AUTOMATIC AIR CONDITIONER

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AUTOMATIC AIR CONDITIONER

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GENERAL

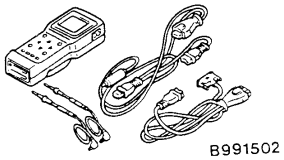
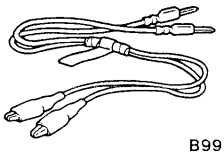
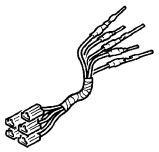
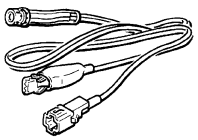
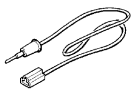
OUTLINE OF CHANGE

The following service procedures have been added as an automatic A/C has been equipped as standard. Other service procedures are the same as before.

SERVICE SPECIFICATIONS

Item		Typical value
Air mixing damper control potentiometer resistance kΩ	MAX HOT	Around 0.18
	MAX COOL	Around 4.82
Mode selection damper control potentiometer resistance kΩ	DEF position	Around 0.18
	FACE position	Around 4.82

SPECIAL TOOLS

Tool	Number	Name	Use
 B991502	MB991502	MUT-II sub-assembly	Automatic air conditioner inspection
 B991529	MB991529	Diagnosis code check harness	Automatic air conditioner inspection when using voltmeter
A  B  C  D  C991223	MB991223 A: MB991219 B: MB991220 C: MB991221 D: MB991222	Harness set A: Check harness B: LED harness C: LED harness adapter D: Probe	Checking continuity and measuring voltage at harness or connector A: For checking connector pin contact pressure B: For checking the power supply circuit C: For checking the power supply circuit D: For connecting commercial tester

TROUBLESHOOTING

DIAGNOSIS TROUBLESHOOTING FLOW

Refer to '97 L200 Workshop Manual (Pub. No. PWTE96E1) GROUP 00 – How to Use Troubleshooting/Inspection Service Points.

DIAGNOSIS FUNCTION

METHOD OF READING DIAGNOSIS CODES

METHOD OF ERASING DIAGNOSIS CODES

Connect the MUT-II to the 16-pin diagnosis connector.
(Refer to '97 L200 Workshop Manual <Pub. No. PWTE96E1> GROUP 00 – How to Use Troubleshooting/Inspection Service Points.)

INSPECTION CHART FOR DIAGNOSIS CODES

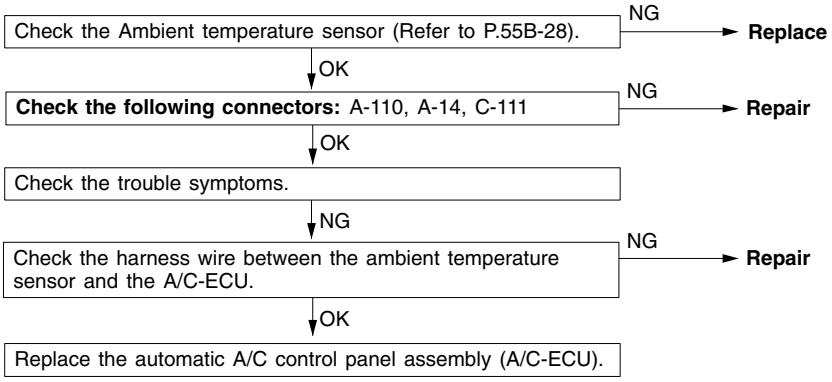
Code No.	Diagnosis item	Reference page
11	Inside air temperature sensor system (open circuit)	55B-3
12	Inside air temperature sensor system (short circuit)	55B-3
13	Ambient temperature sensor system (open circuit)	55B-4
14	Ambient temperature sensor system (short circuit)	55B-4
15	Heater water temperature sensor system (open circuit)	55B-4
16	Heater water temperature sensor system (short circuit)	55B-4
21	Air thermo sensor system (open circuit)	55B-5
22	Air thermo sensor system (short circuit)	55B-5
31	Potentiometer system for the air mixing damper	55B-5
32	Potentiometer system for the mode selection damper	55B-6
41	Air mixing damper control motor drive system	55B-6
42	Mode selection damper control motor drive system	55B-7

INSPECTION PROCEDURE FOR DIAGNOSIS CODES

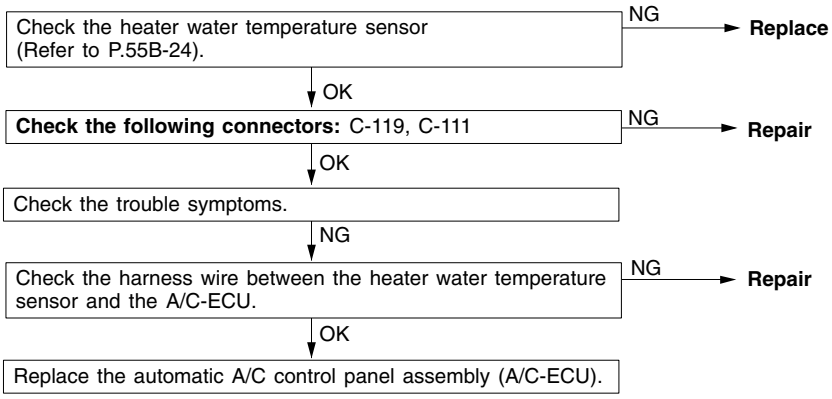
Code No.11, 12 Inside air temperature sensor system	**Probable cause**
Code No.11 is set when the inside air temperature circuit inside the A/C-ECU is open. Meanwhile, code No.12 is set when it is short.	Malfunction of the A/C-ECU

Replace the automatic A/C control panel assembly (A/C-ECU).

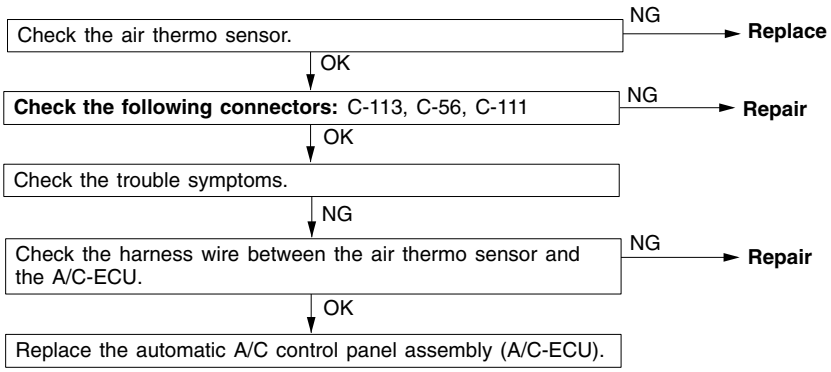
Code No.13, 14 Ambient temperature sensor system	Probable cause
Code No.13 is set when the ambient temperature sensor circuit is open. Meanwhile, code No.14 is set when it is short.	• Malfunction of the ambient temperature sensor • Malfunction of connector or harness • Malfunction of the A/C-ECU



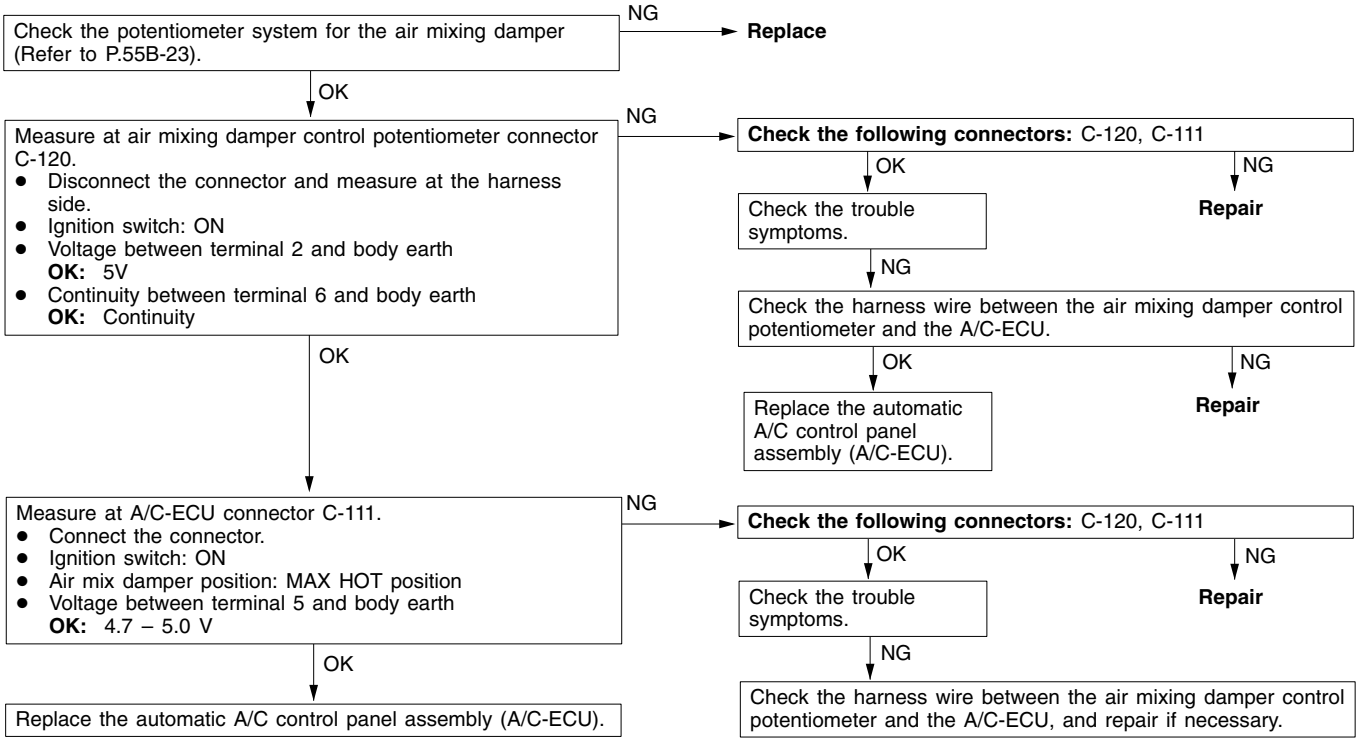
Code No.15, 16 Heater water temperature sensor system	Probable cause
Code No.15 is output when the heater water temperature sensor circuit is open. Code No.16 is output when that circuit is short.	• Malfunction of the heater water temperature sensor • Malfunction of connector or harness • Malfunction of the A/C-ECU



