

CHASSIS ELECTRICAL

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54109000310

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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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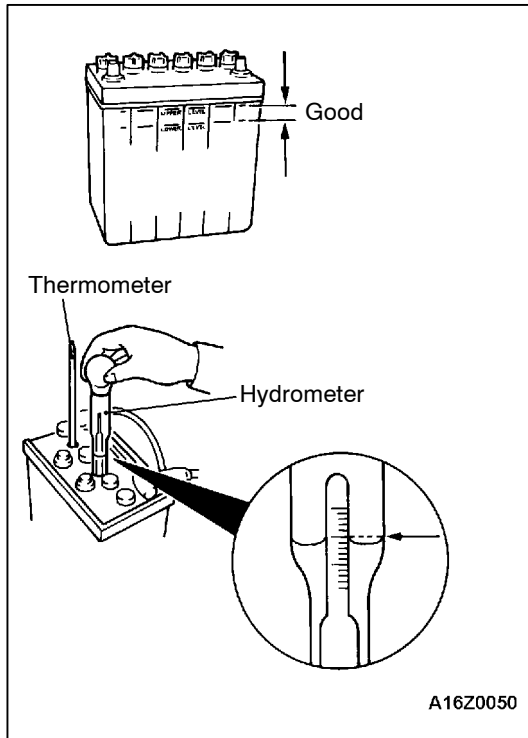
SMART WIRING SYSTEM (SWS)	109	SUNROOF	Refer to GROUP 42
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SERVICE BRAKES (ABS)		CONTROLLED DOOR MIRROR)	
. Refer to GROUP 35B	 Refer to GROUP 51	
DOOR GLASS AND REGULATOR		SUPPLEMENTAL RESTRAINT SYSTEM	
(POWER WINDOWS)		(SRS) Refer to GROUP 52B	
. Refer to GROUP 42		HEATER	Refer to GROUP 55
DOOR HANDLE AND LATCH		AIR CONDITIONER	
(DOOR LOCKING)	 Refer to GROUP 55	
. Refer to GROUP 42			

BATTERY

54100030028

SERVICE SPECIFICATION

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



ON-VEHICLE SERVICE

54100090071

FLUID LEVEL AND SPECIFIC GRAVITY CHECK

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

Standard value: 1.220 - 1.290 [20°C]

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

$$D_{20} = D_t + 0.0007 (t - 20)$$

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

D_t: Actually measured specific gravity

t: Actually measured temperature

CHARGING

54100110173

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

Caution

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

BATTERY TESTING PROCEDURE

54100120251

TEST STEP

- (1) Turn headlamps on for 15 seconds.
 (2) Turn headlamps off for 2 minutes to allow battery voltage to stabilize.
 (3) Disconnect cables.

OK

Read open circuit voltage.
OK: Open circuit voltage is more than 12.4 V

NG

Charge battery at 5 amps. (see LOAD TEST RATE CHART)

OK

Retest

- (1) Connect a load tester to the battery.
 (2) Load the battery at the recommended discharge rate (see LOAD TEST RATE CHART) for 15 seconds.
 (3) Read voltage after 15 seconds, then remove load.
 (4) Compare the measured value with the minimum voltage (see LOAD TEST CHART).
OK: Higher than minimum voltage

NG

Replace battery

OK

Normal

LOAD TEST RATE CHART

Battery type	75D23L
Charging time when fully discharged h [5-amp rated current charging]	11
Load test (Amps)	300

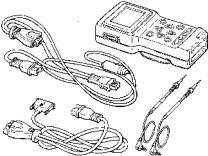
LOAD TEST CHART

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

IGNITION SWITCH AND IMMOBILIZER SYSTEM

54300060511

SPECIAL TOOL

Tool	Number	Name	Use
	MB991502	MUT-II sub assembly	<ul style="list-style-type: none"> • Immobilizer system check (Diagnosis display using the MUT-II) • Registration of the encrypted code

TROUBLESHOOTING

54300070699

Caution

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

STANDARD FLOW OF DIAGNOSIS TROUBLESHOOTING

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

DIAGNOSIS FUNCTION**DIAGNOSIS CODES CHECK**

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

ERASING DIAGNOSIS CODES

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

Caution

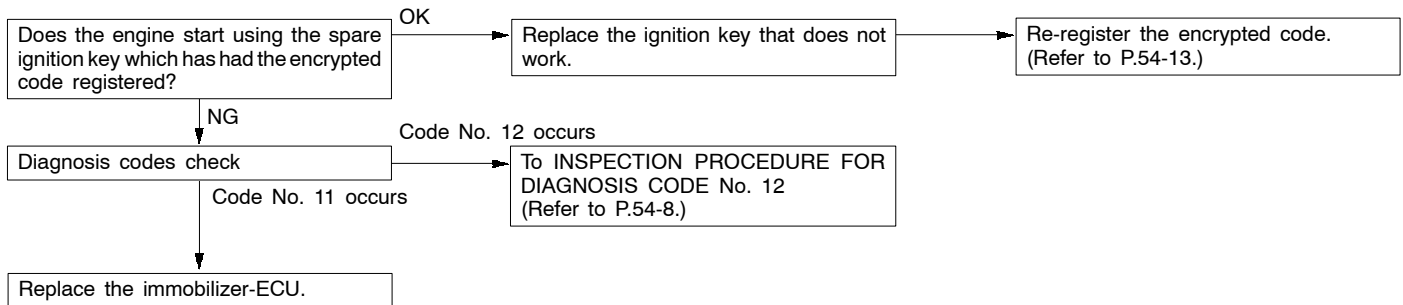
The diagnosis codes which result from disconnecting the battery cables cannot be erased.

INSPECTION CHART FOR DIAGNOSIS CODES

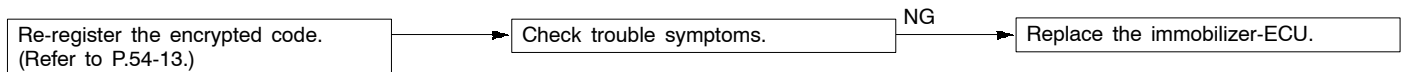
Diagnosis code No.	Inspection items	Reference page
11	Transponder communication system	54-8
12	Encrypted code are not the same or are not registered	54-8

INSPECTION PROCEDURE FOR DIAGNOSIS CODES

Code No. 11 Transponder communication system	Probable cause
The encrypted code of the transponder is not sent to the immobilizer-ECU immediately after the ignition switch is turned to the ON position.	<ul style="list-style-type: none"> ● Malfunction of the transponder ● Malfunction of the ignition key ring antenna ● Malfunction of the immobilizer-ECU



Code No. 12 Encrypted code are not the same or are not registered	Probable cause
The encrypted code which is sent from the transponder is not the same as the encrypted code which is registered in the immobilizer-ECU.	<ul style="list-style-type: none"> ● The encrypted code in the ignition key being used has not been properly registered. ● Malfunction of the immobilizer-ECU



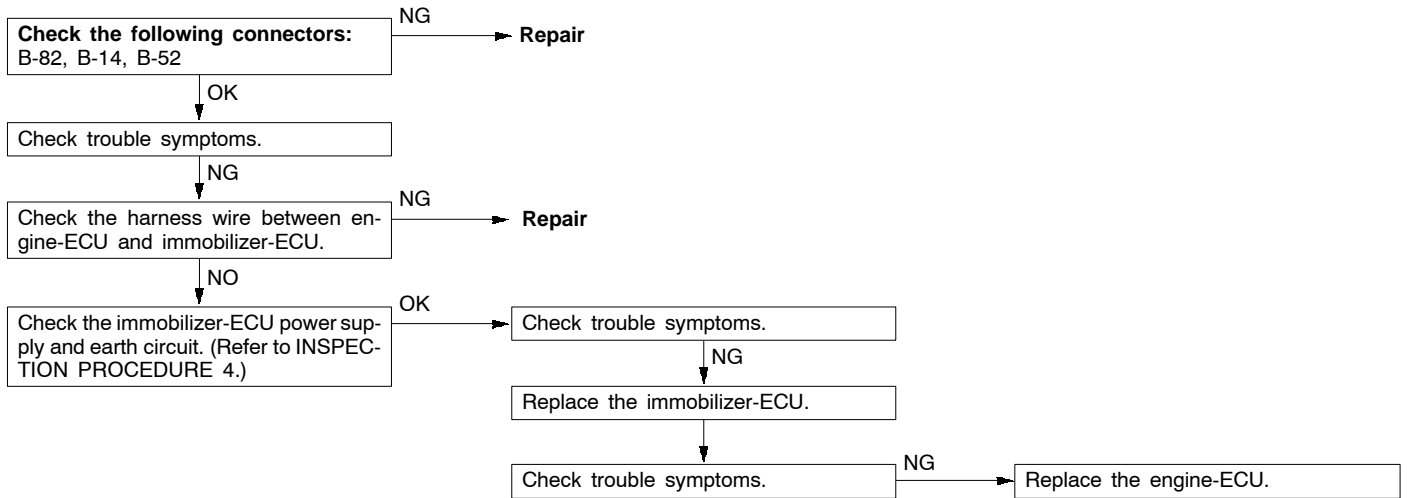
INSPECTION CHART FOR TROUBLE SYMPTOMS

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

INSPECTION PROCEDURE FOR TROUBLE SYMPTOMS

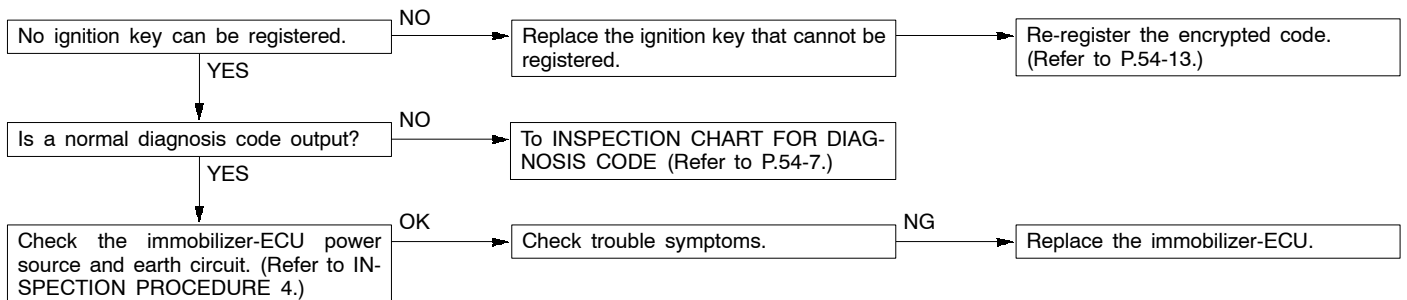
Inspection Procedure 1

<p>Diagnosis code No. 54 has been generated by the engine-ECU.</p>	<p>Probable cause</p>
<p>There is a problem with communication between the engine-ECU and the immobilizer-ECU.</p>	<ul style="list-style-type: none"> ● Malfunction of harness or connector ● Malfunction of the immobilizer-ECU ● Malfunction of the engine-ECU



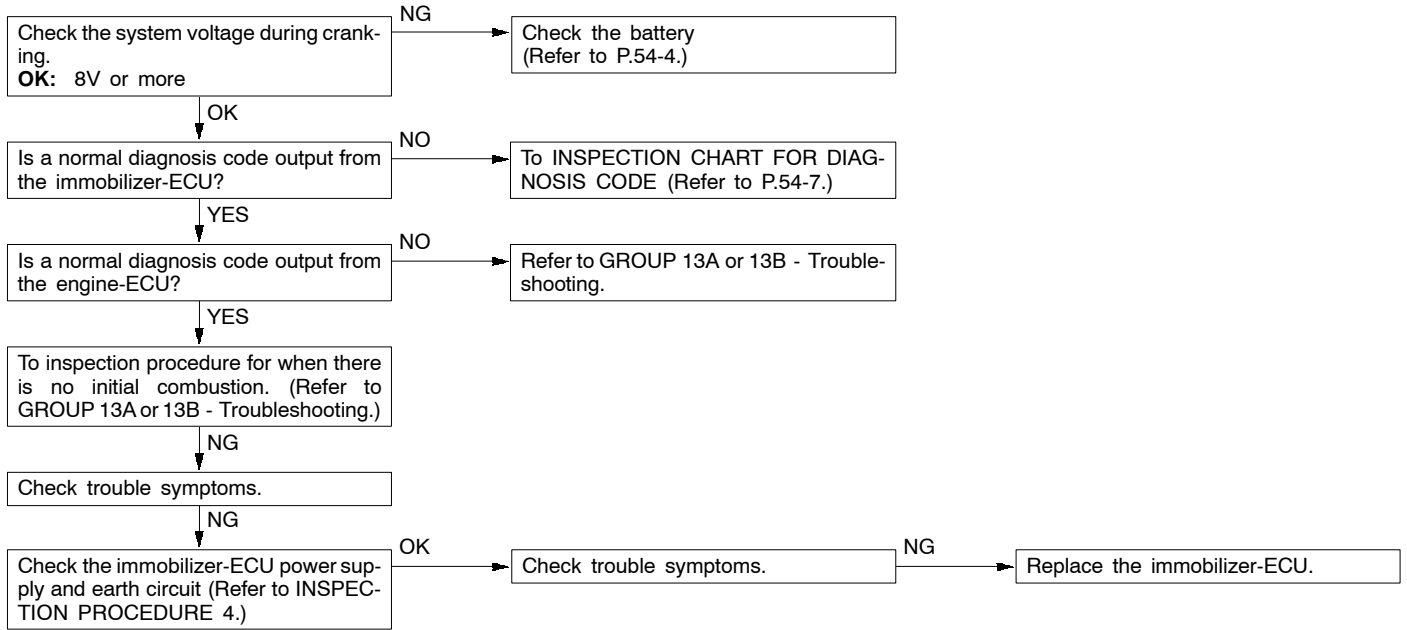
Inspection Procedure 2

<p>Encrypted code cannot be registered using the MUT-II.</p>	<p>Probable cause</p>
<p>The cause is probably that there is no encrypted code registered in the immobilizer-ECU, or there is a malfunction of the immobilizer-ECU.</p>	<ul style="list-style-type: none"> ● Malfunction of the transponder ● Malfunction of the ignition key ring antenna ● Malfunction of harness or connector ● Malfunction of the immobilizer-ECU



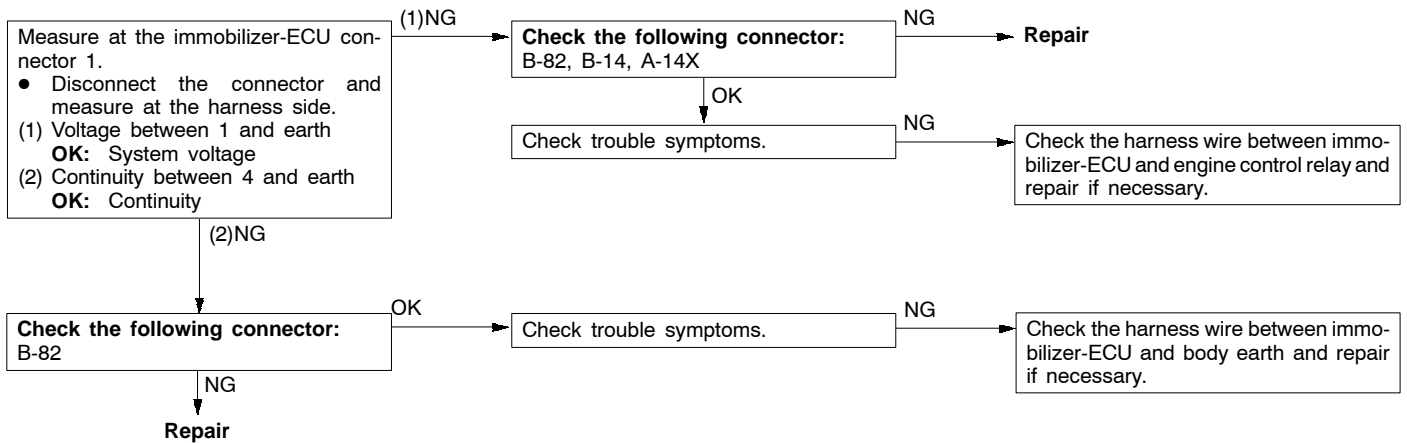
Inspection Procedure 3

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

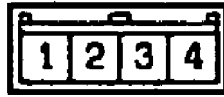


Inspection Procedure 4

Malfunction of the immobilizer-ECU power supply and earth circuit



CHECK AT IMMOBILIZER-ECU
TERMINAL VOLTAGE CHECK CHART



W0599AE

Terminal No.	Signal	Checking requirements	Terminal voltage
1	Immobilizer-ECU power supply	Ignition switch: ON	System voltage
2	—	—	—
3	Engine-ECU	—	—
4	Immobilizer-ECU earth	Always	0 V

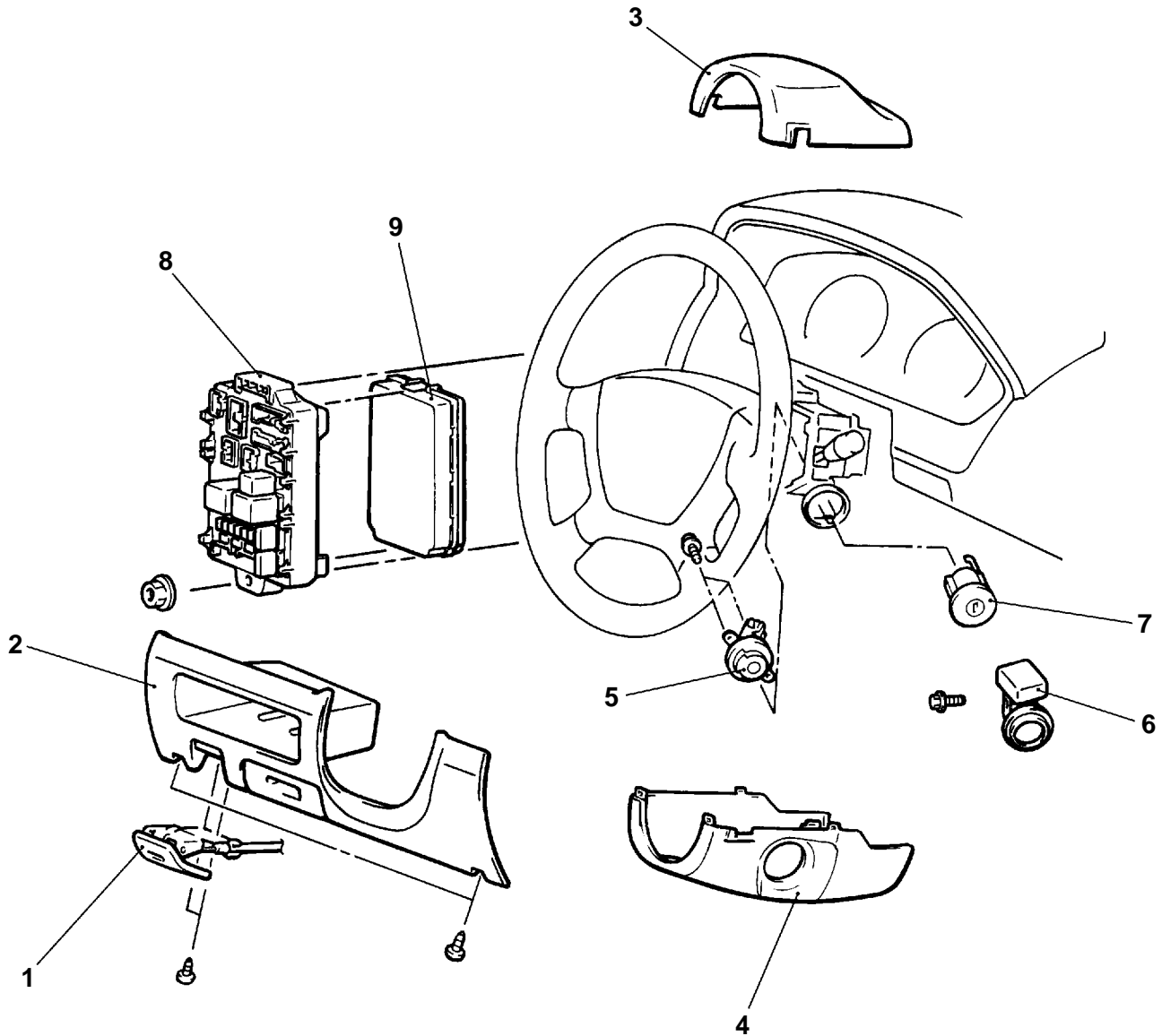
IGNITION SWITCH AND IMMOBILIZER SYSTEM

54300210497

REMOVAL AND INSTALLATION

Caution: SRS

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



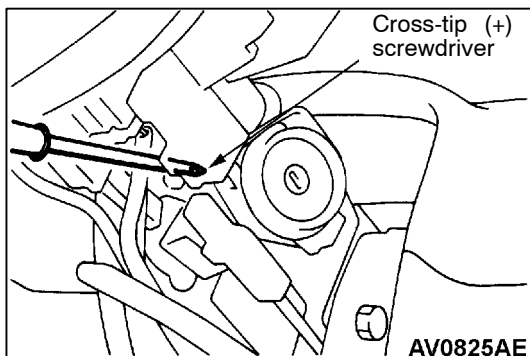
AW0579AE

Removal steps

1. Hood lock release handle
2. Instrument under cover
(Refer to GROUP 52A - Instrument Panel.)
3. Column cover, upper



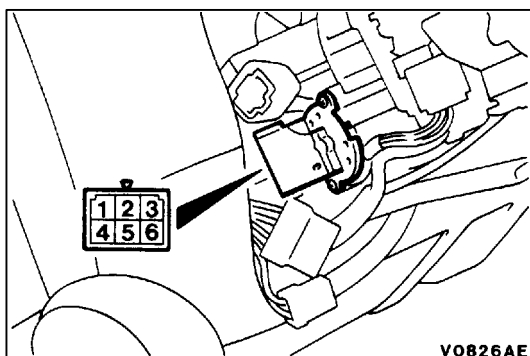
4. Column cover, lower
5. Ignition switch
6. Immobilizer-ECU
7. Steering lock cylinder
8. Junction block
9. ETACS-ECU



REMOVAL SERVICE POINTS

◀▶ STEERING LOCK CYLINDER REMOVAL

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



INSPECTION

54300220346

IGNITION SWITCH CONTINUITY CHECK

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

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

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

54300810093

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.

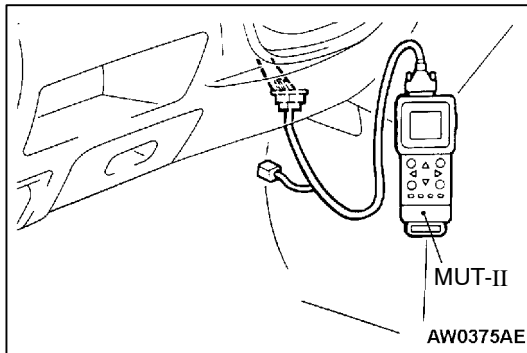
ENCRYPTED CODE REGISTRATION METHOD

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

Caution

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



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

Caution

Turn off the ignition switch before connection or disconnection of the MUT-II.

2. Check that the diagnosis code No.54 is not being generated by the engine-ECU. If it is being generated check according to the Troubleshooting Procedures.
3. Use the ignition key that is to be registered to turn on the ignition switch.
4. Use the MUT-II to register the encrypted code. To register the second or subsequent key, leave the MUT-II connected and remove the first registered key. Within 5 seconds insert the key to be registered and turn on the ignition switch.

NOTE

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

5. This completes the registration operation. Turn off the ignition switch and wait for approx. 10 seconds.
6. Check that the engine can be started with each of the ignition keys.
7. Check the diagnosis output from engine-ECU, and erase code No.54 if it appears.

COMBINATION METERS

54300030291

SERVICE SPECIFICATIONS

Items	Items	Standard value	
Speedometer indication error km/h(mph)	40 (20)	40 - 48 (20 - 25)	
	80 (40)	80 - 92 (40 - 47)	
	120 (60)	120 - 136 (60 - 69)	
	160 (80)	160 - 180 (80 - 91)	
	- (100)	- (100 - 114)	
Tachometer indication error r/min	700	±100	
	3,000	±150	
	5,000	±250	
	6,000	±300	
Fuel gauge unit resistance Ω	Main	Float point F	1 - 3
		Float point E	56.5 - 62.5
	Sub	Float point F	1 - 3
		Float point E	48.5 - 54.5
Fuel gauge unit float height mm	Main	A (Float point F)	31.8 - 37.8
		B (Float point E)	128.7 - 134.7
	Sub	A (Float point F)	20.5 - 26.5
		B (Float point E)	133.7 - 139.7
Engine coolant temperature gauge unit resistance (at 70°C) Ω		104 ± 13.5	
Fuel gauge resistance Ω	Power supply and earth	350	
	Power supply and fuel gauge	250	
	Fuel gauge and earth	100	
Engine coolant temperature gauge resistance Ω	Power supply and earth	194	
	Power supply and engine coolant temperature gauge	90	
	Engine coolant temperature gauge and earth	254	

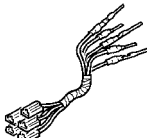
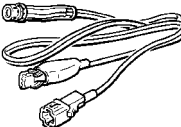


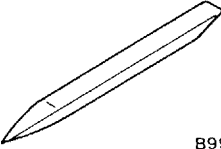
SEALANT

54300050037

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

SPECIAL TOOLS

54300060108

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

TROUBLESHOOTING

54300070705

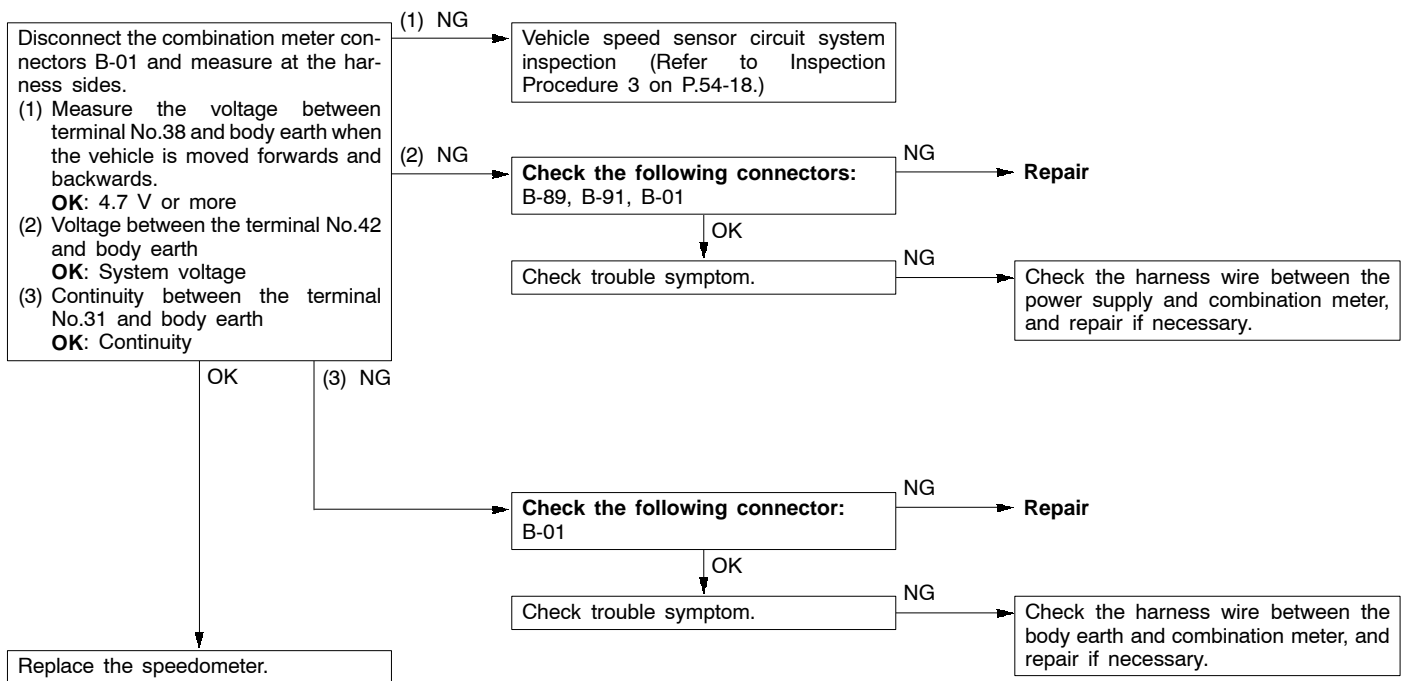
INSPECTION CHART FOR TROUBLE SYMPTOMS

Trouble symptom	Inspection procedure	Reference page
Speedometer does not work.	1	54-17
Tachometer does not work.	2	54-18
Fuel gauge does not operate.	4	54-19
Engine coolant temperature gauge does not operate.	5	54-20

INSPECTION PROCEDURE FOR TROUBLE SYMPTOMS

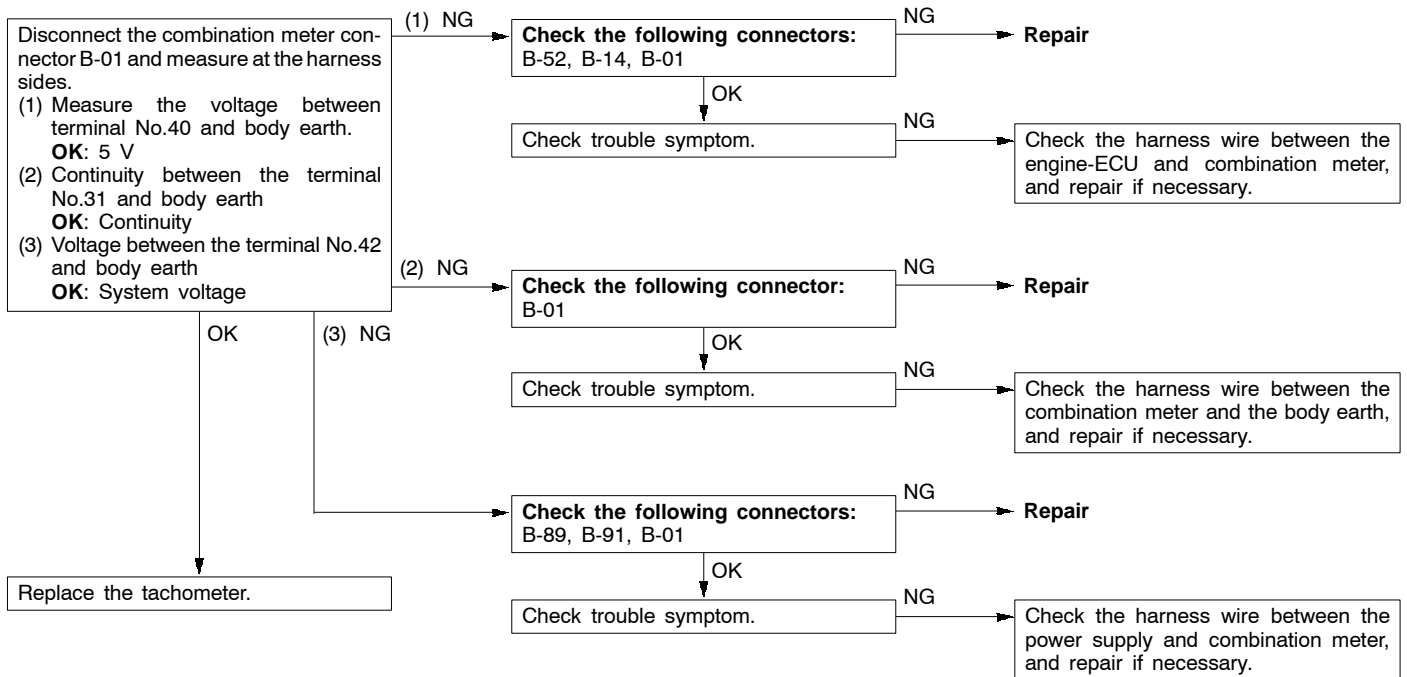
Inspection Procedure 1

Speedometer does not work.	Probable cause
The cause may be a defective vehicle speed sensor circuit system or a defective speedometer. Vehicle speed sensor is co-used among the engine-ECU and A/T-ECU.	<ul style="list-style-type: none"> ● Malfunction of vehicle speed sensor ● Malfunction of speedometer ● Malfunction of harness or connector



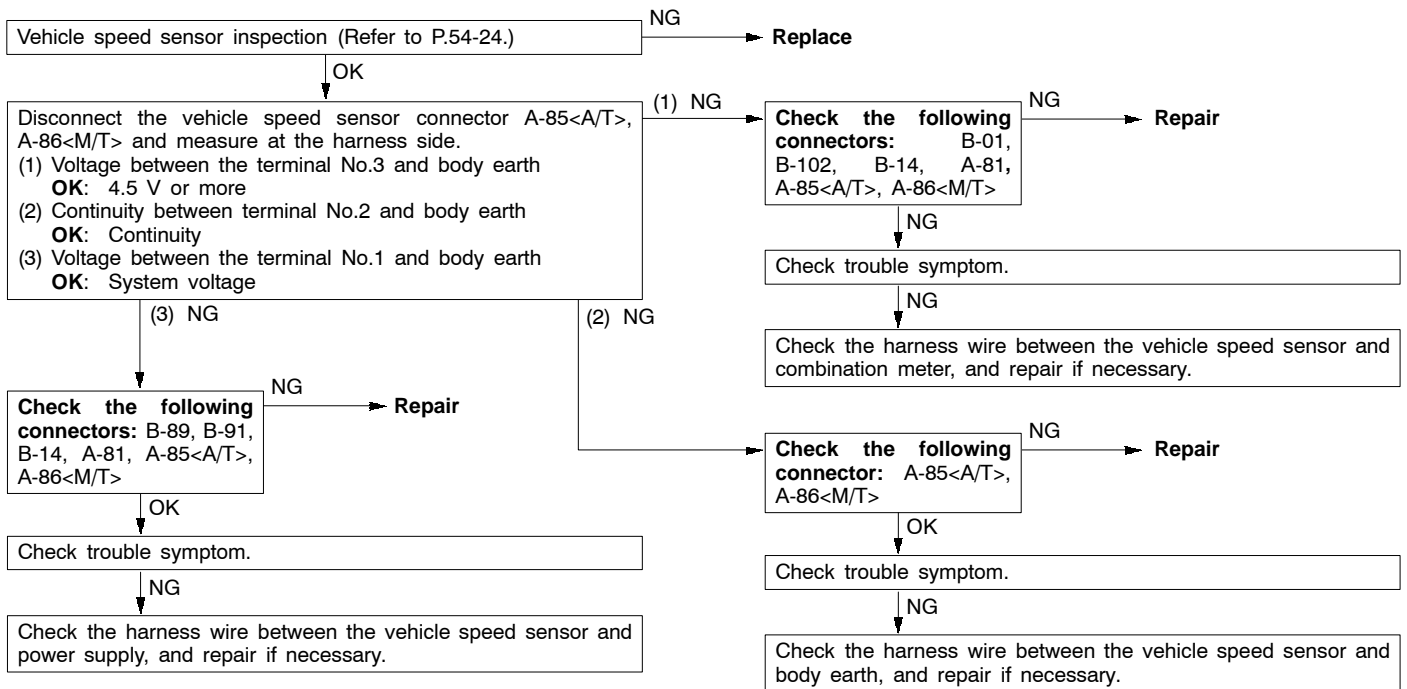
Inspection Procedure 2

Tachometer does not work.	Probable cause
The ignition signal may not be input from the engine, or there may be a malfunction in the power supply or earth circuit.	<ul style="list-style-type: none"> • Malfunction of tachometer • Malfunction of harness or connector



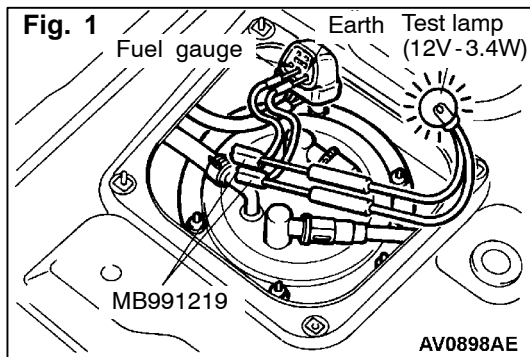
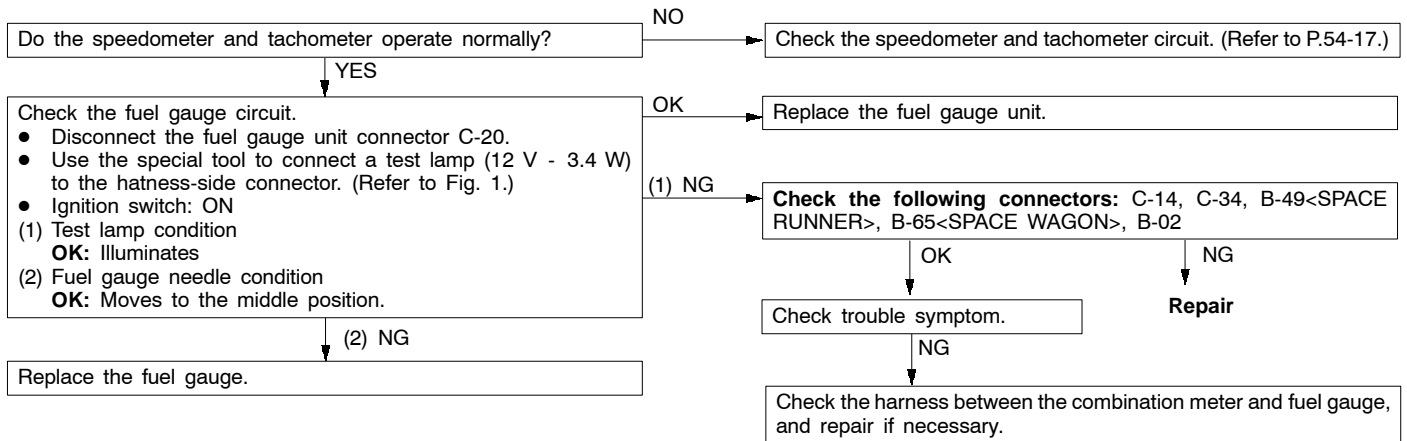
Inspection Procedure 3

Vehicle speed sensor circuit system inspection



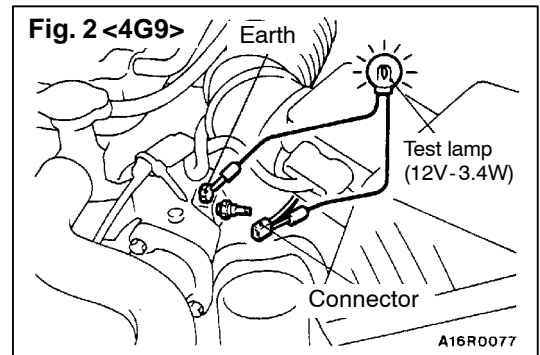
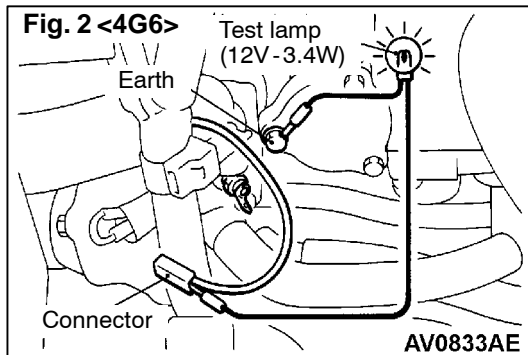
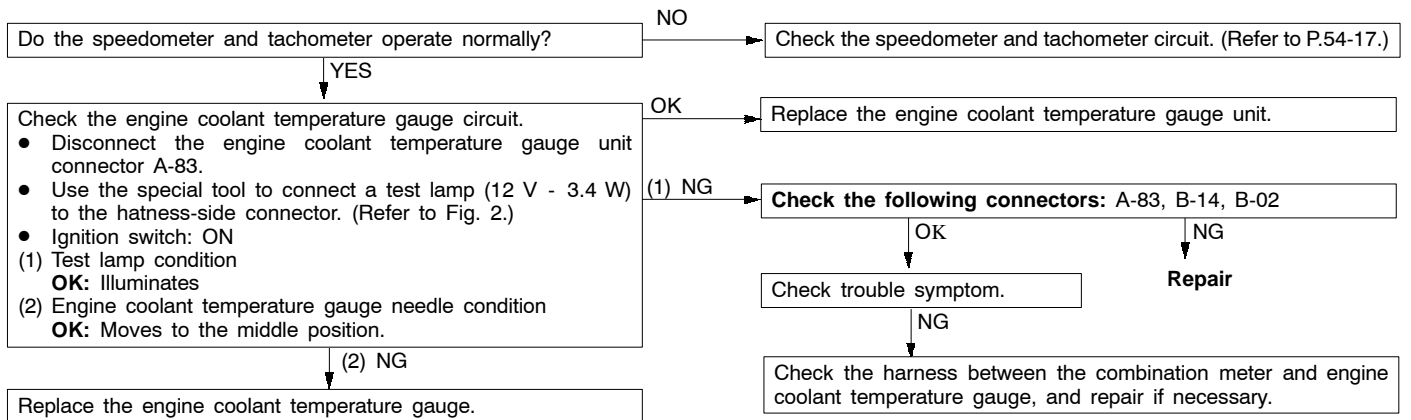
Inspection Procedure 4

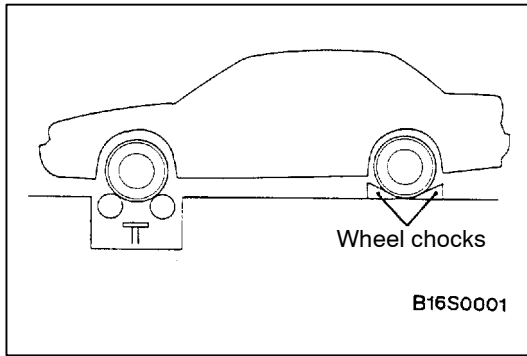
Fuel gauge does not operate.	Probable cause
If speedometer and tachometer operate normally, the harness from power supply to combination meter is normal.	<ul style="list-style-type: none"> ● Malfunction of fuel gauge unit ● Malfunction of fuel gauge ● Malfunction of harness or connector



Inspection Procedure 5

Engine coolant temperature gauge does not operate.	Probable cause
If speedometer and tachometer operate normally, the harness from power supply to combination meter is normal.	<ul style="list-style-type: none"> ● Malfunction of engine coolant temperature gauge unit ● Malfunction of engine coolant temperature gauge ● Malfunction of harness or connector





ON-VEHICLE SERVICE

54300090237

SPEEDOMETER CHECK

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

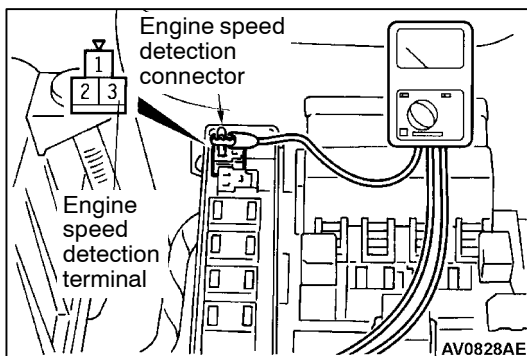
3. Check if the speedometer indicator range is within the standard values.

