

1989 Mazda RX-7 Factory Service Manual

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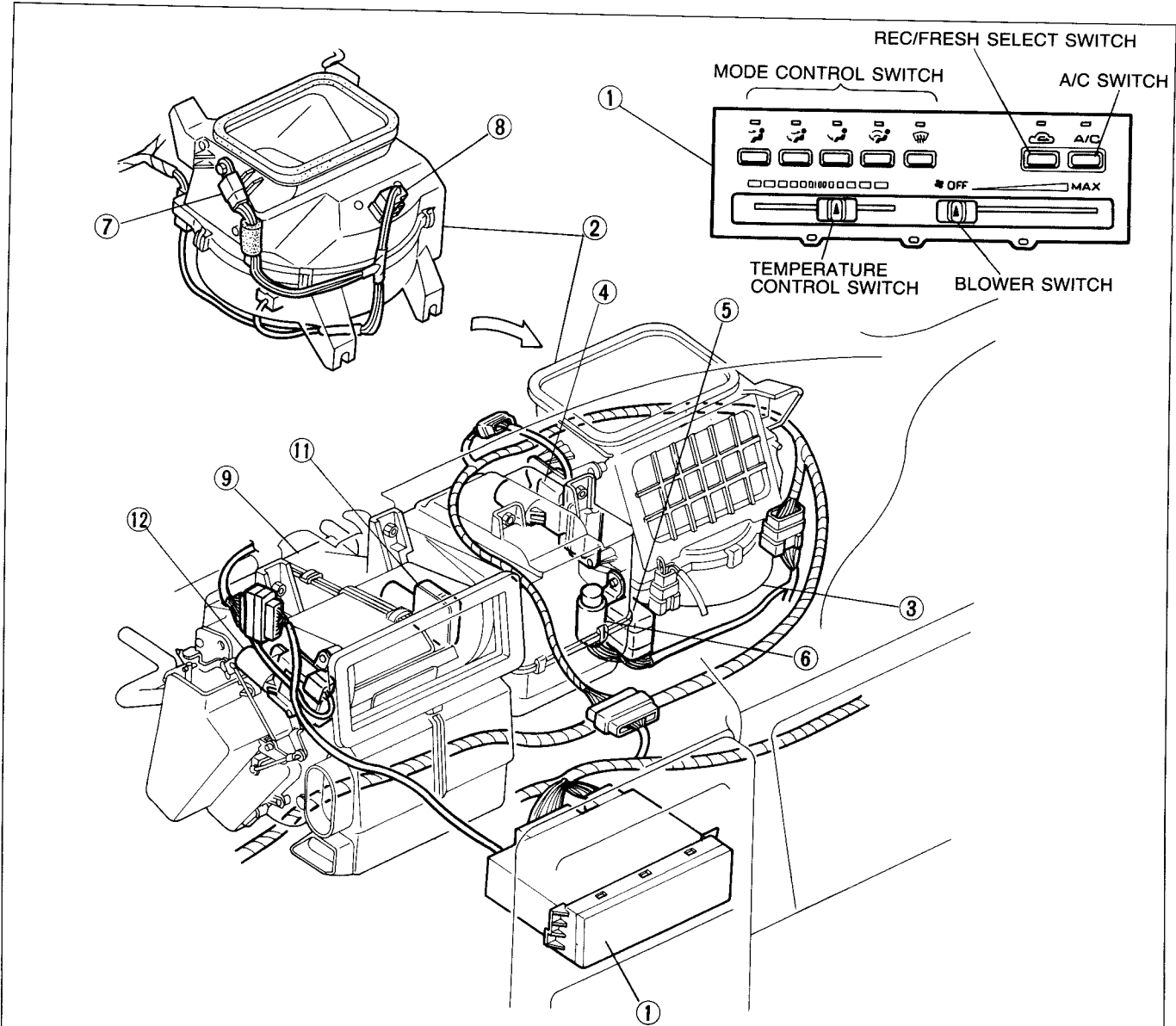
HEATING AND AIR CONDITIONING SYSTEMS

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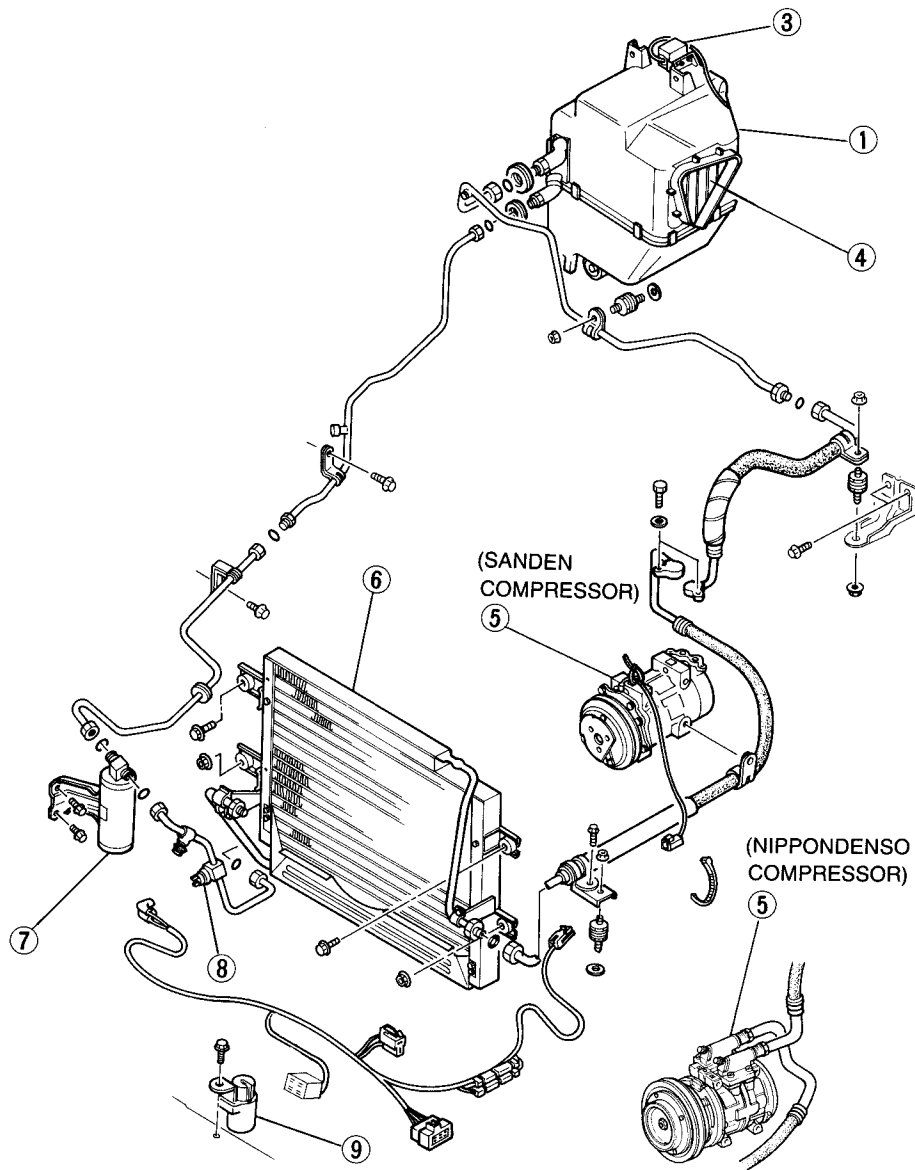
HEATER



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AIR CONDITIONER



Note

Two types of air-conditioning compressors are fitted to this model. One is manufactured by Nippondenso, the other by Sanden.

