

# CHASSIS ELECTRICAL

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

# CHASSIS ELECTRICAL

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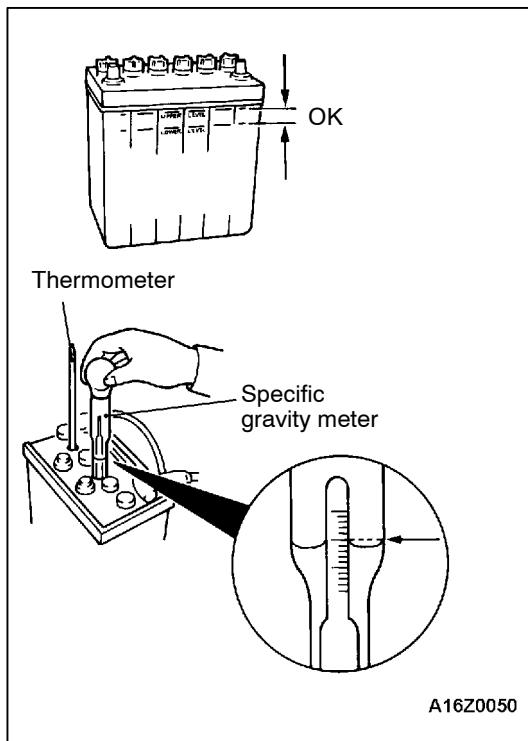
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# BATTERY

## 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                   |

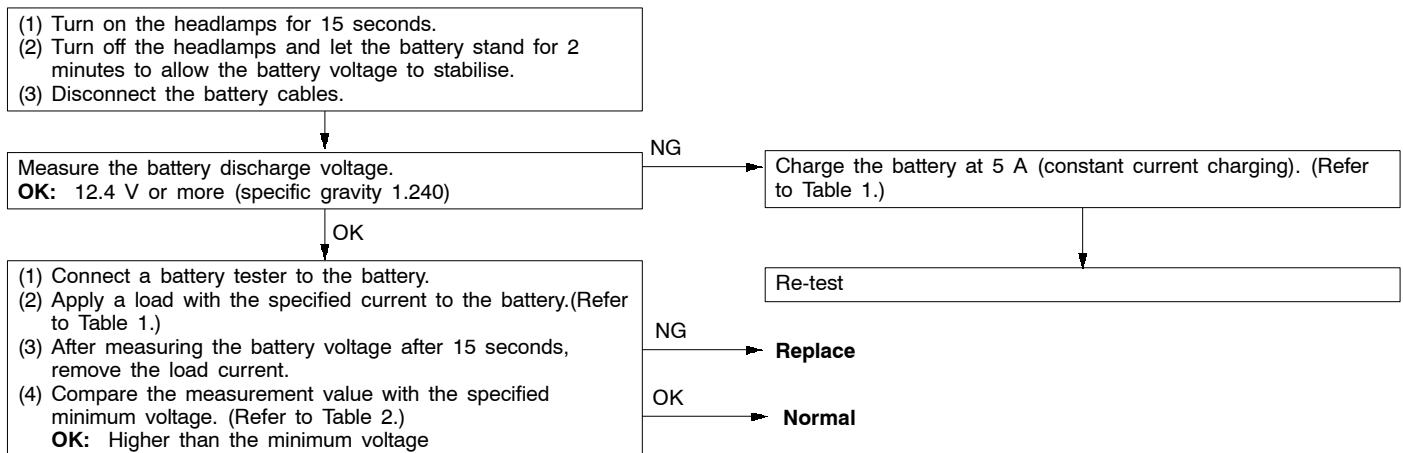
3. Determine when charging is finished.
  - When the specific gravity of the battery electrolyte is constantly within 1.250 - 1.290 for a continuous period of one hour or more
  - When the voltage per cell during charging is 2.5 - 2.8 V constantly for a continuous period of one hour or more

### 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)

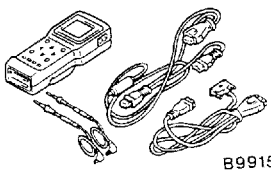
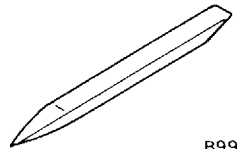
|   |       |       |       |
|---|-------|-------|-------|
| Battery type  | 75D23 | 80D26 | 95D31 |
| Charging time when fully discharged [5 A constant current charging] (H) | 11    | 12    | 14    |
| Load current (A)  | 260   | 281   | 311   |

(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 <EXCEPT FOR 4D56>

### SPECIAL TOOLS

| Tools  | No.      | Name                | Application   |
|--|----------|---------------------|---|
| <br>B991502  | MB991502 | MUT-II Sub assembly | Checking the ETACS-ECU input signals                  |
| <br>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**

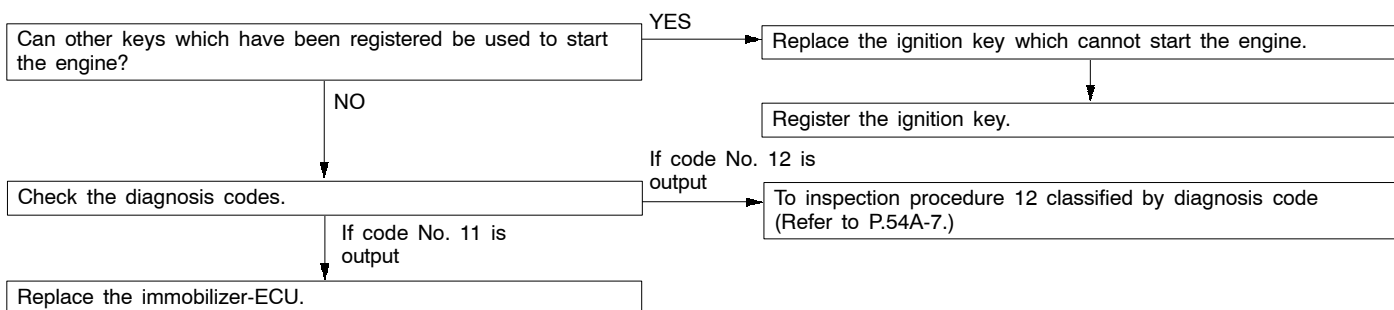
1. Change to Simple Check Diagnosis mode and activate switch diagnosis mode.  
(Refer to GROUP 00 - How to Use Troubleshooting/Inspection Service Points.)
2. In this condition, the input signals for the following switches can be checked.

**CHART CLASSIFIED BY DIAGNOSIS CODES**

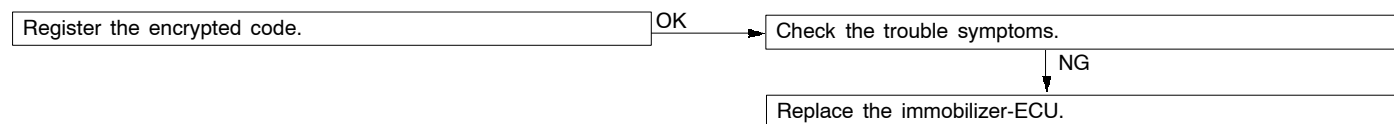
| Code No. | Diagnosis contents  | Reference page |
|----------|---|----------------|
| 11       | Problem related to communication with the ignition key                              | 54A-7          |
| 12       | Ignition key is not registered, or encrypted code from ignition key does not match. | 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"> <li>• Malfunction of ignition key</li> <li>• Malfunction of immobilizer-ECU</li> </ul> |



| 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"> <li>• The ignition key has not been registered with the immobilizer-ECU.</li> <li>• Malfunction of immobilizer-ECU</li> </ul> |



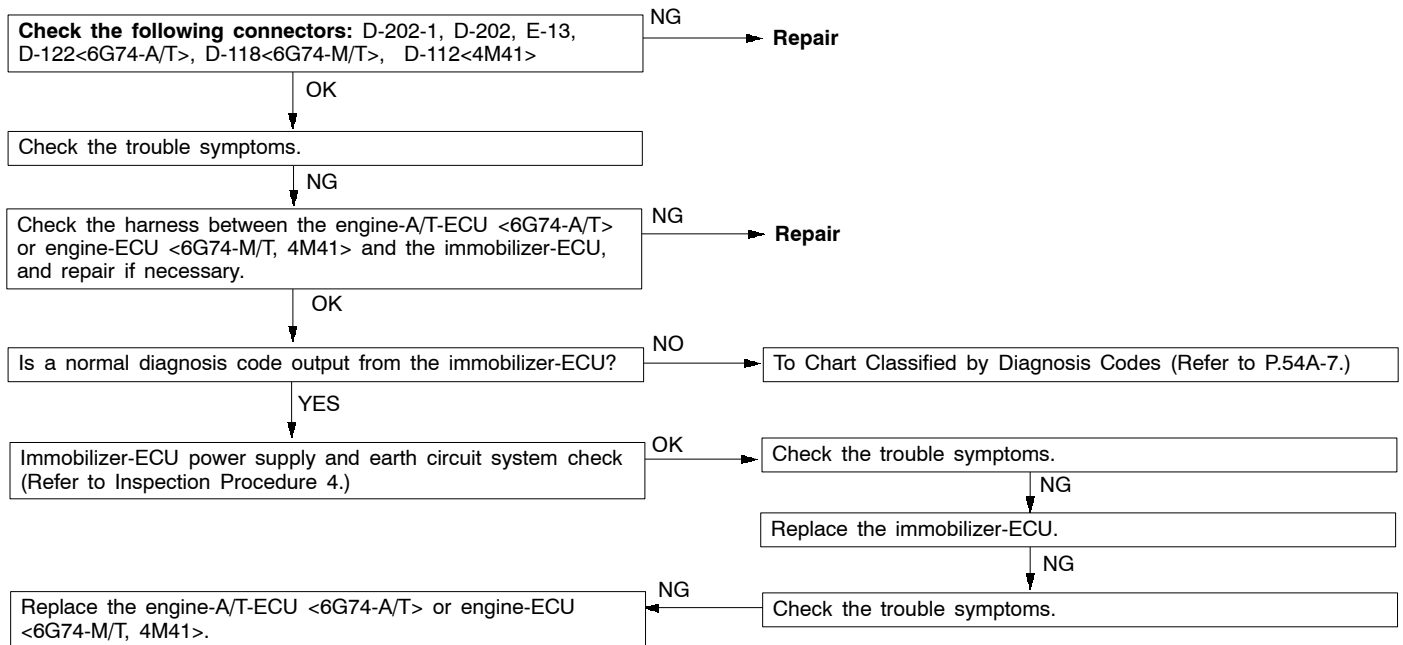
**INSPECTION PROCEDURES FOR EACH TROUBLE SYMPTOM**

| 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 <6G74-A/T> or by the engine-ECU <6G74-M/T, 4M41>. | 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**

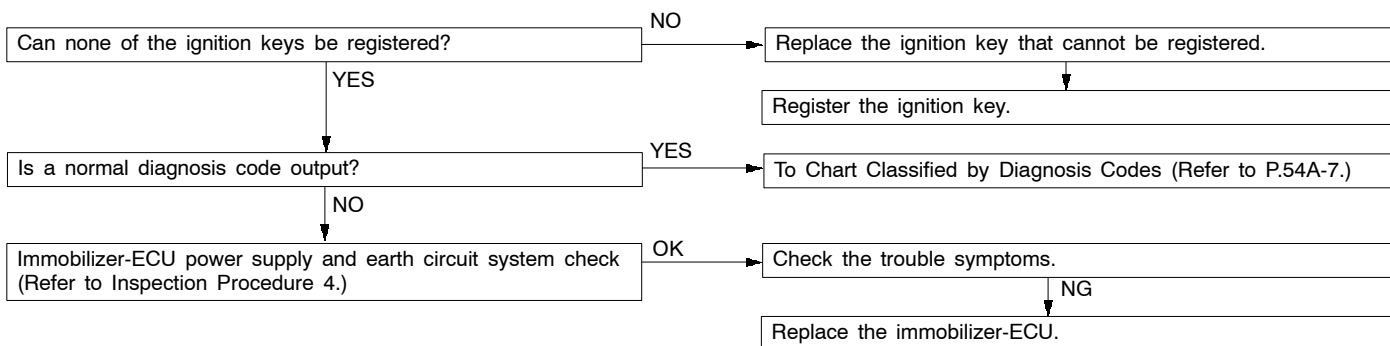
| Diagnosis code No. 54 is generated by the engine-A/T-ECU <6G74-A/T> or by the engine-ECU <6G74-M/T, 4M41>.                                       | Probable cause  |
|--|---|
| The cause is probably a problem with communication between the engine-A/T-ECU <6G74-A/T> or engine-ECU <6G74-M/T, 4M41> and the immobilizer-ECU. | <ul style="list-style-type: none"> <li>● Malfunction of harness or connector</li> <li>● Malfunction of engine-A/T-ECU &lt;6G74-A/T&gt; or engine-ECU &lt;6G74-M/T, 4M41&gt;</li> <li>● Malfunction of immobilizer-ECU</li> <li>● Malfunction of ignition key</li> <li>● The ignition key has not been registered with the immobilizer-ECU.</li> </ul> |





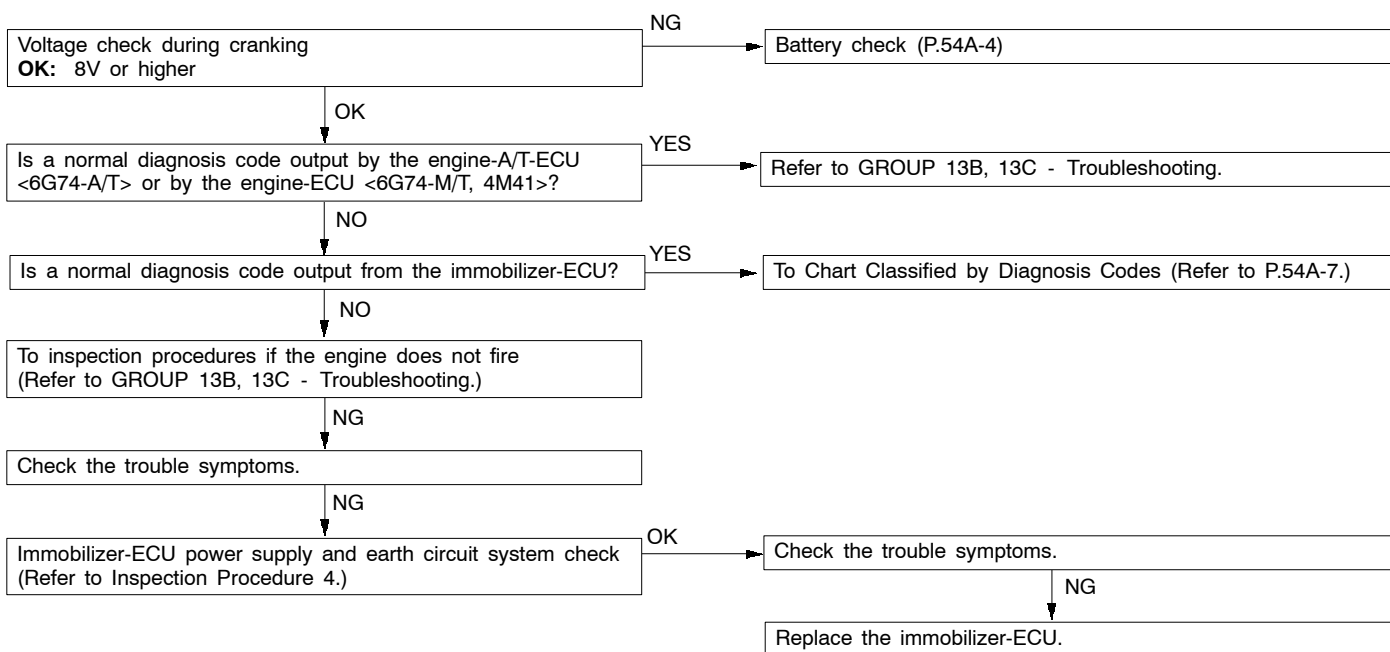
**Inspection procedure 2**

| 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"> <li>● Malfunction of ignition key</li> <li>● Malfunction of harness or connector</li> <li>● Malfunction of immobilizer-ECU</li> </ul> |



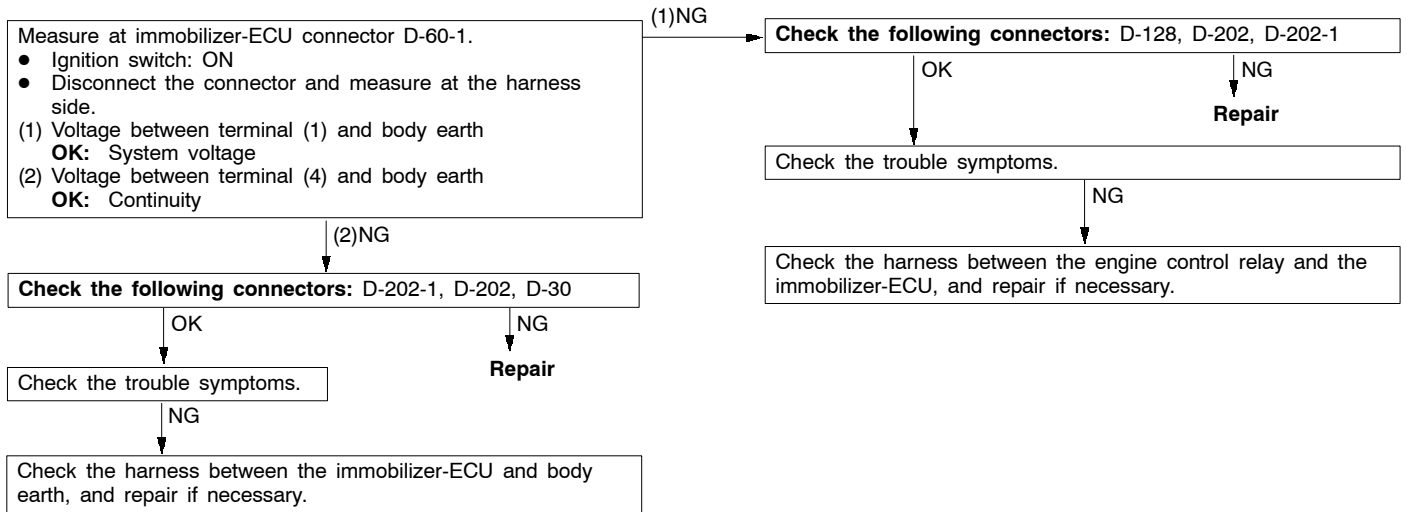
**Inspection procedure 3**

| 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"> <li>● Malfunction of GDI system or Diesel fuel system</li> <li>● Malfunction of immobilizer-ECU</li> </ul> |



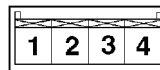
Inspection procedure 4

**Immobilizer-ECU power supply and earth circuit system check**



**IMMOBILIZER-ECU CHECK**

**TERMINAL VOLTAGE CHECK TABLE**

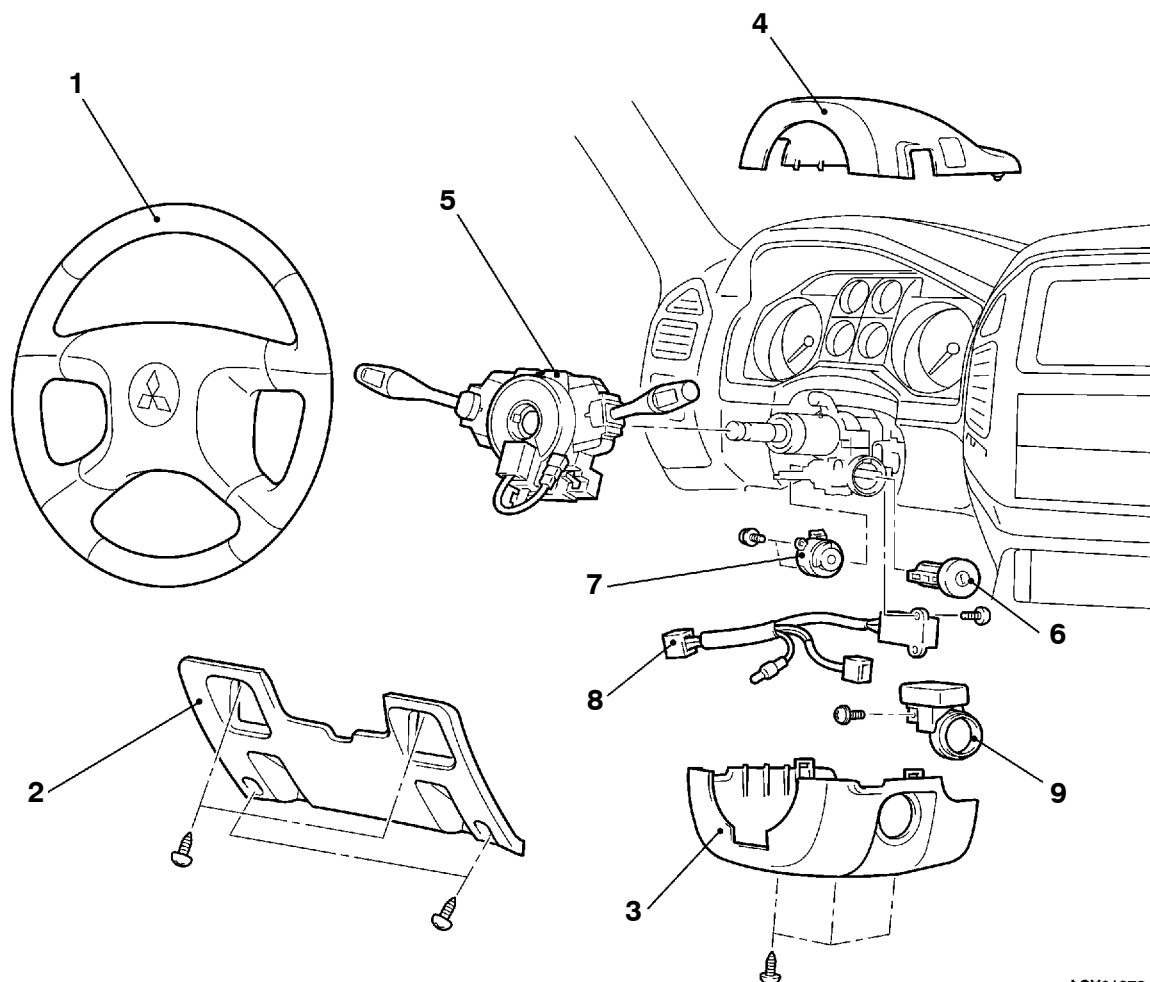


X1185CA

| Terminal No. | Signal   | Inspection conditions | Terminal voltage |
|--------------|--|-----------------------|------------------|
| 1            | Immobilizer-ECU power supply                           | Ignition switch: ON   | System voltage   |
| 2            | -  | -                     | -                |
| 3            | Engine-A/T-ECU <6G74-A/T>, Engine-ECU <6G74-M/T, 4M41> | -                     | -                |
| 4            | Immobilizer-ECU earth                                  | At all times          | 0V               |

# IGNITION SWITCH AND IMMOBILIZER-ECU

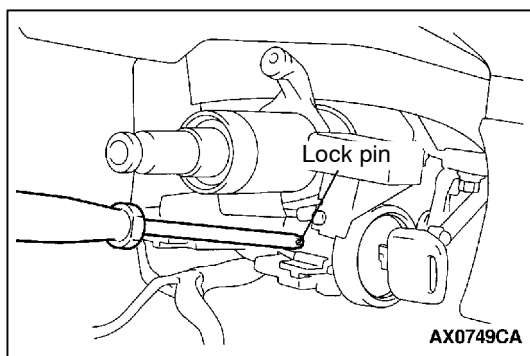
## REMOVAL AND INSTALLATION



ACX01372

### Removal steps

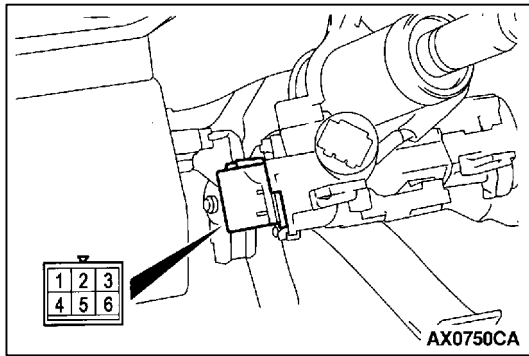
- |   |            |   |
|---|------------|---|
| <ol style="list-style-type: none"> <li>1. Steering wheel<br/>(Refer to GROUP 37A.)</li> <li>2. Instrument panel under cover<br/>(Refer to GROUP 52A - Instrument Panel.)</li> <li>3. Lower column cover (Refer to GROUP 52A - Instrument Panel.)</li> </ol> | <p>◀A▶</p> | <ol style="list-style-type: none"> <li>4. Upper column cover (Refer to GROUP 52A - Instrument Panel.)</li> <li>5. Column Switch</li> <li>6. Steering lock cylinder</li> <li>7. Ignition switch</li> <li>8. Key Reminder Switch</li> <li>9. Immobilizer-ECU</li> </ol> |
|---|------------|---|



### 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.

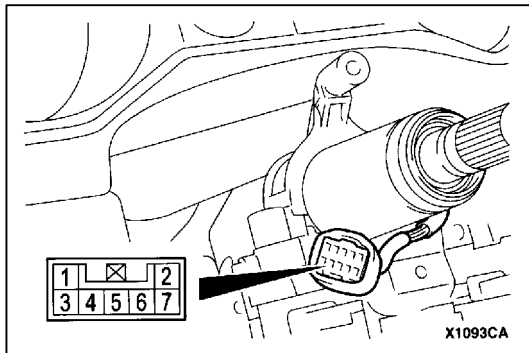


## INSPECTION

### 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                      | <input type="radio"/> |                       |                       |                       | <input type="radio"/> |
| ON                       | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |                       | <input type="radio"/> |
| START                    | <input type="radio"/> | <input type="radio"/> |                       | <input type="radio"/> |                       |



### 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                | <input type="radio"/> | <input type="radio"/> |
| 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.

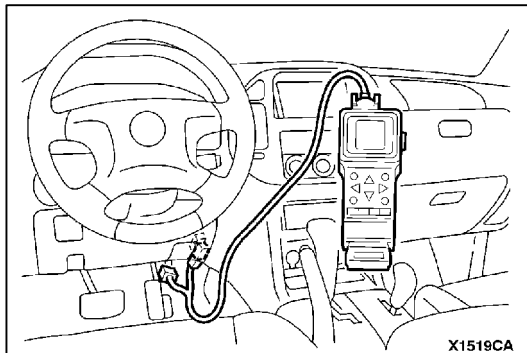
**ENCRYPTED CODE REGISTRATION METHOD**

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.

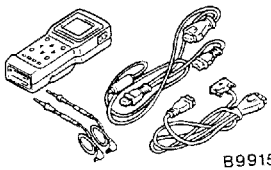
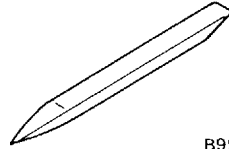
**Caution**

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

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

# IGNITION SWITCH AND IMMOBILIZER<4D56>

## 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

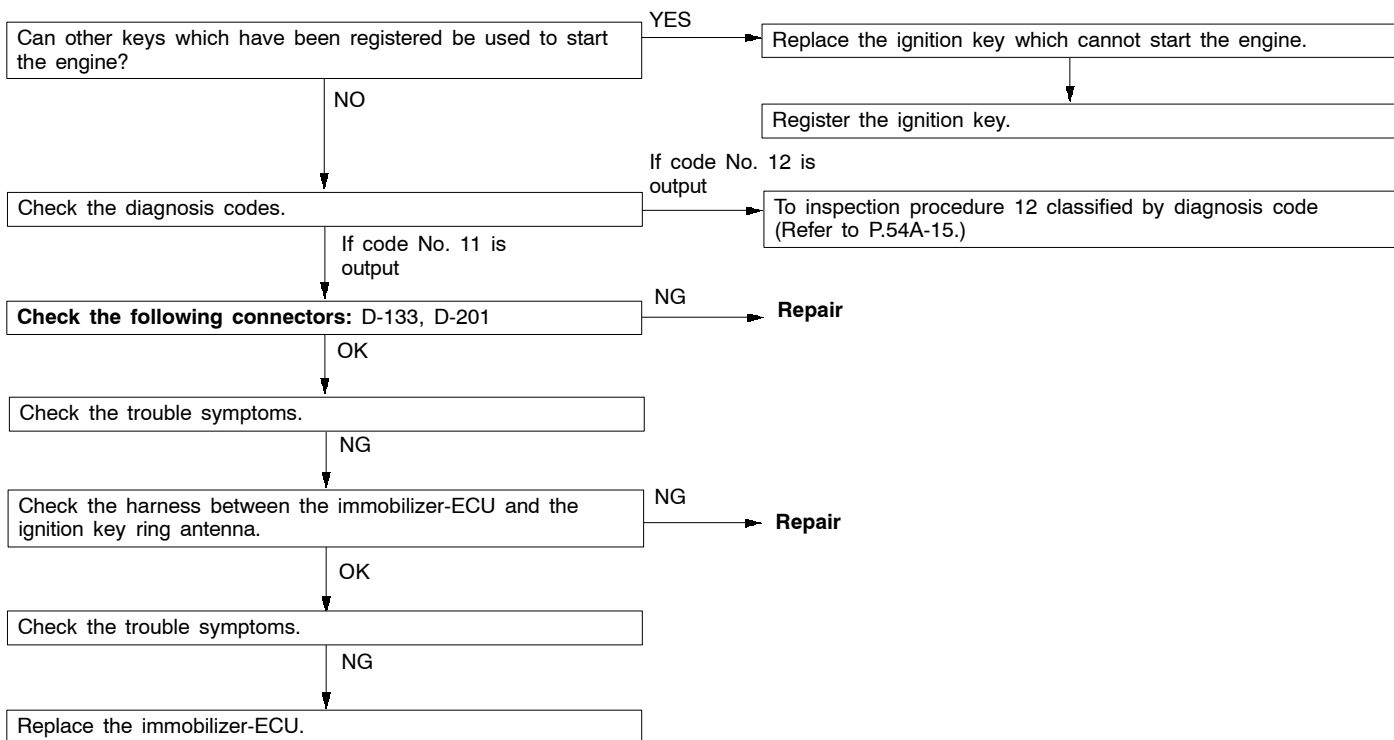
1. Change to Simple Check Diagnosis mode and activate switch diagnosis mode. (Refer to GROUP 00 - How to Use Troubleshooting/Inspection Service Points.)
2. In this condition, the input signals for the following switches can be checked.

##### CHART CLASSIFIED BY DIAGNOSIS CODES

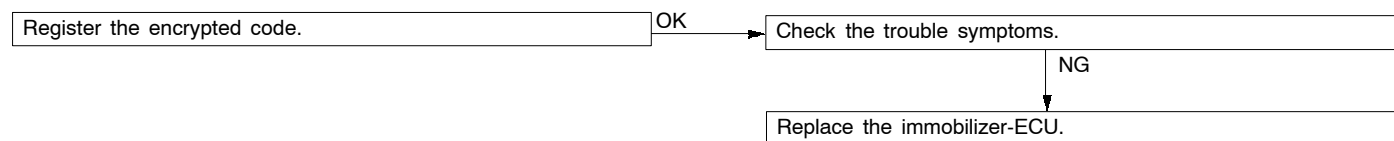
| Code No. | Diagnosis contents  | Reference page |
|----------|---|----------------|
| 11       | Problem related to communication with the ignition key                              | 54A-15         |
| 12       | Ignition key is not registered, or encrypted code from ignition key does not match. |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

### INSPECTION PROCEDURES FOR EACH DIAGNOSIS CODE

|   |  |
|---|--|
| <b>Code No. 11 Problem related to communication with the ignition key</b>   | <b>Probable cause</b>  |
| 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"> <li>● Malfunction of ignition key</li> <li>● Malfunction of immobilizer-ECU</li> <li>● Malfunction of harness or connector</li> </ul> |



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



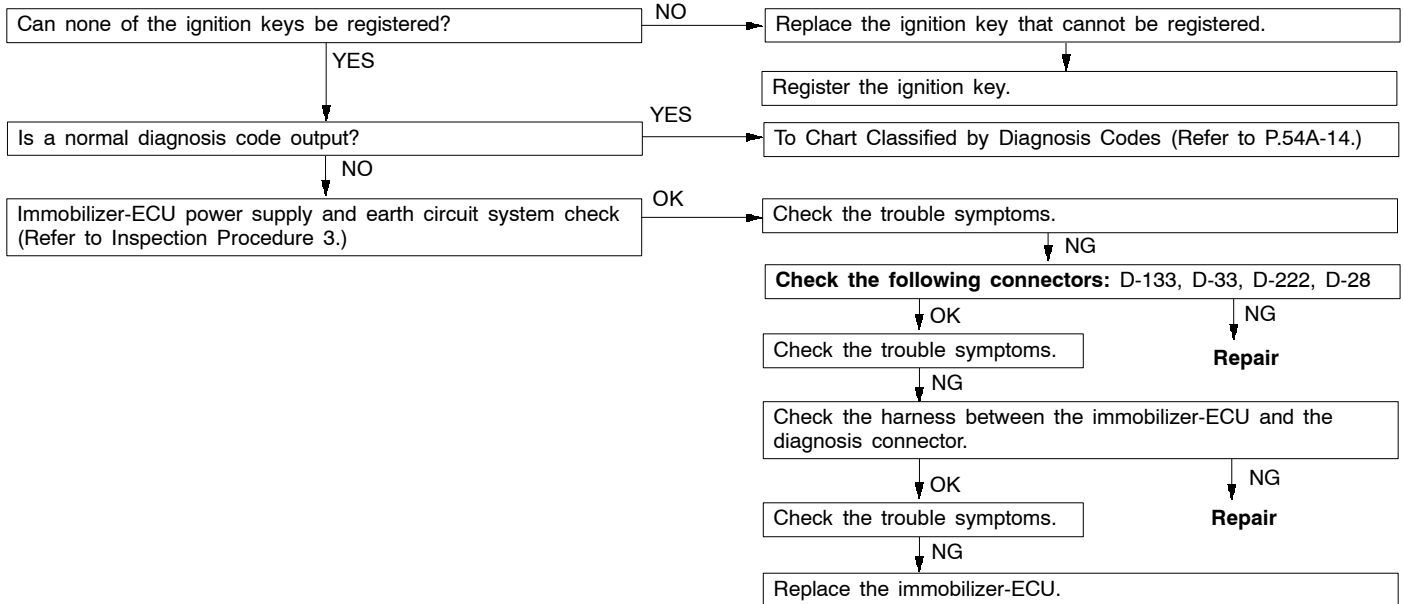
### INSPECTION PROCEDURES FOR EACH TROUBLE SYMPTOM

| 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

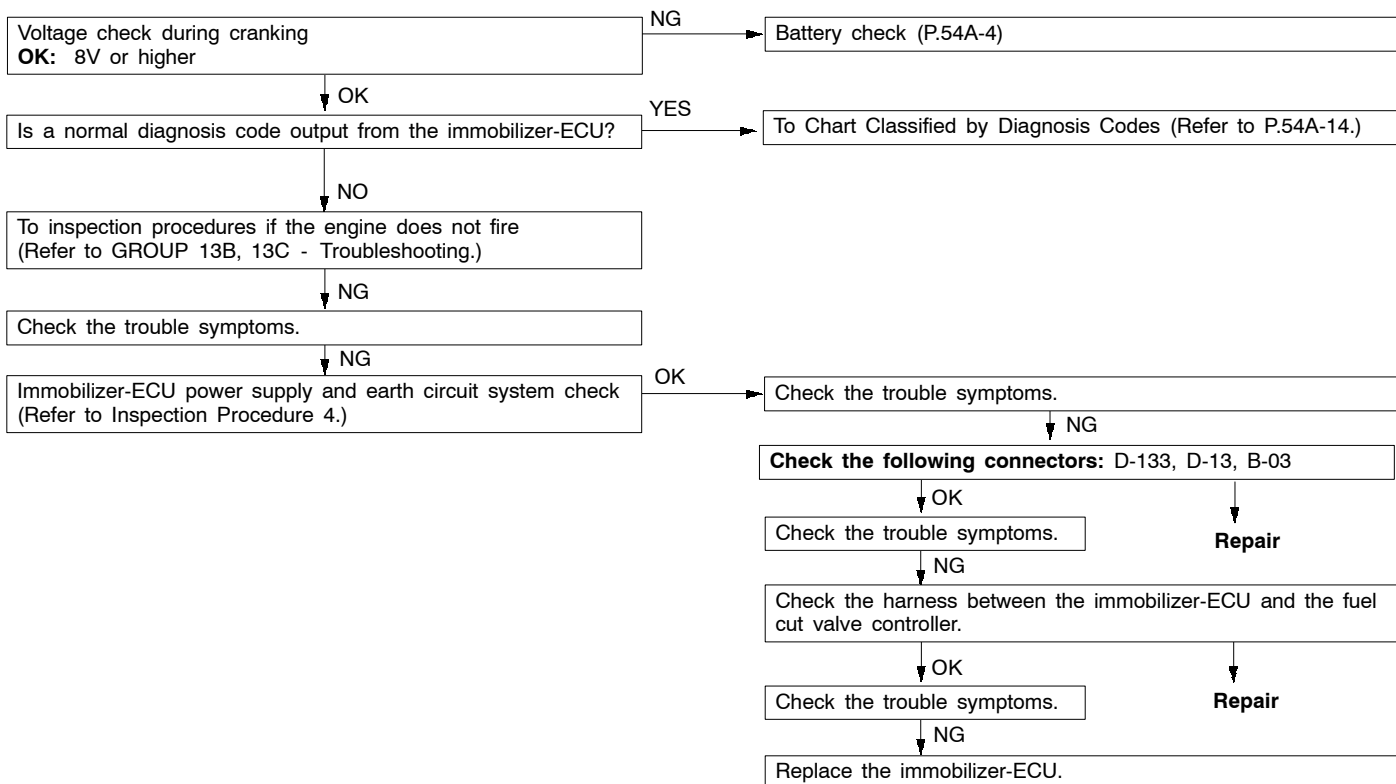
| The ignition keys cannot be registered using the MUT-II.   | Probable cause   |
|--|--|
| The ignition key has not been registered with the immobilizer-ECU.<br>Or that there is a problem with the immobilizer-ECU. | <ul style="list-style-type: none"> <li>● Malfunction of ignition key</li> <li>● Malfunction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