Caution

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

Standard values:

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



TACHOMETER CHECK

54300100244

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

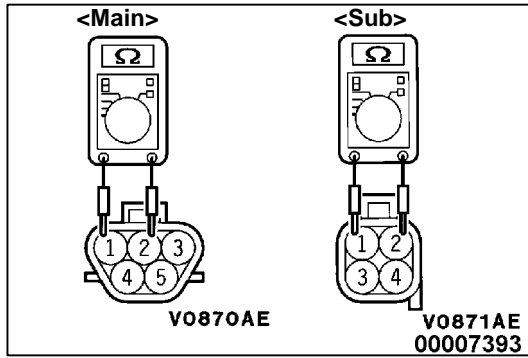
NOTE

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

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

Standard values:

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



FUEL GAUGE UNIT CHECK

54300120400

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

FUEL GAUGE UNIT RESISTANCE

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

Standard value:

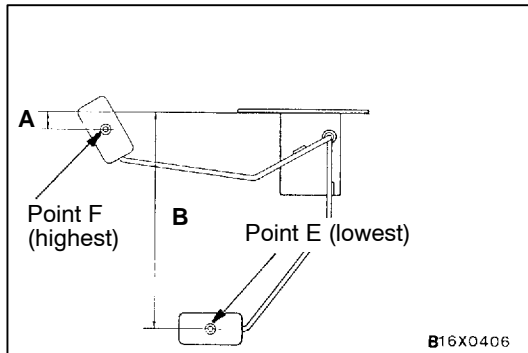
Items		Standard value Ω
Main	Float point F	1 - 3
	Float point E	56.5 - 62.5
Sub	Float point F	1 - 3
	Float point E	48.5 - 54.5

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

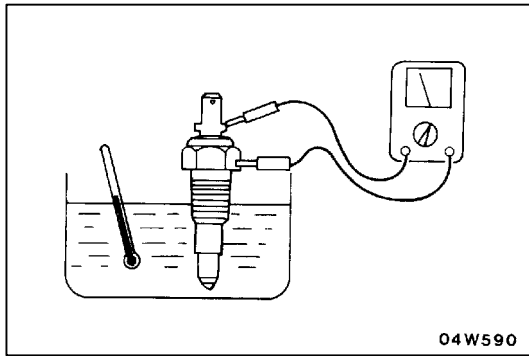
FUEL GAUGE UNIT FLOAT HEIGHT

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

Standard value:



Items		Standard value mm
Main	Float point F	31.8 - 37.8
	Float point E	128.7 - 134.7
Sub	Float point F	20.5 - 26.5
	Float point E	133.7 - 139.7

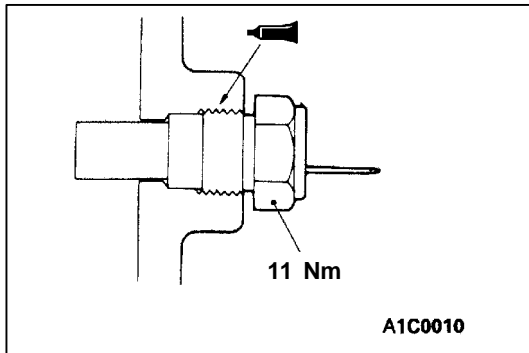


ENGINE COOLANT TEMPERATURE GAUGE UNIT CHECK

54300150041

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

Standard value: 104 ± 13.5 Ω



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

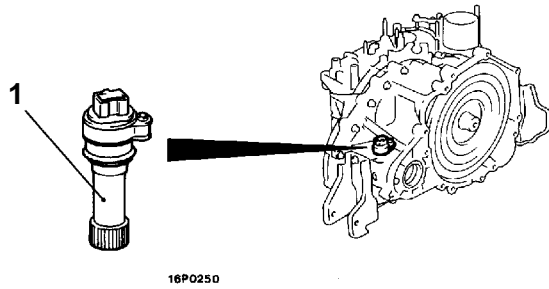
Specified sealant:

3M Adhesive Nut Locking No. 4171 or equivalent

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

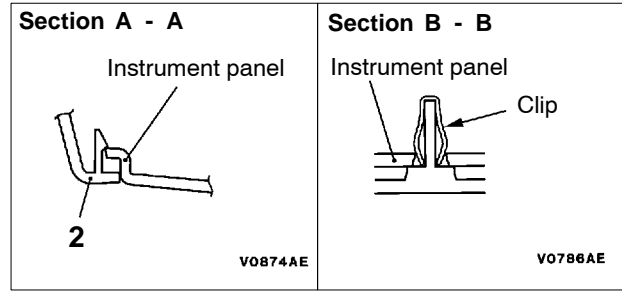
**COMBINATION METERS
REMOVAL AND INSTALLATION**

54300290286



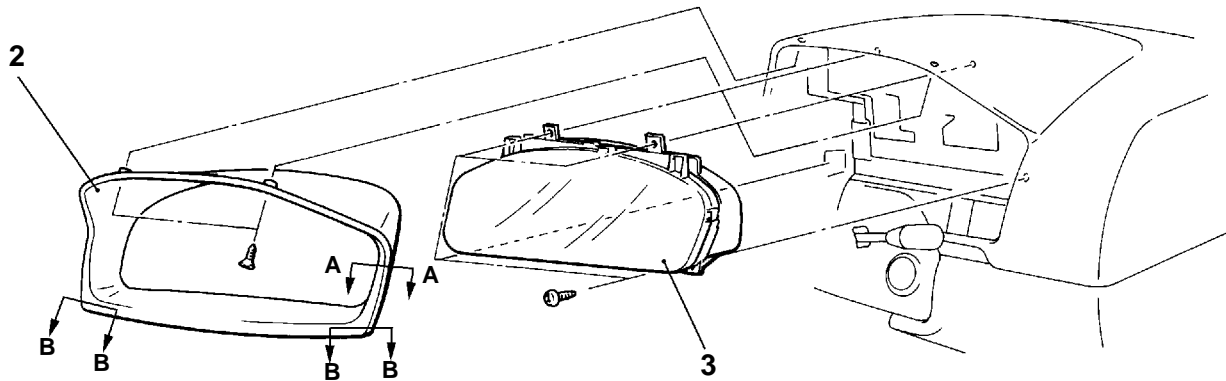
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V0874AE

V0786AE



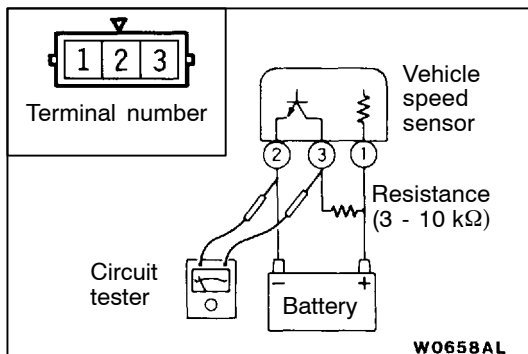
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Speed sensor removal steps

- Air cleaner assembly
- 1. Speed sensor

Combination meter removal steps

2. Meter hood
3. Combination meter



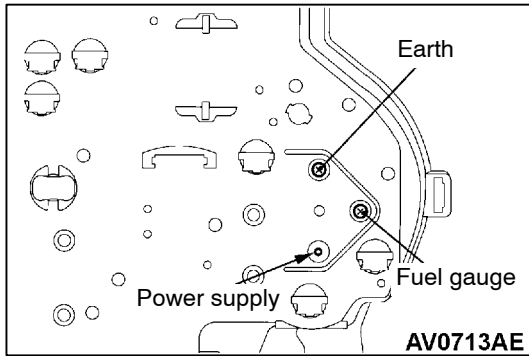
W0658AL

INSPECTION

54300300217

VEHICLE SPEED SENSOR INSPECTION

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

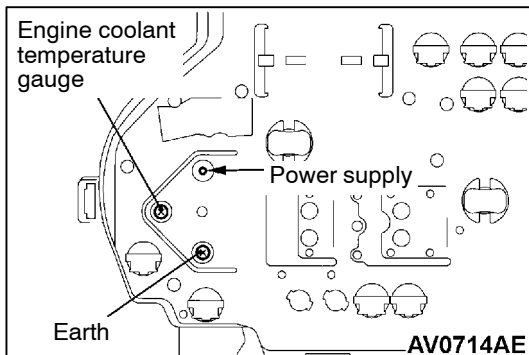
**FUEL GAUGE RESISTANCE CHECK**

54300300224

1. Remove the power supply tightening screw.
2. Use an ohmmeter to measure the resistance value between the terminals.

Standard value:Power supply - Earth: 350 Ω Power supply - Fuel gauge: 250 Ω Fuel gauge - Ground: 100 Ω **Caution**

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

**ENGINE COOLANT TEMPERATURE GAUGE RESISTANCE CHECK**

54300300231

1. Remove the power supply tightening screw.
2. Use an ohmmeter to measure the resistance value between the terminals.

Standard value:Power supply - Earth: 194 Ω Power supply - Engine coolant temperature gauge: 90 Ω Engine coolant temperature gauge - Earth: 254 Ω **Caution**

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

HEADLAMP, FRONT TURN-SIGNAL LAMP AND FRONT FOG LAMP

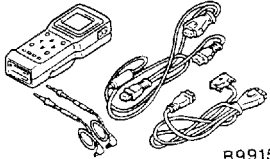
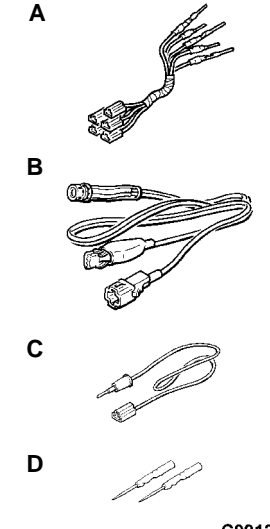
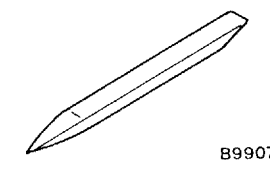
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SERVICE SPECIFICATIONS

Items		Standard value	Limit
Headlamp aiming for low beam	Vertical direction	60 mm below horizontal (H)	-
	Horizontal direction	Position where the 15° sloping section intersects the vertical line (V)	-
Headlamp intensity cd		-	30,000 or more
Front fog lamp aiming	Vertical direction	100 mm below horizontal (H)	-
	Horizontal direction	Parallel to direction of vehicle travel	-

SPECIAL TOOLS

54200060594

Tool	Number	Name	Use
 <p>B991502</p>	MB991502	MUT-II sub assembly	ETACS-ECU input check
 <p>A B C D</p> <p>C991223</p>	MB991223 A: MB991219 B: MB991220 C: MB991221 D: MB991222	Harness set A: Test harness B: LED harness C: LED harness adapter D: Probe	Making voltage and resistance measurements during troubleshooting A: Connector pin contact pressure inspection B: Power circuit inspection C: Power circuit inspection D: Commercial tester connection
 <p>B990784</p>	MB990784	Ornament remover	Removal of switch garnish

TROUBLESHOOTING

54200070610

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

DIAGNOSIS FUNCTION

INPUT SIGNAL INSPECTION PROCEDURE

1. Connect the MUT-II or a voltmeter to the diagnosis connector to check input signal. (Refer to GROUP 00 - How to Use Troubleshooting/Inspection Service Points.)
2. The following input signals can be checked:
 - Lighting switch (AUTO, HEAD, TAIL, Passing, Dimmer)
 - Turn signal lamp switch (R.H., L.H.)
 - Front fog lamp switch
 - Hazard lamp switch
 - Mist

NOTE

If all the input signals cannot be check by using the MUT-II, the diagnosis circuit may be defective.

ETACS FUNCTION ADJUSTMENT PROCEDURE

The following functions can be adjusted by operating input switches. The adjustments will be stored in the ECU memory even after a battery cable is disconnected:

- Automatic headlamp switch-off function
1. Entry conditions to the adjustment mode
The ETACS-ECU sounds a buzzer once when all of the following conditions are satisfied, and then enters the adjustment mode:
 - Hazard warning lamp switch: OFF
 - Diagnosis control: ON (Connect the MUT-II or earth the diagnosis connector No.1 terminal.)
 - Key reminder switch: OFF
 - Ignition switch: OFF
 - Driver's door switch: OFF (Close the driver's door.)If all of the conditions above are satisfied, the windshield washer switch will be turned on for ten seconds.
 2. Exit conditions from the adjustment mode
The ETACS-ECU cancels the adjustment mode when any of the following conditions is satisfied:
 - Diagnosis control: ON (Connect the MUT-II or earth the diagnosis connector No.1 terminal.)
 - Key reminder switch: ON (Pull out the ignition key.)
 - Ignition switch: Other than OFF
 - Driver's door switch: ON (Open the driver's door.)
 - After the ETACS-ECU has entered the adjustment mode, no adjustment is made within three minutes (If any adjustment is made within three minutes, the ETACS-ECU monitors a adjustment operation for other three minutes.)
 - Other warning buzzer(s) sounds

3. Adjustment of functions

Function	Adjustment procedure
Automatic headlamp switch-off function	<p>When the lighting switch is at HEAD position, turn signal lamp switch is at RH position and the passing switch is turned on for two seconds, the headlamp automatic switch-off function toggles on and off.</p> <ul style="list-style-type: none">● If the function toggles on, the buzzer sounds once (default condition).● If the function toggles off, the buzzer sounds twice.
Initialization of the functions above	<p>When the windshield washer switch remains on for more than twenty seconds, the buzzer sounds twice and then all of the following functions will be initialized.</p> <ul style="list-style-type: none">● Automatic headlamp switch-off function● Keyless entry answerback function <p>The buzzer will sound in ten seconds (indicating that the ETACS-ECU enters the adjustment mode), but the washer switch must remain off for twenty seconds in order to initialize all the functions.</p> <p>If the windshield washer switch remains on for more than twenty seconds without entering the adjustment mode, the system enters the adjustment mode in ten seconds, but does not initialize all of the functions.</p>

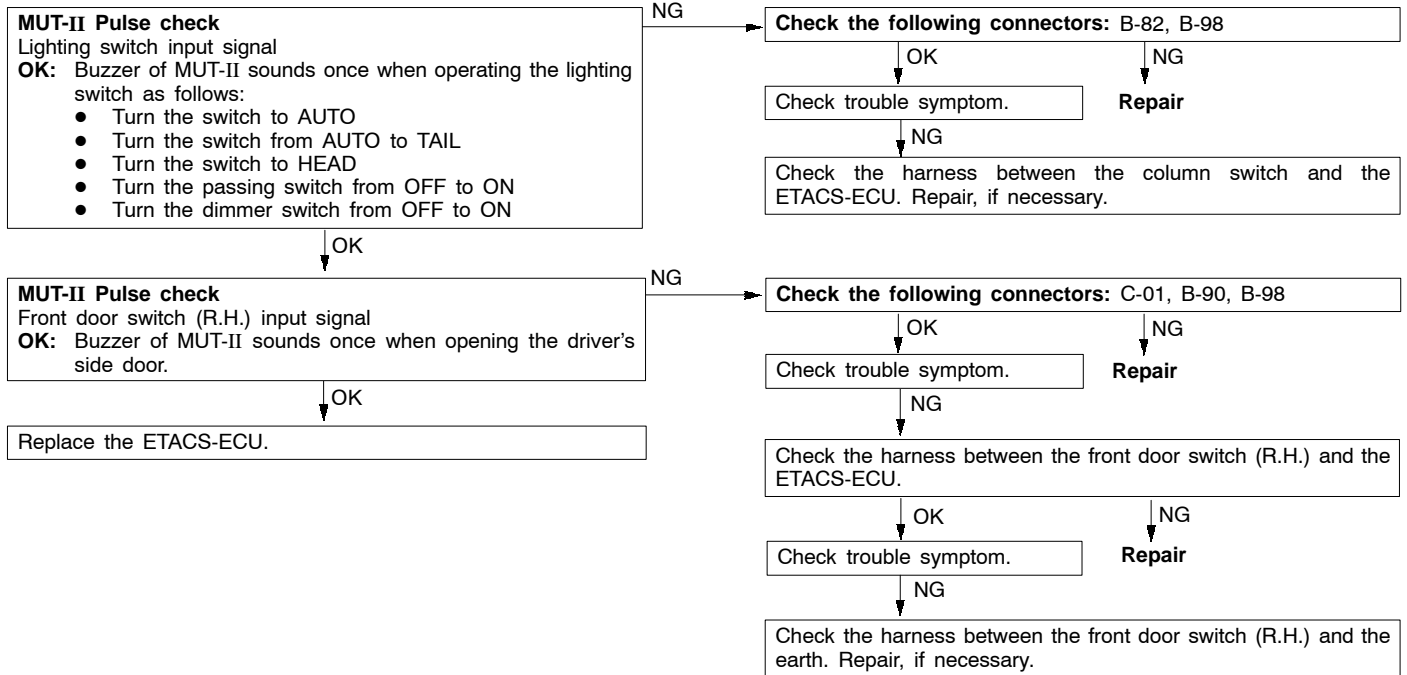
INSPECTION CHART FOR TROUBLE SYMPTOMS

Trouble symptoms	Inspection procedure	Reference page
The lighting monitor buzzer does not sound under the following conditions while tail lamps or headlamps illuminate. <ul style="list-style-type: none"> When the ignition switch is turned to OFF position and the driver's side door is open. 	1	54-30
The headlamps and tail lamps do not switch off automatically when removing the ignition key and opening the driver's side door while tail lamps or headlamps illuminate. (However, the lighting monitor buzzer sounds.)	2	54-31
The headlamps do not change to high beam or low beam.	3	54-31
The headlamps do not illuminate when the passing switch is operated.	4	54-32
Headlamp angle does not change when the headlamp leveling switch is operated.	5	54-33
The headlamps do not illuminate when the vehicle is in the following condition and the ignition switch is at the ON position. However, the headlamps illuminate when the lighting switch is turned to the HEAD position. <Vehicles with daytime running lamp system> <ul style="list-style-type: none"> Lighting switch: OFF Passing switch: OFF 	6	54-34
The headlamps do not switch off when the vehicle is in the following condition and the lighting switch is turned to the TAIL position. <Vehicles with daytime running lamp system> <ul style="list-style-type: none"> Ignition switch: OFF Passing switch: OFF 		
The fog lamps do not illuminate when the fog lamp switch is turned on while tail lamps or headlamps illuminate.	7	54-35
The fog lamps do not switch off when the lighting switch is turned off while fog lamps illuminate.		
The fog lamps do not switch off when the tail lamps switch off by the automatic headlamp switch-off function while fog lamps illuminate.		
The turn signal lamps do not flash.	8	54-35
The hazard warning lamps do not flash.	9	54-36

INSPECTION PROCEDURE FOR TROUBLE SYMPTOMS

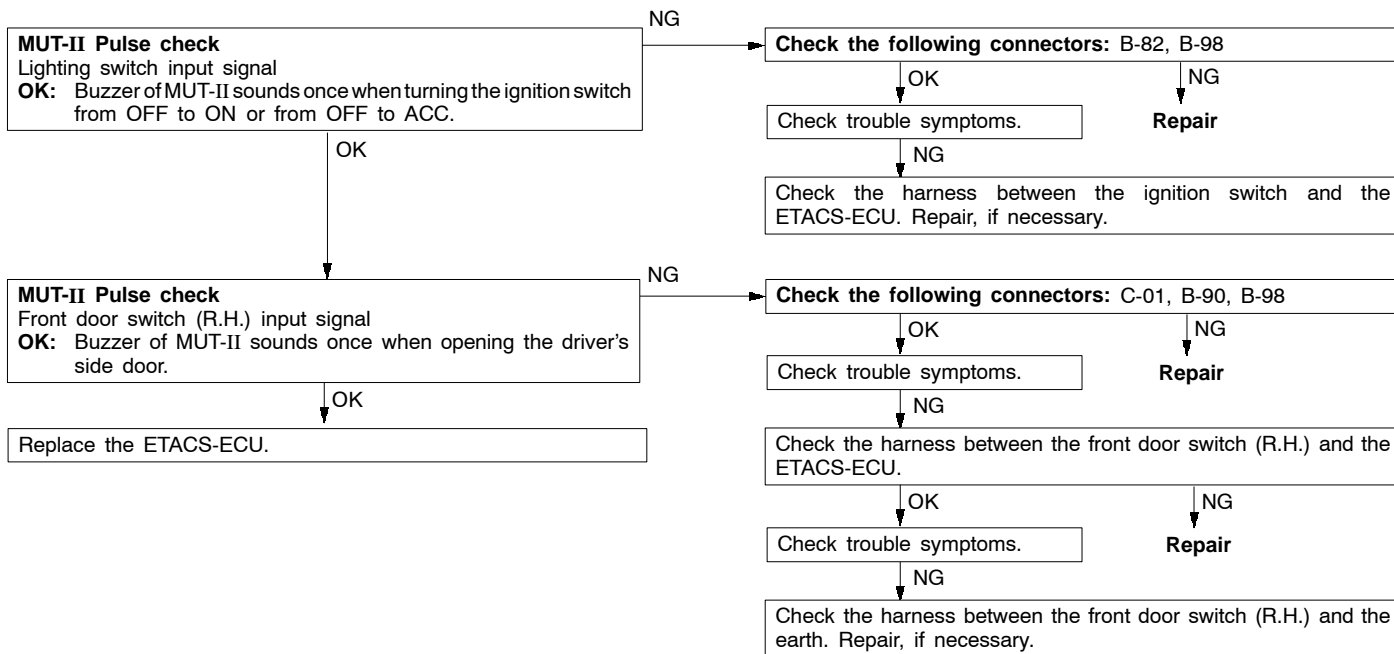
Inspection Procedure 1

<p>The lighting monitor buzzer does not sound when the ignition switch is turned to OFF position and the driver's side door is opened while the tail lamps or headlamps illuminate. When the automatic headlamp switch-off function operates, headlamps switch off after the buzzer sounds for one second, and the buzzer ceases sounding.</p>	<p>Probable cause</p>
<p>The cause is probably a malfunction of the lighting switch input circuit system or a malfunction of the ETACS-ECU. If the ignition key reminder warning buzzer is sounding, even if the tail lamps or headlamps illuminate, the lighting monitor buzzer does not sound.</p>	<ul style="list-style-type: none"> ● Malfunction of harness or connector ● Malfunction of ETACS-ECU



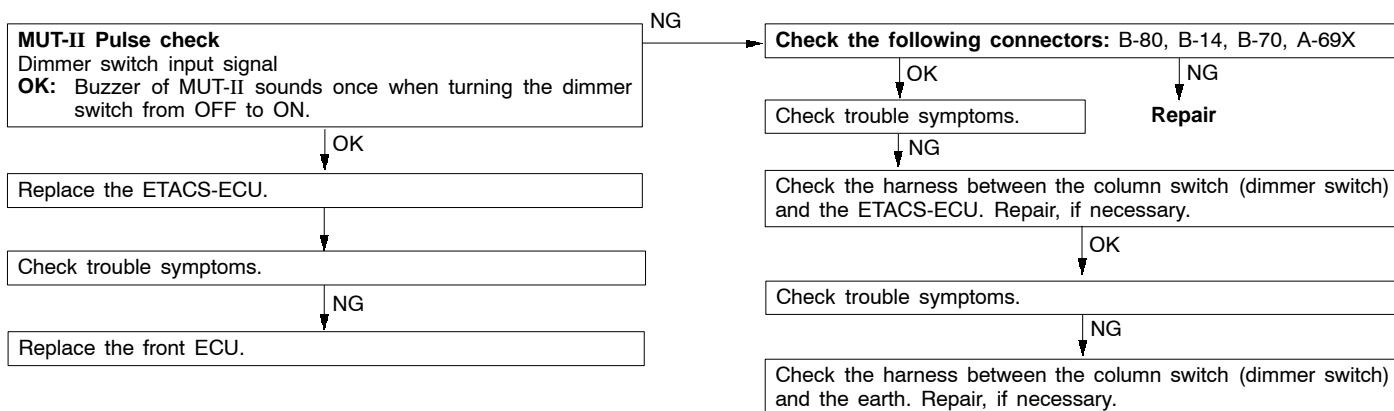
Inspection Procedure 2

<p>The headlamps and tail lamps do not switch off automatically when removing the ignition key and opening the driver's side door while tail lamps or headlamps illuminate. (However, the lighting monitor buzzer sounds.)</p>	<p>Probable cause</p>
<p>The cause is probably a malfunction of the ignition switch and front door switch (R.H.) input circuit system or a malfunction of the ETACS-ECU.</p>	<ul style="list-style-type: none"> ● Malfunction of harness or connector ● Malfunction of ETACS-ECU



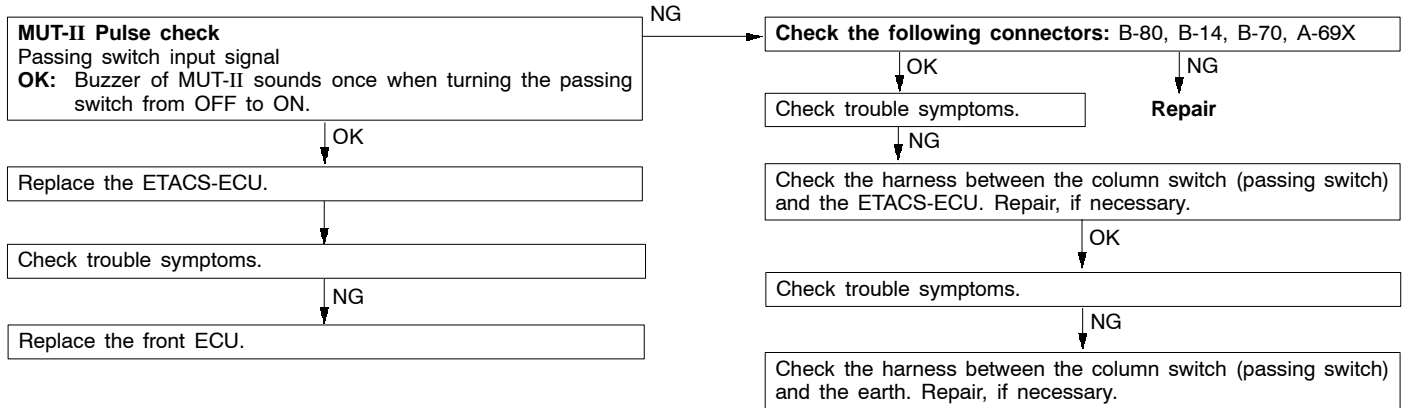
Inspection Procedure 3

<p>The headlamps do not change to high beam or low beam.</p>	<p>Probable cause</p>
<p>The cause is probably a malfunction of the dimmer switch input circuit system or a malfunction of the ETACS-ECU.</p>	<ul style="list-style-type: none"> ● Malfunction of harness or connector ● Malfunction of ETACS-ECU ● Malfunction of front ECU



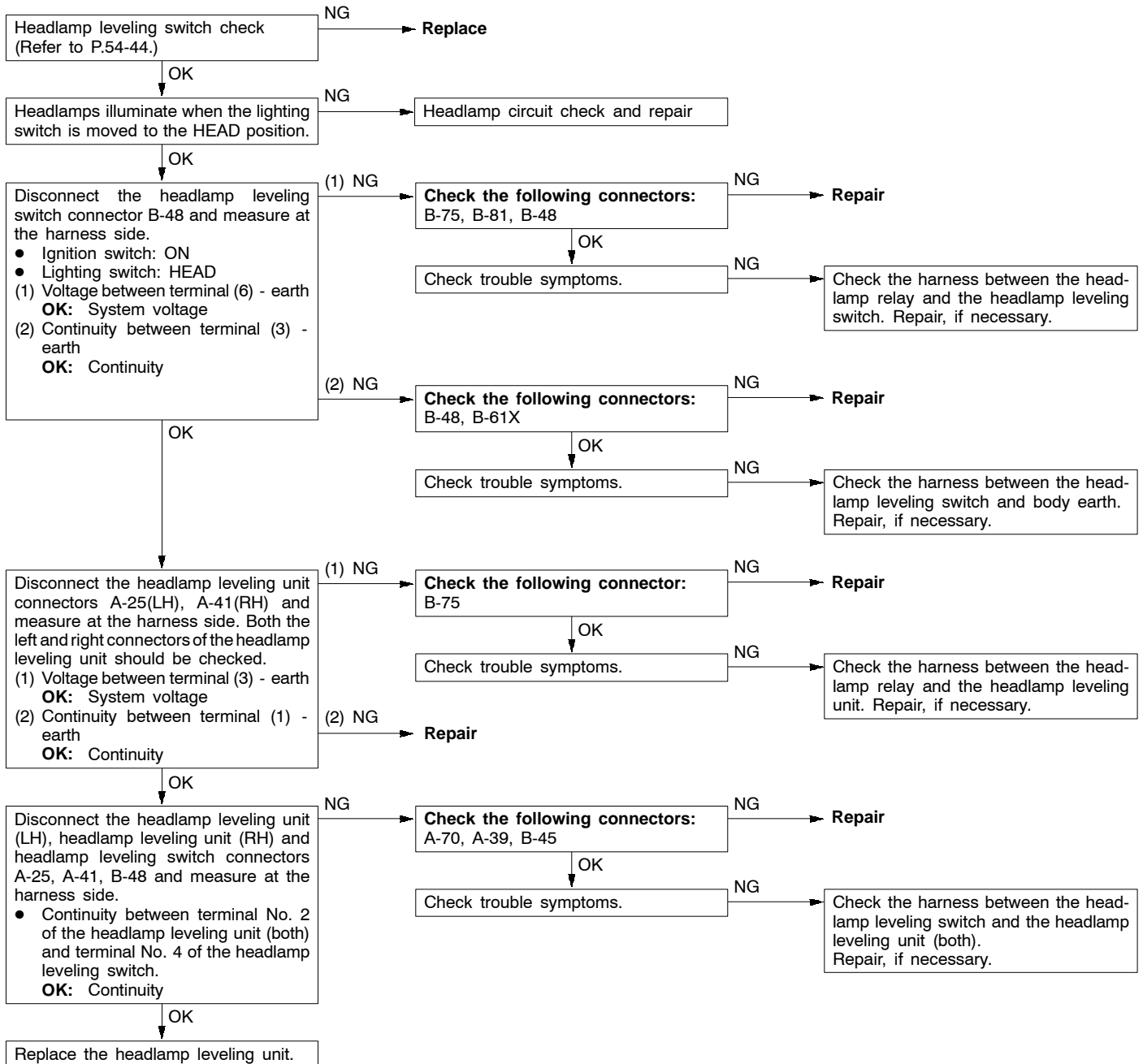
Inspection Procedure 4

The headlamps do not illuminate when the passing switch is operated.	Probable cause
The cause is probably a malfunction of the passing switch input circuit system or a malfunction of the ETACS-ECU.	<ul style="list-style-type: none"> ● Malfunction of harness or connector ● Malfunction of ETACS-ECU ● Malfunction of front ECU



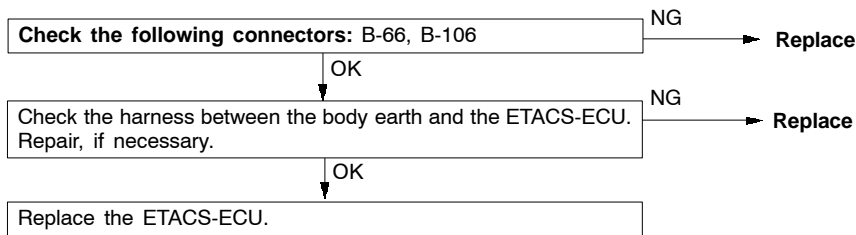
Inspection Procedure 5

Headlamp angle does not change when the headlamp leveling switch is operated.	Probable cause
The cause is probably a malfunction of the headlamp leveling switch circuit system or a malfunction of the headlamp leveling unit circuit system. If there is a blown fuse, there may also be a short-circuit in a harness.	<ul style="list-style-type: none"> ● Malfunction of fuse ● Malfunction the headlamp leveling switch ● Malfunction of connector ● Malfunction of harness ● Malfunction of the headlamp leveling unit



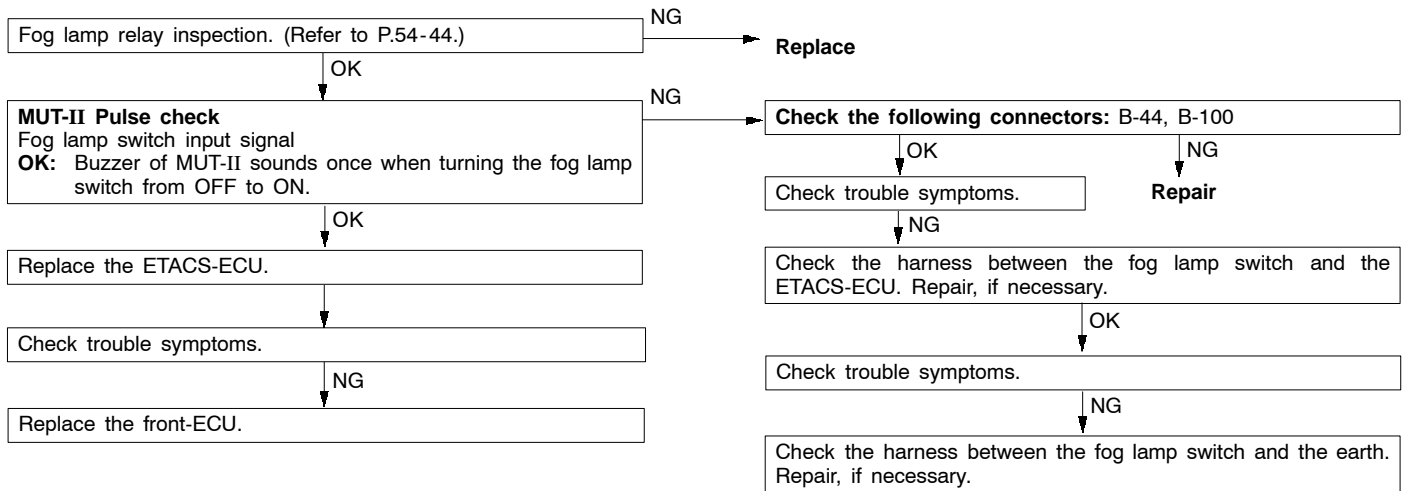
Inspection Procedure 6

<p>The headlamps do not illuminate when the vehicle is in the following condition and the ignition switch is at the the ON position. However, they illuminate when the lighting switch is turned to the HEAD position. <Vehicles with daytime running lamp></p> <ul style="list-style-type: none"> ● Lighting switch: OFF ● Passing switch: OFF 	<p>Probable cause</p>
<p>The headlamps do not switch off when the vehicle is in the following condition and the lighting switch is turned to the TAIL position. <Vehicles with daytime running lamp></p> <ul style="list-style-type: none"> ● Ignition switch: OFF ● Passing switch: OFF 	
<p>The cause is probably a malfunction of the ETACS-ECU circuit system. If there may also be a open-circuit in a harness.</p> <ul style="list-style-type: none"> ● Malfunction of connector ● Malfunction of harness ● Malfunction of the ETACS-ECU 	



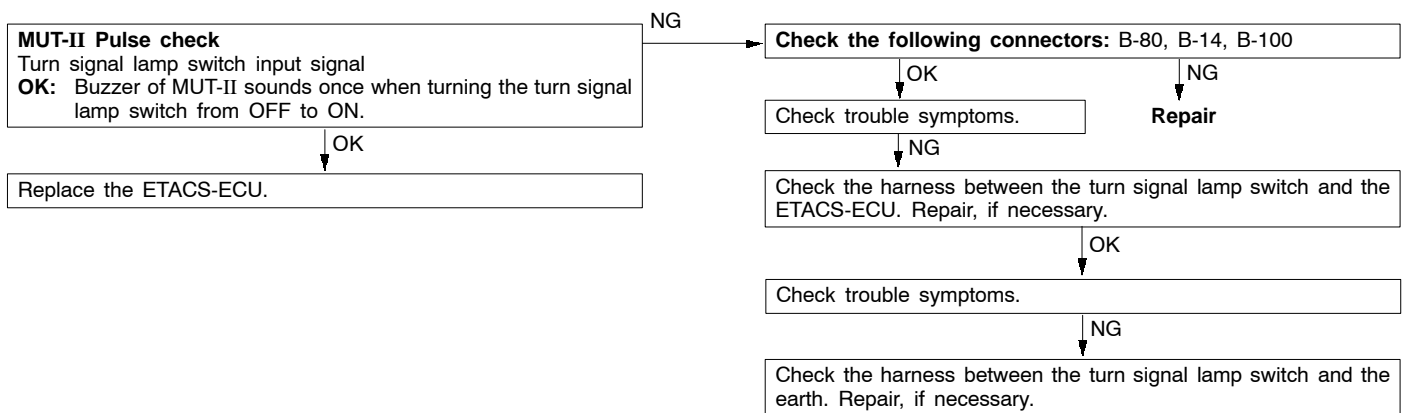
Inspection Procedure 7

<p>The fog lamps do not illuminate when the fog lamp switch is turned on while tail lamps or headlamps illuminate.</p>	<p>Probable cause</p>
<p>The fog lamps do not switch off when the lighting switch is turned off while fog lamps illuminate.</p>	
<p>The fog lamps do not switch off when the tail lamps switch off by the automatic headlamp switch-off function while fog lamps illuminate.</p>	
<p>The cause is probably a malfunction of the fog lamp switch input circuit system or a malfunction of the ETACS-ECU.</p>	<ul style="list-style-type: none"> ● Malfunction of harness or connector ● Malfunction of ETACS-ECU ● Malfunction of front-ECU ● Malfunction of fog lamp relay



