

HEATER, AIR CONDITIONER AND VENTILATION

CONTENTS

MANUAL A/C	55A
AUTOMATIC A/C	55B

HEATER, AIR CONDITIONER AND VENTILATION <MANUAL A/C>

CONTENTS

SERVICE SPECIFICATIONS	3	Air Conditioner Control Panel Assembly and A/C Switch	23
LUBRICANTS	3	Heater Unit and Blower Assembly	26
TROUBLESHOOTING <FRONT HEATER, FRONT A/C>	4	Blower Motor and Resistor	29
TROUBLESHOOTING <REAR HEATER, REAR COOLER>	7	Inside/Outside Air Changeover Damper Motor ...	30
ON-VEHICLE SERVICE	9	Automatic Compressor-ECU and Air Thermo Sensor Assembly	31
Refrigerant Level Test through Performance Test ..	9	REAR HEATER AND REAR COOLER	32
Magnetic Clutch Test	10	Rear A/C Switch, Front Rear Fan Switch	32
Receiver Drier Test	10	Rear A/C Control Unit	34
Compressor Drive Belt Adjustment	10	Rear Heater Unit	34
Dual Pressure Switch Check	10	Rear Heater Unit and Rear Blower Assembly	37
Charging	11	HEAT SWITCH	40
Performance Test	15	COMPRESSOR	41
Front Blower Relay and Rear Blower Relay Continuity Check	18	CONDENSER ASSEMBLY AND CONDENSER FAN	45
Continuity Check of A/C Compressor Relay and Condenser Fan Relay	18	REFRIGERANT LINE	47
PTC Heater Relay Continuity Check	19	ENGINE COOLANT TEMPERATURE SWITCH	51
Idle-up Operation Check <Diesel>	19	IDLE-UP SYSTEM	53
Vacuum Actuator Check <Diesel-powered vehicles>	20	DUCTS	54
Idle-up Solenoid Valve Check	21	VENTILATION	56
Clean Air Filter Replacement Procedure	22		
FRONT A/C	23		

SERVICE SPECIFICATIONS

Item				Standard value
Idle speed r/min (N or P range)	Diesel	4D56		750 ± 100
		4M41		750 ± 50
Idle-up speed r/min (N or P range)	4D56			925 ± 25
	4M41	A/C	When the A/C is under low or medium load	800 ± 50
			When the A/C is under high load	1,000 ± 50
Water temperature switch °C	A/C cut-off		ON	108
			OFF	115
	Condenser fan		OFF	97
			ON	102
Resistor resistance (Front A/C) Ω	Between terminals 2 and 4			0.39 ± 7 %
	Between terminals 1 and 2			1.49 ± 7 %
	Between terminals 2 and 3			2.79 ± 7 %
Resistance of the rear air conditioner switch (temperature control switch) kΩ <except rear heater (floor console)>				0 – 3
Potentiometer for air mix damper kΩ <Rear heater>				1.2 – 4.8
Resistor resistance [Rear heater (front console)] Ω	Between terminals 1 and 6			4.9 ± 7 %
	Between terminals 1 and 3			1.25 ± 7 %
Resistor resistance [Rear heater (quarter trim), rear heater] Ω	Between terminals 1 and 6			4.9 ± 7 %
	Between terminals 1 and 3			1.25 ± 7 %
Idle-up solenoid valve resistance Ω				40
Air compressor air gap mm				0.35–0.65

LUBRICANTS

Item		Specified lubricants	Quantity
Compressor oil mL	Except for vehicles with rear cooler	DENSO OIL 8	120 ± 20
	Vehicles with rear cooler	DENSO OIL 8	140 ± 20
Pipe connections		DENSO OIL 8	As required
Refrigerant g	Except for vehicles with rear cooler	R134a (HFC-134a)	500 ± 20
	Vehicles with rear cooler	R134a (HFC-134a)	780 ± 20

TROUBLESHOOTING <Front heater, Front A/C>

Trouble symptom	Probable cause	Remedy	Reference page
The air conditioner does not work.	Malfunction of fuse	Replace the fuse.	–
	Malfunction of harness or connector	Repair the harness or connector.	–
	Refrigerant leak or overfilling of refrigerant	Replenish the refrigerant, repair the leak or take out some of the refrigerant.	–
	A/C compressor relay is defective.	Replace the A/C compressor relay.	55A-18
	The A/C compressor magnetic clutch is defective.	Replace the A/C compressor.	55A-10
	The dual pressure switch is defective.	Replace the dual-pressure switch.	55A-10
	The A/C switch is defective.	Replace the heater control assembly.	55A-24
	The blower switch is defective.	Replace the heater control assembly.	55A-24
	The air thermo sensor is defective.	Replace the automatic compressor-ECU and the air thermo sensor assembly.	55A-31
	The automatic compressor-ECU is defective.	Replace the automatic compressor-ECU and the air thermo sensor assembly.	55A-6
	The engine-ECU is defective.	Replace the engine-ECU.	–
When the A/C is operating, temperature inside the passenger compartment doesn't decrease (cool air is not emitted).	Refrigerant leak	Replenish the refrigerant and repair the leak.	–
	The dual pressure switch is defective.	Replace the dual-pressure switch.	55A-10
	The condenser fan relay is defective.	Replace the condenser fan relay.	55A-18
	A/C compressor relay is defective.	Replace the A/C compressor relay.	55A-18
	The A/C compressor magnetic clutch is defective.	Replace the A/C compressor.	55A-10
When the A/C is operating, temperature inside the passenger compartment doesn't increase (warm air is not emitted).	Malfunction of the air thermo sensor	Replace the automatic compressor-ECU and the air thermo sensor assembly.	55A-31
The blower motor does not run.	Malfunction of fuse	Replace the fuse.	–
	Malfunction of harness or connector	Repair the harness or connector.	–
	The blower relay is defective.	Replace the blower relay.	55A-18
	The blower motor is defective.	Replace the blower motor.	55A-29
	The blower switch is defective.	Replace the heater control assembly.	55A-24
	Malfunction of the resistor	Replace the resistor.	55A-29
	The automatic compressor-ECU is defective.	Replace the automatic compressor-ECU and the air thermo sensor assembly.	55A-6

Trouble symptom	Probable cause	Remedy	Reference page
The blower motor does not stop running.	Malfunction of fuse	Replace the fuse.	–
	Malfunction of harness or connector	Repair the harness or connector.	–
	The blower switch is defective.	Replace the blower switch assembly.	55A-24
	Malfunction of the resistor	Replace the resistor.	55A-29
	The automatic compressor-ECU is defective.	Replace the automatic compressor-ECU and the air thermo sensor assembly.	55A-6
The inside/outside air changeover is impossible.	Malfunction of fuse	Replace the fuse.	–
	Malfunction of harness or connector	Repair the harness or connector.	–
	Malfunction of the inside/outside air changeover damper motor	Check the inside/outside air changeover damper motor.	55A-30
	The automatic compressor-ECU is defective.	Replace the automatic compressor-ECU and the air thermo sensor assembly.	55A-6

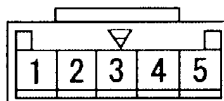
CHECK AT ENGINE-ECU TERMINALS <4M41>

1	2	3	4	5	6	7	8	9	10	11	12	13
14	15	16	17	18	19	20	21	22	23	24	25	26

31	32	33	34	35	36	37	38
39	40	41	42	43	44	45	46

Terminal No.	Check item	Check conditions	Normal condition
7	Input from the condenser fan relay (HI)	When the condenser fan stopped	0 V
		When the condenser fan is operating	System voltage
21	Input from the A/C compressor relay	When the A/C is off.	0 V
		When the A/C is in operation (When the compressor is operating)	System voltage
32	Input from dual pressure switch	Dual-pressure switch: OFF	0 V
		Dual-pressure switch: ON	System voltage
33	Automatic compressor-ECU	–	–

CHECK AT THE AUTOMATIC COMPRESSOR-ECU TERMINALS AND THE AIR THERMO SENSOR ASSEMBLY TERMINALS

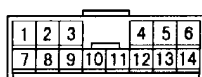


Terminal No.	Check item	Check conditions		Normal condition
2	Automatic compressor-ECU <4M41>	–		–
3	Earth	At all times		Continuity
4	Output to the dual-pressure switch	Dual-pressure switch: OFF		0 V
		Dual-pressure switch: ON		System voltage
5	Input from the A/C switch	Blower switch: LO	A/C switch: OFF	0 V
			A/C switch: ON	System voltage

TROUBLESHOOTING <Rear Heater, Rear Cooler>

Trouble symptom	Probable causes	Remedy	Reference page
The rear cooler does not operate.	Malfunction of fuse	Replace the fuse.	–
	Malfunction of harness or connector	Repair the harness or connector.	–
	Refrigerant leak or overfilling of refrigerant	Replenish the refrigerant, repair the leak or take out some of the refrigerant.	–
	Malfunction of the rear A/C switch	Replace the rear A/C switch.	55A-32
	Malfunction of the front rear fan switch	Replace the front rear fan switch.	55A-33
	Malfunction of the air thermo sensor	Replace the air thermo sensor.	55A-39
	Malfunction of the rear blower relay	Replace the rear blower relay.	55A-18
	The rear blower motor is defective.	Replace the rear blower motor.	55A-40
	The rear cooler control unit is defective.	Replace the rear cooler control unit.	55A-34
When the rear cooler is operating, temperature inside the passenger compartment does not decrease(cool air is not emitted).	Refrigerant leak	Replenish the refrigerant and repair the leak.	–
When the rear heater is operating, temperature inside the passenger compartment does not increase(warm air is not emitted).	Malfunction of the air thermo sensor	Replace the air thermo sensor.	55A-39
The blower motor does not run.	Malfunction of fuse	Replace the fuse.	–
	Malfunction of harness or connector	Repair the harness or connector.	–
	Malfunction of the rear blower relay	Replace the blower relay.	55A-18
	The rear blower motor is defective.	Replace the blower motor.	55A-40
	Malfunction of the rear A/C switch	Replace the rear A/C switch.	55A-32
	Malfunction of the front rear fan switch	Replace the front rear fan switch.	55A-33
	Malfunction of the resistor	Replace the resistor.	55A-35
	The rear cooler control unit is defective.	Replace the rear cooler control unit.	55A-34
The blower motor does not stop running.	Malfunction of fuse	Replace the fuse.	–
	Malfunction of harness or connector	Repair the harness or connector.	–
	Malfunction of the rear A/C switch	Replace the rear A/C switch.	55A-32
	Malfunction of the front rear fan switch	Replace the front rear fan switch.	55A-33
	Malfunction of the resistor	Replace the resistor.	55A-35
	The rear cooler control unit is defective.	Replace the rear cooler control unit.	55A-34

CHECK AT THE REAR A/C CONTROL UNIT TERMINALS



X1136CA

Terminal No.	Check item	Check conditions	Normal condition
1	Magnet valve	Magnet valve: OFF	System voltage
		Magnet valve: ON	Faint voltage (0.5 V)
2	Earth	At all times	Continuity
3	Input from temperature adjusting switch	Temperature adjusting switch: MAX. HOT	1 V
		Temperature adjusting switch: MAX. COOL	4 V
4	Power supply to potentiometer	At all times	5 V
5	Power supply to ignition switch (IG2)	Ignition switch: ON	System voltage
6	Electric motor for the air mix damper (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)
7	Input from potentiometer for air mix damper	Air mix damper: MAX. HOT	1 V
		Air mix damper: MAX. COOL	4 V
8	Earth to sensor and potentiometer	At all times	0 V
9	Signal from air outlet changeover damper motor	Ignition switch: ON	0 – 12 V
10	Signal from air outlet changeover damper motor	Ignition switch: ON	0 – 12 V
11	Signal from air outlet changeover damper motor	Ignition switch: ON	0 – 12 V
12	Input from air thermo sensor	Sensor temperature: 25°C (1.5 k Ω)	2.2 V
13	Input from rear fan switch and front rear fan switch	Rear fan switch or front rear fan switch: ON	0 V
14	Electric motor for the air mix damper (MAX. HOT)	When the damper flap is moving to the MAX. COOL position.	Faint voltage (0.5 V)
		When the damper flap is moving to the MAX. HOT position.	10 V

ON-VEHICLE SERVICE

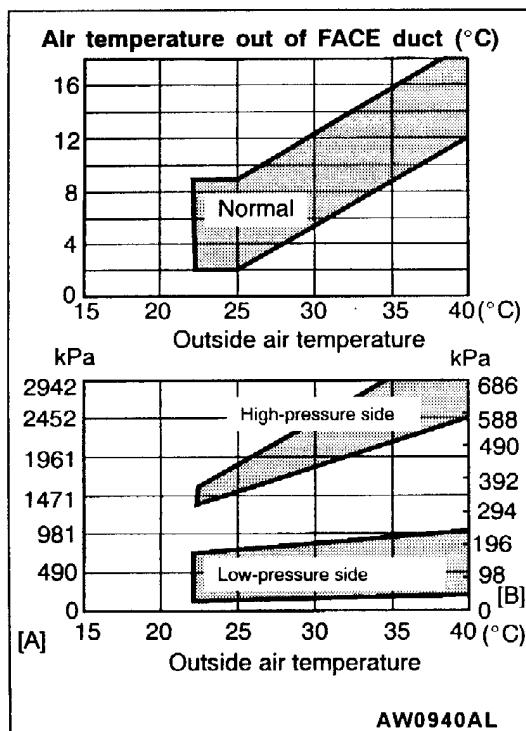
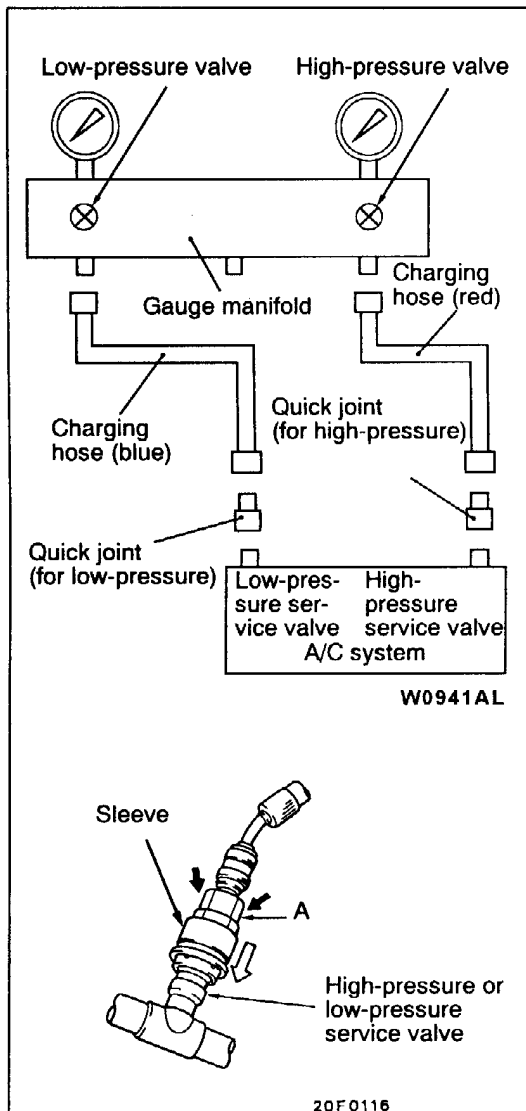
REFRIGERANT LEVEL TEST THROUGH PERFORMANCE TEST

1. Park the vehicle to be tested in a place that is not in direct sunlight.
2. Set conditions for outside air temperature as follows:
Dry-bulb temperature: 22°C or more
Relative humidity: 60 to 100%
3. Close all of the doors with the windows fully closed.
4. Close the valves of the gauge manifold.
5. Connect the charging hose (red) to the gauge manifold (high-pressure side) and the quick joint (for high-pressure) to the end of the hose.
6. Connect the charging hose (blue) to the gauge manifold (low-pressure side) and the quick joint (for low-pressure) to the end of the hose.
7. Connect the quick joints to the appropriate service valves of the vehicle.

Caution

To connect the quick joint, press section "A" firmly against the service valve until a click is heard. When connecting, run your hand along the hose while pressing the section "A" to ensure that there are no bends in the hose.

8. Start the engine.
9. Turn the blower switch to HI position.
10. Turn on the A/C switch, and set the A/C control to MAX. COOL.
11. Set the air outlet changeover to FACE mode and the inside air/outside air changeover to the inside air recirculation mode.
12. Adjust the engine speed to 1,500 r/min.



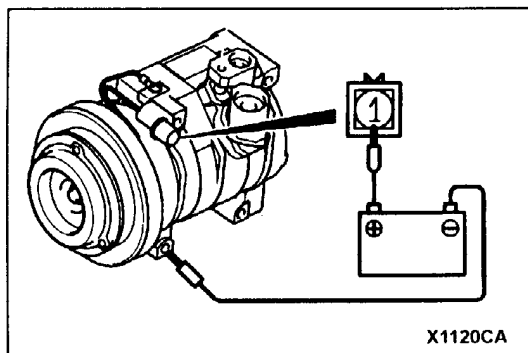
13. Check if the outside air temperature and air temperature blown out of FACE duct, and the outside air temperature and refrigerant pressure (high-pressure and low-pressure sides) are within the normal value range shown in the graphs.
14. If the temperature and pressure are below the given range, replenish the refrigerant. If above, drain the refrigerant. (For charging, refer to P.55A-11.)

NOTE

In the graph below, see the following:

[A]: Refrigerant pressure (high-pressure side)

[B]: Refrigerant pressure (low-pressure side)



MAGNETIC CLUTCH TEST

1. Disconnect the connector (1-pin) to the magnetic clutch.
2. Connect battery (+) voltage directly to the connector for the magnetic clutch.
3. If the magnetic clutch is normal, there will be "click". If the pulley and armature do not make contact ('click'), there is a malfunction.

RECEIVER DRIER TEST

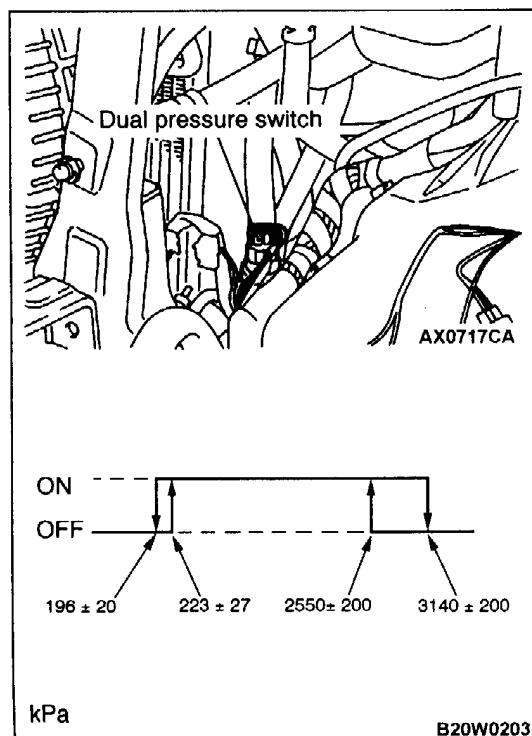
Operate the unit and check the piping temperature by touching the receiver drier outlet and inlet.

If there is a difference in the temperatures, the receiver drier is restricted.

Replace the receiver drier.

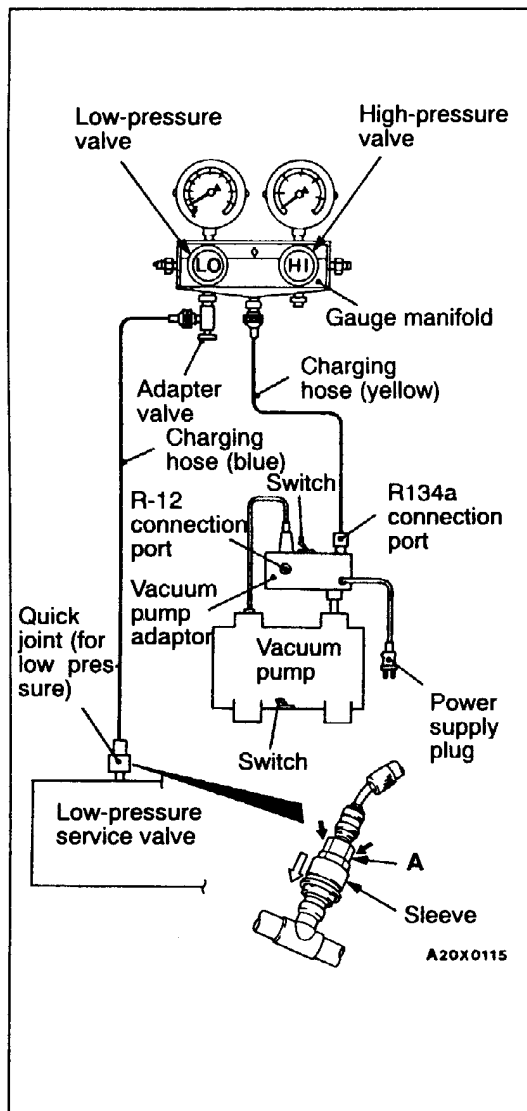
COMPRESSOR DRIVE BELT ADJUSTMENT

Refer to GROUP 11 – On-vehicle Service.



DUAL PRESSURE SWITCH CHECK

1. Remove the dual pressure switch connector and connect the high/low pressure side terminals located on the harness side as shown in the illustration.
2. Install a gauge manifold to the high-pressure side service valve of the refrigerant line. (Refer to Performance Test.)
3. When the high/low pressure sides of the dual pressure switch are at operation pressure (ON) and there is continuity between the respective terminals, then the condition is normal. If there is no continuity, replace the switch.



CHARGING

1. With the handles turned back all the way (valve closed), install the adaptor valve to the low-pressure side of the gauge manifold.
2. Connect the charging hose (blue) to the adaptor valve.
3. Connect the quick joint (for low-pressure) to the charging hose (blue).
4. Connect the quick joint (for low-pressure) to the low-pressure service valve.

NOTE

The low-pressure service valve should be connected to the suction hose.

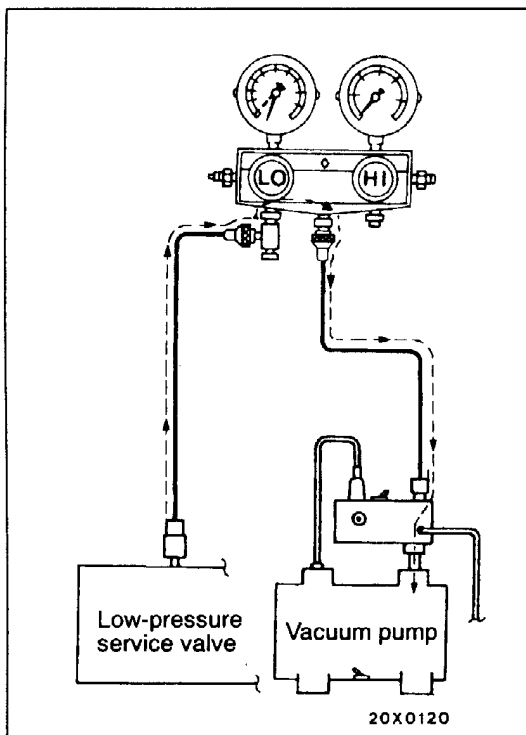
Caution

- (1) Use tools that are suited to R134a.
- (2) To install the quick joint, press section "A" firmly against the service valve until a click is heard. When connecting, run your hand along the hose while pressing to ensure that there are no bends in the hose.

5. Close the high and low-pressure valves of the gauge manifold.
6. Install the vacuum pump adaptor to the vacuum pump.
7. Connect the vacuum pump plug to the vacuum pump adaptor.
8. Connect the charging hose (yellow) to the R134a connection port of the vacuum pump adaptor.
9. Tighten the adaptor valve handle (valve open).
10. Open the low-pressure valve of the gauge manifold.
11. Turn the power switch of the vacuum pump to the ON position.

NOTE

Even if the vacuum pump power switch is turned ON, the vacuum pump will not operate because of the power supply connection in step (7).



12. Turn the vacuum pump adaptor switch to the R134a side to start the vacuum pump.

Caution

Do not operate the compressor for evacuation.

13. Evacuate to a vacuum reading of 100 kPa or higher (takes approx. 10 minutes).
14. Turn the vacuum pump adaptor switch OFF and allow to stand it for 5 minutes.

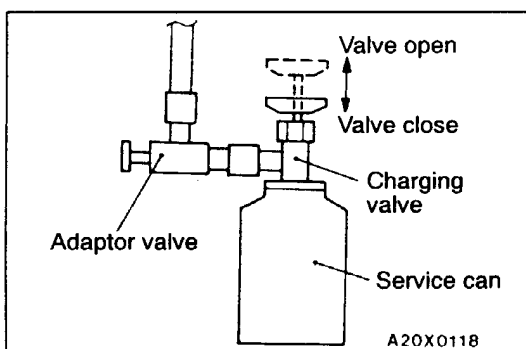
Caution

Do not operate the compressor in the vacuum condition; damage may occur.

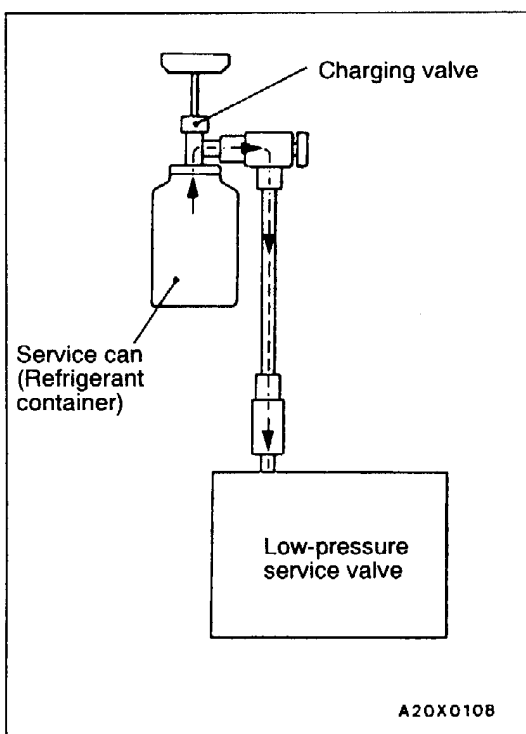
15. Carry out a leak test. (Good if the negative pressure does not drop.)

Caution

If the negative pressure drops, increase the tightness of the connections, and then repeat the evacuation procedure from step (12).



16. With the handle turned back all the way (valve open), install the charging valve to the service can.
17. Turn the handle of the adaptor valve back all the way (valve closed), remove it from the gauge manifold and install the service can.
18. Tighten the handle of the charging valve (valve closed) to puncture the service can.



19. Turn the handle of the charging valve back (valve open) and tighten the handle of the adaptor valve (valve open) to charge the system with refrigerant.

Caution

If the service can is inverted, liquid refrigerant may be drawn into the compressor damaging it by liquid compression. Keep the service can upright to ensure that refrigerant is charged in gas state.

20. If the refrigerant is not drawn in, turn the handle of the adaptor valve back all the way (valve closed).
21. Check for gas leaks using a leak detector. If a gas leak is detected, re-tighten the connections, and then repeat the charging procedure from evacuation in step (12).

Caution

The leak detector for R134a should be used.

22. Start the engine.
23. Operate the A/C and set to the lowest temperature (MAX. COOL).

24. Fix the engine speed at 1,500 r/min.
25. Tighten the handle of the adaptor valve (valve open) to charge the required volume of refrigerant.

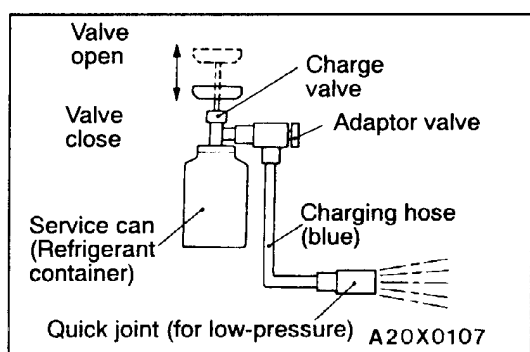
Caution

If the service can is inverted, liquid refrigerant may be drawn into the compressor damaging it by liquid compression. Keep the service can upright to ensure that refrigerant is charged in gas state.

26. After charging with refrigerant, turn the handle of the adaptor valve back all the way (valve closed).
27. Tighten the charging valve handle (valve closed).
Remove the quick joint (for low-pressure) from the low-pressure service valve.

NOTE

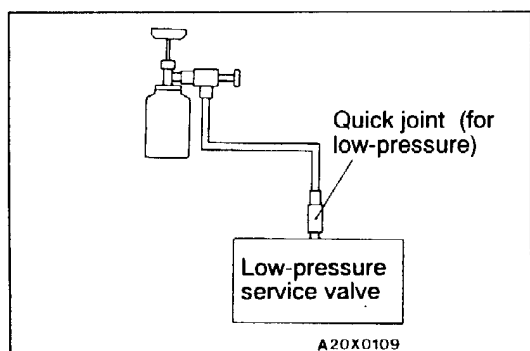
If the service can is not emptied completely, keep the handles of the charging valve and adaptor valve closed for the next charging.

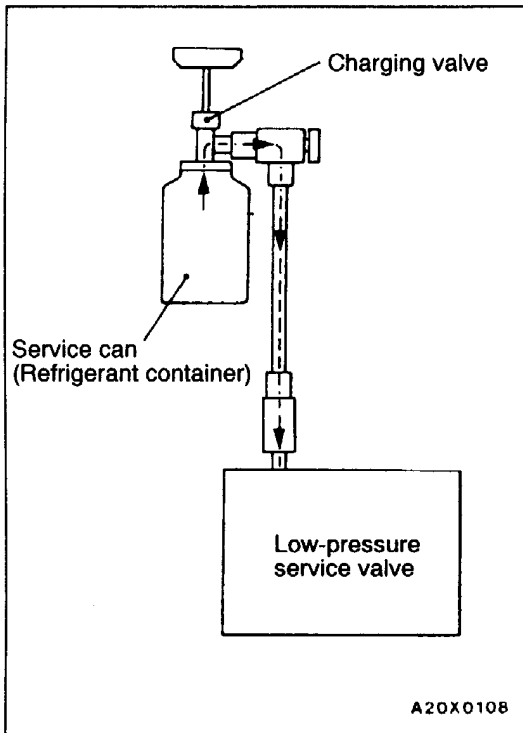
**CORRECTING LOW REFRIGERANT LEVEL IN CASE THE SERVICE CAN IS USED.**

1. Install the charge valve with the handle turned all the way back (valve open) to the service can.
2. Install the adaptor valve with the handle turned all the way back (valve close) to the charging valve.
3. Connect the charging hose (blue) to the adaptor valve.
4. Connect the charging hose (blue) to the quick joint (for low-pressure).
5. Tighten the handle of the charge valve (valve close), and pierce the service can.
6. Turn the handle of the adaptor valve to bleed the air.
7. Install the quick joint (for low-pressure) to the low-pressure service valve.

NOTE

The low-pressure service valve should be connected to the suction hose.





8. Start the engine.
9. Operate the air conditioner and set at the lowest temperature (MAX. COOL).
10. Fix the engine speed at 1,500 r/min.
11. Tighten the handle of the adaptor valve (valve open), and replenish refrigerant while checking the quantity through the sight glass.

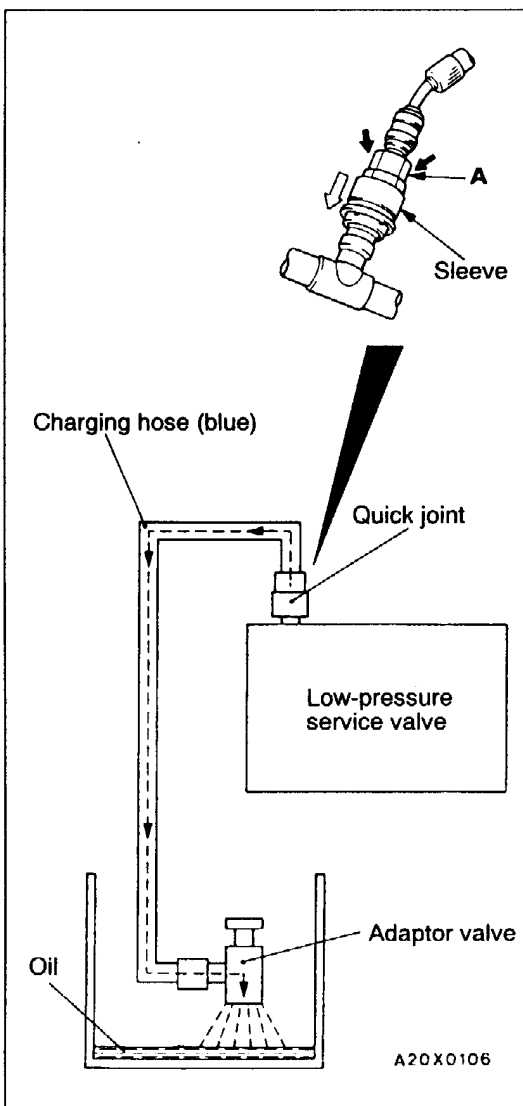
Caution

If the service can is inverted, liquid refrigerant may be drawn into the compressor damaging it by liquid compression. Keep the service can upright to ensure that refrigerant is changed in gas state.

12. After replenishing is completed, turn the handle of the adaptor valve all the way back (valve close), and remove the quick joint.

NOTE

When there is remainder of refrigerant in the service can, keep it for next use with the charge value and the valve of the adaptor valve being closed.



DISCHARGING SYSTEM

1. Run the engine at an engine speed of 1,200 – 1,500 r/min for approximately 5 minutes with the A/C operating to return to the oil.

NOTE

Returning the oil will be more effective if it is done while driving.

2. Stop the engine.
3. Connect the charging hose (blue) to the adaptor valve with its handle turned back all the way (valve closed).
4. Connect the quick joint to the charging hose (blue).
5. Install the quick joint to the low-pressure service valve.

NOTE

The low-pressure service valve should be connected to the suction hose.

Caution

To connect the quick joint, press section "A" firmly against the service valve until a click is heard. When connecting, run your hand along the hose while pressing to ensure that there are no bends in the hose.

6. Place the adaptor valve inside the container and discharge the refrigerant by opening the handle gradually so that oil does not gush out.

NOTE

Any oil remaining in the container should be returned to the A/C system.

REFILLING OF OIL IN THE A/C SYSTEM

Too little oil will provide inadequate compressor lubrication and cause a compressor failure. Too much oil will increase discharge air temperature.

When a compressor is installed at the factory, it contains 120 mL of refrigerant oil. While the A/C system is in operation, the oil is carried through the entire system by the refrigerant. Some of this oil will be trapped and retained in various parts of the system.