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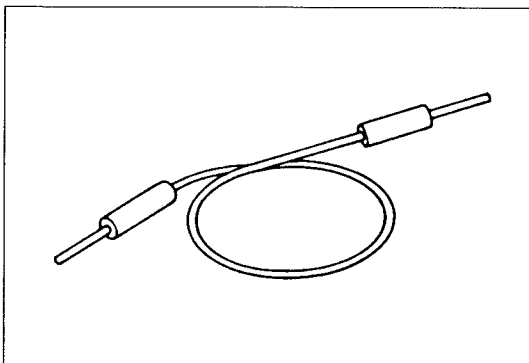
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TROUBLESHOOTING

TROUBLESHOOTING GUIDE

Symptom	Reference page
Insufficient cooling No cooling Intermittent cooling	U- 6
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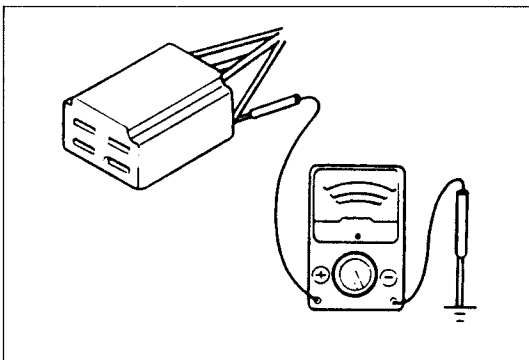
ELECTRICAL TROUBLESHOOTING TOOLS

Jumper Wire

The jumper wire is used for testing by short-circuiting switch terminals and to verify the condition of ground connections.

Caution

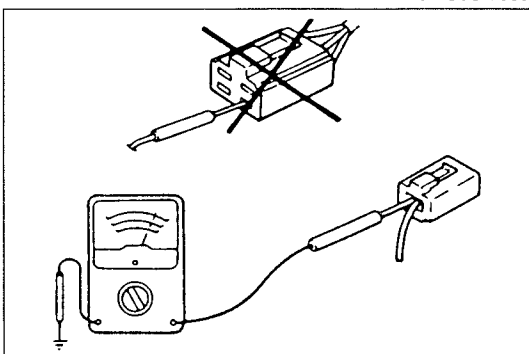
Do not connect the jumper wire between a power source and a body ground. This may cause burning or other damage to harnesses and electronic components.



9MU0UX-009

Voltmeter

The DC voltmeter is used for measurement of circuit voltage. A voltmeter with a range of 15V or more must be used. It is used by connecting the positive (+) probe (red lead) to the point where voltage is to be measured and connecting the negative (-) probe (black lead) to a body ground.



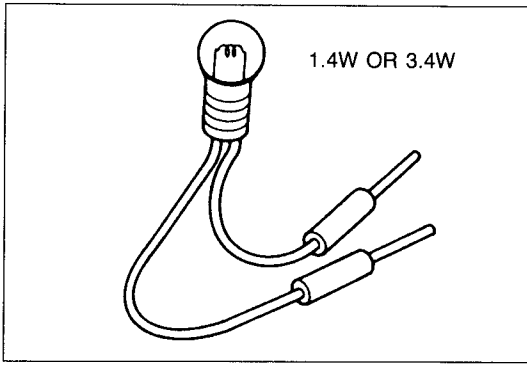
9MU0UX-010

Ohmmeter

The ohmmeter is used to measure the resistance between two points in a circuit, to check for continuity, and to diagnose short circuits.

Caution

Never connect the ohmmeter to any circuit to which voltage is applied. Doing so may burn or otherwise damage the ohmmeter.



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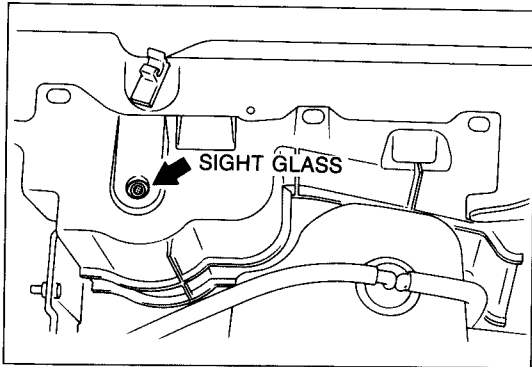
Test Light

The test light, as shown in the figure, uses a 12V bulb. The two leads should be connected to probes. The test light is used for simple voltage checks and to check for short circuits.

Caution

When checking a control unit, never use a bulb over 3.4W.

Symptom: Insufficient cooling
No cooling
Intermittent cooling



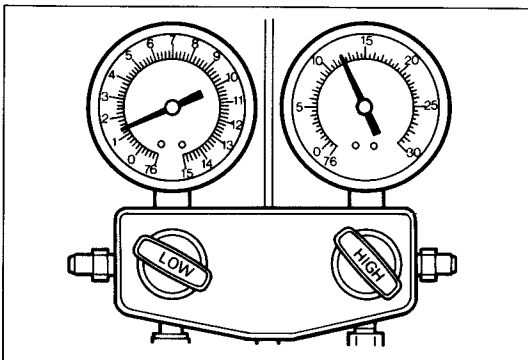
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Step 1 Checking refrigerant charge

1. Run the engine at a fast idle.
2. Operate the air conditioner at maximum cooling for a few minutes.
3. Determine the amount of refrigerant as shown below by observing the sight glass.

Item	Symptom	Amount of refrigerant	Action
1	Bubbles present in sight glass	Insufficient refrigerant	Check refrigerant pressure, go to Step 2
2	No bubbles present in sight glass	Too much or proper amount of refrigerant	Turn air conditioner OFF, and watch bubbles (Refer to Items 3 and 4)
3	Immediately after air conditioner turned off, refrigerant in sight glass stays clear	Too much refrigerant	Check refrigerant pressure, go to Step 2
4	When air conditioner turned OFF, refrigerant foams and then sight glass becomes clear	Proper amount of refrigerant	Refrigerant amount normal

9MU0UX-073



97U0UX-006

Step 2 Checking refrigerant pressure

1. Connect the manifold gauge set. (Refer to page U-39.)
2. Operate the engine at 1,500 rpm and set the air conditioner to maximum cooling.
3. Measure the low and high pressures. (Refer to page U-42.)

Specified pressure at 25°C (77°F)

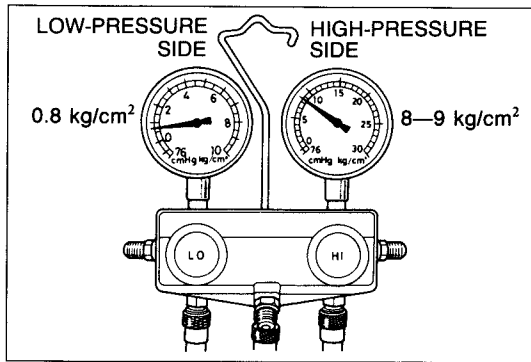
Low pressure:

98—167 kPa (1.0—1.7 kg/cm², 14—24 psi)

High pressure:

1,030—1,324 kPa (10.5—13.5 kg/cm², 149—192 psi)

4. If the pressure is not as specified, refer to the following items and check the system.



9BU0UX-006

Case 1**Measured pressure****Low pressure:****Below 78 kPa (0.8 kg/cm², 11 psi)****High pressure:****785—883 kPa (8—9 kg/cm², 114—128 psi)****Possible cause****Insufficient refrigerant****Condition**

- Outlet air from vents not cold
- Bubbles seen in sight glass

Step 1

1. Check for oil stains on the pipes, hoses and other parts.
2. If oil staining is found at the connection of pipes or hoses, replace the O-ring; then, evacuate, charge, and test the system.
3. If oil staining is not found, go to Step 2.

Step 2

1. Check for leakage from connections with a gas leak tester.

- Inlet and outlet of condenser
- Inlet and outlet of receiver/drier
- Inlet and outlet of compressor
- Sight glass
- Inlet and outlet of cooling unit

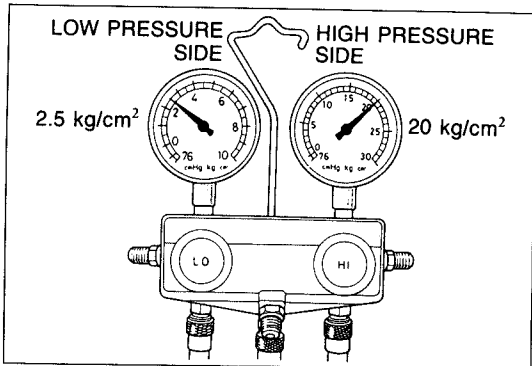
2. If leakage is evident, go to Step 3.