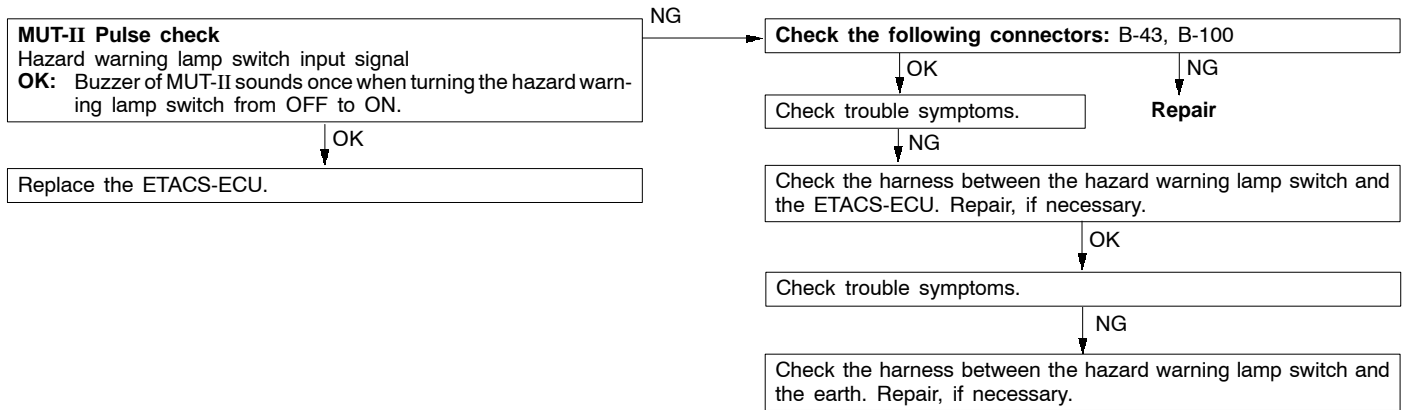
Inspection Procedure 8

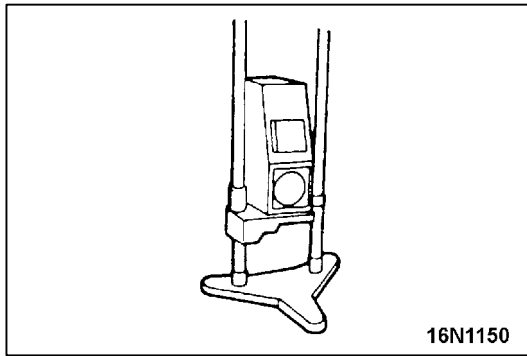
<p>The turn signal lamps do not flash.</p>	<p>Probable cause</p>
<p>The cause is probably a malfunction of the turn signal lamp switch input circuit system or a malfunction of the ETACS-ECU.</p>	<ul style="list-style-type: none"> ● Malfunction of harness or connector ● Malfunction of ETACS-ECU



Inspection Procedure 9

The hazard warning lamps do not flash.	Probable cause
The cause is probably a malfunction of the hazard warning lamp switch input circuit system or a malfunction of the ETACS-ECU.	<ul style="list-style-type: none"> ● Malfunction of harness or connector ● Malfunction of ETACS-ECU





ON-VEHICLE SERVICE

54200090289

HEADLAMP AIMING

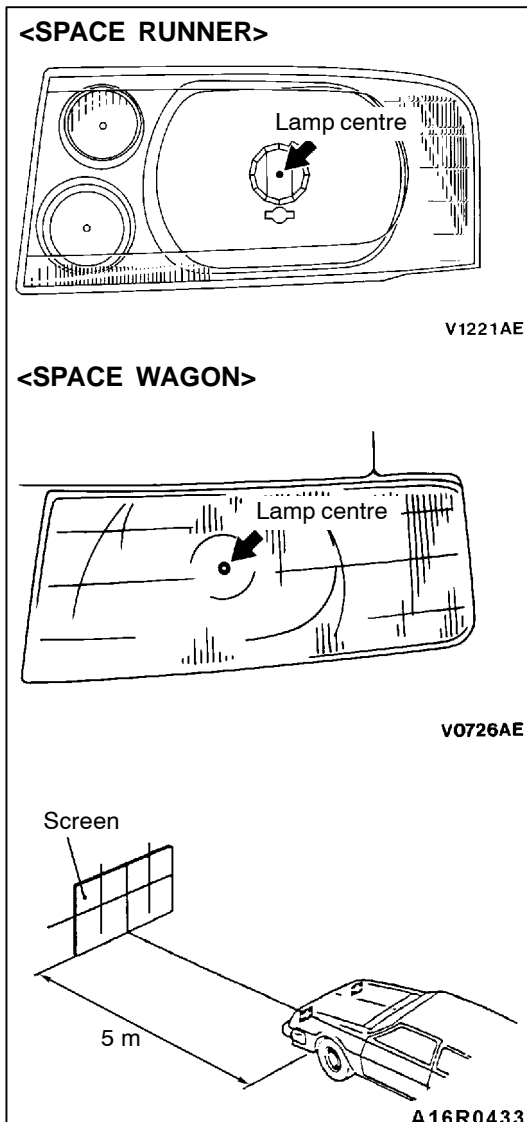
<USING A BEAM SETTING EQUIPMENT>

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

NOTE

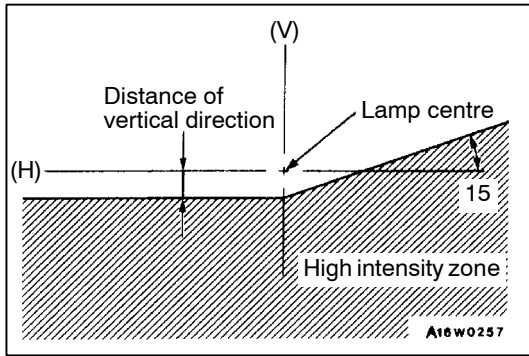
If there are any regulations pertinent to the aiming of headlamps in the area where the vehicle is to be used, adjust so as to meet those requirements.

2. Alternately turn the adjusting screw to adjust the headlamp aiming. (Refer to P.54-37.)



<USING A SCREEN>

1. Inflate the tyres to the specified pressures and there should be no other load in the vehicles other than driver or substituted weight of approximately 75 kg placed in driver's position.
2. Set the headlamp leveling switch to the "0" position.
3. Set the distance between the screen and the centre marks of the headlamps as shown in the illustration.



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

Standard value:

(Vertical direction)

60 mm below horizontal (H)

(Horizontal direction)

Position where the 15° sloping section intersects the vertical line (V)

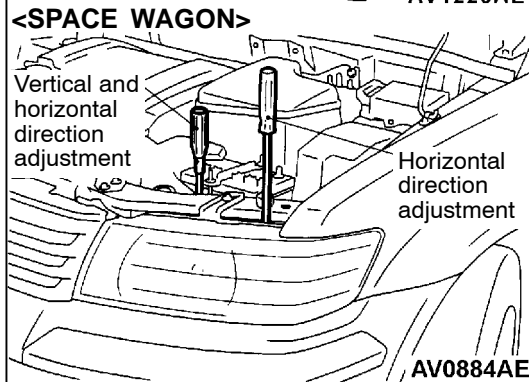
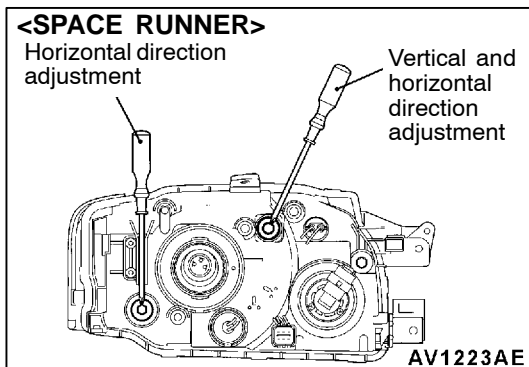
NOTE

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

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

Caution

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



HEADLAMP INTENSITY MEASUREMENT 54200100159

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

Limit: 30,000 cd or more

NOTE

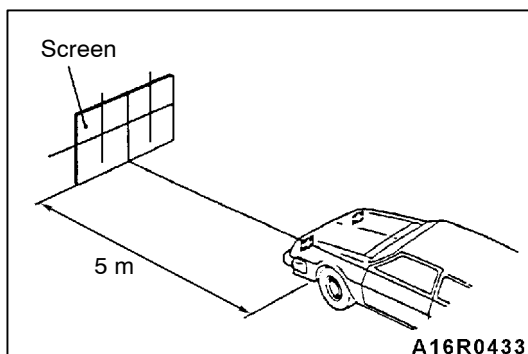
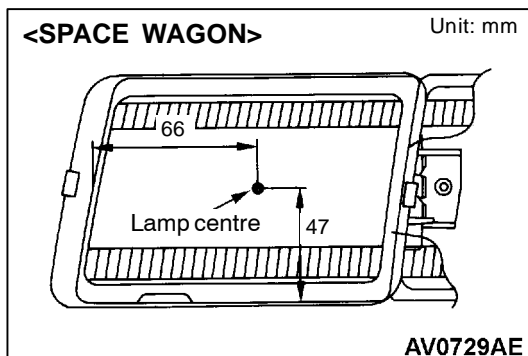
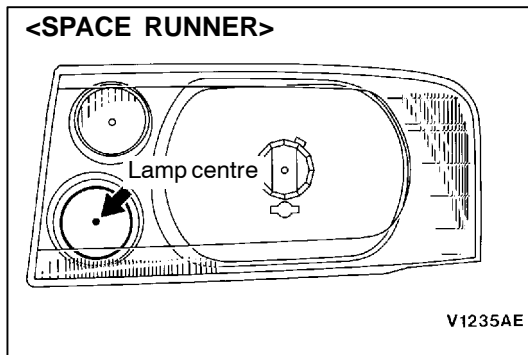
1. When measuring the intensity, maintain an engine speed of 2,000 r/min, with the battery in the charging condition.
2. There may be special local regulations pertaining to headlamp intensity, be sure to make any adjustments necessary to satisfy such regulations.
3. If an illuminometer is used to make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

$$I = Er^2 \text{ Where:}$$

I=intensity (cd)

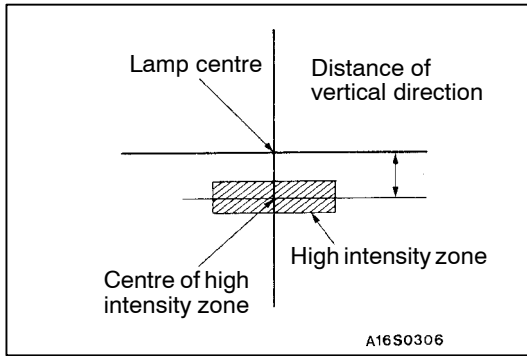
E=illumination (lux)

r=distance (m) from headlamps to illuminometer

**FRONT FOG LAMP AIMING** 54200110213

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

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



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

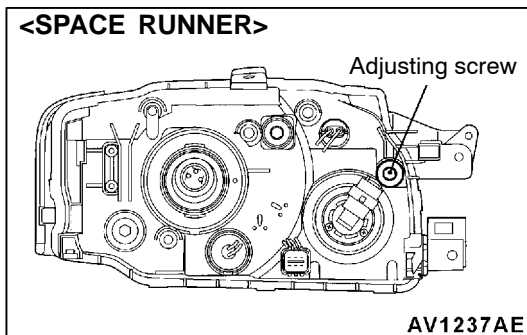
Standard value:

(Vertical direction)

100 mm below horizontal (H)

(Horizontal direction)

Parallel to direction of vehicle travel

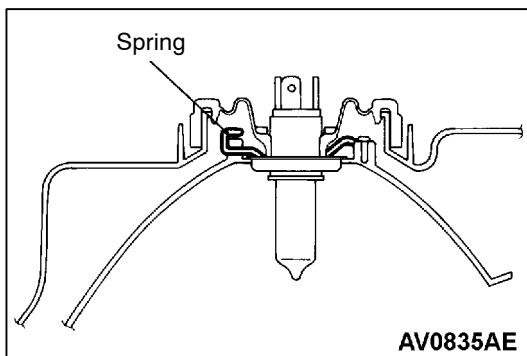
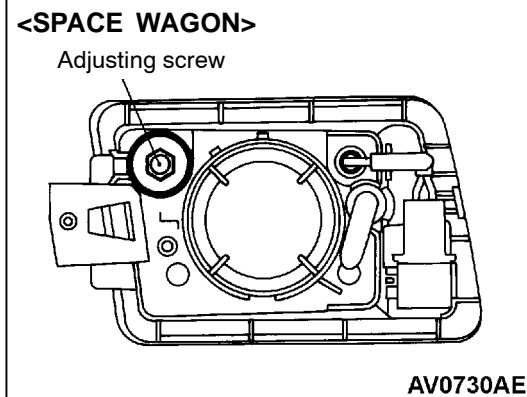


NOTE

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

Caution

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



BULB REPLACEMENT

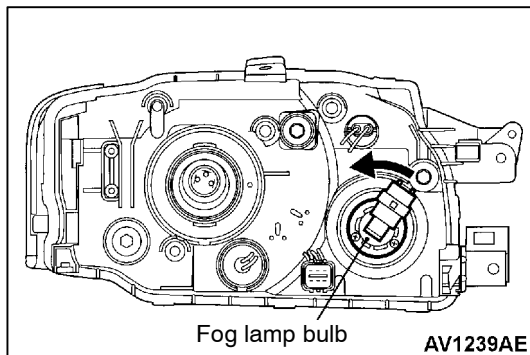
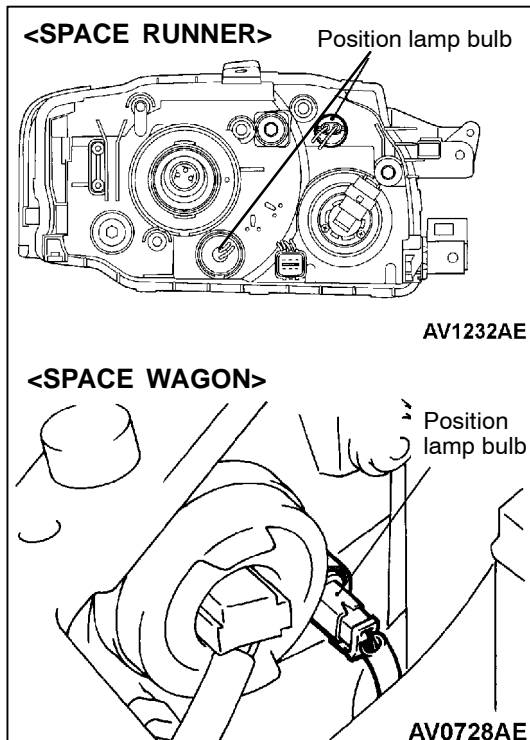
54200130301

<Headlamp Bulb>

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

Caution

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

**<Position Lamp Bulb>**

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

<Fog lamp Bulb>**<SPACE RUNNER>**

Rotate the socket to remove the bulb from the headlamp assembly.

Caution

- (1) Always use the specified genuine part for replacement.
- (2) Do not touch the surface of the bulb with hands or dirty gloves. If the surface does become dirty, clean it with alcohol or thinner, and let it dry thoroughly before installing.

<SPACE WAGON>

1. Remove the fog lamp.
2. Remove the socket cap.
3. Remove the bulb mounting spring, and then withdraw the bulb.
4. Disconnect the connector, and then replace the bulb.

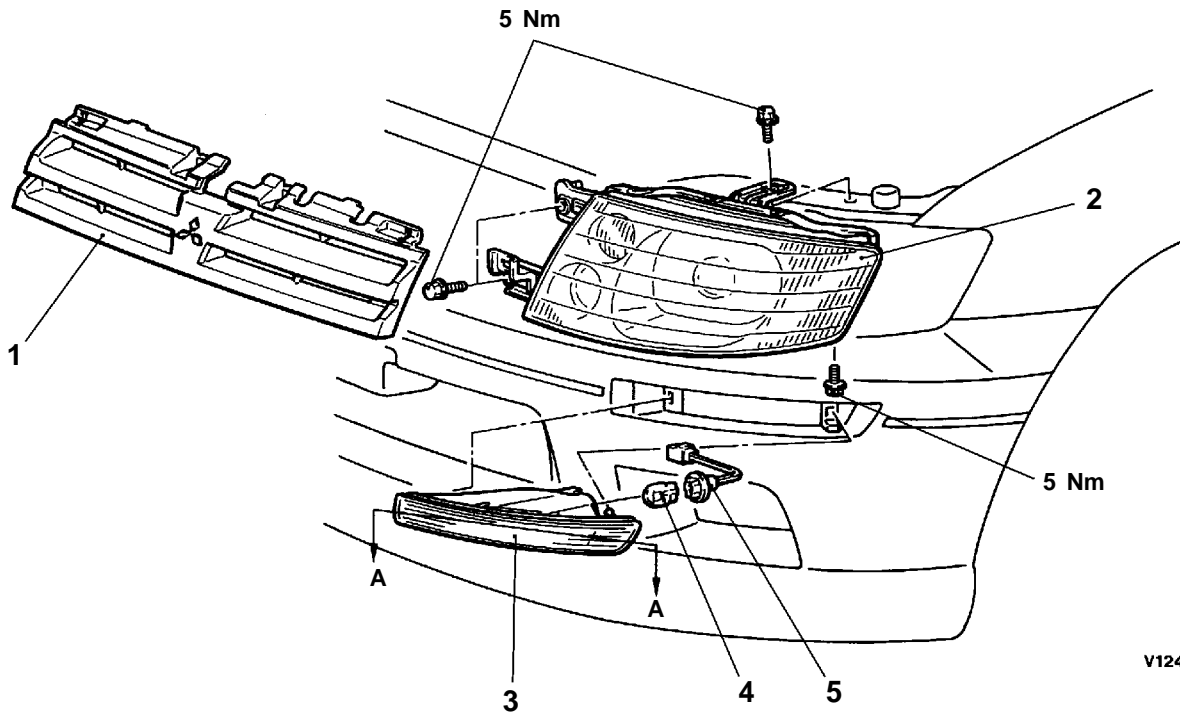
Caution

- (1) Always use the genuine part for replacement.
- (2) Do not touch the surface of the bulb with hands or dirty gloves. If the surface does become dirty, clean it with alcohol or thinner, and let it dry thoroughly before installing.
- (3) Be sure to install the socket cap. If the socket cap is improperly installed, the lens will be fogged or water may enter the lamp unit.

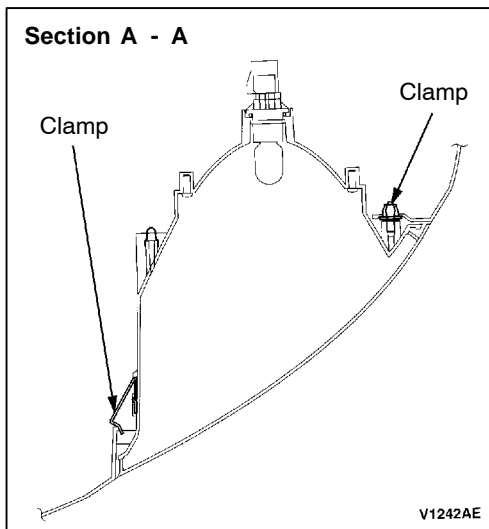
HEADLAMP AND FRONT TURN-SIGNAL LAMP <SPACE RUNNER>

54200240257

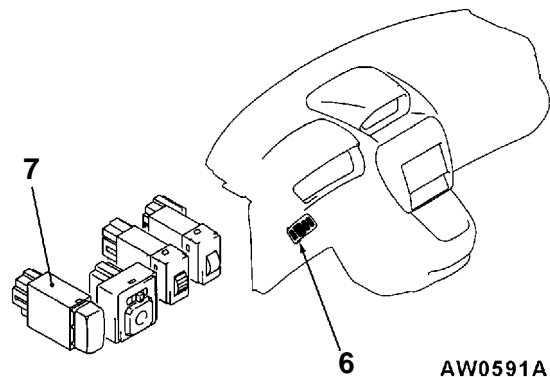
REMOVAL AND INSTALLATION



V1241AE



V1242AE



AW0591AE

00007688

Headlamp removal steps



1. Radiator grille
2. Headlamp

Front turn-signal lamp removal steps



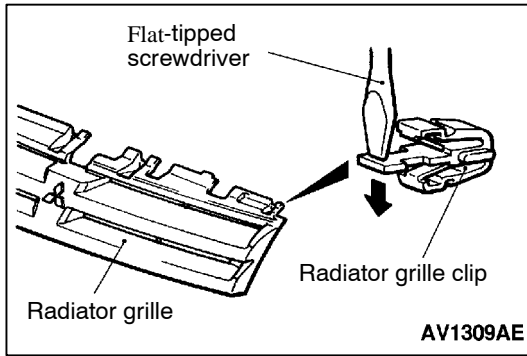
3. Front turn-signal lamp
4. Bulb
5. Socket

Headlamp leveling switch removal steps

6. Switch garnish
7. Headlamp leveling switch

NOTE

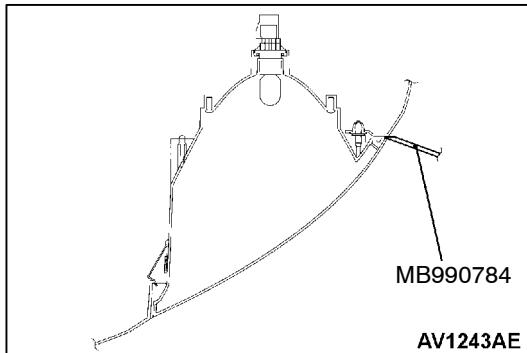
For removal and installation of the column switch (lighting switch), refer to GROUP 37A - Steering Wheel and Shaft.



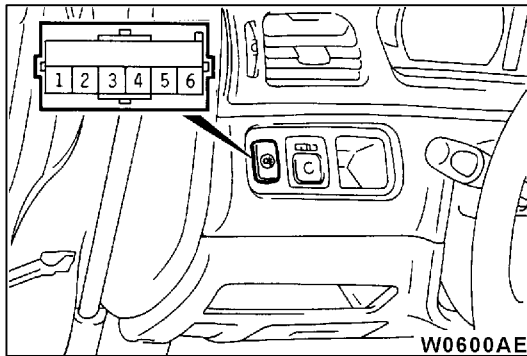
REMOVAL SERVICE POINTS

◀A▶ RADIATOR GRILLE REMOVAL

Pull the radiator grille toward you gently, and press the clip tab with a flat-tipped screwdriver toward the arrow to remove the radiator grille.



◀B▶ FRONT TURN SIGNAL LAMP REMOVAL

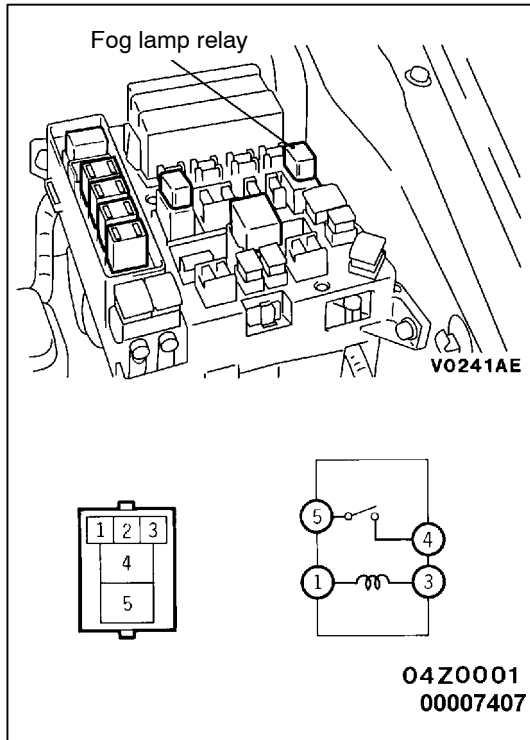


INSPECTION

54200250090

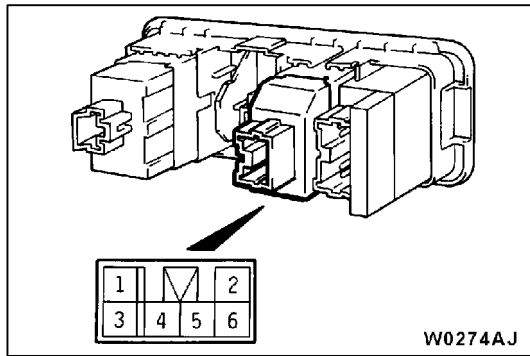
FOG LAMP SWITCH CONTINUITY CHECK

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



FOG LAMP RELAY CONTINUITY CHECK

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



HEADLAMP LEVELING SWITCH CHECK

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

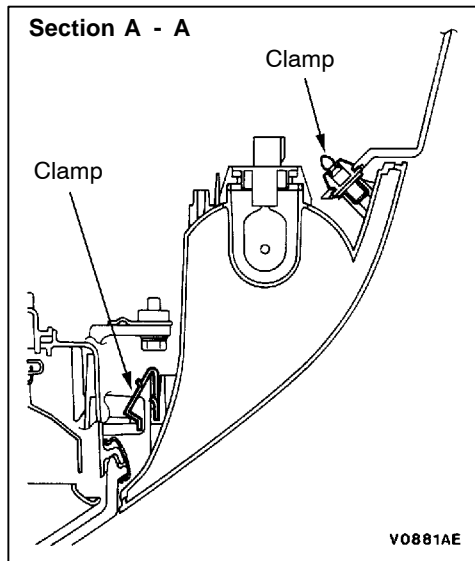
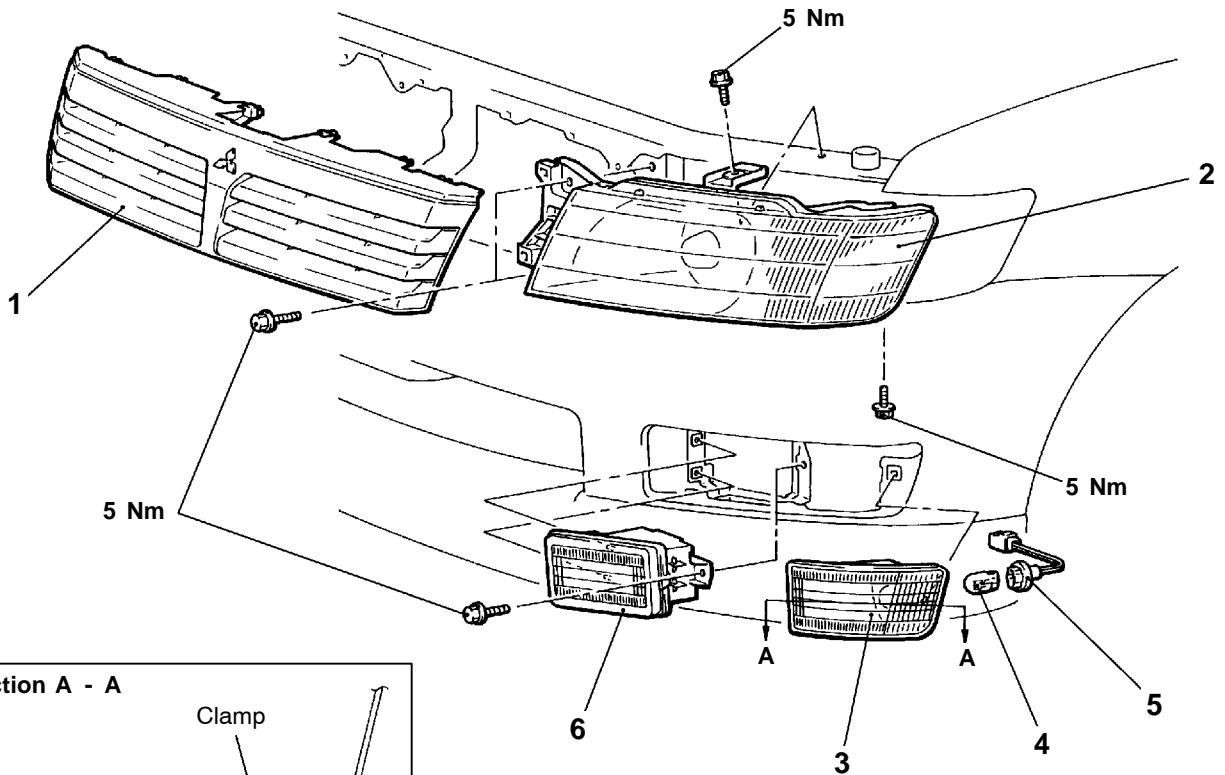
Standard value:

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

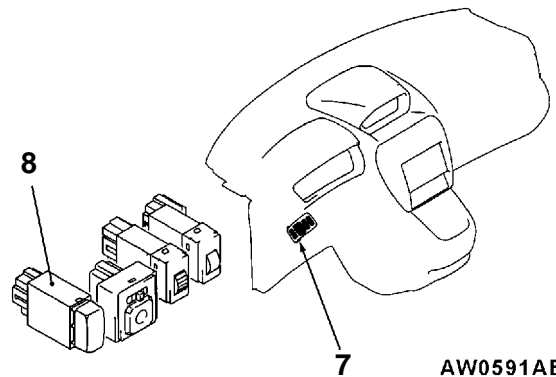
HEADLAMP, FRONT TURN-SIGNAL LAMP AND FRONT FOG LAMP<SPACE WAGON>

54200240264

REMOVAL AND INSTALLATION



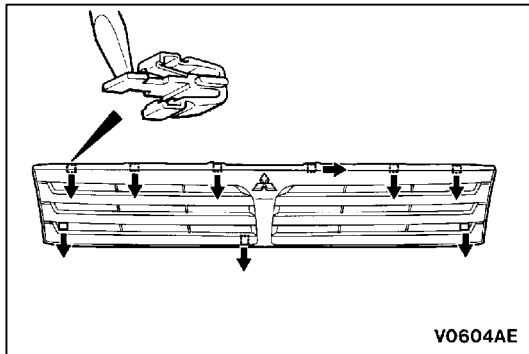
V0880AE



- ◀A▶
- Headlamp removal steps**
1. Radiator grille
 2. Headlamp
- Front turn-signal lamp and front fog lamp removal steps**
- ◀B▶
3. Front turn-signal lamp
 4. Bulb
 5. Socket
 6. Front fog lamp

- Headlamp leveling switch removal steps**
7. Switch garnish
 8. Headlamp leveling switch

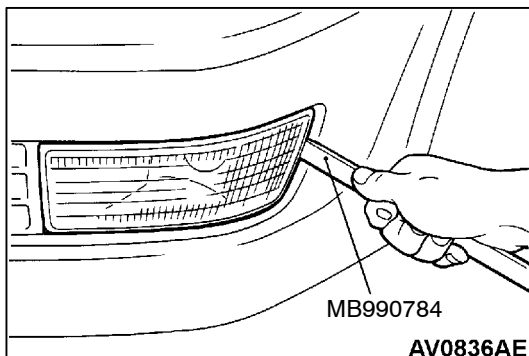
NOTE
For removal and installation of the column switch (lighting switch), refer to GROUP 37A - Steering Wheel and Shaft.



REMOVAL SERVICE POINTS

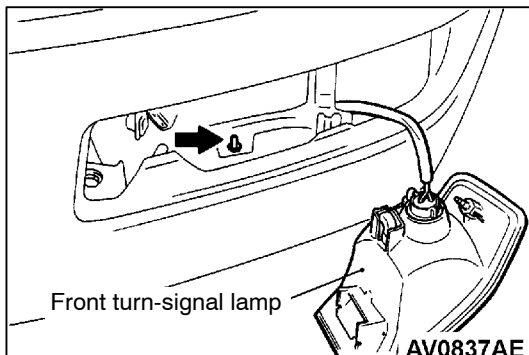
◀A▶ RADIATOR GRILLE REMOVAL

Pull the radiator grille toward you gently, and press the clip tab with a flat-tipped screwdriver toward the arrow to remove the radiator grille.



◀B▶ FRONT TURN-SIGNAL LAMP REMOVAL

1. Use the special tool to remove the front turn-signal lamp.



2. Remove the fog lamp, disconnect the front turn-signal lamp connector from the fog lamp stay, and then remove the front turn-signal lamp from the vehicle.

INSPECTION

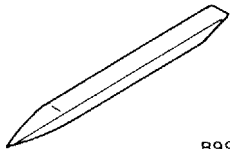
Refer to P.54-43.

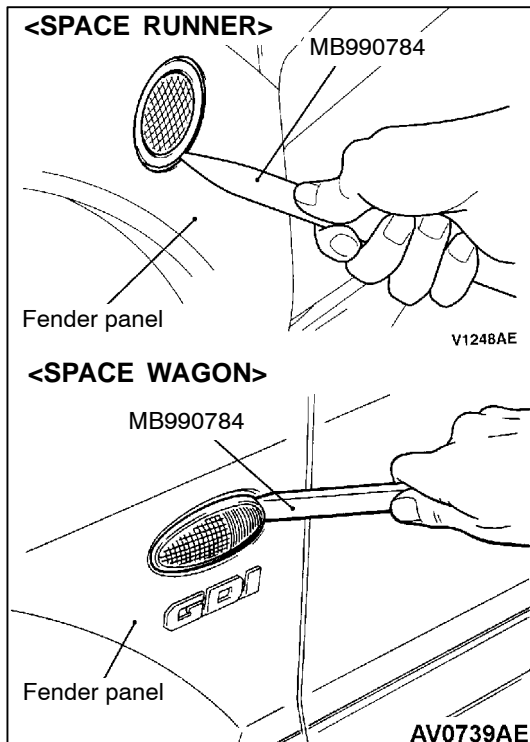
54200250106

SIDE TURN-SIGNAL LAMP

5420060105

SPECIAL TOOL

Tool	Number	Name	Use
 <p>MB990784</p>	MB990784	Ornament remover	Removal of side turn-signal lamp



REMOVAL SERVICE POINT

54200330145

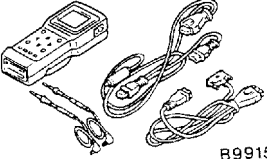
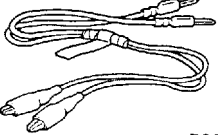
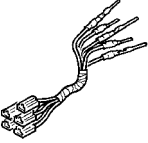
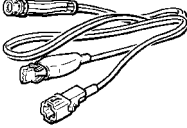
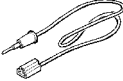

SIDE TURN-SIGNAL LAMP REMOVAL

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

ROOM LAMP

54200060600

SPECIAL TOOLS

Tool	Number	Name	Use
 <p>B991502</p>	MB991502	MUT-II sub assembly	ETACS-ECU input check
 <p>B991529</p>	MB991529	Diagnosis code check harness	ETACS-ECU input check
<p>A</p>  <p>B</p>  <p>C</p>  <p>D</p>  <p>C991223</p>	<p>MB991223</p> <p>A: MB991219</p> <p>B: MB991220</p> <p>C: MB991221</p> <p>D: MB991222</p>	<p>Harness set</p> <p>A: Test harness</p> <p>B: LED harness</p> <p>C: LED harness adapter</p> <p>D: Probe</p>	<p>ETACS-ECU terminal voltage measurement</p> <p>A: Connector pin contact pressure inspection</p> <p>B: Power circuit inspection</p> <p>C: Power circuit inspection</p> <p>D: Commercial tester connection</p>

TROUBLESHOOTING

54200070627

DIAGNOSIS FUNCTION

INPUT SIGNAL INSPECTION PROCEDURE

1. Connect the MUT-II or a voltmeter to the diagnosis connector to check input signal. (Refer to GROUP 00 - How to Use Troubleshooting/Inspection Service Points.)
2. The following input signals can be checked:
 - Door switch
 - Ignition switch
 - Key reminder switch
 - Keyless entry transmitter (LOCK, UNLOCK)

NOTE

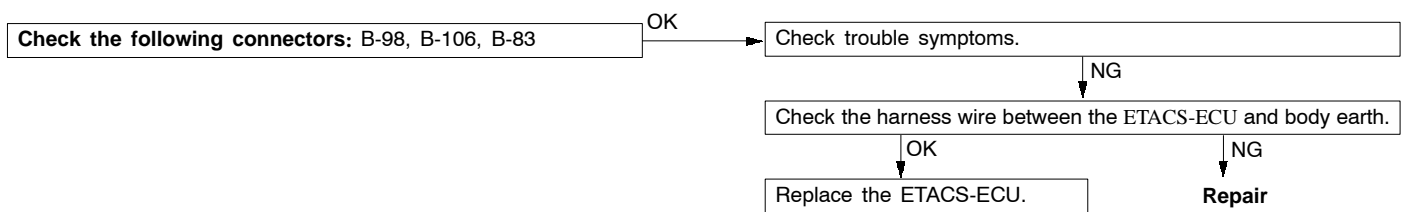
If all the input signals cannot be check by using the MUT-II, the diagnosis circuit may be defective.

