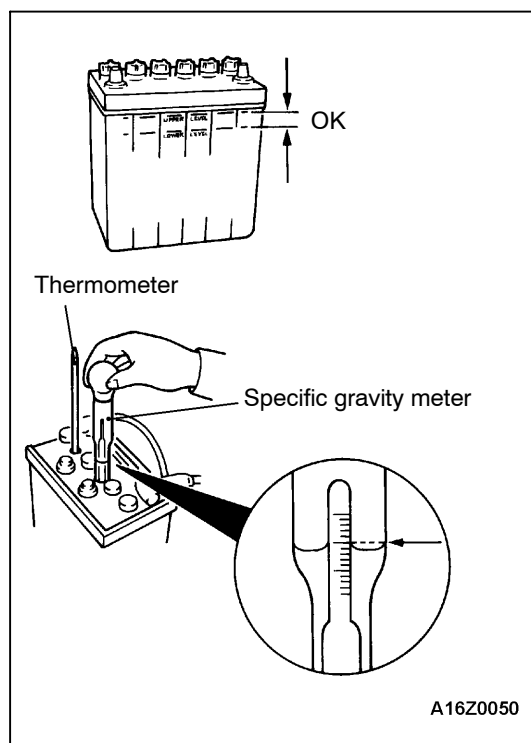


BATTERY

SERVICE SPECIFICATIONS

Item	Standard value
Battery electrolyte specific gravity	1.220 – 1.290 (electrolyte temperature 20°C)



ON-VEHICLE SERVICE

ELECTROLYTE LEVEL AND SPECIFIC GRAVITY CHECK

1. Check that the battery electrolyte level is between the UPPER LEVEL and LOWER LEVEL indications.

Caution

- (1) If the battery is used with the electrolyte level below the LOWER LEVEL indicator, there is the danger that explosions may occur, so add water to the battery until the electrolyte level is between the LOWER LEVEL and UPPER LEVEL indications.
- (2) If too much water is added to make the level rise above the UPPER LEVEL indication, the electrolyte may leak out, so adjust so that the electrolyte level is between the LOWER LEVEL and UPPER LEVEL indications.
2. Use a specific gravity meter and a thermometer to measure the specific gravity.

Standard value:

1.220 – 1.290 (electrolyte temperature 20°C)

The specific gravity of the battery electrolyte changes according to the temperature, so the specific gravity when the electrolyte is at a temperature of 20 °C can be calculated using the following formula.

Use the converted value to judge whether the electrolyte is okay or not.

$$D_{20} = (t-20) \times 0.0007 + Dt$$

D_{20} : Specific gravity converted to a value for electrolyte temperature of 20°C.

t : Electrolyte temperature at the time of measurement

Dt : Actual specific gravity

CHARGING

1. Remove the battery from the vehicle.
2. The normal charging current is a value in amperes which is 1/10th of the battery capacity. If the battery needs to be charged rapidly because of reasons such as time limitations, the maximum charging current for rapid charging is the battery capacity expressed as an ampere value.

Battery type	Capacity (5-hour rate)	Normal charging current	Rapid charging current
75D23	54 A	5.4 A	54 A
80D26	58 A	5.8 A	58 A
95D31	70 A	7.0 A	70 A

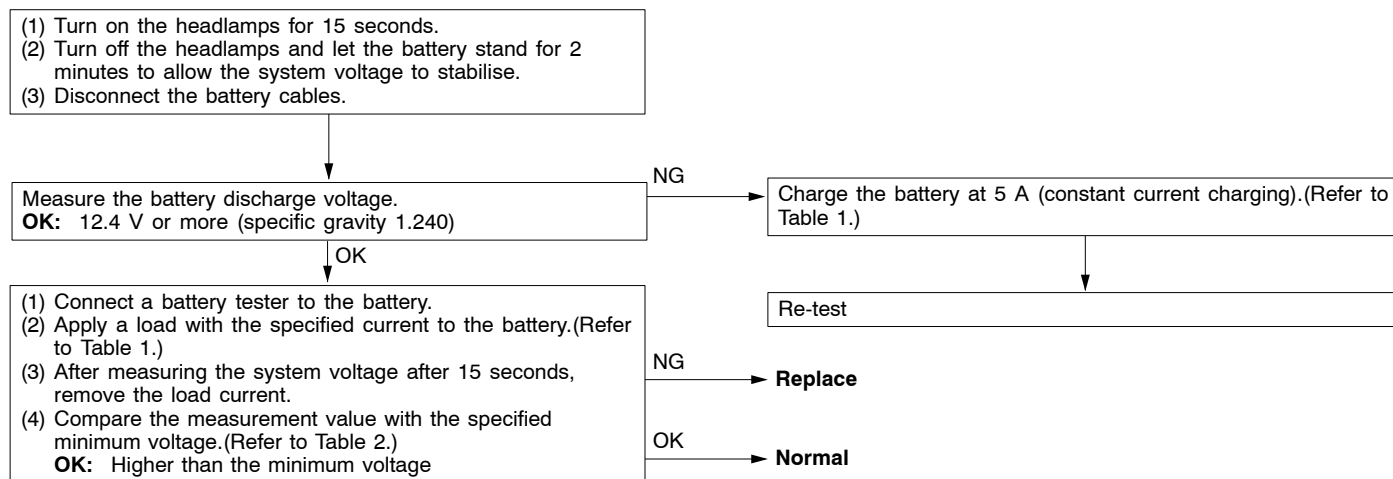
3. Determine when charging is finished.
 - When the specific gravity of the battery electrolyte is constantly within 1.250 – 1.290 for a continuous period of one hour or more
 - When the voltage per cell during charging is 2.5 – 2.8 V constantly for a continuous period of one hour or more

Caution

1. **The battery plugs should be removed during charging.**
2. **The battery electrolyte level may rise and overflow from the battery during charging.**
3. **Explosions may occur if the battery is brought close to naked flames during charging.**
4. **Be careful to avoid tasks that might produce sparks or other danger while the battery is charging.**
5. **After charging is complete, replace the battery plugs, pour water over the battery to rinse away any sulphuric acid, and let the battery stand to dry.**
6. **Charge the battery in a well-ventilated location.**
7. **Do not let the battery electrolyte temperature rise above approximately 45°C (approximately 55°C during rapid charging).**

BATTERY TEST

Test procedure



(Table 1)

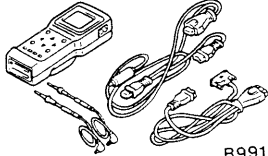
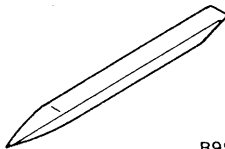
Battery type	75D23	80D26	95D31
Charging time when fully discharged [5 A constant current charging] (H)	11	12	14
Load current (A)	260	281	311

(Table 2)

Outside air temperature (°C)	21 or more	16 – 20	10 – 15	4 – 9	–1 – 3	–1 – –1	–12 – –1	–18 – –13
Minimum voltage (V)	9.6	9.5	9.4	9.3	9.1	8.9	8.7	8.5

IGNITION SWITCH AND IMMOBILIZER <PETROL>

SPECIAL TOOLS

Tools	No.	Name	Application
 B991502	MB991502	MUT-II Sub assembly	Checking the ETACS-ECU input signals
 B990784	MB990784	Ornament remover	Instrument panel under cover and column cover removal

TROUBLESHOOTING

IGNITION SWITCH

The ignition switch is controlled by the Smart Wiring System (SWS). For troubleshooting procedures, refer to GROUP 54B.

IMMOBILIZER

BASIC FLOW OF PROBLEM DIAGNOSIS

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

DIAGNOSIS FUNCTION

READING DIAGNOSIS CODES

The diagnosis codes can be read using the MUT-II or by using the Simple Check Diagnosis mode. (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points.)

NOTE

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

DIAGNOSIS CODE MEMORY ERASING PROCEDURE

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

INSPECTION USING SIMPLE CHECK DIAGNOSIS MODE

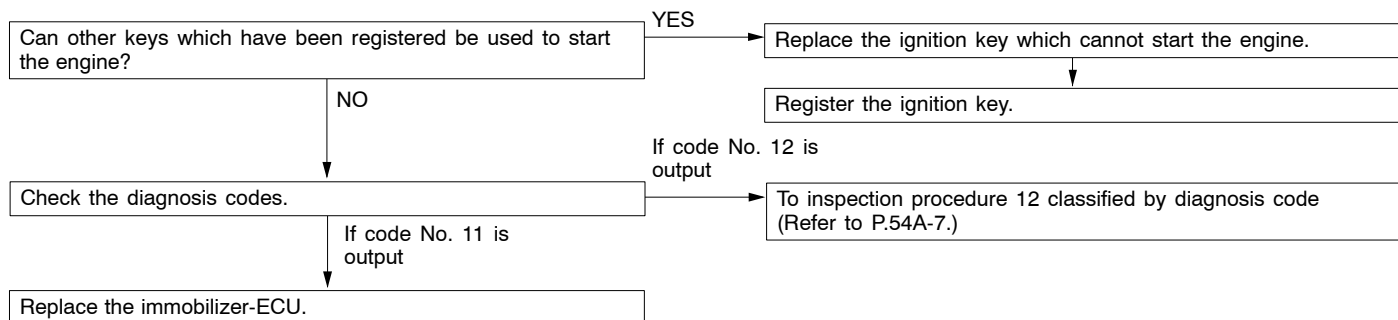
1. Change to Simple Check Diagnosis mode and activate switch diagnosis mode.
(Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points.)
2. In this condition, the input signals for the following switches can be checked.

CHART CLASSIFIED BY DIAGNOSIS CODES

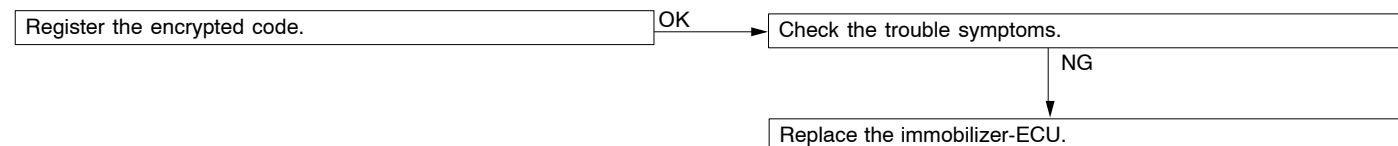
Code No.	Diagnosis contents	Reference page
11	Problem related to communication with the ignition key	54A-7
12	Ignition key is not registered, or encrypted code from ignition key does not match.	54A-7

INSPECTION PROCEDURES FOR EACH DIAGNOSIS CODE

Code No. 11 Problem related to communication with the ignition key	Probable cause
When the ignition switch is at the ON position, the encrypted codes are not transmitted from the ignition key to the immobilizer-ECU.	<ul style="list-style-type: none"> • Malfunction of ignition key • Malfunction of immobilizer-ECU



Code No. 12 Ignition key is not registered, or encrypted code from ignition key does not match.	Probable cause
The ignition key has not been registered with the immobilizer-ECU.	<ul style="list-style-type: none"> • The ignition key has not been registered with the immobilizer-ECU. • Malfunction of immobilizer-ECU



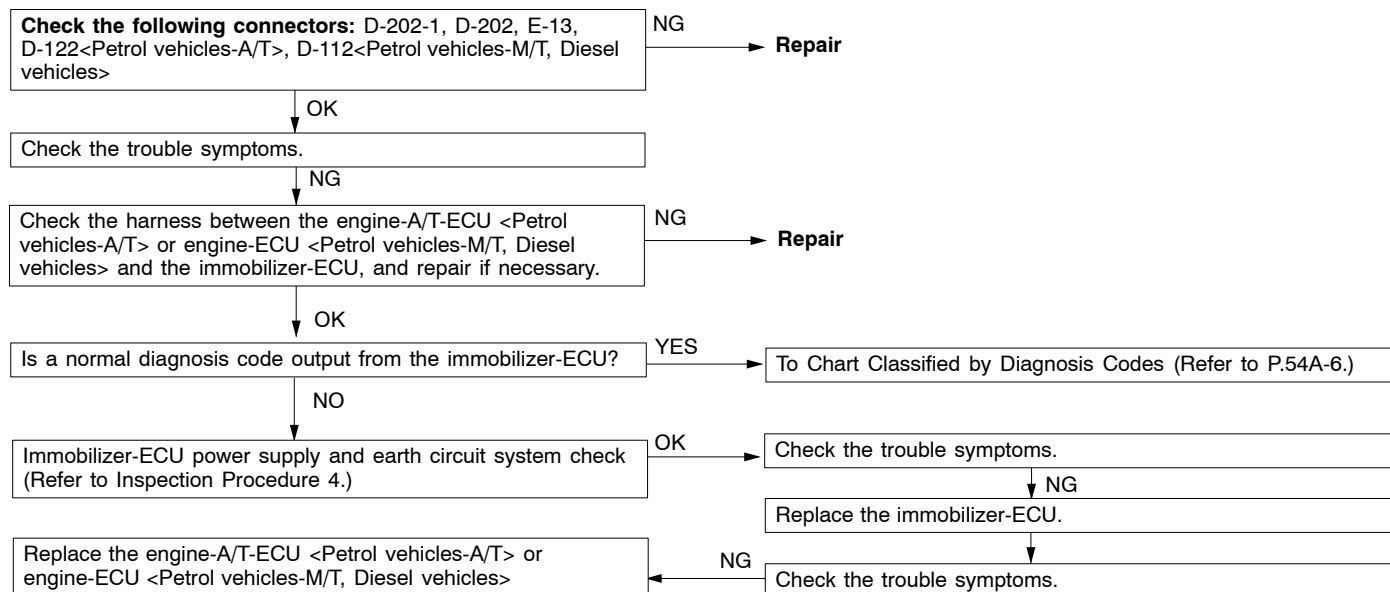
INSPECTION PROCEDURES FOR EACH TROUBLE SYMPTOM

Trouble Symptom	Inspection procedure No.	Reference page
Communication with MUT-II is not possible.	—	GROUP 13B, 13C – Trouble-shooting
Diagnosis code No. 54 is generated by the engine-A/T-ECU <Petrol vehicles-A/T> or by the engine-ECU <Petrol vehicles-M/T, Diesel vehicles>.	1	54A-8
The ignition keys cannot be registered using the MUT-II.	2	54A-9
The engine does not start. (The engine cranks but does not fire.)	3	54A-9
Immobilizer-ECU power supply and earth circuit system check	4	54A-10

INSPECTION PROCEDURES FOR EACH TROUBLE SYMPTOM

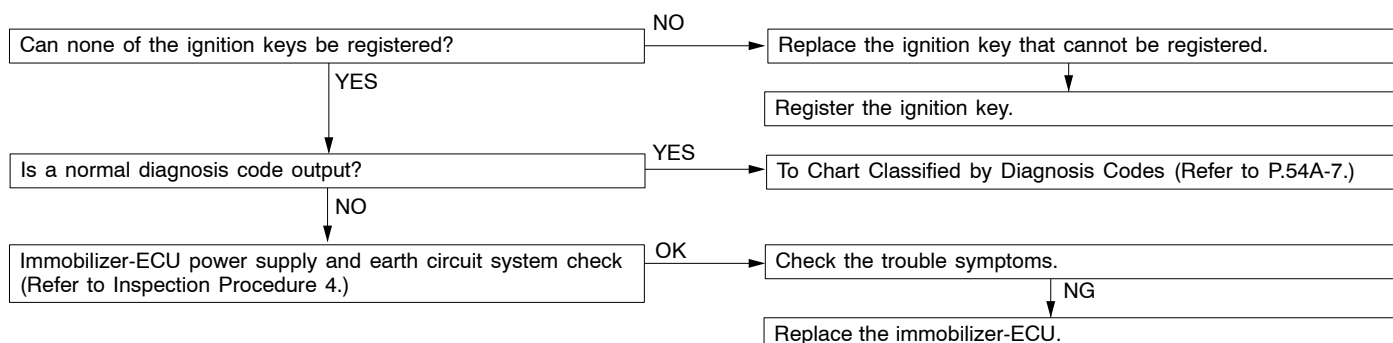
Inspection procedure 1

Diagnosis code No. 54 is generated by the engine-A/T-ECU <Petrol vehicles-A/T> or by the engine-ECU <Petrol vehicles-M/T, Diesel vehicles>.	Probable cause
The cause is probably a problem with communication between the engine-A/T-ECU <Petrol vehicles-A/T> or engine-ECU <Petrol vehicles-M/T, Diesel vehicles> and the immobilizer-ECU.	<ul style="list-style-type: none"> • Malfunction of harness or connector • Malfunction of engine-A/T-ECU <Petrol vehicles-A/T> or engine-ECU <Petrol vehicles-M/T, Diesel vehicles> • Malfunction of immobilizer-ECU • Malfunction of ignition key • The ignition key has not been registered with the immobilizer-ECU.



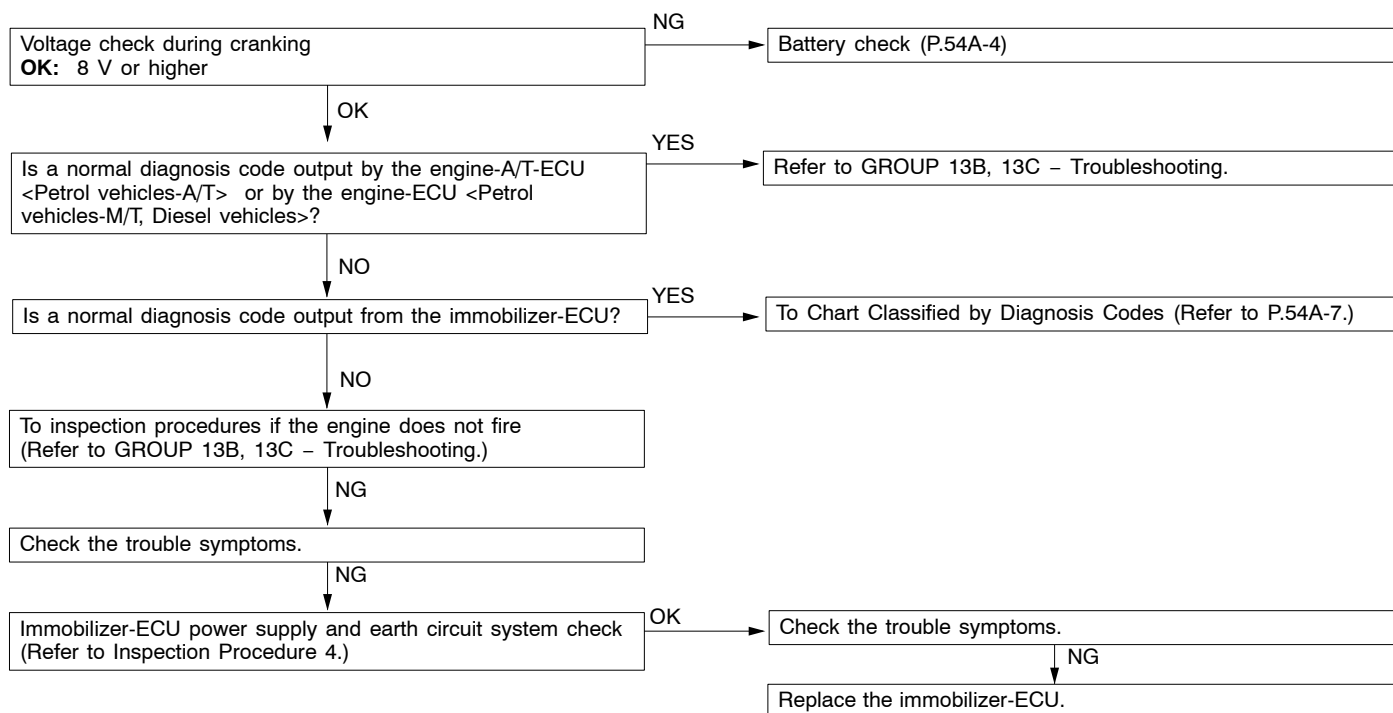
Inspection procedure 2

The ignition keys cannot be registered using the MUT-II.	Probable cause
The ignition key has not been registered with the immobilizer-ECU. Or that there is a problem with the immobilizer-ECU.	<ul style="list-style-type: none"> • Malfunction of ignition key • Malfunction of harness or connector • Malfunction of immobilizer-ECU



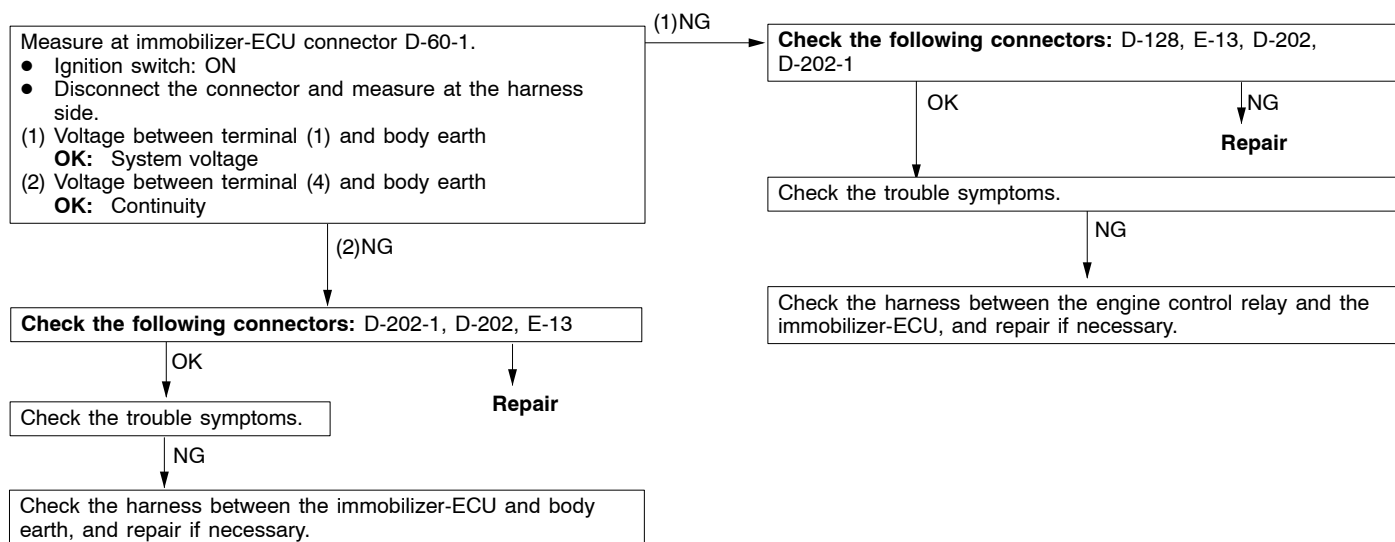
Inspection procedure 3

The engine does not start. (The engine cranks but does not fire.)	Probable cause
If the fuel injection does not operate, the cause is probably a problem with the immobilizer-ECU, or it could also be a problem with the GDI system or the diesel system. If an attempt has been made to start the engine with a key that has not been properly registered, the above symptom is a sign of normal operation.	<ul style="list-style-type: none"> • Malfunction of GDI system or Diesel fuel system • Malfunction of immobilizer-ECU



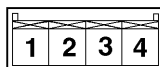
Inspection procedure 4

Immobilizer-ECU power supply and earth circuit system check



IMMOBILIZER-ECU CHECK

TERMINAL VOLTAGE CHECK TABLE

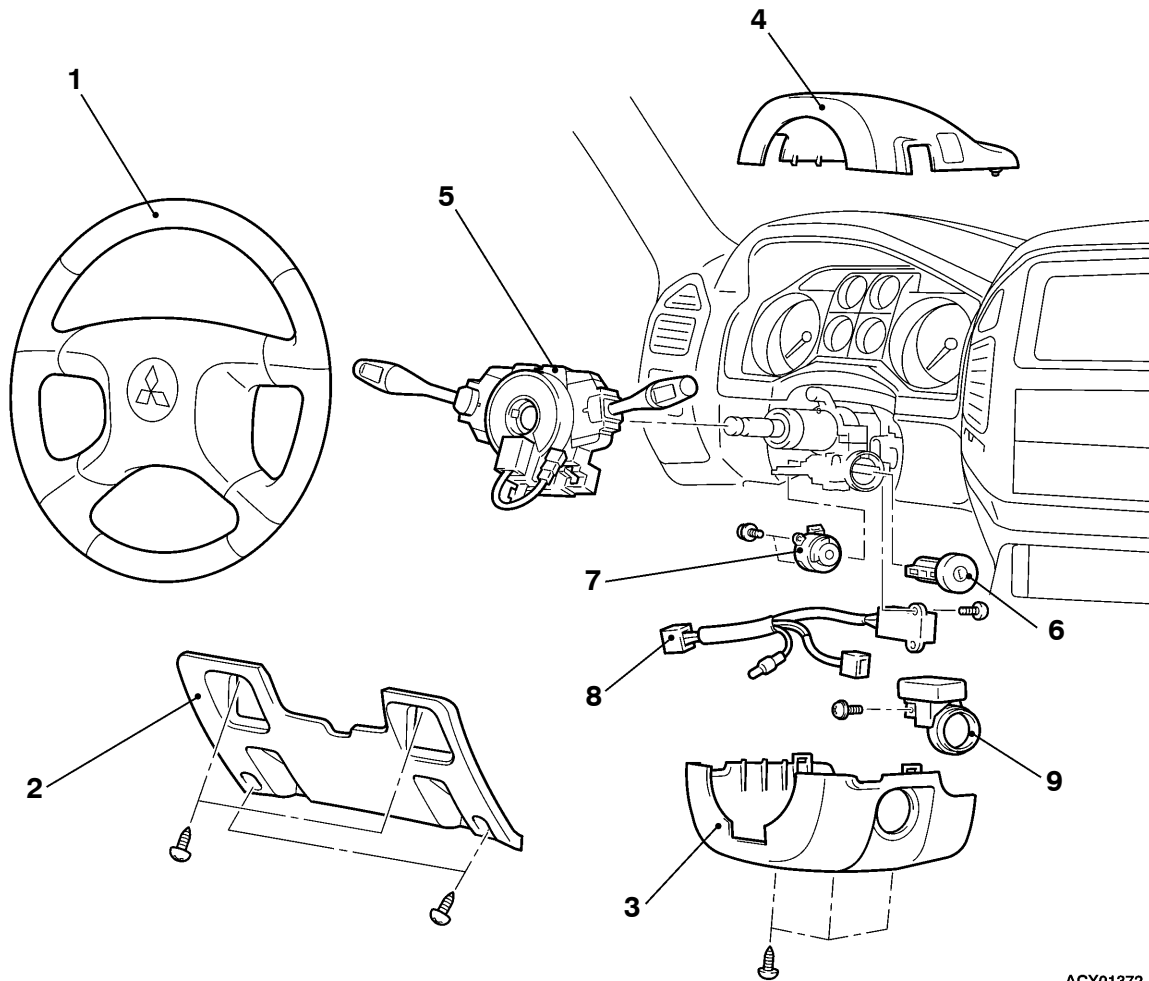


X1185CA

Terminal No.	Signal	Inspection conditions	Terminal voltage
1	Immobilizer-ECU power supply	Ignition switch: ON	System voltage
2	-	-	-
3	Engine-A/T-ECU <Petrol vehicles-A/T>, engine-ECU <Petrol vehicles-M/T, Diesel vehicles>	-	-
4	Immobilizer-ECU earth	At all times	0V

IGNITION SWITCH AND IMMOBILIZER-ECU

REMOVAL AND INSTALLATION

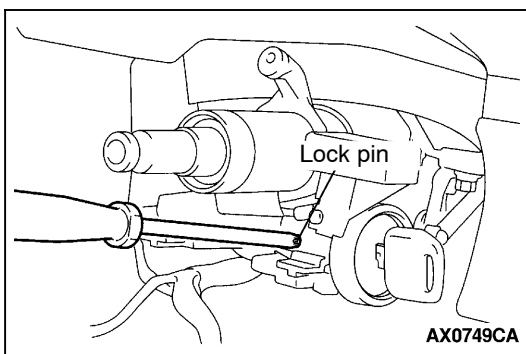


Removal steps

1. Steering wheel
(Refer to GROUP 37A.)
2. Instrument panel under cover
(Refer to GROUP 52A – Instrument Panel.)
3. Lower column cover (Refer to GROUP 52A – Instrument Panel.)



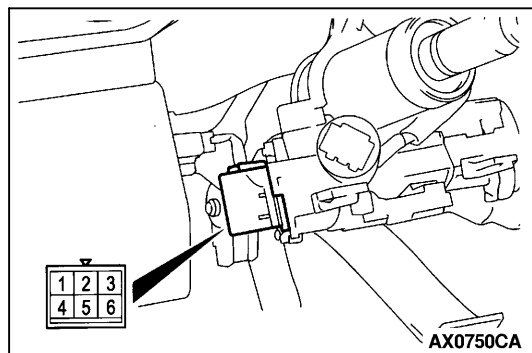
4. Upper column cover (Refer to GROUP 52A – Instrument Panel.)
5. Column Switch
6. Steering lock cylinder
7. Ignition switch
8. Key Reminder Switch
9. Immobilizer-ECU



REMOVAL SERVICE POINTS

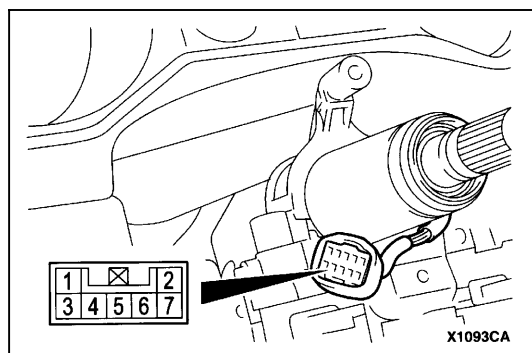
◀▶ STEERING LOCK CYLINDER REMOVAL

1. Insert the key into the steering lock cylinder, and then turn the ignition switch to the ACC position.
2. While using a Phillips screwdriver (small) or similar tool to push the lock pin, remove the steering lock cylinder.

**INSPECTION****IGNITION SWITCH CONTINUITY CHECK**

With the ignition switch installed to the vehicle, disconnect and check the ignition switch connector.

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

**KEY REMINDER SWITCH CONTINUITY CHECK**

With the key reminder switch installed to the vehicle, disconnect and check the key reminder switch connector.

Ignition key condition	Terminal No.	
	4	6
Removed	○	○
Inserted		

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

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

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

NOTE

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

Each engine-ECU has an individual information for immobilizer-ECU, and the individual information is registered in the immobilizer-ECU.

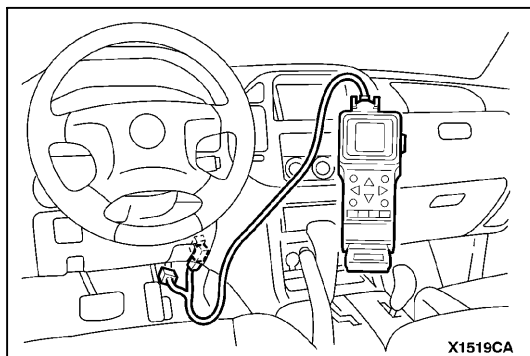
ENCRYPTED CODE REGISTRATION METHOD

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

Moreover, when the immobilizer-ECU has been replaced, you will need to use the MUT-II to register the password that the user specifies into the immobilizer-ECU. (Refer to the MUT-II instruction manual for instructions on using the MUT-II.)

Caution

Because registering of the encrypted codes is carried out after all 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.

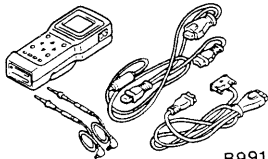
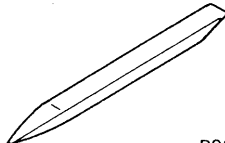
Caution

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

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

IGNITION SWITCH AND IMMOBILIZER <DIESEL>

SPECIAL TOOLS

Tools	No.	Name	Application
 B991502	MB991502	MUT-II sub as- sembly	Checking the ETACS-ECU input signals
 B990784	MB990784	Ornament remov- er	Instrument panel under cover and column cover removal

TROUBLESHOOTING

IGNITION SWITCH

The ignition switch is controlled by the Smart Wiring System (SWS). For troubleshooting procedures, refer to GROUP 54B.

IMMOBILIZER

BASIC FLOW OF PROBLEM DIAGNOSIS

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

DIAGNOSIS FUNCTION

READING DIAGNOSIS CODES

The diagnosis codes can be read using the MUT-II or by using the Simple Check Diagnosis mode. (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points.)

NOTE

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

DIAGNOSIS CODE MEMORY ERASING PROCEDURE

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

INSPECTION USING SIMPLE CHECK DIAGNOSIS MODE

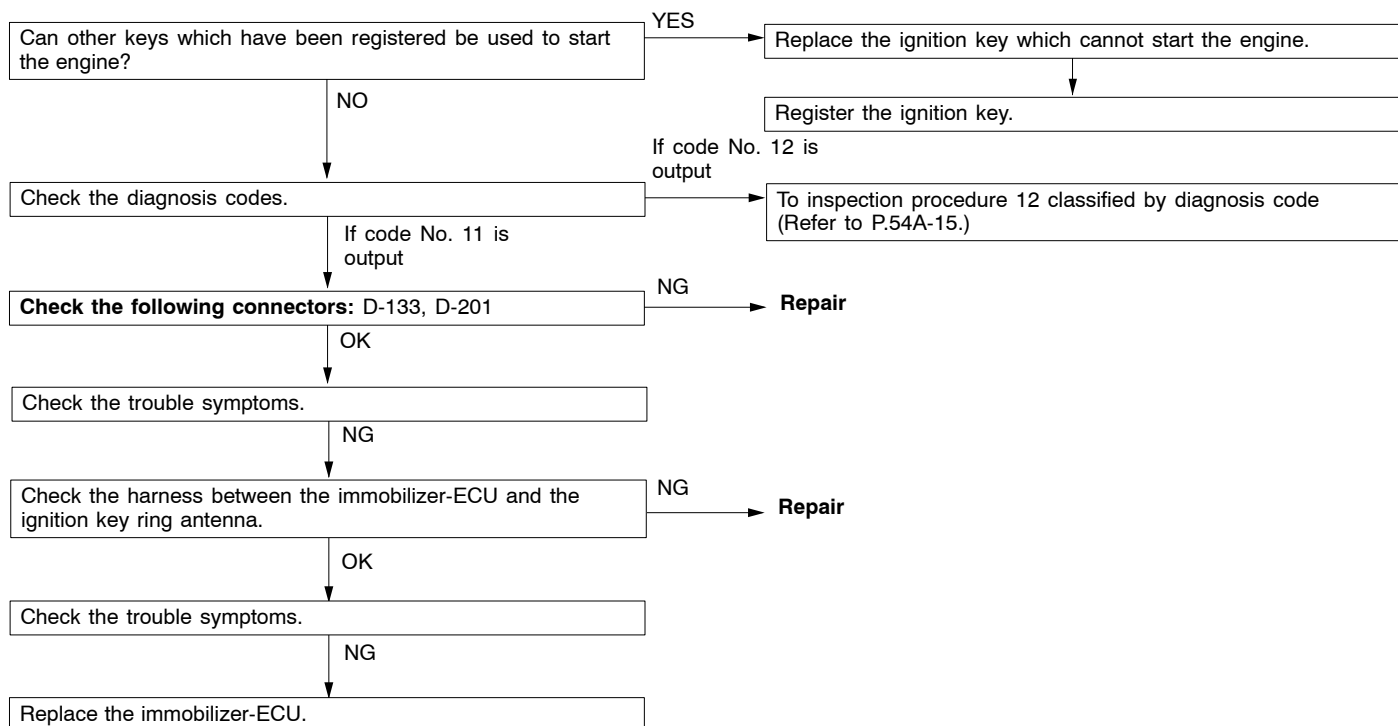
1. Change to Simple Check Diagnosis mode and activate switch diagnosis mode. (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points.)
2. In this condition, the input signals for the following switches can be checked.