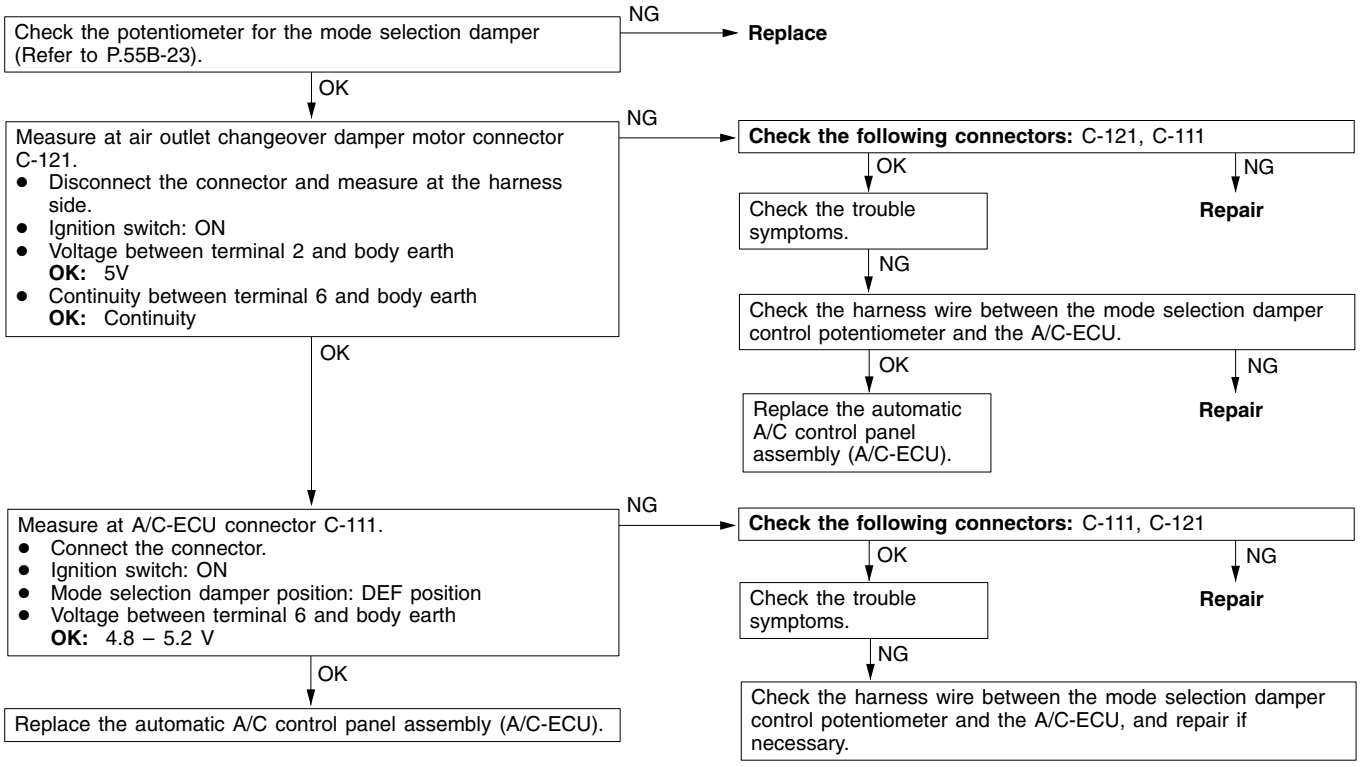
Code No.21, 22 Air thermo sensor system	Probable cause
Code No.21 is set when the air thermo sensor circuit is open. Meanwhile, code No.22 is set when it is short.	• Malfunction of the air thermo sensor • Malfunction of connector or harness • Malfunction of the A/C-ECU



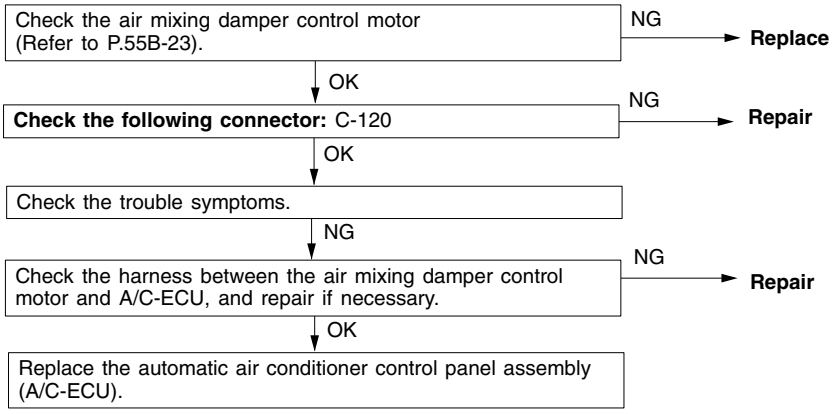
Code No.31 Potentiometer system for the air mixing damper	Probable cause
This diagnosis code is set when the potentiometer for the air mix damper does not send any signal to the A/C-ECU due to short or open circuit.	• Malfunction of the potentiometer system for the air mix damper • Malfunction of connector or harness • Malfunction of the A/C-ECU



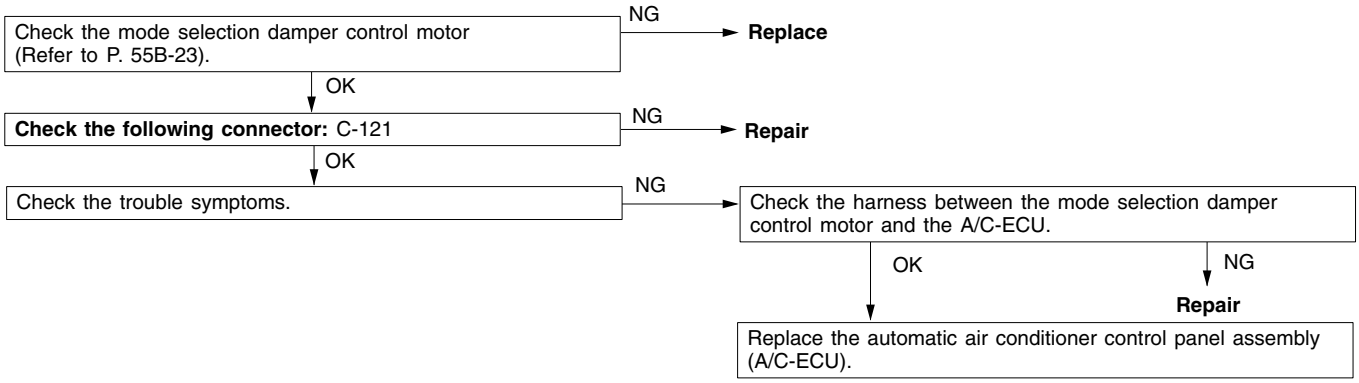
Code No.32 Potentiometer system for the mode selection damper	Probable cause
This diagnosis code is set when the potentiometer for the mode selection does not send any signal to the A/C-ECU due to open or short circuit.	• Malfunction of the potentiometer for the mode selection damper • Malfunction of connector or harness • Malfunction of the A/C-ECU



Code 41 air mixing damper control motor drive system	Probable cause
This code is output when the air mixing damper control motor could not turn as far as the set aperture.	• Air mixing damper control motor fault • Connector or harness fault • A/C-ECU fault



Code 42 mode selection damper control motor drive system	Probable cause
This code is output when the mode selection damper control motor could not turn as far as the set aperture.	• Mode selection damper control motor fault • Connector or harness fault • A/C-ECU fault



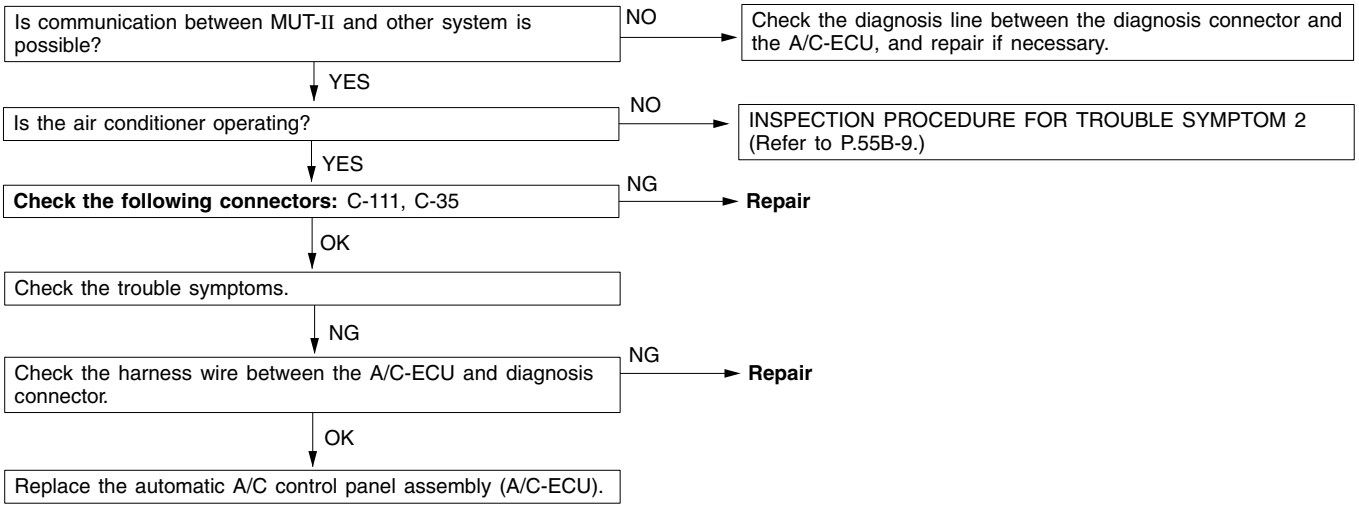
INSPECTION CHART FOR TROUBLE SYMPTOMS

Trouble symptom	Inspection procedure No.	Reference page
Communication with MUT-II is not possible.	1	55B-8
The air conditioner does not operate at all.	2	55B-9
The air conditioner display does not appear on the display.	3	55B-9
A/C outlet air temperature can not be set.	4	55B-10
The blower motor does not operate.	5	55B-11
The blower motor does not operate at high speed.	6	55B-12
The blower air volume can not be changed.	7	55B-13
Air outlet vent cannot be changed.	8	55B-14
outside/Inside air changeover is not possible.	9	55B-14
The condenser fan motor does not operate <4G64>.	10	55B-15
The condenser fan motor does not operate <4D56>.	11	55B-16

INSPECTION PROCEDURES FOR TROUBLE SYMPTOMS

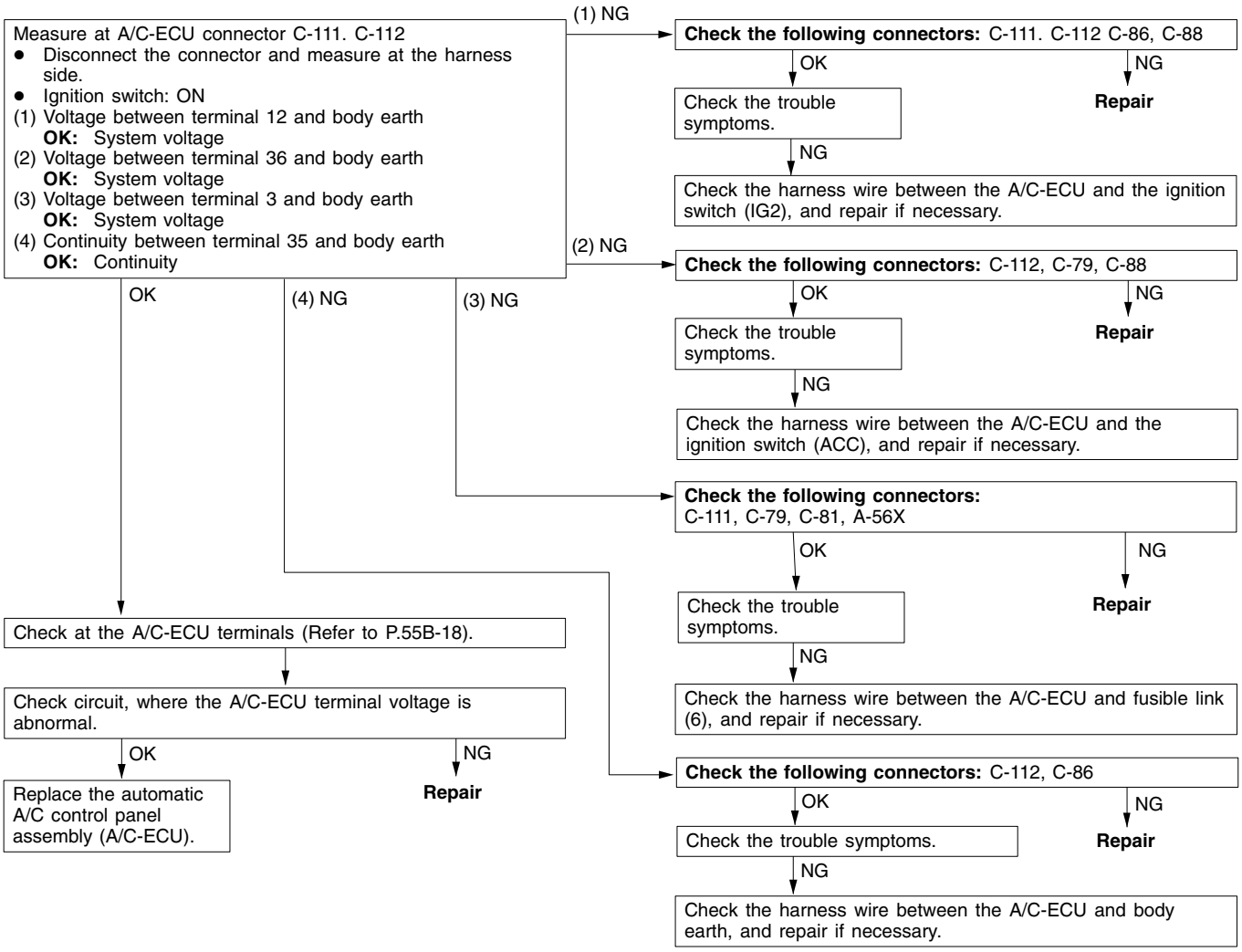
Inspection procedure 1

Communication with the MUT-II is not possible.	Probable cause
If communication with all other systems is not possible, there is a high possibility that there is a malfunction of the diagnosis line. If only the A/C system can not communicate with the MUT-II, the diagnosis line between the diagnosis connector and the A/C-ECU may be defective.	• Malfunction of harness or connector • Malfunction of the A/C-ECU