3. If leakage cannot be found, evacuate, charge, and test the system. (System OK, but refrigerant leaked gradually over time.)

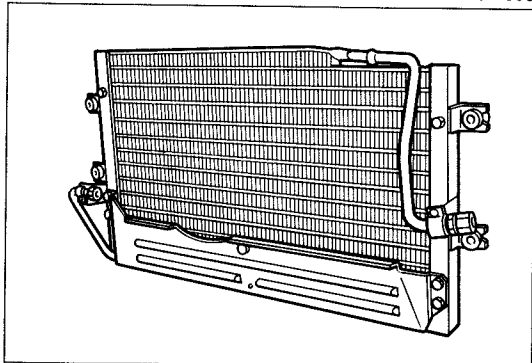
Step 3

1. Check tightening torque of the connection where leak was detected.
2. If the connection is loose, tighten the connection; then, evacuate, charge, and test the system.
3. If the connection is properly tightened, replace the O-ring; then, evacuate, charge, and test the system.

9BU0UX-007



9BU0UX-008



9MU0UX-084

Case 2 Measured pressure

Low pressure:
Above 245 kPa (2.5 kg/cm², 36 psi)

High pressure:
Above 1,962 kPa (20 kg/cm², 284 psi)

Possible cause

Excessive refrigerant or insufficient condenser cooling

Condition

Insufficient cooling

Step 1

1. Check the condenser for bent fins or damage. Repair or replace if necessary.
2. If the condenser is OK, go to Step 2.

Step 2

1. Discharge the excessive refrigerant. (Refer to page U-39.)

Warning

Always wear gloves and eye protection when discharging the refrigerant.

2. Verify that the refrigerant pressure is normal.

Case 3

Measured pressure

Low pressure:
Above 245 kPa (2.5 kg/cm², 36 psi)

High pressure:
Above 2,256 kPa (23 kg/cm², 327 psi)

Possible cause

Air in system

Condition

Insufficient cooling

Step 1

Discharge the refrigeration system. (Refer to page U-39.)

Step 2

Evacuate the system to remove all air from the system. (Refer to page U-40.)

Step 3

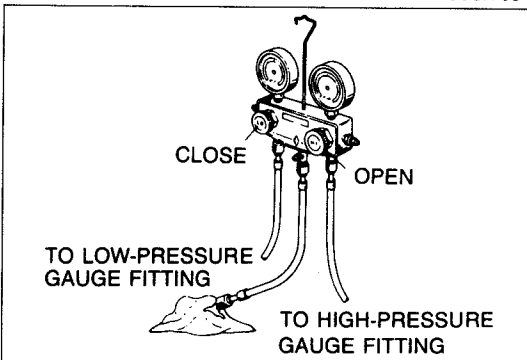
Charge the system with refrigerant. (Refer to page U-40.)

Step 4

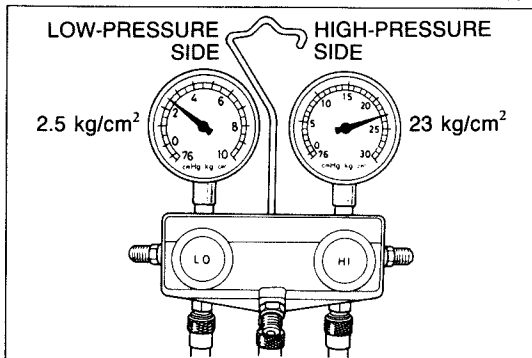
After charging, check the refrigerant pressure. (Refer to page U-42.)

Step 5

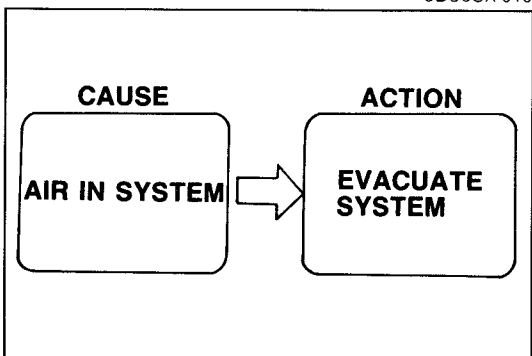
If low and high pressures are still too high, replace the receiver/drier.



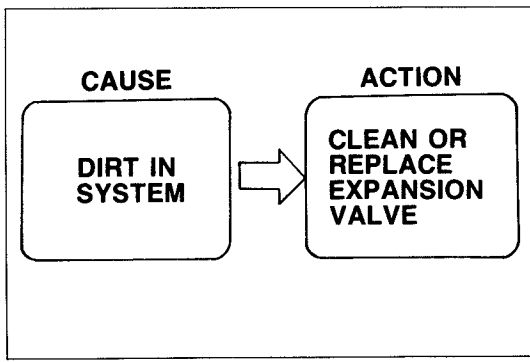
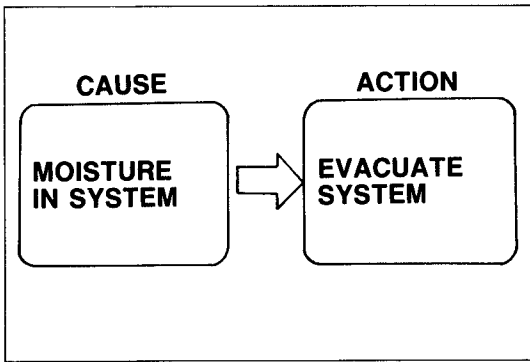
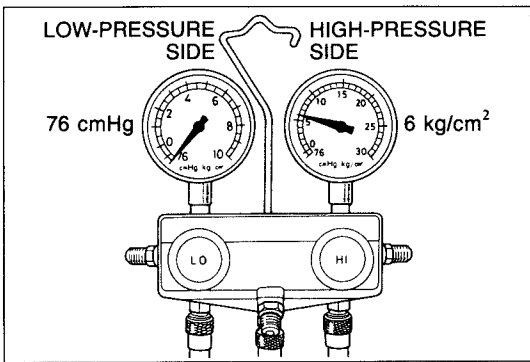
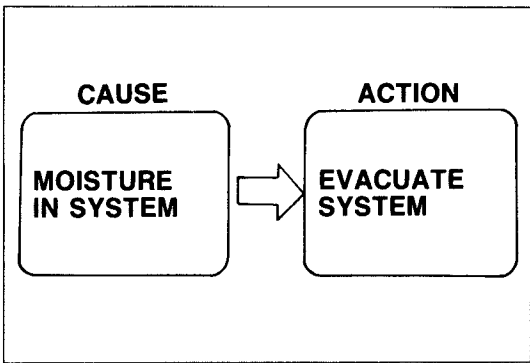
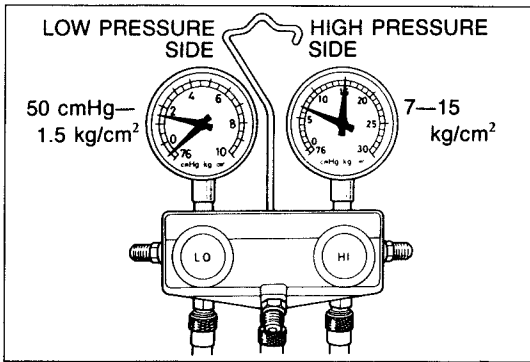
97U0UX-007



9BU0UX-010



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Case 4

Measured pressure

Low pressure: 50 cmHg (2.0 inHg) of Vacuum
—147 kPa (1.5 kg/cm², 21 psi)

High pressure:
687—1,472 kPa (7—15 kg/cm², 100—213 psi)

Possible cause

Moisture in system

Condition

Intermittent cooling

(Moisture in refrigeration system freezes in expansion valve and causes temporary blocking. After time, ice melts and condition returns to normal.)

