

CHASSIS ELECTRICAL

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CHASSIS ELECTRICAL 54A

SMART WIRING SYSTEM (SWS) 54B



INTERIOR

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

WARNING!

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

NOTE

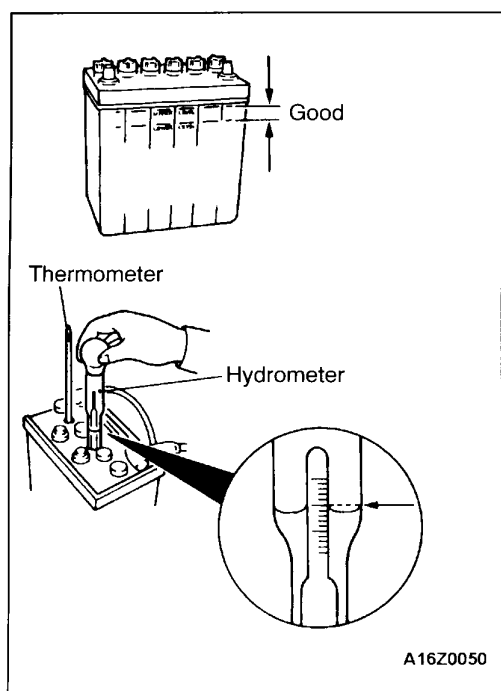
The SRS includes the following components: SRS-ECU, SRS warning lamp, air bag module, clock spring and interconnecting wiring. Other SRS-related components (that may have to be removed/installed in connection with SRS service or maintenance) are indicated in the table of contents by an asterisk (*).

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BATTERY

SERVICE SPECIFICATION

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



ON-VEHICLE SERVICE

FLUID LEVEL AND SPECIFIC GRAVITY CHECK

1. Inspect whether or not the battery fluid is between the UPPER LEVEL and LOWER LEVEL marks.

Caution

- (1) If the battery fluid is below the LOWER LEVEL, the battery could explode in using.
- (2) If the battery fluid is over the UPPER LEVEL, leakage could result.

2. Use a hydrometer and thermometer to check the specific gravity of the battery fluid.

Standard value: 1.220 – 1.290 [20°C]

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

$$D20 = (t - 20) \times 0.0007 + Dt$$

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

Dt: Actually measured specific gravity

t: Actually measured temperature

CHARGING

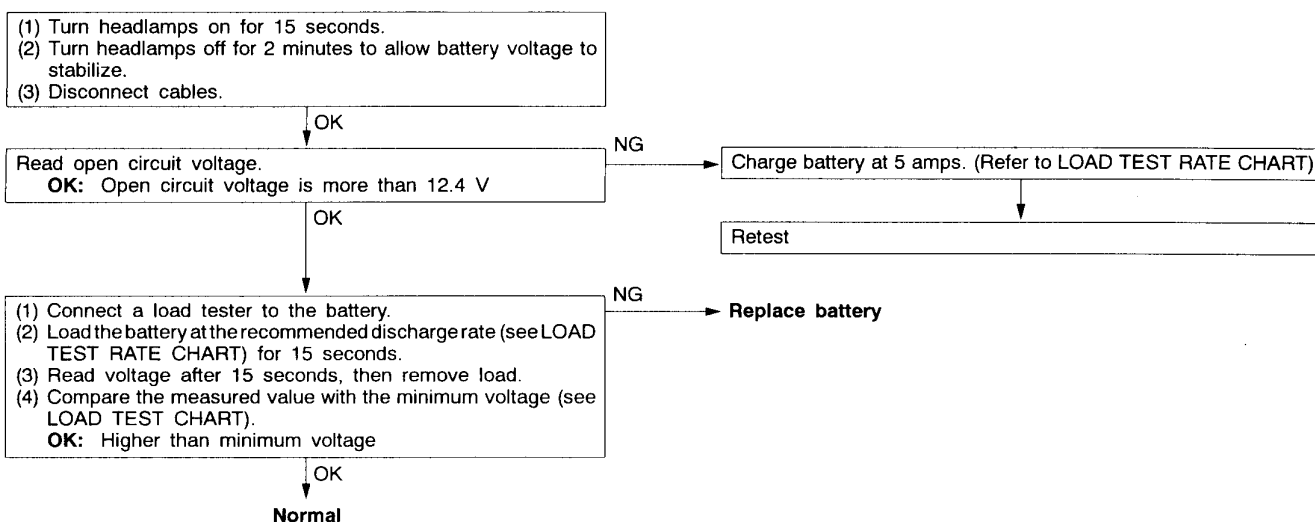
1. Remove the battery from the vehicle.
2. The normal charging current is a value in amperes which is 1/10th of the battery capacity. If the battery needs to be charged rapidly because of reasons such as time limitations, the maximum charging current for rapid charging is the battery capacity expressed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

Battery type	Capacity (5-hour rate)	Normal charging current	Rapid charging current
44B20	34 A	3.4 A	34 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 TESTING PROCEDURE**TEST STEP****ROAD TEST RATE CHART**

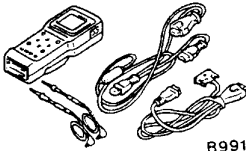
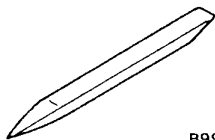
Battery type	44B20L
Charging time when fully discharged h [5-amp. rated current charging]	6.8
Load test (Amps)	150

ROAD TEST CHART

Temperature °C	21 and above	16 – 20	10 – 15	4 – 9	–1 – 3	–7 – –2	–12 – 8	–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 SYSTEM

SPECIAL TOOLS

Tool	Number	Name	Use
 B991502	MB991502	MUT-II Sub assembly	Checking the immobilizer system
 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

STANDARD FLOW OF DIAGNOSIS TROUBLESHOOTING

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

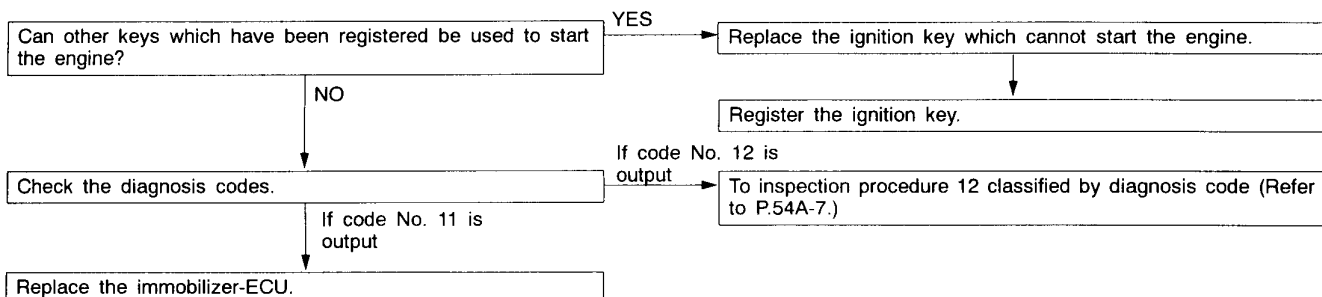
1. Change to Simple Check Diagnosis mode and activate switch diagnosis mode. (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points.)
2. In this condition, the input signals for the following switches can be checked.

CHART CLASSIFIED BY DIAGNOSIS CODES

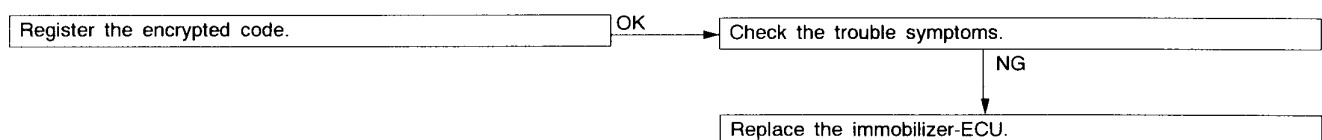
Code No.	Diagnosis contents	Reference page
11	Problem related to communication with the ignition key	54A-7
12	Ignition key is not registered, or encrypted code from ignition key does not match.	54A-7

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.	• Malfunction of ignition key • Malfunction of immobilizer-ECU



Code No. 12 Ignition key is not registered, or encrypted code from ignition key does not match.	Probable cause
The ignition key has not been registered with the immobilizer-ECU.	• The ignition key has not been registered with the immobilizer-ECU. • Malfunction of immobilizer-ECU



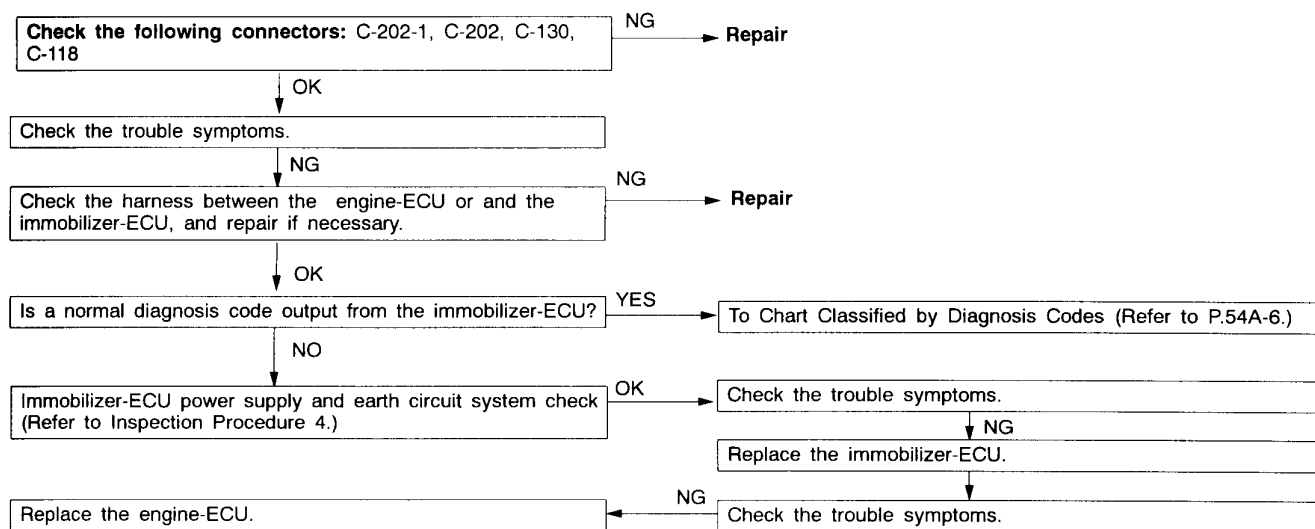
INSPECTION CHART FOR TROUBLE SYMPTOMS

Trouble symptom	Inspection procedure No.	Reference page
Communication with MUT-II is not possible.	—	GROUP 13A – Troubleshooting
Diagnosis code No. P1610 is generated by the engine-ECU.	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 TROUBLE SYMPTOMS

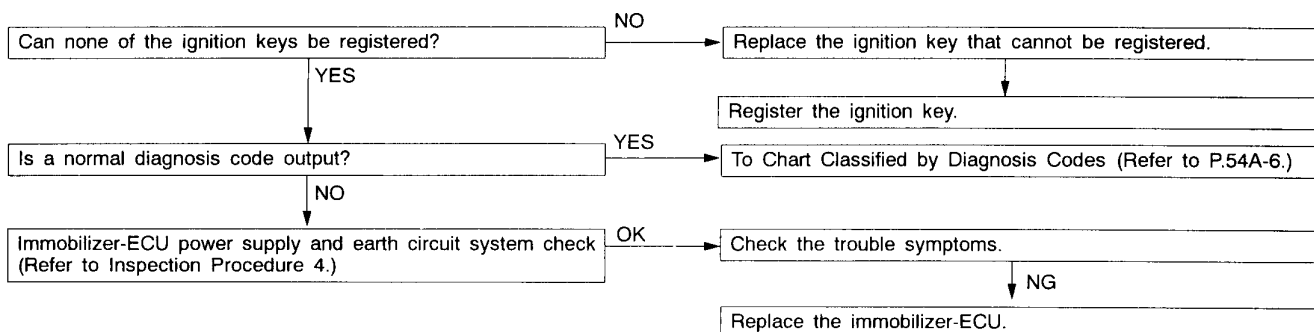
Inspection procedure 1

Diagnosis code No.1610 is generated by the engine-ECU.	Probable cause
The cause is probably a problem with communication between the engine-ECU and the immobilizer-ECU.	• Malfunction of harness or connector • Malfunction of engine-ECU • Malfunction of immobilizer-ECU • Malfunction of ignition key • The ignition key has not been registered with the immobilizer-ECU.



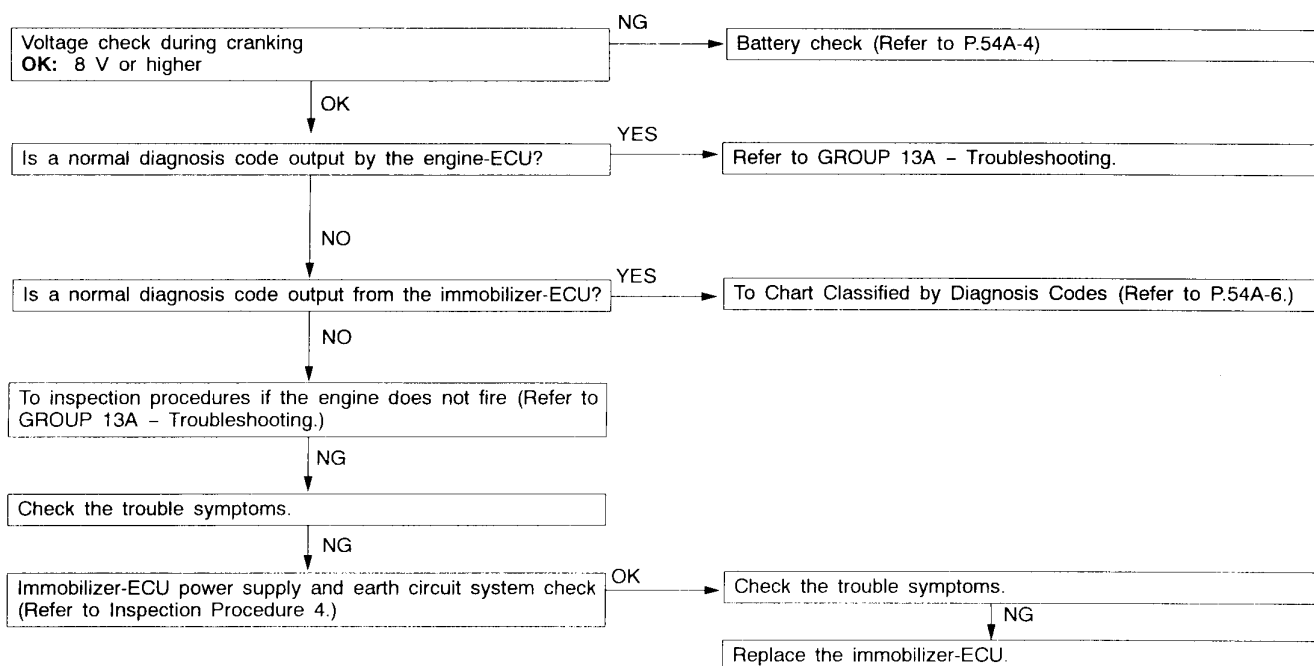
Inspection procedure 2

The ignition keys cannot be registered using the MUT-II.	Probable cause
The ignition key has not been registered with the immobilizer-ECU. Or that there is a problem with the immobilizer-ECU.	• Malfunction of ignition key • Malfunction of harness or connector • Malfunction of immobilizer-ECU



Inspection procedure 3

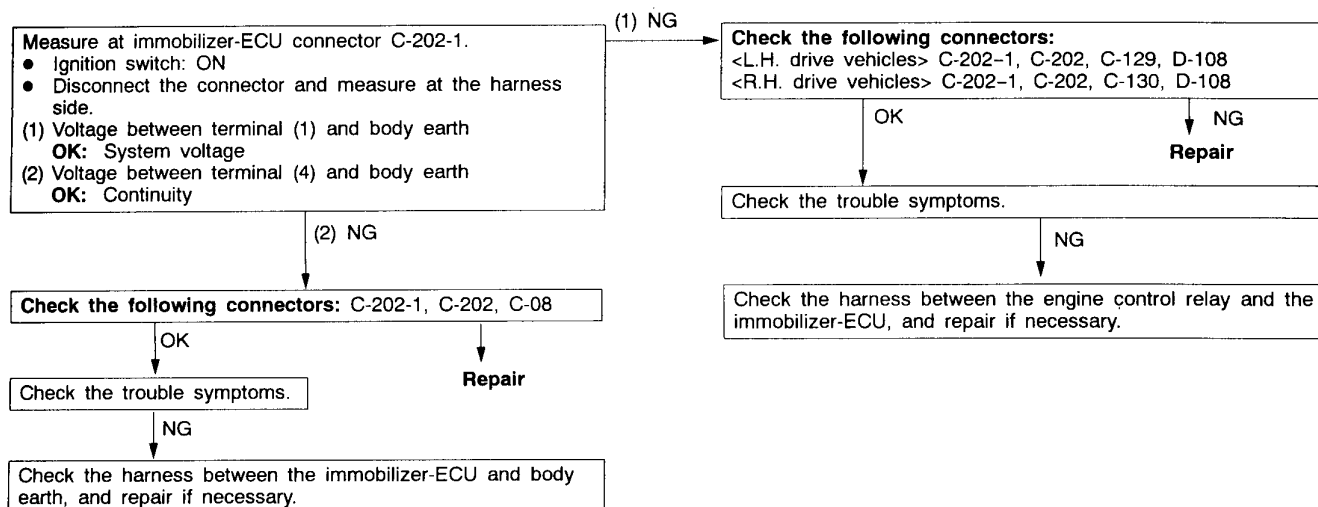
The engine does not start. (The engine cranks but does not fire.)	Probable cause
If the fuel injection does not operate, the cause is probably a problem with the immobilizer-ECU, or it could also be a problem with the MPI system. If an attempt has been made to start the engine with a key that has not been properly registered, the above symptom is a sign of normal operation.	• Malfunction of MPI system. • Malfunction of immobilizer-ECU



54A-10 CHASSIS ELECTRICAL – Ignition Switch and Immobilizer System

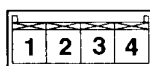
Inspection procedure 4

Immobilizer-ECU power supply and earth circuit system check



IMMOBILIZER-ECU CHECK

TERMINAL VOLTAGE CHECK TABLE

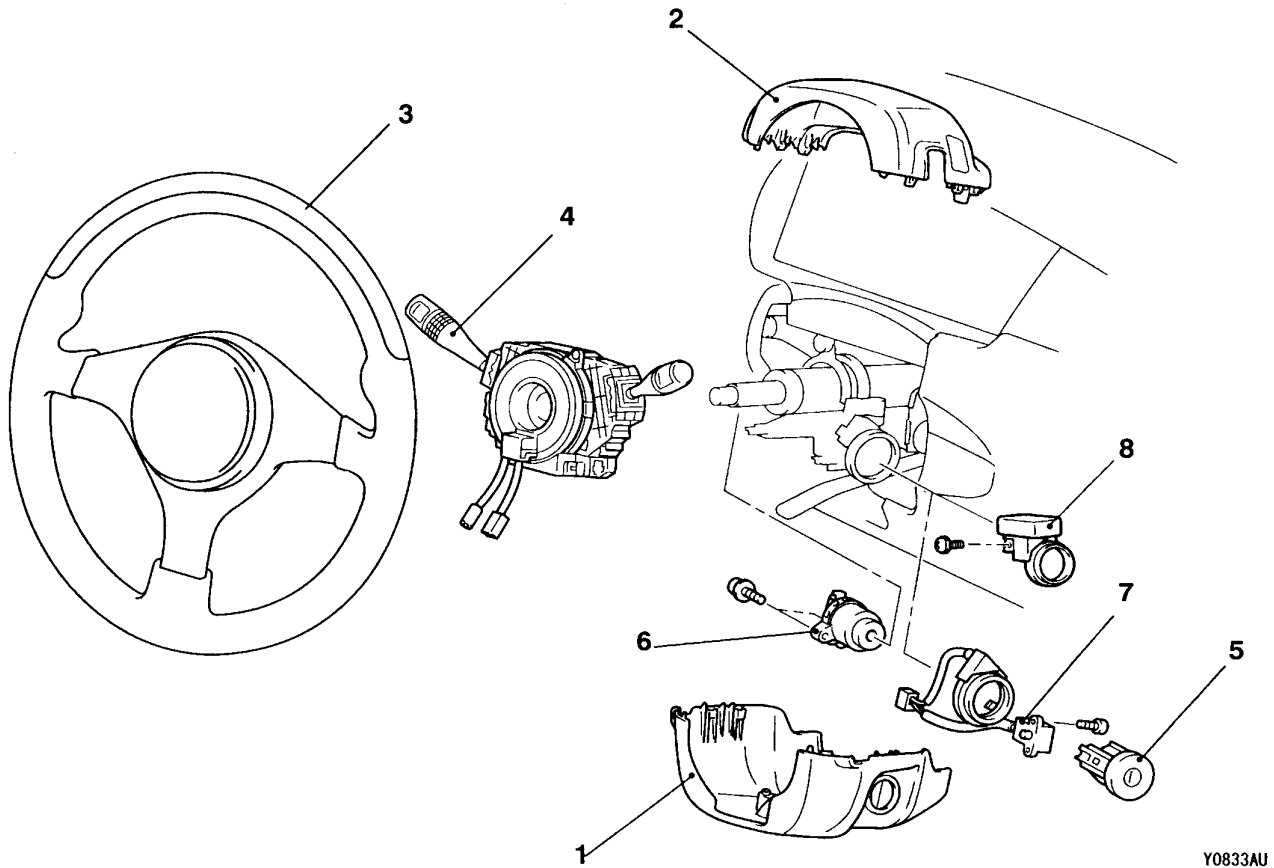


X1185CA

Terminal No.	Signal	Inspection conditions	Terminal voltage
1	Immobilizer-ECU power supply	Ignition switch: ON	System voltage
2	-	-	-
3	Engine-ECU	-	-
4	Immobilizer-ECU earth	At all times	0V

IGNITION SWITCH

REMOVAL AND INSTALLATION

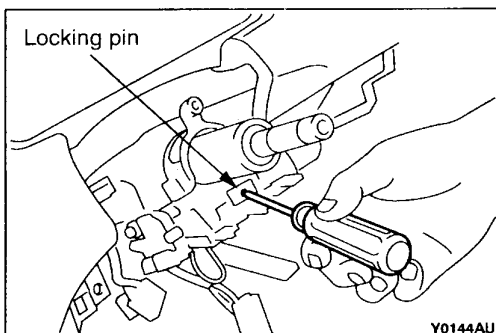


Removal steps

1. Lower column cover (Refer to GROUP 52A – Instrument Panel.)
2. Upper column cover (Refer to GROUP 52A – Instrument Panel.)
3. Steering Wheel (Refer to GROUP 37A.)
4. Clock spring column switch assembly (Refer to GROUP 37A – Steering Shaft.)



5. Steering lock cylinder
6. Ignition switch
7. Key reminder switch
8. Immobilizer-ECU

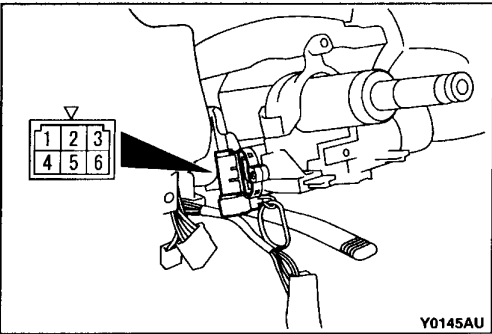


REMOVAL SERVICE POINT

◀▶ STEERING LOCK CYLINDER REMOVAL

1. Insert key into steering lock cylinder to turn ignition key to "ACC" position.
2. Insert locking pin with small plus screwdriver, etc., and remove steering lock cylinder.

54A-12 CHASSIS ELECTRICAL – Ignition Switch and Immobilizer System

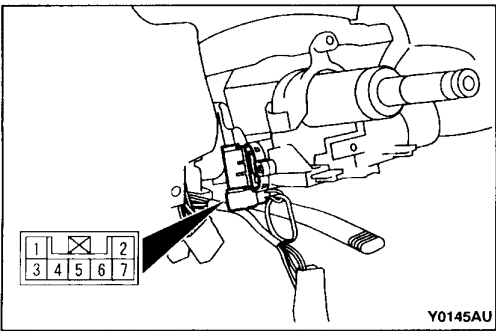


INSPECTION

IGNITION SWITCH CONTINUITY CHECK

With ignition switch installed on the vehicle, disconnect ignition switch connector for inspection.

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



KEY REMINDER SWITCH CONTINUITY CHECK

With key reminder switch installed on the vehicle, disconnect key reminder switch connector for inspection.

Ignition key status	Terminal No.	
	4	6
Remove	○	○
Insert		

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
Immobilizer-ECU	Necessary
Engine-ECU*	Necessary

NOTE

*: If the engine-ECU is replaced, the immobilizer-ECU should be replaced. Each engine-ECU has an individual information for immobilizer-ECU, and the individual information is registered in the immobilizer-ECU.

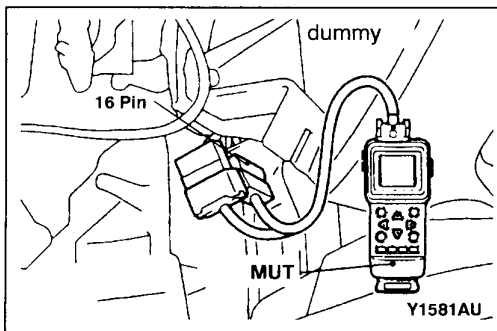
ENCRYPTED CODE REGISTRATION METHOD

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

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

Caution

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



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

Caution

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

2. Check that diagnosis code No. P1160 is not being generated by the each engine-ECU. If it is being generated check according to the Troubleshooting Procedures. (Refer to GROUP 13A – Troubleshooting.)
3. Use the ignition key that is to be registered to turn on the ignition switch.
4. Use the MUT-II to register the encrypted code. If you are registering two or more codes, use the next key to the registered to turn on the ignition switch without disconnecting the MUT-II.
5. Turn off the ignition switch.
6. Check that the engine can be started with each of the ignition keys.
7. Check the diagnosis output from the each engine-ECU, and erase code No. P1160 if it appears. (Refer to GROUP 13A – Troubleshooting.)
8. Disconnect the MUT-II. This completes the registration operation.

COMBINATION METER

Caution

Never remove pointer of combination meter. This may cause damage of combination meter.

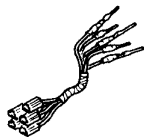
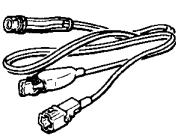
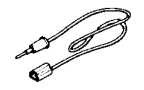
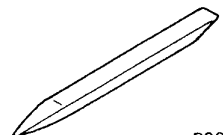
SERVICE SPECIFICATIONS

Item		Standard value	Limit value
Indication range of speedometer km/h	At 40 km/h	37 – 45	—
	At 80 km/h	75 – 88	—
	At 120 km/h	113 – 132	—
	At 160 km/h	150 – 176	—
Deflection of speedometer pointer (Vehicle speed: 35 km/h or more)		—	±3
Indication allowance of tachometer rpm	Engine Speed: 700 rpm	±70	—
	Engine Speed: 2,000 rpm	–100 +150	—
	Engine Speed: 3,000 rpm	–100 +225	—
	Engine Speed: 4,000 rpm	–125 +275	—
	Engine Speed: 5,000 rpm	–125 +325	—
	Engine Speed: 6,000 rpm	–125 +375	—
	Engine Speed: 7,000 rpm	–100 +400	—
	Engine Speed: 8,000 rpm	+400	—
Basic resistance of fuel gauge unit Main (SUB) Ω	Position F	2 ± 1 (2 ± 1)	—
	Position E	41 ± 1 (69 ± 1)	—
Float height of fuel gauge unit Main (SUB) mm	Position F	33.3 (10.7)	—
	Position E	121.9 (138.6)	—
Basic resistance of water temperature gauge unit Ω	70°C	104 ± 13.5	—
Internal resistance of combination meter Ω	Terminal No. 1 - 50	233 ± 3	—
	Terminal No. 1 - 51	181 ± 2	—

SEALANT

Item	Specified sealant	Remark
Water temperature gauge unit	3M ATD Part No.1215 or equivalent	Semi-drying sealant

SPECIAL TOOLS

Tools	Number	Name	Use
A  B  C  D  C991223	MB991223 A: MB991219 B: MB991220 C: MB991221 D: MB991222	Harness set A: Inspection harness B: LED Harness C: LED Harness Adapter D: Probe	Brief test for fuel gauge and water temperature gauge A: For inspection of connector pin contact pressure B: For inspection of power circuit C: For inspection of power circuit D: For connecting commercially available tester
 B990784	MB990784	Ornament remover	Meter bezel removal

TROUBLESHOOTING

DIAGNOSIS FUNCTION

INPUT SIGNAL INSPECTION PROCEDURE

Connect MUT-II or voltmeter to diagnostic connector to perform input inspection. (Refer to GROUP 00 – How to Use Troubleshooting and Inspection Procedure.)

