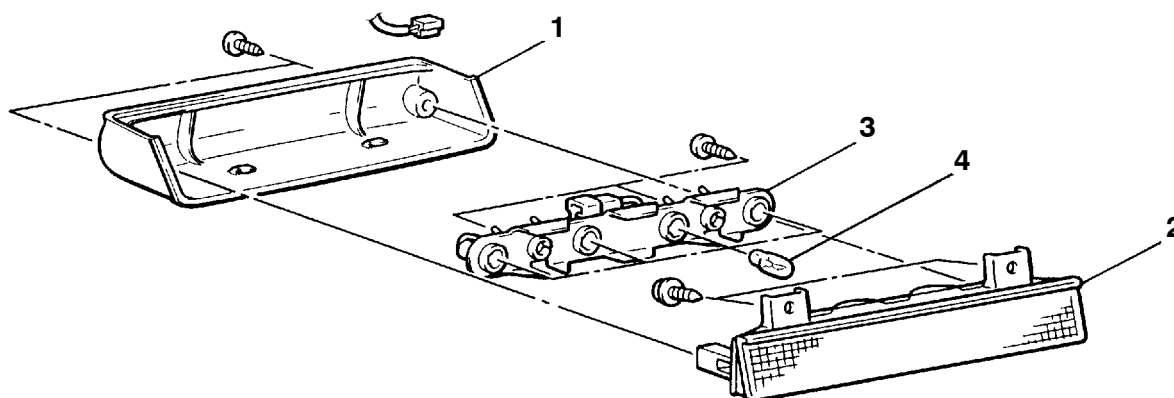
Battery voltage	Terminal No.			
	1	2	3	4
Supplied				
Not supplied				

HIGH-MOUNTED STOP LAMP

54200510297

REMOVAL AND INSTALLATION

<Tailgate mounted type>



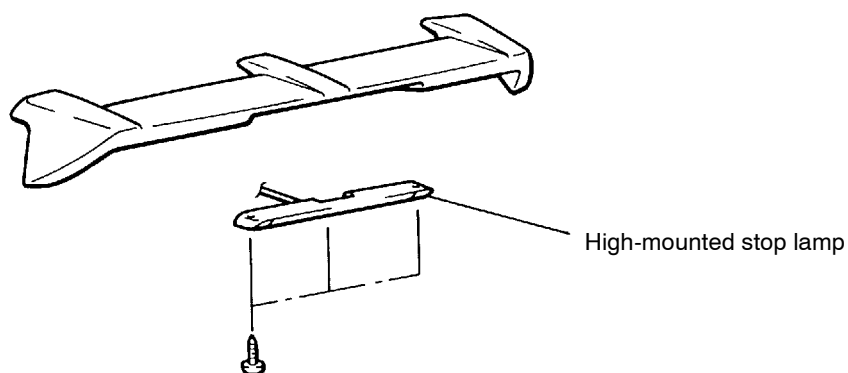
A16V0288

Removal steps

1. Cover
2. Light unit

3. Bulb socket
4. Bulb

<Roof spoiler mounted type>

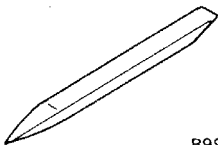


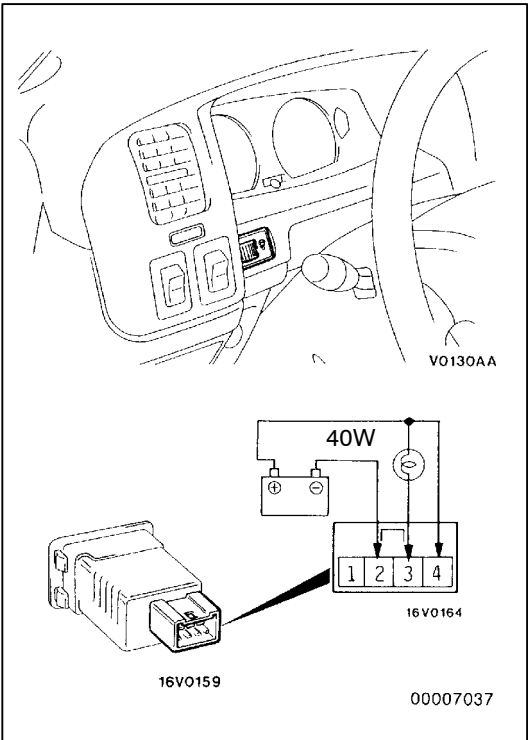
A18V0240

RHEOSTAT

54200060341

SPECIAL TOOL

Tool	Number	Name	Use
 B990784	MB990784	Ornament remover	Rheostat removal



RHEOSTAT

54200610201

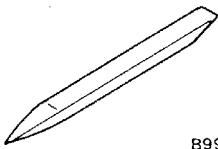
INSPECTION

1. Connect the battery and the test lamp (40 W) 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

54200060358

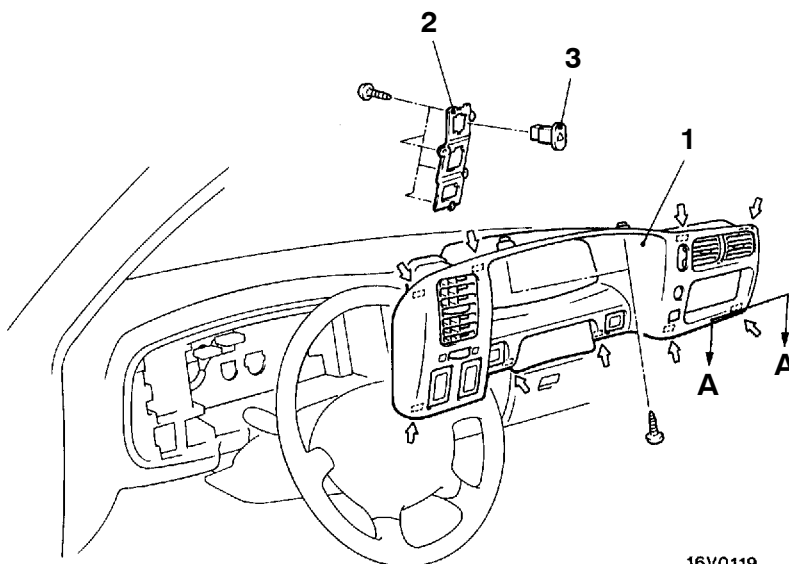
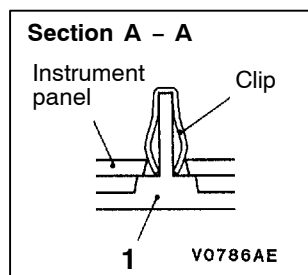
SPECIAL TOOL

Tool	Number	Name	Use
 B990784	MB990784	Ornament remover	Meter bezel assembly removal

HAZARD WARNING LAMP SWITCH

54200660183

REMOVAL AND INSTALLATION



NOTE

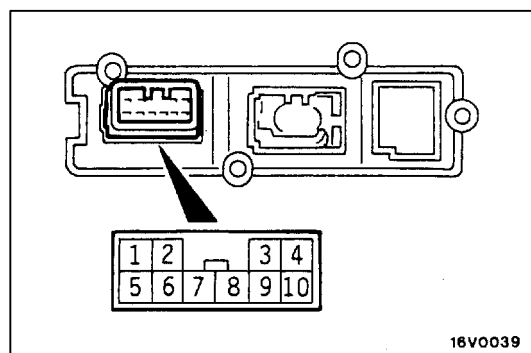
↔ : metal clip position

16V0119

00009167

Removal steps

1. Meter bezel assembly
2. Switch holder
3. Hazard warning lamp switch



INSPECTION

54200670209

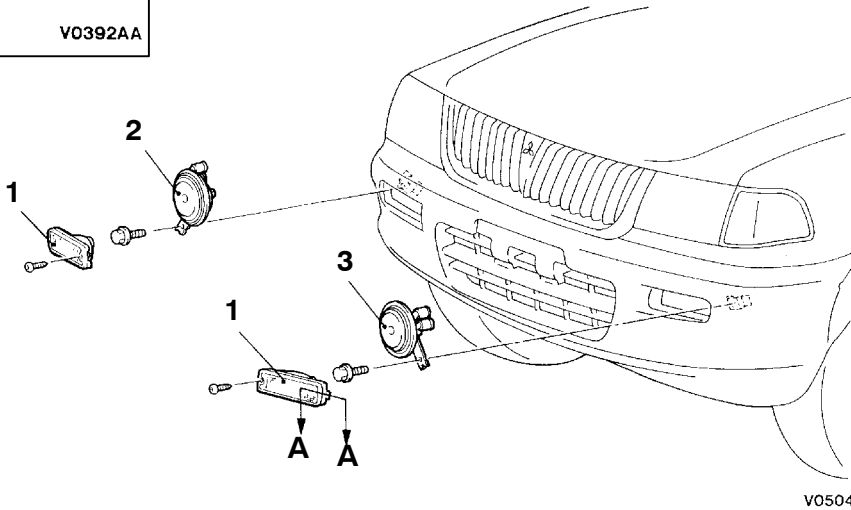
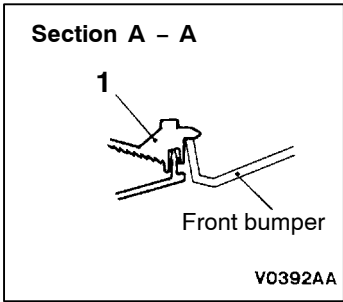
HAZARD WARNING LAMP SWITCH CONTINUITY CHECK

Switch position	Terminal No.								
	1	2	4	5	6	7	9	ILL	10
OFF				○		○	○	Ⓢ	○
ON	○	○	○	○	○		○	Ⓢ	○

HORN

54300790069

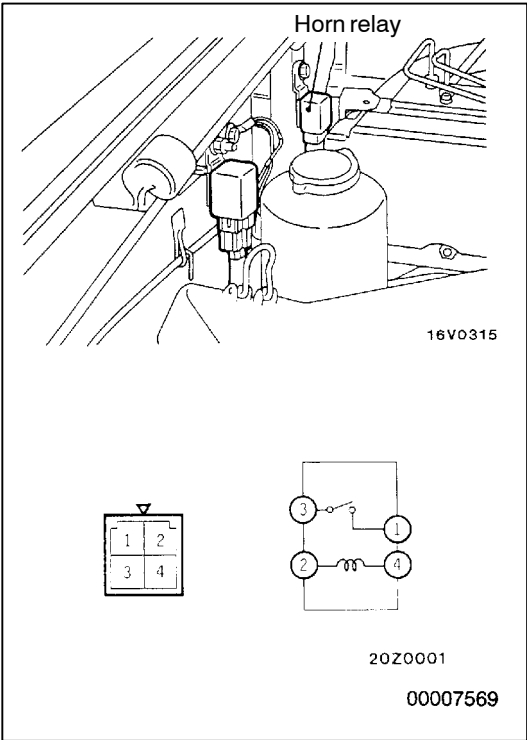
REMOVAL AND INSTALLATION



00007568

Removal steps

- 1. Front turn-signal lamp
- 2. Horn (high sound)
- 3. Horn (low sound)



INSPECTION

54200650036

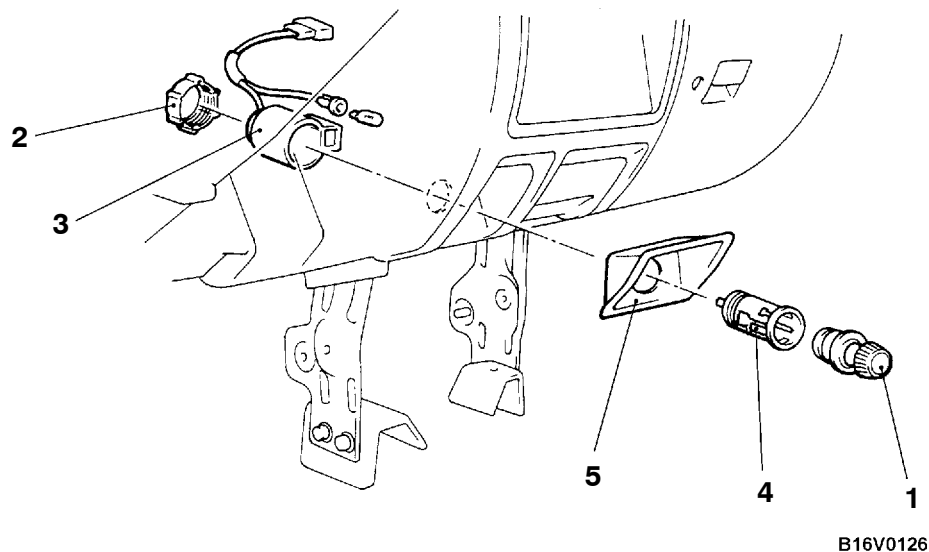
HORN RELAY CONTINUITY CHECK

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

CIGARETTE LIGHTER

54300560189

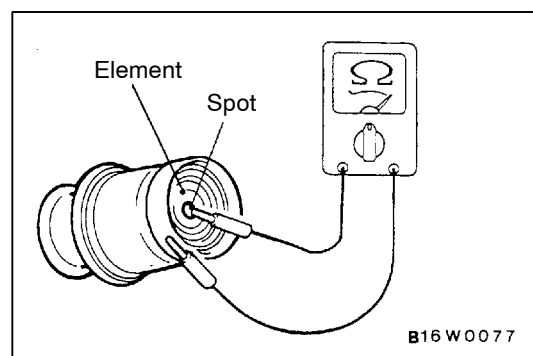
REMOVAL AND INSTALLATION



Removal steps

- Front floor console assembly (Refer to GROUP 52A.)
1. Plug
 2. Fixing ring

3. Socket case
4. Socket
5. Protector



INSPECTION

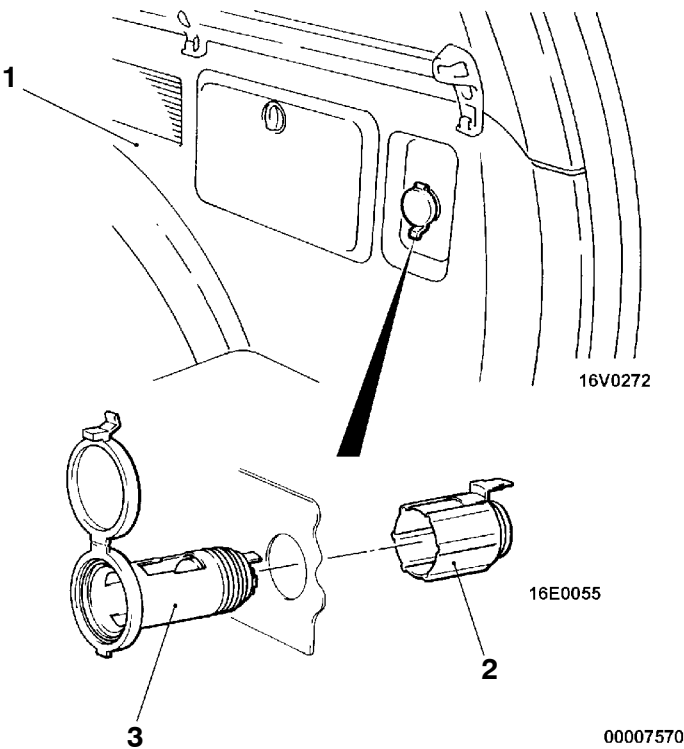
54300570113

- 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.