Step 1

Discharge the refrigeration system. (Refer to page U-39.)

Step 2

Evacuate the system to remove all air and moisture from the system. (Refer to page U-40.)

Step 3

Charge the system with refrigerant. (Refer to page U-40.)

Step 4

After charging, check the refrigerant pressure. (Refer to page U-42.)

Step 5

If low and high pressures are not normal, replace the receiver/drier. (Normal pressure: Refer to page U-6.)

Case 5

Measured pressure

Low pressure:
76 cmHg (3.0 inHg): Vacuum

High pressure:
Below 589 kPa (6 kg/cm², 85 psi)

Possible cause

No refrigerant circulation

Condition

Refrigerant flow obstructed by moisture or dirt, causing freezing or blockage of expansion valve

Step 1

Turn the air conditioner OFF for about 10 minutes. Turn the air conditioner ON to determine whether the blockage is due to moisture or dirt.

a) If caused by moisture

System will operate normally after being OFF for 10 minutes. (Ice melts and relieves blockage).

If cause is moisture, refer to "Moisture in system."

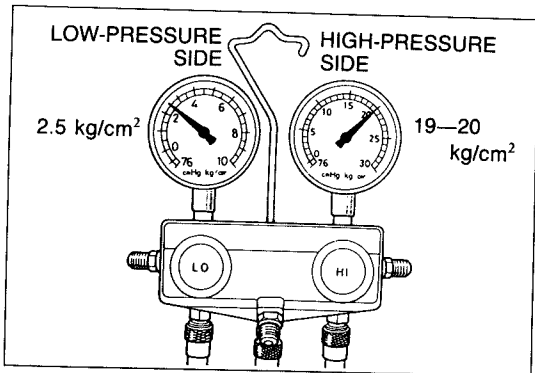
b) If caused by dirt

System remains abnormal after being OFF 10 minutes.

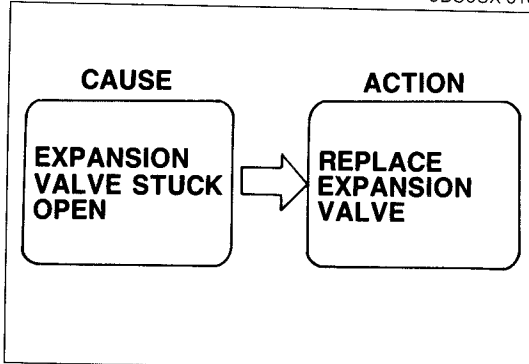
If caused by dirt, go to Step 2.

Step 2

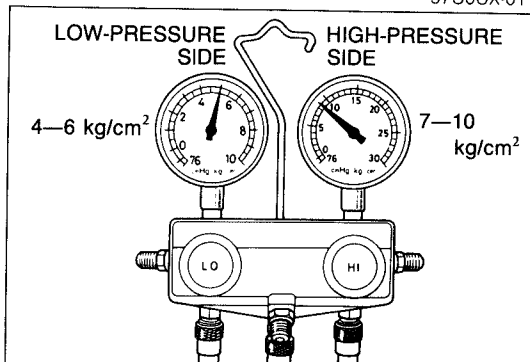
1. Remove the expansion valve. (Refer to page U-44.)
2. Blow out the dirt with compressed air.
3. If unable to remove the dirt, replace the expansion valve.
4. Evacuate, charge, and test the system.



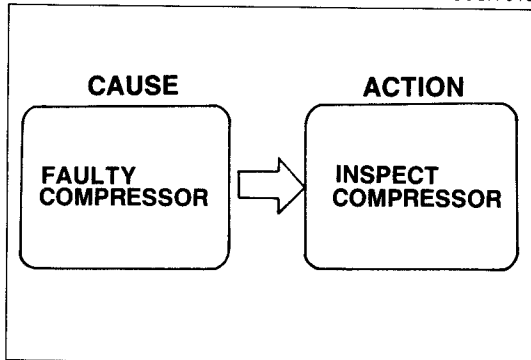
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97U0UX-011



9BU0UX-018



97U0UX-012

Case 6

Measured pressure

Low pressure:

Above 245 kPa (2.5 kg/cm², 36 psi)

High pressure:

1,864—1,962 kPa (19—20 kg/cm², 270—284 psi)

Possible cause

Expansion valve stuck open

Condition

Insufficient cooling

1. Check whether there is frost or heavy dew on the suction pipe (between cooling unit and compressor).
2. If neither is found, refer to "Excessive refrigerant or insufficient condenser cooling," page U-8.
3. If either is found, replace the expansion valve. (Refer to page U-44.)

Case 7

Measured pressure

Low pressure:

392—589 kPa (4—6 kg/cm², 57—85 psi)

High pressure:

687—981 kPa (7—10 kg/cm², 100—142 psi)