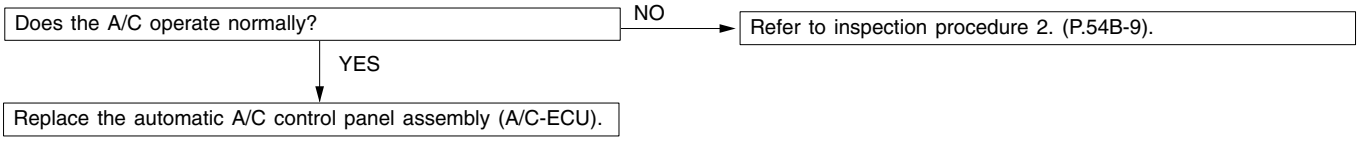
Inspection procedure 2

The air conditioner does not operate at all.	Probable cause
The power supply system (including earth) for the A/C-ECU may be defective. In addition, the A/C-ECU may be inoperative due to a defective harness (such as short).	• Malfunction of harness or connector • Malfunction of the A/C-ECU



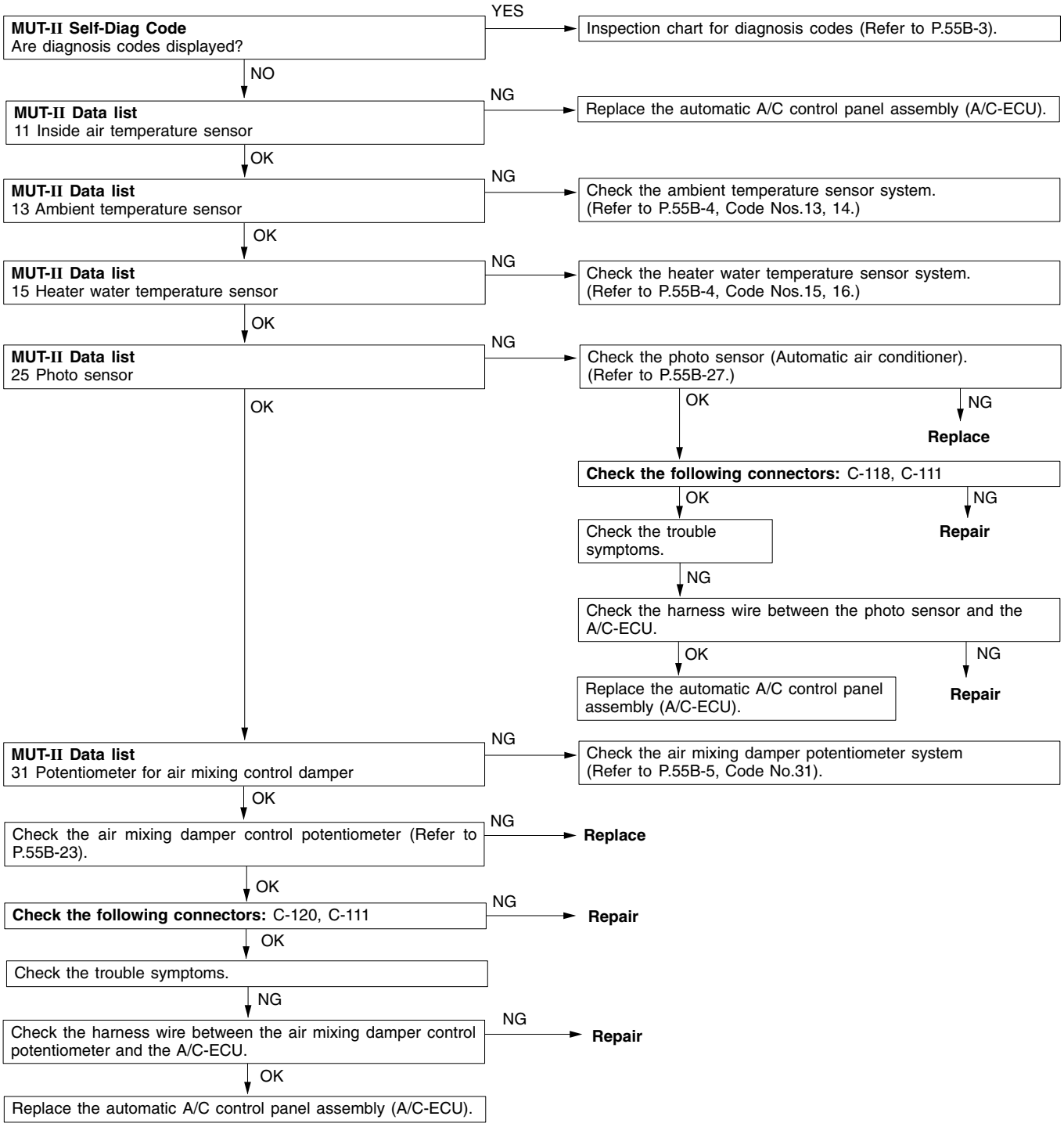
Inspection procedure 3

The air conditioner display does not appear on the display.	Probable cause
Check the harness wires between the A/C-ECU and the center display, and repair if necessary.	• Malfunction of harness or connector • Malfunction of the A/C-ECU



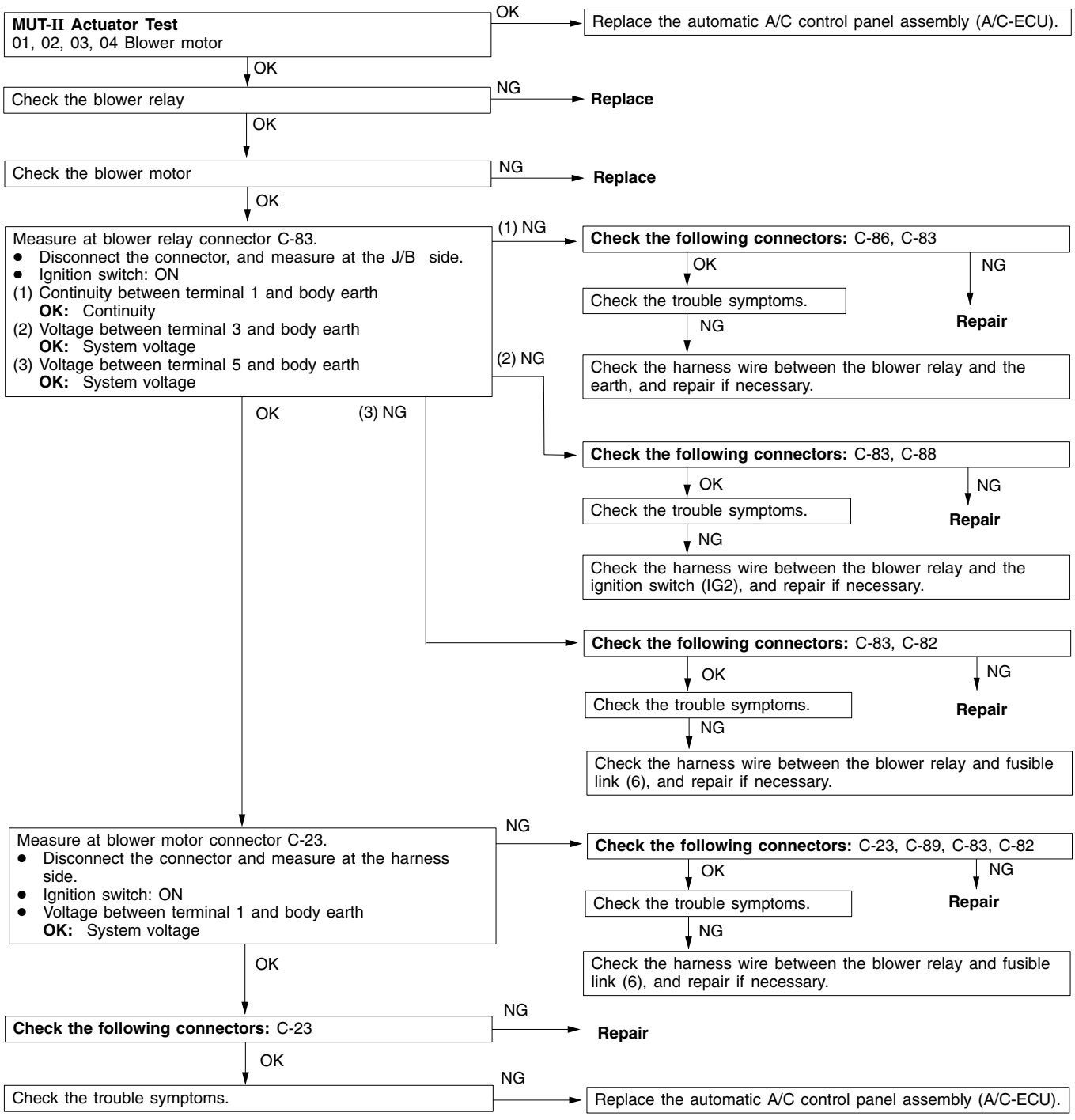
Inspection procedure 4

A/C outlet air temperature can not be set.	Probable cause
If the air outlet temperature can not be changed after a A/C temperature is set, sensor(s) or the air mixing damper may be defective.	• Malfunction of the inside air temperature sensor • Malfunction of the ambient temperature sensor • Malfunction of the heater water temperature sensor • Malfunction of the photo sensor • Malfunction of the air mixing damper control motor • Malfunction of harness or connector • Malfunction of the A/C-ECU