ACCESSORY SOCKET

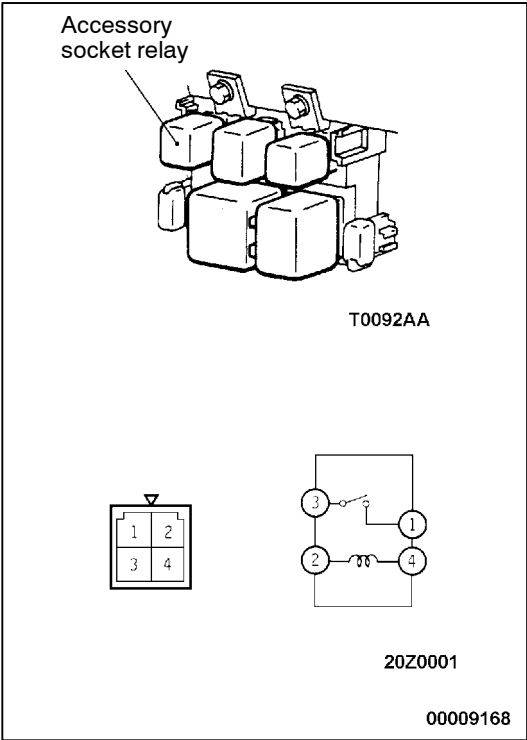
54300890059

REMOVAL AND INSTALLATION



Removal steps

- 1. Quarter trim, lower <R.H.> (Refer to GROUP 52A – Trims.)
- 2. Outer case
- 3. Socket



INSPECTION

54300900042

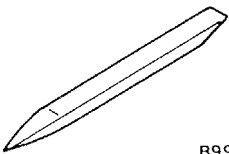
Accessory socket relay continuity check

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

RADIO AND TAPE PLAYER

54400060057

SPECIAL TOOL

Tool	Number	Name	Use
 B990784	MB990784	Ornament remover	Meter bezel assembly removal

TROUBLESHOOTING

54400070265

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

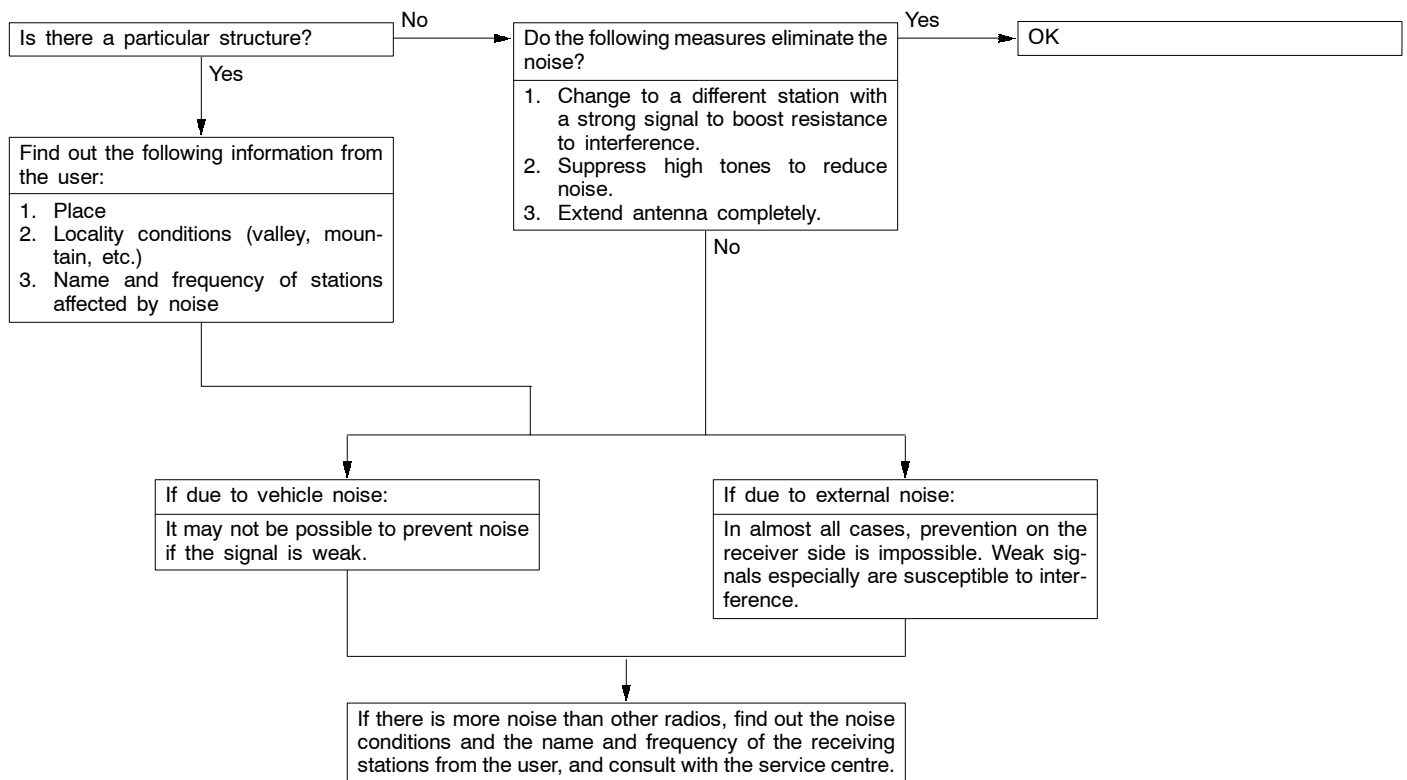
Refer to problem symptoms of AM radio for MW radio.

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.

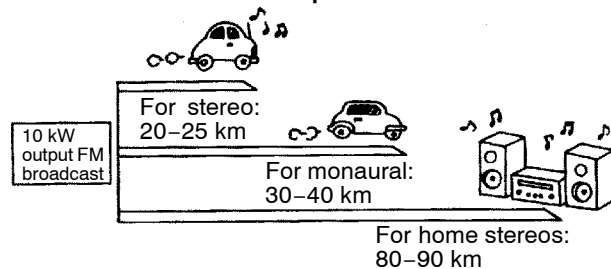
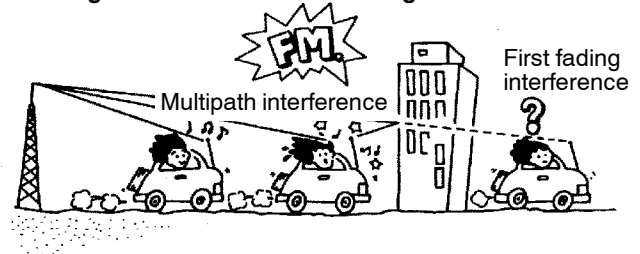
NOTE

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

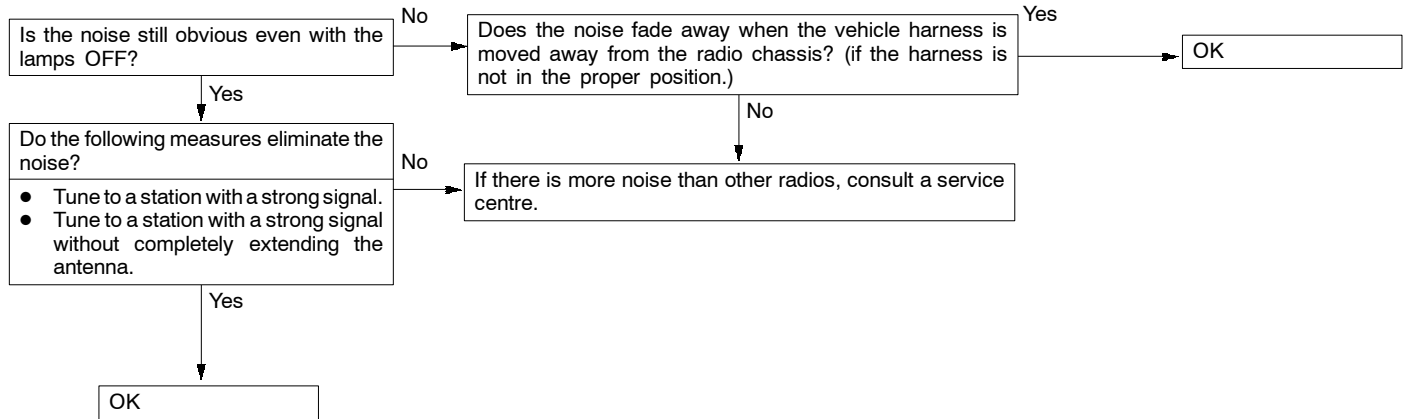
A-3 Mixed with noise, only at night (AM).

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

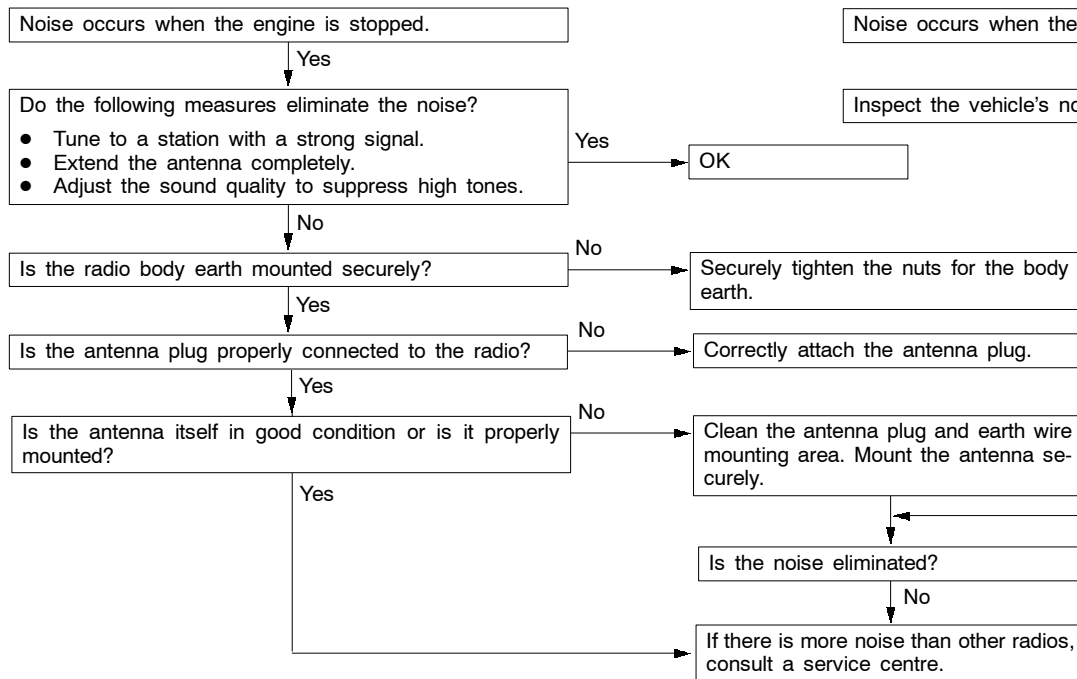
1. Factors due to signal conditions: Due to the fact that long-distance signals are more easily received at night, even stations that are received without problem during the day may experience interference in a general worsening of reception conditions. The weaker a station is the more susceptible it 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.

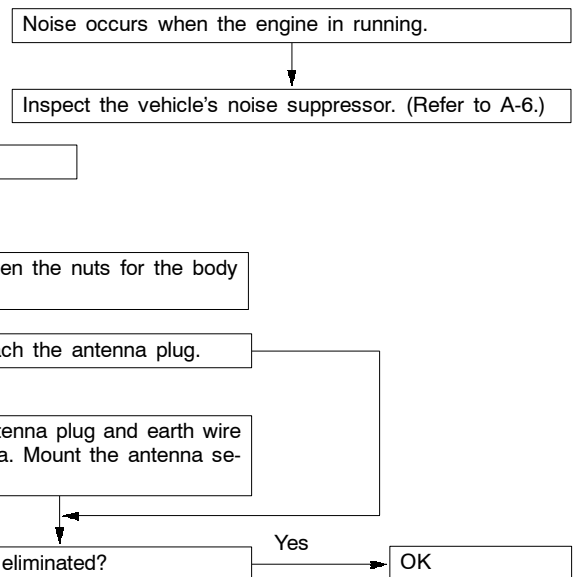
2. Factors due to vehicle noise: Alternator noise may be a cause.

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

(1)



(2)

**NOTE**

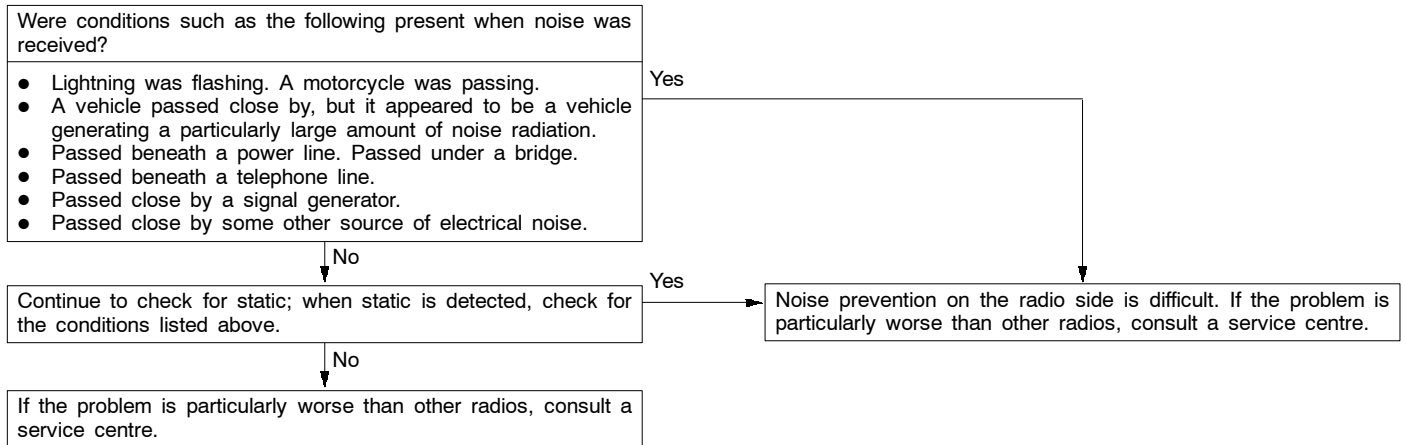
About noise encountered during FM reception only. Due to differences in FM and AM systems, FM is not as susceptible as AM to interference from engines, power lines, lightning, etc. On the other hand, there are cases due to the characteristics

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)	<ul style="list-style-type: none"> Increasing the engine speed causing the popping sound to speed up, and volume decreases. Disappears when the ignition switch is turned to ACC. 	<ul style="list-style-type: none"> Mainly due to the spark plugs. Due to the engine noise. 	<ul style="list-style-type: none"> Check or replace the earth cable. (Refer to Fig. 1, 2 and 3 on P.54-72, 73.) Check or replace the noise capacitor. <6G7> (Refer to 4 on P.54-73.)
Other electrical components	–	Noise may appear as electrical components become older.	Repair or replace electrical components.
Static electricity (Cracking, crinkling)	<ul style="list-style-type: none"> 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.
	<ul style="list-style-type: none"> 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.**

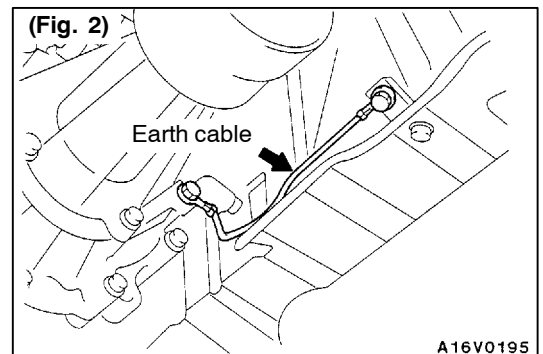
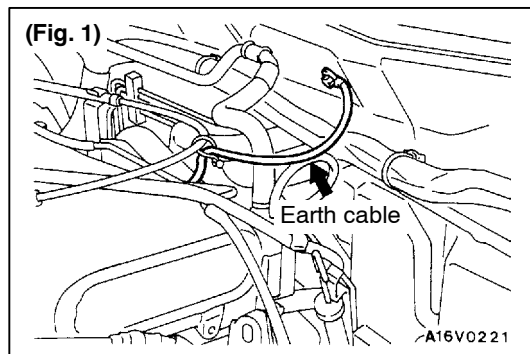
NOTE

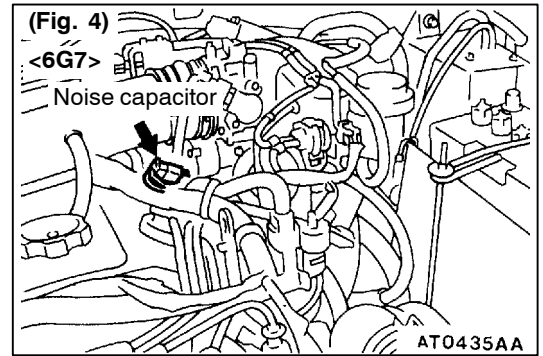
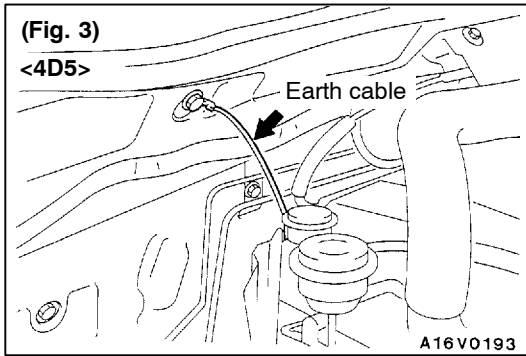
1. Capacitor
The capacitor does not pass D.C. current, but as the number of waves increases when it

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.