When the following system components are changed, it is necessary to add oil to the system to replace the oil being removed with the component.

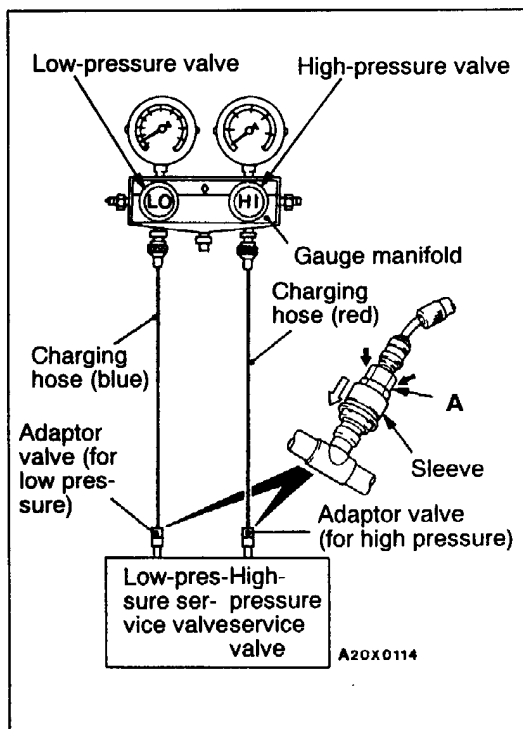
Compressor oil: DENSO OIL 8

Quantity

Condenser: 10 mL

Evaporator: 40 mL

Suction hose: 6.5 mL

**PERFORMANCE TEST**

1. The vehicles to be tested should be in a place that is not in direct sunlight.
2. Close the high and low-pressure valve of the gauge manifold.
3. Connect the charging hose (blue) to the low-pressure valve and connect the charging hose (red) to the high-pressure valve of the gauge manifold.
4. Install the quick joint (for low-pressure) to the charging hose (blue), and connect the quick joint (for high-pressure) to the charging hose (red).
5. Connect the quick joint (for low-pressure) to the low-pressure service valve and connect the quick joint (for high-pressure) to the high-pressure service valve.

NOTE

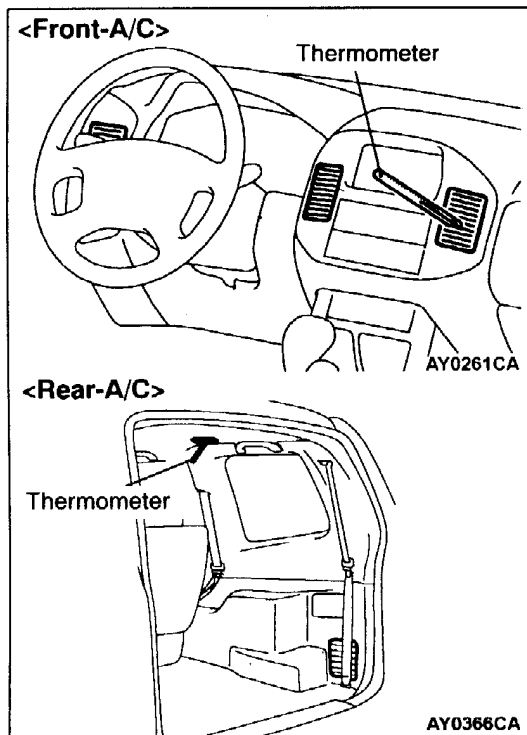
The high-pressure service valve is on liquid pipe A and the low-pressure service valve is on the suction hose.

Caution

To connect the quick joint, press section "A" firmly against the service valve until a click is heard.

When connecting, run your hand along the hose while pressing to ensure that there are no bends in the hose.

6. Start the engine.



7. Set the controls to the A/C as follows:

<Testing the front-A/C>

- A/C switch: A/C – ON position
- Mode selection: Face position
- Temperature control: Max. cooling position
- Air selection: Recirculation position
- Blower switch: HI (Fast) position

<Testing the rear-A/C>

- The front A/C should be set as above.
- A/C switch: A/C – ON position
- Temperature control: Max. cooling position
- Blower switch: HI (Fast) position

8. Adjust engine speed to 1,000 r/min with A/C clutch engaged.
9. Engine should be warmed up with doors and windows closed.
10. Insert a thermometer in the center A/C outlet and operate the engine for 20 minutes.
11. Note the discharge air temperature.

NOTE

If the clutch cycles, take the reading before the clutch disengages.

Performance Temperature Chart

<Front-A/C test>

Garage ambient temperature °C	20	25	35	40
Discharge air temperature °C	3.5 – 5.5	3.5 – 5.5	4.5 – 6.5	5.5 – 7.5
Compressor high-pressure kPa	1,050 – 1,250	1,050 – 1,250	1,400 – 1,600	1,650 – 1,850
Compressor low-pressure kPa	120 – 140	120 – 140	130 – 150	160 – 180

Performance Temperature Chart

<Rear-A/C test>

Garage ambient temperature °C	20	25	35	40
Discharge air temperature °C	5.5 – 7.5	5.5 – 7.5	6.5 – 8.5	7.5 – 9.5
Compressor high-pressure kPa	1,150 – 1,350	1,150 – 1,350	1,500 – 1,700	1,750 – 1,950
Compressor low-pressure kPa	130 – 150	130 – 150	140 – 160	180 – 200

REFRIGERANT LEAK REPAIR

LOST CHARGE

If the system has lost all charge due to a leak:

1. Evacuate the system. (See procedure.)
2. Charge the system with approximately one pound of refrigerant.
3. Check for leaks.
4. Discharge the system.
5. Repair leaks.
6. Replace receiver drier.

Caution

Replacement filter-drier units must be sealed while in storage. The drier used in these units will saturate water quickly upon exposure to the atmosphere. When installing a drier, have all tools and supplies ready for quick reassembly to avoid keeping the system open any longer than necessary.

7. Evacuate and charge system.

LOW CHARGE

If the system has not lost all of its refrigerant charge; locate and repair all leaks. If it is necessary to increase the system pressure to find the leak (because of an especially low charge) add refrigerant. If it is possible to repair the leak without discharging the refrigerant system, use the procedure for correcting low refrigerant level.

COMPRESSOR NOISE

You must first know the conditions when the noise occurs. These conditions are: weather, vehicle speed, in gear or neutral, engine temperature or any other special conditions.

Noises that develop during A/C operation can often be misleading. For example: what sounds like a failed front bearing or connecting rod, may be caused by loose bolts, nuts, mounting brackets, or a loose clutch assembly. Verify accessory drive belt tension (power steering or alternator).

Improper accessory drive belt tension can cause a misleading noise when the compressor is engaged and little or no noise when the compressor is disengaged.

Drive belts are speed-sensitive. That is, at different engine speeds, and depending upon belt tension, belts can develop unusual noises that are often mistaken for mechanical problems within the compressor.

HANDLING TUBING AND FITTINGS

Kinks in the refrigerant tubing or sharp bends in the refrigerant hose lines will greatly reduce the capacity of the entire system. High pressures are produced in the system when it is operating. Extreme care must be exercised to make sure that all connections are pressure tight. Dirt and moisture can enter the system when it is opened for repair or replacement of lines or components. The following precautions must be observed. The system must be completely discharged before opening any fitting or connection in the refrigeration system. Open fittings with caution even after the system has been discharged. If any pressure is noticed as a fitting is loosened, allow trapped pressure to bleed off very slowly.

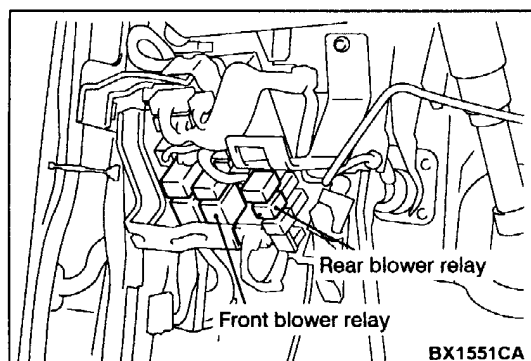
Never attempt to rebend formed lines to fit. Use the correct line for the installation you are servicing. A good rule for the flexible hose lines is keep the radius of all bends at least 10 times the diameter of the hose.

Sharper bends will reduce the flow of refrigerant. The flexible hose lines should be routed so that they are at least 80 mm from the exhaust manifold. It is good practice to inspect all flexible hose lines at least once a year to make sure they are in good condition and properly routed.

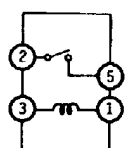
Unified plumbing connections with O-rings, these O-rings are not reusable.

ADJUSTMENT

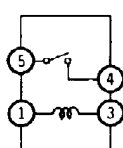
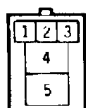
1. Select a quiet area for testing. Duplicate conditions as much as possible. Switch compressor on and off several times to clearly identify compressor noise. To duplicate high ambient conditions (high head pressure), restrict air flow through condenser. Install manifold gauge set to make sure discharge pressure doesn't exceed 2,070 kPa.
2. Tighten all compressor mounting bolts, clutch mounting bolt, and compressor drive belt. Check to assure clutch coil is tight (no rotation or wobble).
3. Check refrigerant hoses for rubbing or interference that can cause unusual noises.
4. Check refrigerant charge. (See "Charging System".)
5. Recheck compressor noise as in Step 1.
6. If noise still exists, loosen compressor mounting bolts and retorqued. Repeat Step 1.
7. If noise continues, replace compressor and repeat Step 1.



Front blower relay



Rear blower relay



X1142CA

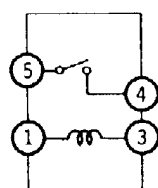
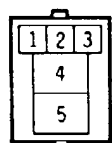
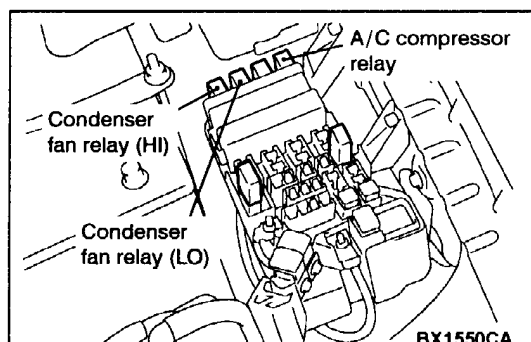
FRONT BLOWER RELAY AND REAR BLOWER RELAY CONTINUITY CHECK <Vehicles with rear cooler>

FRONT BLOWER RELAY

System voltage	Terminal No.			
	1	3	2	5
When current is not supplied	○	○		
When current is supplied	⊕	⊖	○	○

REAR BLOWER RELAY

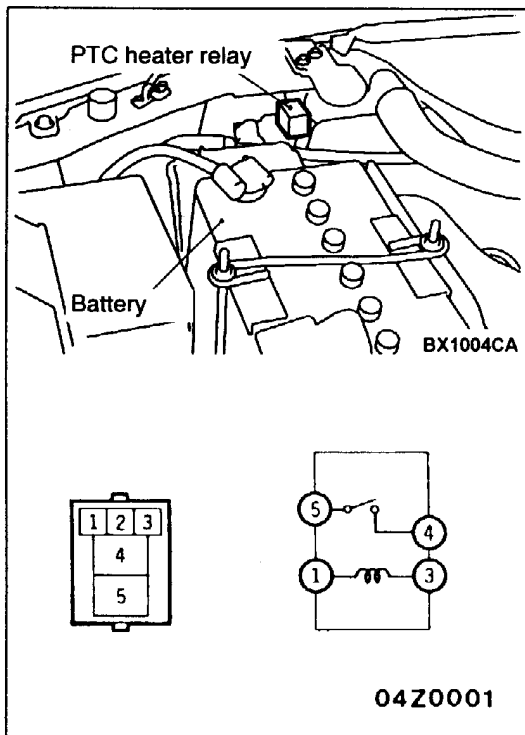
System voltage	Terminal No.			
	1	3	4	5
When current is not supplied	○	○		
When current is supplied	⊕	⊖	○	○



04Z0001

CONTINUITY CHECK OF A/C COMPRESSOR RELAY AND CONDENSER FAN RELAY

System voltage	Terminal No.			
	1	3	4	5
When current is not supplied	○	○		
When current is supplied	⊕	⊖	○	○



PTC HEATER RELAY CONTINUITY CHECK <4M41>

System voltage	Terminal No.			
	1	3	2	5
When current is not supplied	○	○		
When current is supplied	⊕	⊖	○	○

NOTE

The PTC heater is located at the heater core.

IDLE-UP OPERATION CHECK <Diesel>

1. Set the vehicle in the pre-inspection condition:
2. Check that the idle speed is within the standard value.

Standard value:

<4D56> 750 ± 100 r/min

<4M41> 750 ± 50 r/min

NOTE

The idle speed is controlled by the engine-ECU and should not be adjusted.

3. The idle speed should be within the standard value when the A/C switch is turned on and the A/C is operating.

Standard value:

<4D56> 925 ± 25 r/min

<4M41: When the A/C is under low medium load>

800 ± 50 r/min

<4M41: When the A/C is under high load>

$1,000 \pm 50$ r/min

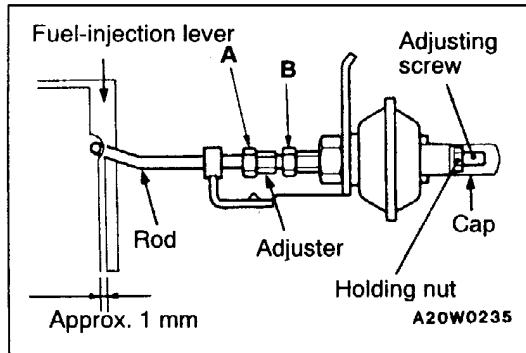
4. When the front A/C is set as follows, the idle speed should be within the standard value.

Blower switch: ON

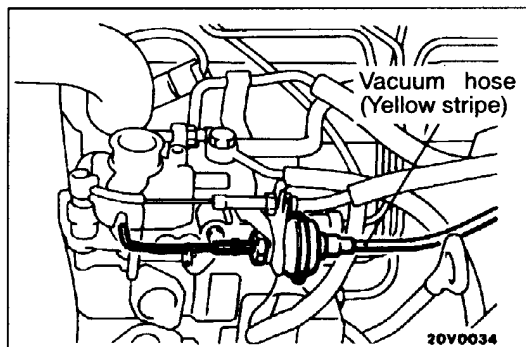
Air outlet temperature: FOOT, FOOT/DEF, DEF

Set temperature: MAX. HOT (32°C)

Heat switch: ON

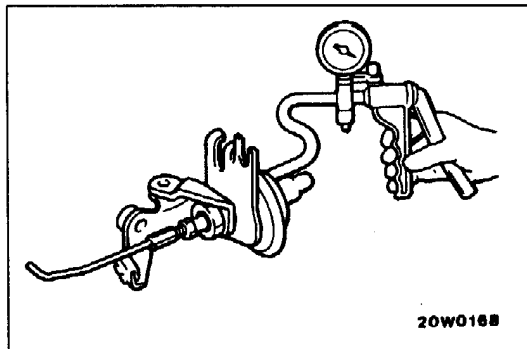


5. If there is a deviation of the idling speed from the standard value, adjust the idling speed by the following the procedures.<4D56>
 - (1) Loosen nuts (A) and (B).
 - (2) Adjust, by using the adjuster, so that the end of the vacuum actuator's rod is at the position indicated in the illustration.
 - (3) Securely tighten nuts (A) and (B).
 - (4) After activating the vacuum actuator, check to be sure that the rod and the lever do not contact when the activation is cancelled.
 - (5) Remove the cap and loosen the nut for holding.
 - (6) Adjust to the specified r/min by turning the adjusting screw.
 - (7) Securely tighten the holding nut, and then attach the cap.



VACUUM ACTUATOR CHECK <Diesel-powered Vehicles>

1. Pull off the vacuum hose (yellow stripe) connected to the vacuum actuator.
2. Connect a manual vacuum pump to the nipple of the vacuum actuator.
3. Check to be sure that the vacuum actuator rod starts to contact when 8 kPa of negative pressure is applied, and that the rod contracts to its full stroke when 12 kPa of negative pressure is applied.
4. Disconnect the manual vacuum pump from the vacuum actuator, and connect the vacuum hose (yellow stripe) to the vacuum actuator.

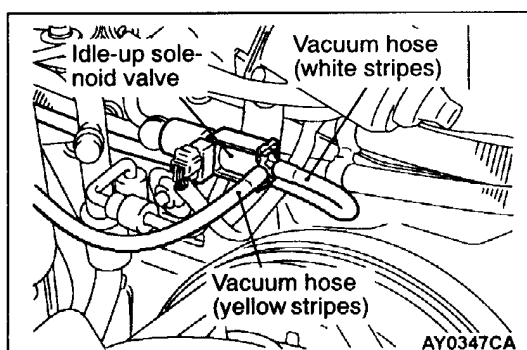


5. Start the engine and let it run at idle. Then cover the end of the vacuum hose (yellow stripe) with a finger and check the negative pressure when the A/C switch is turned on and off.

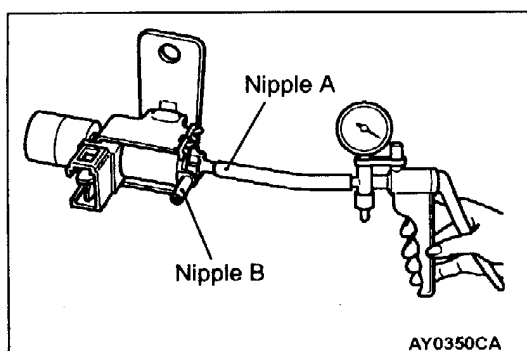
A/C switch	Negative pressure at hose end
OFF	NO
ON	YES

Caution

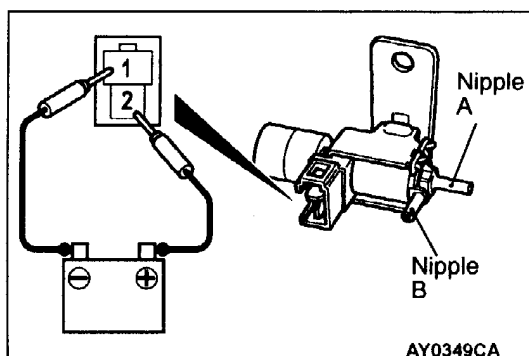
Be careful, when connecting the vacuum hose not to damage it.

**IDLE-UP SOLENOID VALVE CHECK**
<Diesel-powered vehicles>

1. Disconnect the vacuum hoses (white stripes, yellow stripes) from the solenoid valve.
2. Disconnect the harness connector.



3. Connect a manual vacuum pump to the nipple A.

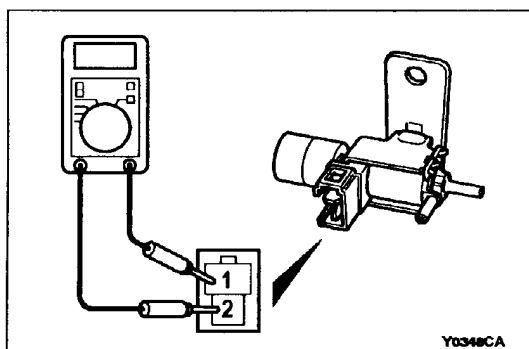


4. Check air-tightness by applying a vacuum with voltage applied directly from the battery to the solenoid valve terminal and without applying voltage.

Battery voltage	Nipple B	Vacuum condition
Applied	Open	Vacuum leaks from nipple B
	Blocked with finger *1	Vacuum is maintained
Not applied	Open	Vacuum is maintained
	Blocked with finger *2	

NOTE

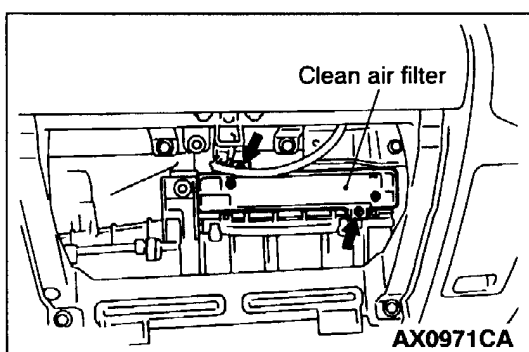
In case of mark *1, a vacuum can be felt but in case of mark *2, a vacuum can not be felt.



5. Measure the resistance of the solenoid valve.

Standard value: Approx. 40 Ω

6. When disconnecting the vacuum hose, always make a mark so that the hose can be reconnected at original position.

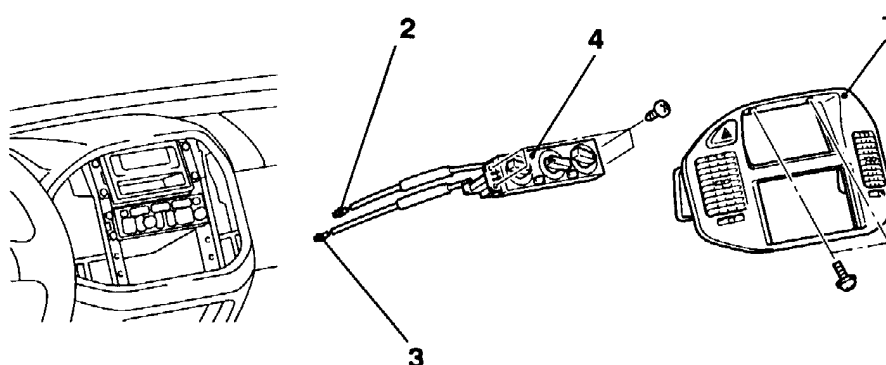


CLEAN AIR FILTER REPLACEMENT PROCEDURE

1. Remove the glove box. (Refer to GROUP 52A – Instrument Panel.)
2. Remove the two screws as shown, and replace the clean air filter.
3. Remove the clean air filter.
4. Install the glove box.

FRONT A/C

AIR CONDITIONER CONTROL PANEL ASSEMBLY AND A/C SWITCH REMOVAL AND INSTALLATION



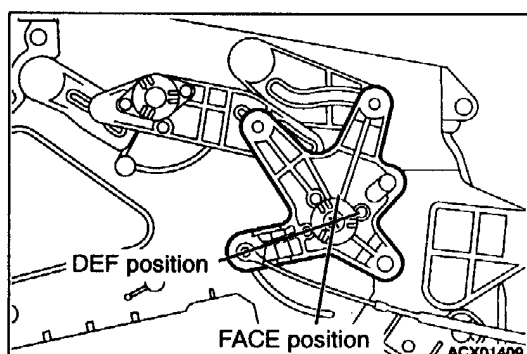
ACX01411

Removal steps

- Front floor console (Refer to GROUP 52A.)
- Lower panel (Refer to GROUP 52A – Instrument Panel.)
- Foot duct C
- Foot duct D



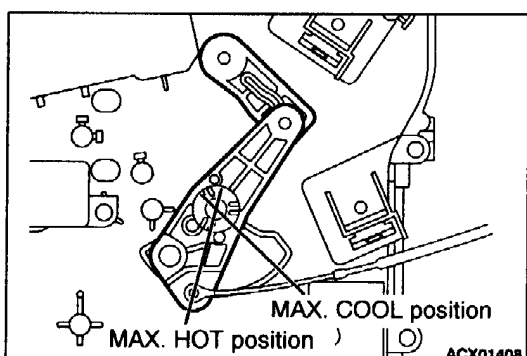
1. Center panel (Refer to GROUP 52A – Instrument Panel.)
2. Air mix damper cable connection
3. Air outlet changeover damper cable connection
4. Heater control assembly



INSTALLATION SERVICE POINTS

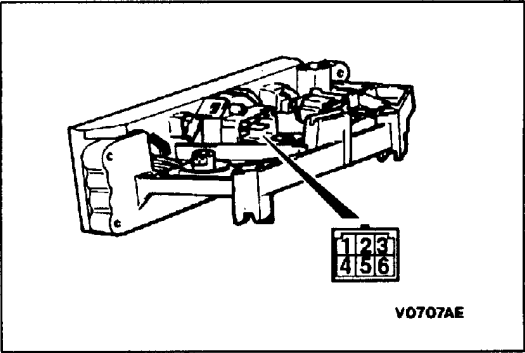
►A◄ AIR OUTLET CHANGEOVER DAMPER CABLE CONNECTION

1. Set the air outlet changeover knob of the heater control assembly to the DEF position.
2. Move the air outlet changeover damper lever to the DEF position (rotate the damper lever counterclockwise fully), and then connect the cable.



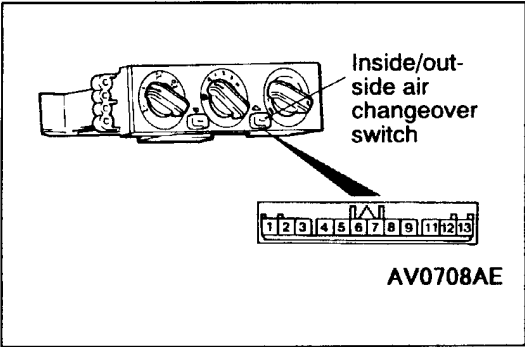
►B◄ AIR MIX DAMPER DOOR CABLE CONNECTION

1. Turn the temperature adjusting knob of the heater control assembly to the HOT side fully.
2. Move the air mix door lever of the heater unit to the MAX. HOT position (rotate the damper lever clockwise fully), and then install the cable.



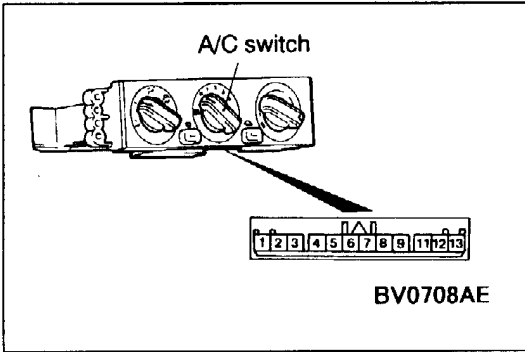
INSPECTION
BLOWER SWITCH CONTINUITY CHECK

Switch position	Terminal No.				
	1	3	4	5	6
0 (OFF)					
1 (LO)		○	—	○	
2 (ML)	○	○			
3 (MH)		○	—		○
4 (HI)		○	○		



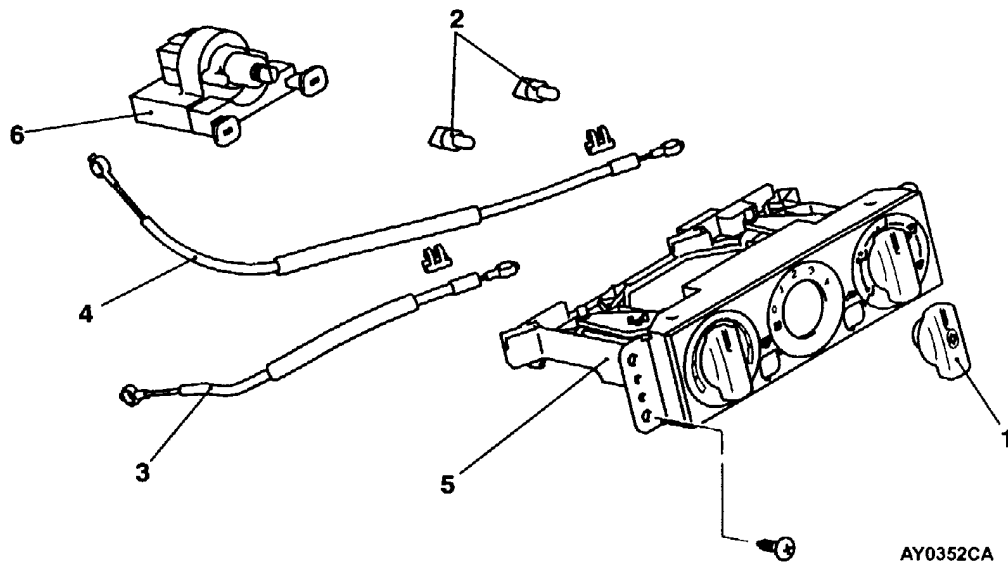
INSIDE/OUTSIDE AIR CHANGEOVER SWITCH CONTINUITY CHECK

Switch position	Terminal No.							
	1	IND	3	4	5	8		9
When the switch is not pressed		○	—					ILL
When the switch is pressed				○	○			



A/C SWITCH CONTINUITY CHECK

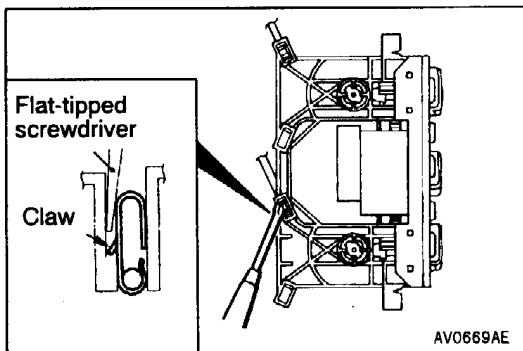
Switch position	Terminal No.							
	1	IND	7	5	6	8		9
OFF position		○	—					ILL
ON position	○	○	○	○	○			

DISASSEMBLY AND REASSEMBLY**Disassembly steps**

1. Knob assembly
2. Bulb
3. Air outlet changeover damper cable



4. Air mix damper cable
5. Heater control panel
6. Blower switch assembly

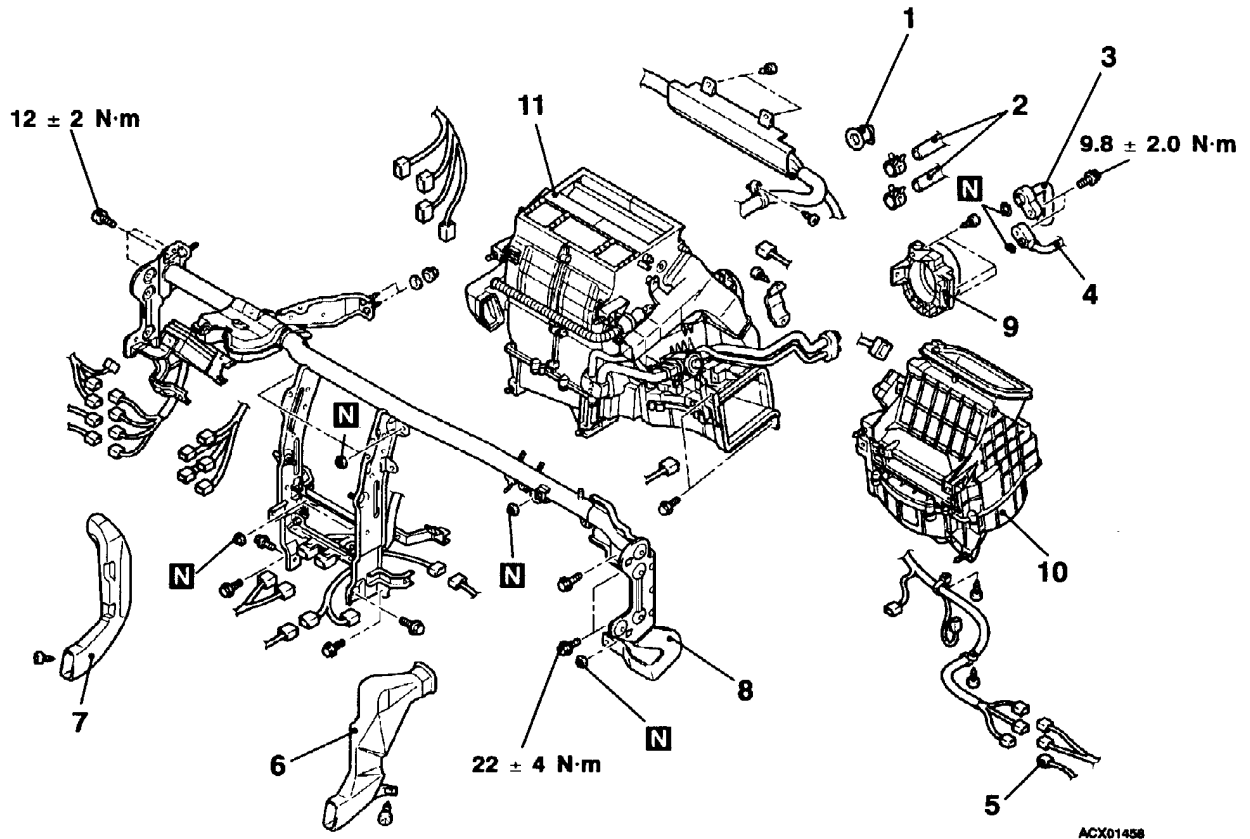
**DISASSEMBLY SERVICE POINT**
**◀A▶ AIR OUTLET CHANGEOVER DAMPER CABLE
/AIR MIX DAMPER CABLE DISCONNECTION**

Insert a flat-tipped screwdriver into the clip through the inside of the control base, and then prise out the clip claw to disconnect the cables.

HEATER UNIT AND BLOWER ASSEMBLY REMOVAL AND INSTALLATION

Pre-removal and Post-installation Operations

- Refrigerant Discharge and Refilling (Refer to P.55A-9.)
- Engine Coolant Draining and Refilling (Refer to GROUP 14 – On-vehicle Service.)
- Instrument Panel Removal and Installation (Refer to GROUP 52A.)
- Bolt Securing Steering Column Shaft to Front Deck Crossmember (Refer to GROUP 37A – Steering Wheel and Shaft.)