Possible cause

Faulty compressor

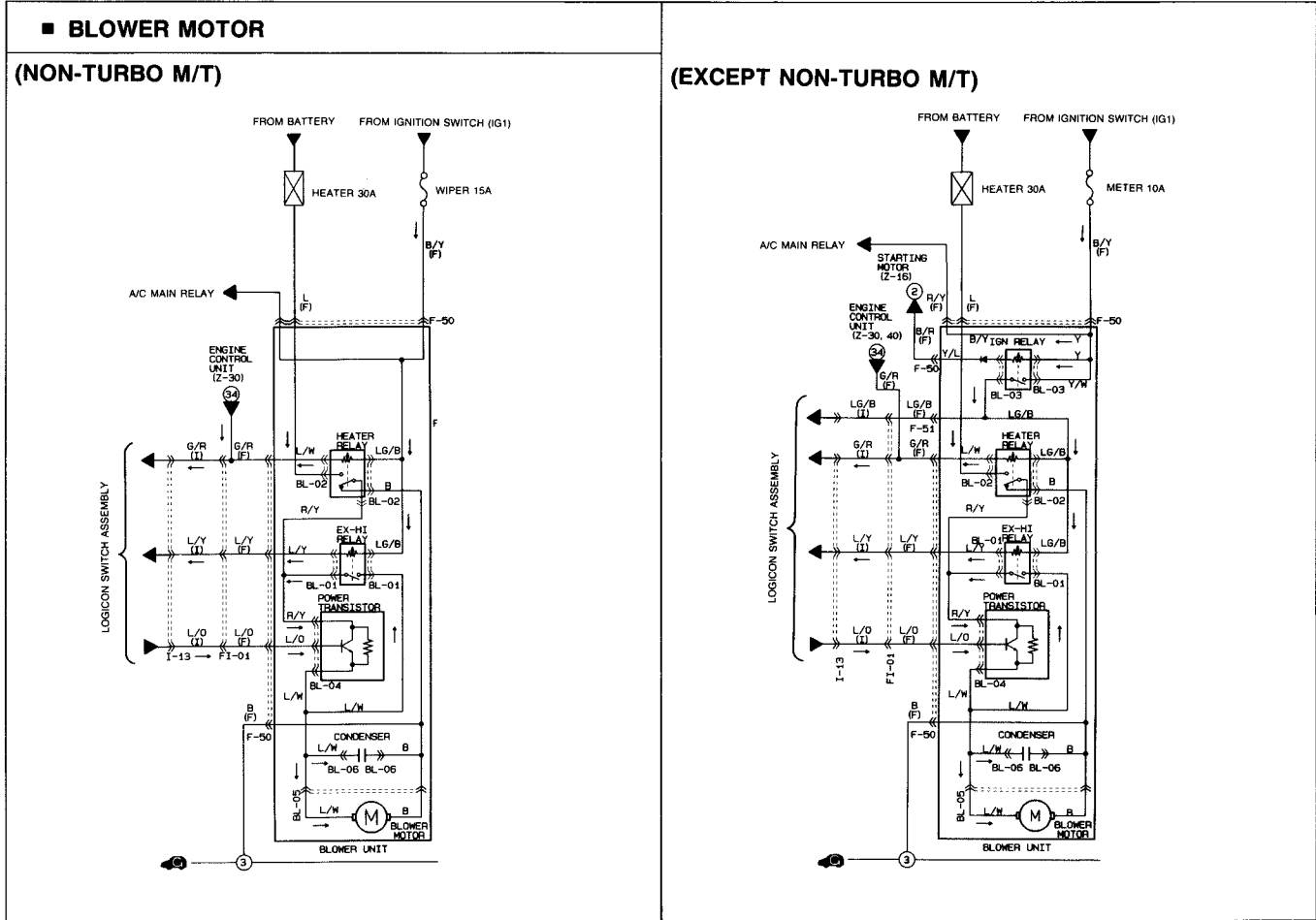
Condition

No cooling

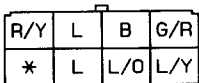
1. Run the engine at a first idle.
2. Check that the magnetic clutch is ON when the A/C switch and blower switch are ON.
3. If the magnetic clutch remains OFF, refer to "Magnetic clutch does not operate," page U-15.
4. If the magnetic clutch is ON, inspect the compressor. (Refer to page U-46.)

Symptom: Blower motor does not operate

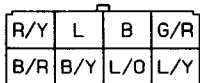
Circuit diagram



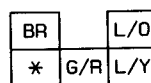
F-50 FRONT (F)-BLOWER UNIT



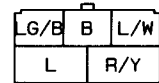
F-50 FRONT (F)-BLOWER UNIT



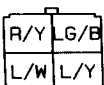
I-13 LOGICON SWITCH (I)



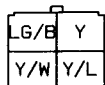
BL-02 HEATER RELAY



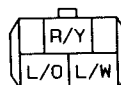
BL-01 EX-HI RELAY



BL-03 IGN RELAY

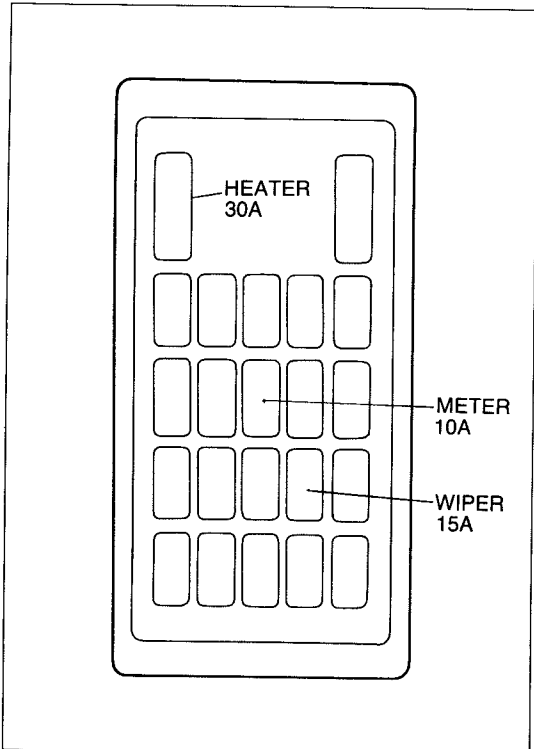


BL-04 POWER TRANSISTOR

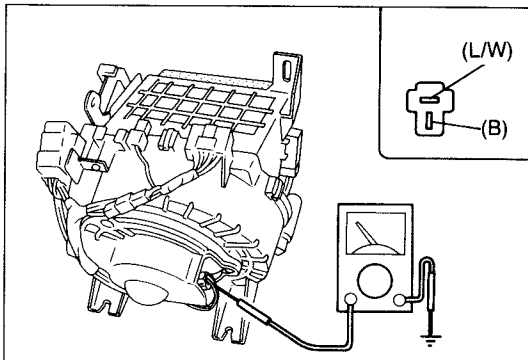


BL-05 BLOWER MOTOR

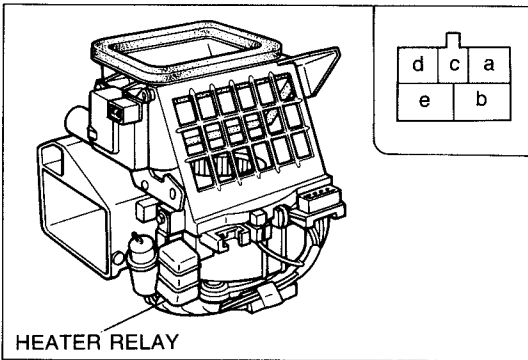




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97U0UX-015



97U0UX-016

Step 1

1. Check the circuit breaker.

Circuit breaker	Amperage	Location
HEATER	30A	Fuse box

2. If the red button is not out, go to Step 2.
3. If the red button is out, check for a short circuit in the harness. Repair as necessary; then depress the red button to reset the circuit breaker.

Step 2

1. Check the fuse.

(Non-Turbo M/T)

Fuse	Amperage	Location
WIPER	15A	Fuse box

(Except Non-Turbo M/T)

Fuse	Amperage	Location
METER	10A	Fuse box

2. If the fuse is OK, go to Step 3.
3. If the fuse is burned, check for a short circuit in the harness. Repair as necessary before replacing the fuse.

Step 3

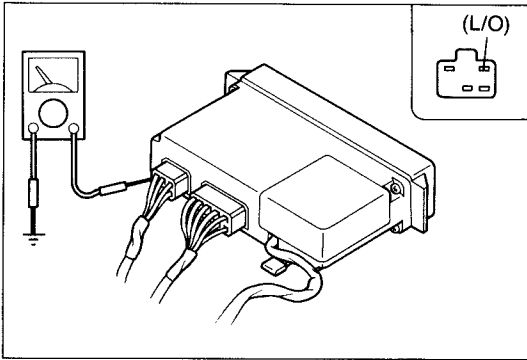
1. Turn the ignition switch ON.
2. Turn the blower switch to the maximum position.
3. Measure the voltage at the terminal-wires of the blower motor connector.

Wire	Voltage	Action
(L/W)	12V	Next, check wire (B)
	0V	Go to Step 4
(B)	12V	Repair wiring harness (Blower motor—Body ground)
	0V	Replace blower motor

Step 4

1. Turn the ignition switch ON.
2. Turn the blower switch ON.
3. Measure the voltage at the terminal-wires of the heater relay.

Wire	Voltage	Action
(R/Y)	12V	Go to Step 5
	0V	Next, check wire (L)
(L)	12V	Next, check wire (LG/B)
	0V	Repair wiring harness (Circuit breaker—Heater relay)
(LG/B)	12V	Next, check wire (L/W)
	Less than 2V	(Non-Turbo M/T) Repair wiring harness (WIPER fuse—Heater relay) (Except Non-Turbo M/T) Go to Step 9
(L/W)	12V	Go to Step 10
	Less than 2V	Replace heater relay

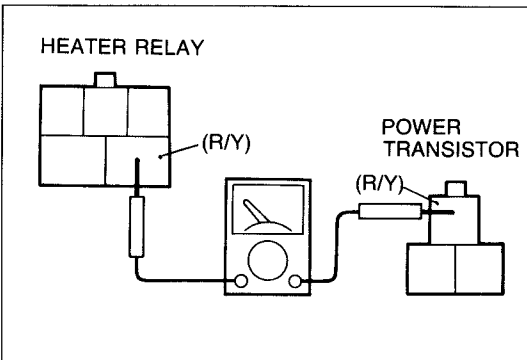


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Step 5

1. Turn the ignition switch ON.
2. Turn the blower switch ON.
3. Measure the voltage at terminal-wire (L/O) of the logicon switch assembly with the blower switch from Low to Maximum.