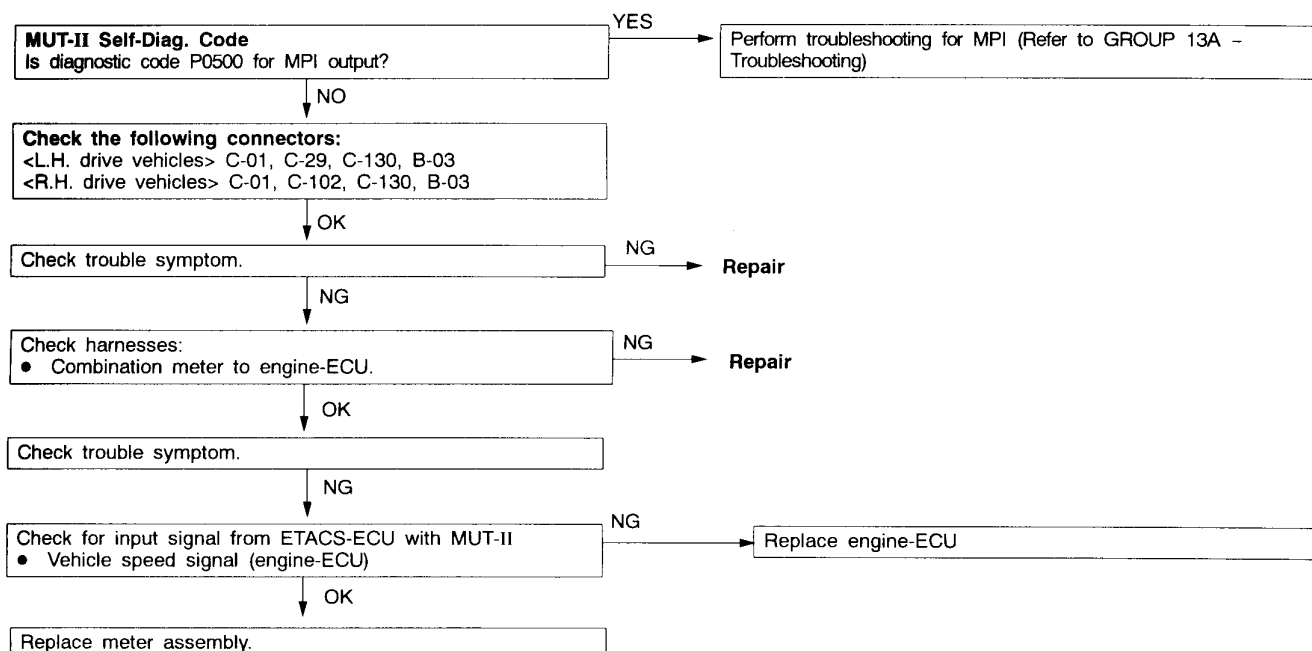
INSPECTION CHART FOR DIAGNOSIS CODES

Trouble symptom	Inspection procedure No.	Reference page
Speedometer inoperative (other meters are operated)	1	54A-16
Tachometer inoperative (other meters are operated)	2	54A-16
Fuel gauge inoperative (other meters are operated)	3	54A-17
Water temperature gauge inoperative (other meters are operated)	4	54A-18
All meters inoperative	5	54A-19

INSPECTION PROCEDURE FOR TROUBLE SYMPTOMS

Inspection procedure 1

Speedometer inoperative (other meters are operated)	Probable cause
Failure may occur on engine-ECU system, harnesses, connectors, meter assembly.	• Engine-ECU fault • Harness or connector fault • Meter assembly fault



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.

Inspection procedure 2

Tachometer inoperative (other meters are operated)	Probable cause
No input of ignition signal from engine, or failure may occur on power and earth circuits of meter.	• Harness or connector fault • Meter assembly fault

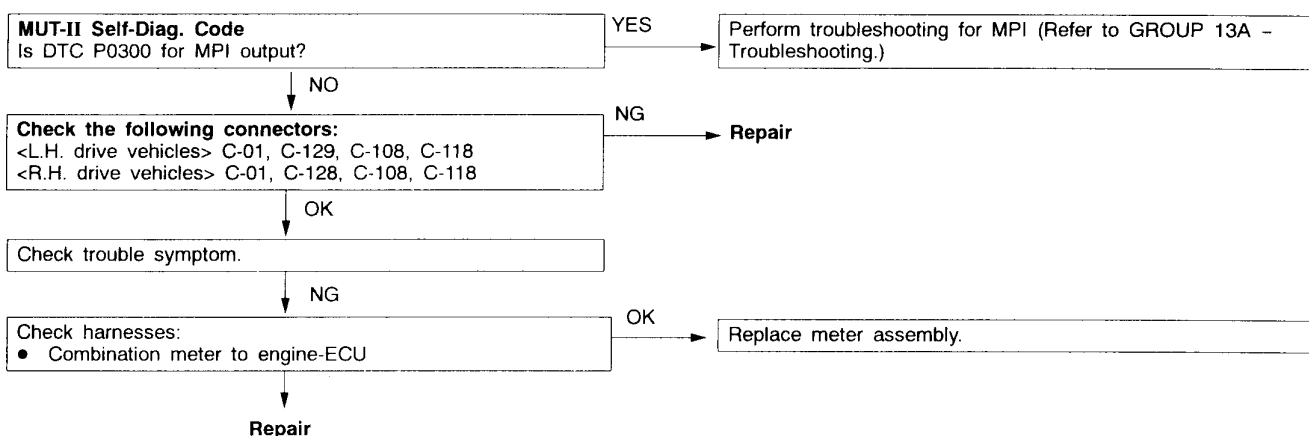


Fig. 2

MB991219

Fuel gauge

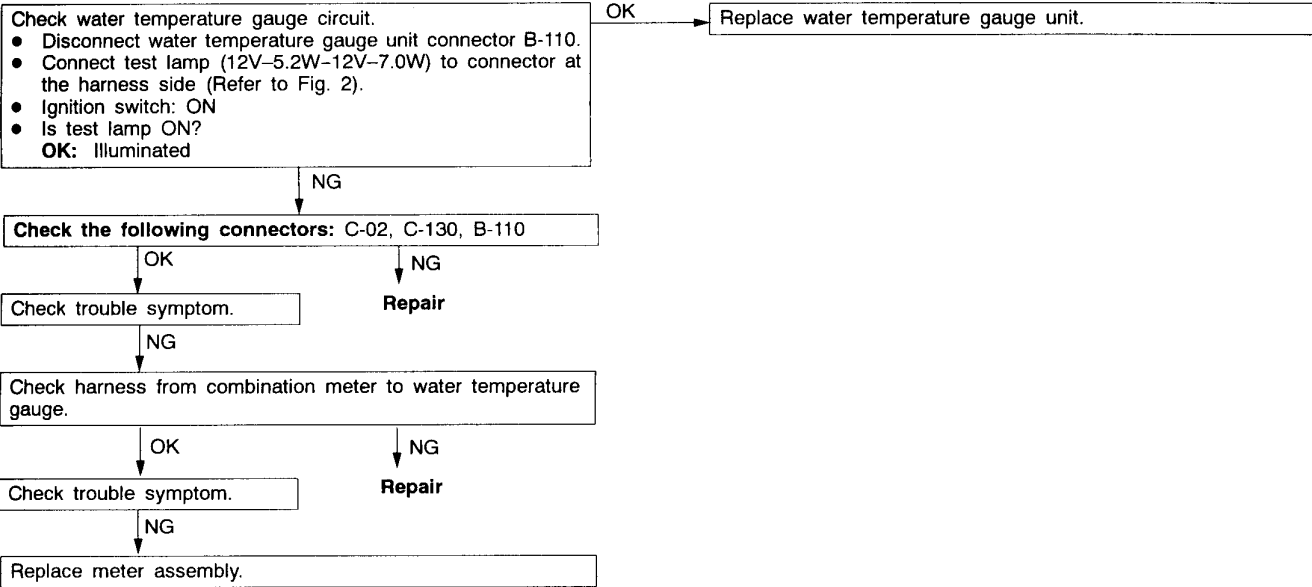
Test lamp (12V-3.4W)

Earth

A10119AU

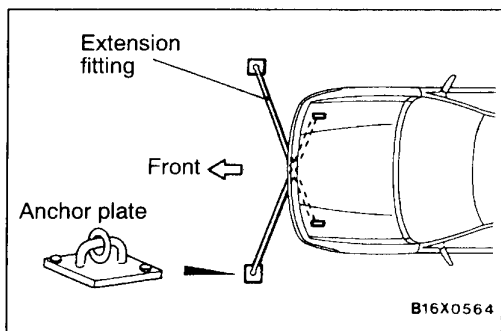
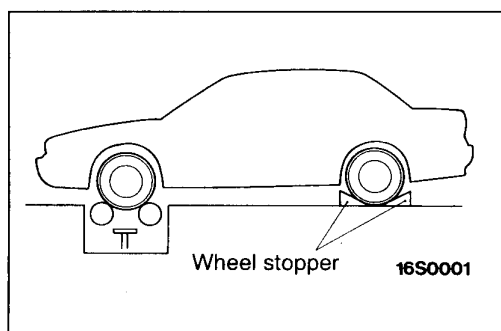
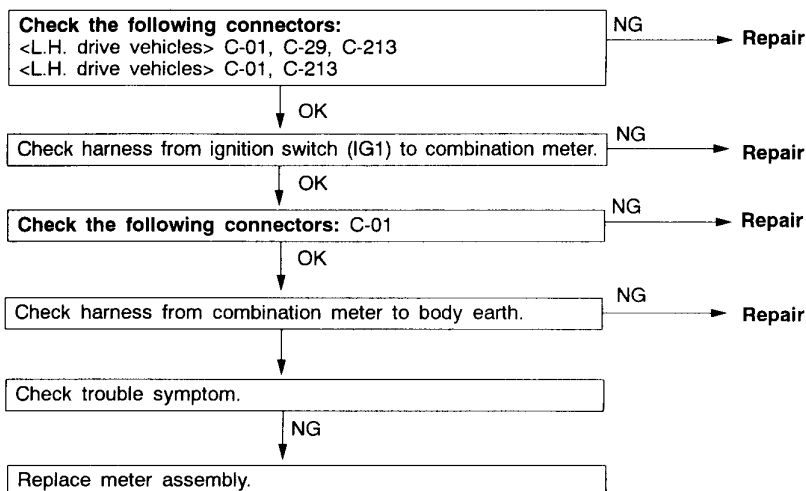
Inspection procedure 4

Water temperature gauge inoperative (other meters are operated)	Probable cause
When speedometer and tachometer are properly operated, harness from power source to combination meter is normal.	• Water temperature gauge unit fault • Harness or connector fault • Meter assembly fault



Inspection procedure 5

All meters inoperative	Probable cause
When individual indicators and warning lamps are properly operated, harness from power source (IG1) to combination meter is normal.	• Meter assembly fault • Harness or connector fault



ON-VEHICLE SERVICE

SPEEDOMETER CHECK

- (1) Ensure that tire pressure indicates the value of tire pressure label.
- (2) Place the vehicle on speedometer tester.
- (3) Place stoppers at rear wheels, and properly engage parking brake.
- (4) For prevention of front wheel lateral runout, install extension fittings on front towing eye and tie down hook, and install both ends on anchor plate.
- (5) For prevention of vehicle from starting out, install chain or wire (the other end of which is tightly fixed on rear towing eye) on the vehicle.
- (6) Ensure that speedometer indication range is within standard value, or pointer deflection is within limit value.

Caution

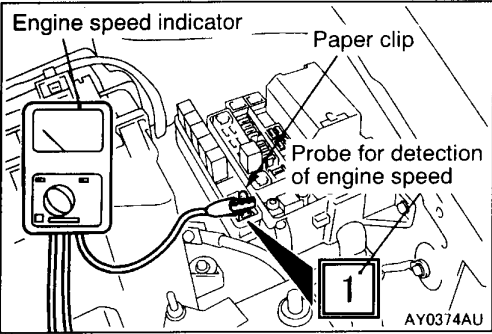
During operation, avoid excessive acceleration and deceleration.

Standard value:

Vehicle speed km/h	40	80	120	160
Indication range of speedometer km/h	37 – 45	75 – 88	113 – 132	150 – 176

Limit:**Pointer deflection**

(vehicle speed: 35 km/h or more): ± 3 km/h

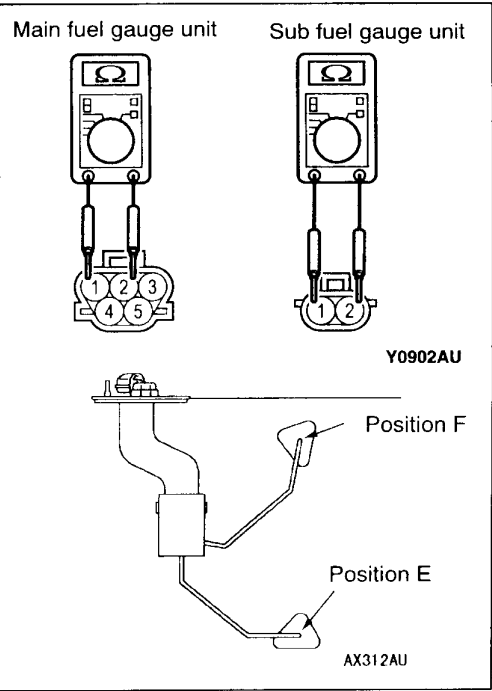


TACHOMETER CHECK

1. Insert paper clip (Zem clip) from harness side of the probe for detection of engine speed to connect engine speed indicator.
2. Compare measured values of individual engine speed with tachometer values, and ensure that indication allowance is within standard value.

Standard value:

Engine speed (rpm)	Indication allowance of tachometer rpm
700	±70
2,000	-100 +150
3,000	-100 +225
4,000	-125 +275
5,000	-125 +325
6,000	-125 +375
7,000	-100 +400
8,000	+400



FUEL GAUGE UNIT CHECK

Remove fuel gauge unit from fuel tank.

BASIC RESISTANCE OF FUEL GAUGE UNIT

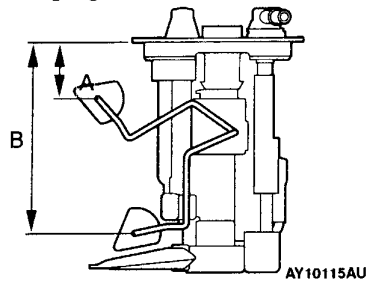
1. When float of fuel gauge unit is in Position F and E, ensure that resistance between fuel gauge unit terminal and earth terminal is within standard value.

Standard Value:

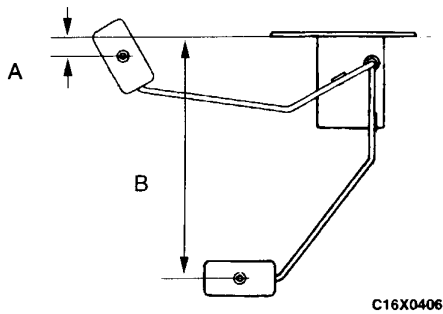
Float Position	Main fuel gauge unit	Sub fuel gauge unit
Position F	$2 \pm 1 \Omega$	$2 \pm 1 \Omega$
Position E	$41 \pm 1 \Omega$	$69 \pm 1 \Omega$

2. When float is moved slowly between Position F and E, also ensure that resistance is smoothly changing.

Main fuel gauge unit



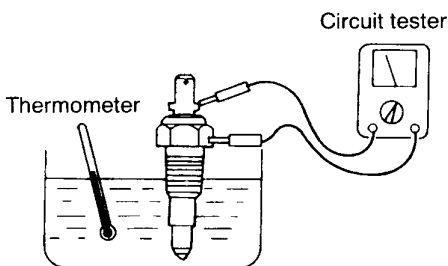
Sub fuel gauge unit

**FLOAT HEIGHT OF FUEL GAUGE UNIT**

When float is moved to contact float arm on stopper, ensure that Position F (A) and E (B) are within standard value.

Standard Value:

Float Position	Main fuel gauge unit	Sub fuel gauge unit
Position F (A)	33.3 mm	10.7 mm
Position E (B)	121.9 mm	138.6 mm



04W590

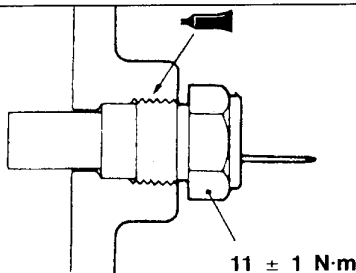
ENGINE COOLANT TEMPERATURE GAUGE UNIT CHECK

1. Drain coolant. (Refer to GROUP 14 – On-vehicle Service)
2. Remove water temperature gauge unit.
3. Put water temperature gauge unit into the hot water in specified temperature, and ensure that basic resistance is within standard value.

Standard value: 70°C 104 ± 13.5 Ω

Reference value:

Temperature	Resistance Ω
50°C	230
60°C	155
80°C	73



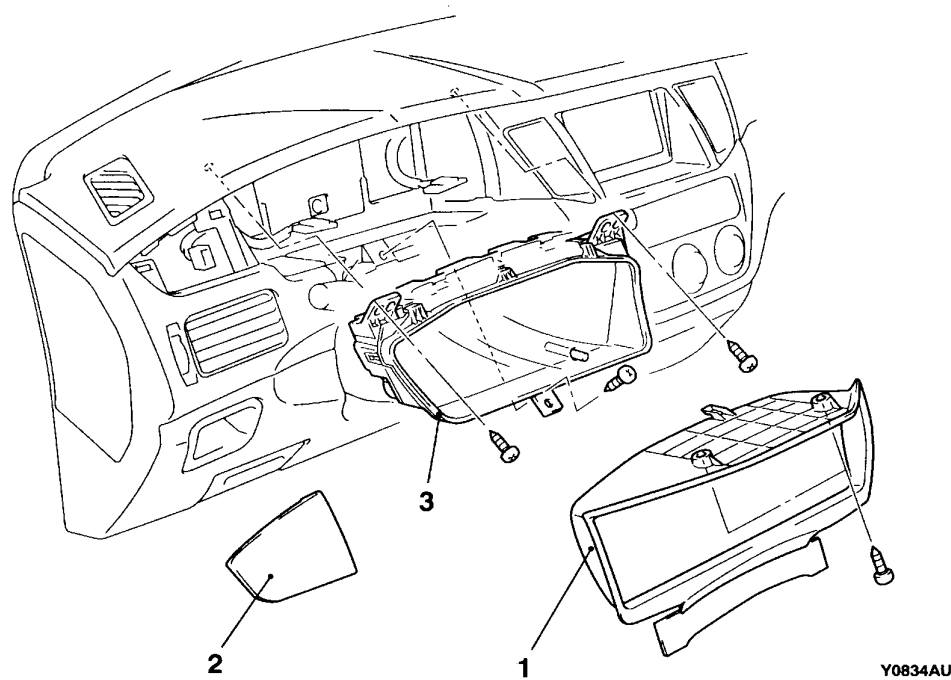
A1C0010

4. After inspection, apply specified sealant at threads of water temperature gauge unit, and tighten to the specified torque.

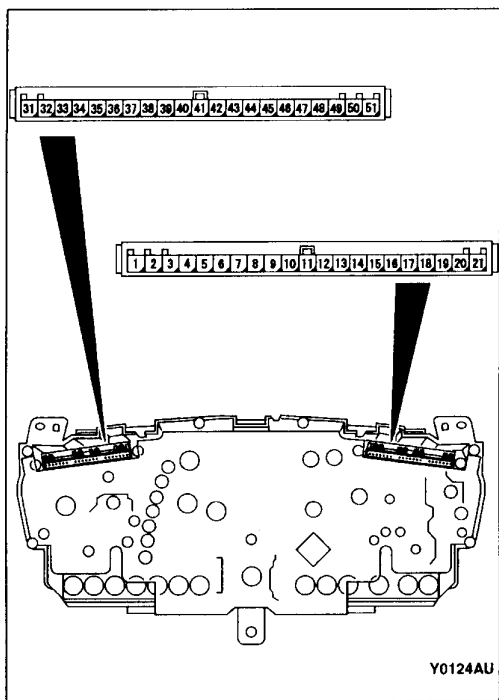
Semi-drying sealant: 3M ATD Part No.1215 or equivalent

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

COMBINATION METER
REMOVAL AND INSTALLATION



- Removal steps**
- 1. Meter bezel
 - 2. Instrument panel ornament
 - 3. Combination meter

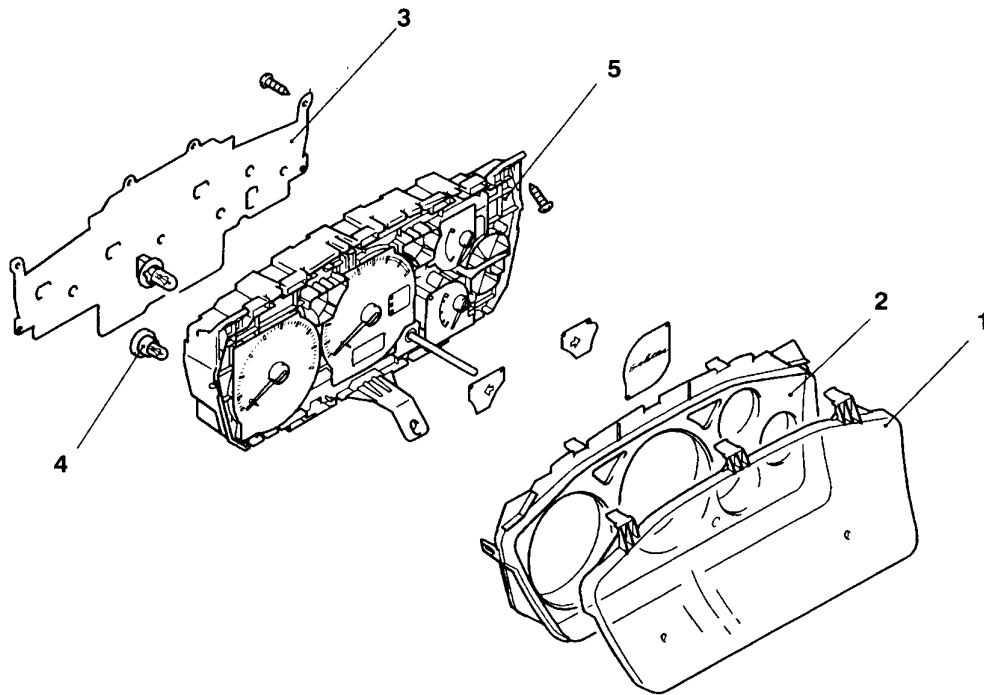


INSPECTION
COMBINATION METER INTERNAL RESISTANCE CHECK

Use circuit tester to measure combination meter internal resistance.

Standard Value:

Measuring terminal No.	Terminal name	Standard value Ω
1-50	Water temperature gauge to earth	233 ± 3
1-51	Fuel gauge to earth	181 ± 2

DISASSEMBLY AND REASSEMBLY

AY2106AU

Disassembly step

1. Glass
2. Window plate
3. Circuit board cover

4. Bulb
5. Meter assembly

HEADLAMP ASSEMBLY

SERVICE SPECIFICATIONS

Item			Standard value	Limit
Headlamp aiming	Low beam	Vertical direction	120mm (0.69°) below horizontal line (H)	± 0.29°
		Horizontal direction	Position at which the startup point of 15° is crossed with vertical line (V)	± 0.5°
	High beam	Vertical direction	The center of high intensity zone is on the point of intersection of line (H) and line (V).	– 0.5° of the point of intersection of line (H)
		Horizontal direction	The center of high intensity zone is on the point of intersection of line (V).	± 0.5° of the center of line (V)
Measurement of headlamp illuminous intensity (at high beam)			–	30,000 cd or more per one headlamp

NOTES ON HEADLAMP ASSEMBLY:

Plastic outer lens are equipped with headlamp assembly. For handling, care should be taken for the following items:

- Headlamps should not be illuminated for more than 3 minutes with scratch preventive protectors, etc. covered on them.
- Masking such as taping should not be attached on outer lens.
- Outer lens surface should not be rubbed with a sharp-edged tool, etc.
- Specified wax remover should be used for insistently washing.
- Authorized Mitsubishi Genuine bulbs should be used.

TROUBLESHOOTING

Headlamps are controlled smart wiring system (SWS). For troubleshooting, refer to GROUP 54B.

NOTE

When ETACS-ECU is defective, headlamps can be illuminated only in a low beam mode as fail-safe function.

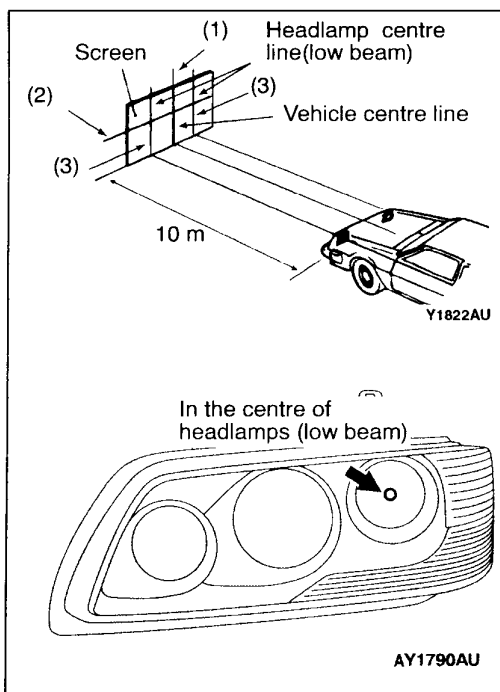
ON-VEHICLE SERVICE

HEADLAMP AIMING

PRE-AIMING INSTRUCTION

1. Inspect for badly rusted or faulty headlamp assemblies.
2. These conditions must be corrected before a satisfactory adjustment can be made.
3. Inspect tyres inflation, and adjust if necessary.

4. If the fuel tank is not full, place a weight in luggage room of vehicle to simulate weight of a full tank 0.8 kg per litre.
5. There should be no other load in the vehicle other than driver or substituted weight of approximately 75 kg placed in driver's position.
6. Thoroughly clean headlamp lenses.
7. Place the vehicle on a level floor, perpendicular to a flat screen 10m away from the bulb center-marks on the headlamp lens.
8. Rock vehicle sideways to allow vehicle to assume its normal position.
9. Bounce the front suspension through three (3) oscillations by applying the body weight to hood or bumper.

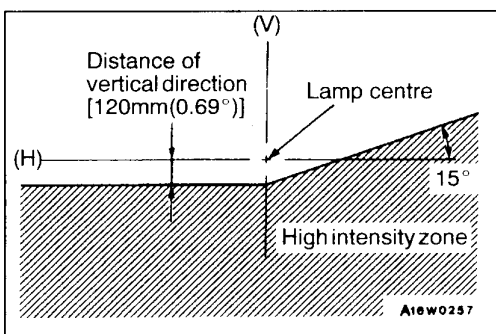


HEADLAMP ADJUSTMENT

<USING A SCREEN>

Low Beam Adjustment

1. Four lines of adhesive tape (or equivalent markings) are required on screen or wall:
 - (1) Position a vertical tape or mark so that it is aligned with the vehicle centre line.
 - (2) Measure the distance from the centre-marks on the low beam headlamp lens to the floor. Transfer the measurement to the screen. Horizontal tape or mark on the screen is for reference of vertical adjustment.
 - (3) Measure the distance from the centre line of the vehicle to the centre of each low beam headlamp. Transfer the measurement to the screen. Vertical tape or mark on the screen with reference to the centre line of each low beam headlamp bulb.