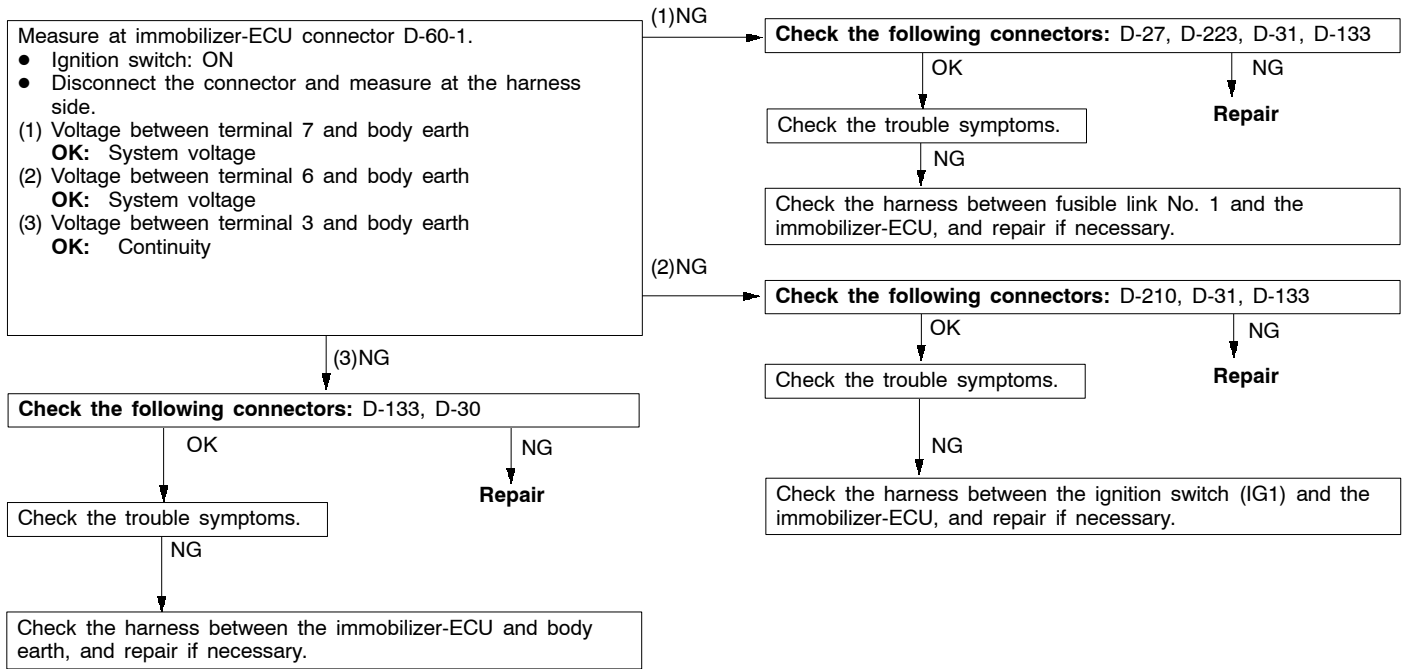
Inspection procedure 2

| The engine does not start.<br>(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"> <li>● Malfunction of diesel fuel system</li> <li>● Malfunction of immobilizer-ECU</li> </ul> |



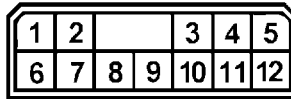
Inspection procedure 3

**Immobilizer-ECU power supply and earth circuit system check**



**IMMOBILIZER-ECU CHECK**

**TERMINAL VOLTAGE CHECK TABLE**

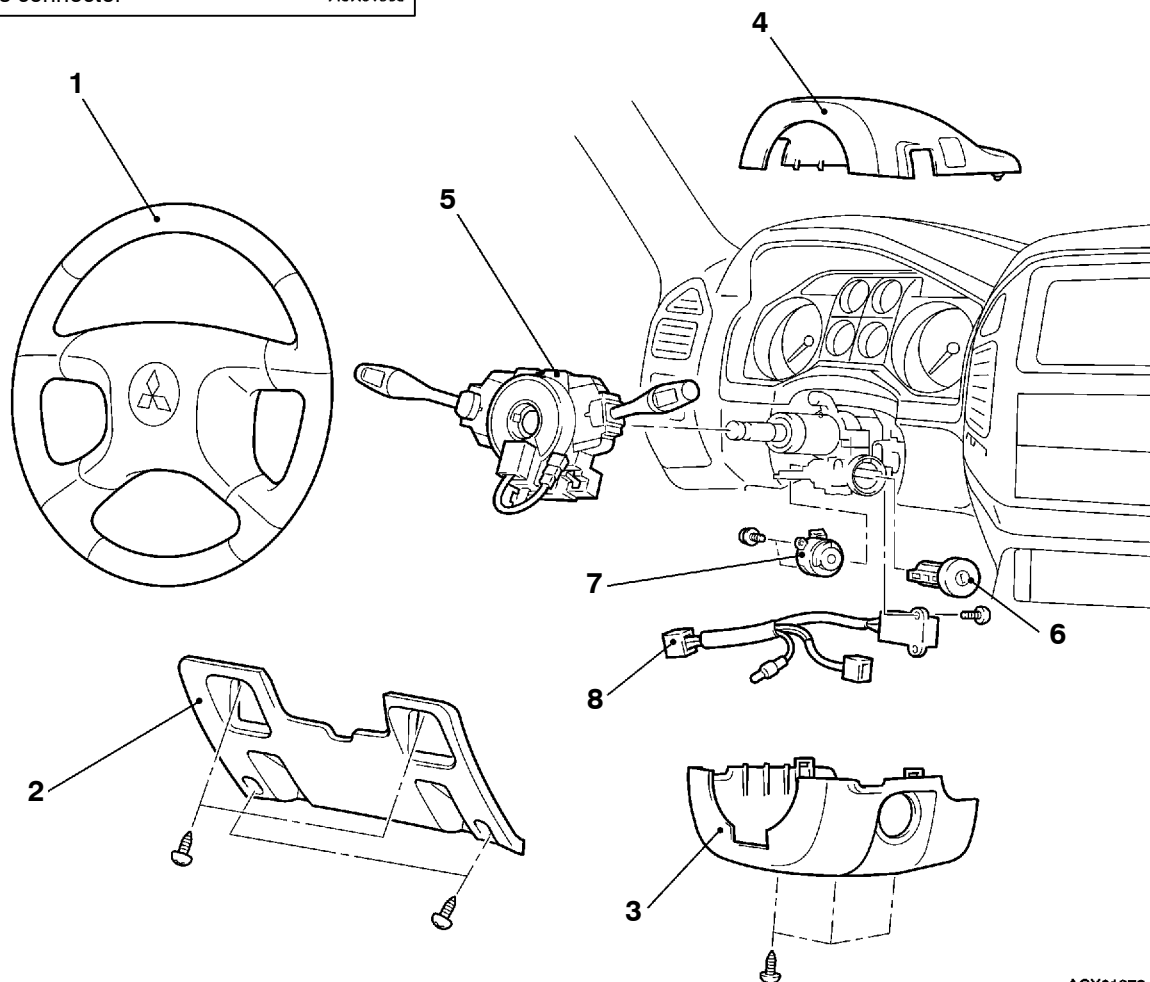
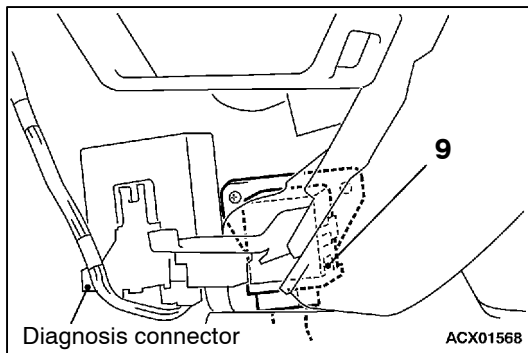


ACX01564 AB

| 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

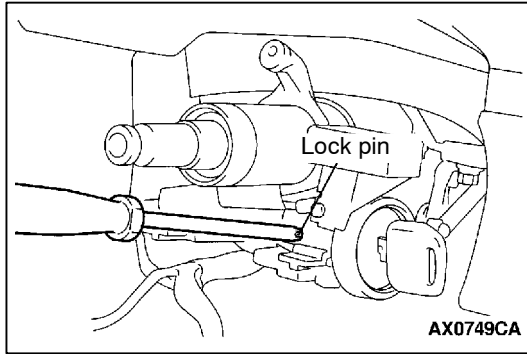


### Removal steps

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.)



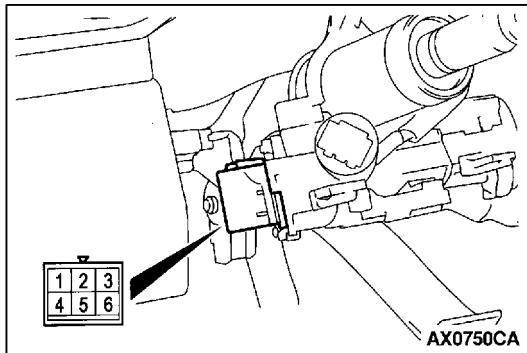
4. Upper column cover (Refer to GROUP 52A - Instrument Panel.)
5. Column Switch
6. Steering lock cylinder
7. Ignition switch
8. Key Reminder Switch
9. Immobilizer-ECU



## 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.

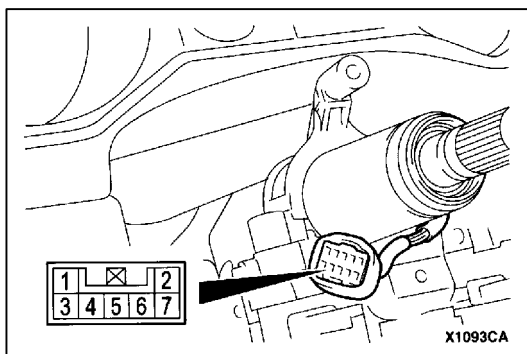


## INSPECTION

### IGNITION SWITCH CONTINUITY CHECK

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

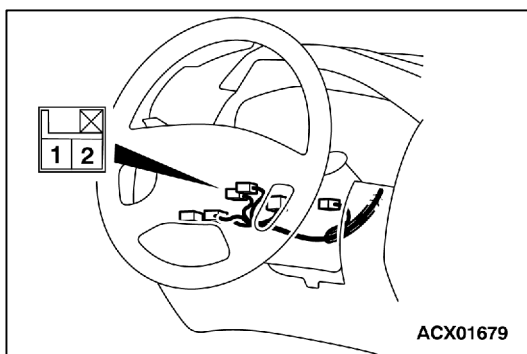
| Ignition switch position | Terminal No. |   |   |   |   |
|--------------------------|--------------|---|---|---|---|
|                          | 1            | 2 | 4 | 5 | 6 |
| LOCK                     |              |   |   |   |   |
| ACC                      |              | ○ |   |   | ○ |
| 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               |              |   |



### 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.

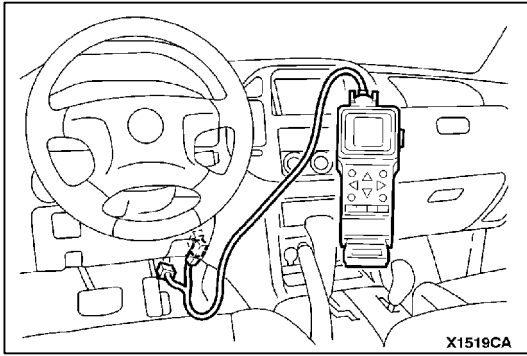
### ENCRYPTED CODE REGISTRATION METHOD

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 the LOCK (OFF) before connecting or disconnecting of the MUT-II.

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

# 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 | — |

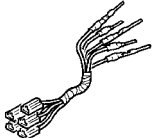
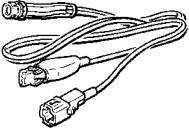
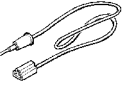

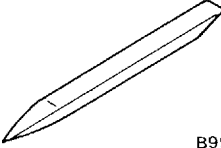
## SEALANTS

|                                       |  |
|---------------------------------------|--|
| Usage location                        | Brand  |
| Engine coolant temperature gauge unit | Semi-drying sealant:<br>Threebond 1104 [0110207], Threebond 1141E<br>(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<br/>B: MB991220<br/>C: MB991221<br/>D: MB991222</p> | <p>Harness set</p> <p>A: Check harness<br/>B: LED harness<br/>C: LED harness adapter<br/>D: Probe</p> | <p>Fuel gauge simple checking<br/>Engine coolant temperature gauge simple checking</p> <p>A: For checking contact pin contact pressure<br/>B: For checking the power supply<br/>C: For checking the power supply<br/>D: For checking the power supply circuit</p> |
|  <p>B990784</p>   | <p>MB990784</p>  | <p>Ornament remover</p>   | <p>Meter bezel removal</p>  |

## 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.



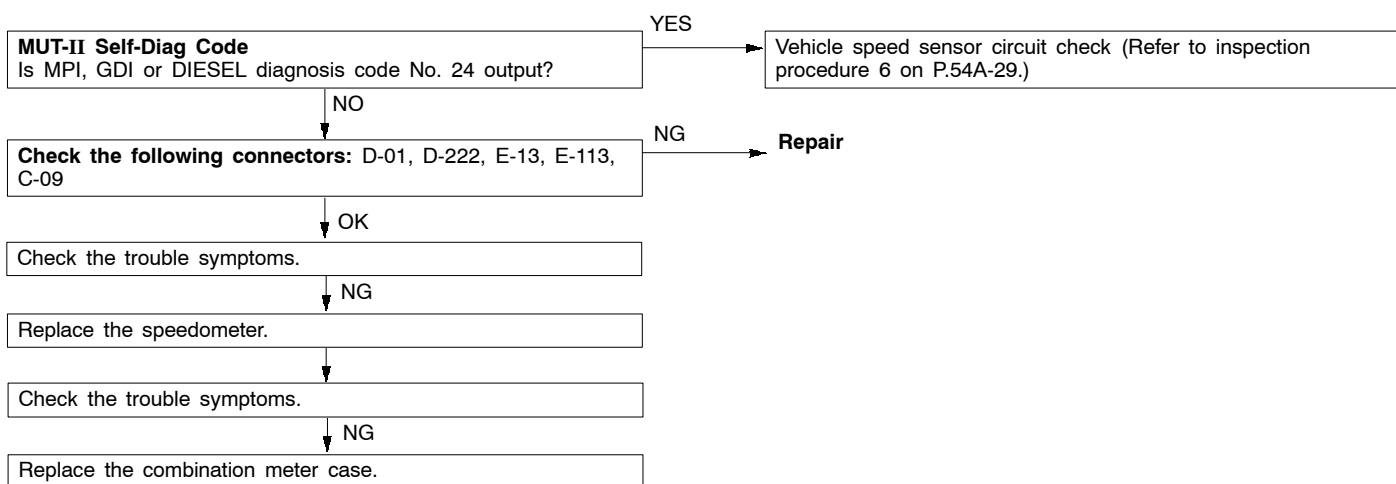
### CHART CLASSIFIED BY TROUBLE SYMPTOMS

| 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-29         |

### INSPECTION PROCEDURES FOR EACH TROUBLE SYMPTOM

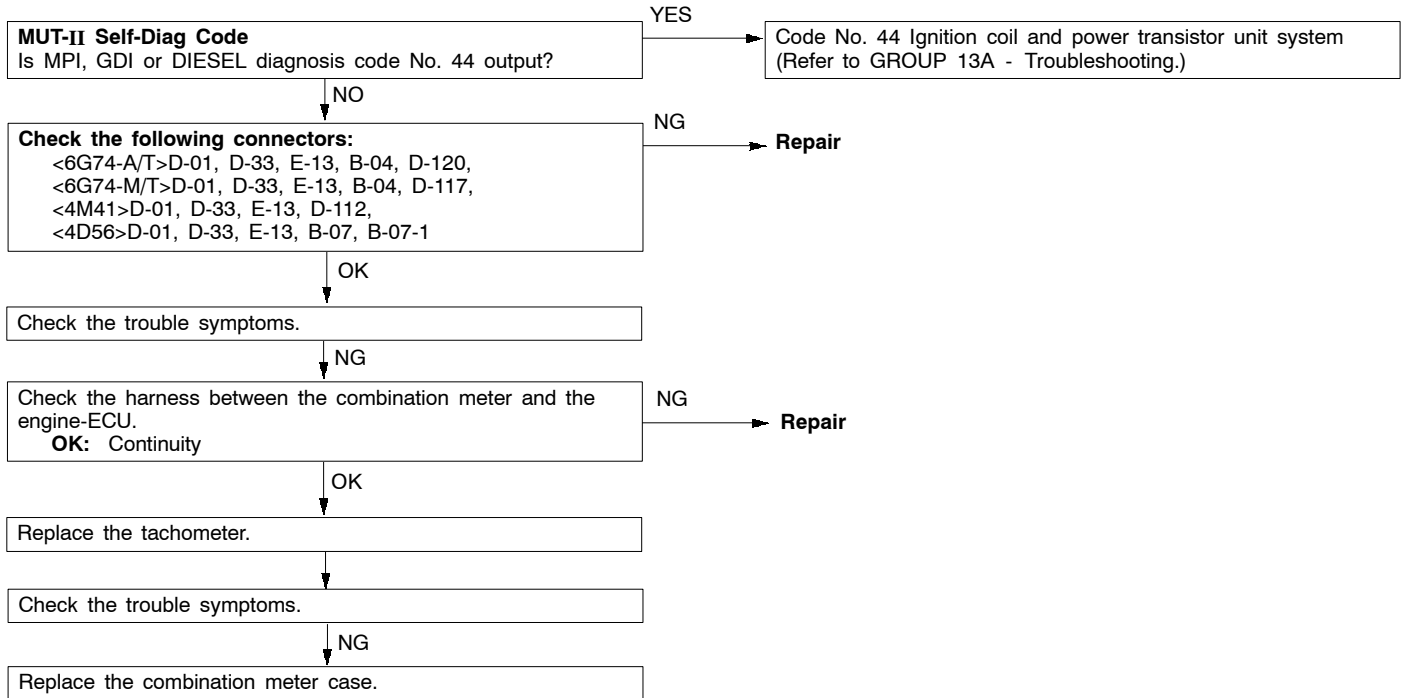
#### Inspection procedure 1

| 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"> <li>● Malfunction of vehicle speed sensor</li> <li>● Malfunction of harness or connector</li> <li>● Malfunction of speedometer</li> <li>● Malfunction of printed circuit board</li> </ul> |



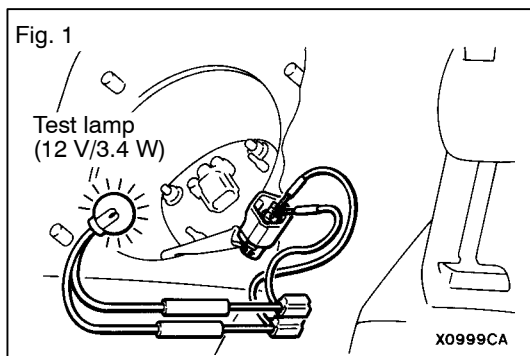
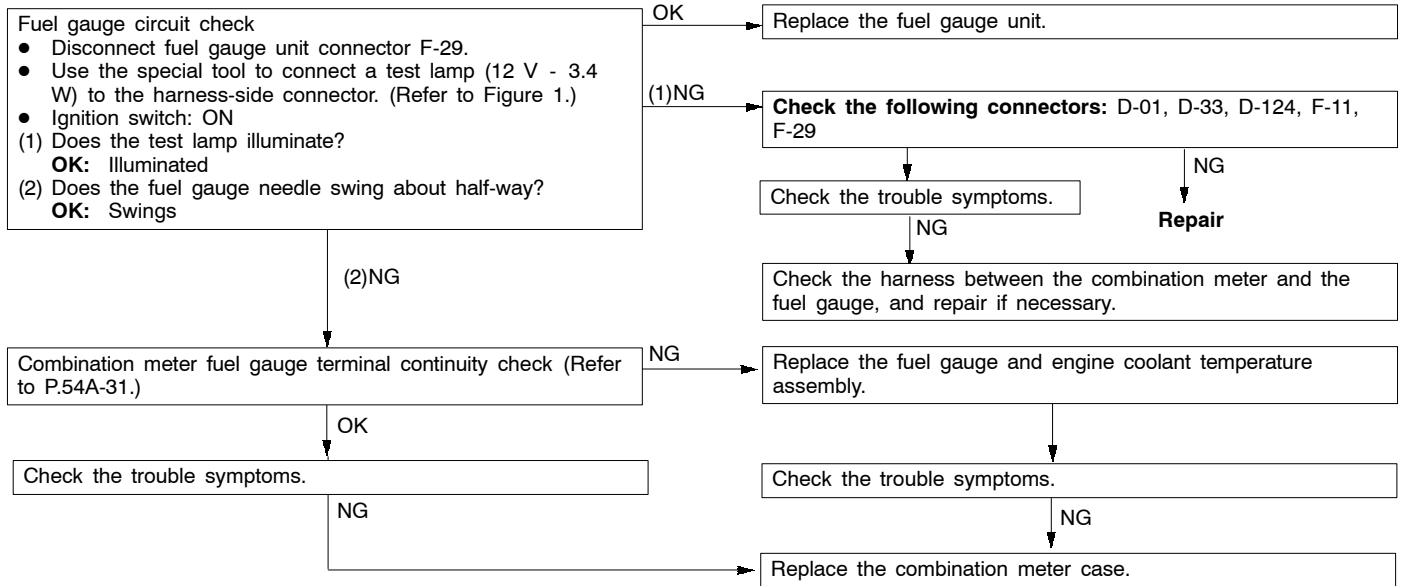
## Inspection procedure 2

| 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"> <li>● Malfunction of tachometer</li> <li>● Malfunction of harness or connector</li> <li>● Malfunction of printed circuit board</li> </ul> |



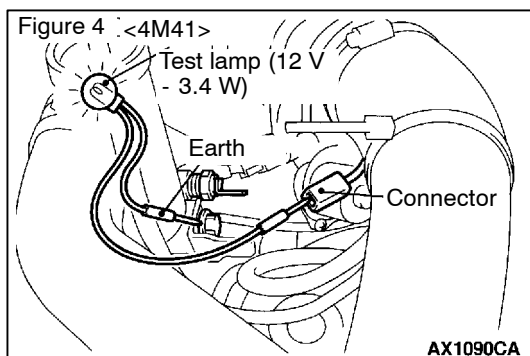
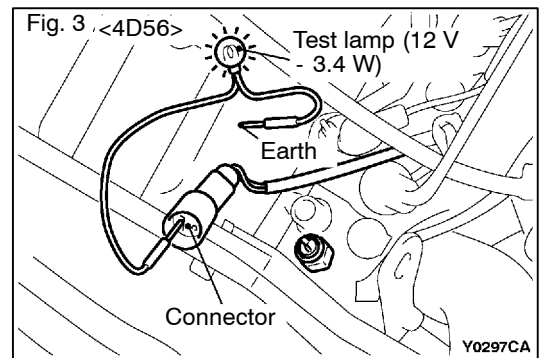
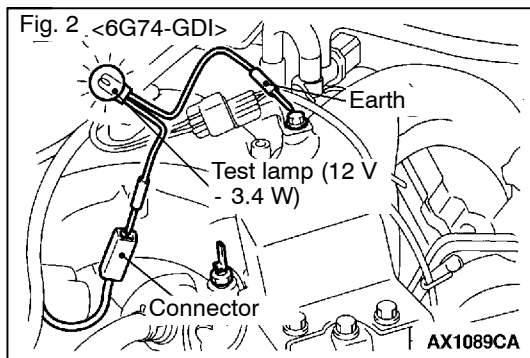
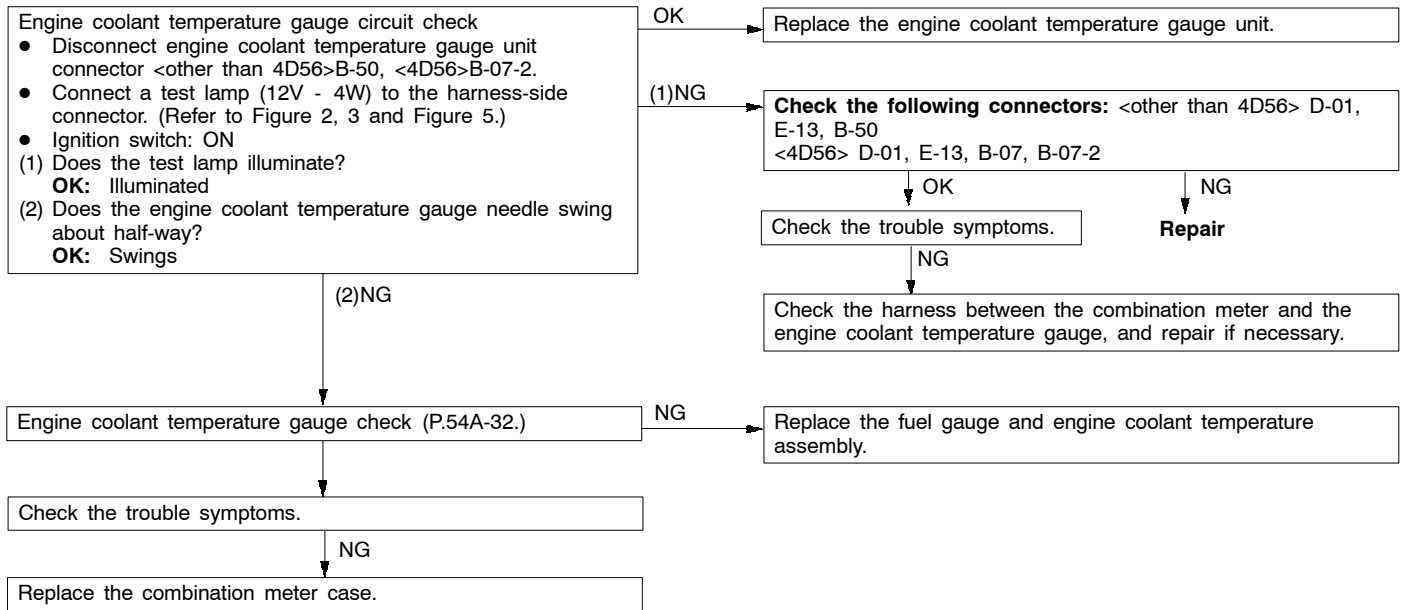
Inspection procedure 3

| 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"> <li>● Malfunction of fuel gauge unit</li> <li>● Malfunction of fuel gauge and engine coolant temperature assembly</li> <li>● Malfunction of harness or connector</li> <li>● Malfunction of printed circuit board</li> </ul> |



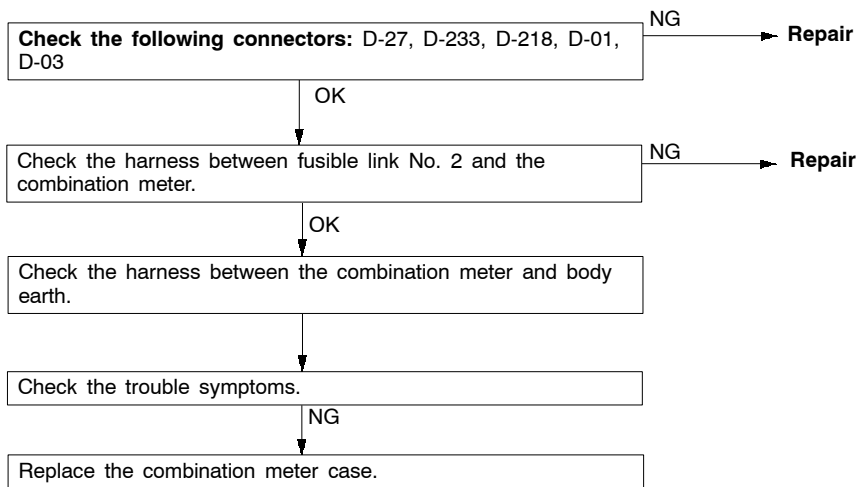
Inspection procedure 4

| Engine coolant temperature gauge does not operate.<br>(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"> <li>● Malfunction of engine coolant temperature gauge unit</li> <li>● Malfunction of fuel gauge and engine coolant temperature assembly</li> <li>● Malfunction of harness or connector</li> <li>● Malfunction of printed circuit board</li> </ul> |



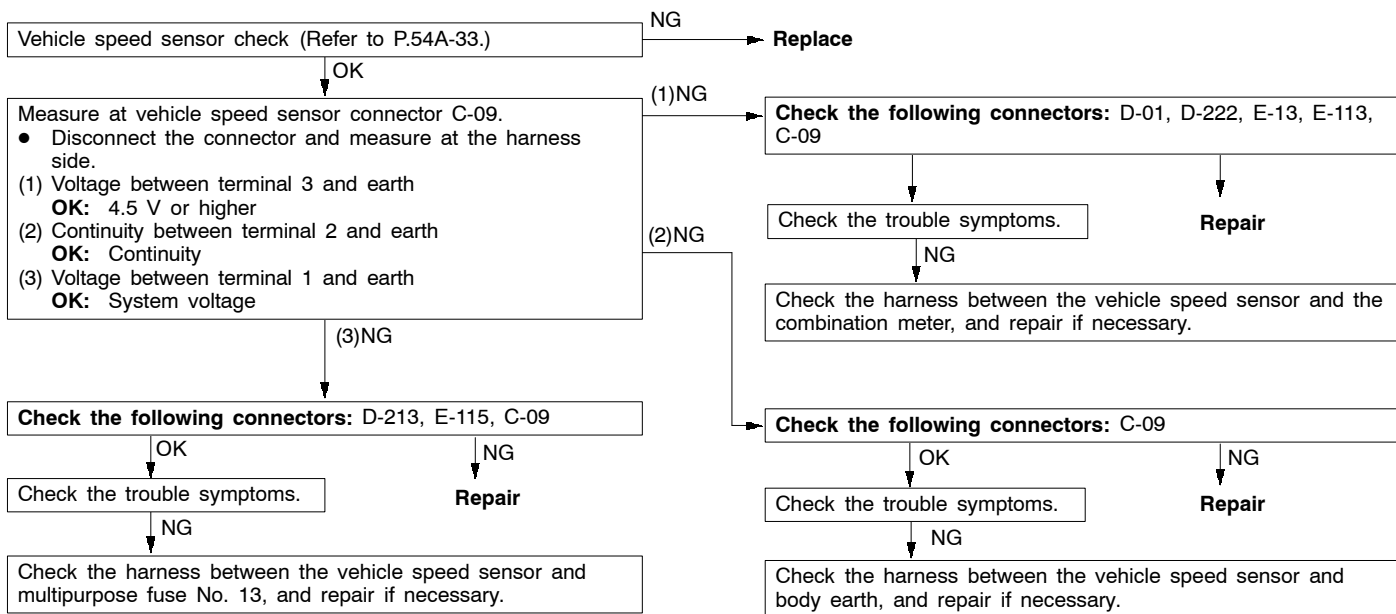
**Inspection procedure 5**

| 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"> <li>Malfunction of printed circuit board</li> <li>Malfunction of harness or connector</li> </ul> |



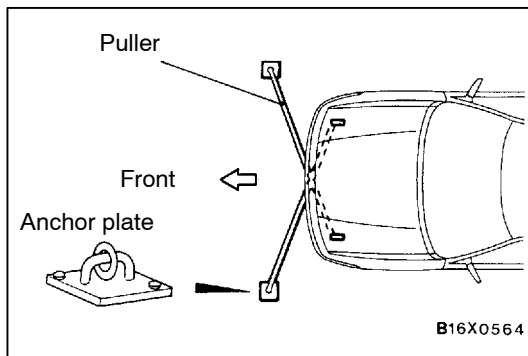
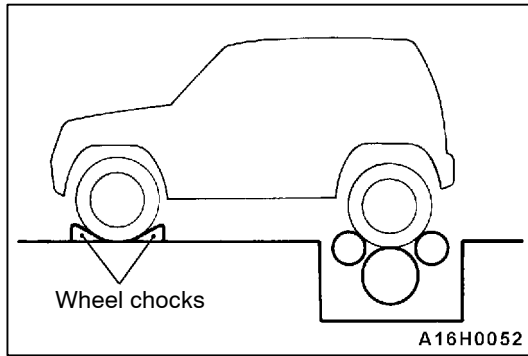
**Inspection procedure 6**

| 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

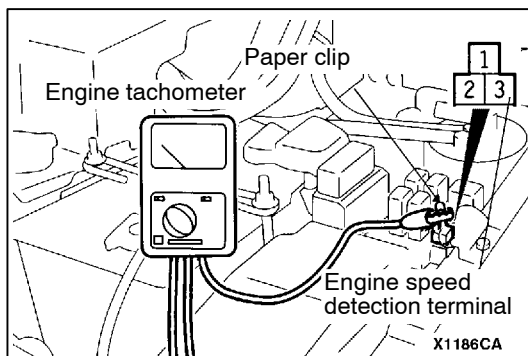
Set the vehicle to 2WD.

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: Needle swing (driving at a speed of 35 km/h or higher)  $\pm$  3 km/h**

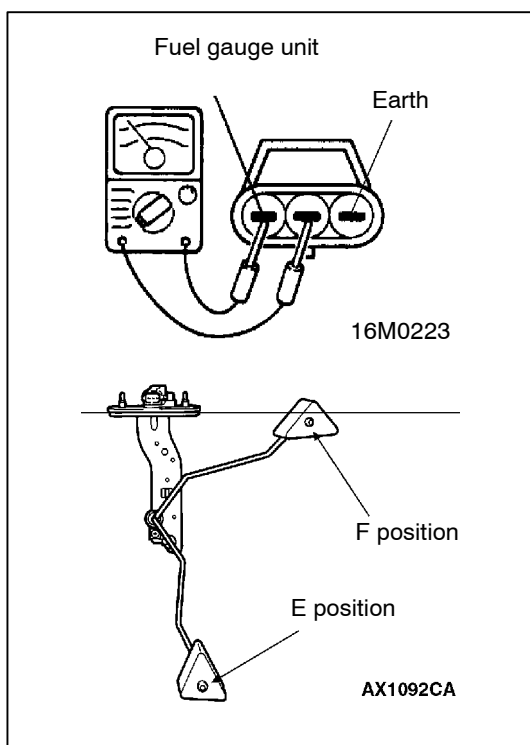


### TACHOMETER CHECK

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 | - 175+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.

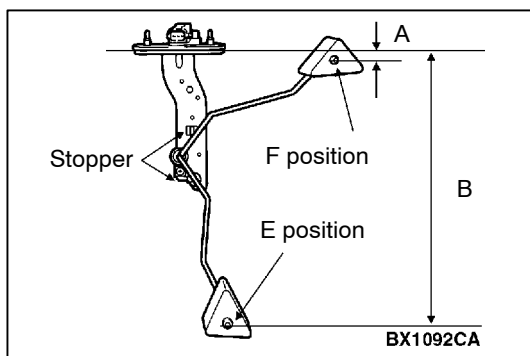
#### Fuel gauge unit standard resistance value

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.

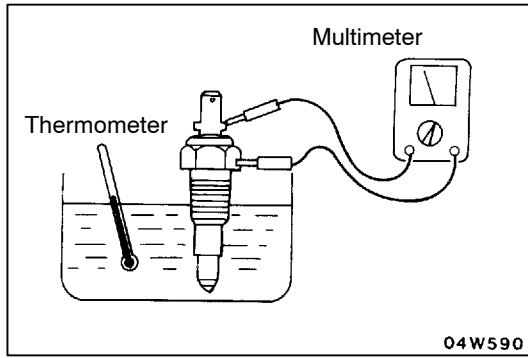


#### Fuel gauge unit float height

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:

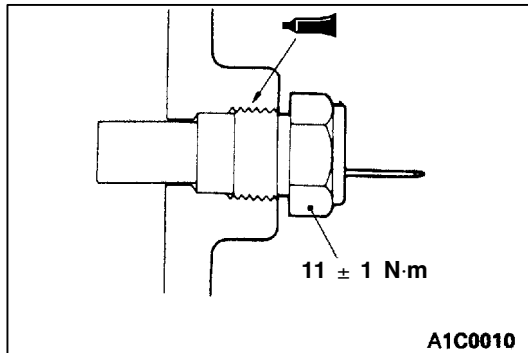
| Float position | Float centre height |
|----------------|---------------------|
| F position (A) | 11.9 mm             |
| E position (B) | 195.2 mm            |



### 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 ± 13.5 Ω**



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.