Wire	Voltage	Action
(L/O)	5–12V	Go to Step 6
	0V	Check fan amp (Refer to page U-29)



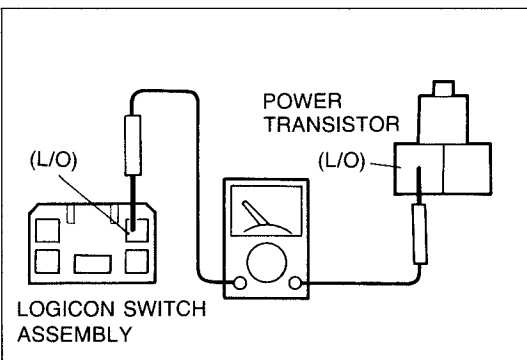
97U0UX-018

Step 6

1. Check for continuity between the terminal-wires of the heater relay and the power transistor.

Wire		Continuity
Heater relay	Power transistor	
(R/Y)	(R/Y)	Yes

2. If correct, go to Step 7.
3. If not as specified, repair the wiring harness.



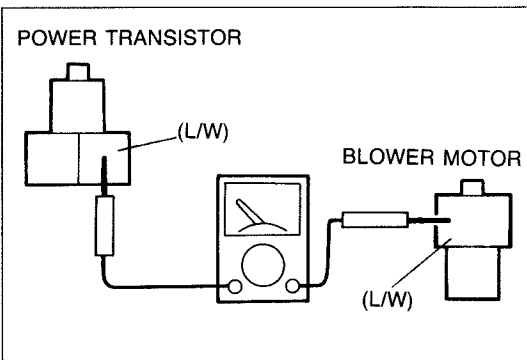
97U0UX-019

Step 7

1. Check for continuity between the terminal-wires of the logicon switch assembly and the power transistor.

Wire		Continuity
Logicon switch assembly	Power transistor	
(L/O)	(L/O)	Yes

2. If correct, go to Step 8.
3. If not as specified, repair the wiring harness.



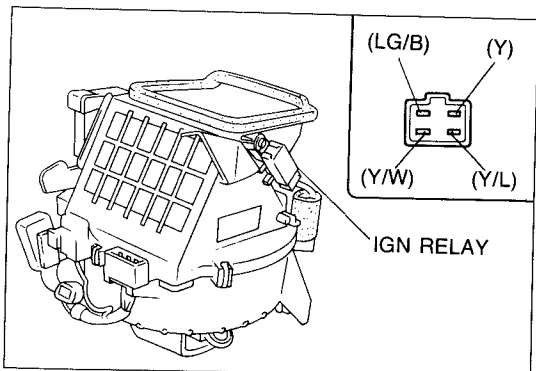
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Step 8

1. Check for continuity between the terminal-wires of the blower motor and the power transistor.

Wire		Continuity
Blower motor	Power transistor	
(L/W)	(L/W)	Yes

2. If not as specified, repair the wiring harness.
3. If correct, replace the power transistor.

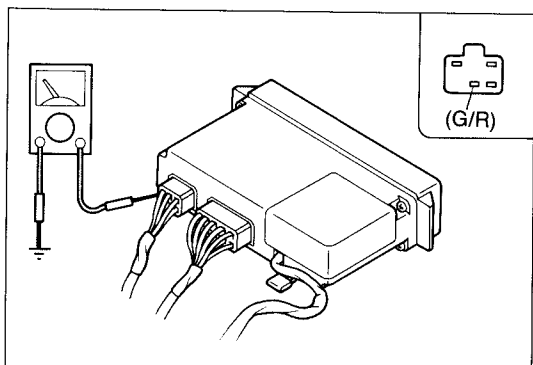


97U0UX-021

Step 9 (Except Non-Turbo M/T)

1. Turn the ignition switch ON.
2. Turn the blower switch ON.
3. Measure the voltage at the terminal-wires of the Ign relay.

Wire	Voltage	Action
(Y)	12V	Next, check wire (Y/L)
	0V	Repair wiring harness (METER fuse—Ign relay)
(Y/L)	12V	Repair wiring harness (Ign relay—Starting motor)
	0V	Next, check wire (Y/W)
(Y/W)	12V	Next, check wire (LG/B)
	0V	Repair wiring harness (METER fuse—Ign relay)
(LG/B)	12V	Repair wiring harness (Ign relay—Heater relay)
	Less than 2V	Replace Ign relay



97U0UX-022

Step 10

1. Turn the ignition switch ON.
2. Turn the blower switch ON.
3. Measure the voltage at terminal-wire (G/R) of the logicon switch assembly.

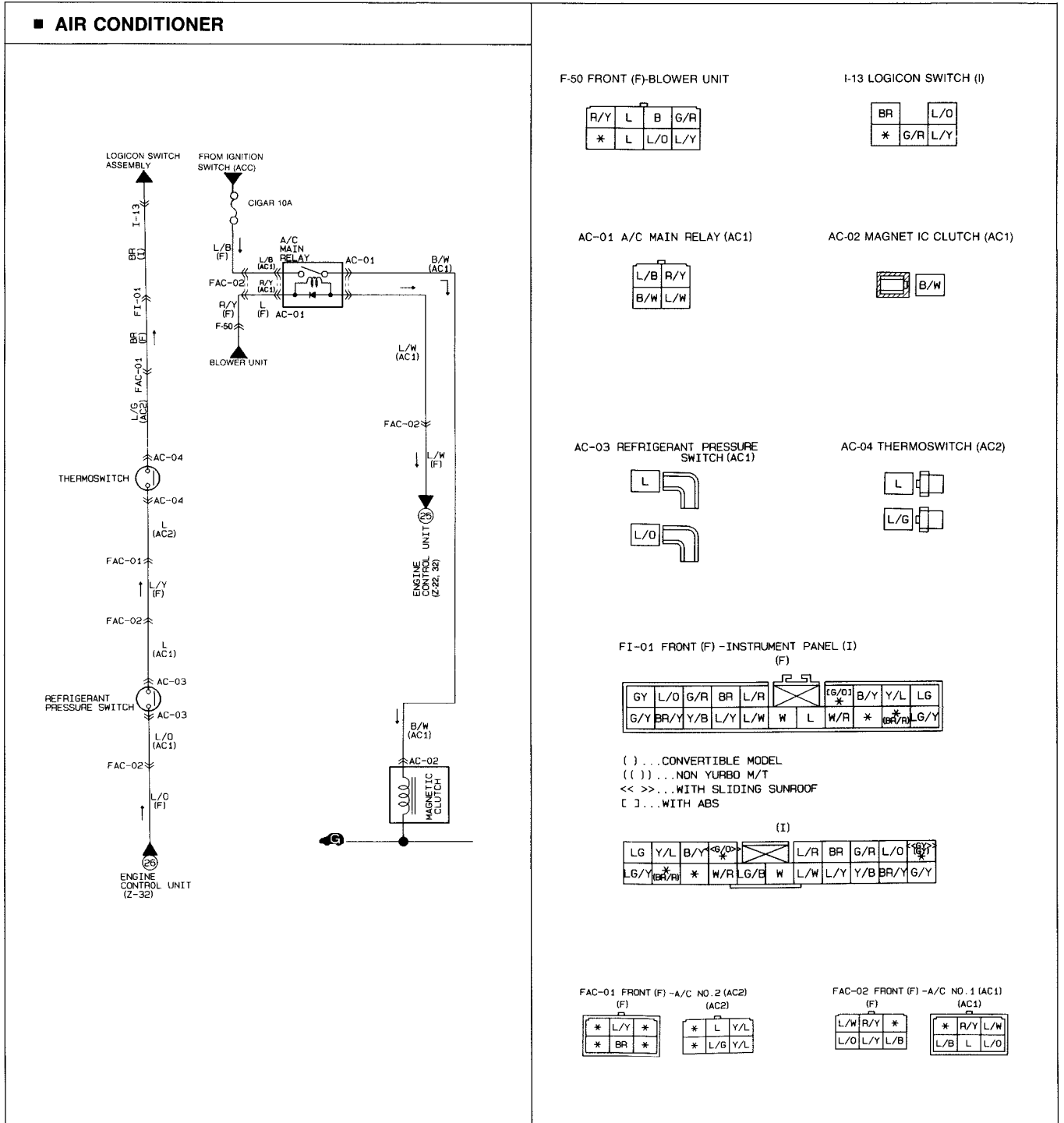
Wire	Voltage	Action
(G/R)	12V	Check fan amp (Refer to page U-29)
	Less than 2V	Repair wiring harness (Heater relay—Logicon switch assembly)