Removal steps

- | | |
|-------------------------------------|-------------------------------|
| 1. Drain hose | 7. Foot duct |
| 2. Heater hose connection | 8. Front crossmember assembly |
| 3. Suction flexible hose connection | 9. Flange bracket |
| 4. Liquid pipe A connection | 10. Blower assembly |
| 5. Connectors | 11. Heater unit |
| 6. Foot duct B | |



REMOVAL SERVICE POINT

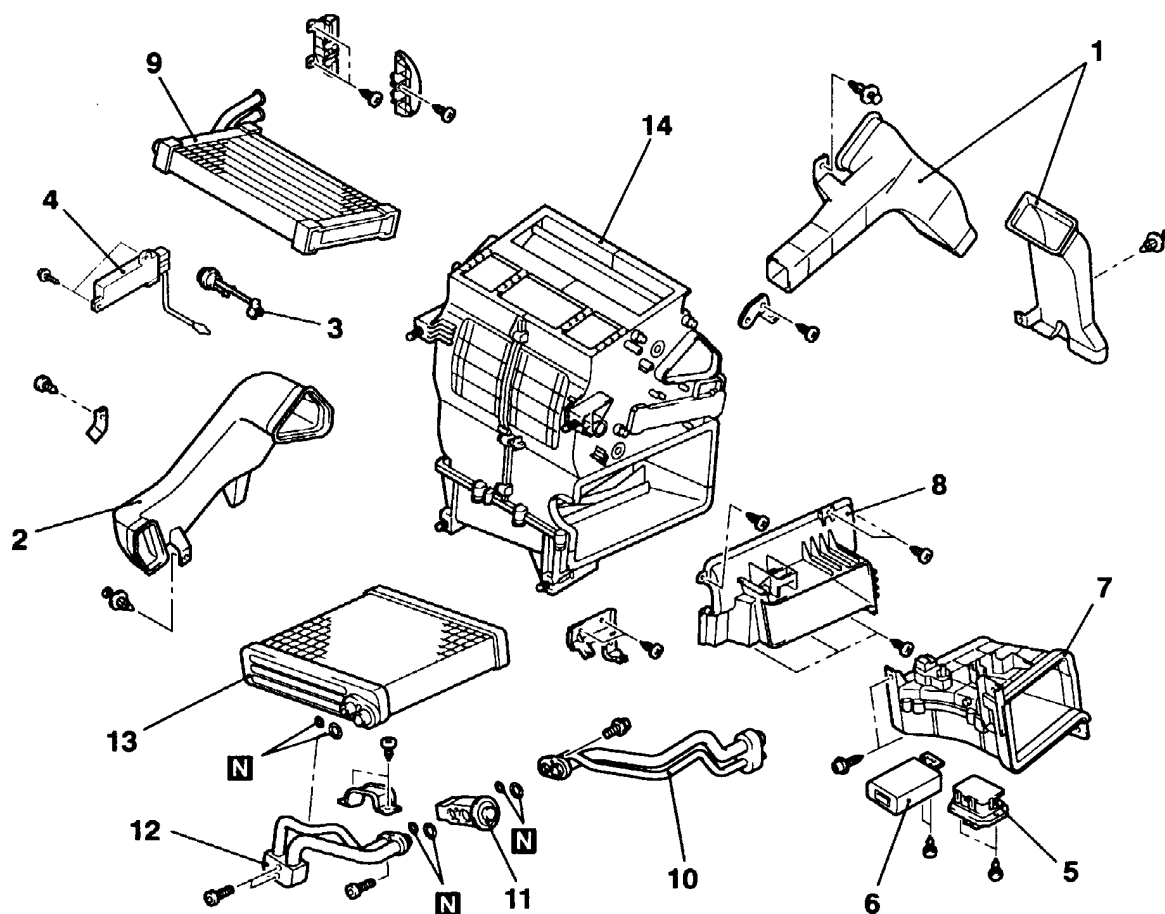
◀A▶ SUCTION FLEXIBLE HOSE/LIQUID PIPE A DISCONNECTION

Plug the disconnected hose nipple to prevent dust or foreign material from entering them.

Caution

Use a plug, which air does not penetrate through.
Compressor oil and receiver absorb moisture easily.

HEATER UNIT DISASSEMBLY AND REASSEMBLY

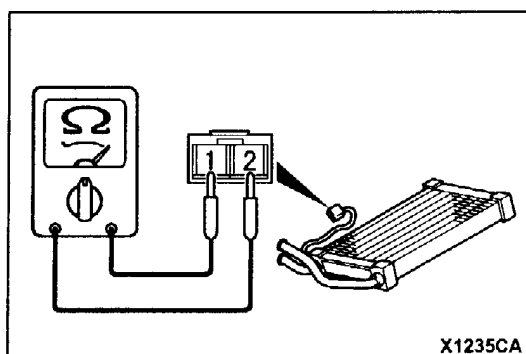


ACX01450

Disassembly steps

1. Foot duct A
2. Foot duct C
3. Air thermo sensor clip
4. Automatic compressor-ECU and air thermo sensor assembly
5. Aspirator hose
6. Blower linear controller
7. Rear A/C control unit
<Vehicles with dual A/C>

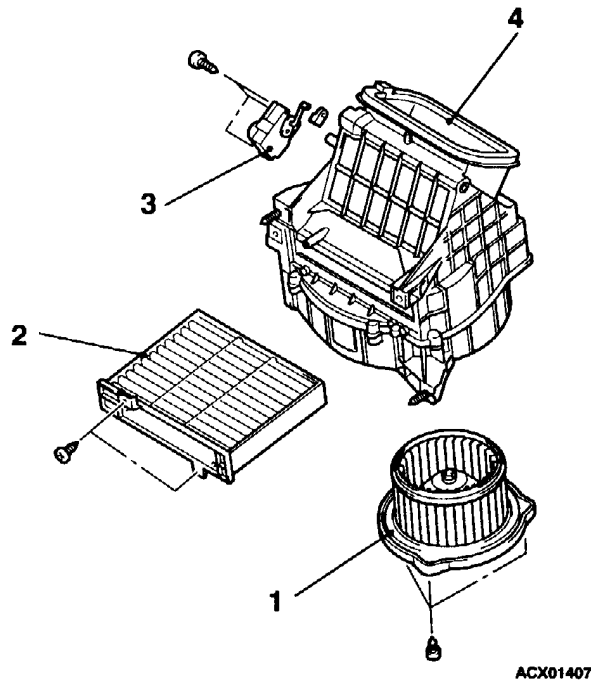
8. Joint duct
9. Air duct sub-assembly
10. Heater core
11. Front pipe assembly
12. Expansion valve
13. Pipe
14. Evaporator
15. Case



X1235CA

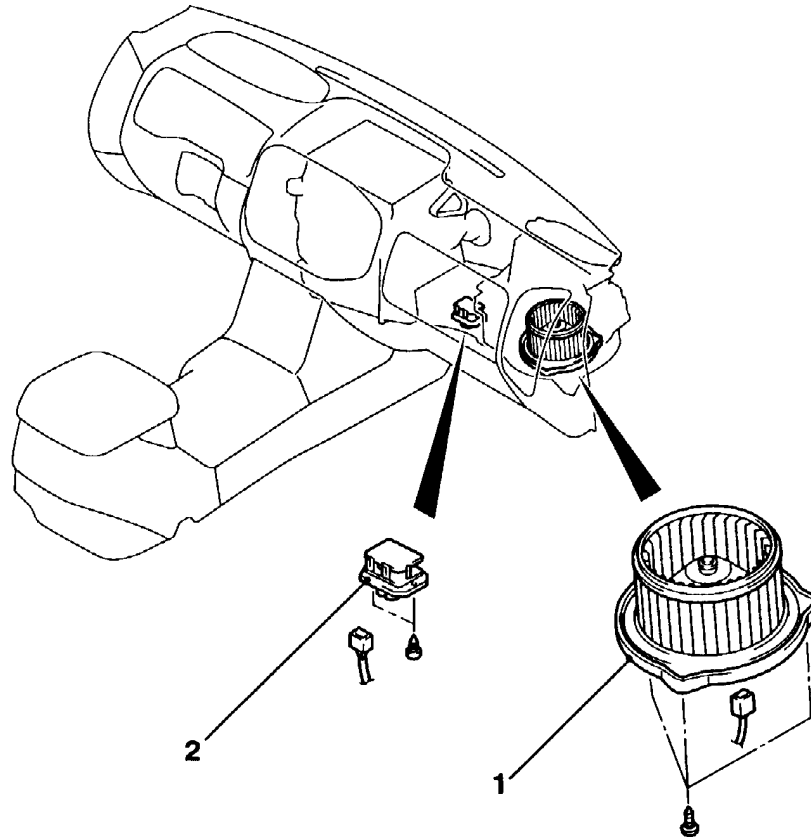
INSPECTION**PTC HEATER CHECK <4M41>**

Continuity should be present between the terminals.

BLOWER ASSEMBLY DISASSEMBLY AND REASSEMBLY**Disassembly steps**

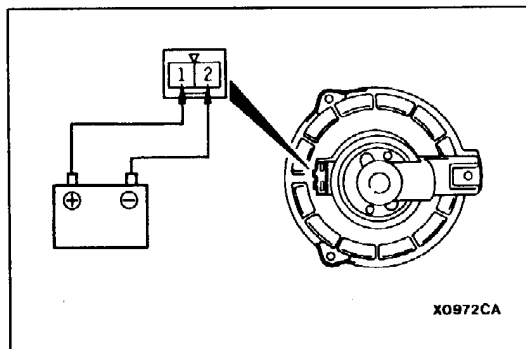
1. Blower motor
2. Clean air filter <Vehicles with clean air filter>
3. Inside/outside air changeover damper motor
4. Case

BLOWER MOTOR AND RESISTOR REMOVAL AND INSTALLATION



ACX01452

1. Blower motor
2. Resistor

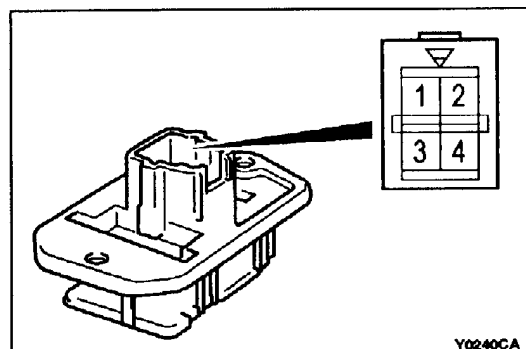


X0972CA

INSPECTION

BLOWER MOTOR INSPECTION

The motor should run when battery voltage is applied between the terminals. In addition, any abnormal sound should not be heard from the motor.



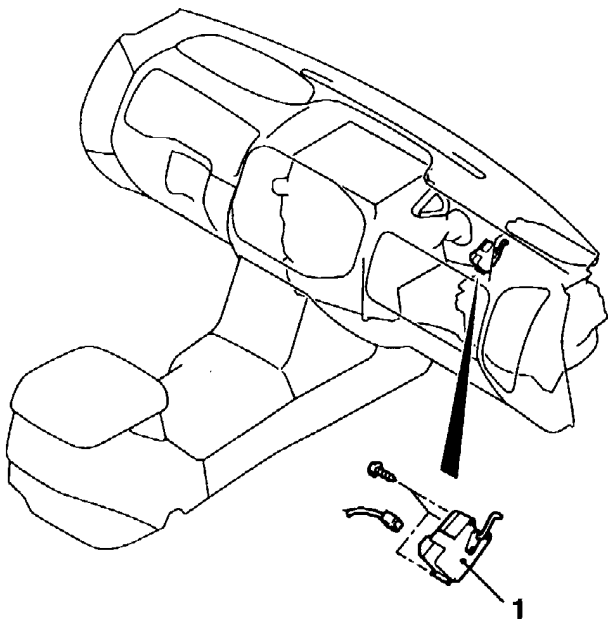
Y0240CA

RESISTOR CHECK

Standard value:

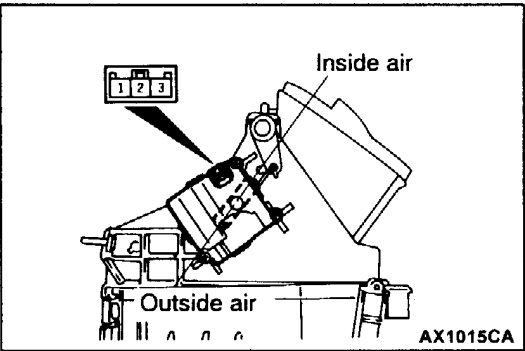
Terminal to be measured	Standard value Ω
Between terminals No.3 and 2	$2.79 \pm 7 \%$
Between terminals No.1 and 2	$1.49 \pm 7 \%$
Between terminals No.2 and 4	$0.39 \pm 7 \%$

INSIDE/OUTSIDE AIR CHANGEOVER DAMPER MOTOR
REMOVAL AND INSTALLATION



Removal steps

- Glove box (Refer to GROUP 52A – Instrument Panel.)
- 1. Inside/outside air changeover damper motor



INSPECTION

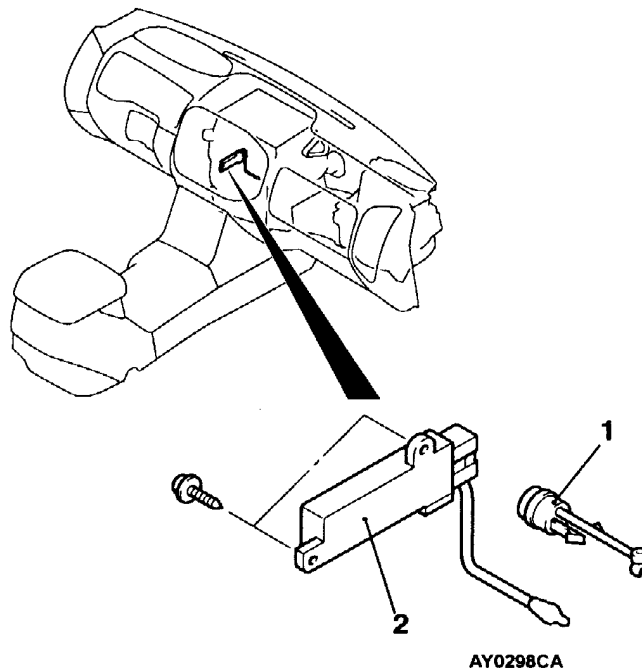
INSIDE/OUTSIDE AIR CHANGEOVER DAMPER MOTOR
CHECK

Battery terminal voltage			Lever operation
1	2	3	
+		-	Rotate to the inside air recirculation position.
+	-		Rotate to the outside air induction position.

Caution

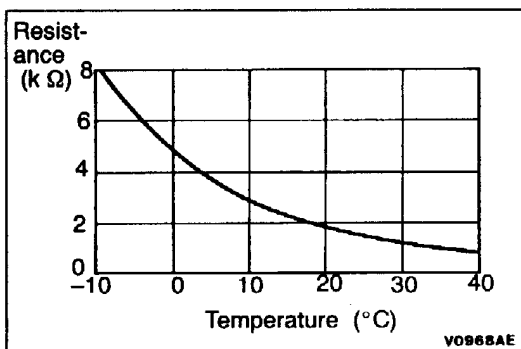
If the lever reaches the stop position, disconnect the battery voltage.

AUTOMATIC COMPRESSOR-ECU AND AIR THERMO SENSOR ASSEMBLY REMOVAL AND INSTALLATION



Removal steps

- Under cover (Refer to GROUP 52A – Instrument Panel.)
- 1. Air thermo sensor clip
- 2. Automatic compressor-ECU and air thermo sensor assembly



INSPECTION

AIR THERMO SENSOR CHECK

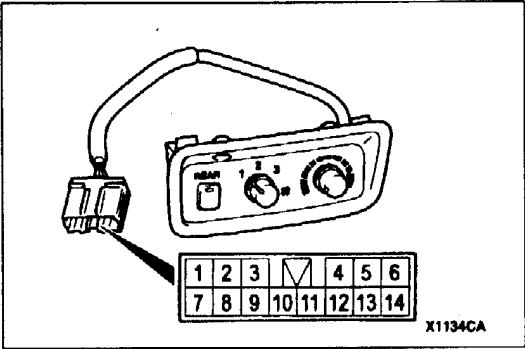
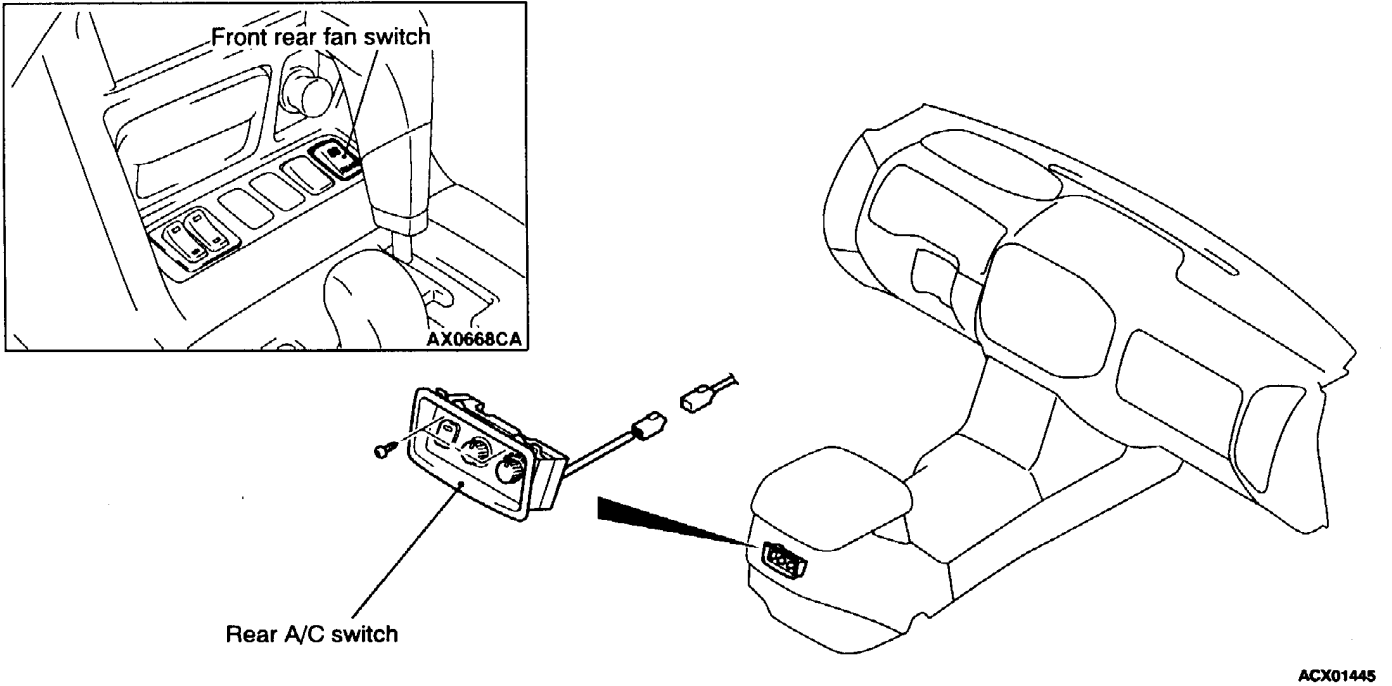
Measure the resistance between the sensor terminals under at least two temperatures. The resistance values should meet the left graph.

NOTE

The temperature should be within the shown range.

REAR HEATER AND REAR COOLER

REAR A/C SWITCH, FRONT REAR FAN SWITCH
REMOVAL AND INSTALLATION



INSPECTION
CONTINUITY CHECK OF THE REAR A/C SWITCH
Air Volume Adjusting Switch Check

Switch position	Terminal No.			
	1	4	6	7
1				
2				
3				

Rear Fan Switch Check

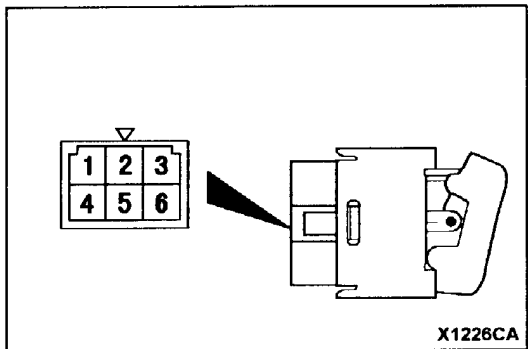
The rear fan switch toggles on and off.

Switch position	Terminal No.							
	2	8	9	IND	12	10	ILL	11
OFF position		○	○	↔	○	○	○	○
ON position	○	○	○	↔	○	○	○	○

Temperature Adjusting Switch Check

Connect an ohmmeter between connector terminals No.3 and 5 as well as 5 and 13. The resistance values should change within the standard value range gradually when the temperature adjusting switch is operated.

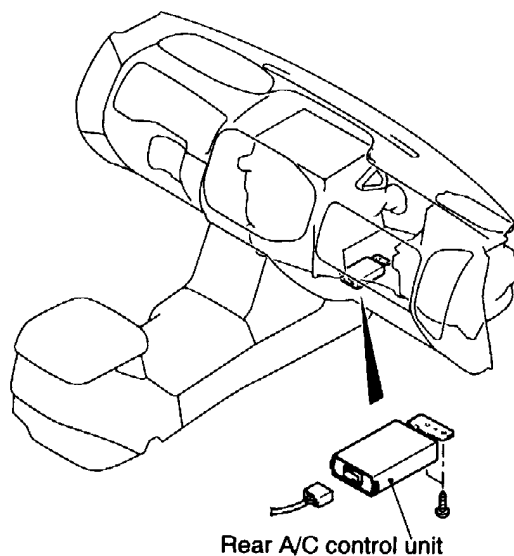
Standard value: 0 – 3 kΩ



Front Rear Fan Switch Continuity Check

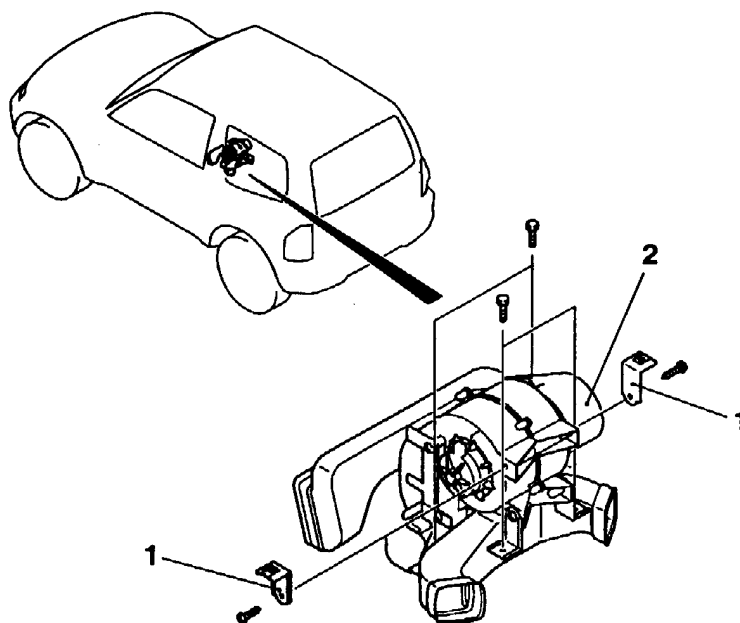
Switch position	Terminal No.							
	1	2	IND	5	6	3	ILL	4
OFF position	○	○	↔		○	○	○	○
ON position	○	○	↔		○	○	○	○

REAR A/C CONTROL UNIT REMOVAL AND INSTALLATION



BX0970CA

REAR HEATER UNIT <Floor console> REMOVAL AND INSTALLATION

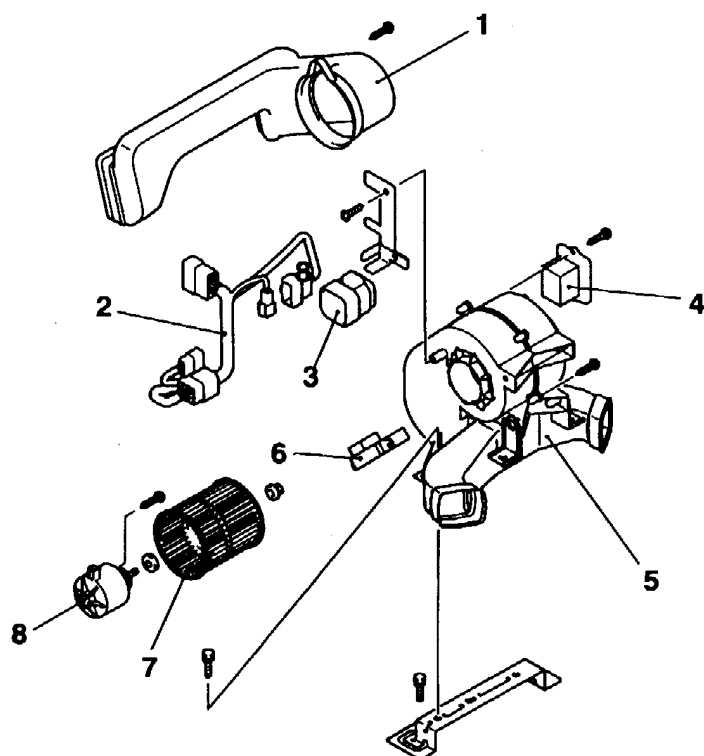


AY0259CA

Removal steps

- Front floor console
(Refer to GROUP 52A.)
 1. Upper bracket
 2. Rear heater unit

REAR HEATER UNIT <FLOOR CONSOLE> DISASSEMBLY AND REASSEMBLY

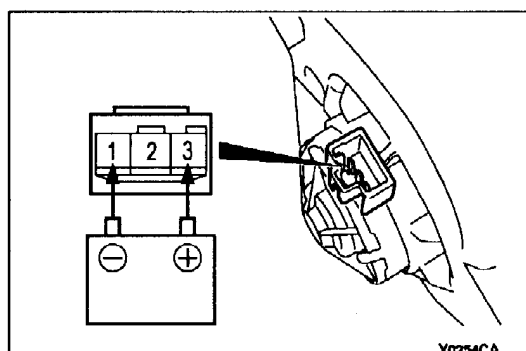


AY0258CA

Disassembly steps

1. Rear inlet duct
2. Harness assembly
3. Relay
4. Resistor

5. Heater case
6. Heater core
7. Blower fan
8. Blower motor

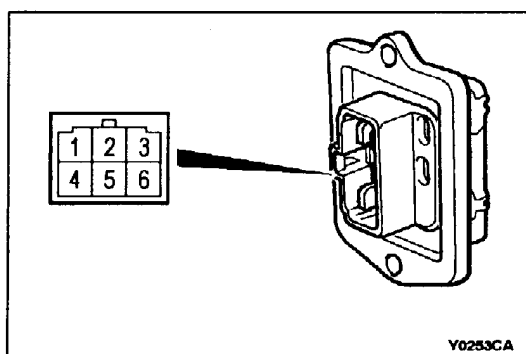


Y0254CA

INSPECTION

BLOWER MOTOR INSPECTION

The motor should run when battery voltage is applied between the terminals. In addition, any abnormal sound should not be heard from the motor.

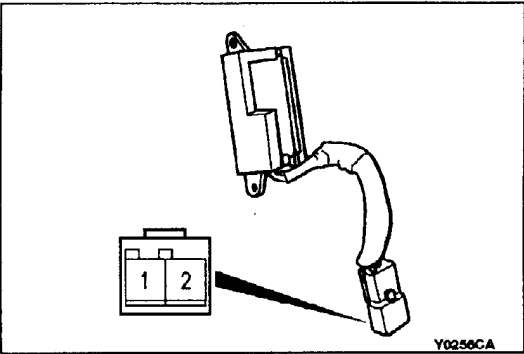


Y0253CA

RESISTOR CHECK

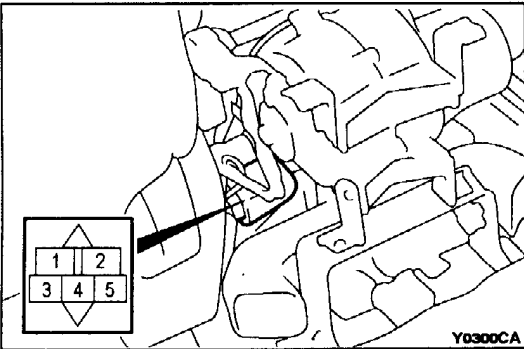
Standard value:

Terminal to be measured	Standard value Ω
Between terminals No.1 and 6	$4.9 \pm 7 \%$
Between terminals No.1 and 3	$1.25 \pm 7 \%$



PTC HEATER CHECK

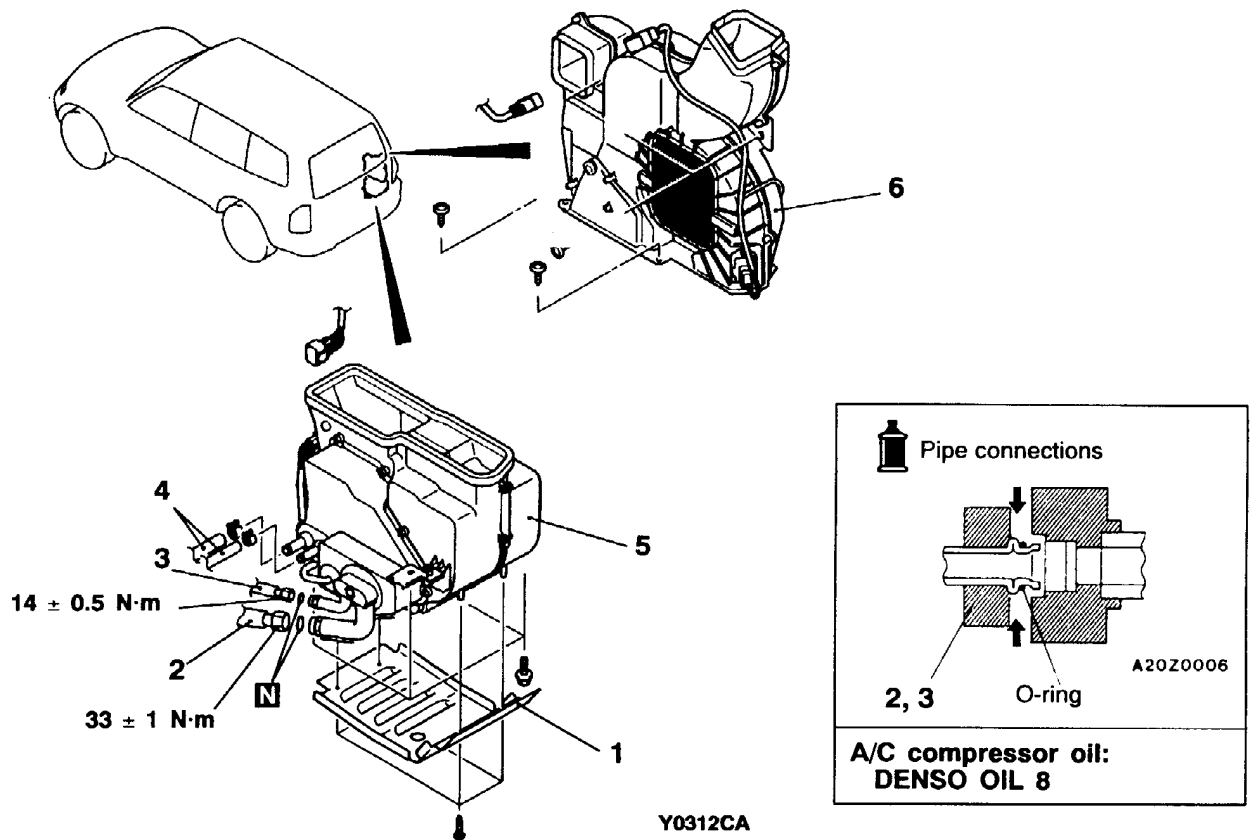
Continuity should be present between the terminals.



RELAY CONTINUITY CHECK

System volt- age	Terminal No.			
	1	3	2	5
When current is not supplied	○	○		
When current is supplied	⊕	⊖	○	○

REAR HEATER UNIT AND REAR BLOWER ASSEMBLY <QUARTER TRIM> REMOVAL AND INSTALLATION



Rear heater unit removal steps

- Refrigerant discharge and refilling (Refer to P.55A-9.)
 - Engine coolant draining and refilling (Refer to GROUP 14 - On-vehicle Service.)
 - Rear mud guard (Refer to GROUP 51.)
1. Heater cover
 2. Suction pipe C connection
 3. Liquid pipe D connection
 4. Heater hose connection
 5. Rear heater unit



Rear blower assembly removal steps

- Upper quarter trim (RH), lower quarter trim (RH) (Refer to GROUP 52A - Trim.)
- Rear quarter duct, rear floor duct A mounting bolt, pillar duct mounting bolt (Refer to P.55A-55.)
- 6. Rear blower assembly

REMOVAL SERVICE POINTS

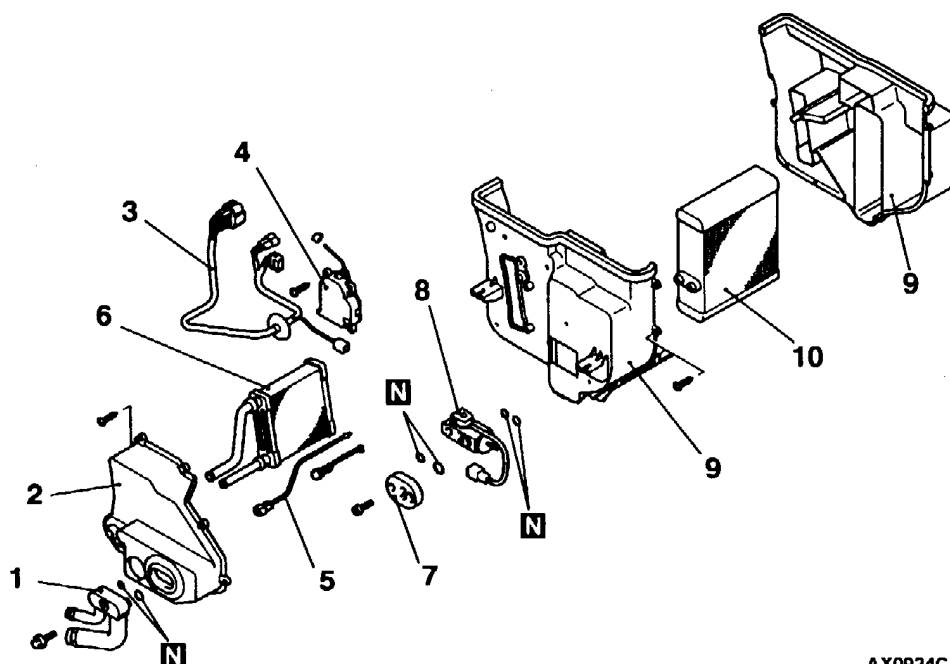
◀A▶ SUCTION PIPE C/LIQUID PIPE D DISCONNECTION

Plug the disconnected pipe and the rear heater unit nipples to prevent dust or foreign material from entering them.

Caution

Use a plug, which air does not penetrate through. Compressor oil and receiver absorb moisture easily.