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

Standard value:

(Vertical direction)

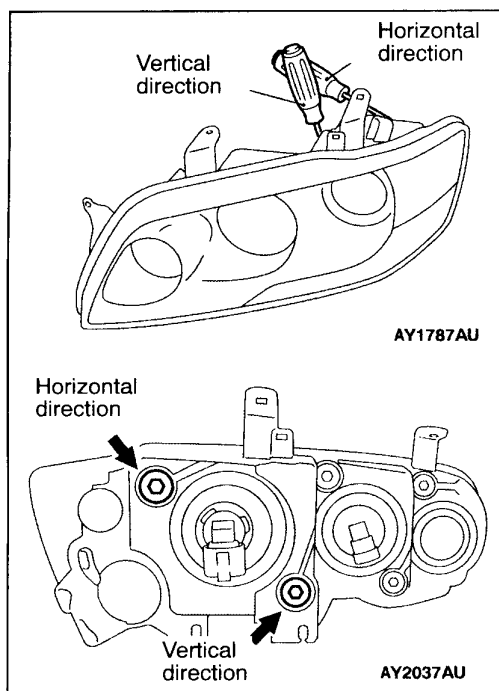
120 mm (0.69°) below horizontal line (H)

(Horizontal direction)

Position at which the startup point of 15° is crossed with vertical line (V)

Limit:(Vertical direction) $\pm 0.29^\circ$ (Horizontal direction) $\pm 0.5^\circ$ **NOTE**

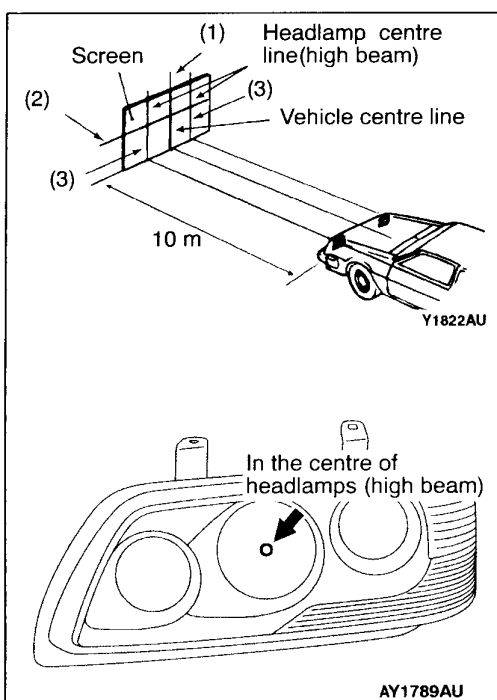
The illustration shows L.H. drive vehicles. For R.H. drive vehicles, it is symmetrical.



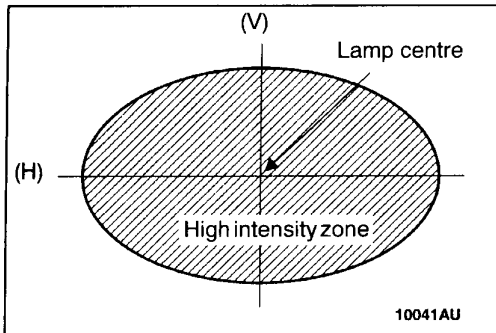
3. Alternately turn the adjusting screw to adjust the headlamp low beam aiming.

Caution

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

**High Beam Adjustment**

- Four lines of adhesive tape (or equivalent markings) are required on screen or wall:
 - (1) Position a vertical tape or mark so that it is aligned with the vehicle centre line.
 - (2) Measure the distance from the centre-marks on the high beam headlamp lens to the floor. Transfer the measurement to the screen. Horizontal tape or mark on the screen is for reference of vertical adjustment.
 - (3) Measure the distance from the centre line of the vehicle to the centre of each high beam headlamp. Transfer the measurement to the screen. Vertical tape or mark on the screen with reference to the centre line of each high beam headlamp bulb.



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

Standard value:

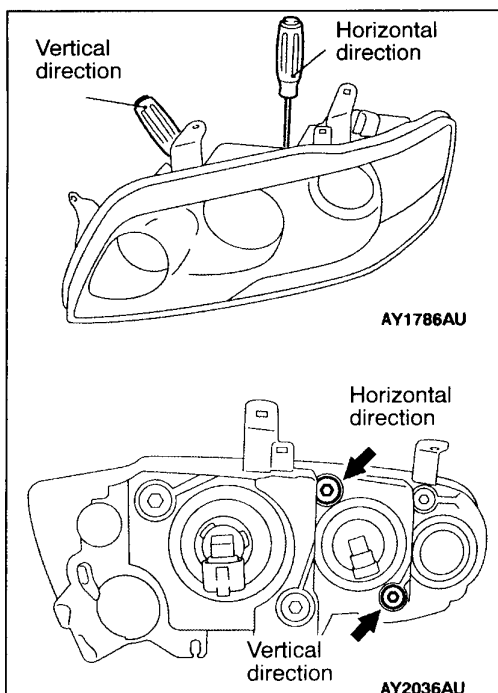
(Vertical and horizontal direction)

The center of high intensity zone is on the point of intersection of line (H) and line (V).

Limit:

(Vertical direction) -0.5° of the point of intersection of line (H)

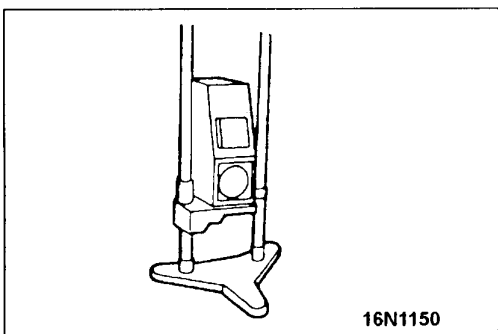
(Horizontal direction) $\pm 0.5^\circ$ of the center of line (V)



3. Alternately turn the adjusting screw to adjust the headlamp high beam aiming.

Caution

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



<USING A BEAM SETTING EQUIPMENT>

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

NOTE

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

2. Alternately turn the adjusting screw to adjust the headlamp aiming. (Refer to P.54A-24.)

HEADLAMP INTENSITY MEASUREMENT

1. Using a photometer, and following its manufacture's instruction manual.
2. Maintain an engine speed of 2,000 r/min., with the battery in the charging condition
3. Set the headlamps to high beam
4. Measure the headlamp centre intensity (a point of H line and V line) and check to be sure that the limit value is satisfied.

Limit:

High beam 30,000 cd or more per one headlamp

NOTE

1. There may be special local regulations pertaining to headlamp intensity, be sure to make any adjustments necessary to satisfy such regulations.
2. If an illuminometer is used to make the measurements, convert its values to photometer values by using the following formula.

$I = E r^2$ Where:

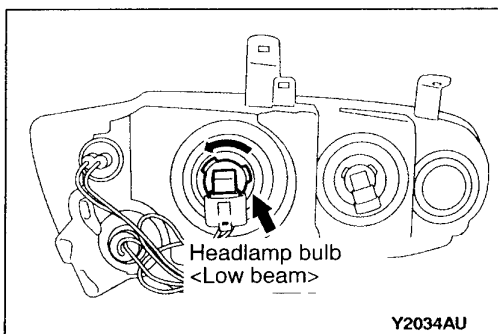
I=intensity (cd)

E=illumination (lux)

r=distance (m) from headlamps to illuminometer

Caution

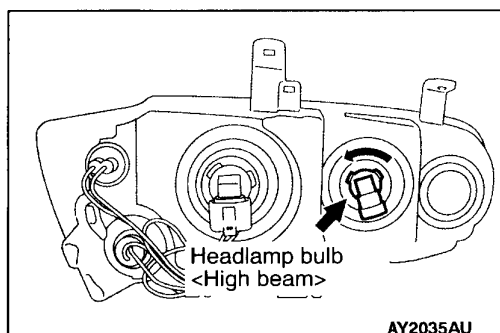
1. On the headlamp not yet adjusted, perform aiming with connector removed and the lamps switched off, if applicable. In addition, care should be taken to prevent a change of optical axis when connector is reconnected.
2. Plastic outer lens are equipped with headlamps. When lens surface is covered with materials for not penetrating light, headlamp operation time should be within 3 minutes. In addition, masking such as taping should not be performed.

**HEADLAMP BULB (LOW BEAM) REPLACEMENT**

- (1) Disconnect battery.
- (2) Disconnect connector.
- (3) Screw out socket to pull out bulb.
- (4) After bulb is replaced, properly reconnect connector.

Caution

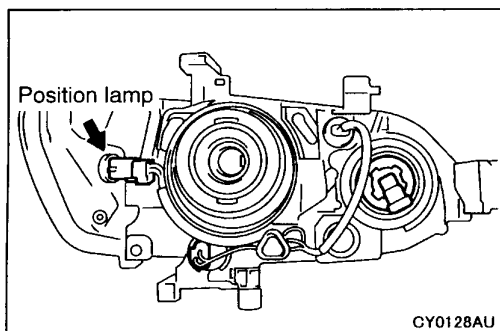
Do not touch bulb surface bare-handed or with dirty gloves. If dirt is attached on glass surface of the bulb, immediately use alcohol or thinner to remove dirt, and install the bulb after well dried.

**HEADLAMP BULB (HIGH BEAM) REPLACEMENT**

- (1) Disconnect battery.
- (2) Disconnect connector.
- (3) Screw out socket to pull out bulb.
- (4) After bulb is replaced, properly reconnect connector.

Caution

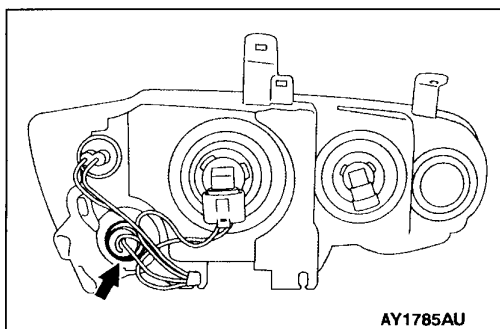
Do not touch bulb surface bare-handed or with dirty gloves. If dirt is attached on glass surface of the bulb, immediately use alcohol or thinner to remove dirt, and install the bulb after well dried.

**POSITION LAMP BULB REPLACEMENT**

1. Remove the splash shield.
2. Disconnect the connector and remove the socket of the position lamp by turning to left.

Caution

Do not touch bulb surface bare-handed or with dirty gloves. If dirt is attached on glass surface of the bulb, immediately use alcohol or thinner to remove dirt, and install the bulb after well dried.

**FRONT TURN-SIGNAL LAMP BULB REPLACEMENT**

1. Remove the splash shield.
2. Disconnect the connector and remove the socket of the front turn signal lamp by turning to left.

Caution

Do not touch bulb surface bare-handed or with dirty gloves. If dirt is attached on glass surface of the bulb, immediately use alcohol or thinner to remove dirt, and install the bulb after well dried.

HEADLAMP AUTO CUT ADJUSTMENT PROCEDURE

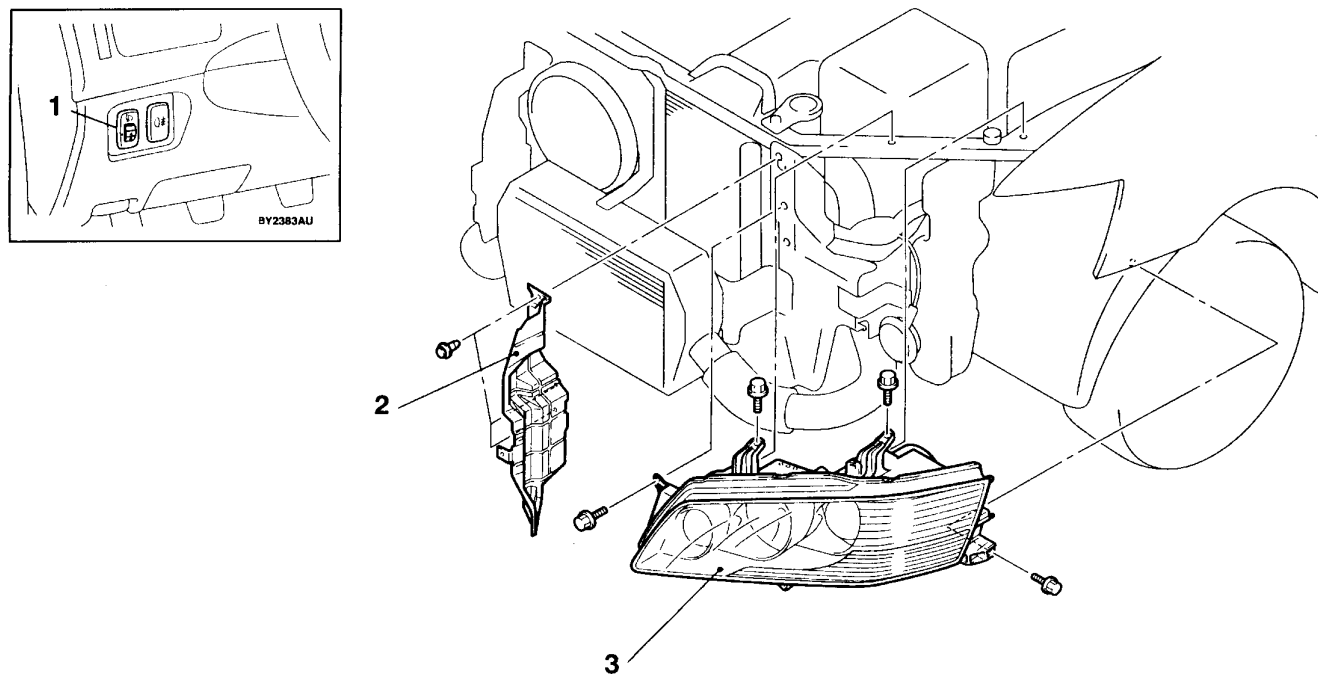
Headlamps are controlled smart wiring system (SWS). For adjustment procedure of headlamp auto lamp and headlamp auto cut, refer to GROUP 54B.

HEADLAMP AUTO CUT FUNCTION CHECK

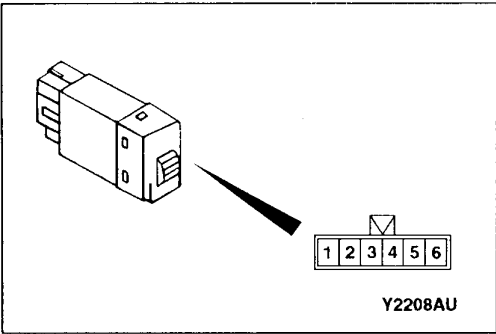
When lighting switch is turned ON (to HEAD position) with ignition switch removed from ignition key cylinder and driver's door is opened, ensure that headlamps are switched off after one second. When headlamps are inoperative, perform troubleshooting. (Refer to GROUP 54B.)

HEADLAMP ASSEMBLY

REMOVAL AND INSTALLATION



1. Headlamp leveling switch
2. Air guide panel
3. Headlamp assembly
- Headlamp removal steps**
- Front bumper (Refer to GROUP 51)



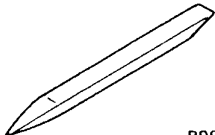
INSPECTION

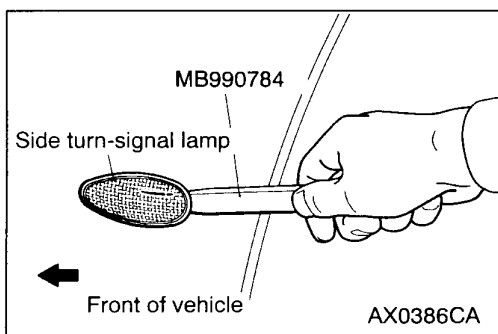
HEADLAMP LEVELING SWITCH CONTINUITY CHECK

Switch Position	Resistance between the terminal 4 and 5 (Ω)
0	120
1	300
2	620
3	1.1 k
4	2 k

SIDE TURN-SIGNAL LAMP

SPECIAL TOOL

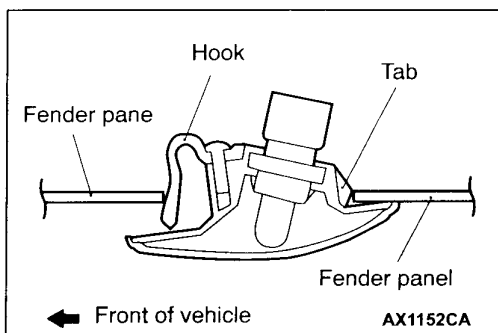
Tools	Number	Name	Use
 B990784	MB990784	Ornament remover	Side turn-signal lamp removal



SIDE TURN-SIGNAL LAMP

REMOVAL SERVICE POINT

Use special tool, etc. to press and deflect hook to vehicle front from fender, and unhook the pawls to remove side turn-signal lamp.



INSTALLATION SERVICE POINT

Insert pawls into fender panel and install side turn-signal lamp.

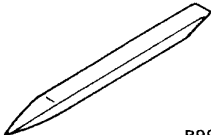
ROOM LAMP

TROUBLESHOOTING

For troubleshooting of room lamp, refer to GROUP 54B.

REAR COMBINATION LAMP

SPECIAL TOOL

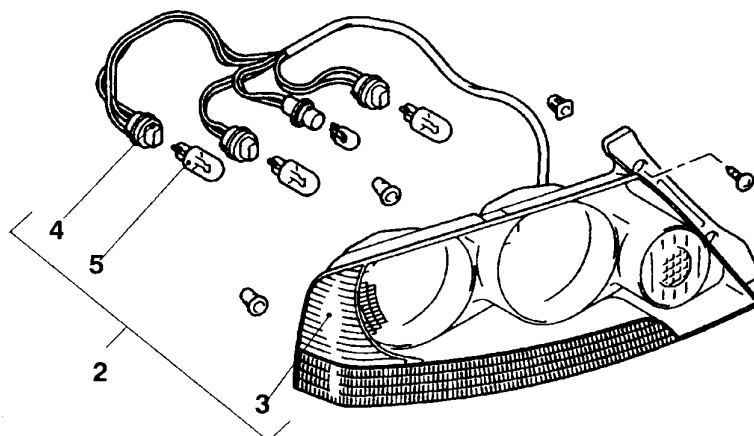
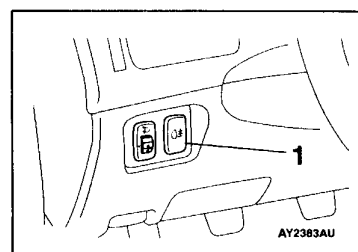
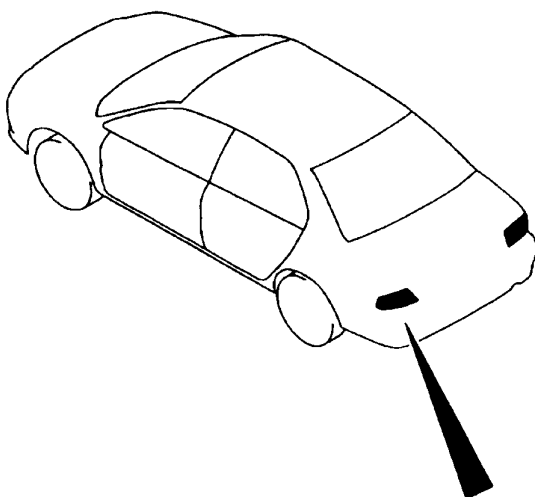
Tool	Number	Name	Use
 B990784	MB990784	Ornament remover	Rear combination lamp removal

TROUBLESHOOTING

For troubleshooting on rear combination lamps, refer to GROUP 54B.

REAR COMBINATION LAMP

REMOVAL AND INSTALLATION



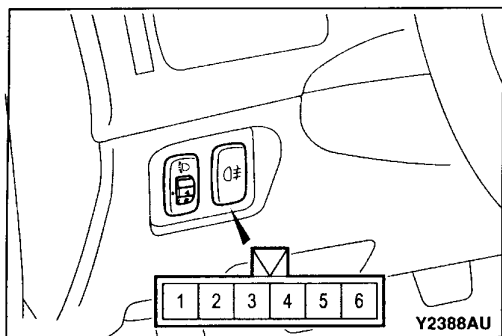
AY2156AU

1. Rear fog lamp switch

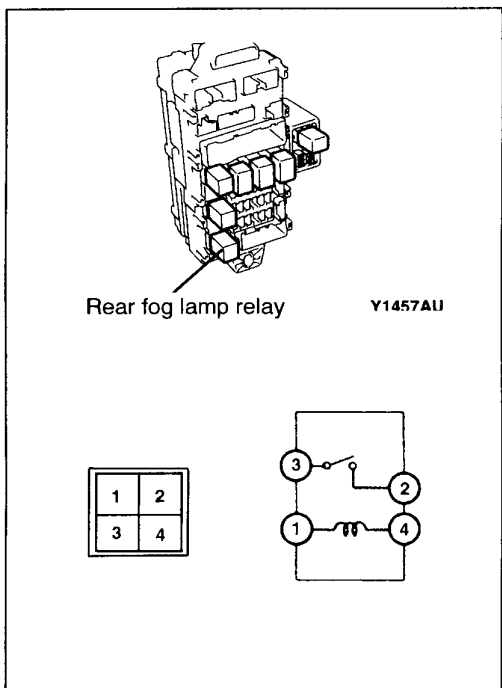
Removal steps

2. Rear combination lamp assembly
3. Rear combination lamp body

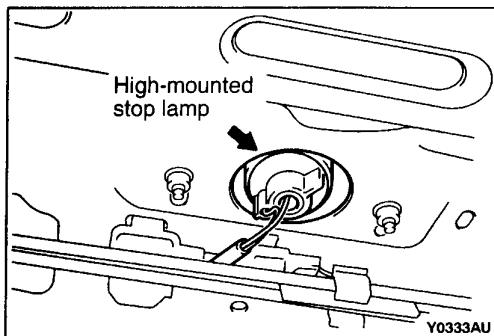
4. Socket assembly
5. Bulb

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

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

**REAR FOG LAMP RELAY CONTINUITY CHECK**

Battery Voltage	Terminal No.			
	1	4	2	3
De-energized	○	○		
Energized	+	-	○	○



HIGH-MOUNTED STOP LAMP

ON-VEHICLE SERVICE

HIGH-MOUNTED STOP LAMP BULB REPLACEMENT

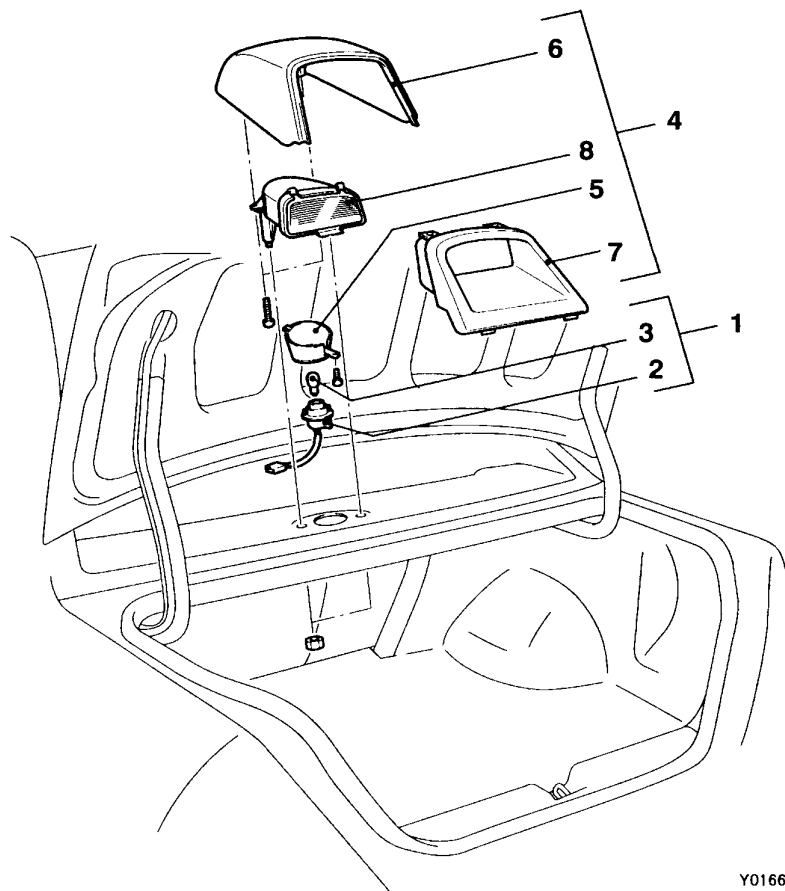
Remove socket from trunk compartment, and replace bulb.

Caution

Do not touch bulb surface bare-handed or with dirty gloves. If dirt is attached on glass surface of the bulb, immediately use alcohol or thinner to remove dirt, and install the bulb after well dried.

HIGH-MOUNTED STOP LAMP

REMOVAL AND INSTALLATION

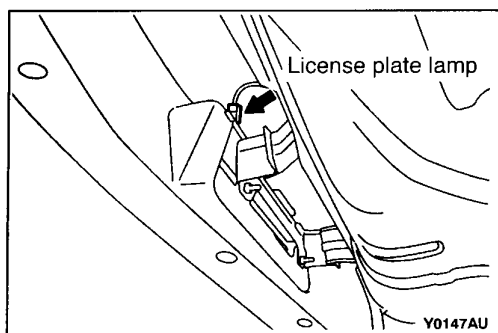


Y0166AU

Removal steps

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

5. Socket holder
6. High-mounted stop lamp cover (front)
7. High-mounted stop lamp cover (rear)
8. High-mounted stop lamp body



LICENSE PLATE LAMP

ON-VEHICLE SERVICE

LICENSE PLATE LAMP REPLACEMENT

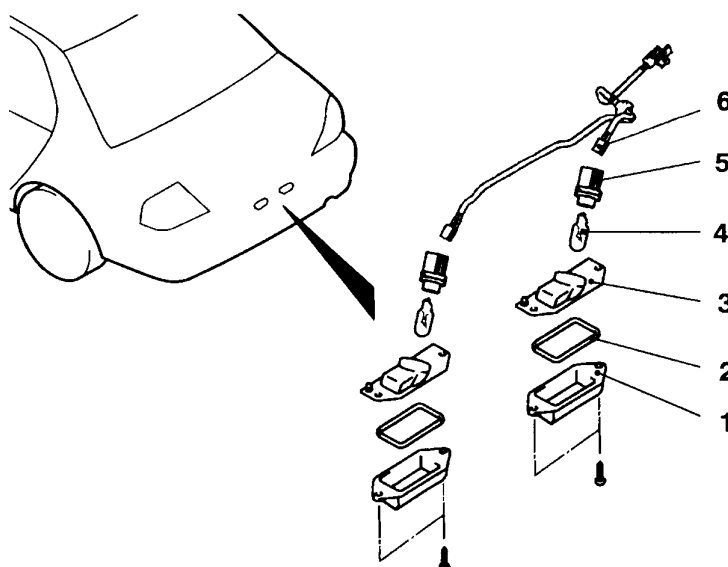
Remove socket between rear bumper and body, and remove bulb.

Caution

Do not touch bulb surface bare-handed or with dirty gloves. If dirt is attached on glass surface of the bulb, immediately use alcohol or thinner to remove dirt, and install the bulb after well dried.