INSPECTION CHART FOR TROUBLE SYMPTOMS

Trouble symptoms	Inspection procedure	Reference page
When all the doors is closed, the room lamp is switched off immediately, but does not fade out.	1	54-49
When a door is opened with the room lamp switch in the DOOR position, the room lamp does not illuminate.	2	54-50
When the ignition switch is turned to the ON position while the room lamp is fading out, the room lamp is not switched off (However, the room lamp will be switched off after fading out).	3	54-50
The room lamp can not be switched off (However, it is switched off when the room lamp switch is set to the OFF position).	4	54-51

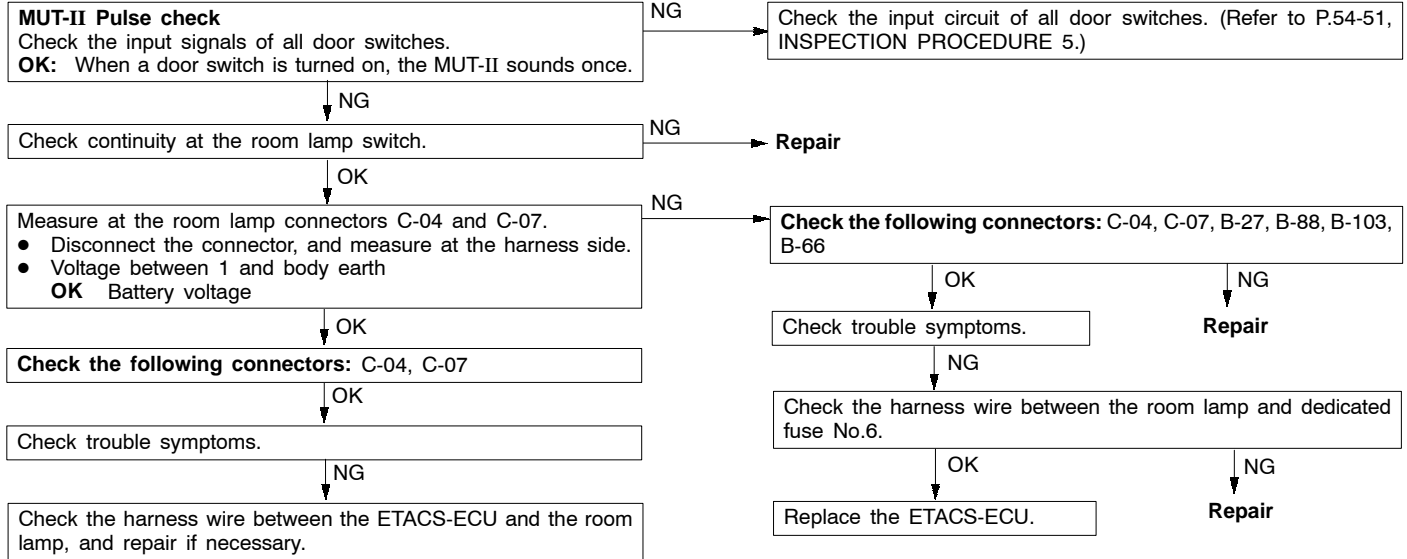
INSPECTION PROCEDURE 1

When all the doors is closed, the room lamp is switched off immediately, but does not fade out.	Probable cause
The harness wire in the earth circuit or the ETACS-ECU can be defective.	<ul style="list-style-type: none"> ● Malfunction of harness or connector ● Malfunction of ETACS-ECU



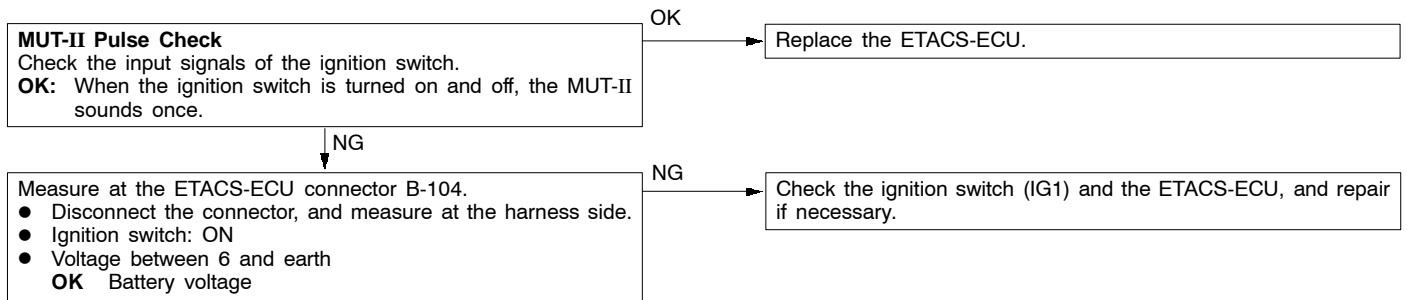
INSPECTION PROCEDURE 2

<p>When a door is opened with the room lamp switch in the DOOR position, the room lamp does not illuminate.</p>	<p>Probable cause</p>
<p>The door switch circuit of all doors or the room lamp illumination circuit can be defective.</p>	<ul style="list-style-type: none"> ● Malfunction of room lamp ● Malfunction of harness or connector ● Malfunction of ETACS-ECU



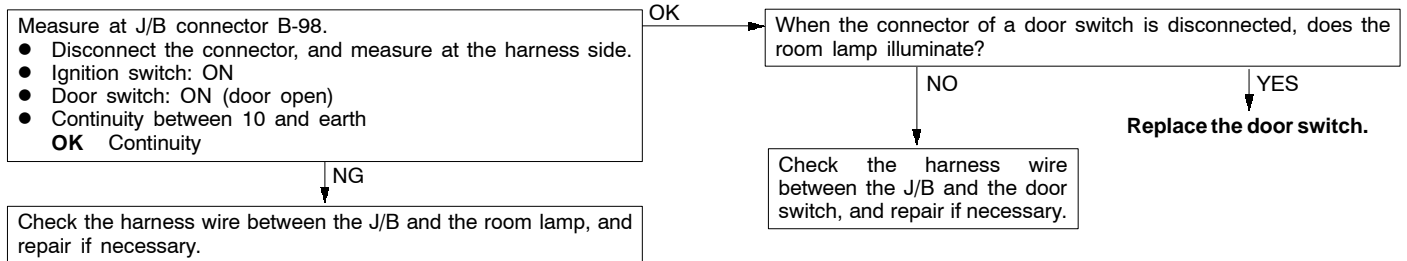
INSPECTION PROCEDURE 3

<p>When the ignition switch is turned to the ON position while the room lamp is fading out, the room lamp is not switched off (However, the room lamp will be switched off after fading out).</p>	<p>Probable cause</p>
<p>The ignition circuit or the ETACS-ECU can be defective. In addition, a defective fuse can cause a malfunction in the indicator lamp in the combination meter or a short in the harness wire.,</p>	<ul style="list-style-type: none"> ● Malfunction of fuse ● Malfunction of connector ● Malfunction of harness ● Malfunction of ETACS-ECU



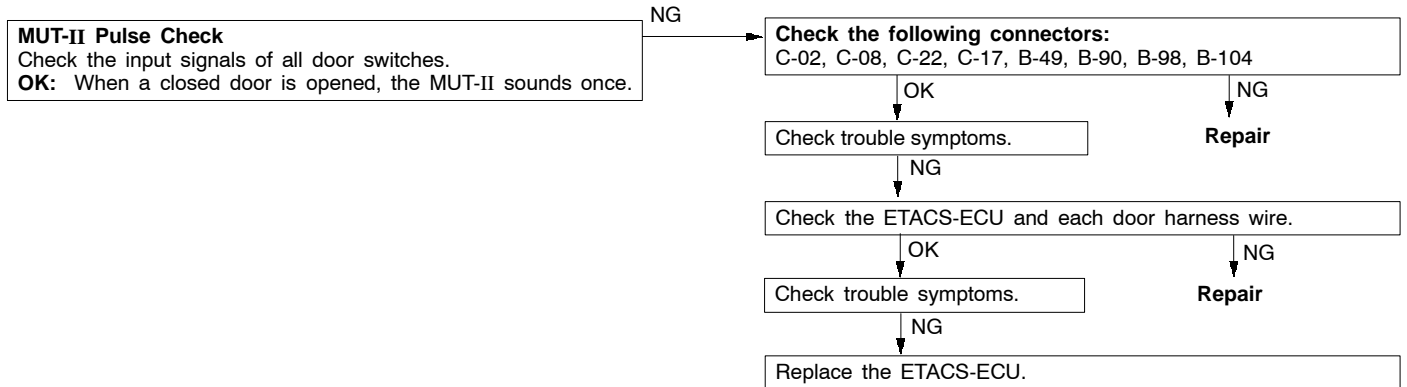
INSPECTION PROCEDURE 4

<p>The room lamp can not be switched off (However, it is switched off when the room lamp switch is set to the OFF position.)</p>	<p>Probable cause</p>
<p>A short in the harness wire can be present, or a door switch can be defective.</p>	<ul style="list-style-type: none"> ● Malfunction of door switch ● Malfunction of harness



INSPECTION PROCEDURE 5

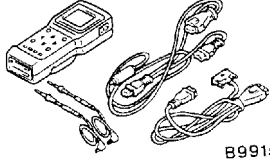
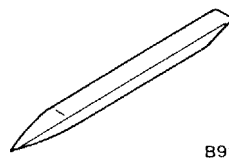
Check the input circuit of all door switches.



REAR COMBINATION LAMP

54200060587

SPECIAL TOOLS

Tool	Number	Name	Use
 B991502	MB991502	MUT-II sub assembly	ETACS-ECU input check
 B990784	MB990784	Ornament remover	Removal of switch garnish

TROUBLESHOOTING

5420007034

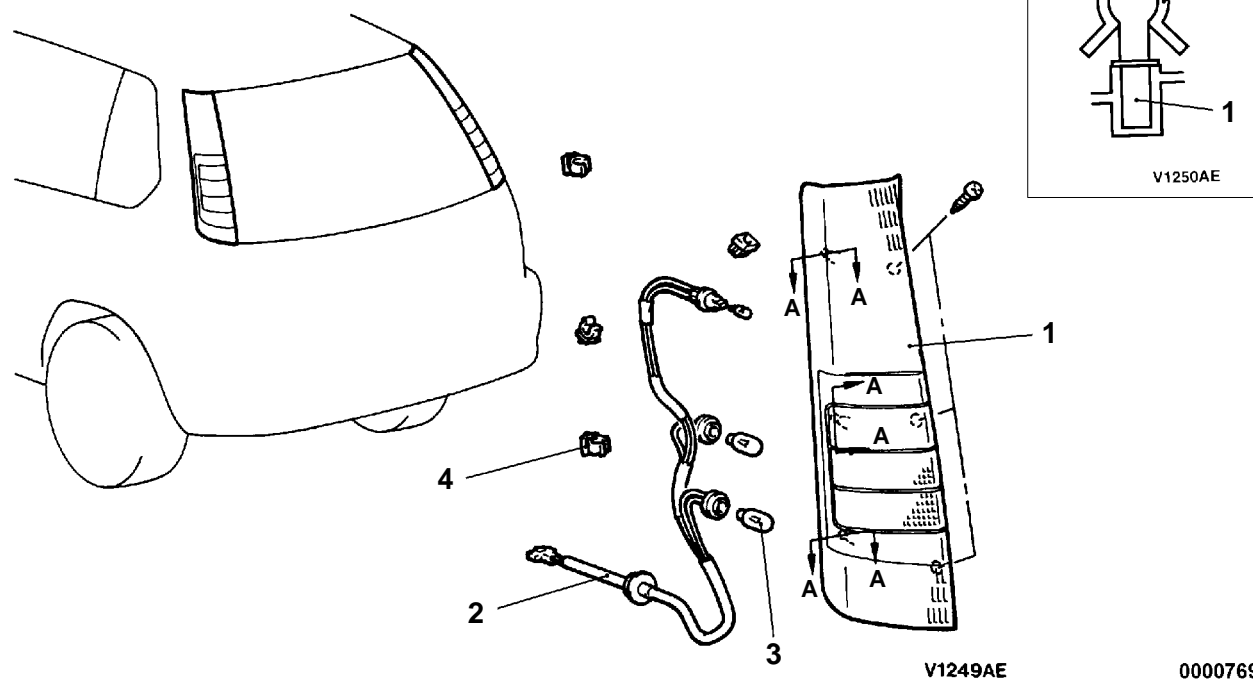
Refer to P.54-27.

54200450148

REAR COMBINATION LAMP**REMOVAL AND INSTALLATION**

<SPACE RUNNER>

Pre-removal and Post-installation Operation
 Quarter Trim Removal and Installation (Refer to GROUP 52A.)

**Removal steps**

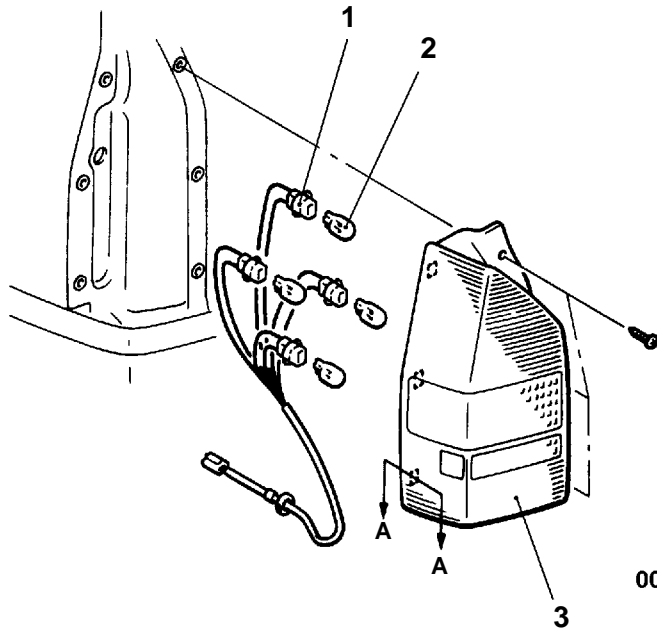
1. Rear combination lamp
2. Socket assembly
3. Bulb
4. Grommet

NOTE

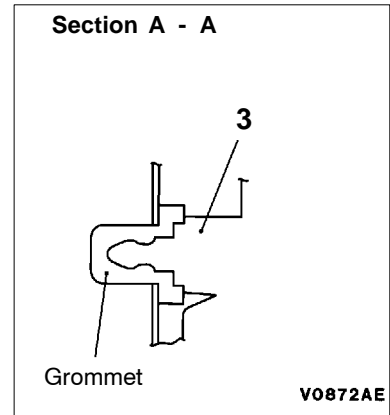
For removal and installation of the column switch (lighting switch), refer to GROUP 37A - Steering Wheel and Shaft.

<SPACE WAGON>

Pre-removal and Post-installation Operation
 Quarter Trim Removal and Installation (Refer to GROUP 52A.)



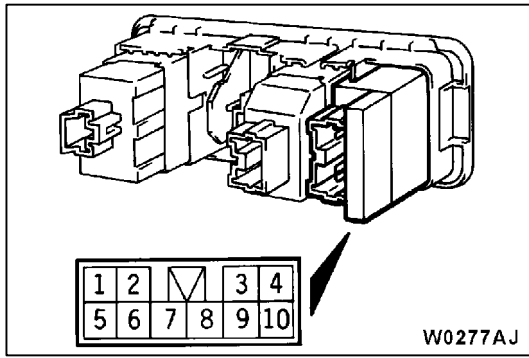
V0887AE
 00007395

**Removal steps**

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

NOTE

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

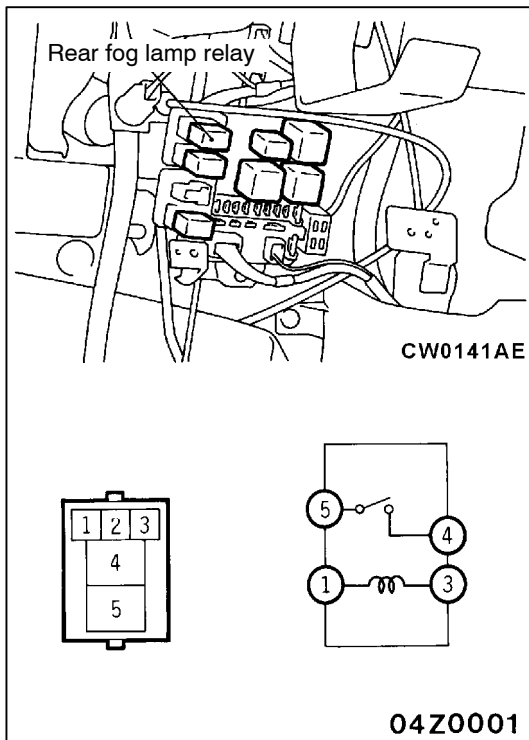


INSPECTION

54200460073

REAR FOG LAMP SWITCH CHECK

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



REAR FOG LAMP RELAY CHECK

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

LIGHTING SWITCH AND TURN-SIGNAL LAMP SWITCH CHECK

Refer to P.54-111.

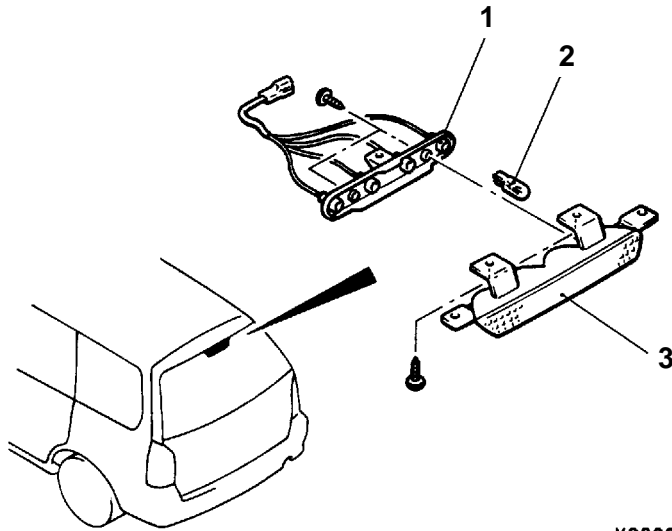
HIGH-MOUNTED STOP LAMP

54200510310

REMOVAL AND INSTALLATION

Pre-removal and Post-installation Operation
Tailgate Trim Removal and Installation (Refer to GROUP 42.)

<Tailgate-mounted type>

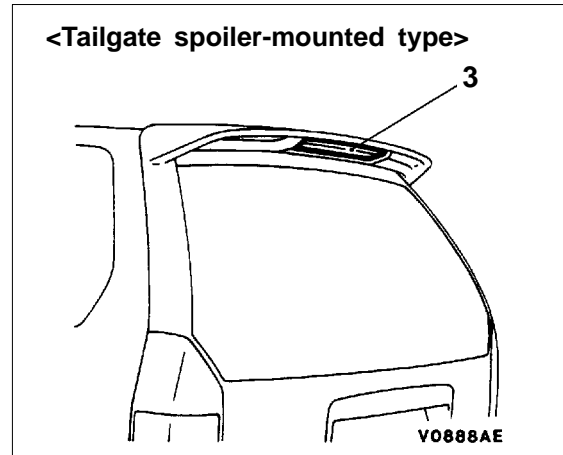


V0889AE
00007396

Removal steps

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

<Tailgate spoiler-mounted type>



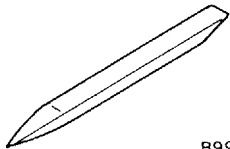
NOTE

For removal and installation of the high-mounted stop lamp (tailgate spoiler-mounted type), refer to GROUP 51 - Aero parts.

RHEOSTAT

5420060136

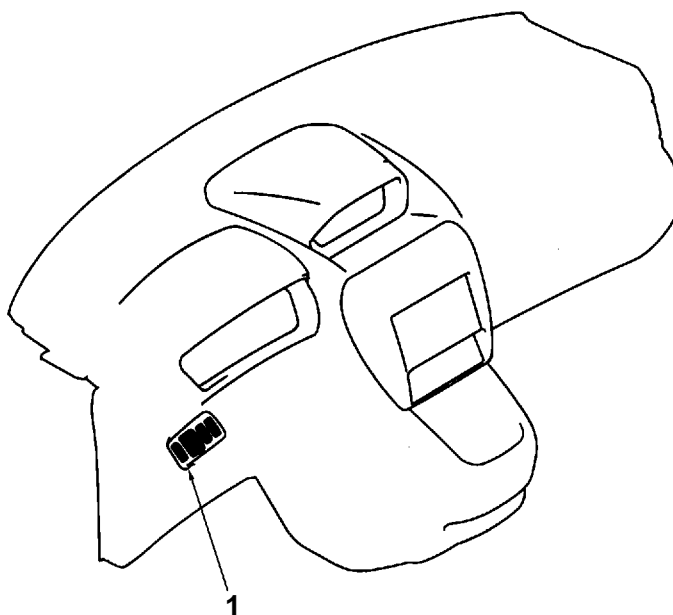
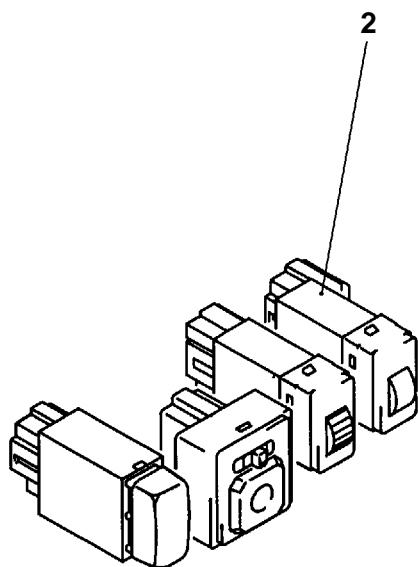
SPECIAL TOOL

Tool	Number	Name	Use
 <p>B990784</p>	MB990784	Ornament remover	Removal of switch garnish

RHEOSTAT

54200600154

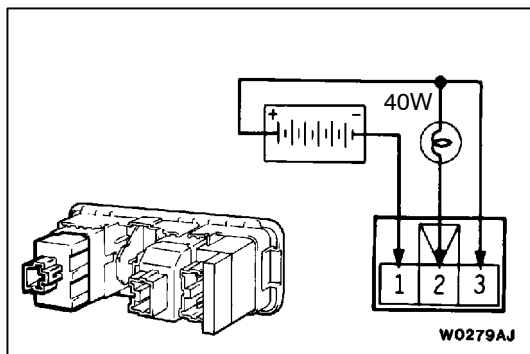
REMOVAL AND INSTALLATION



BW0591AE

Removal steps

1. Switch garnish
2. Rheostat



INSPECTION

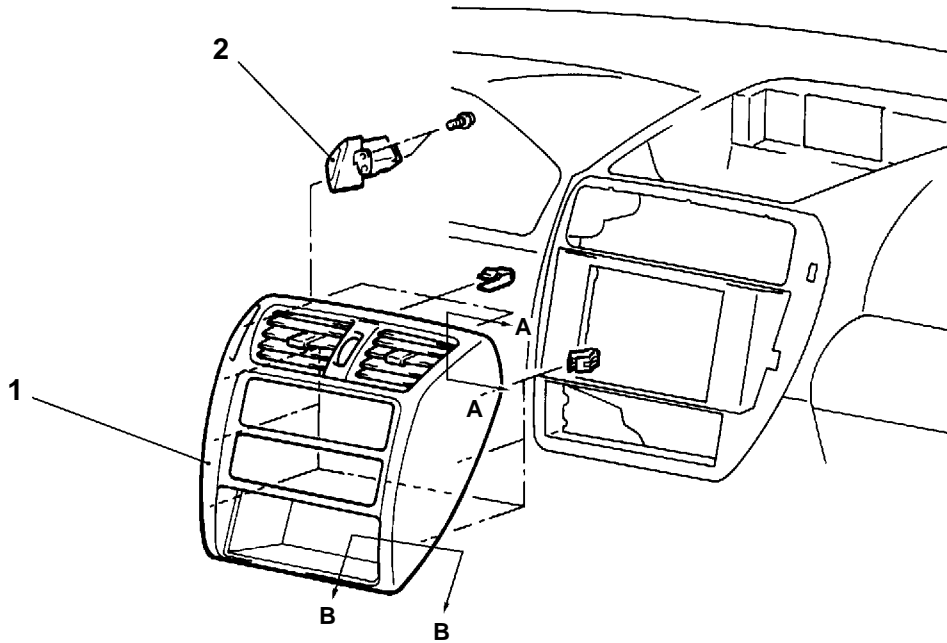
54200610218

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

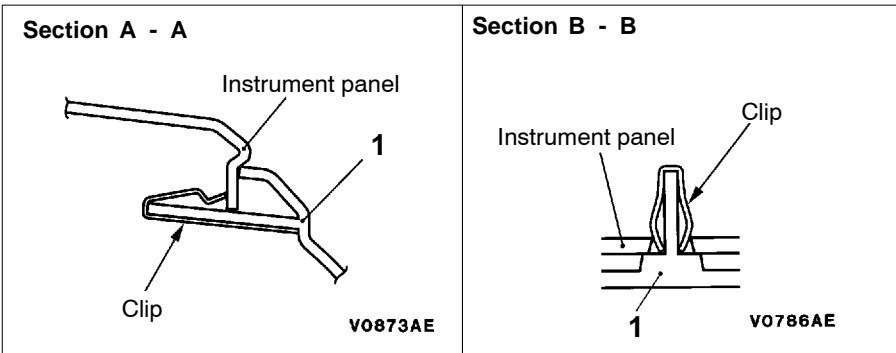
HAZARD WARNING LAMP SWITCH

54200660213

REMOVAL AND INSTALLATION

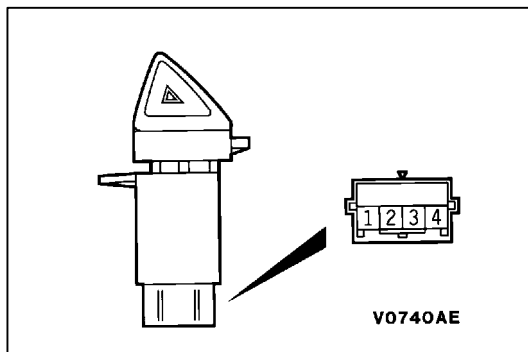


AW0584AE



Removal steps

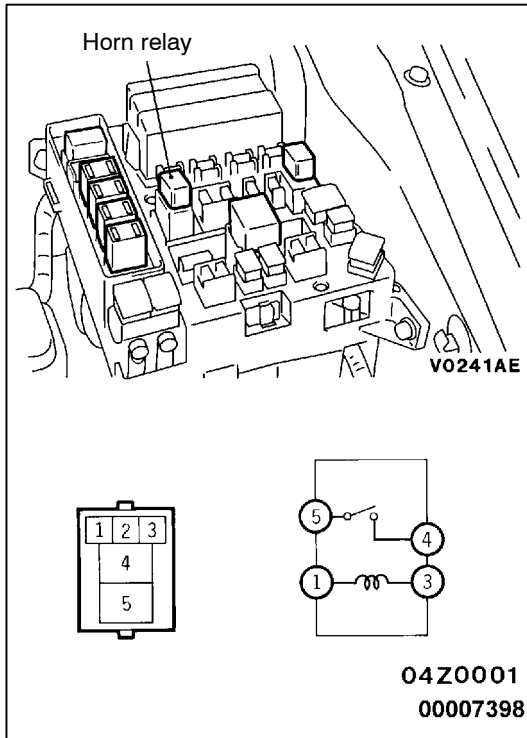
1. Center air outlet assembly
2. Hazard warning lamp switch



INSPECTION

54200670230

Switch position	Terminal No.			
	1	2	3	4
OFF			○ — (ILL) — ○	○
ON	○ — ○		○ — (ILL) — ○	○



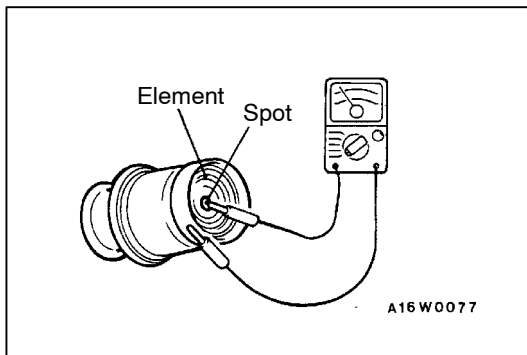
HORN

54300800076

INSPECTION

HORN RELAY CONTINUITY CHECK

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



CIGARETTE LIGHTER

54300570038

INSPECTION

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

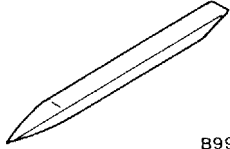
CAUTIONS FOR USE OF THE CIGARETTE LIGHTER SOCKET AS AUXILIARY POWER SOURCE

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

CLOCK

54300060535

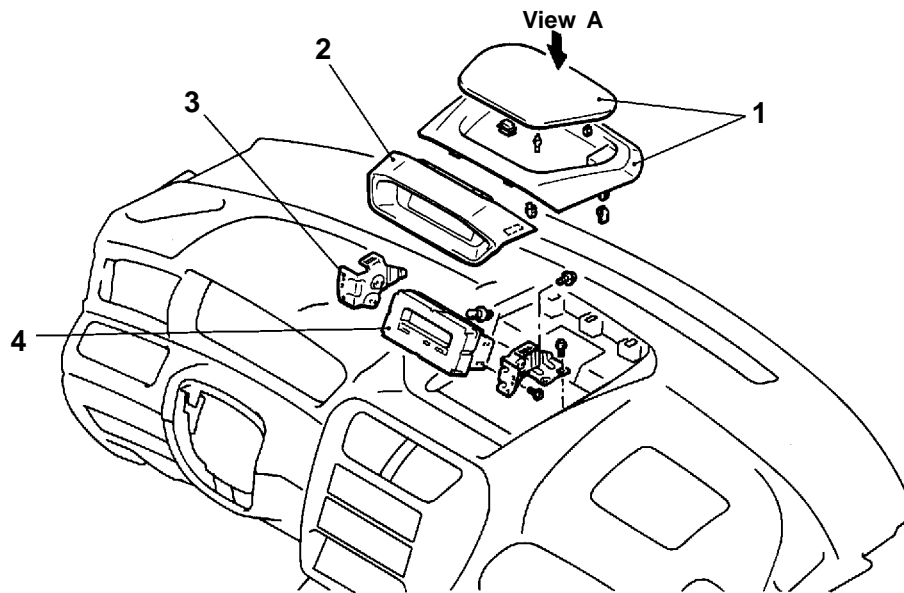
SPECIAL TOOL

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

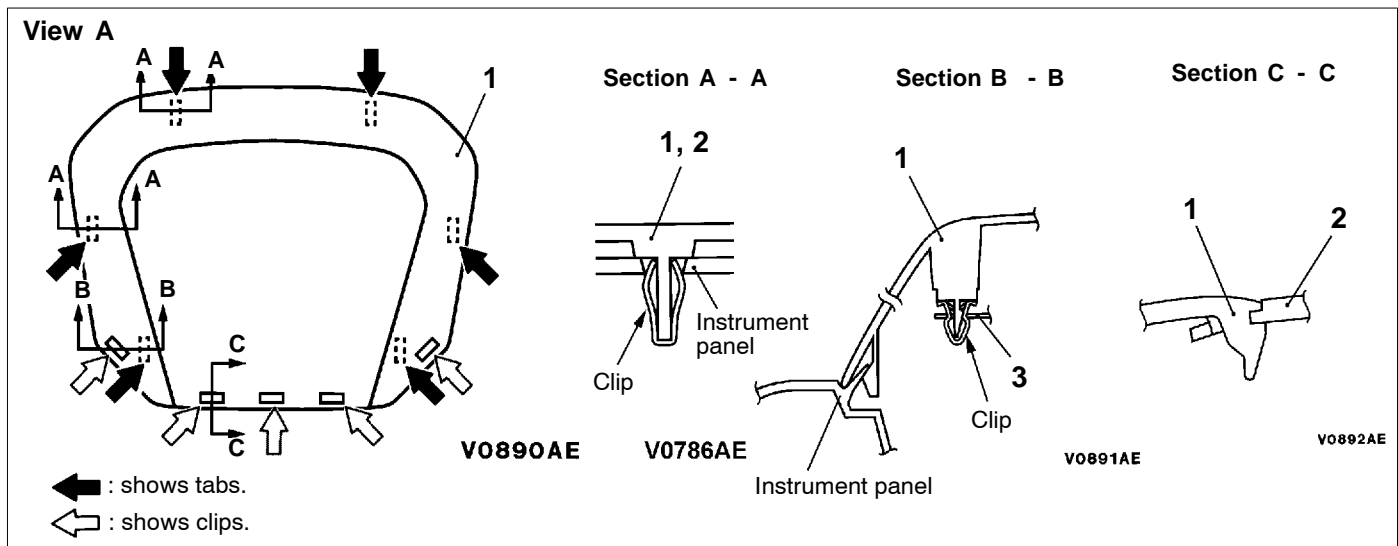
CLOCK

54300590102

REMOVAL AND INSTALLATION



AW0585AE



Removal steps

1. Hood panel
2. Center hood

3. Bracket
4. Clock

RADIO AND TAPE PLAYER

54400070036

TROUBLESHOOTING

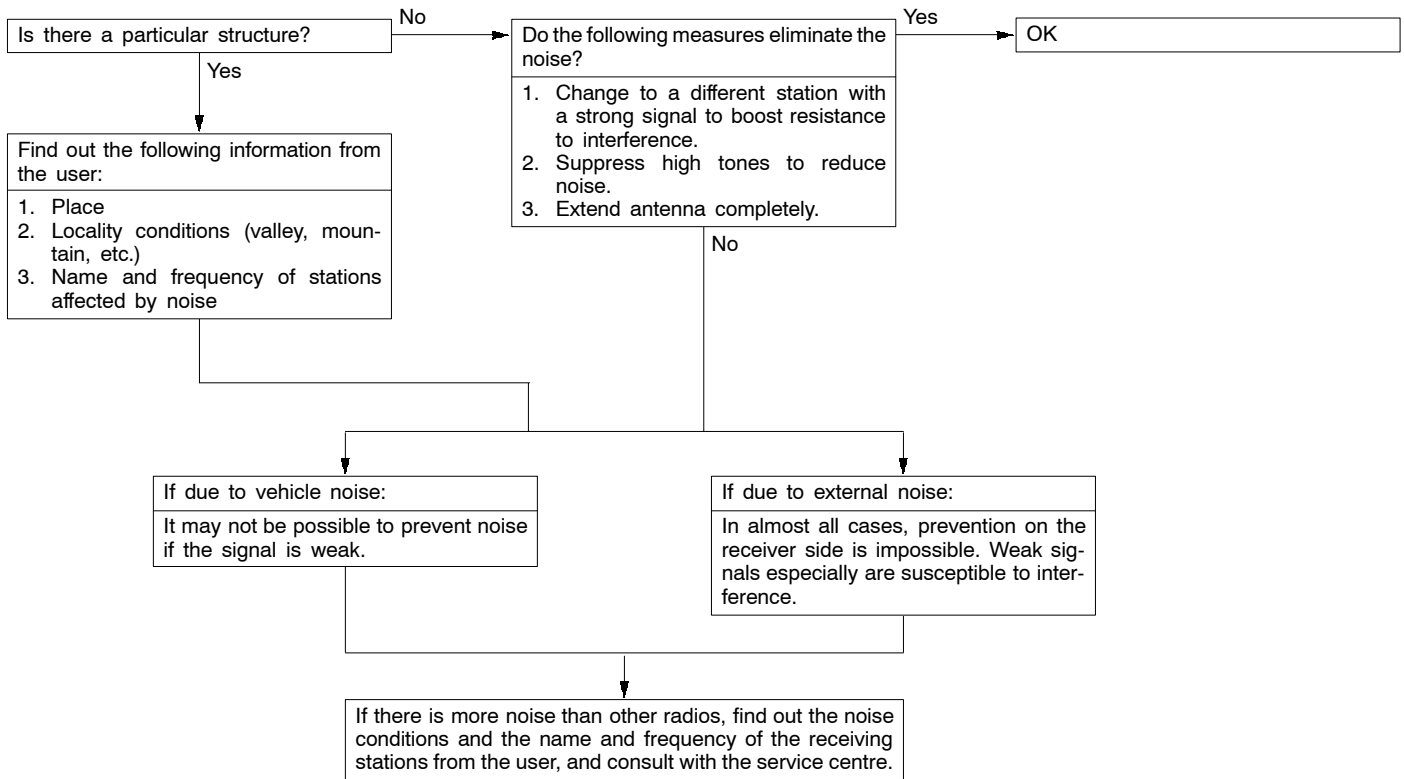
QUICK-REFERENCE TROUBLESHOOTING CHART

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.



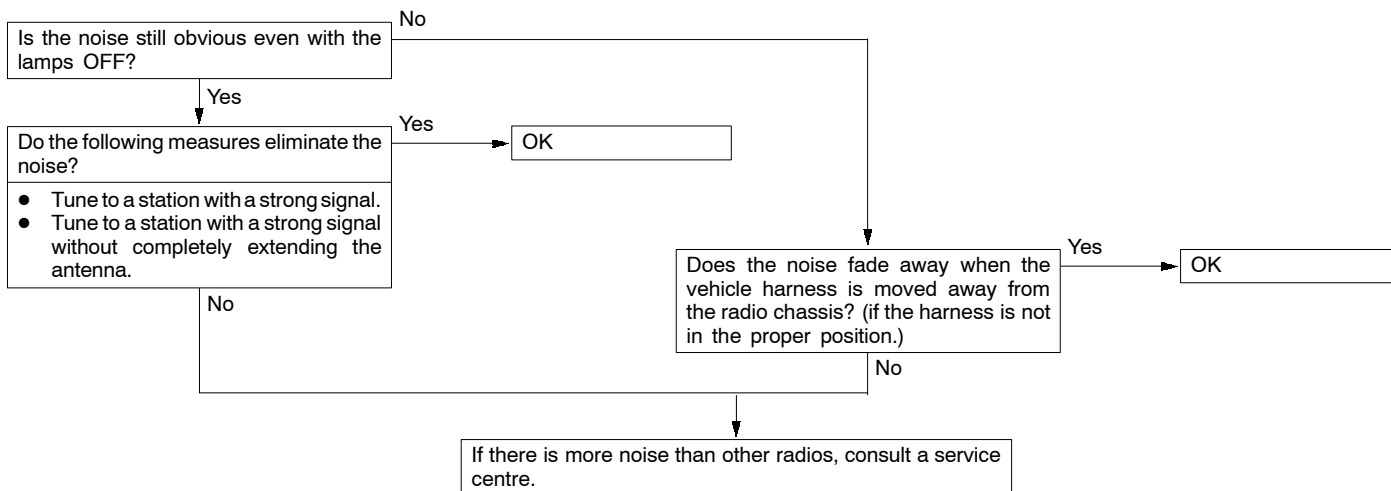
A-2 Mixed with noise, only at night.

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

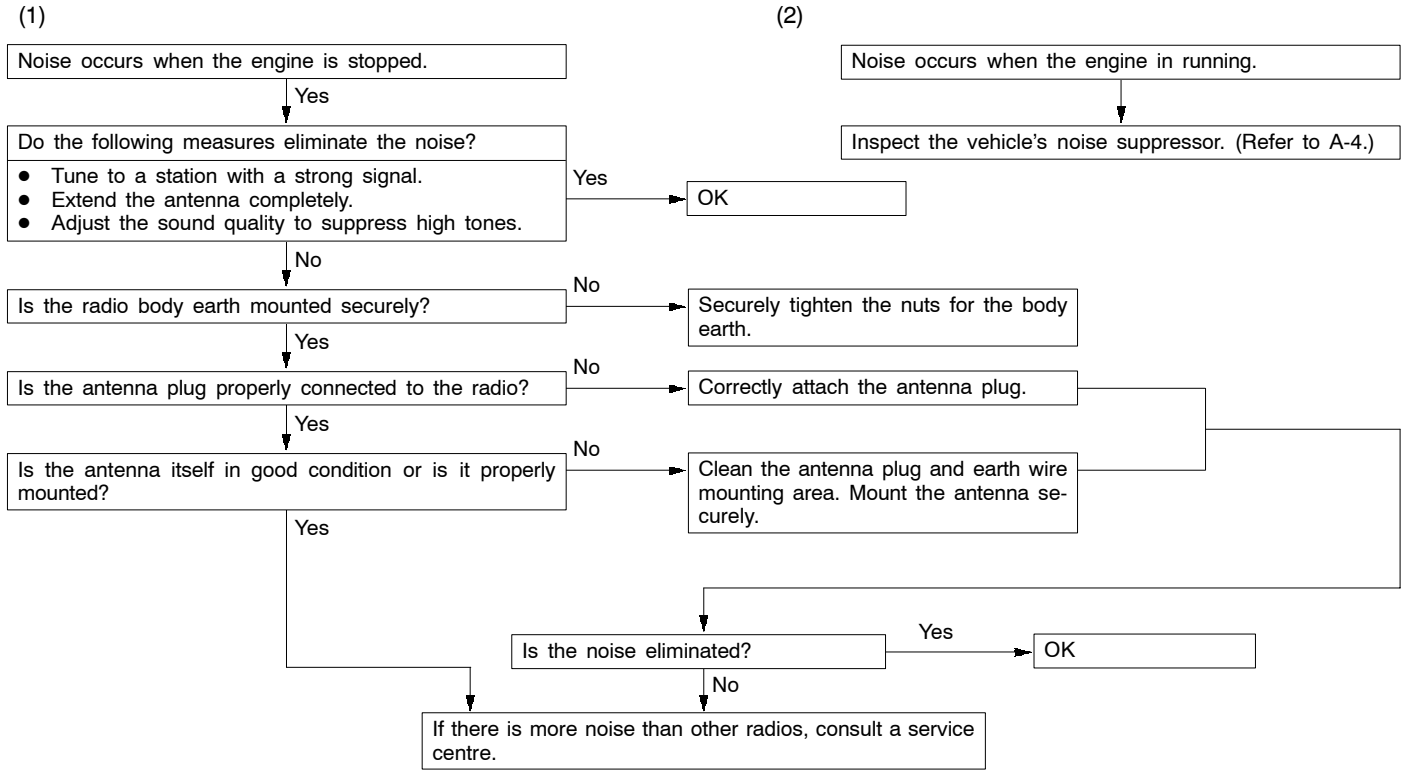
1. Factors due to signal conditions: Due to the fact that long-distance signals are more easily received at night, even stations that are received without problem during the day may experience interference in a general worsening of reception conditions. The weaker a station is the more susceptible it 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 Sounds are in parentheses ().	Conditions	Cause	Remedy
UKW/MW/LW: Ignition noise (Popping, snapping, cracking, buzzing)	<ul style="list-style-type: none"> Increasing the engine speed causing the popping sound to speed up, and volume decreases. Disappears when the ignition switch is turned to ACC. 	<ul style="list-style-type: none"> Mainly due to the spark plugs. Due to the engine noise. 	<ul style="list-style-type: none"> Check or replace the earth cable. (Refer to Fig. 1 on P.54-65.) Check or replace the noise capacitor.
Other electrical components	-	Noise may appear as electrical components become older.	Repair or replace electrical components.
Static electricity (Cracking, crinkling)	<ul style="list-style-type: none"> Disappears when the vehicle is completely stopped. Severe when the clutch is engaged. 	Occurs when parts or wiring move for some reason and contact metal parts of the body.	Return parts or wiring to their proper position.
	<ul style="list-style-type: none"> Various noises are produced depending on the body part of the vehicle. 	Due to detachment from the body of the front hood, bumpers, exhaust pipe and muffler, suspension, etc.	Tighten the mounting bolts securely. Cases where the problem is not eliminated by a single response to one area are common, due to several body parts being imperfectly earthed.