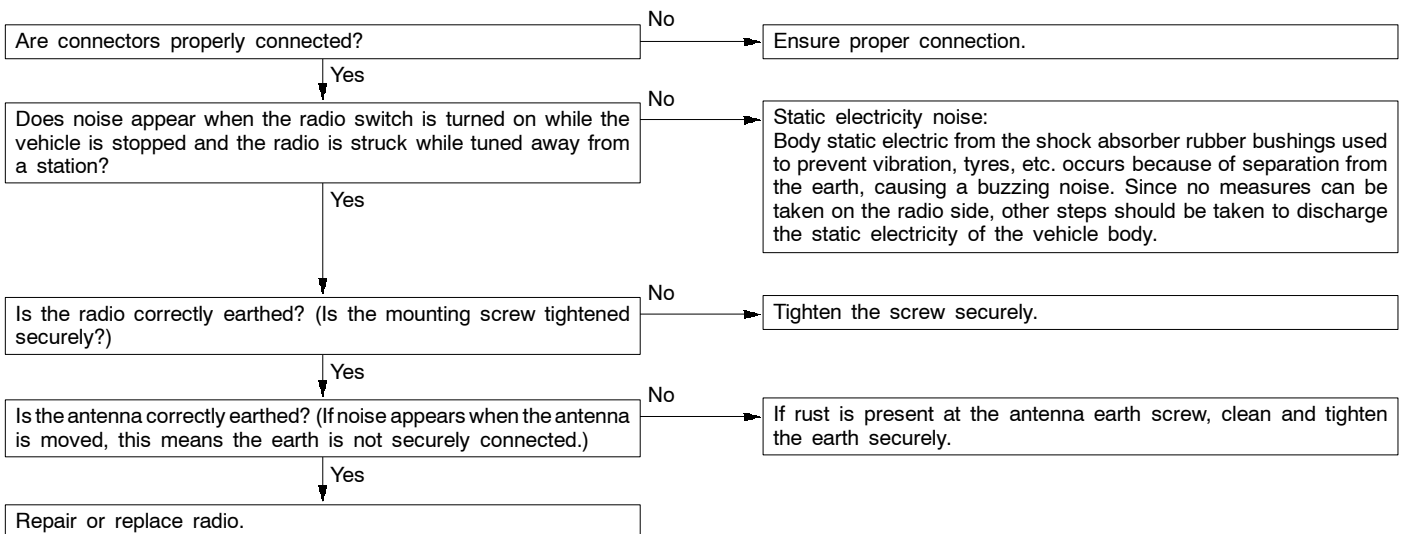
2. Coil

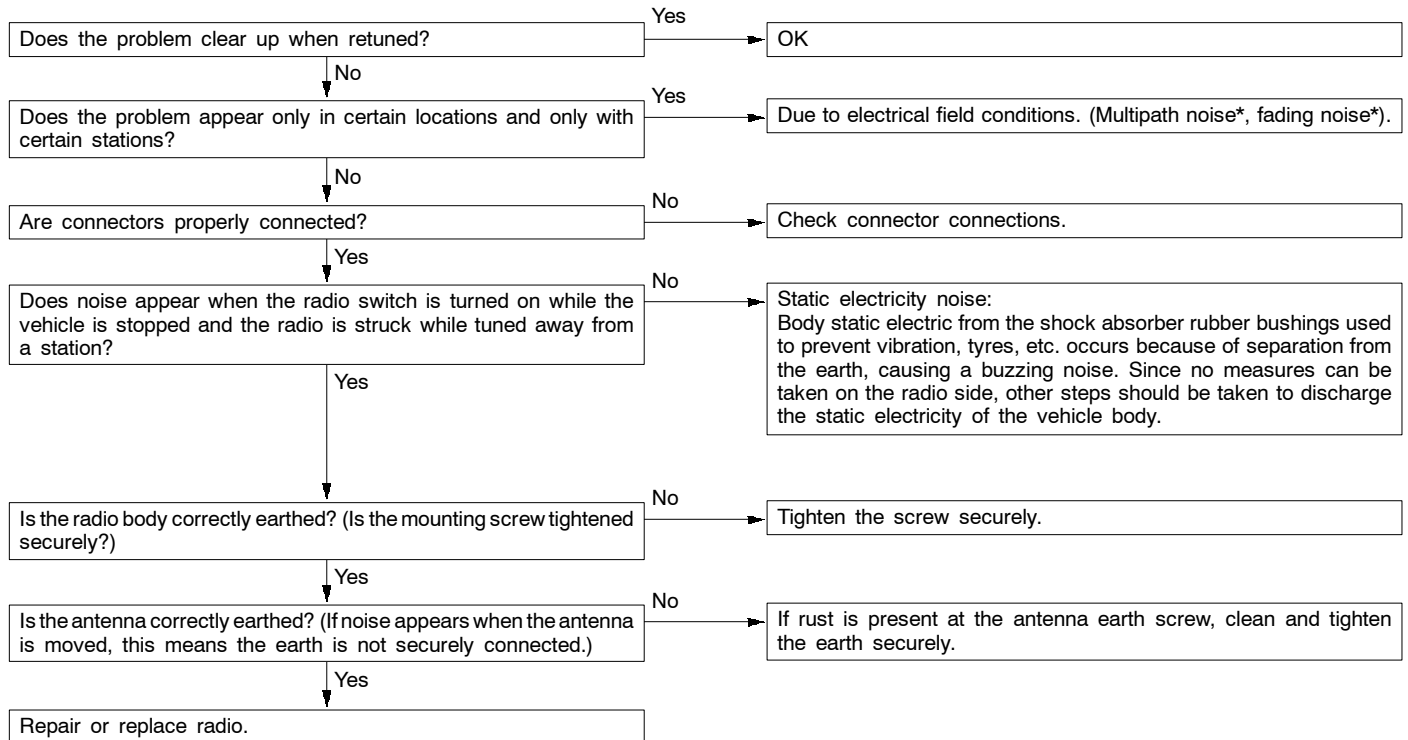
The coil passes D.C. current, but impedance rises as the number of waves increases relative to the A.C. current. A noise suppressing coil which takes advantage of this property is inserted into the power line for the noise source, and works by preventing the noise component from flowing or radiating out of the line.





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



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).

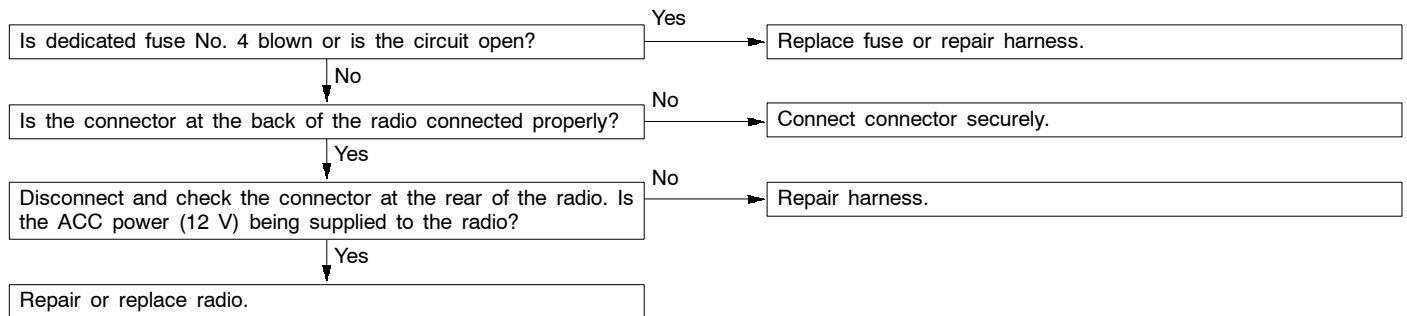
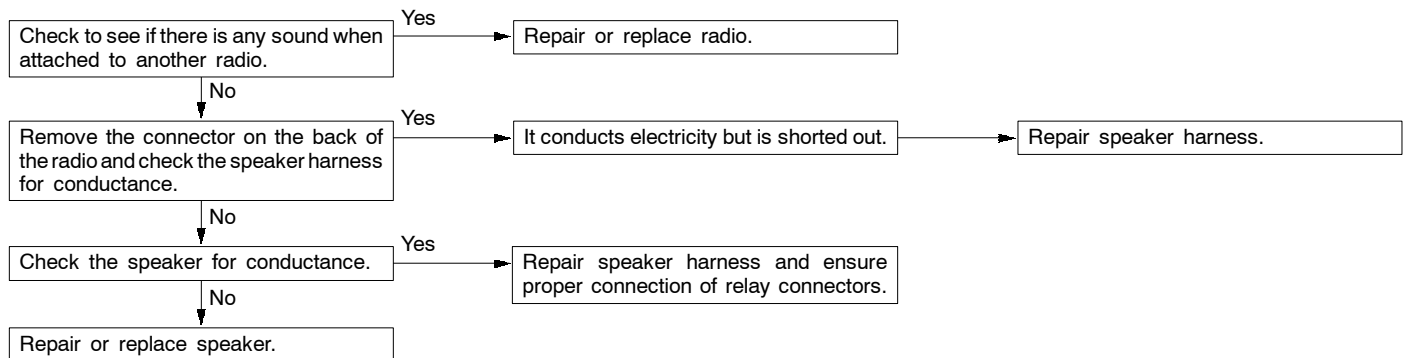
- Fading noise
This is a buzzing noise that occurs when the broadcast beam is disrupted by obstructing objects and the signal strength fluctuates intricately within a narrow range.

A-9 Ever-present noise.

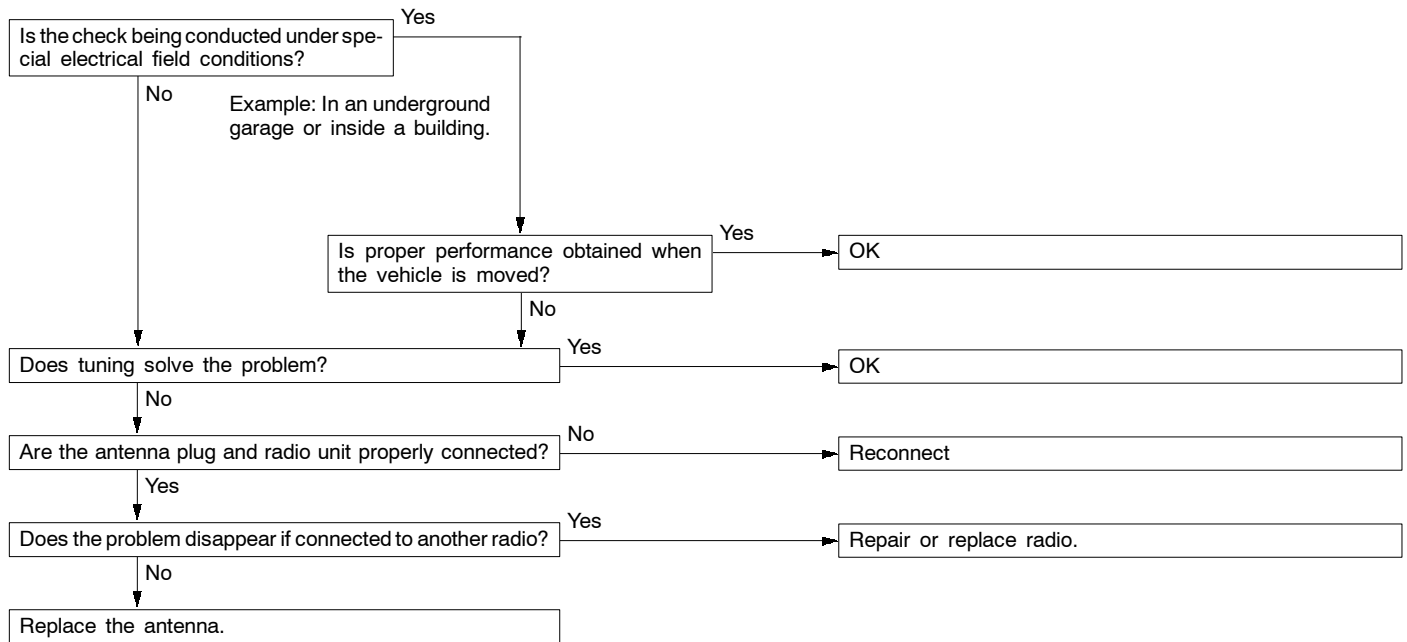
Noise is often created by the following factors, and often the radio is OK when it is checked individually.

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

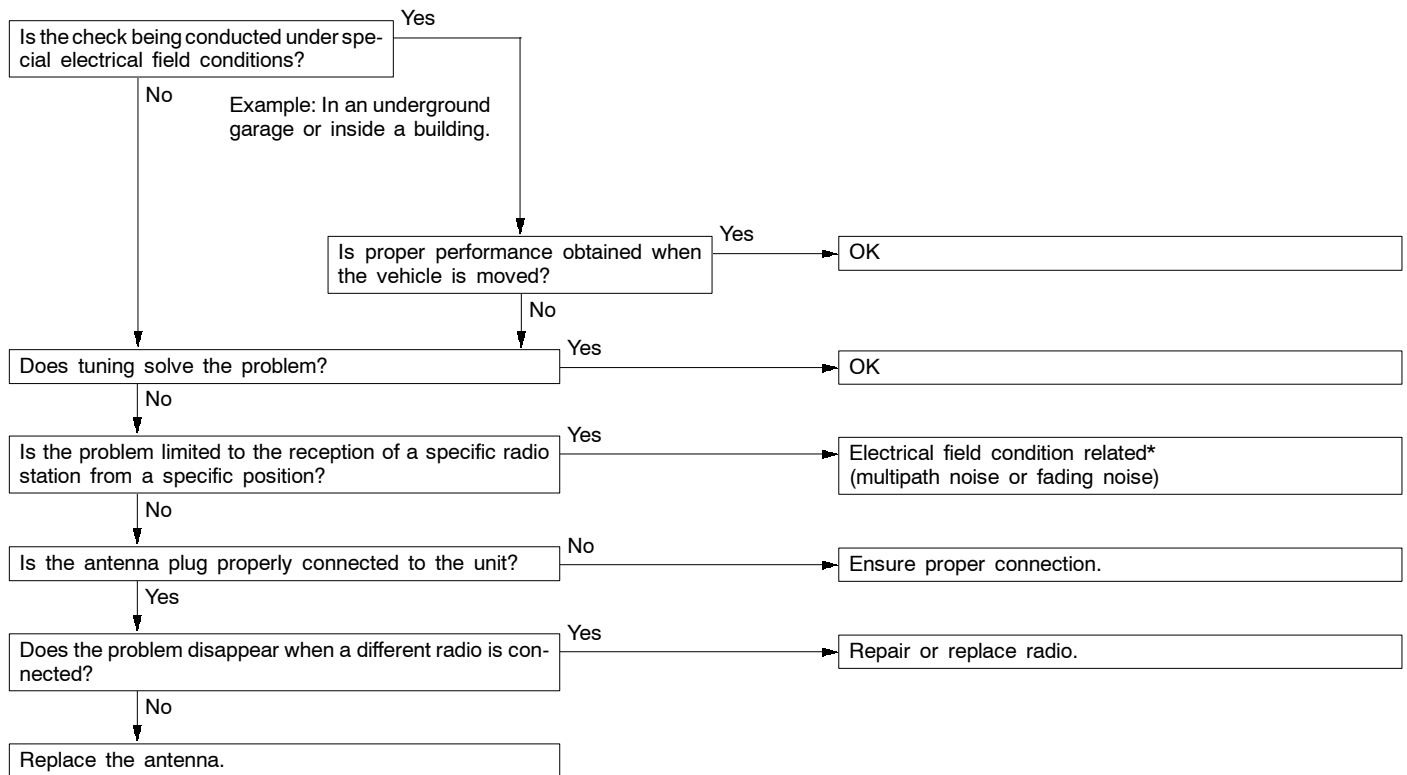
For this reason, if there are still problems with noise even after the measures described in steps A-1 to A-8 have been taken, get information on the factors listed above as well as determining whether the problem occurs with AM or FM, the station names, frequencies, etc., and contact a service centre.

B. RADIO**B-1 No power is supplied when the switch is set to ON.****B-2 No sound from one speaker.**

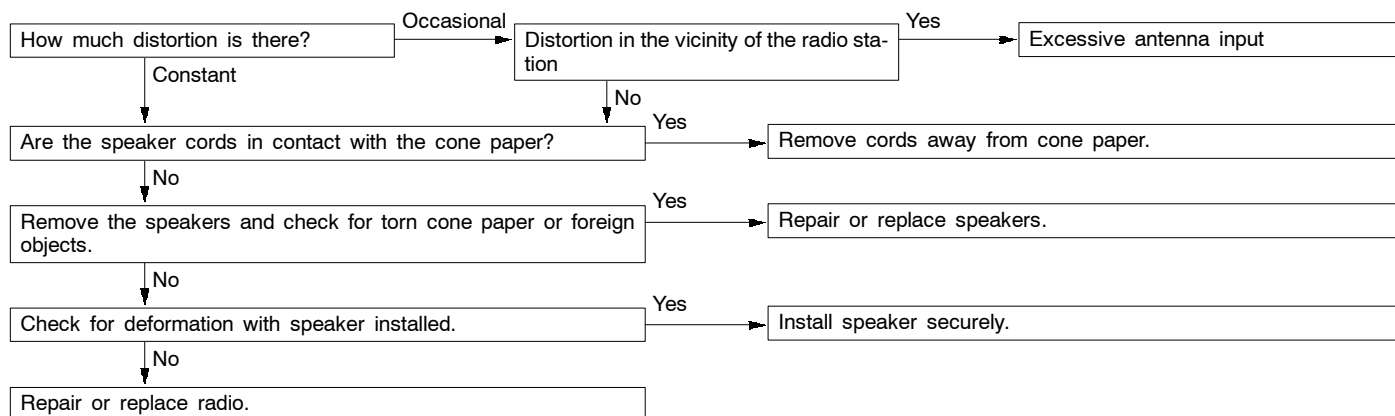
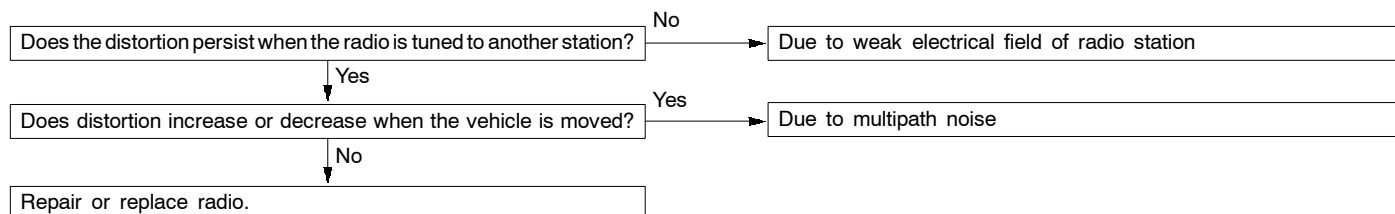
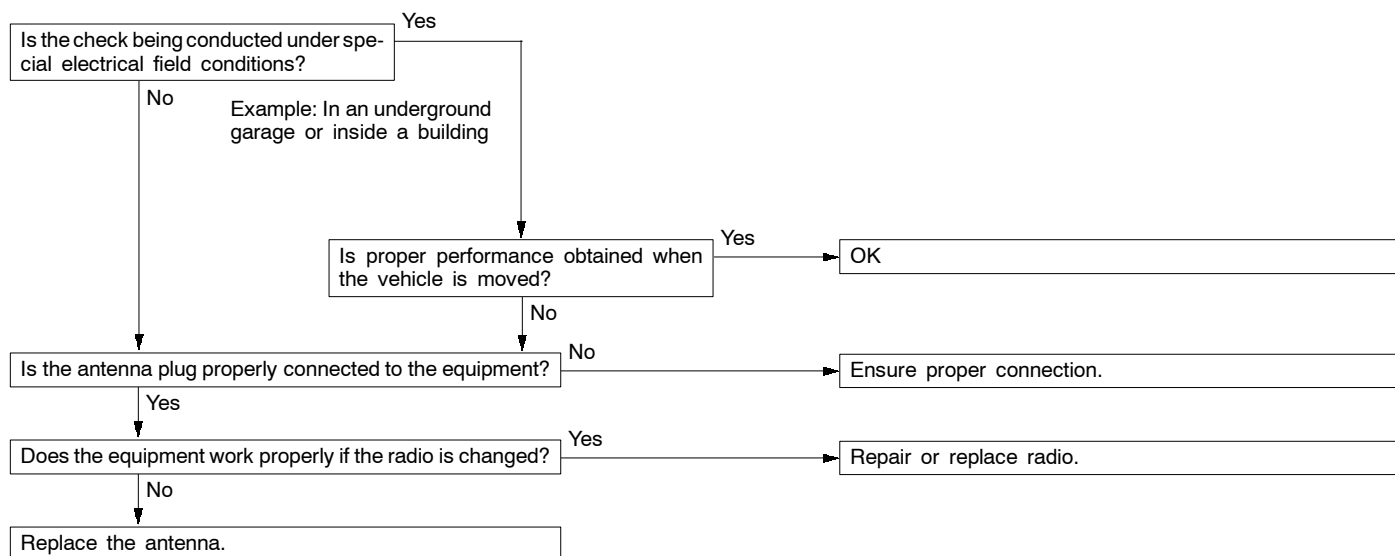
B-3 There is noise but no reception for both AM and FM or no sound from AM, or no sound from FM.