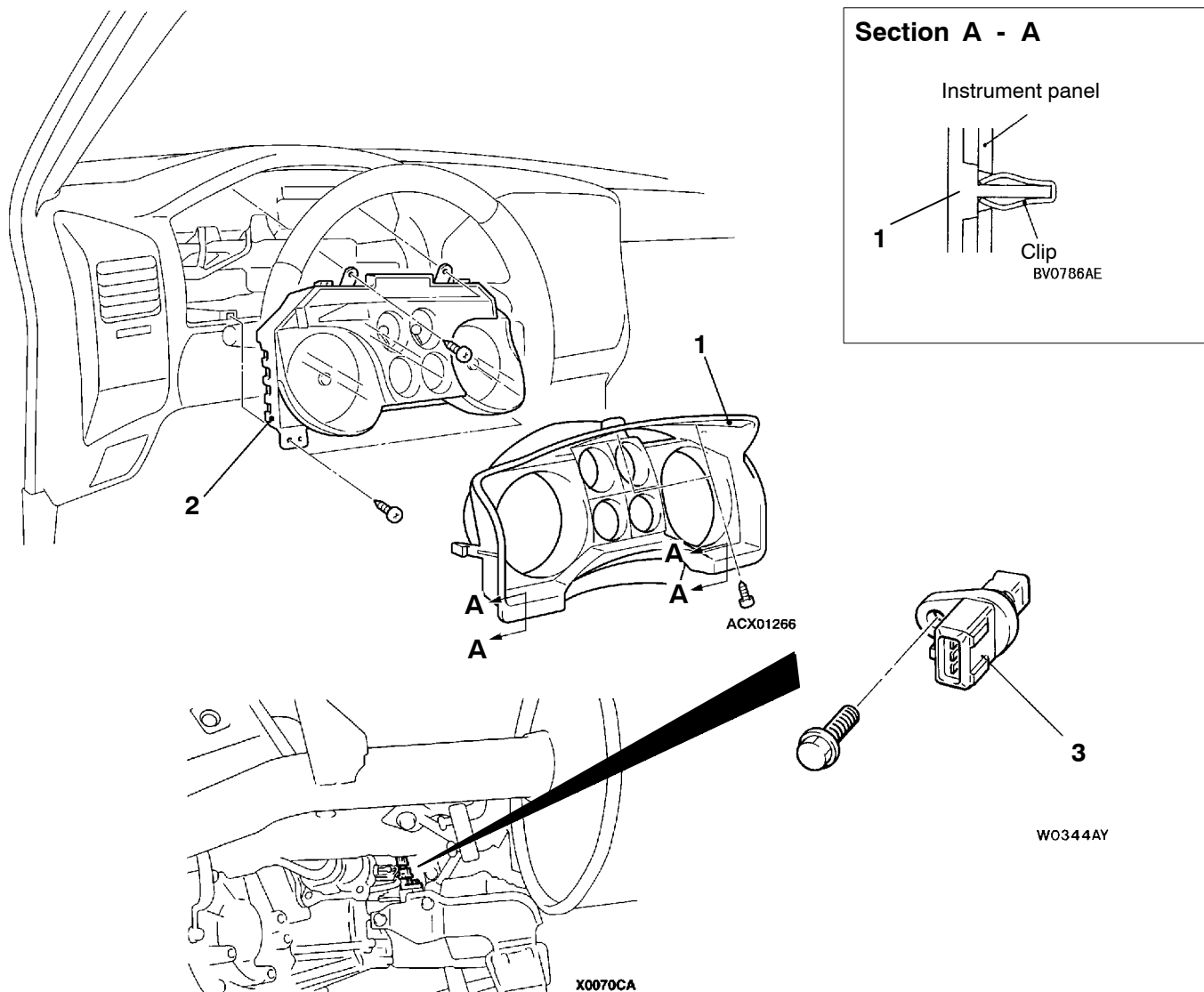
**Semi-drying sealant: Threebond 1104 or equivalent**

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



# COMBINATION METER

## REMOVAL AND INSTALLATION

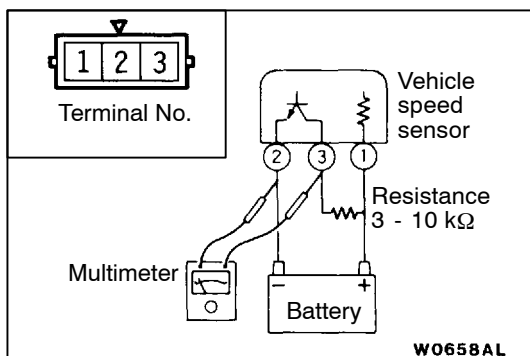


### Combination meter removal steps

1. Meter bezel
2. Combination meter

### Vehicle speed sensor removal

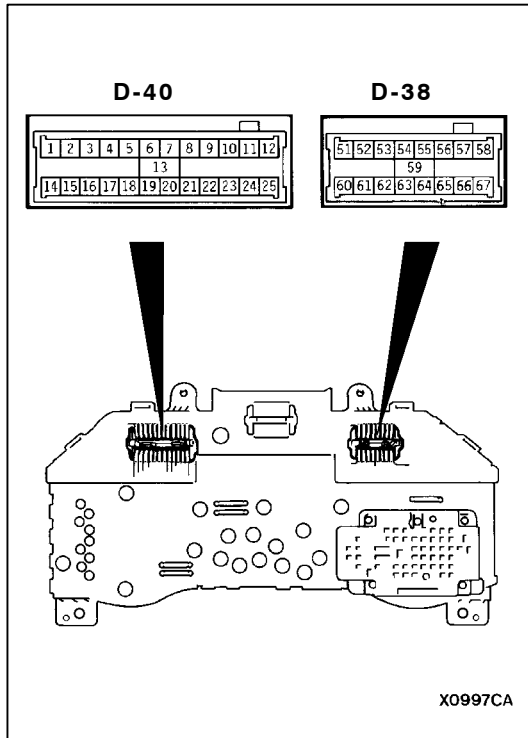
3. Vehicle speed sensor



## 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).



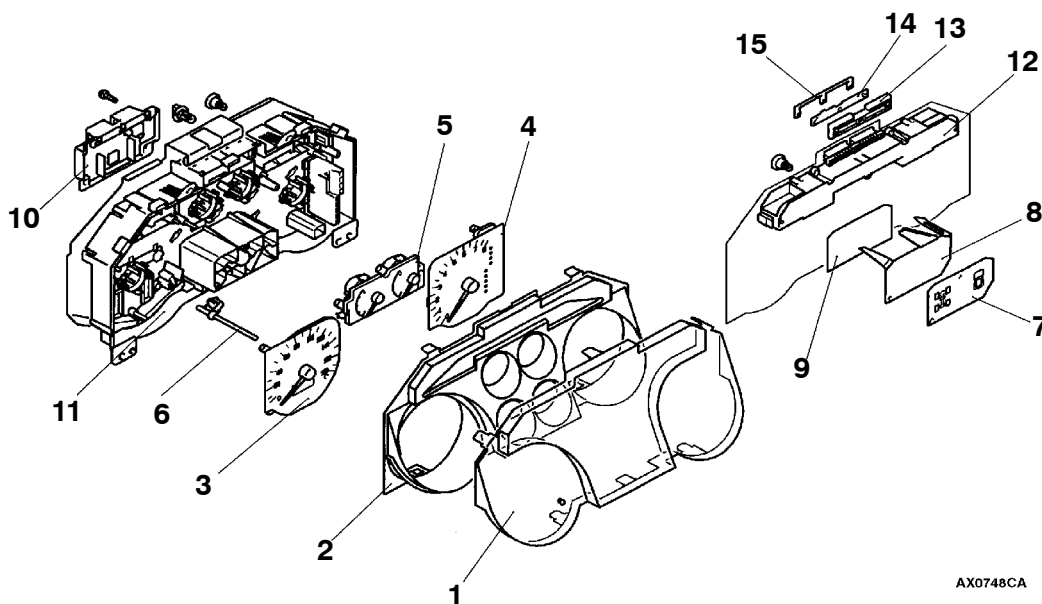
### COMBINATION METER INTERNAL RESISTANCE VALUE CHECK

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                                 | 1M $\Omega$ or more |
| 62 - 25                  | IG power supply - Earth                                 | 1M $\Omega$ or more |
| 62 - 63                  | IG power supply - Fuel gauge                            | 1M $\Omega$ or more |
| 62 - 64                  | IG power supply - Engine coolant temperature gauge      | 1M $\Omega$ or more |
| 63 - 11                  | Fuel gauge - Earth                                      | 180 $\Omega$        |
| 63 - 25                  | Fuel gauge - Earth                                      | 180 $\Omega$        |
| 64 - 11                  | Engine coolant temperature gauge - Earth                | 210 $\Omega$        |
| 64 - 25                  | Engine coolant temperature gauge - Earth                | 210 $\Omega$        |
| 67 - 11                  | Battery power supply - Earth                            | 1M $\Omega$ or more |
| 67 - 25                  | Battery power supply - Earth                            | 1M $\Omega$ or more |
| 67 - 63                  | Battery power supply - Fuel gauge                       | 1M $\Omega$ or more |
| 67 - 64                  | Battery power supply - Engine coolant temperature gauge | 1M $\Omega$ or more |

**DISASSEMBLY AND REASSEMBLY**



AX0748CA

**Disassembly steps**

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

# HEADLAMP ASSEMBLY

## SERVICE SPECIFICATIONS

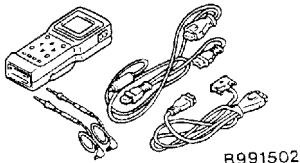
| Item  |              |                         | Standard value  | Limit                            |
|---|--------------|-------------------------|---|----------------------------------|
| Headlamp emitter adjustment<br>[Cut-off line (light/dark boundary<br>line) position]              | Low-<br>beam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

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

## TROUBLESHOOTING

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

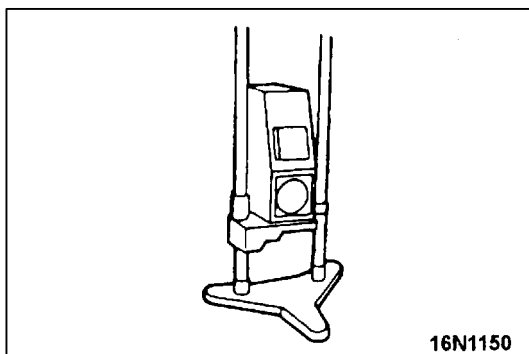
## ON-VEHICLE SERVICE

### HEADLAMP AIMING ADJUSTMENT

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

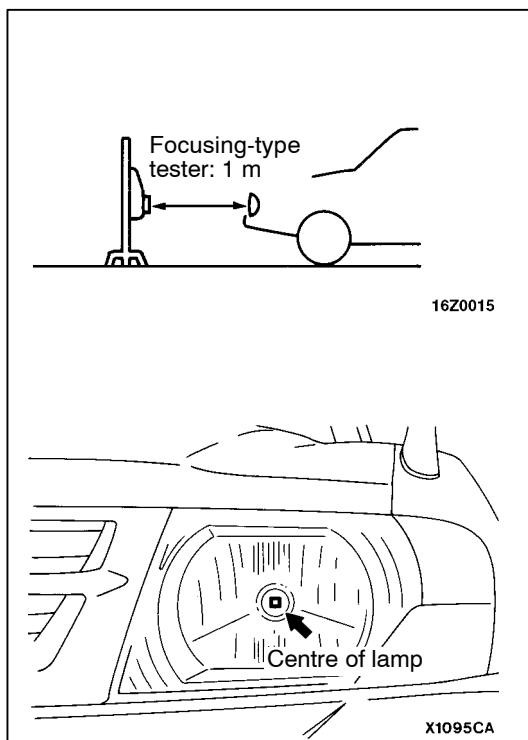
- Check that the tyre inflation pressure is at the value indicated on the tyre pressure labels.
- Set the vehicle to the unladen condition and park it on a level surface.
- Have a single person (approximately 55 kg) sit in the driver's seat.

- Run the engine at a speed of 2000 r/min to fully charge the battery.
- Turn the headlamp level control switch to position "0".

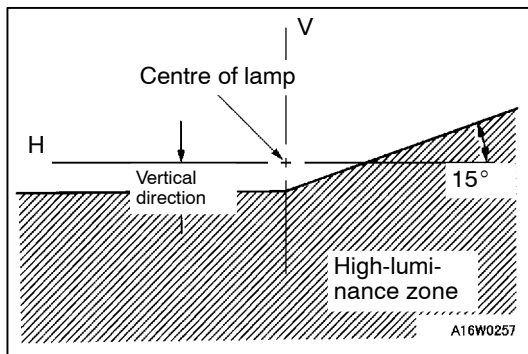
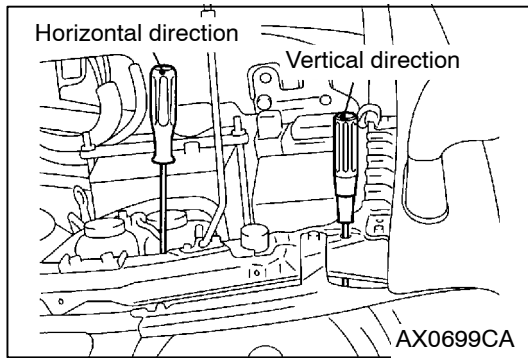


### LOW BEAM ADJUSTMENT

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.



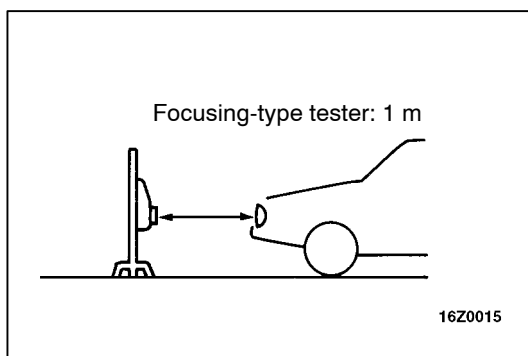
- Turn the adjusting screws to adjust so that the deviation in the centre of the high-luminance zone (main optical axis) is at the standard value.

**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**

- 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.
- 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.
- The adjustment should always be completed by turning the adjusting screws in the tightening direction.



**LUMINANCE MEASUREMENT**

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

**NOTE**

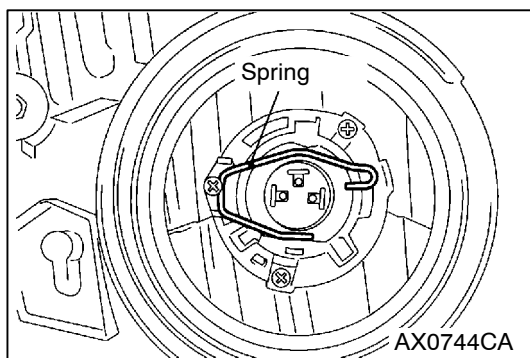
Check that the light/dark separation line on the adjustment screen and the low-beam cut-off line are aligned at this time.

- 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.

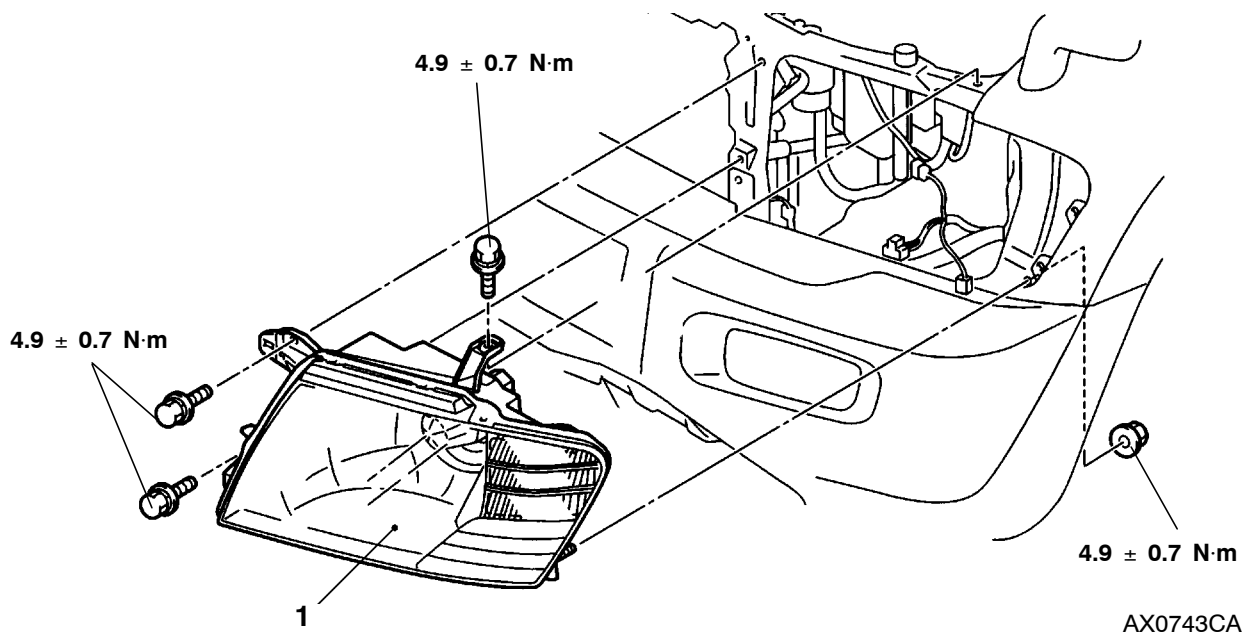
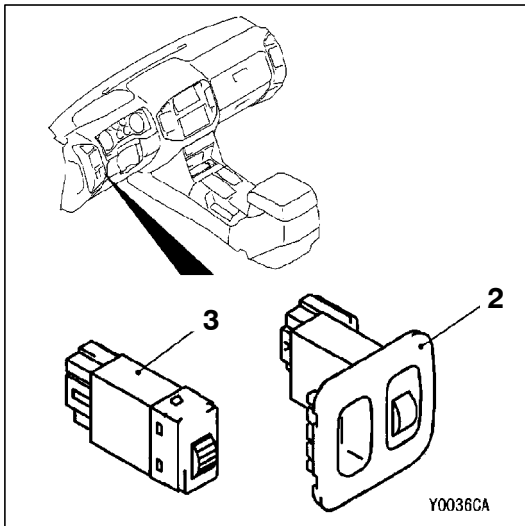
**Caution**

**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.**

## HEADLAMP ASSEMBLY

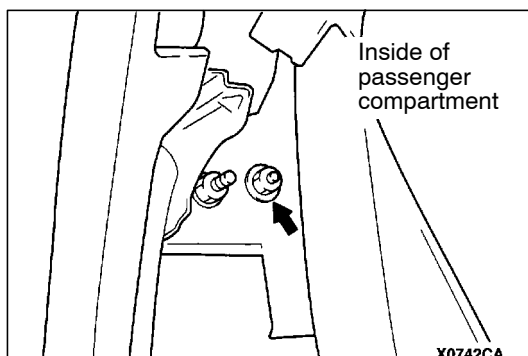
## REMOVAL AND INSTALLATION

**Headlamp removal steps**

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

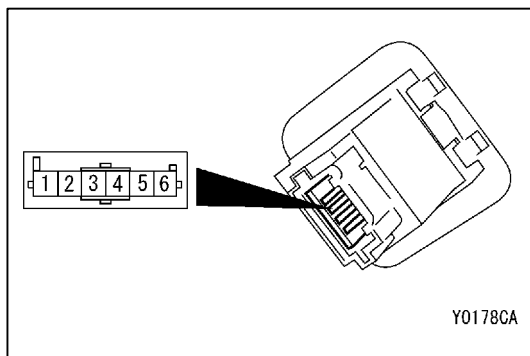
**Headlamp level control switch removal steps**

2. Switch garnish
3. Headlamp level control switch

**REMOVAL SERVICE POINT****◀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.





## INSPECTION

### HEADLAMP LEVEL CONTROL SWITCH CHECK

If the resistance value in the table shown below cannot be obtained after operating the headlamp level control switch, replace the headlamp level control switch.

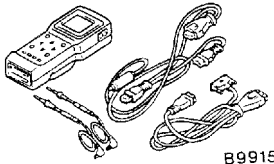
| Terminal No. to measure resistance       | Switch position |     |     |       |       |
|--|-----------------|-----|-----|-------|-------|
|  | 0               | 1   | 2   | 3     | 4     |
| Resistance between terminals (4) and (5) | 120             | 300 | 620 | 1,100 | 2,000 |

## 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 assembly | 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 2,000 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**

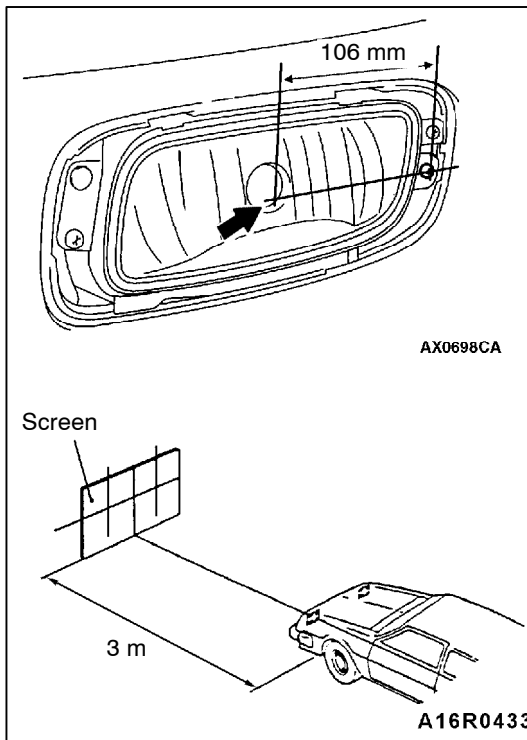
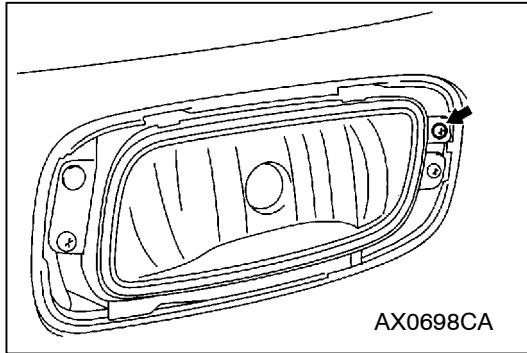
If the value is outside the standard value range, adjust using the adjusting screw.

**NOTE**

Horizontal adjustment is not possible.

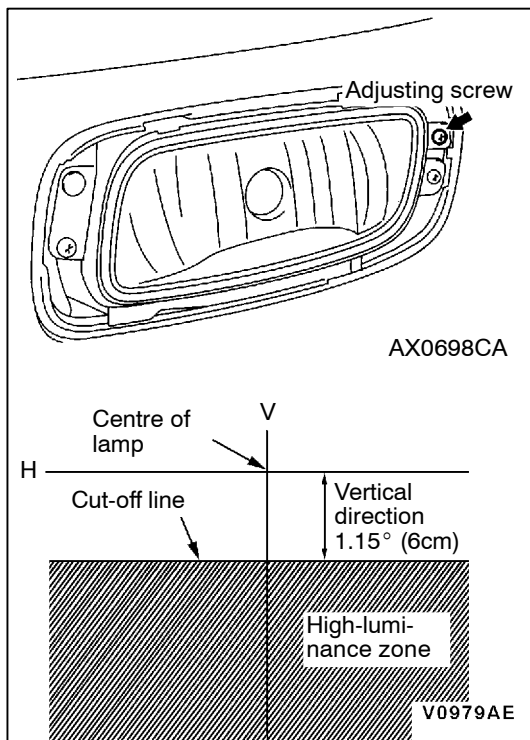
**Caution**

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**

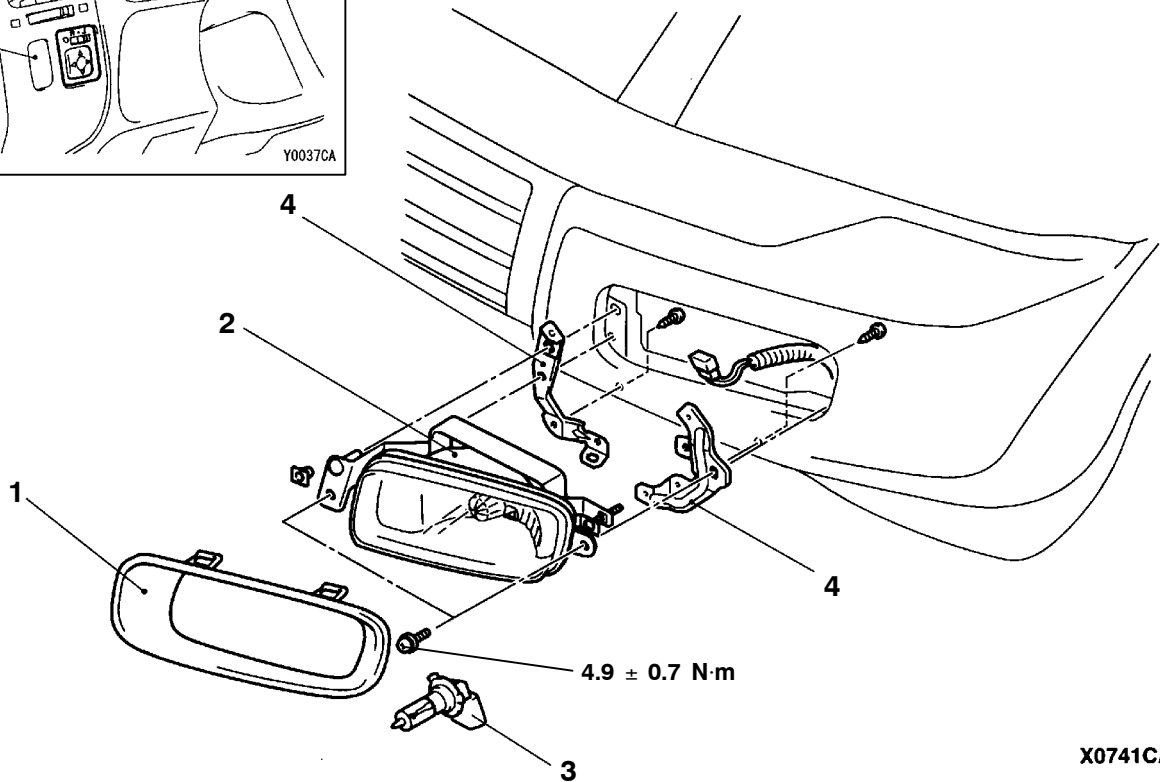
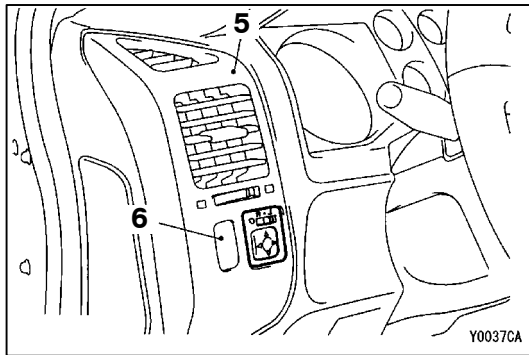
Horizontal adjustment is not possible.

**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

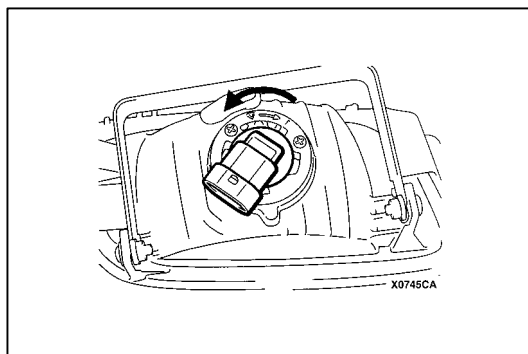


## Fog lamp removal steps

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 POINT

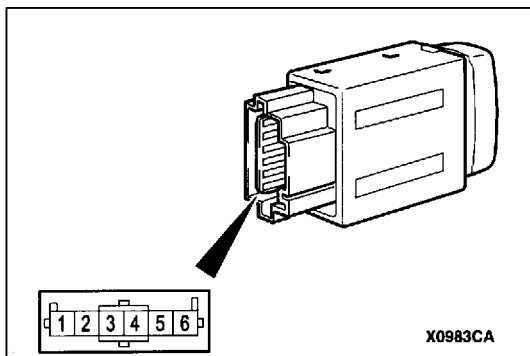
## ◀▶ BULB REMOVAL

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.



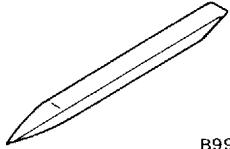
**INSPECTION**

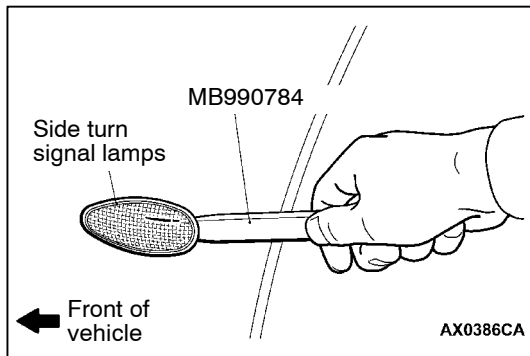
**FOG LAMP SWITCH CONTINUITY CHECK**

| Switch position |       | Terminal No. |   |     |     |   |     |   |
|-----------------|-------|--------------|---|-----|-----|---|-----|---|
|                 |       | 1            | 2 | 3   | ILL | 4 | 5   | 6 |
| ON              | FRONT | ○—○          |   | ○—⊕ | ○   |   |     |   |
|                 | REAR  |              |   | ○—⊕ | ○   |   | ○—○ |   |
| OFF             |       |              |   | ○—⊕ | ○   |   |     |   |

**SIDE TURN-SIGNAL LAMPS**

**SPECIAL TOOL**

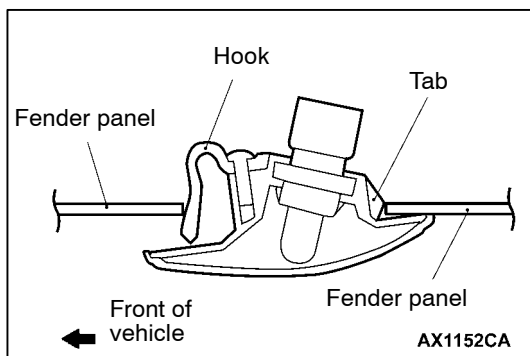
| Tools  | No.      | Name             | Application                   |
|--|----------|------------------|-------------------------------|
| <br>B990784 | MB990784 | Ornament remover | Side turn-signal lamp removal |



## SIDE TURN-SIGNAL LAMPS

### REMOVAL SERVICE POINTS

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



### INSTALLATION SERVICE POINTS

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.

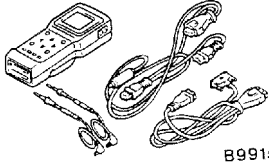
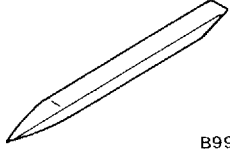
### ON-VEHICLE SERVICE

#### 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

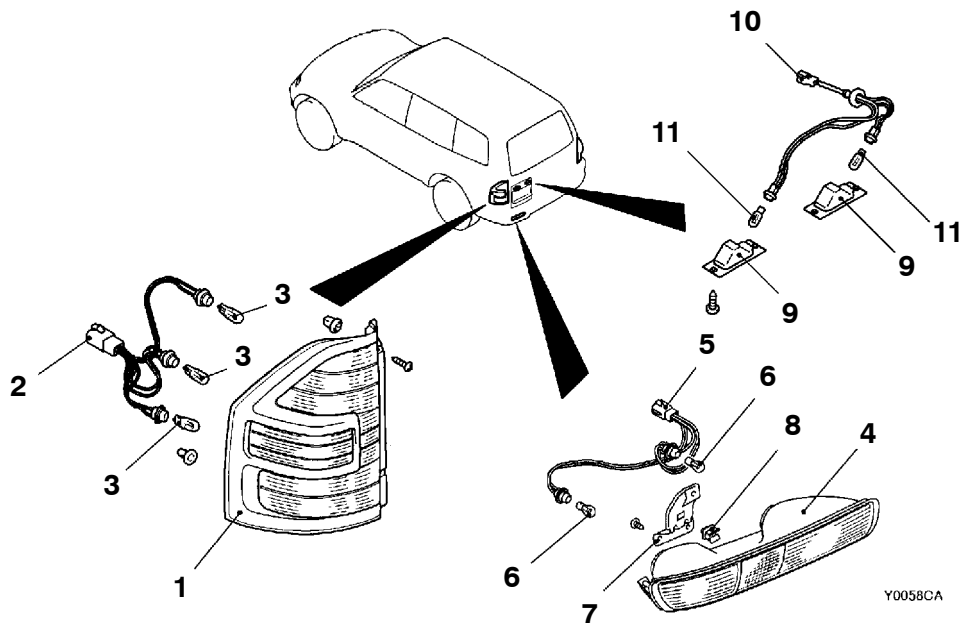
## SPECIAL TOOLS

| Tools  | No.      | Name                | Application                          |
|--|----------|---------------------|--------------------------------------|
| <br>B991502 | MB991502 | MUT-II Sub assembly | Checking the ETACS-ECU input signals |
| <br>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



### Rear combination lamp removal steps

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

### Rear lamp removal steps

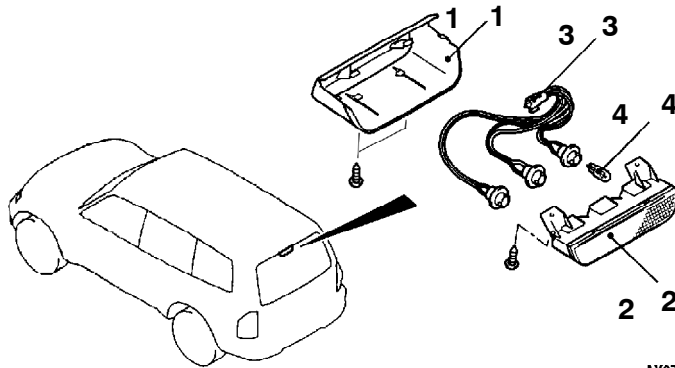
4. Rear lamp
5. Socket assembly
6. Bulb
7. Rear lamp bracket
8. Clip

### Licence plate lamp removal steps

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

# HIGH-MOUNTED STOP LAMP

## REMOVAL AND INSTALLATION



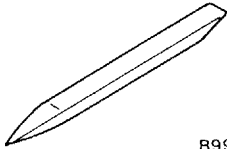
AX0747CA

### Removal steps

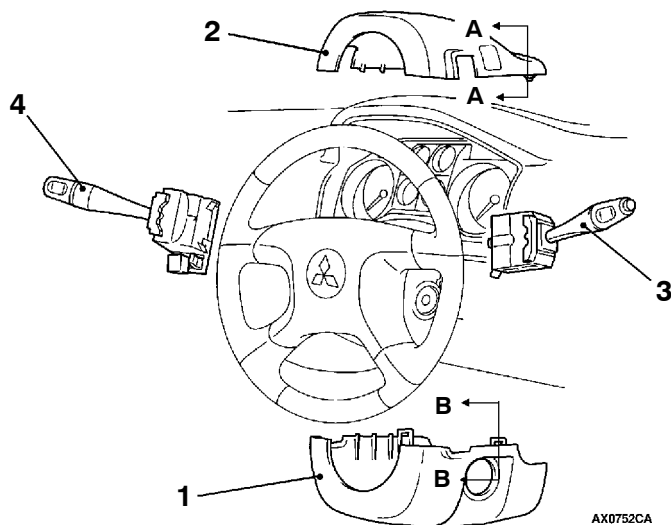
1. High-mounted stop lamp cover
2. High-mounted stop lamp body
3. Socket assembly
4. Bulb

# COLUMN SWITCH

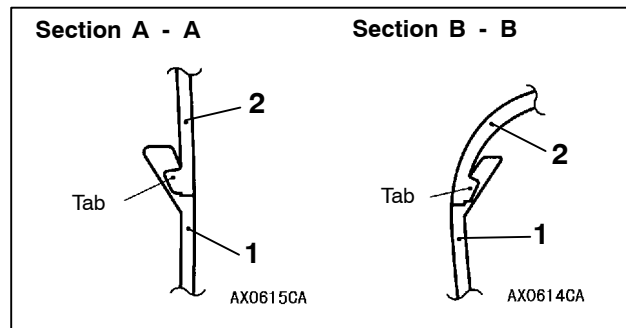
## SPECIAL TOOL

| Tools   | No.      | Name             | Application          |
|---|----------|------------------|----------------------|
| <br>B990784 | MB990784 | Ornament remover | Column cover removal |

## REMOVAL AND INSTALLATION



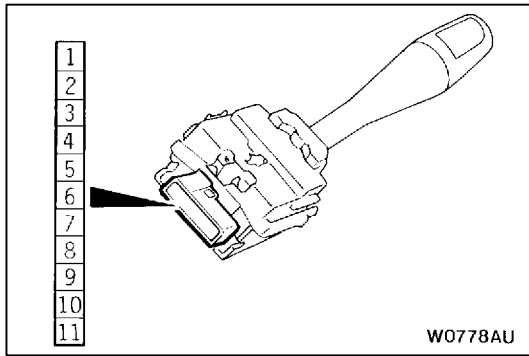
AX0752CA



### 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

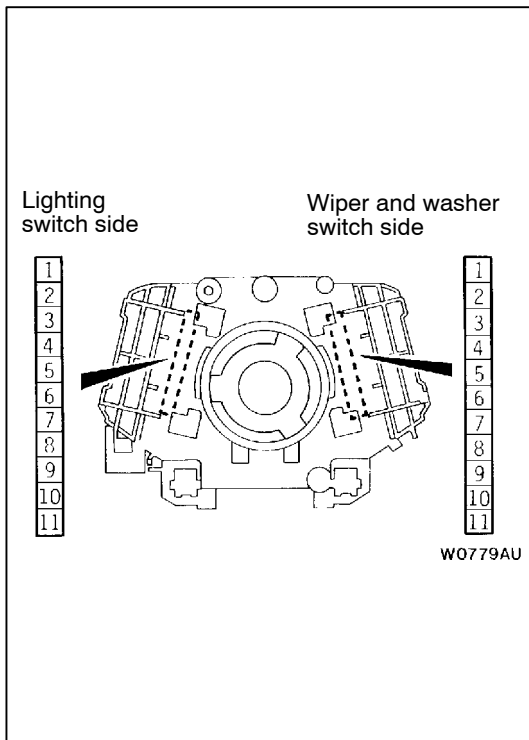




**INSPECTION**

**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. | ○            |   |   |   |   |    | ○  |



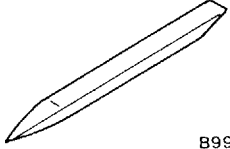
**COLUMN SWITCH (SWITCH BODY) CONTINUITY CHECK**