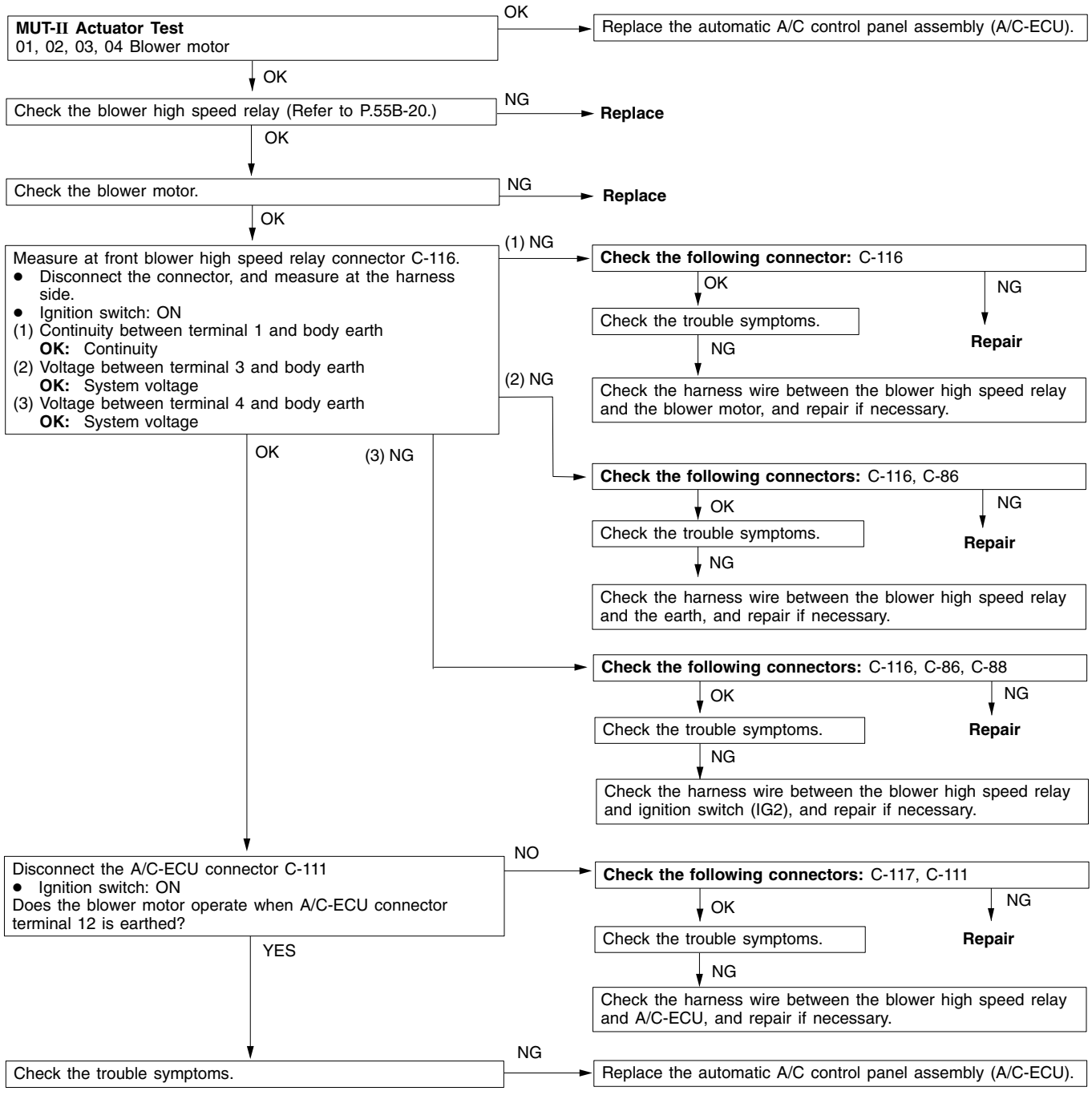
Inspection procedure 5

The blower motor does not operate.	Probable cause
If no air comes out of the blower even though the blower switch is on, the cause is probably a malfunction of the front blower relay circuit.	• Malfunction of the front blower relay • Malfunction of the blower motor • Malfunction of harness or connector • Malfunction of the A/C-ECU



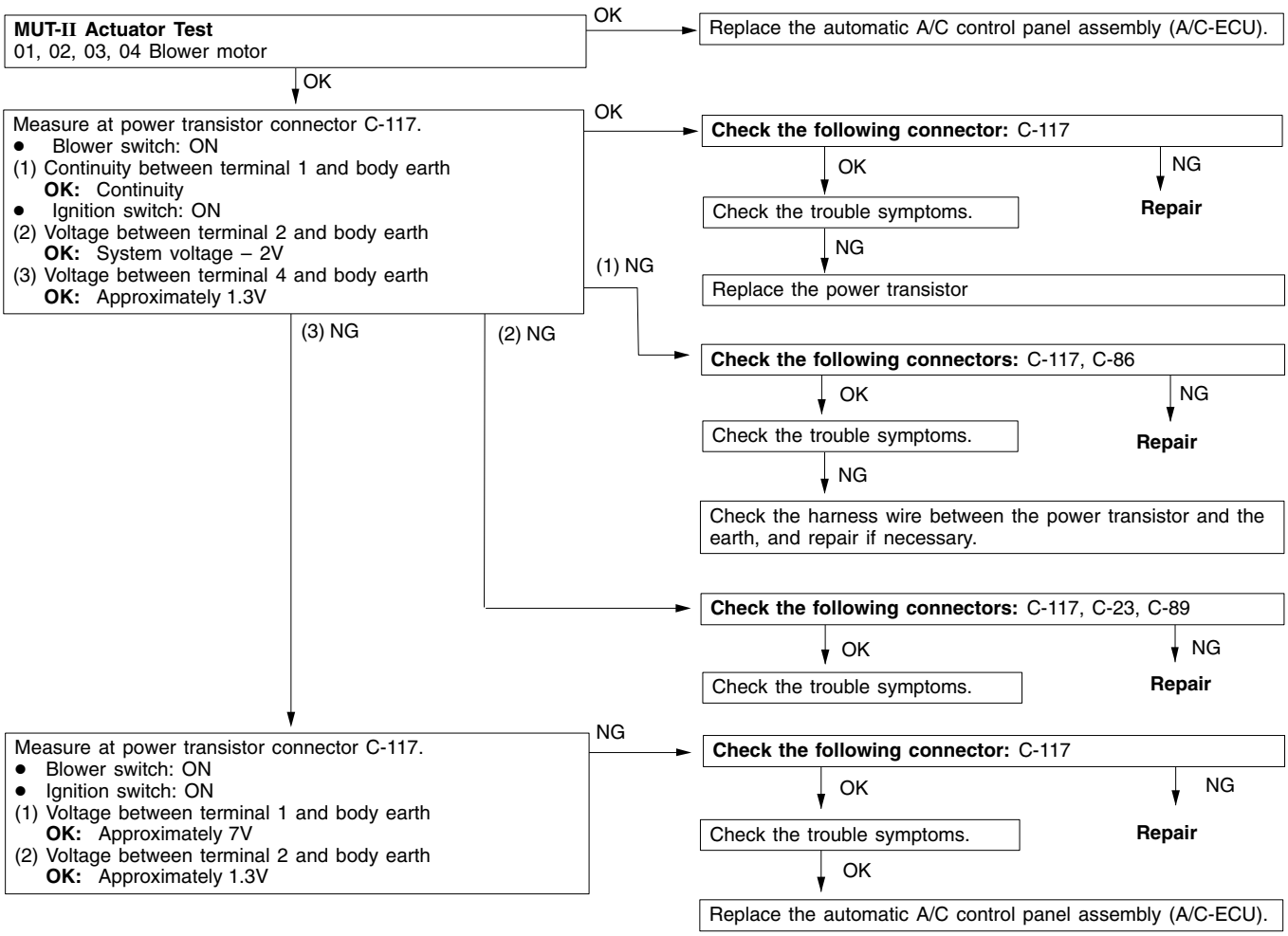
Inspection procedure 6

The blower motor does not operate at high speed.	Probable cause
If the blower motor does not operate at high speed when the temperature is set to 17 or 32, the blower high speed relay circuit system may be defective.	• Malfunction of the blower high speed relay • Malfunction of harness or connector • Malfunction of the A/C-ECU



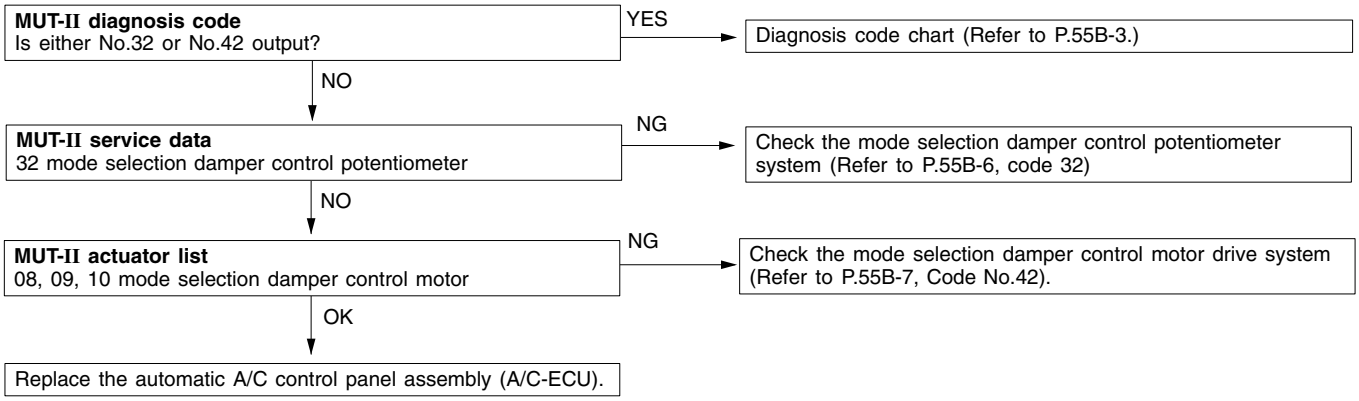
Inspection procedure 7

The blower air volume can not be changed.	Probable cause
If the air volume can not be controlled, the power transistor circuit may be defective.	• Malfunction of the power transistor • Malfunction of harness or connector • Malfunction of the A/C-ECU



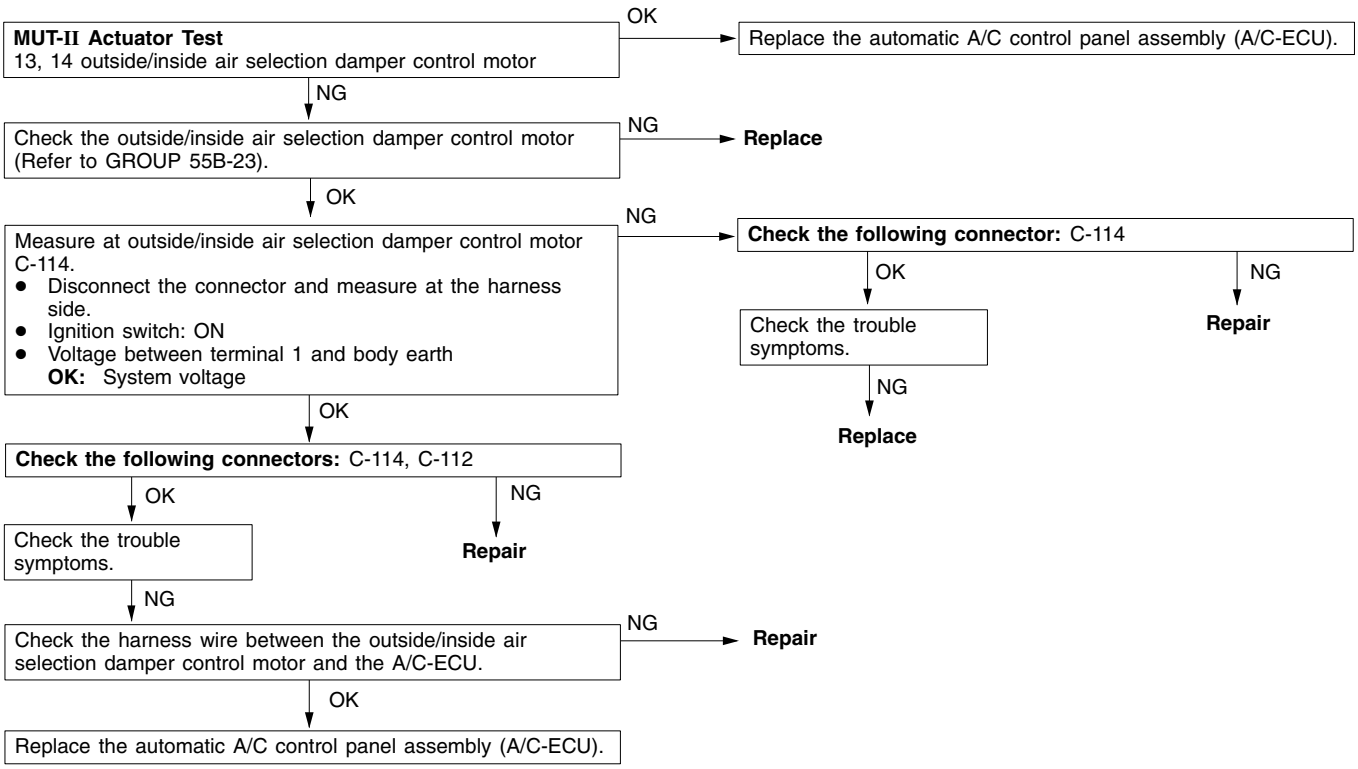
Inspection procedure 8

Air outlet vent cannot be changed.	Probable cause
When the air outlet vents cannot be changed even if the changeover switch is operated, the mode selection damper control circuit may be defective.	• Malfunction of the mode selection damper control motor • Malfunction of the mode selection damper control potentiometer • Malfunction of harness or connector • Malfunction of the A/C-ECU