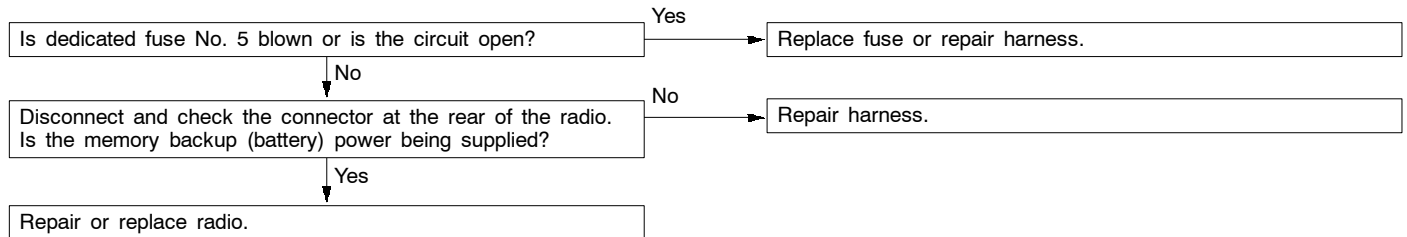
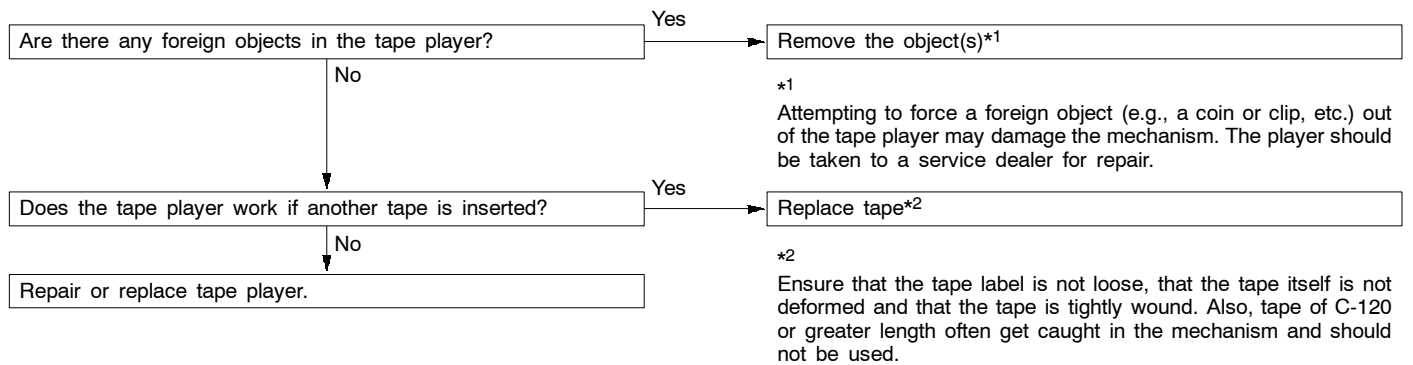
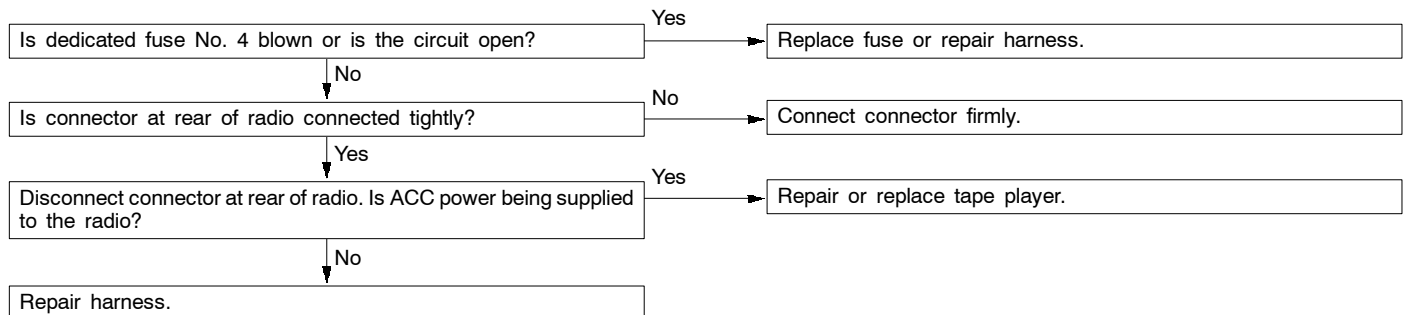


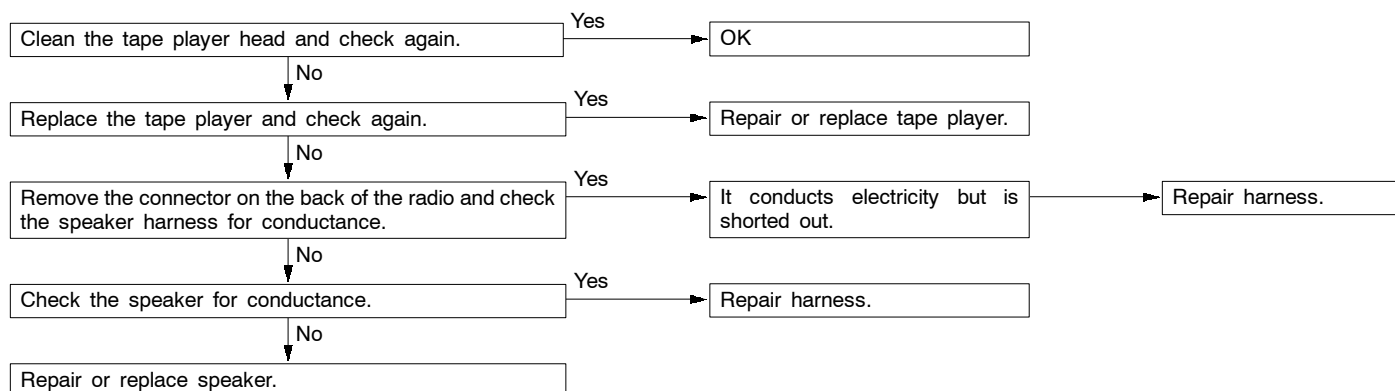
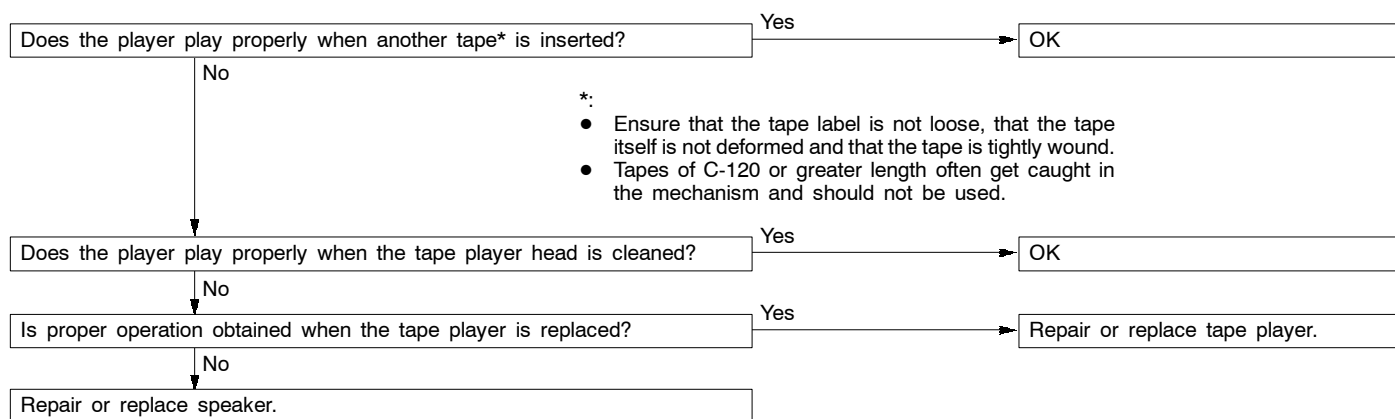
B-4 Insufficient sensitivity.



* For multipath noise and fading noise problems, refer to P. 54-72.

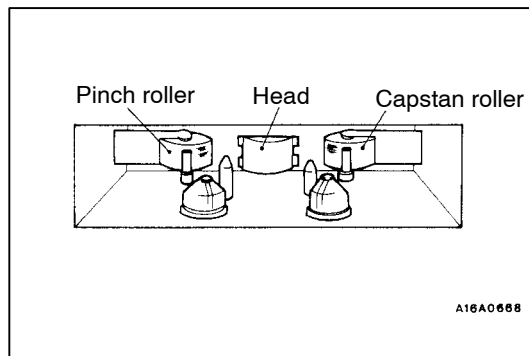
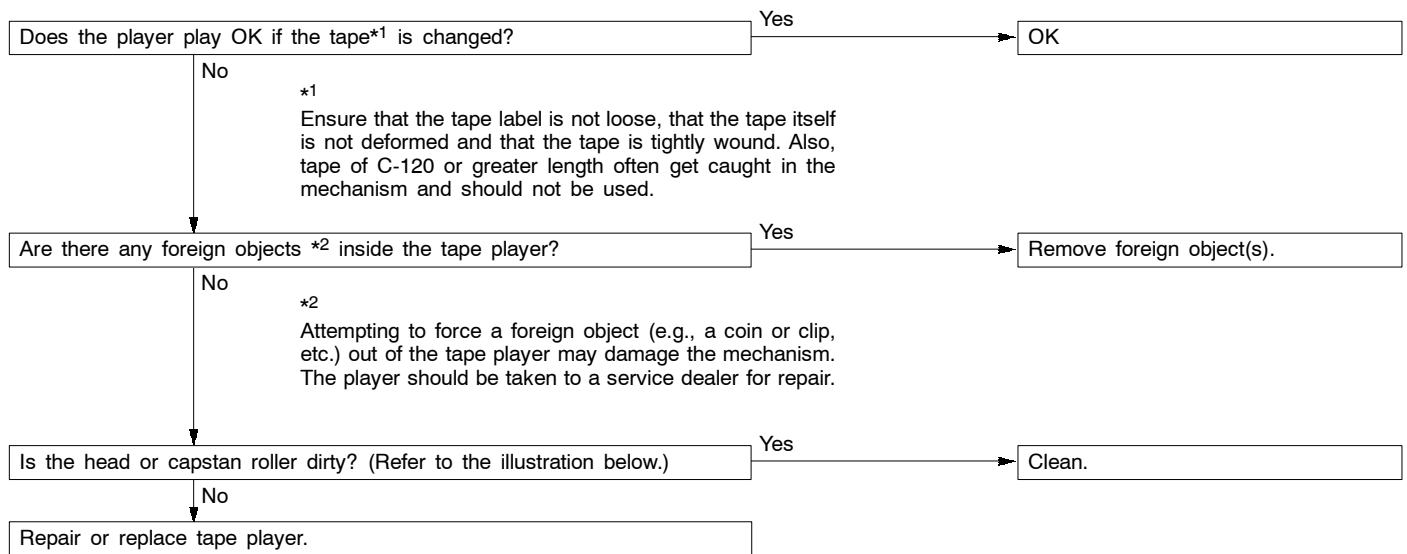
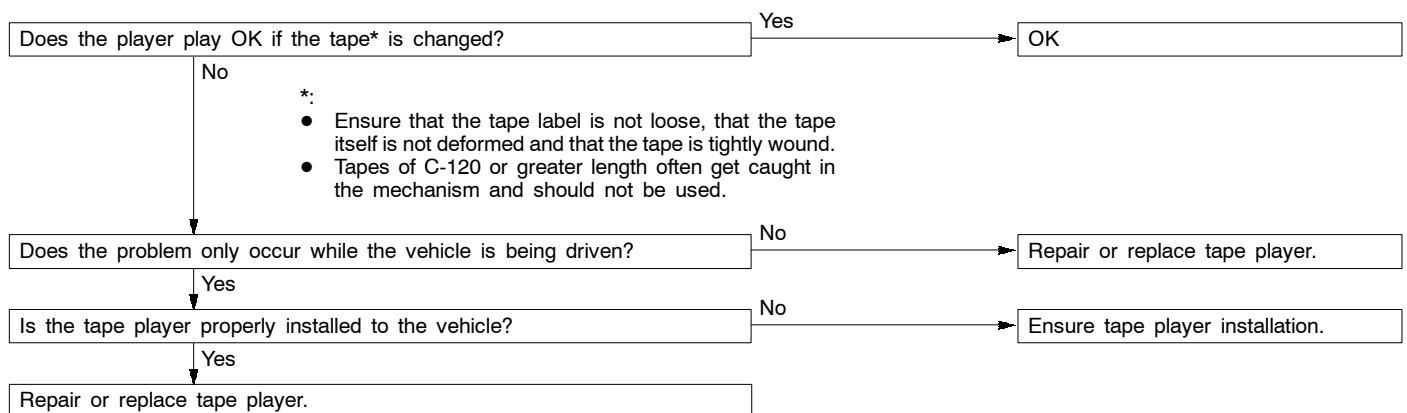
B-5 Distortion on AM or on both AM and FM.**B-6 Distortion on FM only****B-7 Too few automatic select stations.**

B-8 Insufficient memory (preset stations are erased).**C. TAPE PLAYER****C-1 Cassette tape will not be inserted.****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

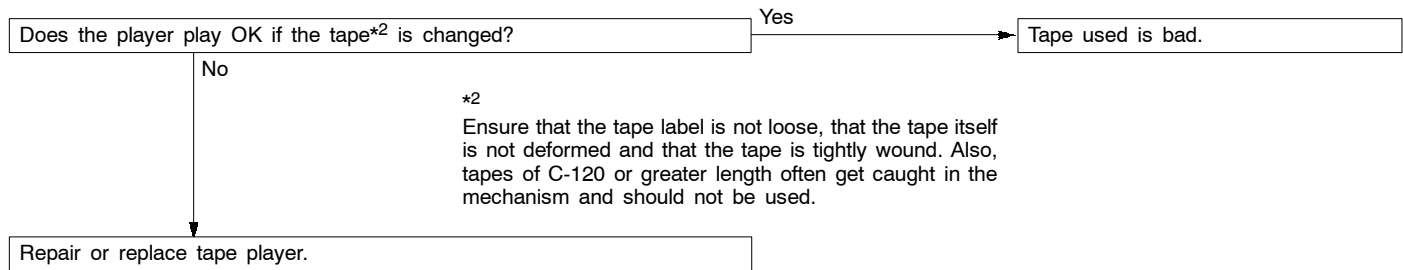
also possible, and attempting to force the tape out of the player can cause damage to the mechanism. The player should be taken to a service dealer for repair.

C-6 Uneven revolution. Tape speed is fast or slow.**C-7 Faulty auto reverse.**

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.