Caution

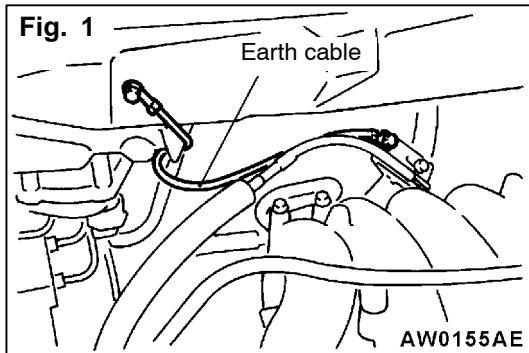
1. Connecting a high tension cable to the noise filter may destroy the noise filter and should never be done.
2. Check that there is no external noise. Since failure caused by this may result in misdiagnosis due to inability to identify the noise source, this operation must be performed.
3. Noise prevention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

NOTE

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

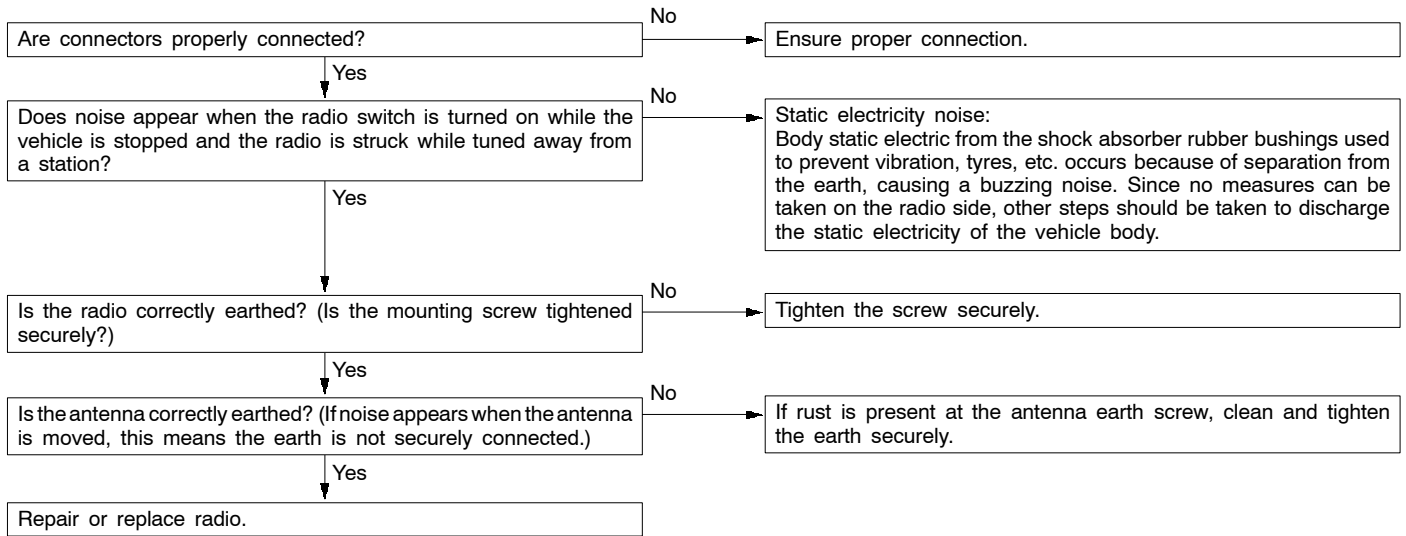
passes A.C. current, impedance (resistance against A.C.) decreases, and current flow is facilitated. A noise suppressing condenser which takes advantage of this property is inserted between the power line for the noise source and the earth. This suppresses noise by earthing the noise component (A.C.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

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



spot={{ID-#1}}link=GA
spot={{ID-#2}}link=GA

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



A-6 Ever-present noise.

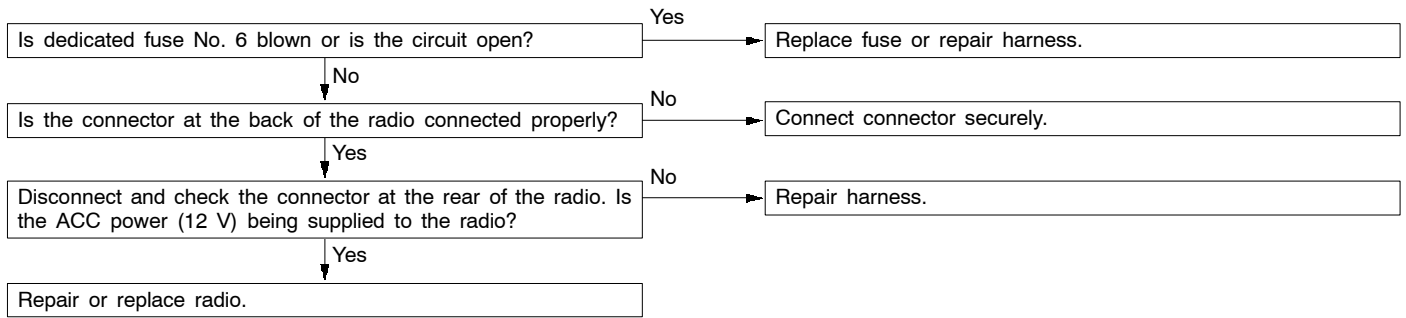
Noise is often created by the following factors, and often the radio is OK when it is checked individually.

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

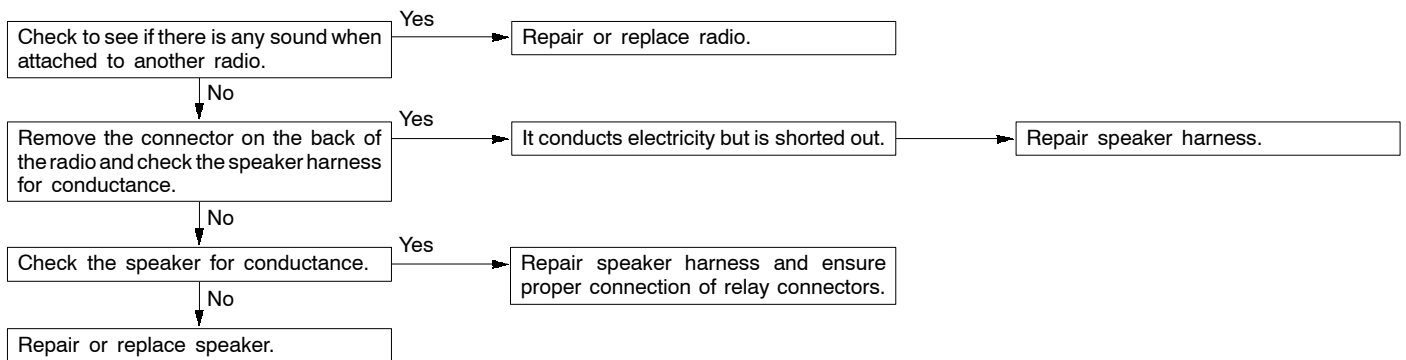
For this reason, if there are still problems with noise even after the measures described in steps A-1 to A-8 have been taken, get information on the factors listed above as well as determining whether the problem occurs with UKW/MW/LW, the station names, frequencies, etc., and contact a service centre.

B. RADIO

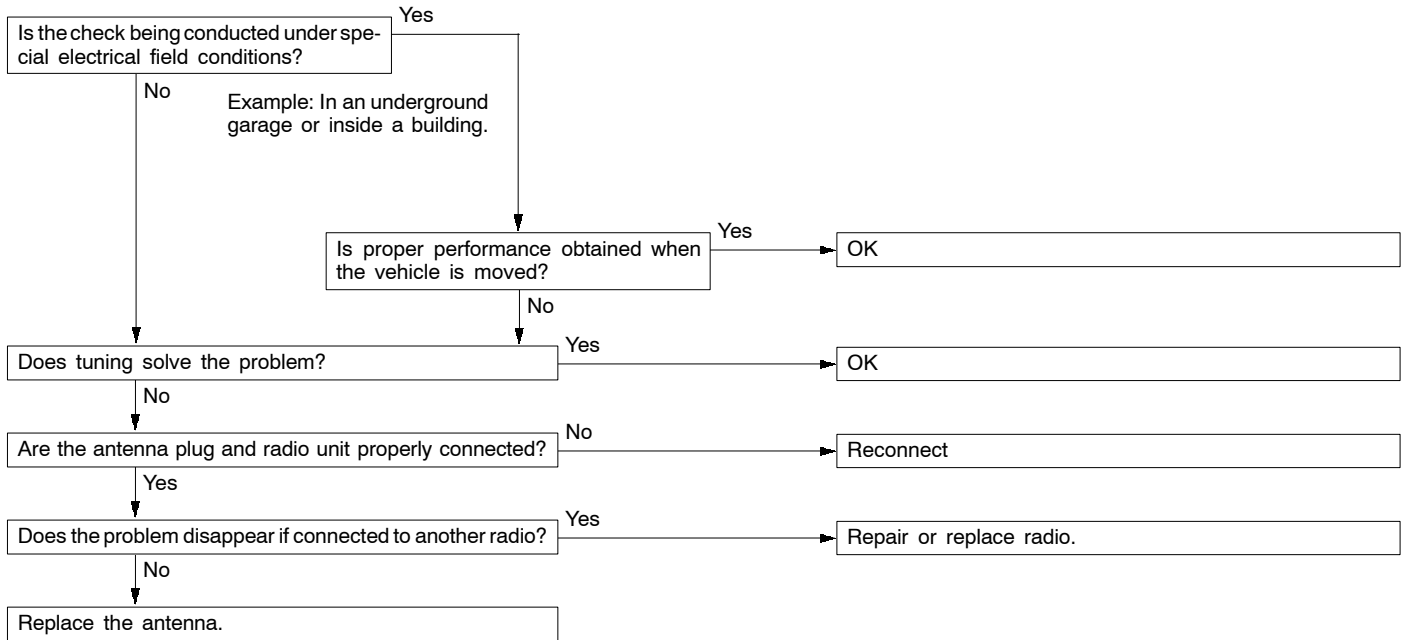
B-1 No power is supplied when the switch is set to ON.



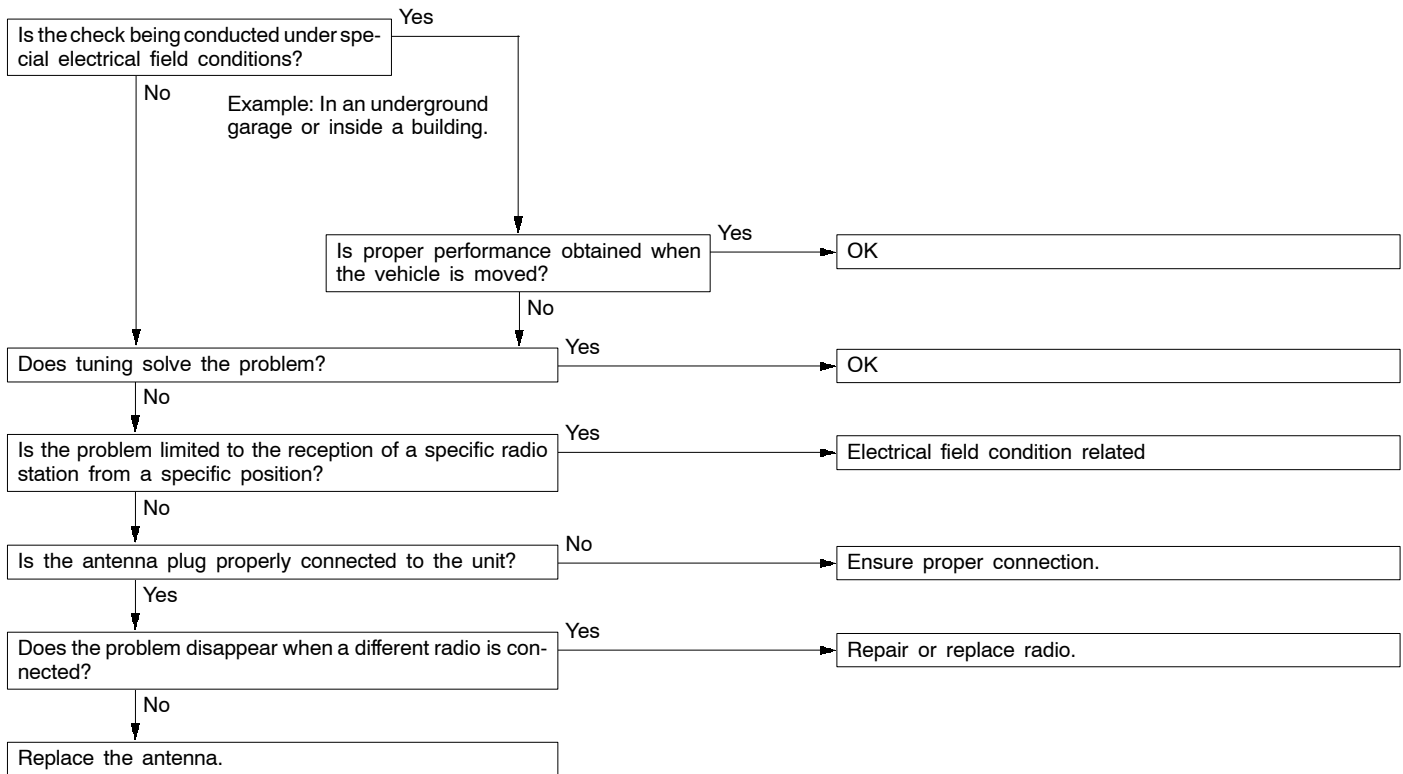
B-2 No sound from one speaker.



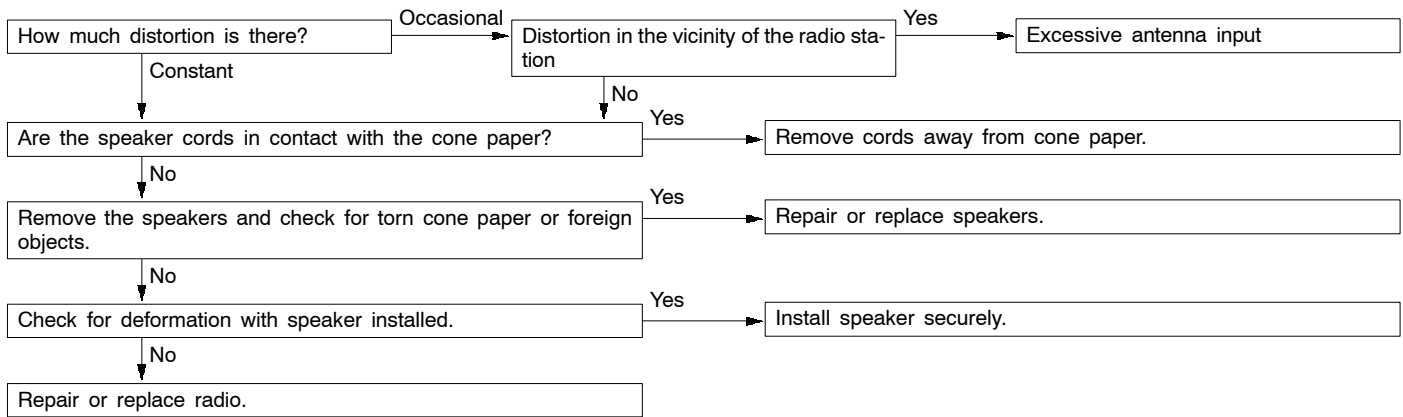
B-3 There is noise but no reception for UKW/MW/LW or no sound from UKW/MW/LW.



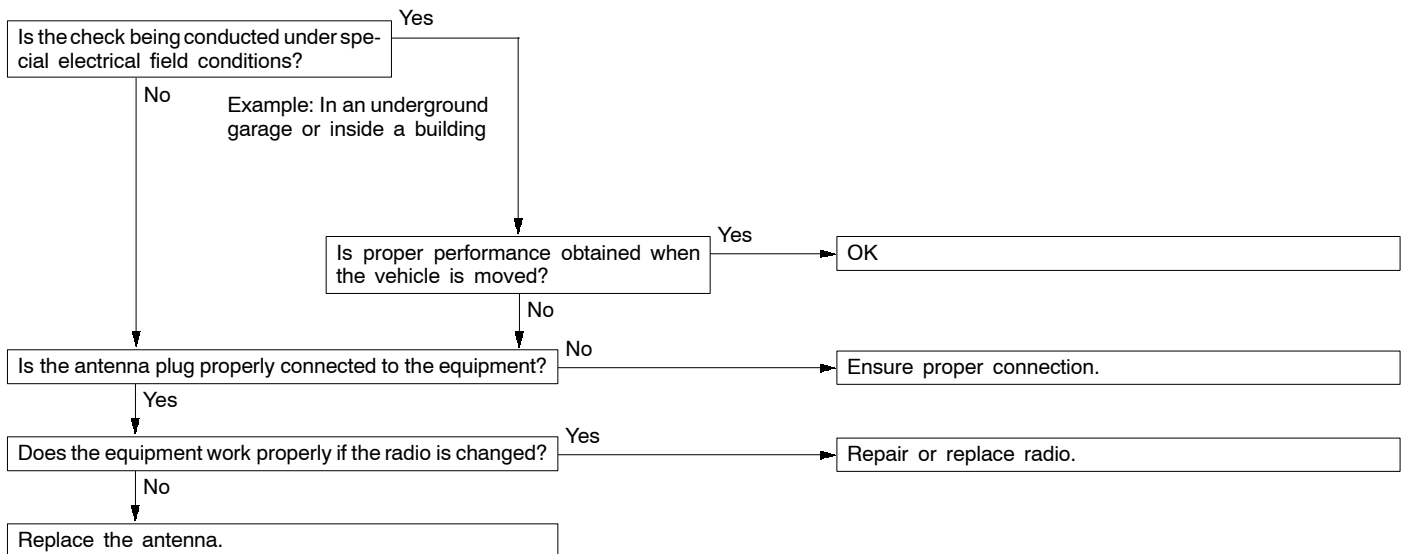
B-4 Insufficient sensitivity.

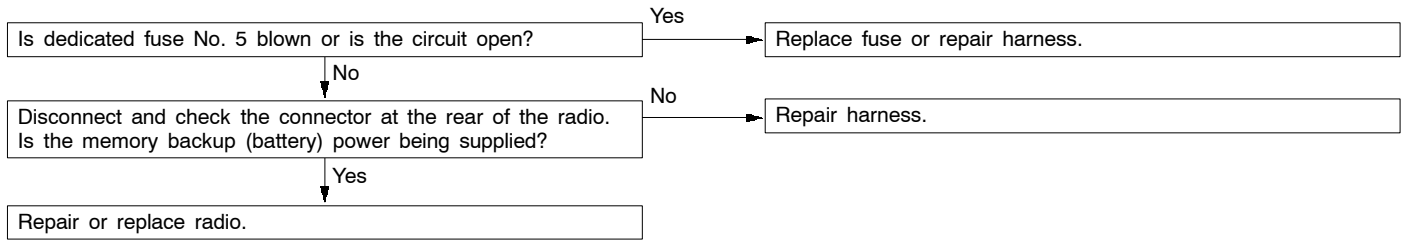
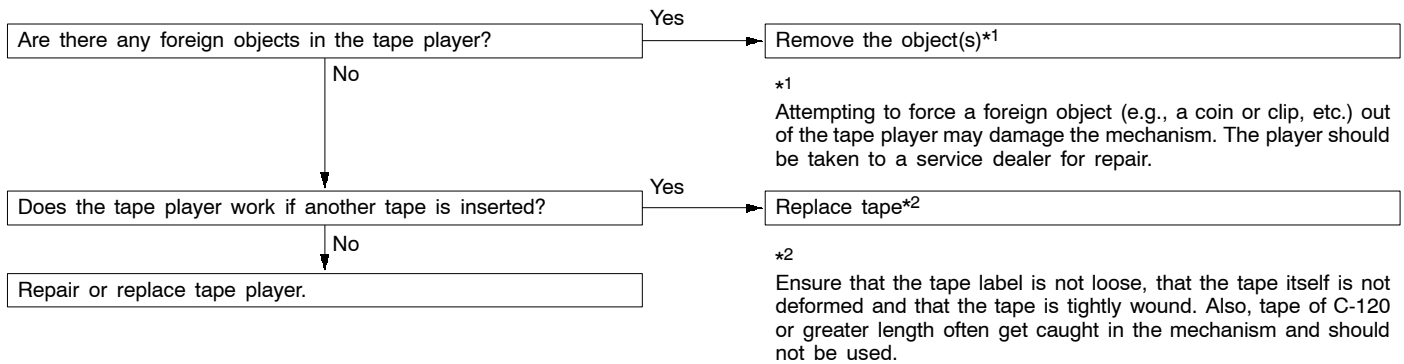
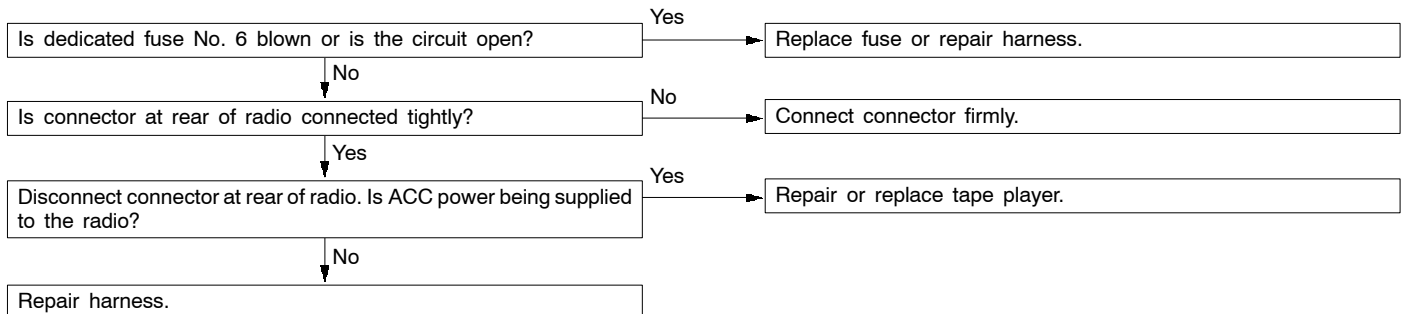


B-5 Distortion on UKW/MW/LW.

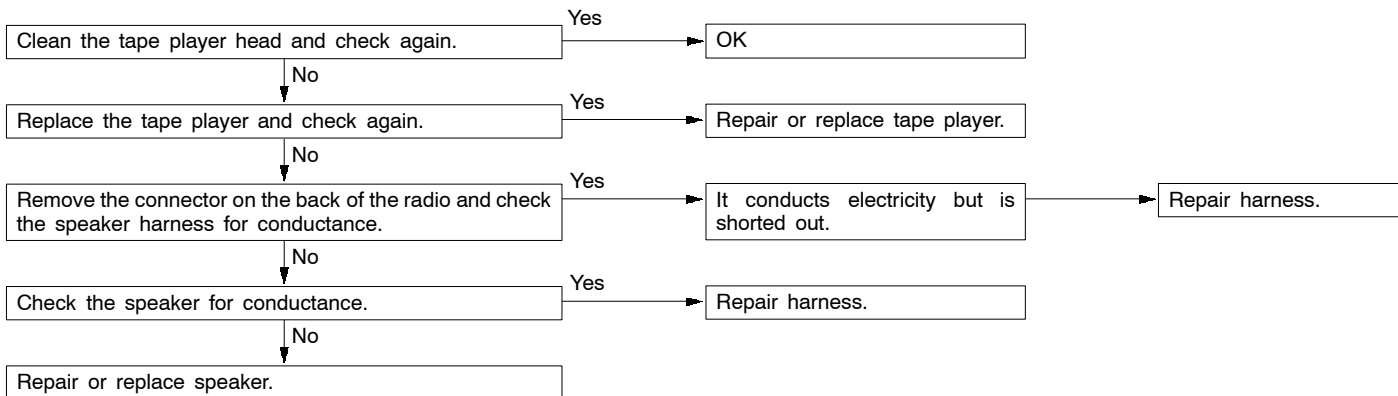


B-6 Too few automatic select stations.

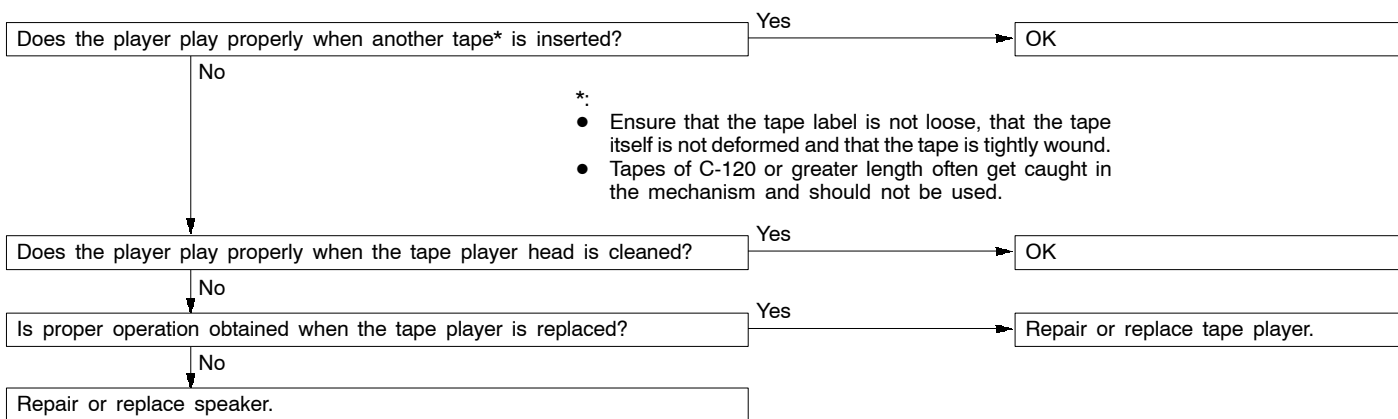


B-7 Insufficient memory (preset stations are erased).**C. TAPE PLAYER****C-1 Cassette tape will not be inserted.****C-2 No sound (even after a tape has been inserted).**

C-3 No sound from one speaker.



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

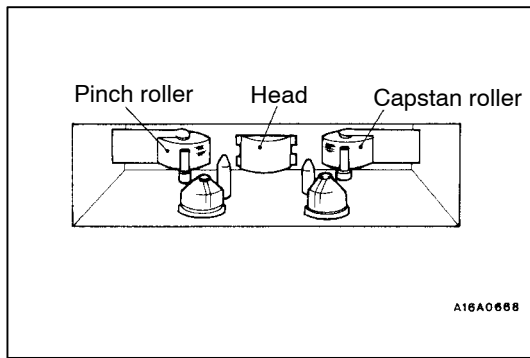
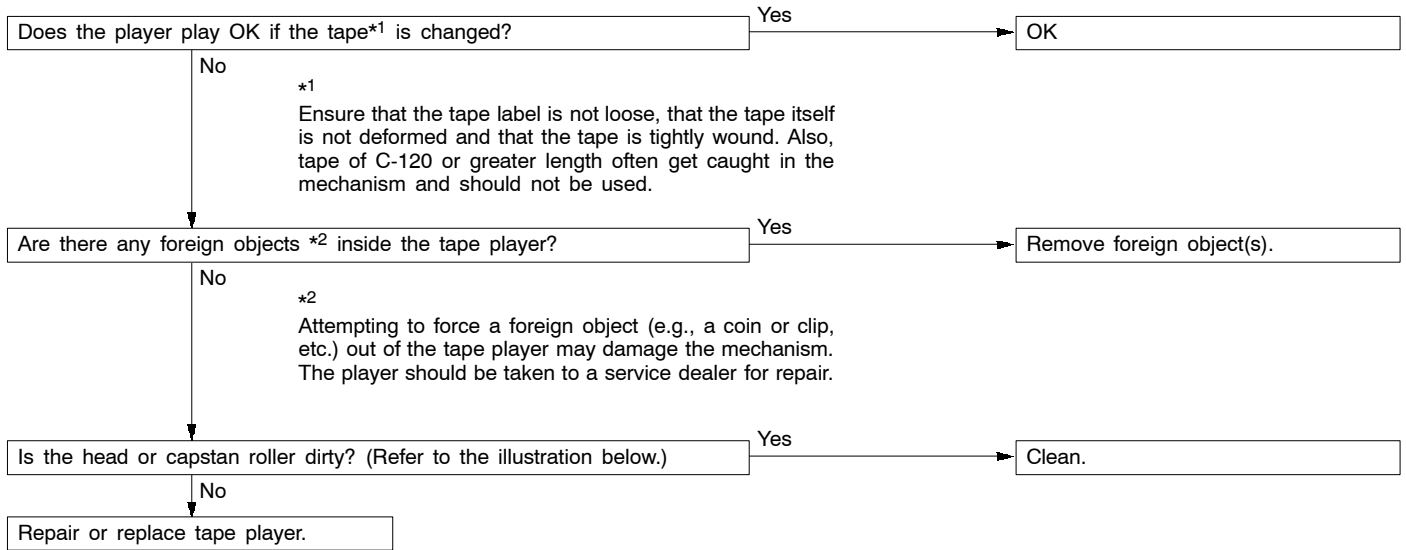


C-5 Cassette tape will not be ejected.

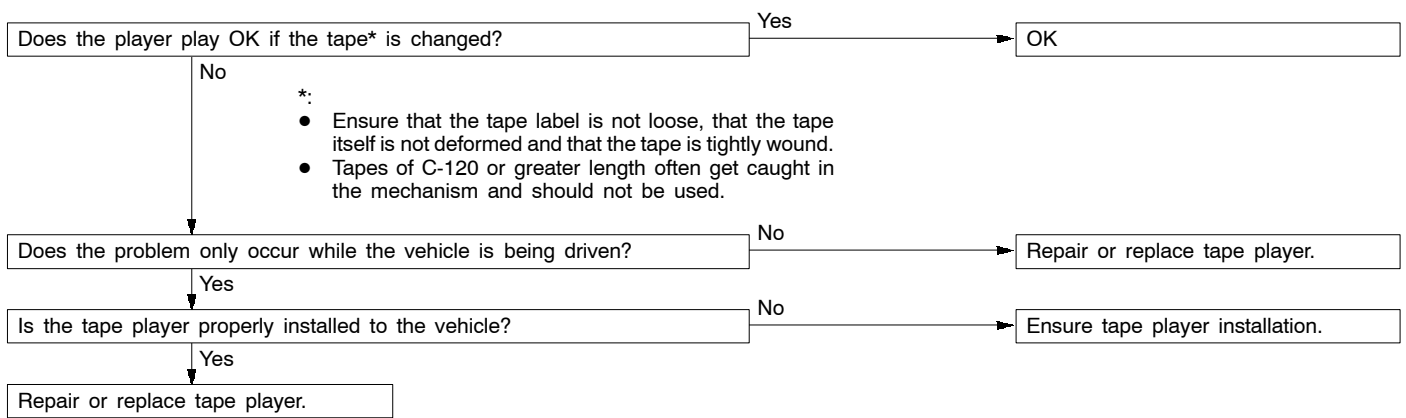
The problems covered here are all the result of the use of a bad tape (deformed or not properly tightened) or of a malfunction of the tape player itself. Malfunctions involving the tape becoming caught in the mechanism and ruining the case are

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.

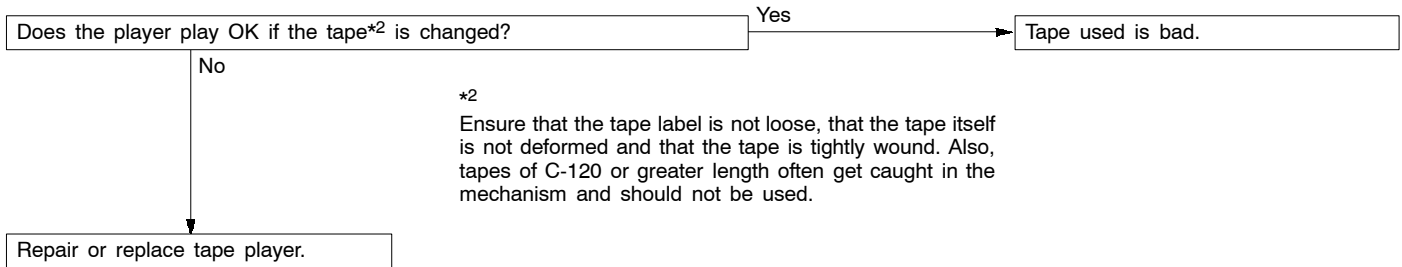


C-7 Faulty auto reverse.



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.

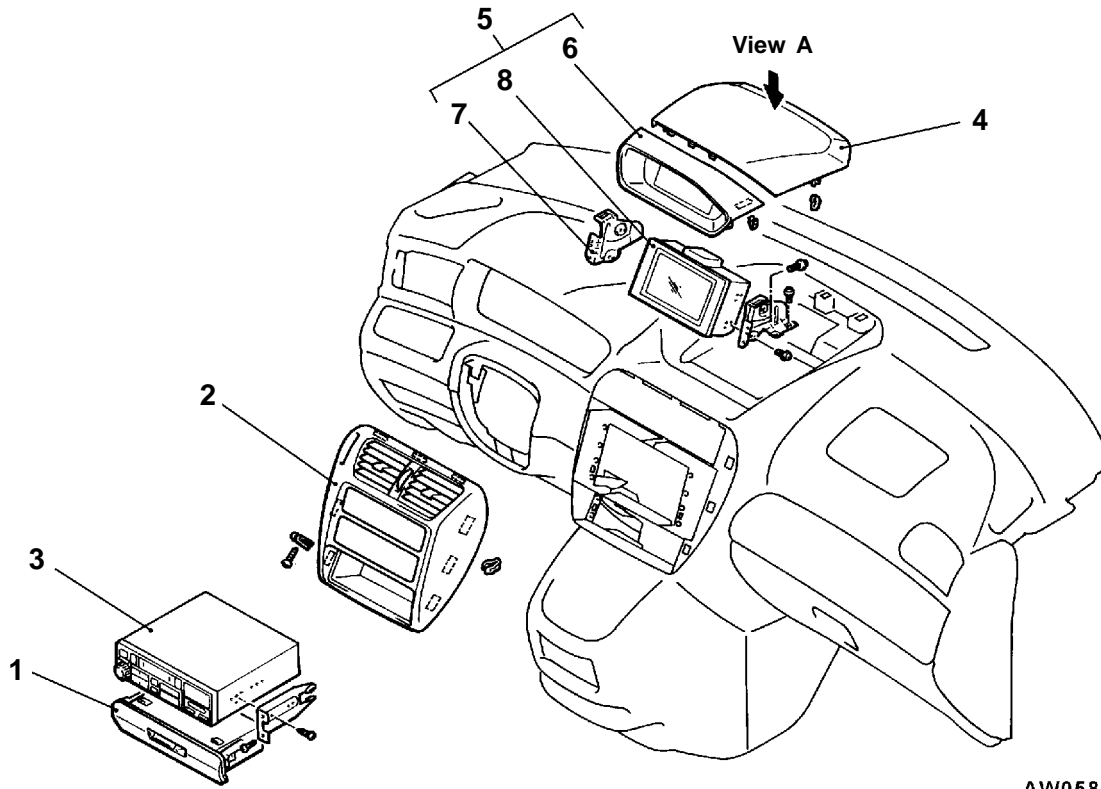


*2
Ensure that the tape label is not loose, that the tape itself is not deformed and that the tape is tightly wound. Also, tapes of C-120 or greater length often get caught in the mechanism and should not be used.