- (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                             |   |   |   |   |   |   |    |    | ○ |

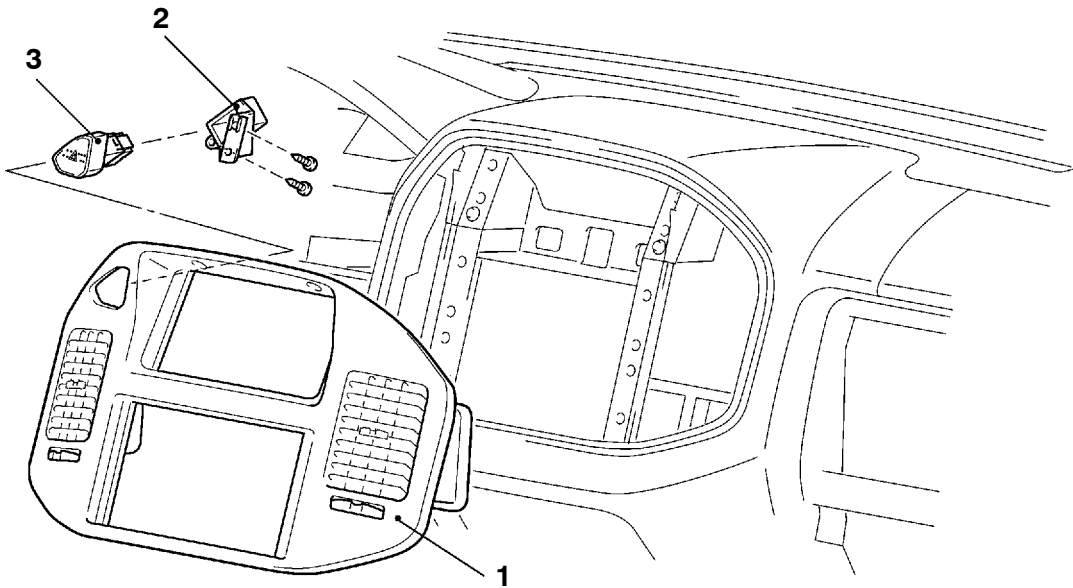
# HAZARD WARNING LAMP SWITCH

## SPECIAL TOOL

| Tools  | No.      | Name             | Application          |
|--|----------|------------------|----------------------|
| <br>B990784 | MB990784 | Ornament remover | Center panel removal |

## HAZARD WARNING LAMP SWITCH

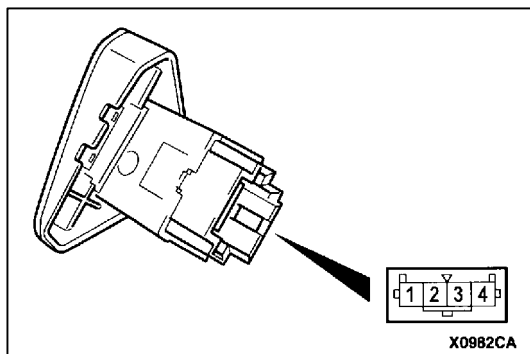
### REMOVAL AND INSTALLATION



ACX01270

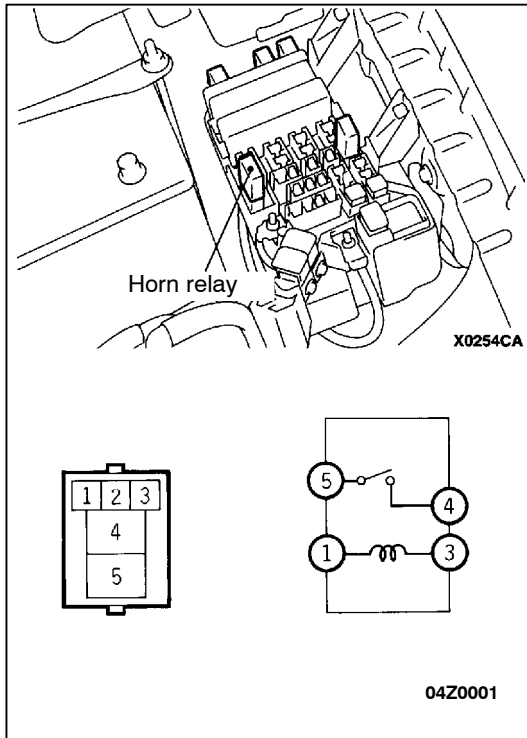
#### Removal steps

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



#### HAZARD LAMP SWITCH CONTINUITY CHECK

| Switch position | Terminal No. |   |   |     |   |
|-----------------|--------------|---|---|-----|---|
|                 | 1            | 2 | 3 | ILL | 4 |
| OFF             |              |   | ○ | ⊕   | ○ |
| ON              | ○            | ○ | ○ | ⊕   | ○ |

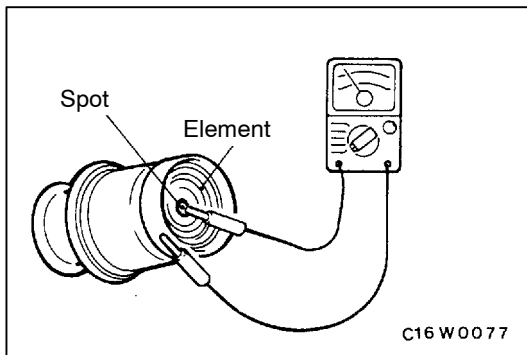


## HORN

### INSPECTION

#### HORN RELAY CONTINUITY CHECK

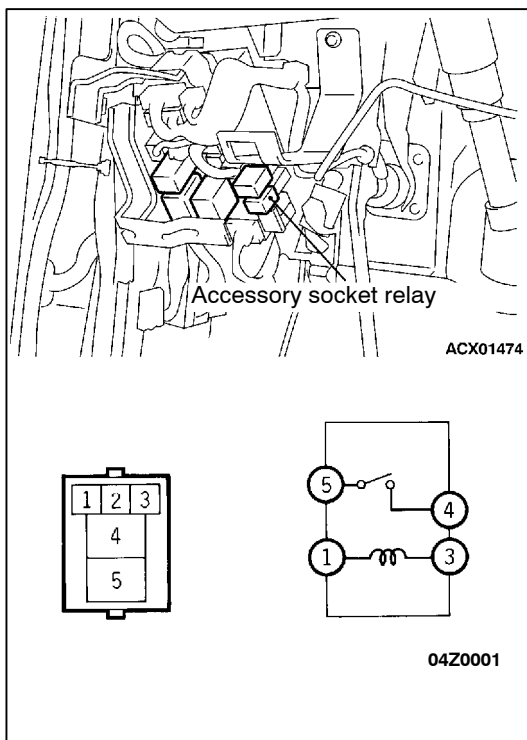
| Switch position              | Terminal No. |   |   |   |
|------------------------------|--------------|---|---|---|
|                              | 1            | 3 | 4 | 5 |
| When current is not supplied | ○            | ○ |   |   |
| When current is supplied     | ⊖            | ⊕ | ○ | ○ |



## 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.

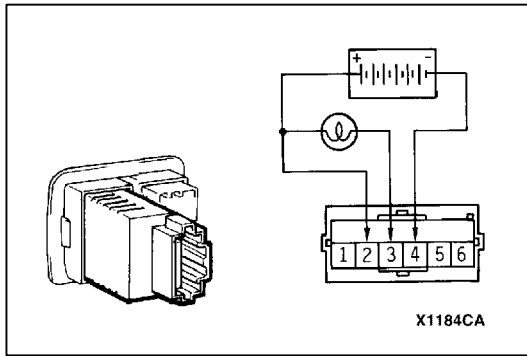


## ACCESSORY SOCKET

### 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 OR CENTER DISPLAY

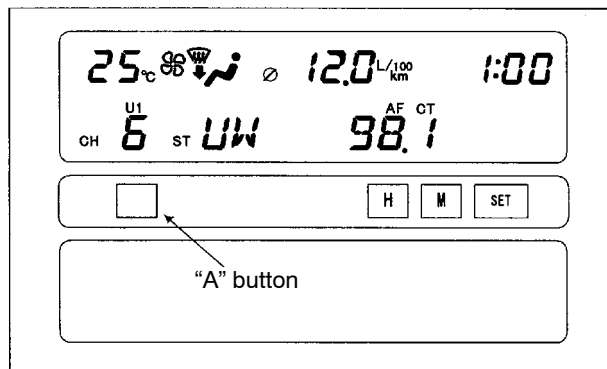
## PRECAUTIONS WITH REGARD TO CENTER DISPLAY SERVICE WORK

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.

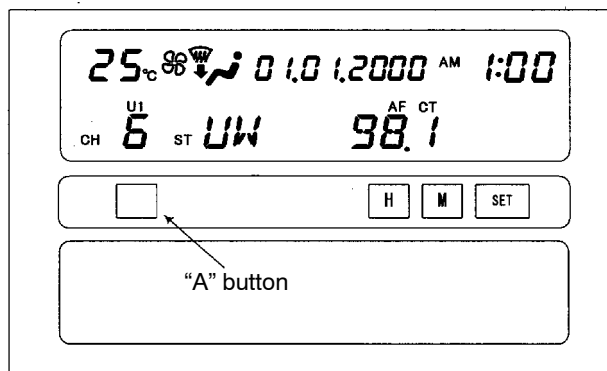
## TROUBLESHOOTING

| 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<br>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<br>* 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<br>Voltage (%) on terminal for MUT-II<br>Vehicle speed signal sent by engine-ECU<br>Oscillating signal |

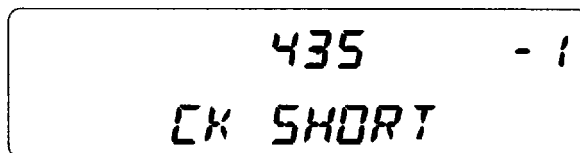
## SERVICE MODE FOR CENTER DISPLAY

### 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.



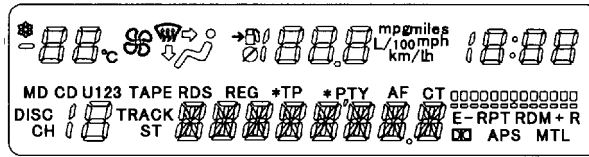
|              |                         |                         |                    |
|--------------|-------------------------|-------------------------|--------------------|
| Parts No.    | MR532881                | MR532880                |                    |
| Vehicle type | Diesel-powered vehicles | Petrol-powered vehicles |                    |
|              |                         | Short wheelbase         | Long wheelbase     |
| Display      | 435 - 2<br>CK           | 435 - 1<br>CK SHORT     | 435 - 1<br>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

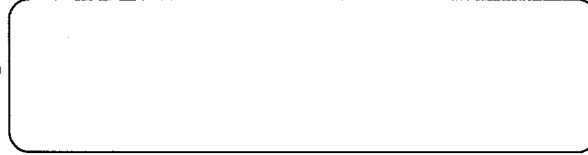
This service mode consists of 6 display screens; the screen where all segments are illuminated, the screen where all segments are extinguished, and four kind of screens where 1/4 of segments are illuminated. Each screen can be changed sequentially when pushing on the "SET" button.

All segments illuminated



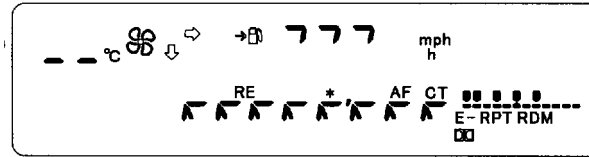
↓ SET

All segments extinguished



↓ SET

1/4 of segments illuminated



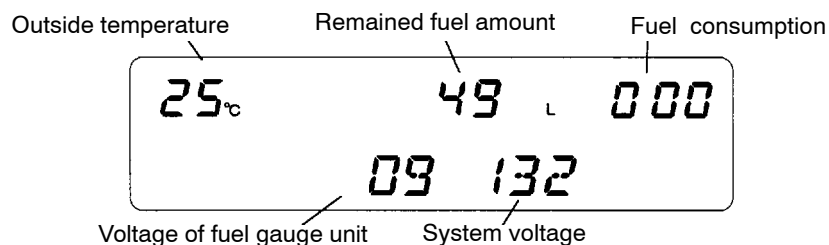
(4 displays) ↓

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]<br>+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.

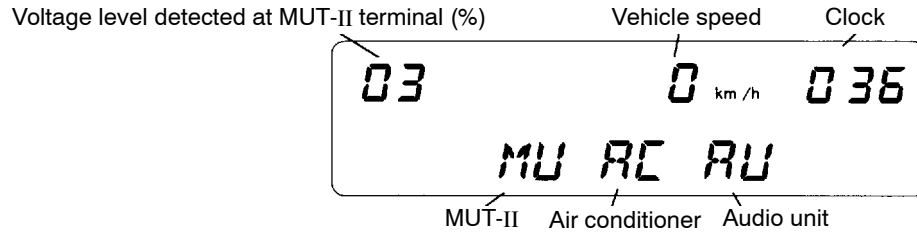
|                 |        |        |        |
|-----------------|--------|--------|--------|
| Battery         | 12.0 V | 13.2 V | 14.4 V |
| Fuel gauge unit | 1.8 V  | 2.0 V  | 2.2 V  |

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-Litre 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 Litre 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.

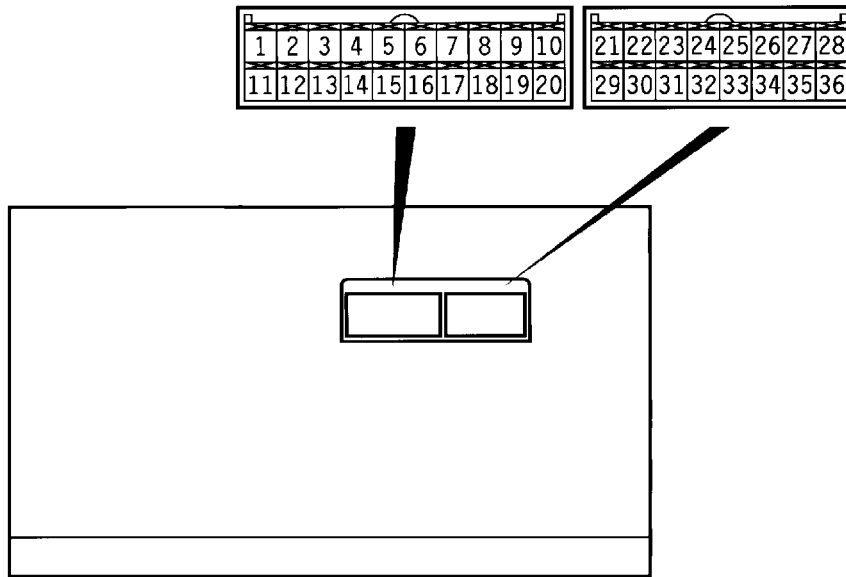
## 4. Check of units connected into the center display

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<br>Lo: 0-1 | Exists                 | Exists        | MUT-II cannot be used to check the engine-ECU.  |
| 6            | -             | -               | -                             | -                      | -             |   |
| 7            | Input/ Output | M-DATA (AUDIO)  | Hi: 4-5<br>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. |
| 8            | Input/ Output | M-CLOCK (AUDIO) | Hi: 4-5<br>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. |
| 9            | Input/ Output | M-DATA (A/C)    | Hi: 4-5<br>Lo: 0-1            | Exists                 | Exists        | A/C display does not appear. Outside air temperature does not appear  |
| 10           | Input/ Output | M-CLOCK (AUDIO) | Hi: 4-5<br>Lo: 0-1            | Exists                 | Exists        | A/C display does not appear. Outside air temperature does not appear  |
| 11-14        | -             | -               | -                             | -                      | -             | -   |

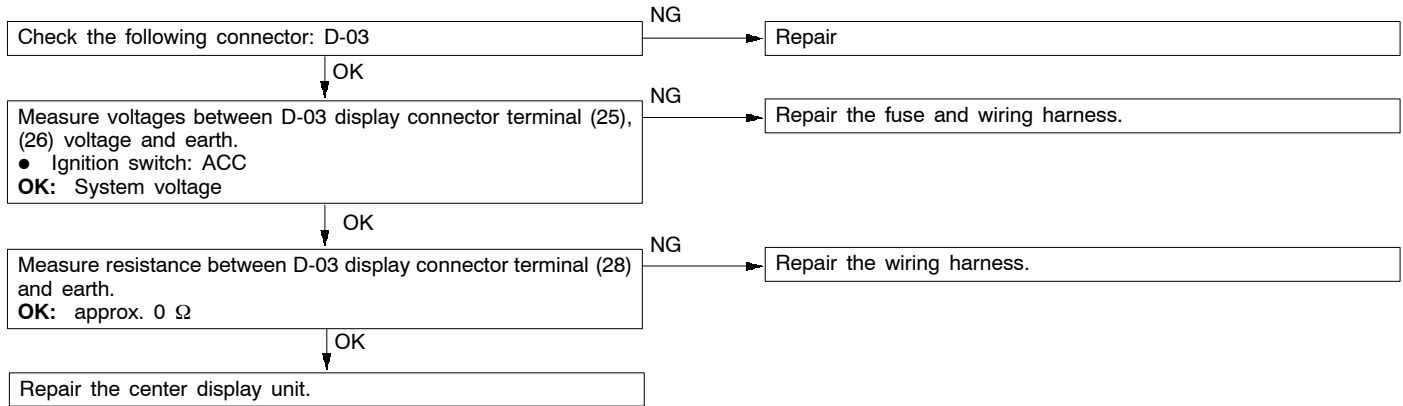
| Terminal No. | Input/ Output | Signal symbol          | Terminal voltage (V)          | Wiring harness problem |               | Trouble symptom caused by wiring harness problem   |
|--------------|---------------|------------------------|-------------------------------|------------------------|---------------|--|
|              |               |                        |                               | Open circuit           | Short circuit |  |
| 15           | Input/ Output | K                      | Hi: System voltage<br>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<br>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<br>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<br>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<br>Lo: 0-1 | Exists                 | Exists        | Abnormal outside air temperature appears.<br>(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.  |
| 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**

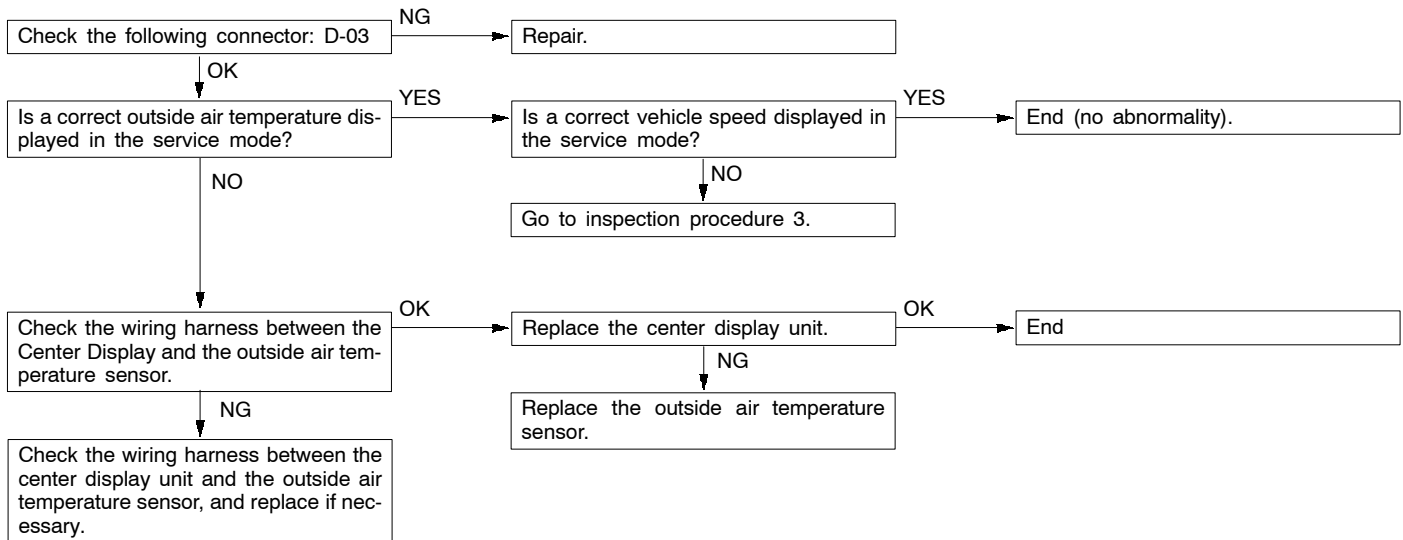
| Related unit   | Trouble Symptom   | Inspection procedure No. | Reference page |
|--|---|--------------------------|----------------|
| Malfunction of center display, related sensors, and wiring harnesses | No display appears after the ignition key is turned to the ACC position.  | 1                        | 54A-62         |
|  | Outside air temperature does not appear or abnormal outside air temperature appears.  | 2                        | 54A-62         |
|  | Abnormal vehicle speed is displayed on the service mode.  | 3                        | 54A-63         |
|  | Abnormal driving data are displayed: <ul style="list-style-type: none"> <li>● Abnormal average fuel consumption (momentary fuel consumption) and average vehicle speed</li> <li>● Abnormal cruising distance</li> </ul> | 4                        | 54A-64         |
|  | Clock runs fast or slow.  | 5                        | 54A-64         |
|  | The display screen is dim.  | 6                        | 54A-65         |
|  | Air conditioning display does not appear.   | 7                        | 54A-66         |

**INSPECTION PROCEDURE 1**

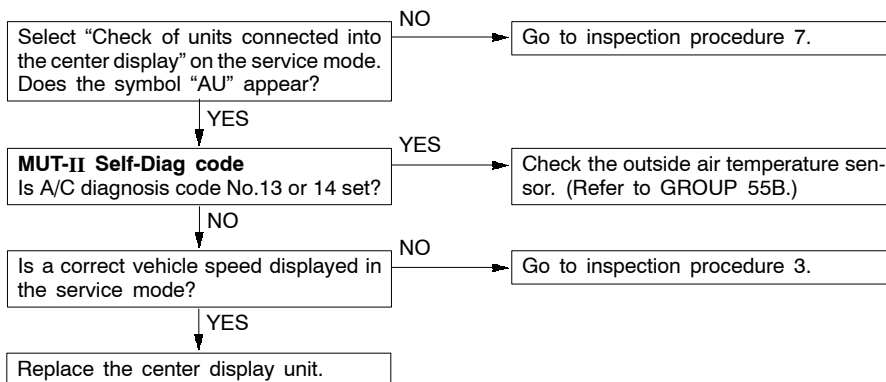
No display appears after the ignition key is turn to the ACC position.

**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>

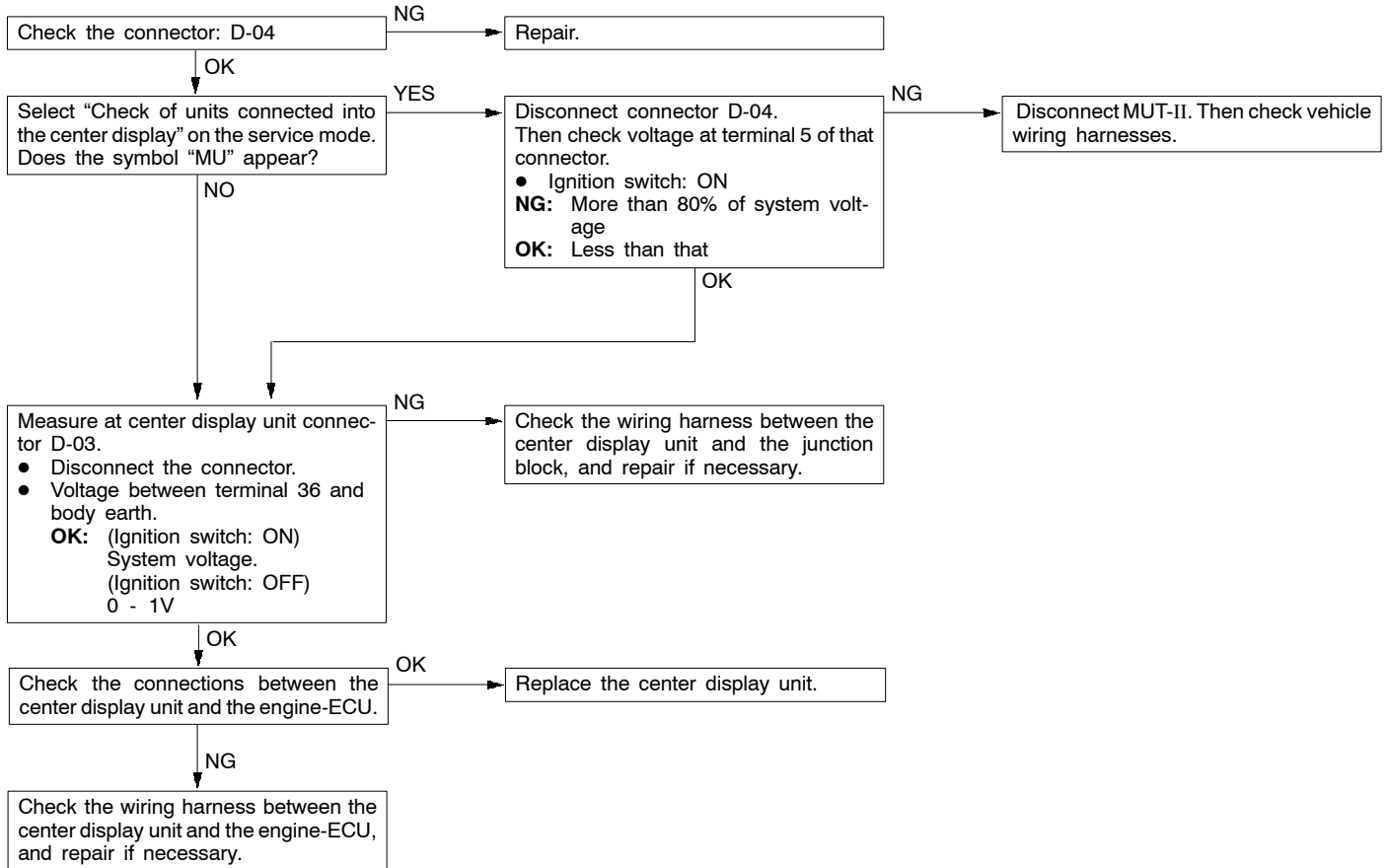


NOTE: It is necessary to drive for a while and get accurate temperature in display if you pass a area in which temperature is much different. It might show high temperature on display in case it is high around sensor due to high temperature of engine after battery is exchanged, or a display unit is reinstalled.

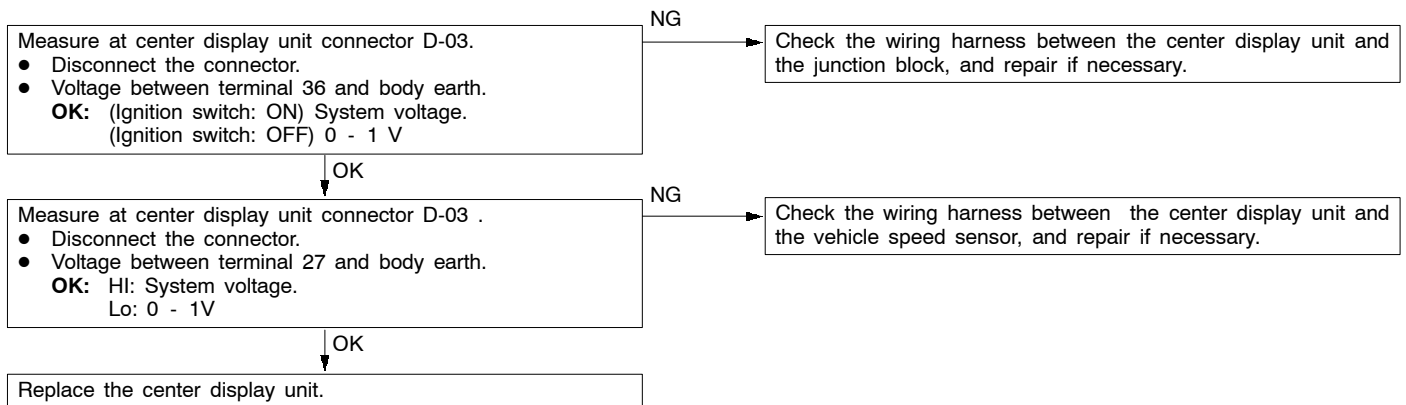
### INSPECTION PROCEDURE 3

Abnormal vehicle speed is displayed on the service mode.

#### <Petrol-powered vehicles>



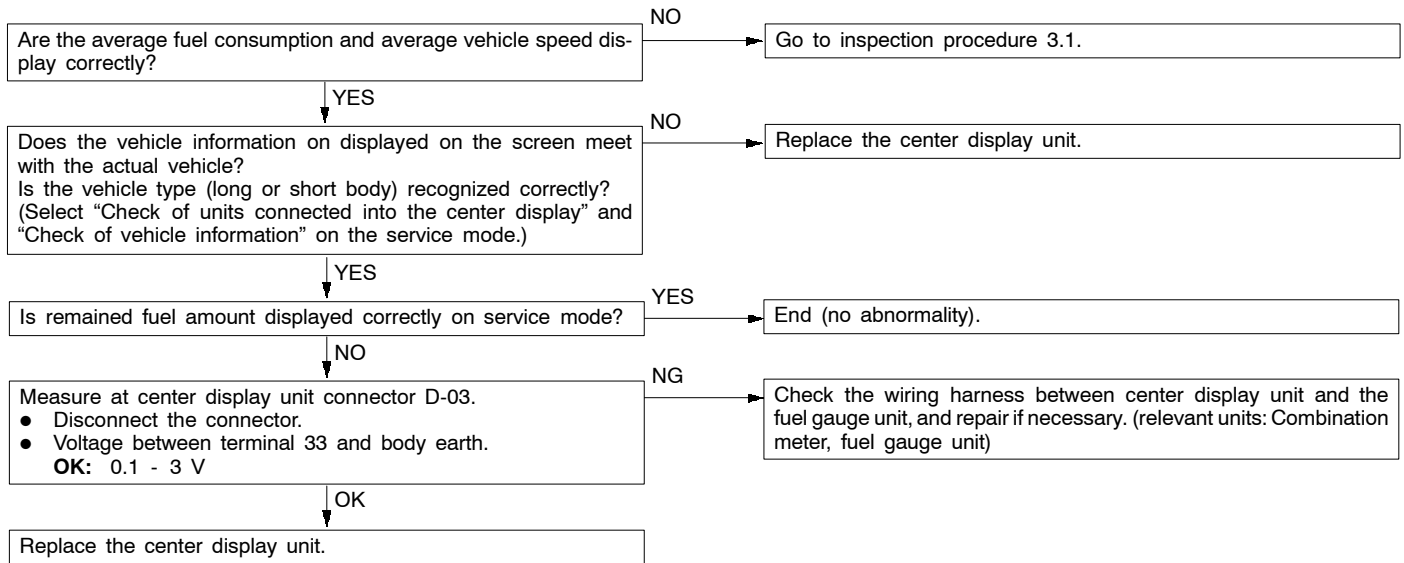
#### <Diesel-powered vehicles>



**INSPECTION PROCEDURE 4**

Abnormal driving data are displayed:

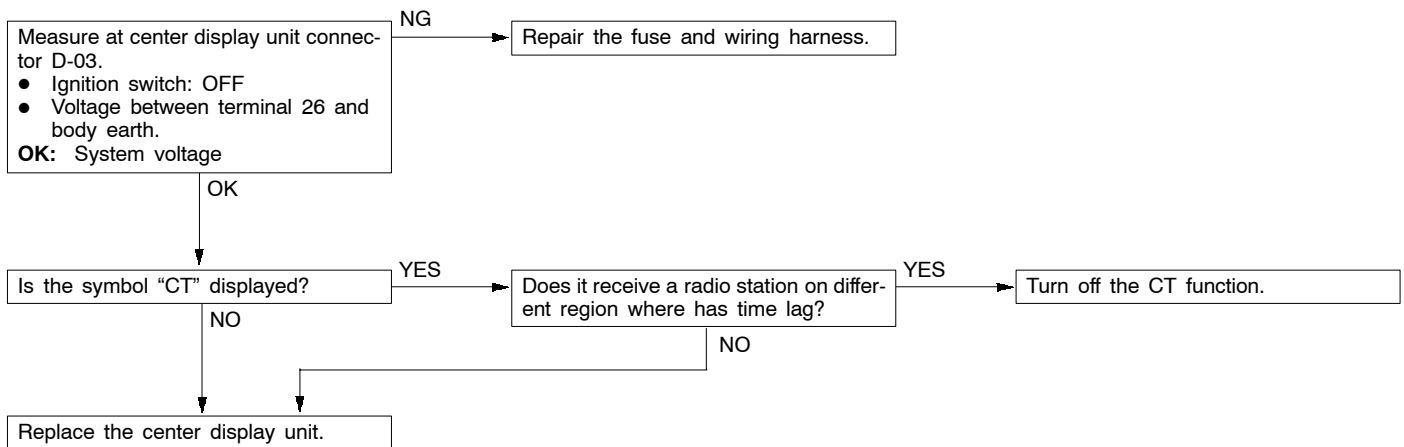
- Abnormal average fuel consumption (momentary fuel consumption) and average vehicle speed
- Abnormal cruising distance

**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**

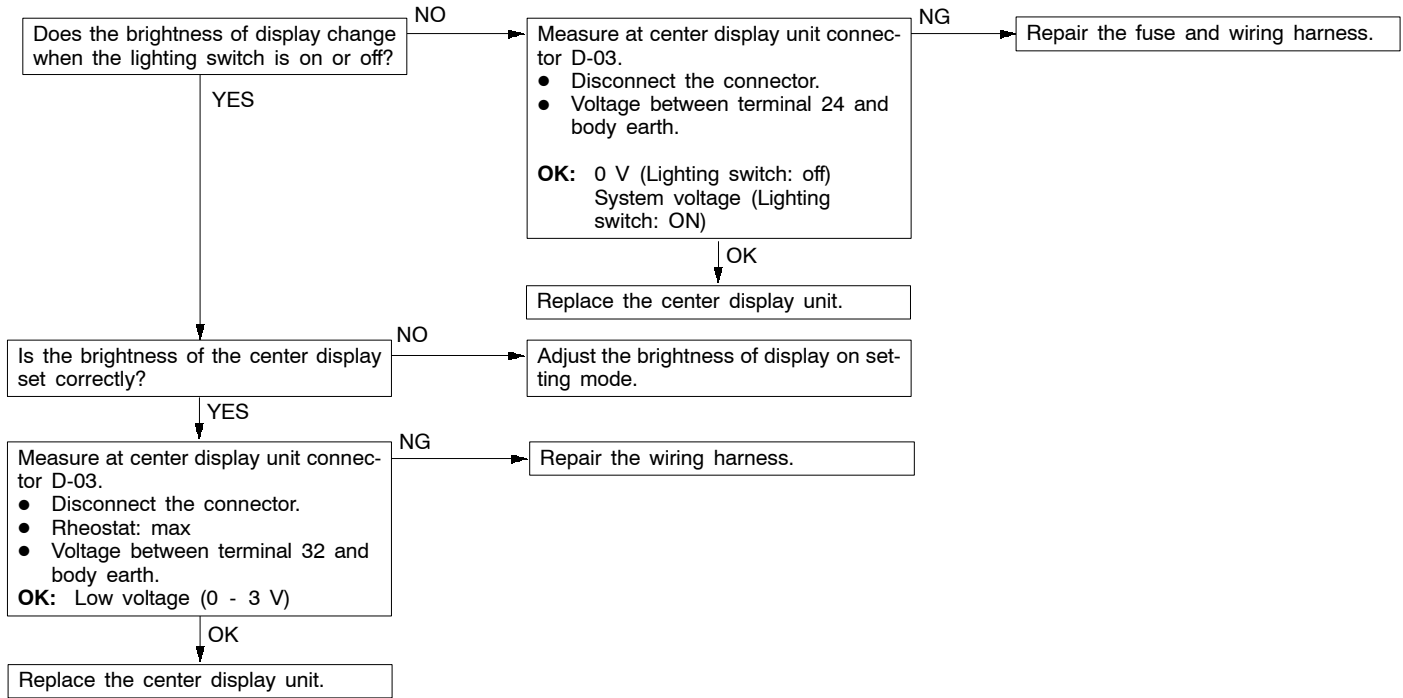
Clock runs fast or slow.