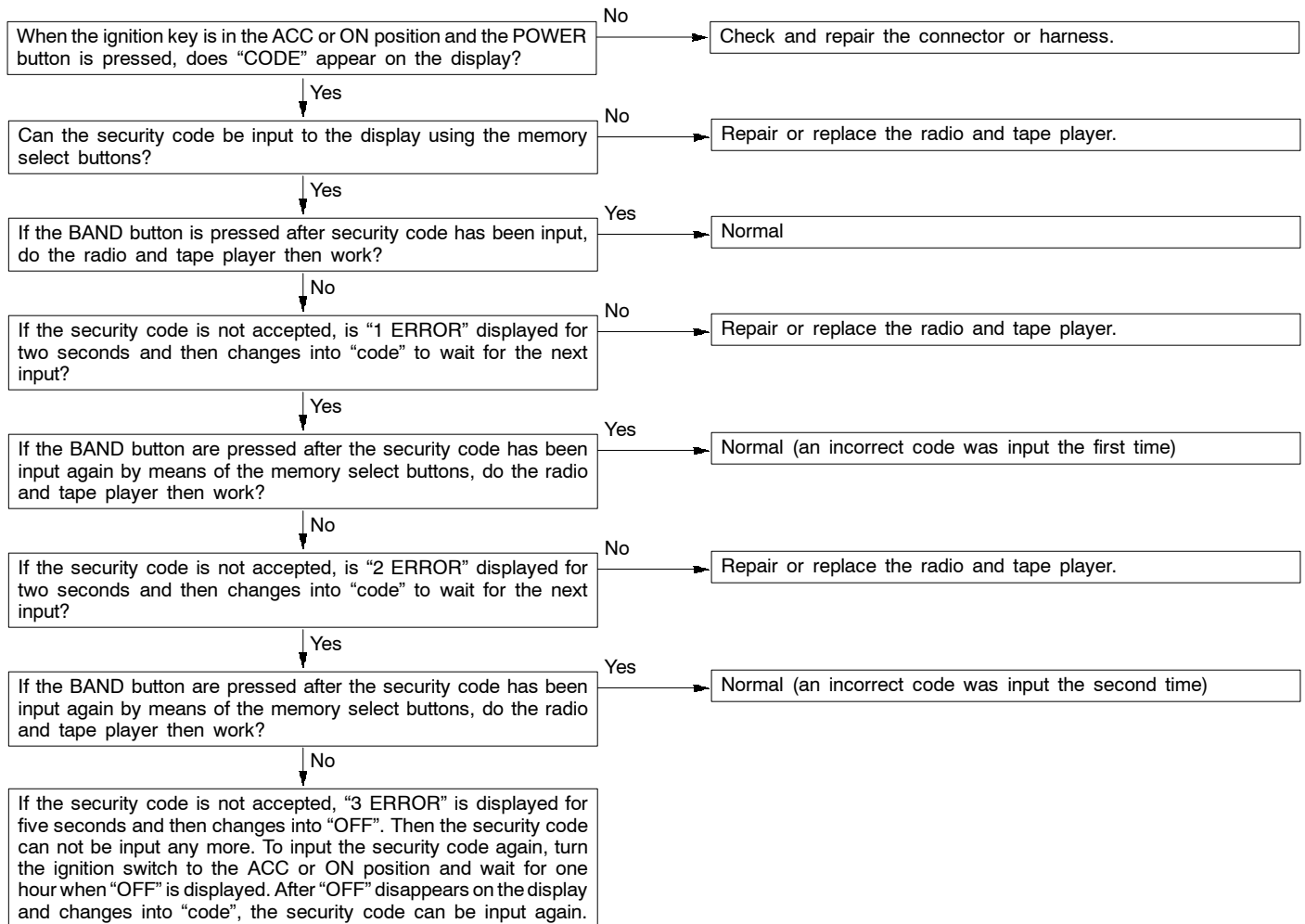


RADIO AND TAPE PLAYER WITH ANTI-THEFT SYSTEM

54400430032

- After the power supply to the radio and tape player has been interrupted for an hour or more, the anti-theft system will prevent the radio and tape player from working, even if the power

supply is restored. Problem with the anti-theft system can be found using the flow chart below.



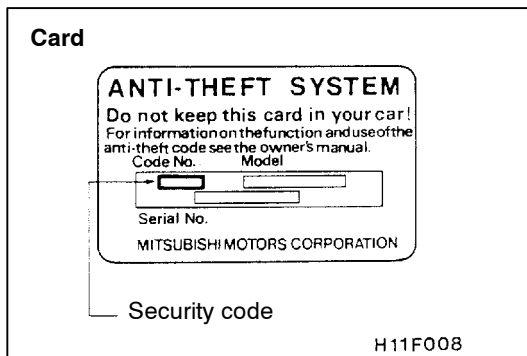
PROCEDURE FOR INPUT OF SECURITY CODE FOR RADIO AND TAPE PLAYER WITH ANTI-THEFT SYSTEM

54400440158

The radio and tape player does not work in the following states.

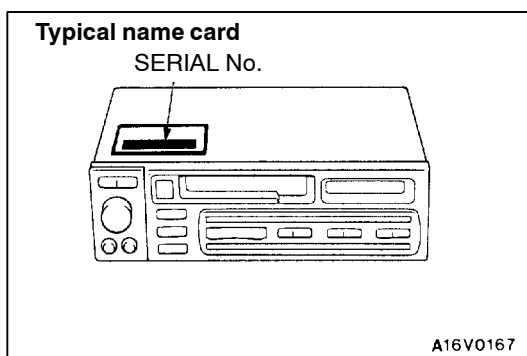
- Power supply to the radio and tape player has been suspended for more than an hour continuously by removing the cable from the battery terminal for disconnecting the harness connectors.
- The power supply to the radio and tape player has been suspended for more than an hour owing to blown fuse or discharged battery.
- The radio and tape player has been replaced.

If the radio and tape player does not work for these causes, input the security code by the following procedure.

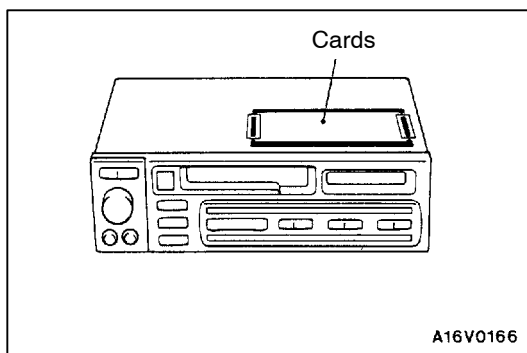


1. Using any of the following methods, confirm the security code.

- (1) Read the security code indicated on the cards retained by the car.



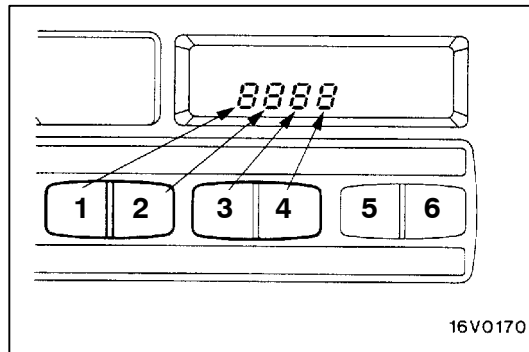
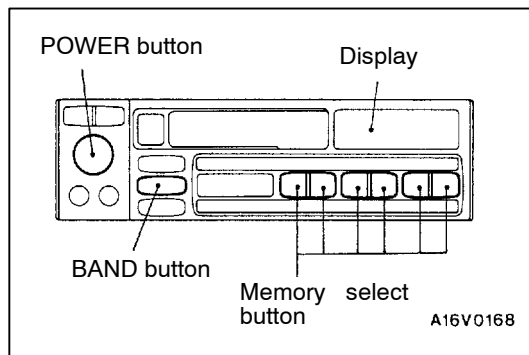
- (2) If the security code is unknown owing to the user's loss of the card:
 - a. Remove the radio and tape player, referring to P.54-85.
 - b. Read the serial No. stamped on the radio and tape player.
 - c. Look up the security code (anti-theft code table) corresponding to the serial number, or ask the authorized Mitsubishi dealer.



- (3) When the radio and tape player is replaced:
Read the security code on the cards attached to the upper surface of the replacement radio and tape player.

NOTE

Deliver the two cards to the user.

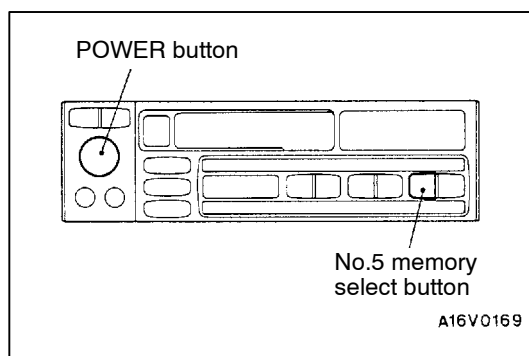


2. Return the power supply from the battery to the normal condition.
3. Turn the ignition key to the "ACC" or "ON" position.
4. Press the POWER button, and "CODE" will be displayed.

5. Press No.1 through No.4 memory select button to set the four-digit security code shown on the card. Every time each digit key is pressed, the figure changes as follows: 0→1→2.....9→0
6. Press the BAND button, and a beep will be heard and the radio and tape player will work.
7. If the security code is not accepted, "1 ERROR" is displayed. In a few minutes, it will change to "CODE". Then repeat the steps 5 and 6.

NOTE

- (1) If an incorrect security code is input, the anti-theft system will allow three attempts at most to input the correct code.
- (2) The second error is displayed as "2 ERROR". When the third error is made, "3 ERROR" is displayed and then the display changes to "OFF". If this should occur, the unit will not work any more.
- (3) To input the security code again, turn the ignition switch to the ACC or ON position and wait for one hour when "OFF" is displayed. After "OFF" disappears on the display and changes into "CODE", the security code can be input again.



5-minute operation mode

To facilitate replacement or check, the radio and tape player can be operated for five minutes without inputting the security code.

1. Press the POWER button and No.5 memory select button together to operate the radio and tape player.
2. In five minutes the unit will not be able to work, and "CODE" will be displayed to indicate that the security code can be input again.

RADIO AND TAPE PLAYER

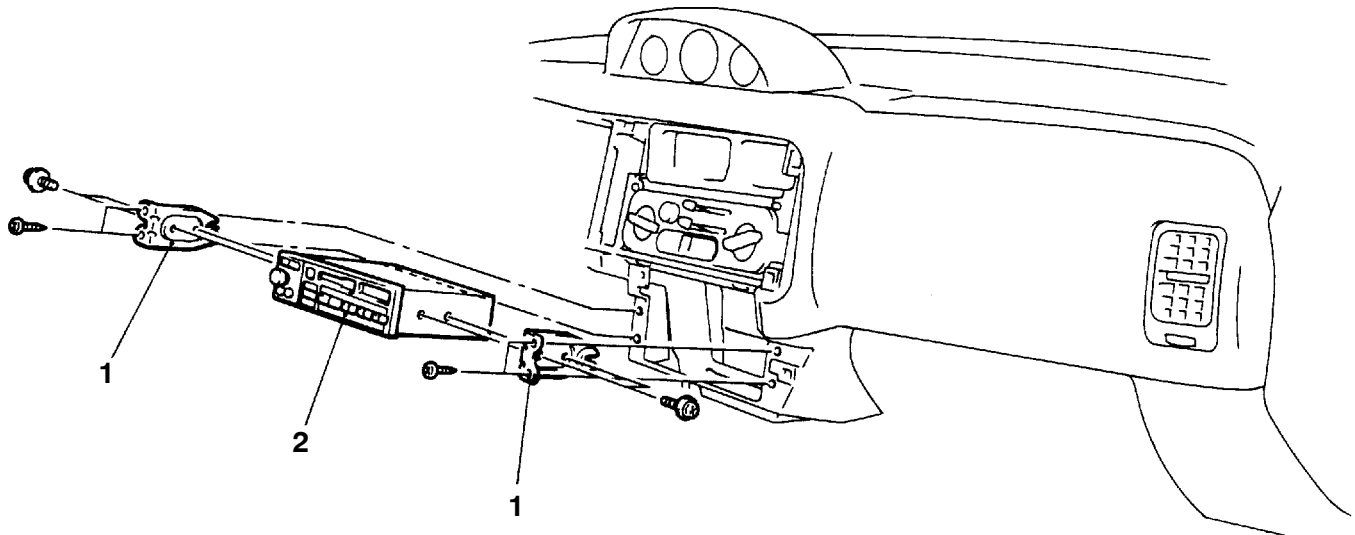
54400140164

REMOVAL AND INSTALLATION

Pre-removal and Post-installation Operation

- Front Floor Console Assembly Removal and Installation (Refer to GROUP 52A.)
- Driver's Side Under Cover or Knee Protector Assembly, Meter Bezel Assembly, Glove Box

Assembly, Center Under Cover Removal and Installation (Refer to GROUP 52A – Instrument Panel.)



A16V0134

Removal steps

1. Radio bracket
2. Radio and tape player

SPEAKER

54400260358

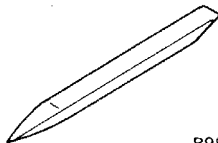
REMOVAL AND INSTALLATION

Refer to GROUP 42 – Door.

ANTENNA

54400060064

SPECIAL TOOL

Tool	Number	Name	Use
 B990784	MB990784	Ornament remover	Meter bezel assembly removal

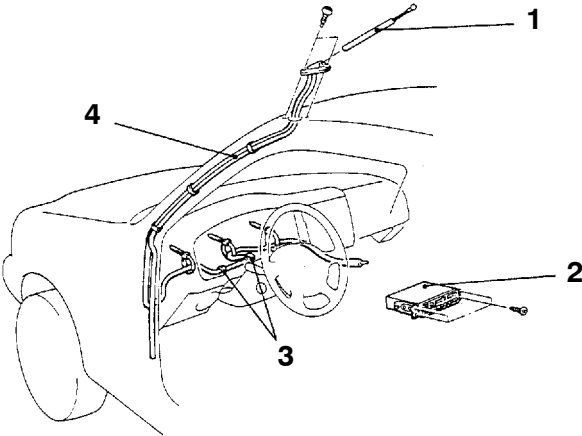
ANTENNA

54400290340

REMOVAL AND INSTALLATION

- Pre-removal and Post-installation Operation**

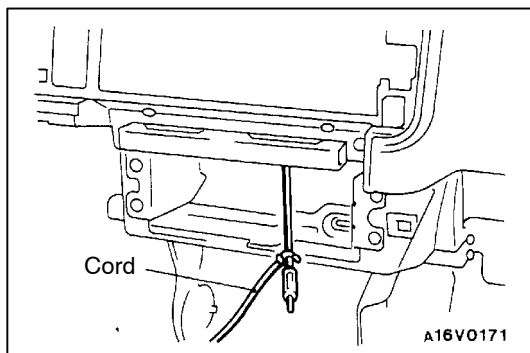
 - Front Floor Console Assembly Removal and Installation (Refer to GROUP 52A.)
 - Driver's Side Under Cover, Meter Bezel Assembly, Glove Box Assembly, Center Under Cover Removal
- and Installation (Refer to GROUP 52A – Instrument Panel.)



B16V0133

Removal steps

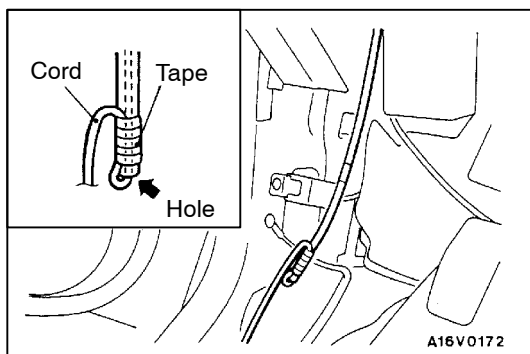
1. Pole
 2. Radio and tape player
 - Front scuff plate (driver's side), cowl side trim (driver's side) (Refer to GROUP 52A – Trim.)
- ◀A▶
3. Cable clipped portion
 4. Antenna base



REMOVAL SERVICE POINT

◀A▶ ANTENNA BASE REMOVAL

1. Tie a cord to the end of the feeder cable.



2. Pull out the antenna base until the end of the drain pipe can be seen.
3. Pass the cord through the hole in the end of the drain pipe and wrap it with vinyl tape.

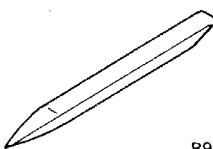
Caution

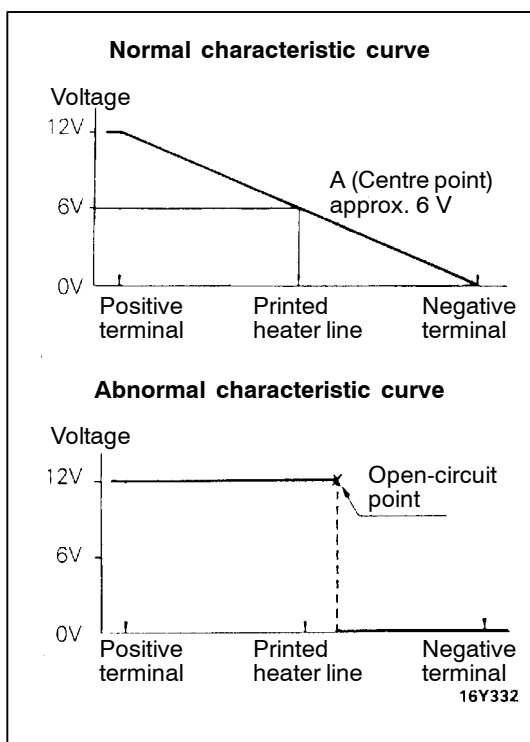
Wrap it securely so that the cord will not come off.