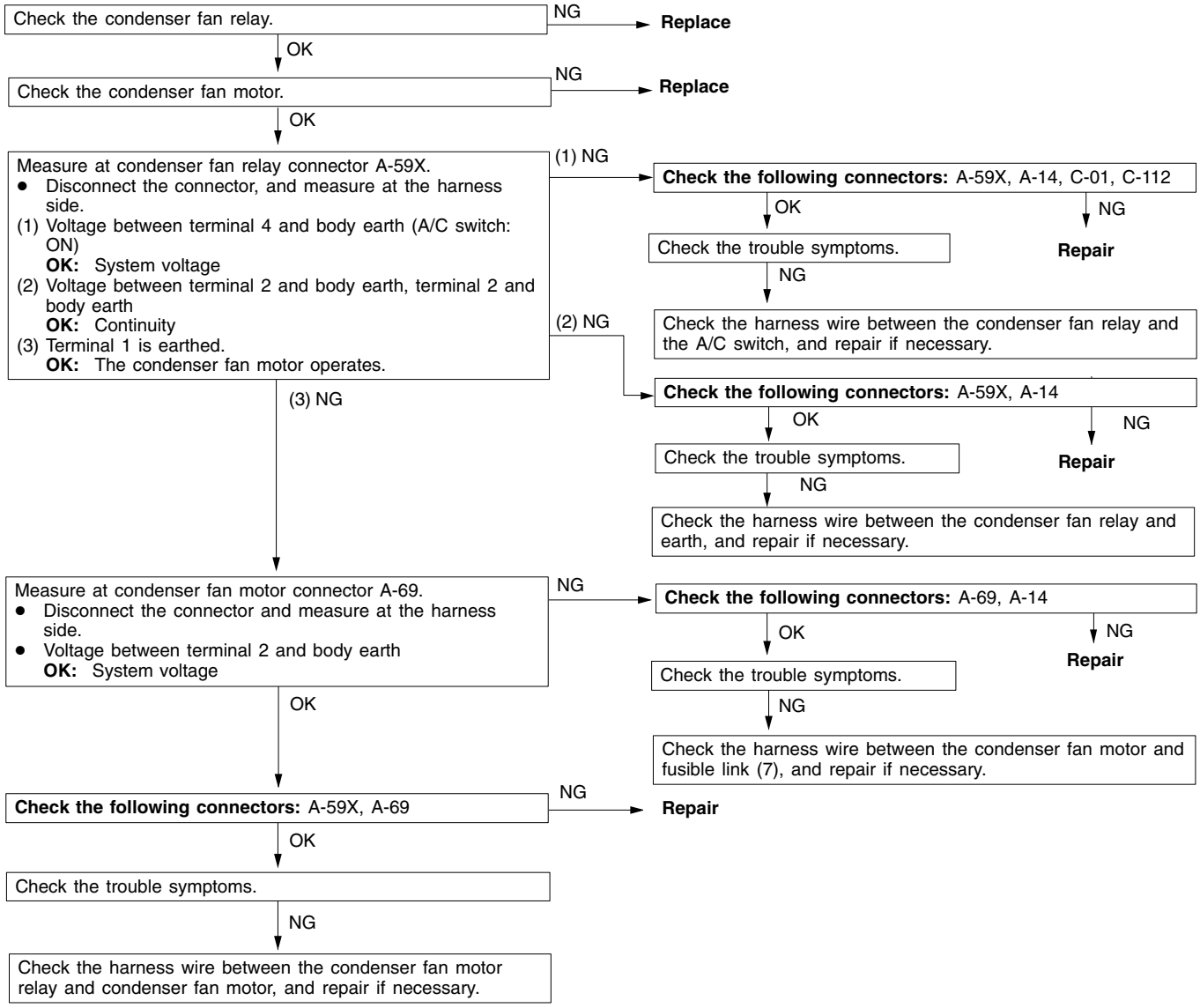
Inspection procedure 9

outside/inside air changeover is not possible.	Probable cause
When inside air cannot be changed to outside air or vice versa even if its changeover switch is on, the outside/inside air selection damper control system may be defective.	• Malfunction of the outside/inside air selection damper control motor • Malfunction of harness or connector • Malfunction of the A/C-ECU



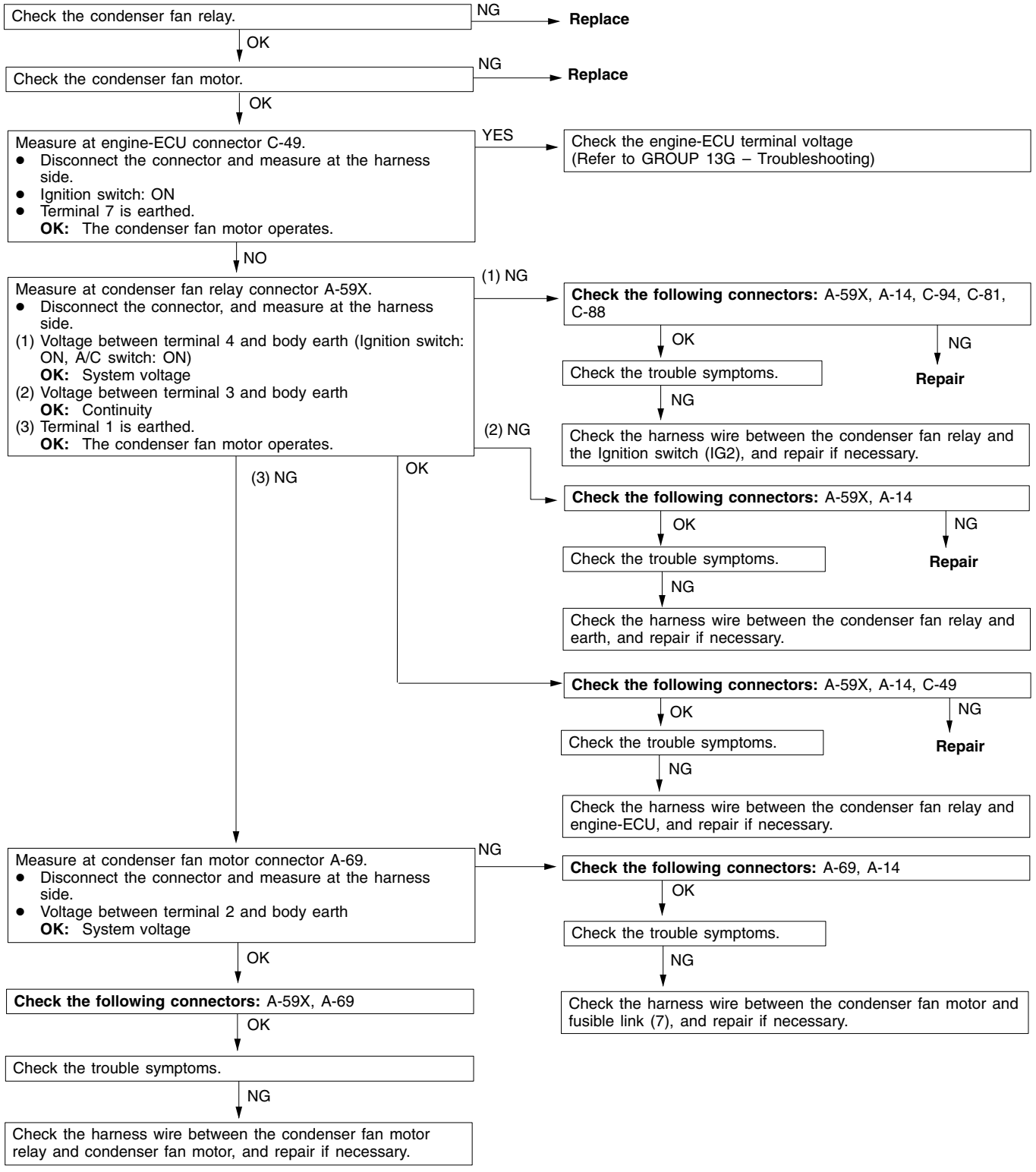
Inspection procedure 10

The condenser fan motor does not operate <4G64>.	Probable cause
If the condenser fan does not operate, the condenser fan relay or motor may be defective.	• Malfunction of the condenser fan relay • Malfunction of the condenser fan motor • Malfunction of harness or connector



Inspection procedure 11

The condenser fan motor does not operate <4D56>.	Probable cause
If the condenser fan motor does not operate, the condenser fan relay or motor may be defective.	• Malfunction of the condenser fan relay • Malfunction of the condenser fan motor • Malfunction of harness or connector



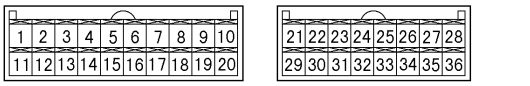
DATA LIST REFERENCE TABLE

Item No.	Check item	Inspection contents	
11	Inside air temperature sensor	Ignition switch: ON	Inside air temperature and temperature displayed on the MUT-II are identical.
13	Ambient temperature sensor	Ignition switch: ON	Outside air temperature and temperature displayed on the MUT-II are identical.
15	Heater water temperature sensor	Ignition switch: ON	Heater core surface temperature and temperature displayed on the MUT-II are identical.
21	Air thermo sensor	Ignition switch: ON	Evaporator outlet temperature and temperature displayed on the MUT-II are identical.
25	Photo sensor	Ignition switch: ON	Amount of incident light is proportional to voltage displayed on the MUT-II.
31	Potentiometer for the air mixing damper control	Ignition switch: ON Damper position: MAX HOT	Opening angle: Approximately 100%
		Ignition switch: ON Damper position: MAX COOL	Opening angle: Approximately 0%
32	Potentiometer for the mode selection damper control	Ignition switch: ON Damper position: FACE	Opening angle: Approximately 0%
		Ignition switch: ON Damper position: FOOT	Opening angle: Approximately 50%
		Ignition switch: ON Damper position: FOOT/DEF	Opening angle: Approximately 75%
		Ignition switch: ON Damper position: DEF	Opening angle: Approximately 100%

ACTUATOR TEST TABLE

Item No.	Check item	Drive Contents
01	Blower motor	Stopped
02		Low speed
03		Medium speed
04		High speed
05	Air mixing damper control motor	Opening angle: Approximately 0%
06		Opening angle: Approximately 50%
07		Opening angle: Approximately 100%
08	Mode selection damper control motor	FACE
09		FOOT
10		DEF
11	Compressor ON/OFF	OFF
12		ON
13	Outside/inside air selection damper control motor	Outside air
14		Inside air