CHART CLASSIFIED BY DIAGNOSIS CODES

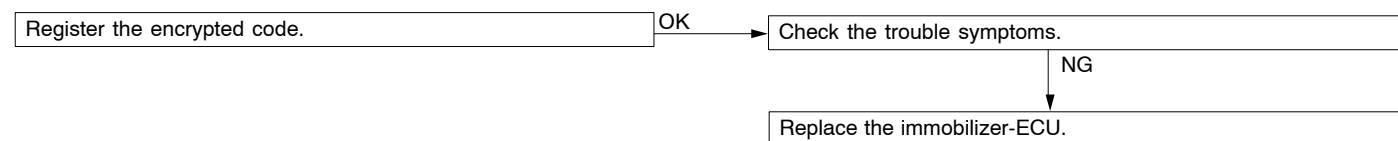
Code No.	Diagnosis contents	Reference page
11	Problem related to communication with the ignition key	54A-15
12	Ignition key is not registered, or encrypted code from ignition key does not match.	54A-15

INSPECTION PROCEDURES FOR EACH DIAGNOSIS CODE

Code No. 11 Problem related to communication with the ignition key	Probable cause
When the ignition switch is at the ON position, the encrypted codes are not transmitted from the ignition key to the immobilizer-ECU.	<ul style="list-style-type: none"> • Malfunction of ignition key • Malfunction of immobilizer-ECU • Malfunction of harness or connector



Code No. 12 Ignition key is not registered, or encrypted code from ignition key does not match.	Probable cause
The ignition key has not been registered with the immobilizer-ECU.	<ul style="list-style-type: none"> • The ignition key has not been registered with the immobilizer-ECU. • Malfunction of immobilizer-ECU

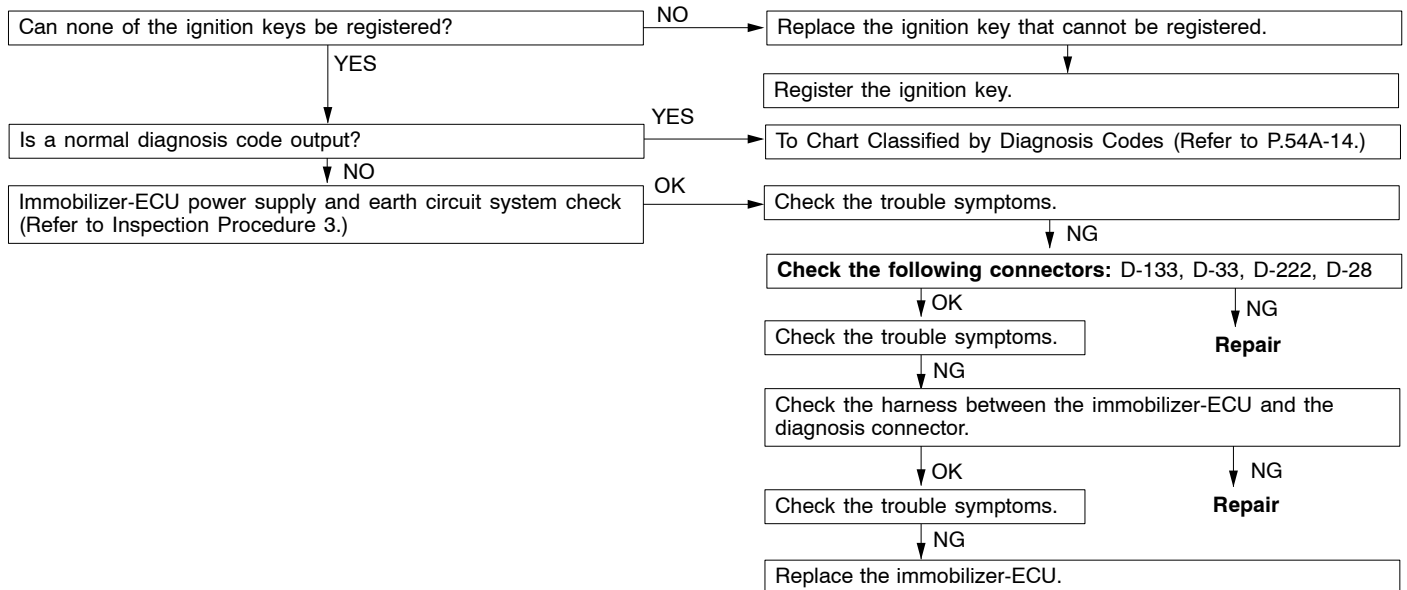


INSPECTION PROCEDURES FOR EACH TROUBLE SYMPTOM

Trouble Symptom	Inspection procedure No.	Reference page
Communication with MUT-II is not possible.	—	GROUP 13B, 13C – Trouble-shooting
The ignition keys cannot be registered using the MUT-II.	1	54A-16
The engine does not start.(The engine cranks but does not fire.)	2	54A-17
Immobilizer-ECU power supply and earth circuit system check	3	54A-18

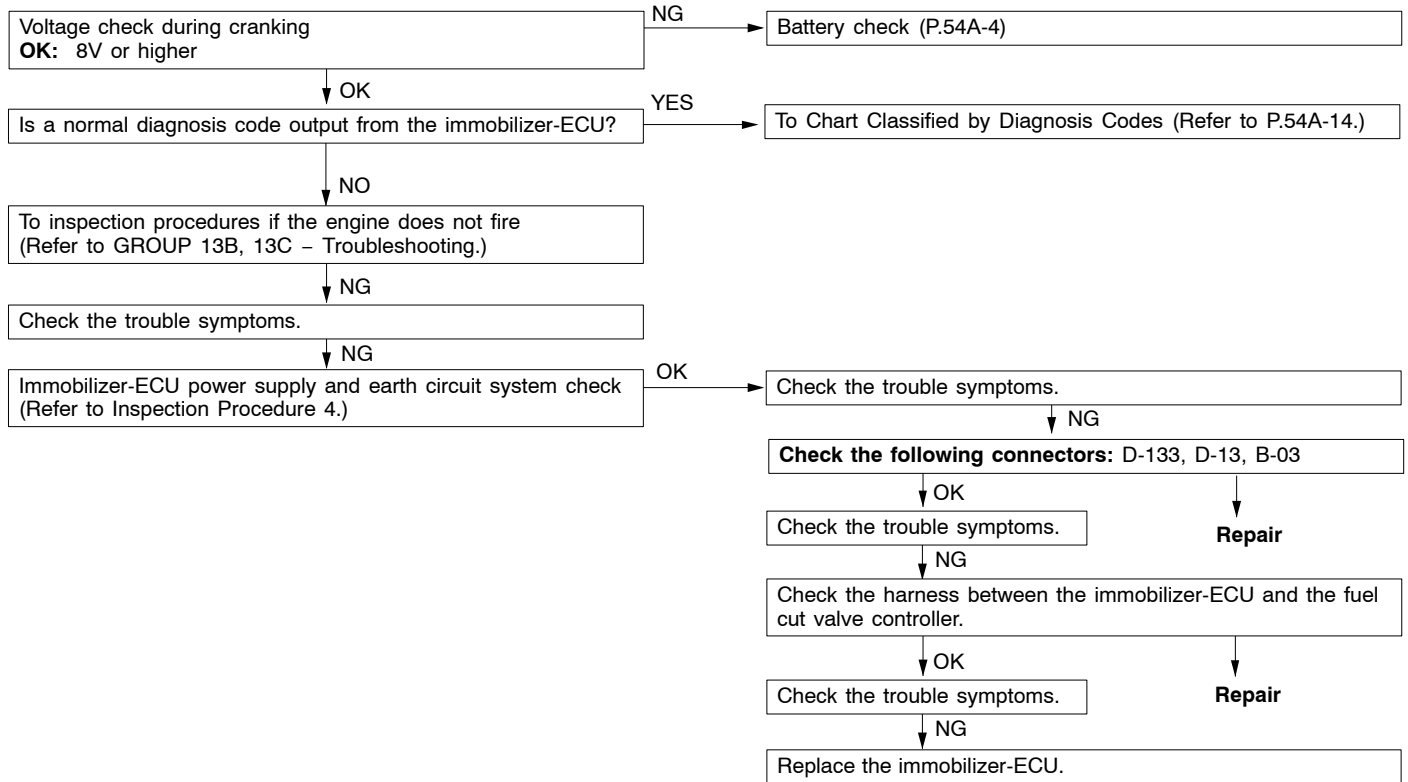
INSPECTION PROCEDURES FOR EACH TROUBLE SYMPTOM**Inspection procedure 1**

The ignition keys cannot be registered using the MUT-II.	Probable cause
The ignition key has not been registered with the immobilizer-ECU. Or that there is a problem with the immobilizer-ECU.	<ul style="list-style-type: none"> • Malfunction of ignition key • Malfunction of harness or connector • Malfunction of immobilizer-ECU



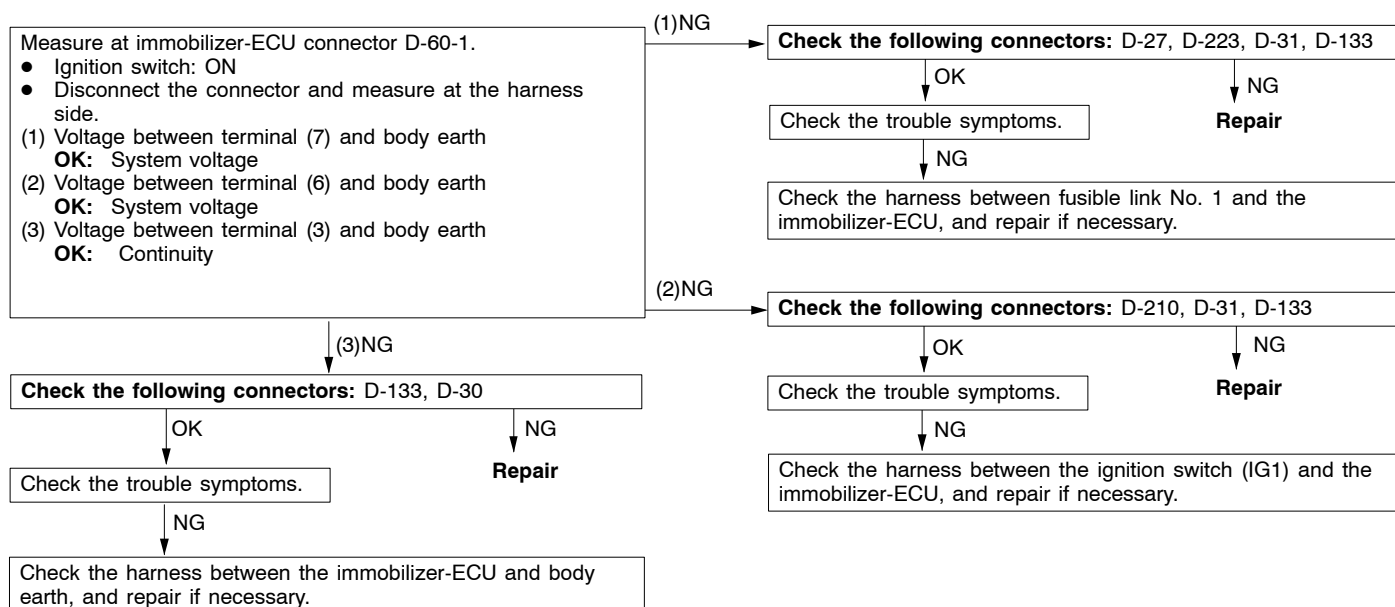
Inspection procedure 2

The engine does not start. (The engine cranks but does not fire.)	Probable cause
If the fuel injection does not operate, the cause is probably a problem with the immobilizer-ECU, or it could also be a problem with the Diesel fuel system. If an attempt has been made to start the engine with a key that has not been properly registered, the above symptom is a sign of normal operation.	<ul style="list-style-type: none"> • Malfunction of Diesel fuel system • Malfunction of immobilizer-ECU



Inspection procedure 3

Immobilizer-ECU power supply and earth circuit system check



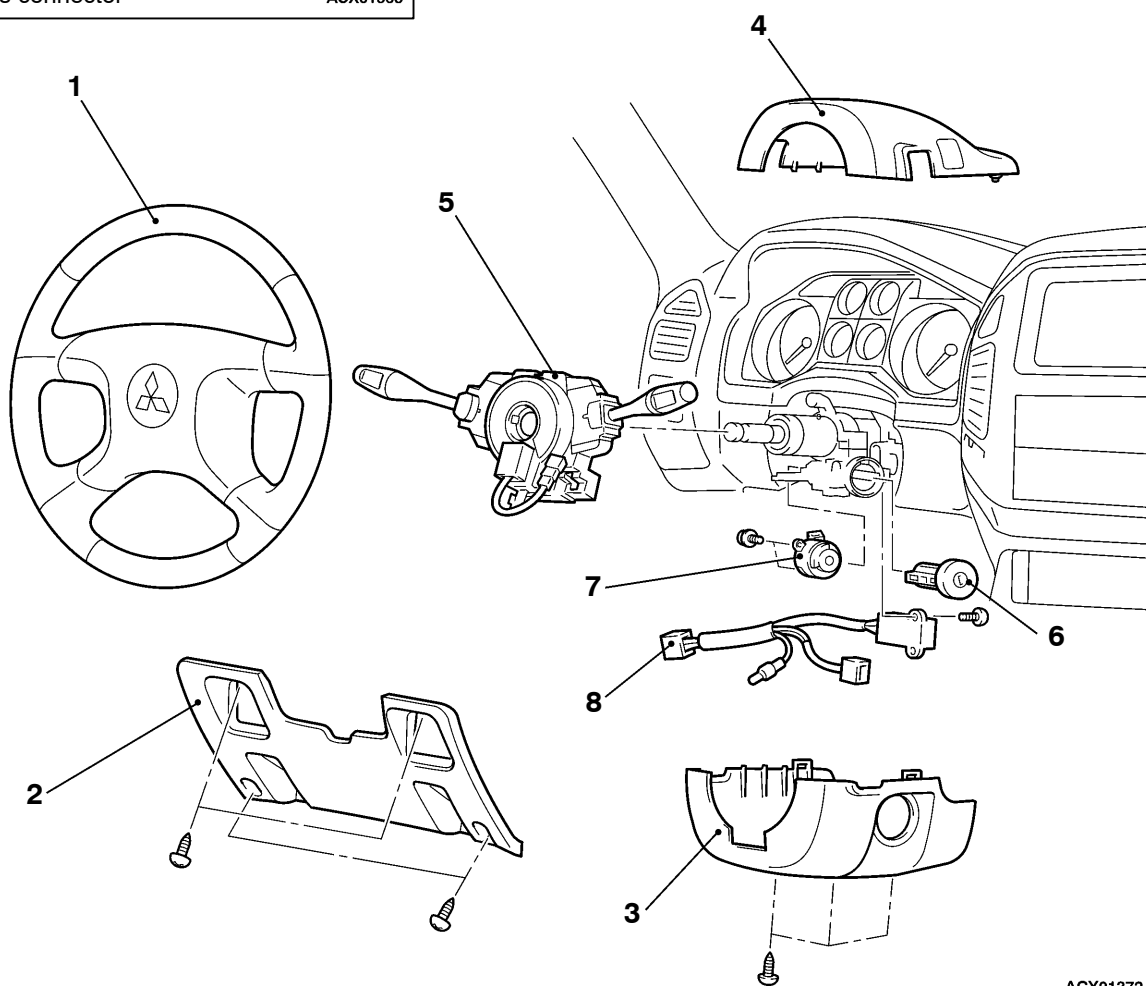
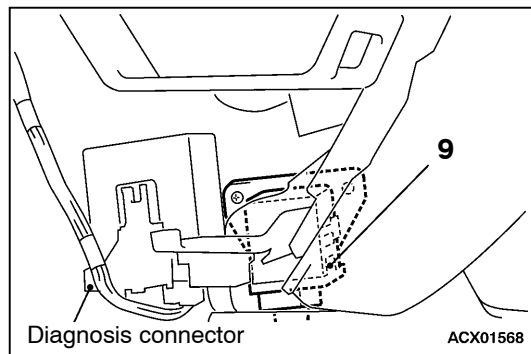
IMMOBILIZER-ECU CHECK

TERMINAL VOLTAGE CHECK TABLE

1	2			3	4	5
6	7	8	9	10	11	12

ACX01564 AB

Terminal No.	Signal	Inspection conditions	Terminal voltage
1	Diagnosis connector	–	–
2	–	–	–
3	Immobilizer-ECU earth	Always	0 V
4	–	–	–
5	Engine-ECU	–	–
6	Ignition switch (IG1) power supply	Ignition switch : ON	System voltage
7	Immobilizer-ECU power supply	Always	System voltage
8, 9	–	–	–
10	Ignition key ring antenna	–	–
11	Ignition key ring antenna	–	–
12	Diagnosis connector	–	–

IGNITION SWITCH AND IMMOBILIZER-ECU**REMOVAL AND INSTALLATION**

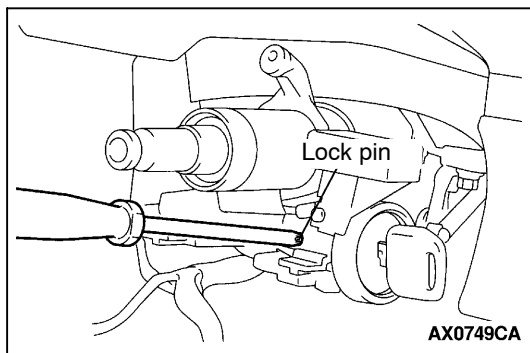
ACX01372

Removal steps

1. Steering wheel
(Refer to GROUP 37A.)
2. Instrument panel under cover
(Refer to GROUP 52A – Instrument Panel.)
3. Lower column cover (Refer to GROUP 52A – Instrument Panel.)



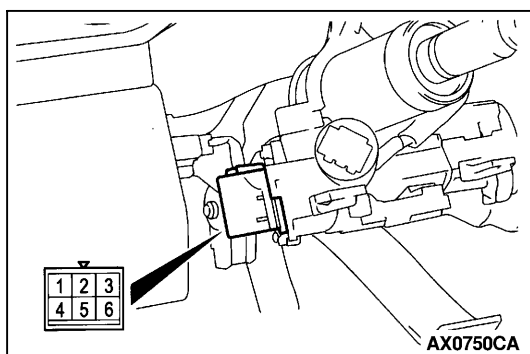
4. Upper column cover (Refer to GROUP 52A – Instrument Panel.)
5. Column Switch
6. Steering lock cylinder
7. Ignition switch
8. Key Reminder Switch
9. Immobilizer-ECU



REMOVAL SERVICE POINTS

◀A▶ STEERING LOCK CYLINDER REMOVAL

1. Insert the key into the steering lock cylinder, and then turn the ignition switch to the ACC position.
2. While using a Phillips screwdriver (small) or similar tool to push the lock pin, remove the steering lock cylinder.

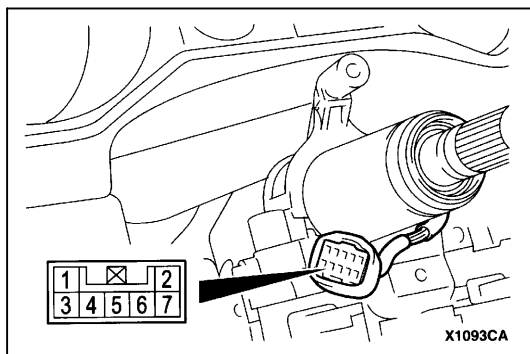


INSPECTION

IGNITION SWITCH CONTINUITY CHECK

With the ignition switch installed to the vehicle, disconnect and check the ignition switch connector.

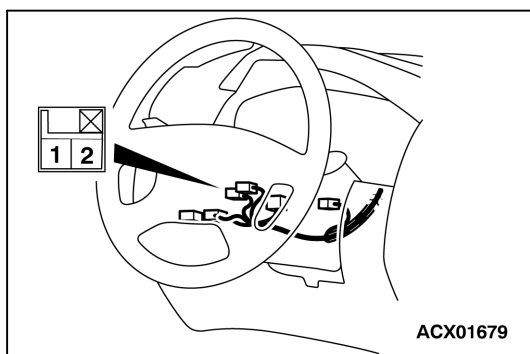
Ignition switch position	Terminal No.				
	1	2	4	5	6
LOCK					
ACC		○			○
ON		○	○	○	○
START		○	○	○	



KEY REMINDER SWITCH CONTINUITY CHECK

With the key reminder switch installed to the vehicle, disconnect and check the key reminder switch connector.

Ignition key condition	Terminal No.	
	4	6
Removed	○	○
Inserted		



IGNITION KEY RING ANTENNA CONTINUITY CHECK

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

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

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

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

NOTE

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

Each engine-ECU has an individual information for immobilizer-ECU, and the individual information is registered in the immobilizer-ECU.

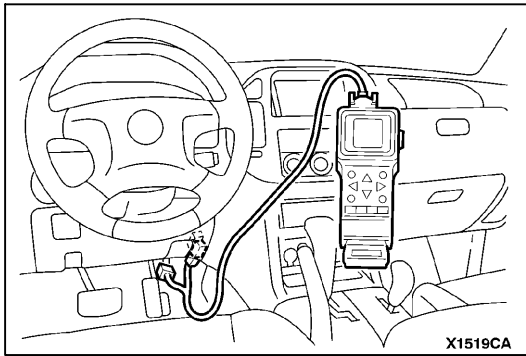
ENCRYPTED CODE REGISTRATION METHOD

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

Moreover, when the immobilizer-ECU has been replaced, you will need to use the MUT-II to register the password that the user specifies into the immobilizer-ECU. (Refer to the MUT-II instruction manual for instructions on using the MUT-II.)

Caution

Because registering of the encrypted codes is carried out after all 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 the ignition switch to LOCK (OFF) position before connecting or disconnecting the MUT-II.

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

COMBINATION METER

SERVICE SPECIFICATIONS

Item			Standard value	Limit
Speedometer indication range km/h	At 20 km/h		18 – 23	—
	At 40 km/h		37 – 45	—
	At 80 km/h		75 – 88	—
	At 120 km/h		113 – 132	—
	At 160 km/h		150 – 176	—
Speedometer needle swing km/h (when driving at 35 km/h or higher)			—	± 3
Tachometer indication error r/min	When engine speed is 700 r/min		± 120	—
	When engine speed is 2,000 r/min	Petrol	–175+225	—
		Diesel	± 175	—
	When engine speed is 3,000 r/min	Petrol	–175+300	—
		Diesel	± 225	—
	When engine speed is 4,000 r/min	Petrol	-225+375	—
		Diesel	± 300	—
	When engine speed is 4,750 r/min <Diesel vehicles>		± 260	—
	When engine speed is 5,000 r/min <Petrol vehicles>		–225+425	—
When engine speed is 6,000 r/min <Petrol vehicles>		–225+475	—	
Fuel gauge unit standard resistance value Ω	F position		3	—
	E position		110	—
Fuel gauge unit float height mm	F position		11.9	—
	E position		195.2	—
Engine coolant temperature gauge unit standard resistance value Ω			104 ± 13.5	—
Combination meter internal resistance value Ω (Measured at connector D-38 and connector D-40)	62 – 11 (IG power supply – earth)		1MΩ or more	—
	62 – 25 (IG power supply – earth)		1MΩ or more	—
	62 – 63 (IG power supply – fuel gauge)		1MΩ or more	—
	62 – 64 (IG power supply – engine coolant temperature gauge)		1MΩ or more	—
	63 – 11 (fuel gauge – earth)		180	—
	63 – 25 (fuel gauge – earth)		180	—
	64 – 11 (engine coolant temperature gauge – earth)		210	—
	64 – 25 (engine coolant temperature gauge – earth)		210	—
	67 – 11 (battery power supply – earth)		1MΩ or more	—
	67 – 25 (battery power supply – earth)		1MΩ or more	—
	67 – 63 (battery power supply – fuel gauge)		1MΩ or more	—
	67 – 64 (battery power supply – engine coolant temperature gauge)		1MΩ or more	—

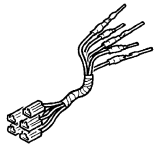
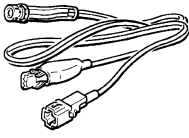
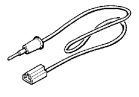

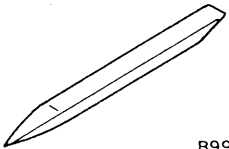
SEALANTS

Usage location	Brand
Engine coolant temperature gauge unit	Semi-drying sealant: Threebond 1104 [0110207], Threebond 1141E (Manufactured by Threebond)

NOTE

Numbers in [] indicate genuine parts numbers.

SPECIAL TOOLS

Tools	No.	Name	Application
<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: Check harness</p> <p>B: LED harness</p> <p>C: LED harness adapter</p> <p>D: Probe</p>	<p>Fuel gauge simple checking</p> <p>Engine coolant temperature gauge simple checking</p> <p>A: For checking connector pin contact pressure</p> <p>B: For checking the power supply</p> <p>C: For checking the power supply</p> <p>D: For checking the power supply circuit</p>
 <p>B990784</p>	MB990784	Ornament remover	Meter bezel removal

TROUBLESHOOTING

DIAGNOSIS FUNCTION

Input signal check procedure

1. Connect the MUT-II or a voltage meter to the diagnosis connector, and check the input.(Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points.)
2. The vehicle speed sensor input signal can be checked.

NOTE

If the vehicle speed sensor input signal cannot be checked using the MUT-II, the cause is probably a malfunction of the diagnosis circuit system.

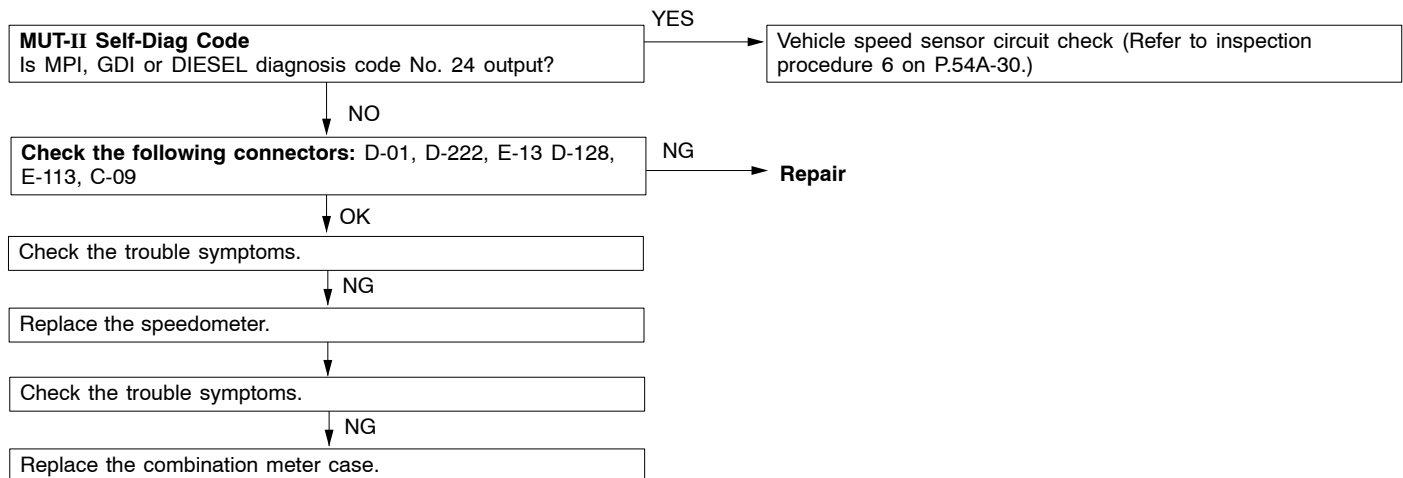
CHART CLASSIFIED BY TROUBLE SYMPTOMS

Trouble Symptom	Inspection No.	procedure	Reference page
Speedometer does not operate.(Other meters and gauges operate.)	1		54A-25
Tachometer does not operate.(Other meters and gauges operate.)	2		54A-26
Fuel gauge does not operate.(Other meters and gauges operate.)	3		54A-27
Engine coolant temperature gauge does not operate. (Other meters and gauges operate.)	4		54A-28
None of the meters and gauges operate.	5		54A-30
Vehicle speed sensor check	6		54A-30

INSPECTION PROCEDURES FOR EACH TROUBLE SYMPTOM

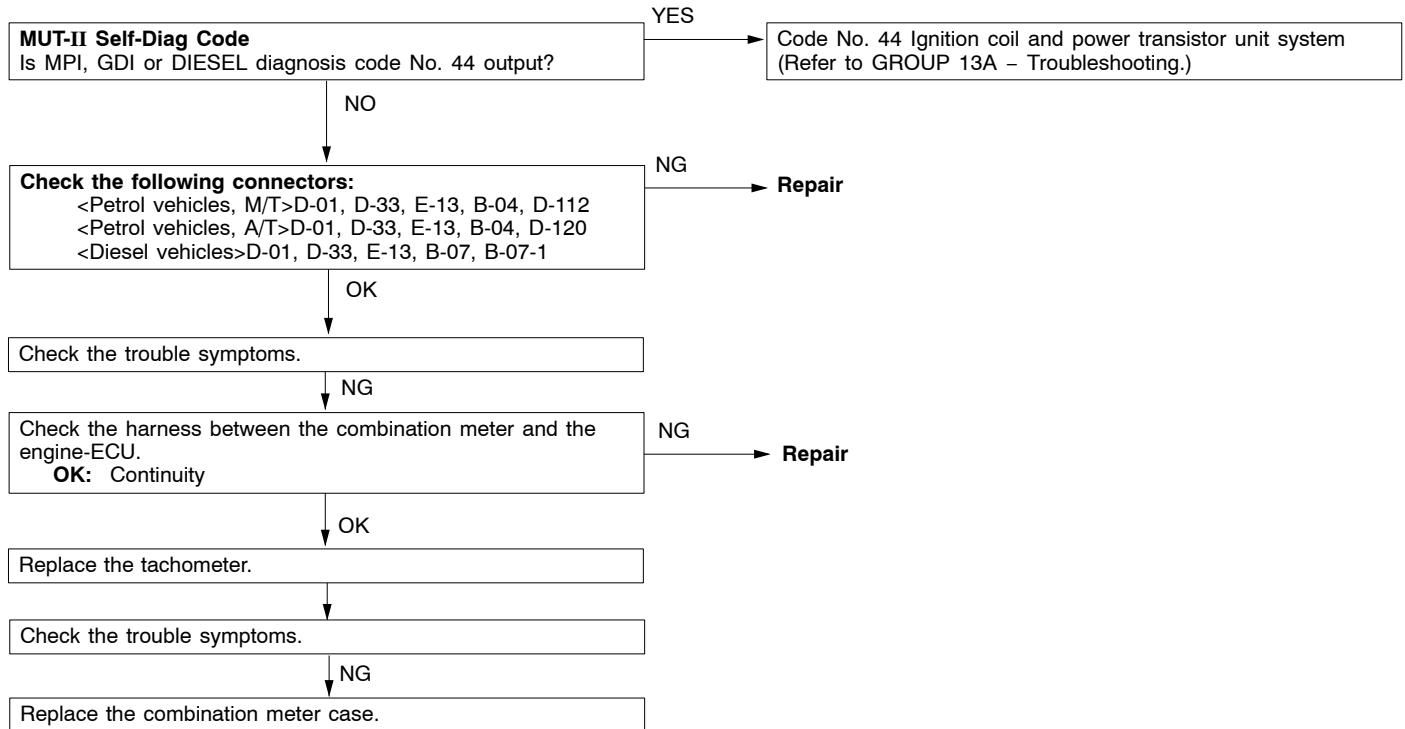
Inspection procedure 1

Speedometer does not operate.(Other meters and gauges operate.)	Probable cause
The cause is probably a malfunction of the vehicle speed sensor input system.	<ul style="list-style-type: none"> • Malfunction of vehicle speed sensor • Malfunction of harness or connector • Malfunction of speedometer • Malfunction of printed circuit board



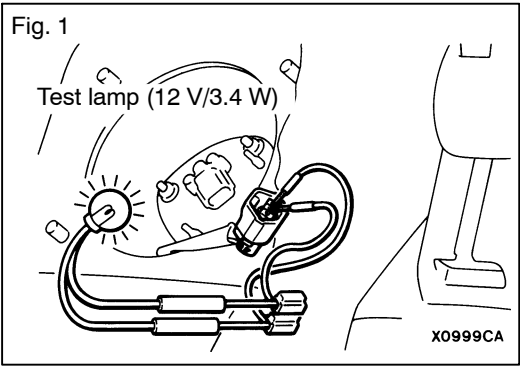
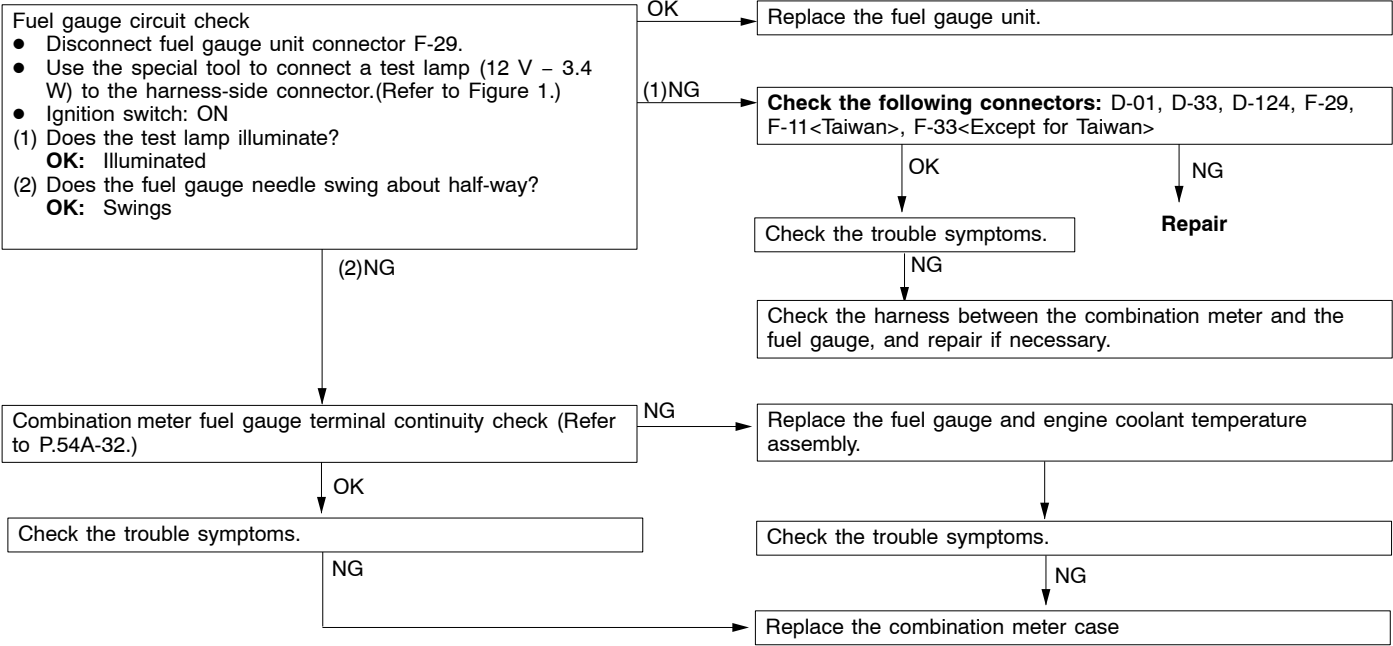
Inspection procedure 2

Tachometer does not operate. (Other meters and gauges operate.)	Probable cause
The cause is probably that the ignition signal is not being input from the engine, or that there is a malfunction of the meter power supply or earth circuit.	<ul style="list-style-type: none"> • Malfunction of tachometer • Malfunction of harness or connector • Malfunction of printed circuit board



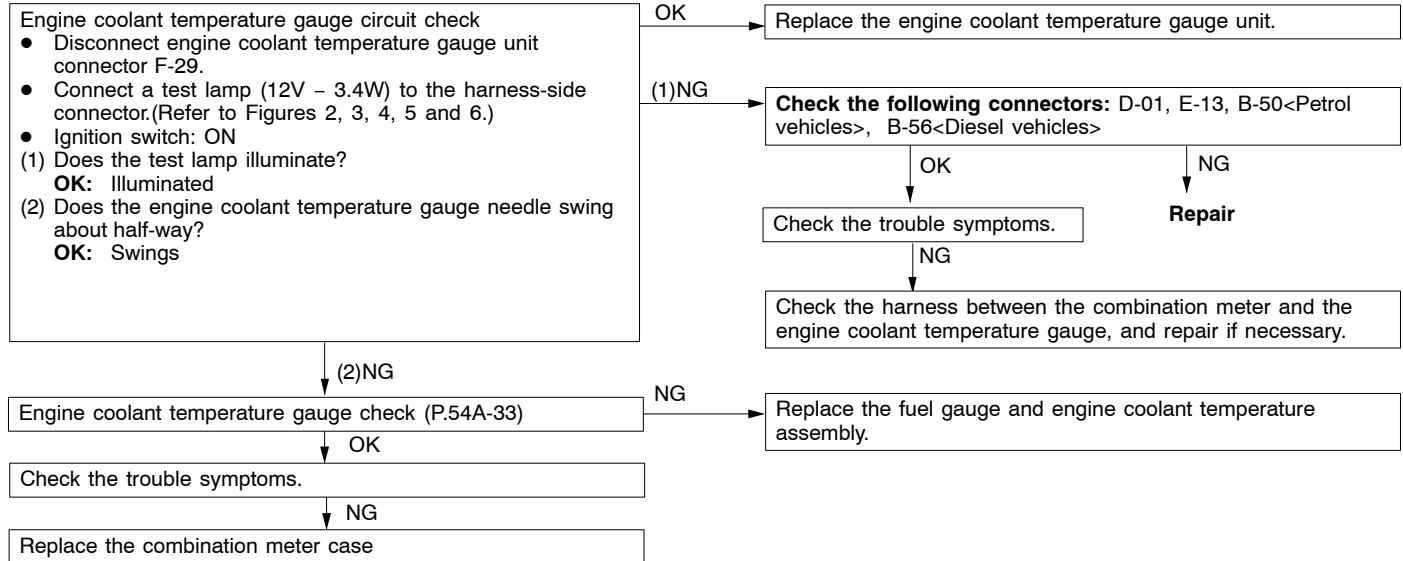
Inspection procedure 3

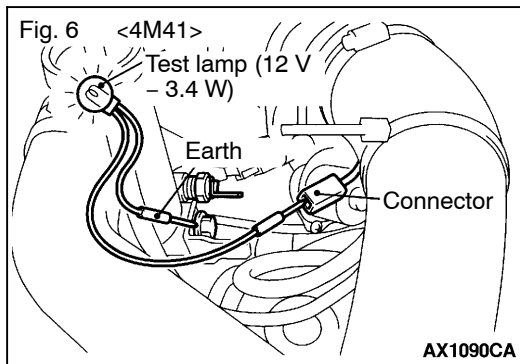
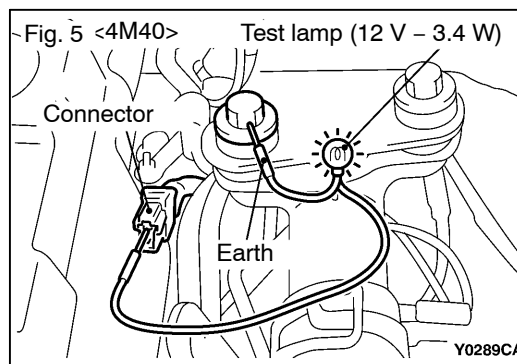
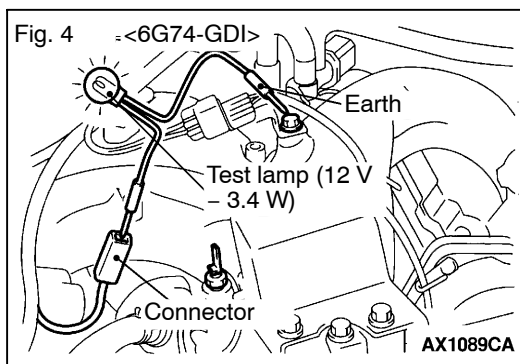
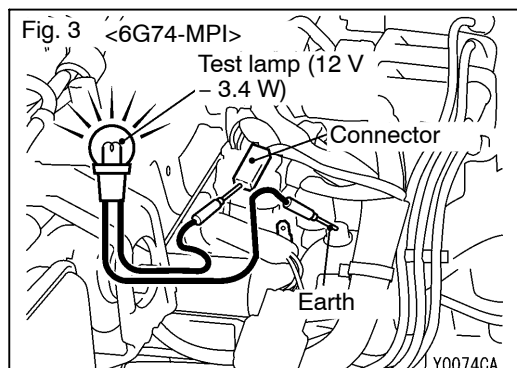
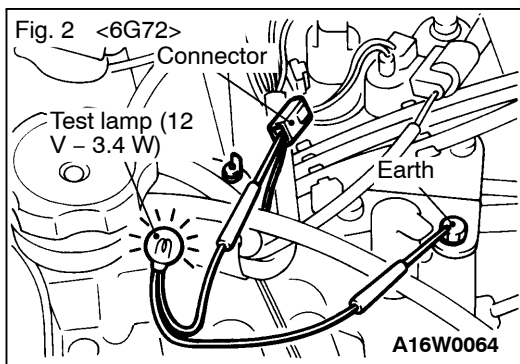
Fuel gauge does not operate. (Other meters and gauges operate.)	Probable cause
If the speedometer and tachometer are normal, the harness from the power supply to the combination meter is normal.	<ul style="list-style-type: none">• Malfunction of fuel gauge unit• Malfunction of fuel gauge and engine coolant temperature assembly• Malfunction of harness or connector• Malfunction of printed circuit board