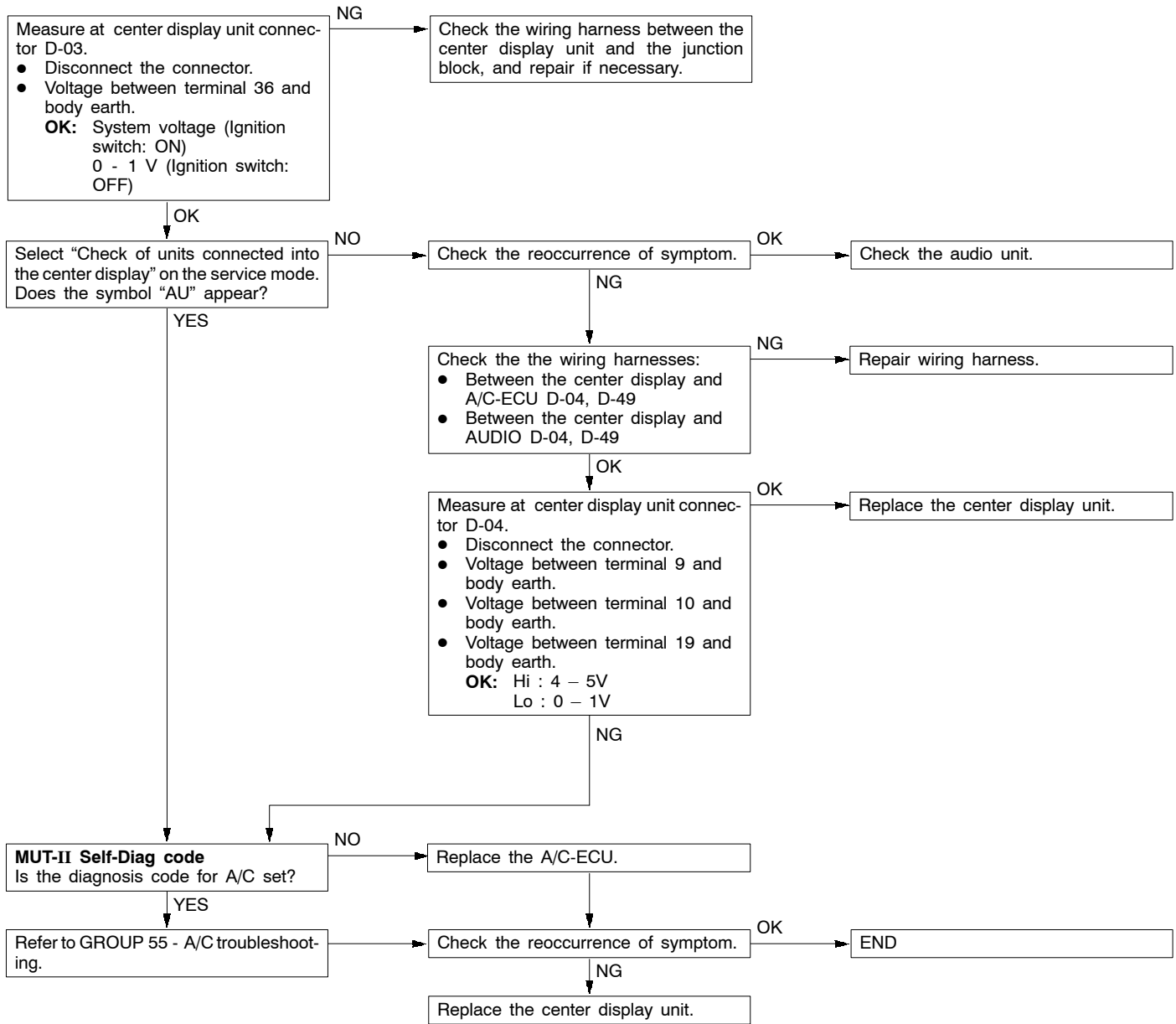
**INSPECTION PROCEDURE 6**

The display screen is dim.



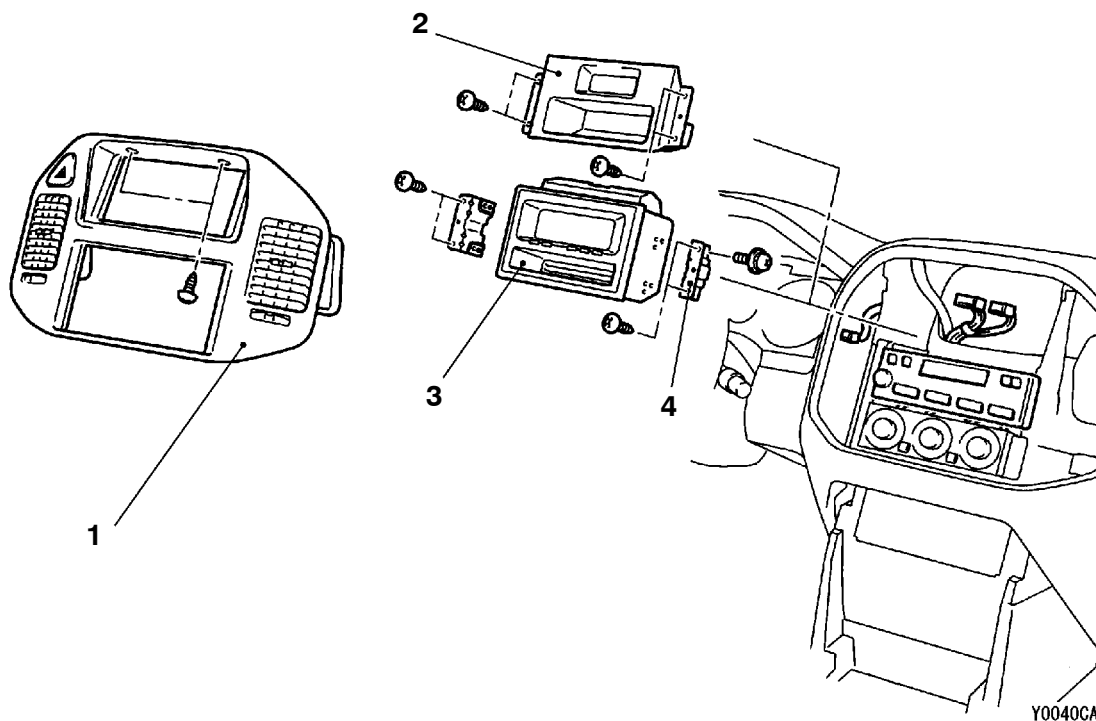
## INSPECTION PROCEDURE 7

Air conditioning display is not available.



# CLOCK OR CENTER DISPLAY

## REMOVAL AND INSTALLATION



### Removal steps

1. Center panel  
(Refer to GROUP 52A - Instrument Panel.)
2. Clock
3. Center display
4. Bracket

# RADIO/TAPE PLAYER

## TROUBLESHOOTING

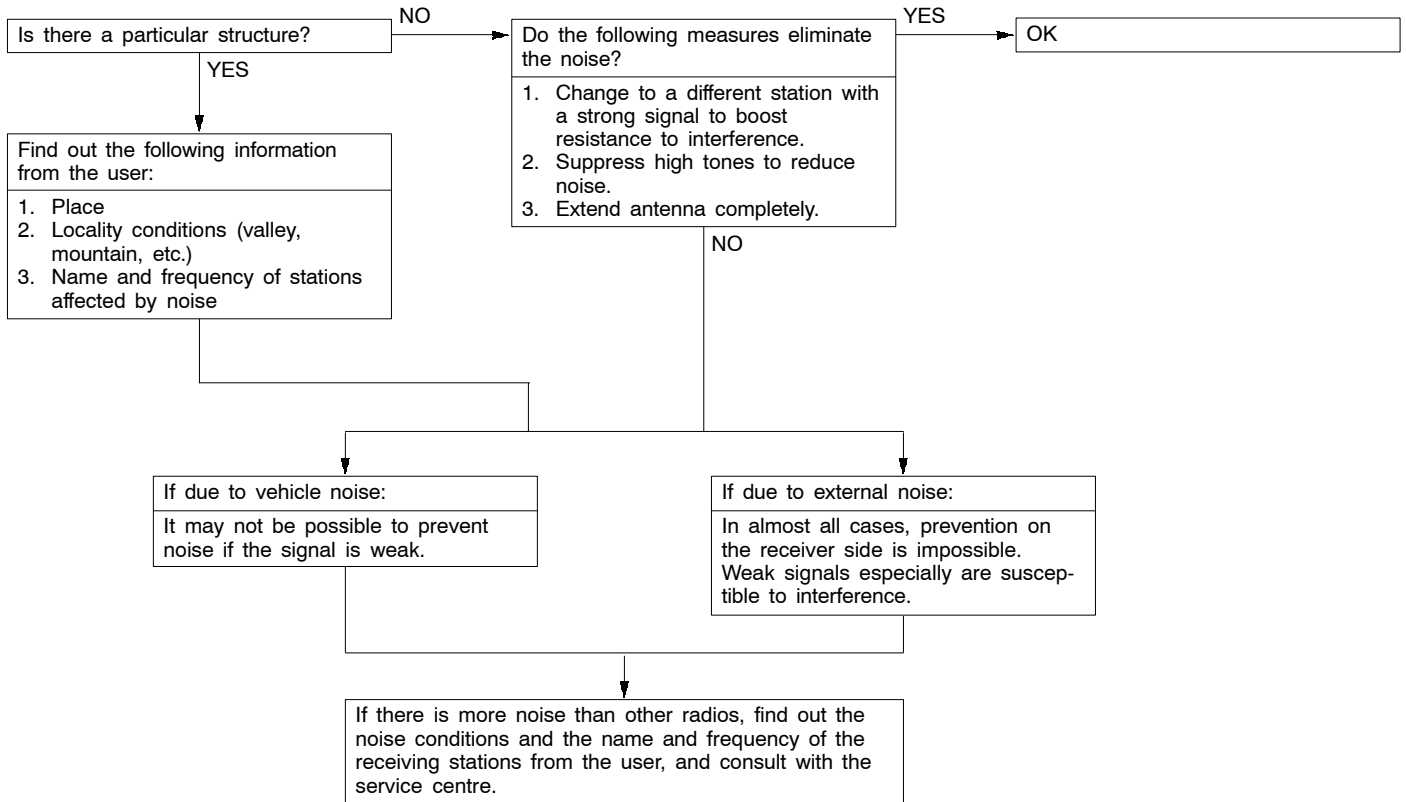
### QUICK-REFERENCE TROUBLESHOOTING CHART

| 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.**



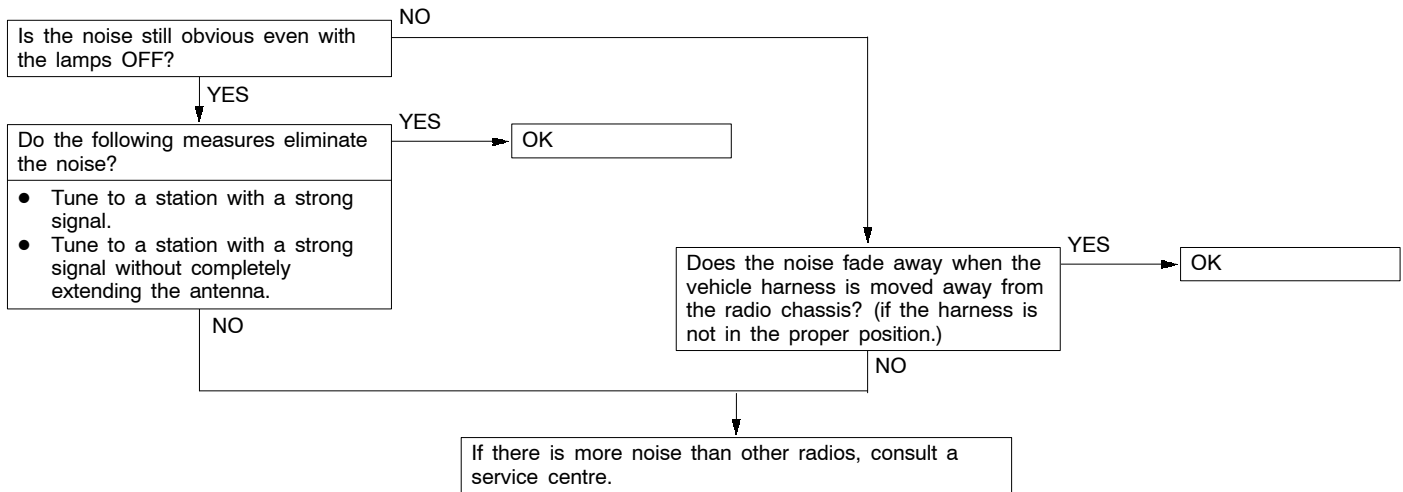
**A-2 Mixed with noise, only at night.**

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

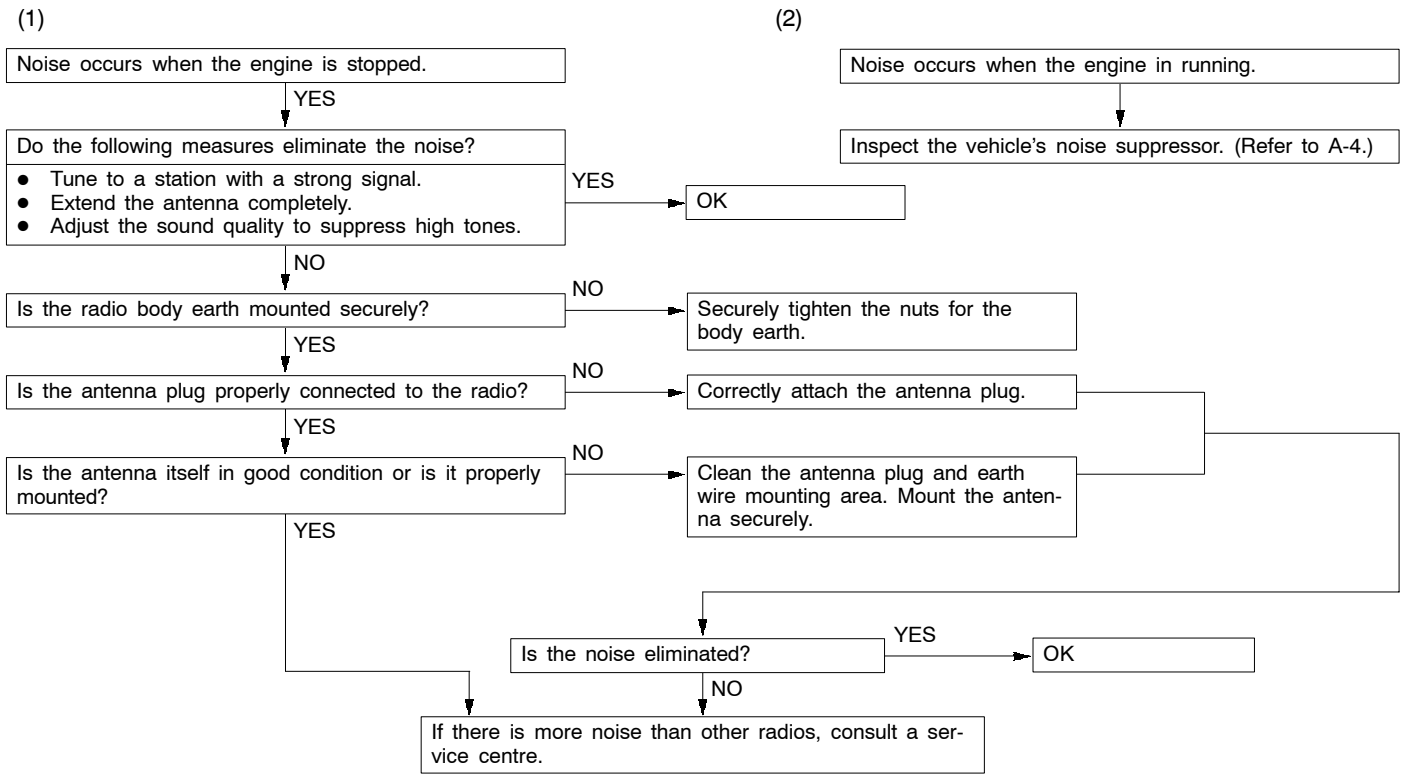
1. Factors due to signal conditions: Due to the fact that long-distance signals are more easily received at night, even stations that are received without problem during the day may experience interference in a general worsening of reception conditions. The weaker a station is the more susceptible it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



## A-4 There is noise when starting the engine.

| Noise type<br>Sounds are in parentheses ( ).                           | Conditions  | Cause  | Remedy   |
|--|---|--|--|
| UKW/MW/LW:<br>Ignition noise<br>(Popping, snapping, cracking, buzzing) | <ul style="list-style-type: none"> <li>Increasing the engine speed causing the popping sound to speed up, and volume decreases.</li> <li>Disappears when the ignition switch is turned to ACC.</li> </ul> | <ul style="list-style-type: none"> <li>Mainly due to the spark plugs.</li> <li>Due to the engine noise.</li> </ul> | <ul style="list-style-type: none"> <li>Check or replace the earth cable. (Refer to Fig. 1, 2, 3 and 4 on P.54-58 and 54-59.)</li> <li>Check or replace the noise capacitor.</li> </ul> |
| Other electrical components  | -   | Noise may appear as electrical components become older.  | Repair or replace electrical components.   |
| Static electricity<br>(Cracking, crinkling)                            | <ul style="list-style-type: none"> <li>Disappears when the vehicle is completely stopped.</li> <li>Severe when the clutch is engaged.</li> </ul>  | 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"> <li>Various noises are produced depending on the body part of the vehicle.</li> </ul>  | Due to detachment from the body of the front hood, bumpers, exhaust pipe and muffler, suspension, etc.             | Tighten the mounting bolts securely. Cases where the problem is not eliminated by a single response to one area are common, due to several body parts being imperfectly earthed.       |

**Caution**

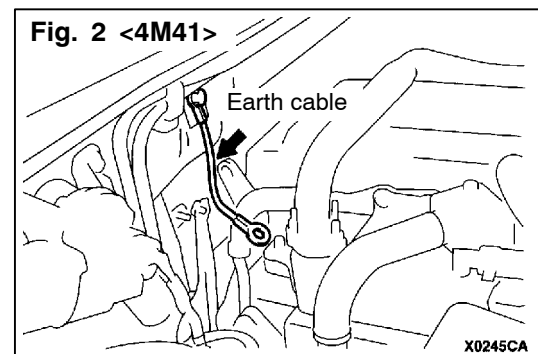
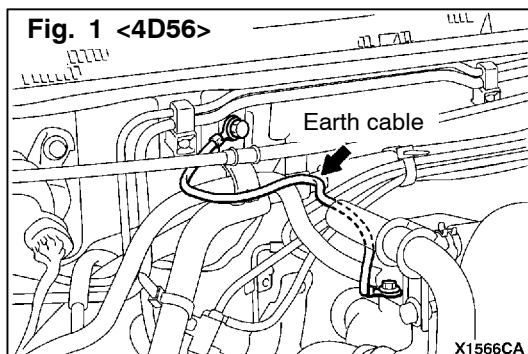
1. Connecting a high tension cable to the noise filter may destroy the noise filter and should never be done.
2. Check that there is no external noise. Since failure caused by this may result in misdiagnosis due to inability to identify the noise source, this operation must be performed.
3. Noise prevention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

**NOTE**

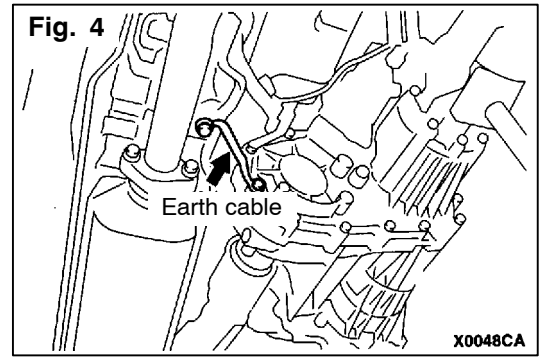
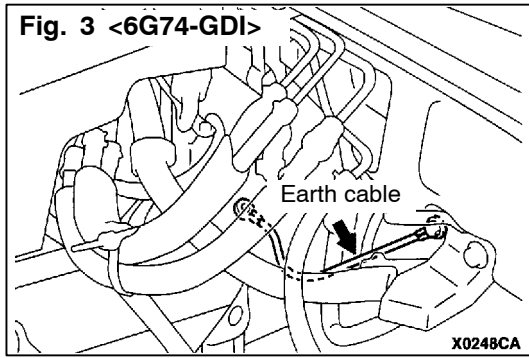
1. Capacitor  
The capacitor does not pass D.C. current, but as the number of waves increases when it

passes A.C. current, impedance (resistance against A.C.) decreases, and current flow is facilitated. A noise suppressing condenser which takes advantage of this property is inserted between the power line for the noise source and the earth. This suppresses noise by earthing the noise component (A.C. or pulse signal) to the body of the vehicle.

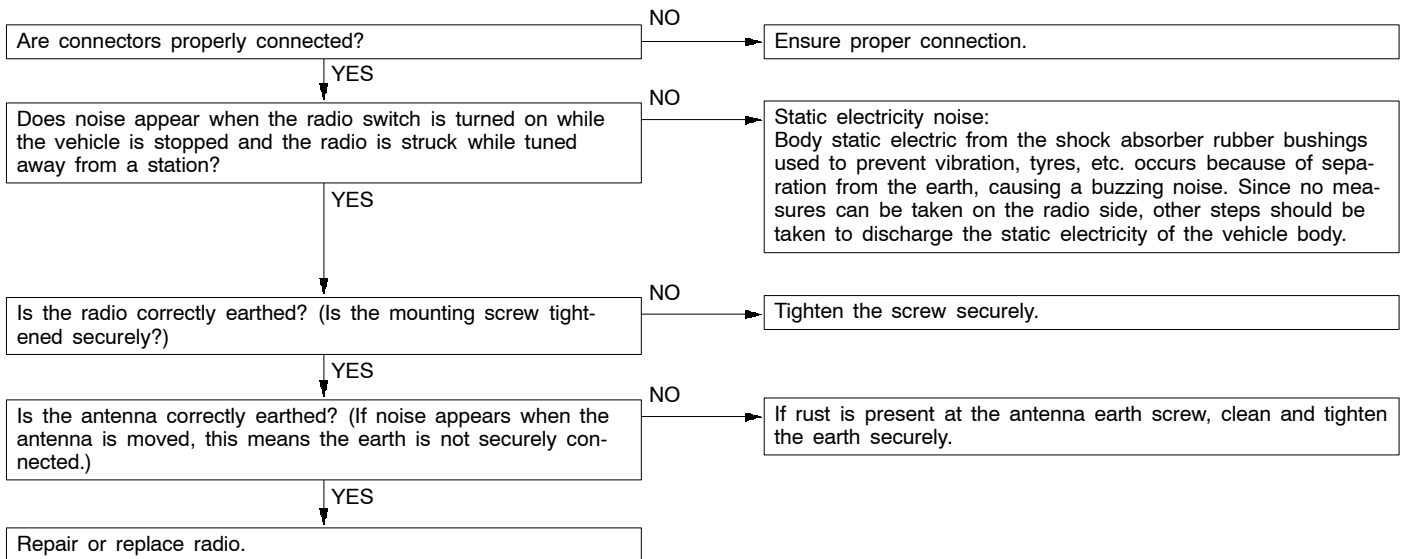
2. Coil  
The coil passes D.C. current, but impedance rises as the number of waves increases relative to the A.C. current. A noise suppressing coil which takes advantage of this property is inserted into the power line for the noise source, and works by preventing the noise component from flowing or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







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



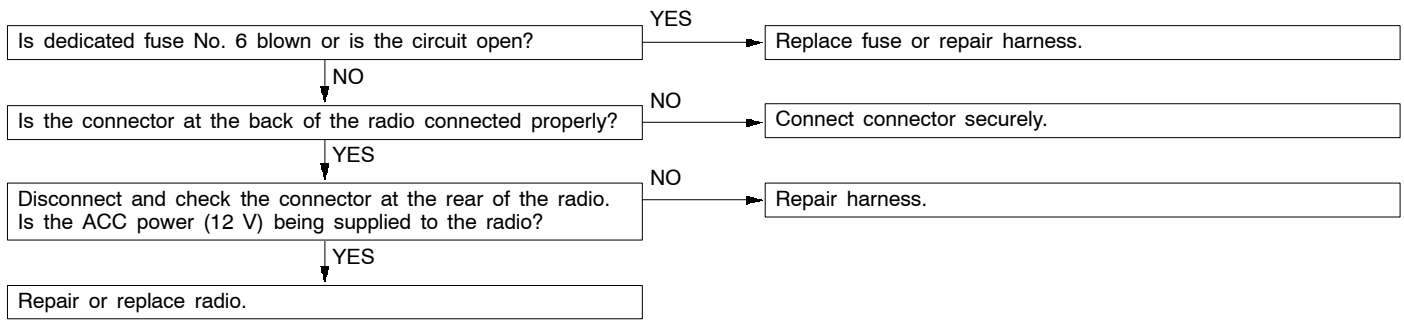
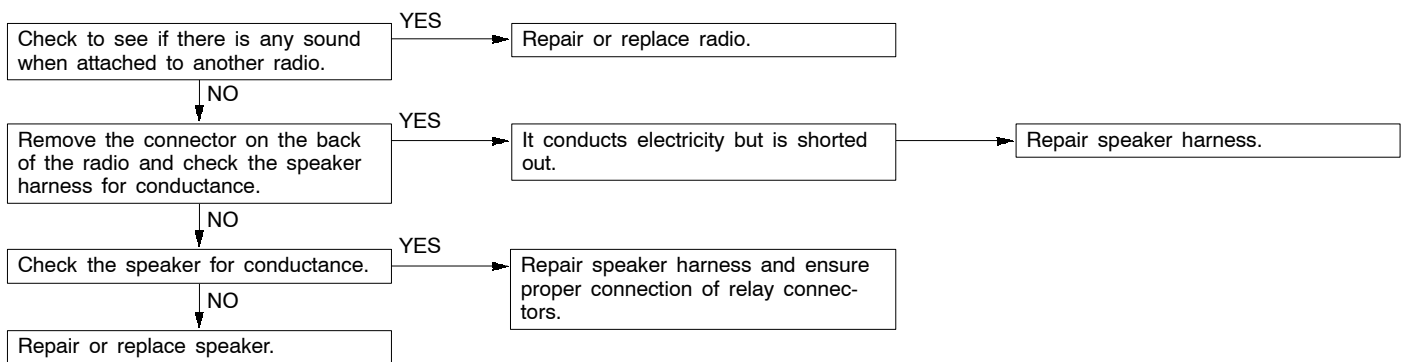
**A-6 Ever-present noise.**

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

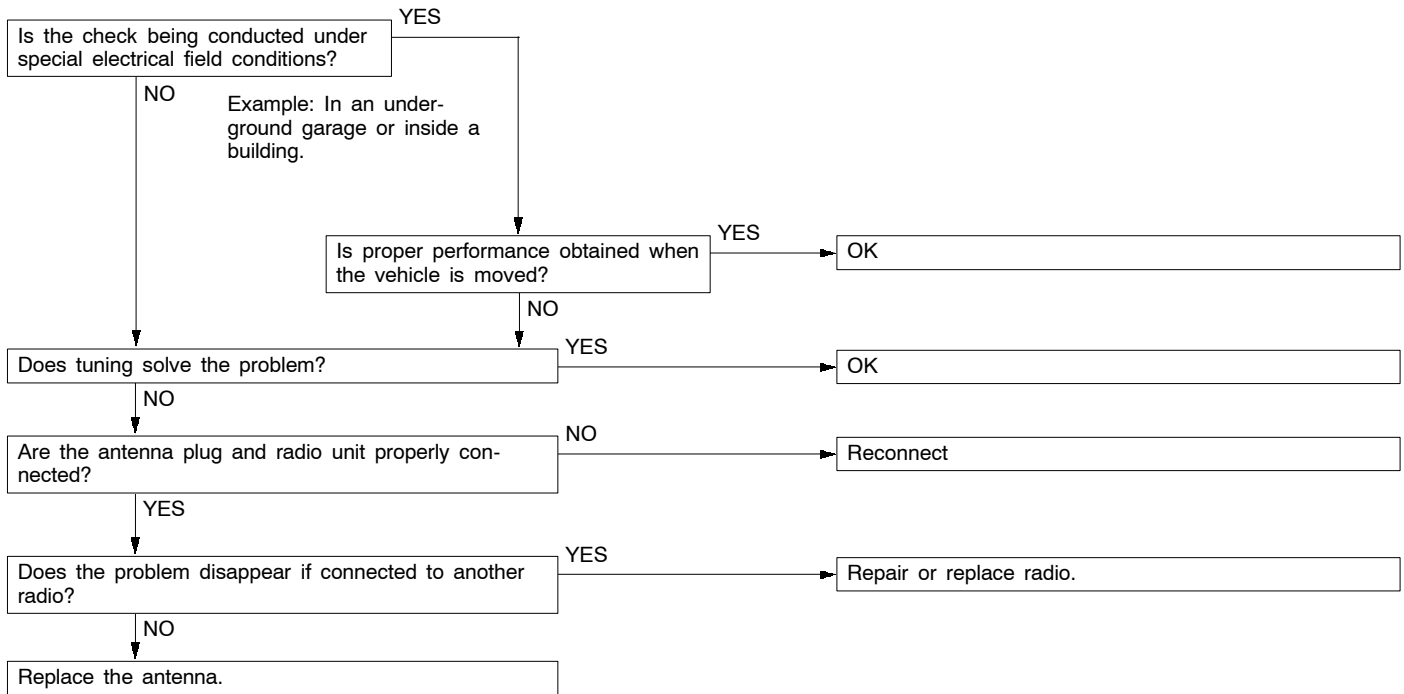
- Travelling conditions of the vehicle
- Terrain of area travelled through
- Surrounding buildings
- Signal conditions
- Time period

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.

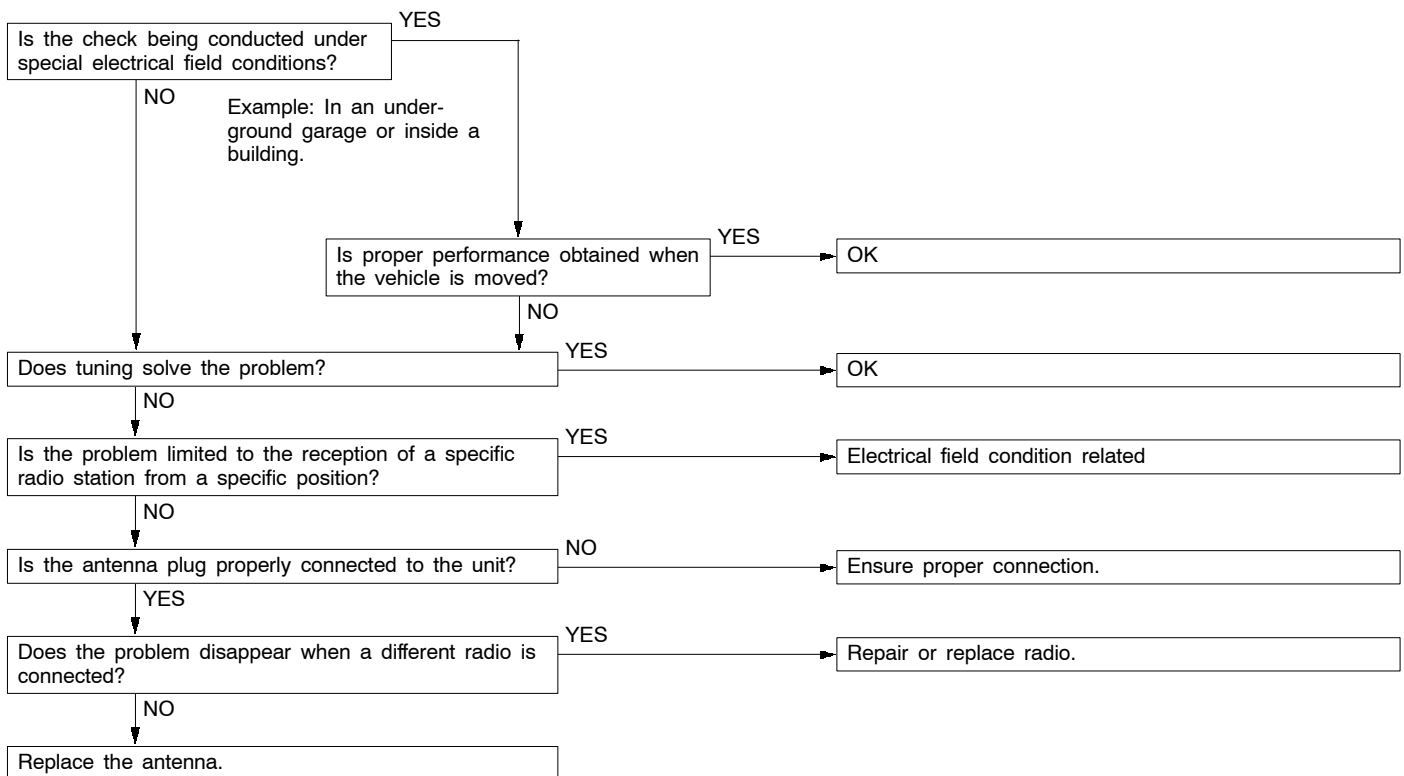
## B. RADIO

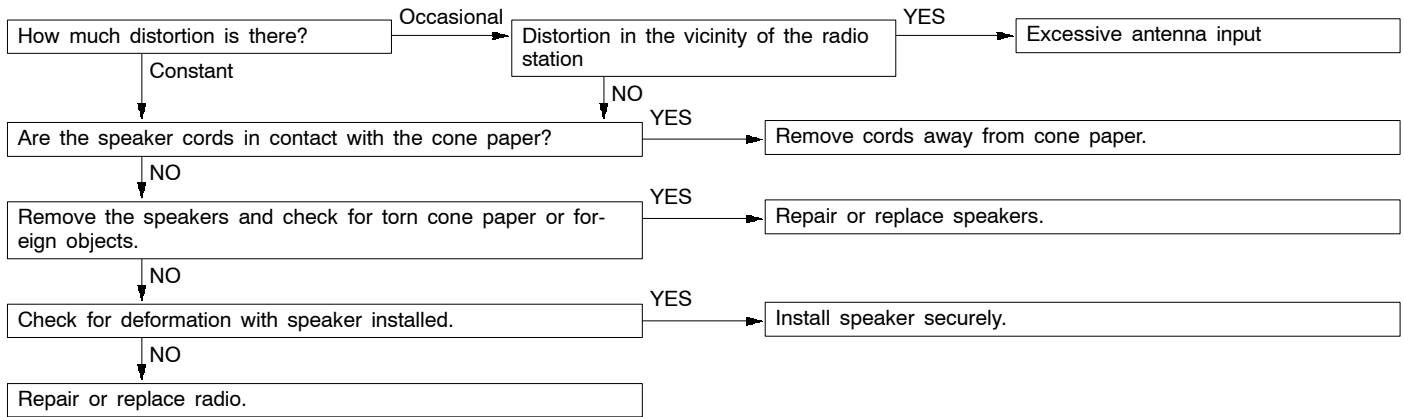
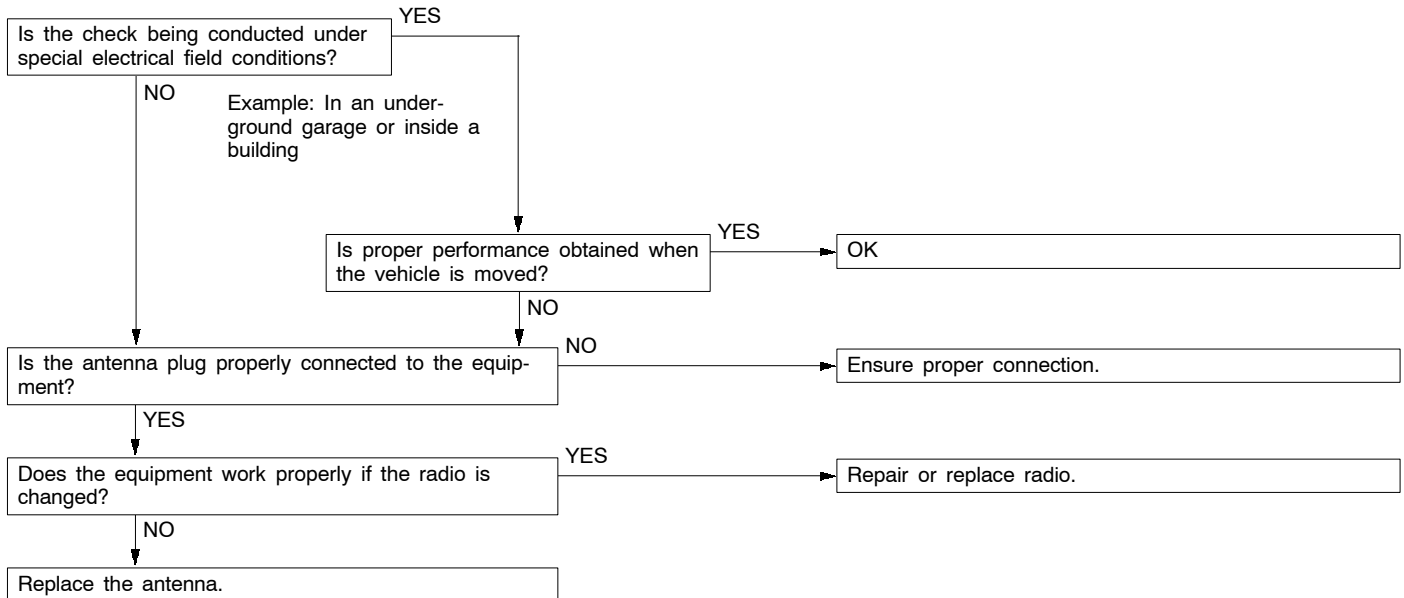
**B-1 No power is supplied when the switch is set to ON.****B-2 No sound from one speaker.**