LICENSE PLATE LAMP

REMOVAL AND INSTALLATION



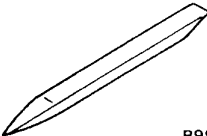
X0261AU

Removal steps

1. License plate lamp lens
2. Packing
3. License plate lamp body
4. Bulb
5. Socket
6. Harness

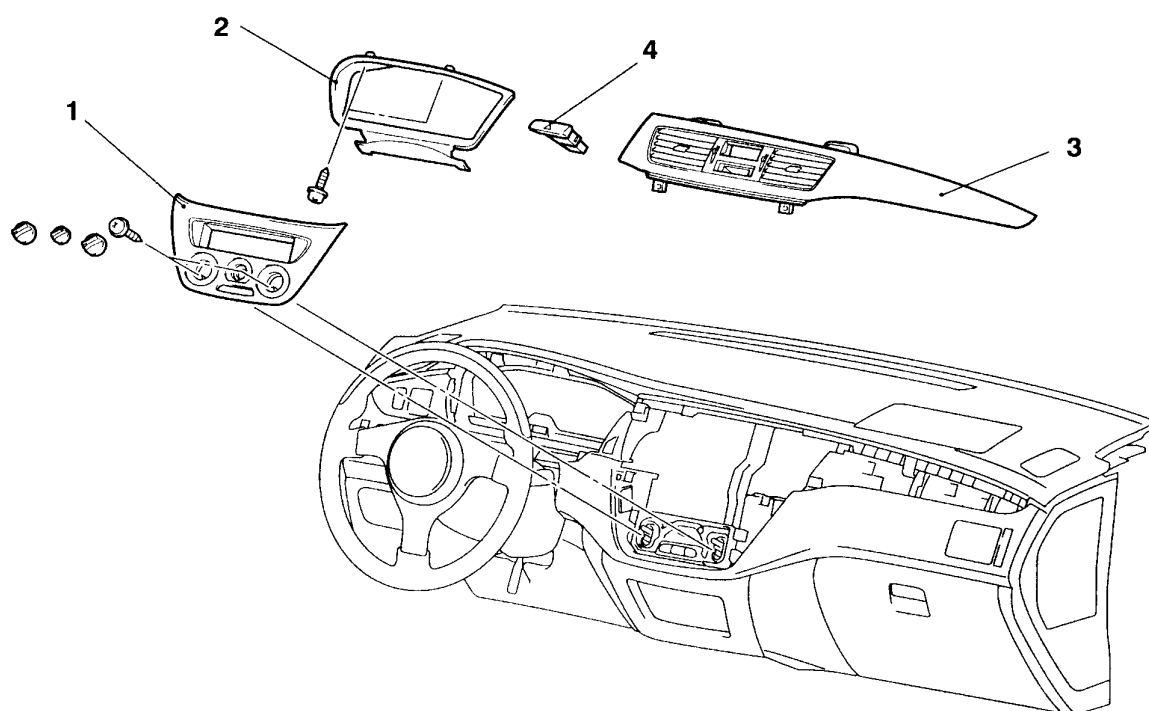
HAZARD WARNING LAMP SWITCH

SPECIAL TOOL

Tool	Number	Name	Use
 B990784	MB990784	Ornament remover	Center panel assembly removal

HAZARD WARNING LAMP SWITCH

REMOVAL AND INSTALLATION

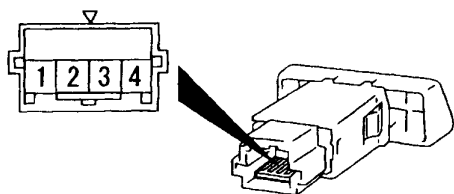


AY2381AU

Removal steps

1. Center panel assembly (Refer to GROUP 52A – Instrument Panel.)
2. Meter bezel (Refer to P.54A-22.)
3. Center air outlet panel (Refer to GROUP 52A – Instrument Panel.)
4. Hazard warning lamp switch

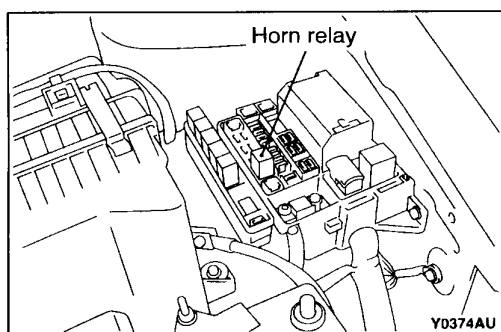
<Except Japan-spec. models>



INSPECTION

HAZARD WARNING LAMP SWITCH CONTINUITY CHECK

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

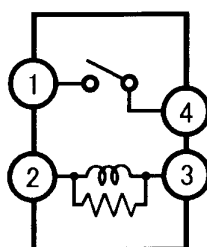
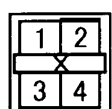


HORN

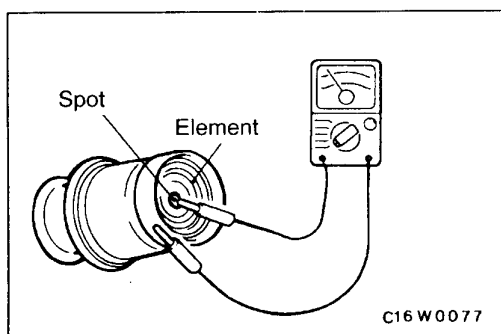
INSPECTION

HORN RELAY CONTINUITY CHECK

Switch Position	Terminal No.			
	1	4	3	2
De-energized			○	○
Energized	○	○	+	-



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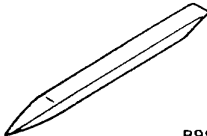
CIGARETTE LIGHTER

INSPECTION

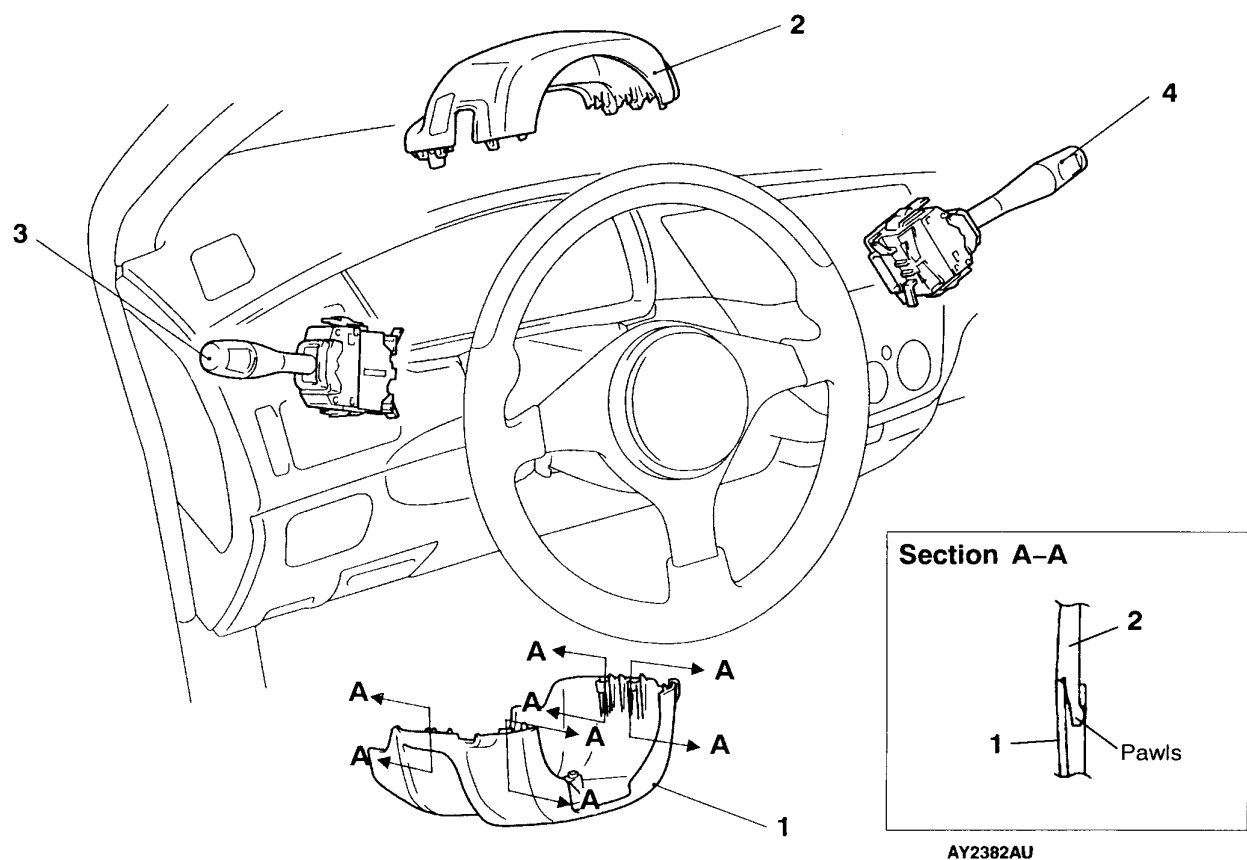
- Remove plug and check for wear on spot.
- Check for residual cigarette or foreign object on element.
- With circuit tester, check for element continuity.

COLUMN SWITCH

SPECIAL TOOL

Tool	Number	Name	Use
 B990784	MB990784	Ornament remover	Column cover removal

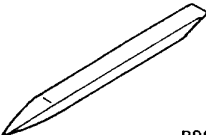
COLUMN SWITCH
REMOVAL AND INSTALLATION



- Removal steps**
- 1. Lower column cover
 - 2. Upper column cover
 - 3. Lighting switch
 - 4. Wiper/Washer switch

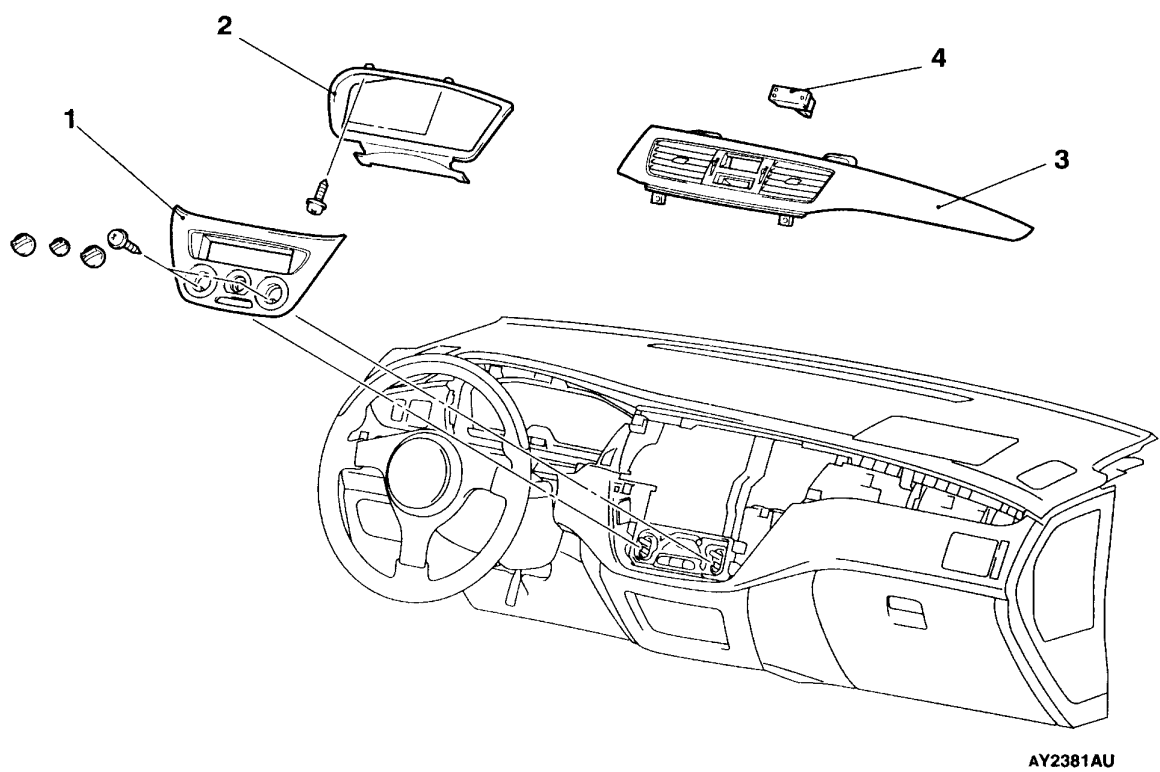
CLOCK

SPECIAL TOOL

Tool	Number	Name	Use
 B990784	MB990784	Ornament remover	Center panel assembly and center air outlet panel removal

CLOCK

REMOVAL AND INSTALLATION



AY2381AU

Removal steps

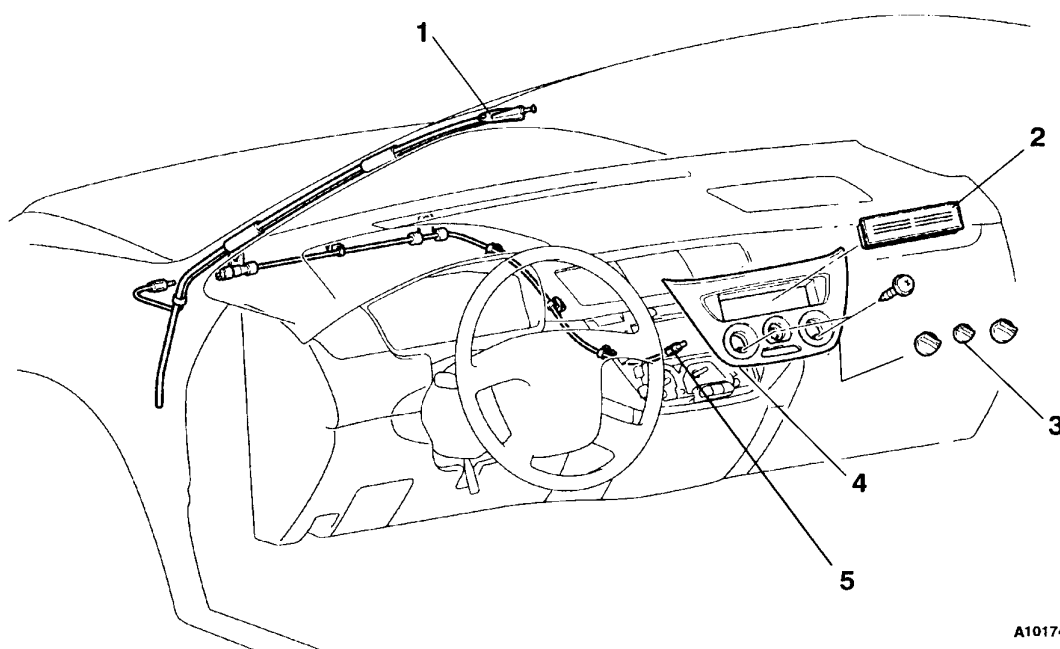
1. Center panel assembly (Refer to GROUP 52A – Instrument Panel.)

2. Meter bezel (Refer to P.54A-22.)
3. Center air outlet panel (Refer to GROUP 52A – Instrument Panel.)

4. Clock

POLE ANTENNA

REMOVAL AND INSTALLATION



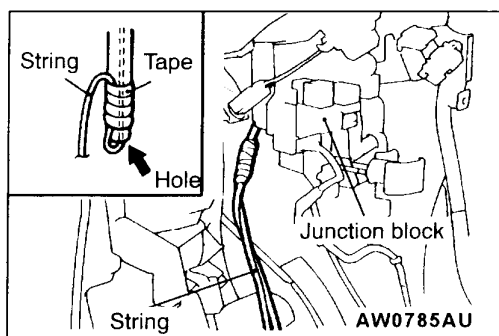
A10174AU

Removal steps



1. Antenna base
2. Radio plug
3. Knob assembly
4. Center panel assembly (Refer to GROUP 52A – Instrument Panel.)

- Instrument under cover (Refer to GROUP 52A – Instrument Panel.)
- Instrument panel (Refer to GROUP 52A.)
- 5. Antenna feeder cable



REMOVAL SERVICE POINT

◀▶ ANTENNA BASE REMOVAL

Use the following steps to easily route antenna feeder cable in the event of installation:

1. Tie string at the top end of feeder cable.
2. Pull out feeder cable until pipe end of antenna base is visible.
3. Insert string into the hole at pipe end of antenna base, and wrap vinyl tape on the string.

Caution

Tape should be wrapped so that the string cannot be removed.

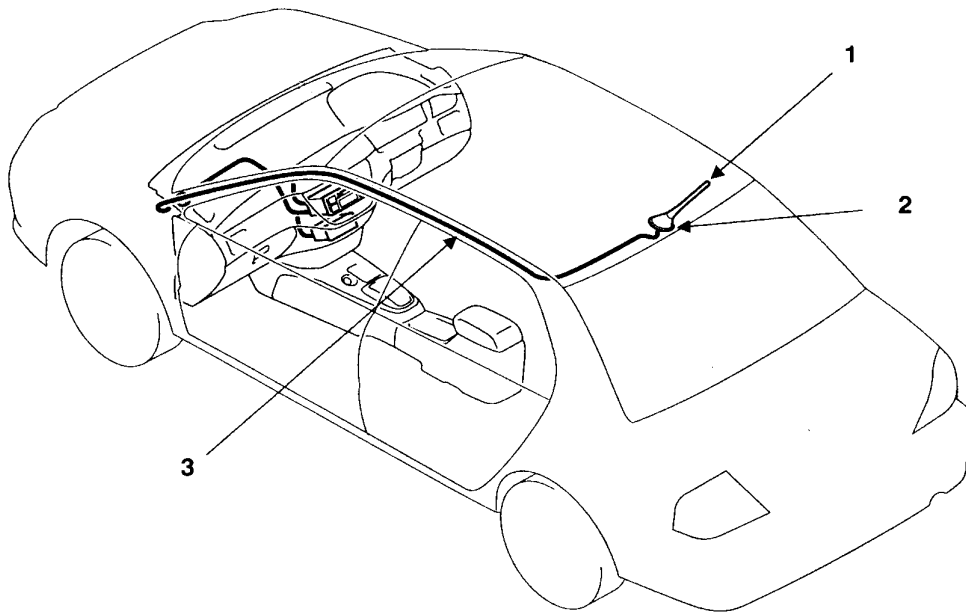
4. Gradually pull out remove antenna base.

ROOF ANTENNA

REMOVAL AND INSTALLATION

pre-removal and Post-installation Operations

- Front Pillar trim, Rear Pillar Trim and Lower/Upper Center Pillar Trim Removal and Installation (Refer to GROUP 52A – Trims.)
- Assist Step Removal and Installation (Refer to GROUP 52A – Head Lining.)
- Front Room Lamp and Rear Room Lamp Removal and Installation
- Head Lining Removal and Installation (Refer to GROUP 52A – Head Lining.)



A Y2415AU

Removal steps

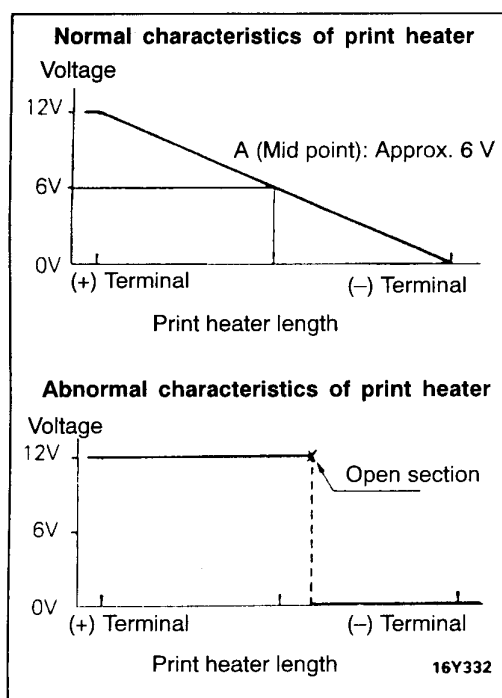
1. Antenna pole
 2. Roof antenna base
- Instrument panel (Refer to GROUP 52A – Instrument Panel.)

3. Antenna feeder cable

DEFOGGER

TROUBLESHOOTING

Refer to GROUP 55.



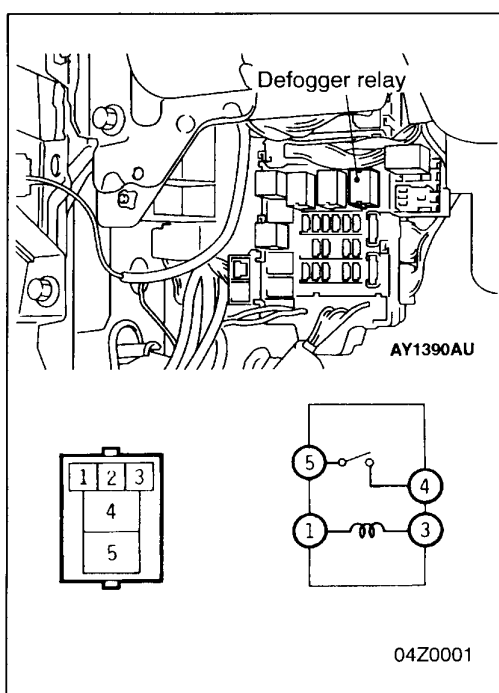
ON-VEHICLE SERVICE

PRINTED HEATER CHECK

- (1) With engine running at 2,000 rpm and battery in charging mode, check print heater for normal operation.
- (2) With defogger switch in "ON" position, use circuit tester to measure voltage of individual print heaters at the center point A of rear window glass. When the tester indicates approx. 6V, the print heater is evaluated normal.
- (3) When the measured value at Position A is 12V, open circuit occurs between Position A and minus terminal. In this case, carefully move test bar to minus terminal side to detect a rapid voltage drop point (0V). This voltage drop point indicates open circuit section.
- (4) When voltage at Position A is 0V, open circuit occurs between Position A and plus terminal. According to the previous step, detect a rapid voltage increase point (12V).

DEFOGGER RELAY CONTINUITY CHECK

Battery voltage	Terminal No.			
	1	3	4	5
De-energized	○	○		
Energized	⊕	⊖	○	○



DEFOGGER SWITCH

REMOVAL, INSTALLATION AND CHECK

Refer to GROUP 55 – Heater Control Assembly, A/C Switch and Fresh/Recirculated Air Switch.

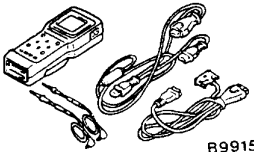
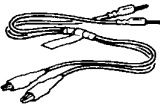
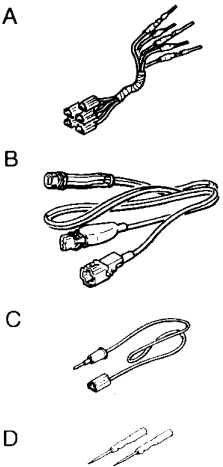
SMART WIRING SYSTEM (SWS)

CONTENTS

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SPECIAL TOOLS

Tool	Number	Name	Use
 B991502	MB991502	MUT-II subassembly	For SWS inspections (diagnosis code display and input signal check by MUT-II)
	MB991529	Diagnosis code check harness	For checking input signals by voltmeter
 A B C D C991223	MB991223 A: MB991219 B: MB991220 C: MB991221 D: MB991222	Harness set A: Test harness B: LED harness C: LED harness adapter D: Probe	For checking voltage (continuity and value) at harnesses and connectors A: For checking connector pin contact voltage B: For checking power supply circuits C: For checking power supply circuits D: For connection to commercially available testers

TROUBLESHOOTING

BEFORE COMMENCING TROUBLESHOOTING

Before starting troubleshooting, check the following two points to ensure there are no defects.

- Check the state of the connector couplings to the ETACS-ECU and junction box.
- Check that the fuses and fusible links relating to all systems are not fused.

STANDARD FLOW OF DIAGNOSTIC TROUBLESHOOTING

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

DIAGNOSTIC FUNCTIONS

READING DIAGNOSIS CODES

Read the diagnosis codes using MUT-II. (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points.)

NOTE

1. Connect MUT-II to the 16-pin diagnosis connector (black).
2. The diagnosis code cannot be read when there is an ETACS-ECU fault or when the power is first turned ON (voltage rising). In this case, refer to “No Communication with MUT-II” (P. 54B-10) on Fault Symptom Inspection Procedure, and perform troubleshooting.

INPUT SIGNAL CHECK

1. Check the inputs using MUT-II or a voltmeter. (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points.)
2. The following input signals can be checked using MUT-II or a voltmeter connected to the diagnosis connector.

NOTE

When fault is detected during input signal inspection, refer to Trouble Symptom Chart to perform troubleshooting. (Refer to P.54B-7).

Input Signal Check Function

Input signal		Buzzer operation condition
Ignition switch (ACC)		When ignition switch turned from “LOCK” (OFF) to ACC.
Ignition switch (IG1)		When ignition switch turned from “ACC” to “ON”.
Hazard warning lamp switch		When switch turned from OFF to ON.
Rear fog lamp switch		
Driver’s door switch		When driver’s door opened from closed
All door switches		When any door opened when all doors were closed.
Driver’s door lock actuator		When the driver’s side key cylinder or inside lock knob is moved from the locked to unlocked position or vice versa.
Vehicle speed signal		Vehicle speed changes from less than 10 km/h to 10 km/h or more.
Column switches	Tail lamp switch	When lighting switch turned from automatic lighting to tail lamp position.
	Headlamp switch	When lighting switch turned from tail lamp to headlamp position.
	Dimmer switch	When switch turned from OFF to ON.
	Passing switch	
	Left-hand turn signal lamp switch	
	Right-hand turn signal lamp switch	
	Windshield mist wiper switch	
	Windshield wiper intermittent timing switch	
	Windshield wiper LO speed switch	
	Windshield wiper HI speed switch	
	Windshield washer switch	When switch turned from OFF to ON.
Power window main switch	All switches	When switch turned from OFF to ON.

DIAGNOSIS CODE CHART

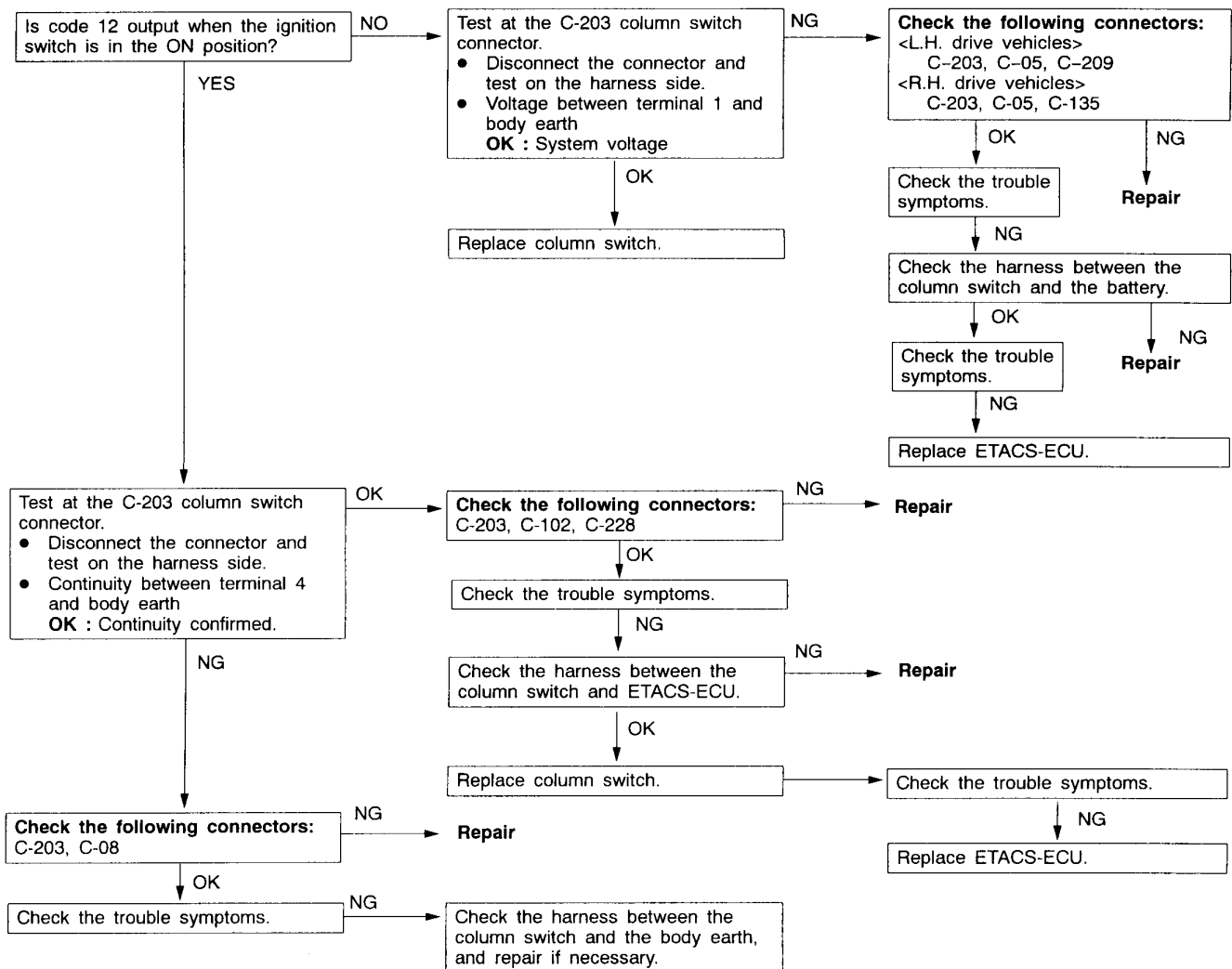
Code No.	Diagnosis item	Reference page
11	ETACS-ECU-related failure	54B-4
12	Column switch-related failure or fault in connecting to ETACS-ECU	54B-4
13	Front-ECU-related failure or fault in connecting to ETACS-ECU	54B-5
21	Short circuit in communication lines	54B-6

DIAGNOSIS CODE INSPECTION PROCEDURES

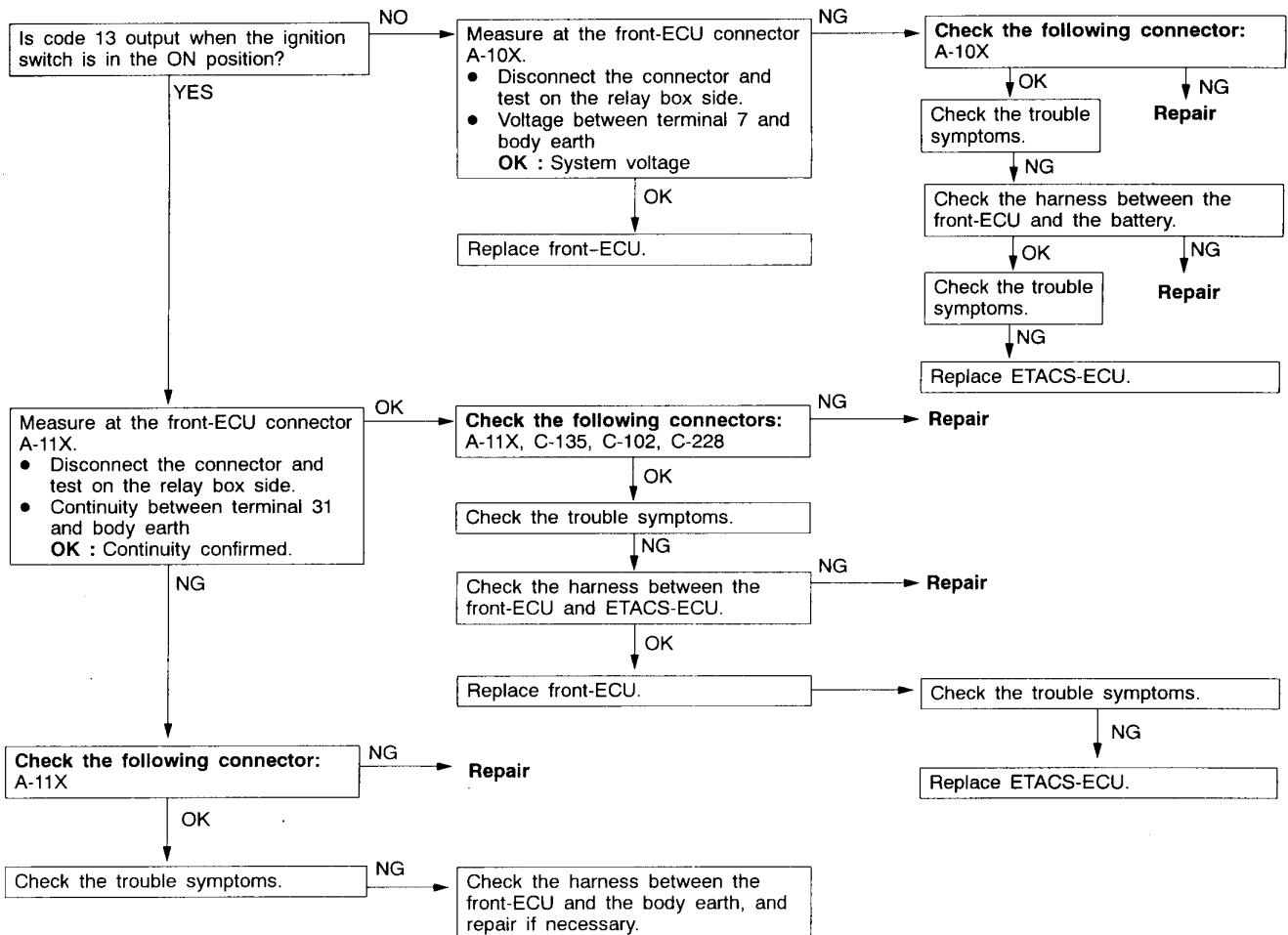
Code No. 11 ETACS-ECU-related failure	Probable cause
The ETACS-ECU monitors its own communication data, outputting this diagnosis code when data error occurs 15 consecutive times (for 0.6 seconds). The diagnosis code output stops when the ETACS-ECU confirms that its data was transmitted normally 15 consecutive times (for 0.6 seconds).	ETACS-ECU fault

Replace ETACS-ECU.