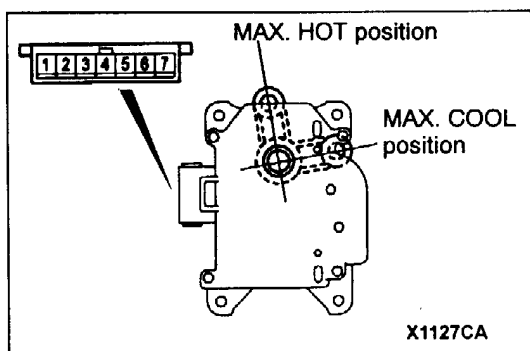
REAR HEATER UNIT DISASSEMBLY AND REASSEMBLY



AX0924CA

Disassembly steps

1. Tube accessory assembly
2. Heater cover
3. Harness assembly
4. Electric motor for the air mix damper
<Vehicles with rear heater>
5. Air thermo sensor
<Vehicles with rear cooler>
6. Heater core
<Vehicles with rear heater>
7. Connector tube
<Vehicles with rear cooler>
8. Expansion valve
<Vehicles with rear cooler>
9. Heater case
10. Evaporator
<Vehicles with rear cooler>



INSPECTION

AIR MIX DAMPER MOTOR CHECK

Motor Check

Battery connection terminal		Lever operation
1	2	
+	-	Rotate to the COOL position.
-	+	Rotate to the HOT position.

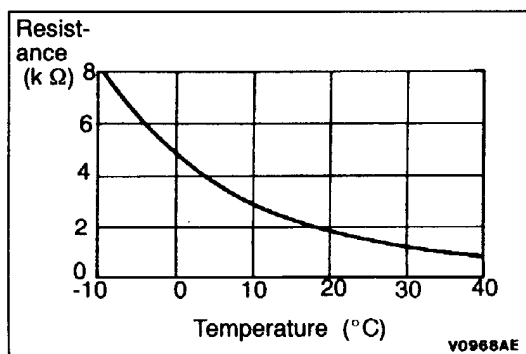
Caution

If the lever reaches the stop position, disconnect the battery voltage.

Potentiometer Check

When the resistances between terminals 3 and 5 as well as terminals 3 and 7 are measured at the previous check, the resistance value should change gradually within the standard value.

Standard value: 1.2 – 4.8 kΩ

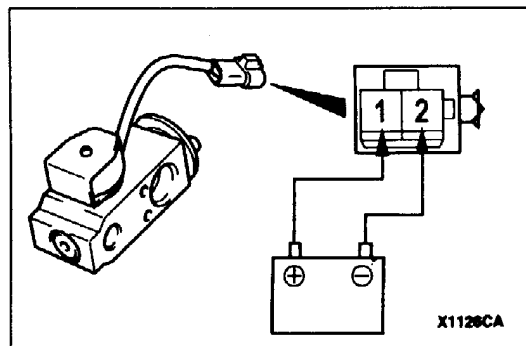


Air Thermo Sensor Check

Measure the resistance between the sensor terminals under at least two temperatures. The resistance values should meet the left graph.

NOTE

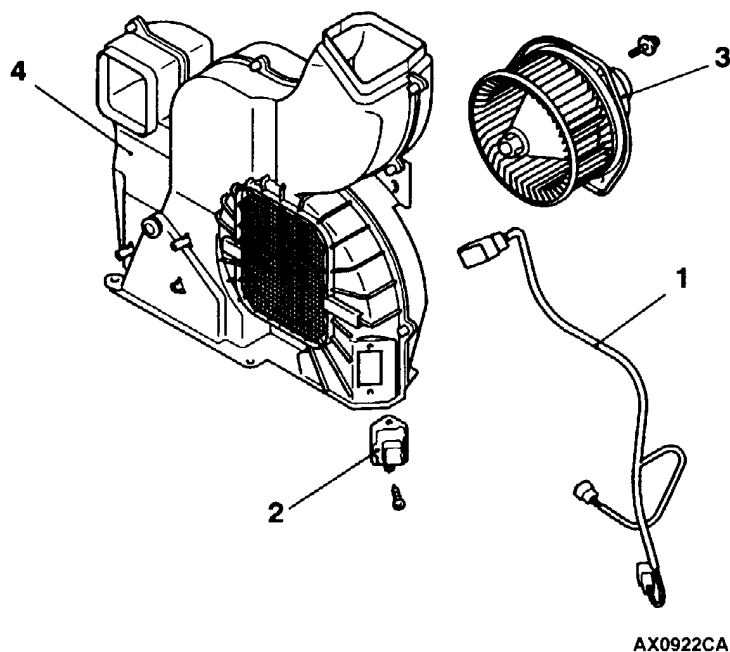
The temperature should be within the shown range.



Expansion Valve (Magnet Valve) Check

When battery voltage is applied to the magnetic valve terminal No.1 and No.2 terminal is earthed, operating sound should be heard from the magnetic valve.

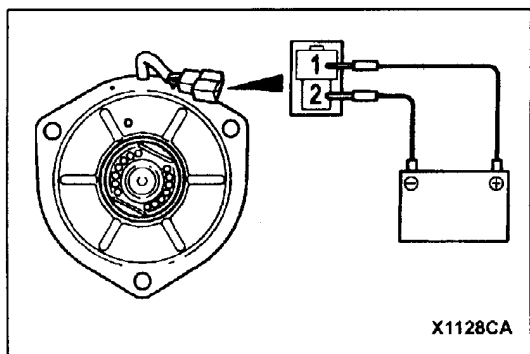
REAR BLOWER ASSEMBLY DISASSEMBLY AND REASSEMBLY



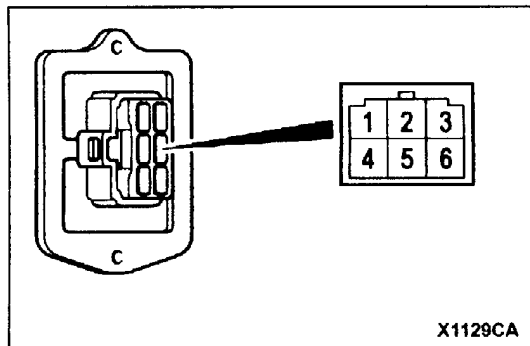
Disassembly steps

1. Harness assembly
2. Resistor

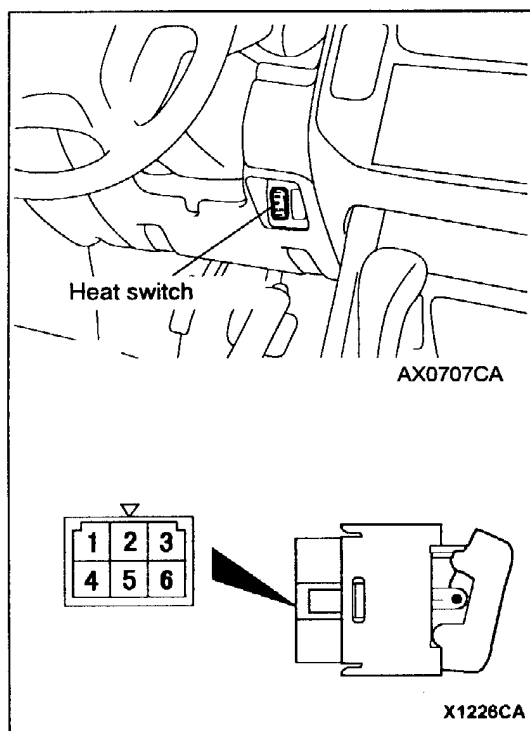
3. Blower motor assembly
4. Case

**INSPECTION****BLOWER MOTOR CHECK**

The motor should run when battery voltage is applied between the terminals. In addition, any abnormal sound should not be heard from the motor.

**RESISTOR CHECK****Standard value:**

Terminal to be measured	Standard value Ω
Between terminals No.1 and 6	$4.9 \pm 7\%$
Between terminals No.1 and 3	$1.25 \pm 7\%$

**HEAT SWITCH <4M41>****INSPECTION****HEAT SWITCH CHECK**

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

COMPRESSOR

REMOVAL AND INSTALLATION

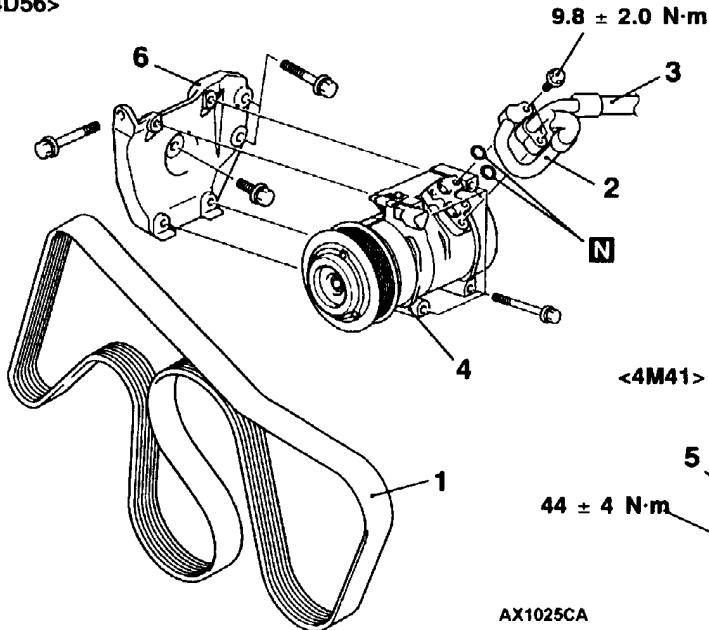
Pre-removal Operations

- Refrigerant Discharge (Refer to P.55A-9.)
- Air Duct A Removal (Refer to GROUP 15 – Air Cleaner.)
- Condense Tank Removal (Refer to GROUP 14 – Radiator.)

Post-installation Operations

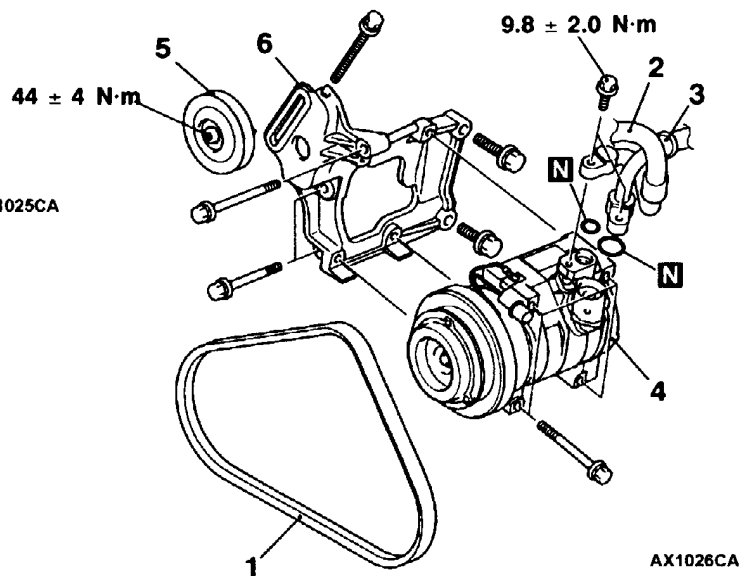
- Refrigerant Charge (Refer to P.55A-9.)
- Condense Tank Installation (Refer to GROUP 14 – Radiator.)
- Air Duct A Installation (Refer to GROUP 15 – Air Cleaner.)
- Drive Belt Tension Check (Refer to GROUP 11A, B – On-vehicle Service.)

<4D56>



<4M41>

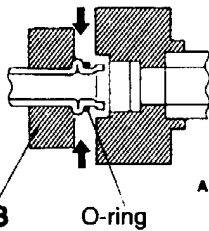
AX1025CA



AX1026CA



Pipe connections



A20Z0006

A/C compressor oil:
DENSO OIL 8

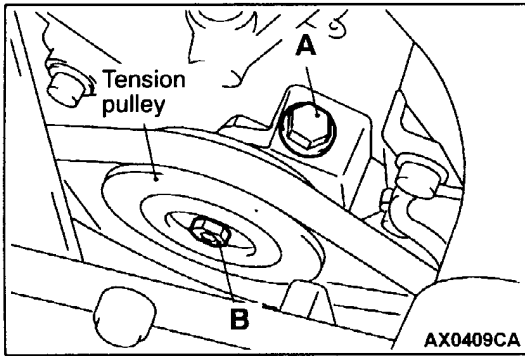
Removal steps



1. Drive belt
2. Discharge flexible hose connection
3. Suction flexible hose connection



4. Compressor
5. Tension pulley assembly
6. Compressor bracket



REMOVAL SERVICE POINTS

◀A▶ DRIVE BELT REMOVAL

Loosen tension pulley mounting bolt A and adjusting bolt B in that order, and then remove the drive belt.

Caution

If the drive belt is reused, mark an arrow indicating rotation direction (clockwise direction) on the belt surface with a chalk.

◀B▶ DISCHARGE FLEXIBLE HOSE/SUCTION FLEXIBLE HOSE DISCONNECTION

Plug the disconnect hoses and the compressor nipples to prevent dust or foreign material from entering them.

Caution

Use a plug, which air does not penetrate through. Compressor oil and receiver absorb moisture easily.

◀C▶ COMPRESSOR REMOVAL

Be careful not to spill the compressor oil.

INSTALLATION SERVICE POINT

▶A◀ COMPRESSOR INSTALLATION

If a new compressor is installed, first adjust the amount of oil according to the procedures described below, and then install the compressor.

1. Measure the amount of oil within the removed compressor. (X mL)
2. Drain (from the new compressor) the amount of oil calculated according to the following formula, and then install the new compressor.

Except vehicles with rear cooler:

$$120 \text{ mL} - X \text{ mL} = Y \text{ mL}$$

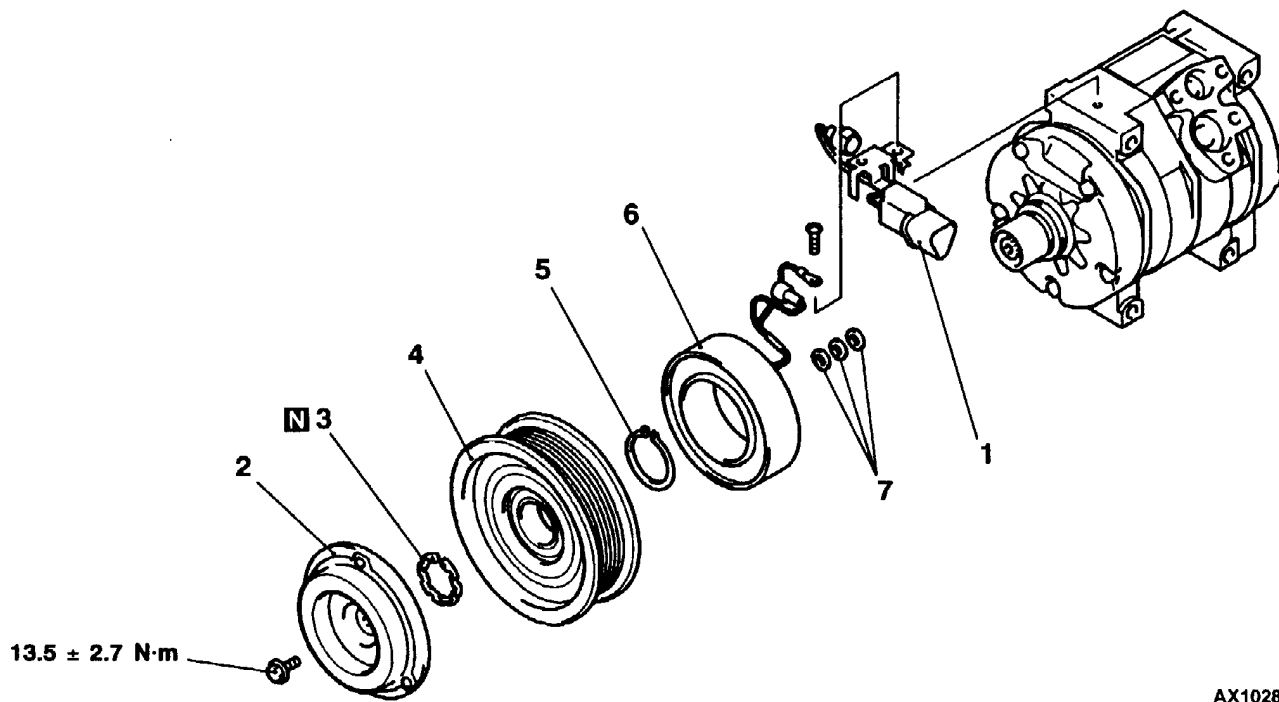
Vehicles with rear cooler, dual A/C:

$$140 \text{ mL} - X \text{ mL} = Y \text{ mL}$$

NOTE

- (1) The above amounts (120 mL and 140 mL) indicate the factory-charged amount inside a new compressor.
- (2) Y mL indicates the amount of oil in the refrigerant line, the condenser, the evaporator, etc.

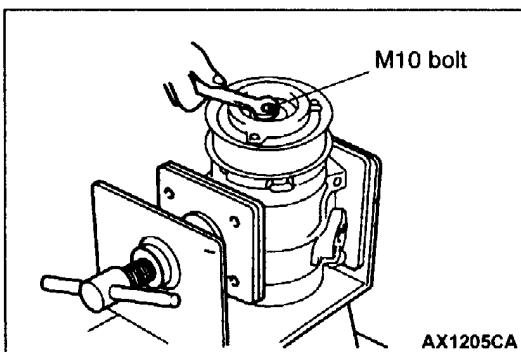
DISASSEMBLY AND REASSEMBLY

**Disassembly steps**

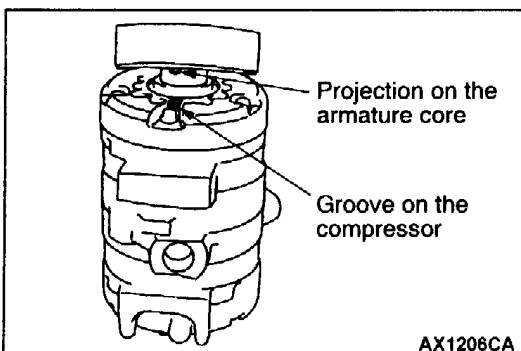
- C◄ ● Air gap adjustment
 1. Connector
 2. Armature
 3. Snap ring

- A◄ 4. Rotor
 5. Snap ring
 6. Field core
 7. Washer

AX1028CA

**DISASSEMBLY SERVICE POINT****►A◄ ARMATURE REMOVAL**

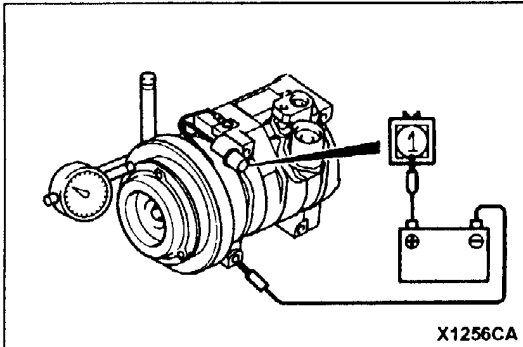
1. Remove the armature mounting bolt.
2. Tighten the M10 bolt in the armature bolt hole to disengage the shaft from the armature serration.

**ASSEMBLY SERVICE POINT****►A◄ FIELD CORE INSTALLATION**

Align the compressor groove with the field core projection to install the field core.

►B◄ SNAP RING INSTALLATION

Be careful not to expand the snap ring excessively. If the inside diameter of the snap ring exceeds 30.5 mm due to excessive expansion, replace it.

**►C◄ AIR GAP ADJUSTMENT**

Apply battery voltage to the magnetic clutch, and check that the clutch air gap is within the standard value. If not within the standard value, use a washer to adjust the air gap.

Standard value: 0.35 – 0.65 mm

NOTE

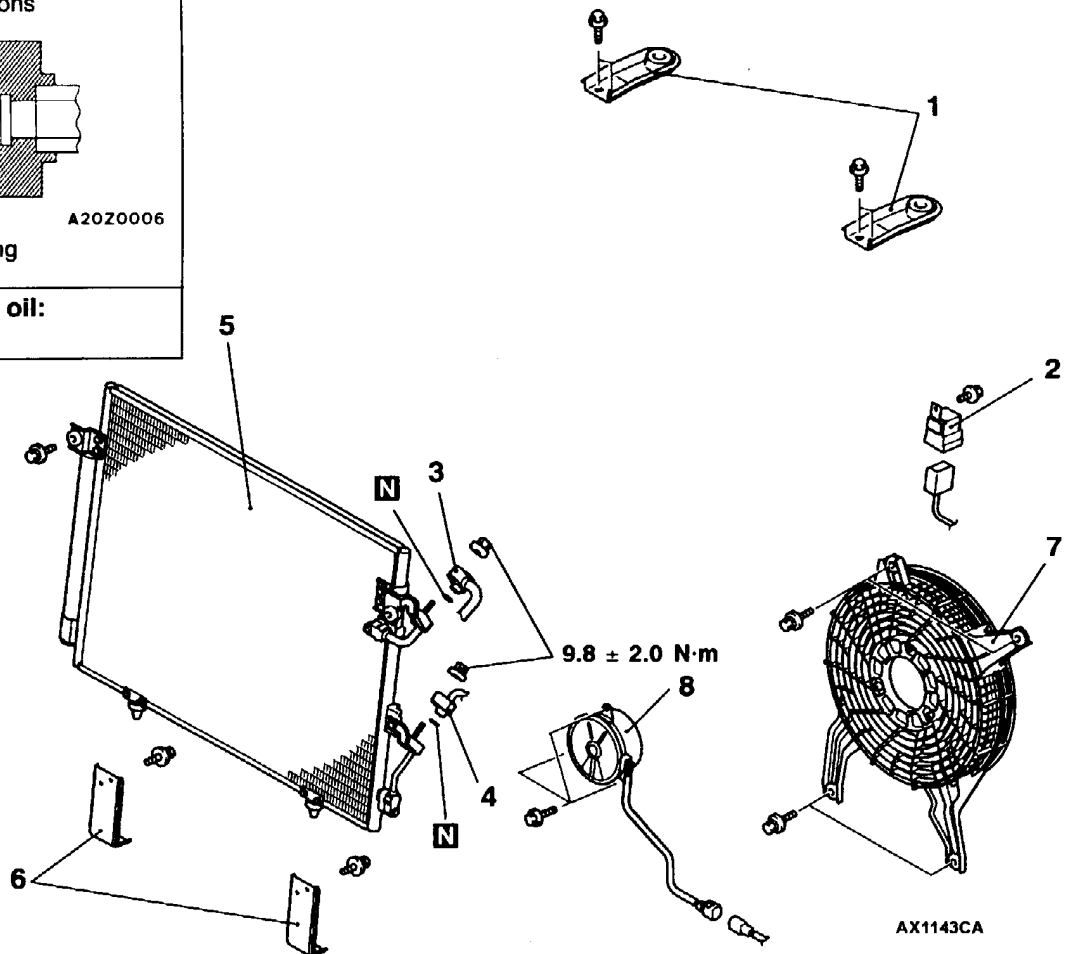
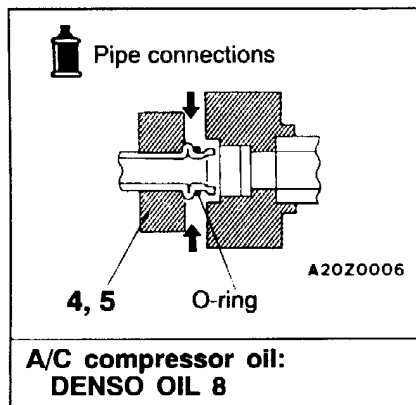
The washers are available in three thicknesses (0.1 mm, 0.3 mm, 0.5 mm).

CONDENSER ASSEMBLY AND CONDENSER FAN

REMOVAL AND INSTALLATION

Pre-removal and Post-installation Operations

- Refrigerant Discharge and Refilling (Refer to P.55-9.)
- Radiator Grille and Skid Plate Removal and Installation (Refer to GROUP 51 – Front Bumper.)
- Air Duct A Removal and Installation (Refer to GROUP 15 – Air Cleaner.)
- Condenser Tank Removal and Installation (Refer to GROUP 14 – Radiator.)
- Oil Reservoir Mounting Bolt Removal and Installation (Refer to GROUP 37 – Oil Line.)



Condenser assembly removal steps

1. Radiator bracket
2. PTC heater relay <4M41>
3. Discharge flexible hose connection
4. Liquid pipe A connection

5. Condenser
6. Condenser bracket

Condenser fan removal steps

7. Condenser fan assembly
8. Motor assembly



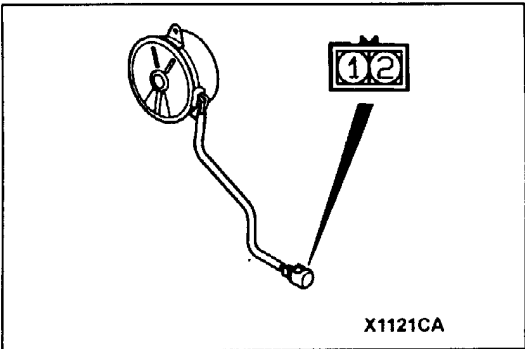
REMOVAL SERVICE POINT

◀A▶ DISCHARGE FLEXIBLE HOSE/LIQUID PIPE A
DISCONNECTION

Plug the disconnected hoses, pipes and the condenser nipples
to prevent system contamination.

Caution

Use a plug, which air does not penetrate through.
Compressor oil and receiver absorb moisture easily.



INSPECTION

MOTOR ASSEMBLY CHECK

Battery connection terminal		Motor operation
1	2	
⊕	⊖	Turns

REFRIGERANT LINE

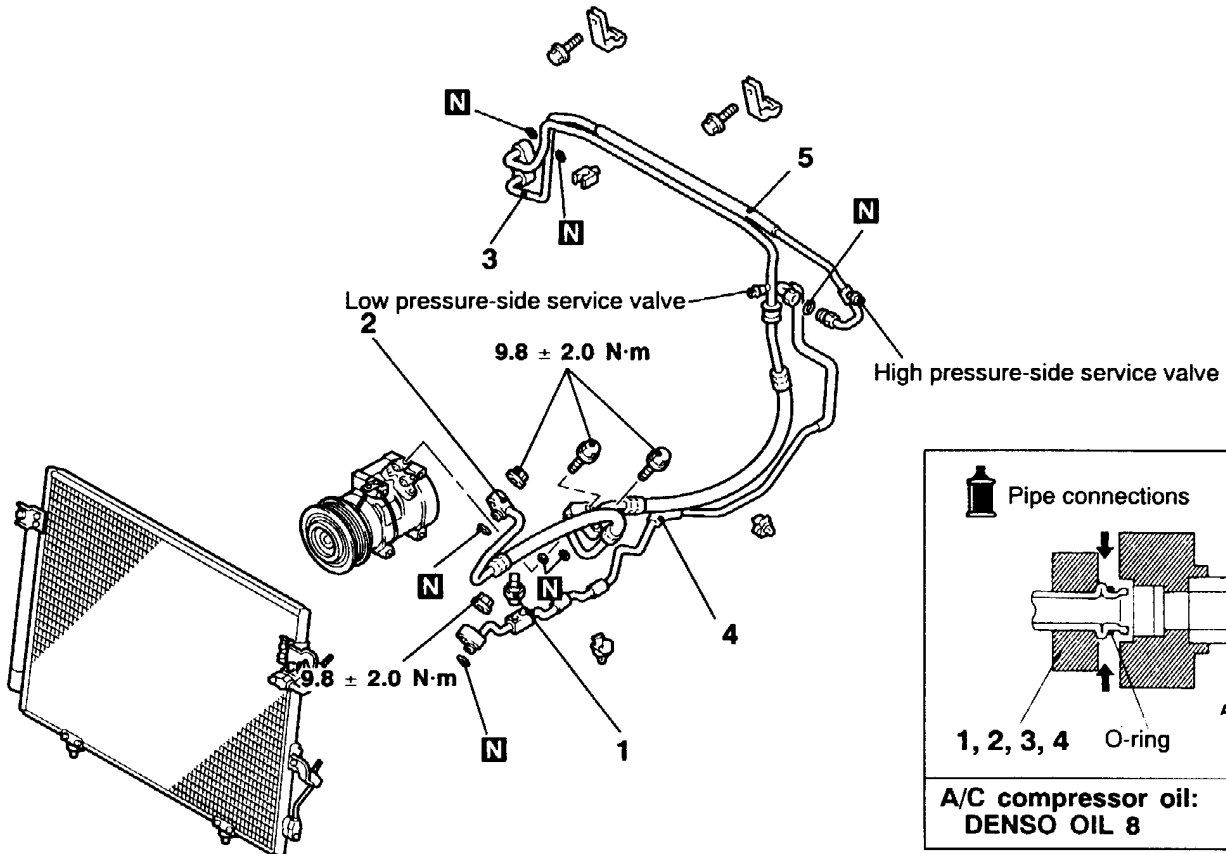
REMOVAL AND INSTALLATION

<L.H. drive vehicles>

Pre-removal and Post-installation Operations

- Refrigerant Discharge and Refilling (Refer to P.55-9.)
- Condense Tank Removal and Installation (Refer to GROUP 14 – Radiator.)
- Engine Cover Removal
- Battery, Battery Tray Removal and Installation

<Single A/C>



Y0052CA

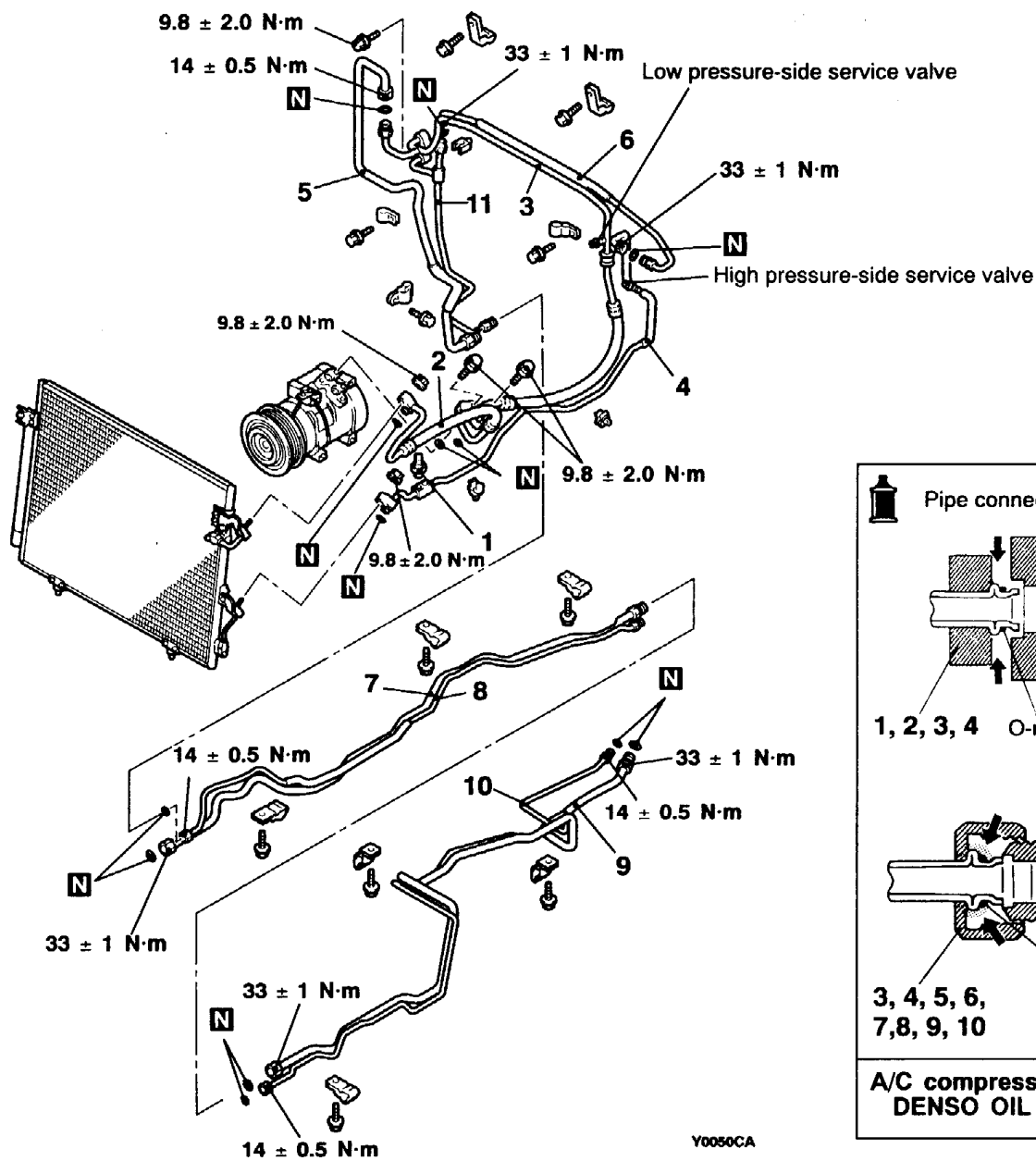
Removal steps

1. Dual pressure switch
2. Discharge flexible hose
3. Suction flexible hose



4. Liquid pipe A
5. Liquid pipe B

<Dual A/C>

**Removal steps**

1. Dual pressure switch
2. Discharge flexible hose
3. Suction flexible hose
4. Liquid pie A
5. Suction pipe A
6. Liquid pipe B



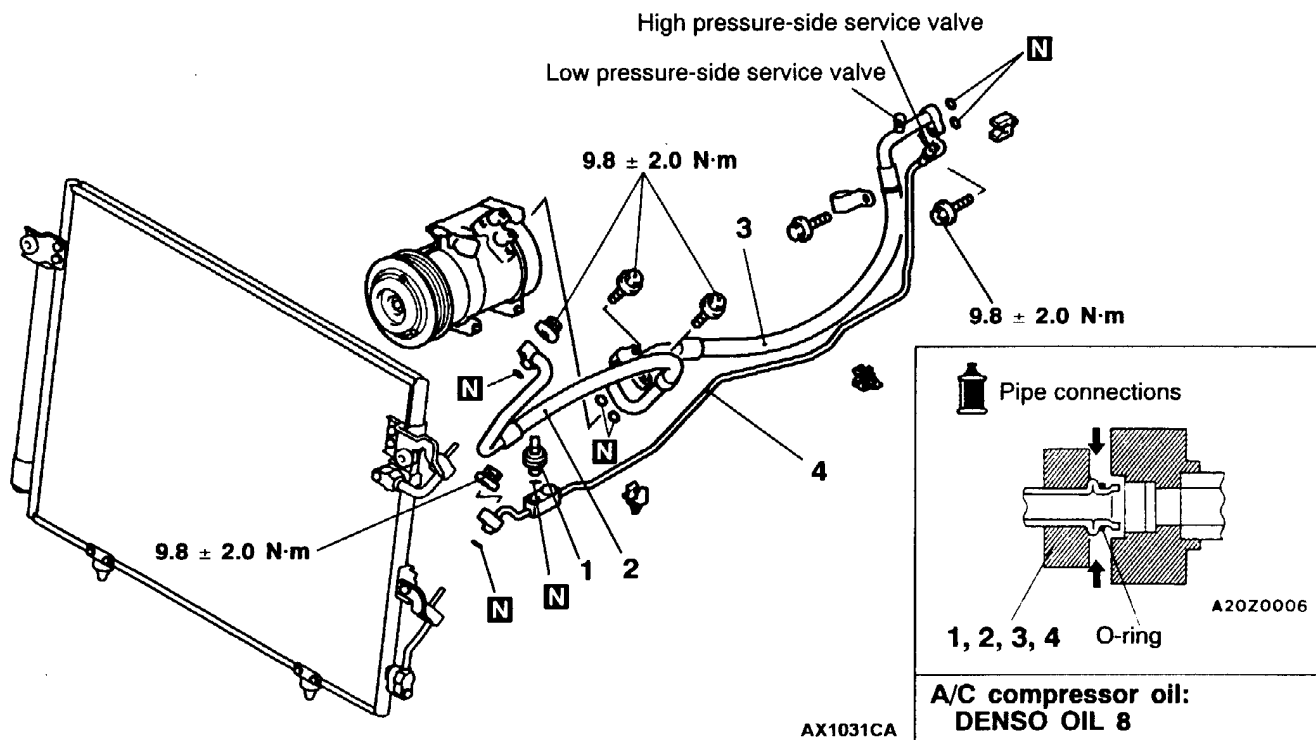
7. Suction pipe B
8. Liquid pipe C
9. Suction pipe C
10. Liquid pipe D
11. Liquid pipe E