CHECK AT A/C-ECU TERMINALS



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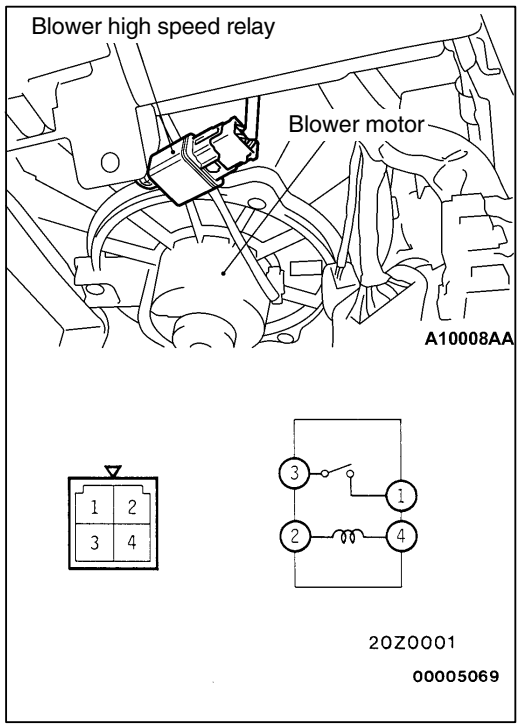
Terminal No.	Check item	Check conditions	Normal condition
1	Power transistor collector output	When blower switch OFF position	System voltage
		When blower switch LO position	Approximately 7V
		When blower switch HI position	Faint voltage (0.5 V)
2	Power transistor base output	When blower switch OFF position	0 V
		When blower switch LO position	Approximately 1.3V
		When blower switch HI position	Approximately 2.5V
3	Backup power supply	At all times	System voltage
4	Input from heater water temperature sensor	When sensor temperature: 25°C (4 kΩ)	2.3 – 2.9 V
5	Input to air mixing damper control potentiometer	When the damper is moving to the MAX. HOT position	4.7 – 5.0 V
6	Input to mode selection damper control potentiometer	When the damper flap is moving to the DEF position	4.8 – 5.2 V
7	Input from ambient temperature sensor	When sensor temperature: 25°C (4 kΩ)	2.3 – 2.9 V
8	Input from air thermo sensor	Sensor temperature: 25°C (4 kΩ)	2.3 – 2.9 V
9	Photo sensor (–)	Illuminance 1000 lux	5.0 – 7.6 mV
		Illuminance 100 lux	0.5 – 0.76 mV
10	Sensor power supply	At all times	4.8 – 5.2 V
12	Blower high speed relay	Blower switch: HI	1.5V or less
		Blower switch: except HI	System voltage
13	Earth	At all times	Continuity
16	Power supply to ignition switch (IG2)	Ignition switch: ON	System voltage
17	Diagnosis output	Ignition switch: ON	A voltmeter needle fluctuates between 0 and 12 V.
18	Diagnosis control output	Ignition switch: ON	System voltage – 2V
19	Photo sensor (+)	At all times	0 V
20	Earth to potentiometer	At all times	0 V
21	Mode selection damper control motor (FACE)	When the damper flap is moving to the FACE position.	10 V
		When the damper flap is moving to the DEF position.	Faint voltage (0.5 V)
22	Air mixing damper control motor (MAX COOL)	When the damper flap is moving to the MAX COOL position.	10 V
		When the damper flap is moving to the MAX HOT position.	Faint voltage (0.5 V)

Terminal No.	Check item	Check conditions	Normal condition
23	Outside/inside air selection damper control motor (Outside)	When the damper flap is moving to the outside position.	10 V
		When the damper flap is moving to the inside position.	Faint voltage (0.5 V)
24	Mode selection damper control motor (DEF)	When the damper flap is moving to the DEF position.	10 V
		When the damper flap is moving to the FACE position.	Faint voltage (0.5 V)
25	Air mixing damper control motor (MAX HOT)	When the damper flap is moving to the MAX HOT position.	10 V
		When the damper flap is moving to the MAX COOL position.	Faint voltage (0.5 V)
26	Outside/inside air selection damper control motor (Inside)	When the damper flap is moving to the inside position.	10 V
		When the damper flap is moving to the outside position.	Faint voltage (0.5 V)
29	Illumination earth	At all times	Continuity
30	Power supply to illumination	Lighting switch: ON	System voltage
34	A/C output	When the A/C is OFF	0 V
		When the A/C is ON	System voltage
35	Earth	At all times	Continuity



ON-VEHICLE SERVICE

BLOWER HIGH SPEED RELAY CONTINUITY CHECK

Battery voltage	Terminal No.			
	2	4	1	3
Power is not supplied	○	○		
Power is supplied	⊕	⊖	○	○

IDLE-UP INSPECTION <4D56>

(1) Before the check, set the following conditions.
- Engine cooling water temperature: 80‘90
- Lamps, electric cooling fan, accessories operations: OFF
- Transmission: N range

(2) Confirm that the idling speed is set to the typical value.

Standard value: 750 ± 30 rpm

NOTE
The idling speed does not need adjusting as it is automatically controlled by the ISC system.

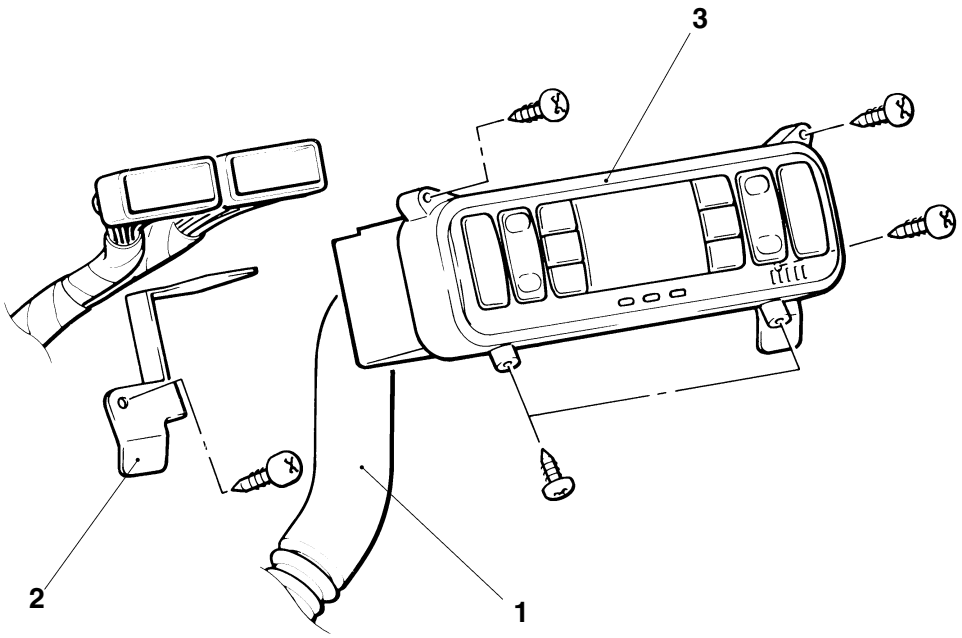
(3) Check that the idling speed conforms with the standard value when the A/C switch is turned ON and the air conditioning operates.

Standard value: 850 ± 50 r/min

AUTOMATIC AIR CONDITIONER CONTROL PANEL ASSEMBLY (A/C-ECU)

REMOVAL AND INSTALLATION

Pre-removal and Post-installation Operations
- Driver Side Under Cover, Meter Bezel Assembly, Glove Box Assembly, Center Under Cover Removal and Installation (Refer to GROUP 52A – Instrument Panel.)*



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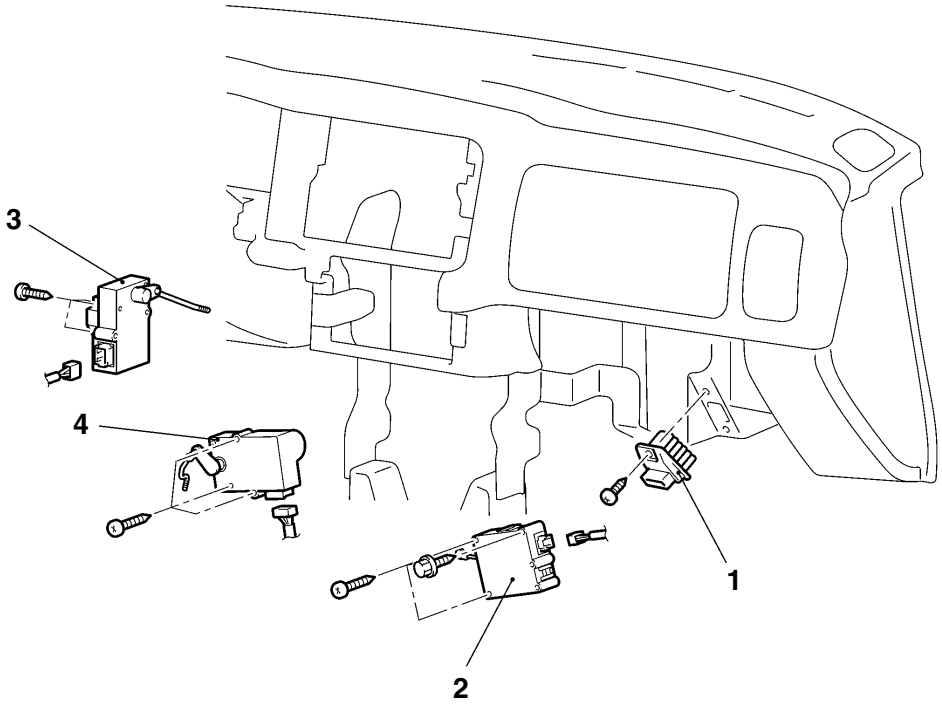
Removal steps
1. Aspirator hose
2. Automatic air conditioner control panel bracket
3. Automatic air conditioner control panel assembly (A/C-ECU)

NOTE:
*: Refer to the '97 L200 Workshop Manual (Pub. No. PWTE96E1)

MOTOR

REMOVAL AND INSTALLATION



Power transistor removal steps

- Glove box assembly (Refer to GROUP 52A.)*

1. Power transistor

Outside/inside air selection damper control motor removal steps

- Glove box assembly (Refer to GROUP 52A.)*

2. Outside/inside air selection damper control motor

Mode selection damper control motor removal steps

- Driver side under cover (Refer to GROUP 52A.)*

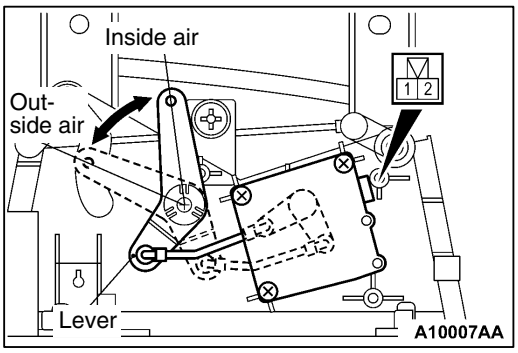
3. Mode selection damper control motor

Air mixing damper control motor removal steps

- Front floor console, Glove box assembly (Refer to GROUP 52A.)*
- Driver side under cover (Refer to GROUP 52A.)*
- Meter bezel assembly (Refer to GROUP 52A.)*
- Center reinforcement A (Refer to GROUP 52A.)*

4. Air mixing damper control motor

NOTE:
*: Refer to the '97 L200 Workshop Manual (Pub. No. PWTE96E1)

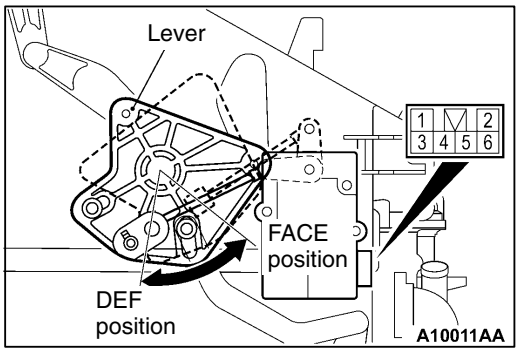


INSPECTION

OUTSIDE/INSIDE AIR SELECTION DAMPER CONTROL MOTOR CHECK

Battery connection terminal lever operation		Operating the lever
1	2	
⊕	⊖	Turn to outside air side
⊖	⊕	Turn to cabin air side

Caution
When the lever is in the inside air position or outside air position, no power is supplied.