Inspection procedure 4

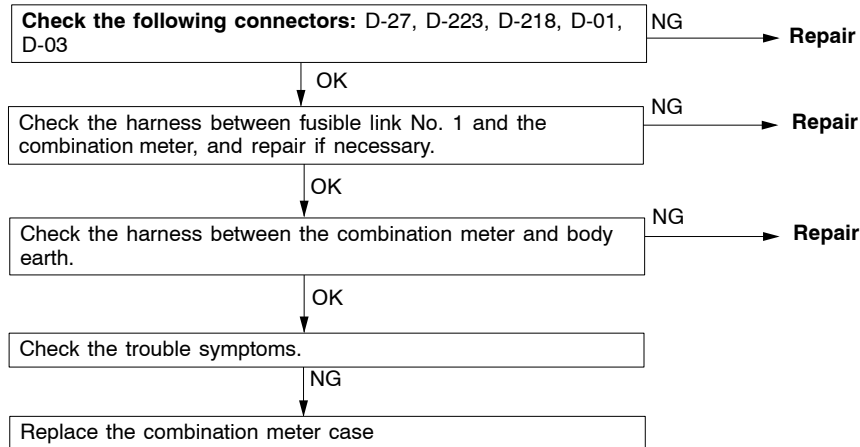
Engine coolant temperature gauge does not operate. (Other meters and gauges operate.)	Probable cause
If the speedometer and tachometer are normal, the harness from the power supply to the combination meter is normal.	<ul style="list-style-type: none"> • Malfunction of engine coolant temperature gauge unit • Malfunction of fuel gauge and engine coolant temperature assembly • Malfunction of harness or connector • Malfunction of printed circuit board





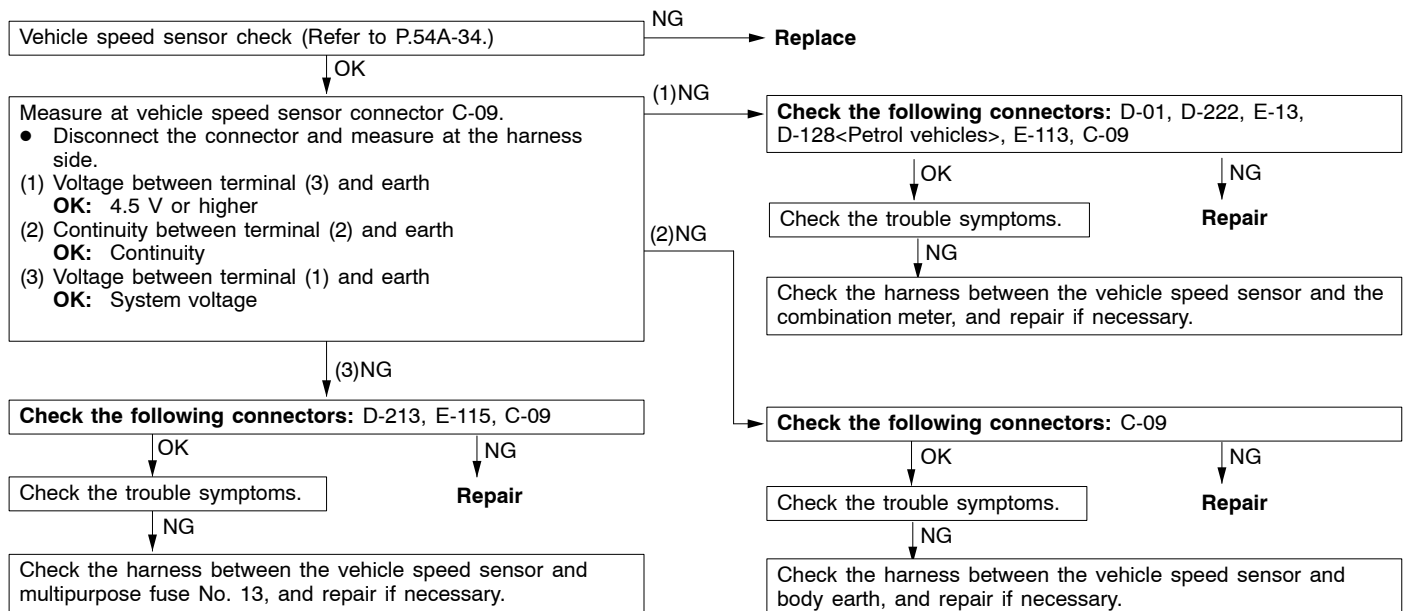
Inspection procedure 5

None of the meters and gauges operate.	Probable cause
If the indicators and warning lamps are normal, then the harness from the power supply (IG1) to the combination meter is normal.	<ul style="list-style-type: none"> • Malfunction of printed circuit board • Malfunction of harness or connector



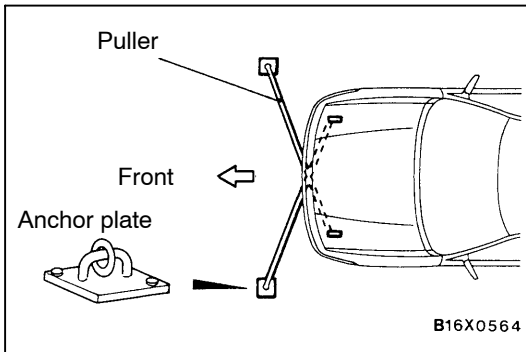
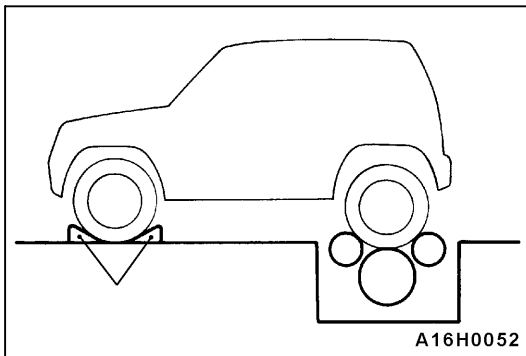
Inspection procedure 6

Vehicle speed sensor check
The vehicle speed sensor is used by the speedometer, engine-ECU and A/T-ECU.



NOTE

If the trouble symptoms cannot be eliminated by the above checks, there is probably a short-circuit at the vehicle speed sensor output side (harness, speedometer, engine-ECU or A/T-ECU), and so this should be checked.



ON-VEHICLE SERVICE

SPEEDOMETER CHECK

1. Check that the tyre inflation pressure is at the value indicated on the tyre pressure labels.
2. Place the vehicle onto a speedometer tester.
3. Place wheel locks on front wheels.

NOTE

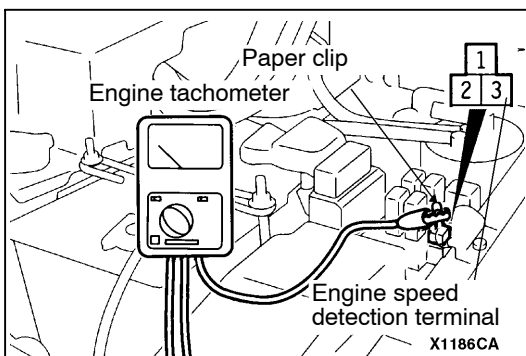
Set the vehicle to 2WD.

4. Install a puller to the towing hook and tie-down hook at the front of the vehicle to stop the front wheels from moving sideways, and secure both ends of the puller to anchor plates.
5. Connect a chain or wire cable to the rear towing hook and secure the other end to a strong, rigid support, to stop the vehicle from moving.
6. Check that the speedometer display range is within the standard value, and that the needle swing is within the limit value.

Standard value:

Speed km/h	20	40	80	120	160
Speedometer display range km/h	18 – 23	37 – 45	75 – 88	113 – 132	150 – 176

Limit value needle swing (driving at a speed of 35 km/h or higher) ± 3 km/h

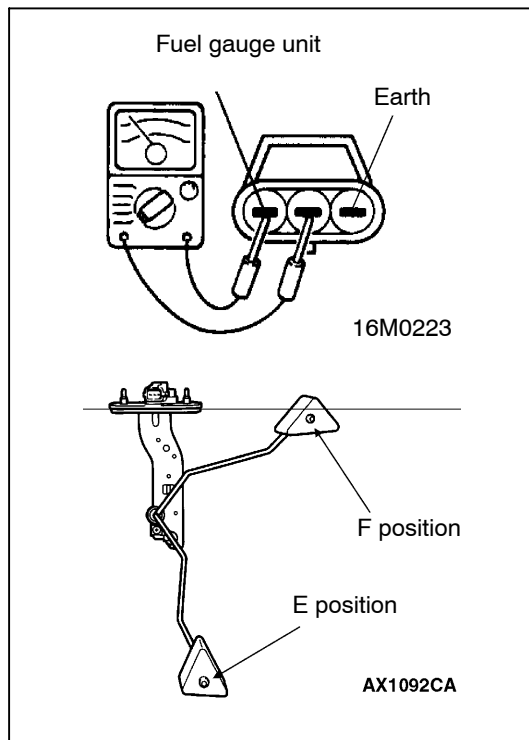


TACHOMETER CHECK

1. Insert a paper clip into the harness-side engine speed detection terminal and connect an engine tachometer.
2. Compare the engine tachometer display and the vehicle tachometer display at various engine speeds, and check that the display errors are within the standard value ranges.

Standard value:

Engine speed r/min		Tachometer display error r/min
700		± 120
2,000	Petrol	$-175+225$
	Diesel	± 175
3,000	Petrol	$-75+300$
	Diesel	± 225
4,000	Petrol	$-225+375$
	Diesel	± 300
4,750 (Diesel)		± 260
5,000 (Petrol)		$-225+425$
6,000 (Petrol)		$-225+475$

**FUEL GAUGE UNIT CHECK**

Remove the fuel gauge unit from the fuel tank.

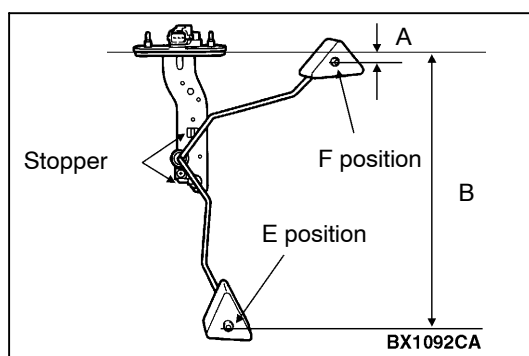
Fuel gauge unit standard resistance value

1. Check that the resistance between the fuel gauge unit terminal and the earth terminal is at the standard value when the float of the fuel gauge unit is at the F position and the E position.

Standard value:

Float position	Gauge resistance value
F position	3 Ω
E position	110 Ω

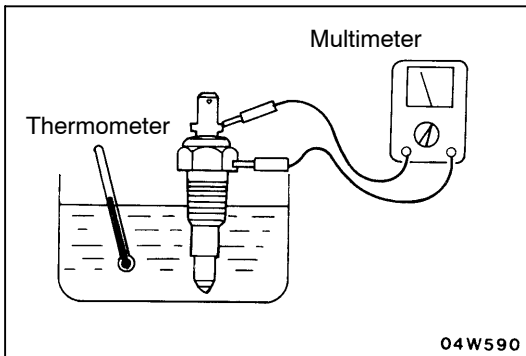
2. Check that the resistance value changes smoothly when the float is moved slowly between the F position and the E position.

**Fuel gauge unit float height**

Move the float and check that F position height (A) and E position height (B) are at the standard values when the float arm touches the stopper.

Standard value:

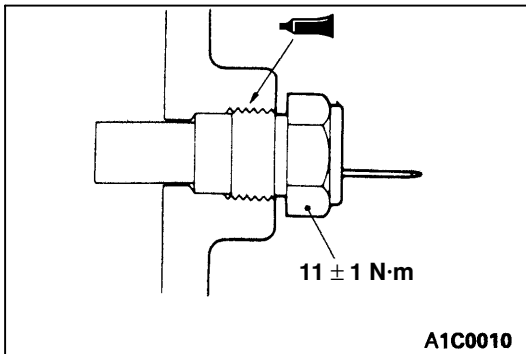
Float position	Float centre height
F position (A)	11.9 mm
E position (B)	195.2 mm



ENGINE COOLANT TEMPERATURE GAUGE UNIT CHECK

1. Drain the engine coolant. (Refer to GROUP 14 – On-vehicle Service.)
2. Remove the engine coolant temperature gauge unit.
3. Immerse the engine coolant temperature gauge unit in water at a temperature of 70 °C and check that the basic resistance is at within the standard value range.

Standard value: $104 \pm 13.5 \Omega$



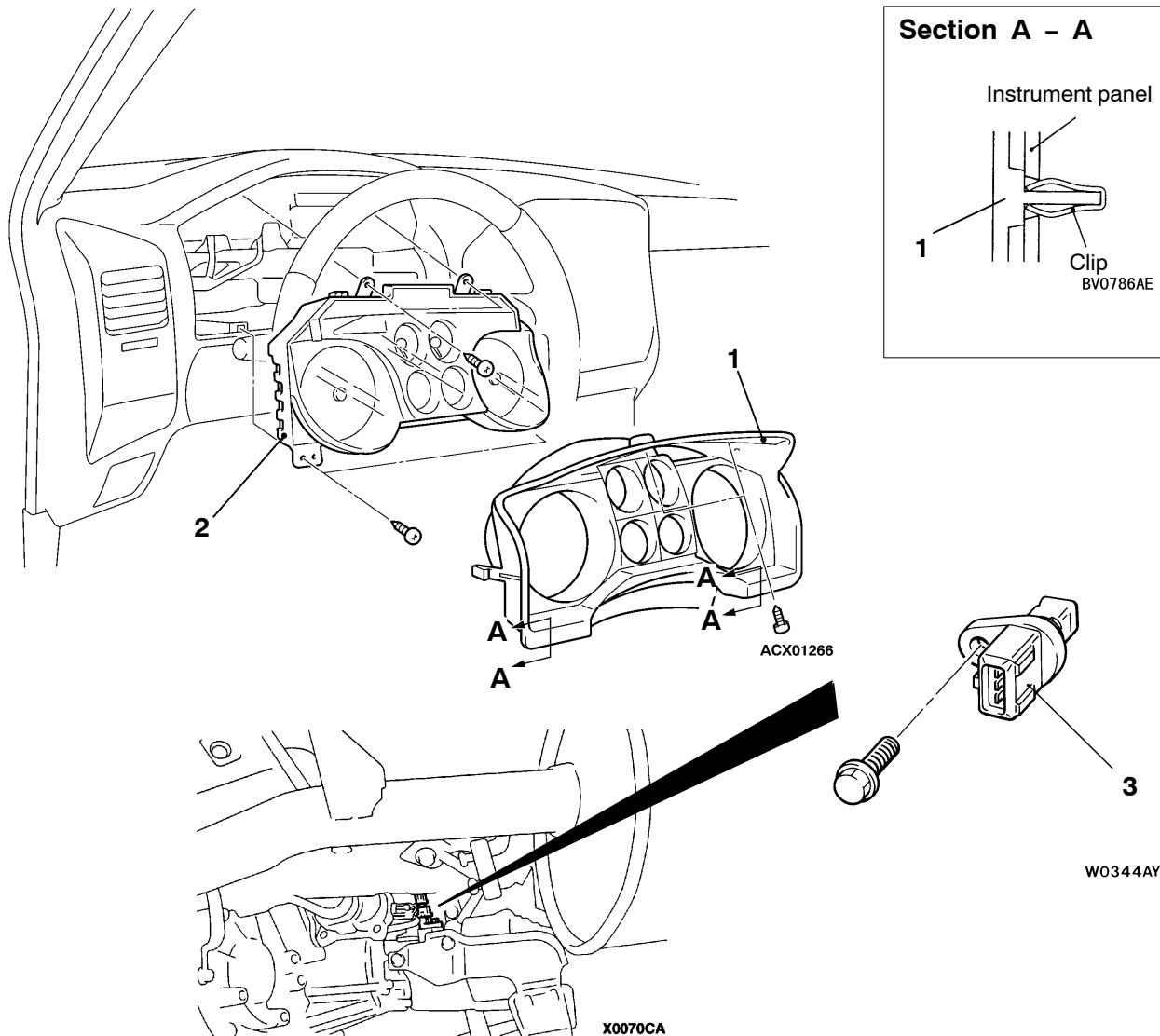
4. After checking, apply specified sealant to the threaded section of the engine coolant temperature gauge unit, and then tighten it to the specified torque.

Semi-drying sealant: Threebond 1104 or equivalent

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

COMBINATION METER

REMOVAL AND INSTALLATION

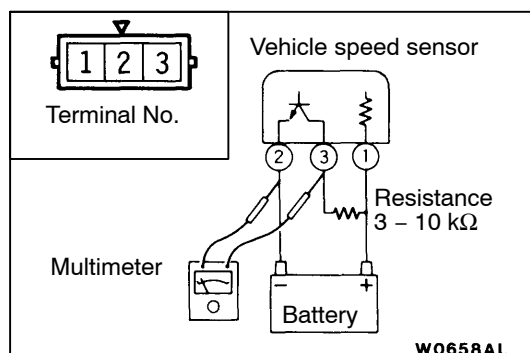


Combination meter removal steps

1. Meter bezel
2. Combination meter

Vehicle speed sensor removal

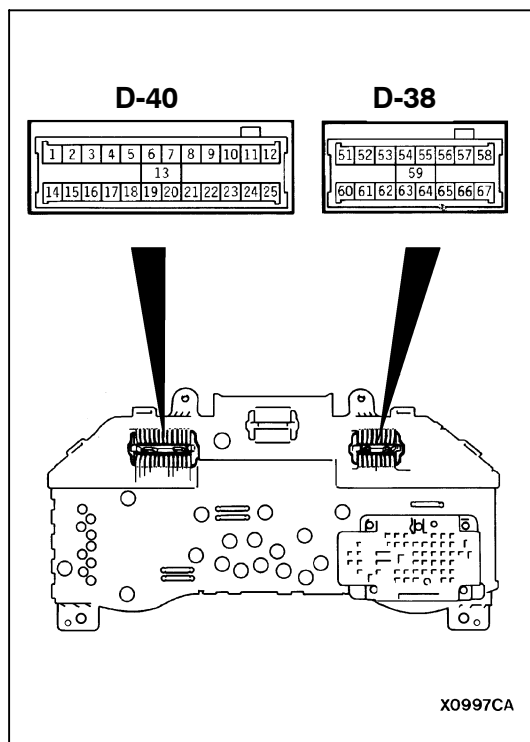
3. Vehicle speed sensor



INSPECTION

VEHICLE SPEED SENSOR CHECK

1. Jack up the vehicle.
2. Remove the vehicle speed sensor, and then connect a 3 – 10 kΩ resistance as shown in the illustration at left.
3. Use a multimeter to check the change in voltage between terminals (2) and (3) when the propeller shaft is rotated. (4 pulses per rotation)



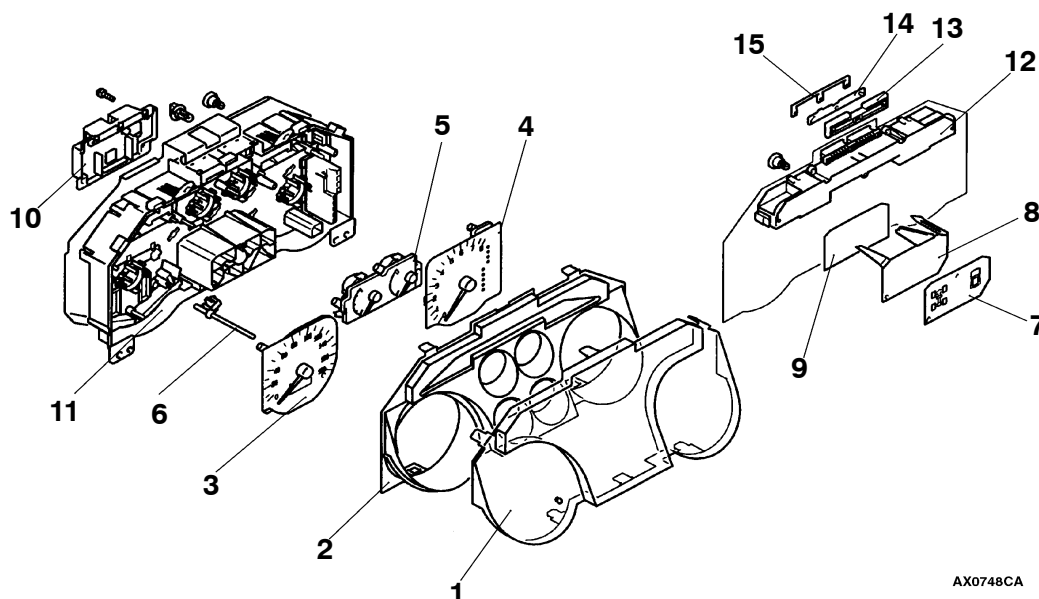
COMBINATION METER INTERNAL RESISTANCE VALUE CHECK

Use a multimeter to measure the resistance between the terminals.

Standard value:

Measurement terminal No.	Terminal name	Standard value
62 – 11	IG power supply – Earth	1MΩ or more
62 – 25	IG power supply – Earth	1MΩ or more
62 – 63	IG power supply – Fuel gauge	1MΩ or more
62 – 64	IG power supply – Engine coolant temperature gauge	1MΩ or more
63 – 11	Fuel gauge – Earth	180 Ω
63 – 25	Fuel gauge – Earth	180 Ω
64 – 11	Engine coolant temperature gauge – Earth	210 Ω
64 – 25	Engine coolant temperature gauge – Earth	210 Ω
67 – 11	Battery power supply – Earth	1MΩ or more
67 – 25	Battery power supply – Earth	1MΩ or more
67 – 63	Battery power supply – Fuel gauge	1MΩ or more
67 – 64	Battery power supply – Engine coolant temperature gauge	1MΩ or more

DISASSEMBLY AND REASSEMBLY



AX0748CA

Disassembly steps

1. Glass
2. Window plate
3. Speedometer
4. Tachometer
5. Fuel gauge and engine coolant temperature assembly
6. Trip meter knob
7. Indicator plate
8. Indicator prism
9. Indicator lens
10. Instrument panel printed circuit board
11. Replace the combination meter case
12. Indicator case
13. Combination plate A
14. Combination plate B
15. Combination plate C

HEADLAMP ASSEMBLY

SERVICE SPECIFICATIONS

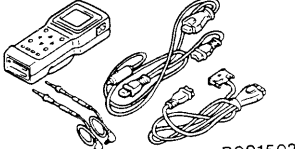
Item			Standard value	Limit
Headlamp emitter adjustment [Cut-off line (light/dark boundary line) position]	Low-beam	Vertical direction	0.57° (10 mm) down from horizontal line H	—
		Horizontal direction	Position where 15° rising portion intersects vertical line V	—
Headlamp illumination measurement cd (Corresponding to road surface 40 m in front at low beam)			—	6,400 or higher for each lamp

NOTES ON HANDLING HEADLAMPS AND FRONT TURN-SIGNAL LAMPS

The headlamps and front turn-signal lamps have plastic outer lenses, and so the following points should be noted during handling.

- Do not leave the headlamps on for more than 3 minutes while they are covered with protectors, otherwise damage may result.
- Do not mask the surfaces of the outer lenses by attaching tape.
- Do not scrape the surfaces of the outer lenses with tools that have sharp points.
- Use only the specified wax remover, and wash thoroughly with water.
- Only the specified genuine bulbs should be used.

SPECIAL TOOL

Tools	No.	Name	Application
 B991502	MB991502	MUT-II sub assembly	Checking the ETACS-ECU input signals

TROUBLESHOOTING

The headlamps are controlled by the Smart Wiring System (SWS). For troubleshooting procedures, refer to GROUP 54B.

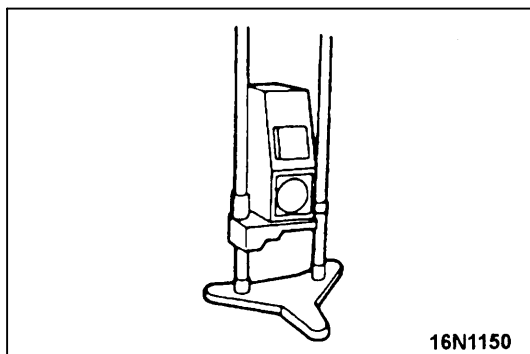
ON-VEHICLE SERVICE

HEADLAMP AIMING ADJUSTMENT

After setting the vehicle to the following condition, adjust the headlamp aiming.

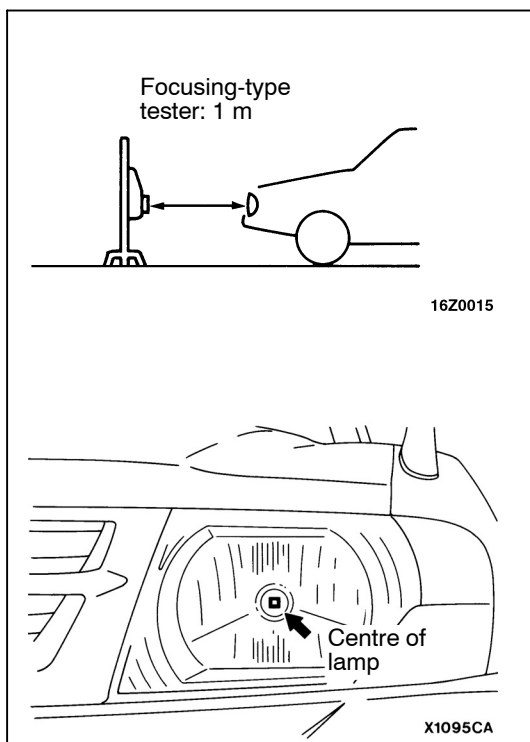
- Check that the tyre inflation pressure is at the value indicated on the tyre pressure labels.
- Set the vehicle to the unladen condition and park it on a level surface.
- Have a single person (approximately 55 kg) sit in the driver's seat.

- Run the engine at a speed of 2,000 r/min to fully charge the battery.

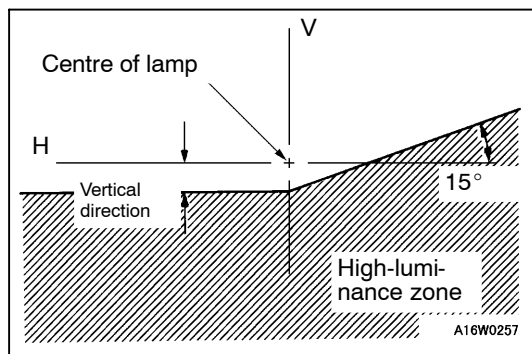
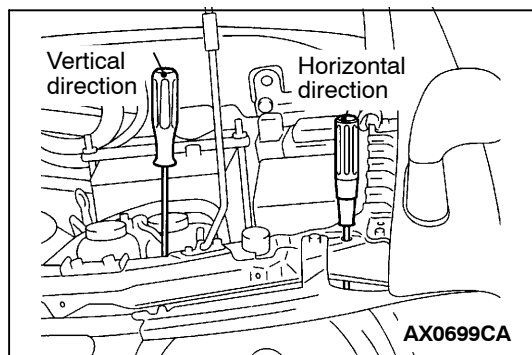


LOW BEAM ADJUSTMENT

1. Adjust the low-beam light axis by following the procedure given for the focusing-type headlamp tester which you are using.



2. Set the tester so that the centre of the focusing lens is 1 m directly in front of the centre of the headlamp.



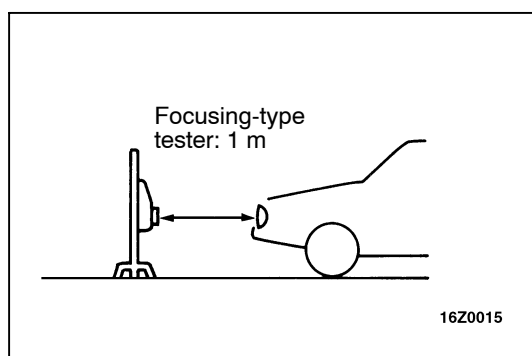
3. Turn the adjusting screws to adjust so that the deviation in the centre of the high-luminance zone (main optical axis) is at the standard value.

Standard value:

Vertical direction	0.57 ° (10 mm) down from horizontal line H
Horizontal direction	Position where 15 ° rising portion intersects vertical line V

Caution

- (1) For the headlamp which is not being measured, disconnect that headlamp's connector if possible so that it does not illuminate while carrying out the adjustment. Furthermore, make sure that the light axis does not get shifted when re-connecting the connector.
- (2) The headlamps have outer lenses which are made of plastic, so if covering the lens surface with an object which does not let light pass through, the headlamp should not be turned on for any more than 3 minutes. In addition, do not mask the outer lens surface by attaching tape or similar.
- (3) The adjustment should always be completed by turning the adjusting screws in the tightening direction.



LUMINANCE MEASUREMENT

1. Place the tester receiver so that it is directly opposite the headlamp at the distance shown in the illustration.
2. Run the engine at a speed of 2000 r/min to fully charge the battery.
3. Align with the centre of the lamp.

NOTE

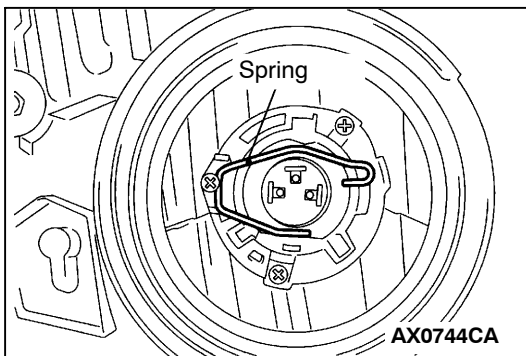
Check that the light/dark separation line on the adjustment screen and the low-beam cut-off line are aligned at this time.

4. With the headlamps set to low beam, check that the luminance satisfies the limit value.

Limit: 6,400 cd or higher for each lamp

Caution

- (1) For the headlamp which is not being measured, disconnect that headlamp's connector if possible so that it does not illuminate while carrying out the adjustment. Furthermore, make sure that the light axis does not get shifted when re-connecting the connector.
- (2) The headlamps have outer lenses which are made of plastic, so if covering the lens surface with an object which does not let light pass through, the headlamp should not be turned on for any more than 3 minutes. In addition, do not mask the outer lens surface by attaching tape or similar.

**HEADLAMP BULB REPLACEMENT**

1. Remove the air cleaner case (R.H. side) and the ABS valve relay (L.H. side).
2. Disconnect the connector.
3. Remove the socket cover.
4. Remove the bulb retainer spring, and then take out the bulb.
5. After replacing the bulb, securely connect the connector.

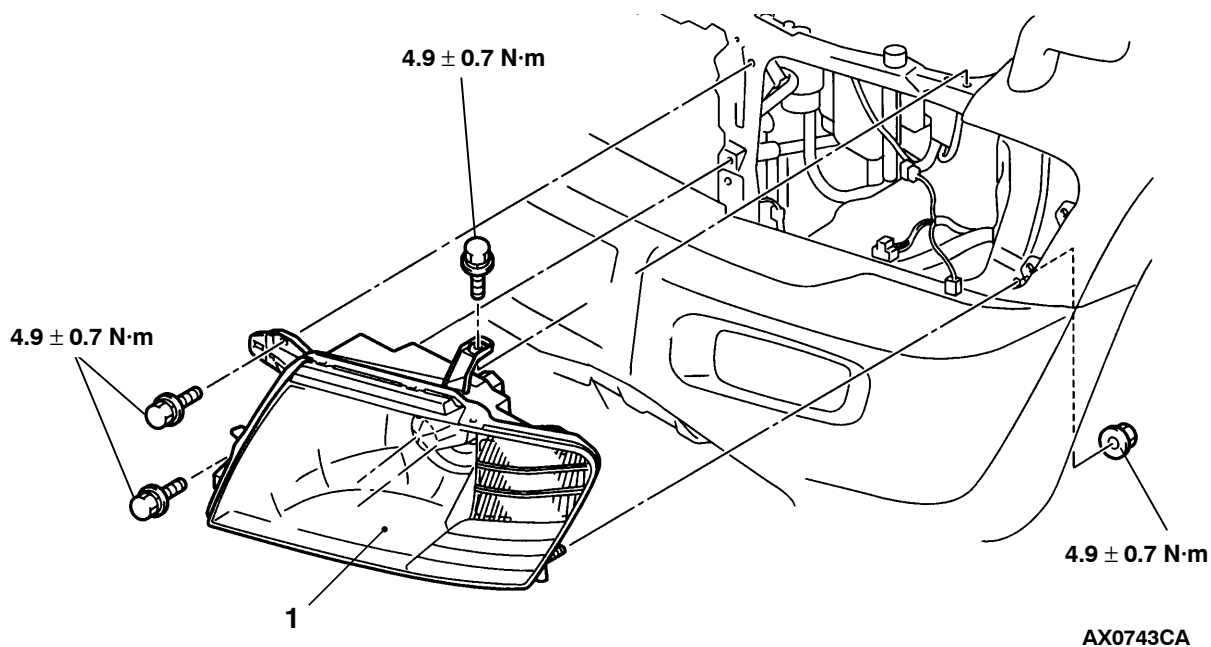
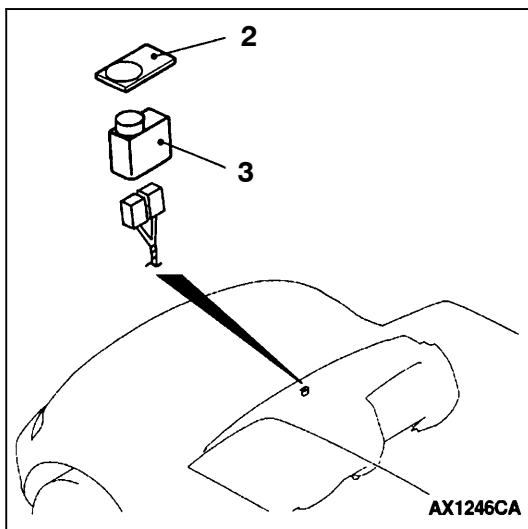
Caution

Do not touch the surface of the bulb with bare hands or with dirty gloves.

If the surface (glass section) should become dirty, clean it immediately with alcohol or thinner, and let it dry thoroughly before installing it.

AUTOMATIC HEADLAMP LIGHTING AND HEADLAMP AUTOMATIC CUT-OFF ADJUSTMENT PROCEDURE <Hong Kong>

The headlamps are controlled by the Smart Wiring System (SWS). For headlamp automatic lamp and headlamp automatic cut-off adjustment procedure, refer to GROUP 54B.

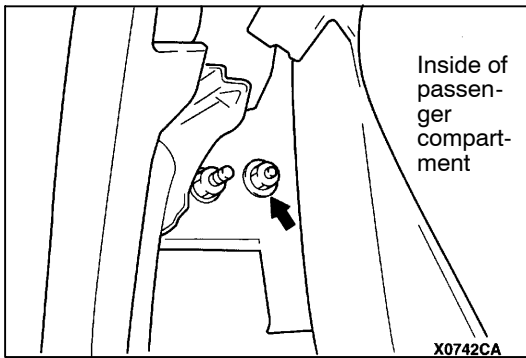
HEADLAMP ASSEMBLY**REMOVAL AND INSTALLATION****Headlamp removal steps**

- Radiator grille
(Refer to GROUP 51 – Front Bumper.)
1. Headlamp Assembly

Photo sensor removal steps

- Clock and Center Display or RV meter
(Refer to P.54A-84.)
2. Photo sensor cover
 3. Photo sensor

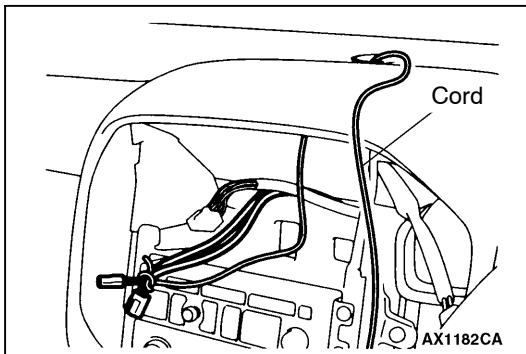


**REMOVAL SERVICE POINTS****◀A▶ HEADLAMP ASSEMBLY REMOVAL**

The headlamp mounting nut is the nut on the inside of the nut which is visible inside the passenger compartment when the front splash shield mounting is removed, and it is this nut which should be removed.