4. Pull out the antenna base little by little to remove it.

REAR WINDOW DEFOGGER SPECIAL TOOL

54300060269

Tool	Number	Name	Use
 B990784	MB990784	Ornament remover	Meter bezel assembly removal



ON-VEHICLE SERVICE

54300180033

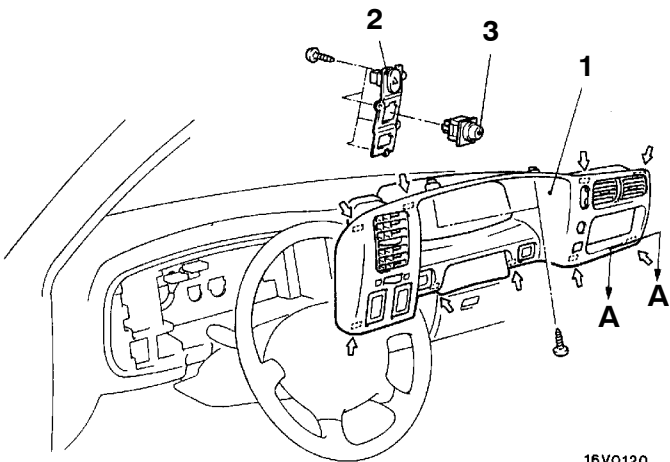
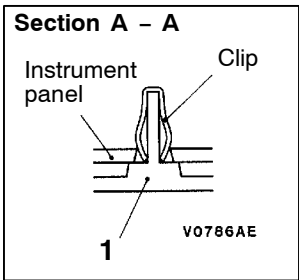
PRINTED-HEATER LINE CHECK

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 SWITCH

54300620191

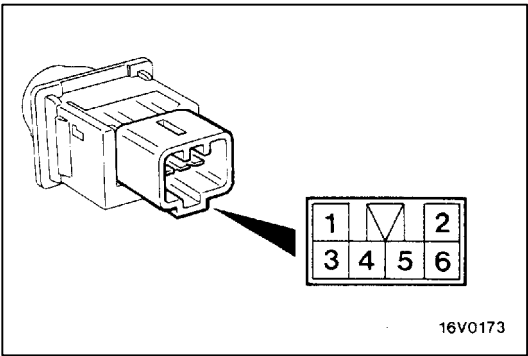
REMOVAL AND INSTALLATION



16V0120
00009169

NOTE
↔ : metal clip position

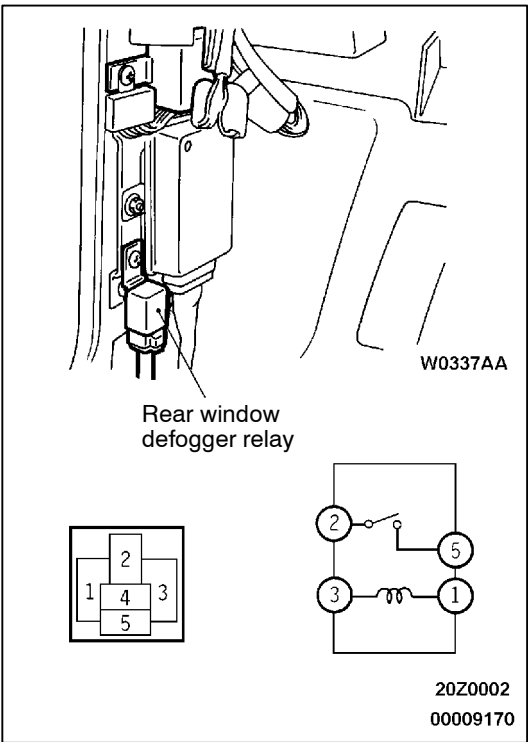
- Removal steps**
- 1. Meter bezel assembly
 - 2. Switch holder
 - 3. Rear window defogger switch



INSPECTION
DEFOGGER SWITCH CONTINUITY CHECK

54300630033

Switch position	Terminal No.							
	1	ILL	5	2	IND	6	3	4
OFF								
ON								



REAR WINDOW DEFOGGER RELAY CONTINUITY CHECK

54300680205

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

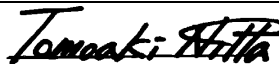
Service Bulletins

Click on the applicable bookmark to select the Service Bulletin.



SERVICE BULLETIN

QUALITY INFORMATION ANALYSIS
OVERSEAS SERVICE DEPT. MITSUBISHI MOTORS CORPORATION

SERVICE BULLETIN		No.: MSB-99E54-501	
		Date: 1999-12-15	<Model> (EC) PAJERO SPORT (K9)
Subject: ADDED DESCRIPTION OF IMMOBILIZER SYSTEM			
Group: CHASSIS ELECTRICAL	Draft No.: 99SY051413		
CORRECTION	INTERNATIONAL CAR ADMINISTRATION OFFICE	 T.NITTA - PROJECT LEADER AFTER SALES SERVICE & CS PROMOTION	

1. Description:

Omission of a fuller description of the immobilizer system under OPERATION SYSTEM (Technical Information Manual) and ENCRYPTED CODE REGISTRATION METHOD AND RESETTNG THE CODE TO THE FACTORY SETTING (Workshop Manual), has been rectified.

2. Applicable Manuals:

Manual	Pub. No.	Language	Page(s)
'99 PAJERO SPORT Technical Information Manual	PYJE9804	(English)	7-4
'99 PAJERO SPORT Workshop Manual chassis	PWJE9812	(English)	54-22
	PWJG9815	(German)	
	PWJF9814	(French)	
'99 MONTERO SPORT Workshop Manual chassis	PWJS9813	(Spanish)	

3. Details:

'99 PAJERO SPORT Technical Information Manual, page 2
'99 PAJERO SPORT Workshop Manual chassis, page 3

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

54300810086

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

Replacement part	6G7	4D5	
	Encrypted code registration	Encrypted code registration	Resetting the code to the factory setting
Ignition key	Necessary	Necessary	Not Necessary
Ignition key ring antenna	Not Necessary	Not Necessary	Not Necessary
Immobilizer-ECU <input type="text" value="*2"/> ← <Added>	Necessary	Necessary	Necessary
Engine-ECU <6G7> *	Necessary	–	–
Fuel cut valve controller (fuel injection pump) <4D5>	–	Not Necessary	Not Necessary (New part) Necessary (Used part)

NOTE

*: If the engine-ECU is replaced, the immobilizer-ECU and ignition key should be replaced together with it. Each immobilizer-ECU has encrypted code for ignition key, and the encrypted code is registered in the immobilizer-ECU.

*2: For vehicles with 4D5, if the immobilizer-ECU is replaced, the ignition key must be replaced together with it. Each immobilizer-ECU has encrypted code for ignition key, and the encrypted code is registered in the ignition key.

↑
<Added>

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 input the vehicle secret code and to register the password (secret code) that the user specifies into the immobilizer-ECU. (Refer to the “MUT-II REFERENCE MANUAL” or “MUT-II OPERATING INSTRUCTIONS”)

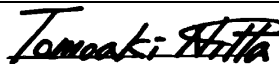
Caution

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



SERVICE BULLETIN

QUALITY INFORMATION ANALYSIS
OVERSEAS SERVICE DEPT. MITSUBISHI MOTORS CORPORATION

SERVICE BULLETIN		No.: MSB-99E54-503	
		Date: 1999-12-15	<Model> (EC) PAJERO SPORT (K9)
Subject: CORRECTION TO IMMOBILIZER-ECU TERMINAL VOLTAGE CHECK		<M/Y> 99-10	
Group: CHASSIS ELECTRICAL	Draft No.: 9SUY061618		(EC) MONTERO SPORT (K9)
CORRECTION	INTERNATIONAL CAR ADMINISTRATION OFFICE	 T. NITTA - PROJECT LEADER AFTER SALES SERVICE & CS PROMOTION	

1. Description:

The incorrectness of a description of the immobilizer-ECU terminal voltage check has been rectified.

2. Applicable Manuals:

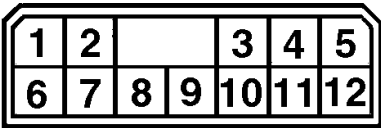
Manual	Pub. No.	Language	Page(s)
'99 PAJERO SPORT Workshop Manual Chassis	PWJE9812	(English)	54-18
	PWJF9814	(French)	
	PWJG9815	(German)	
'99 MONTERO SPORT Workshop Manual Chassis	PWJS9813	(Spanish)	

3. Details:

CHECK AT IMMOBILIZER-ECU

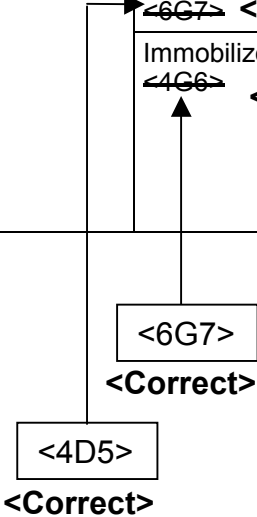
54300760053

Terminal Voltage Check Chart



20F0191

Terminal No.	Signal	Checking requirements	Terminal voltage
3	Immobilizer-ECU earth	Always	0 V
6	Ignition switch-IG <4D5>	Ignition switch: OFF	0 V
		Ignition switch: ON	System voltage
7	Immobilizer-ECU power supply	Always	System voltage
	<6G7> <Incorrect>		
	Immobilizer-ECU power supply	Ignition switch: OFF or approx. 5 or more seconds after switch has been turned from ON to OFF	0 V
	<4G6> <Incorrect>		
		Ignition switch: ON or within approx. 5 seconds after switch has been turned from ON to OFF	System voltage



GROUP 54

CHASSIS ELECTRICAL

GENERAL

OUTLINE OF CHANGES

- The following service procedures have been added due to the change of the outside thermo sensor.
- The following service procedures have been added due to the change of the headlamps. The other procedures are the same as before.
- The following service procedures have been added due to change of the fog lamps.

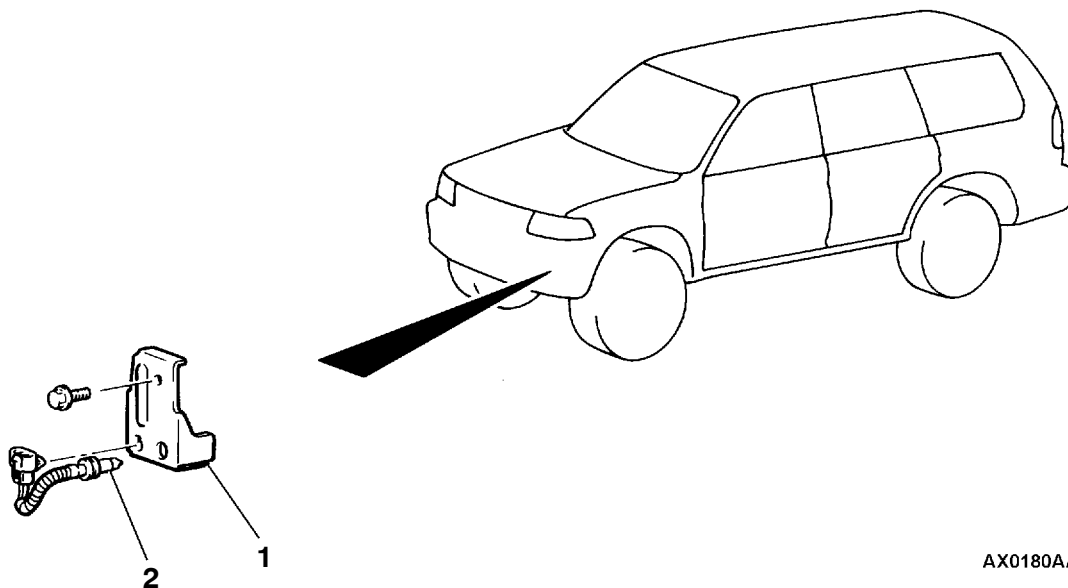
OUTSIDE THERMO SENSOR

SERVICE SPECIFICATION

Item		Standard value
Internal resistance of outside thermo sensor Ω	At 20°C	Approx. 1,200
	At 40°C	Approx. 500

OUTSIDE THERMO SENSOR

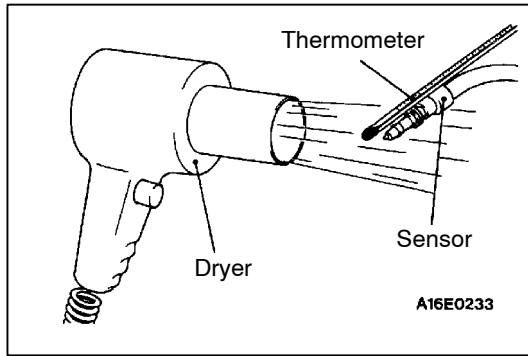
REMOVAL AND INSTALLATION



AX0180AA

Removal steps

1. Bracket
2. Outside thermo sensor



INSPECTION

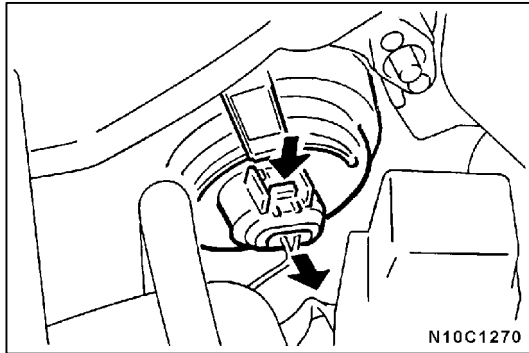
OUTSIDE THERMO SENSOR INTERNAL RESISTANCE CHECK

Check the internal resistance of the outside thermo sensor at the standard values at temperatures of 20 °C and 40 °C.

Standard value:

Approx. 1,200 Ω (at 20 °C)

Approx. 500 Ω (at 40 °C)



HEADLAMP ASSEMBLY

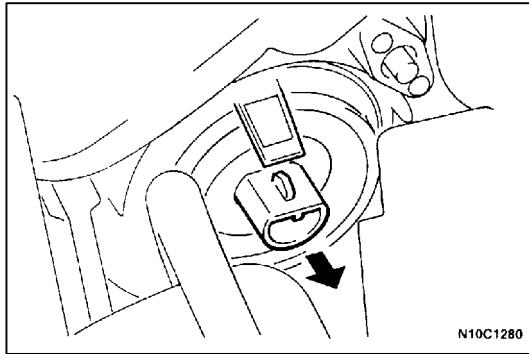
BULB REPLACEMENT

<Headlamp Bulb>

1. When replacing the right side headlamp bulb, remove the resonator.
2. Disconnect the connector.
3. Remove the locking cap by turning it counter clock wise.
4. Remove the lamp socket, and then remove the bulb.

Caution

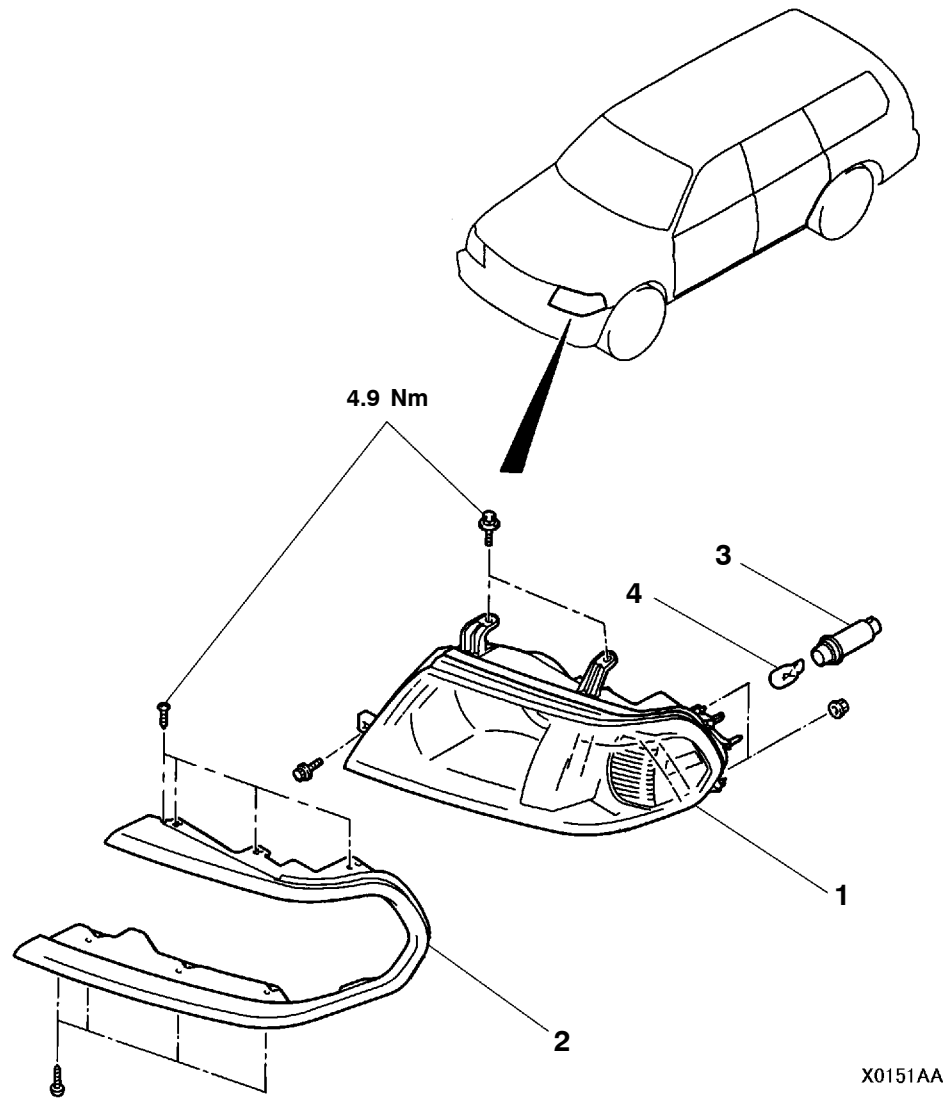
Do not touch the surface of the bulb with hands or dirty gloves. If the surface does become dirty, clean it with alcohol or thinner, and let it dry thoroughly before installing.



HEADLAMP ASSEMBLY

REMOVAL AND INSTALLATION

Post-installation operation
Headlamp aiming adjustment

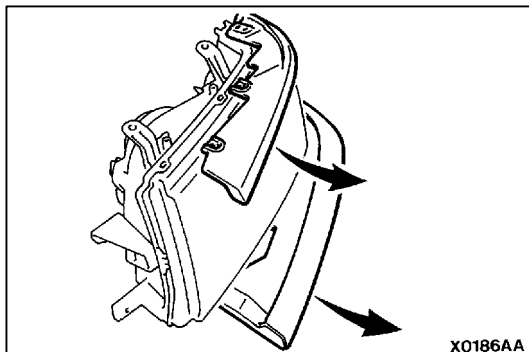


Removal steps

- Radiator grille (Refer to GROUP 51 – Grille, Moulding and Garnish.)
- Splash shield (Refer to GROUP 42 - Fender.)



- 2. Headlamp
- 3. Headlamp bezel
- 4. Bulb socket
- 5. Bulb



REMOVAL SERVICE POINT

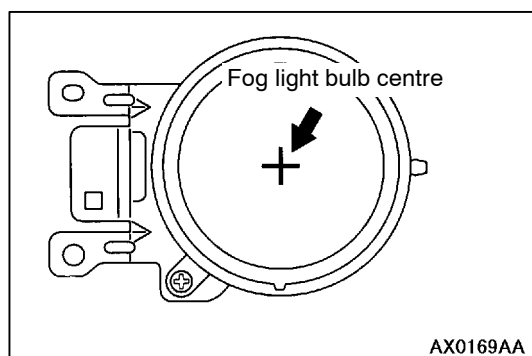
◀A▶ HEADLAMP BEZEL REMOVAL

Using care not to damage the engagement with the headlamp, remove the headlamp bezel little by little starting from the body center.