MODE SELECTION DAMPER CONTROL MOTOR CHECK

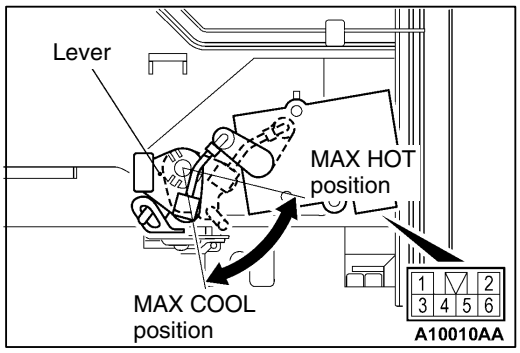
Battery connection terminal		Lever operation
1	3	
⊕	⊖	Turn to DEF. side.
⊖	⊕	Turn to FACE side.

NOTE
When the lever is in the FACE position or DEF position, no power is supplied.

POTENTIOMETER CHECK

When measuring the resistance between connector terminals nos. 2 and 5, and between terminals 5 and 6 under the same conditions as the mode selection damper control motor check, confirm that the resistance gradually fluctuates within the standard value range.

Standard value: 0.18 – 4.82 kΩ



AIR MIXING DAMPER CONTROL MOTOR CHECK

Battery connection terminal		Lever operation
1	3	
⊕	⊖	Turn to COOL side.
⊖	⊕	Turn to HOT side.

NOTE
When the lever is in the MAX HOT position or MAX COOL position, no power is supplied.

Potentiometer Check

When measuring the resistance between connector terminals nos. 2 and 5, and between terminals 5 and 6 under the same conditions as the air mixing damper motor check, confirm that the resistance gradually fluctuates within the standard value range.

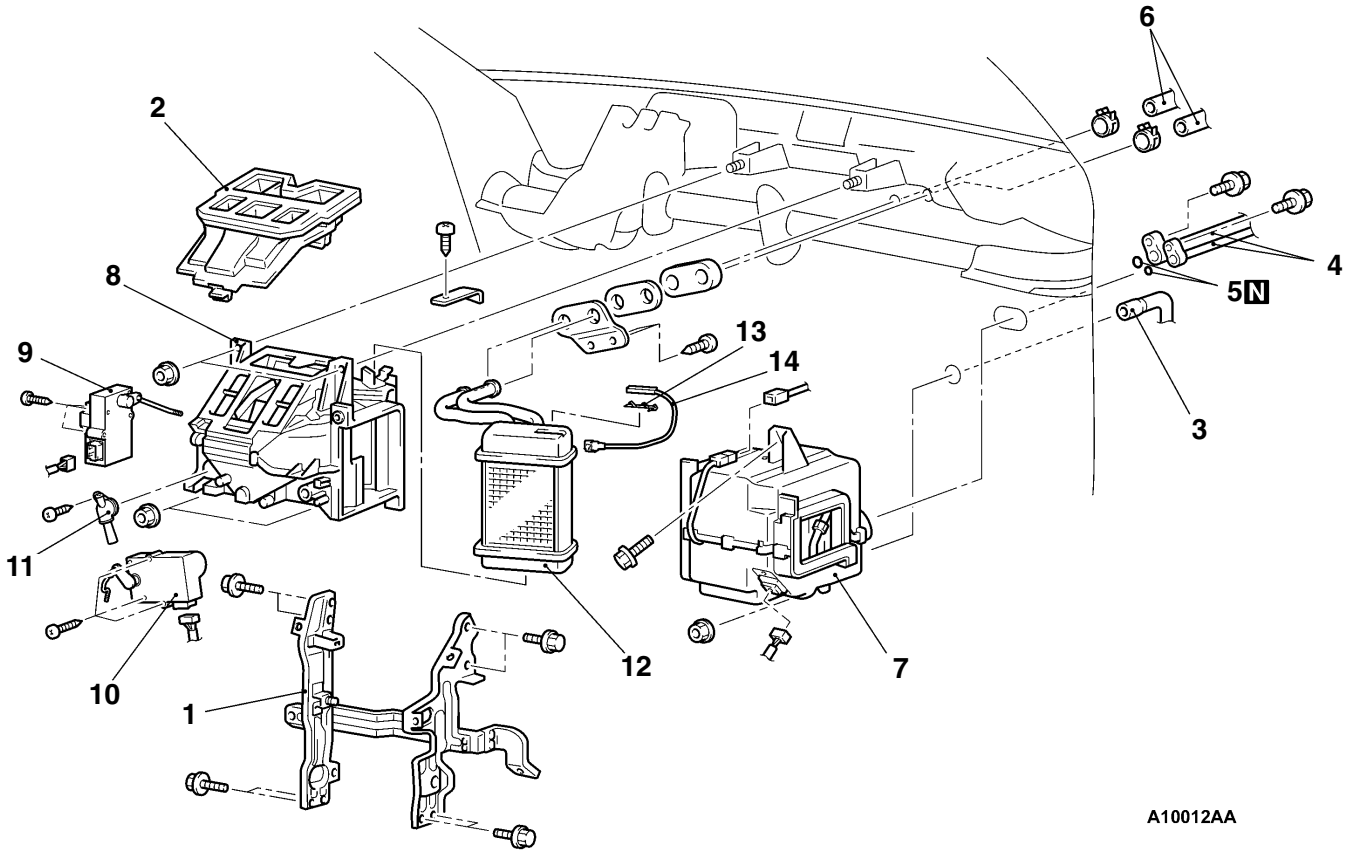
Standard value: 0.18 – 4.82 kΩ

HEATER UNIT

REMOVAL AND INSTALLATION

Pre-removal and Post-installation Operation
- Refrigerant Discharging and Charging
- Engine Coolant Draining and Refilling
- Instrument Panel Removal and Installation
- Joint Duct Removal and Installation

Caution: SRS
When removing and installing the heater unit from vehicles equipped with SRS, do not let it bump against the SRS diagnostic unit or the components.



Removal steps
1. Center reinforcement
2. Center ventilation duct
3. Drain hose
◀A▶ 4. Liquid pipe B and suction pipe connection
5. O-ring
6. Heater hose connection
7. Evaporator
8. Heater unit
9. Mode selection damper control motor
10. Air mixing damper control motor
11. Aspirator
12. Heater core
◀B▶ ▶A◀ 13. Heater water temperature sensor clip
14. Heater water temperature sensor

REMOVAL SERVICE POINTS

◀A▶ LIQUID PIPE B/SUCTION PIPE DISCONNECTION

To prevent the entry of dust or other foreign bodies, plug the dismantled pipes and nipples.

◀B▶CLIP/HEATER WATER TEMPERATURE SENSOR REMOVAL

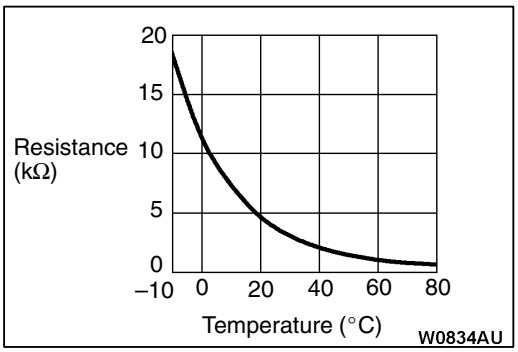
Remove the clip from the side of the heater unit and lift the heater water temperature sensor out of the heater unit.

INSTALLATION SERVICE POINTS

▶A◀HEATER WATER TEMPERATURE SENSOR/CLIP INSTALLATION

Insert the heater water temperature sensor into the mounting hole on the side of the heater unit and secure the sensor with the clip.

NOTE
As the compressor oil and receiver are highly moisture absorbent, use a non-porous material to plug the hoses and nipples.



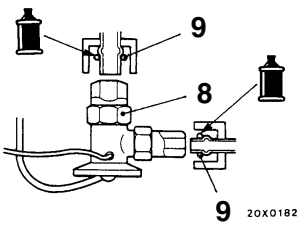
INSPECTION

HEATER WATER TEMPERATURE SENSOR CHECK

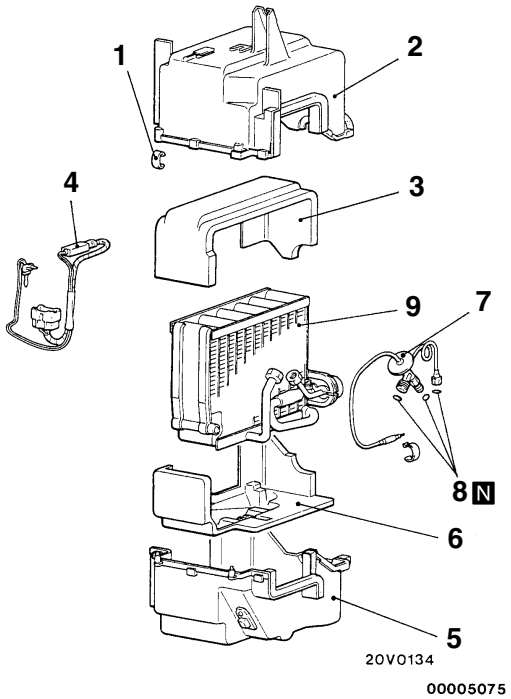
Measure the resistance between the sensor terminals under at least two different temperatures. The resistance values should generally match those in the graph.

EVAPORATOR

DISASSEMBLY AND REASSEMBLY

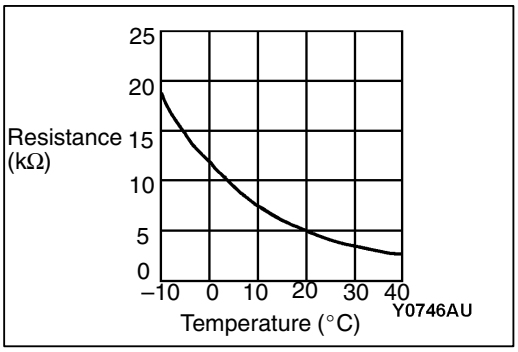


Compressor oil: ZXL 100PG



Disassembly steps

1. Clip
2. Evaporator cover (upper)
3. Lining, upper
4. Thermostat
5. Evaporator cover (lower)
6. Lining, lower
7. Expansion valve
8. O-ring
9. Evaporator



INSPECTION

AIR THERMO SENSOR CHECK

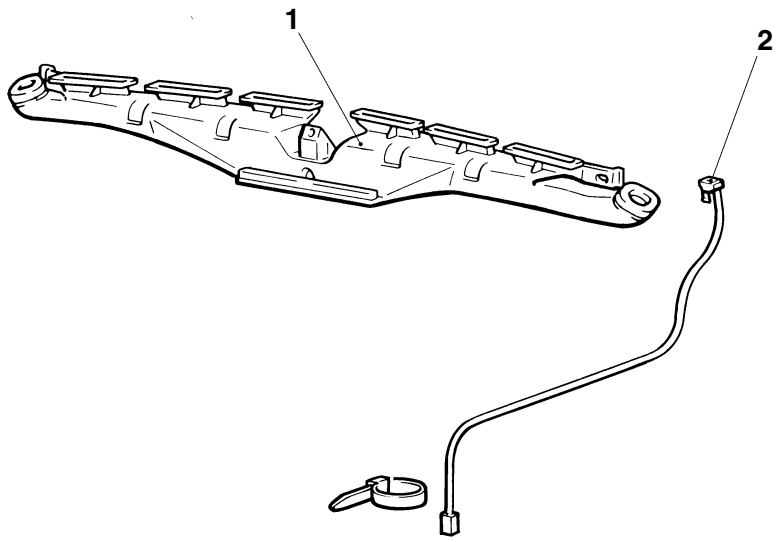
Measure the resistance between the sensor terminals under at least two different temperatures. The resistance values should generally match those in the graph.