◀B▶ PHOTO SENSOR REMOVAL

1. Remove the photo sensor cover from the centre-top of the instrument panel.
2. Pull the harness which is connected to the photo sensor out through the front of the instrument panel (the hole left after the clock and the Center Display or RV meter have been removed) together with the photo sensor, and then disconnect the photo sensor from the harness.

**INSTALLATION SERVICE POINTS****▶A◀ PHOTO SENSOR INSTALLATION**

Tie a cord to the photo sensor harness (at the connector end) as shown in the illustration, pass the harness through the photo sensor mounting hole, and then install the photo sensor and the photo sensor cover from the centre-top of the instrument panel.

INSPECTION**PHOTO SENSOR CHECK**

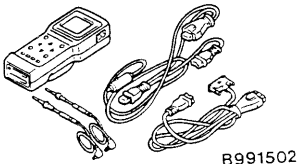
If the headlamps illuminate when the lamp switch is at the AUTO position (during summer daylight hours) and the photo sensor receptor is covered, then the photo sensor operation is normal. If the headlamps do not illuminate, replace the photo sensor.

FOG LAMPS

SERVICE SPECIFICATIONS

Item	Standard value
Fog lamp light axis check	Illuminates to within 40 metres

SPECIAL TOOLS

Tools	No.	Name	Application
	MB991502	MUT-II sub as-sembly	Checking the ETACS-ECU input signals

TROUBLESHOOTING

The fog lamp are controlled by the Smart Wiring System (SWS). For troubleshooting procedures, refer to GROUP 54B.

ON-VEHICLE SERVICE

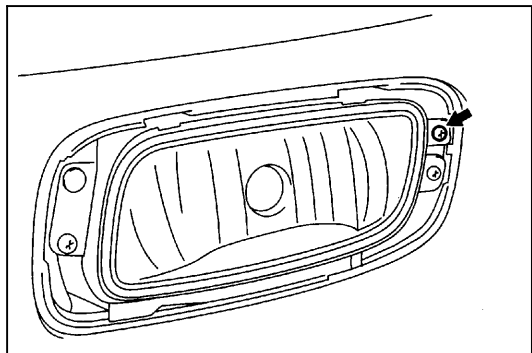
FOG LAMP AIMING CHECK

After setting the vehicle to the following condition, adjust the headlamp aiming.

- Check that the tyre inflation pressure is at the value indicated on the tyre pressure labels.
- Set the vehicle to the unladen condition and park it on a level surface.
- Have a single person (approximately 55 kg) sit in the driver's seat.
- Run the engine at a speed of 2000 r/min to fully charge the battery.

Turn on the fog lamps and check that the illumination is within the standard value range.

Standard value: Illuminates to within 40 metres



If the value is outside the standard value range, adjust using the adjusting screw.

NOTE

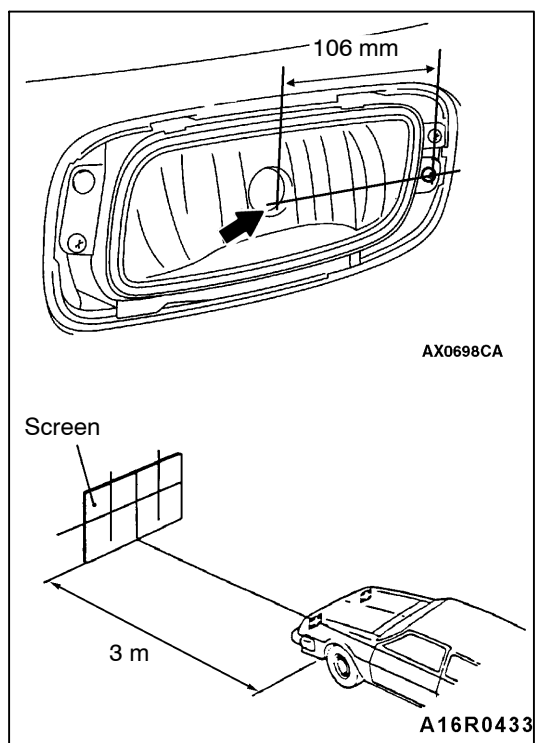
Horizontal adjustment is not possible.

Caution

1. For the headlamp which is not being measured, disconnect that headlamp's connector if possible so that it does not illuminate while carrying out the adjustment. Furthermore, make sure that the light axis does not get shifted when re-connecting the connector.
2. The adjustment should always be completed by turning the adjusting screws in the tightening direction.

In addition, the method of checking the light axis on a screen (simple check) is given below.

1. Measure the centre of the fog lamp as shown in the illustration.
2. Place the screen so that it is directly opposite the centre of the fog lamp at a distance of 3 metres, and turn on the fog lamps.



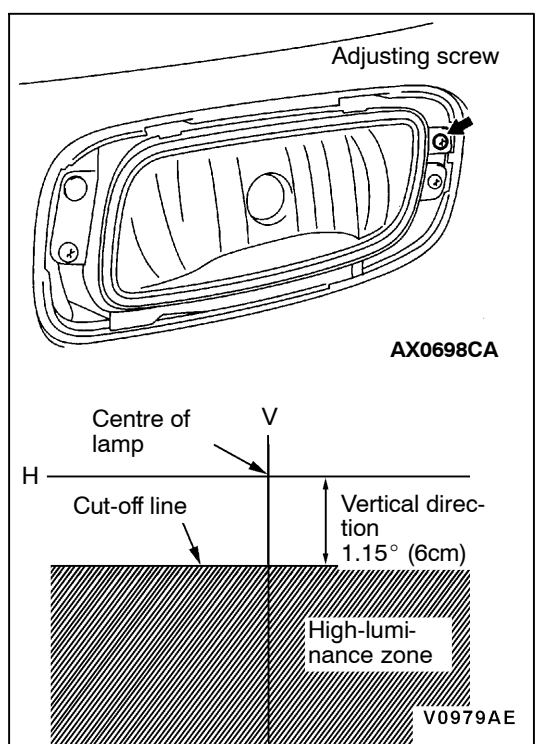
3. Turn the adjusting screw to adjust so that the position of the cut-off line (light/dark border line) is as shown in the figure.

NOTE

Horizontal adjustment is not possible.

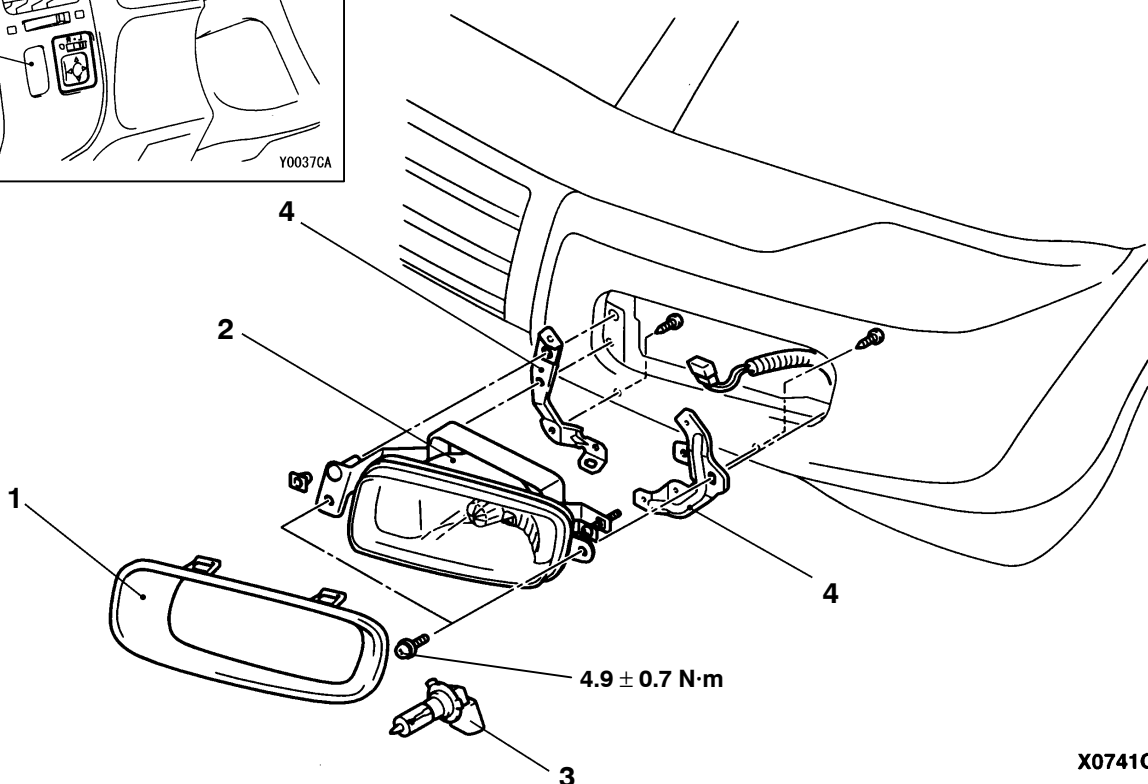
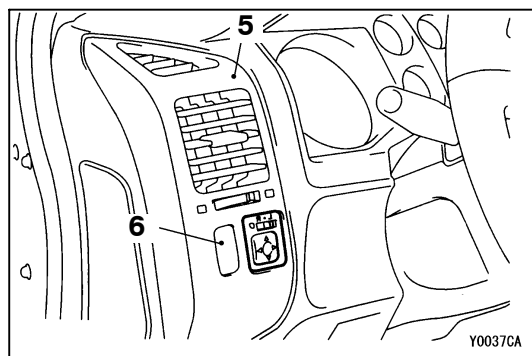
Caution

- (1) For the headlamp which is not being measured, disconnect that headlamp's connector if possible so that it does not illuminate while carrying out the adjustment. Furthermore, make sure that the light axis does not get shifted when re-connecting the connector.
- (2) The adjustment should always be completed by turning the adjusting screws in the tightening direction.



FOG LAMPS

REMOVAL AND INSTALLATION



Fog lamp removal steps

1. Fog lamp bezel
2. Fog lamp
3. Bulb
4. Fog lamp bracket

Fog lamp switch removal steps

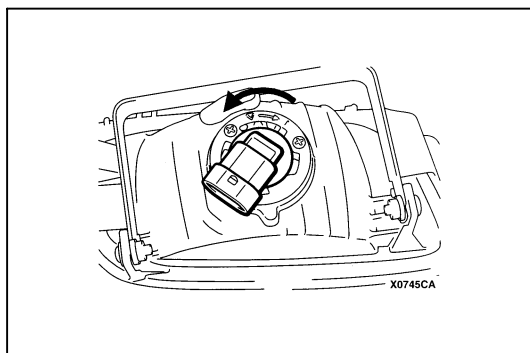
5. Air outlet assembly (Refer to GROUP 52A – Instrument Panel.)
6. Fog lamp switch



REMOVAL SERVICE POINTS

◀A▶ BULB REMOVAL

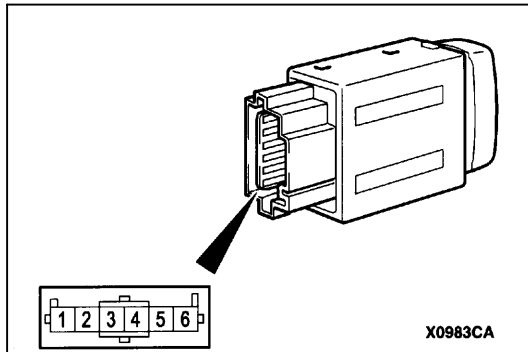
Turn the bulb assembly anti-clockwise to remove the bulb.








Caution

1. Only the specified genuine bulbs should be used.
2. Do not touch the surface of the bulb with bare hands or with dirty gloves.

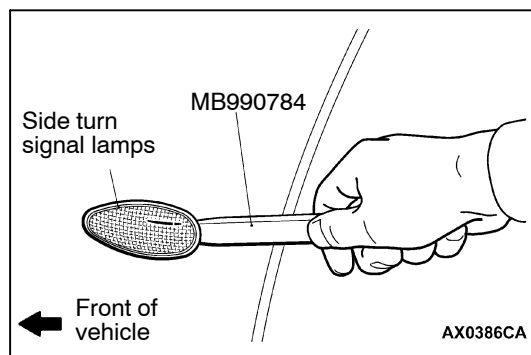
If the surface (glass section) should become dirty, clean it immediately with alcohol or thinner, and let it dry thoroughly before installing it.

**INSPECTION****FOG LAMP SWITCH CONTINUITY CHECK**

Switch position		Terminal No.						
		1	2	3	IL L	4	5	6
ON	FRONT							
	REAR							
OFF								

SIDE TURN-SIGNAL LAMPS**SPECIAL TOOL**

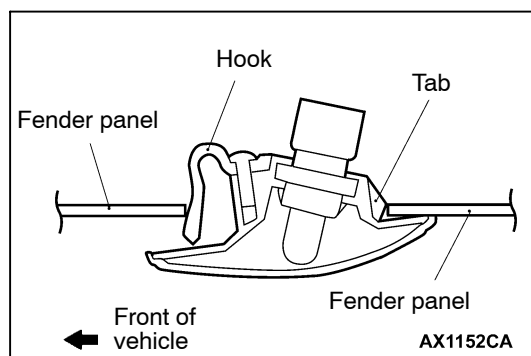
Tools	No.	Name	Application
 B990784	MB990784	Ornament remover	Side turn-signal lamp removal



SIDE TURN-SIGNAL LAMPS

REMOVAL SERVICE POINT

Use the special tool or similar tool to disengage the hook from the fender, and then remove the side turn-signal lamp.



INSTALLATION SERVICE POINT

Hook the tab onto the fender panel to install the side turn-signal lamp.

ROOM LAMP

TROUBLESHOOTING

The room lamps are controlled by the Smart Wiring System (SWS). For troubleshooting procedures, refer to GROUP 54B.

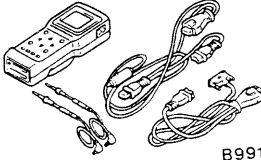
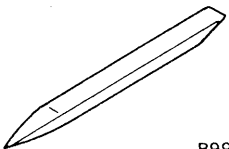
ON-VEHICLE SERVICE

ROOM LAMP DELAY-OFF TIME ADJUSTMENT PROCEDURE

The room lamps are controlled by the Smart Wiring System (SWS). For room lamp delay-off time adjustment procedures, refer to GROUP 54B.

REAR COMBINATION LAMPS

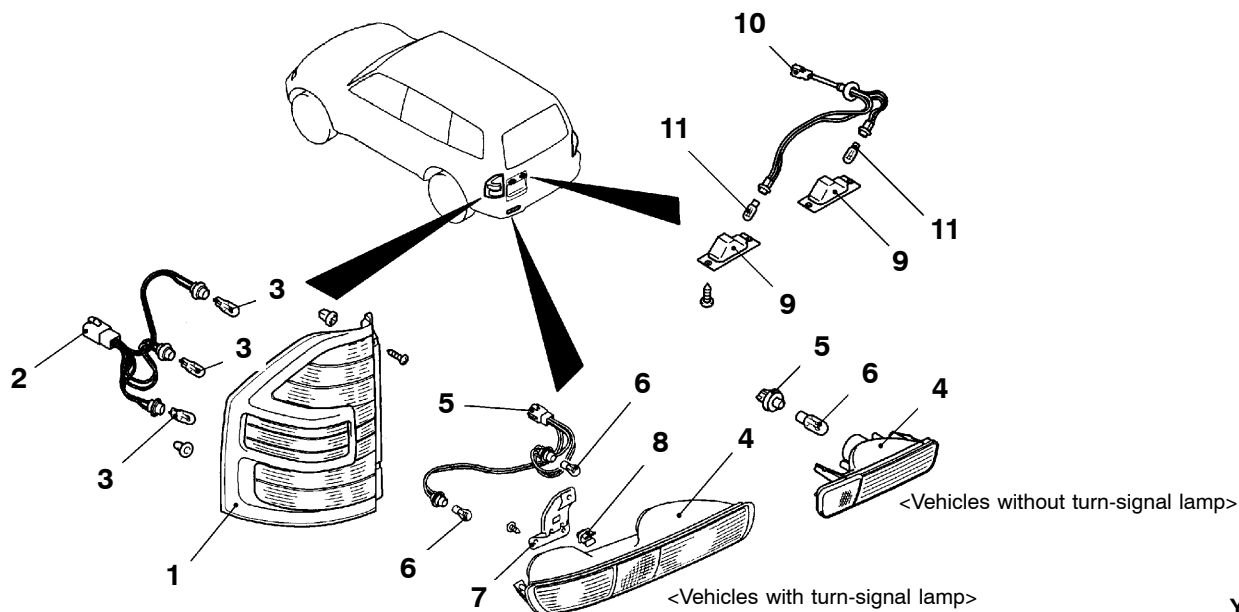
SPECIAL TOOLS

Tools	No.	Name	Application
 B991502	MB991502	MUT-II sub assembly	Checking the ETACS-ECU input signals
 B990784	MB990784	Ornament remover	Rear combination lamp removal

TROUBLESHOOTING

Rear combination lamps are controlled by the Smart Wiring System (SWS). For troubleshooting procedures, refer to GROUP 54B.

REAR COMBINATION LAMPS REMOVAL AND INSTALLATION



Y0057CA

Rear combination lamp removal steps

1. Rear combination lamp
2. Socket assembly
3. Bulb

Rear lamp removal steps

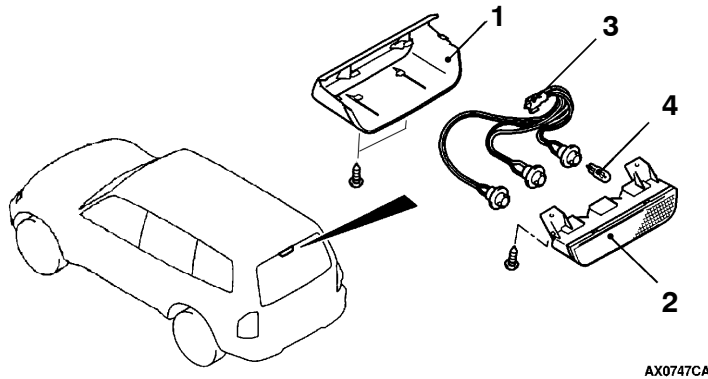
4. Rear lamp
5. Socket assembly
6. Bulb
7. Rear lamp bracket
8. Clip

Licence plate lamp removal steps

9. Licence plate lamp
10. Socket assembly
11. Bulb

HIGH-MOUNTED STOP LAMP

REMOVAL AND INSTALLATION



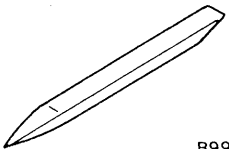
Removal steps

1. High-mounted stop lamp cover
2. High-mounted stop lamp body

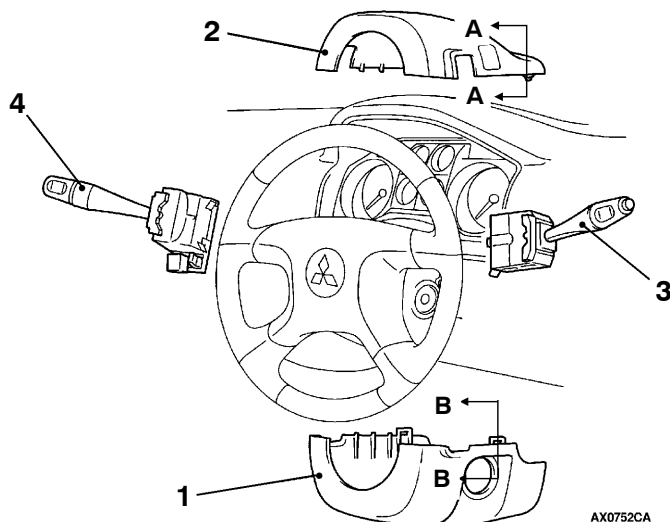
3. Socket assembly
4. Bulb

COLUMN SWITCH

SPECIAL TOOL

Tools	No.	Name	Application
 B990784	MB990784	Ornament remover	Column cover removal

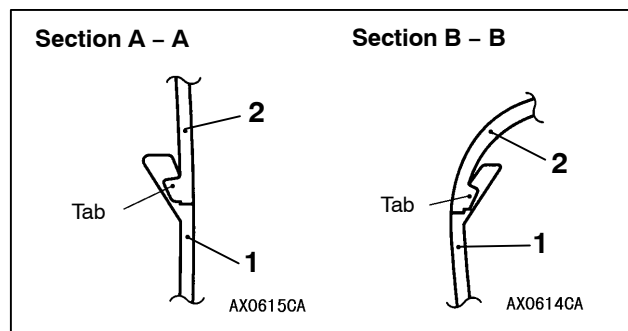
REMOVAL AND INSTALLATION



Removal steps

1. Lower column cover (Refer to GROUP 52A – Instrument Panel.)
2. Upper column cover (Refer to GROUP 52A – Instrument Panel.)

3. Wiper and washer switch
4. Lighting switch














LIGHTING SWITCH CONTINUITY CHECK <R.H. DRIVE VEHICLES>

Switch position	Terminal No.						
	3	6	7	8	9	10	11
OFF							
Tail gate lamps	○	—	○				
Headlamps	○	○					
Passing lamps	○	—	—	○			
Dimmer	○	—	—	—	○		
Turn-signal lamp R.H.	○	—	—	—	—	○	
Turn-signal lamp L.H.	○	—	—	—	—	—	○

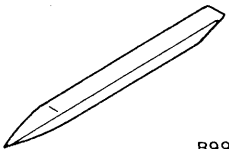


- (1) Remove the lighting switch and the wiper and washer switch.
- (2) Check that there is continuity between the same terminals [terminals (3) and (11)] of each connector of the column switch body which is still on the steering column.

Terminal No.		Lighting switch-side connector									
		3	4	5	6	7	8	9	10	11	
Wiper and washer switch-side connector	3										
	4										
	5										
	6										
	7										
	8										
	9										
	10										
11											

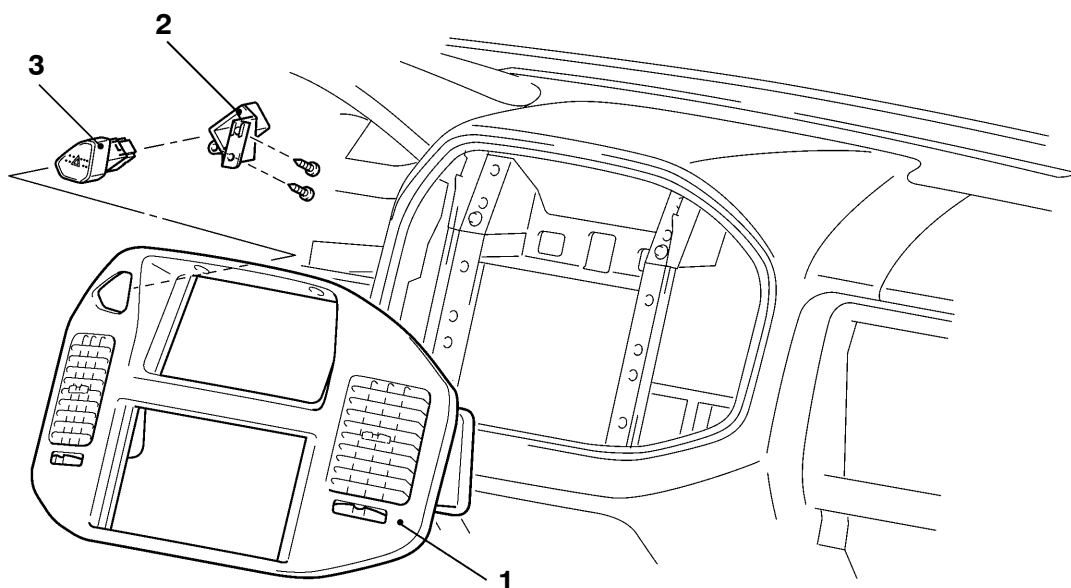
HAZARD WARNING LAMP SWITCH

SPECIAL TOOL

Tools	No.	Name	Application
 B990784	MB990784	Ornament remover	Center panel removal

HAZARD WARNING LAMP SWITCH

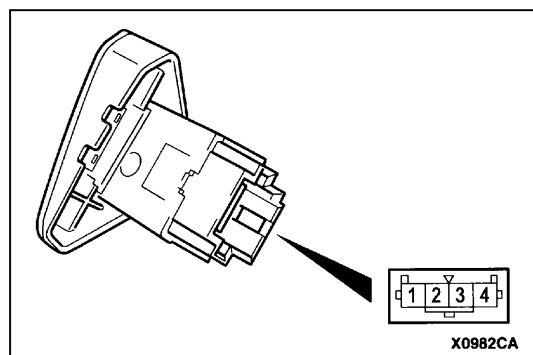
REMOVAL AND INSTALLATION



ACX01270

Removal steps

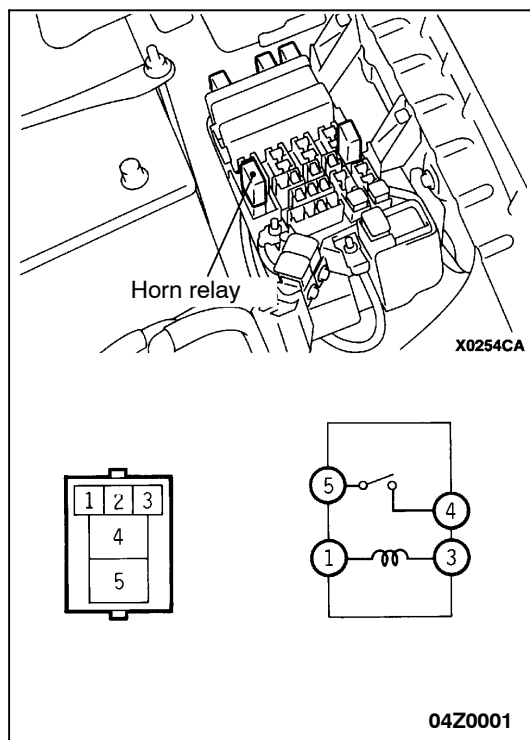
1. Center panel (Refer to GROUP 52A – Instrument Panel.)
2. Bracket
3. Hazard Warning Lamp Switch



INSPECTION

HAZARD LAMP SWITCH CONTINUITY CHECK

Switch position	Terminal No.				
	1	2	3	ILL	4
OFF			○	Ⓢ	○
ON	○	○	○	Ⓢ	○

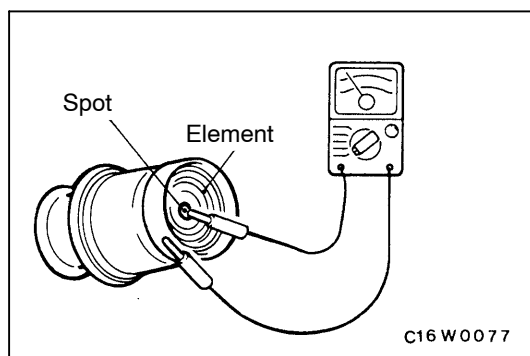


HORN

INSPECTION

HORN RELAY CONTINUITY CHECK

Switch position	Terminal No.			
	1	3	4	5
When current is not supplied	○	○		
When current is supplied	⊖	⊕	○	○



CIGARETTE LIGHTER

INSPECTION

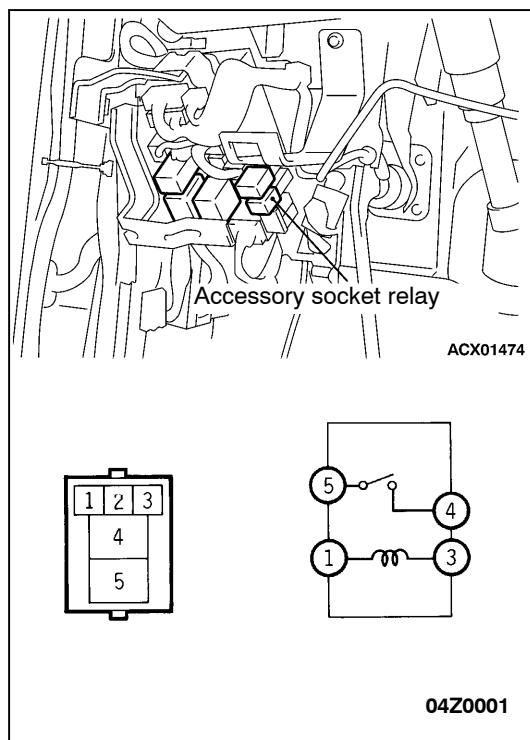
- Remove the plug and check the spot for wear.
- Check that there are no tobacco stains or foreign particles on the element.
- Use a multimeter to check the continuity of the element.

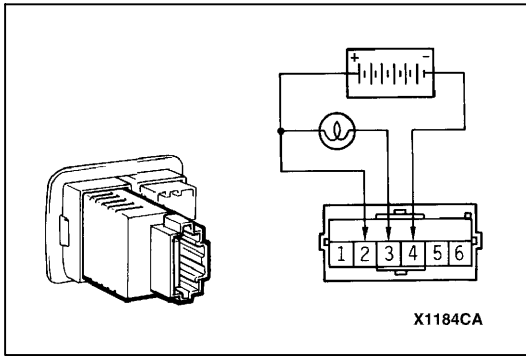
ACCESSORY SOCKET

INSPECTION

ACCESSORY SOCKET RELAY CONTINUITY CHECK

Switch position	Terminal No.			
	1	3	4	5
When current is not supplied	○	○		
When current is supplied	⊖	⊕	○	○





RHEOSTAT

INSPECTION

1. Connect a test lamp (40 W) to the battery as shown in the illustration.
2. Operate the rheostat. If the luminance of the lamp changes steadily with no flashing, the rheostat is functioning normally.

CLOCK, RV METER OR CENTER DISPLAY

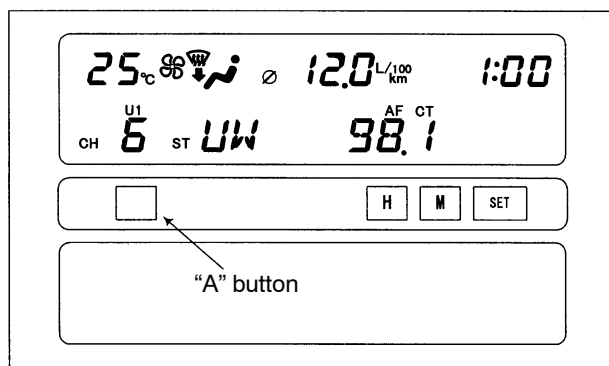
PRECAUTIONS WITH REGARD TO CENTER DISPLAY SERVICE WORK

When the battery is disconnected, model selection screen is shown in center display. Select the model with “H” key or “M” key and enter the selection with “SET” key. If model selection needs to be corrected, press the key on the left end to display the setting screen.

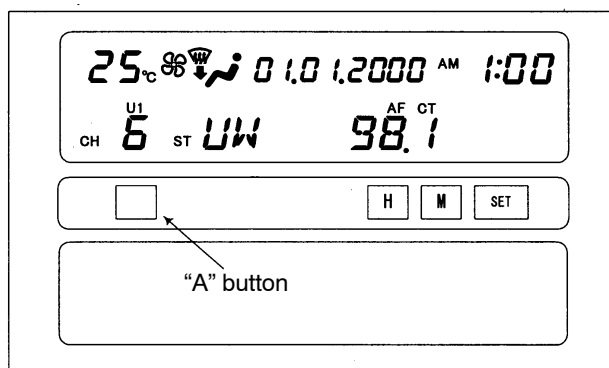
TROUBLESHOOTING FOR CENTER DISPLAY

Vehicle	Center display unit
Petrol-powered vehicles	MR532880
	DU-435-1
Diesel-powered vehicles	MR532881
	DU-435-2

Petrol-powered vehicles



Diesel-powered vehicles



BEFORE REMOVING THE BATTERY

The Center display has a large amount of data unique to the vehicle in its memory. When the battery cable is disconnected, that memory is affected as shown in the table below. Accordingly, it is necessary to make sure that you take notes of important information before disconnecting the battery cable.

Function	Input function/memory	When battery cable is disconnected
Clock set on display	Current time	Retains data for approx. 1 hour
Vehicle model set	Short (3-door models)/long (5-door models)	Retains data for approx. 1 hour
Brightness set for display	Position set on display	Retains data for approx. 1 hour
Unit set for trip computer	km or mile, L/100km or mpg or km/L Average vehicle speed after reset	Retains data for approx. 1 hour
Average vehicle speed on display	Average vehicle speed after reset	Retains data for approx. 1 hour
Average fuel consumption on display	Average fuel consumption after reset	Retains data for approx. 1 hour
Cruising range on display	Cruising range, fuel economy	Retains data for approx. 1 hour
Outside temperature on display	Outside temperature after the ignition switch is turned to the OFF(LOCK) position.	Retains data for approx. 1 hour * The outside temperature sensor is located near the engine. Therefore, incorrectly high temperature may be displayed when the battery cable is reconnected within one hour.

DIAGNOSIS FUNCTION FOR CENTER DISPLAY

Center display has the following diagnosis function:

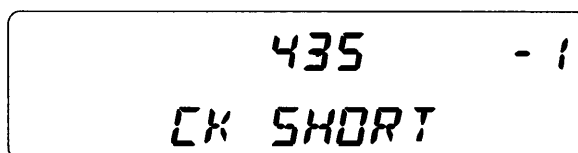
Function	Contents
Service function	There are the following 4 diagnosis modes available
1. Check of vehicle information	The vehicle, short (3-door models)/long (5-door models) set
2. Check of LCD segments	The LCD segments for display available to light on or not
3. Check of sensors	Outside temperature, voltage of fuel gauge unit, system voltage, fuel amount remains, fuel economy calculated after supply of fuel
4. Check of units connected into the center display	The units connected on display Voltage (%) on terminal for MUT-II Vehicle speed signal sent by engine-ECU Oscillating signal

SERVICE MODE FOR CENTER DISPLAY**ENTERING AND TERMINATING THE SERVICE MODE**

- (1) To enter the service mode, turn the ignition switch to the LOCK (OFF) position.
- (2) Turn the ignition switch to the ON position while pushing “A” button, and then push “H” button twice while pushing “A” button.
- (3) Now the center display has entered the service mode. Each mode is displayed when the “SET” button is pushed.
- (4) To terminate the service mode, press any button other than the “SET” button.

1. Check of vehicle information

The following screen is displayed first when the unit enters the service mode.

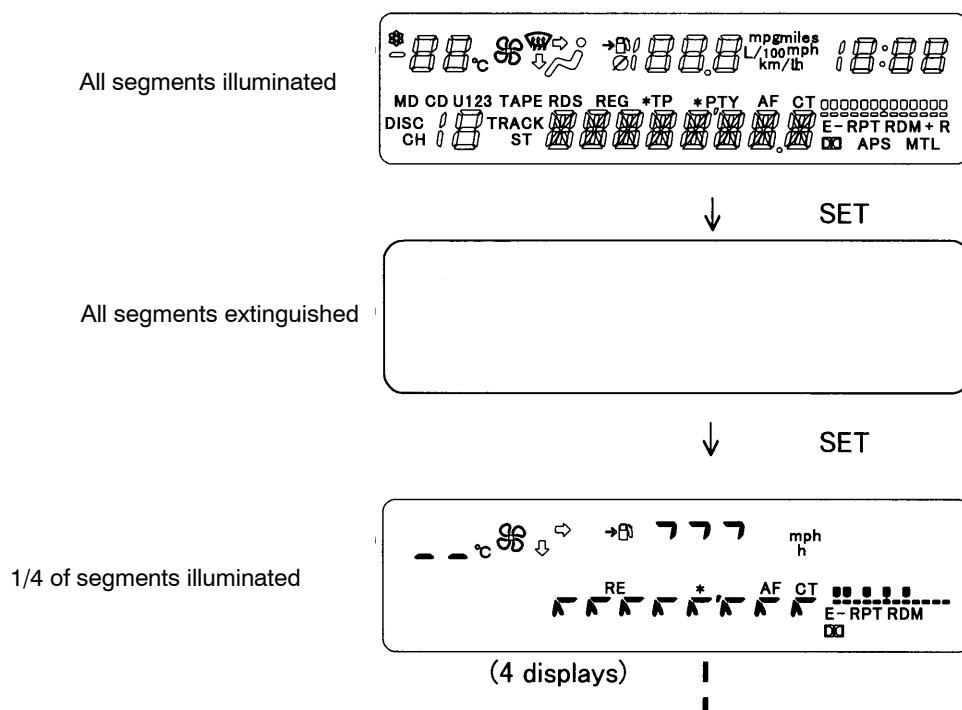


Parts No.	MR532881	MR532880	
Vehicle type	Diesel-powered vehicles	Petrol-powered vehicles	
		Short wheelbase	Long wheelbase
Display	435 –2 CK	435 –1 CK SHORT	435 –1 CK LONG

When the “SET” button is pushed on this screen, the unit proceeds to the next service mode, Check of LCD segments.

2. Check of LCD segments

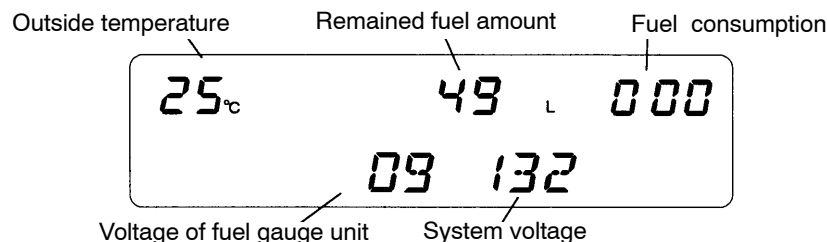
This service mode consists of 6 display screens; the screen where all segments are illuminated, the screen where all segments are extinguished, and four kind of screens where 1/4 of segments are illuminated. Each screen can be changed sequentially when pushing on the “SET” button.



When the “SET” button is pushed on this screen six times, the unit proceeds to the next service mode, Check of Sensors.