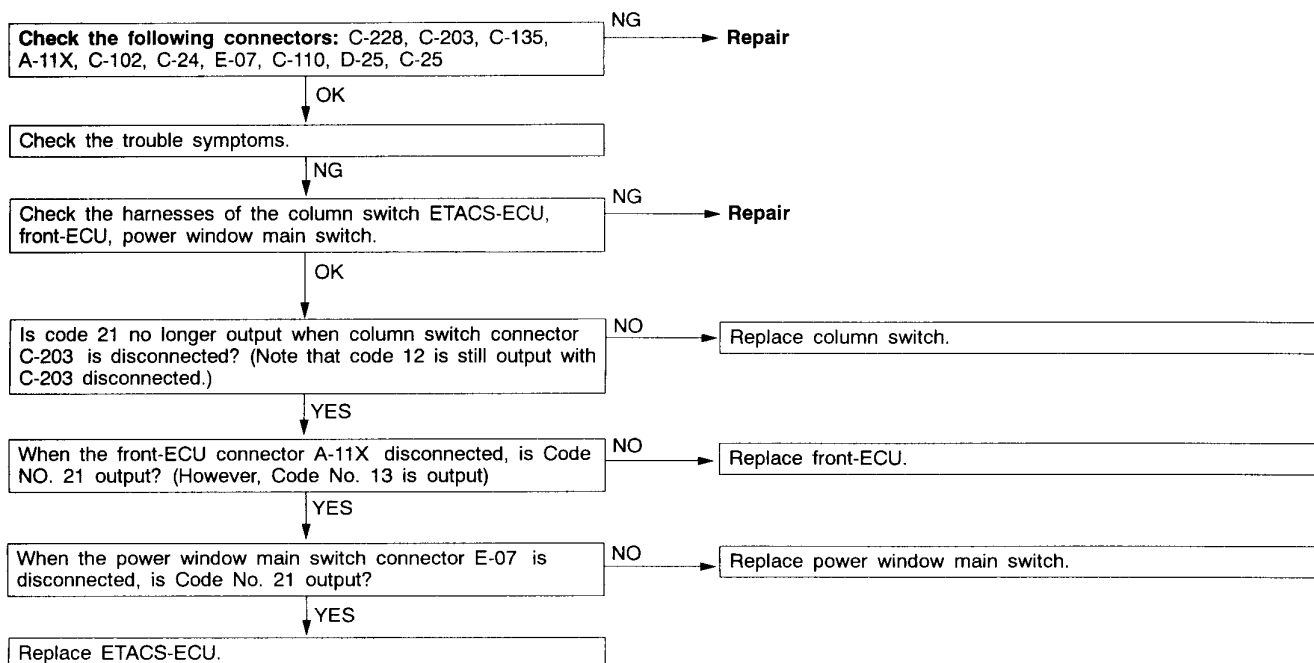
Code No. 12 Column switch-related fault or fault in connecting to ETACS-ECU	Probable cause
This diagnosis code is output when a column switch outputs a signal (at least three times a second) that is not in accordance with the transmission request signal from ETACS-ECU. The diagnosis code output stops when the column switch continuously outputs for one second a signal that accords with the transmission request signal from ETACS-ECU.	- Column switch fault - ETACS-ECU fault - Harness or connector fault



Code No. 13 Front-ECU-related fault or fault in connecting to ETACS-ECU	Probable cause
This diagnosis code is output when the signal output from the front-ECU to ETACS-ECU contains an error for 15 consecutive communication cycles (0.6 seconds). The diagnosis code output stops when the signal output from the front-ECU to ETACS-ECU is normal for 15 consecutive communication cycles (0.6 seconds).	• front-ECU fault • ETACS-ECU fault • Harness or connector fault



Code No. 21 Short circuit in communication lines.	Probable cause
This diagnostic code is output when the voltage on an SWS communication line goes LOW for 0.3 seconds. The diagnosis code output stops when the ETACS-ECU data line voltage goes HIGH for 0.3 seconds, or when the ETACS-ECU receives a normal signal from another ECU or switch. During the output of this code, other codes are suppressed.	• Column switch fault • front-ECU fault • Power window main switch fault • ETACS-ECU fault • Harness or connector fault



TROUBLE SYMPTOM CHART

Trouble symptom		Inspection procedure	Reference page
No communication with MUT-II		A-1	54B-10
Buzzers	Lights left ON reminder warning function not working normally.	B-1	54B-10
Central locking	Central door locking system not working at all.	C-1	54B-11
	Some doors not locking or unlocking.	C-2	54B-11
Power window	Power windows not working at all.	D-1	54B-12
	Power windows are not operated with the power window main switch.		
	Driver's power window not responding to power window main switch.	D-2	54B-13
	Windows not responding to passenger or rear power window switches.	D-3	54B-14
	Passenger or rear power windows not responding to power window main switch.	D-4	54B-15
	Power window timer function not working normally.	D-5	54B-15
	While the window is winding up, it suddenly starts coming down again.	D-6	54B-16
	Safety mechanism (to prevent jamming of fingers, etc.) not working.	D-7	54B-16
Windshield wipers and washer	The windshield wipers do not work at all.	E-1	54B-17
	The windshield wipers only operate at LO speed (though the wipers and washer can be switched OFF).	E-2	54B-17
	The windshield wipers do not respond to any switch position.	E-3	54B-18
	The windshield wipers do not stop in the normal predetermined position.	E-4	54B-18
	The windshield washer does not work at all.	E-5	54B-19
	Windshield wipers are not operated with the switch in INT, WASHER and MIST positions, and operated in a low mode with the switch in Lo and Hi positions.	E-6	54B-19
Headlamps, tail lamps	Except for lighting switch "OFF," the headlamps only respond to the "low-beam" position.	F-1	54B-20
	The tail lamps do not work.	F-2	54B-20
	The headlamps (low-beam) do not light.	F-3	54B-21
	The headlamps (high-beam) do not light.	F-4	54B-21
	The headlamps (low or high-beam) do not work when the passing switch is ON.	F-5	54B-22
	The headlamp automatic cut-off function is not working normally.	F-6	54B-22
Rear fog lamp	Rear fog lamp is not properly illuminated.	G-1	54B-23
Flasher timer	The turn signal lamps do not light.	H-1	54B-24
	The hazard warning lamps do not light up.	H-2	54B-24
Room lamps	The room lamps do not come ON or OFF normally.	I-1	54B-25

DEFECTS FOUND BY INPUT SIGNAL CHECK

When a fault is identified in an input signal check, use the following table to investigate the fault.

Trouble symptom		Inspection procedure	Reference page
No ignition switch (ACC) signal input to ETACS-ECU.		J-1	54B-26
No ignition switch (IG1) signal input to ETACS-ECU.		J-2	54B-26
No hazard warning lamp switch signal input to ETACS-ECU.		J-3	54B-27
No rear fog lamp switch signal input to ETACS-ECU.		J-4	54B-28
No driver's door switch signal input to ETACS-ECU.		J-5	54B-29
No door switch signals input to ETACS-ECU.			
No driver's door lock actuator signal input to ETACS-ECU.		J-6	54B-30
Column switches	No tail lamp switch signal input to ETACS-ECU.	J-7	54B-31
	No headlamp switch signal input to ETACS-ECU.		
	No dimmer switch signal input to ETACS-ECU.		
	No passing switch signal input to ETACS-ECU.		
	No turn signal lamp left-hand switch signal input to ETACS-ECU.		
	No turn signal lamp right-hand switch signal input to ETACS-ECU.		
Column switches	No windshield mist wiper switch signal input to ETACS-ECU.	J-8	54B-31
	No windshield wiper intermittent switch signal input to ETACS-ECU.		
	No windshield low-speed wiper switch signal input to ETACS-ECU.		
	No windshield high-speed wiper switch signal input to ETACS-ECU.		
	No windshield washer switch signal input to ETACS-ECU.		
Power window main switch	No power window main switch signal input to ETACS-ECU.	J-9	54B-32
When the ignition switch is in the LOCK (OFF) position, no functions work normally.		K-1	54B-33
ETACS-ECU battery power supply circuit control check.			

NOTE

A diagnosis code is output for front-ECU and column switch battery power supply circuit control abnormalities. Apply the diagnosis code inspection procedures to address these abnormalities.

Input Signal Inspection Procedure Nos. by Function

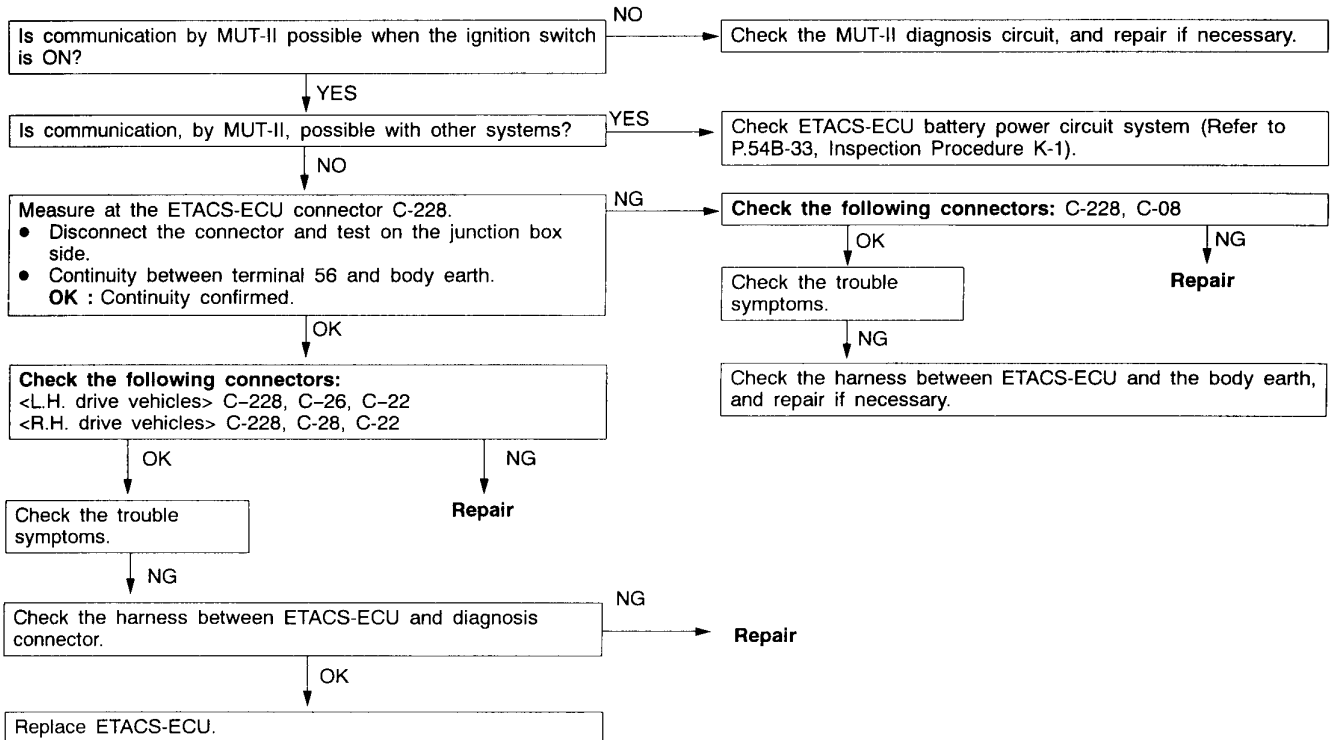
When more than one SWS function fails at the same time, run checks based on the following table. (The table lists only input signals and functions in which multiple faults can occur.)

Function	J-1	J-2	J-3	J-5		J-6	J-7	J-8
				Driver's door	All doors			
Central locking control						●		
Power window control		●						
Power window timer		●		●				
Windshield wiper and washer control	●							●
Rear wiper and washer control	●							●
Headlamp control							●	
Rear fog lamp control							●	
Tail lamp control							●	
Headlamp automatic turn-off		●		●			●	
Turn signal lamp control		●					●	
Hazard warning lamp control			●					
Room lamp control		●			●	●		

INSPECTION PROCEDURE FOR TROUBLE SYMPTOMS

Inspection Procedure A-1

No communication with MUT-II	Probable cause
Either the ETACS-ECU power supply circuit system or the harness or connector between the diagnosis connector and ETACS-ECU may be defective.	• Harness or connector fault • ETACS-ECU fault

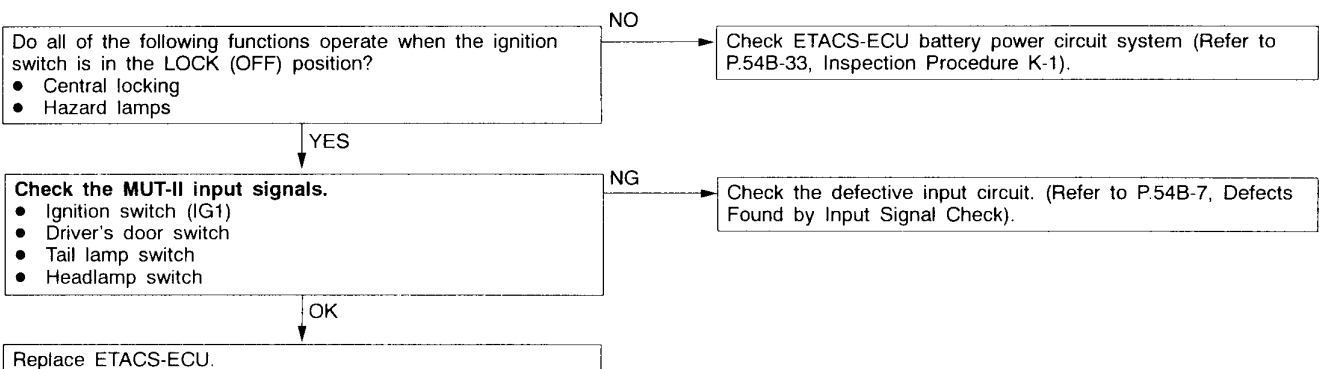


NOTE:

When failure is detected on the harness between ETACS-ECU and the body earth, check No. 3 terminal (C-226) of ETACS-ECU as well. Repair, if required.

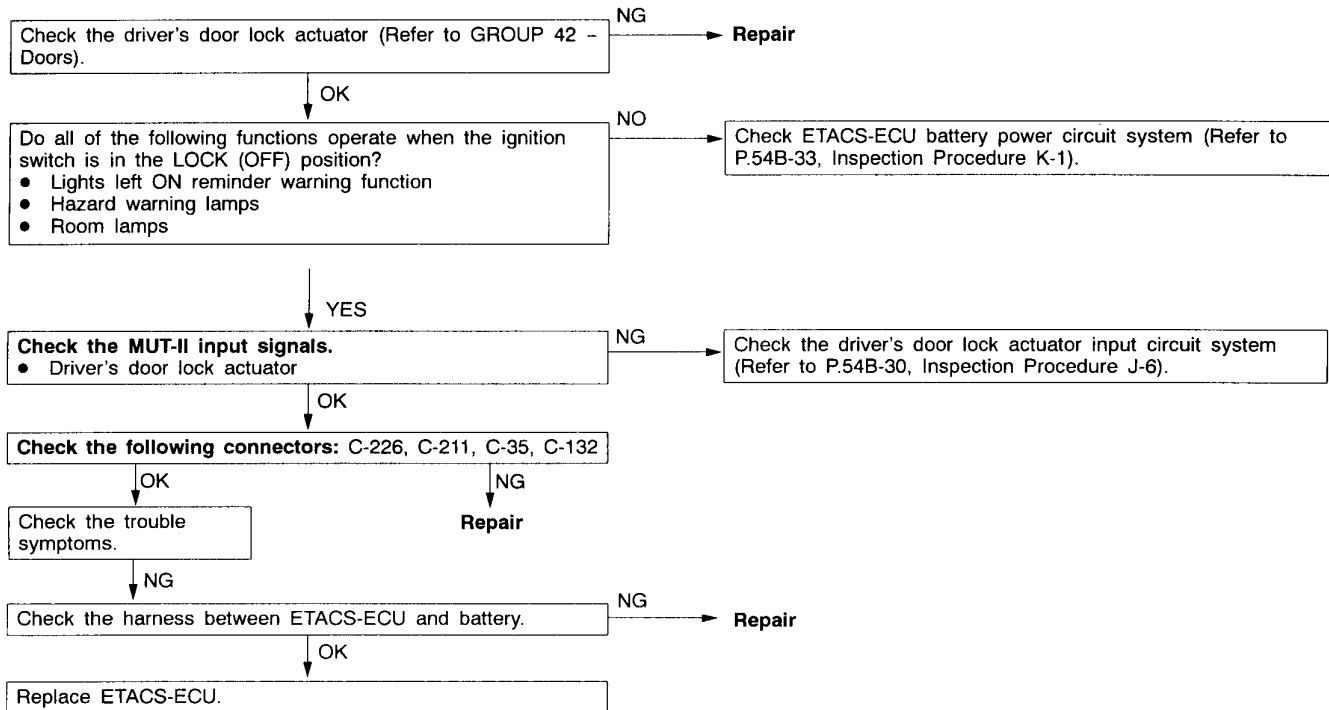
Inspection Procedure B-1

Lights left ON reminder warning function not working normally.	Probable cause
The ETACS-ECU controls the headlamp automatic cut-off function based on input signals from the following switches. • Ignition switch (IG1) • Driver's door switch • Tail lamp switch • Headlamp switch	• Driver's door switch fault • Column switch fault • ETACS-ECU fault • Harness or connector fault

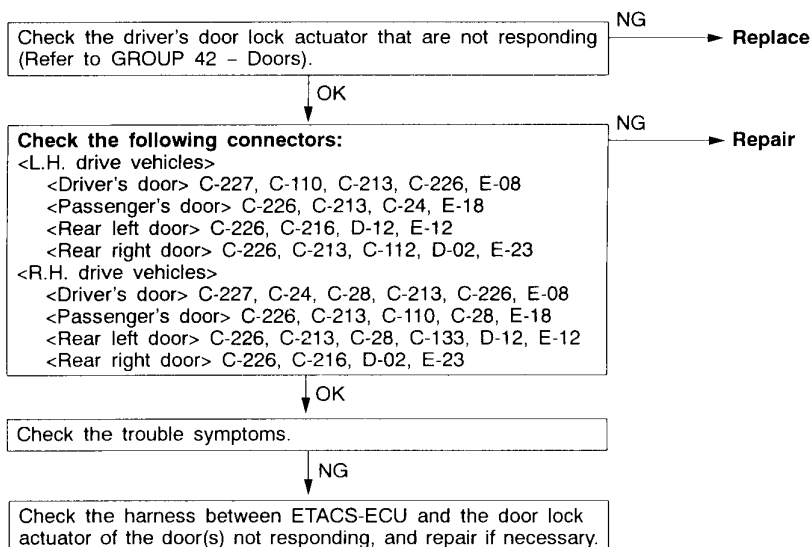


Inspection Procedure C-1

Central door locking system not working at all.	Probable cause
A change in the input signal from the driver's door lock actuator activates all the door lock actuators, causing the ETACS-ECU to lock or unlock all the doors. If the central locking is not working normally, the driver's door lock actuator or the ETACS-ECU may be defective.	• Driver's door lock actuator fault • ETACS-ECU fault • Harness or connector fault

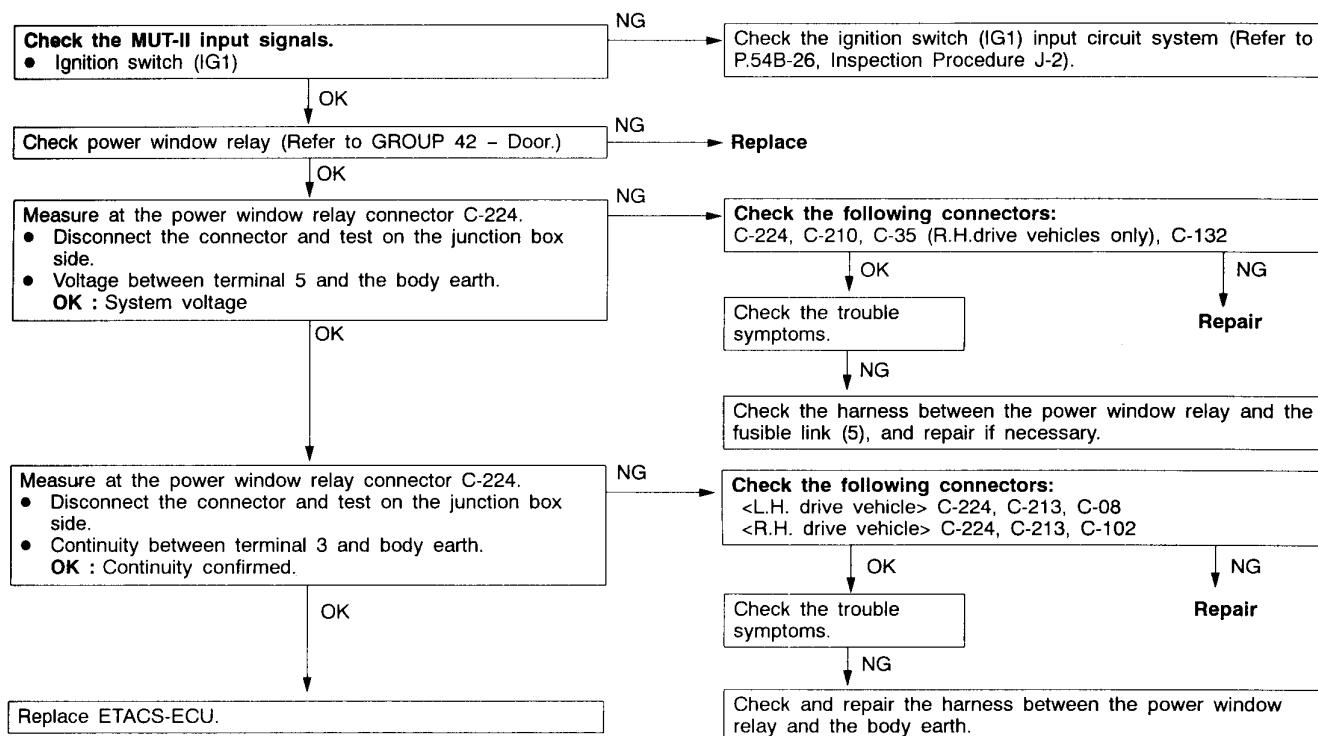
**Inspection Procedure C-2**

Some doors not locking or unlocking.	Probable cause
The door lock actuator of the door(s) that are not responding may be defective.	• Door lock actuator fault • Harness or connector fault



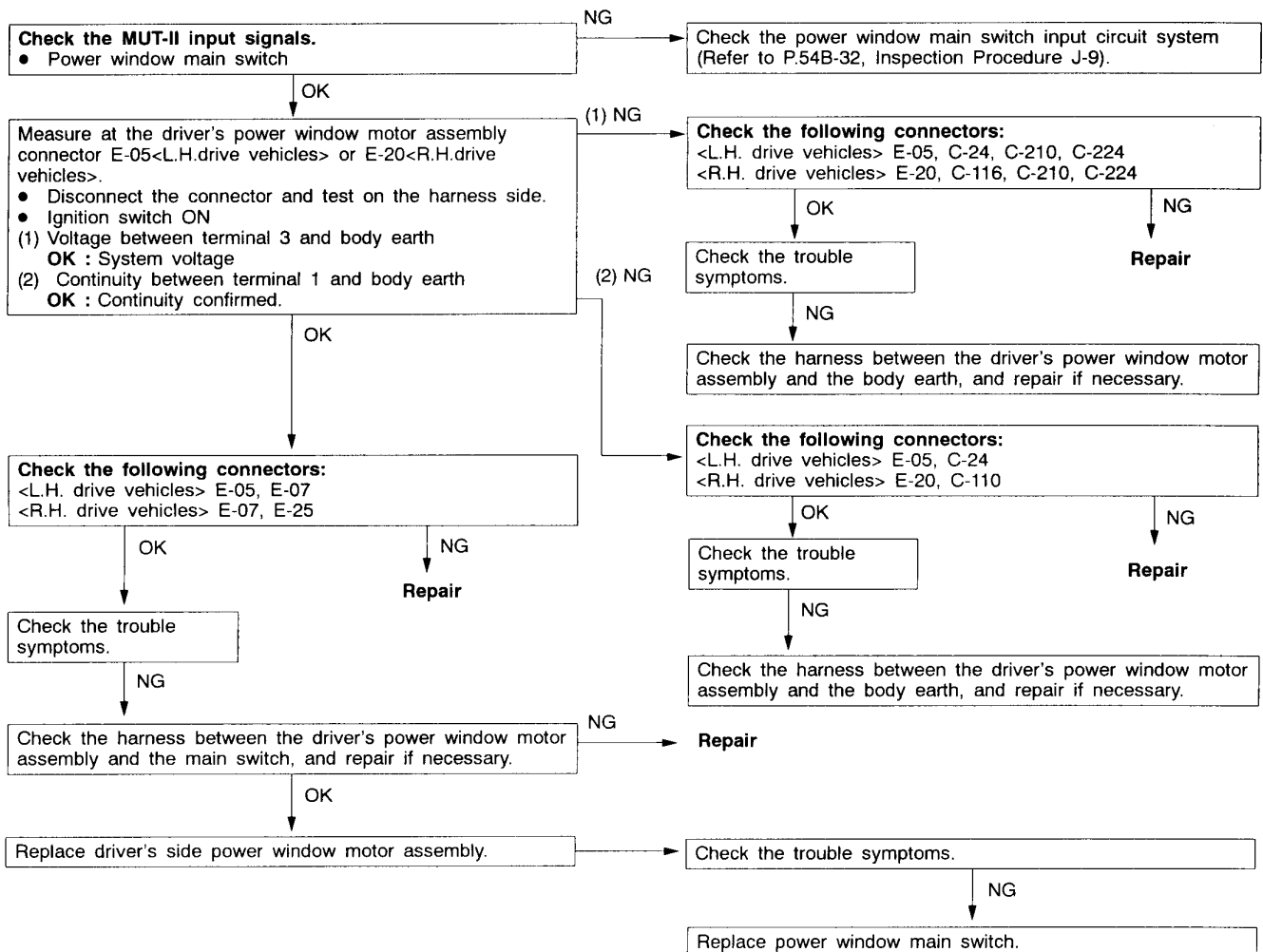
Inspection Procedure D-1

Power windows not working at all.	Probable cause
Power windows are not operated with the power window main switch.	
The power window relay or the ETACS-ECU may be defective.	• Power window relay fault • ETACS-ECU fault • Harness or connector fault