**B-3 There is noise but no reception for UKW/MW/LW or no sound from UKW/MW/LW.**

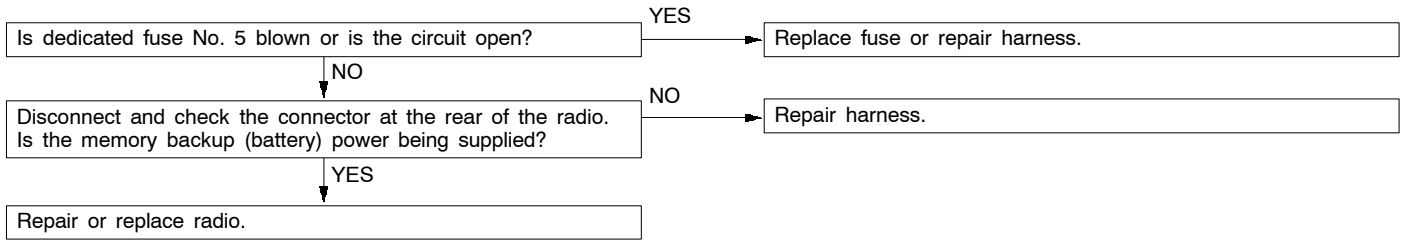


**B-4 Insufficient sensitivity.**



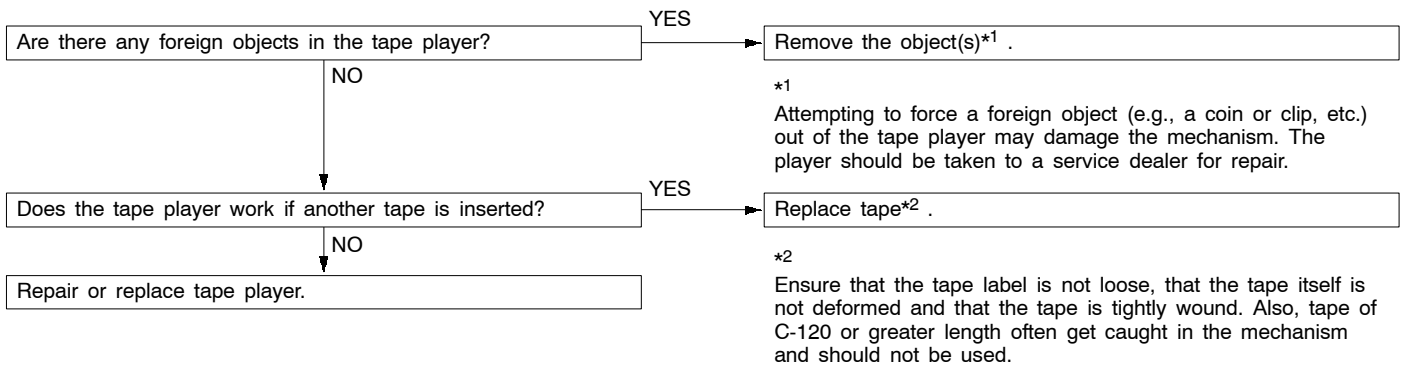
**B-5 Distortion on UKW/MW/LW.****B-6 Too few automatic select stations.**

**B-7 Insufficient memory (preset stations are erased).**

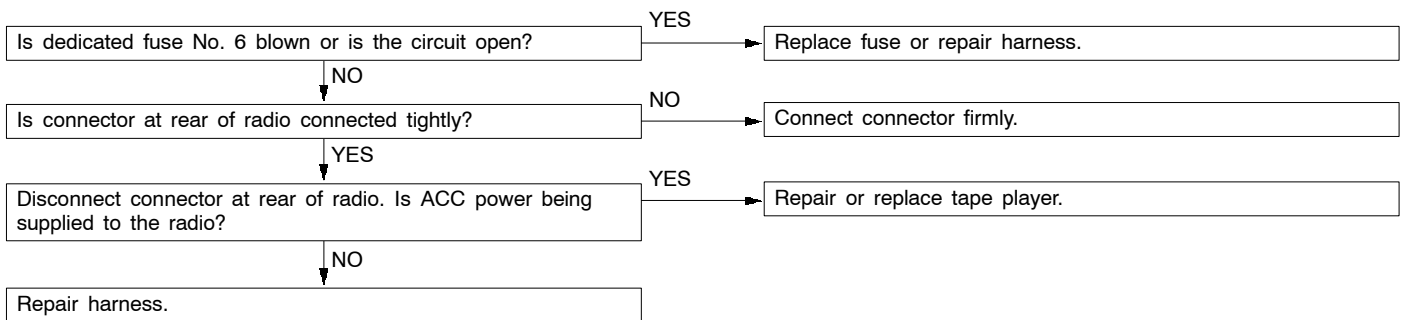


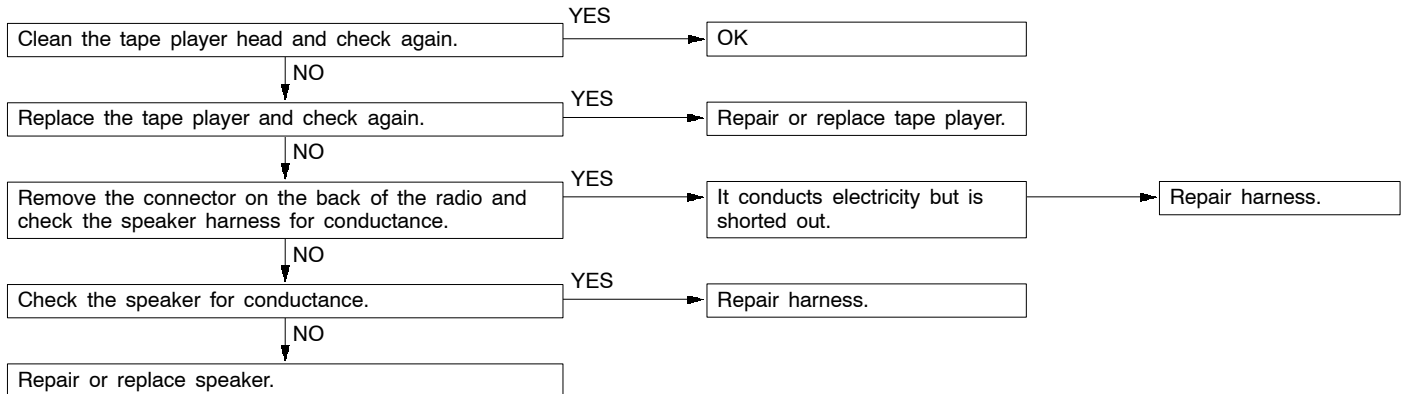
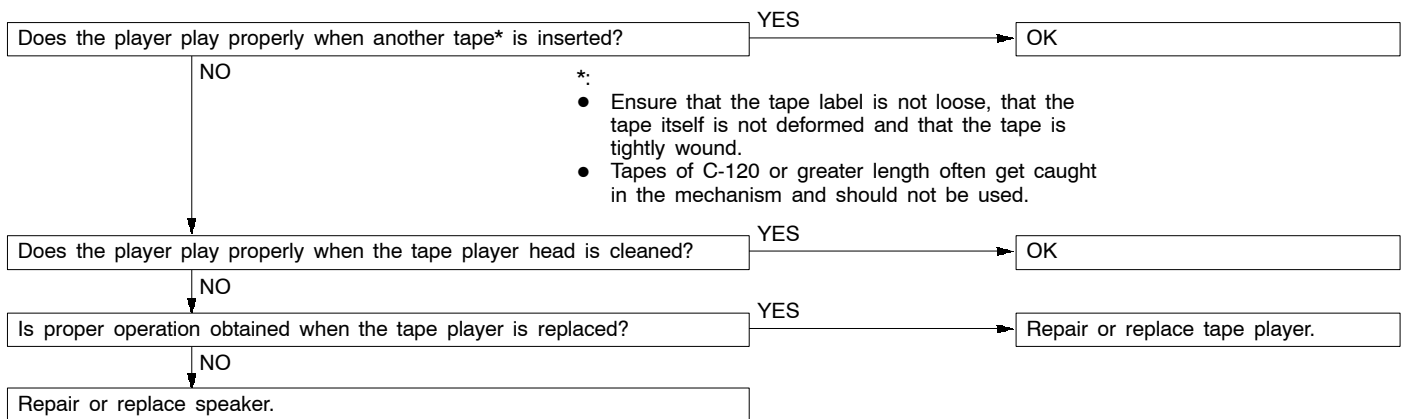
**C. TAPE PLAYER**

**C-1 Cassette tape will not be inserted.**



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

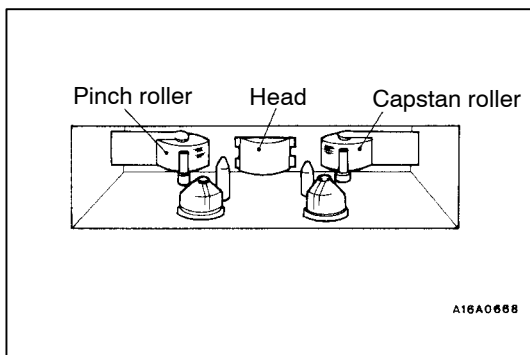
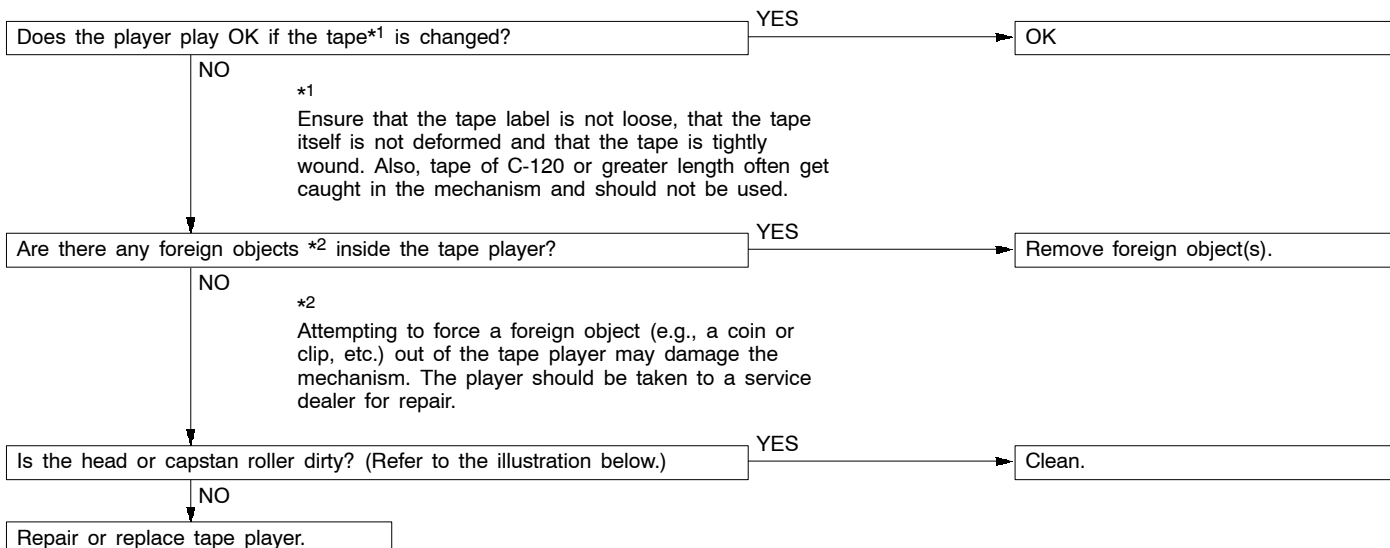


**C-3 No sound from one speaker.****C-4 Sound quality is poor, or sound is weak.****C-5 Cassette tape will not be ejected.**

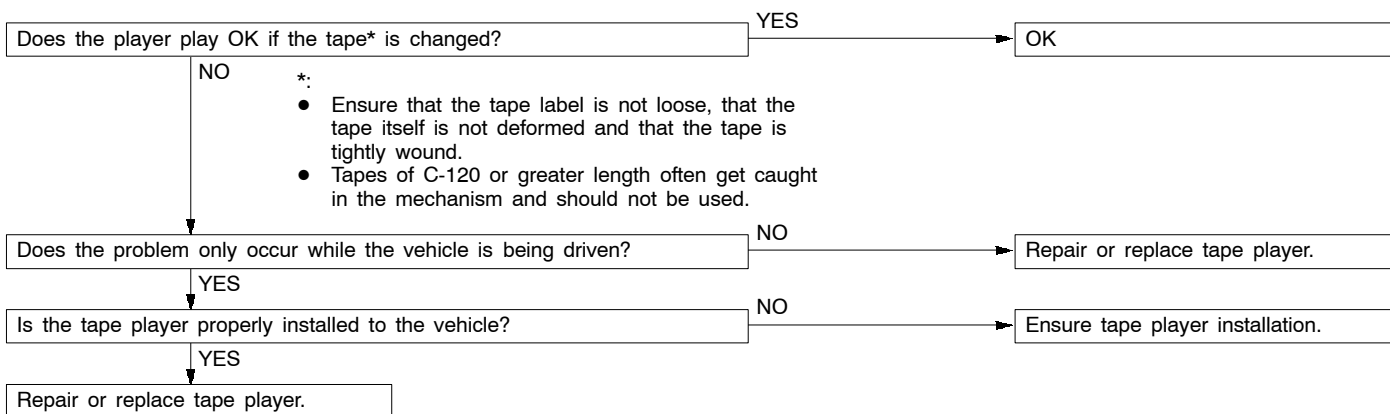
The problems covered here are all the result of the use of a bad tape (deformed or not properly tightened) or of a malfunction of the tape player itself. Malfunctions involving the tape becoming caught in the mechanism and ruining the case are

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.**



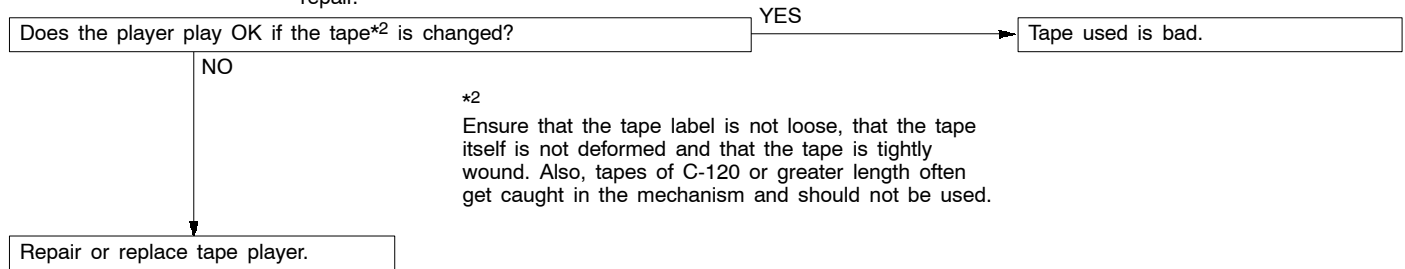
**C-7 Faulty auto reverse.**



**C-8 Tape gets caught in mechanism\*1.**

\*1

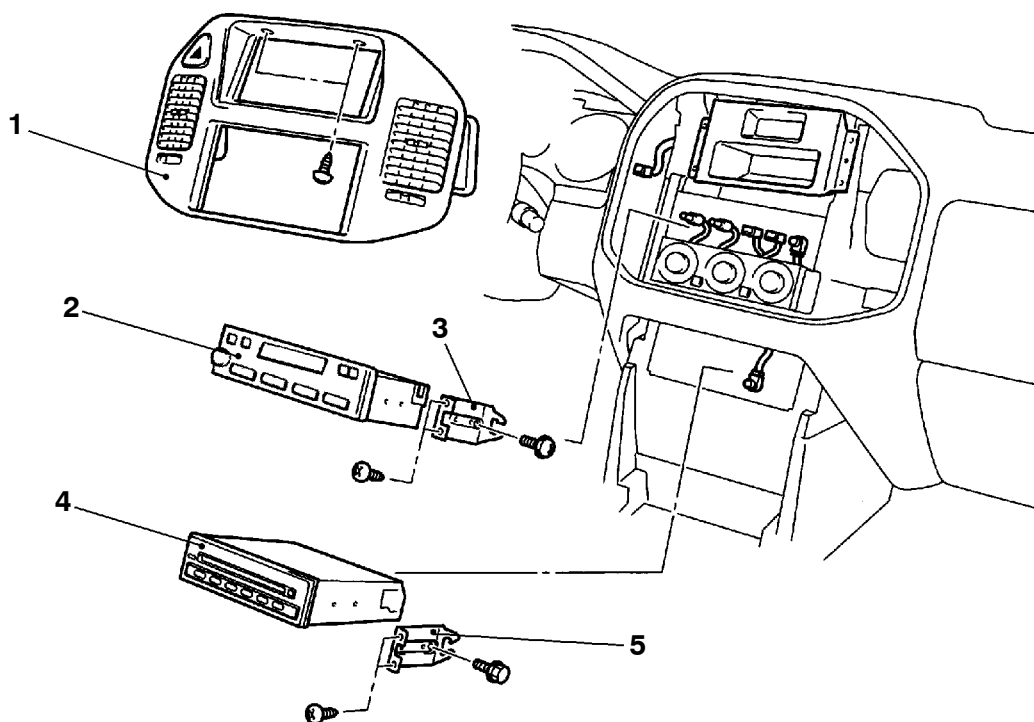
When the tape is caught in the mechanism, the case may not eject. When this occurs, do not try to force the tape out as this may damage the tape player mechanism. Take the cassette to a service dealer for repair.





## RADIO AND CD AUTO CHANGER

### REMOVAL AND INSTALLATION



Y0041CA

#### Radio removal steps

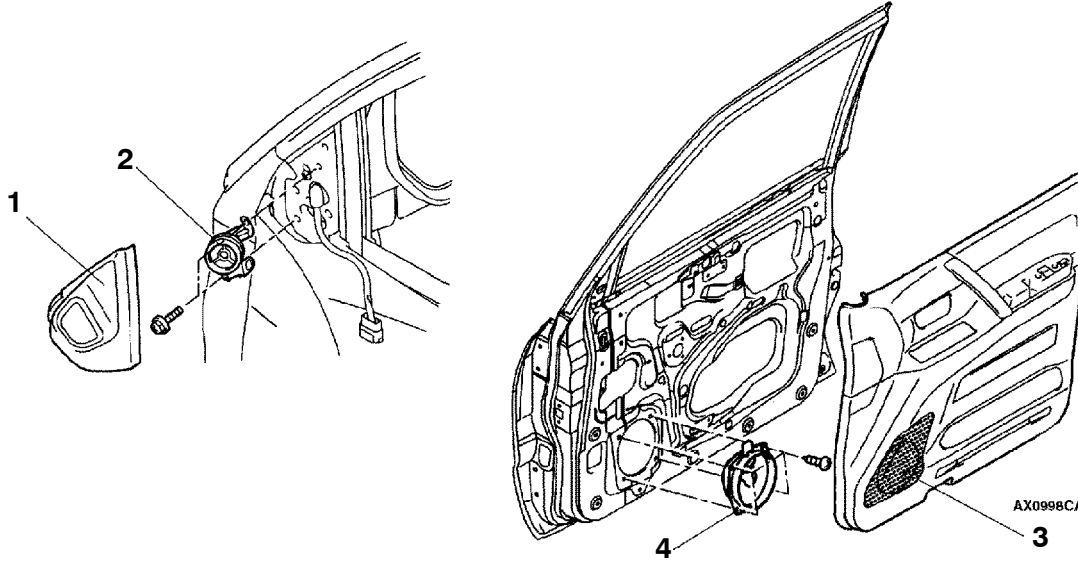
1. Center panel  
(Refer to GROUP 52A - Instrument Panel.)
2. Radio/tape player
3. Radio/tape player bracket

#### 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

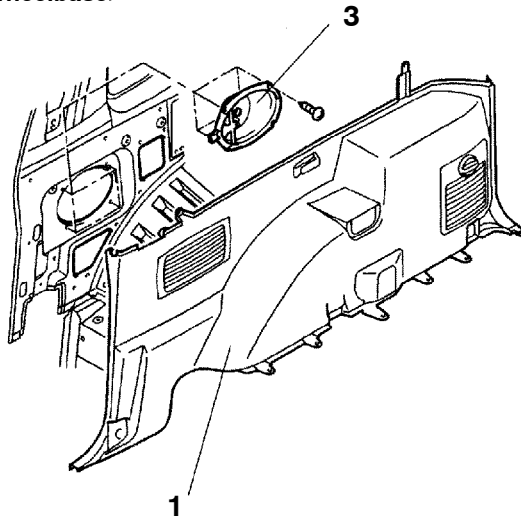
### Front door speaker removal steps

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

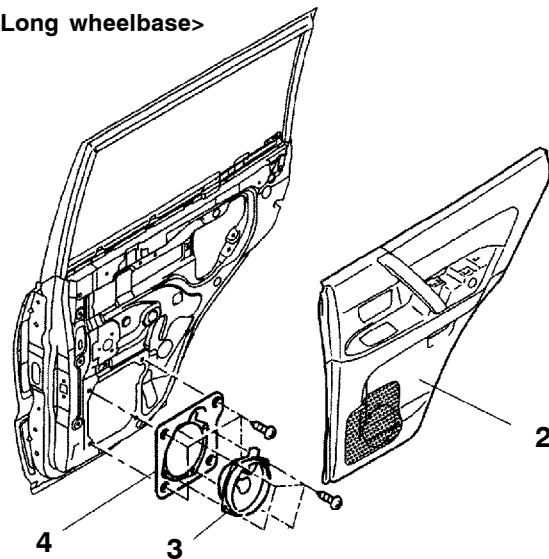
# REAR SPEAKERS

## REMOVAL AND INSTALLATION

<Short wheelbase>



<Long wheelbase>



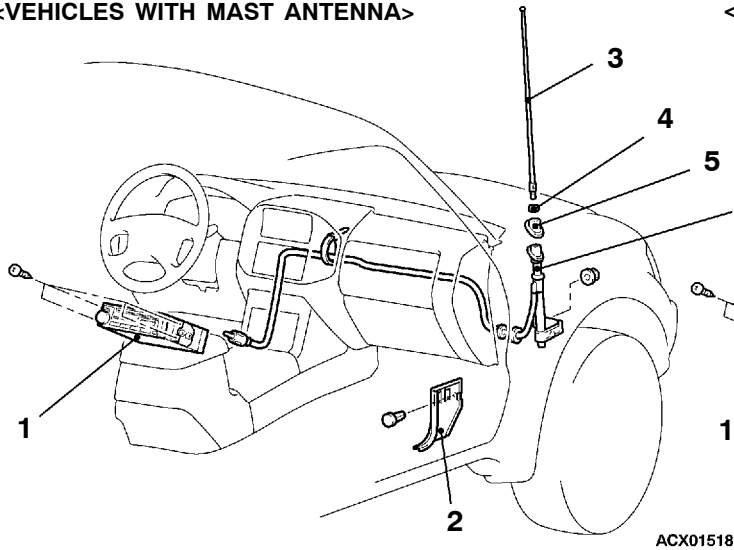
### Removal steps

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

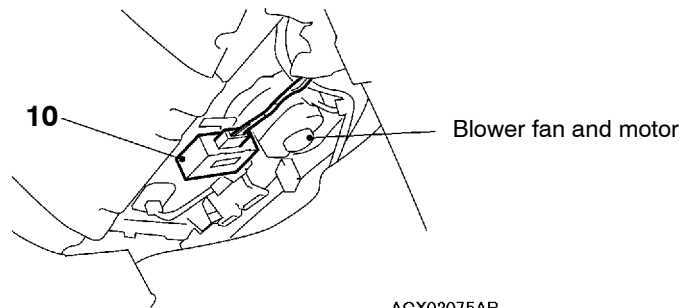
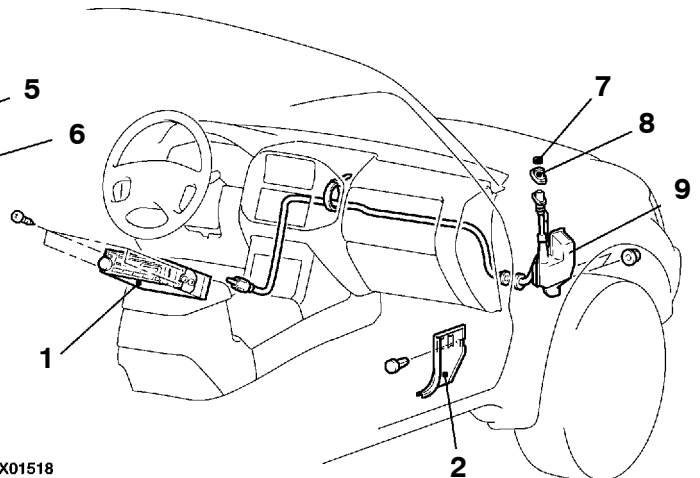
# ANTENNA

## REMOVAL AND INSTALLATION

<VEHICLES WITH MAST ANTENNA>



<VEHICLES WITH MOTOR ANTENNA>



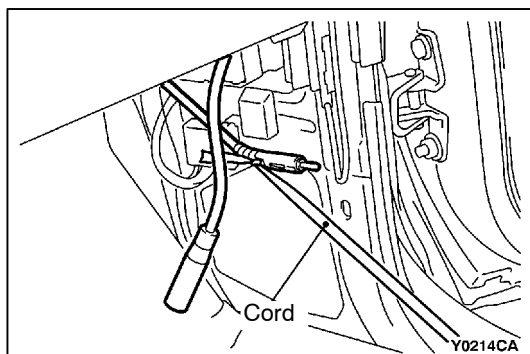
### Mast antenna removal steps

- Center panel (Refer to GROUP 52A – Instrument Panel.)
- 1. Radio/tape player (Refer to P.54-81.)
- 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 GROUP 52A – Instrument Panel.)
- 1. Radio/tape player (Refer to P.54-81.)
- 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

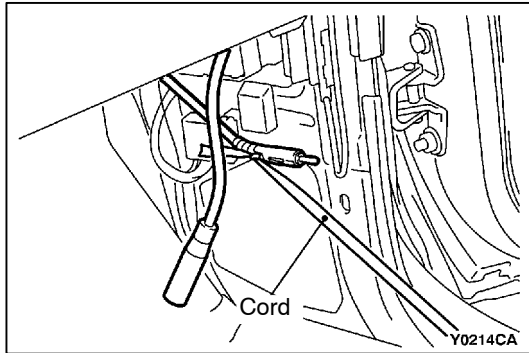
Carry out the following procedure to allow the feeder cable of the base antenna assembly for an easy installation.

1. Tie the cord with the end of the feeder cable.
2. Pull out the base antenna assembly 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**

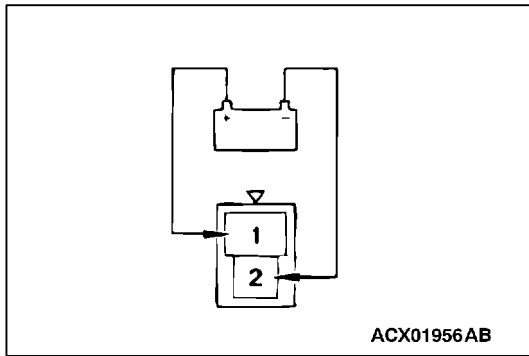
Ensure that the cord is wrapped tightly to prevent it from coming off.

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



**◀▶ MOTOR ANTENNA BODY REMOVAL**

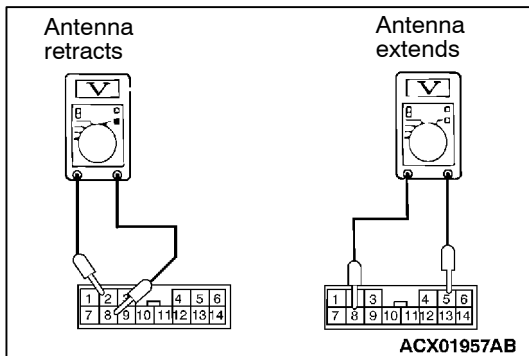
Pull out the cord after tying it with the feeder cable of the base antenna ass'y for an easy installation.



**INSPECTION**

**MOTOR ANTENNA CHECK**

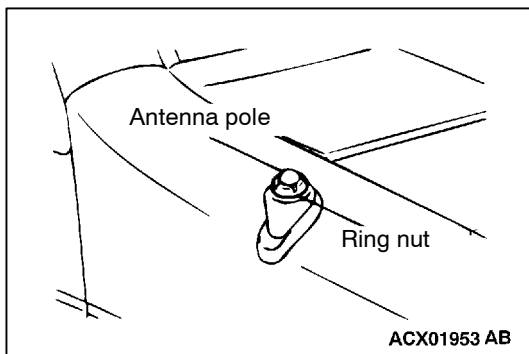
Check the antenna for extension if the connector of the motor antenna-ECU is disconnected, the (+) terminal of the battery is connected to terminal No.1, and the (-) terminal of the battery is connected to terminal No. 2. Check the antenna for retraction if the connection is reversed.



**MOTOR ANTENNA-ECU CHECK**

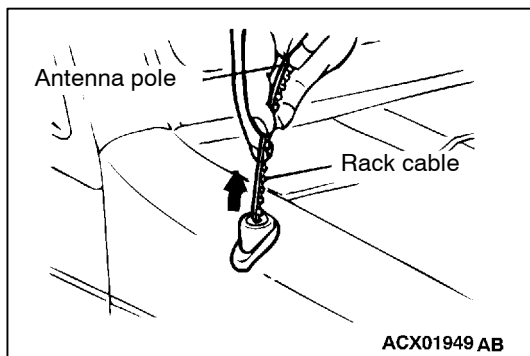
1. Remove the motor antenna-ECU mounting bolt.
2. With the ignition switch at the ACC or the ON position, check the voltage between the terminals during extension or retraction of the antenna by operating the radio switch.

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

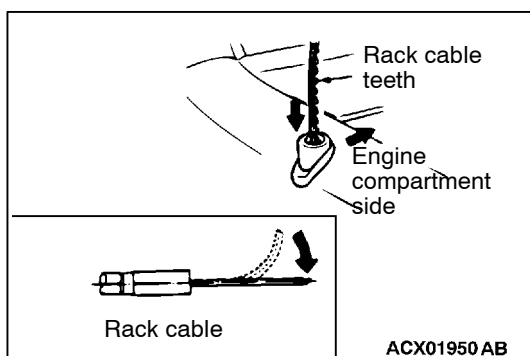


**ANTENNA POLE REPLACEMENT**

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.

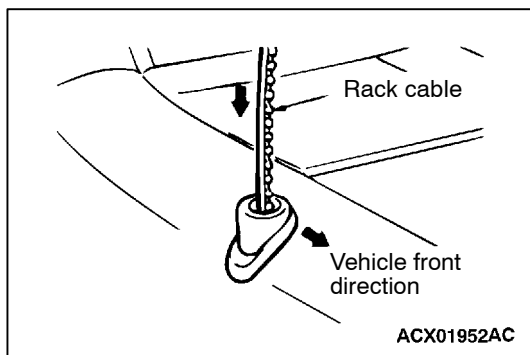


3. Extend the antenna pole completely.

#### 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.

# DEFOGGER

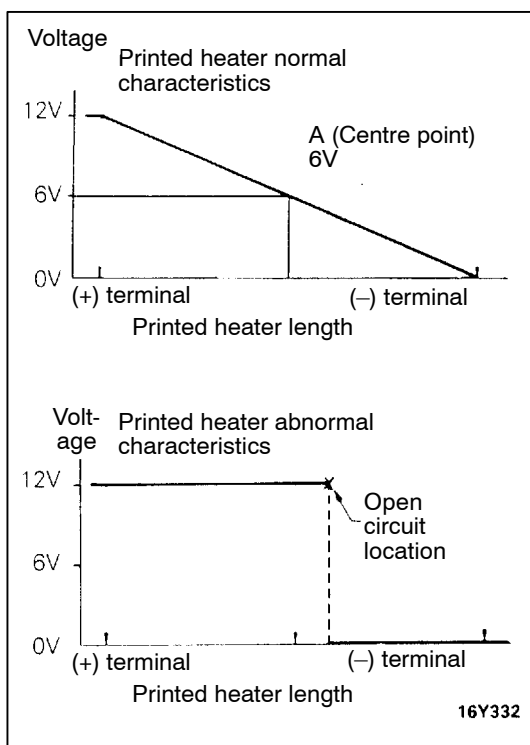
## TROUBLESHOOTING <VEHICLE WITH AUTOMATIC AIR CONDITIONER>

Refer to GROUP 55B.

### ON-VEHICLE SERVICE

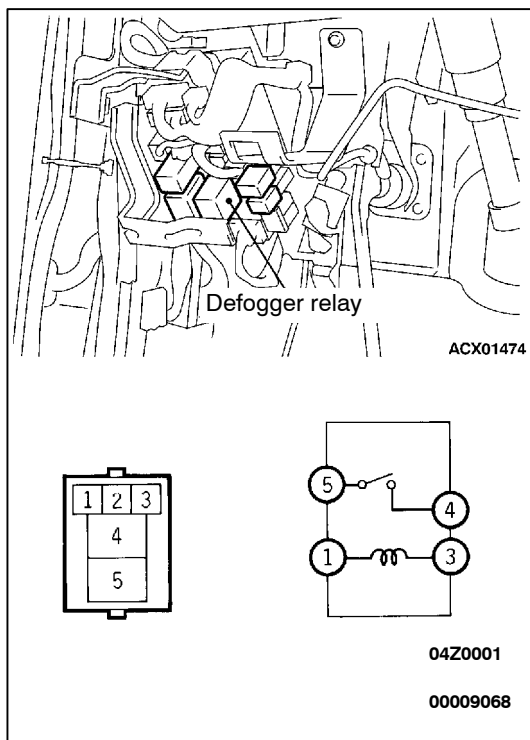
#### PRINTED HEATER CHECK

1. Run the engine at a speed of 2000 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     | ⊕            | ⊖ | ○ | ○ |



# DEFOGGER SWITCH <VEHICLE WITH MANUAL AIR CONDITIONER>

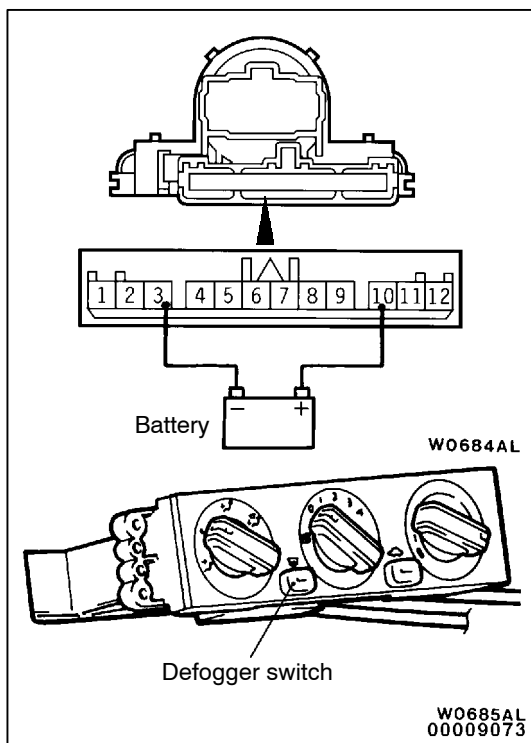
## REMOVAL AND INSTALLATION

Refer to GROUP 55A - Heater Control Assembly, A/C Switch, Ventilation Switch.

## INSPECTION

### DEFOGGER SWITCH CONTINUITY CHECK

Check the battery voltage between terminal 3 and 10 while being energized.



| Switch position | Terminal No. |    |     |    |    |
|-----------------|--------------|----|-----|----|----|
|                 | 3            | 10 | -   | 11 | 12 |
| OFF             | ○            | ○  | IND | ○  |    |
| ON              | ○            | ○  | IND | ○  | ○  |

### NOTE

After turning the defogger switch to the ON position, check the continuity between terminal 3 and 12 for 9 to 13 minutes. Afterwards, the switch is turned to the OFF position.

NOTES




# Service Bulletins

Click on the applicable bookmark to select the Service Bulletin.



# SERVICE BULLETIN

QUALITY INFORMATION ANALYSIS  
OVERSEAS SERVICE DEPT. MITSUBISHI MOTORS CORPORATION

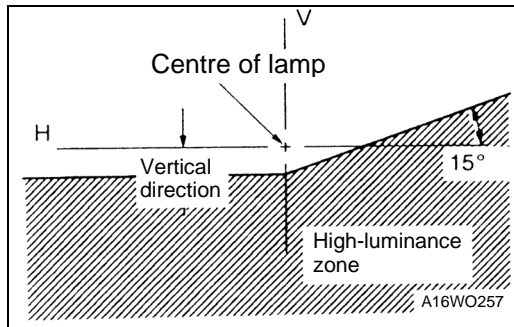
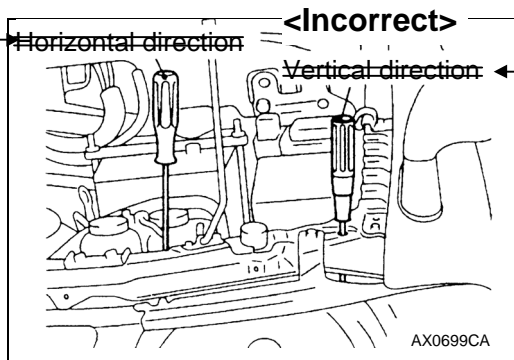
|   |  |  |               |
|---|--|--|---------------|
| <b>SERVICE BULLETIN</b>   |  | No.: MSB-00E54-506   |               |
|   |  | Date: 2000-11-30   | <Model> <M/Y> |
| <b>Subject:</b> CORRECTION OF ERRORS IN ILLUSTRATION FOR HEADLAMP AIMING ADJUSTMENT |  | (EC)PADERO/<br>MONTERO(V60,70)   | 01-10         |
| <b>Group:</b> CHASSIS ELECTRICAL  | <b>Draft No.:</b> 00sy051817                     |  |               |
| <b>CORRECTION</b>   | INTERNATIONAL<br>CAR<br>ADMINISTRATION<br>OFFICE | <br>T.NITTA - PROJECT LEADER<br>AFTER SALES SERVICE & CS PROMOTION |               |

**1. Description:**

This Service Bulletin informs you that correction has been made of errors in the illustration for headlamp aiming adjustment.