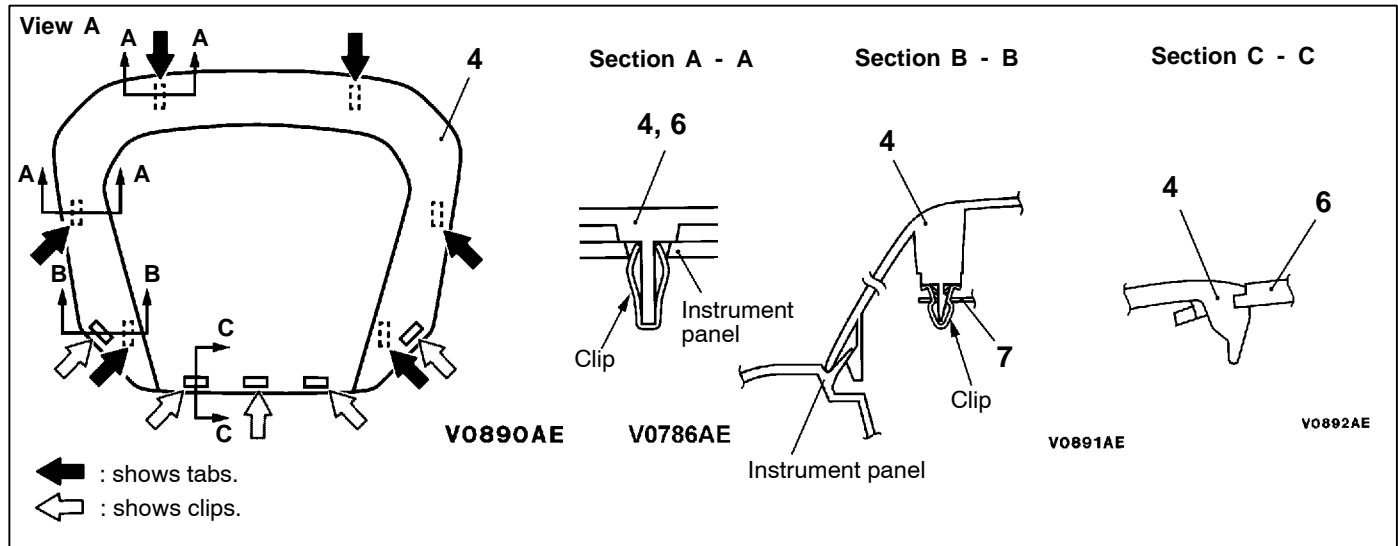
RADIO AND TAPE PLAYER

54400140195

REMOVAL AND INSTALLATION



AW0586AE



Radio and tape player removal steps

1. Box
2. Center air outlet assembly
3. Radio and tape player

Multi center display removal steps

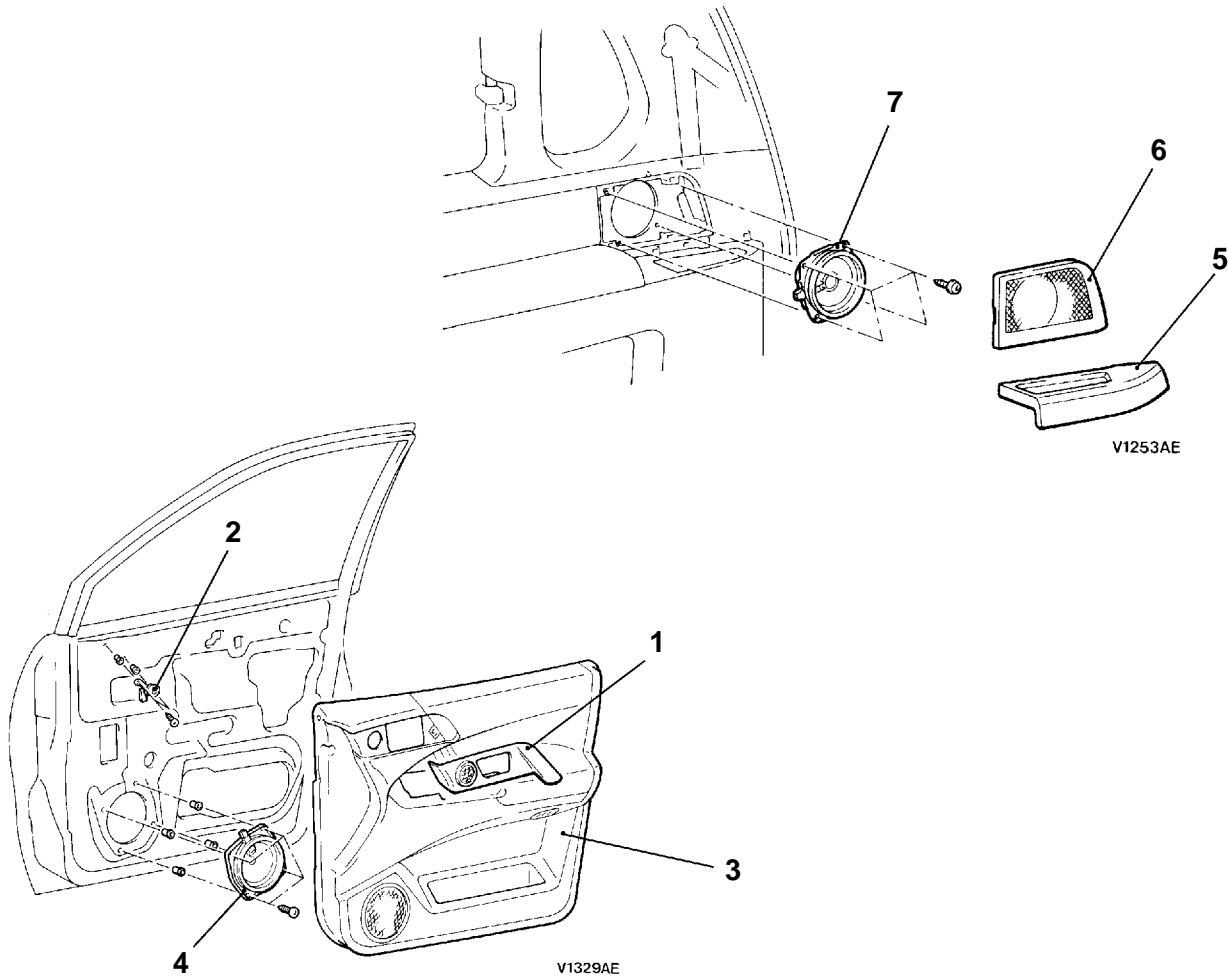
4. Hood panel
5. Center hood and multi center display assembly
6. Center hood
7. Multi center display unit bracket
8. Multi center display unit

SPEAKER

54400260396

REMOVAL AND INSTALLATION

<SPACE RUNNER>

**Speaker (front door) removal steps**

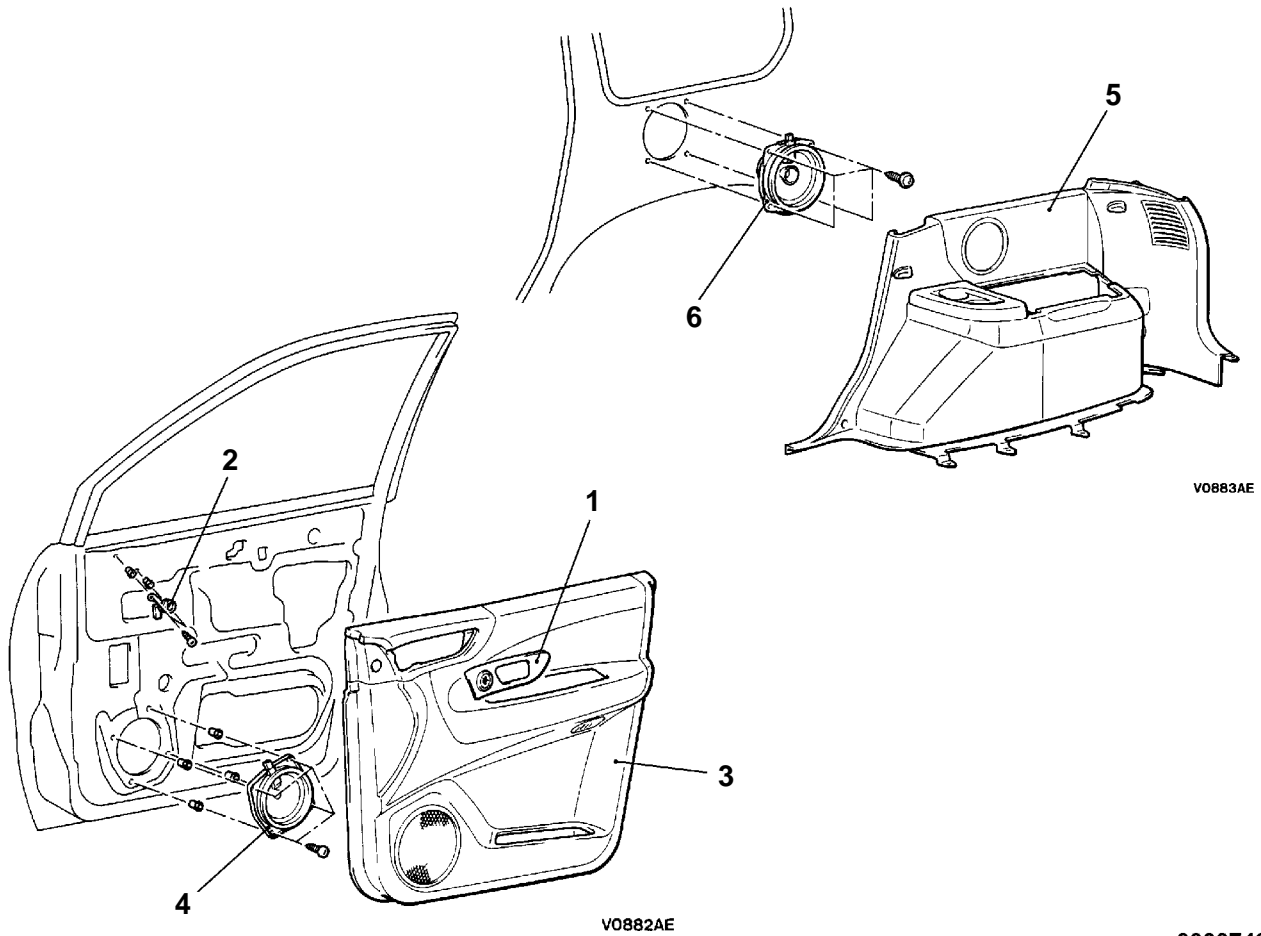
1. Inside handle cover
<Vehicles with 6 speakers>
2. Tweeter speaker
<Vehicles with 6 speakers>
3. Door trim (Refer to GROUP 42)
4. Speaker

Speaker (quarter panel) removal steps

5. Lid
6. Speaker garnish
7. Speaker

00007692

<SPACE WAGON>



V0883AE

V0882AE

00007409

Speaker (front door) removal steps

1. Inside handle cover
<vehicles with 6 speakers>
2. Tweeter speaker
<vehicles with 6 speakers>
3. Door trim (Refer to GROUP 42.)
4. Speaker

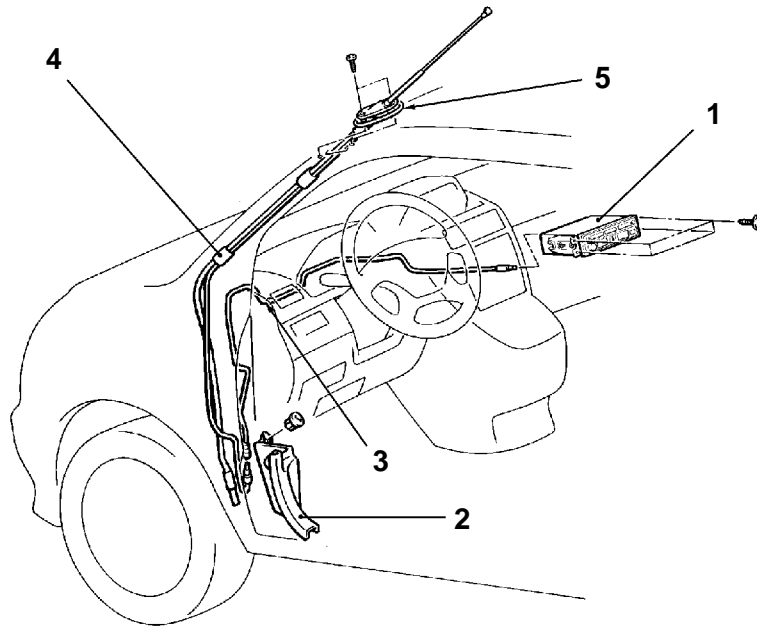
Speaker (quarter panel) removal steps

5. Quarter trim (Refer to GROUP 52A.)
6. Speaker

ANTENNA

54400290371

REMOVAL AND INSTALLATION



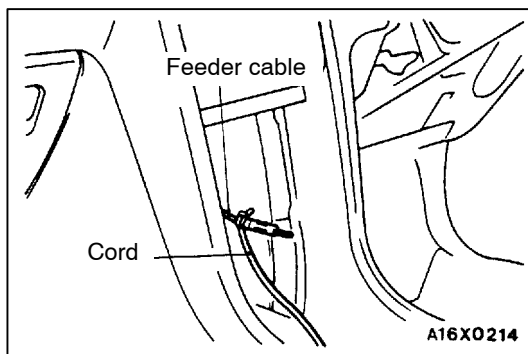
AW0587AE

Removal steps

- Center air outlet (Refer to P.54-58.)
- 1. Radio and tape player (Refer to P.54-74.)
- Under cover assembly (Refer to GROUP 52A.)



- 2. Cowl side trim (Refer to GROUP 52A)
- 3. Antenna feeder
- 4. Antenna assembly
- 5. Antenna base



REMOVAL SERVICE POINT

◀▶ ANTENNA ASSEMBLY REMOVAL

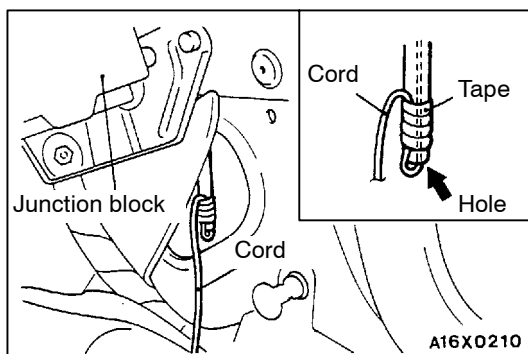
Observe the following steps to make the feeder cable of the antenna to be routed easily during reinstallation.

1. Secure a cord to the end of the feeder cable.
2. Pull out the feeder cable slightly until the tube end of the antenna can be seen.
3. Insert a cord into the tube end, and secure the cord with plastic tape as shown.

Caution

Make sure that the cord is not loosened.

4. Remove the antenna assembly by pulling it gradually.



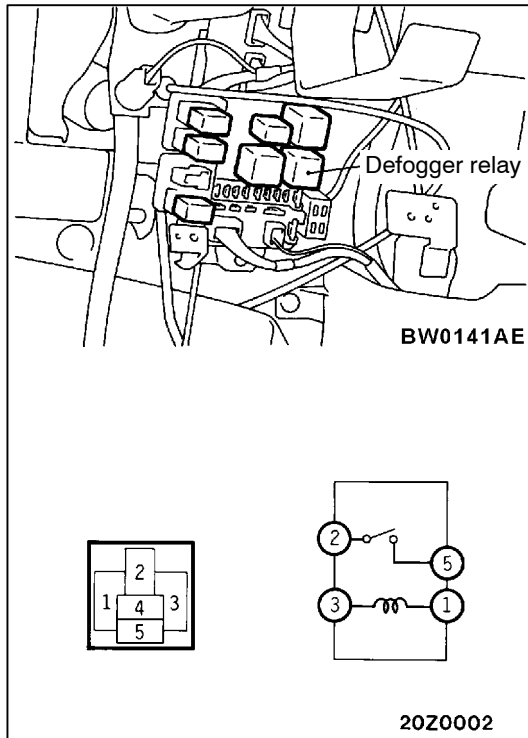
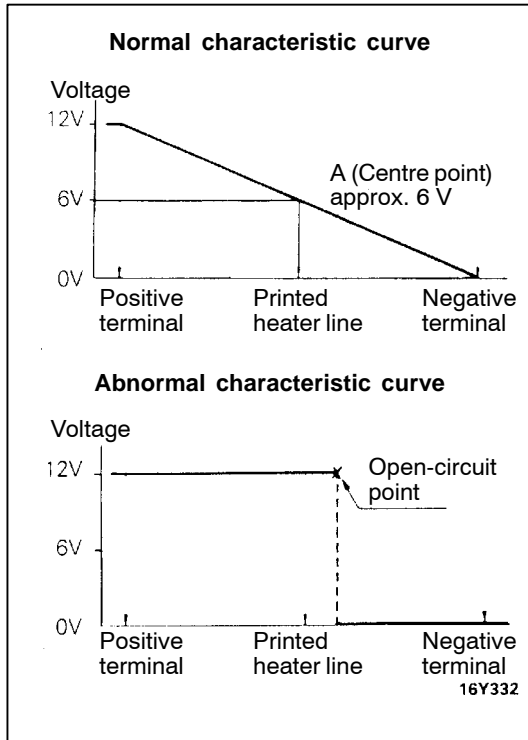
REAR WINDOW DEFOGGER

54300180163

ON-VEHICLE SERVICE

PRINTED-HEATER LINE CHECK

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



REAR WINDOW DEFOGGER RELAY CONTINUITY CHECK

54300680229

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

REAR WINDOW DEFOGGER SWITCH

54300620207

REMOVAL AND INSTALLATION

Refer to GROUP 55 - Heater Control.

INSPECTION

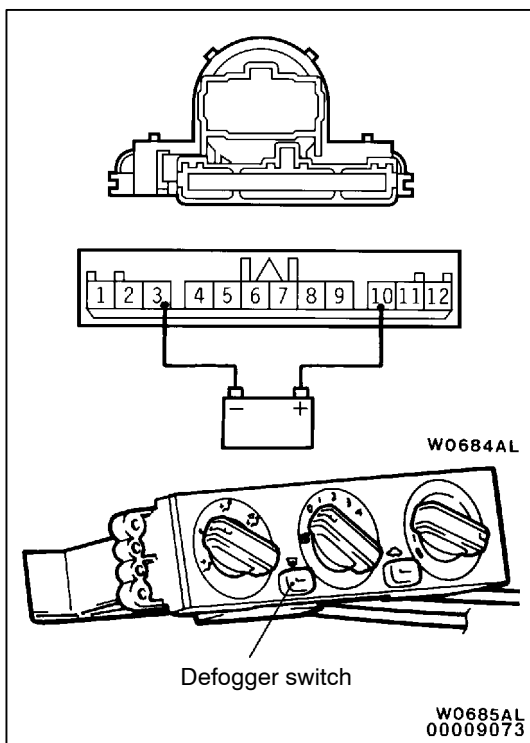
54300630071

DEFOGGER SWITCH CONTINUITY CHECK

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

NOTE

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



MULTI CENTER DISPLAY

54600070025

TROUBLESHOOTING

NOTES WITH REGARD TO SERVICE PROCEDURES

1. Before removing the battery

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

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

2. Notes on trouble diagnosis relating to the overall system

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

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

NOTE

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

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

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

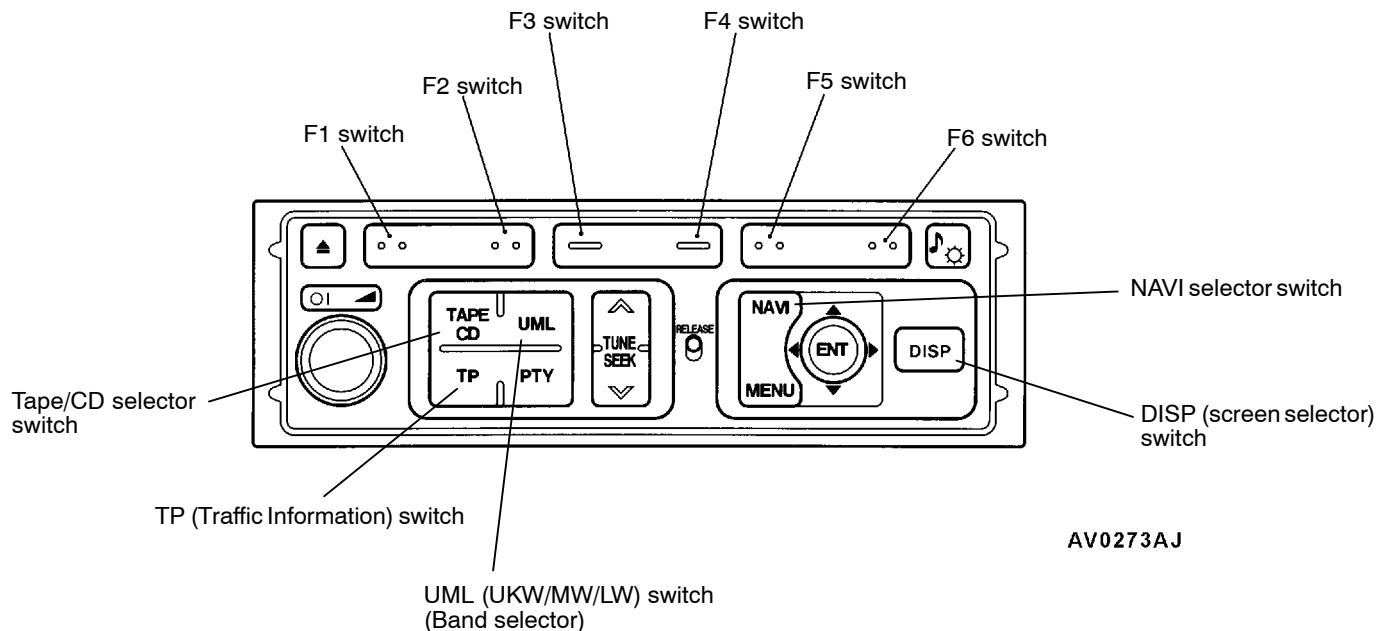
4. Notes on trouble diagnosis of the navigation function

- (1) The vehicle positioning accuracy of the navigation function is limited because of the principle of operation which it uses. Because of this, the system may be operating normally even though customers might be reporting a problem.

Before carrying out troubleshooting, get as much information as possible from the customer regarding things such as usage conditions and driving locations. If it is possible to judge from this that the problem is not caused by a system abnormality, explain the principle of operation used by the navigation function and how to utilize it effectively.

- (2) If you find that there is a system abnormality, check according to the Inspection Chart Classified by Trouble Symptoms in the Troubleshooting section.

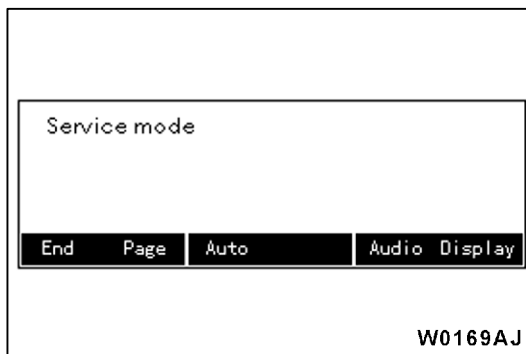
MULTI CENTER DISPLAY CONTROL PANEL



TROUBLE DIAGNOSIS SERVICE FUNCTIONS

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

Function	Contents
Diagnosis function	During normal use, this function constantly monitors the system communication lines, and displays an error if it finds any abnormalities.
CD-ROM checking function <Vehicles with navigation system>	This function displays a message if it cannot read the CD-ROM or if no CD-ROM is inserted.
Service functions 1. Monitor checking 2. Audio checking 3. Automatic diagnosis by mode 4. Self-diagnosis <ul style="list-style-type: none"> ● Wiring and communication checking ● Sensor checking ● Vehicle signals ● Version data 5. Diagnosis recording	There are five checking modes available: monitor checking, audio checking, automatic checking by mode, self-diagnosis and diagnosis recording. This mode checks that the image display function is operating normally. This mode checks that the speakers and operating switches of the audio system are all working normally. In this mode, wiring and communication checking, audio checking, sensor checking and vehicle signal checking are carried out continuously. This mode includes functions such as wiring and communication checking, sensor checking, vehicle signals and version data checking. This checks system communication between all units. This checks all of the sensors that are necessary to the navigation system. This displays the current vehicle signal condition. This displays the version numbers for each unit in the Multi Center Display. This mode displays error codes from communication checking. (Error codes are erased when the ignition switch is turned to OFF.)

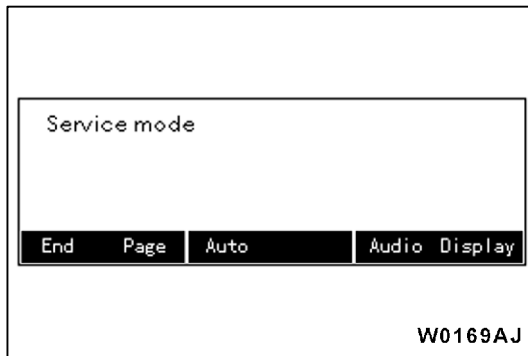


1. ACTIVATING AND ENDING SERVICE MODE

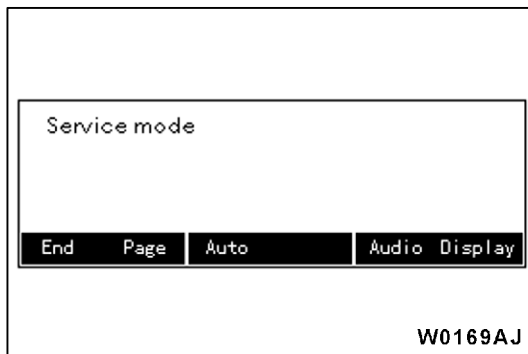
- (1) Activating service mode can be carried out by turning the ignition switch to the ON position while pressing the DISP switch on the audio unit and the F6 switch. (Continue pressing each switch for at least 5 seconds after turning the ignition switch to ON.)
- (2) If the special CD-ROM has been inserted into the navigation unit but the program has not been set up, the program will then be loaded from the CD-ROM. Service mode can be used once this process is completed.

NOTE

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

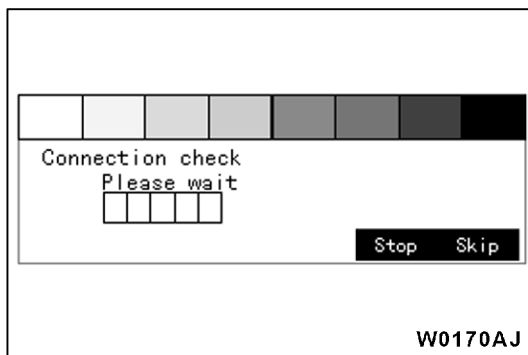


- (3) If the F1 switch is pressed at the service mode initial screen, service mode will be ended and the screen will change to navigation mode.

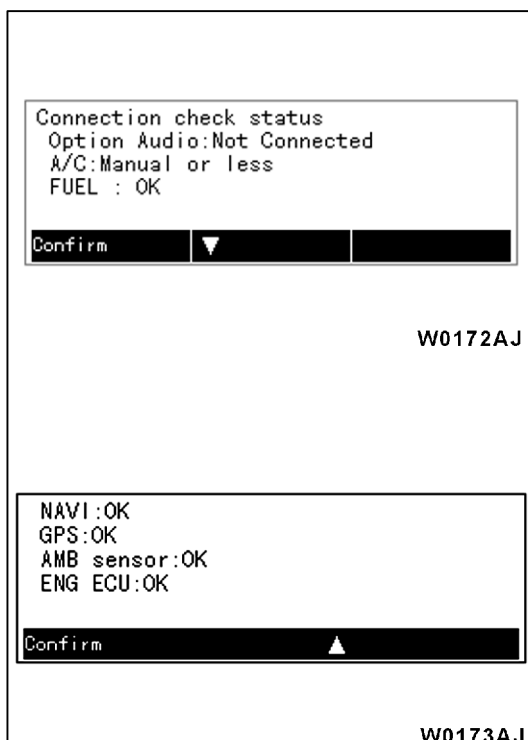


2. AUTOMATIC DIAGNOSIS BY MODE

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



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

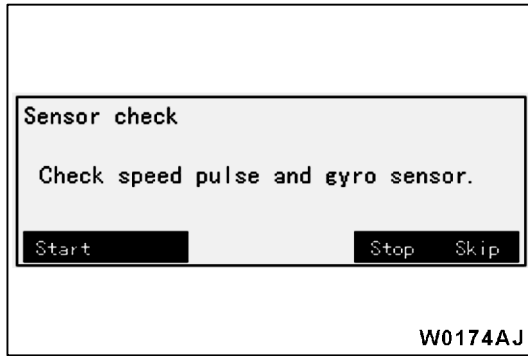


- (3) Once the transmission checking is completed, the results of the wiring and transmission checking will appear on the screen.

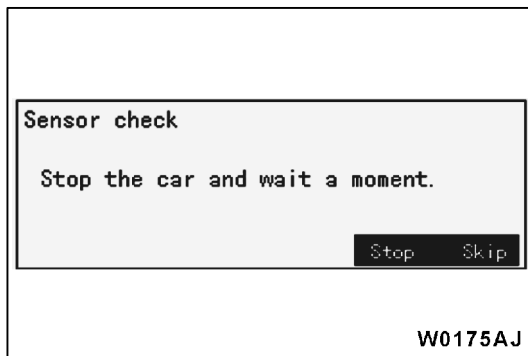
After checking the results, press the F1 switch to proceed to the next check. The next check will start when the switch is pressed.

NOTE

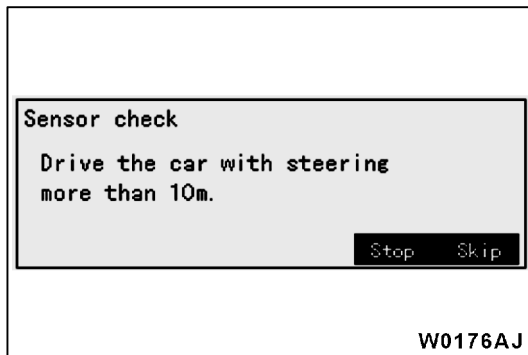
- 1) If the fuel gauge and the engine-ECU are checked while the ignition switch is at ACC, an error will be generated, but this is not a sign of an abnormality.
- 2) If checking is carried out while the fuel tank is full or the while ignition switch is at ACC, the fuel gauge may be shown to be not connected,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



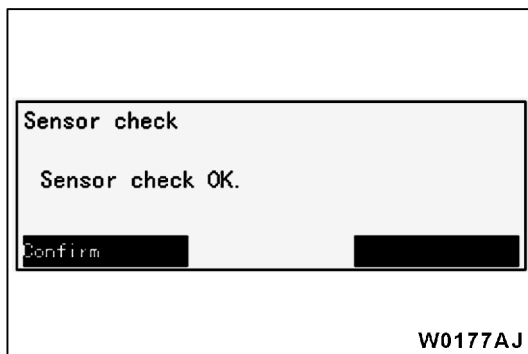
- (4) The next mode is the sensor checking mode. Press the F1 switch to start sensor checking. If you would like to proceed to the next checking operation without carrying out sensor checking, press the F6 switch.



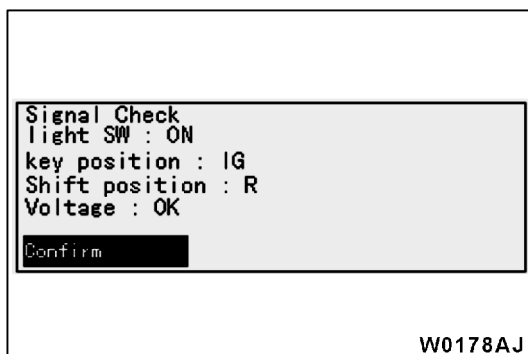
- (5) When sensor checking starts, the gyro output will be checked first while the vehicle is stopped, so make sure that the vehicle is stopped for this check. If the vehicle is moving when the sensor checking starts, the vehicle speed sensor will be shown as defective. Follow the guidance message on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



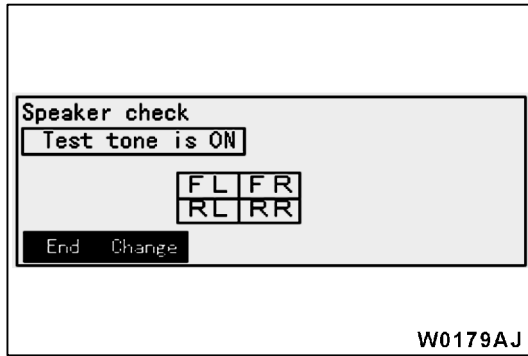
- (6) Next, drive the vehicle for approximately 10 meters while changing the running direction in order to check the vehicle speed pulse and the gyro sensor output. The sensor checking will then be completed. If there is an open circuit in the vehicle speed sensor, sensor checking will not complete even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



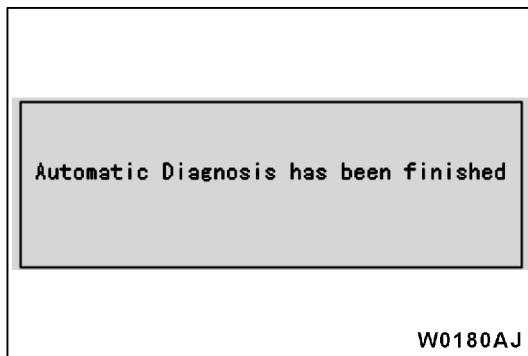
- (7) When sensor checking is completed, the check results will appear on the screen. After checking the results, press the F1 switch to proceed to the next check.



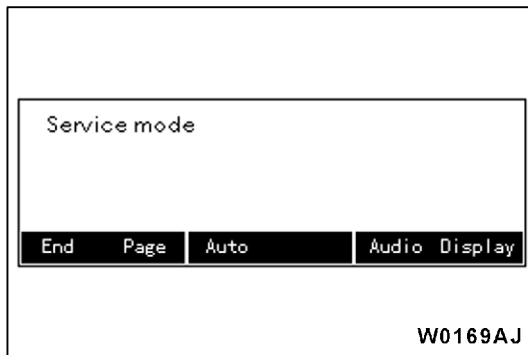
- (8) The next mode is the vehicle signal checking mode. The lighting switch condition, ignition key position, shift lever selection (R or a position other than R) and the power supply voltage drop will be appear on the screen. Check that the details displayed match the actual vehicle signals, and then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



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

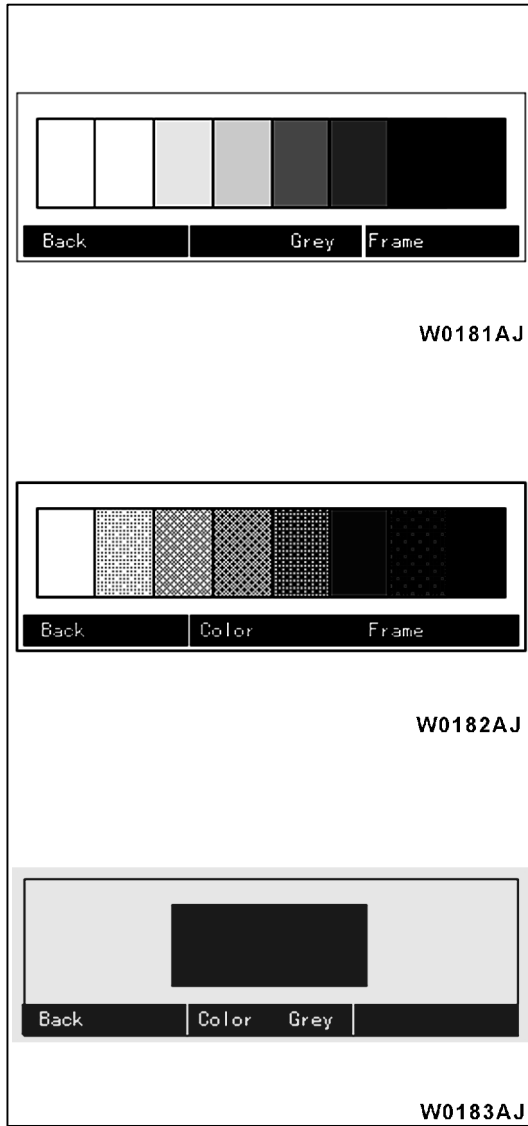


- (10) Press the F1 switch to end service mode. The screen will change to navigation mode.

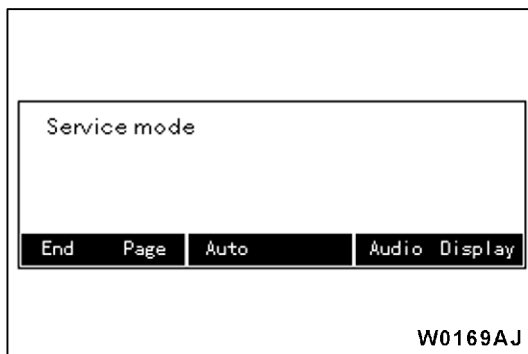


3. MONITOR CHECKING

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

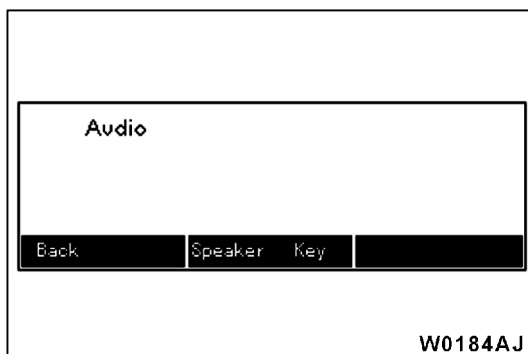


- (2) A colored bar will appear on the screen. Press a function switch to change to another screen. The screen will return to the service mode initial screen if the F1 switch is pressed.

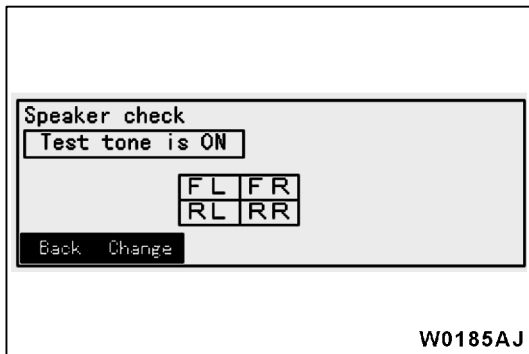


4. AUDIO CHECKING

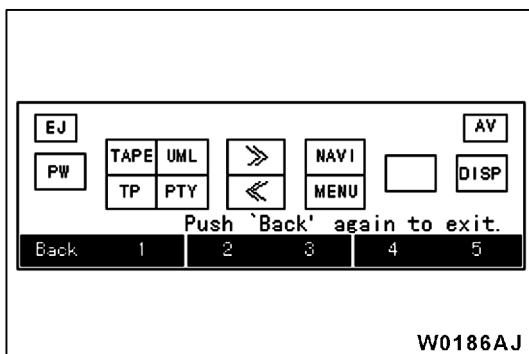
- (1) If the F5 switch is pressed at the service mode initial screen, the audio checking menu screen will appear.



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

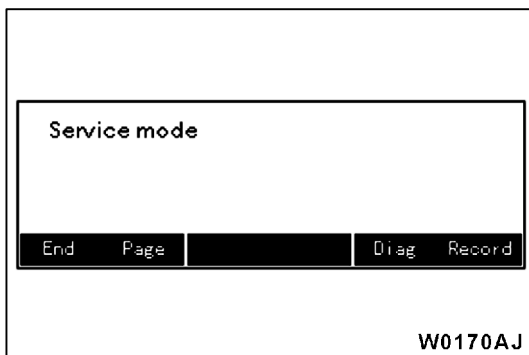


- (3) Press the F3 switch to display the speaker checking screen.
The test sound will be output alternately from each speaker each time the F2 switch is pressed.
Press the F1 switch to end speaker checking and return to the audio checking menu screen.
At the early mass production, sometimes radio sound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

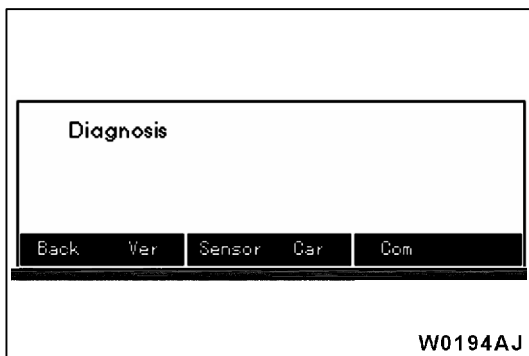


- (4) Press F4 to display the audio key checking screen.
When one of the audio switches is pressed, the screen display color for that switch should change. This indicates that this particular switch system is working normally.
Press the F1 switch to check the operation of the F1 switch. Press the F1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

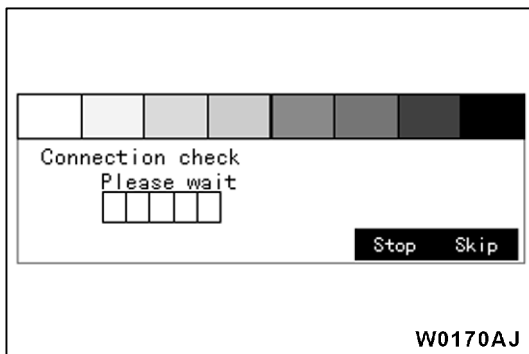
5. SELF-DIAGNOSIS



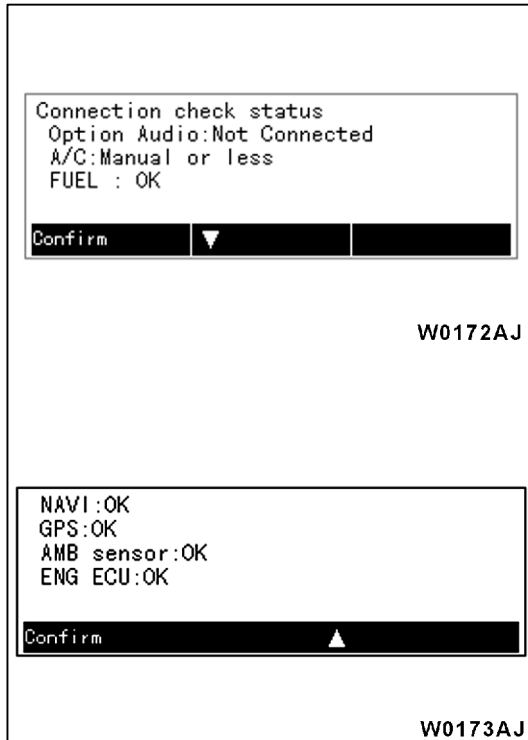
- (1) If the F5 switch is pressed at the service mode initial screen, the self-diagnosis menu screen will appear.



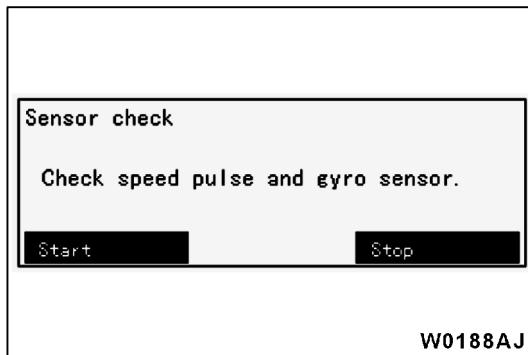
- (2) Next, use the function switches to carry out self-diagnosis.