NOTE
The temperature at the check should not exceed the range in the graph.

PHOTO SENSOR

REMOVAL AND INSTALLATION

- Instrument Panel Removal and Installation (Refer to GROUP 52A.)*



A10014AA

Removal steps
1. Defroster nozzle
2. Photo sensor

NOTE:
*: Refer to the '97 L200 Workshop Manual (Pub. No. PWTE96E1)

INSPECTION

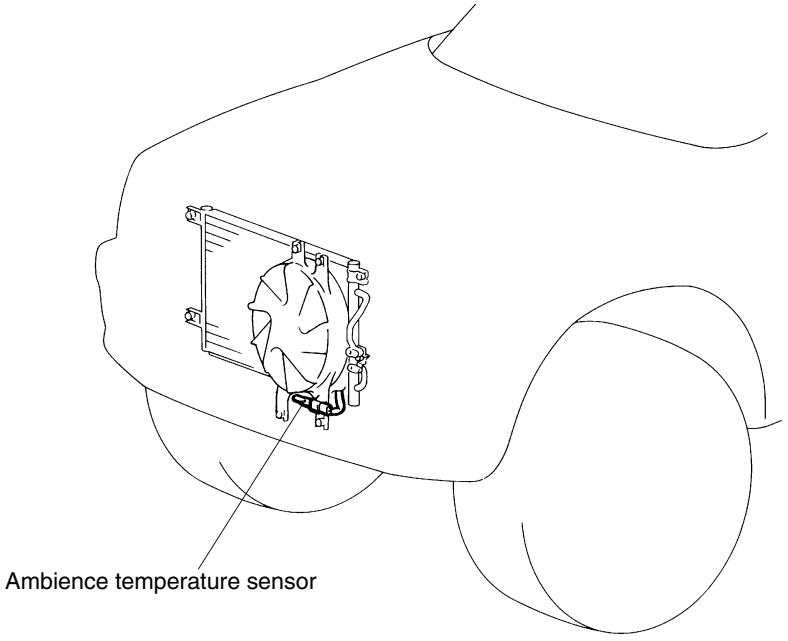
PHOTO SENSOR CHECK

When the full automatic air conditioner is operating, cover the insolation sensor photo-sensor with your hand. If the blower speed drops, it is normal. If the blower speed does not drop, replace the photo sensor.

AMBIENCE TEMPERATURE SENSOR

REMOVAL AND INSTALLATION

- Front bumper (Refer to GROUP 51.)



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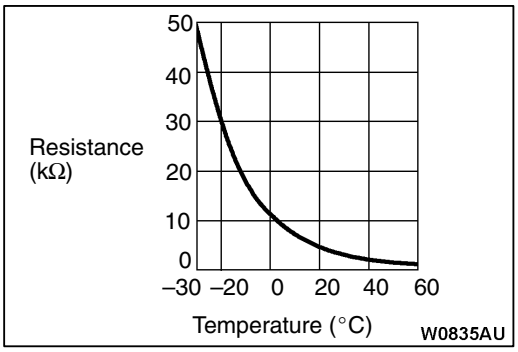


INSPECTION

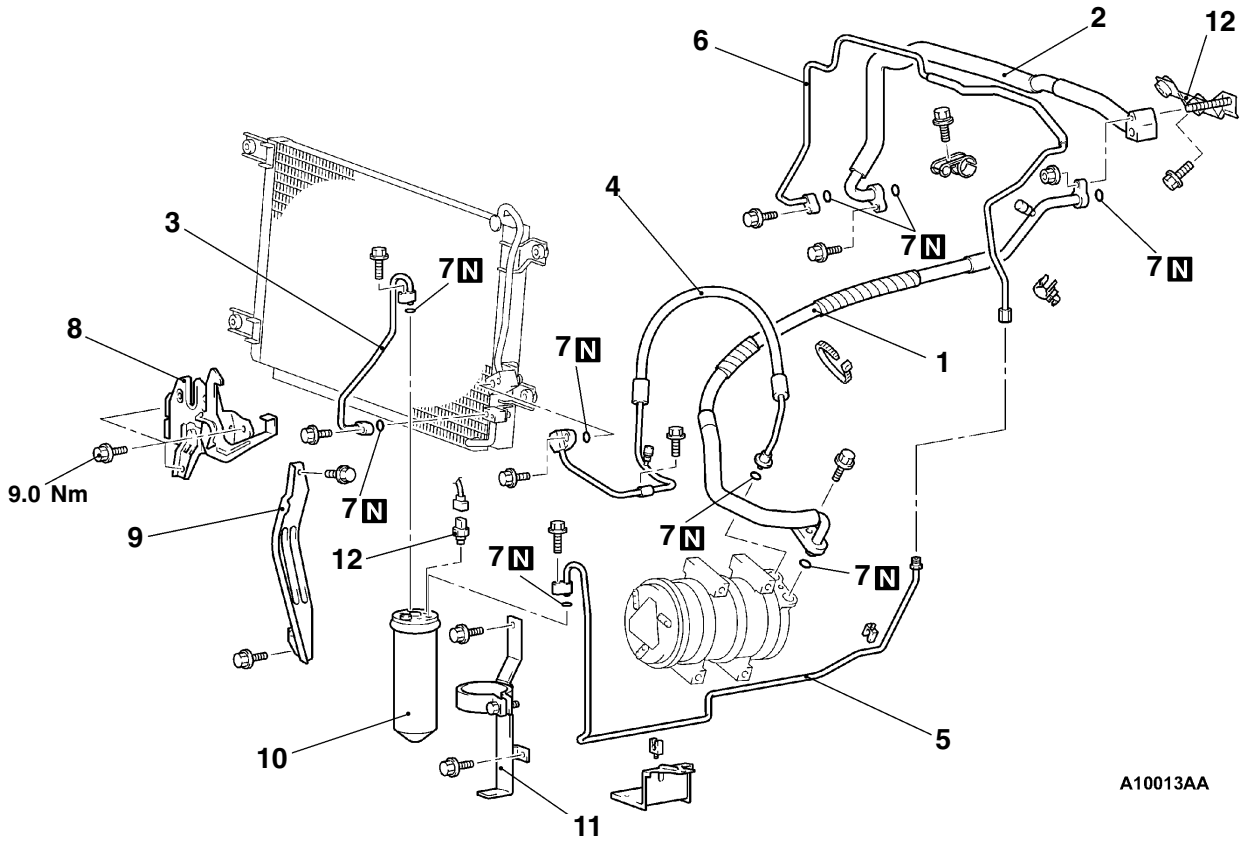
AMBIENCE TEMPERATURE SENSOR CHECK

Measure the resistance between the sensor terminals under at least two different temperatures. The resistance values should generally match those in the graph.

REFRIGER LINE

REMOVAL AND INSTALLATION

Pre-removal and Post-installation Operations
- Refrigerant Discharging and Charging
- Radiator Grill Removal and Installation
- Front Bumper Removal and Installation
- Battery Removal and Installation
- Windshield Washer Tank Removal and Installation



Removal steps

◀A▶ 1. Suction flexible hose
◀A▶ 2. Suction pipe A
◀A▶ 3. Liquid pipe A
◀A▶ 4. Discharge hose
◀A▶ 5. Liquid pipe B
◀A▶ 6. Liquid pipe C
7. O-ring
8. Hood latch
9. Hood lock stay
10. Receiver assembly
11. Receiver bracket
12. Suction pipe braclet

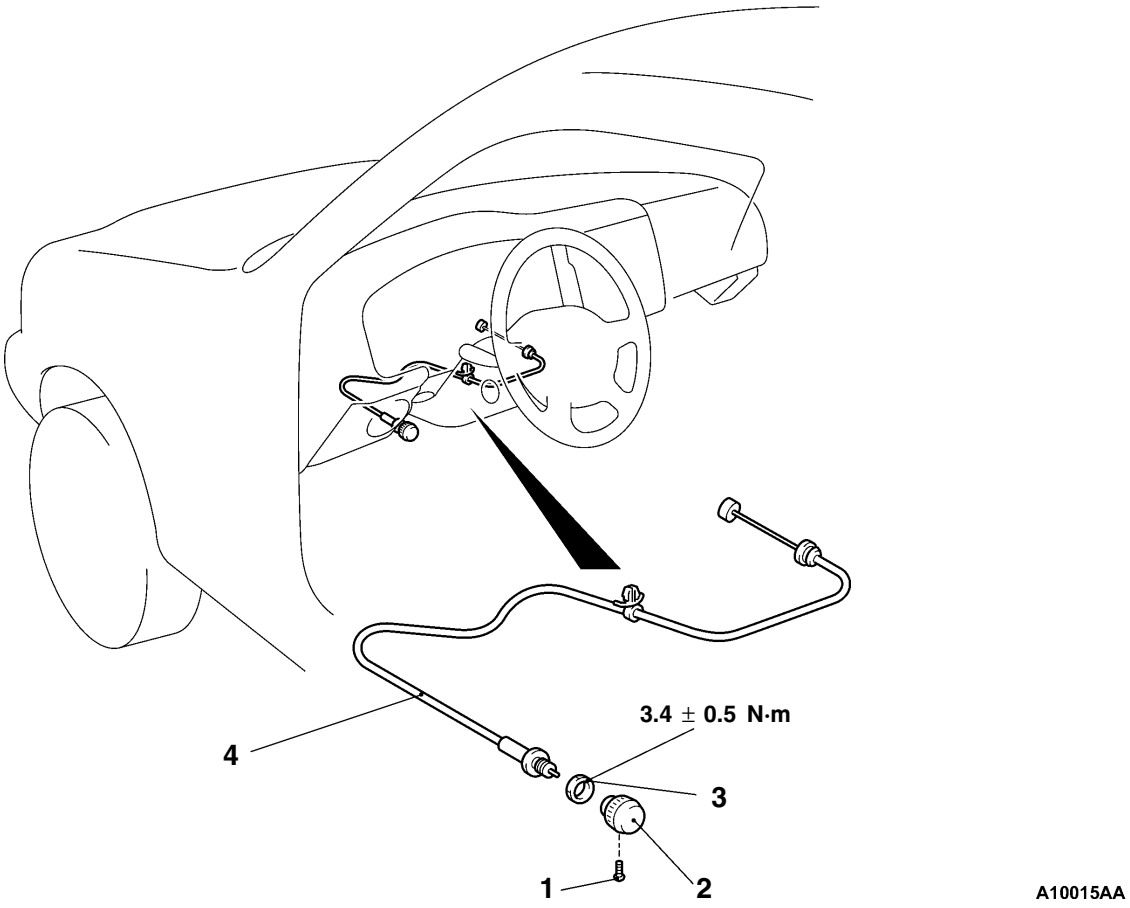
REMOVAL SERVICE POINTS

◀A▶ REMOVAL OF HOSES AND PIPES

To prevent the entry of dust or other foreign bodies, plug the condenser, compressor, pipes and nipples.

THROTTLE CABLE

REMOVAL AND INSTALLATION



Removal steps

1. Screw
2. Knob
3. Nut
4. Throttle cable

NOTES