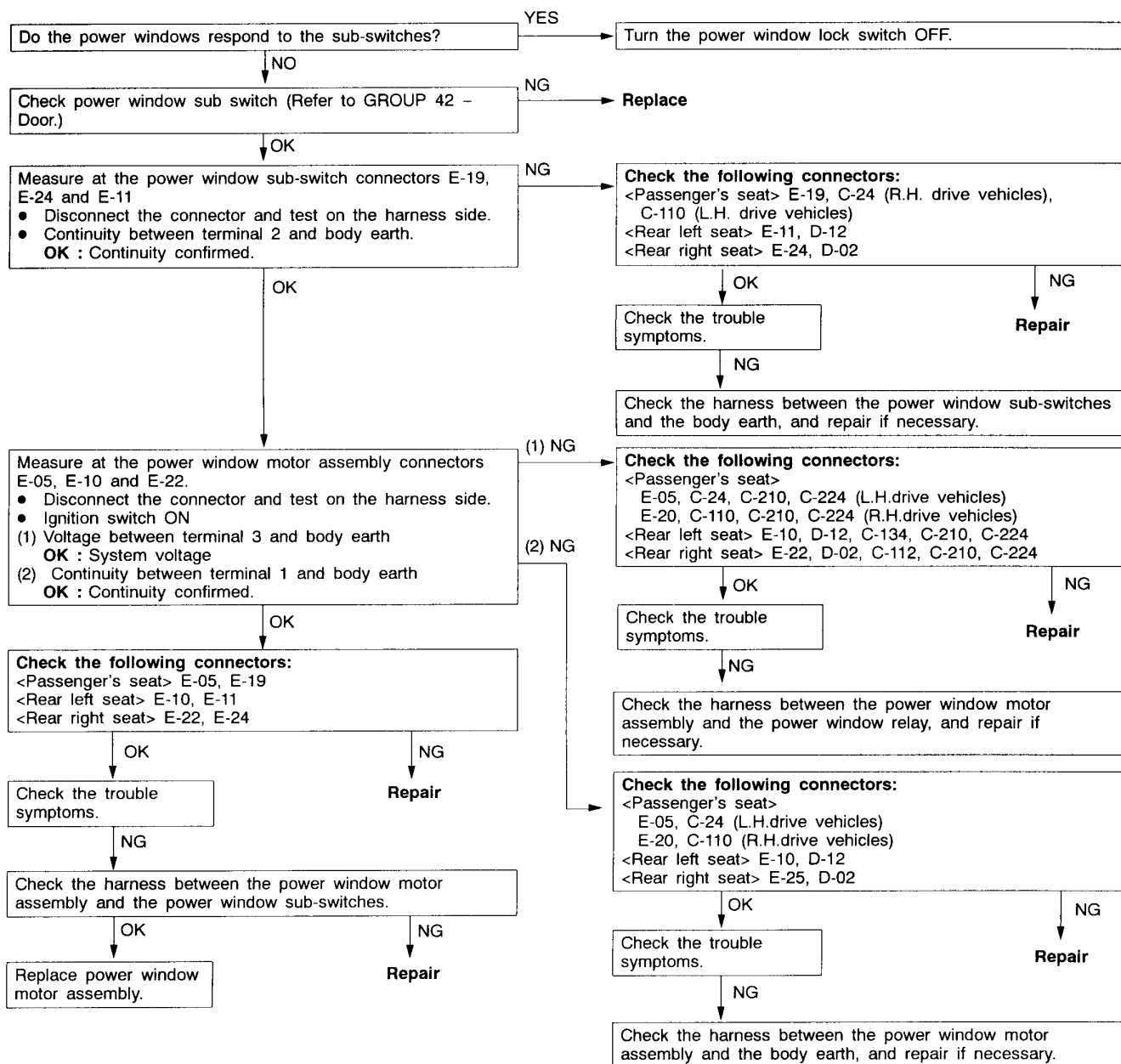
Inspection Procedure D-2

Driver's power window not responding to power window main switch.	Probable cause
Either the power window main switch or the driver's side power window motor assembly may be defective. The power window lock switch could be ON.	- Power window main switch fault - Driver's side power window motor assembly fault - Harness or connector fault



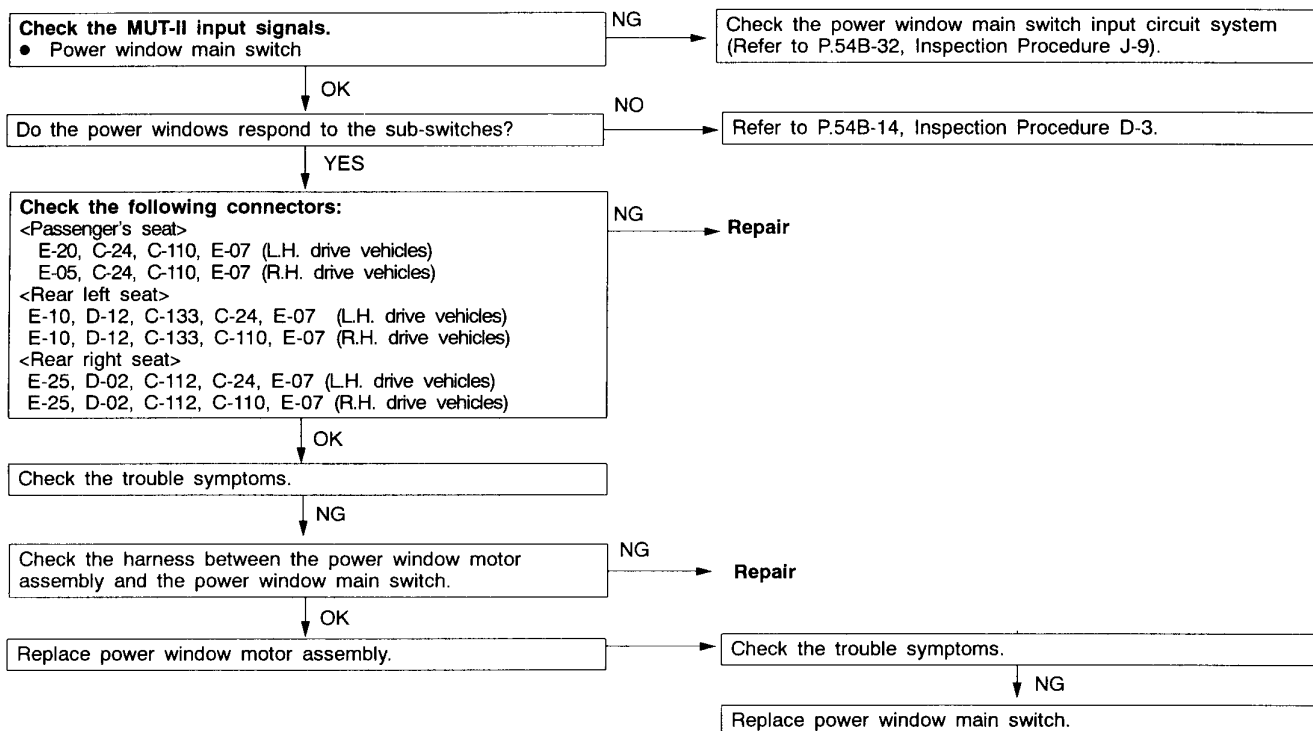
Inspection Procedure D-3

Windows not responding to passenger or rear power window switches.	Probable cause
Either the power window sub-switches or the passenger's or rear power window motor assembly may be defective.	- Power window sub-switch fault - Passenger's or rear power window motor assembly fault - Harness or connector fault



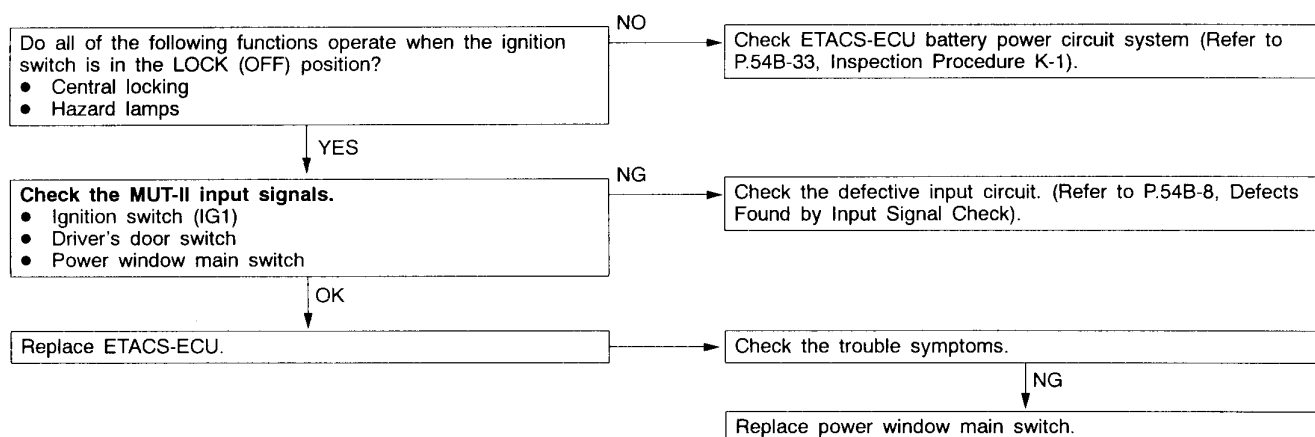
Inspection Procedure D-4

Passenger or rear power windows not responding to power window main switch.	Probable cause
Either the power window main switch or the passenger's or rear power window motor assembly may be defective.	- Power window main switch fault - Passenger's or rear power window motor assembly fault - Harness or connector fault



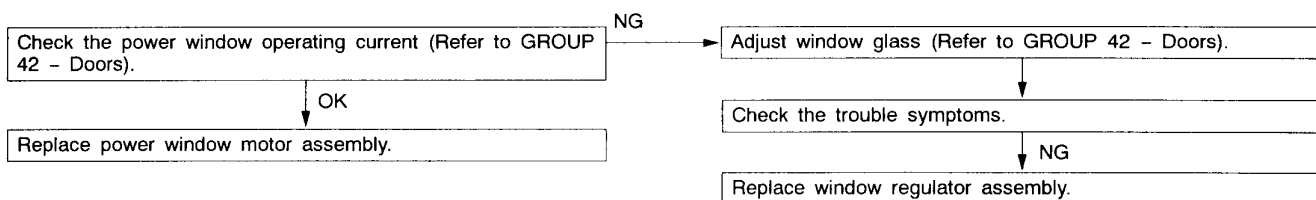
Inspection Procedure D-5

Power window timer function not working normally.	Probable cause
The ETACS-ECU controls the headlamp automatic cut-off function based on input signals from the following switches. - Ignition switch (IG1) - Driver's door switch If the power window timer function does not operate normally, one of the above input circuit systems, the power window main switch, or the ETACS-ECU may be defective.	- Driver's door switch fault - Power window main switch fault - ETACS-ECU fault - Harness or connector fault



Inspection Procedure D-6

While the window is winding up, it suddenly starts coming down again.	Probable cause
If the sliding resistance is too great when the window is being raised or if the glass encounters an object, the window will return about 150 mm.	• The window glass is not properly adjusted. • The glass slider is incorrectly installed or warped. • Power window motor assembly fault • Window regulator assembly fault



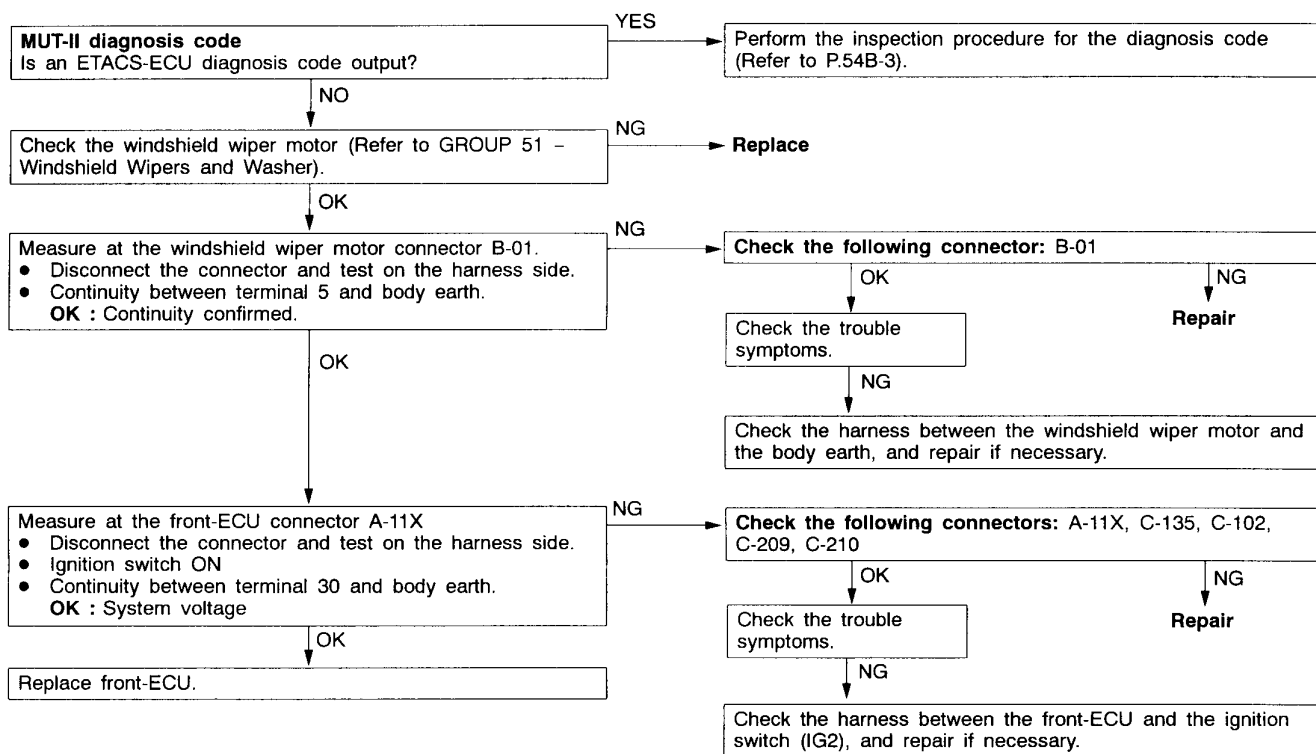
Inspection Procedure D-7

The power window safety mechanism is not working.	Probable cause
The revolution detection sensor in the power window motor assembly is defective.	• Power window motor assembly fault

Replace power window motor assembly.

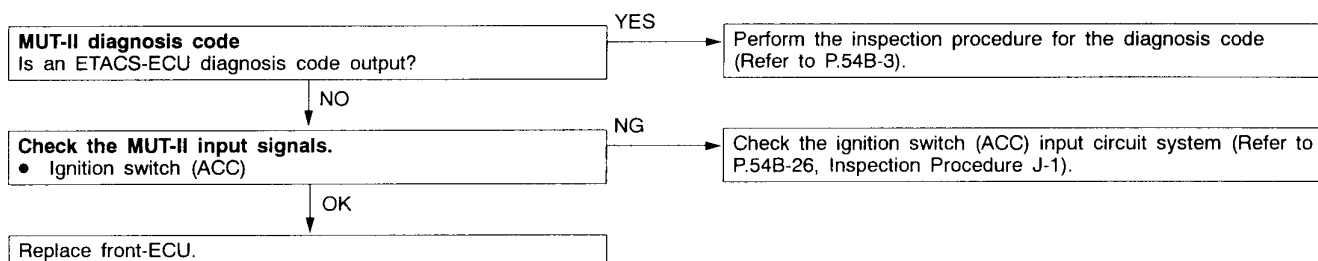
Inspection Procedure E-1

The windshield wipers do not work at all.	Probable cause
Either the windshield wiper motor, the column switch, or the front-ECU may be defective.	• Windshield wiper motor fault • Column switch fault • front-ECU fault • Harness or connector fault



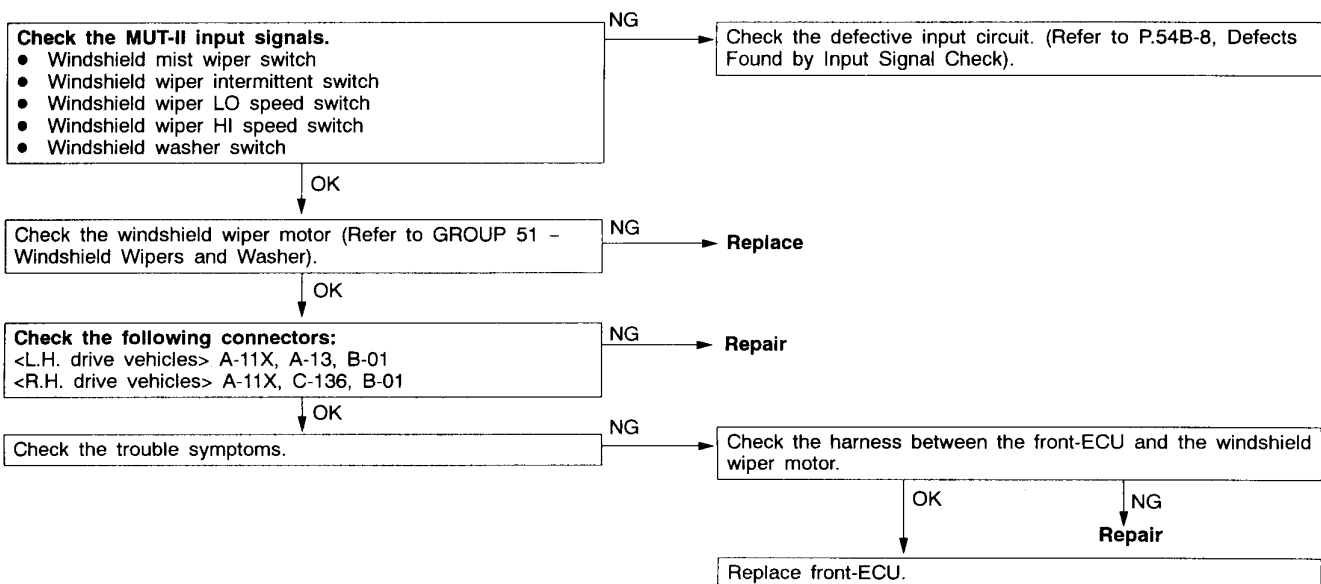
Inspection Procedure E-2

The windshield wipers only operate at LO speed (though the wipers and washer can be switched OFF).	Probable cause
If the windshield wipers only operate at LO speed regardless of the switch position, the windshield wiper fail-safe function is probably activated. Or the ETACS-ECU ignition switch (ACC) signal may be controlling the wiper operation.	• Column switch fault • front-ECU fault • Harness or connector fault



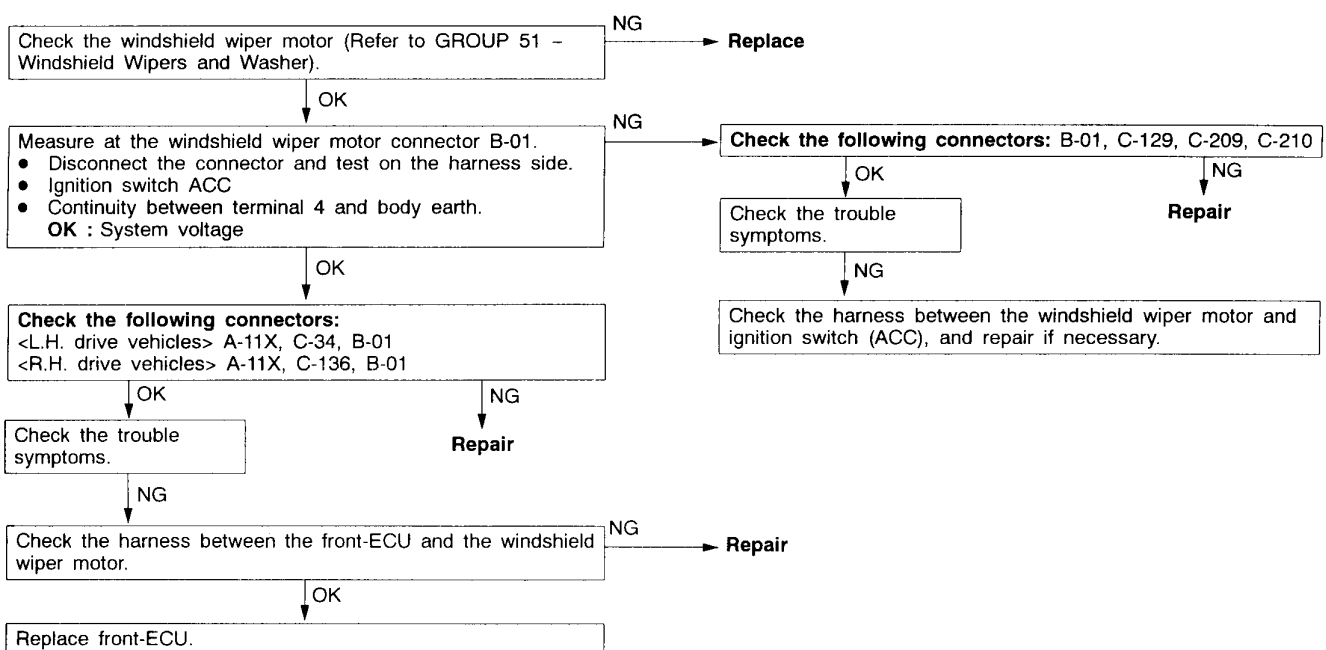
Inspection Procedure E-3

The windshield wipers do not respond to any switch position.	Probable cause
Either the windshield wiper motor, the column switch, or the front-ECU may be defective.	• Windshield wiper motor fault • Column switch fault • front-ECU fault • Harness or connector fault



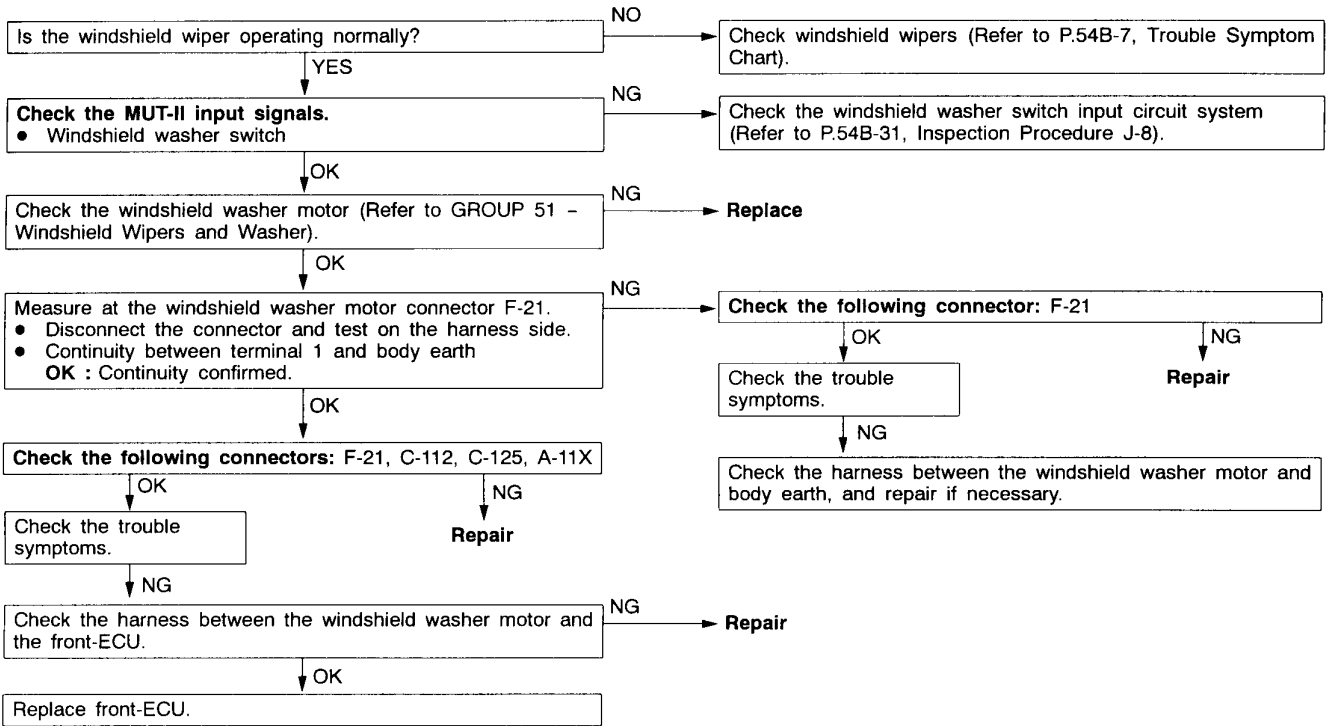
Inspection Procedure E-4

The windshield wipers do not stop in the normal predetermined position.	Probable cause
Either the windshield wiper motor or the front-ECU may be defective.	• Windshield wiper motor fault • front-ECU fault • Harness or connector fault

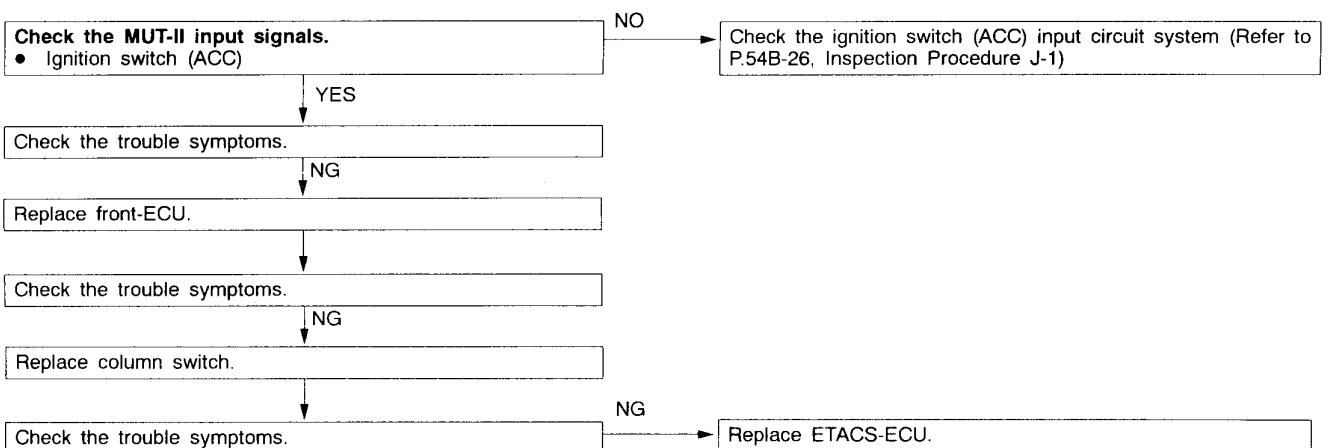


Inspection Procedure E-5

The windshield washer does not work at all.	Probable cause
Either the windshield washer switch input circuit system, the windshield washer motor, or the front-ECU may be defective.	• Windshield washer motor fault • Column switch fault • front-ECU fault • Harness or connector fault