3. Check of Sensors

This service mode checks outside temperature, remained fuel amount, fuel consumption, system voltage, and fuel consumption after supply of fuel.



Fuel gauge unit characteristics (only petrol-powered vehicles)

Remained fuel amount [L]	MR532880	
	Petrol-powered vehicles	
	Short wheelbase	Long wheelbase
	Voltage of fuel gauge unit [V] +0.2/-0.2V	
80	–	0.3
70	–	0.7
60	0.4	0.9
50	0.8	1.2
40	1.2	1.5
30	1.6	1.9
20	2.0	2.3
10	2.5	2.7
5	2.8	2.9
0	3.0	3.1

The voltage of fuel gauge unit depends on the system voltage.

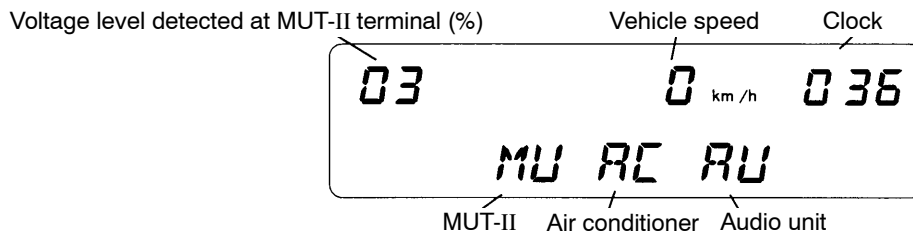
Battery	12.0 V	13.2 V	14.4 V
Fuel gauge unit	1.8 V	2.0 V	2.2 V

The remained fuel amount, which is displayed on the screen, is less than the actual amount. This will give the vehicle an extra amount of 5-liter fuel in case of shortage of gasoline. Moreover, the fuel remaining under the fuel gauge unit (pump) cannot be sucked. Therefore, there is more than 5 liter difference between the actual remaining fuel amount and the displayed amount of fuel.

When the “SET” button is pushed on this screen, the unit proceeds to the next service mode, Check of Unit connected Sensors.

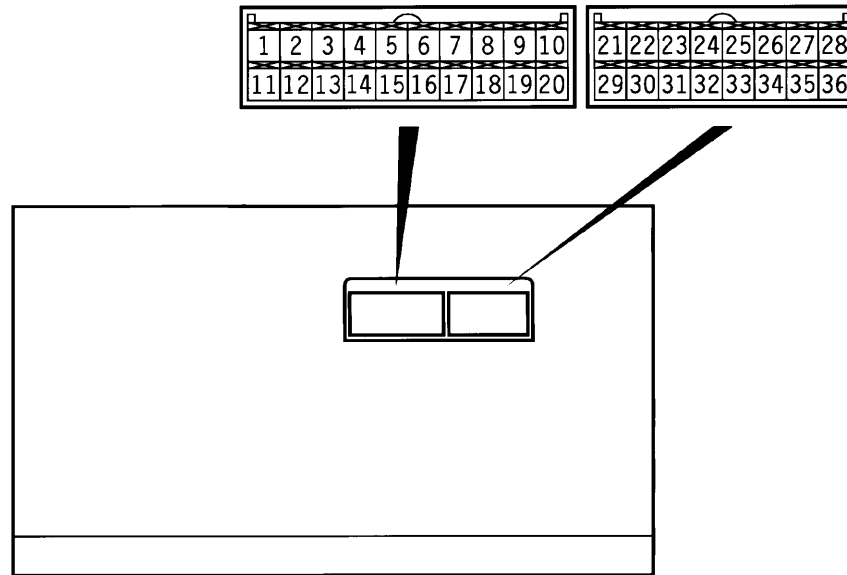
4. Check of units connected into the center display

The lower column of this screen shows whether an audio unit, air-conditioner or the MUT-II is connected. The upper column shows voltage level (%) detected at the MUT-II terminal, the vehicle speed and clock.



When the “SET” button is pushed on this screen, the unit returns to the first screen, Check of Vehicle Information.

VOLTAGE AT CENTER DISPLAY UNIT TERMINALS



V0844AE

Terminal No.	Input/ Output	Signal symbol	Terminal voltage (V)	Wiring harness problem		Trouble symptom caused by wiring harness problem
				Open circuit	Short circuit	
1-4	–	–	–	–	–	
5	Input	ISOK	Hi: System voltage Lo: 0-1	Ex-ists	Ex-ists	MUT-II cannot be used to check the engine-ECU.
6	–	–	–	–	–	
7	Input/ Output	M-DATA (AUDIO)	Hi: 4-5 Lo: 0-1	Ex-ists	Ex-ists	Audio display does not appear. Panel switch cannot be operated for audio unit. Nighttime illumination does not appear for audio unit.
8	Input/ Output	M-CLOCK (AUDIO)	Hi: 4-5 Lo: 0-1	Ex-ists	Ex-ists	Audio display does not appear. Panel switch cannot be operated for audio unit. Nighttime illumination does not appear for audio unit.
9	Input/ Output	M-DATA (A/C)	Hi: 4-5 Lo: 0-1	Ex-ists	Ex-ists	A/C display does not appear. Outside air temperature does not appear
10	Input/ Output	M-CLOCK (AUDIO)	Hi: 4-5 Lo: 0-1	Ex-ists	Ex-ists	A/C display does not appear. Outside air temperature does not appear
11-14	–	–	–	–	–	–

Terminal No.	Input/ Output	Signal symbol	Terminal voltage (V)	Wiring harness problem		Trouble symptom caused by wiring harness problem
				Open circuit	Short circuit	
15	Input/ Output	K	Hi: System voltage Lo: 0-1	Exists	Exists	Values on trip information screen (average vehicle speed, fuel consumption and cruising distance) are abnormal. Communication is impossible between the engine-ECU and the MUT-II.
16	–	–	–	–	–	–
17	Input/ Output	M-BUSY (AUDIO)	Hi: 4-5 Lo: 0-1	Exists	Exists	Audio display does not appear. Panel switch cannot be operated for audio unit. Nighttime illumination does not appear for audio unit.
18	–	SHIELD-GND	–	–	–	–
19	Input/ Output	M-BUSY (A/C)	Hi: 4-5 Lo: 0-1	Exists	Exists	A/C display does not appear. Outside air temperature does not appear
20	–	SHIELD-GND	–	–	–	–
21, 22	–	–	–	–	–	–
23	Input	EX-TEMP		Exists	Exists	Outside air temperature does not appear.
24	Input	ILL+	Hi: System voltage Lo: 0-1	Exists	–	Nighttime illumination does not appear for audio units.
				–	Exists	Blown multipurpose fuse.
25	Input	ACC (ACC power supply)	System voltage	Exists	–	Screen display does not appear.
				–	Exists	Blown multipurpose fuse.
26	Input	+B	System voltage	Exists	–	Screen display does not appear.
				–	Exists	Blown multipurpose fuse.
27	Input	VSS	Hi: System voltage Lo: 0-1	Exists	Exists	Abnormal outside air temperature appears. (only diesel-powered vehicles)
28	–	GND (earth)	–	Exists	–	Screen display does not appear.
29, 30	–	–	–	–	–	–
31	–	GND-TEMP		Exists	Exists	Outside air temperature does not appear.
32	Input	ILL–		Exists	Exists	The display screen can not be dimmed.
33	Input	FUEL GAUGE	–		Exists	Abnormal cruising distance appears.

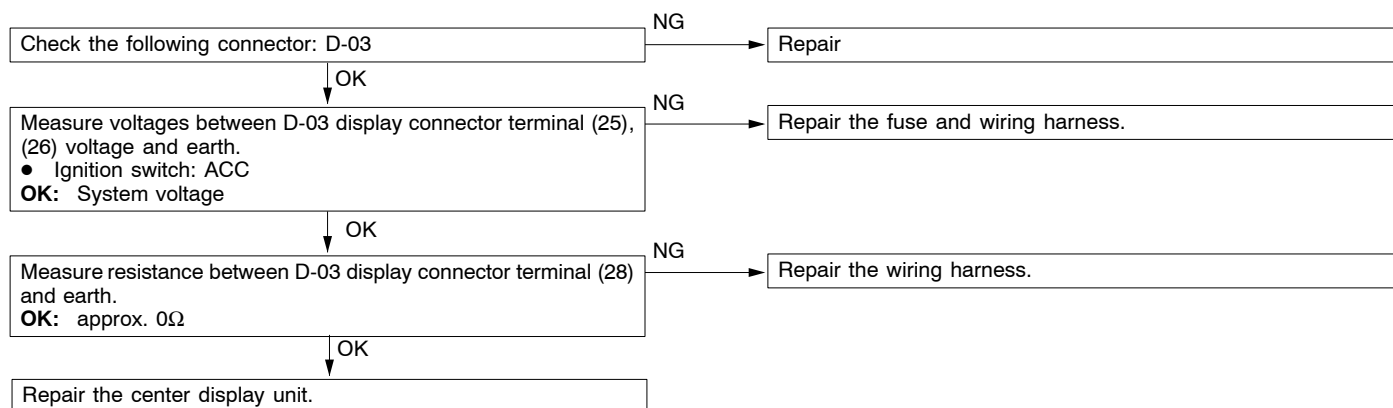
Terminal No.	Input/ Output	Signal symbol	Terminal voltage (V)	Wiring harness problem		Trouble symptom caused by wiring harness problem
				Open circuit	Short circuit	
34, 35	–	–	–	–	–	–
36	Input	IG1	Hi: System voltage	Exists	–	Communication with engine-ECU is impossible. Abnormal driving data values appear.
				–	Exists	Communication with engine-ECU is impossible. Abnormal driving data values appear. Blown multipurpose fuse.

INSPECTION CHART CLASSIFIED BY TROUBLE SYMPTOMS

Related unit	Trouble Symptom	Inspection procedure No.	Reference page
Malfunction of center display, related sensors, and wiring harnesses	No display appears after the ignition key is turned to the ACC position.	1	54A-63
	Outside air temperature does not appear or abnormal outside air temperature appears.	2	54A-63
	Abnormal vehicle speed is displayed on the service mode.	3	54A-64
	Abnormal driving data are displayed: <ul style="list-style-type: none"> Abnormal average fuel consumption (momentary fuel consumption) and average vehicle speed Abnormal cruising distance 	4	54A-65
	Clock runs fast or slow.	5	54A-65
	The display screen is dim.	6	54A-66
	Air conditioning display does not appear.	7	54A-67

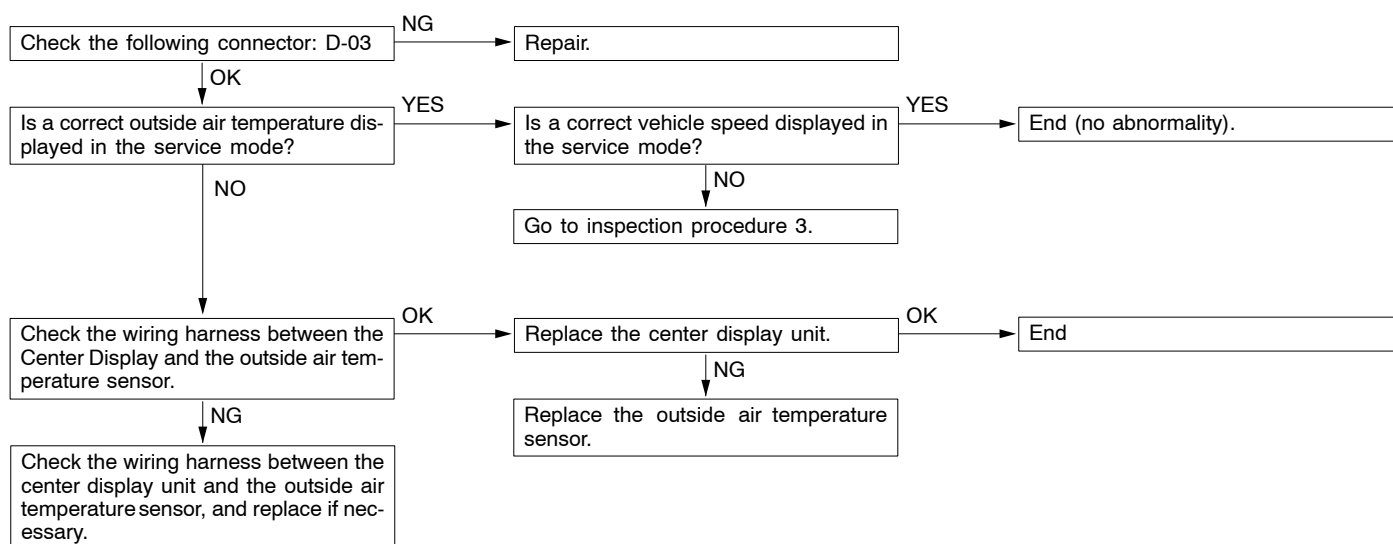
INSPECTION PROCEDURE 1

No display appears after the ignition key is turn to the ACC position.

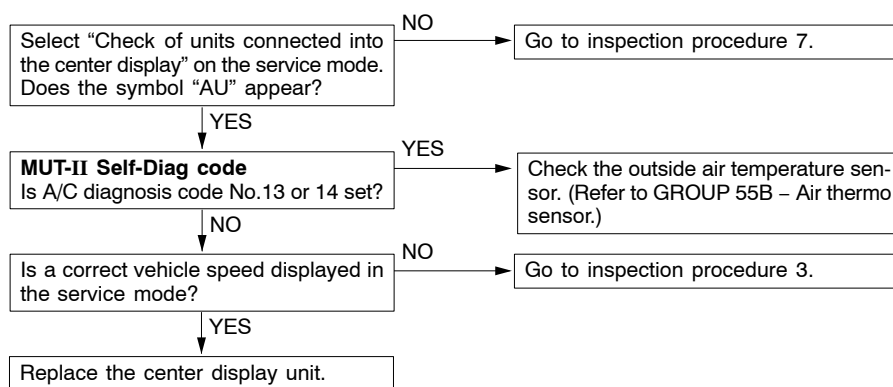
**INSPECTION PROCEDURE 2**

Outside air temperature does not appear or abnormal outside air temperature appears.

<Vehicles without automatic air conditioner system>



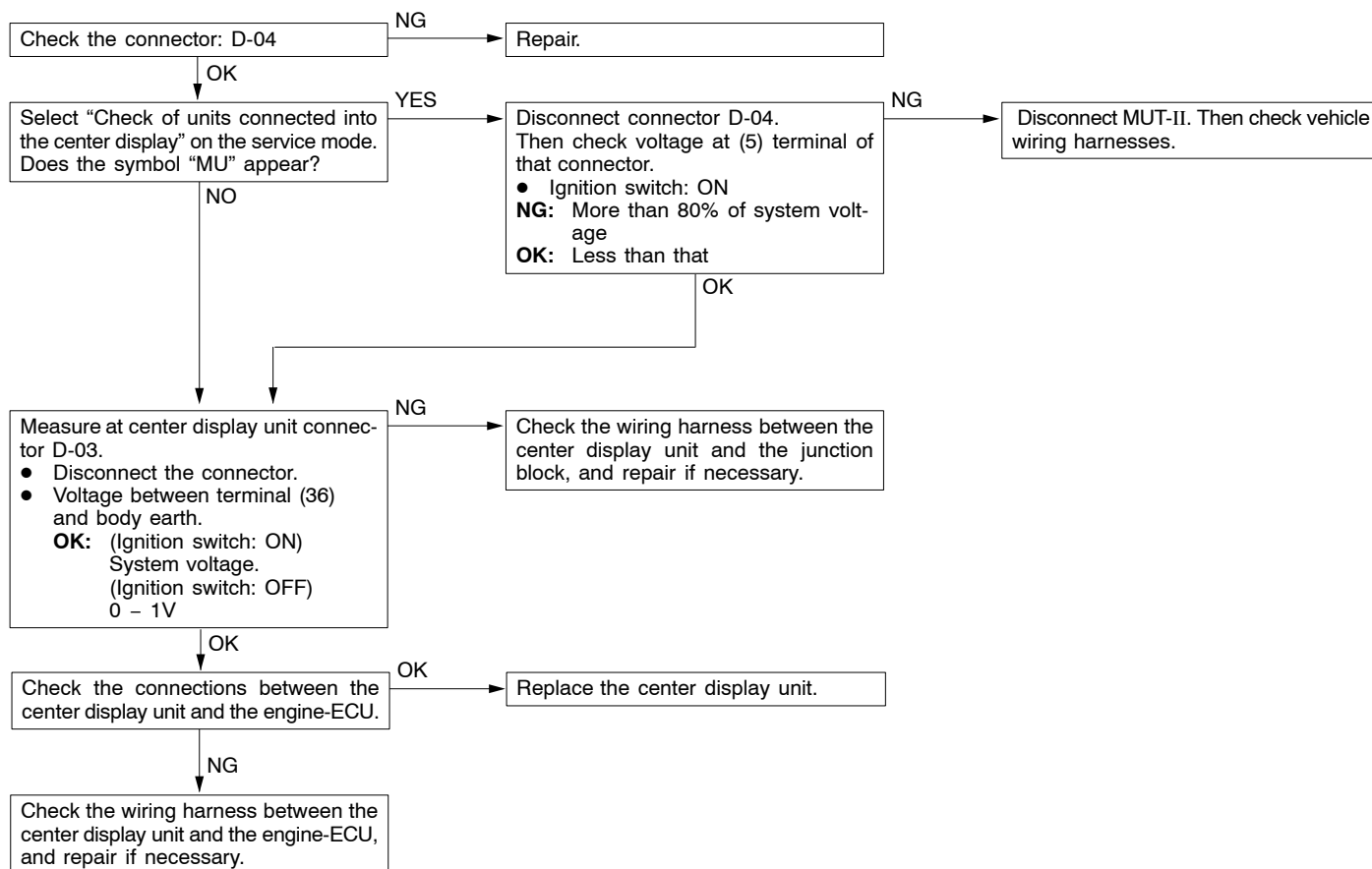
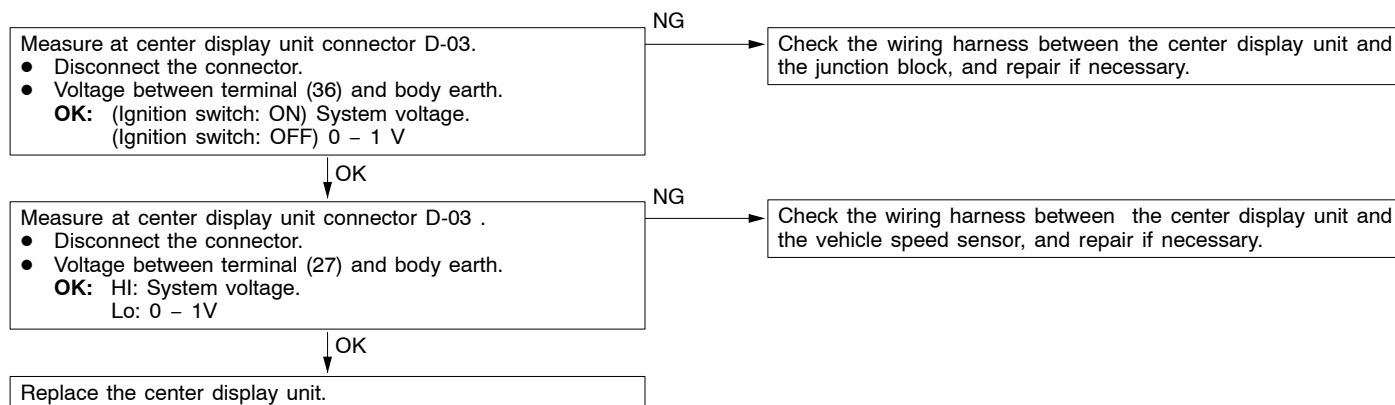
<Vehicles with automatic air conditioning system>



NOTE: It is necessary to drive for a while and get accurate temperature in display if you pass a area in which temperature is much different. It might show high temperature on display in case it is high around sensor due to high temperature of engine after battery is exchanged, or a display unit is reinstalled.

INSPECTION PROCEDURE 3

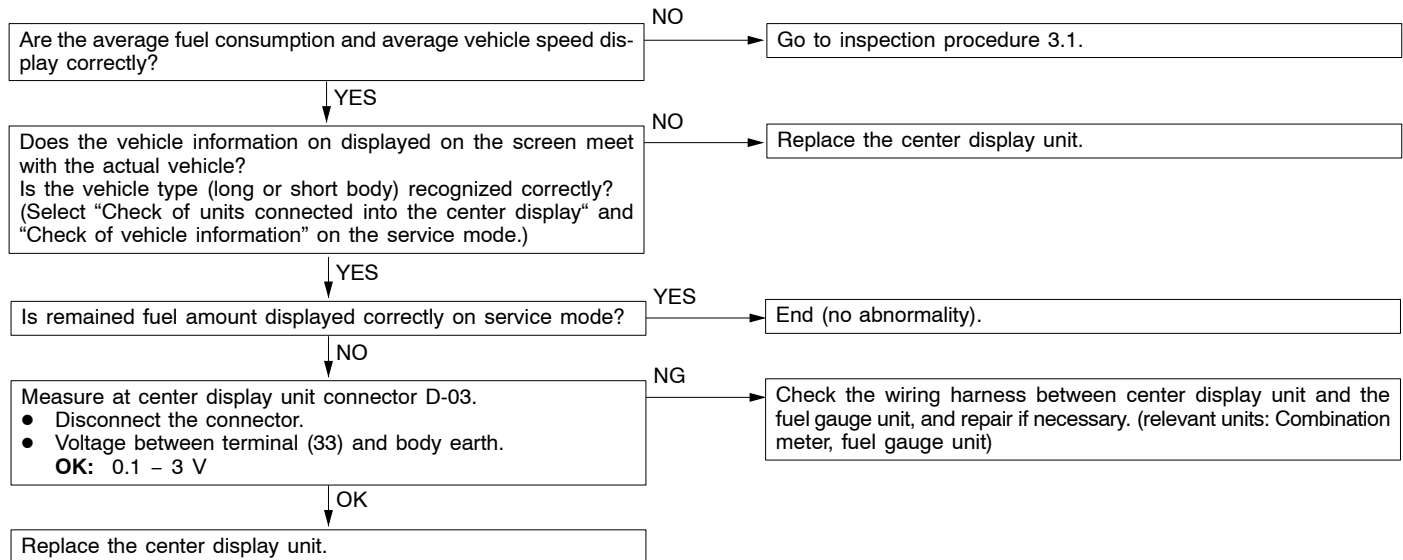
Abnormal vehicle speed is displayed on the service mode.

<Petrol-powered vehicles>**<Diesel-powered vehicles>**

INSPECTION PROCEDURE 4

Abnormal driving data are displayed:

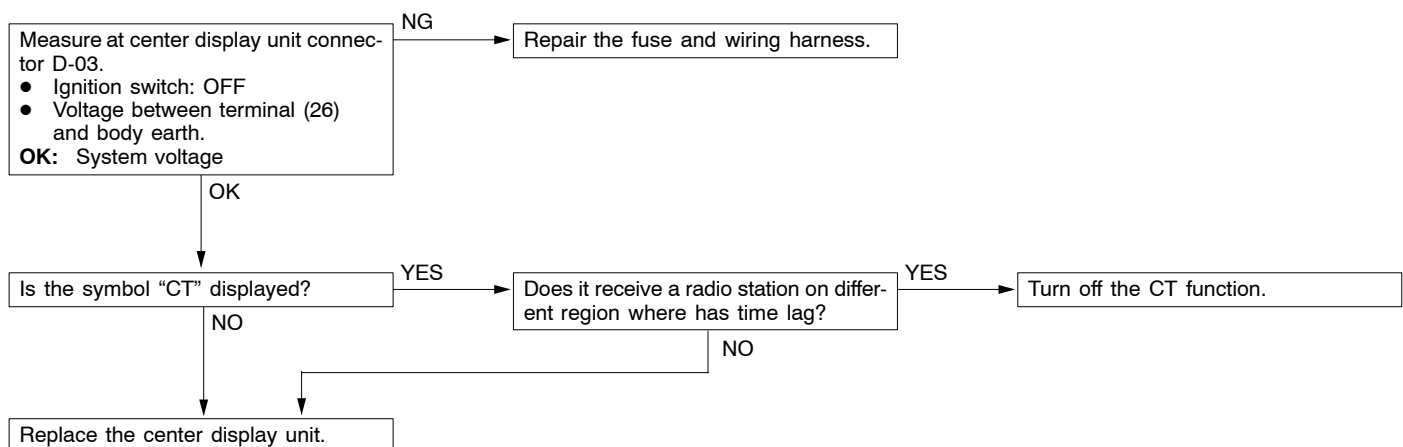
- Abnormal average fuel consumption (momentary fuel consumption) and average vehicle speed
- Abnormal cruising distance

**NOTE**

- (1) If the remained fuel amount is so small that the fuel gauge unit can not detect a correct amount, incorrect cruising range may be displayed.
- (2) Fuel consumption is updated each time fuel is supplied. Furthermore, the cruising range depends on road and driving conditions.

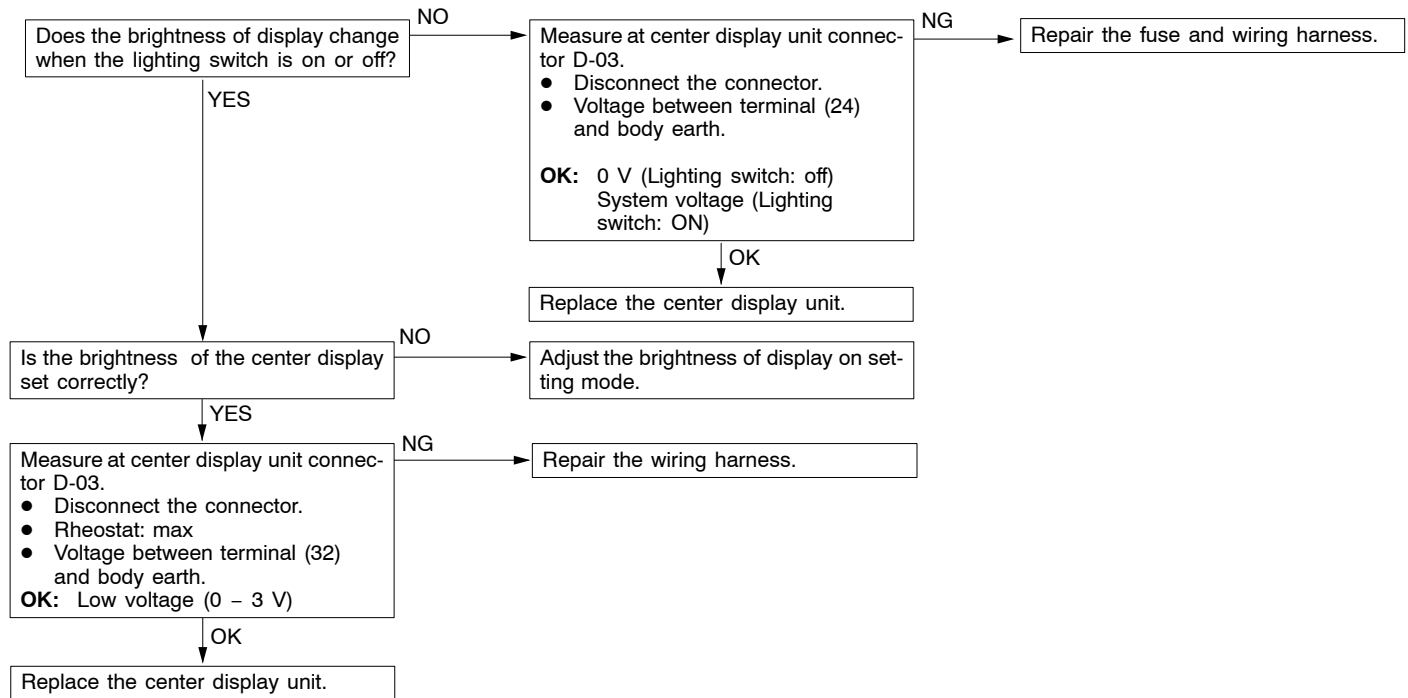
INSPECTION PROCEDURE 5

Clock runs fast or slow.



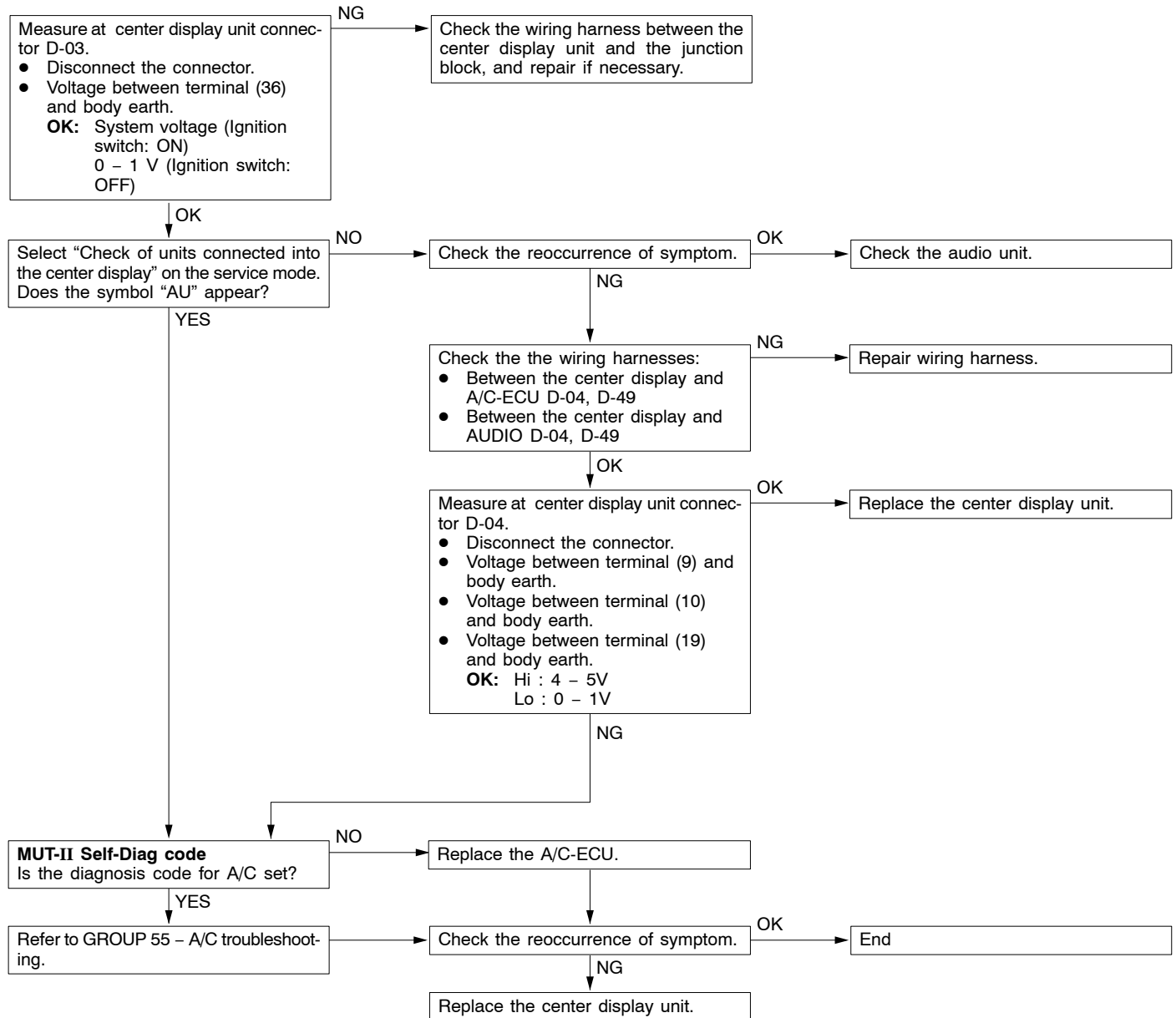
INSPECTION PROCEDURE 6

The display screen is dim.



INSPECTION PROCEDURE 7

Air conditioning display is not available.



TROUBLESHOOTING FOR RV METER

PRECAUTIONS WITH REGARD TO RV METER SERVICE WORK

PROBLEM DIAGNOSIS POINTS RELATING TO THE OVERALL SYSTEM

1. Check the connections of all related harness connectors. If any problems are found, repair the problem location and then re-check the trouble symptoms.
2. If there are no problems with the harness connections, check the harnesses. If there are no problems with the harnesses, replace the related unit. Make a note of the service function data at this time.

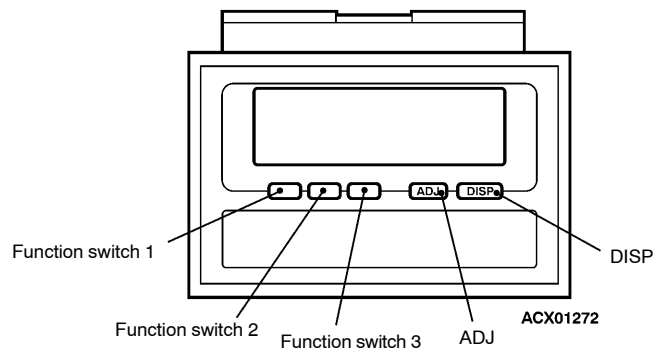
NOTE

If the cause of the problem is thought to be related to system communication, carry out troubleshooting.

PROBLEM DIAGNOSIS POINTS FOR TROUBLE WITH SPECIAL FUNCTIONS ONLY

1. Check the connections of the harnesses connectors which are related to the special function. If any problems are found, repair the problem location and then re-check the trouble symptoms.
2. If there are no problems with the connector connections, check the harnesses. If there are no problems with the harnesses, replace the unit which controls that function.

RV METER UNIT OPERATING PANEL



TROUBLE DIAGNOSIS SERVICE FUNCTIONS

The RV meter is equipped with the following trouble diagnosis service functions.

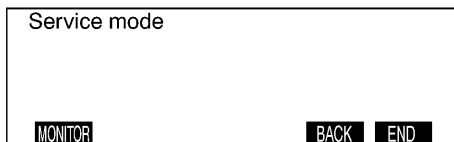
Function		Contents
Service functions	Automatic mode diagnosis	Carry out communication and wiring check continuously.
	Diagnosis mode	Carry out the version check of each unit, vehicle signal check, communication and wiring check.
	History mode	Display the number of errors after carrying out communication and wiring check.
	Monitor check mode	Inspect the screen display function and the geomagnetic sensor for proper operation.

1st menu of the service mode



ACX01984

2nd menu of the service mode



ACX01985

SERVICE FUNCTION STARTING

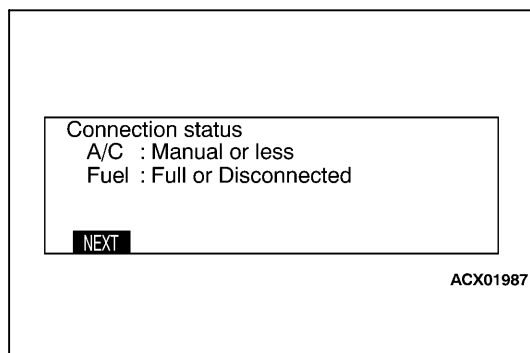
1. Turn the ignition switch to the LOCK (OFF) position, and then while pressing and holding the ADJ switch, turn the ignition switch to the ACC position.
After the adjustment switch has been pressed continuously for 5 seconds or longer, the reception signal sound (beep) will sound, and at the same time the service function will start up and the first menu of the service mode screen will be displayed.
2. When function switch 1 (Automatic) is pressed at the 1st menu of the service mode screen, the mode is switched to the automatic mode. When function switch 2 (DIAG) is pressed, the mode is switched to diagnosis mode. When function switch 3 (HISTORY) is pressed, the mode is switched to history mode. Moreover, when ADJ switch, "NEXT" is pressed, the mode is switched to the 2nd menu of the service mode.

AUTOMATIC MODE

1. When function switch 1 (Automatic) is pressed at the 1st menu of the service mode screen, the mode is switched to automatic checking mode.
At this time, a display will appear to prompt you to turn the ignition switch to the ON position.
2. When the ignition switch is turned to the ON position, communication and wiring check is carried out.

Checking the system connection.
Please Wait!

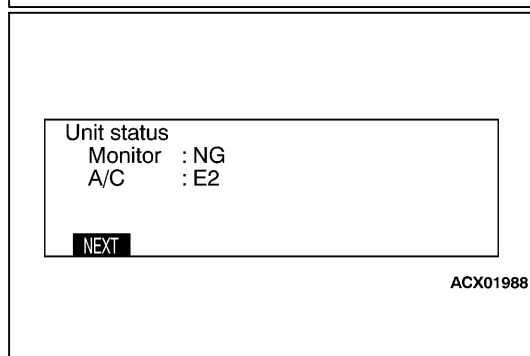
ACX01986



3. When the communication check is completed, the communication and wiring check results are displayed on the screen.

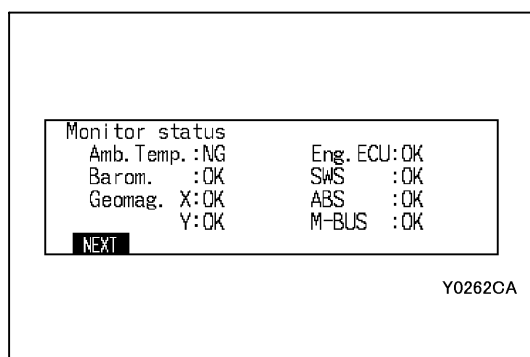
Air conditioner input (Automatic, Manual or without air conditioning) is displayed.

Fuel gauge input (OK, not connected or fuel tank full) is displayed.