**2. Applicable Manuals:**

| Manual                                | Pub. No.       | Language  | Page(s) |
|---------------------------------------|----------------|-----------|---------|
| 2001 PAJERO<br>Workshop Manual VOL.2  | PWJE0001 (2/2) | (English) | 54A-38  |
| 2001 MONTERO<br>Workshop Manual VOL.2 | PWJS0002 (2/2) | (Spanish) |         |



Vertical  
direction  
<Correct>

Horizontal  
direction  
<Correct>

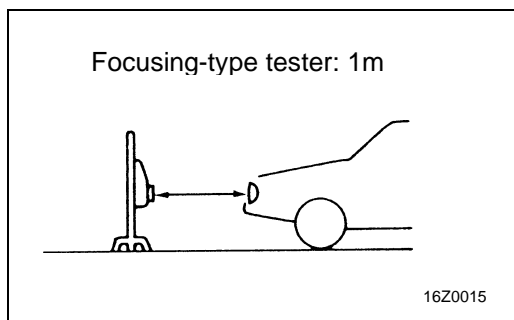
- Turn the adjusting screws to adjust so that the deviation in the centre of the high-luminance zone (main optical axis) is at the standard value

#### Standard value:

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

#### Caution

- 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.
- The headlamp have outer lenses which are made of plastic, so if covering the lens surface with 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.
- The adjustment should always be completed by turning the adjustment screws in the tightening direction.



#### LUMINANCE MEASUREMENT

- Place the tester receiver so that it is directly opposite the headlamp at the distance shown in the illustration.
- Run the engine at a speed of 2000 r/min to fully charge the battery.
- 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

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

**Limit: 6,400 cd or higher for each lamp**

---

# CHASSIS ELECTRICAL

## CONTENTS

|                                 |          |                            |           |
|---------------------------------|----------|----------------------------|-----------|
| <b>GENERAL</b> .....            | <b>2</b> | Troubleshooting .....      | 5         |
| Outline of Changes .....        | 2        | <b>RV METER</b> .....      | <b>6</b>  |
| General Information .....       | 2        | Troubleshooting .....      | 6         |
| Construction Diagram .....      | 3        | RV meter .....             | 23        |
| <b>IMMOBILIZER SYSTEM</b> ..... | <b>5</b> | <b>GLASS ANTENNA</b> ..... | <b>24</b> |
| <b>COMBINATION METER</b> .....  | <b>5</b> | Antenna feeder cable ..... | 24        |

## GENERAL

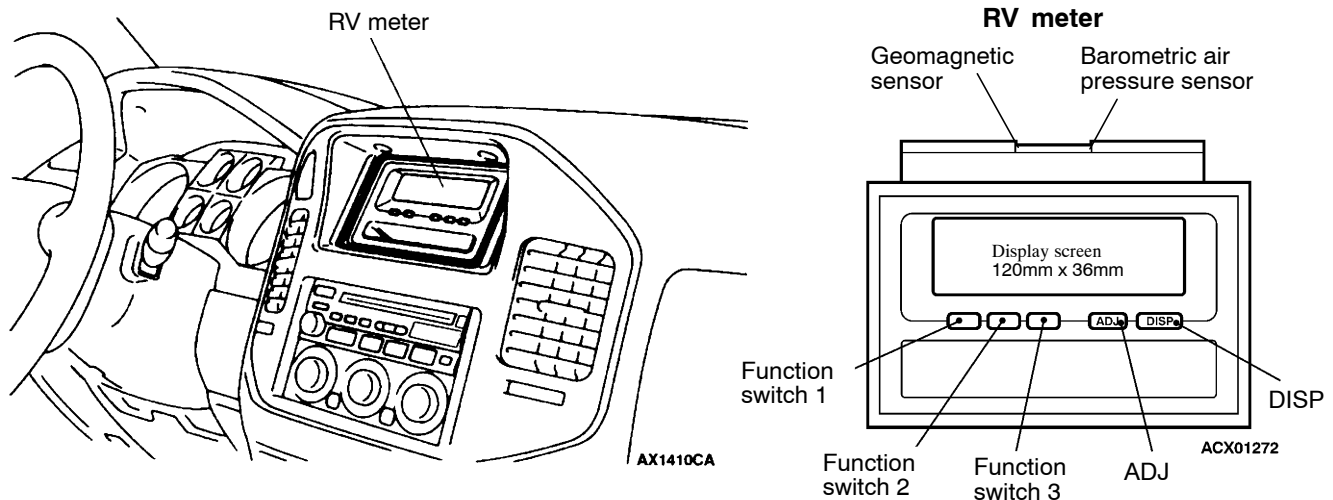
### OUTLINE OF CHANGES

- Since the immobilizer-ECU location has been moved from the ignition key cylinder to near the diagnosis connector, the removal and installation procedure has been changed.
- The troubleshooting for speedometer has been changed to the method employing simulated vehicle speed signal input check with the MUT-II.
- Due to the adoption of an RV meter, the service adjustment procedure has been added.
- Due to the adoption of a glass antenna on the left of a quarter window glass, the removal and installation procedure of feeder cables has been added.

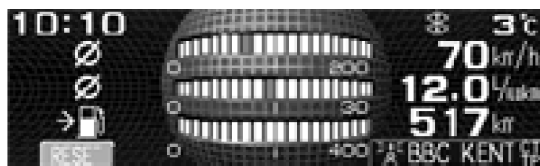
The service adjustment procedures which are not described here are the same as before.

### GENERAL INFORMATION

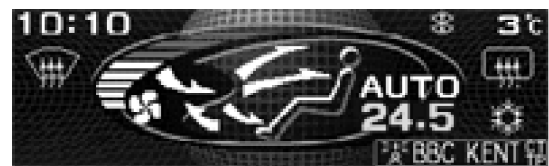
The RV meter, which displays various vehicle information has been used for some models. By operating each function switch, including "ADJ" and "DISP" switches, driving information screen, A/C information screen, environment information screen, clock information screen, and audio screen can be called up.



#### DRIVING INFORMATION



#### A/C INFORMATION



The driving information screen displays the average vehicle speed, average fuel efficiency, and possible travel distance based on the information derived from the engine-ECU and the fuel gauge unit.

The screen displays set temperature, fan air mass, rear defogger operation, compressor operation, front defroster operation, and inside and outside air mode.

**ENVIRONMENT INFORMATION**



**CLOCK INFORMATION**



The environment information screen displays ambient temperature, direction, altitude, and barometric air pressure. If the ambient temperature is 3°C or lower when starting the vehicle, a frozen marking blinks and an alarm sound warns a driver.

Digitally displayed clock and date are featured. When the function switch 3 on the clock display screen is pressed for 3 seconds or longer, the time adjustment screen can be called up.

**AUDIO INFORMATION**

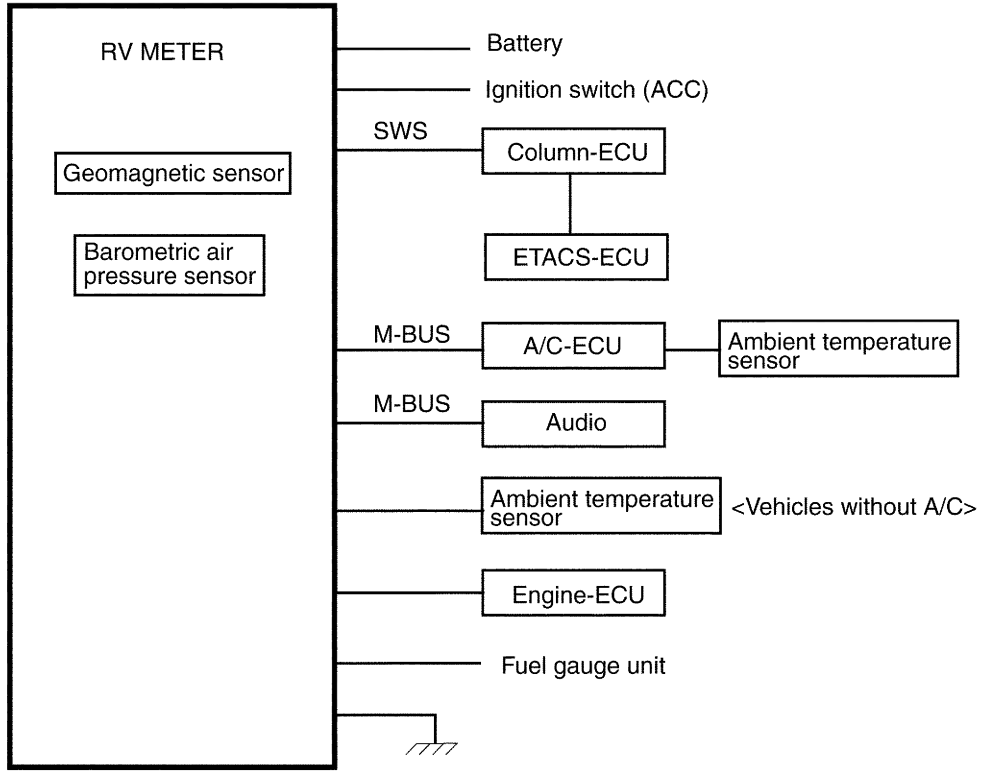


The audio function and setting of radio, tape, and CD are displayed.

**CONSTRUCTION DIAGRAM**

**This system:**

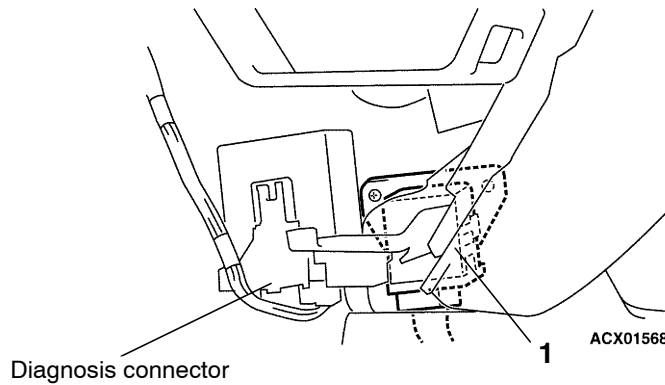
1. receives A/C information, such as ambient temperature sensor from the A/C-ECU and audio information from the audio system through M-BUS.
2. receives information regarding buzzer sound and ignition switch position recognition from the RV meter through SWS communication.
3. receives the vehicle speed data from the engine-ECU to calculate the average vehicle speed. Moreover, this system receives the fuel injection amount data to calculate the average fuel efficiency and possible travel distance.
4. calculates the direction of a vehicle by using the geomagnetic sensor.
5. calculates the outside air temperature by using the ambient temperature sensor.
6. measures the ambient pressure by using the barometric air pressure sensor to calculate the altitude based on the information.
7. obtains information on remaining fuel amount required for calculating the possible travel distance by using the fuel gauge unit.



10014CA

# IMMOBILIZER SYSTEM

## REMOVAL AND INSTALLATION



### Immobilizer-ECU removal steps

- Lower center panel <LH> panel  
(Refer to GROUP 52A - Floor console assembly)
1. Immobilizer-ECU

### NOTE

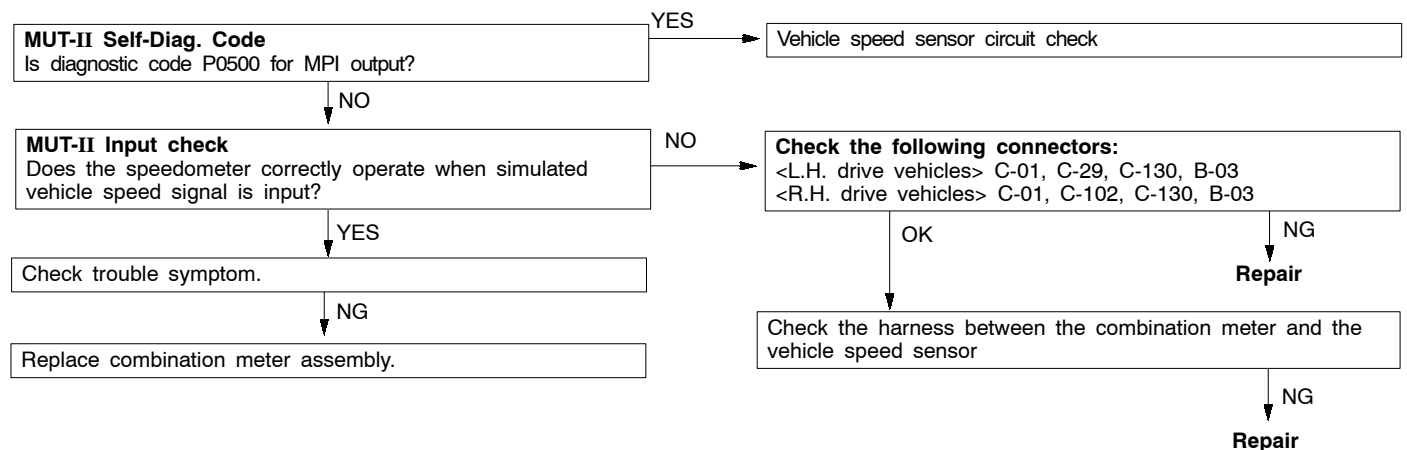
On vehicles with the 4D5 engine, the ignition key registration procedure is the same as for the 4M41 engine.

# COMBINATION METER

## TROUBLESHOOTING

### INSPECTION PROCEDURES FOR TROUBLE SYMPTOM

| Speedometer inoperative (other meters are operated)                               | Probable cause   |
|---|--|
| Failure may occur on vehicle speed sensor, harnesses, connectors, meter assembly. | <ul style="list-style-type: none"> <li>• Malfunction of vehicle speed sensor</li> <li>• Malfunction of vehicle harness or connector</li> <li>• Malfunction of combination meter</li> </ul> |



### NOTE

When vehicle speed signal is checked with MUT-II in the ETACS-ECU input signal test, drive the vehicle with MUT-II connected to diagnostic connector. When the buzzer sounds, this test is evaluated OK.



# RV METER

## TROUBLESHOOTING

### 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.

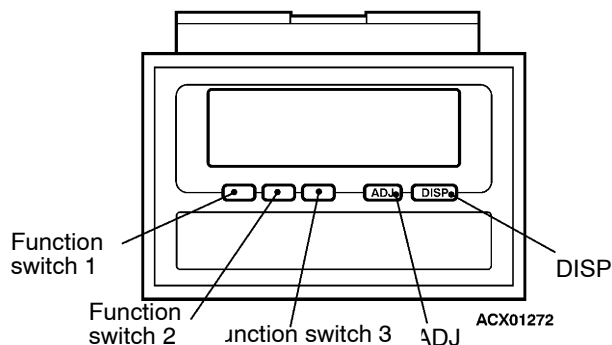
#### NOTE

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.

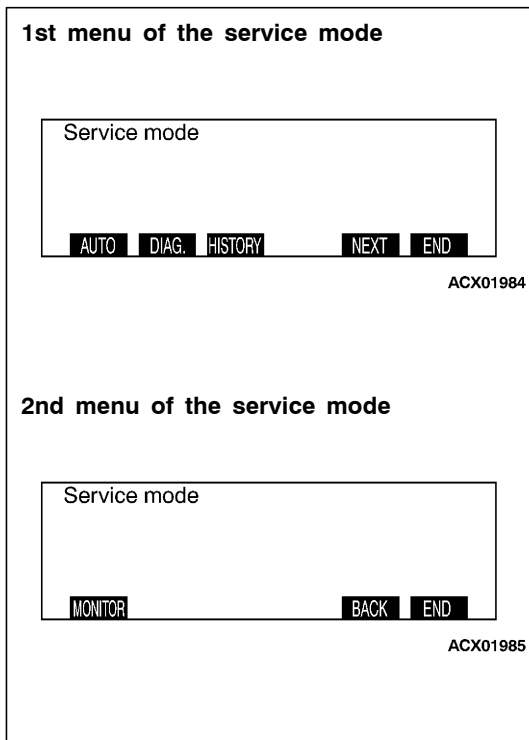
### RV METER UNIT OPERATING PANEL



### TROUBLE DIAGNOSIS SERVICE FUNCTIONS

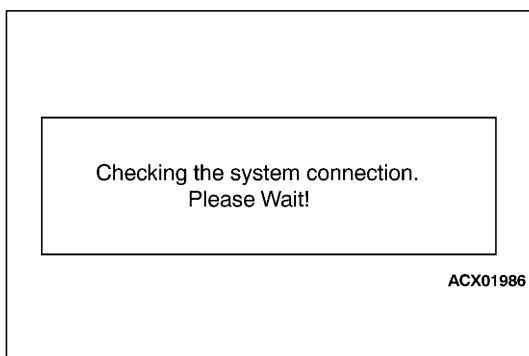
The RV meter is equipped with the following trouble diagnosis service functions.

| Service function         | Contents   | Reference Page                 |        |
|--------------------------|--|--------------------------------|--------|
| Automatic mode diagnosis | checks vehicle signal information communication, audio, A/C, fuel information, monitor automatically whenever function switch 1 (NEXT) is pressed. | 54A-7                          |        |
| Diagnosis mode           | checks version, vehicle signal, communication information (audio, A/C, and fuel).  | 54A-9                          |        |
| History mode             | displays history of communication error.   | 54A-11                         |        |
| Monitor check mode       | Display check mode   | checks the display.            | 54A-11 |
|                          | Geomagnetic check mode   | checks the geomagnetic sensor. | 54A-12 |
|                          | Altimeter adjust mode  | adjusts the altimeter.         | 54A-13 |



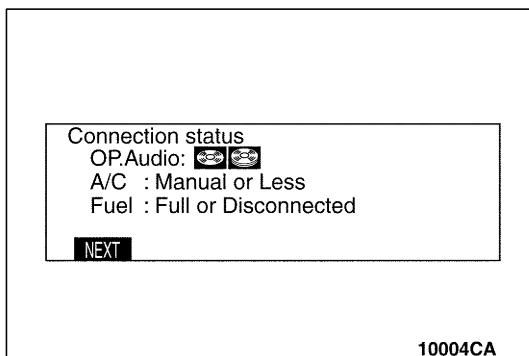
**SERVICE FUNCTION STARTING**

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 ADJ switch (NEXT) is pressed at the 1st menu of the oservice mode screen, the mode is switched to the 2nd menu of the service mode screen. When function switch 1 (MONITOR) is pressed at the current screen, the screen mode is switched to monitor check mode.(Refer to P.54A-11.)

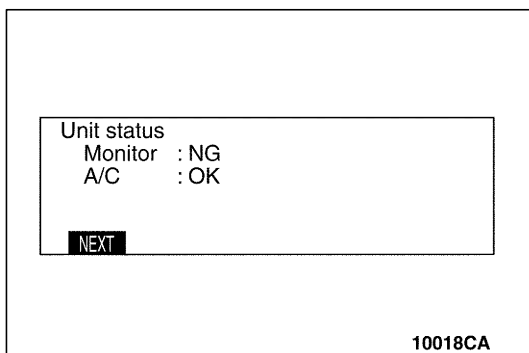


**AUTOMATIC MODE**

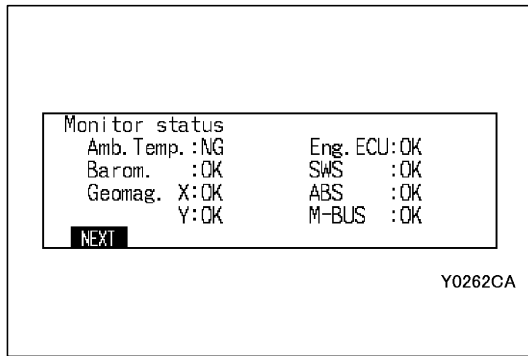
1. When function switch 1 (AUTO) is pressed at the 1st menu of the service mode screen, the mode is switched to automatic checking mode. At this time, a display will appear to prompt you to turn the ignition switch to the ON position.
2. When the ignition switch is turned to the ON position, communication and wiring check is carried out.
3. When the communication check is completed, the communication and wiring check results are displayed on the screen. If the audio system is recognized, the applicable icon is displayed. 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 pressed at the previous screen, the status of unit is displayed.



| Item            | Display example |
|-----------------|-----------------|
| Monitor         | NG              |
| Air conditioner | OK              |

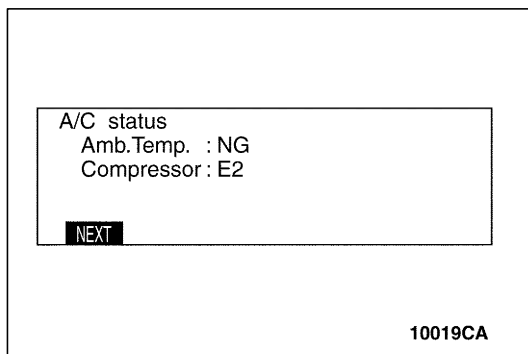


5. When function switch 1 (NEXT) is pressed at the previous screen, a list of monitor check items and results is displayed.

| Item  | Display example | Contents or conditions        |
|---|-----------------|-------------------------------|
| Ambient temperature                               | OK              | —                             |
| Barometric pressure                               | OK              | —                             |
| Geomagnetic sensor<br>X direction,<br>Y direction | OK              | —                             |
| Engine-ECU,<br>SWS,<br>M-BUS                      | E1              | Communication error           |
|   | E2              | Open circuit or not connected |

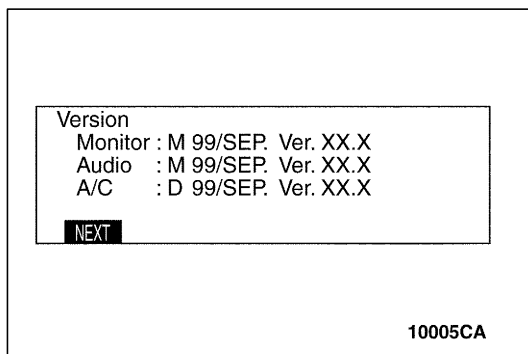
#### NOTE

For diesel vehicles, E2 is normally displayed for Engine-ECU. (meaning that it is not connected)

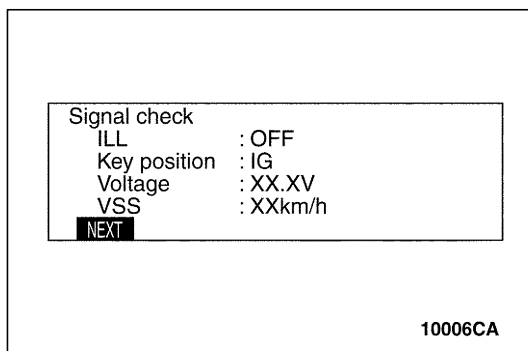


6. When function switch 1 (NEXT) is pressed at the previous screen, A/C related item list is displayed.  
 For vehicles without air conditioner or with a manual air conditioner, the version is not displayed.

| Item                       | Display example |
|----------------------------|-----------------|
| Ambient temperature sensor | NG              |
| Compressor                 | OK              |



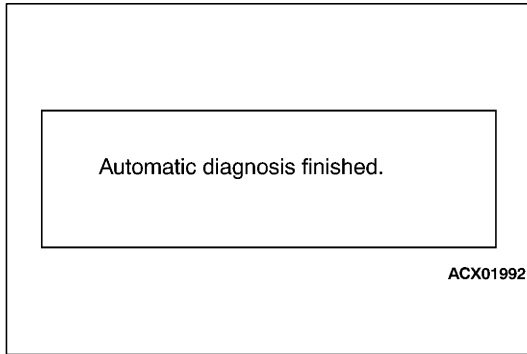
7. When function switch 1 (NEXT) is pressed at the previous screen, the version of monitor, audio and air conditioner is displayed.  
 For vehicles without air conditioner or with a manual air conditioner, the version is not displayed.



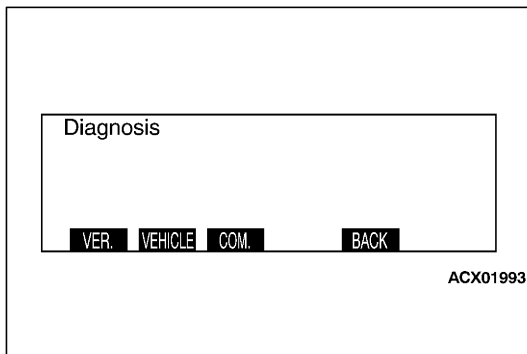
8. When function switch 1 (NEXT) is pressed at the previous screen, the status of vehicle signal is displayed.

| Item                  | Display example | Contents or conditions     |
|-----------------------|-----------------|----------------------------|
| Illumination          | OFF             | Conditions of illumination |
| Ignition key position | IG              | Ignition switch position   |
| Voltage               | 12V             | Power supply voltage       |

| Item | Display example | Contents or conditions                |
|------|-----------------|---------------------------------------|
| VSS  | XX km/h         | Speed on basis of vehicle speed pulse |

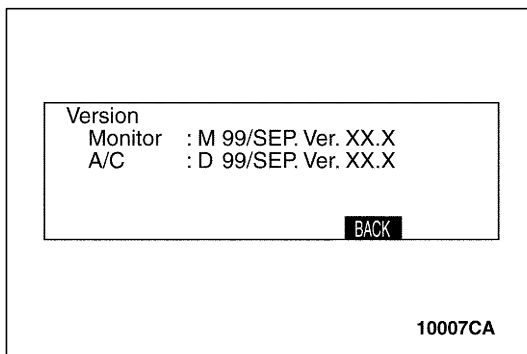


9. When function switch 1 (NEXT) is pressed at the previous screen, the displaying the message "Automatic diagnosis finished."

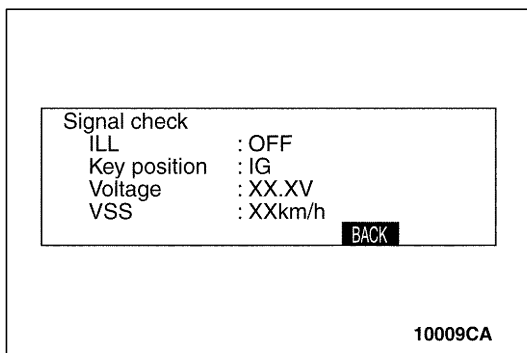


**DIAGNOSIS MODE**

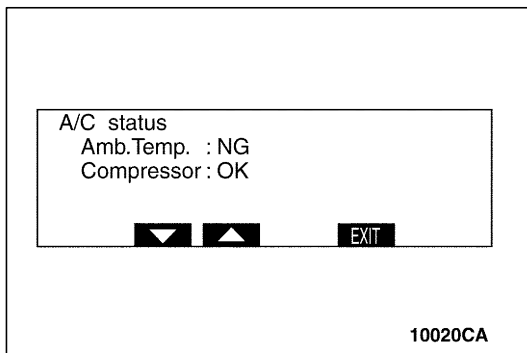
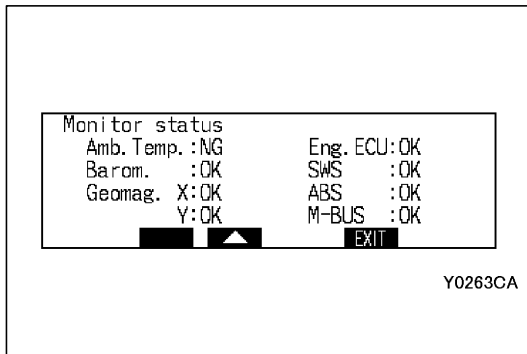
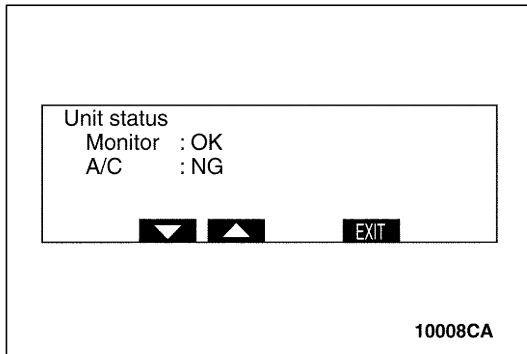
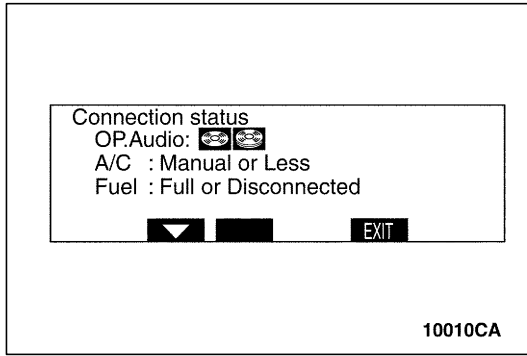
1. From the 1st menu of the service mode screen, press function switch 2 (DIAG) to display diagnosis mode.
2. The following displays appear when the various function switches are pressed.



- (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.  
 If the audio system is recognized, the icon is displayed. Air conditioner input (Automatic, Manual or without air conditioning) is displayed.  
 Fuel gauge input (OK, not connected or fuel tank full) is displayed.

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

- When function switch 1 (▼) at the previous screen, the status of monitor is displayed.

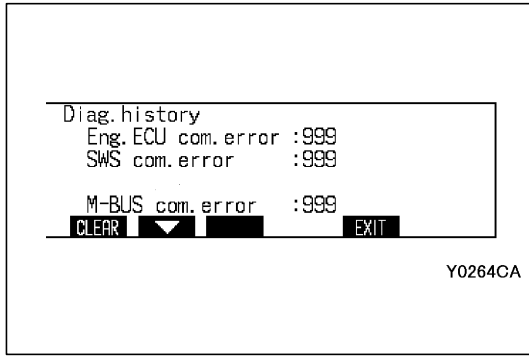
| Item  | Display example | Contents or conditions        |
|---|-----------------|-------------------------------|
| Ambient temperature                         | OK              | —                             |
| Barometric pressure                         | OK              | —                             |
| Geomagnetic sensor X direction, Y direction | OK              | —                             |
| Engine-ECU, SWS, M-BUS                      | E1              | Communication error           |
|   | E2              | Open circuit or not connected |

NOTE

For diesel vehicles, E2 is normally displayed for Engine-ECU. (meaning that it is not connected)

- When function switch 1 (▼) at the previous screen, the status of monitor is displayed. A/C related item list is displayed.  
 For vehicles without air conditioner or with a manual air conditioner, the version is not displayed.

| Item                       | Display example |
|----------------------------|-----------------|
| Ambient temperature sensor | NG              |
| Compressor                 | OK              |

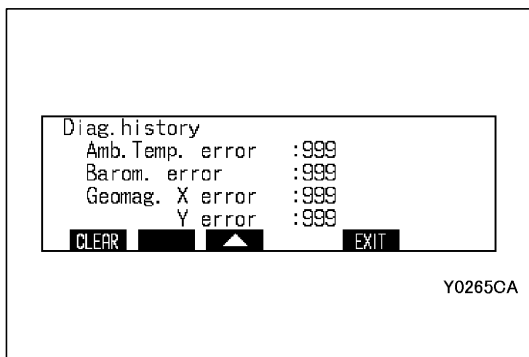


**HISTORY MODE**

- (1) When function switch 3 (HISTORY) is pressed at the 1st menu of the service mode screen, the mode is switched to history mode.

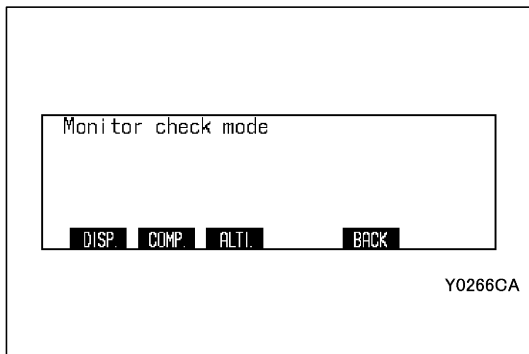
| Item                   | Display example | CONTENTS                    |
|------------------------|-----------------|-----------------------------|
| Engine-ECU, SWS, M-BUS | 000             | No. of communication errors |

- When function switch 1 (CLEAR) is pressed, the number of errors is erased.



- (2) When the function switch 2 (▼) is pressed, the mode is switched to the 2nd menu of history mode.

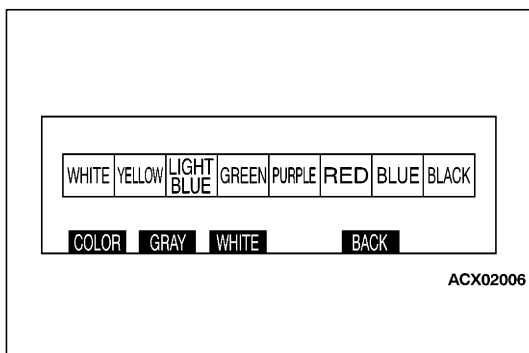
| Item                        | Display example | CONTENTS                    |
|-----------------------------|-----------------|-----------------------------|
| Amb.Temp, Barom, Geomag X.Y | 000             | No. of communication errors |



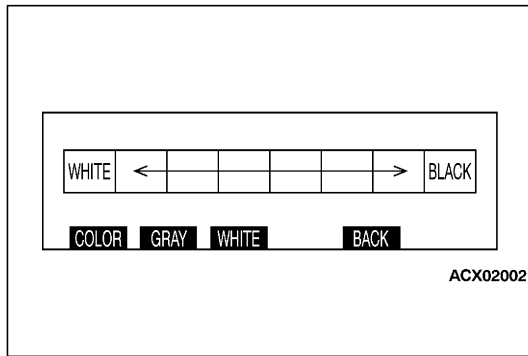
**MONITOR CHECK MODE**

**Display check mode**

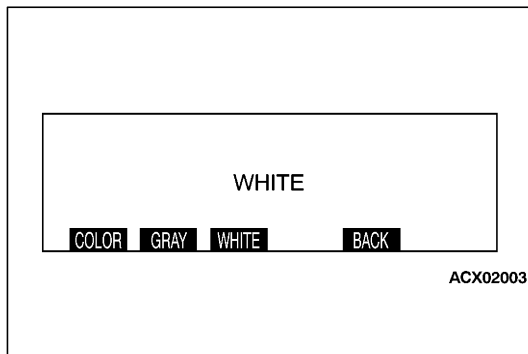
1. When function switch 1 (MONITOR) is pressed at the 2nd menu of the service mode screen, the mode is switched to monitor check mode. The following displays appear when the various function switches are pressed.



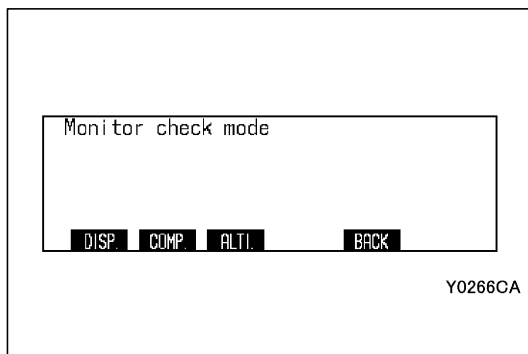
- When function switch 1 (DISP) is pressed, the color bar is displayed.



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



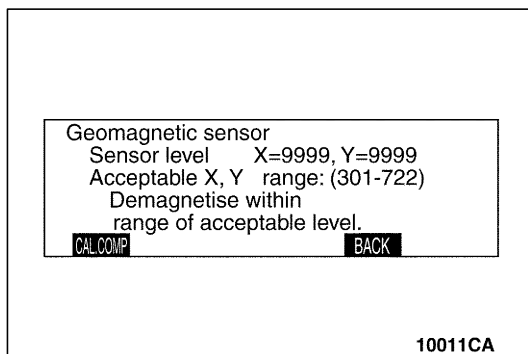
- When function switch 3 (WHITE) is pressed, the white screen is displayed.



### Geomagnetic 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.

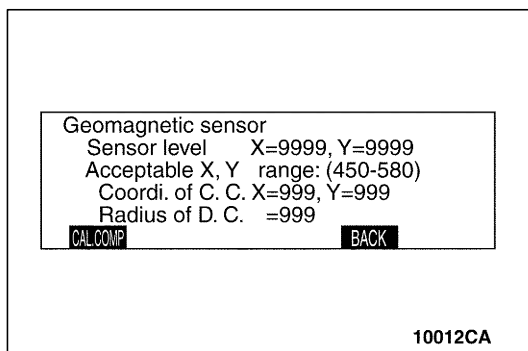


2. When function switch 2 (COMP) is pressed at the previous screen, the mode is switched to geomagnetic sensor mode.

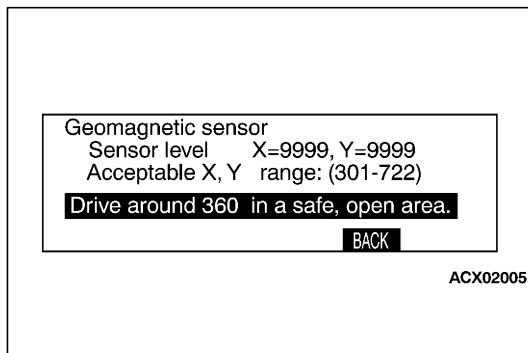
- At geomagnetic sensor mode, outputs in X- and Y-axes of the geomagnetic sensor, the circular bearing coordinate, and the radius are displayed.