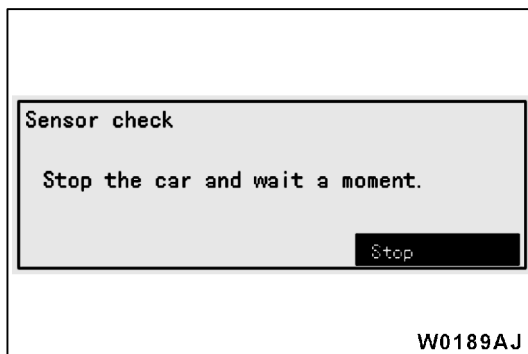
- (3) When the F5 switch is pressed, self-diagnosis for the wiring is carried out.
A colored bar will appear on the screen of the Multi Center Display unit, and all units which are connected to the navigation unit will be checked during this time.



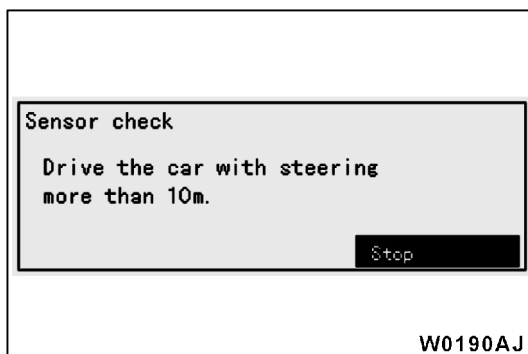
- (4) Once the transmission checking is completed, the results of checking will appear on the screen. After checking the results, press the F1 switch to return to the self-diagnosis menu screen.



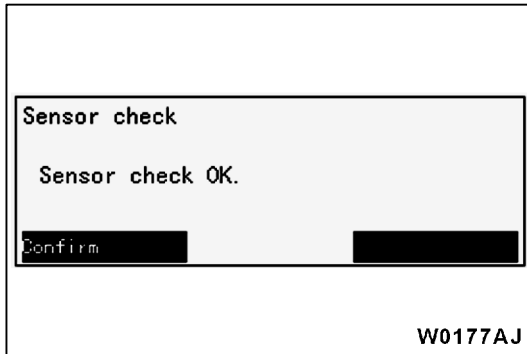
- (5) If the F6 switch is pressed at the self-diagnosis menu screen, sensor checking will start. Press the F1 switch to start sensor checking. If you would like to return to the self-diagnosis menu screen without carrying out sensor checking, press the F5 switch.



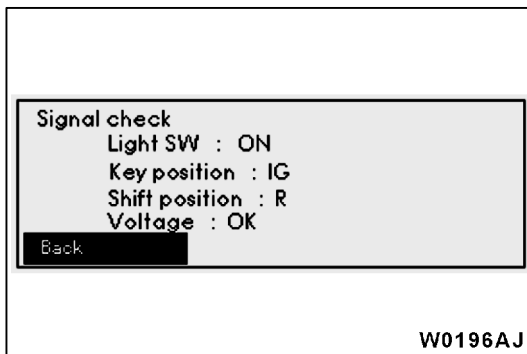
- (6) When sensor checking starts, the gyro output will be checked first while the vehicle is stopped, so make sure that the vehicle is stopped for this check. If the vehicle is moving when the sensor checking starts, the vehicle speed sensor will be shown as defective. Follow the guidance message on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



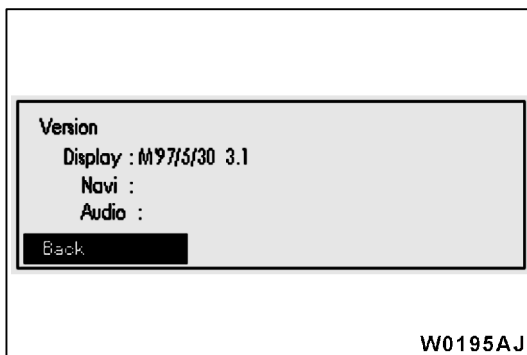
- (7) Next, drive the vehicle for approximately 10 meters while changing the running direction in order to check the vehicle speed pulse and the gyro sensor output. The sensor checking will then be completed. If there is an open circuit in the vehicle speed sensor, sensor checking will not complete even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



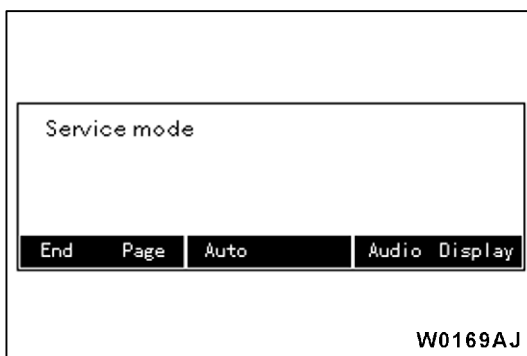
- (8) When sensor checking is completed, the check results will appear on the screen. After checking the results, press the F1 switch to return to the self-diagnosis menu screen.



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

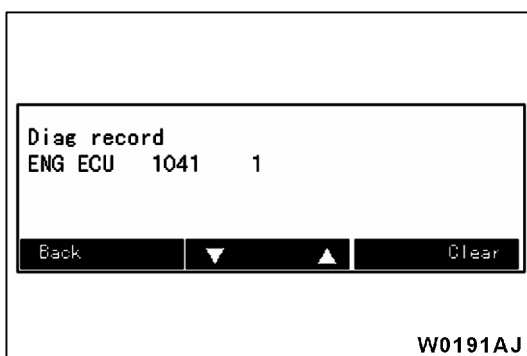


If the F2 switch is pressed at the self-diagnosis menu screen, version data self-diagnosis will be carried out, and the check results will appear on the screen. Press the F1 switch to return to the self-diagnosis menu screen.

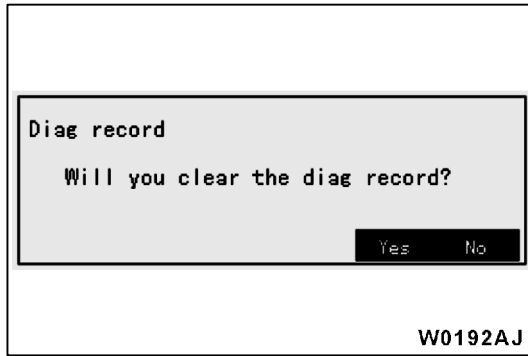


6. DIAGNOSIS RECORDING

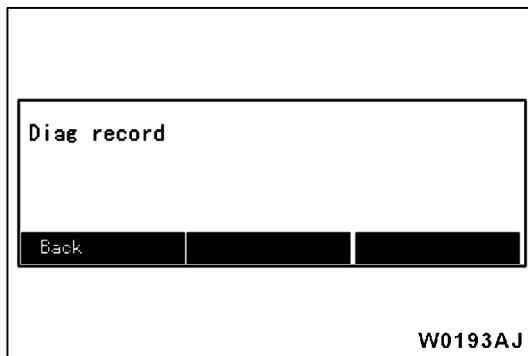
- (1) If the F6 switch is pressed at the service mode initial screen, the diagnosis recording screen will appear.
 (2) Press the F1 switch to return to the service mode initial screen.



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



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



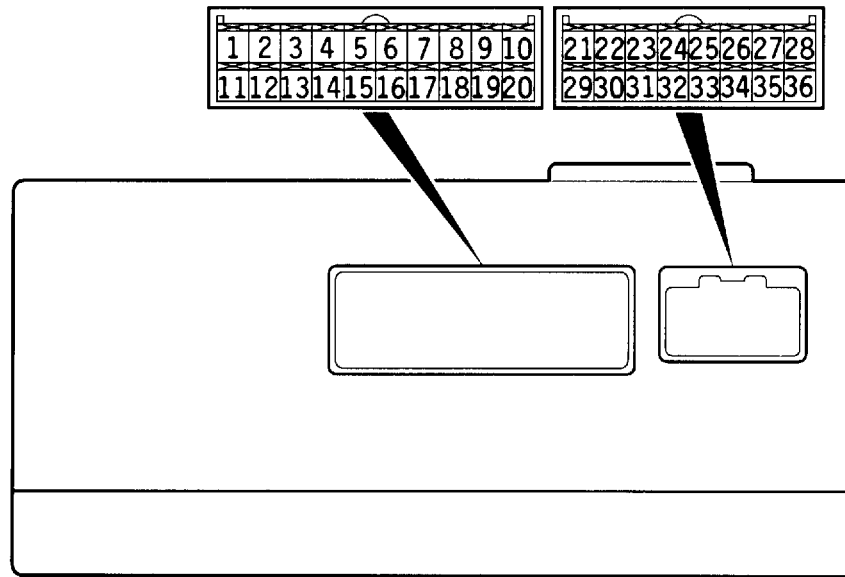
- (5) Press the F1 switch to return to the service mode initial screen.

7. ERROR CODE TABLE

Error Code No.	Error Details	Detection Method (Reference)	Reference Page
1011	Ambient temperature sensor not connected during diagnosis	Connection checking	54-104
1021	Fuel gauge not connected during diagnosis	Connection checking	54-105
1031	GPS abnormality during diagnosis	Connection checking	54-105
1041	Engine-ECU not connected during diagnosis	Connection checking	54-105
1051	SWS not connected during diagnosis (This error does not occur when correct car type is set)	Connection checking	54-105
1091	CD drive too hot during diagnosis	Connection checking	54-106
1092 - 1096	CD drive abnormality during diagnosis	Connection checking	54-106
10A1, 10B1	Memory of navigation unit abnormality during diagnosis	Connection checking	54-106
20D1, 30D1	Vehicle speed pulse abnormality during diagnosis	Sensor checking	54-106
20E1, 20E2, 30E1, 30E2	Gyro level abnormality during diagnosis	Sensor checking	54-106

MAIN UNIT TERMINAL VOLTAGES

1. MULTI CENTER DISPLAY UNIT



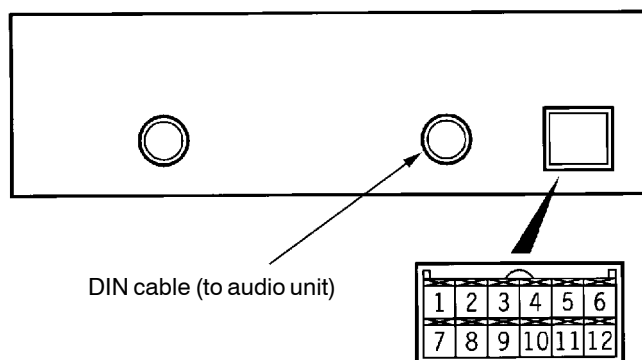
W0278AJ

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

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

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

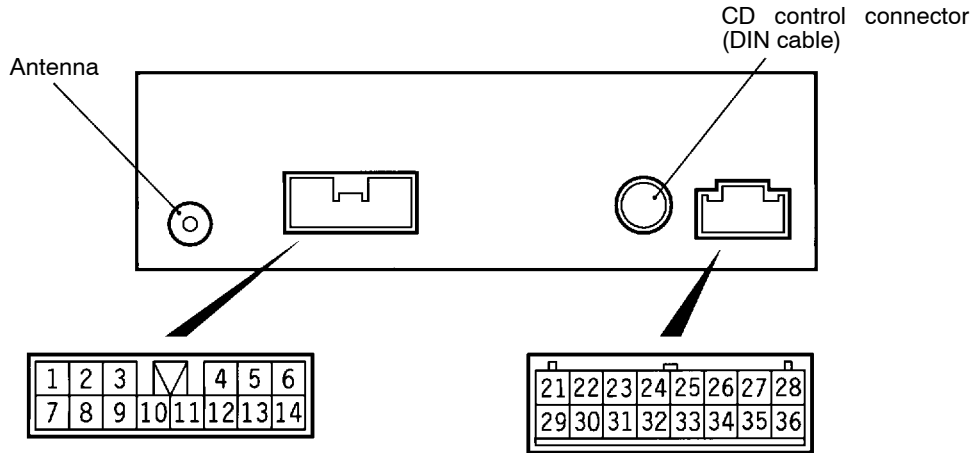
2. NAVIGATION UNIT



AV0845AE

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

3. AUDIO UNIT



BV0846AE

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

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

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

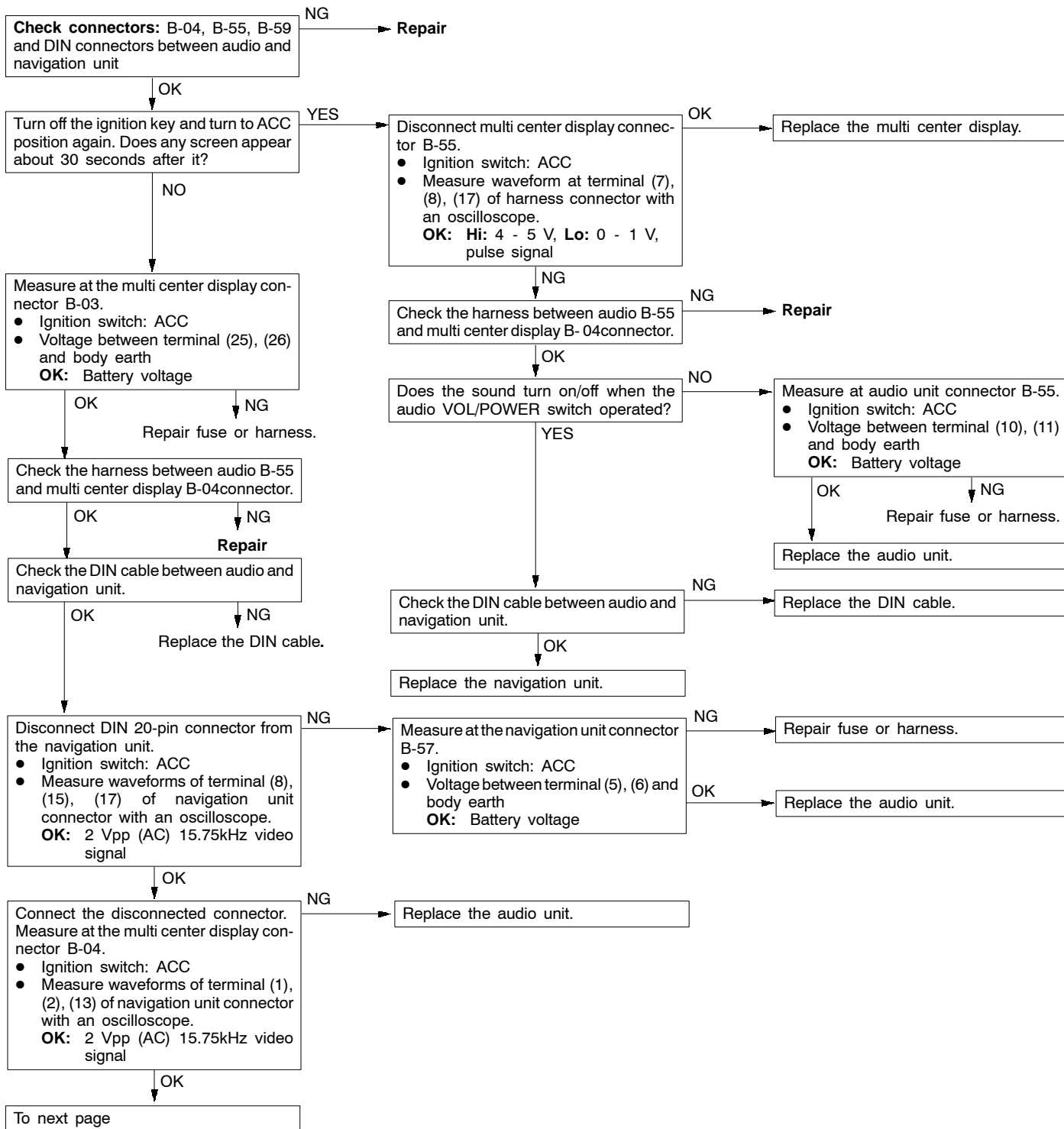
INSPECTION CHART CLASSIFIED BY TROUBLE SYMPTOMS

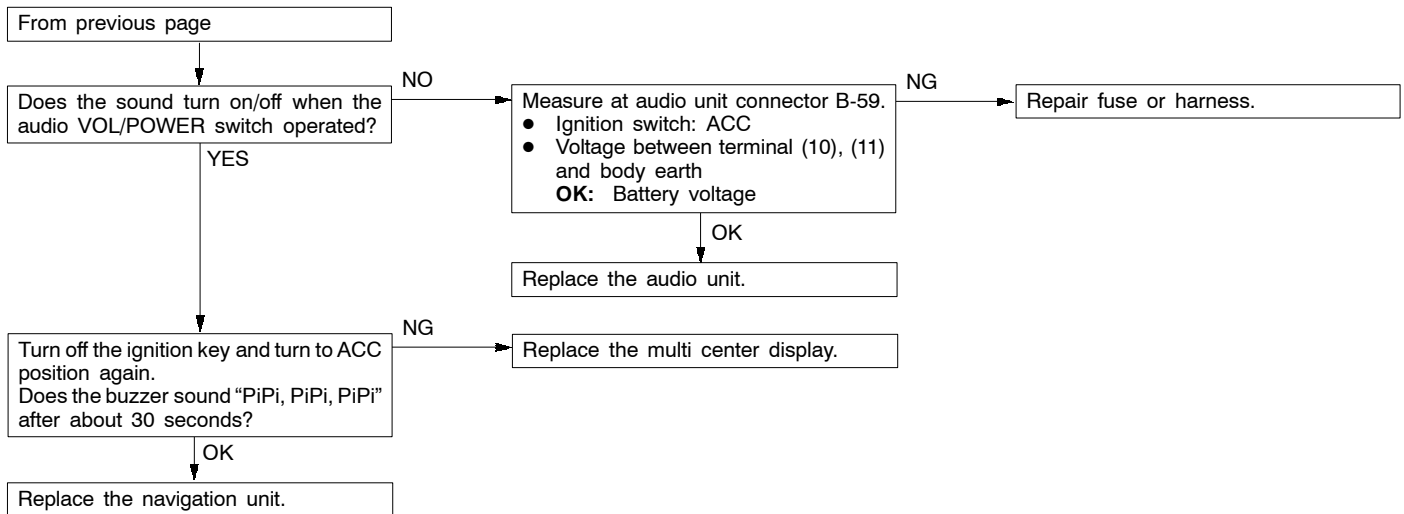
Related Unit	Trouble Symptom	Inspection Procedure No.	Reference Page
Malfunction of navigation unit, multi center display, audio unit and related sensor, harness	TAPE/CD, UML switches do not work. No display appears after the ignition key is turned to ACC.	1	54-97
	TAPE/CD, UML switches do not work. (Display appears.)	2	54-98
	No display appears after the ignition key is turned to ACC, but TAPE/CD, UML switches can be operative.	3	54-99
	CD changer screen display does not appear when TAPE/CD switch is operated.	4	54-100
	GPS reception is not possible.	5	54-100
	Outside air temperature data is not displayed.	6	54-100
	Abnormal driving data display <ul style="list-style-type: none"> ● Abnormal average fuel consumption (momentary fuel consumption) and average speed displays. ● Abnormal cruising distance displays 	7	54-101
	Daytime/nighttime display mode does not change in conjunction with lighting switch operations.	8	54-102
	Display moves about. Screen colours do not match correctly.	9	54-102
	Compass display does not rotate , or guidance does not appear when following a route.	10	54-103
	One of the following messages appears during navigation mode. <ul style="list-style-type: none"> ● The CD drive has failure condition. Check and reload the disc, please. ● Wrong disc is in the CD drive. Insert a map disc, please. ● No disc is in the CD drive. Insert a map disc please. ● A music disc is in the CD-drive. 	11	54-103

INSPECTION PROCEDURES FOR EACH TROUBLE SYMPTOM

INSPECTION PROCEDURE 1

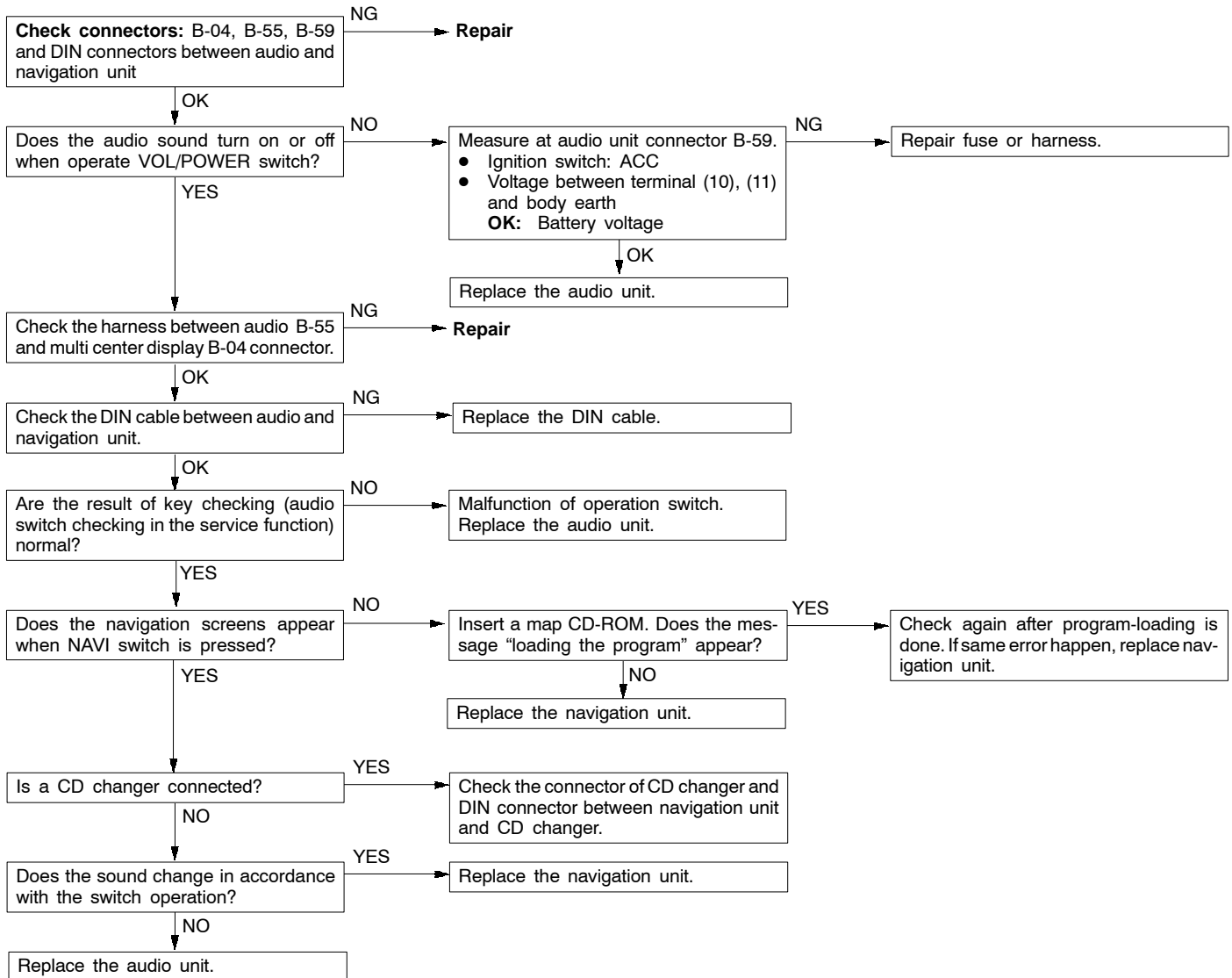
TAPE/CD, UML switches do not work. No display appears after the ignition key is turned to ACC.





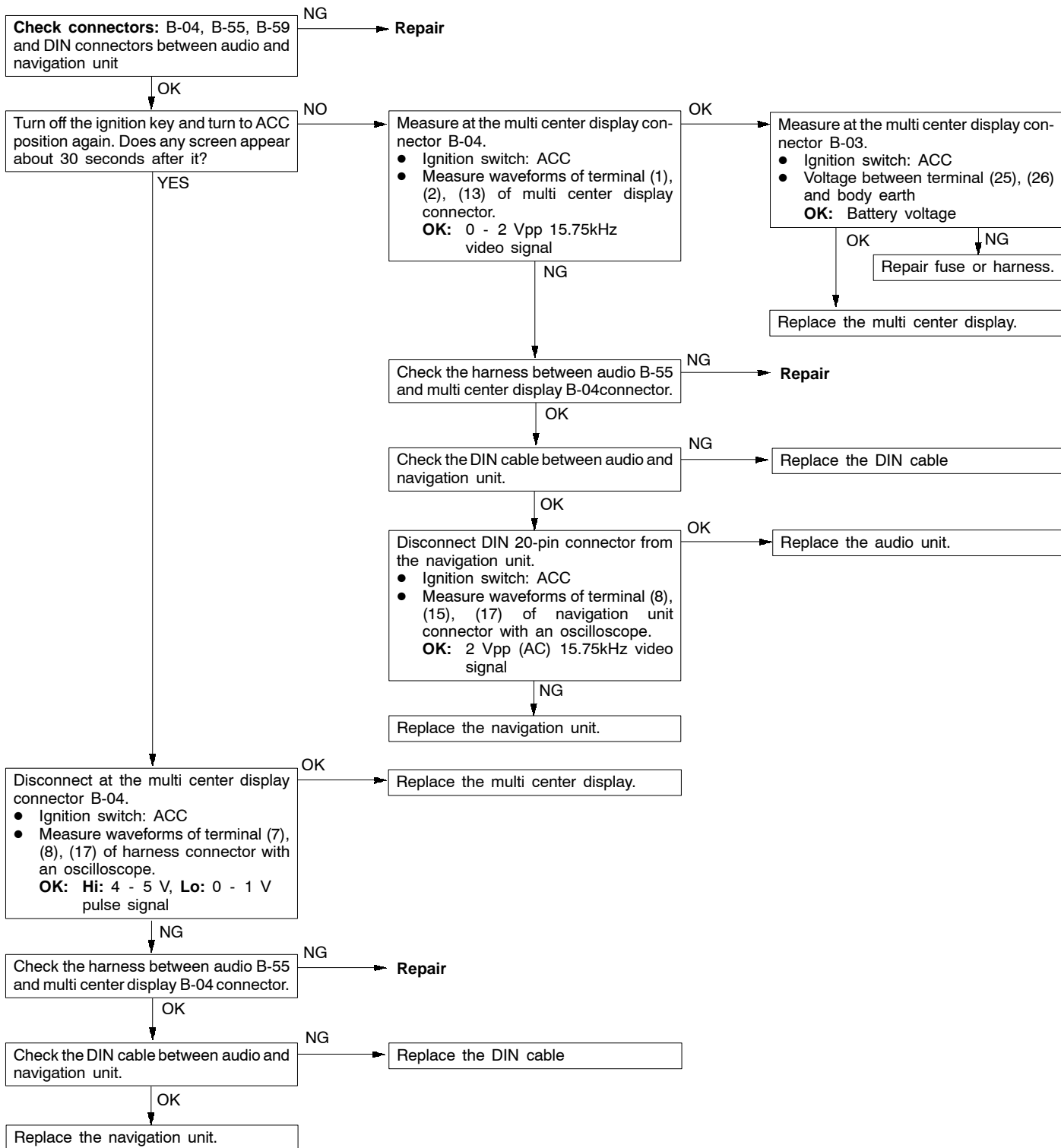
INSPECTION PROCEDURE 2

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



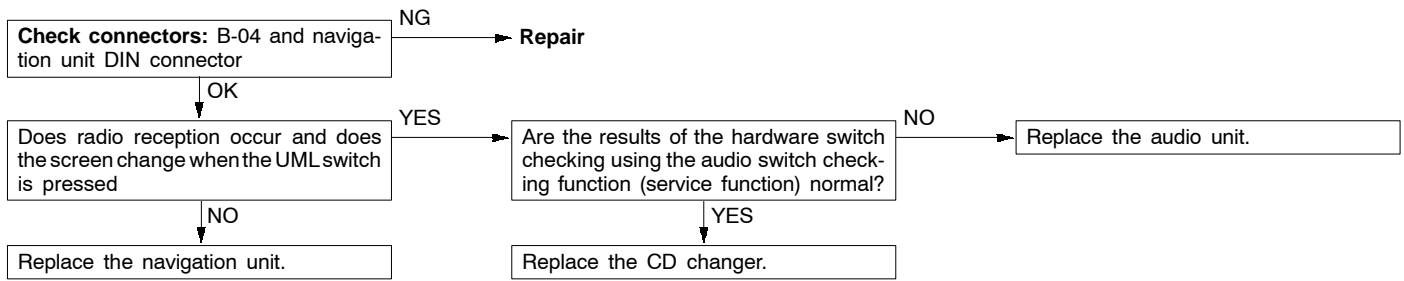
INSPECTION PROCEDURE 3

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



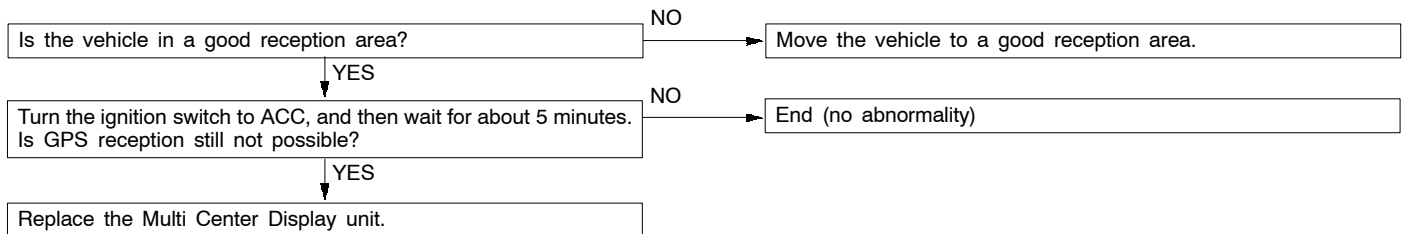
INSPECTION PROCEDURE 4

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



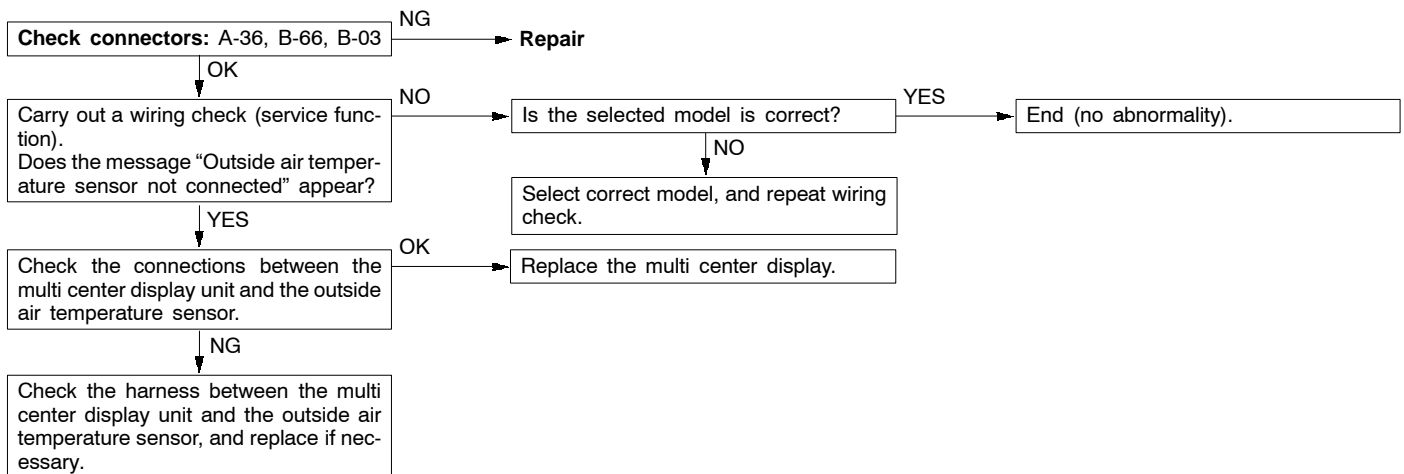
INSPECTION PROCEDURE 5

GPS reception is not possible.



INSPECTION PROCEDURE 6

Outside air temperature data is not displayed.

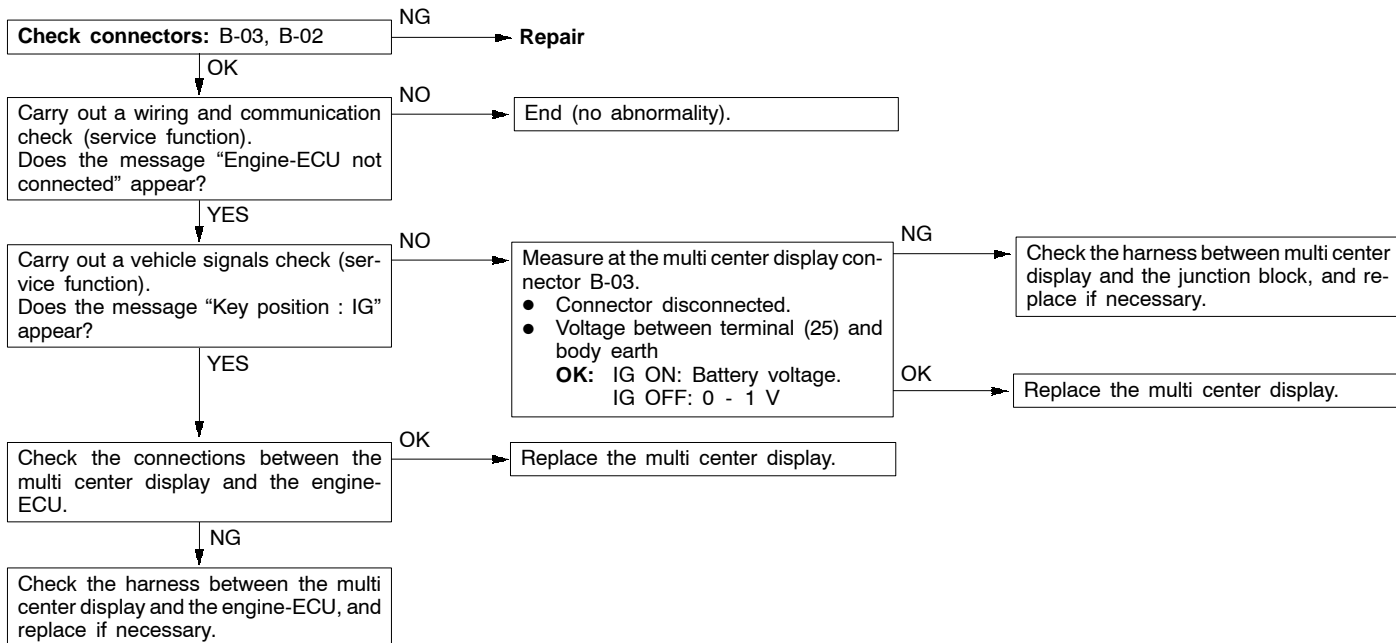


INSPECTION PROCEDURE 7

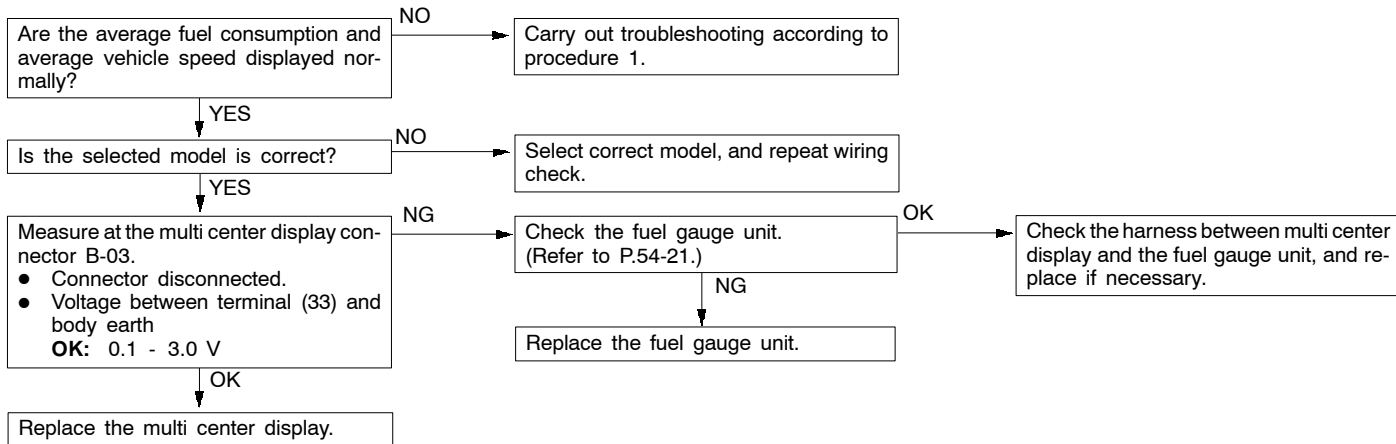
Abnormal driving data displays.