<R.H. drive vehicles>

Pre-removal and Post-installation Operations

- Refrigerant Discharge and Refilling (Refer to P.55-9.)
- Condense Tank Removal and Installation (Refer to GROUP 14 – Radiator.)
- Engine Cover Removal
- Battery, Battery Tray Removal and Installation

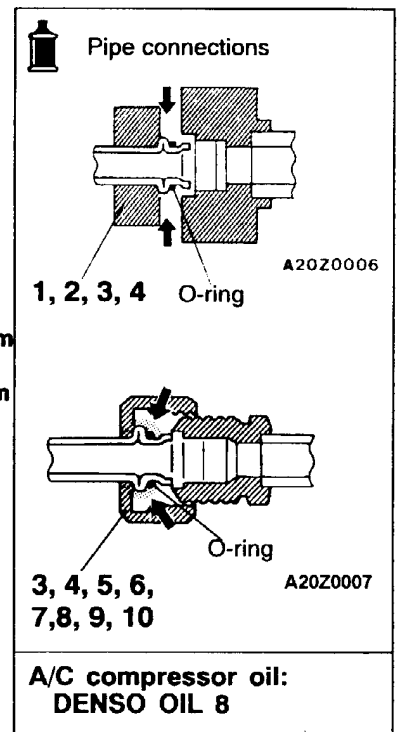
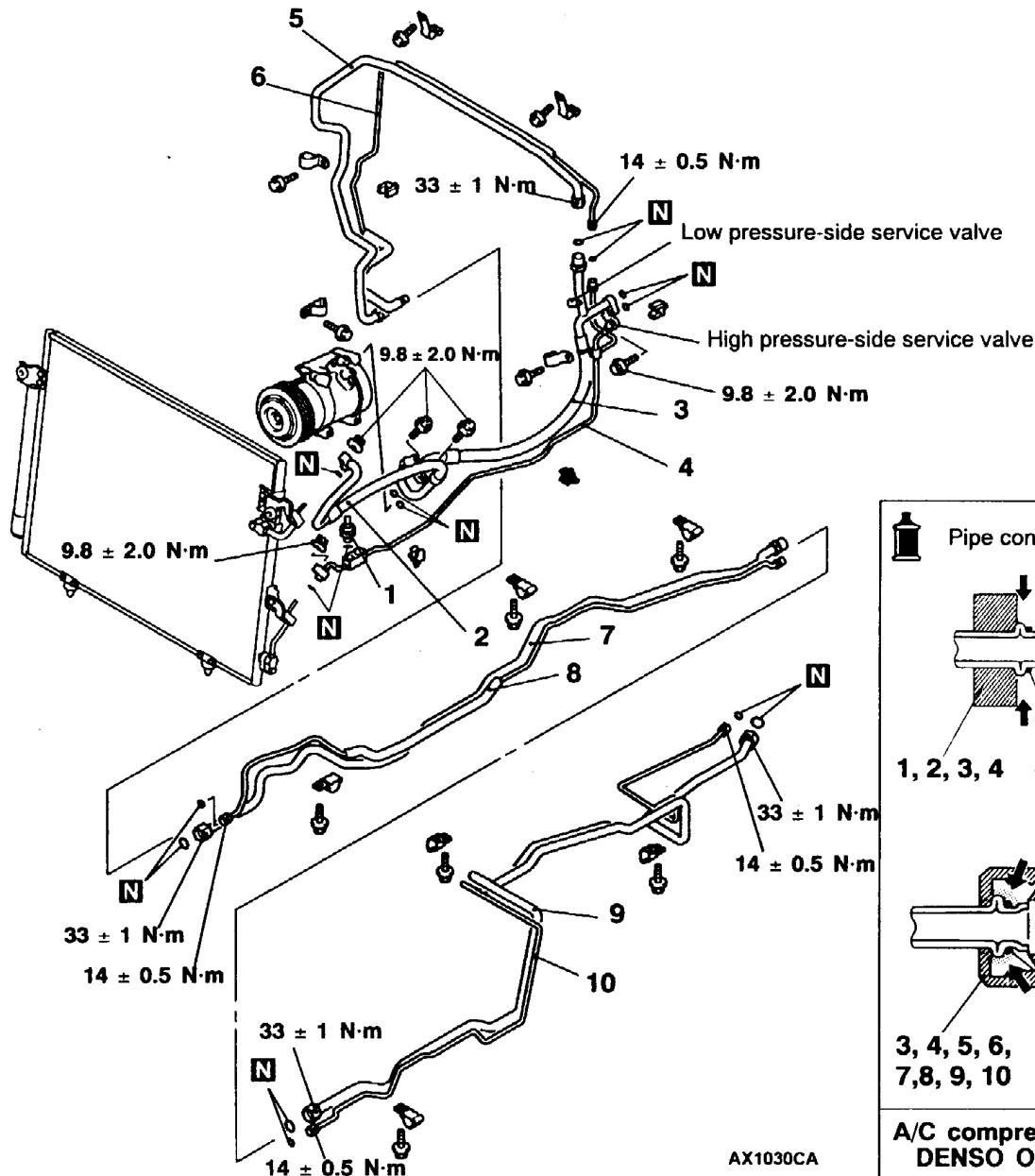
<Single A/C>

**Removal steps**

1. Dual pressure switch
2. Discharge flexible hose

3. Suction flexible hose
4. Liquid pipe A

<Dual A/C>

**Removal steps**

1. Dual pressure switch
2. Discharge flexible hose
3. Suction flexible hose
4. Liquid pie A
5. Suction pipe A



6. Liquid pipe B
7. Suction pipe B
8. Liquid pipe C
9. Suction pipe C
10. Liquid pipe D

REMOVAL SERVICE POINT**◀A▶ HOSE/PIPE DISCONNECTION**

Plug the condenser, the compressor and the heater unit nipples to prevent system contamination.

Caution

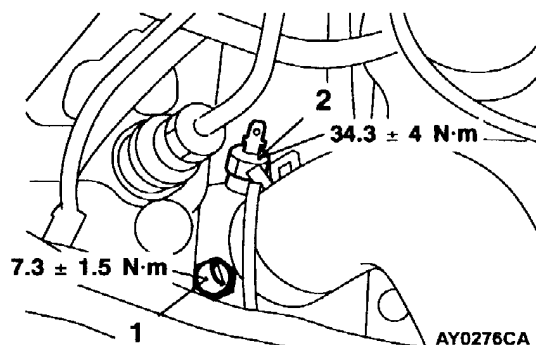
Use a plug, which air does not penetrate through.
Compressor oil and receiver absorb moisture easily.

ENGINE COOLANT TEMPERATURE SWITCH<4D56>

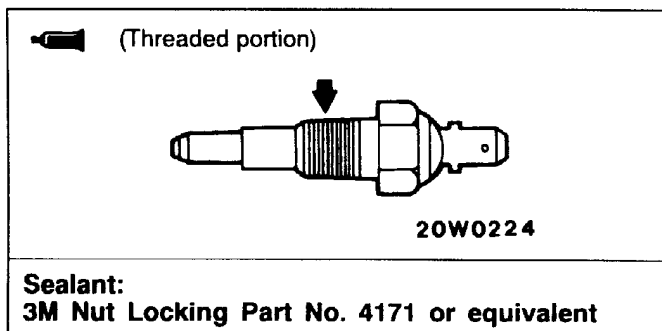
REMOVAL AND INSTALLATION

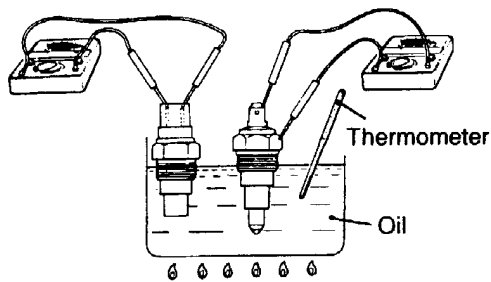
Pre-removal and Post-installation Operation

- Coolant Refilling (Refer to GROUP 14 - On-vehicle Service.)
- Intercooler Removal and Installation <Vehicles with intercooler> (Refer to GROUP 15.)

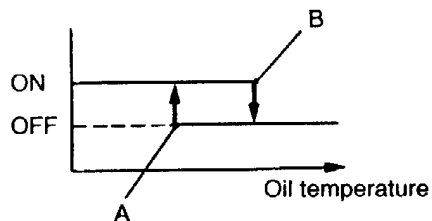


1. Engine coolant temperature switch (for A/C cut-off)
2. Engine coolant temperature switch (for condenser fan)



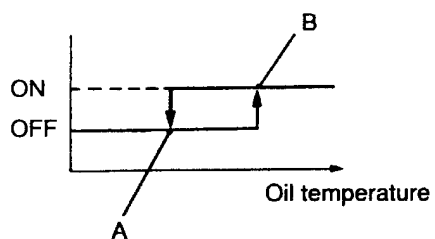


<For A/C cut-off>



20W0237

<For condenser fan>



20W0204
00000585

INSPECTION

ENGINE COOLANT TEMPERATURE SWITCH CONTINUITY CHECK

1. Dip the engine coolant temperature switch in oil and heat the oil with a gas burner or similar item.

Caution

Do not heat any more than is necessary.

2. Check the continuity with a circuit tester as the temperature of the oil changes, and the condition is normal if the continuity is within the following ranges.

Standard value:

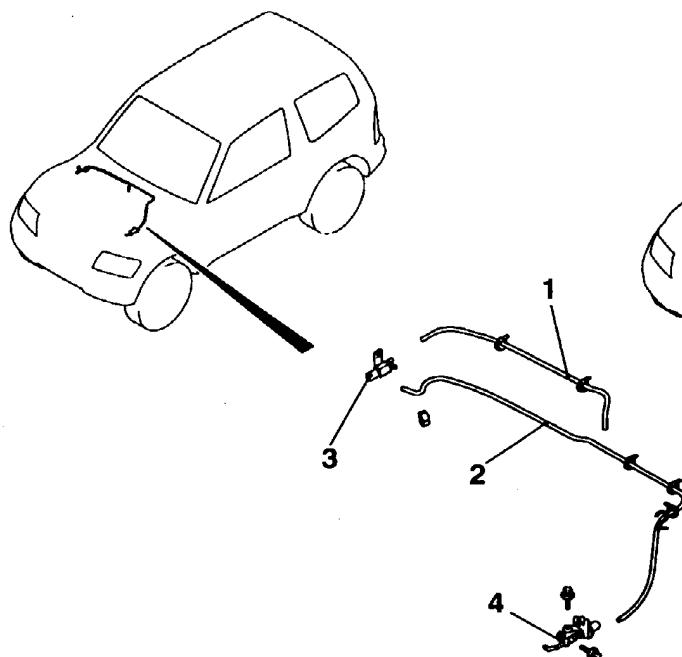
Engine coolant temperature switch	Temperature	Continuity
For A/C cut-off	Less than 108 °C (Temperature at point A)	ON (Continuity)
	More than 115 °C (Temperature at point B)	OFF (No continuity)
For condenser fan	Less than 97 °C (Temperature at point A)	OFF (No continuity)
	More than 102 °C (Temperature at point B)	ON (Continuity)

IDLE-UP SYSTEM <Diesel-powered Vehicles>**REMOVAL AND INSTALLATION****Pre-removal Operation**

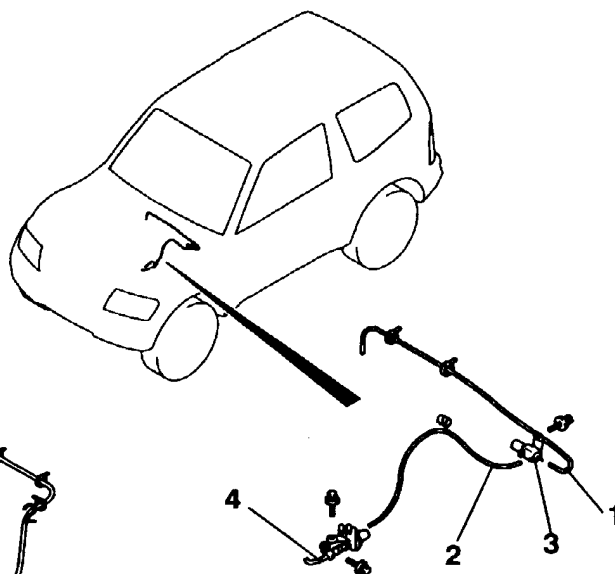
Intercooler Removal <Vehicle with intercooler> (Refer to GROUP 15.)

Post-installation Operation

- Accelerator Cable Adjustment (Refer to GROUP 17 – On-vehicle Service.)
- Throttle Cable Adjustment <A/T> (Refer to GROUP 23 – On-vehicle Service.)
- Intercooler Installation <Vehicles with intercooler> (Refer to GROUP 15.)
- Idle-up Operation Check (Refer to P. 55-16.)

<R.H. drive vehicles>

AY0277CA

<L.H. drive vehicles>

AY0275CA

Idle-up solenoid valve removal steps

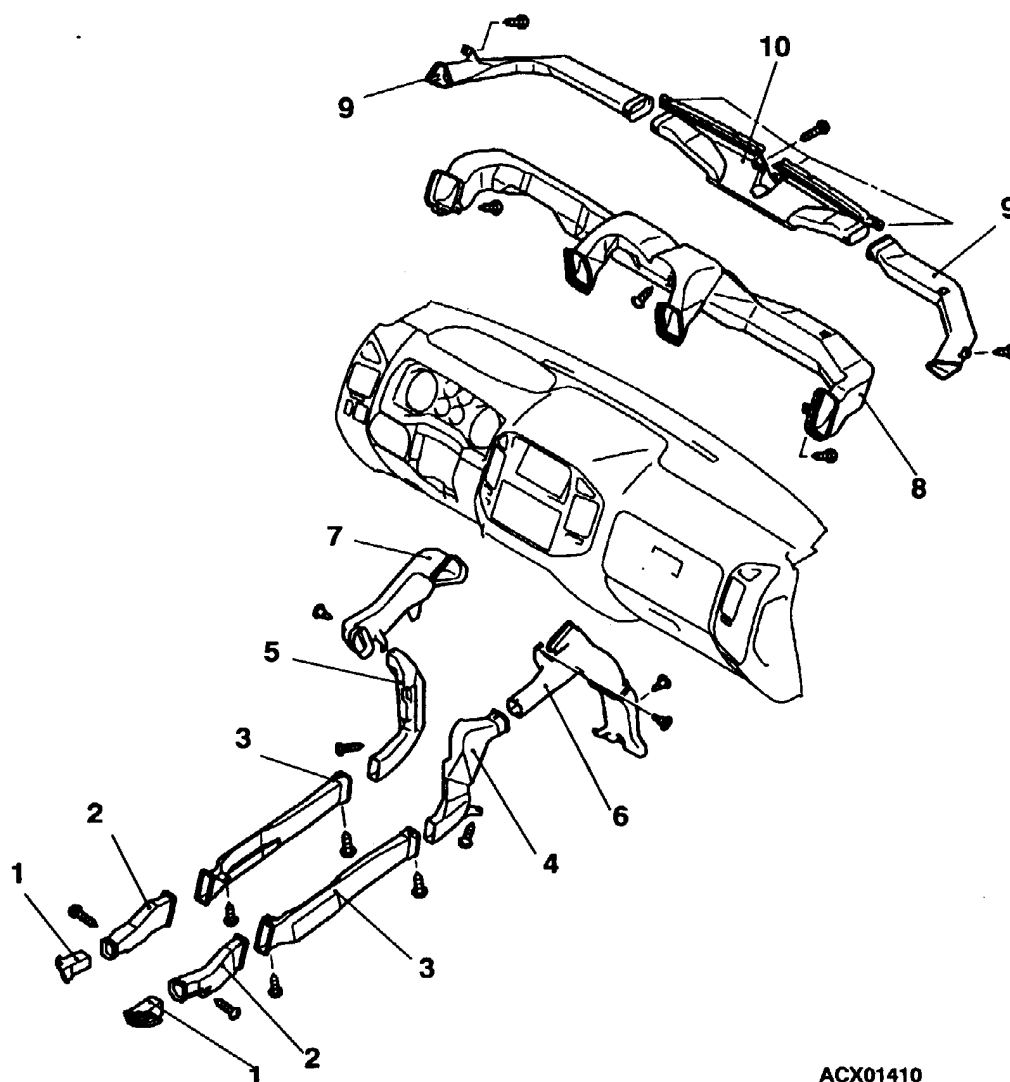
1. Vacuum hose (white stripe) connection
2. Vacuum hose (yellow stripe) connection
3. Idle-up solenoid valve
4. Solenoid valve bracket B
5. Solenoid valve bracket A

Vacuum actuator assembly removal steps

2. Vacuum hose (yellow stripe) connection
6. Accelerator cable connection
7. Split pin <A/T>
8. Throttle cable connection <A/T>
9. Vacuum hose (blue stripe) <Vehicles with ABS>
10. Vacuum actuator assembly

DUCTS

FRONT A/C DUCT REMOVAL AND INSTALLATION



ACX01410

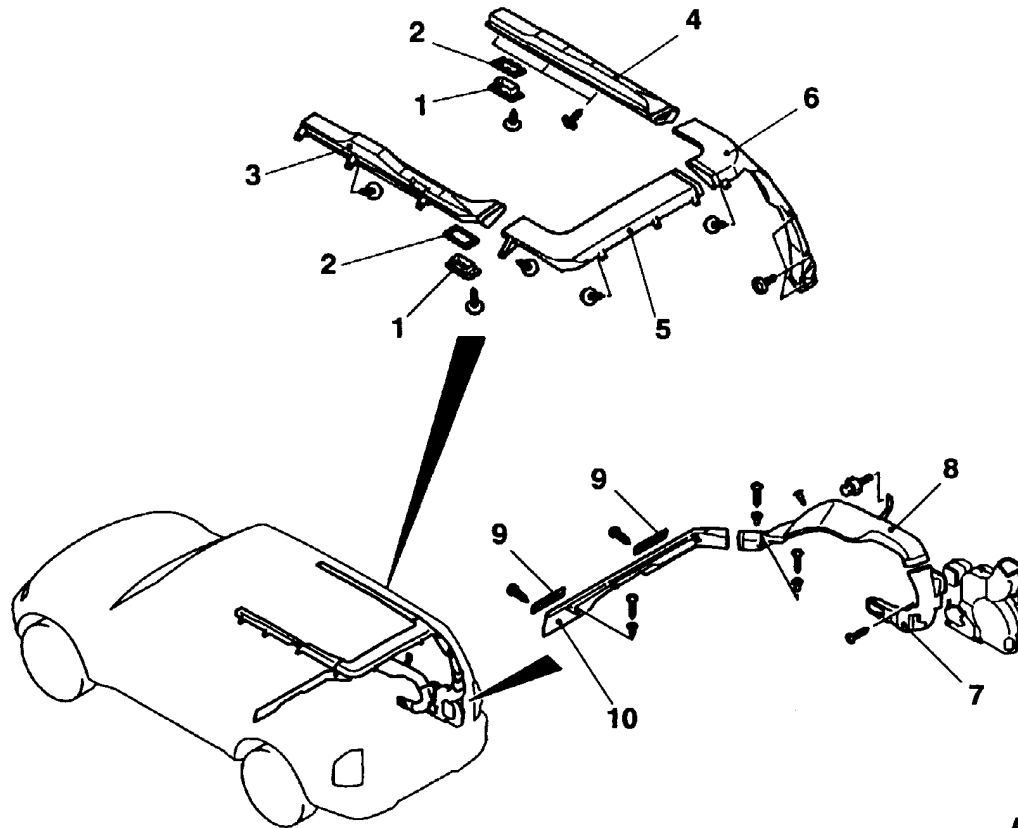
Rear heater duct removal steps

- Front floor console and rear floor console (Refer to GROUP 52A.)
- 1. Foot grille
- 2. Rear heater duct B
- 3. Rear heater duct A

Defroster nozzle, distribution duct and foot duct removal steps

- Instrument panel (Refer to GROUP 52A.)
- 4. Foot duct B
- 5. Foot duct D
- 6. Foot duct A
- 7. Foot duct C
- 8. Distribution duct
- 9. Side defroster duct
- 10. Defroster nozzle assembly

REAR A/C DUCT REMOVAL AND INSTALLATION



AX1063CA

Rear roof duct removal steps

- Upper quarter trim (R.H.)
(Refer to GROUP 52-Trims.)
- 1. Air outlet assembly
- 2. Retainer
- Head lining
- 3. Roof duct (L.H.)
- 4. Roof duct (R.H.)
- 5. Rear roof duct
- 6. Pillar duct

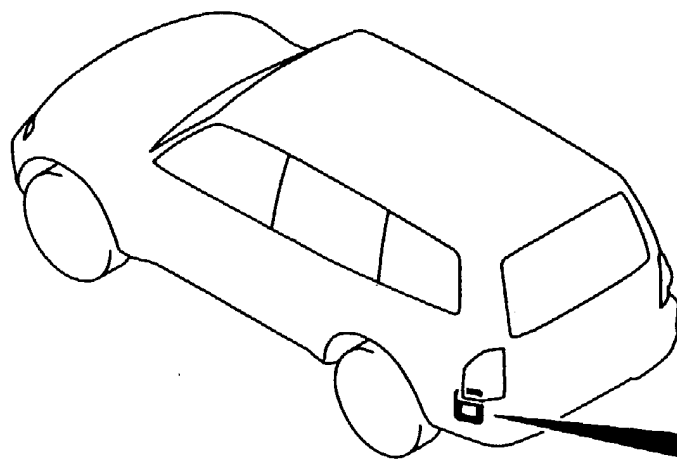
Rear floor duct removal steps

- Upper quarter trim (R.H.), lower quarter trim (R.H.)
(Refer to GROUP 52 – Trims.)
- 7. Rear quarter duct
- 8. Rear floor duct A
- 9. Rear heater grille
- Floor carpet
- 10. Rear floor duct B

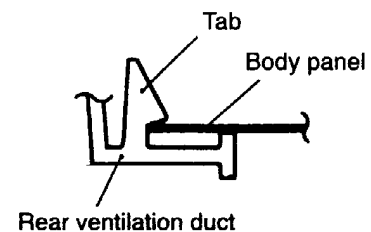
VENTILATION

REMOVAL AND INSTALLATION

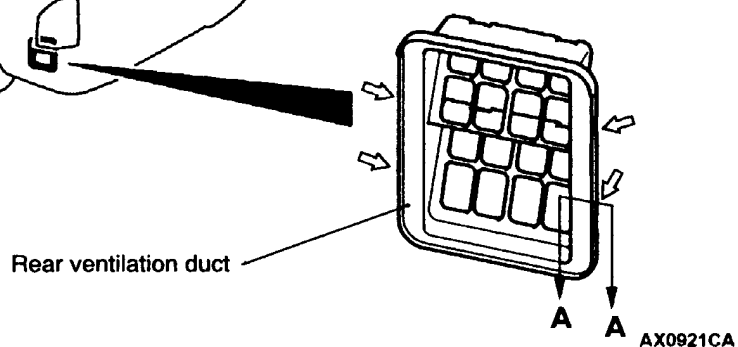
Pre-removal and Post-installation Operations
Rear Bumper Removal and Installation (Refer to GROUP 51.)



Section A – A



AV0545AA



NOTE

↔ : indicates the tab positions.

HEATER, AIR CONDITIONER AND VENTILATION <AUTOMATIC A/C>

CONTENTS

SERVICE SPECIFICATIONS	2	Blower Linear Controller	26
LUBRICANTS	2	Air Mix Damper Motor and Air Outlet Changeover Damper Motor	27
SPECIAL TOOLS	3	Heater Water Temperature Sensor	29
TROUBLESHOOTING <FRONT A/C>	3	PHOTO SENSOR	30
TROUBLESHOOTING <REAR A/C>	3	OUTSIDE AIR TEMPERATURE SENSOR ...	30
ON-VEHICLE SERVICE	24	REAR A/C	30
Magnetic Clutch Test	24	Electric Motor for Air Outlet Changeover Damper	30
Idle Up Operation Check <Petrol>	25	REFRIGERANT LINE	31
FRONT A/C	25	COMPRESSOR	33
Automatic A/C Control Panel Assembly (A/C-ECU)	25		

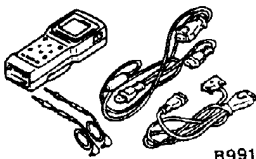
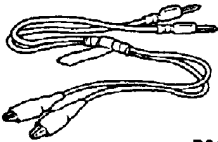
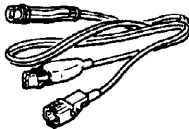
SERVICE SPECIFICATIONS

Item		Standard value	
Resistance value of the potentiometer for the air mix damper (front A/C) kΩ		Approx. 0.96 – 5.76	
Resistance value of the potentiometer for the air outlet changeover damper (front A/C) kΩ		Approx. 0.96 – 5.76	
Resistance of the rear air conditioner switch (temperature control switch) <except rear heater (floor console)> kΩ		0 – 3	
Resistance of the potentiometer for the air mix damper <Rear heater, dual A/C> kΩ		1.2 – 4.8	
Resistance value of the resistor (rear A/C) Ω	Between terminals 1 and 6	4.9 ± 7 %	
	Between terminals 1 and 3	1.25 ± 7%	
Air compressor air gap mm		0.35 – 0.65	
Idle speed r/min (N or P range)	Petrol		
Idle-up speed r/min (N or P range)	Petrol	When the A/C is under low load	700 ± 50
		When the A/C is under medium load	800 ± 50
		When the A/C is under high load	1,000 ± 50

LUBRICANTS

Item		Brand	Quantity
Compressor oil ml	Single A/C <except vehicles with rear cooler>	DENSO OIL 8	120 $\pm$ 20
	Single air conditioner <vehicles with rear cooler>, dual air conditioner	DENSO OIL 8	140 $\pm$ 20
Pipe connections		DENSO OIL 8	As required
Refrigerant g	Single A/C <except vehicles with rear cooler>	R134a (HFC-134a)	500 $\pm$ 20
	Single air conditioner <vehicles with rear cooler>, dual air conditioner	R134a (HFC-134a)	780 $\pm$ 20

SPECIAL TOOLS

Tools	No.	Name	Application
 B991502	MB991502	MUT-II sub assembly	Front A/C check
 B991529	MB991529	Diagnosis code checking harness	Check of the full-automatic air conditioner by using a 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	Continuity check and voltage measurement at harnesses 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 <FRONT A/C>**DIAGNOSIS TROUBLESHOOTING FLOW**

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

DIAGNOSIS FUNCTION**METHOD OF READING DIAGNOSIS CODES**

Connect the MUT-II to the 16-pin diagnosis connector.

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

METHOD OF ERASING DIAGNOSIS CODES

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

INSPECTION CHART FOR DIAGNOSIS CODES

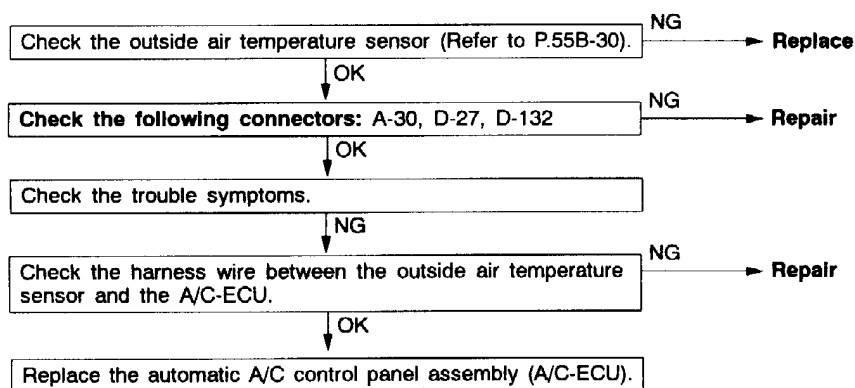
Code No.	Diagnosis item	Reference page
11	Inside air temperature sensor system (open circuit)	55B-4
12	Inside air temperature sensor system (short circuit)	55B-4
13	Outside air temperature sensor system (open circuit)	55B-4
14	Outside air temperature sensor system (short circuit)	55B-4
15	Heater water temperature sensor system (open circuit)	55B-5
16	Heater water temperature sensor system (short circuit)	55B-5
21	Air thermo sensor system (open circuit)	55B-5
22	Air thermo sensor system (short circuit)	55B-5
31	Potentiometer system for the air mix damper	55B-6
32	Potentiometer system for the air outlet changeover damper	55B-7

INSPECTION PROCEDURE FOR DIAGNOSIS CODES

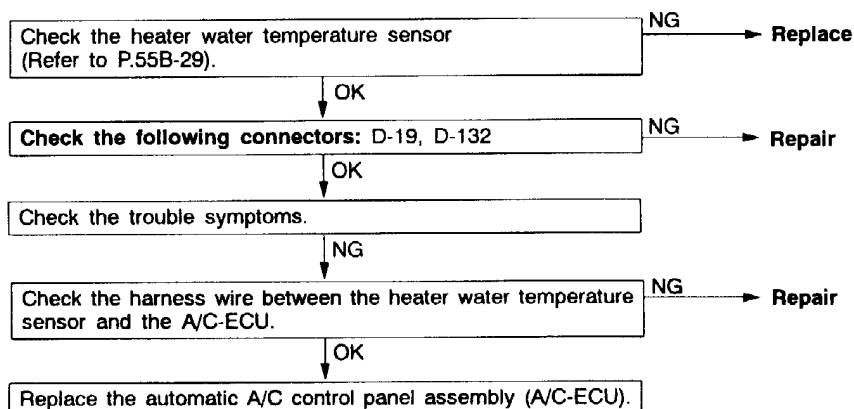
Code No.11, 12 Inside air temperature sensor system	Probable cause
Code No.11 is set when the inside air temperature circuit inside the A/C-ECU is open. Meanwhile, code No.12 is set when it is short.	Malfunction of the A/C-ECU

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

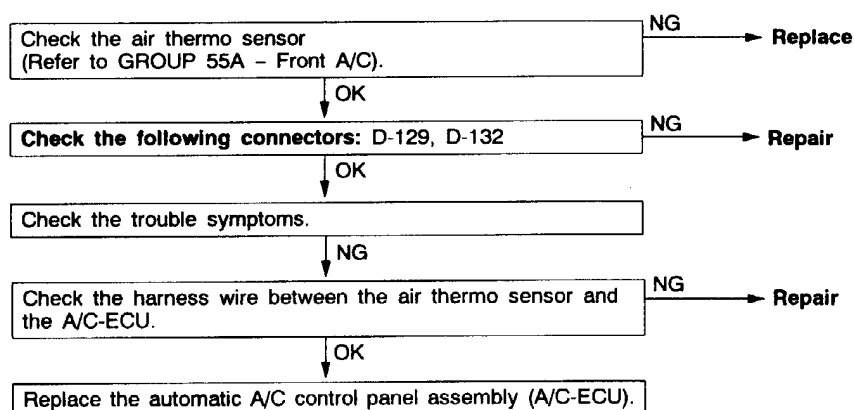
Code No.13, 14 Outside air temperature sensor system	Probable cause
Code No.13 is set when the outside air temperature sensor circuit is open. Meanwhile, code No.14 is set when it is short.	● Malfunction of the outside air temperature sensor ● Malfunction of connector or harness ● Malfunction of the 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

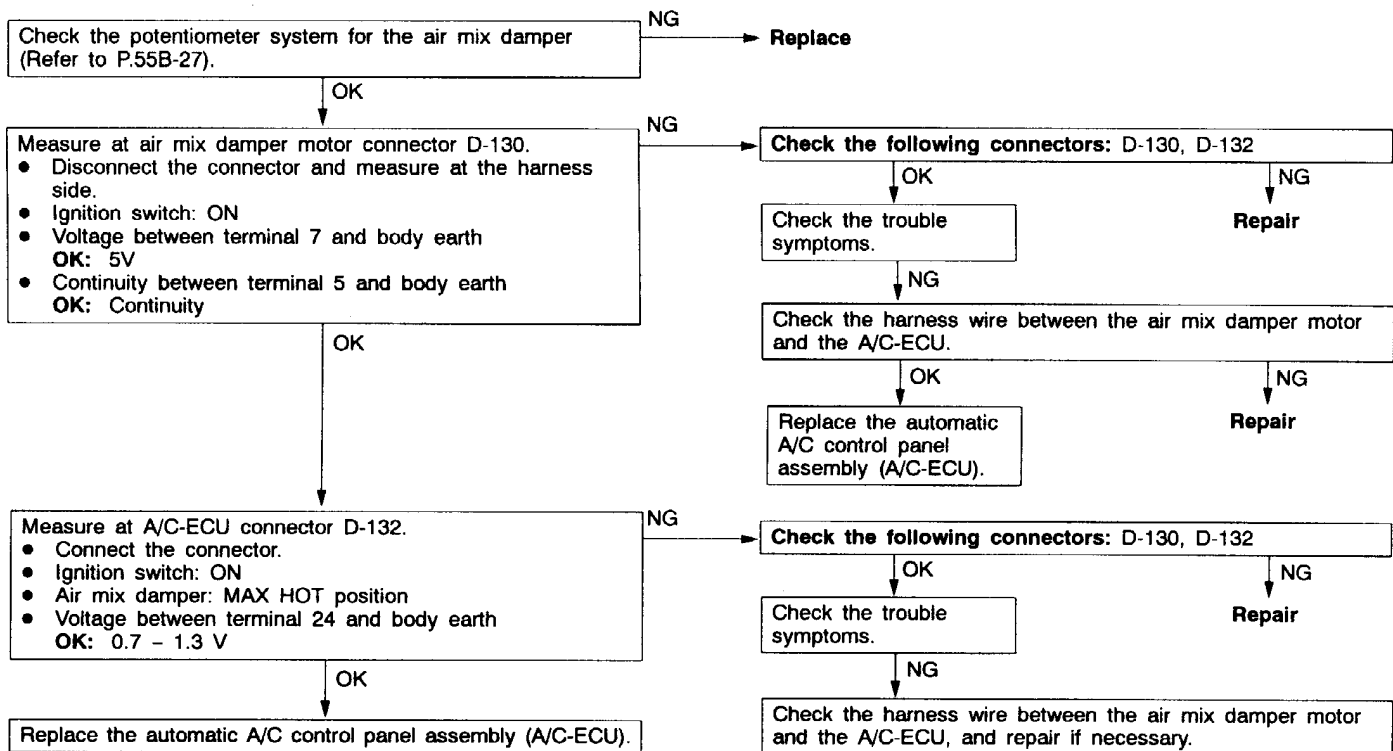


Code No.21, 22 Air thermo sensor system	Probable cause
Code No.21 is set when the air thermo sensor circuit is open. Meanwhile, code No.22 is set when it is short.	• Malfunction of the air thermo sensor • Malfunction of connector or harness • Malfunction of the A/C-ECU