FRONT FOG LAMP

SERVICE SPECIFICATION

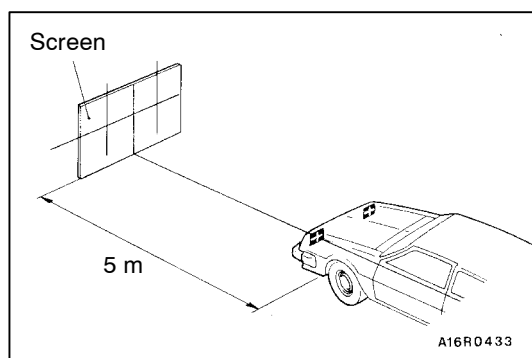
Item		Standard value
Front fog lamp aiming	Vertical direction	100 mm below horizontal (H)
	Horizontal direction	Parallel to direction of vehicle travel



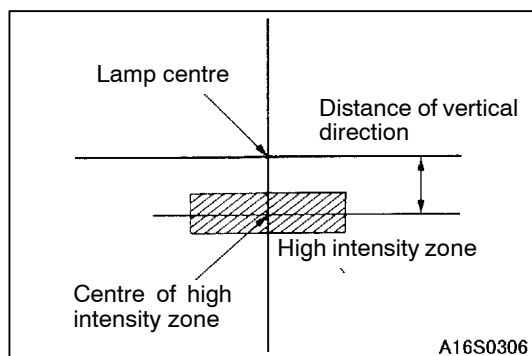
ON-VEHICLE SERVICE

FRONT FOG LAMP AIMING

1. Measure the centre of the fog lamps, 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.

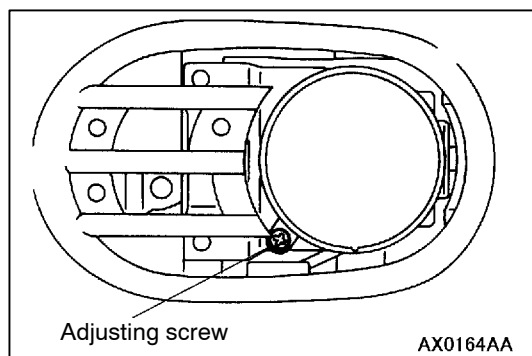
Standard value:

(Vertical direction)

100 mm below horizontal (H)

(Horizontal direction)

Parallel to direction of vehicle travel

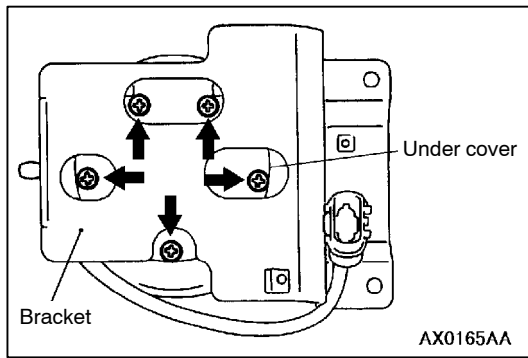


NOTE

The horizontal direction is non-adjustable. If 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.

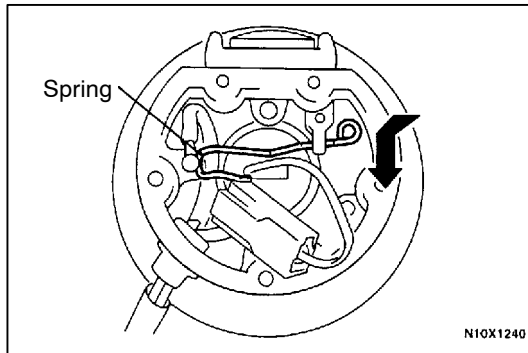
Caution

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



BULB REPLACEMENT

1. Remove the fog lamp.
2. Remove the screws shown in the illustration, then remove the cover.



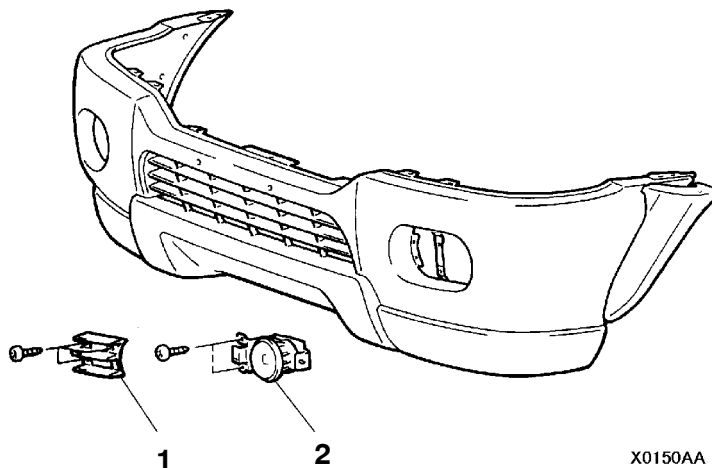
3. Unhook the spring which secures the bulb and then remove the bulb.

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.
- If the under cover is not attached properly, the lens might become cloudy or water might penetrate inside the lamp unit. Always be sure to install the under cover securely.

FRONT FOG LAMP

REMOVAL AND INSTALLATION



Removal steps

1. Front bumper grille
2. Fog lamp

Service Bulletins

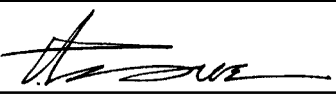
Click on the applicable bookmark to select the Service Bulletin.



SERVICE BULLETIN

SERVICE PUBLICATION

INTERNATIONAL CAR ADMINISTRATION OFFICE. MITSUBISHI MOTORS CORPORATION

SERVICE BULLETIN		NO.: MSB-01E54-502	
		DATE : 2001-05-20	<MODEL> (EUR)PAJERO SPORT(K80W,K90W)
SUBJECT : RECTIFICATION OF OMITTED DESCRIPTIONS OF MOTOR ANTENNA		<M/Y> 00-00	
GROUP : CHASSIS ELECTRICAL		DRAFTNO. : 01SY004	
CORRECTION	INTERNATIONAL CAR ADMINISTRATION OFFICE	 T. Inoue - Manager SERVICE PUBLICATION	

1. Description:

Omission of motor antenna descriptions from the PAJERO SPORT Workshop Manual has been rectified.

2. Applicable Manual:

Manual	Pub. No.	Page
'00 PAJERO SPORT Workshop Manual chassis SUPPLEMENT	PWJE9812-A (English)	54-1, 54-5-10
	PWJS9813-A (Spanish)	
	PWJF9814-A (French)	
	PWJG9815-A (German)	

3. Details:

GROUP 54 CHASSIS ELECTRICAL

GENERAL

OUTLINE OF CHANGES

- The following service procedures have been added due to the change of the outside thermo sensor.
- The following service procedures have been added due to the change of the headlamps. The other procedures are the same as before.
- The following service procedures have been added due to change of the fog lamps.

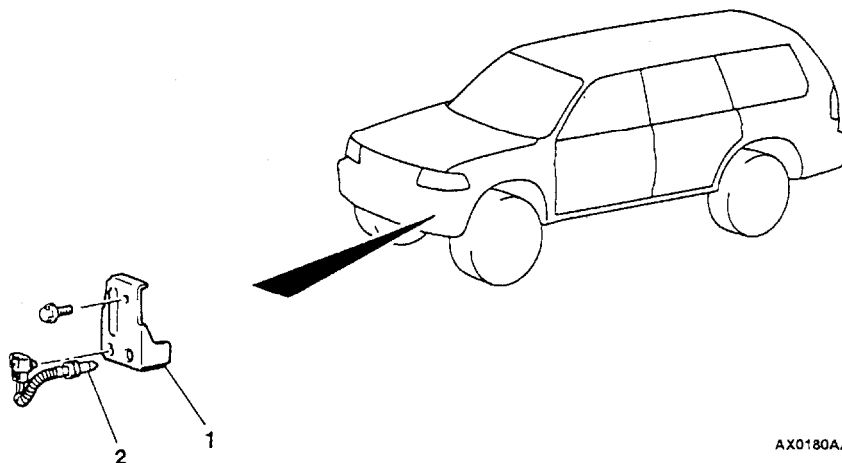
OUTSIDE THERMO SENSOR

SERVICE SPECIFICATION

Item		Standard value
Internal resistance of outside thermo sensor Ω	At 20°C	Approx. 1,200
	At 40°C	Approx. 500

OUTSIDE THERMO SENSOR

REMOVAL AND INSTALLATION

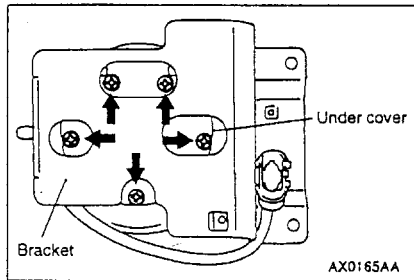


Removal steps

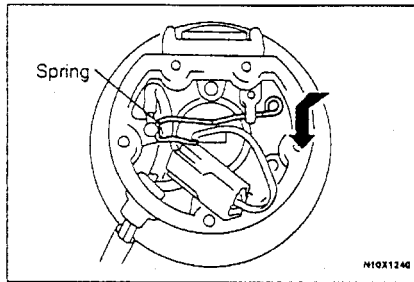
1. Bracket
2. Outside thermo sensor

<Added>

- With addition of the motor antenna assembly, troubleshooting, removal and installation procedures for the antenna have newly been added.

**BULB REPLACEMENT**

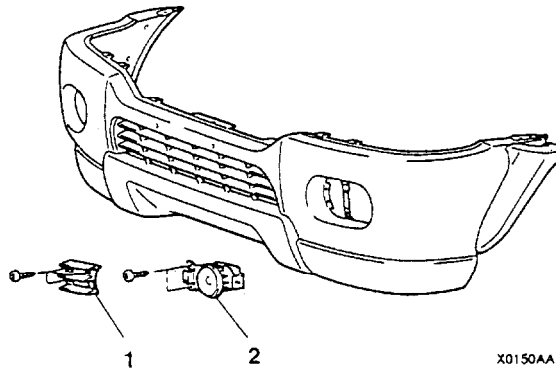
1. Remove the fog lamp.
2. Remove the screws shown in the illustration, then remove the cover.



3. 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.
- If the under cover is not attached properly, the lens might become cloudy or water might penetrate inside the lamp unit. Always be sure to install the under cover securely.

FRONT FOG LAMP**REMOVAL AND INSTALLATION****Removal steps**

1. Front bumper grille
2. Fog lamp

Added (All the following pages.)

RJST909003-210

<Added>

54-6

CHASSIS ELECTRICAL – Radio and Tape Player

RADIO AND TAPE PLAYER

TROUBLESHOOTING

QUICK-REFERENCE TROUBLESHOOTING CHART

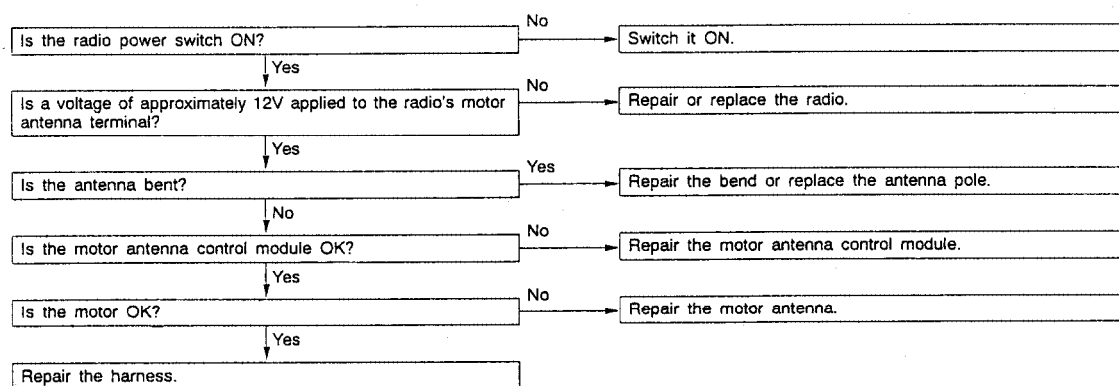
Items	Problem symptom	Relevant chart
Motor antenna	Motor antenna won't extend or retract.	D-1
	Motor antenna extends and retracts but does not receive.	D-2

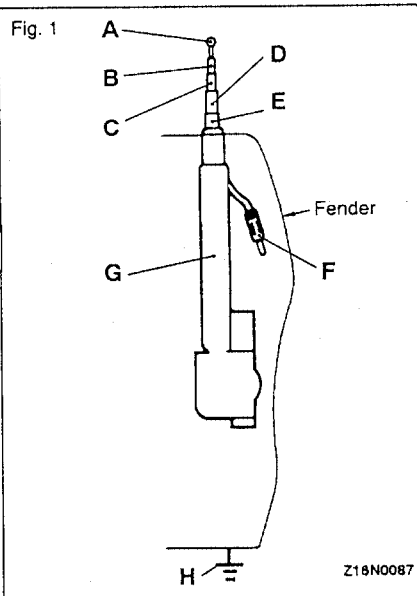
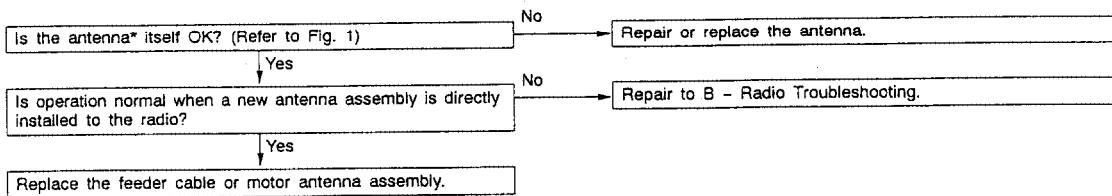
CHART

D. MOTOR ANTENNA

D-1 Motor antenna won't extend or retract.

Clean and polish the surface of the antenna pole.



D-2 Motor antenna extends and retracts but does not receive.**Checking the antenna***

Ohmmeter measurement locations	Result
Circuits from F to A, B, C, D and E	Continuity
Circuits between G and H	Continuity
Circuits from H to A, B, C, D and E	No continuity

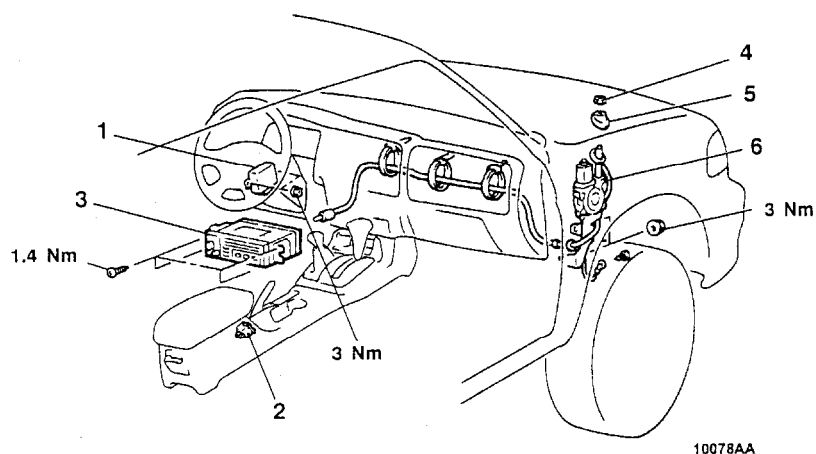
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54-8

CHASSIS ELECTRICAL - Antenna

ANTENNA

REMOVAL AND INSTALLATION



Antenna motor-ECU removal steps

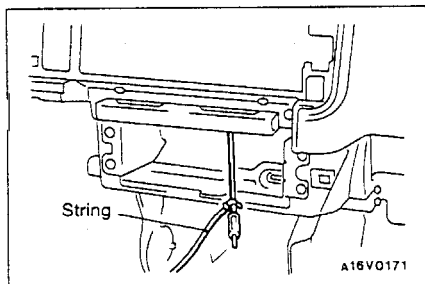
1. Antenna motor-ECU

Motor antenna switch removal steps

- Switch panel (Refer to GROUP 52A - Floor console.)
2. Motor antenna switch

Motor antenna assembly removal steps

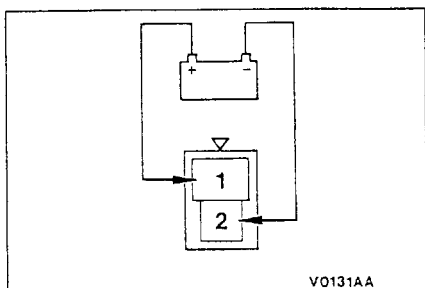
3. Radio and tape player (Refer to Basic manual.)
4. Ring nut
5. Base
 - Fender (Refer to GROUP 42 - fender.)
6. Motor antenna assembly



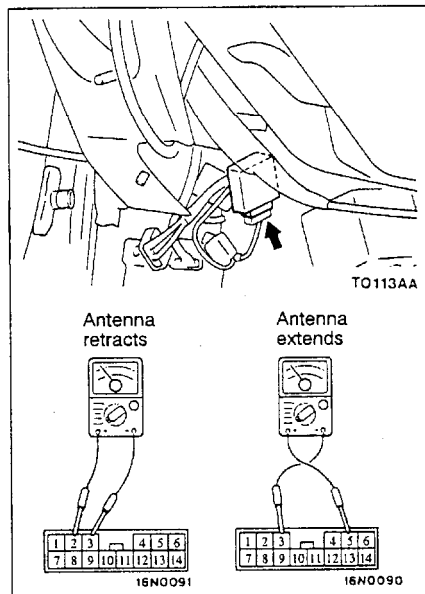
REMOVAL SERVICE POINT

◀A▶ MOTOR ANTENNA ASSEMBLY REMOVAL

To make installation easy, tie a string on the feeder cable of the motor antenna assembly and pull.