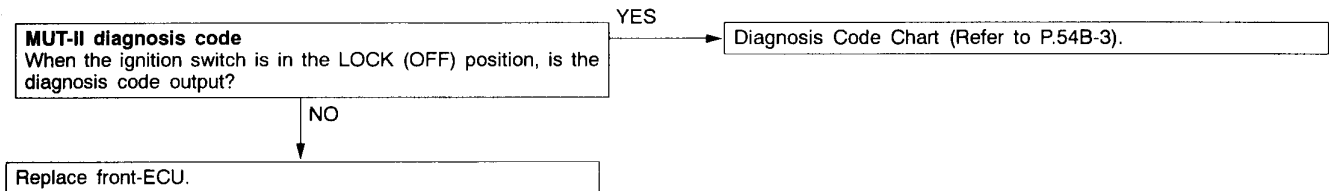
**Inspection Procedure E-6**

Windshield wipers are not operated with the switch in INT, WASHER and MIST positions, and operated in a low mode with the switch in Lo and Hi positions.	Probable cause
Fail-safe function may be operated due to the fault on SWS communication line. Fail-safe function is activated with the ignition switch in ACC position when the ignition switch ACC signal is not input due to the open circuit, etc.	• Column switch fault • front-ECU fault • ETACS-ECU fault • Harness or connector fault



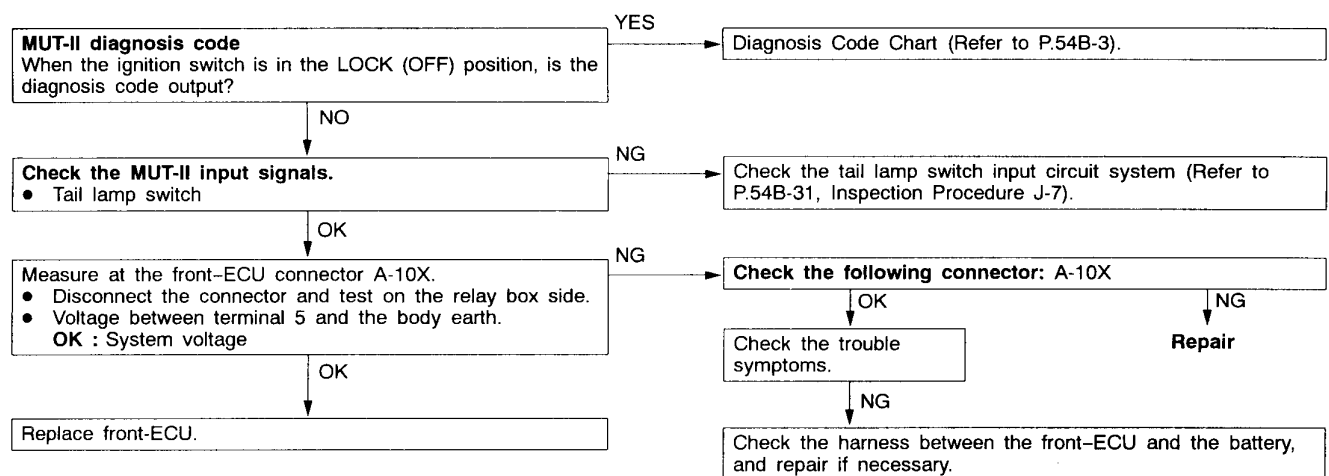
Inspection Procedure F-1

Except for lighting switch “OFF” the headlamps only respond to the “low-beam” position.	Probable cause
If the headlamps only go onto low-beam regardless of the switch position, the headlamp fail-safe function is probably activated.	• Column switch fault • front-ECU fault • Harness or connector fault



Inspection Procedure F-2

The tail lamps do not work.	Probable cause
If none of the tail lamps light up, either the tail lamp switch input circuit system or the front-ECU may be defective.	• Column switch fault • front-ECU fault • Harness or connector fault

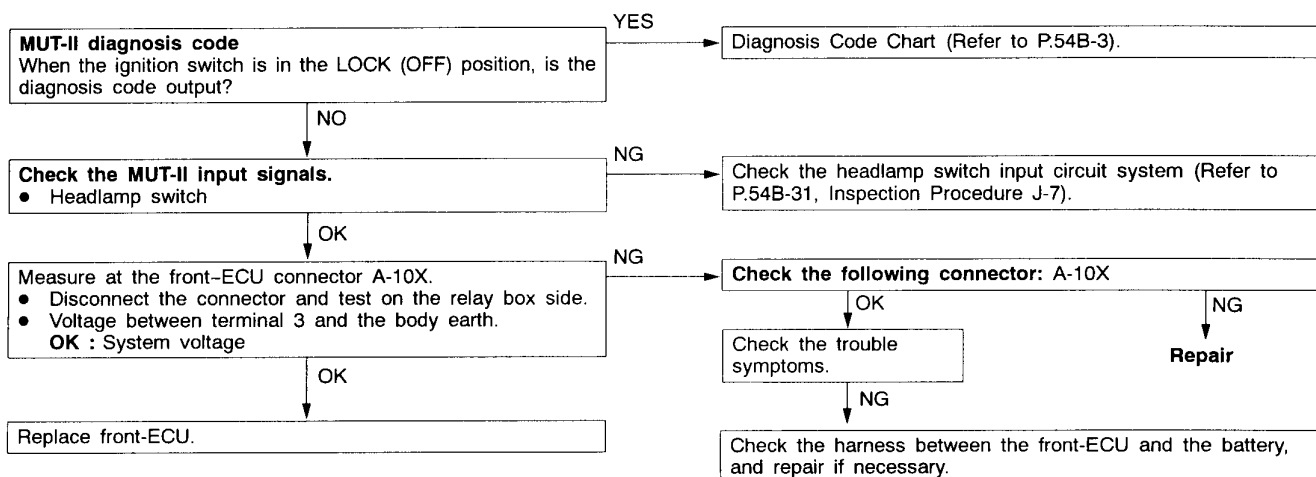


NOTE

If only one of the tail lamps fails to light up, check the bulb and the harness between the front-ECU and the lamp, and between the lamp and body earth.

Inspection Procedure F-3

The headlamps (low-beam) do not light.	Probable cause
If the (low-beam) headlamp on neither side lights up, either the headlamp switch input circuit system or the front-ECU may be defective.	- Column switch fault - front-ECU fault - Harness or connector fault

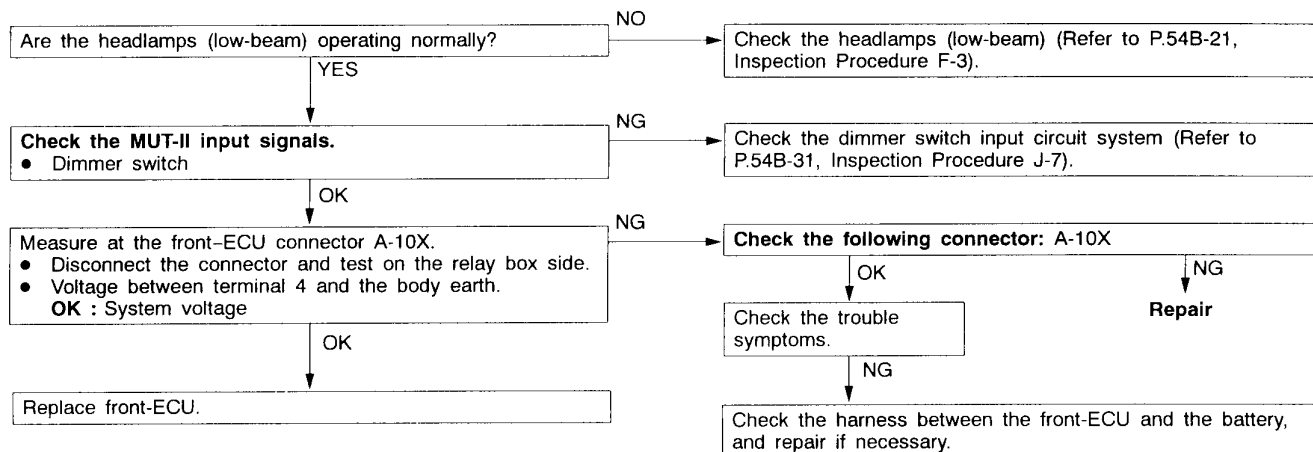


NOTES:

- If only one of the headlamps fails to light up, check the headlamp bulb and the harness between the front-ECU and the headlamps, and between the headlamps and body earth.
- When failure is detected on the harness from the front-ECU to the battery, check and repair the front-ECU No. 4 terminal (A-10X) as well.

Inspection Procedure F-4

The headlamps (high-beam) do not light.	Probable cause
If the (high-beam) headlamp on neither side lights up, either the dimmer switch input circuit system or the front-ECU may be defective.	- Column switch fault - front-ECU fault - Harness or connector fault

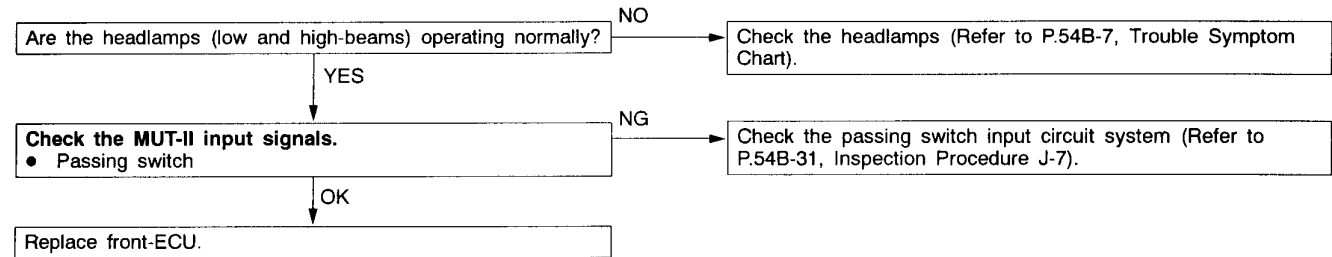


NOTE

- If only one of the headlamps fails to light up, check the headlamp bulb and the harness between the front-ECU and the headlamps, and between the headlamps and body earth.
- When failure is detected on the harness from the front-ECU to the battery, check and repair the front-ECU No. 3 terminal (A-10X) as well.

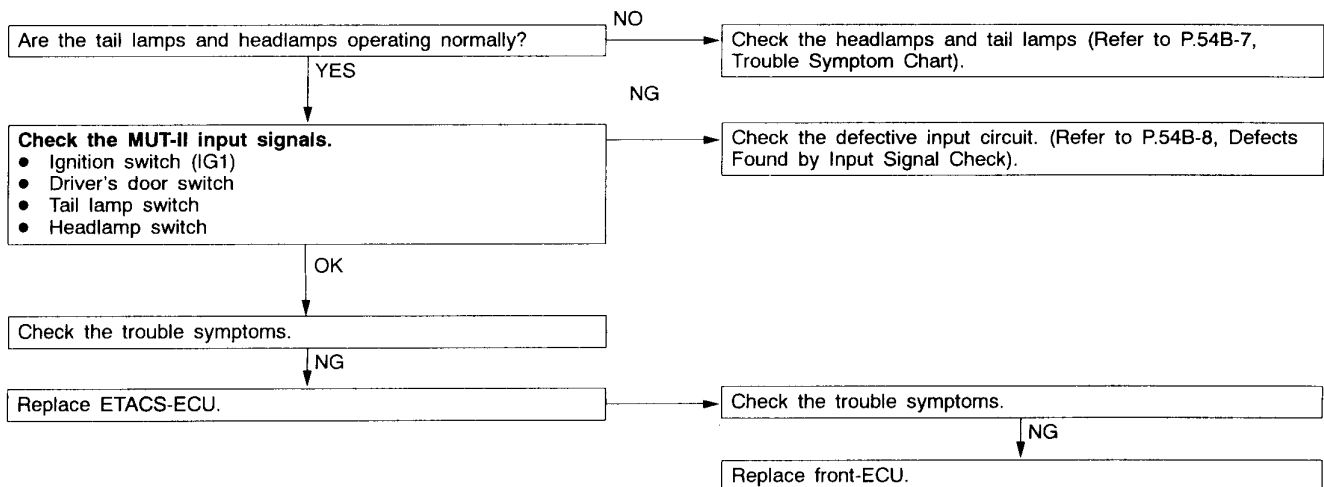
Inspection Procedure F-5

The headlamps (low or high-beam) do not work when the passing switch is ON.	Probable cause
If the headlamps (low and high-beams) are normal, either the passing switch input circuit system or the front-ECU may be defective.	• Column switch fault • front-ECU fault • Harness or connector fault



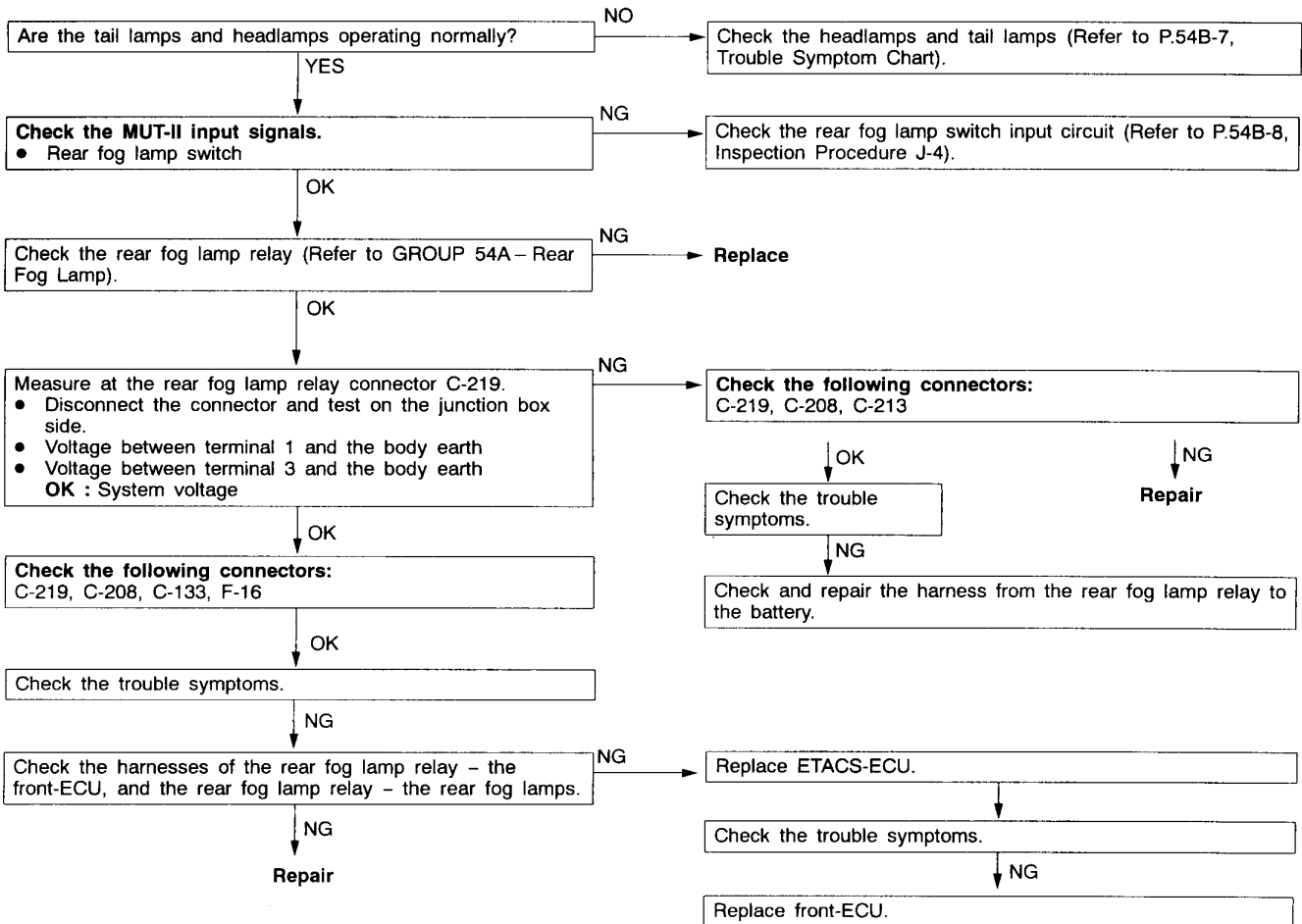
Inspection Procedure F-6

The headlamp automatic cut-off function is not working normally.	Probable cause
The ETACS-ECU controls the headlamp automatic cut-off function based on input signals from the following switches. • Ignition switch (IG1) • Driver's door switch • Tail lamp switch • Headlamp switch If the headlamp automatic cut-off function is not operating normally, either one of the above input circuit systems, the front-ECU, or the ETACS-ECU may be defective.	• Driver's door switch fault • Column switch fault • front-ECU fault • ETACS-ECU fault • Harness or connector fault



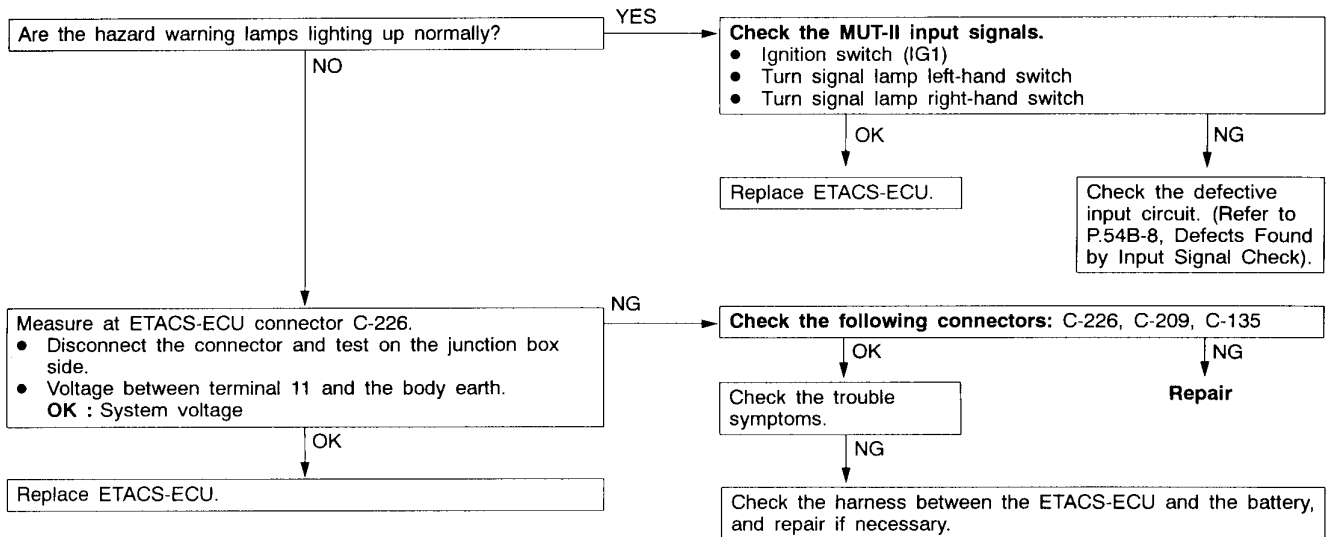
Inspection Procedure L-1

Rear fog lamp is not properly illuminated.	Probable cause
If the tail lamps and the headlamps are normal when the rear fog lamps are not illuminated, failure may occur on the rear fog lamp switch input circuit, the rear fog lamp relay, and the front-ECU or ETACS-ECU.	• Fog fog lamp switch inoperative • Rear fog lamp relay inoperative • front-ECU fault • ETACS-ECU fault • Harness or connector fault



Inspection Procedure H-1

The turn signal lamp do not light.	Probable cause
The ETACS-ECU controls the turn signal lamps based on input signals from the following switches. • Ignition switch (IG1) • Turn signal lamp left-hand switch • Turn signal lamp right-hand switch If none of the turn signal lamps are operating normally, either one of the above input circuit systems or the ETACS-ECU may be defective.	• Column switch fault • ETACS-ECU fault • Harness or connector fault

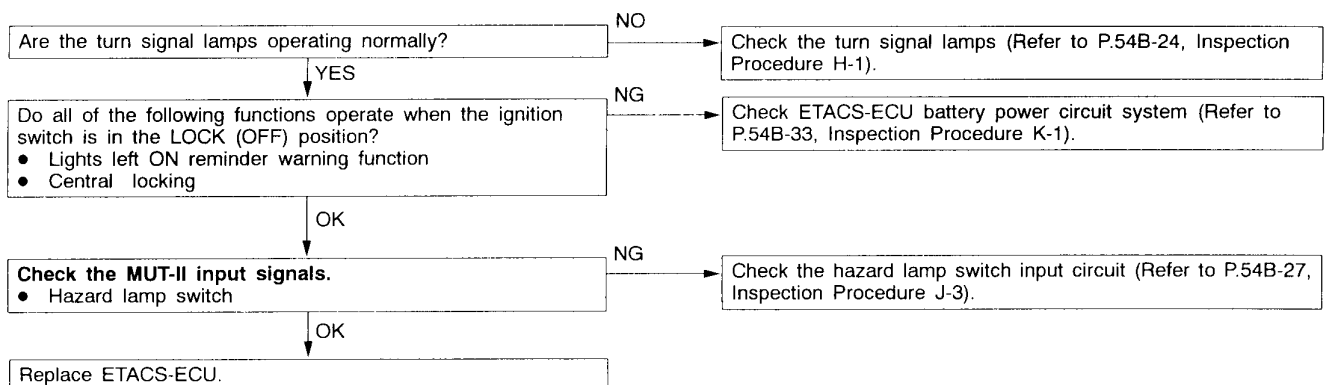


NOTE

If only one of the turn signal lamps is not lighting, check the bulb and the harness between the ETACS-ECU and the lamp, and between the lamp and the body earth.

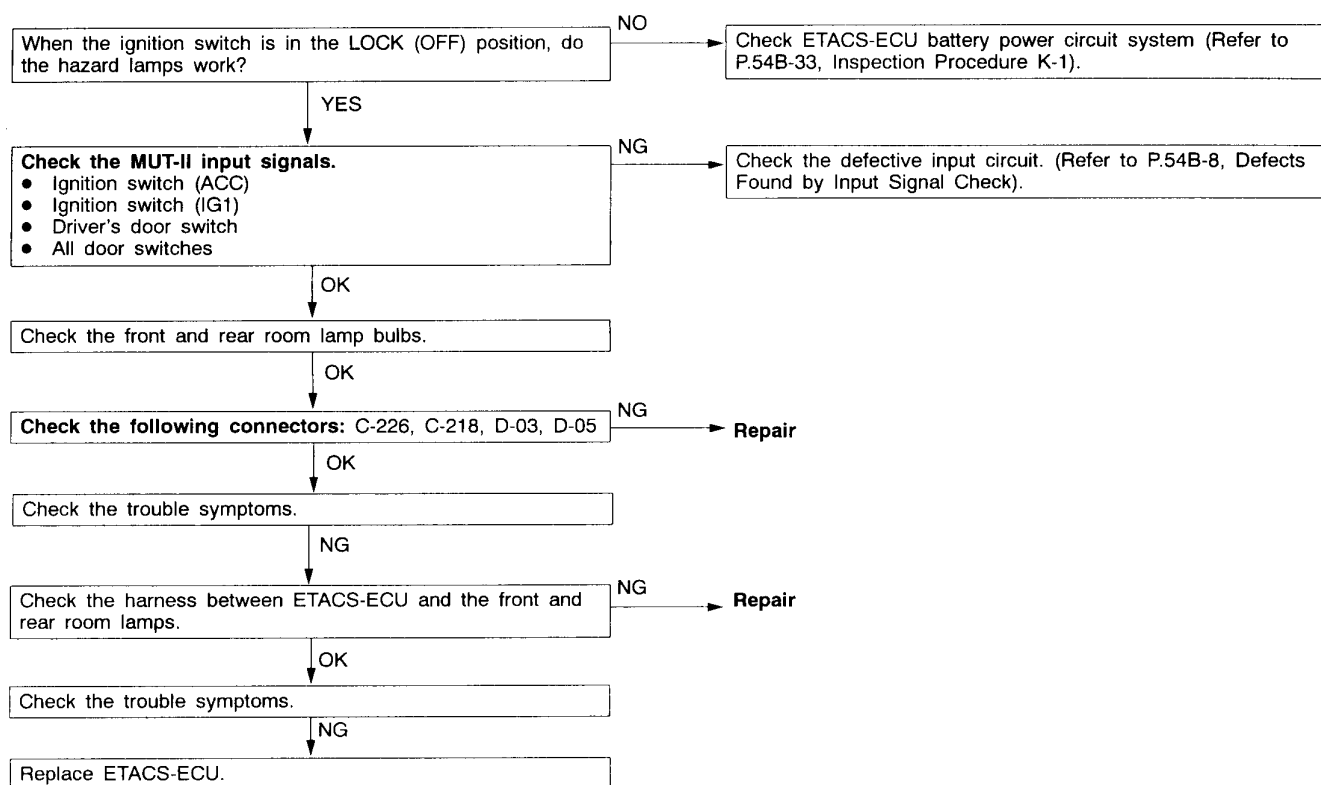
Inspection Procedure H-2

The hazard warning lamps do not light up.	Probable cause
The ETACS-ECU controls the hazard warning lamps based on input signals from the hazard warning lamp switch. If the hazard warning lamps are not operating normally, either the hazard warning lamp switch input circuit system or the ETACS-ECU may be defective.	• Hazard warning lamp switch fault • ETACS-ECU fault • Harness or connector fault



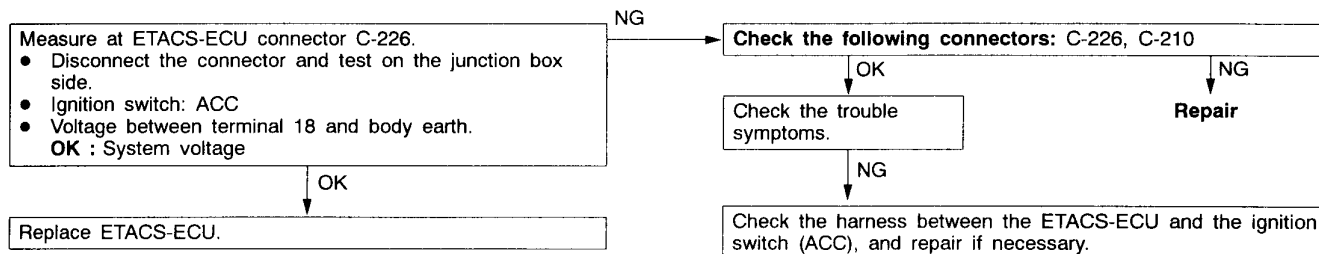
Inspection Procedure I-1

The room lamps do not come ON or OFF normally.	Probable cause
The ETACS-ECU controls the room lamp ON/OFF operation based on input signals from the following. • Ignition switch (ACC) • Ignition switch (IG1) • Driver's door switch • All door switches • Driver's door lock actuator If the room lamp ON/OFF operation is defective, either one of the above input circuit systems or the ETACS-ECU may be defective.	• Door switch fault • Driver's door lock actuator fault • ETACS-ECU fault • Harness or connector fault



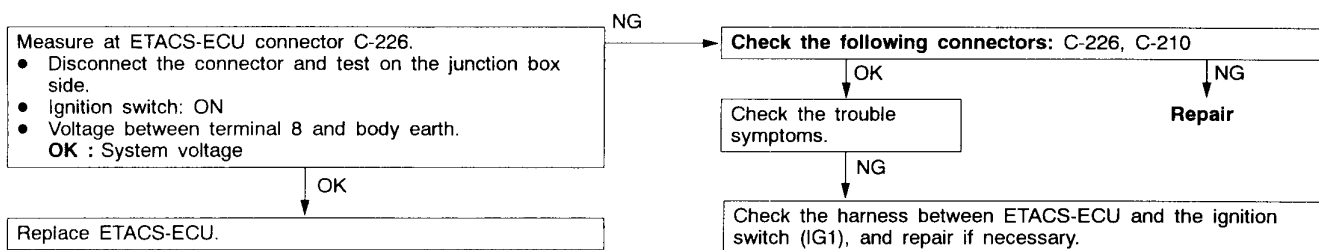
Inspection Procedure J-1

No ignition switch (ACC) signal input to ETACS-ECU.	Probable cause
As the ignition switch (ACC) input signal is used to control the operation of the following functions, any abnormality in this signal prevents these functions operating normally. • Windshield wiper and washer	• ETACS-ECU fault • Harness or connector fault