4. When function switch 1 (NEXT) is displayed at the previous screen, the status of unit is displayed.

Item	Display example	Contents or conditions
Monitor	OK	—
Air conditioner	OK	—
	E1	Communication error
	E2	Open circuit or not connected

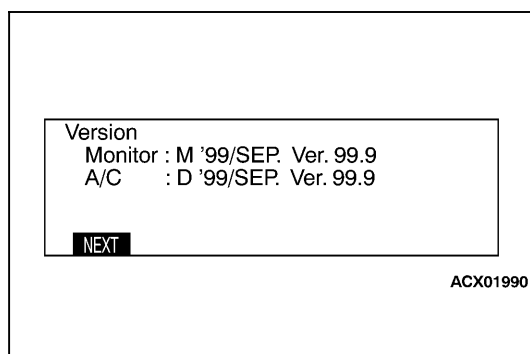


5. When function switch 1 (NEXT) is pressed at the previous screen, a list of monitor check items and results is displayed.

Item	Display example	Contents or conditions
Outside air	OK	—
Barometric pressure	OK	—
X direction, Y direction	OK	—
Eng.ECU, SWS, ABS, M-BUS	E1	Communication error
	E2	Open circuit or not connected

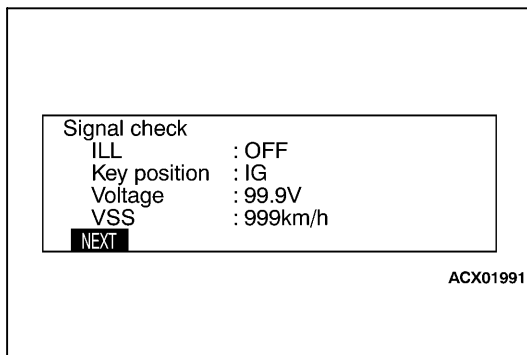
NOTE

- (1) For diesel vehicles, E2 is normally displayed for Eng.ECU.(meaning that it is not connected)
- (2) For vehicles without ABS, E2 is normally displayed for ABS.(meaning that it is not connected)

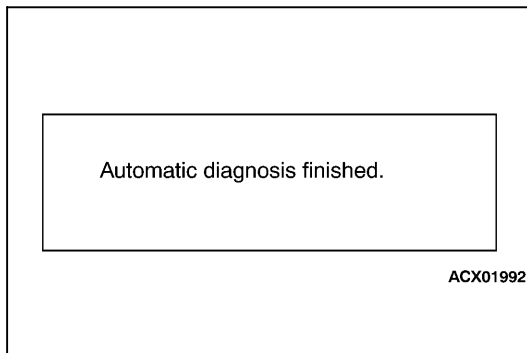


6. When function switch 1 (NEXT) is pressed at the previous screen, the version of monitor and air conditioner is displayed.

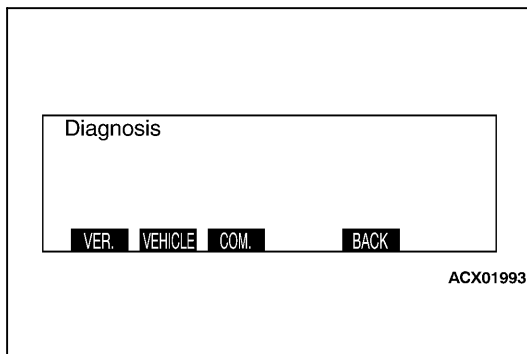
For vehicles without air conditioner or with a manual air conditioner, the version is not displayed.



7. When function switch 1 (NEXT) is pressed at the previous screen, the status of vehicle signal is displayed.

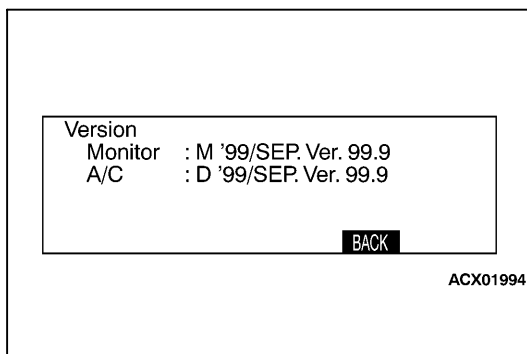


8. When function switch 1 (NEXT) is pressed at the previous screen, the mode is switched to the previous mode screen of the service mode screen approximately 7 seconds after displaying the message, "Automatic diagnosis is completed."

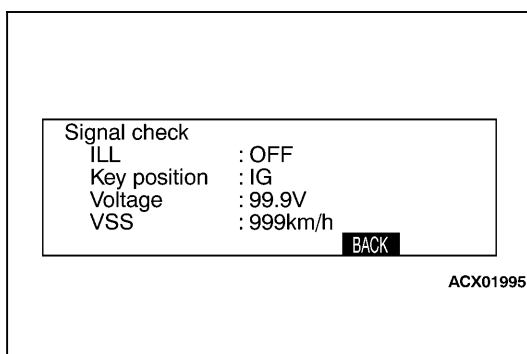


DIAGNOSIS MODE

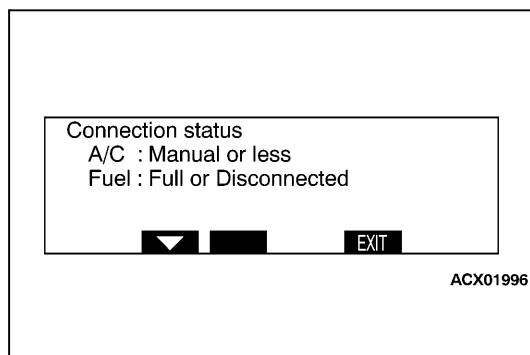
1. From the 1st menu of the service mode screen, press function switch 2 (DIAG) to display diagnosis mode.
2. The following displays appear when the various function switches are pressed.



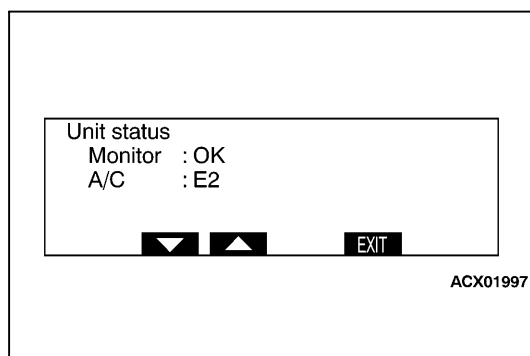
- (1) When function switch 1 (VER) is pressed, the version of monitor and air conditioner is displayed.



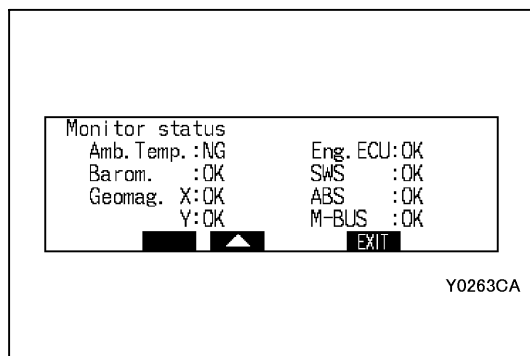
- (2) When function switch 2 (VEHICLE) is pressed, the vehicle signal condition is displayed.



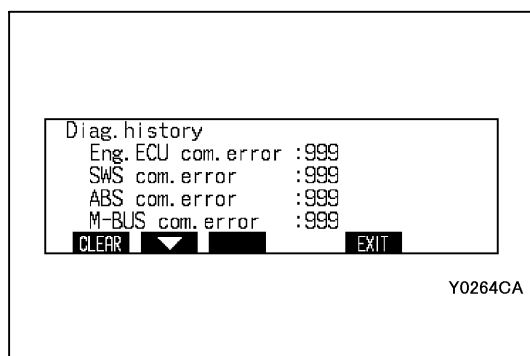
- (3) When function switch 3 (COM) is pressed, the results are displayed after communication and wiring check is carried out.



- When function switch 2 (▼) at the previous screen, the status of unit is displayed.



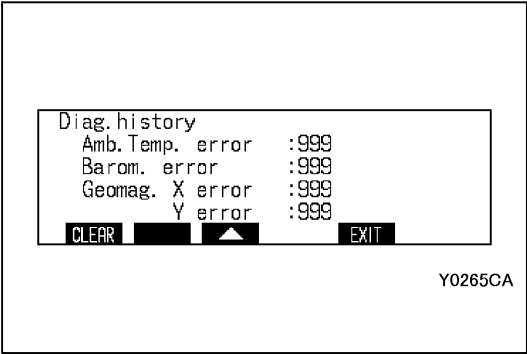
- When function switch 2 (▼) at the previous screen, the status of monitor is displayed.



HISTORY MODE

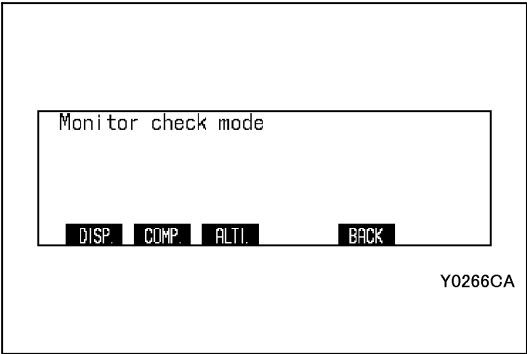
- (1) When function switch 3 (HISTORY) is pressed at the 1st menu of the service mode screen, the mode is switched to history mode.
- When function switch 1 (CLEAR) is pressed, the number of errors is erased. When the function switch 2 (▼) is pressed, the mode is switched to the 2nd menu of history mode.

Item	Display example	Contents
Eng.ECU, SWS, ABS, M-BUS	000	No. of communication errors



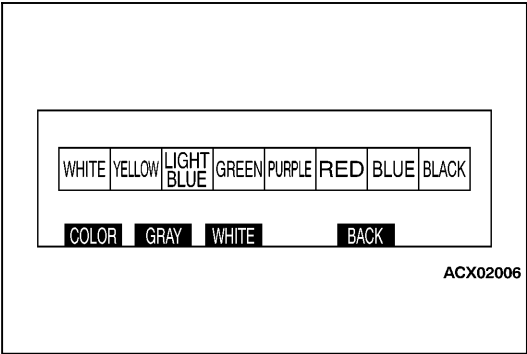
- When function switch 1 (CLEAR) is pressed, the number of errors is erased. When the function switch 3 (▲) is pressed, the mode is switched to the 1nd menu of history mode.

Item	Display example	Contents
Amb.Temp, Barom, Geomag X.Y	000	No. of communication errors

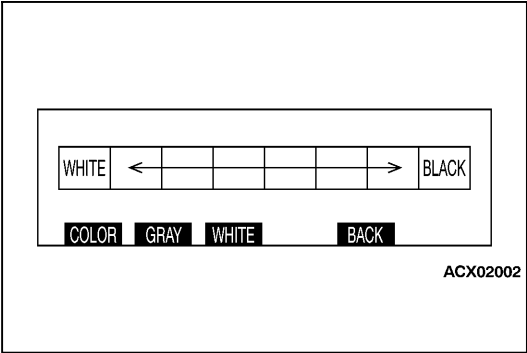


MONITOR CHECK MODE

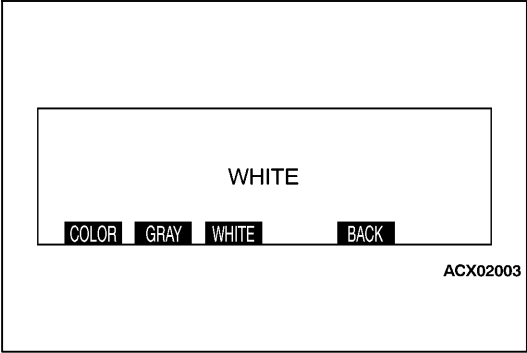
1. When function switch 1 (MONITOR) is pressed at the 2nd menu of the service mode screen, the mode is switched to monitor check mode.
The following displays appear when the various function switches are pressed.



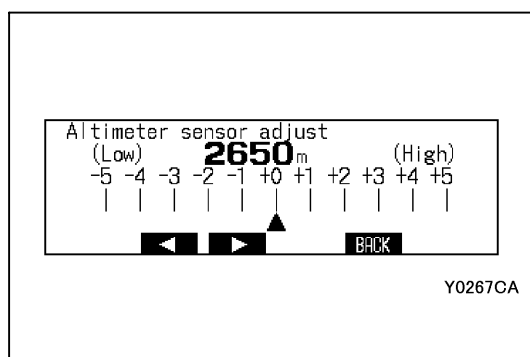
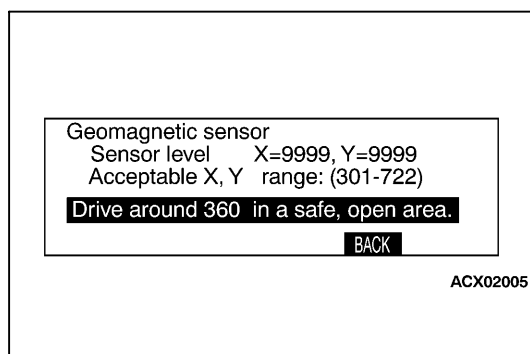
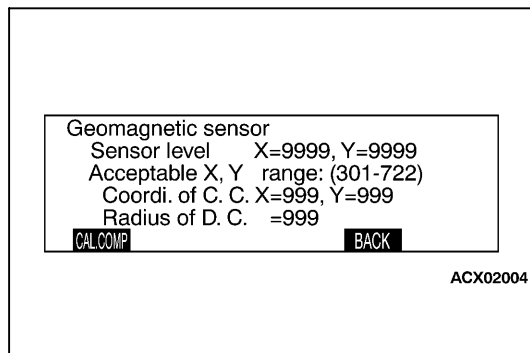
2. When function switch 1 (DISP) is pressed, the mode will be switched to display check mode.
 - When function switch 1 (COLOR) is pressed, the colour bar is displayed.



- When function switch 2 (GRAY) is pressed, the grey scale screen is displayed.



- When function switch 3 (WHITE) is pressed, the white screen is displayed.



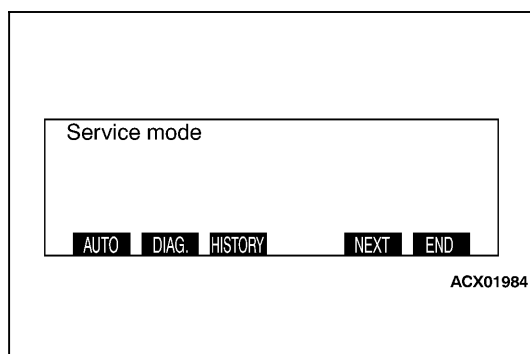
3. When function switch 2 (COMP) is pressed at the previous screen, the mode is switched to geomagnetic sensor mode.

- At geomagnetic sensor mode, outputs in X- and Y-axes of the geomagnetic sensor, the circular bearing coordinate, and the radius are displayed.

- When function switch1 (CAL.COMP) is pressed at the previous screen, the message shown in the illustration is displayed, and then when calibration has been completed, the circular bearing coordinate screen is displayed.

4. When function switch3 (ALTI) is pressed, the mode is switched to altitude correction mode.
The altitude can be corrected as follows using the function keys.

- When function switch 2 (◀) is pressed, the altitude is corrected downwards, and after approximately 5 seconds, the correction results are displayed in the altitude correction column.
- When function switch 3 (▶) is pressed, the altitude is corrected upwards, and after approximately 5 seconds, the correction results are displayed in the altitude correction column.
- When ADJ switch (BACK) is pressed, the mode is switched to monitor check mode screen.



CANCELLING SERVICE MODE

At the 1st menu of the service mode screen, press DISP switch (END) , or turn the ignition switch to the LOCK (OFF) position to cancel service mode.

SERVICE MODE FIRST MENU SCREEN

Service mode

AUTO

DIAG.

HISTORY

NEXT

END

VEHICLE MAGNETIC COMPENSATION

Confirmation of magnetisation and demagnetisation

1. Press the ADJ switch with the ignition switch at “LOCK”(OFF) position, and while keeping on pressing, turn the ignition switch to the “ACC” or “ON” position. When the ADJ switch is pressed continuously for more than five seconds, the service function is activated at the same time with the reception signal (pip sound) and the first menu screen of the service mode is displayed.

2. Press the ADJ[NEXT] switch.

The screen changes to the service mode second menu screen.

SERVICE MODE SECOND MENU SCREEN

Service mode

MONITOR

BACK

END

3. Press the function switch 1 [MONITOR] on the service mode second menu screen.

The screen is switched to the monitor check mode.

MONITOR CHECK MODE SCREEN

Monitor check mode

DISP.

COMP.

BACK

4. Press the function switch 2 [COMP] switch.

- Normal case that the body is not magnetised
The geomagnetic sensor mode screen is displayed. Each of X- and Y-outputs of the geomagnetic sensor, center coordinates, and radius of the direction circle are displayed.

Geomagnetic sensor

Sensor level X=XXX, Y=XXX

Acceptable X, Y range: (301-722)

Coordi. of C.C. X=999, Y=999

Radius of D.C. X=999, Y=999

CALCOMP

BACK

- Case that the body is magnetised
When the X- and Y-output in the “Sensor level” deviate from the range of 301 to 722, it is meant that the body is magnetised. The screen that calls upon to demagnetise the body stating “Demagnetise within range of acceptable level” is displayed. In this case, it is necessary to demagnetise the body and to correct the geomagnetic sensor.

Geomagnetic sensor

Sensor level X=XXX, Y=XXX

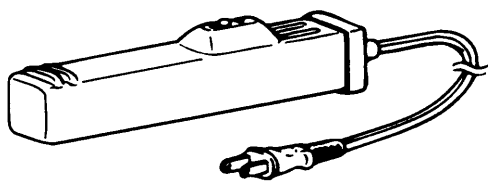
Acceptable X, Y range: (301-722)

Demagnetise within
range of acceptable level.

CALCOMP

BACK

Example: Commercial demagnetiser



AC001246AB

Geomagnetic sensor

Sensor level X=XXX, Y=XXX

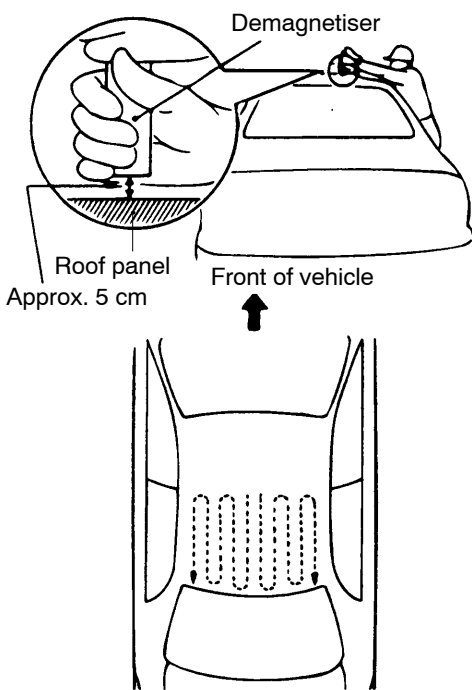
Acceptable X, Y range: (301-722)

Coordi. of C.C. X=999, Y=999

Radius of D.C. X=999, Y=999

CAL.COMP

BACK



AC001247

Geomagnetic sensor

Sensor level X=XXX, Y=XXX

Acceptable X, Y range: (301-722)

Demagnetise within
range of acceptable level.

CAL.COMP

BACK

Demagnetisation and correction method

1. Demagnetise the body using a commercial demagnetiser.
2. Run the engine in idling condition to call out the confirmation screen of magnetisation/demagnetisation on the RV meter.
3. While keeping the distance between the tip of demagnetiser and the roof panel to approx. 5 cm, move the demagnetiser slowly with a sweeping manner on the rear-half surface of roof panel.

Caution
If the tip of demagnetiser touches the roof panel, the magnetising condition of body becomes worse to the contrary. Absolutely avoid this.
4. Slowly draw the demagnetiser apart from the body. Turn OFF the switch of demagnetiser when it is apart from the body more than 50 cm.

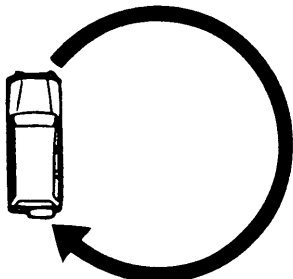
Caution
If the demagnetiser is turned OFF near the body or it is suddenly moved away from the body, the magnetising condition of body becomes worse to the contrary. Absolutely avoid these.
5. Perform the demagnetisation until the X- and Y-output of "Sensor level" become the range of 301 to 722 on the magnetisation/demagnetisation confirmation screen of the RV meter. Press the function switch 1 [CAL. COMP.] to call out the correction screen.

Geomagnetic sensor
Sensor level X=XXX, Y=XXX
Acceptable X, Y range: (301-722)
Drive around 360° in a safe, open area.

CAL COMP

BACK

6. The screen that demands driving around of the vehicle is displayed.



AC001243AB

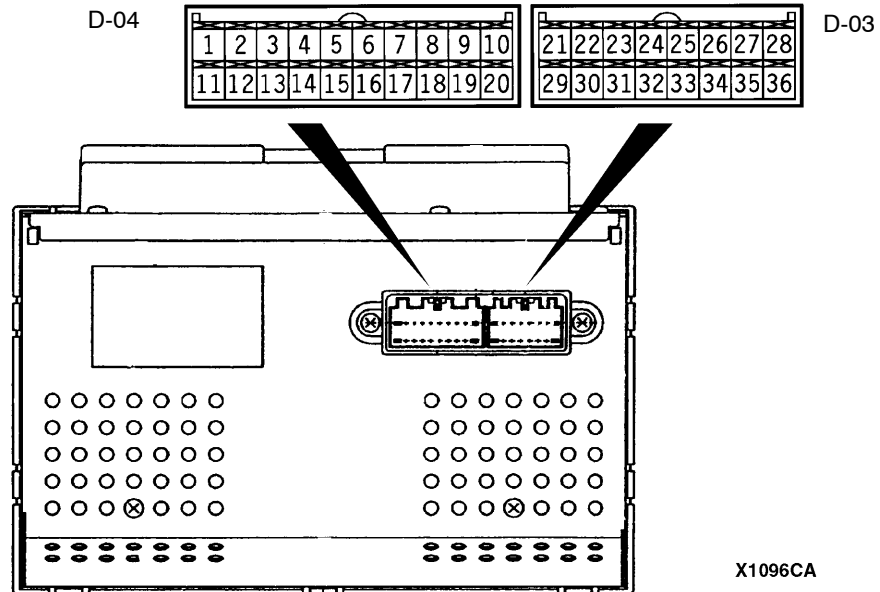
7. Drive around the vehicle.

NOTE

When driving around the vehicle to correct the sensor, select a safe and open area where there are no structures exist such as the high-tension line and the iron bridge that affect the geomagnetic sensor in circumference.

8. Press the ADJ [BACK.] switch to escape from the magnetisation/demagnetisation confirmation screen.

RV METER TERMINAL VOLTAGES



Terminal No.	Input/output	Signal symbol	Terminal voltage (V)	Harness problem		Trouble symptoms when there is a harness problem
				Open circuit	Short-circuit	
1 – 4	—	—	—	—	—	—
5	Input	ISOK (MUT-II data signal)	Hi: System voltage Lo: 0 – 1	Exists	Exists	Communication between the MUT-II and the engine-ECU <Diesel vehicles> or engine-A/T-ECU <petrol vehicles> is not possible.
6	Input/output	DATA (ETACS SWS data signal)	Hi: System voltage Lo: 0 – 1	Exists	Exists	<ul style="list-style-type: none"> Switch operating sound (buzzer) does not sound. Daytime/nighttime mode does not change in conjunction with the tail gate lamps. Indicators (buttons, illumination panel) do not illuminate.
7 – 8	—	—	—	—	—	—
9	Input/output	M-DATA(A/C) (M-BUS data signal)	Hi: 4 – 5 Lo: 0 – 1	Exists	Exists	<ul style="list-style-type: none"> Air conditioner information does not appear on the screen. Outside air temperature is not displayed.
10	Input/output	M-CLOCK(A/C) (M-BUSC lock signal)	Hi: 4 – 5 Lo: 0 – 1	Exists	Exists	<ul style="list-style-type: none"> Air conditioner information does not appear on the screen. Outside air temperature is not displayed.

Terminal No.	Input/output	Signal symbol	Terminal voltage (V)	Harness problem		Trouble symptoms when there is a harness problem
				Open circuit	Short-circuit	
11 – 14	–	–	–	–	–	–
15	Input/output	K (engine K-LINE signal)	Hi: System voltage Lo: 0 – 1	Exists	Exists	<ul style="list-style-type: none"> Wiring communication error Communication between the engine-A/T-ECU <Petrol vehicles> is not possible. Abnormal driving information numerical display
Terminal No.	Input/output	Signal symbol	Terminal voltage (V)	Harness problem		Trouble symptoms when there is a harness problem
				Open circuit	Short-circuit	
16	Input	WHEEL SPEED SERIAL SIGNAL	Hi: System voltage Lo: 0 – 1	Exists	Exists	Wheel speed information screen does not appear.
17 – 18	–	–	–	–	–	–
Terminal No.	Input/output	Signal symbol	Terminal voltage (V)	Harness problem		Trouble symptoms when there is a harness problem
				Open circuit	Short-circuit	
19	Input/output	M-BUSY (A/C)	Hi: System voltage Lo: 0 – 1	Exists	Exists	<ul style="list-style-type: none"> Air conditioner information does not appear on the screen. Outside air temperature is not displayed.
20	–	SHIELD-GND	–	–	–	–
21 – 22	–	–	–	–	–	–
24	Input	ILL + (Lighting switch)	Hi: System voltage Lo: 0 – 1	Exists	Exists	Does not illuminate.
25	Input	ACC (ACC power supply)	System voltage	Exists	–	Screen does not appear. No operations are possible.
				–	Exists	Blown multi-purpose fuse
26	Input	+B	System voltage	Exists	–	Screen does not appear. No operations are possible.
				–	Exists	Blown multi-purpose fuse
27	Input	VSS (Vehicle speed pulse signal)	Hi: System voltage Lo: 0 – 1	Exists	Exists	<ul style="list-style-type: none"> Abnormal “Distance km after replacement” display in maintenance screen Switches which are not supposed to operate during driving do operate. (Example: ⌚ clock adjustment screen, maintenance settings, etc.) Outside air temperature display is abnormally high.
28	–	GND (earth)	–	Exists	–	Screen does not appear.

Terminal No.	Input/output	Signal symbol	Terminal voltage (V)	Harness problem		Trouble symptoms when there is a harness problem
				Open circuit	Short-circuit	
29 – 31	–	–	–	–	–	–
32	–	ILL – (illumination light adjustment signal)	–	Exists	Exists	Unable to adjust illumination light
33	Input	FUEL GAUGE	0 – 3	Exists	Exists	–
34 – 36	–	–	–	–	–	–

CHART CLASSIFIED BY TROUBLE SYMPTOMS

Related unit	Trouble Symptom	Inspection procedure No.	Reference page
Malfunction of RV meter	No system operations can be carried out.	1	54A-80
	System voltage drop warning screen appears.	2	54A-80
	Outside air temperature does not display normally.	3	54A-81
	Compass does not display normally.	4	54A-81
	Altimeter does not display normally.	5	54A-82
	Wheel speed information does not display normally. (Vehicles with ABS only)	6	54A-82
	Air conditioner information does not display normally.	7	54A-83

INSPECTION PROCEDURES FOR EACH TROUBLE SYMPTOM

Inspection procedure 1

No system operations can be carried out.

Check the following connectors: D-27, D-221, D-31, D-07, D-30

NG

Repair

OK

Check the trouble symptoms.

NG

Replace the RV meter.

Inspection procedure 2

System voltage abnormality screen appears.

Does the voltage abnormality screen appear immediately after the ignition switch is turned to the ACC position?

NO

End

YES

Measure at RV meter connector D-07.

- Connector disconnected
 - Voltage between terminal (26) and body earth
- OK: System voltage

OK

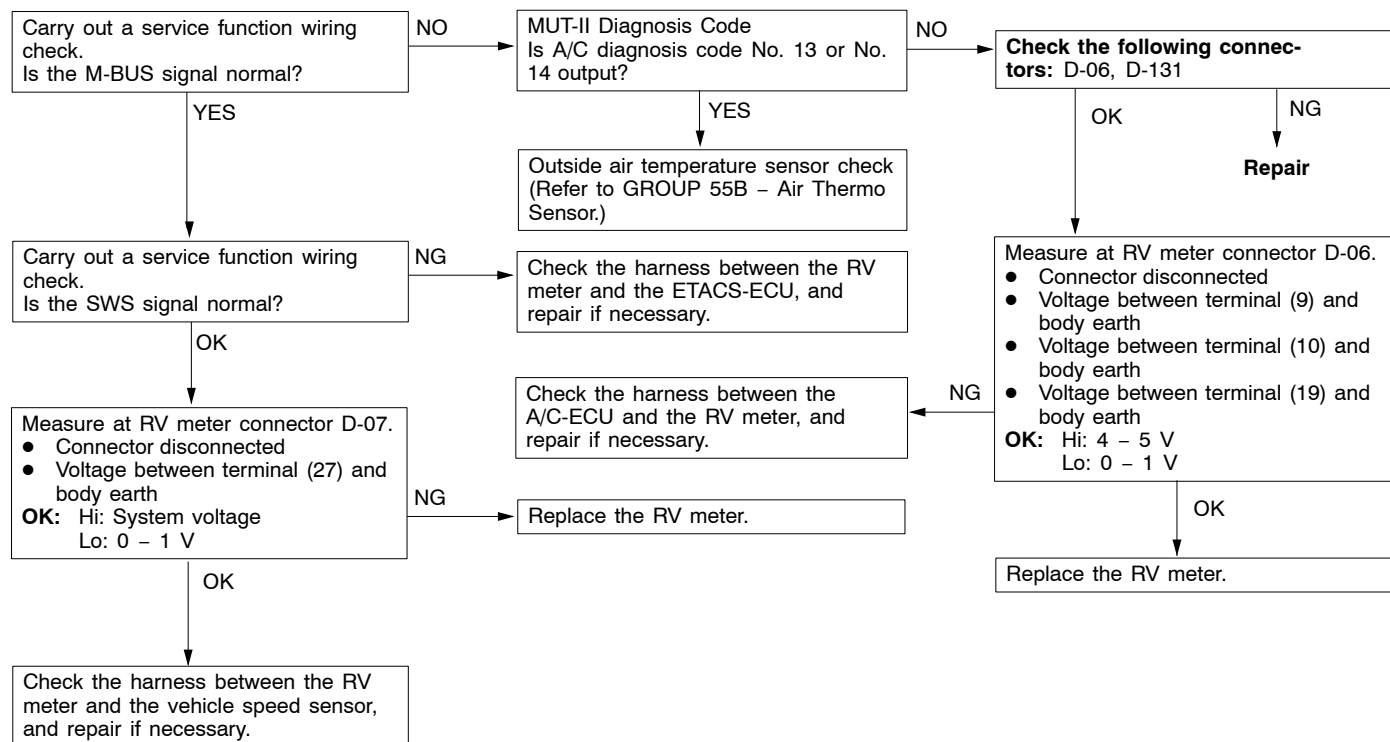
Malfunction of RV meter voltage judgment circuit

NG

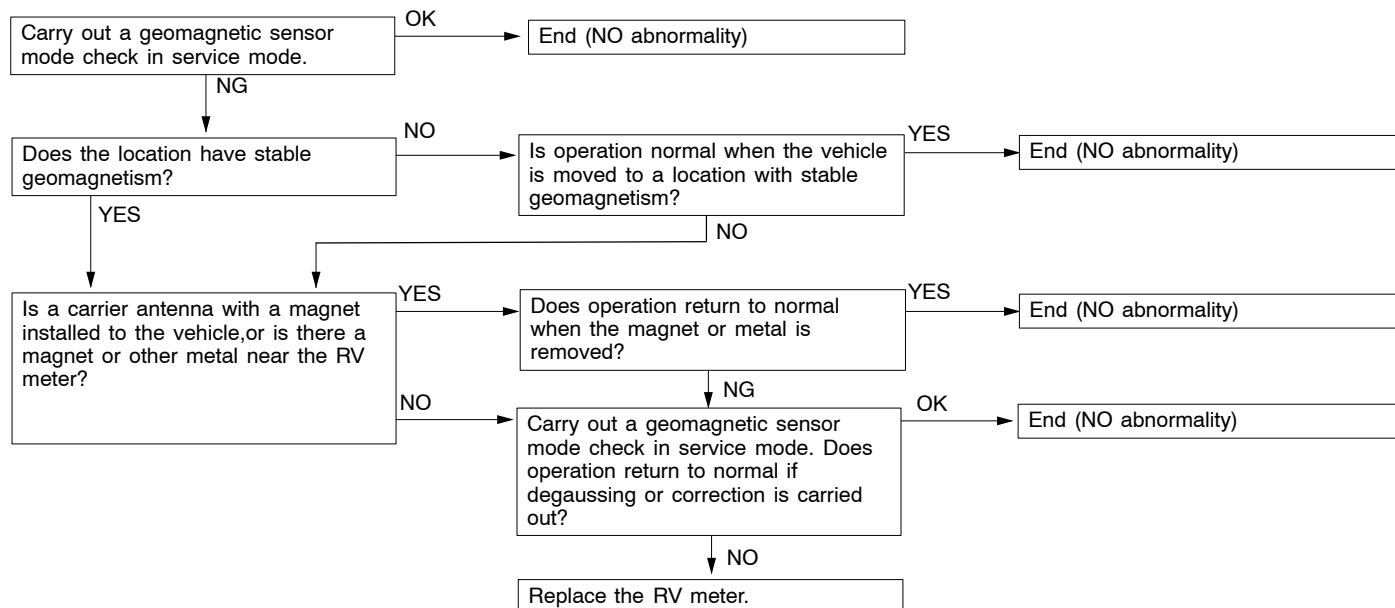
Replace the RV meter.

Replace the battery.

Inspection procedure 3

Outside air temperature does not display normally.

Inspection procedure 4

Compass does not display normally.

Inspection procedure 5

Altimeter does not display normally.

Carry out an altitude correction mode check in service mode.

OK

End (No abnormality)

NG

Replace the RV meter.

Inspection procedure 6

Wheel speed information does not display normally.(Vehicles with ABS only)

Carry out a service function communication and wiring check. One of the following ABS outputs will appear.

- (1) E1 (Communication error)
(2) E2 (Open circuit or short-circuit)
(3) OK

(1)

Measure at RV meter connector D-06.

- Connector disconnected
- Voltage between terminal (16) and body earth

OK: Hi: System voltage
Lo: 0 – 1V

OK

Replace the RV meter.

NG

Measure the wave pattern at ABS-ECU connector E-106.

- Connector disconnected
- Voltage between terminal (24) and body earth

OK: Hi: System voltage
Lo: 0 – 1V

NG

Check the trouble symptoms.

OK

Check the following connectors: D-06, E-111, E-106

OK

NG

Repair

Check the harness between the RV meter and the ABS-ECU, and repair if necessary.

NO

Replace the RV meter.

YES

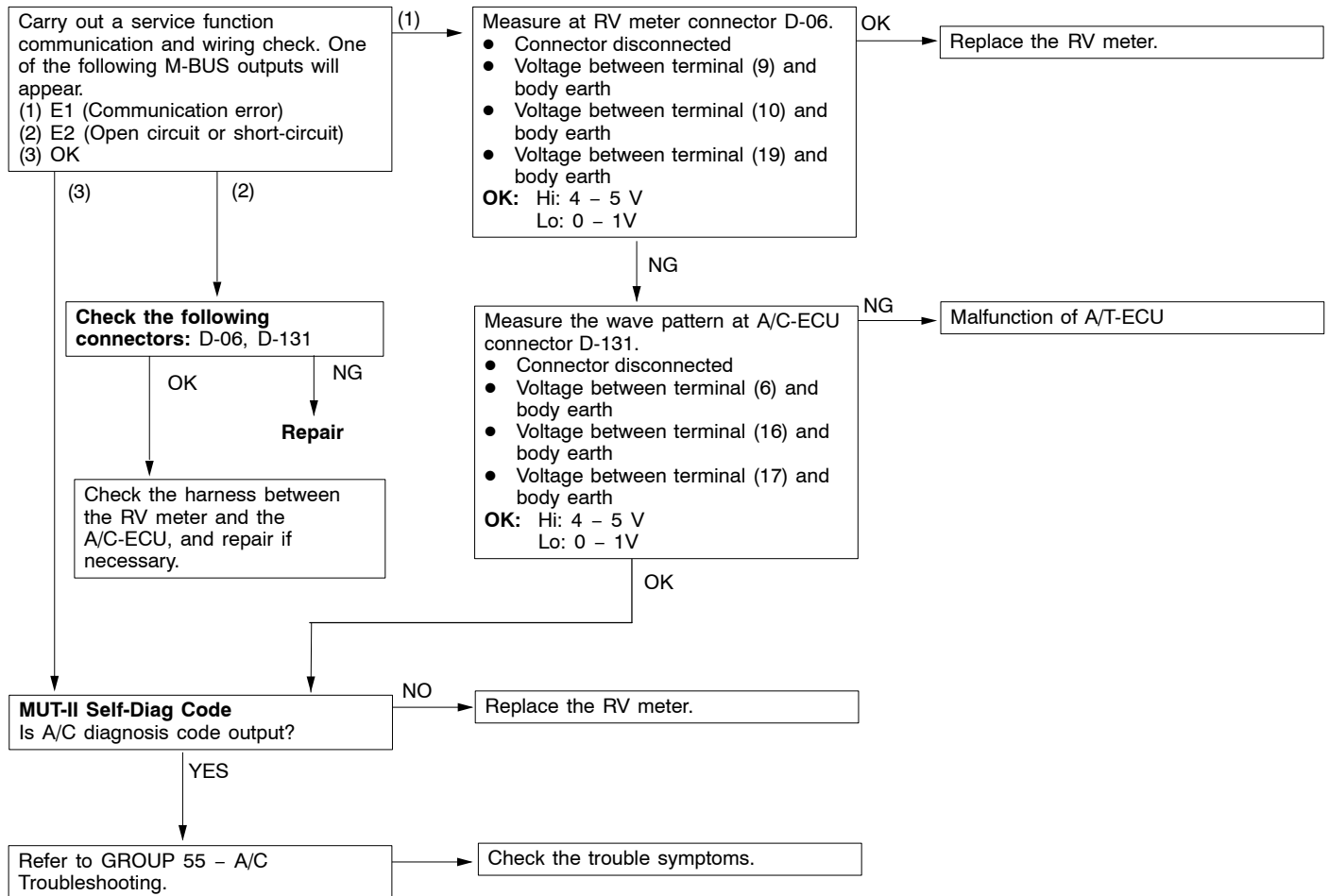
Refer to GROUP 35B – ABS Troubleshooting.