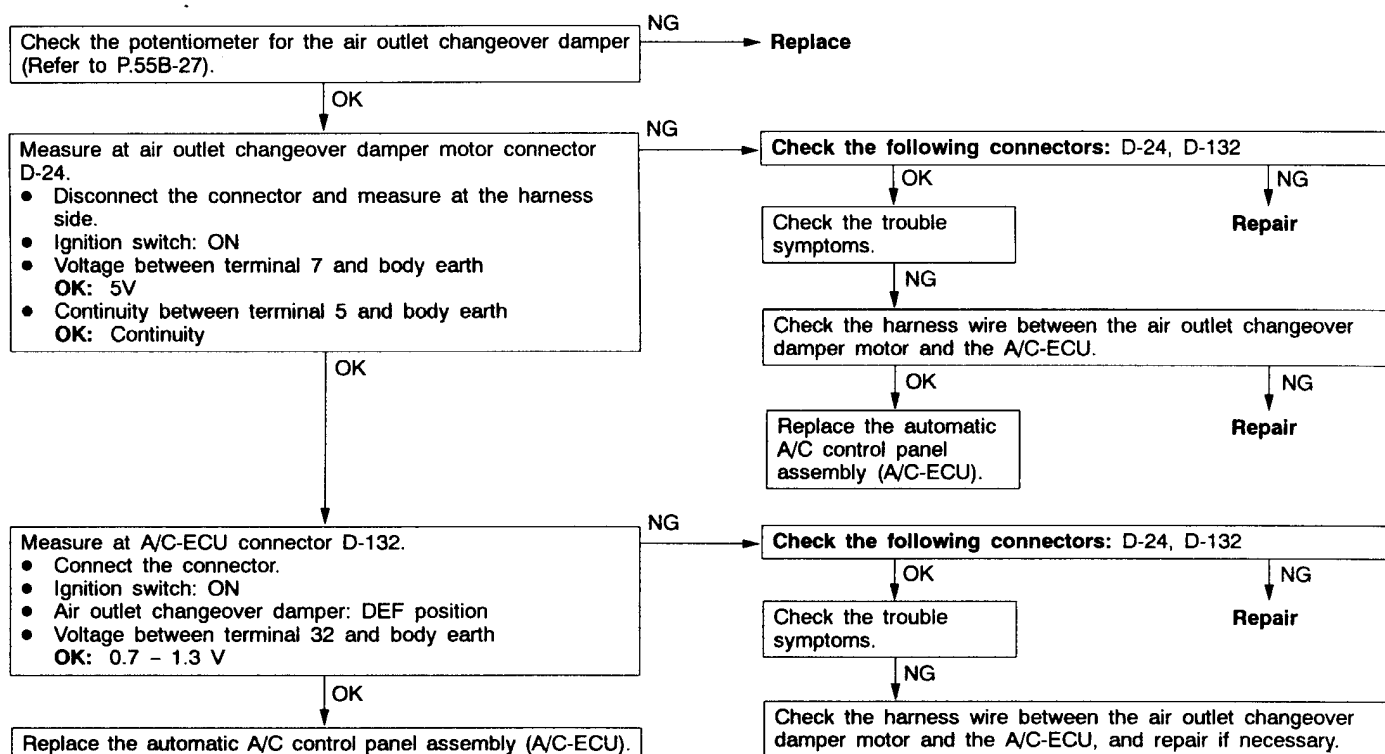


55B-6 HEATER, AIR CONDITIONER AND VENTILATION – Troubleshooting <Front A/C>

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



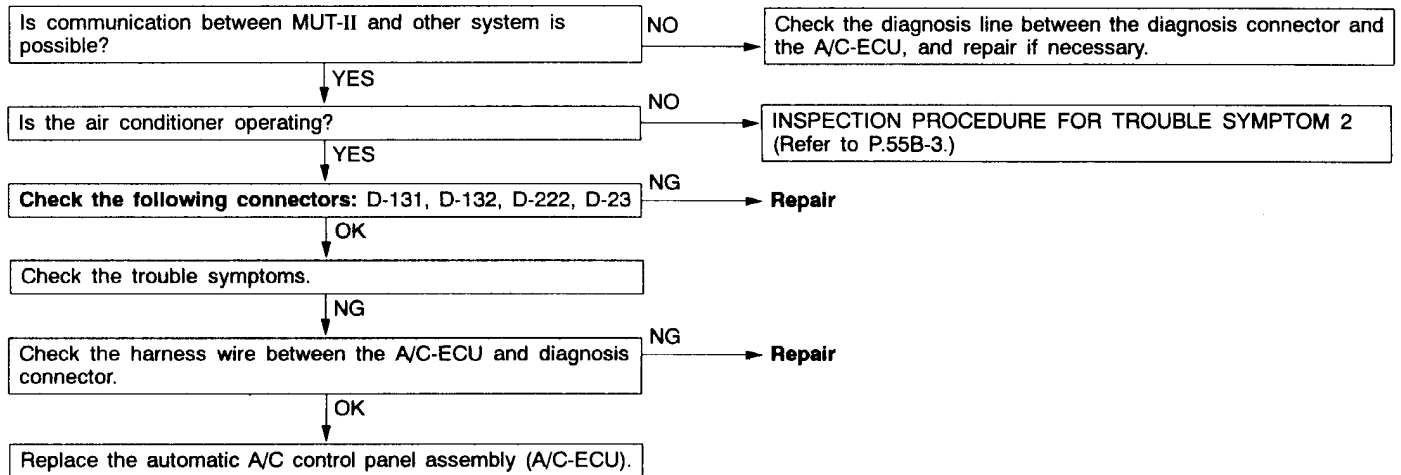
INSPECTION CHART FOR TROUBLE SYMPTOMS

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

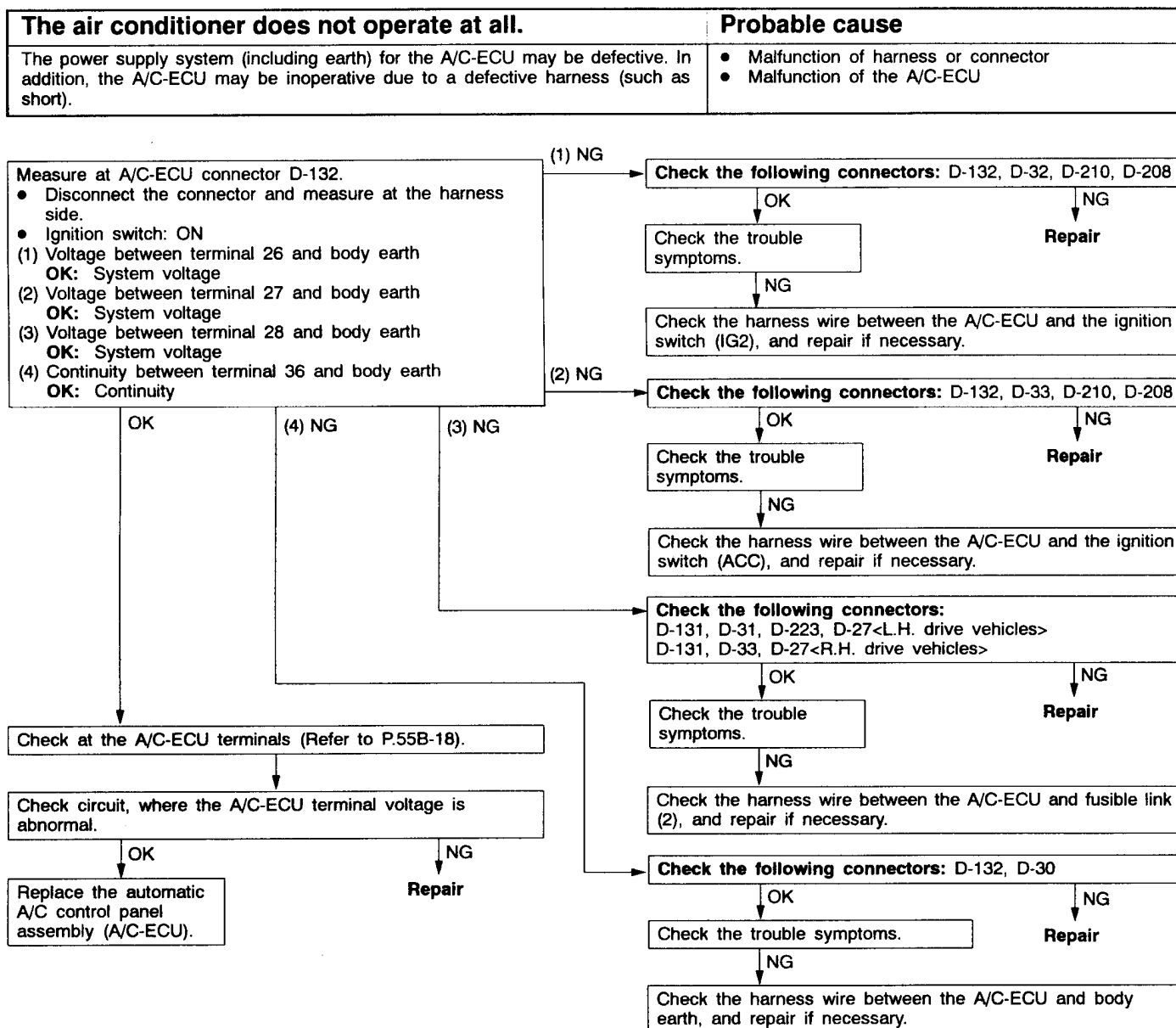
INSPECTION PROCEDURES FOR TROUBLE SYMPTOMS

Inspection procedure 1

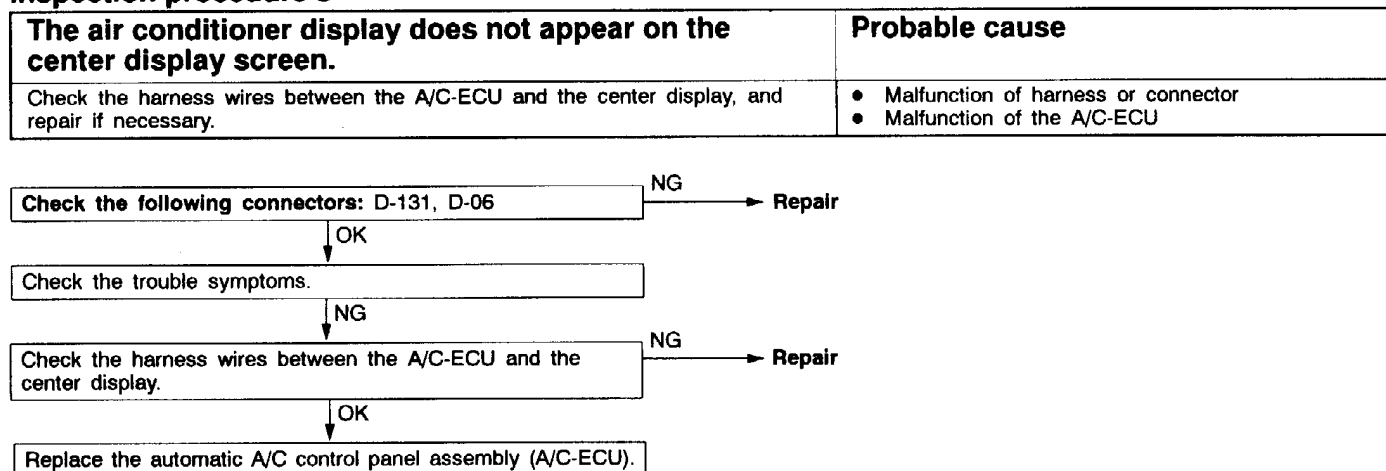
Communication with the MUT-II is not possible.	Probable cause
If communication with all other systems is not possible, there is a high possibility that there is a malfunction of the diagnosis line. If only the A/C system can not communicate with the MUT-II, the diagnosis line between the diagnosis connector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



Inspection procedure 2



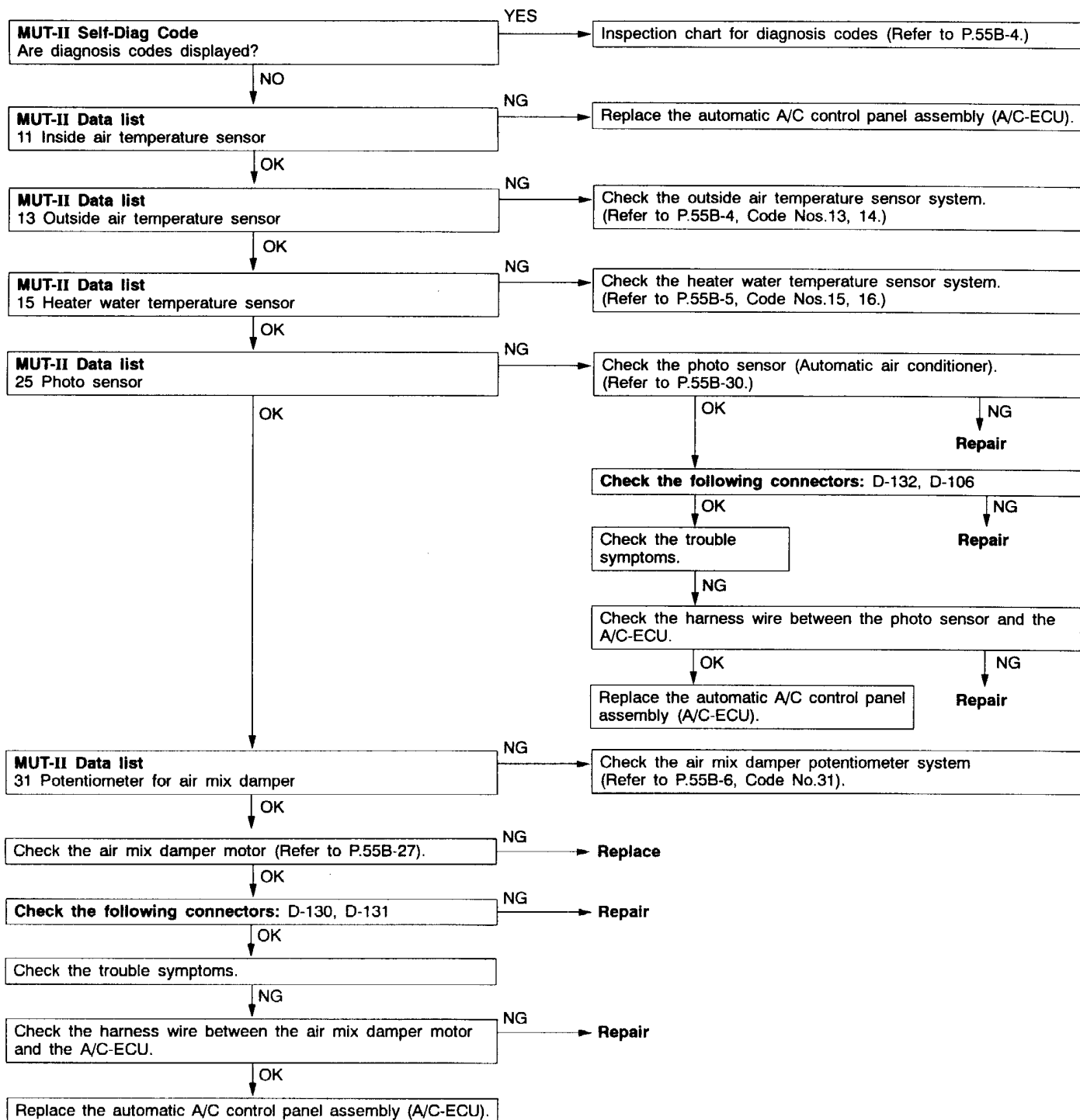
Inspection procedure 3



55B-10 HEATER, AIR CONDITIONER AND VENTILATION – Troubleshooting <Front A/C>

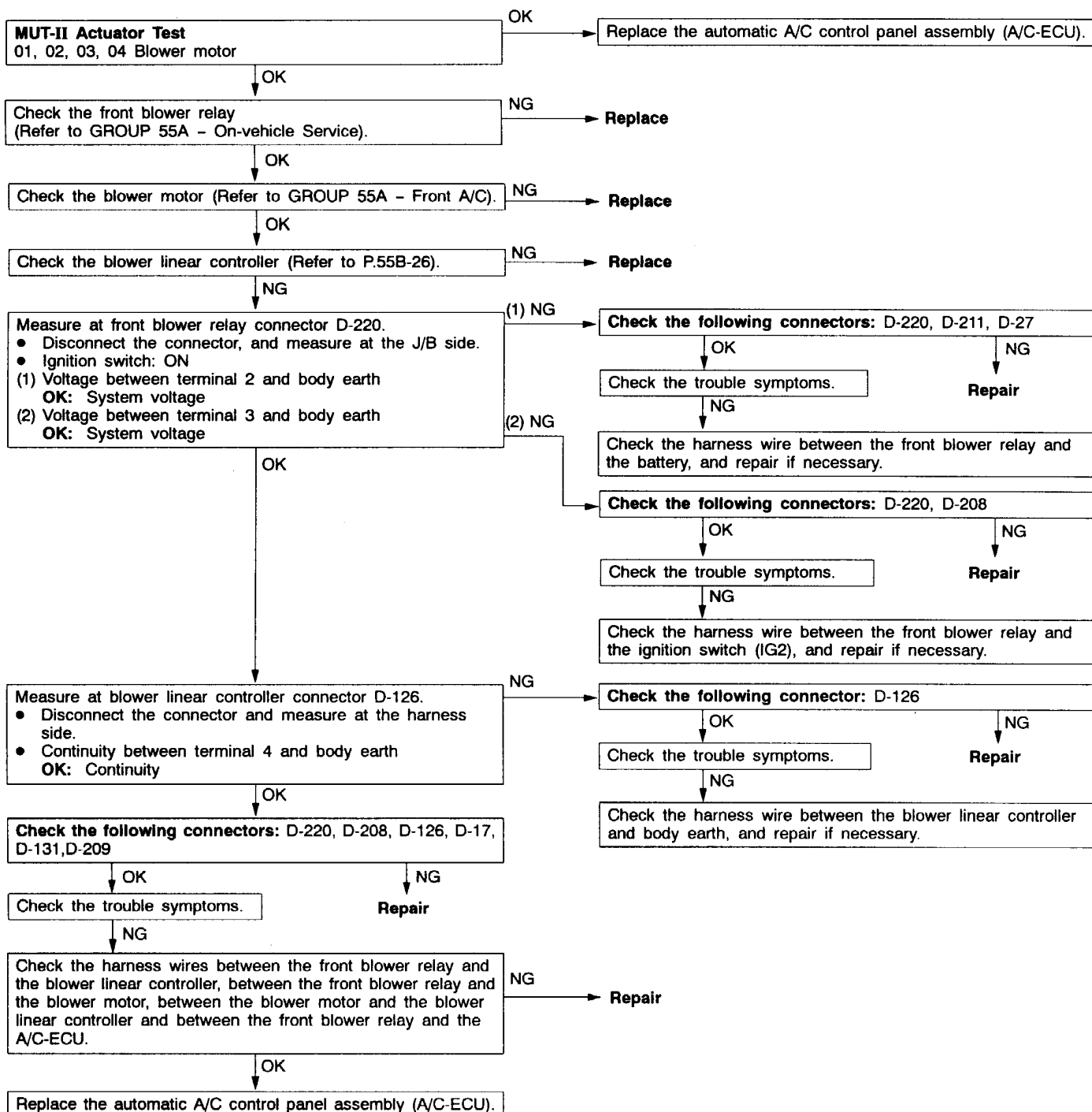
Inspection procedure 4

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 mix damper may be defective.	• Malfunction of the inside air temperature sensor • Malfunction of the outside air temperature sensor • Malfunction of the heater water temperature sensor • Malfunction of the photo sensor • Malfunction of the electric motor for the air mix damper • Malfunction of harness or connector • Malfunction of the A/C-ECU



Inspection procedure 5

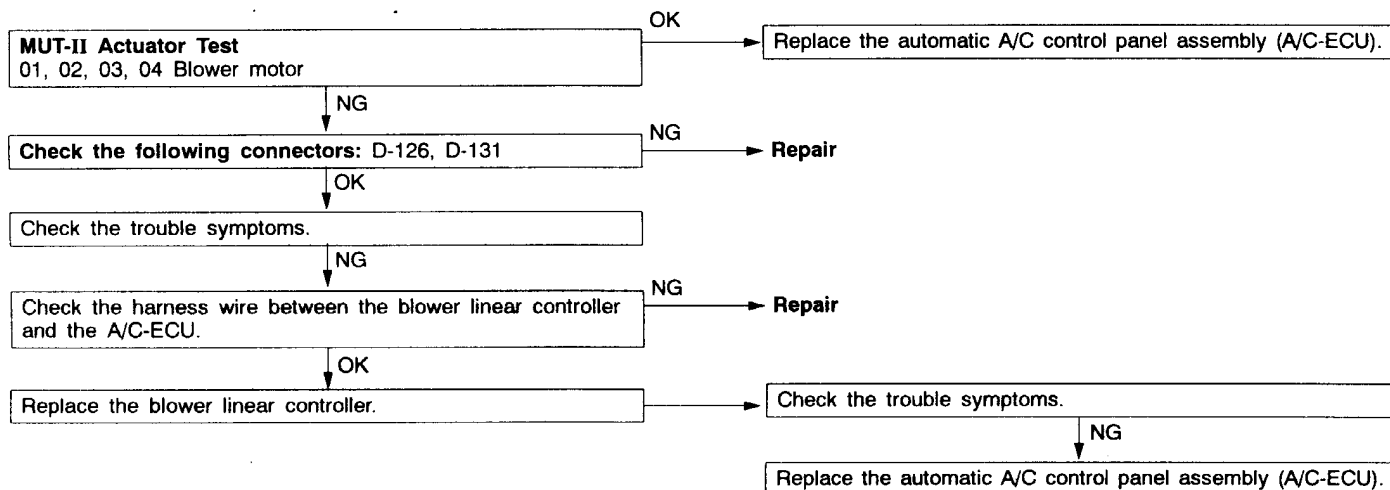
The blower does not operate.	Probable cause
If no air comes out of the blower even though the blower switch is on, the cause is probably a malfunction of the front blower relay circuit.	• Malfunction of the front blower relay • Malfunction of the blower linear controller • Malfunction of the blower motor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



55B-12 HEATER, AIR CONDITIONER AND VENTILATION – Troubleshooting <Front A/C>

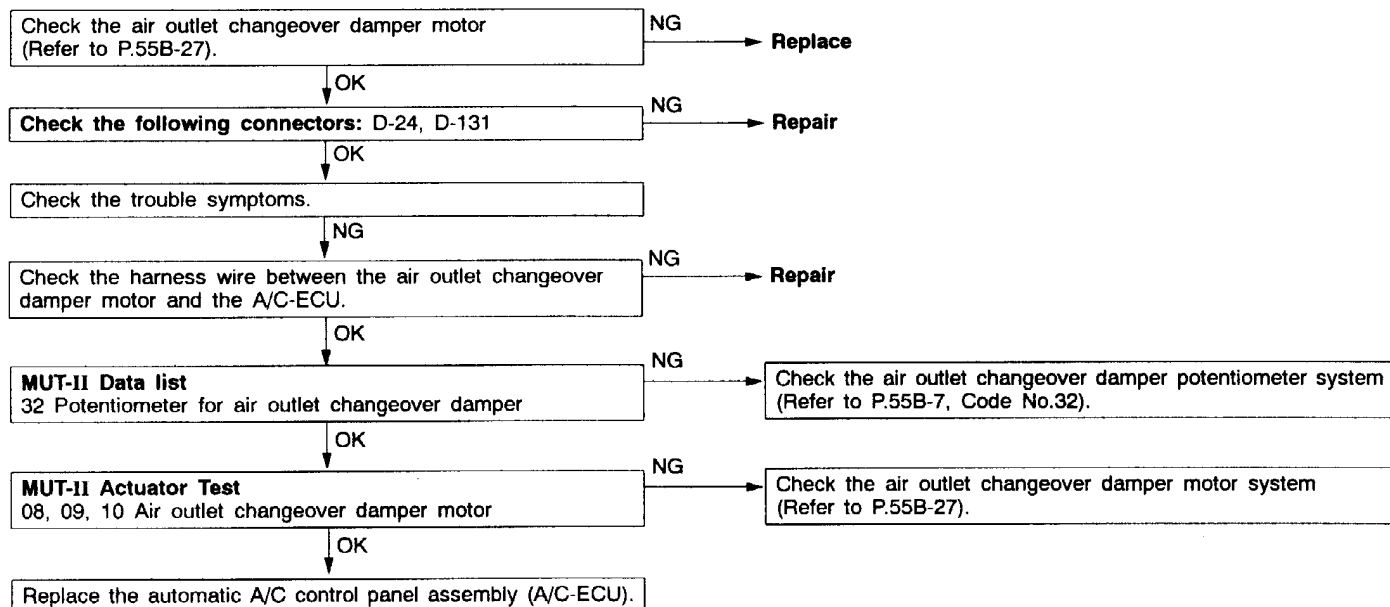
Inspection procedure 6

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



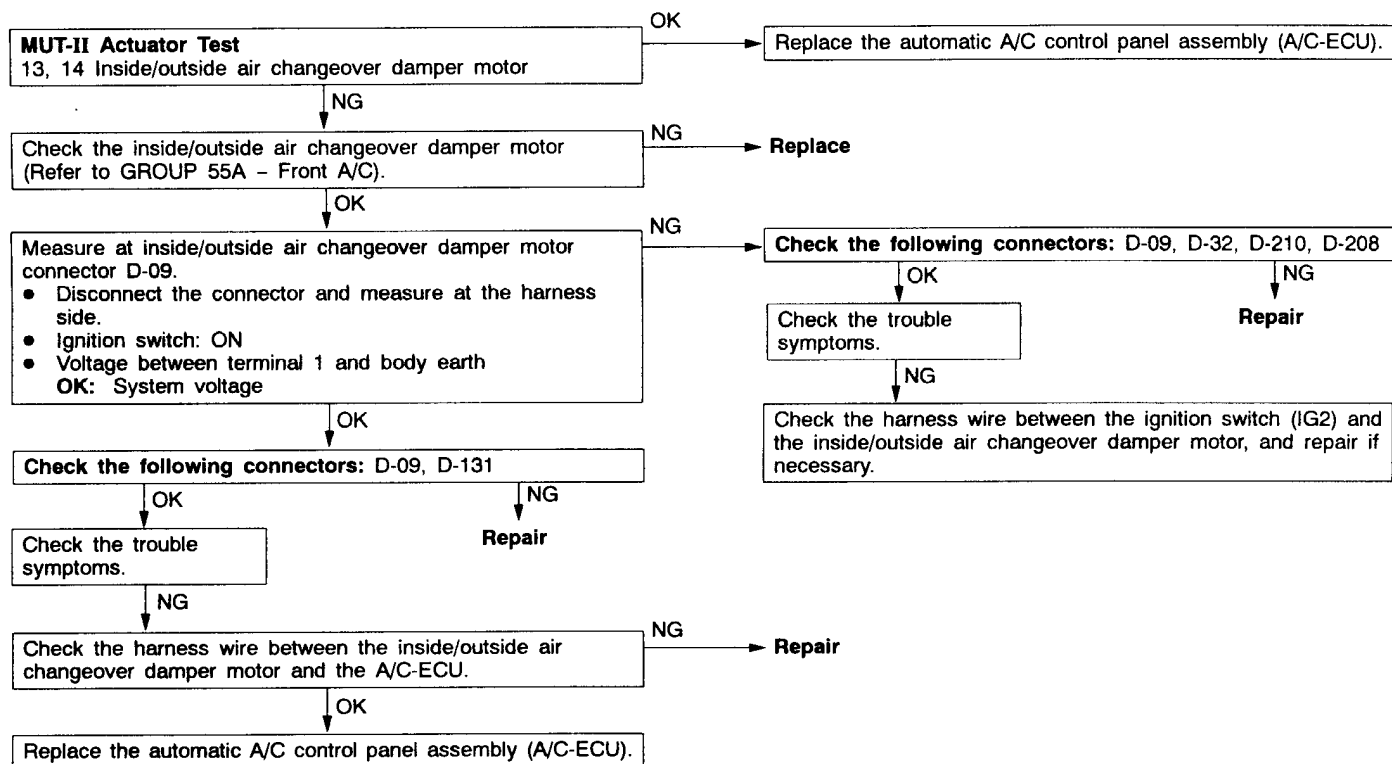
Inspection procedure 7

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



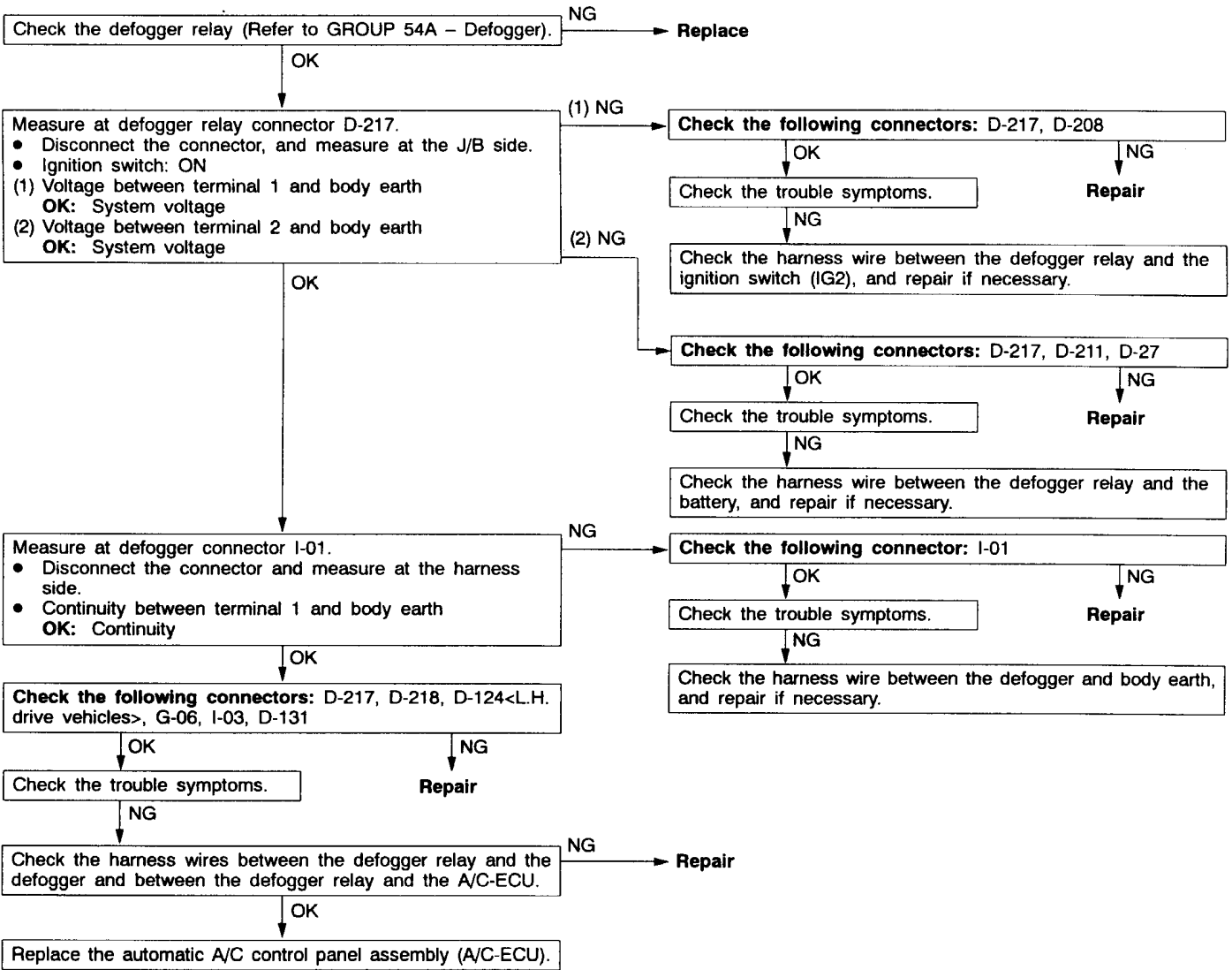
Inspection procedure 8

Inside/outside 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 inside/outside air changeover damper motor system may be defective.	• Malfunction of the inside/outside air changeover damper motor • Malfunction of harness or connector • Malfunction of the A/C-ECU