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

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

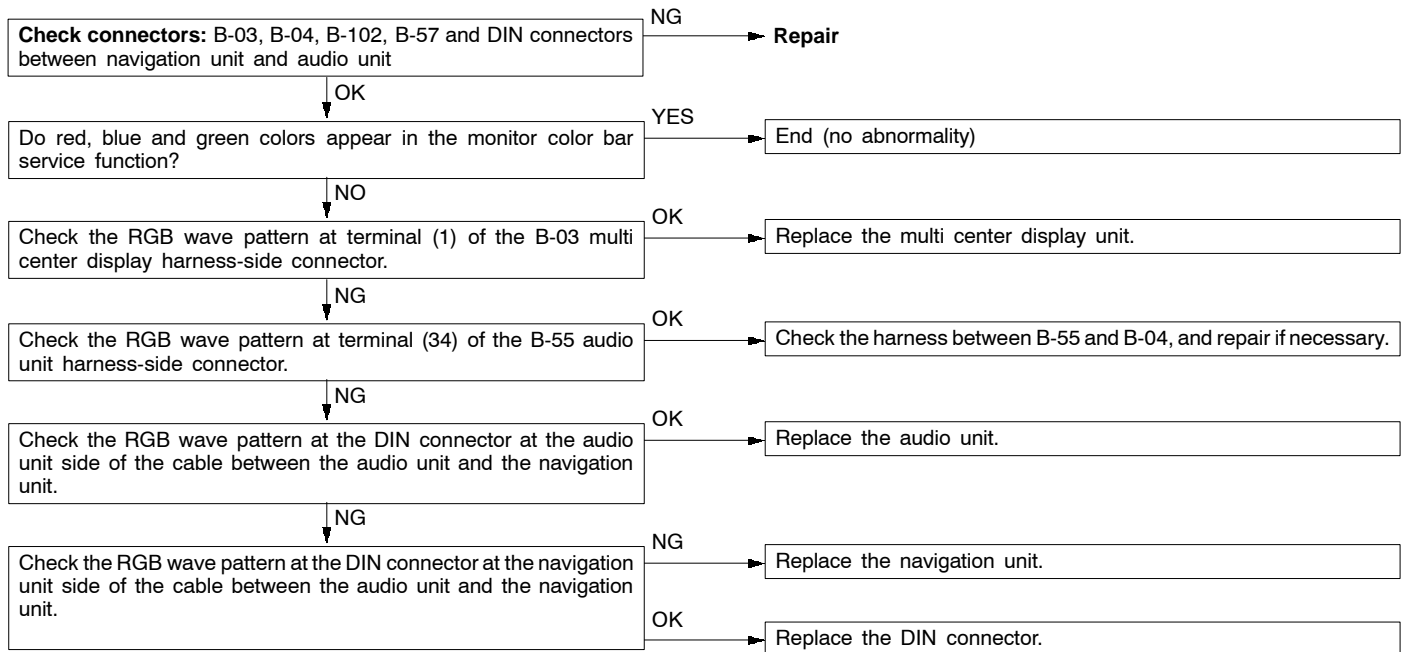


2. When cruising distance display is abnormal.



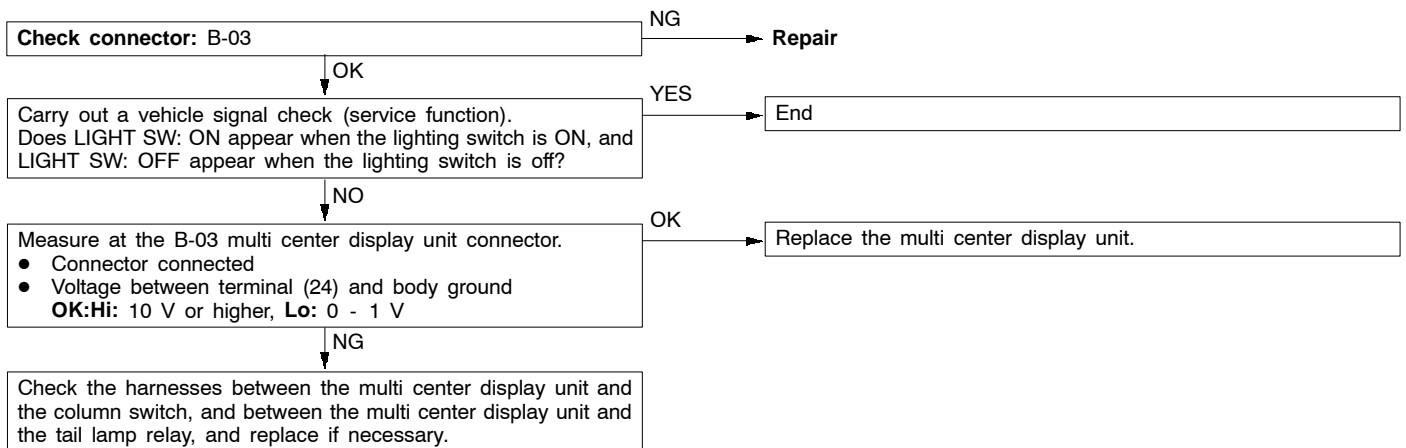
INSPECTION PROCEDURE 8

**Display moves about.
Screen colors do not match correctly.**



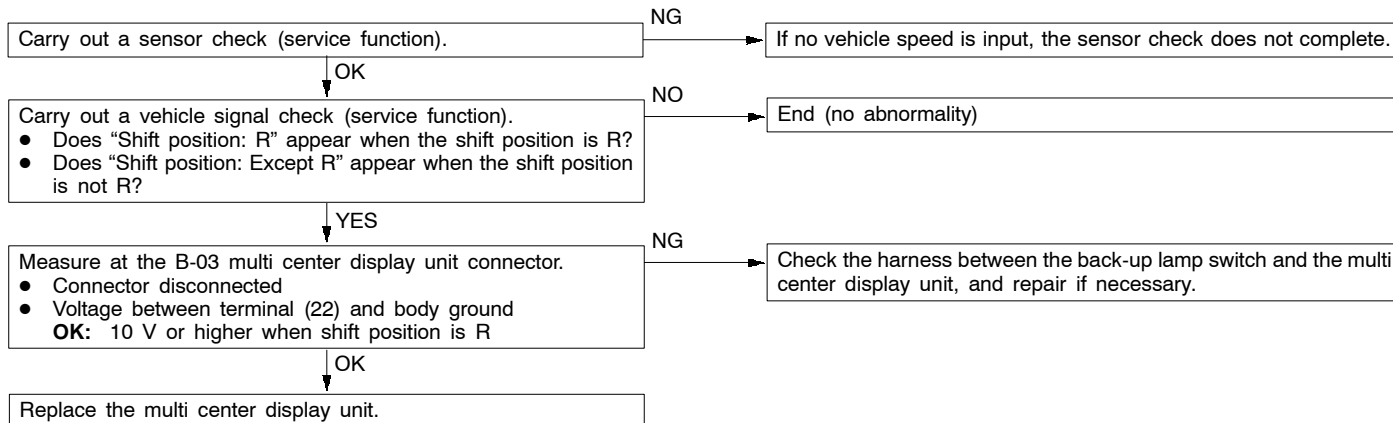
INSPECTION PROCEDURE 9

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



INSPECTION PROCEDURE 10

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

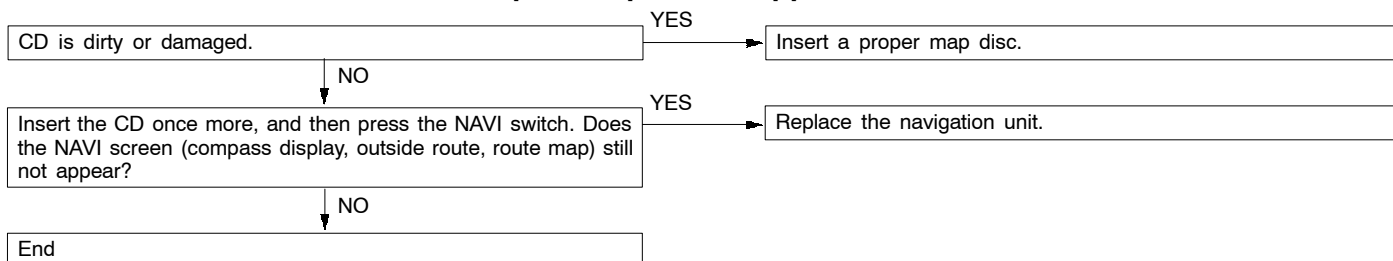


INSPECTION PROCEDURE 11

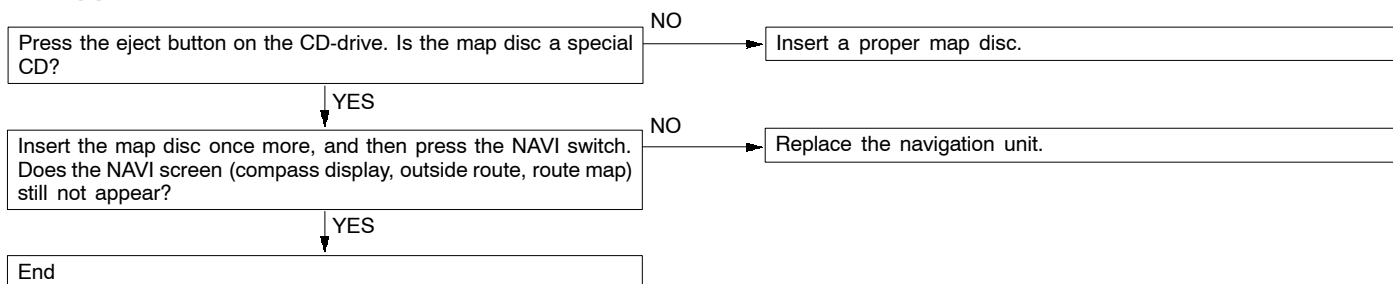
One of the following messages appears during navigation mode.

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

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

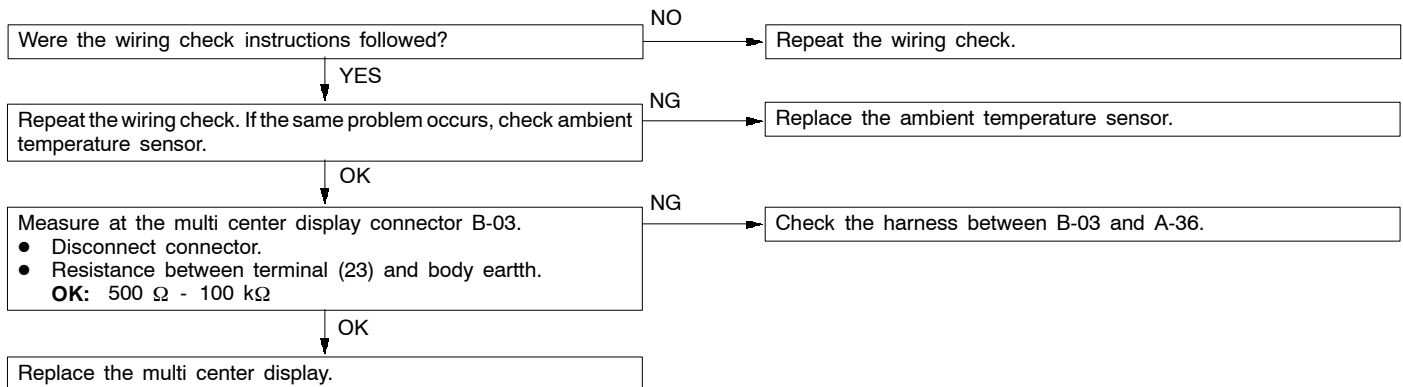


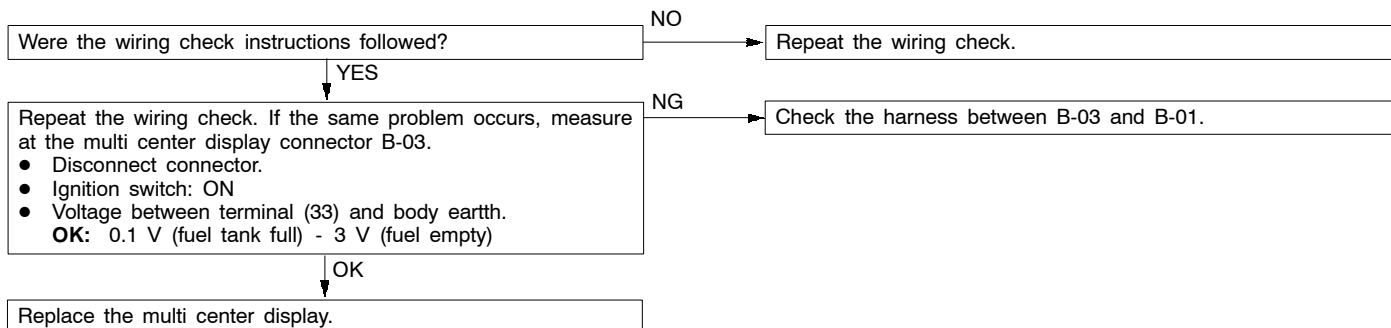
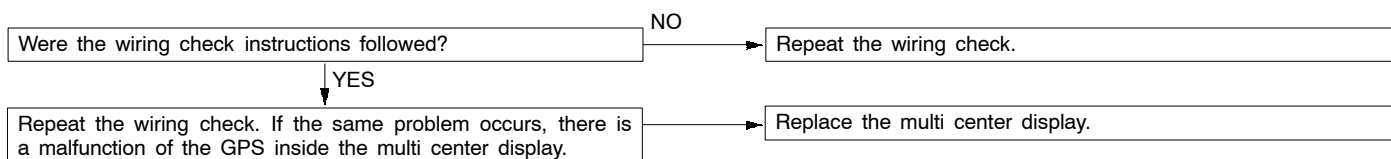
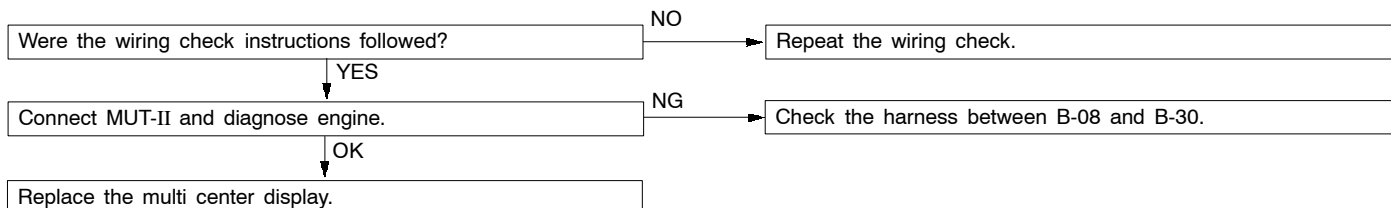
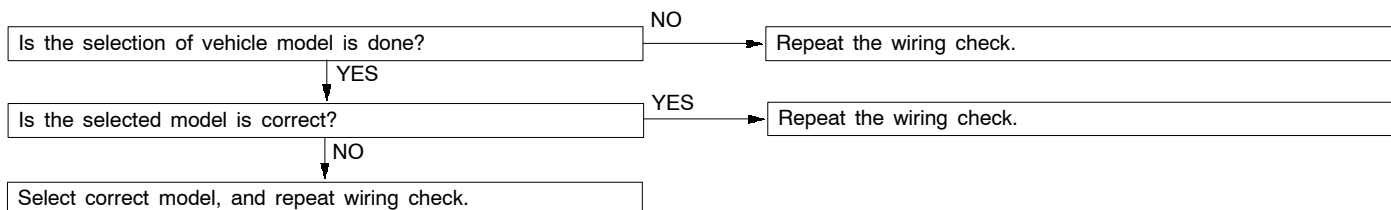
2. "No disc is in the CD-drive. Insert a map disc, please." or "A music disc is in the CD-drive" appears.



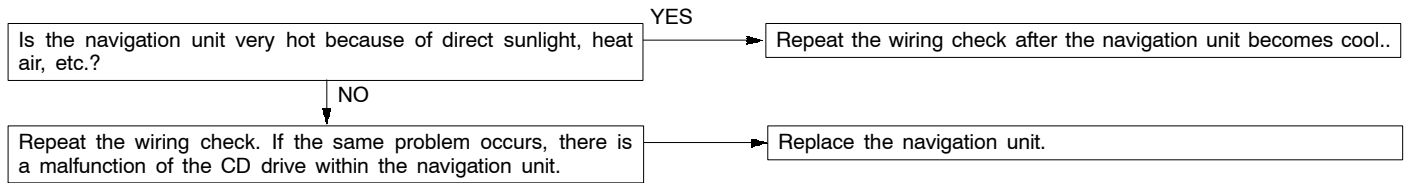
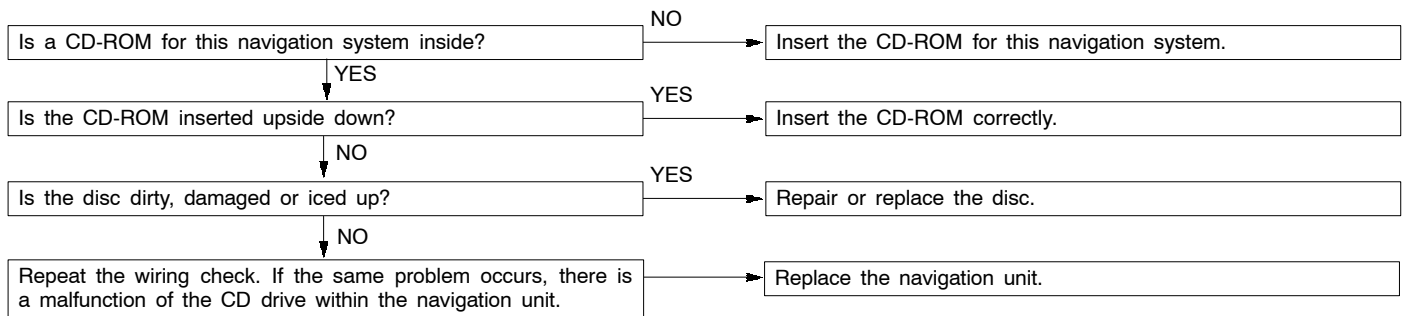
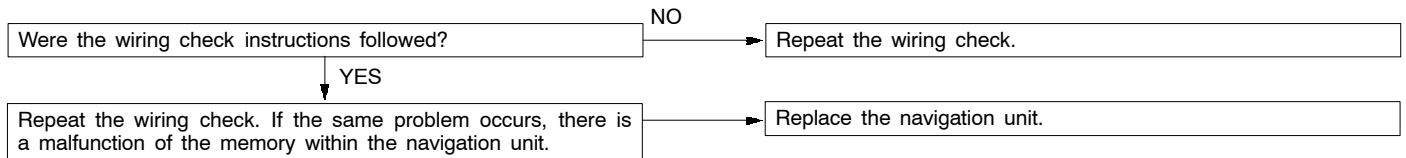
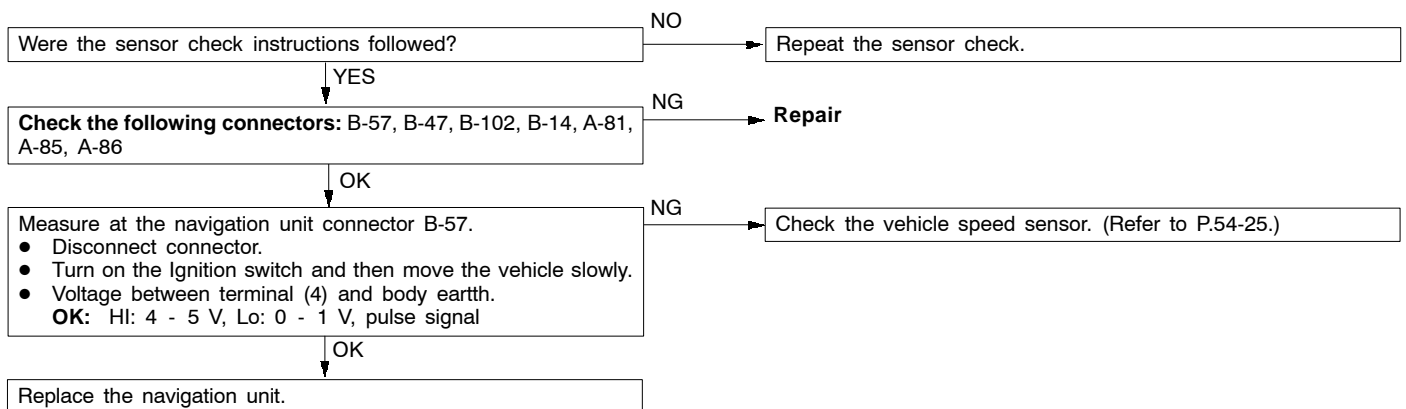
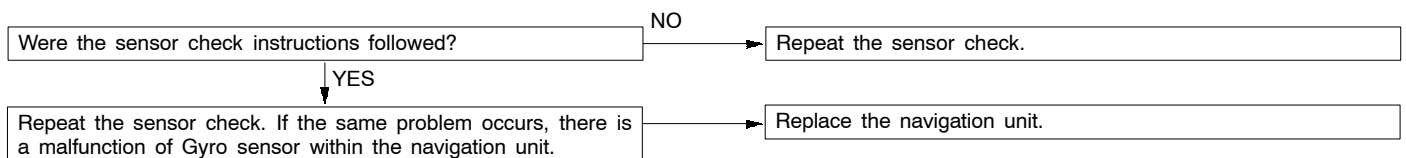
ERROR CODE TABLE <ACCORDING TO SCREEN DISPLAY>

Error Code No.	Error Details	Detection Method (Reference)	Reference Page
1011	Ambient temperature sensor not connected during diagnosis	Connection checking	54-104
1021	Fuel gauge not connected during diagnosis	Connection checking	54-105
1031	GPS abnormality during diagnosis	Connection checking	54-105
1041	Engine-ECU not connected during diagnosis	Connection checking	54-105
1051	SWS not connected during diagnosis (This error does not occur when correct car type is set)	Connection checking	54-105
1091	CD drive too hot during diagnosis	Connection checking	54-105
1092 - 1096	CD drive abnormality during diagnosis	Connection checking	54-106
10A1, 10B1	Memory of navigation unit abnormality during diagnosis	Connection checking	54-106
20D1, 30D1	Vehicle speed pulse abnormality during diagnosis	Sensor checking	54-106
20E1, 20E2, 30E1, 30E2	Gyro level abnormality during diagnosis	Sensor checking	54-106

INSPECTION PROCEDURES FOR EACH ERROR CODE <ACCORDING TO SCREEN DISPLAY>**Error Code No. 1011**

Error Code No. 1021**Error Code No. 1031****Error Code No. 1041****Error Code No. 1051****How to confirm model selection is correctly done.**

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

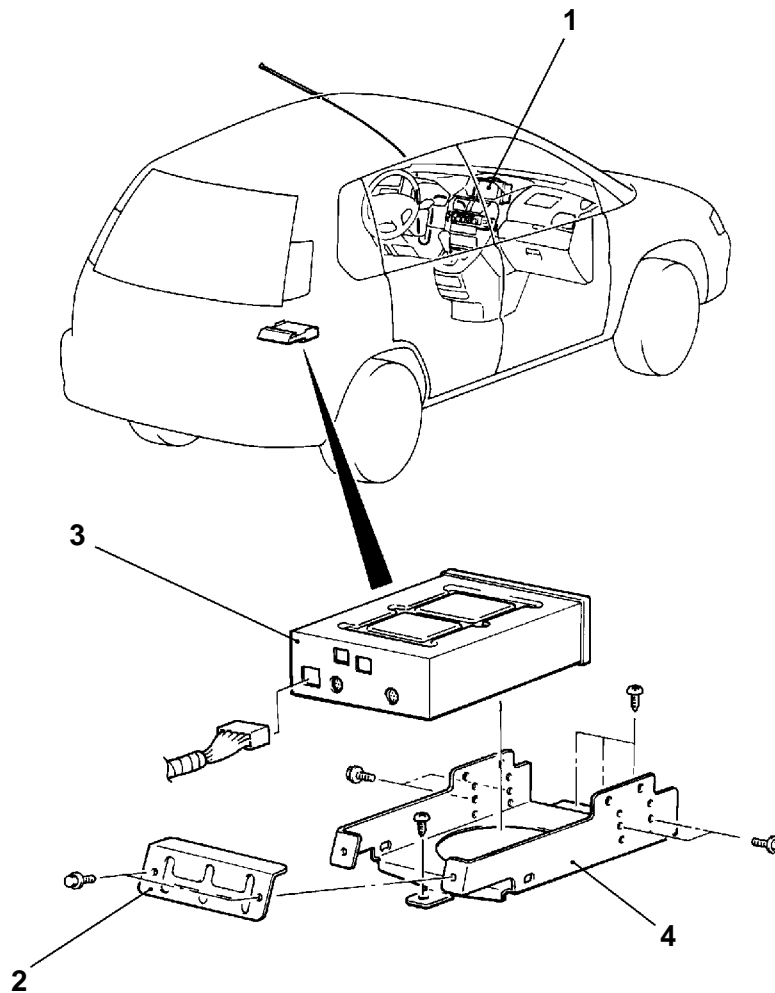
Error Code No. 1091**Error Code No. 1092, 1093, 1094, 1095, 1096****Error Code No. 10A1, 10B1****Error Code No. 20D1, 30D1****Error Code No. 20E1, 20E2, 30E1, 30E2**

MULTI CENTER DISPLAY AND NAVIGATION UNIT

54600100021

REMOVAL AND INSTALLATION

<SPACE RUNNER>



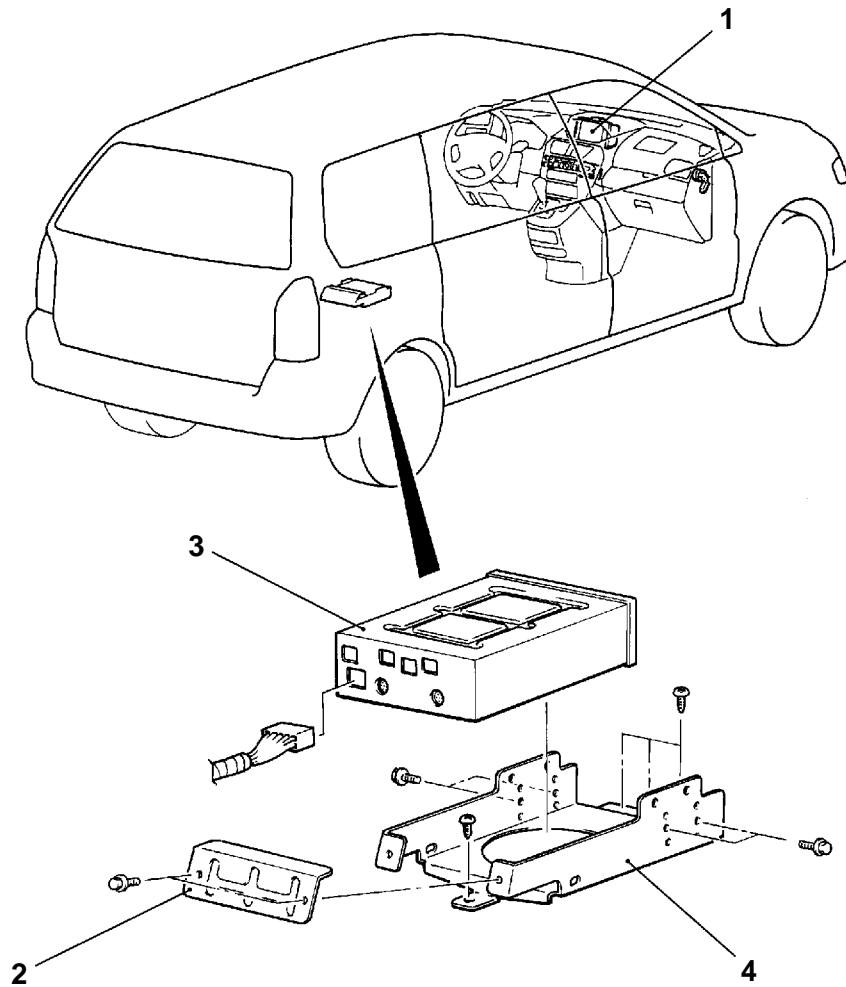
AW0588AE

1. Multi center display
(Refer to P.54-74.)

Navigation unit removal steps

- Driver's seat (Refer to GROUP 52A.)
- 2. No.2 navigation unit bracket
- 3. Navigation unit
- 4. Navigation unit bracket

<SPACE WAGON>



AW0589AE

1. Multi center display
(Refer to P.54-74.)

Navigation unit removal steps

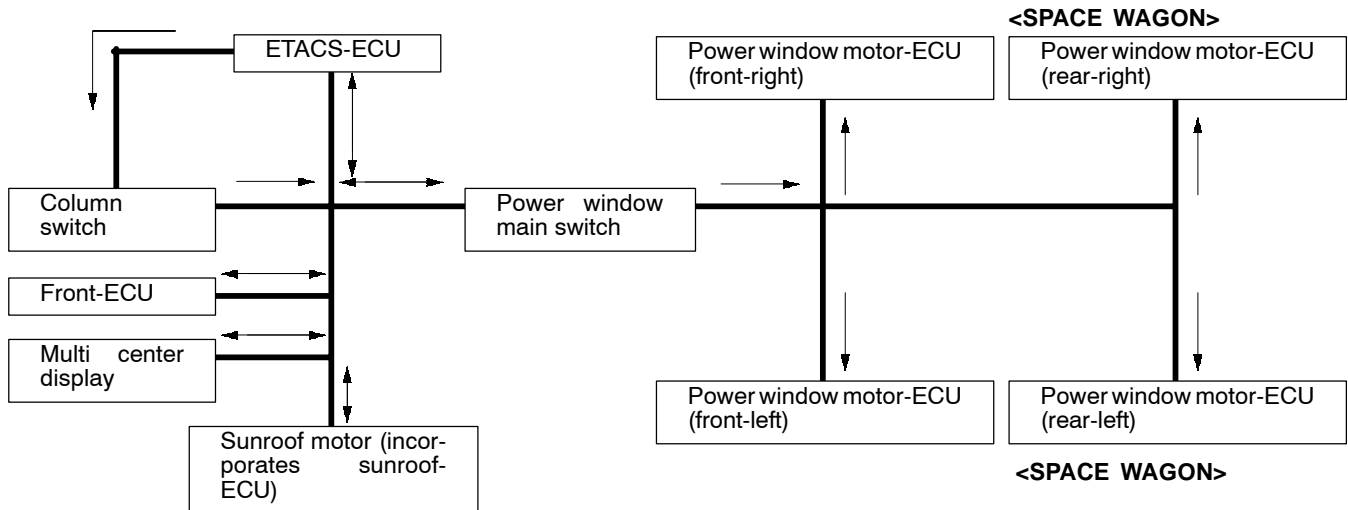
- Driver's seat (Refer to GROUP 52A.)
- 2. No.2 navigation unit bracket
- 3. Navigation unit
- 4. Navigation unit bracket

SMART WIRING SYSTEM (SWS)

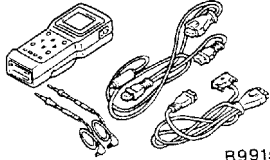
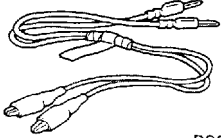
54900010040

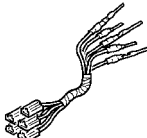
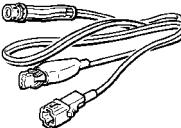


COMMUNICATION LINE

Data lines for multiplex communication are connected between the front-ECU, ETACS-ECU, multi-purpose centre display, column switch assembly, sunroof motor, power window main switch, and power window motors as illustrated below.



SPECIAL TOOLS

Tool	Number	Name	Use
 <p>B991502</p>	MB991502	MUT-II sub assembly	Checking of the SWS (Diagnosis code display and input check with the MUT-II)
 <p>B991529</p>	MB991529	Diagnosis code check harness	Simple diagnosis

Tool	Number	Name	Use
<p>A</p>  <p>B</p>  <p>C</p>  <p>D</p>  <p>C991223</p>	<p>MB991223</p> <p>A: MB991219</p> <p>B: MB991220</p> <p>C: MB991221</p> <p>D: MB991222</p>	<p>Harness set</p> <p>A: Test harness</p> <p>B: LED harness</p> <p>C: LED harness adapter</p> <p>D: Probe</p>	<p>Measurement of terminal voltage at ECUs</p> <p>A: Connector pin contact pressure inspection</p> <p>B: Power circuit inspection</p> <p>C: Power circuit inspection</p> <p>D: Commercial tester connection</p>

TROUBLESHOOTING

54900040032

STANDARD FLOW OF DIAGNOSTIC TROUBLESHOOTING

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

DIAGNOSTIC FUNCTION

DIAGNOSIS CODES CHECK

Use the MUT-II or the simple diagnosis mode to check a diagnosis code.
(Refer to GROUP 00 - How to Use Troubleshooting/Inspection Service Points.)

NOTE

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

ERASING DIAGNOSIS CODE

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

CHECK BY USING SIMPLE DIAGNOSIS MODE

- (1) Set the MUT-II to simple diagnosis mode, and then select the switch diagnosis mode.
(Refer to GROUP 00 - How to Use Troubleshooting/Inspection Service Points.)
- (2) In this condition, the following input switches can be checked.

Input Signal Check Function

Input signal		Buzzer/LED operation condition
ETACS	Ignition switch (IG1)	Turned from OFF to ON
	Ignition switch (ACC)	Turned from OFF to ACC
	Front door switch (driver's side)	Driver's door opened from closed condition
	Door switches	All doors closed to any door opened
	Key reminder switch	Ignition key removed from ignition key cylinder (from inserted position)
	Front door lock actuator (driver's side)	Driver's door lock knob moved from lock position to unlock position or vice versa
	Front door key switch (passenger's side)	Passenger's door locked or unlocked using ignition key
	Back door <SPACE RUNNER> or tailgate <SPACE WAGON> key switch	Back door <SPACE RUNNER> or tailgate <SPACE WAGON> locked or unlocked using ignition key
	Hazard lamp switch	Turned from OFF to ON
	Front fog lamp switch	
	Back-up lamp switch <M/T>	Shift lever moved to R position
	Inhibitor switch (reverse) <A/T>	Selector lever moved to R position
	Keyless entry transmitter (LOCK and UNLOCK switches)	LOCK or UNLOCK switch turned OFF to ON
Column switch assembly	Tail lamp switch	Lighting switch turned to tail lamp position from any other position
	Headlamp switch	Lighting switch turned to headlamp position from any other position
	Dimmer switch	Turned from OFF to ON
	Passing switch	
	Right-hand turn signal switch	
	Left-hand turn signal switch	
	Windshield mist wiper switch	
	Windshield wiper and washer switches	
	Windshield wiper INT switch	
	Windshield wiper LO switch	
	Windshield wiper HI switch	
	Rear wiper INT switch	
	Rear wiper and washer switches	
Headlamp washer switch		
Power window switches	Any switch	Turned from OFF to ON
Multi center display	Function switch	
Sunroof	Any switch	

DIAGNOSIS CODE CHART

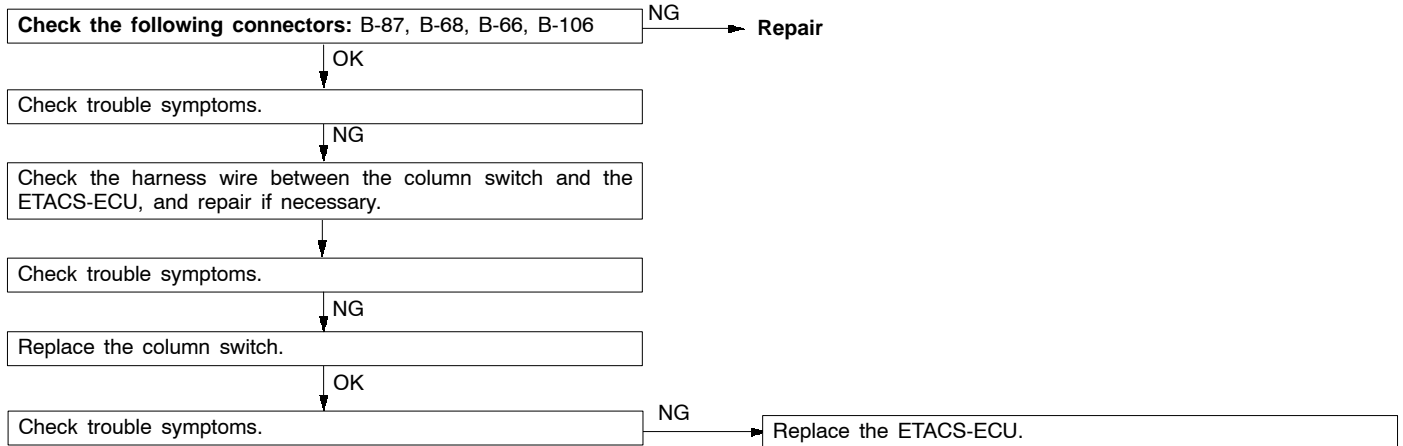
Code No.	Diagnosis item	Reference page
11	Failure concerning the ETACS-ECU	54-112
12	Failure concerning the column switch or improper connection with the ETACS-ECU	54-112
13	Failure concerning the front-ECU	54-113
21	Short circuit in communication line	54-113

DIAGNOSIS CODE INSPECTION PROCEDURES

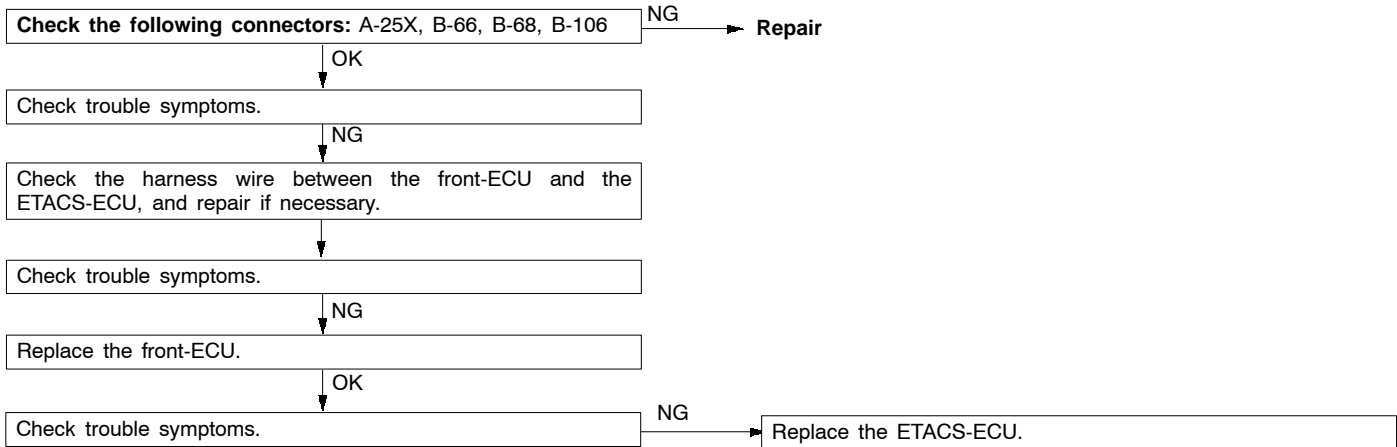
Code No.11 Failure concerning the ETACS-ECU	Probable cause
<p>The ETACS-ECU monitors its own communication data, and sends a diagnosis code when an error takes place consecutive fifteen times in 0.6 second. The diagnosis code will be erased when the ETACS-ECU determines that its own communication data is sent consecutive 15 times in 0.6 second.</p>	<ul style="list-style-type: none"> • Malfunction of ETACS-ECU

Replace the ETACS-ECU.

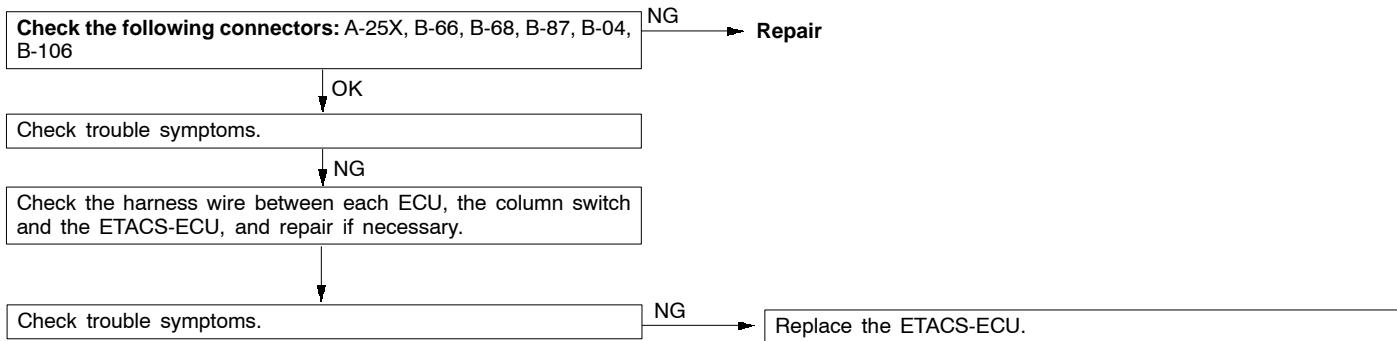
Code No.12 Failure concerning the column switch or improper connection with the ETACS-ECU	Probable cause
<p>This diagnosis code is displayed when the column switch sends a signal regardless of the transmission request signal from the ETACS-ECU (three times or more in one second). The diagnosis code is erased when the column switch continues to send a signal according to the transmission request signal from the ETACS-ECU for one second.</p>	<ul style="list-style-type: none"> • Malfunction of column switch • Malfunction of connector • Malfunction of harness • Malfunction of ETACS-ECU



Code No.13 Failure concerning the front-ECU	Probable cause
This diagnosis code is displayed when the signals that the front-ECU sends to the ETACS-ECU are errors consecutive fifteen times in 0.6 second. The diagnosis code will be erased when the front-ECU sends normal signals to the ETACS-ECU consecutive 15 times in 0.6 second.	<ul style="list-style-type: none"> ● Malfunction of the front-ECU ● Malfunction of the connector ● Malfunction of the harness ● Malfunction of the ETACS-ECU



Code No.21 Short circuit in communication line	Probable cause
This diagnosis code is displayed when the SWS communication line voltage reaches the LO level for 0.3 second. The diagnosis code is erased when voltage in the ETACS-ECU data line reaches the HI level for 0.3 second, or the ETACS-ECU receives a normal signal from other ECUs or switches. While this code is displayed, other codes are not displayed.	<ul style="list-style-type: none"> ● Malfunction of the front-ECU ● Malfunction of the connector ● Malfunction of the harness ● Malfunction of the ETACS-ECU



TROUBLE SYMPTOM CHART

Trouble symptom	Inspection procedure No.	Reference page
Communication with the MUT-II is impossible.	1	54-114

TROUBLE SYMPTOM INSPECTION PROCEDURES

Inspection procedure 1

Communication with the MUT-II is impossible.	Probable cause
Power supply or earth circuit for the ETACS-ECU can be defective.	<ul style="list-style-type: none"> ● Malfunction of the harness and connector ● Malfunction of the ETACS-ECU