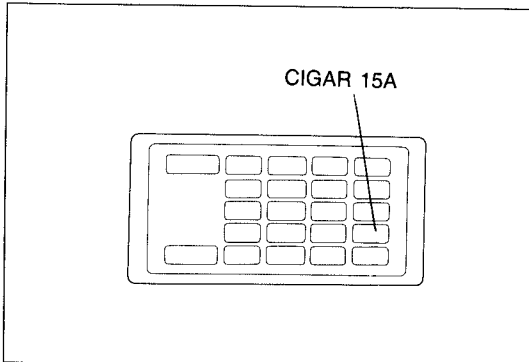
Symptom: Magnetic clutch does not operate

Note

If the blower motor does not operate, see "Blower motor does not operate", page U-11.

Circuit diagram





97U0UX-024

Step 1

1. Check the fuse.

Fuse	Amperage	Location
CIGAR	15A	Fuse box

2. If the fuse is OK, go to Step 2.
3. If the fuse is burned, check for a short circuit in the harness and repair as necessary before replacing the fuse.

Step 2

1. Disconnect the magnetic clutch connector.
2. Check for continuity between the terminal-wire of the magnetic clutch connector and a ground.

Note

Set the ohmmeter to the $\times 1000$ range.

Continuity	Action
Yes	Reconnect connector and go to Step 3
No	Replace stator

Step 3

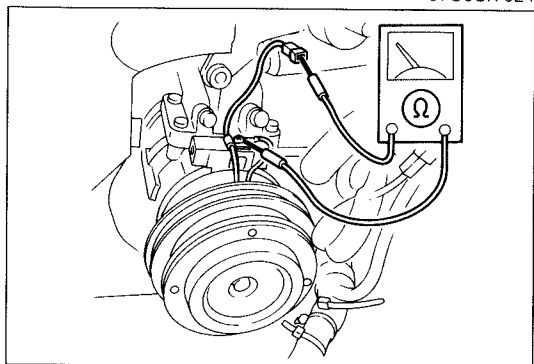
1. Turn the ignition switch ON.
2. Turn the blower switch and A/C switch ON.
3. Measure the voltage at the terminal-wires of the A/C main relay connector.

Wire	Voltage	Action
(L/B)	12V	Next, check wire (B/W)
	0V	Repair wiring harness (CIGAR fuse—A/C main relay)
(B/W)	12V	Repair wiring harness (A/C main relay—Magnetic clutch)
	0V	Next, check wire (L/W)
(L/W)	12V	Go to Step 4
	0V	Next, check wire (R/Y)
(R/Y)	12V	Replace A/C main relay
	0V	(Non-Turbo M/T) Repair wiring harness (WIPER fuse—A/C main relay)
		(Except Non-Turbo M/T) Repair wiring harness (METER fuse—A/C main relay)

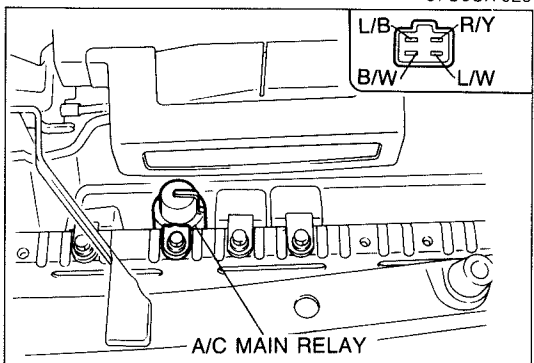
Step 4

1. Turn the ignition switch ON.
2. Turn the blower switch and A/C switch ON.
3. Measure the voltage at terminal-wire (BR) of the logicon switch assembly.

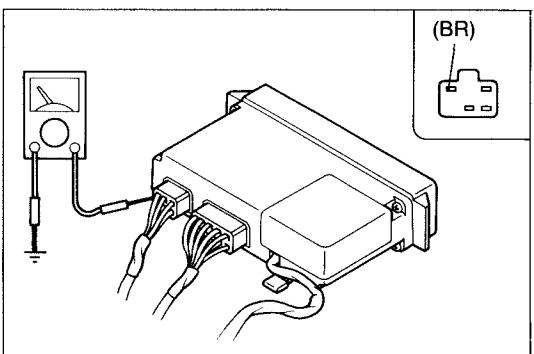
Wire	Voltage	Action
(BR)	12V	Replace logicon switch assembly
	0V	Go to Step 5



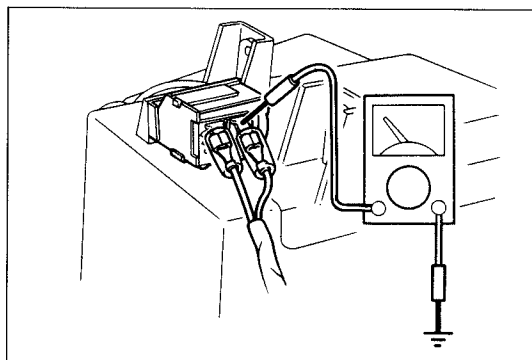
97U0UX-025



97U0UX-026



97U0UX-027



97U0UX-028

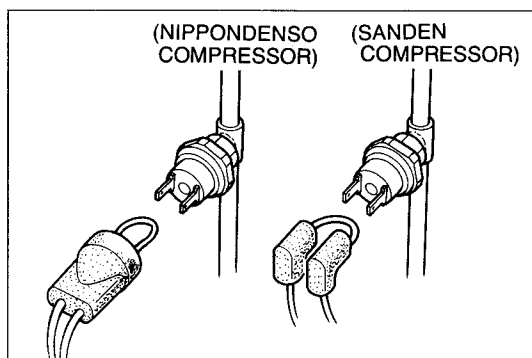
Step 5

1. Turn the ignition switch ON.
2. Turn the blower switch and A/C switch ON.
3. Measure the voltage of the terminal-wires of the thermostat.

Wire	Voltage	Action
(L/G)	12V	Repair wiring harness (Thermostat—Logicon switch assembly)
	0V	Check wire (L)
(L)	12V	Check thermostat (Refer to page U-45)
	0V	Go to Step 6

Step 6

1. Disconnect the negative battery cable.
2. Disconnect the refrigerant pressure switch connector.
3. Connect a jumper wire between terminal-wires (L) and (L/O) of the connector.
4. Reconnect the negative battery cable.
5. Turn the ignition switch ON.
6. Turn the blower switch and A/C switch ON.
7. If the magnetic clutch operates, go to Step 7.
8. If not, measure the voltage of the terminal-wire of the refrigerant pressure connector.

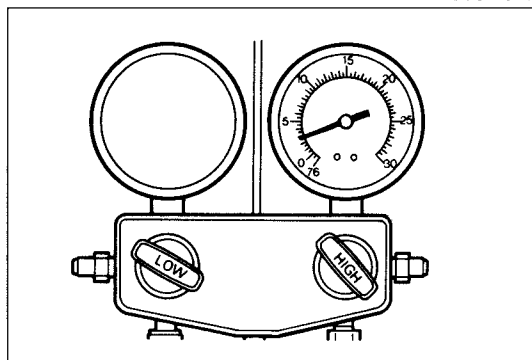


97U0UX-029

Voltage	Action
12V	Repair wiring harness (Refrigerant pressure switch—Thermostat)
0V	Engine control unit malfunction Refer to Section F.