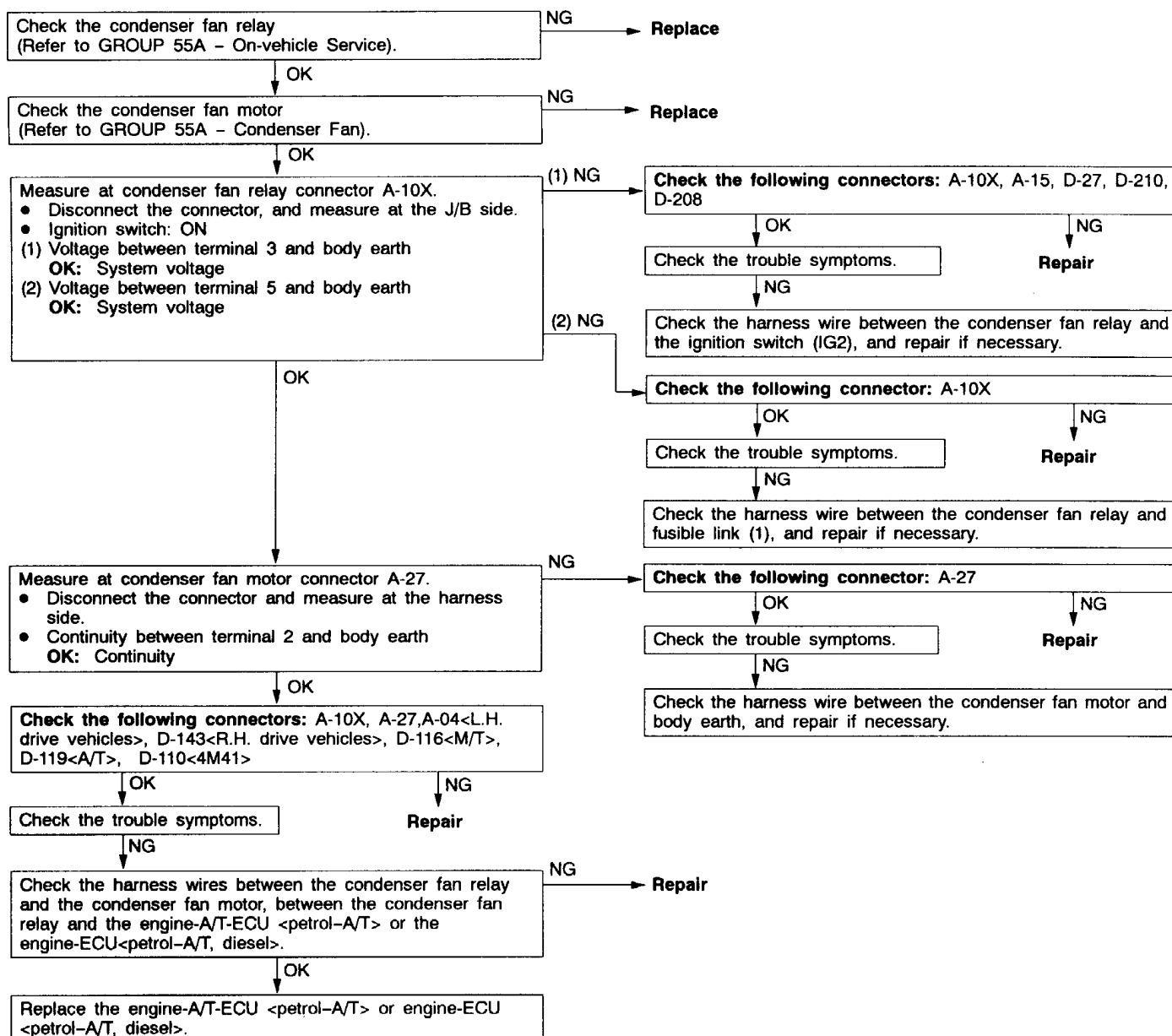
Inspection procedure 9

The rear defogger does not operate.	Probable cause
When the rear defogger does not operate even if the rear defogger switch is on (the defogger remains on for twenty minutes due to a timer function), the rear defogger relay system may be defective.	• Malfunction of the defogger relay • Malfunction of harness or connector • Malfunction of the A/C-ECU



Inspection procedure 10

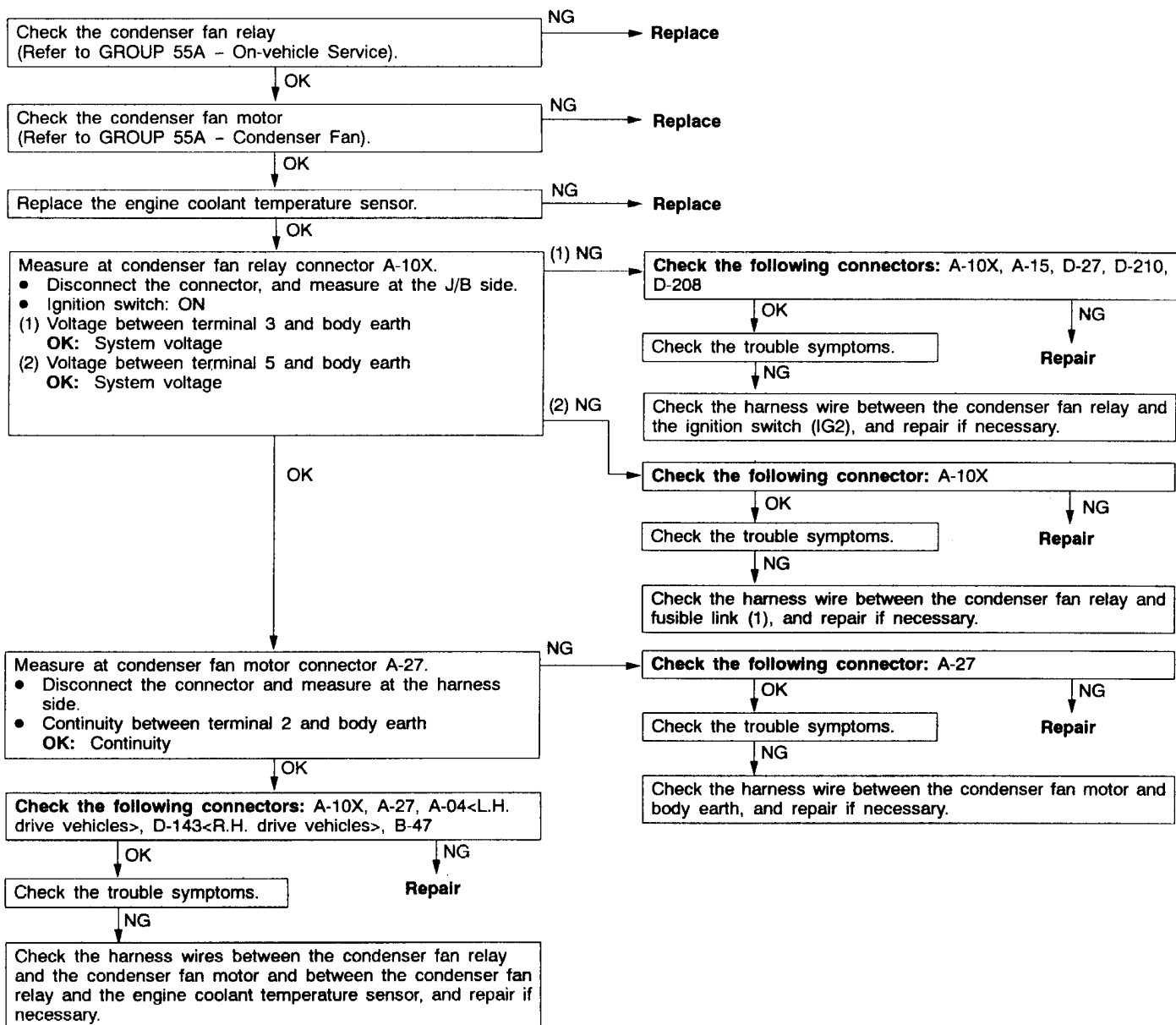
The condenser fan does not operate <except 4D56>.	Probable cause
If the condenser fan does not operate, the condenser fan relay or motor may be defective.	- Malfunction of the condenser fan relay - Malfunction of harness or connector - Malfunction of the engine-A/T-ECU <petrol> or engine-ECU <diesel>



55B-16 HEATER, AIR CONDITIONER AND VENTILATION – Troubleshooting <Front A/C>

Inspection procedure 11

The condenser fan does not operate <4D56>.	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 harness or connector • Malfunction of the engine-A/T-ECU <petrol> or engine-ECU <diesel>

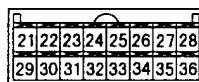
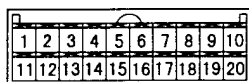


DATA LIST REFERENCE TABLE

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	Outside air 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 mix damper	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 air outlet changeover damper	Ignition switch: ON Damper position: FACE	Opening angle: Approximately 0%
		Ignition switch: ON Damper position: FOOT	Opening angle: Approximately 60%
		Ignition switch: ON Damper position: FOOT/DEF	Opening angle: Approximately 80%
		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	Electric motor for the air mix damper	Opening angle: Approximately 0%
06		Opening angle: Approximately 50%
07		Opening angle: Approximately 100%
08	Electric motor for the air outlet changeover damper	FACE
09		FOOT
10		DEF
11	Compressor ON/OFF	OFF
12		ON
13	Inside/outside air changeover damper motor	Outside air
14		Inside air

CHECK AT A/C-ECU TERMINALS

W0763AU

Terminal No.	Check item	Check conditions	Normal condition
1	Electric motor for the air mix damper (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)
2	Electric motor for the air outlet changeover damper (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)
3	Inside/outside air changeover damper motor (Inside air)	When the damper flap is moving to the inside air recirculation position.	Faint voltage (0.5 V)
		When the damper flap is moving to the outside air induction position.	10 V (when the motor is stopped)
4	Inside/outside air changeover damper motor (Outside air)	When the damper flap is moving to the inside air recirculation position.	10 V (when the motor is stopped)
		When the damper flap is moving to the outside air induction position.	Faint voltage (0.5 V)
5	Input signal from dual pressure switch	Dual pressure switch: OFF	0 V
		Dual pressure switch: ON	System voltage
6	Multi center display unit communication line	Ignition switch: ON	Hi: 4 – 5 V Lo: 0 – 1 V
7	Output to the engine-A/T-ECU <petrol> or engine-ECU <diesel>.	When the A/C is off.	0 V
		When the A/C is in operation (When compressor is operating)	System voltage
9	Input from lock sensor <petrol>	When the compressor is operating	0 – 0.75 V (pulse signal)
10	Output to blower linear controller	When the blower is operating	0 – 3.5 V (Effective alternating voltage)
11	Electric motor for the air mix damper (MAX HOT)	When the damper flap is moving to the MAX COOL position.	Faint voltage (0.5 V)
		When the damper flap is moving to the MAX HOT position.	10 V
12	Electric motor for the air outlet changeover damper (DEF)	When the damper flap is moving to the FACE position.	Faint voltage (0.5 V)
		When the damper flap is moving to the DEF position.	10 V
13	Engine-ECU <Diesel for cold zone>	Blower switch: ON Air outlet temperature: FOOT, FOOT/DEF, DEF Set temperature: MAX HOT (32°C)	System voltage
14	Blower relay	When the blower is stopped	System voltage
		When the blower is operating	0 V

Terminal No.	Check item	Check conditions	Normal condition
15	Rear defogger	Rear defogger: OFF	System voltage
		Rear defogger: ON	1.5 V or less
16	Multi center display unit communication line	Ignition switch: ON	Hi: 4 – 5 V Lo: 0 – 1 V
17	Multi center display unit communication line	Ignition switch: ON	Hi: 4 – 5 V Lo: 0 – 1 V
18	Multi center display unit communication line shield	At all times	0 V
19	Diagnosis output	Ignition switch: ON	A voltmeter needle fluctuates between 0 and 12 V.
20	Input from A/C compressor relay	When the A/C is off.	0 V
		When the A/C is in operation (When compressor is operating)	System voltage
21	Power supply to potentiometer	At all times	5 V
22	Input from outside air temperature sensor	Sensor temperature: 25°C (1.7 kΩ)	1.9 V
23	Input from heater water temperature sensor	Sensor temperature: 25°C (5 kΩ)	2.8 V
24	Input from potentiometer for air mix damper	When the damper flap is moving to the MAX HOT position.	0.7 – 1.3 V
25	Power supply to illumination	Lighting switch: ON	System voltage
26	Power supply to ignition switch (IG2)	Ignition switch: ON	System voltage
27	Power supply to ignition switch (ACC)	Ignition switch: ACC	System voltage
28	Backup power supply	At all times	System voltage
29	Earth to sensor and potentiometer	At all times	0 V
30	Input from air thermo sensor	Sensor temperature: 25°C (1.5 kΩ)	2.2 V
31	Photo sensor (+)	During 800 kcal/m ² – h	1 V
32	Input from potentiometer for the air outlet changeover damper	When the damper flap is moving to the DEF position.	0.7 – 1.3 V
33	Diagnosis input	Ignition switch: ON	0 V
34	Compressor lock signal (ignition signal)	Engine speed: 3 000 r/min	0.3 – 3.0
35	Illumination earth	At all times	Continuity
36	Earth	At all times	Continuity

CHECK AT ENGINE-A/T-ECU OR ENGINE-ECU TERMINALS

Refer to GROUP 13A – Troubleshooting <petrol> or GROUP 13B – Troubleshooting <diesel>.

TROUBLESHOOTING <REAR A/C>

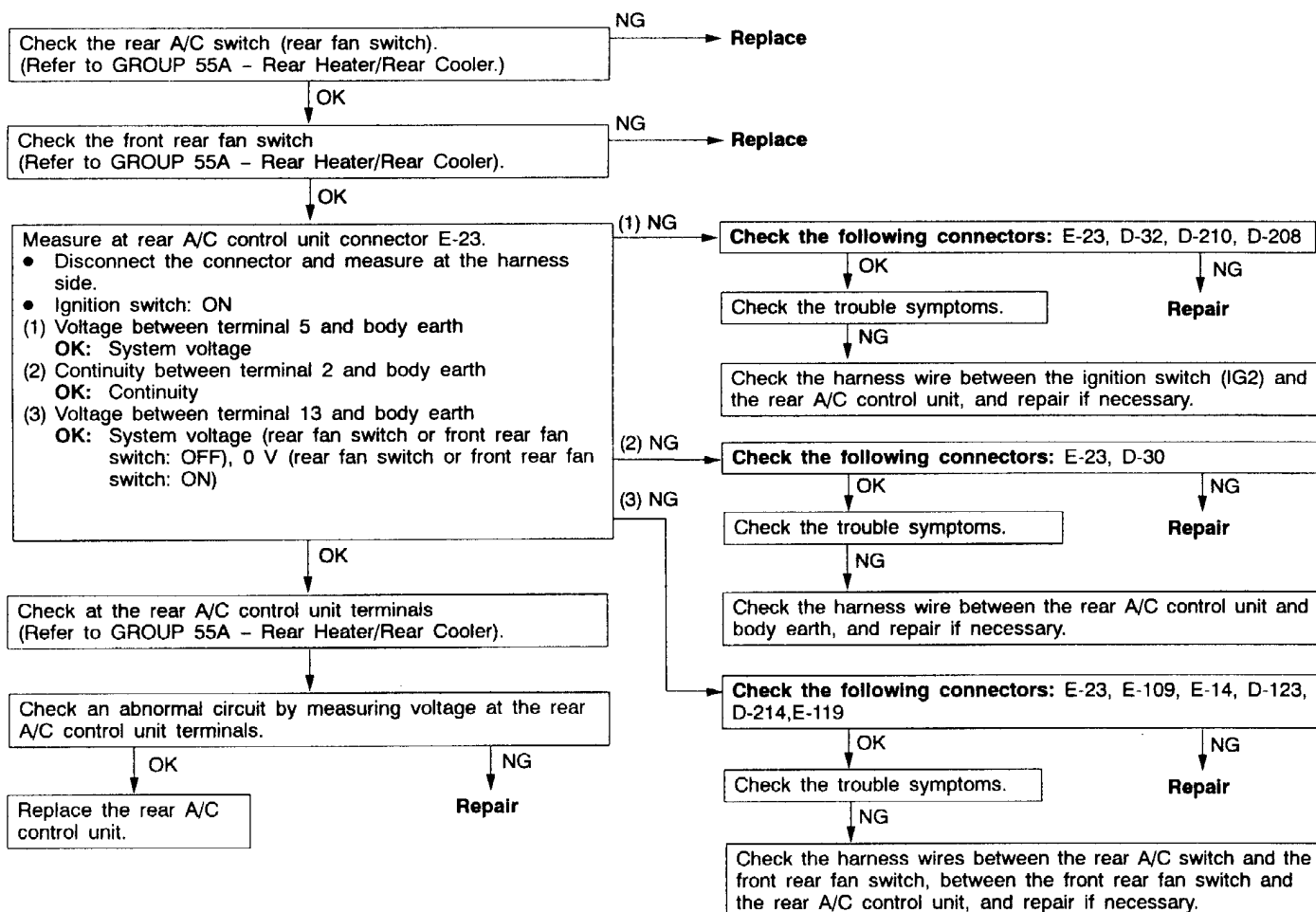
INSPECTION CHART FOR TROUBLE SYMPTOMS

Trouble symptom	Inspection procedure No.	Reference page
The rear A/C does not operate at all.	1	55B-20
The rear A/C outlet air temperature can not be set.	2	55B-21
The rear blower does not operate.	3	55B-22
Rear blower air volume can not be changed.	4	55B-23
Air outlet vents can not be changed in proportion to the temperature adjusting switch.	5	55B-23

INSPECTION PROCEDURES FOR TROUBLE SYMPTOMS

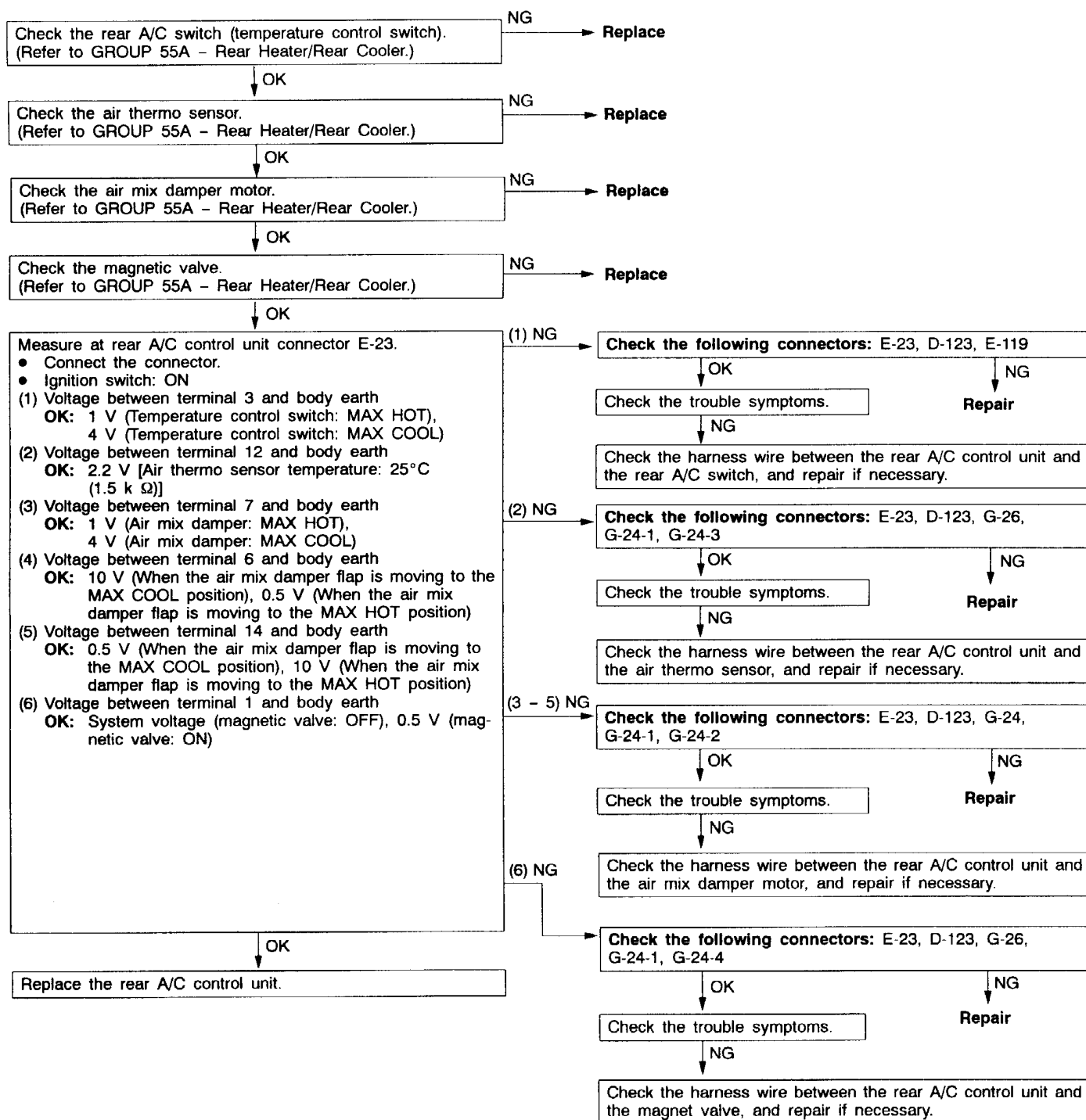
Inspection procedure 1

The rear A/C does not operate at all.	Probable cause
The rear fan switch or front rear fan switch circuit, or the power supply system (including earth) for the rear A/C control unit may be defective. Besides that, the rear A/C control unit may not be operating correctly due to a defective harness (such as short circuit).	- Malfunction of the rear fan switch - Malfunction of the front rear fan switch - Malfunction of harness or connector - Malfunction of the rear A/C control unit



Inspection procedure 2

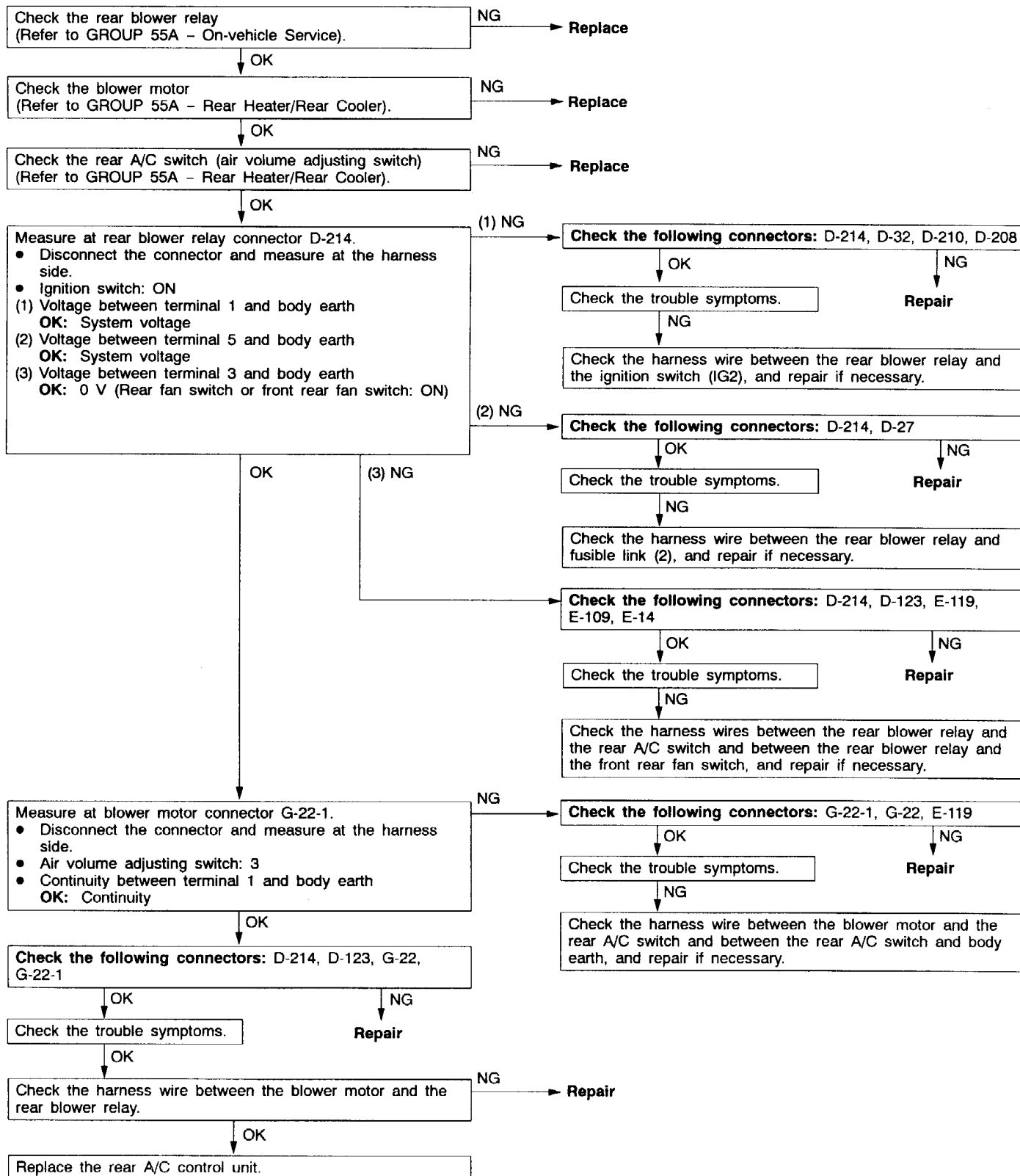
The rear A/C outlet air temperature can not be set.	Probable cause
If the air outlet temperature can not be changed after a temperature control switch is operated, the temperature control switch, the air thermo sensor, the magnet valve or the air mix damper maybe defective.	• Malfunction of the rear A/C switch • Malfunction of the air thermo sensor • Magnet valve • Malfunction of the electric motor for the air mix damper • Malfunction of harness or connector • Malfunction of the rear A/C control unit



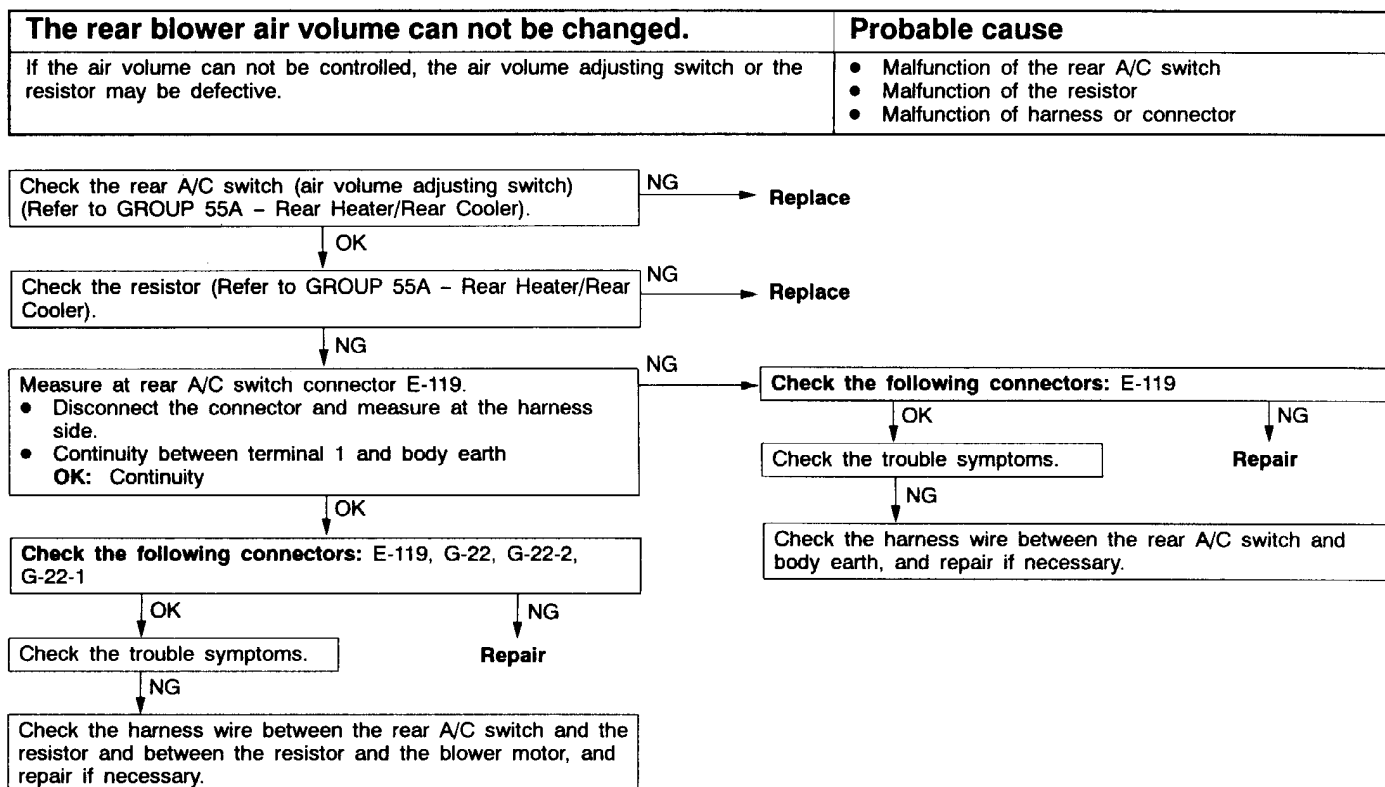
55B-22 HEATER, AIR CONDITIONER AND VENTILATION – Troubleshooting <Rear A/C>

Inspection procedure 3

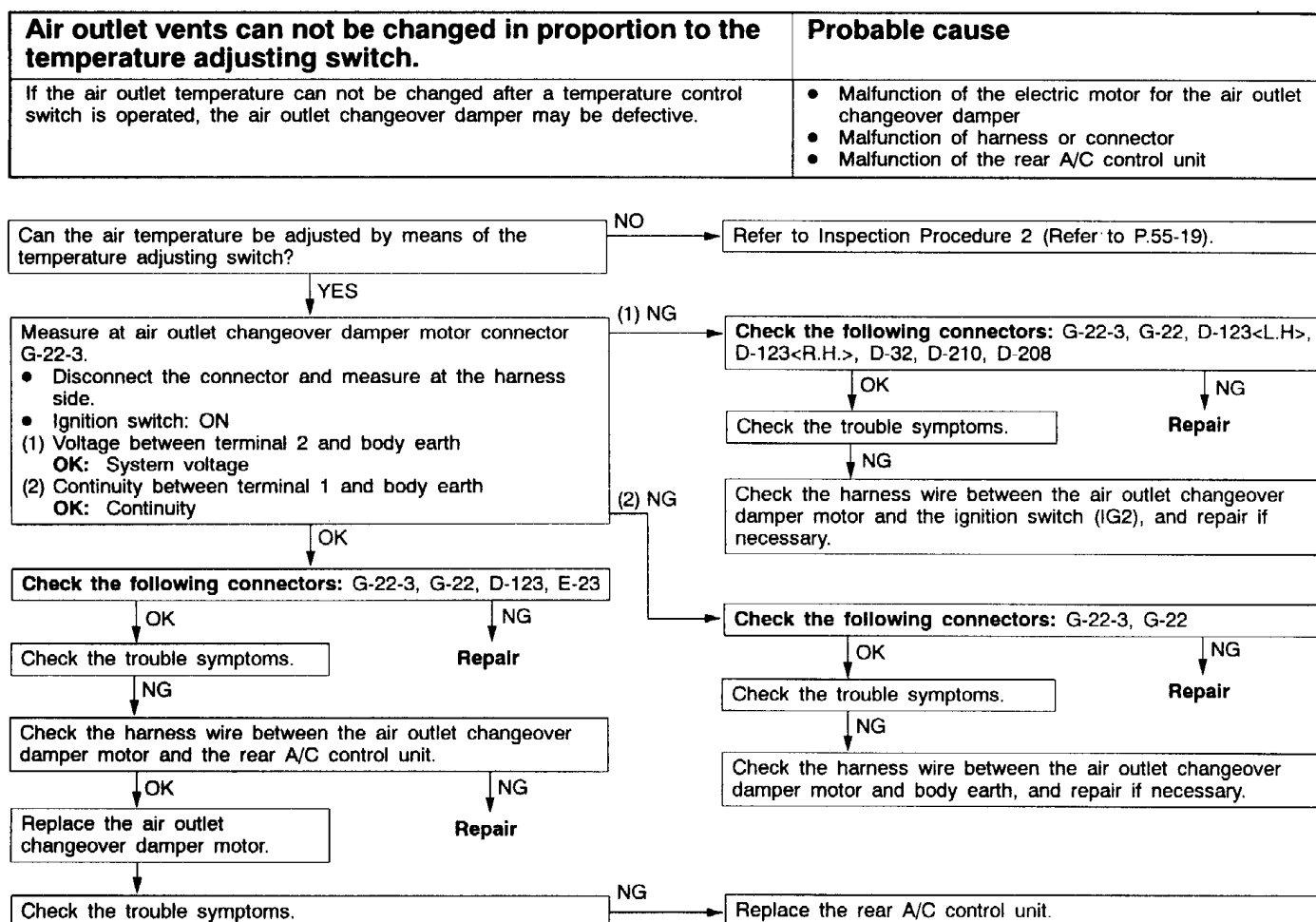
The rear blower does not operate.	Probable cause
If no air comes out of the air vents even if the rear fan switch or the front rear fan switch is turned on, the rear blower relay circuit may be defective.	• Malfunction of the rear blower relay • Malfunction of the blower motor • Malfunction of the rear A/C switch • Malfunction of harness or connector



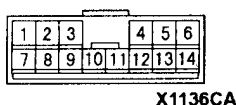
Inspection procedure 4



Inspection procedure 5



CHECK AT REAR A/C CONTROL UNIT TERMINALS

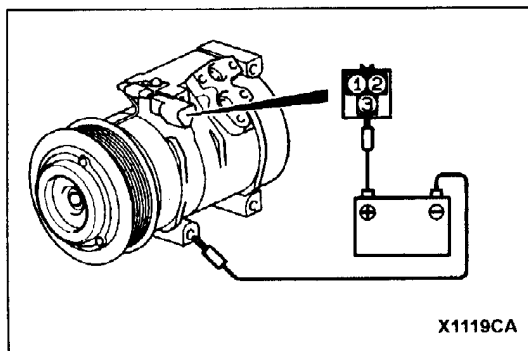


Terminal No.	Check item	Check conditions	Normal condition
1	Magnet valve	Magnet valve: OFF	System voltage
		Magnet valve: ON	Faint voltage (0.5 V)
2	Earth	At all times	Continuity
3	Input from temperature adjusting switch	Temperature adjusting switch: MAX HOT	1 V
		Temperature adjusting switch: MAX COOL	4 V
4	Power supply to potentiometer	At all times	5 V
5	Power supply to ignition switch (IG2)	Ignition switch: ON	System voltage
6	Electric motor for the air mix damper (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)
7	Input from potentiometer for air mix damper	Air mix damper: MAX HOT	1 V
		Air mix damper: MAX COOL	4 V
8	Earth to sensor and potentiometer	At all times	0 V
9	Signal from air outlet changeover damper motor	Ignition switch: ON	0 – 12 V
10	Signal from air outlet changeover damper motor	Ignition switch: ON	0 – 12 V
11	Signal from air outlet changeover damper motor	Ignition switch: ON	0 – 12 V
12	Input from air thermo sensor	Sensor temperature: 25°C (1.5 kΩ)	2.2 V
13	Input from rear fan switch and front rear fan switch	Rear fan switch or front rear fan switch: ON	0 V
14	Electric motor for the air mix damper (MAX HOT)	When the damper flap is moving to the MAX COOL position.	Faint voltage (0.5 V)
		When the damper flap is moving to the MAX HOT position.	10 V

ON-VEHICLE SERVICE

MAGNETIC CLUTCH TEST

1. Disconnect the connector (3-pin) to the magnetic clutch.
2. Connect battery (+) voltage directly to the connector for the magnetic clutch.
3. If the magnetic clutch is normal, there will be "click". If the pulley and armature do not make contact ('click'), there is a malfunction.