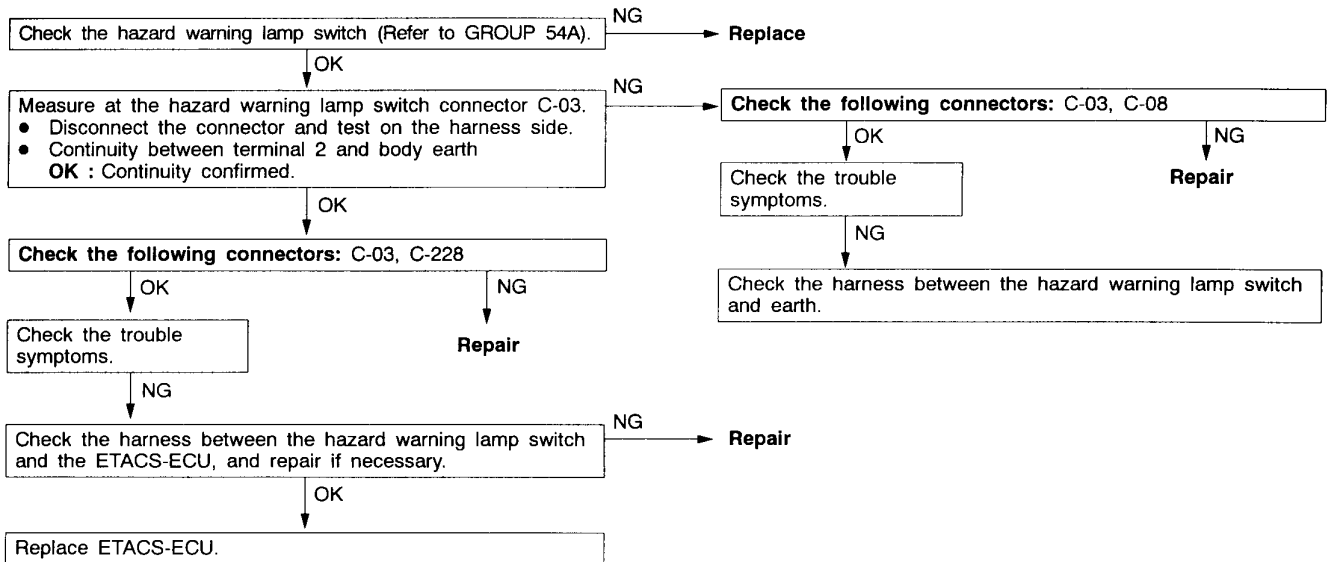
Inspection Procedure J-2

No ignition switch (IG1) signal input to ETACS-ECU.	Probable cause
As the ignition switch (IG1) input signal is used to control the operation of the following functions, any abnormality in this signal prevents these functions operating normally. • Lights left ON reminder warning function • Power window timer function • Headlamp automatic cut-off function • Turn signal lamps • Room lamps	• ETACS-ECU fault • Harness or connector fault



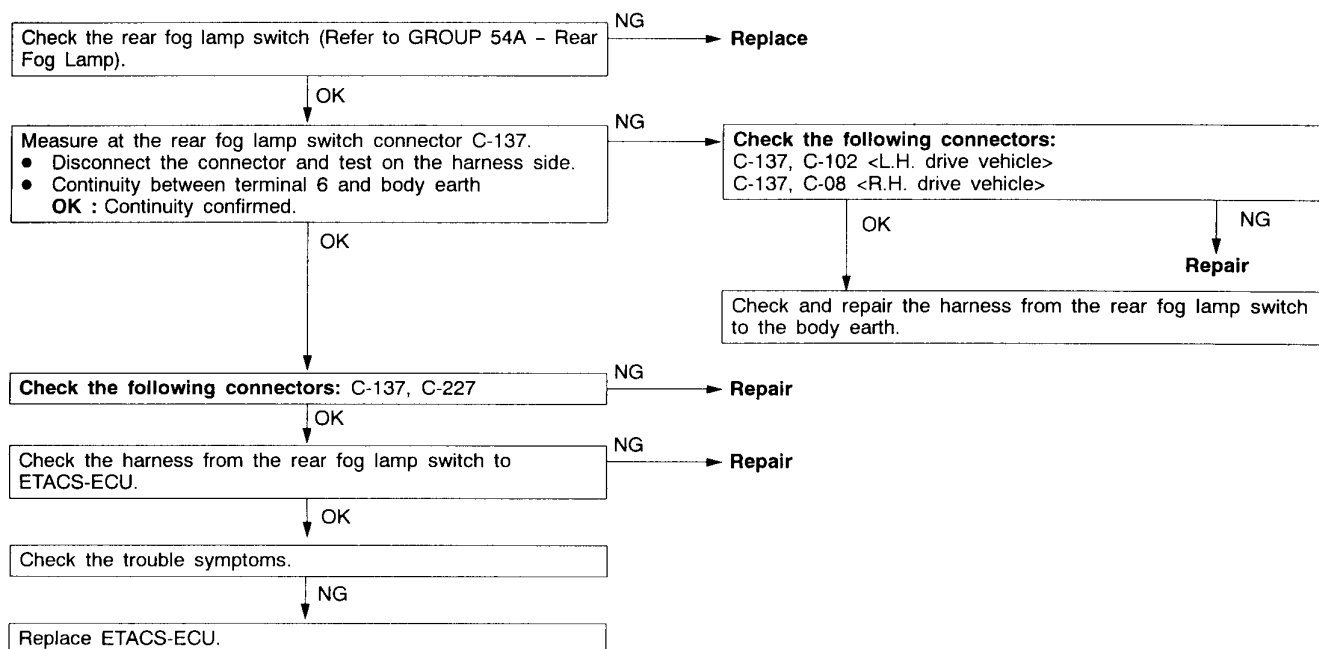
Inspection Procedure J-3

No hazard warning lamp switch signal input to ETACS-ECU.	Probable cause
As the hazard warning lamp switch input signal is used to control the operation of the following functions, any abnormality in this signal prevents these functions operating normally. • Hazard warning lamps	• Hazard warning lamp switch fault • ETACS-ECU fault • Harness or connector fault



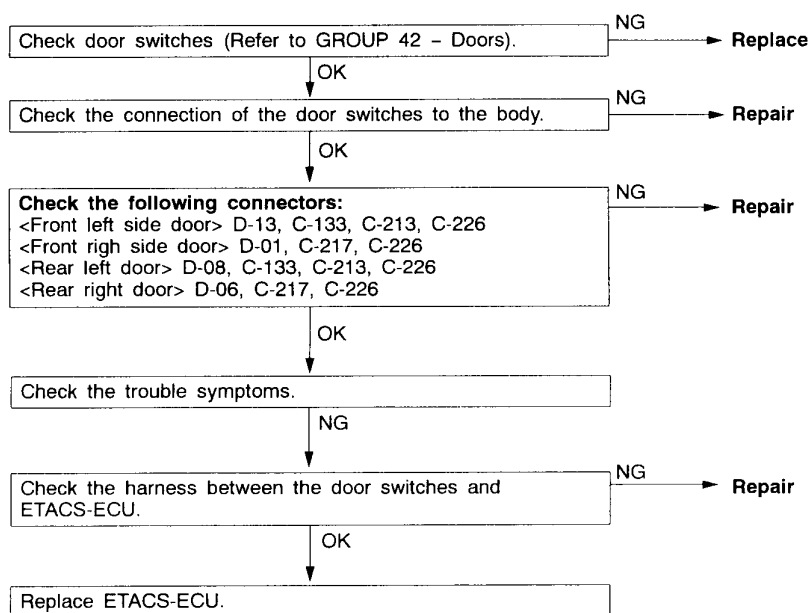
Inspection Procedure J-4

No fog lamp switch signal input to ETACS-ECU.	Probable cause
When the rear fog lamp switch input signal fault occurs, the rear fog lamp switch signal is not transmitted to the SWS communication line.	• Rear fog lamp switch inoperative • ETACS-ECU fault • Harness or connector fault



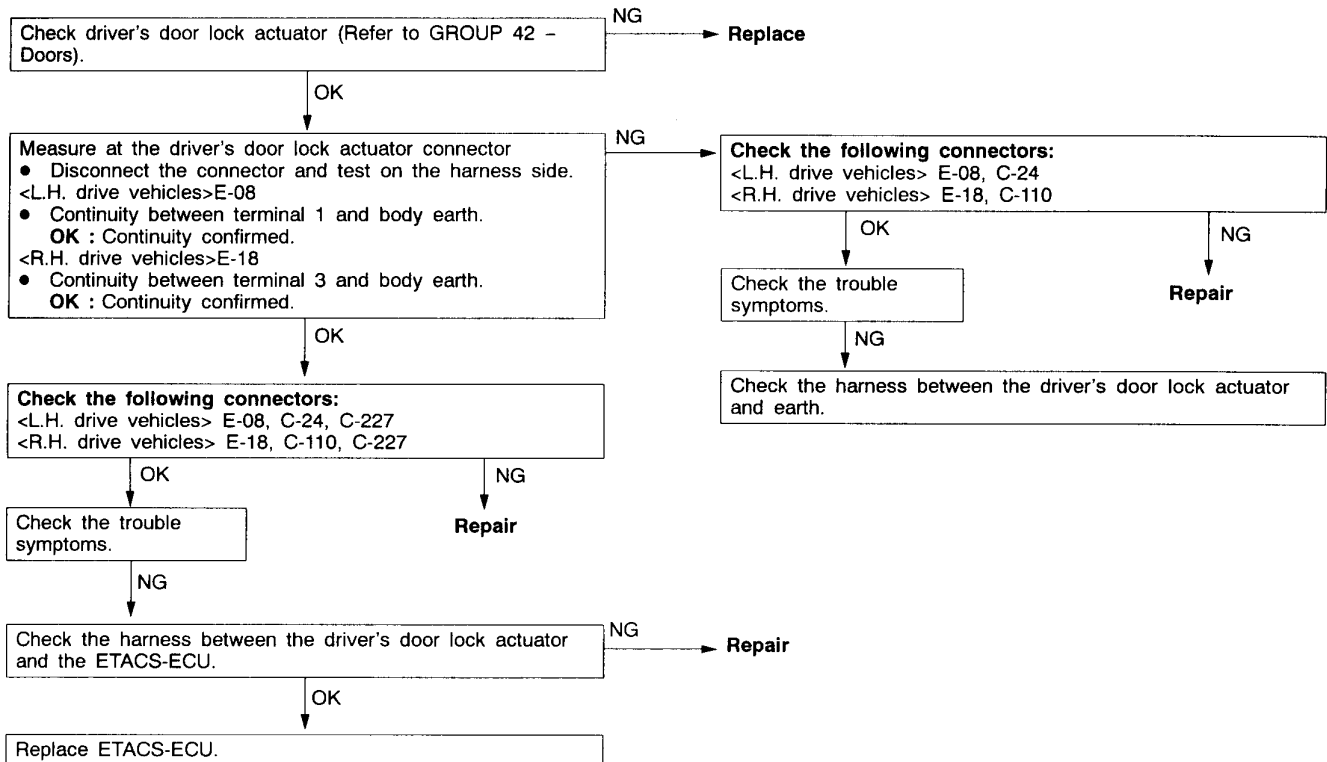
Inspection Procedure J-5

No driver's door switch signal input to ETACS-ECU.	Probable cause
No door switch signals input to ETACS-ECU.	
Driver's door switch As the driver's door switch input signal is used to control the operation of the following functions, any abnormality in this signal prevents these functions operating normally. • Lights left ON reminder warning function • Power window timer function • Headlamp automatic cut-off function • Room lamps Door switches As the door switch input signals are used to control the operation of the following functions, any abnormality in these signals prevents the functions operating normally. • Room lamps	• Door switch fault • ETACS-ECU fault • Harness or connector fault



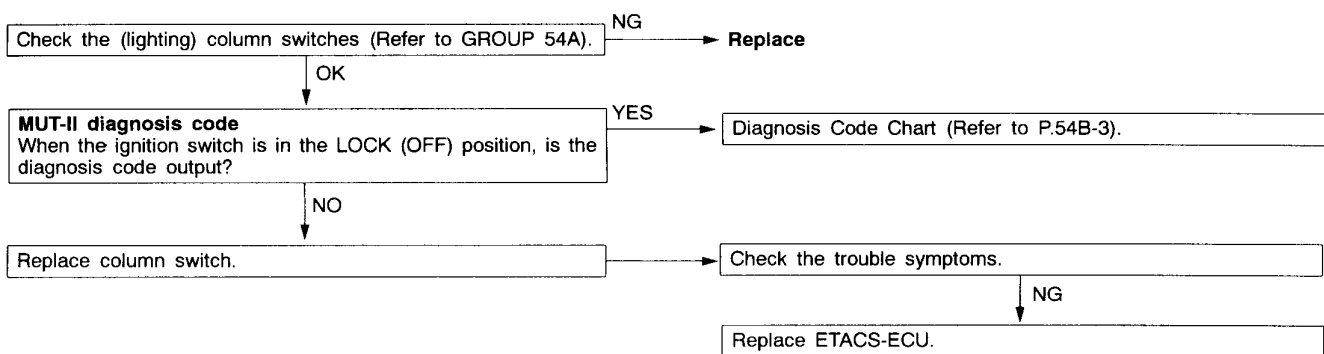
Inspection Procedure J-6

No driver's door lock actuator signal input to ETACS-ECU.	Probable cause
As the driver's door lock actuator input signal is used to control the operation of the following functions, any abnormality in this signal prevents these functions operating normally. Central locking	- Driver's door lock actuator fault - ETACS-ECU fault - Harness or connector fault



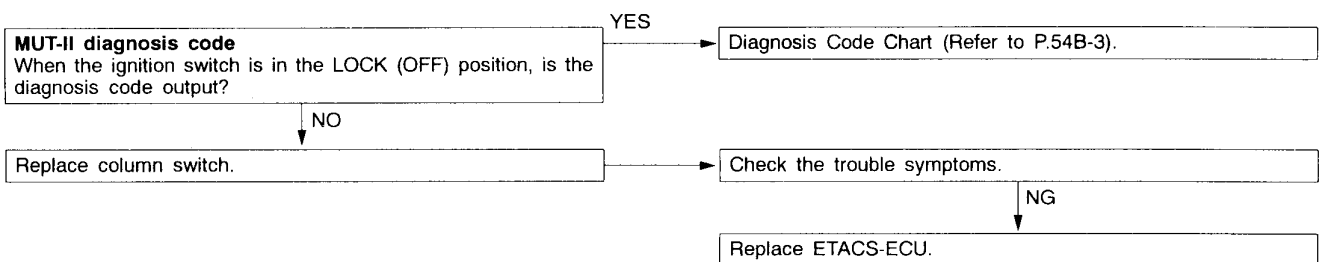
Inspection Procedure J-7

Column switches: • No tail lamp switch signal input to ETACS-ECU. • No headlamp switch signal input to ETACS-ECU. • No dimmer switch signal input to ETACS-ECU. • No passing switch signal input to ETACS-ECU. • No turn signal lamp left-hand switch signal input to ETACS-ECU. • No turn signal lamp right-hand switch signal input to ETACS-ECU.	Probable cause
As the (lighting) column switch input signals control the operation of the following functions, any abnormality in the signals prevents these functions operating normally. • Lights left ON reminder warning function • Headlamps, tail lamps • Turn signal lamps	• Column switch fault • ETACS-ECU fault • Harness or connector fault



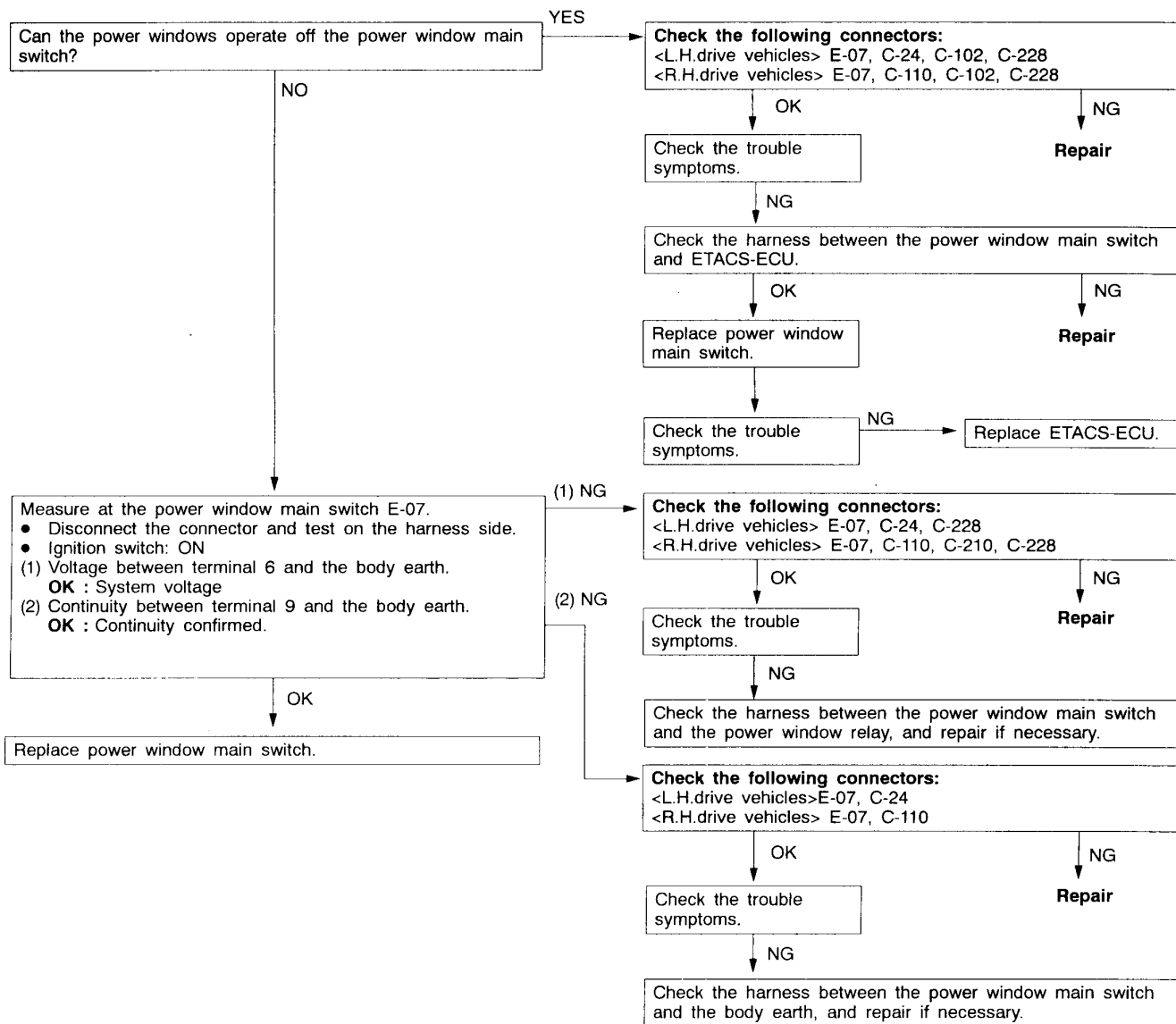
Inspection Procedure J-8

Column switches: • No windshield mist wiper switch signal input to ETACS-ECU. • No windshield wiper intermittent switch signal input to ETACS-ECU. • No windshield low-speed wiper switch signal input to ETACS-ECU. • No windshield high-speed wiper switch input to ETACS-ECU. • No windshield washer switch signal input to ETACS-ECU.	Probable cause
As the column switch (wiper/washer switch) input signal is used to control the following functions, any failure prevents these functions from operating properly. • Windshield wiper and washer	• Column switch fault • ETACS-ECU fault • Harness or connector fault



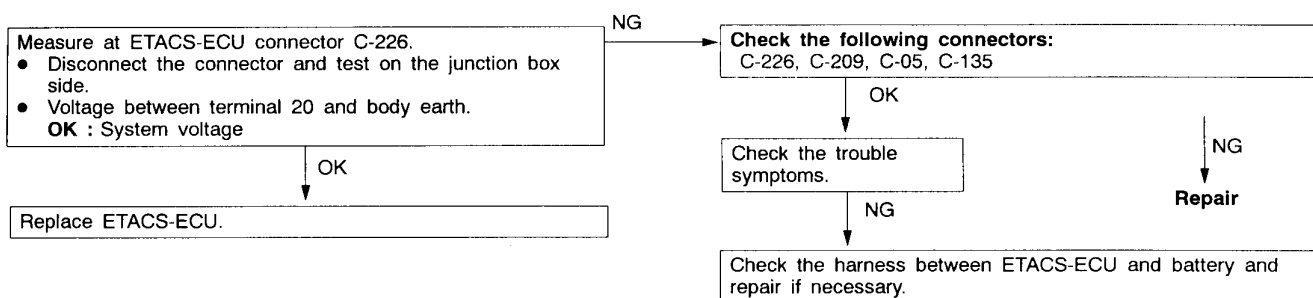
Inspection Procedure J-9

No power window main switch signal input to ETACS-ECU.	Probable cause
The power window main switch input signal is generated to check the individual switch position of the power window main switch, and the communication status for ETACS-ECU. Any communication line abnormality stops the following functions operating normally. Power windows	- Power window main switch fault - ETACS-ECU fault - Harness or connector fault



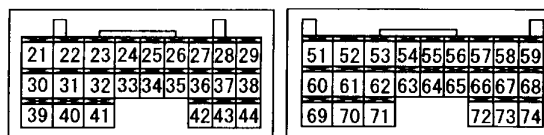
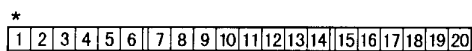
Inspection Procedure K-1

When the ignition switch is in the LOCK (OFF) position, no functions work normally.	Probable cause
Checking of the ETACS-ECU battery power supply circuit system.	Probable cause
As a fault in this circuit disables ETACS-ECU functions when the ignition switch is in the LOCK (OFF) position, any abnormality in this signal prevents the following functions operating. • Lights left ON reminder warning function • Power window timer function • Headlamp automatic cut-off function Or, the following functions operate when the ignition switch is in the ON position only. • Diagnosis code reading and input signal check by MUT-II. • Central locking • Headlamps, tail lamps • Hazard lamps • Room lamps	• ETACS-ECU fault • Harness or connector fault



CHECKS AT ECU TERMINALS

ETACS-ECU



Y0795AU

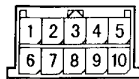
NOTE

*See the list below for data on the ETACS-ECU terminal 1 – 20 connectors. As the ETACS-ECU connects directly onto the junction box, the voltages cannot be measured.

Terminal No.	Check items	Checking requirements	Normal condition
1	Power window relay output	When power windows operating normally	System voltage
2	Battery power supply (for central locking)	Any time	System voltage
3	Earth (for ECU)	Any time	0 V
4	Ignition switch (ACC)	Ignition switch: ACC	System voltage
5	Room lamp output	When room lamps ON	2 V or below
6	–	–	–
7	Door switch input	When any one door switch ON (door open)	0 V
8	Ignition switch (IG1) power supply	Ignition switch: ON	System voltage
9	Right-hand turn signal lamp output	When right-hand turn signal lamp ON	System voltage
10	Driver's door switch input	When driver's door switch ON (door open)	0 V
11	Battery power supply (for hazard lamps)	Any time	System voltage
12	Central locking (lock) output	When door lock actuator operating (locking operation)	System voltage
13	Central locking (unlock) output (NOT driver's door)	When door lock actuator operating (unlocking)	System voltage
14	Left-hand turn signal lamp output	When left-hand turn signal lamp ON	System voltage
15 – 17	–	–	–
18	Ignition switch (ACC) power supply	Ignition switch: ACC	System voltage
19	Battery power supply for interior lamp	When interior lamp ON	System voltage
20	Battery power supply (for ECU)	Any time	System voltage
21	Rear fog lamp switch input	When the rear fog lamp switch ON	0 V
22	Central locking (unlock) output (for driver's door)	When door lock actuator operating (unlocking)	System voltage
23	–	–	–
24 – 32	–	–	–
33	Door lock key cylinder switch input (unlock switch)	When driver's door lock unlocked	0 V
34	Door lock key cylinder switch input (lock switch)	When driver's door lock locked	0 V

Terminal No.	Check items	Checking requirements	Normal condition
35	Driver's door lock actuator (locking switch) input	When driver's door lock locked	0 V
36	Driver's door lock actuator (unlocking switch) input	When driver's door lock unlocked	0 V
37, 38	–	–	–
39	Back-up lamp switch input	When shift lever in reverse position	System voltage
40	–	–	–
51	Diagnosis output/input check signal output	During diagnosis output (when MUT-II connected or diagnosis connector No. 1 grounded on the body.)	0 – 12 V (pulse signal)
		When an input check is output	0, 12 V (at input signal change)
52	Ignition switch (ACC) power supply	Ignition switch: ACC	System voltage
53, 54	–	–	–
55	Hazard warning lamp switch input	Hazard warning lamp switch: ON	0 V
56	Earth (for sensors)	Any time	0 V
57, 58	–	–	–
59	SWS communication line	Any time	0 – 12 V (pulse signal)
60	–	–	–
61	Battery power supply	Any time	System voltage
62	–	–	–
63	Vehicle speed signal input	When vehicle driven	0 – 12 V (pulse signal)
64 – 66	–	–	–
67	Diagnosis control input	When MUT-II connected	0 V
68	SWS request signal output	Any time	0 – 12 V (pulse signal)
69	Ignition key cylinder illumination lamp output	When ignition key cylinder illumination lamp ON	2 V or below
70	–	–	–
71 – 73	–	–	–
74	Rear fog lamp output <Europe and General Export-spec. models>	When rear fog lamps ON	System voltage

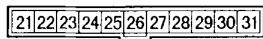
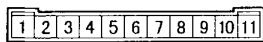
COLUMN SWITCHES



X1209CA

Terminal No.	Check item	Checking requirements	Normal condition
1	Battery power supply	Any time	System voltage
2	SWS request signal input	Any time	0 – 12 V (pulse signal)
3	SWS communication line	Any time	0 – 12 V (pulse signal)
4	Earth	Any time	0 V
5 – 7	–	–	–
8	Windshield wiper switch backup output	Windshield wiper low or high-speed switch: ON	0 V
9	Ignition switch (IG1) power supply	Ignition switch: ON	System voltage
10	Headlamp switch backup output	Headlamp switch: ON	0 V

FRONT-ECU



X1210CA

NOTE

See the list below for data on the front-ECU terminals. As the front-ECU connects directly onto the relay box, the voltages cannot be measured.

Terminal No.	Check item	Checking requirements	Normal condition
1	–	–	–
2	Headlamp (high-beam) output	When headlamp (high-beam) ON	System voltage
3, 4	Battery power supply (for headlamps)	Any time	System voltage
5	Battery power supply (for tail lamps)	Any time	System voltage
6	Headlamp (low-beam) output	When headlamp (low-beam) ON	System voltage
7	Battery power supply (for ECU)	Any time	System voltage
8	Tail lamp output	When tail lamps ON	System voltage
9 – 11	–	–	–
21	Windshield washer output	When windshield washer operating	System voltage
22	SWS communication line	Any time	0 – 12 V (pulse signal)
23	Windshield wiper automatic STOP signal input	When windshield wiper operating	System voltage
24	Ignition switch (ACC) power supply	Ignition switch: ACC	System voltage
25	Headlamp switch backup input	Headlamp switch: ON	0 V
26	Windshield wiper switch backup input	Windshield wiper low or high-speed switch: ON	0 V
27	Windshield wiper (low-speed) output	When windshield wiper operating (at low-speed)	System voltage
28	Windshield wiper (high-speed) output	When windshield wiper operating (at high-speed)	System voltage

Terminal No.	Check item	Checking requirements	Normal condition
30	Ignition switch (IG2) power supply	Ignition switch: ON	System voltage
31	Earth	Any time	0 V

POWER WINDOW MAIN SWITCH

Y0794AU

Terminal No.	Check item	Checking requirements	Normal condition
1	–	–	–
2	SWS communication line (with power window motor assembly)	Power window relay: ON	0 – 12 V (pulse signal)
3 – 5	–	–	–
6	Power supply	Power window relay: ON	System voltage
7	–	–	–
8	SWS communication line (with ETACS-ECU)	Any time	0 – 12 V (pulse signal)
9	Earth	Any time	0 V
10	–	–	–

POWER WINDOW MOTOR ASSEMBLY

X1213CA

Terminal No.	Check item	Checking requirements	Normal condition
1	Earth	Any time	0 V
2	Power window sub-switch (DOWN) input (passenger's and rear doors only)	Power window sub-switch: DOWN	0 V
3	Power supply	Power window relay: ON	System voltage
4	Power window sub-switch (UP) input (passenger's and rear doors only)	Power window sub-switch: UP	0 V
6	SWS communication line	Power window relay: ON	0 – 12 V (pulse signal)