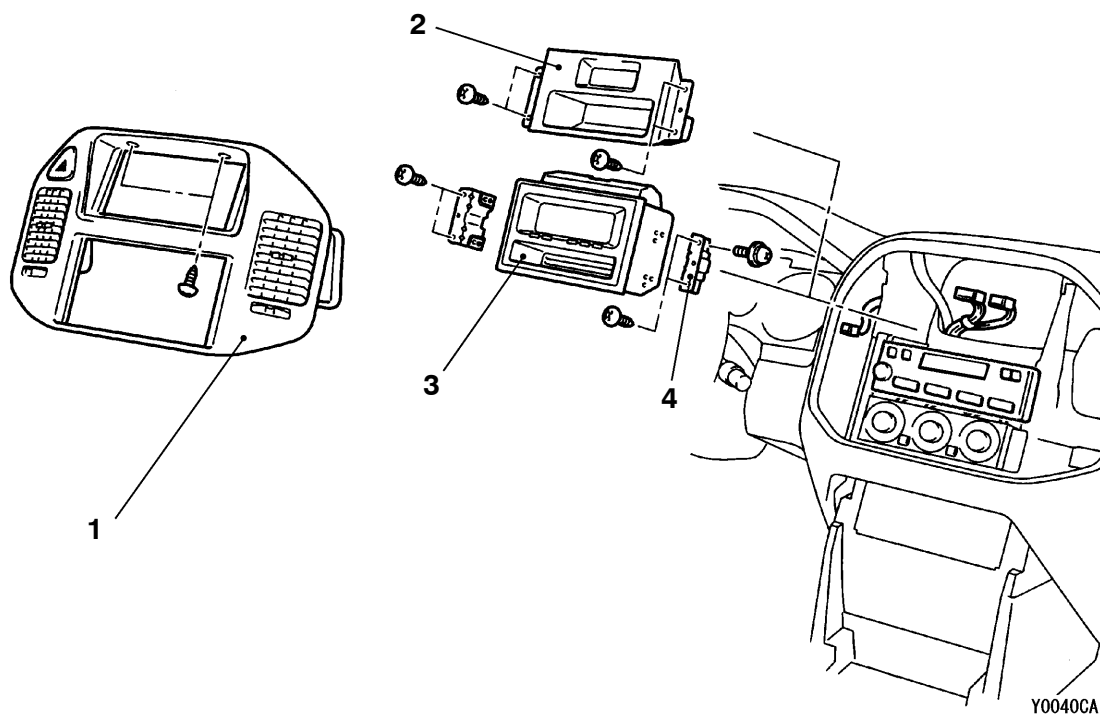
Check the trouble symptoms.

MUT-II Self-Diag Code
Is an ABS diagnosis code output, or is the warning lamp illuminated?

Inspection procedure 7

Air conditioner information does not display normally.



CLOCK, RV METER OR CENTER DISPLAY**REMOVAL AND INSTALLATION****Removal steps**

1. Center panel
(Refer to GROUP 52A – Instrument Panel.)
2. Clock
3. RV meter or Center display
4. Bracket

RADIO/TAPE PLAYER

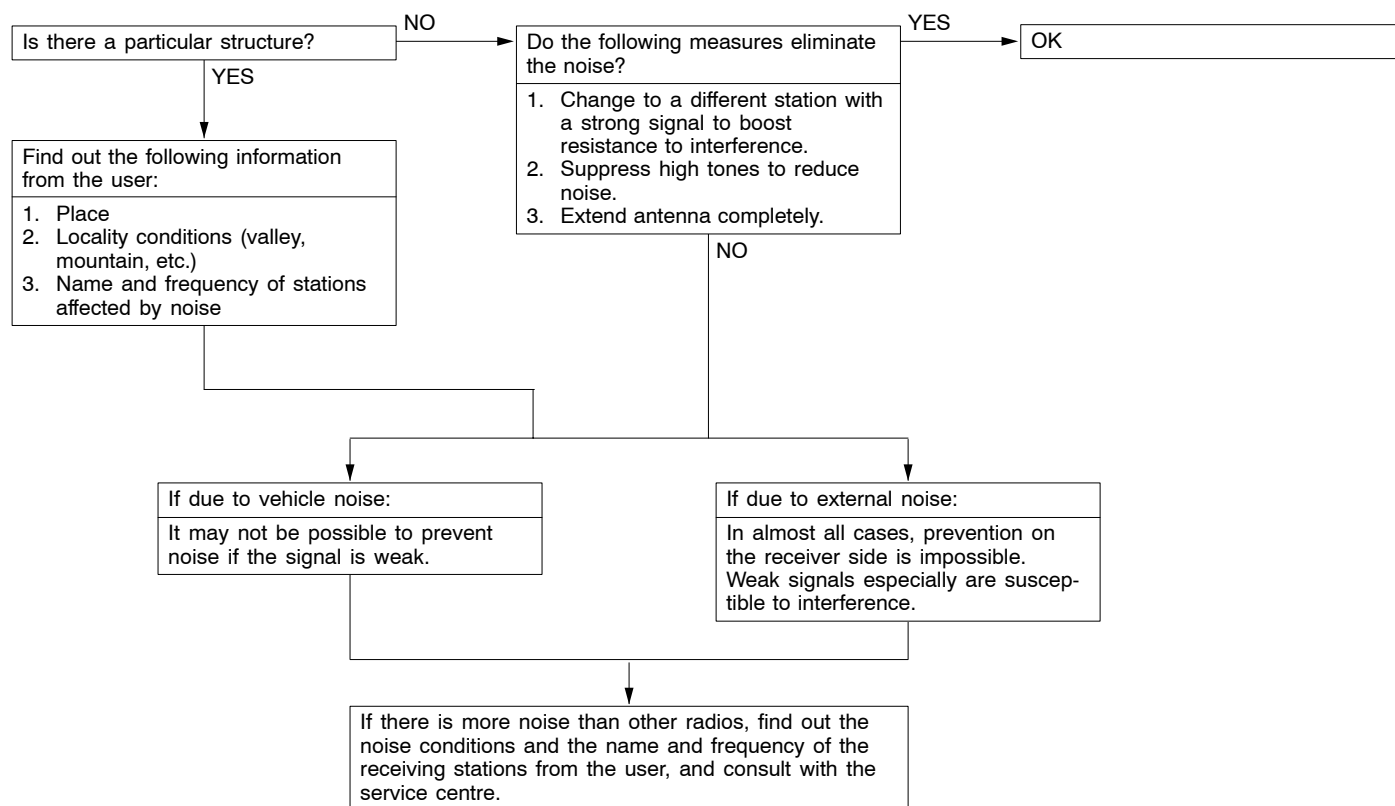
TROUBLESHOOTING

QUICK-REFERENCE TROUBLESHOOTING CHART

Items	Problem symptom	Relevant chart
Noise	Noise appears at certain places when travelling.	A-1
	Mixed with noise, only at night.	A-2
	Broadcasts can be heard but UKW/MW/LW has a lot of noise.	A-3
	There is noise when starting the engine.	A-4
	Some noise appears when there is vibration or shocks during travelling.	A-5
	Ever-present noise.	A-6
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 UKW/MW/LW or no sound from UKW/MW/LW.	B-3
	Insufficient sensitivity.	B-4
	Distortion on UKW/MW/LW.	B-5
	Too few automatic select stations.	B-6
	Insufficient memory (preset stations are erased).	B-7
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.

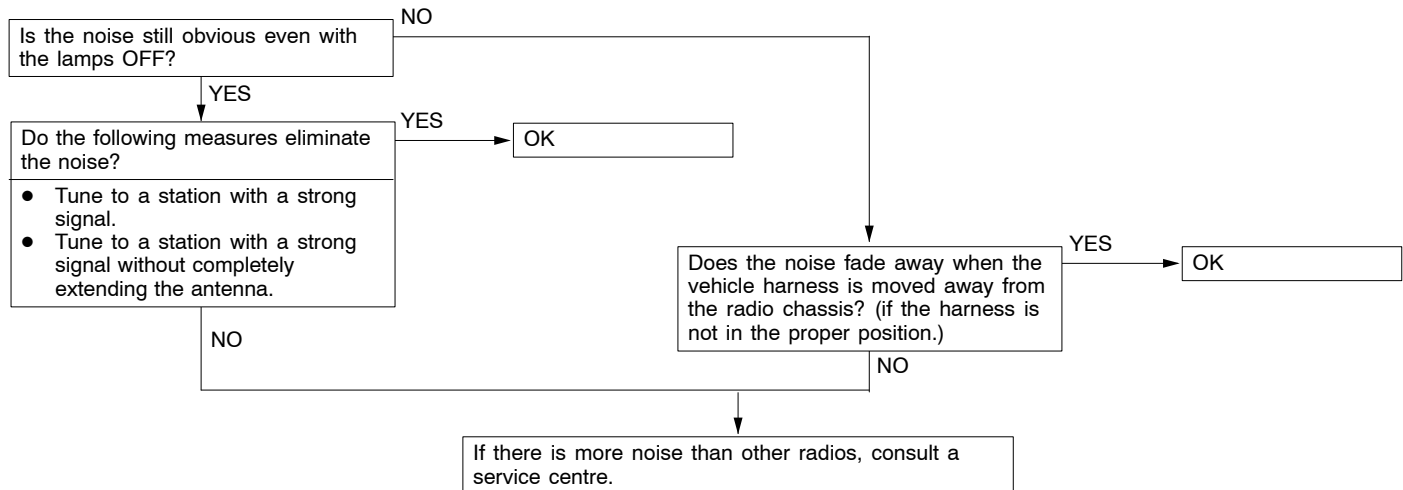
A-2 Mixed with noise, only at night.

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-3 Broadcasts can be heard but UKW/MW/LW has a lot of noise.

(1)

Noise occurs when the engine is stopped.

YES

Do the following measures eliminate the noise?

- Tune to a station with a strong signal.
- Extend the antenna completely.
- Adjust the sound quality to suppress high tones.

YES

OK

NO

Is the radio body earth mounted securely?

NO

Securely tighten the nuts for the body earth.

YES

Is the antenna plug properly connected to the radio?

NO

Correctly attach the antenna plug.

YES

Is the antenna itself in good condition or is it properly mounted?

NO

Clean the antenna plug and earth wire mounting area. Mount the antenna securely.

YES

Is the noise eliminated?

YES

OK

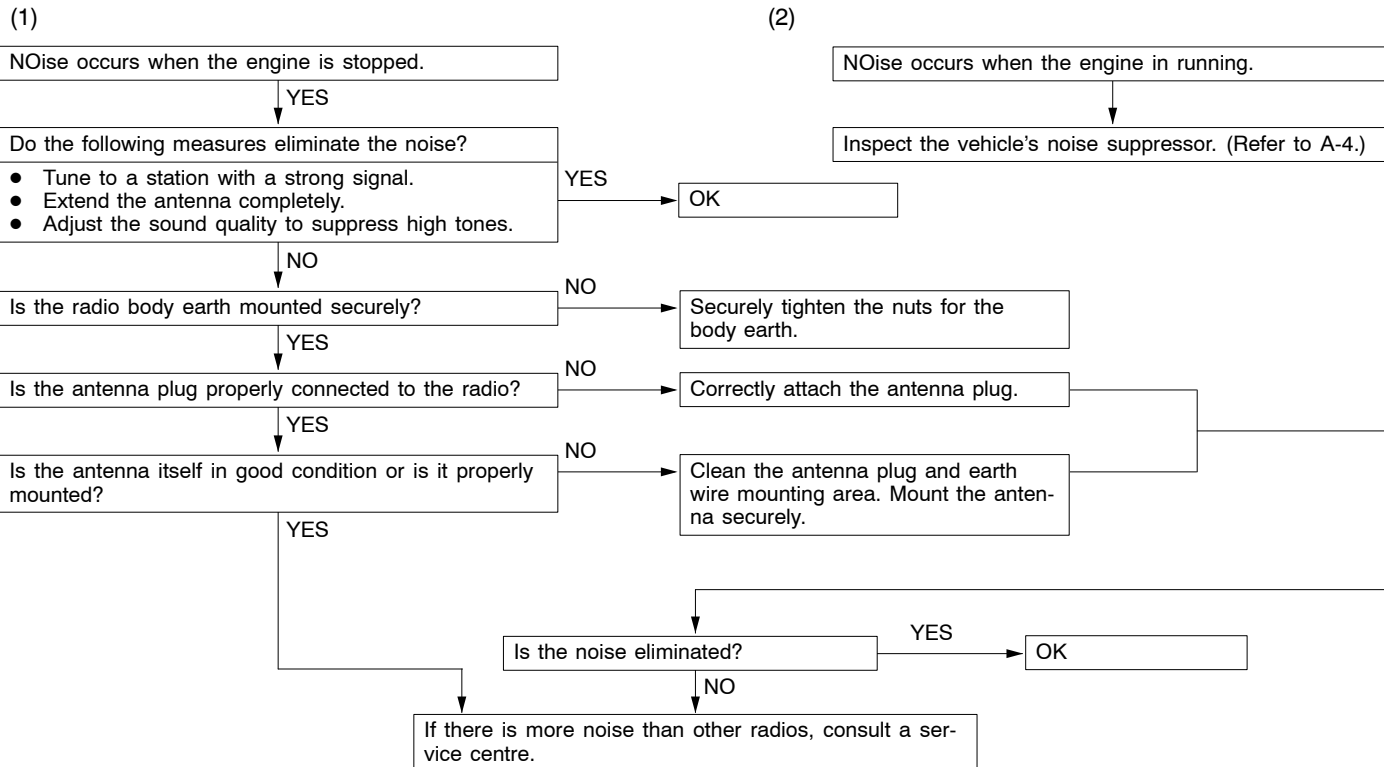
NO

If there is more noise than other radios, consult a service centre.

(2)

Noise occurs when the engine is running.

Inspect the vehicle's noise suppressor. (Refer to A-4.)



A-4 There is noise when starting the engine.

Noise type Sounds are in parentheses ().	Conditions	Cause	Remedy
UKW/MW/LW: 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, 3, 4 and 5 on P.54-89 and 54-90.) Check or replace the noise capacitor.
Other electrical components	–	Noise may appear as electrical components become older.	Repair or replace electrical components.
Static electricity (Cracking, crinkling)	<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.

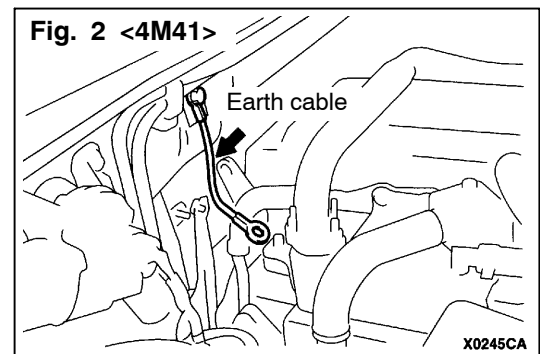
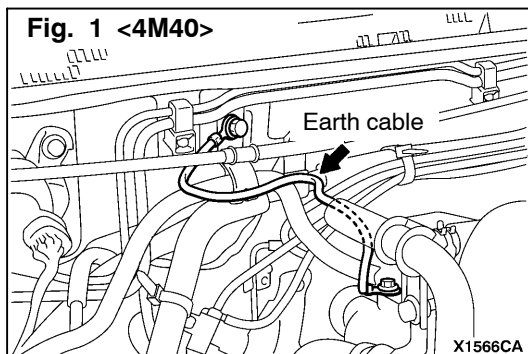


Fig. 3 <GDI>

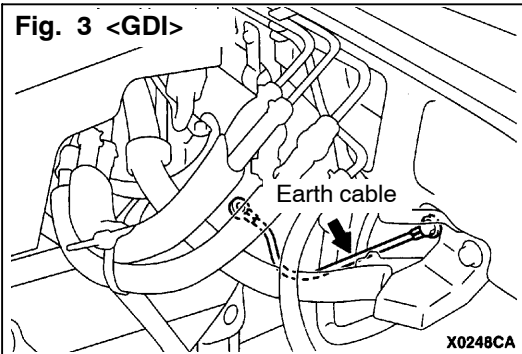


Fig. 4 <MPI>

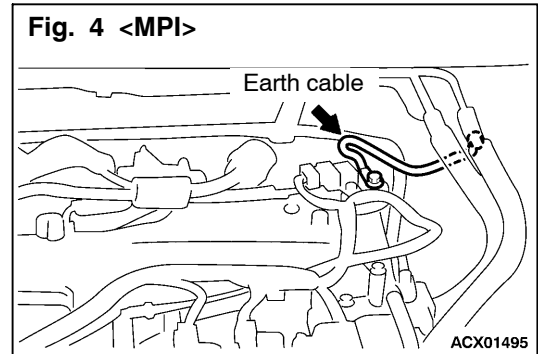
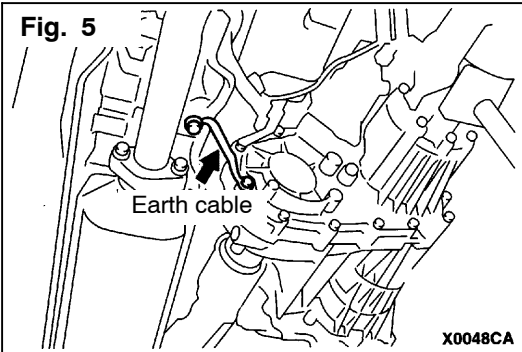
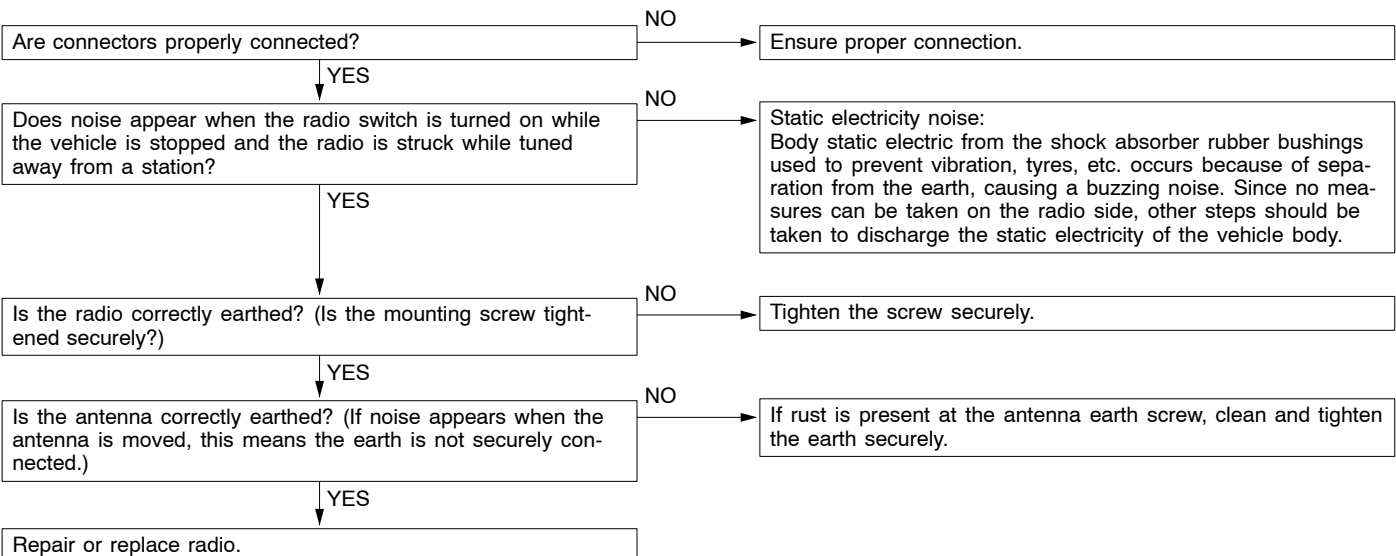


Fig. 5



A-5 Some noise appears when there is vibration or shocks during travelling.

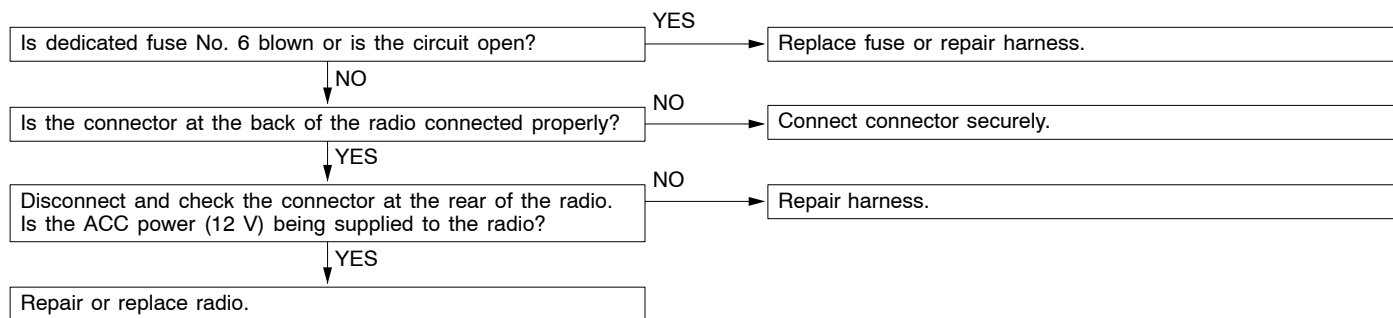
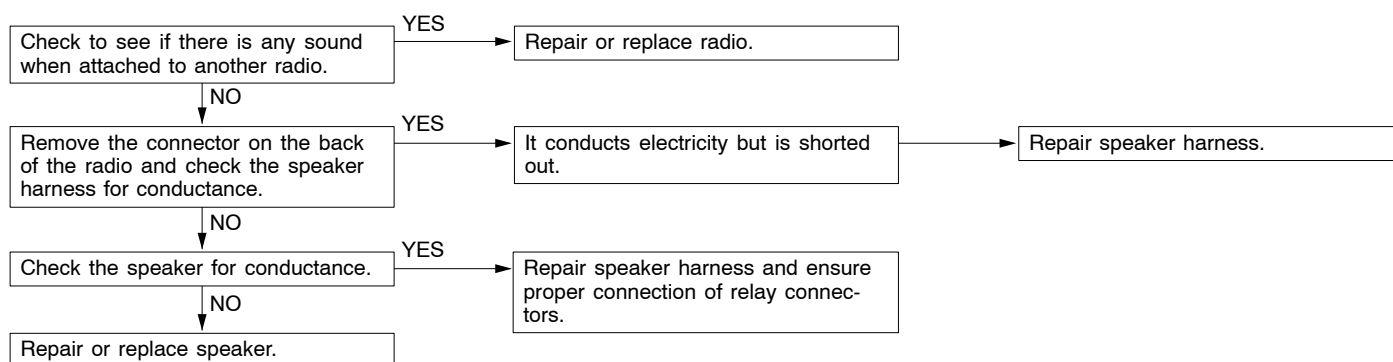


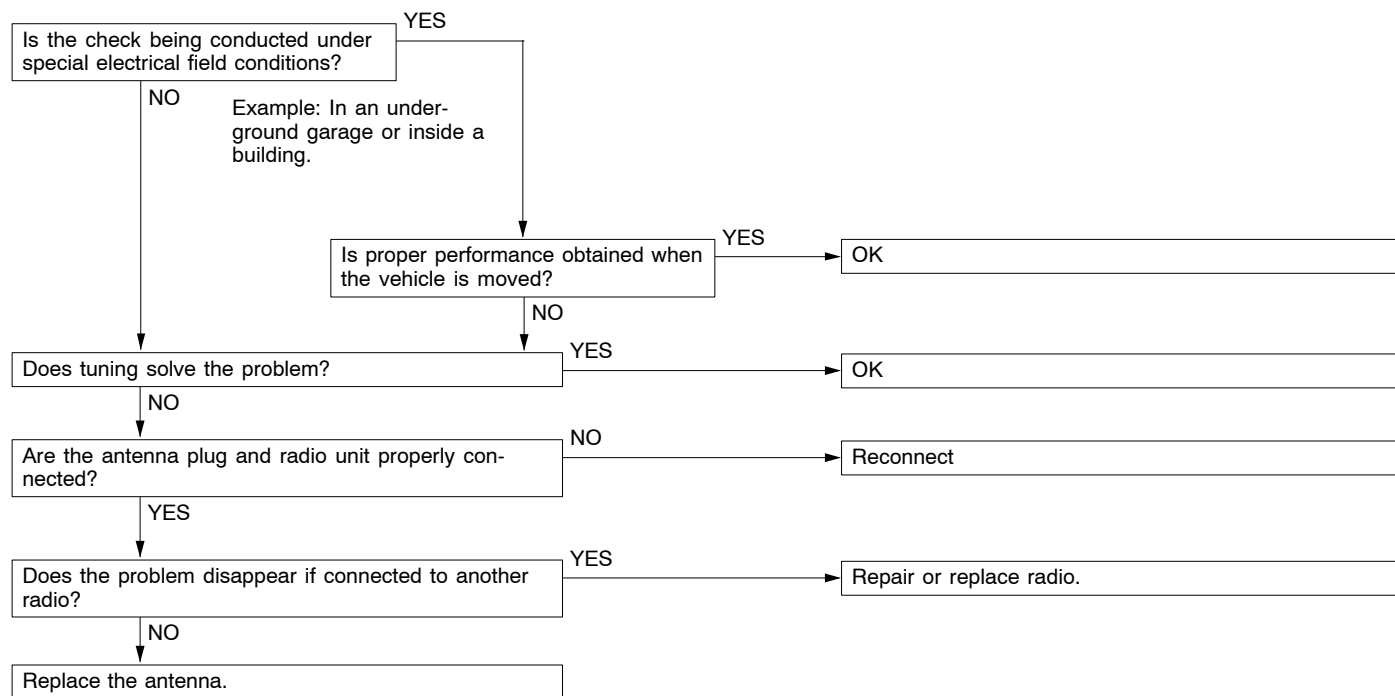
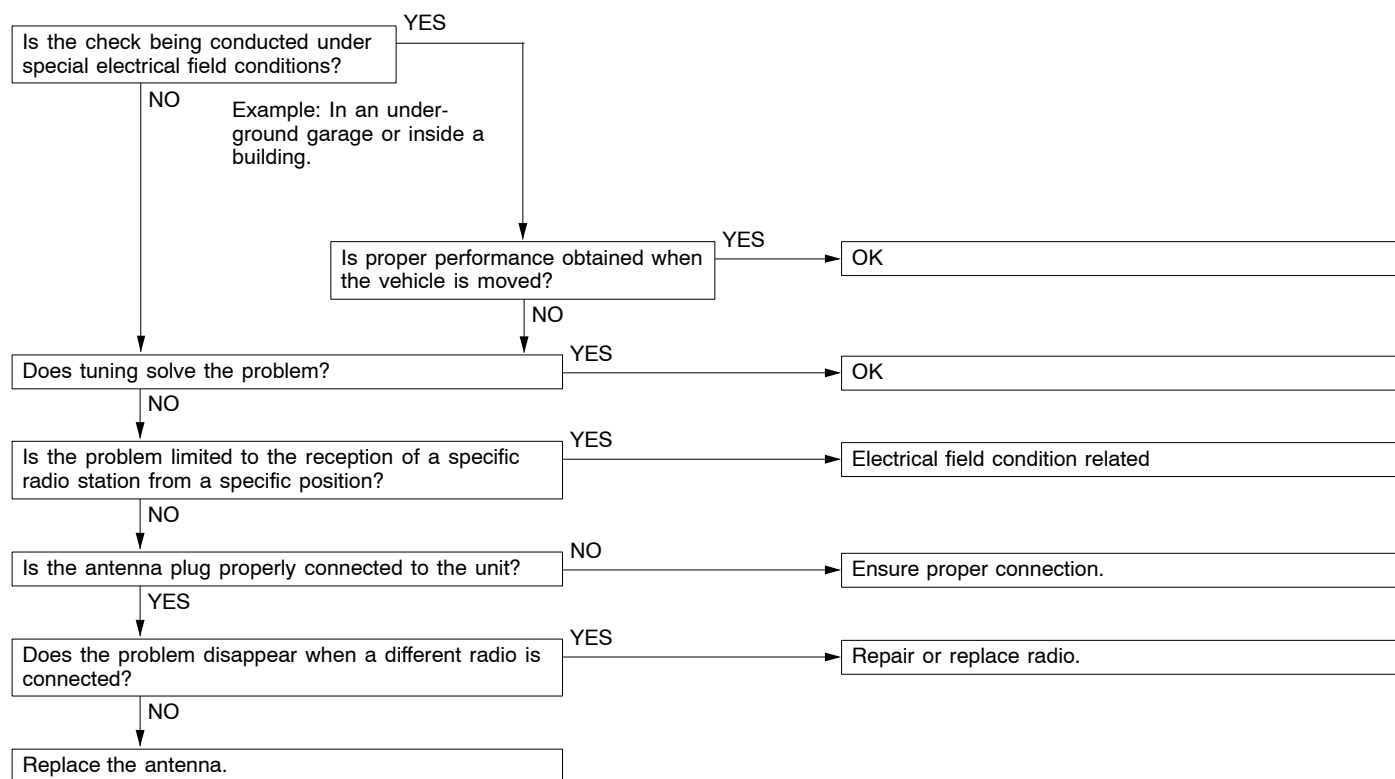
A-6 Ever-present noise.

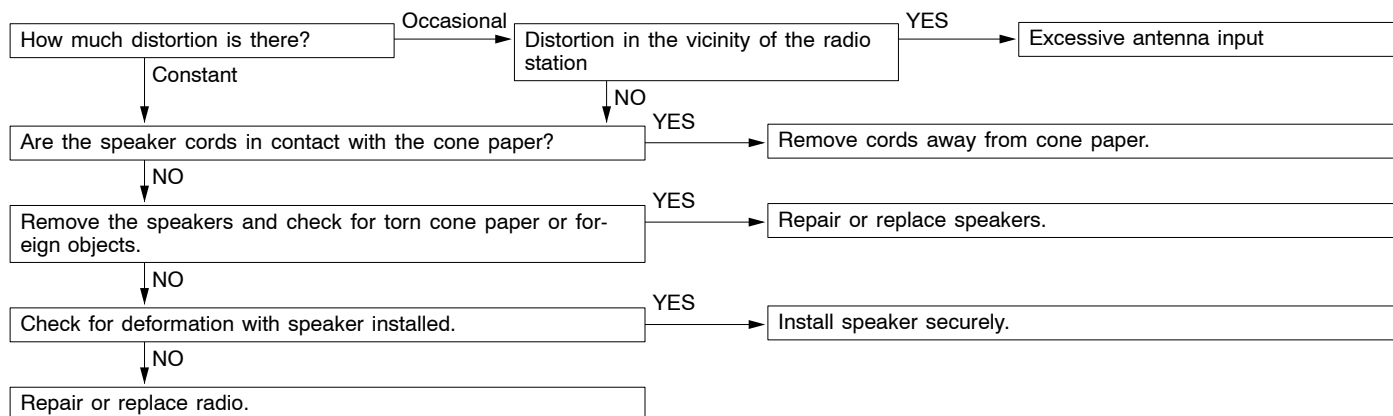
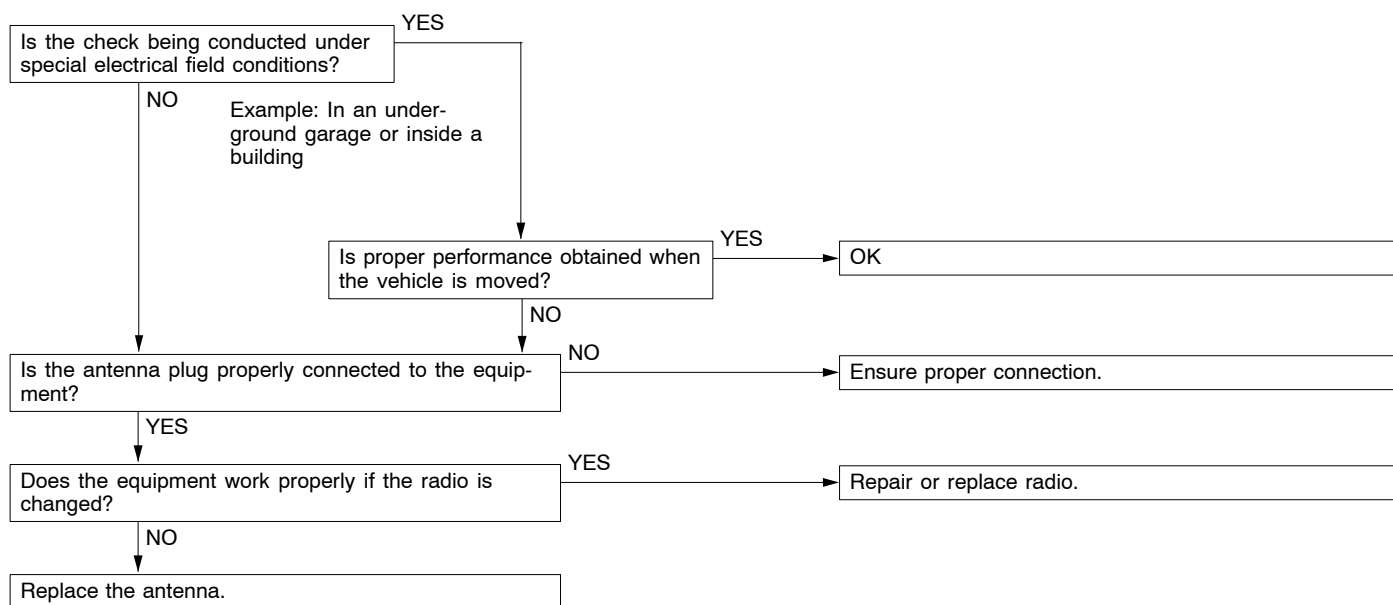
Noise is often created by the following factors, and often the radio is OK when it is checked individually.