IDLE UP OPERATION CHECK <Petrol>

1. Set the vehicle in the following condition:
2. Check that the idle speed is within the standard value.

Standard value: 700 ± 50 r/min

NOTE

- (1) The idle speed is controlled by the ISC system and should not be adjusted.
 - (2) Run the engine at idle, and wait for at least two minutes before the check.
3. The idle speed should be within the standard value when the A/C switch is turned on and the A/C is operating.

Standard value:

<While the A/C is under low load>

700 ± 50 r/min

<While the A/C is under medium load>

800 ± 50 r/min

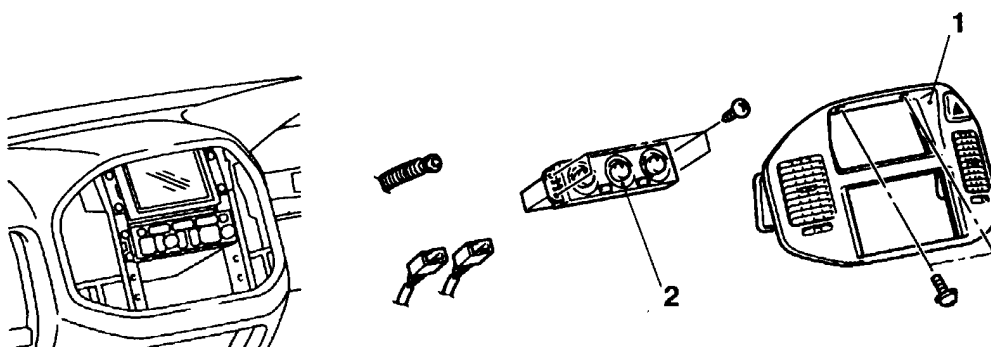
<While the A/C is under high load>

1,000 ± 50 r/min

FRONT A/C

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

REMOVAL AND INSTALLATION

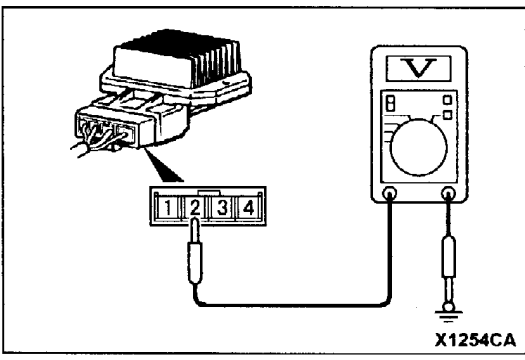
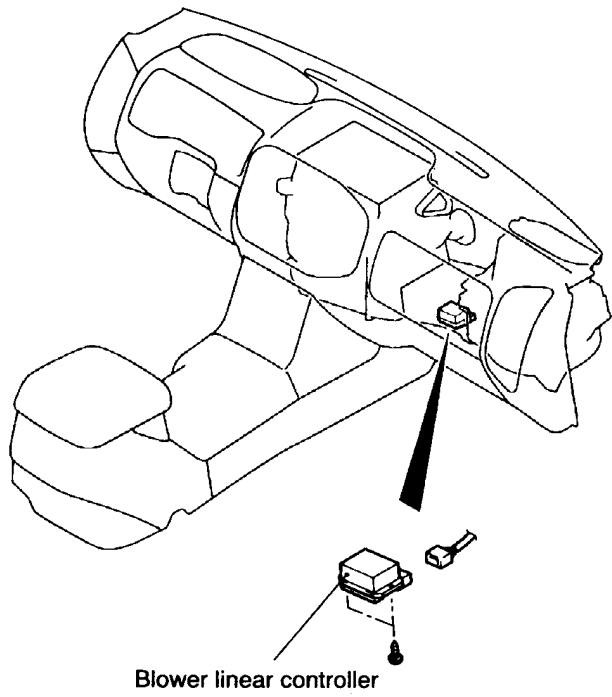


AX1027CA

Removal steps

1. Center panel (Refer to GROUP 52A – Instrument Panel.)
2. Automatic A/C control panel assembly (A/C-ECU)

**BLOWER LINEAR CONTROLLER
REMOVAL AND INSTALLATION**



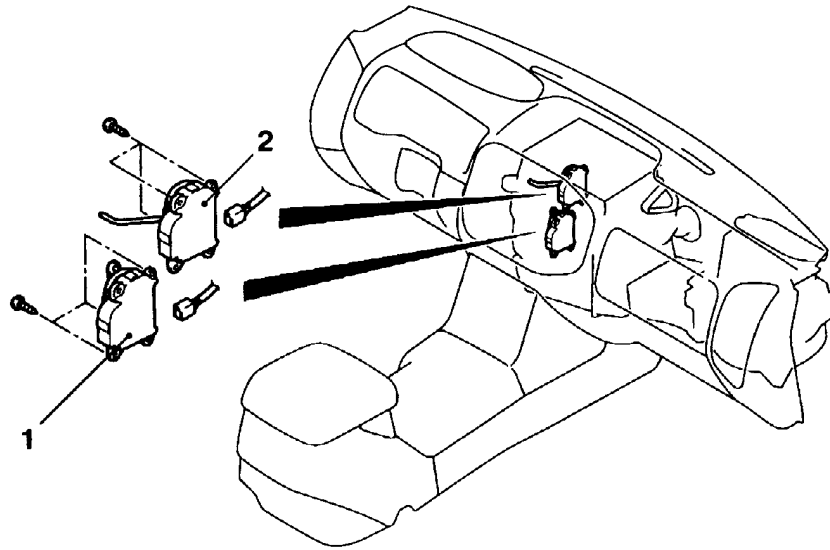
INSPECTION

BLOWER LINEAR CONTROLLER INSPECTION

When the connector is connected and the ignition switch is turned ON, the voltage at terminal 2 should meet the following table.

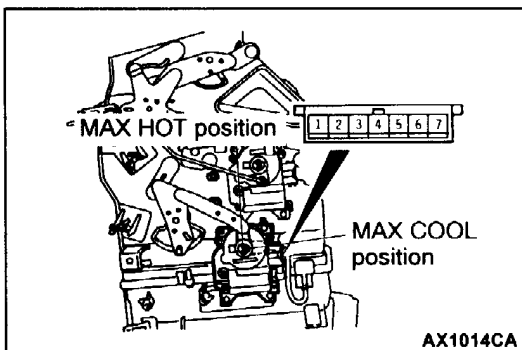
Blower switch position	Voltage at terminal No.2 V
Low speed	4.0
Medium speed	7.9
High speed	13.7

AIR MIX DAMPER MOTOR AND AIR OUTLET CHANGEOVER DAMPER MOTOR REMOVAL AND INSTALLATION



Removal steps

- Under cover (Refer to GROUP 52A – Instrument Panel.)
- 1. Electric motor for the air mix damper
- 2. Electric motor for the air outlet changeover damper



INSPECTION

AIR MIX DAMPER MOTOR INSPECTION

Motor check

Battery connection terminal		Lever operation
1	2	
+	-	Rotate to the HOT position.
-	+	Rotate to the COOL position.

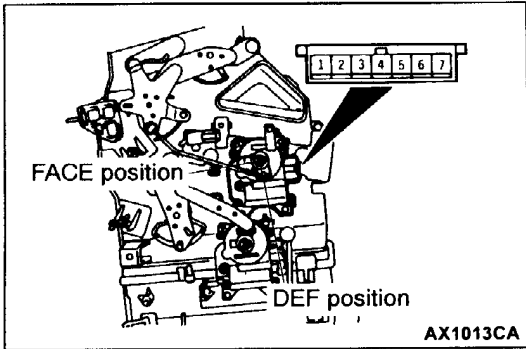
Caution

If the lever reaches the stop position, disconnect the battery voltage.

Potentiometer check

When the resistances between terminals 3 and 5 as well as terminals 3 and 7 are measured at the previous check, the resistance value should change gradually within the standard value.

Standard value: Approximately 0.96 – 5.76 kΩ



AIR OUTLET CHANGEOVER DAMPER MOTOR CHECK

Motor check

Battery connection terminal		Lever operation
1	2	
⊕	⊖	Rotate to the DEF position.
⊖	⊕	Rotate to the FACE position.

Caution

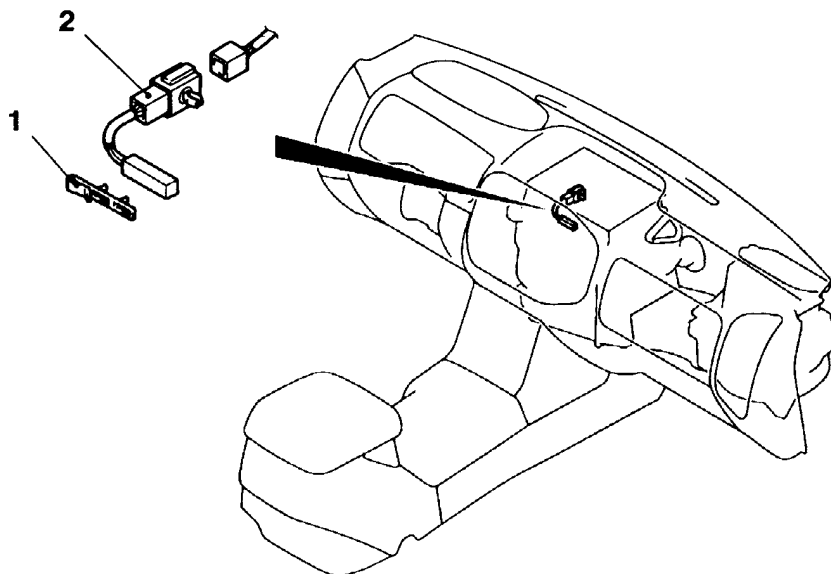
If the lever reaches the stop position, disconnect the battery voltage.

Potentiometer check

When the resistances between terminals 3 and 5 as well as terminals 3 and 7 are measured at the previous check, the resistance value should change gradually within the standard value.

Standard value: Approximately 0.96 – 5.76 kΩ

HEATER WATER TEMPERATURE SENSOR REMOVAL AND INSTALLATION



Removal steps

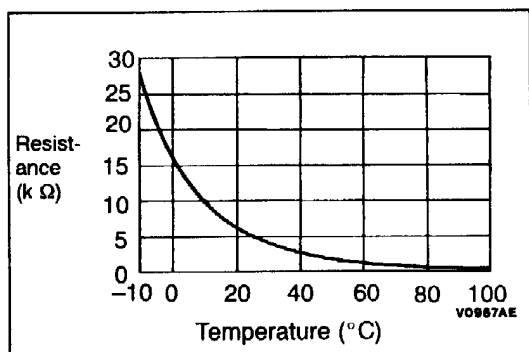
- Under cover (Refer to GROUP 52A – Instrument Panel.)
- 1. Heater water temperature sensor clip
- 2. Heater water temperature sensor



INSTALLATION SERVICE POINTS

►A◄ HEATER WATER TEMPERATURE SENSOR CLIP INSTALLATION

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



INSPECTION

HEATER WATER TEMPERATURE SENSOR CHECK

Measure the resistance between the sensor terminals under at least two temperatures. The resistance values should meet the left graph.

NOTE

The temperature should be within the shown range.

PHOTO SENSOR

REMOVAL AND INSTALLATION

(Refer to GROUP 54A – Headlamp.)

INSPECTION

PHOTO SENSOR CHECK

The blower speed should drop when the light-receiving section of the photo sensor is covered with your hand. If not, replace the photo sensor.

OUTSIDE AIR TEMPERATURE SENSOR

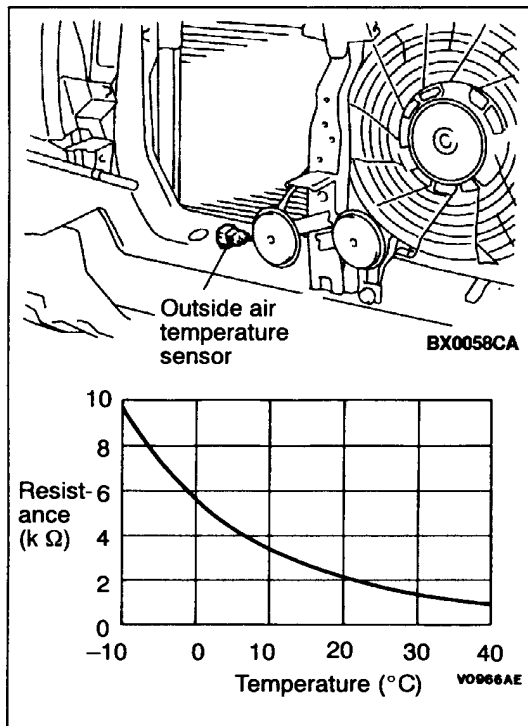
INSPECTION

OUTSIDE AIR TEMPERATURE SENSOR CHECK

Measure the resistance between the sensor terminals under at least two temperatures. The resistance values should meet the left graph.

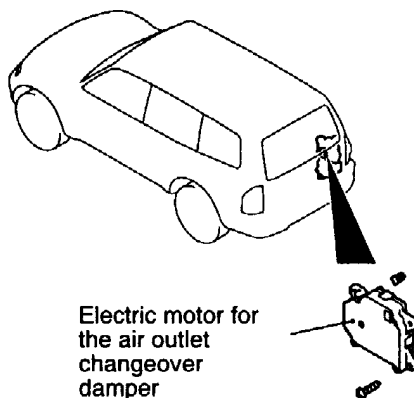
NOTE

The temperature should be within the shown range.



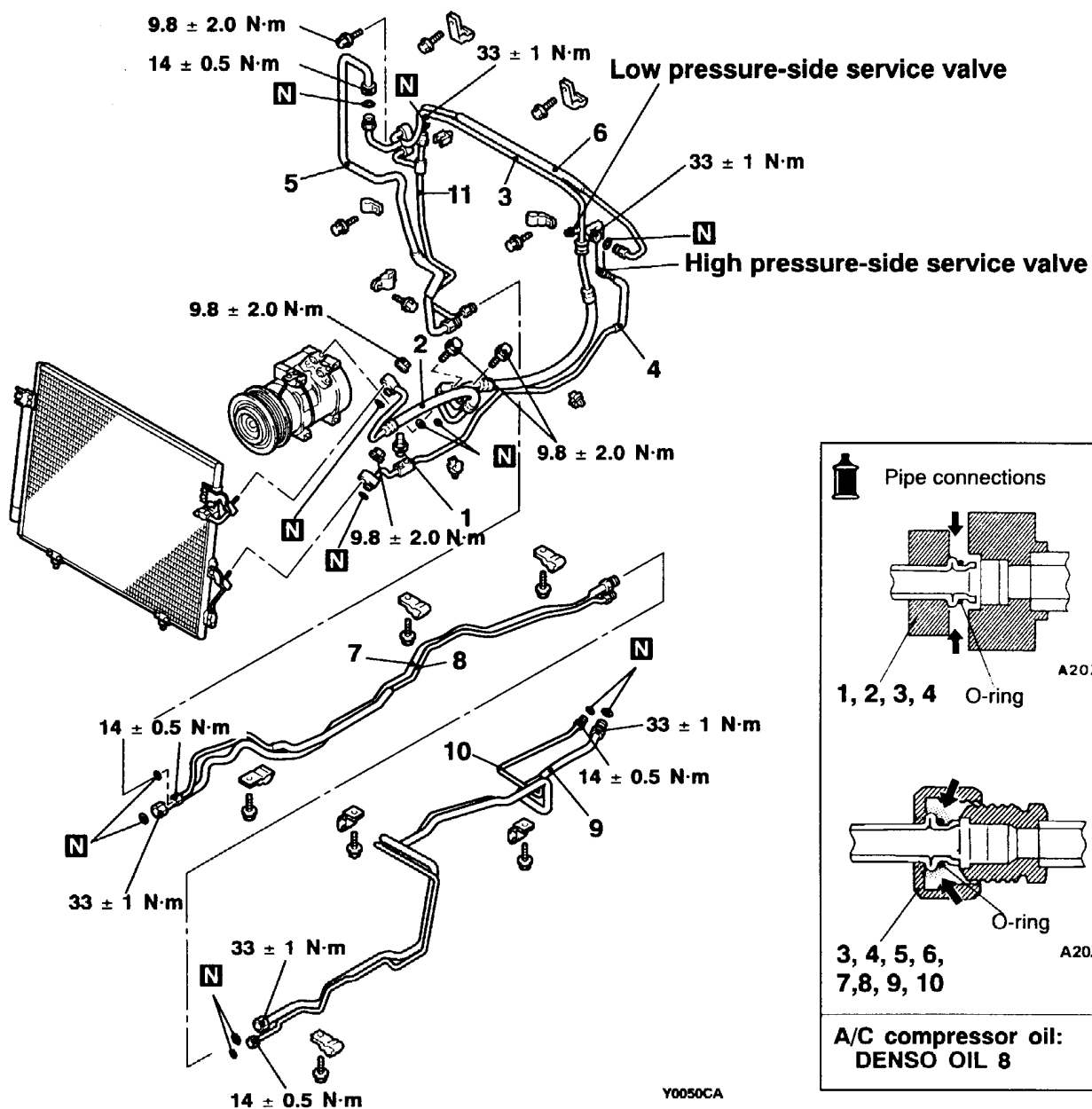
REAR A/C

ELECTRIC MOTOR FOR THE AIR OUTLET CHANGEOVER DAMPER REMOVAL AND INSTALLATION



REFRIGERANT LINE <PETROL>**REMOVAL AND INSTALLATION <L.H. drive vehicles>**

Dual A/C

**Removal steps**

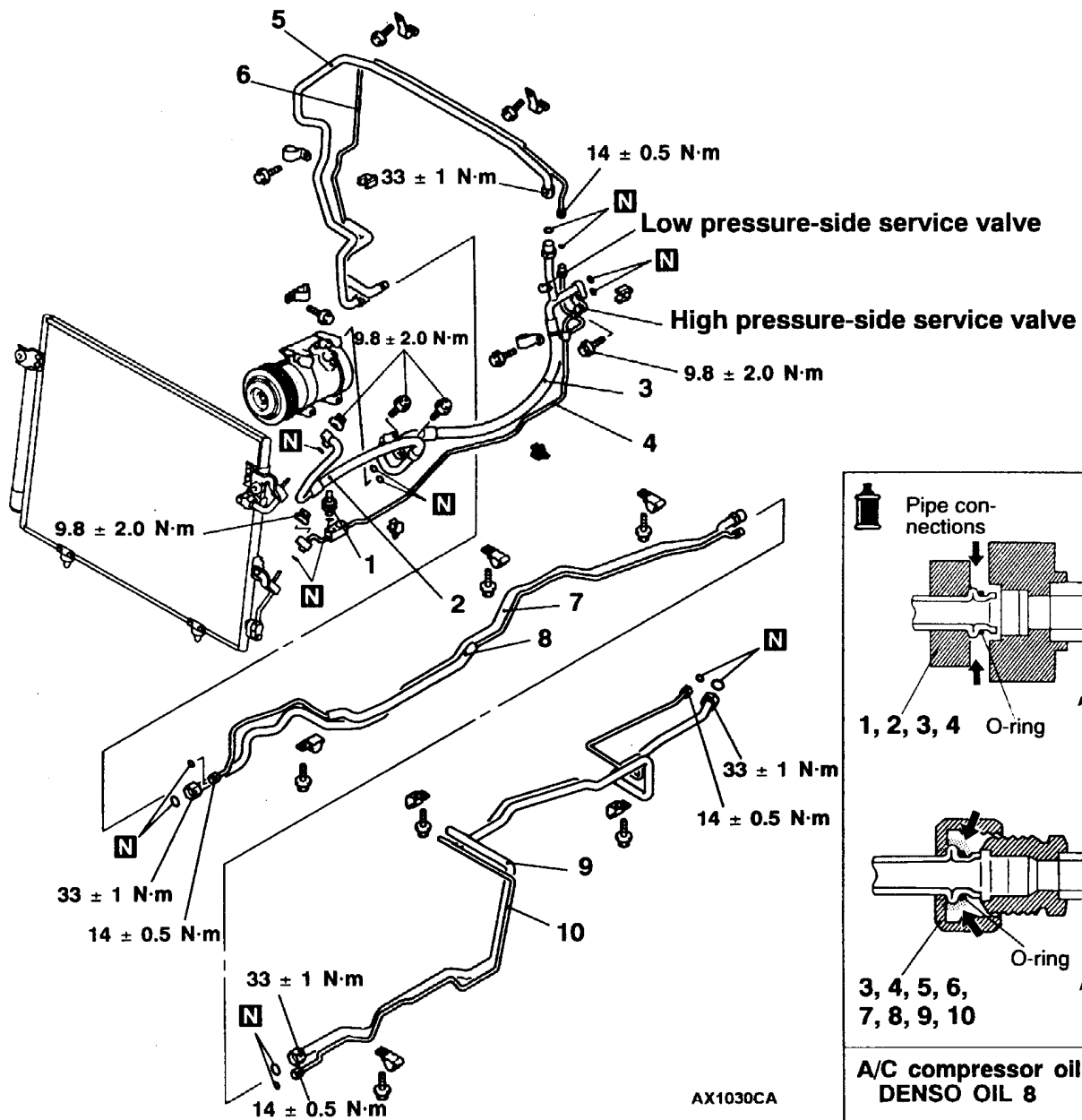
1. Dual pressure switch
2. Discharge flexible hose
3. Suction flexible hose
4. Liquid pipe A
5. Suction pipe A
6. Liquid pipe B



7. Suction pipe B
8. Liquid pipe C
9. Suction pipe C
10. Liquid pipe D
11. Liquid pipe E

<R.H. drive vehicles>

Dual A/C

**Removal steps**

1. Dual pressure switch
2. Discharge flexible hose
3. Suction flexible hose
4. Liquid pipe A
5. Suction pipe A



6. Liquid pipe B
7. Suction pipe B
8. Liquid pipe C
9. Suction pipe C
10. Liquid pipe D

REMOVAL SERVICE POINT

◀A▶ HOSE/PIPE DISCONNECTION

Plug the condenser, the compressor and the heater unit nipples to prevent system contamination.

Caution

Use a plug, which air does not penetrate through.
Compressor oil and receiver absorb moisture easily.

COMPRESSOR <petrol>

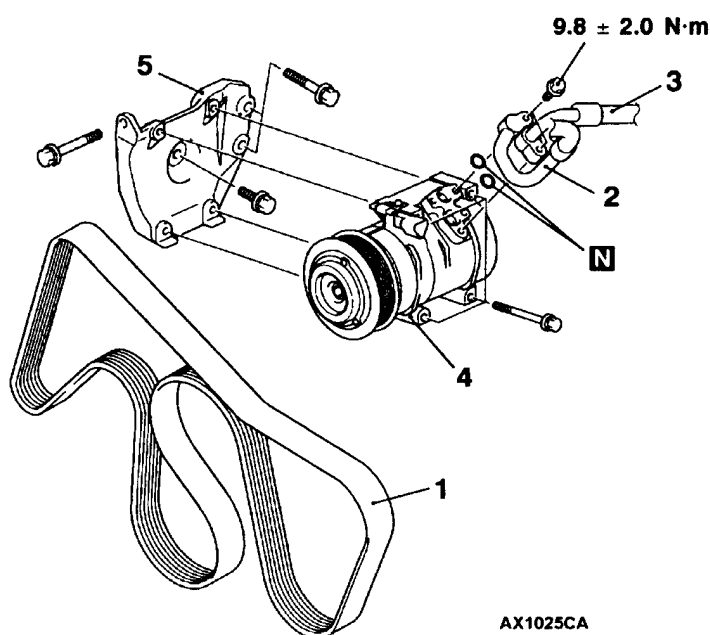
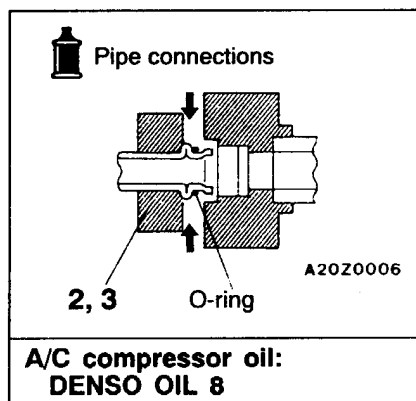
REMOVAL AND INSTALLATION

Pre-removal Operations

Refrigerant discharge
(Refer to GROUP-55A – On-vehicle Service.)

Post-installation Operations

- Refrigerant charge
(Refer to GROUP-55A – On-vehicle Service.)
- Drive belt tension check
(Refer to GROUP 11A, B – On-vehicle Service.)

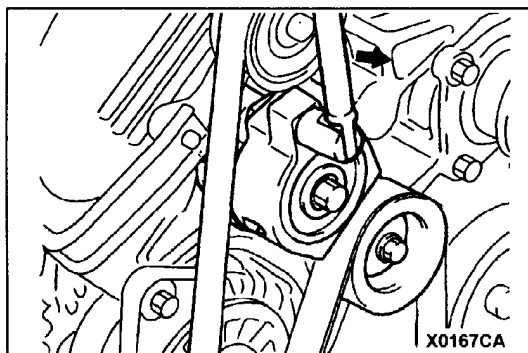


Removal steps



1. Drive belt
2. Discharge flexible hose connection
3. Suction flexible hose connection

- ◀C▶ ▶A▶
4. Compressor
 5. Compressor bracket



REMOVAL SERVICE POINTS

◀A▶ DRIVE BELT REMOVAL

Engage a socket wrench with the service square hole on the automatic tensioner, move the wrench to the shown direction to loosen the drive belt.

Caution

If the drive belt is reused, mark an arrow indicating rotation direction (clockwise direction) on the belt surface with a chalk.

◀B▶ DISCHARGE FLEXIBLE HOSE/SUCTION FLEXIBLE HOSE DISCONNECTION

Plug the disconnect hoses and the compressor nipples to prevent dust or foreign material from entering them.

Caution

Use a plug, which air does not penetrate through. Compressor oil and receiver absorb moisture easily.

◀C▶ COMPRESSOR REMOVAL

Be careful not to spill the compressor oil.

INSTALLATION SERVICE POINT

▶A◀ COMPRESSOR INSTALLATION

If a new compressor is installed, first adjust the amount of oil according to the procedures described below, and then install the compressor.

1. Measure the amount of oil within the removed compressor. (X ml)
2. Drain (from the new compressor) the amount of oil calculated according to the following formula, and then install the new compressor.

Single A/C <except vehicles with rear cooler>:

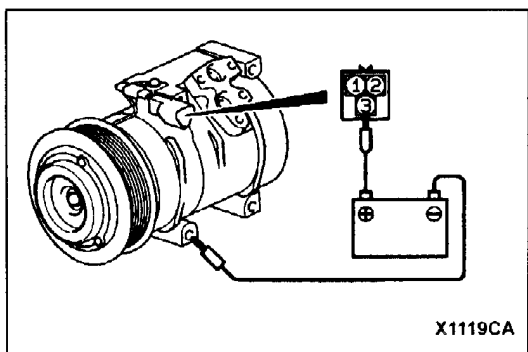
$$120 \text{ ml} - X \text{ ml} = Y \text{ ml}$$

Single A/C <Vehicles with rear cooler>, dual A/C:

$$140 \text{ ml} - X \text{ ml} = Y \text{ ml}$$

NOTE

- (1) The above amounts (120 ml and 140 ml) indicate the factory-charged amount inside a new compressor.
- (2) Y ml indicates the amount of oil in the refrigerant line, the condenser, the evaporator, etc.

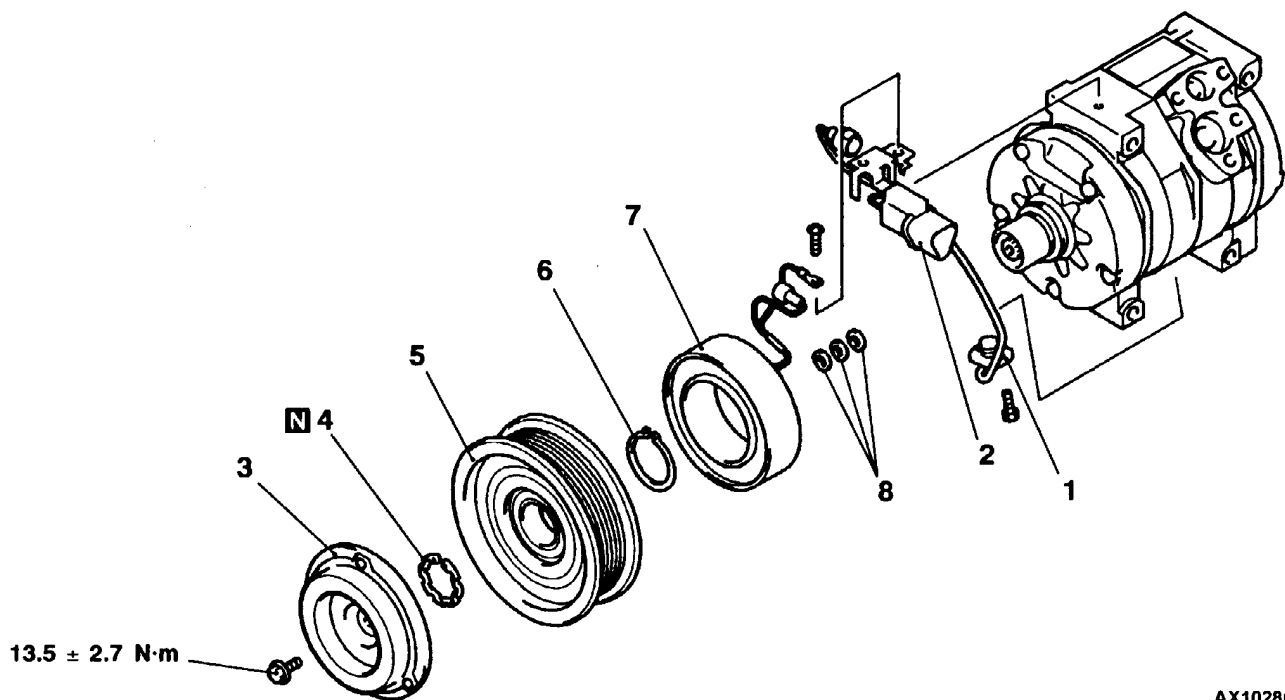


INSPECTION

COMPRESSOR MAGNETIC CLUTCH OPERATION INSPECTION

Connect the positive battery cable to compressor connector terminal No.3 or No.1 and negative battery cable to the compressor housing (earth). The magnetic clutch should click.

DISASSEMBLY AND REASSEMBLY

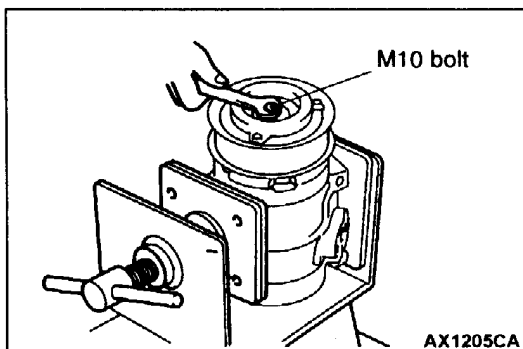


AX1028CA

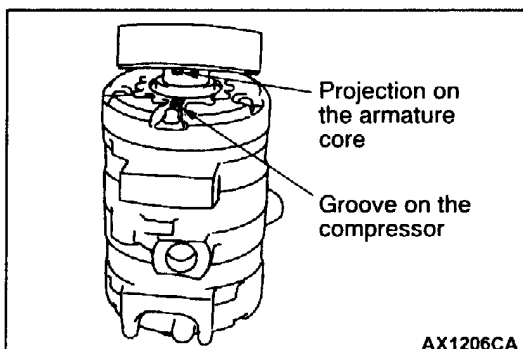
Disassembly steps

- C◀ ● Air gap adjustment
 1. Lock sensor
 2. Connector
 3. Armature

- B◀ 4. Snap ring
 5. Rotor
 6. Snap ring
 ►A◀ 7. Field core
 8. Washer

**DISASSEMBLY SERVICE POINT****►A◀ ARMATURE REMOVAL**

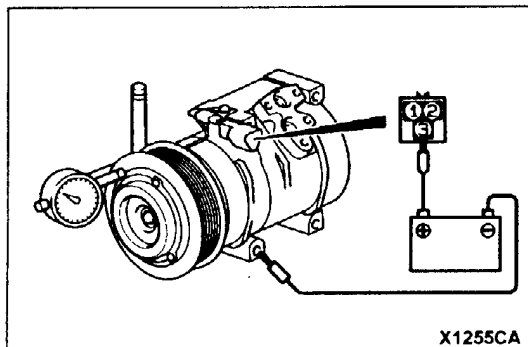
1. Remove the armature mounting bolt.
2. Tighten the M10 bolt in the armature bolt hole to disengage the shaft from the armature serration.

**REASSEMBLY SERVICE POINTS****►A◀ FIELD CORE INSTALLATION**

Align the compressor groove with the field core projection to install the field core.

►B◄ SNAP RING INSTALLATION

Be careful not to expand the snap ring excessively. If the inside diameter of the snap ring exceeds 30.5 mm due to excessive expansion, replace it.

**►C◄ AIR GAP ADJUSTMENT**

Apply battery voltage to the magnetic clutch, and check that the clutch air gap is within the standard value. If not within the standard value, adjust it by using washers.

Standard value: 0.35 – 0.65 mm

NOTE

The washers are available in three thicknesses (0.1 mm, 0.3 mm, 0.5 mm).