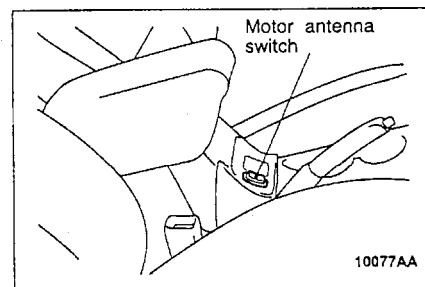
**INSPECTION****MOTOR ANTENNA INSPECTION**

Disconnect the antenna motor-ECU connector. Check that the antenna extends when the positive terminal of the battery is connected to terminal No. 1 and the negative terminal of the battery is connected to terminal No. 2. Check that the antenna retracts when the connection is reversed.

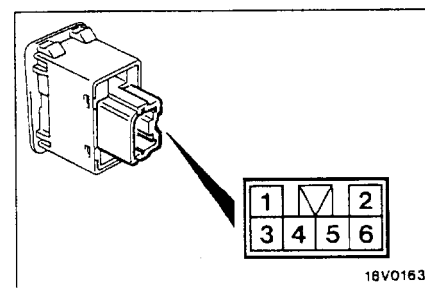
**ANTENNA MOTOR-ECU INSPECTION**

1. Remove the antenna motor-ECU installation bolt.
2. Operate the radio switch when the ignition switch is turned to the ACC or ON position, and check the voltage between the terminals while the antenna is extending or retracting.

Antenna operation direction	Measurement terminal	Voltage (V)
While retracting	2 - 3	10 - 13
While extending	3 - 5	10 - 13

**ANTENNA SWITCH INSPECTION**

1. Remove the antenna switch.



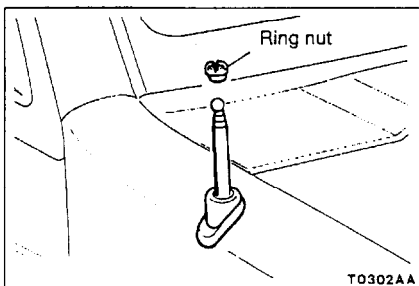
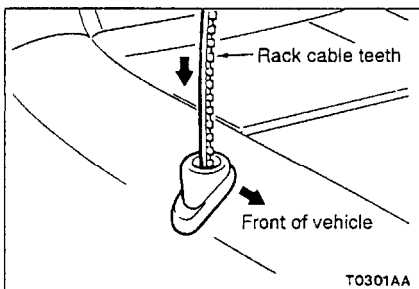
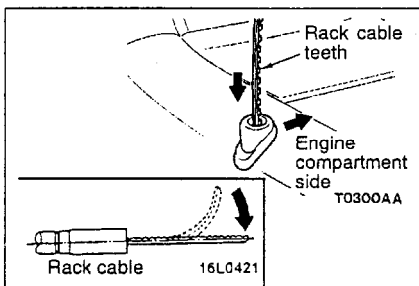
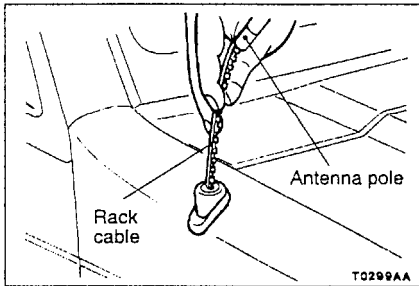
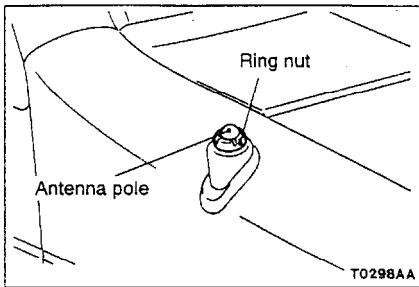
2. Operate the switch to check continuity between terminals.

Switch position	Terminal No.						
	2	3	4	5	3	ILL	6
FULL	○			○	○	⬇	○
HALF	○	○			○	⬇	○

<Added>

54-10

CHASSIS ELECTRICAL – Antenna



ANTENNA POLE REPLACEMENT

1. Remove the ring nut.
2. After setting the ignition switch to ACC or ON, turn the radio switch on. Extend the antenna pole and remove it together with the rack cable.

3. Pull the antenna out to the farthest end.

NOTE

If the motor end side of the rack cable is bent, straighten it out.

4. Face the teeth side of the rack cable toward the engine compartment, and feed the rack cable into the motor assembly.
5. Turn the teeth side of the rack cable toward the front of the vehicle (90° to the right), and engage the rack cable with the motor gears.
6. Pull lightly on the rack cable. If there is no resistance and it comes out, it is not engaged with the motor gears. Check that the end of the rack gear is not bent again, and then repeat steps (3) and (4) above again.
7. Set up the antenna pole vertically, and turn the radio off to wind in the rack cable. the antenna pole will be pulled into the motor antenna as the rack cable is wound in.
8. After tightening the ring nut, turn the radio on and off and check the operation of the antenna pole.

GROUP 54

CHASSIS ELECTRICAL

GENERAL

OUTLINE OF CHANGE

The following service procedure of the immobilizer system has been changed. The service procedures except for the items below are the same as before.

- The troubleshooting has been changed due to the addition of the 4D56 engine which complies with emission regulation step III.

IMMOBILIZER SYSTEM

The same troubleshooting and ignition key registration method as 4D56 engine are applied except for the following (Refer to '99 PAJERO SPORT Workshop Manual, Pub. No. PWJE9812).

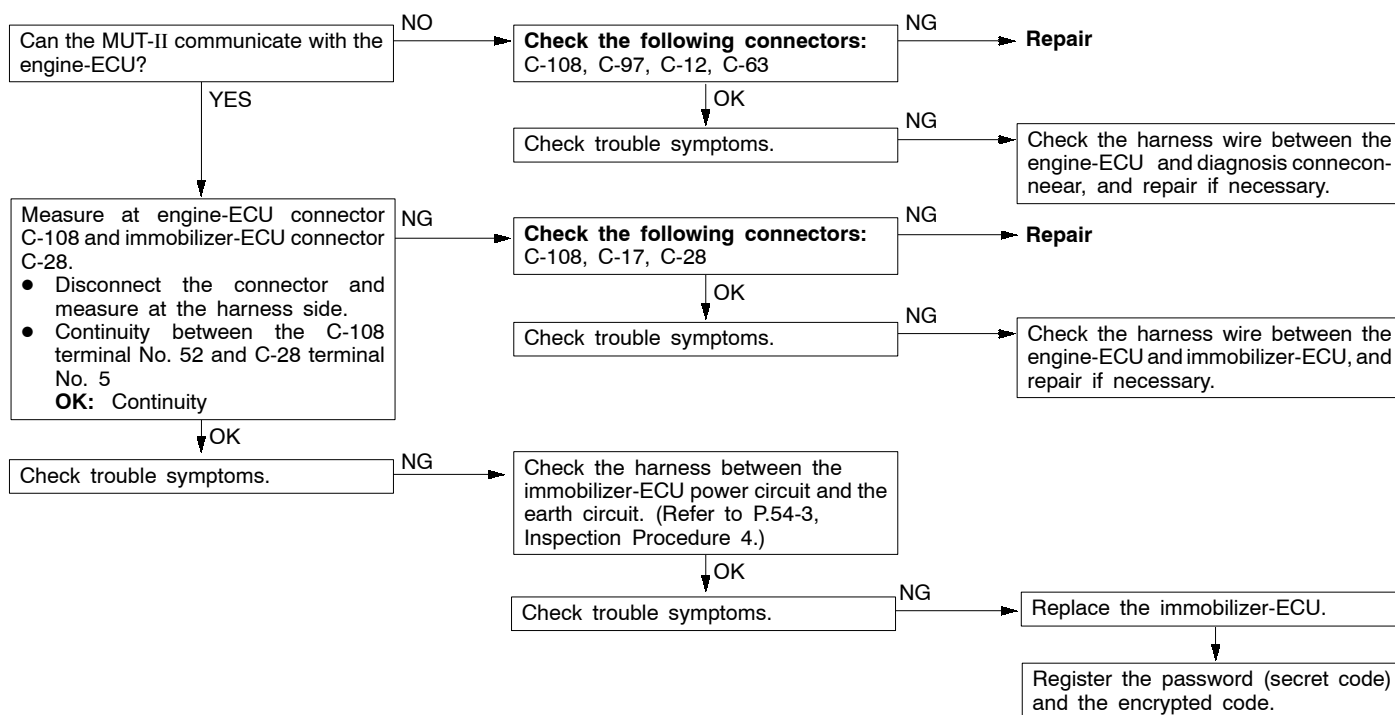
INSPECTION CHART FOR TROUBLE SYMPTOMS

Trouble symptom	Inspection procedure No.	Reference page
Communication with MUT-II is not possible.	1	54-1
Encrypted code cannot be registered using the MUT-II.	2	54-2
Engine does not start (Cranking but no initial combustion).	3	54-2
Malfunction of the immobilizer-ECU power source and earth circuit.	4	54-3

INSPECTION PROCEDURE FOR TROUBLE SYMPTOMS <4D56-Step III>

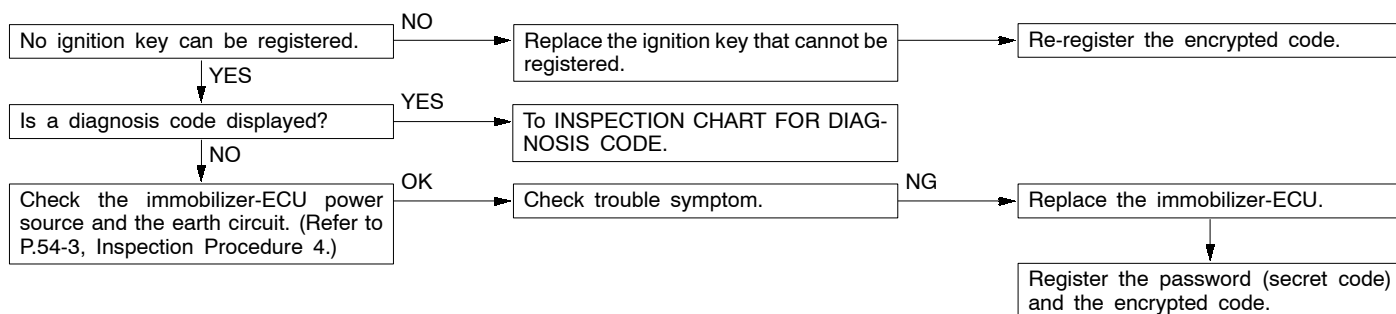
Inspection Procedure 1

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.	<ul style="list-style-type: none"> Malfunction of diagnosis line Malfunction of harness or connector Malfunction of immobilizer-ECU



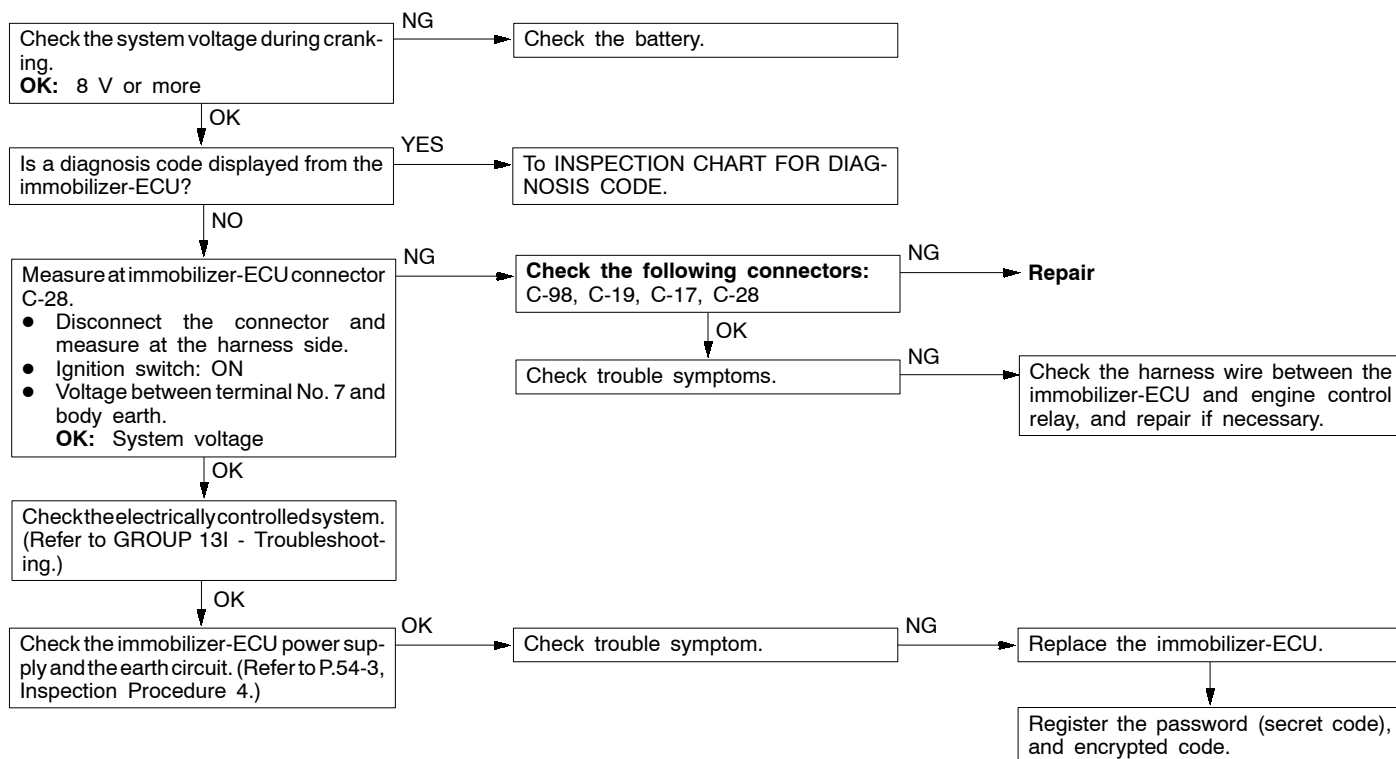
Inspection Procedure 2

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.	<ul style="list-style-type: none"> • Malfunction of transponder • Malfunction of ignition key ring antenna • Malfunction of harness or connector • Malfunction of immobilizer-ECU



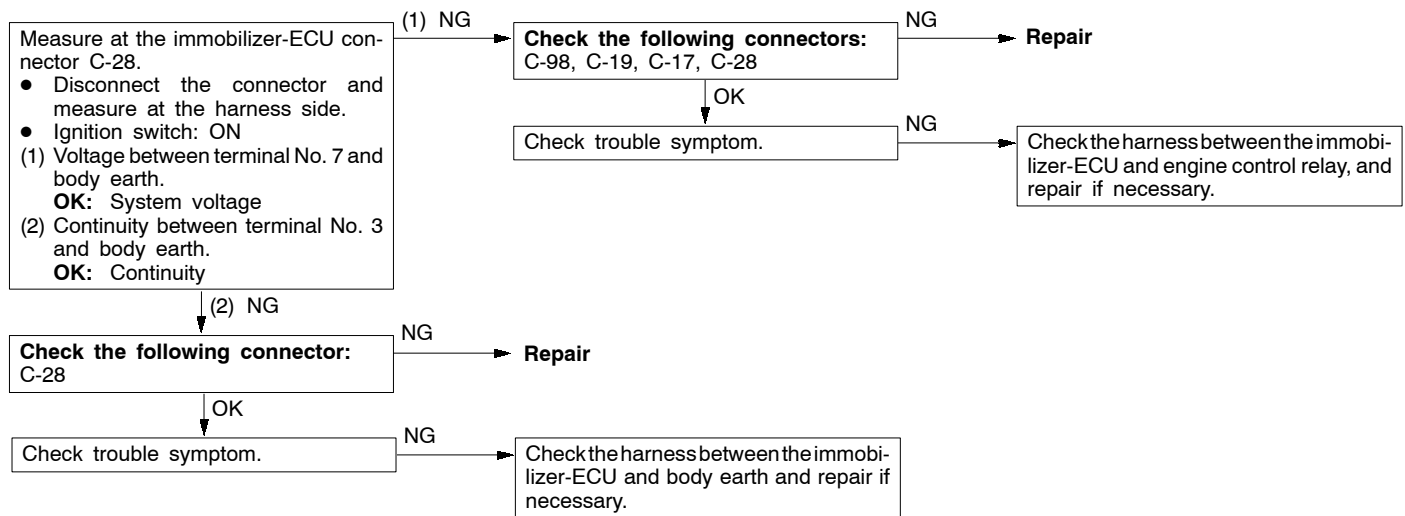
Inspection Procedure 3

Engine does not start (Cranking but no initial combustion).	Probable cause
If no fuel injection, there might be a problem with the fuel injection 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.	<ul style="list-style-type: none"> • Malfunction of diesel fuel injection system • Malfunction of immobilizer-ECU



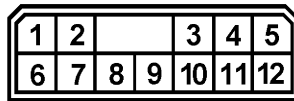
Inspection Procedure 4

Malfunction of the immobilizer-ECU power source and earth circuit



CHECK AT IMMOBILIZER-ECU

Terminal Voltage Check Chart



20F0191

Terminal No.	Signal	Checking requirements	Terminal voltage
3	Immobilizer-ECU earth	Always	0 V
5	Engine-ECU	-	-
7	Immobilizer-ECU power supply	Ignition switch: OFF or approx. 5 or more seconds after switch has been turned from ON to OFF.	0 V
		Ignition switch: ON or within approx. 5 or more seconds after switch has been turned from ON to OFF	System voltage
10	Ignition key ring antenna	-	-
11	Ignition key ring antenna	-	-

NOTES