If both values of the sensor (X, Y) are outside the range between 450 and 580, there is a high possibility of geomagnetisation and the screen displays a message of degeomagnetisation request.

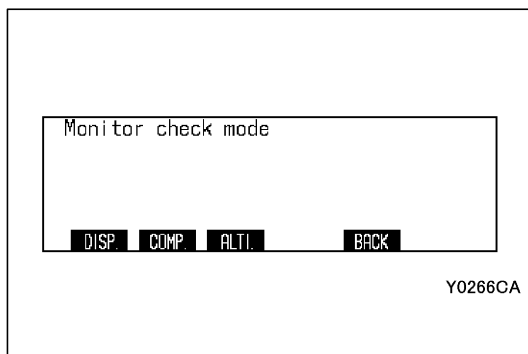
For degeomagnetisation, refer to P.54A-15.



- If both values of the sensor (X, Y) are input within the range between 450 and 580 for one second or longer continuously, the axes are displayed.

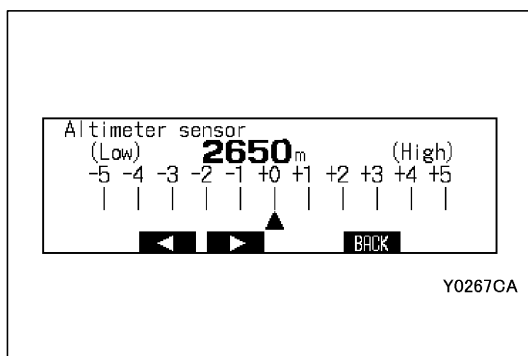


- When function switch 1 (CAL.COMP) is pressed at the previous screen, a message of rotation compensation is displayed. For the method of magnetization compensation by rotation, refer to P.54A-14.



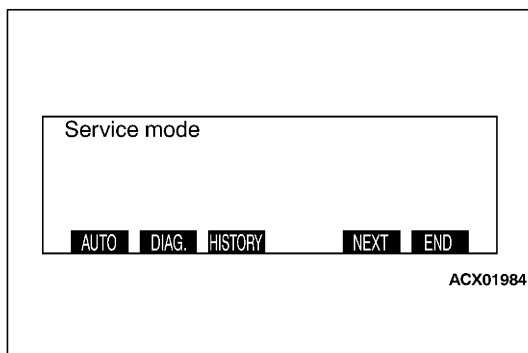
### Altimeter adjust mode

When function switch 3 (ALTI) is pressed at the monitor check mode. The following displays appear when the various function switches are pressed.



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



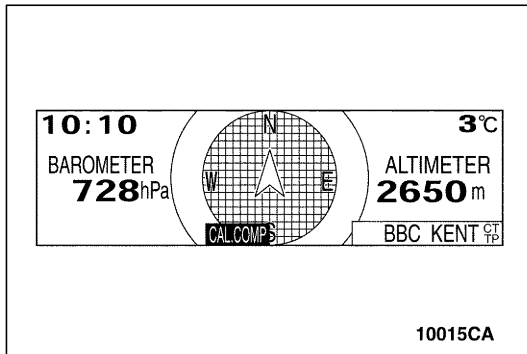
### CANCELLING SERVICE MODE

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.

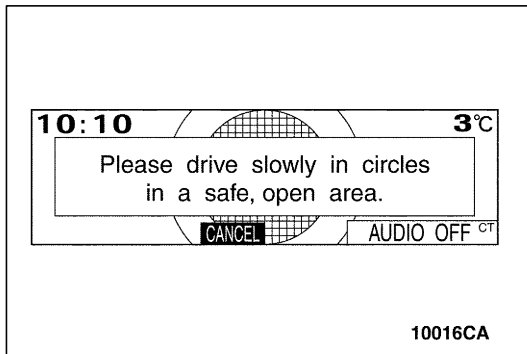


**MANUAL GEOMAGNETISATION CALIBRATION**

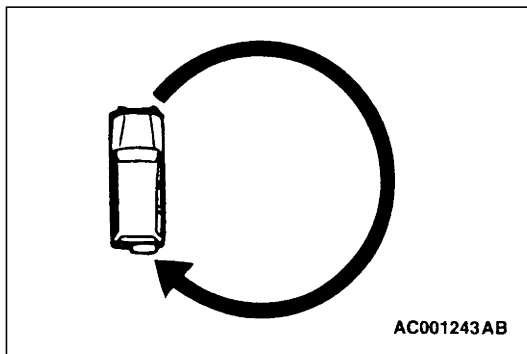
The RV meter automatically conducts geomagnetisation calibration by sampling direction data while the vehicle is normally driving. The calibration can be done manually at any time.



1. Press function switch 3 for three seconds or more during the environment information screen to call up the screen as shown in the illustration .



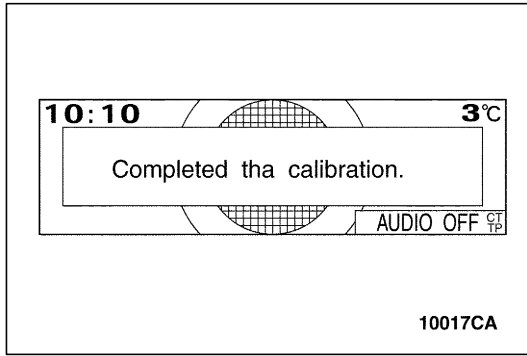
2. When function switch 3 (CAL.COMP) is pressed, a message of urging geomagnetisation calibration is displayed.



3. 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.



4. A message of completing geomagnetisation calibration is displayed.

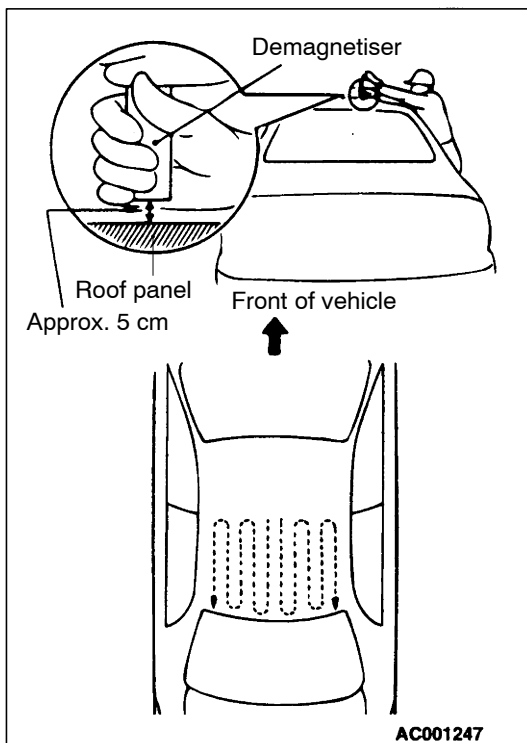
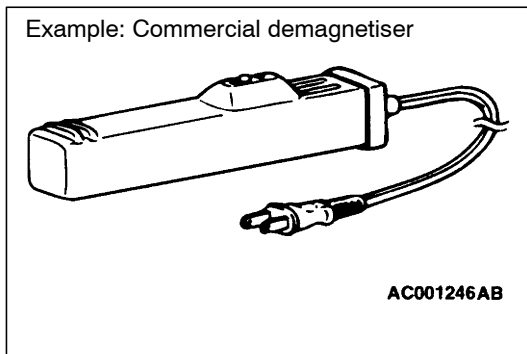
**NOTE**

If the following switches are pressed before completion of calibration, the system cancels calibration and use the previously corrected data.

- When pressing "DISP" and "ADJ" switches
- When pressing function switch 3 switch (CANCEL)
- When operating auto A/C and audio
- When turning the ignition switch to the "OFF" (LOCK) position

**Degeomagnetisation and calibration method**

1. Demagnetise the body using a commercial demagnetiser.



2. 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.**

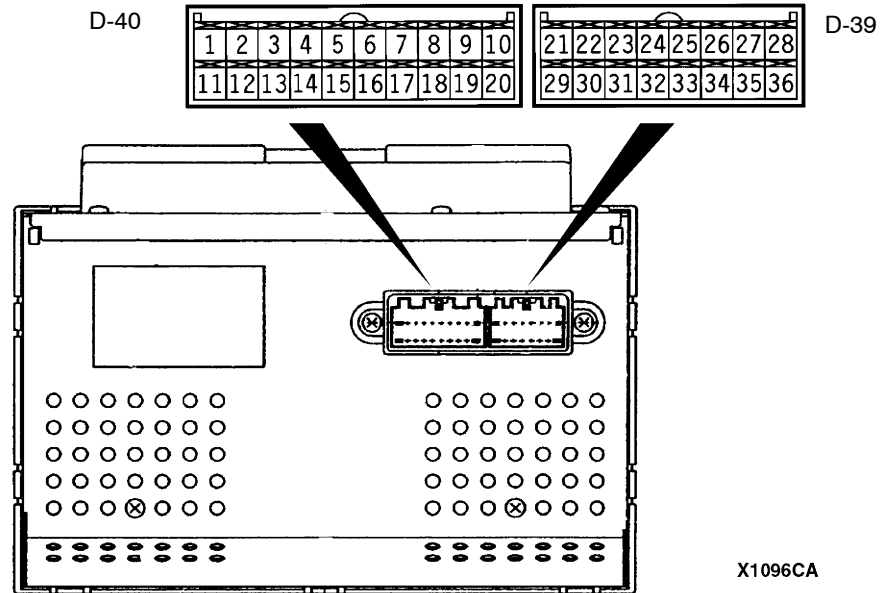
3. Slowly draw the demagnetiser apart from the body. Turn OFF the switch of demagnetiser when it is apart from the body more than 50 cm.

**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.**

4. After degeomagnetisation, geomagnetisation calibration is carried out (Refer to P.54A-14.)

## 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 |   |
| 4 - 1        | —            | —                                       | —                               | —               | —             | —   |
| 5            | Input        | ISOK (MUT-II data signal)               | Hi: System voltage<br>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<br>Lo: 0 - 1 | Exists          | Exists        | <ul style="list-style-type: none"> <li>Switch operating sound (buzzer) does not sound.</li> <li>Daytime/nighttime mode does not change in conjunction with the tail gate lamps.</li> <li>Indicators (buttons, illumination panel) do not illuminate.</li> </ul> |
| 7            | Input/output | M-DATA(AUDIO) (M-BUS data signal)       | Hi: 4 - 5<br>Lo: 0 - 1          | Exists          | Exists        | <ul style="list-style-type: none"> <li>Audio information does not appear on the screen.</li> </ul>  |
| 8            | Input/output | M-CLOCK(AUDIO)<br>M-BUS (C lock signal) | Hi: 4 - 5<br>Lo: 0 - 1          | Exists          | Exists        | <ul style="list-style-type: none"> <li>Audio information does not appear on the screen.</li> </ul>  |
| 9            | Input/output | M-DATA(A/C) (M-BUS data signal)         | Hi: 4 - 5<br>Lo: 0 - 1          | Exists          | Exists        | <ul style="list-style-type: none"> <li>Air conditioner information does not appear on the screen.</li> <li>Ambient temperature is not displayed.</li> </ul>   |
| 10           | Input/output | M-CLOCK(A/C)<br>M-BUS (C lock signal)   | Hi: 4 - 5<br>Lo: 0 - 1          | Exists          | Exists        | <ul style="list-style-type: none"> <li>Air conditioner information does not appear on the screen.</li> <li>Ambient temperature is not displayed.</li> </ul>   |

| 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<br>Lo:0 - 1 | Exists          | Exists        | <ul style="list-style-type: none"> <li>Wiring communication error</li> <li>Communication between the engine-A/T-ECU &lt;Petrol vehicles&gt; is not possible.</li> <li>Abnormal driving information numerical display</li> </ul>   |
| 16           | —            | —                                | —                              | —               | —             | —   |
| 17           | Input/output | M-BUSY (AUDIO)                   | Hi: System voltage<br>Lo:0 - 1 | Exists          | Exists        | <ul style="list-style-type: none"> <li>Audio information does not appear on the screen.</li> </ul>  |
| 18           | —            | SHIELD-EARTH (AUDIO)             | —                              | —               | —             | —   |
| 19           | Input/output | M-BUSY (A/C)                     | Hi: System voltage<br>Lo:0 - 1 | Exists          | Exists        | <ul style="list-style-type: none"> <li>Air conditioner information does not appear on the screen.</li> <li>Ambient temperature is not displayed.</li> </ul>   |
| 20           | —            | SHIELD-EARTH                     | —                              | —               | —             | —   |
| 22 - 21      | —            | —                                | —                              | —               | —             | —   |
| 23           | Input        | Ambient temperature sensor       | —                              | Exists          | Exists        | <ul style="list-style-type: none"> <li>Ambient temperature is not displayed.</li> </ul>   |
| 24           | Input        | ILL + (Lighting switch)          | Hi: System voltage<br>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<br>Lo:0 - 1 | Exists          | Exists        | <ul style="list-style-type: none"> <li>Abnormal "Distance km after replacement" display in maintenance screen</li> <li>Switches which are not supposed to operate during driving do operate. (Example: clock adjustment screen, maintenance settings, etc.)</li> <li>Ambient temperature display is abnormally high.</li> </ul> |
| 28           | —            | 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 - 30      | -            | -   | -                    | -               | -             | -  |
| 31           | -            | EARTH (TEMP)                                | -                    | -               | -             | -  |
| 32           | -            | ILL - (illumination lamp adjustment signal) | -                    | Exists          | Exists        | Unable to adjust illumination lamp               |
| 33           | Input        | FUEL GAUGE                                  | 0 - 3                | Exists          | Exists        | -  |
| 34 - 36      | -            | -   | -                    | -               | -             | -  |

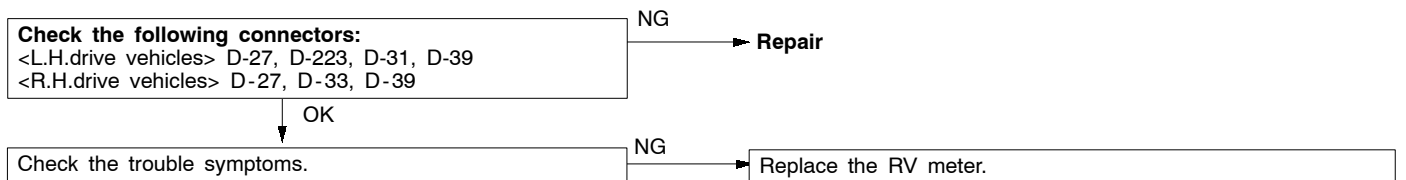
**CHART CLASSIFIED BY TROUBLE SYMPTOMS**

| Related unit            | Trouble Symptom  | Inspection procedure No. | Reference page |
|-------------------------|--|--------------------------|----------------|
| Malfunction of RV meter | No system operations can be carried out.               | 1                        | 54A-18         |
|                         | System voltage drop warning screen appears.            | 2                        | 54A-18         |
|                         | Ambient temperature does not display normally.         | 3                        | 54A-19         |
|                         | Compass does not display normally.                     | 4                        | 54A-20         |
|                         | Altimeter does not display normally.                   | 5                        | 54A-21         |
|                         | Air conditioner information does not display normally. | 6                        | 54A-21         |
|                         | Audio information does not display normally.           | 7                        | 54A-22         |

**INSPECTION PROCEDURES FOR EACH TROUBLE SYMPTOM**

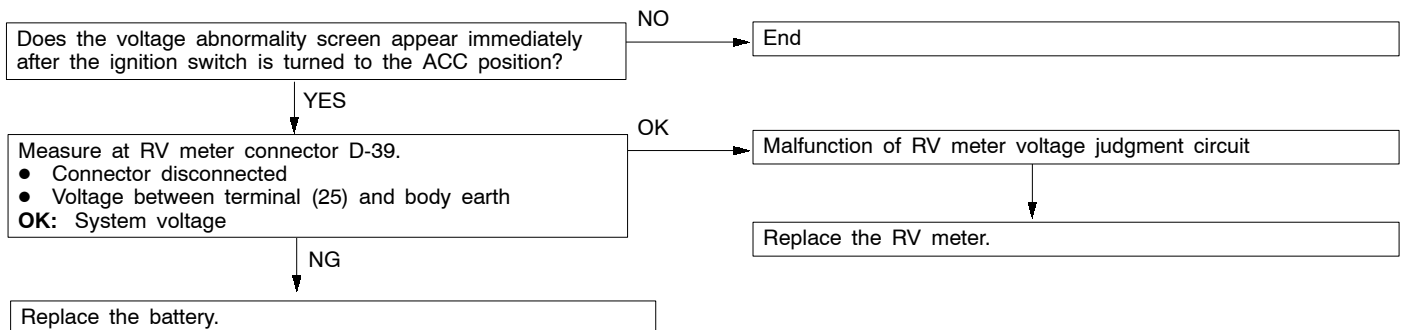
**Inspection procedure 1**

**No system operations can be carried out.**



**Inspection procedure 2**

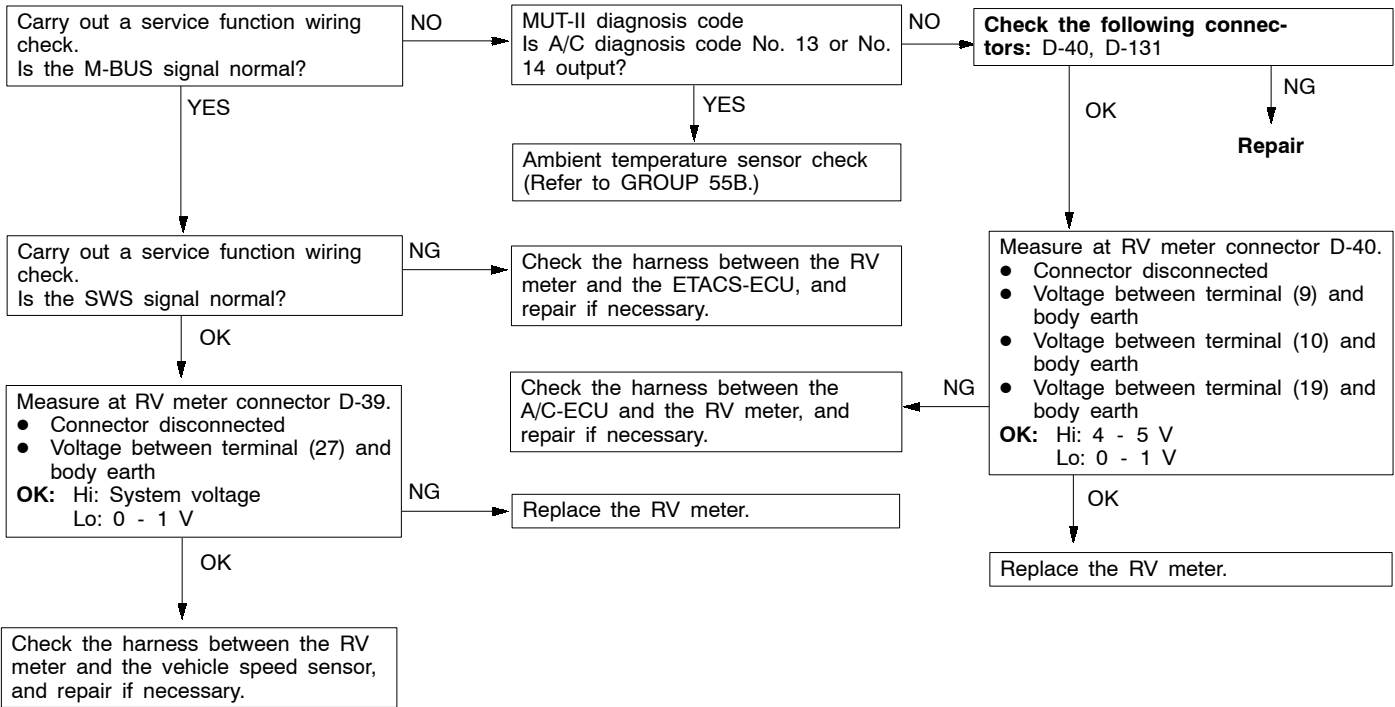
**System voltage abnormality screen appears.**



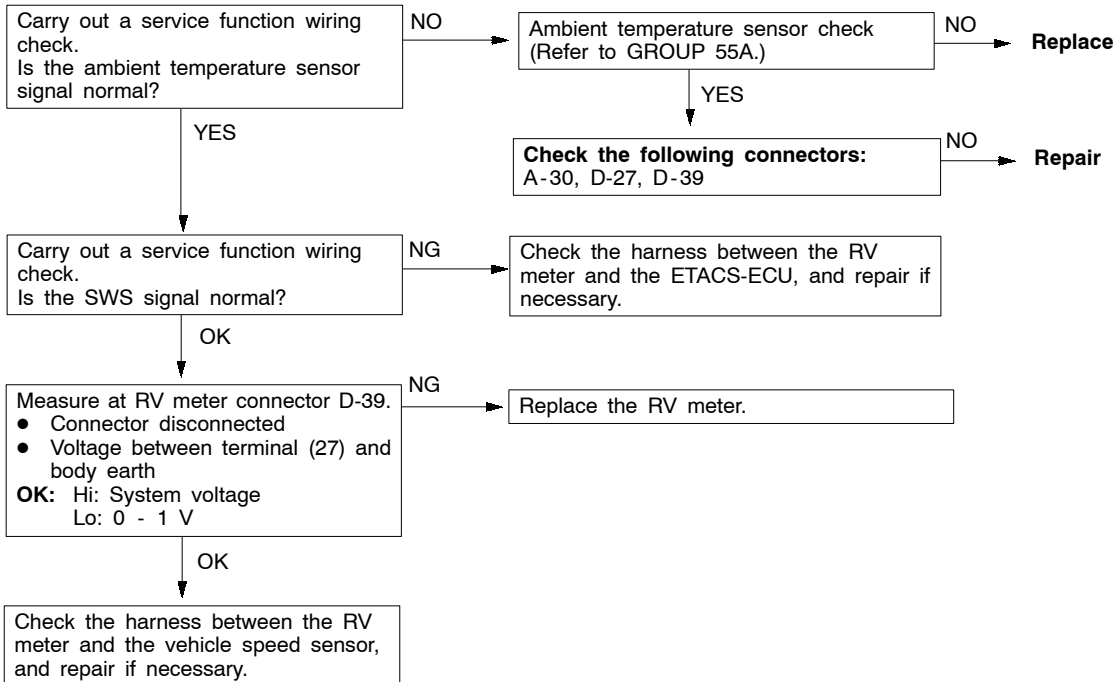
Inspection procedure 3

**Ambient temperature does not display normally.**

**<Vehicles with automatic A/C>**

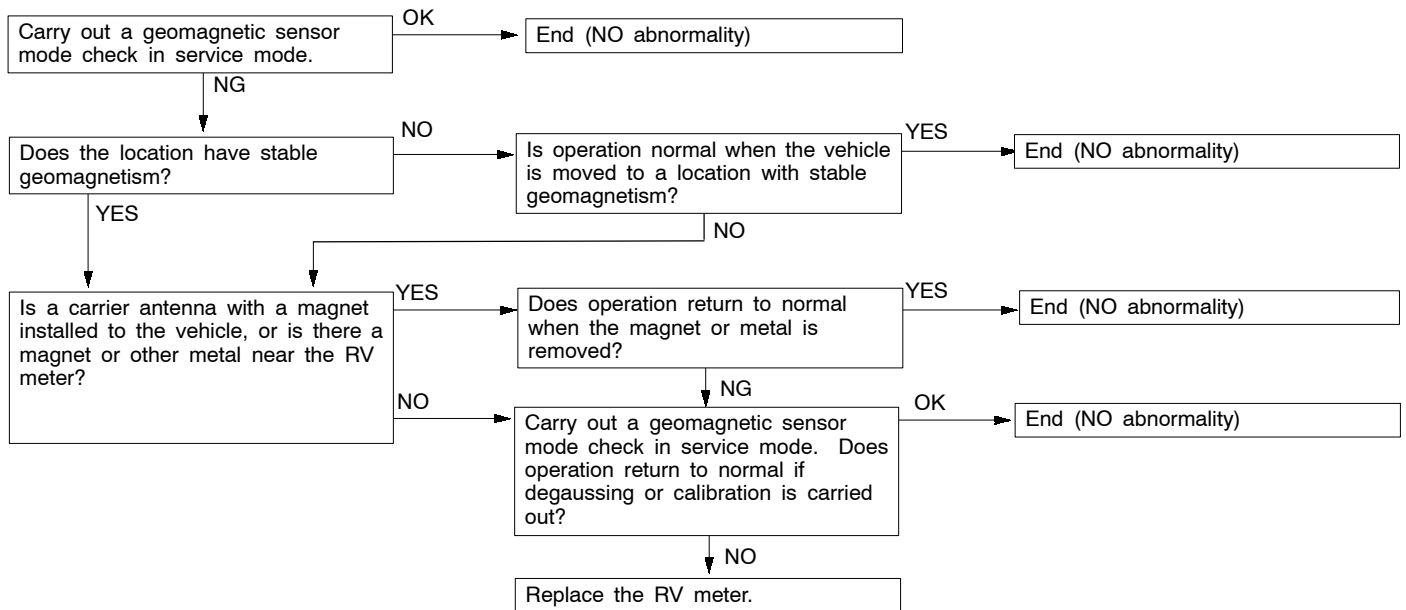


**<Vehicles without automatic A/C>**



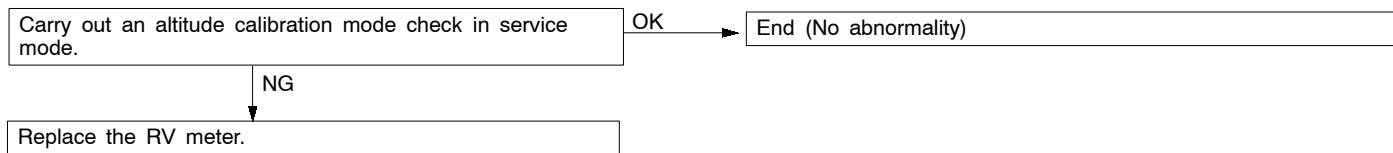
## Inspection procedure 4

Compass does not display normally.



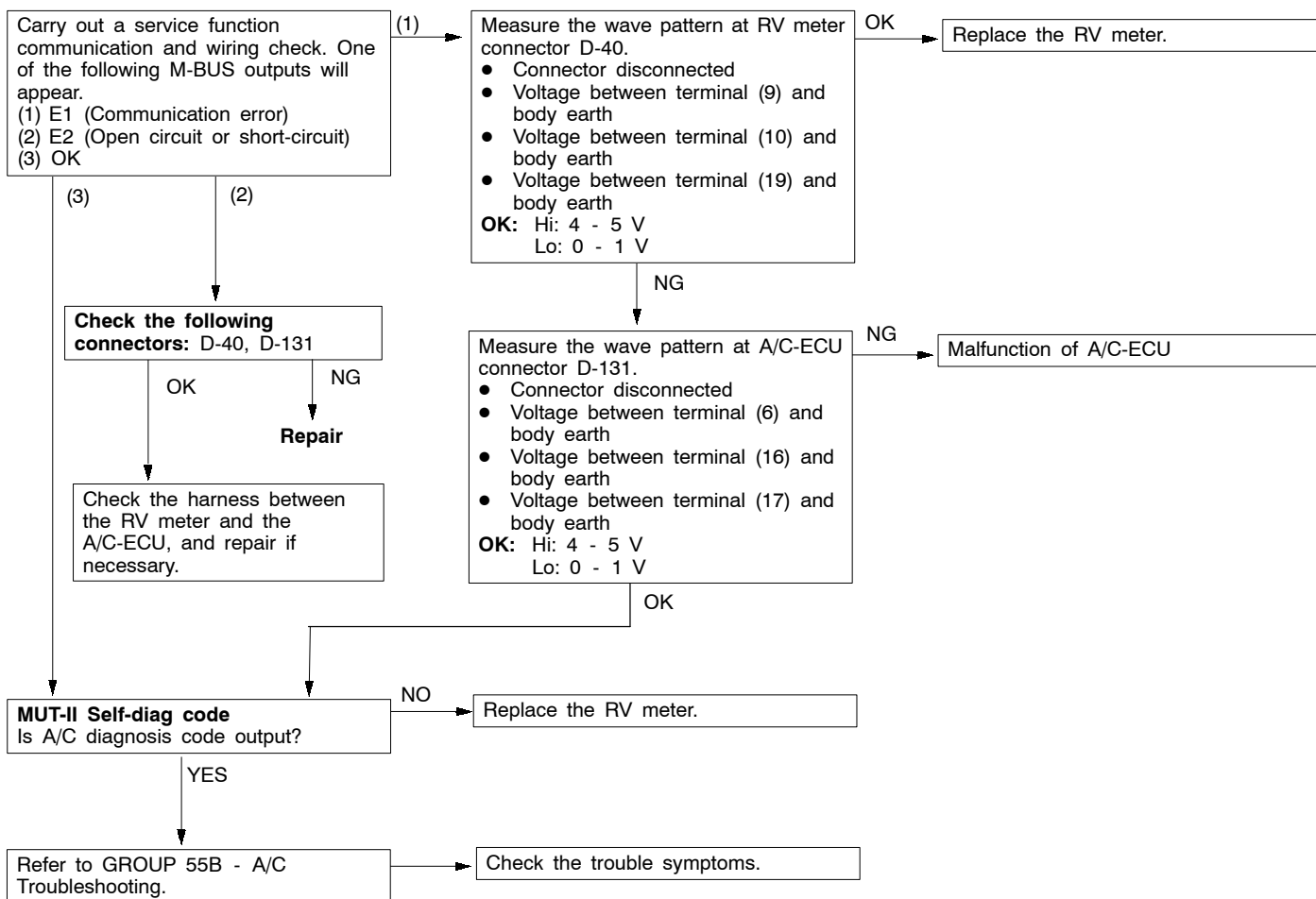
**Inspection procedure 5**

**Altimeter does not display normally.**



**Inspection procedure 6**

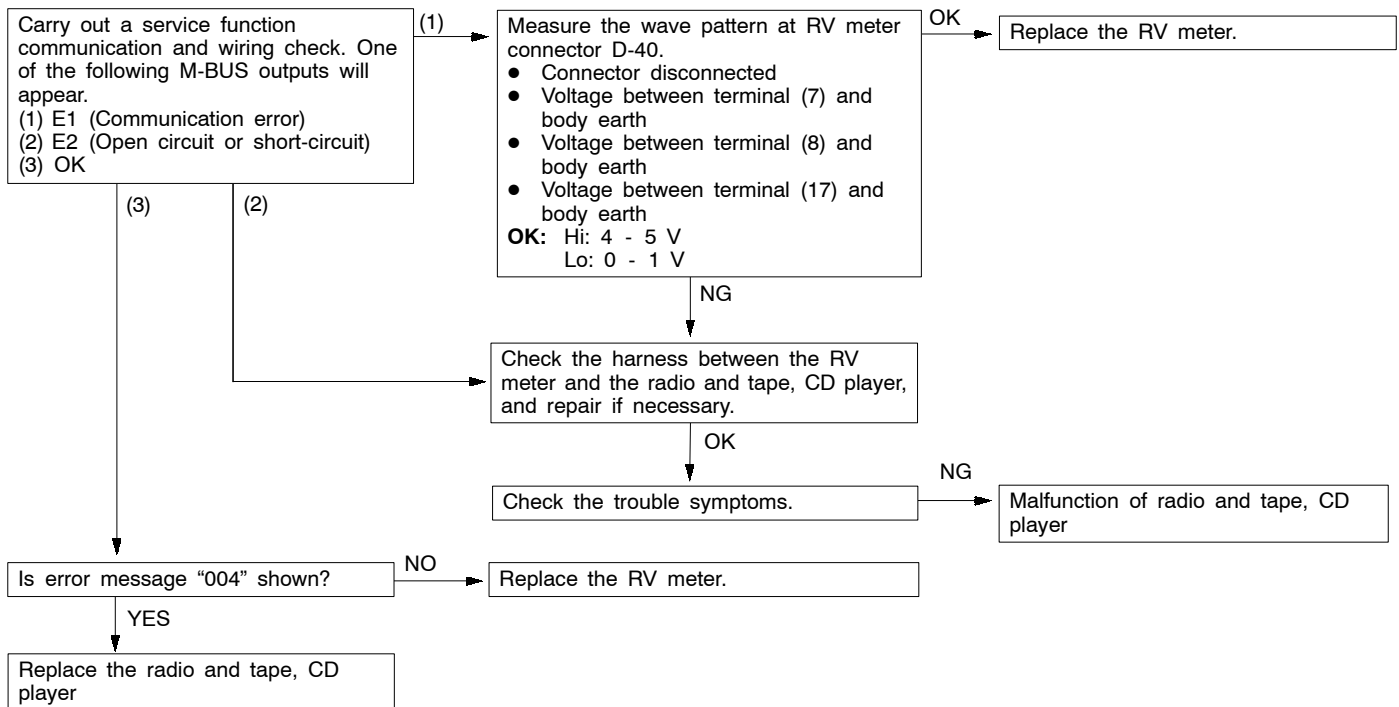
**Air conditioner information does not display normally.**





## Inspection procedure 7

## Audio information does not display normally.



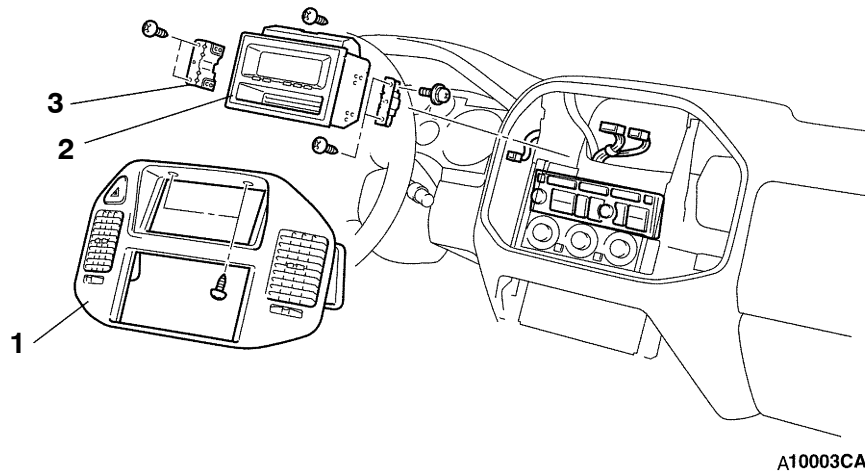
## NOTE:

The contents of error messages shown in the audio display screen are as follows:

| Error message | Location and cause of malfunction  |
|---------------|--|
| EJECT         | A magazine for CD changer is not inserted.   |
| NO DISC       | CD is not inserted.  |
| ERROR 001     | Program error in audio   |
| ERROR 002     | Error in CD disk   |
| ERROR 003     | Mechanical error in audio system   |
| ERROR 004     | Communication error in audio system and RV meter, power supply error in audio system, and other errors |
| ERROR HOT     | Heat protection for audio system   |

## RV METER

### REMOVAL AND INSTALLATION



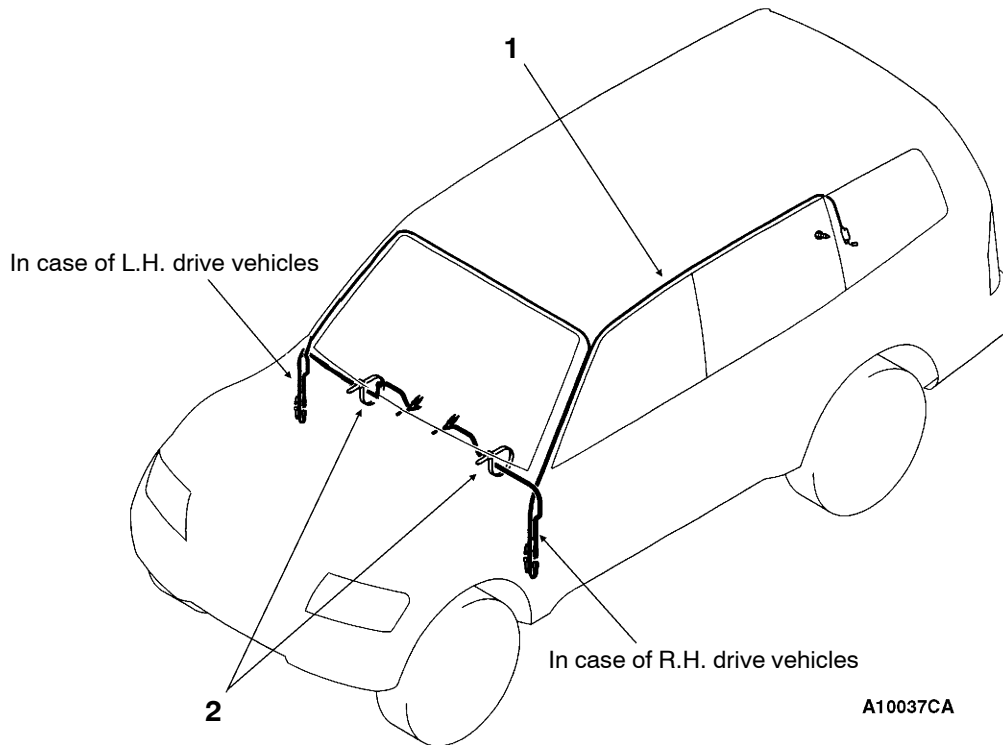
#### Removal steps

1. Center panel  
(Refer to GROUP 52A - Instrument Panel.)
2. RV meter
3. Bracket

# GLASS ANTENNA

## ANTENNA FEEDER CABLE

### REMOVAL AND INSTALLATION



#### 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. Cable band