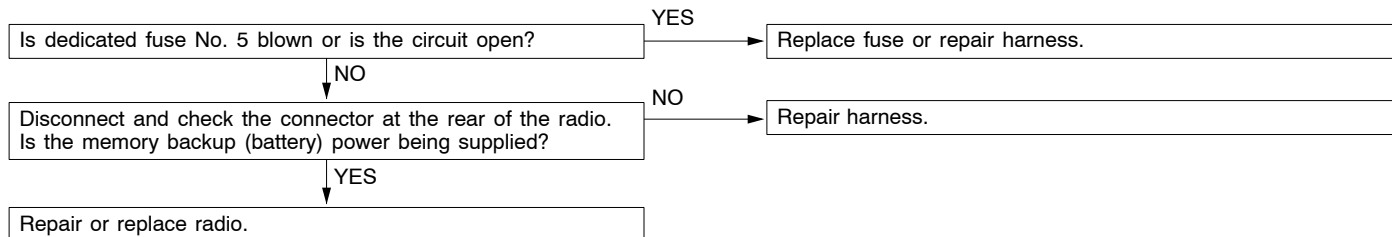
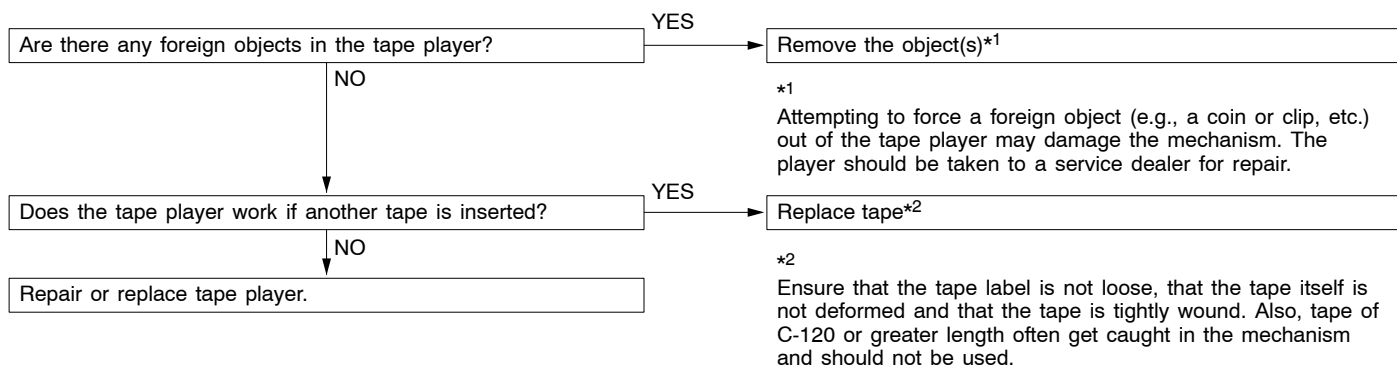
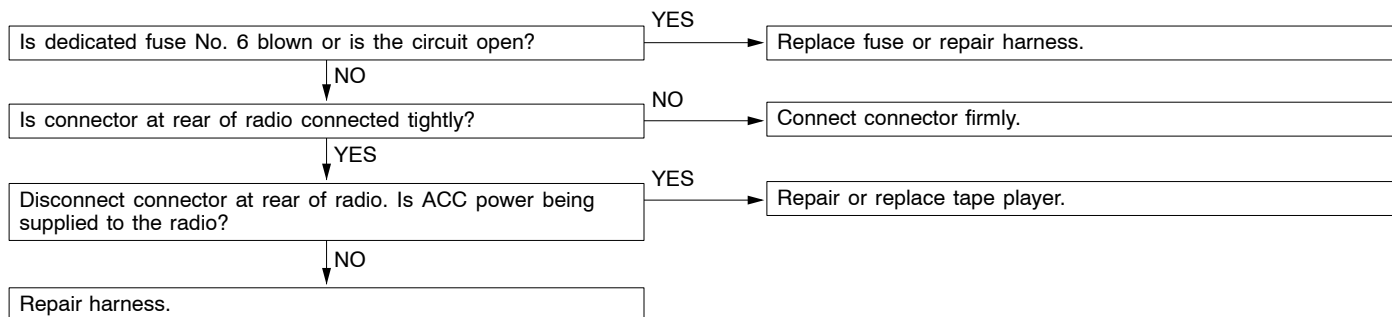
- Travelling conditions of the vehicle
- Terrain of area travelled through
- Surrounding buildings
- Signal conditions
- Time period

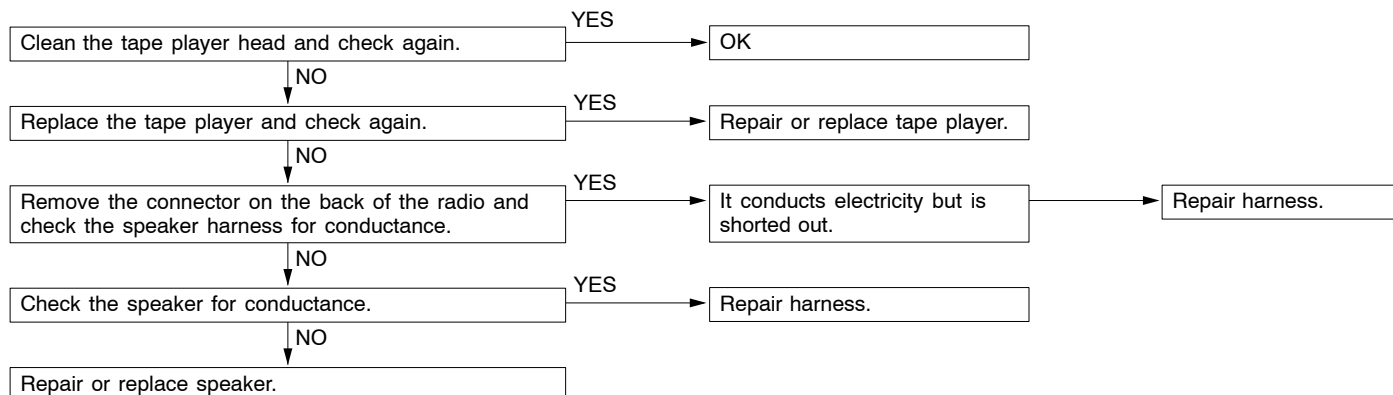
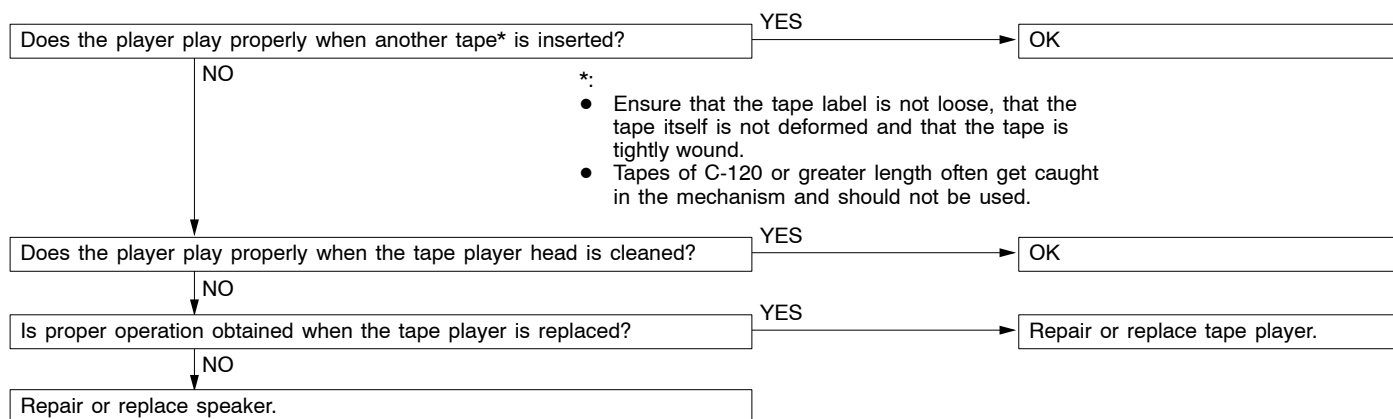
For this reason, if there are still problems with noise even after the measures described in steps A-1 to A-8 have been taken, get information on the factors listed above as well as determining whether the problem occurs with UKW/MW/LW, the station names, frequencies, etc., and contact a service centre.

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 UKW/MW/LW or no sound from UKW/MW/LW.**B-4 Insufficient sensitivity.**

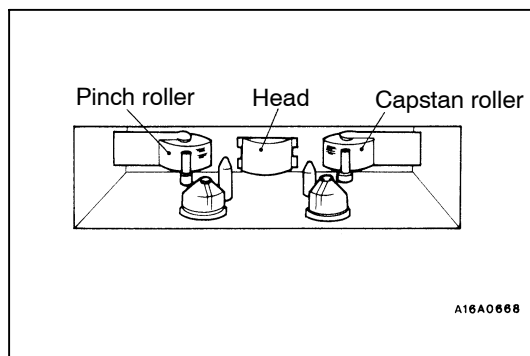
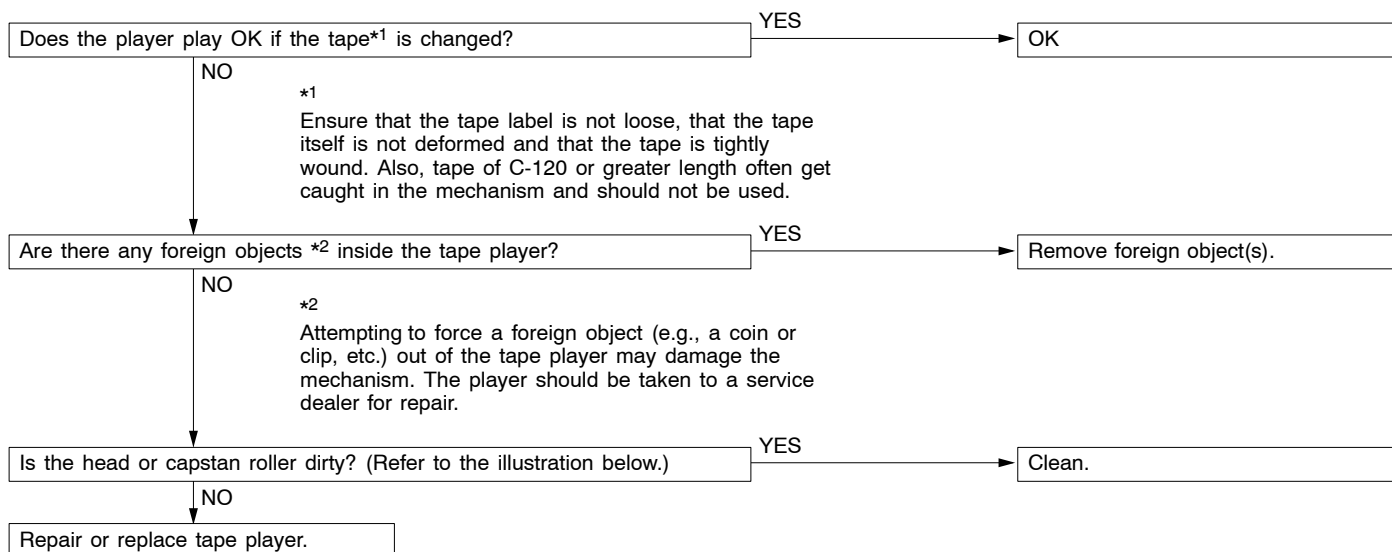
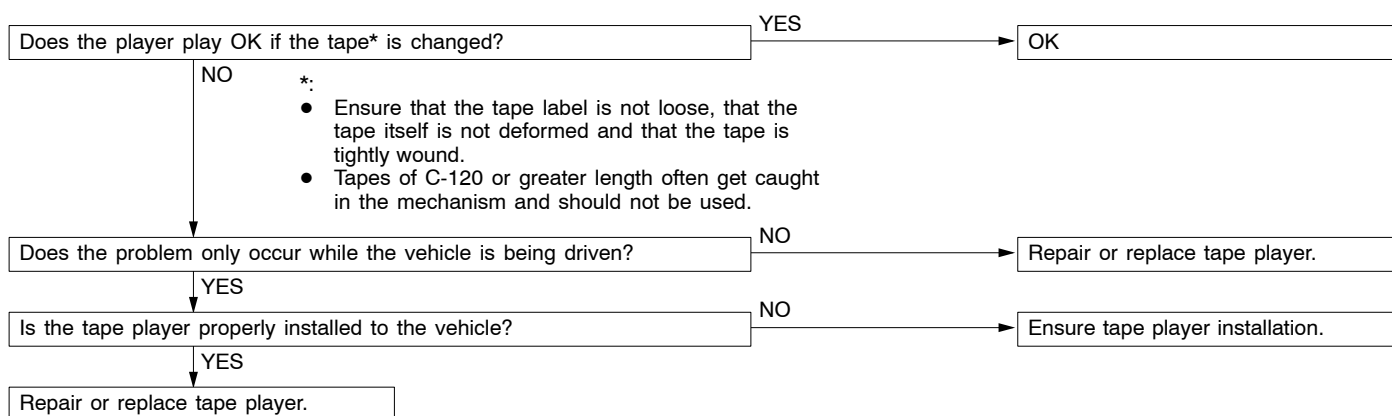
B-5 Distortion on UKW/MW/LW.**B-6 Too few automatic select stations.**

B-7 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

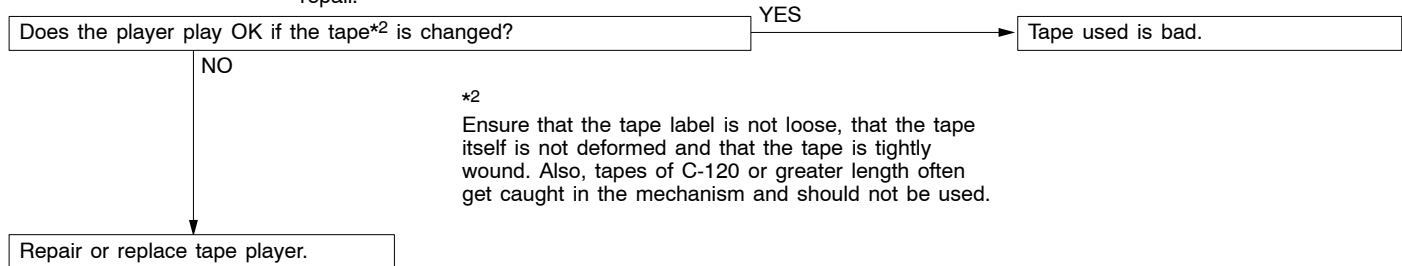
also possible, and attempting to force the tape out of the player can cause damage to the mechanism. The player should be taken to a service dealer for repair.

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

C-8 Tape gets caught in mechanism*1.

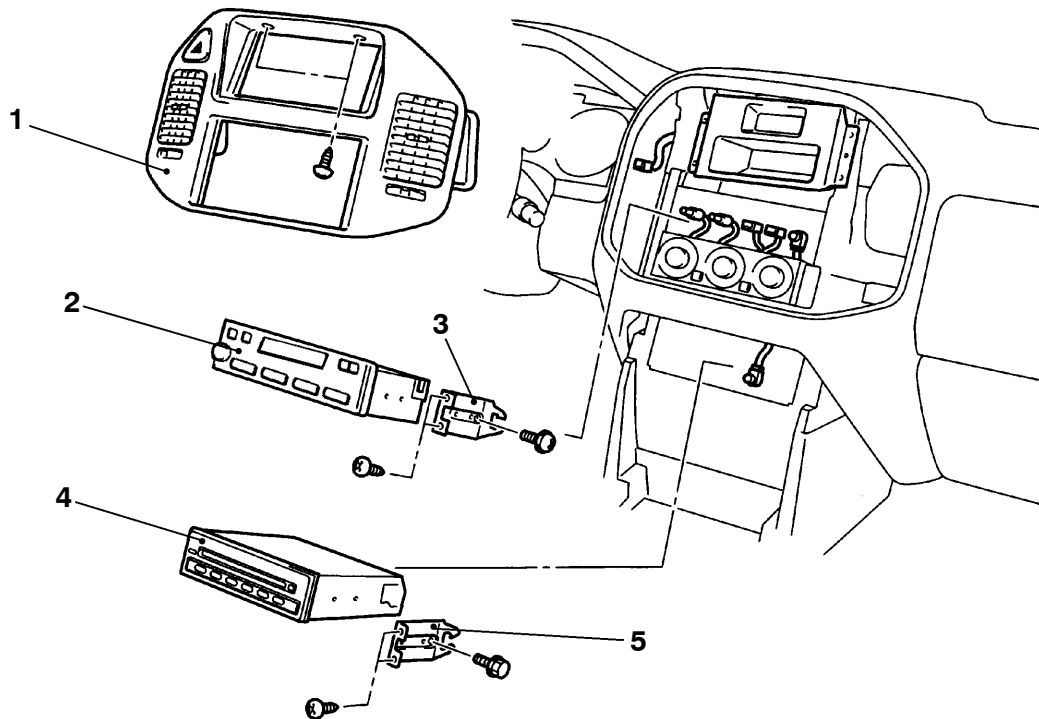
*1

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 CD AUTO CHANGER

REMOVAL AND INSTALLATION



Y0041CA

Radio removal steps

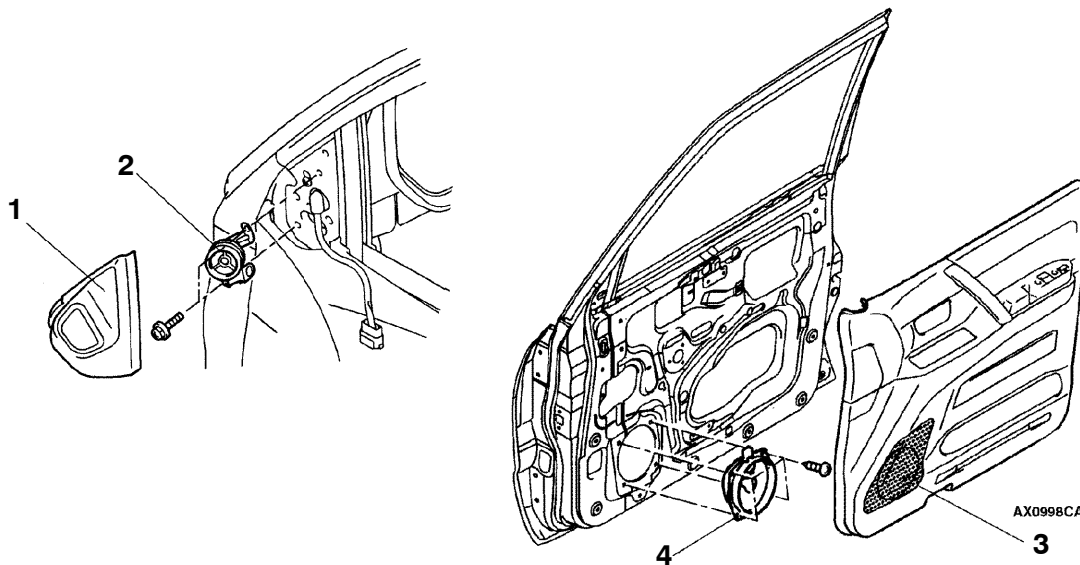
1. Center panel
(Refer to GROUP 52A – Instrument Panel.)
2. Radio/Tape Player
3. Radio/tape player bracket

CD auto changer removal steps

- Lower center panel
(Refer to GROUP 52A – Instrument Panel.)
4. CD auto changer
 5. CD auto changer bracket

FRONT SPEAKERS

REMOVAL AND INSTALLATION



Tweeter removal steps

1. Delta inner cover
2. Tweeter

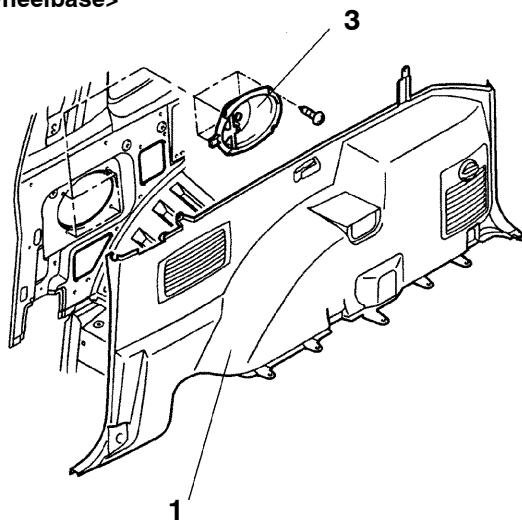
Front door speaker removal steps

3. Front door trim (Refer to GROUP 42.)
4. Front door speaker removal steps

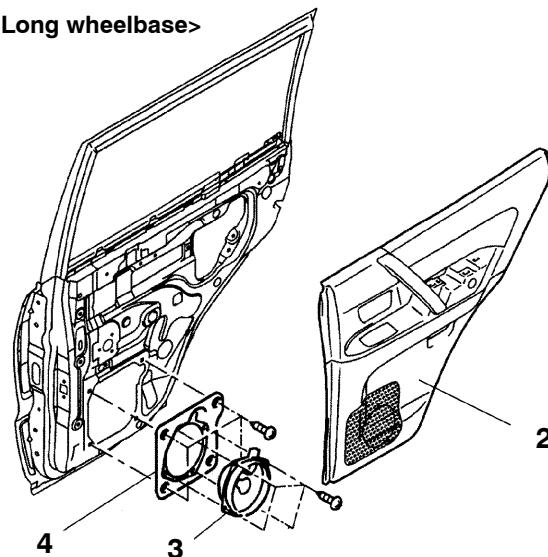
REAR SPEAKERS

REMOVAL AND INSTALLATION

<Short wheelbase>



<Long wheelbase>



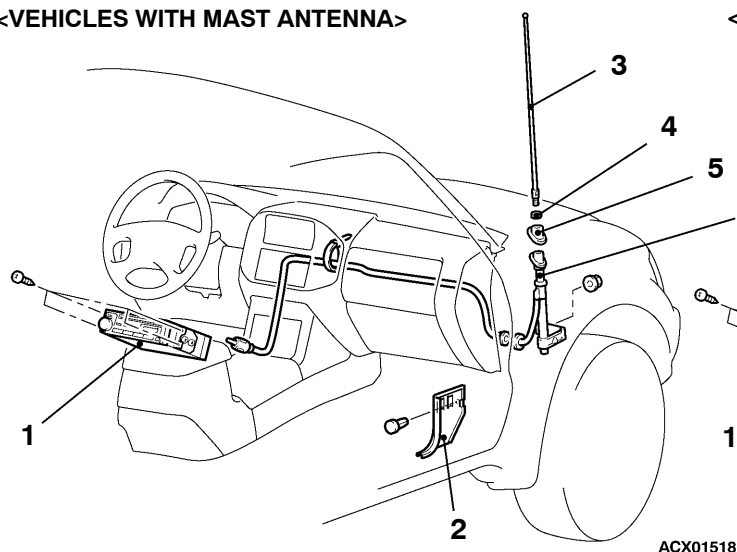
Removal steps

1. Lower quarter trim (Refer to GROUP 52A – Instrument Panel.)
2. Rear door trim (Refer to GROUP 52A – Instrument Panel.)
3. Rear speakers
4. Rear speaker bracket

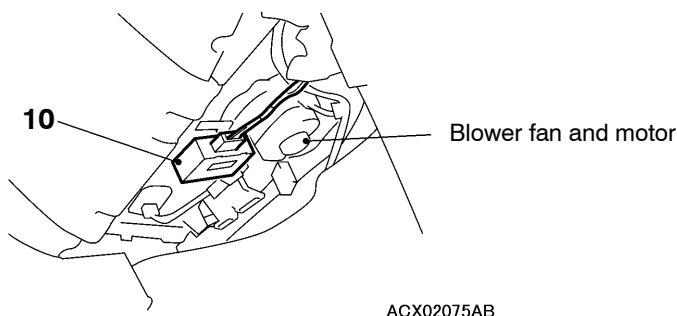
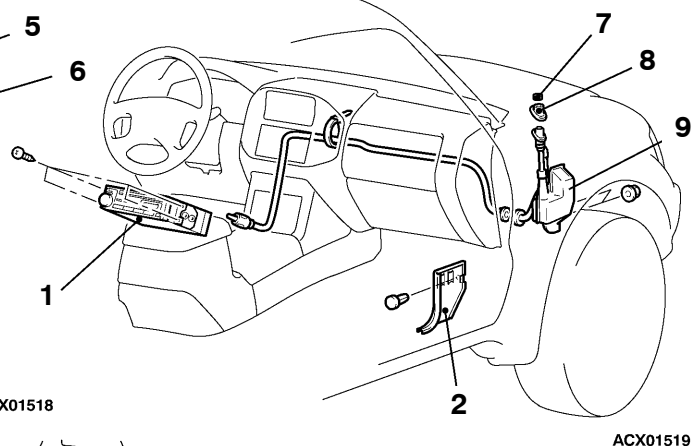
MAST ANTENNA AND MOTOR ANTENNA

REMOVAL AND INSTALLATION

<VEHICLES WITH MAST ANTENNA>



<VEHICLES WITH MOTOR ANTENNA>

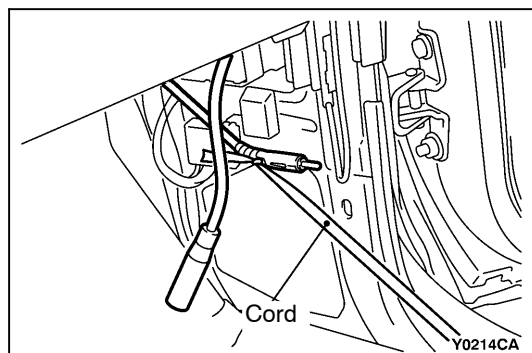


Mast antenna removal steps

- Center panel (Refer to P.54A-98.)
- 1. Radio/tape player (Refer to P.54-98.)
- 2. Scuff plate, cowl side trim (Refer to GROUP 52A.)
- 3. Mast antenna
- 4. Mounting nut
- 5. Base
- 6. Mast antenna body

Motor antenna removal steps

- Center panel (Refer to P.54A-98.)
- 1. Radio/tape player (Refer to P.54A-98.)
- 2. Scuff plate, cowl side trim (Refer to GROUP 52A.)
- 7. Ring nut
- 8. Base
- 9. Motor antenna body
- 10. Motor antenna-ECU



REMOVAL SERVICE POINTS

◀A▶ MAST ANTENNA BODY REMOVAL

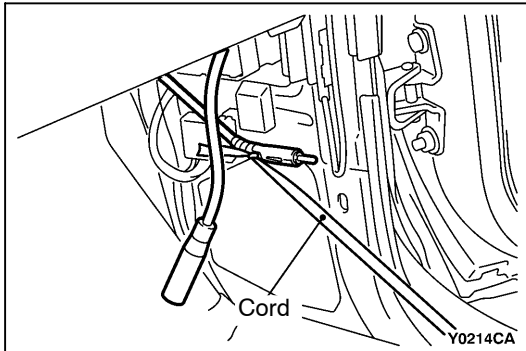
Carry out the following procedure to allow the feeder cable of the base antenna assembly for an easy installation.

1. Tie the cord with the end of the feeder cable.
2. Pull out the base antenna Ass'y slowly until the pipe end appears.
3. Insert the cord into the hole of the pipe end to wrap the cord around with a plastic tape.

Caution

Ensure that the cord is wrapped tightly to prevent it from coming off.

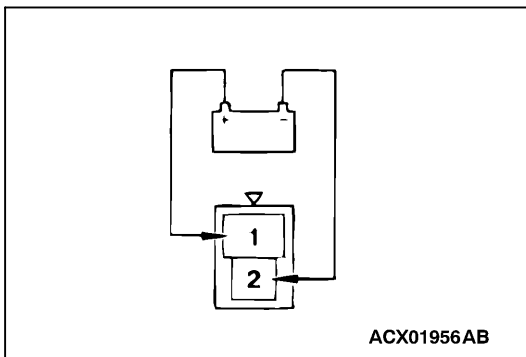
4. Pull out the base antenna assembly slowly to remove.


◀A▶ MOTOR ANTENNA BODY REMOVAL

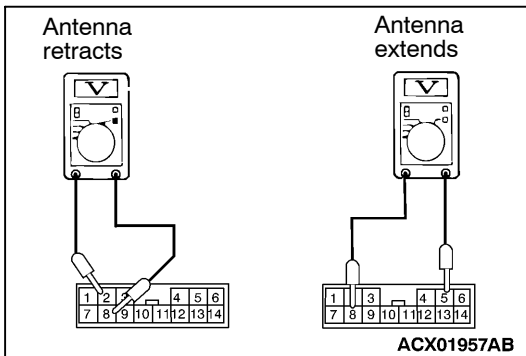
Pull out the cord after tying it with the feeder cable of the base antenna assembly for an easy installation.

INSPECTION
MOTOR ANTENNA CHECK

Check the antenna for extension if the connector of the motor antenna-ECU is disconnected, the (+) terminal of the battery is connected to terminal No.1, and the (-) terminal of the battery is connected to terminal No. 2. Check the antenna for retraction if the connection is reversed.


MOTOR ANTENNA-ECU CHECK

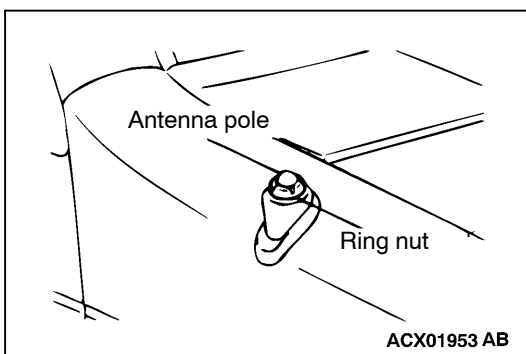
1. Remove the motor antenna-ECU mounting bolt.
2. With the ignition switch at the ACC or the ON position, check the voltage between the terminals during extension or retraction of the antenna by operating the radio switch.

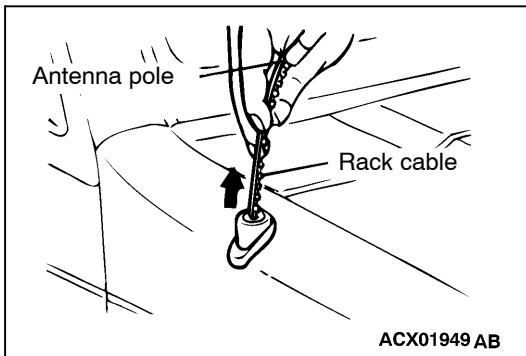


Direction of antenna movement	Measurement terminal	Voltage (V)
Retracting	2 – 8	10 – 13
Extending	8 – 5	10 – 13

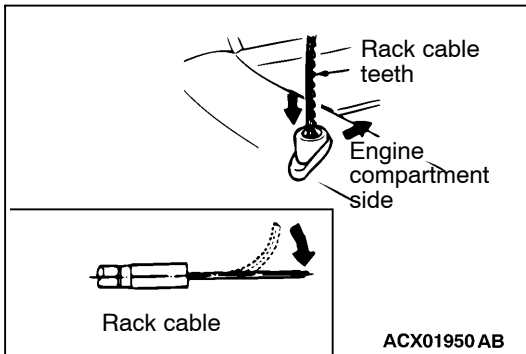
ANTENNA POLE REPLACEMENT

1. Remove ring nut.





2. After the ignition switch is turned to the ACC or ON position, turn on the radio and extend the antenna pole to remove it with the rack cable.

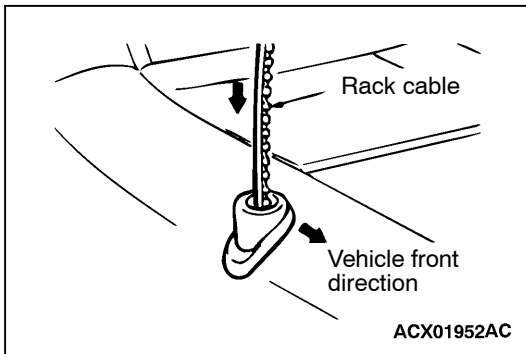


3. Extend the antenna pole completely.

NOTE

If there is any bend at the motor end of the rack cable, repair the bend.

4. Face the teeth of the rack cable to the engine room side to push the rack cable into the motor assembly.

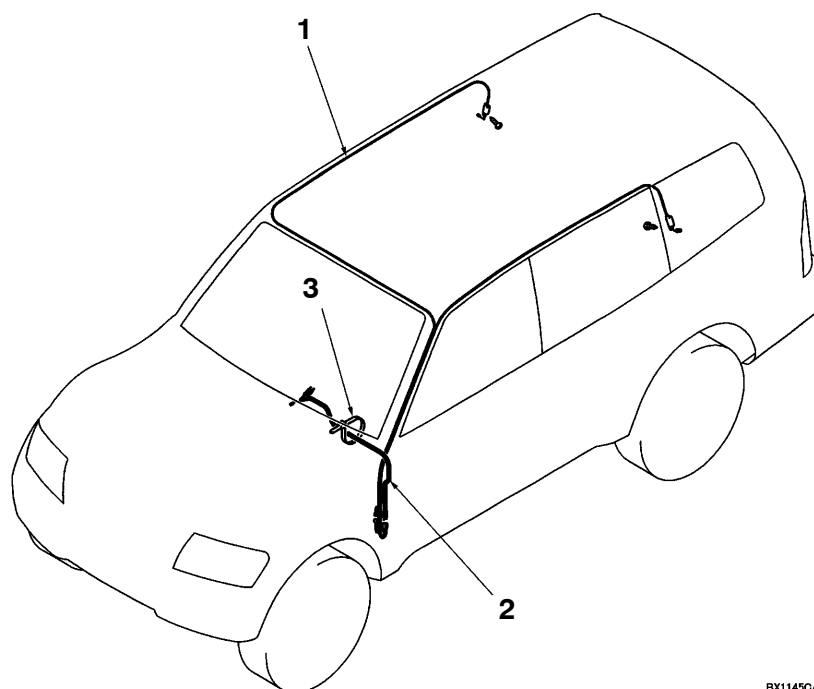


5. Rotate the teeth of the rack cable to the front of the vehicle (90° to the right) to engage the cable with the motor gears.
6. If the rack cable comes off easily by pulling it out slightly, it indicates that the rack cable does not engage with the motor gears. In that case, carry out the above-mentioned procedures in (3) and (4) after checking the end of the rack cable for bend again.
7. Set the antenna pole perpendicular and turn off the radio to wind the rack cable. Insert the antenna pole into the motor antenna side corresponding with winding the rack cable.

GLASS ANTENNA

ANTENNA FEEDER CABLE

REMOVAL AND INSTALLATION



BX11450A

Removal steps

- Cowl side trim, front pillar, center pillar trim, quarter trim (Refer to GROUP 52A.)
- Head lining

- 1 Antenna feeder cable
- Instrument Panel (Refer to GROUP 52A)
- 2. Antenna feeder cable
- 3. Cable band

DEFOGGER

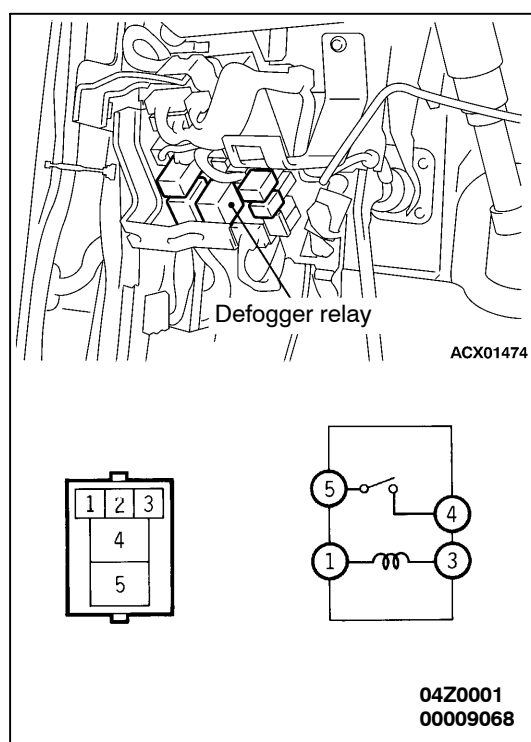
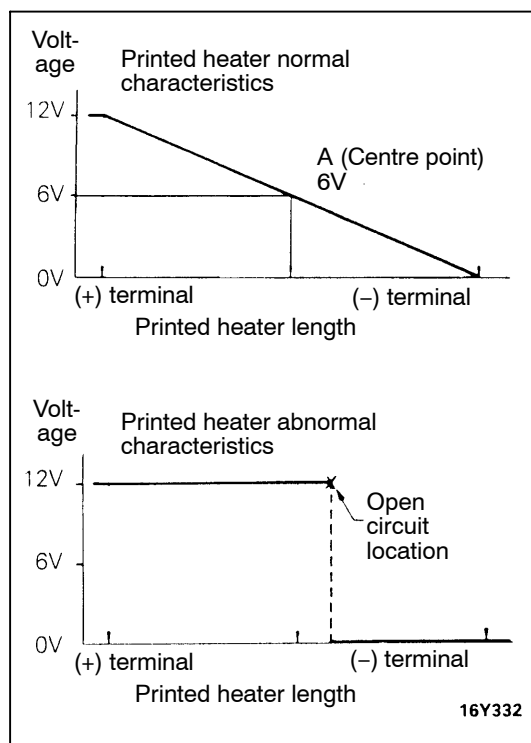
TROUBLESHOOTING

Refer to GROUP 55.

ON-VEHICLE SERVICE

PRINTED HEATER CHECK

1. Run the engine at a speed of 2,000 r/min to fully charge the battery, and then check the printed heater.
2. With the defogger switch turned on, use a multimeter to measure the voltages of each printed heater at centre point A on the window glass. The printed heater is okay if 6 V is displayed.
3. If a voltage of 12 V is indicated at point A, the open circuit location is between point A and the (–) terminal. Move the test bar gradually towards the (–) terminal to find the point where the voltage suddenly changes (0 V). The point where the voltage changes is the location of the open circuit.
4. In addition, if a voltage of 0 V is indicated at point A, the open circuit location is between point A and the (+) terminal. Use the same procedure as described above to find the point where the voltage changed to 12 V.



DEFOGGER RELAY CONTINUITY CHECK

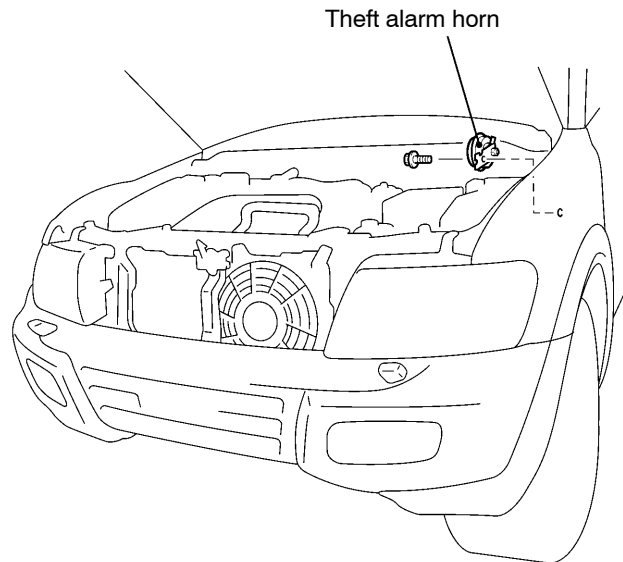
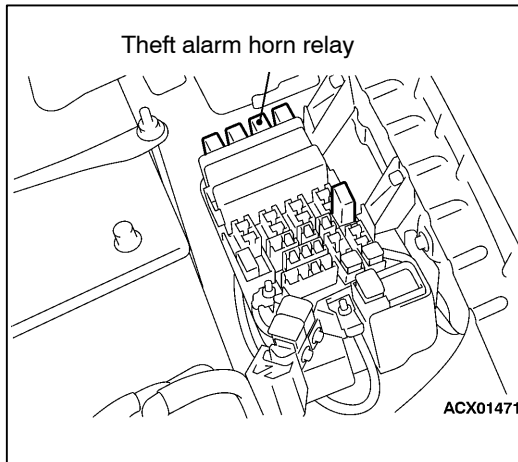
Switch position	Terminal No.			
	1	3	4	5
When current is not supplied	○	○		
When current is supplied	⊕	⊖	○	○

THEFT-ALARM SYSTEM

TROUBLESHOOTING

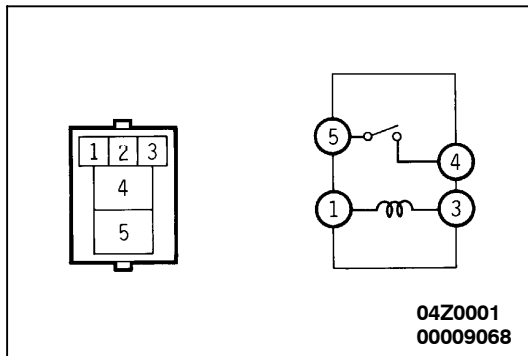
The theft alarm indicator, the theft alarm horn relay, the theft alarm horn are controlled by the Smart Wiring System (SWS). For troubleshooting procedures, refer to GROUP 54B.

REMOVAL AND INSTALLATION



NOTE

For removal and installation of theft alarm indicator procedures, refer to P.54A-41 (Removal and Installation of photo sensor.)

**THEFT ALARM HORN****INSPECTION****THEFT ALARM HORN RELAY CONTINUITY CHECK**

Switch position	Terminal No.			
	1	3	4	5
When current is not supplied				
When current is supplied				