Step 7

1. Connect the manifold gauge set. (Refer to page U-39.)
2. Measure the refrigerant pressure.



97U0UX-030

Pressure	Action
More than 2.3 kg/cm ²	Replace refrigerant pressure switch
Less than 2.3 kg/cm ²	Check refrigerant system (Refer to page U-6)

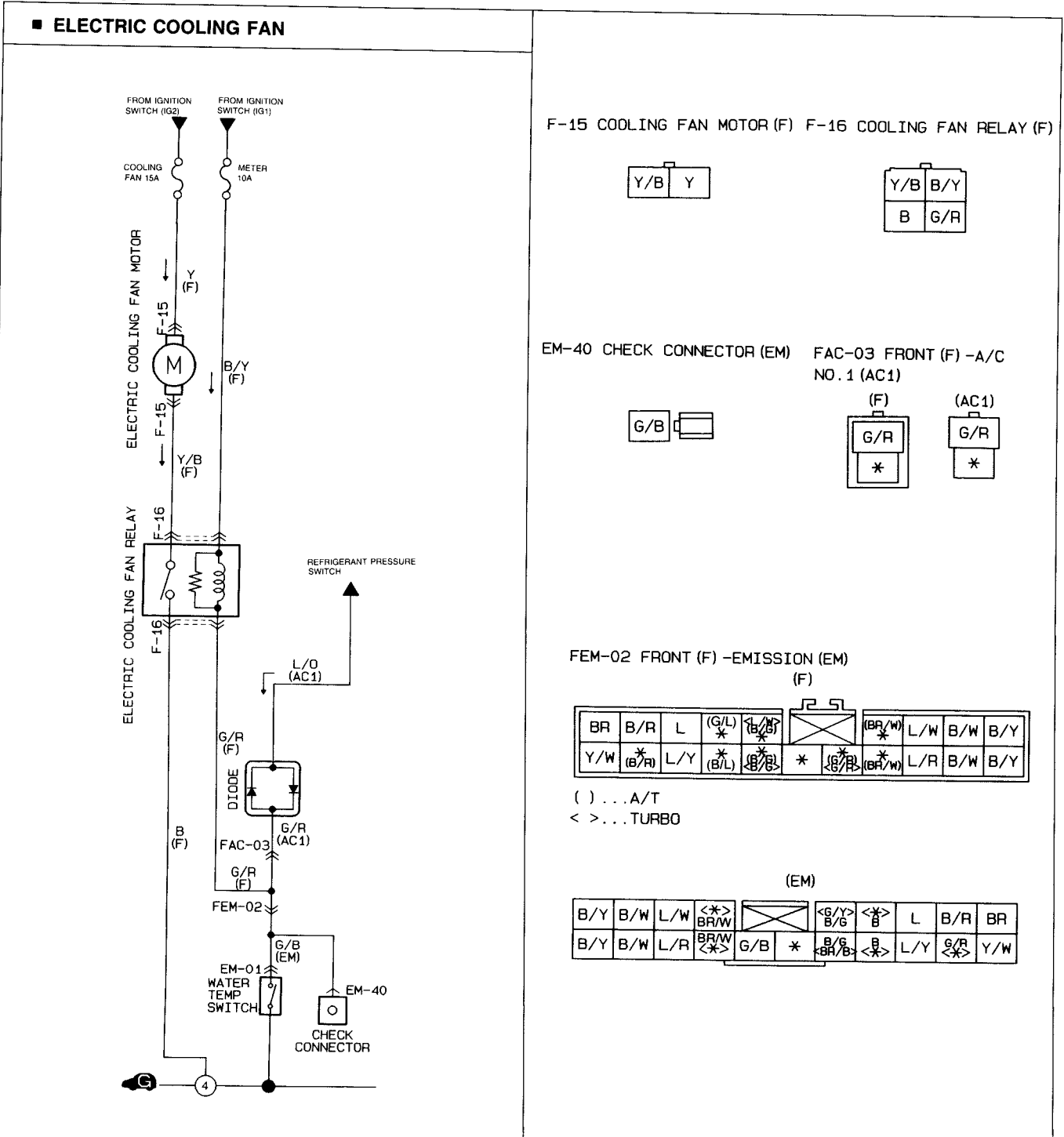
(Except Non-Turbo M/T)

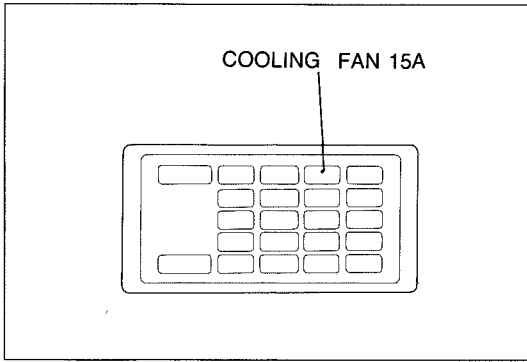
Symptom: Electric cooling fan does not operate

Note

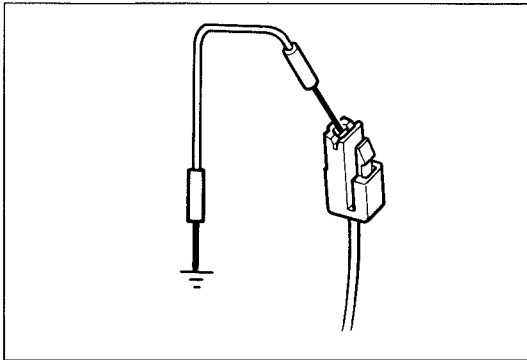
If the blower motor does not operate, see "Blower motor does not operate", page U-11.
 If the magnetic clutch does not operate, see "Magnetic clutch does not operate", page U-15.

Circuit diagram

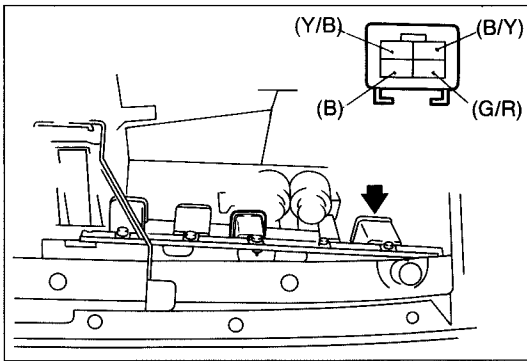




97U0UX-032



97U0UX-033



97U0UX-034

Step 1

1. Check the fuse.

Fuse	Amperage	Location
COOLING FAN	15A	Fuse box

2. If the fuse is OK, go to Step 2.
3. If the fuse is burned, check for a short circuit in the harness and repair as necessary before replacing the fuse.

Step 2

1. Turn the ignition switch ON.
2. Turn the blower switch and the A/C switch ON.
3. Ground the electric cooling fan check connector.
4. If the fan operates, repair the wiring harness between the electric cooling fan relay and the refrigerant pressure switch.
5. If the fan does not operate, go to Step 3.

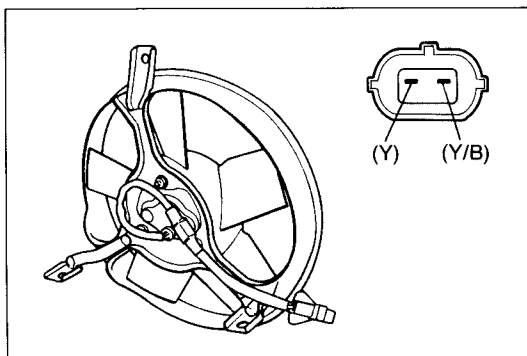
Step 3

1. Turn the ignition switch ON.
2. Turn the blower switch and A/C switch ON.
3. Measure the voltage of the terminal-wires of the electric cooling fan relay.

Wire	Voltage	Action
(Y/B)	12V	Next, check wire (B)
	0V	Go to Step 4
(B)	12V	Repair wiring harness (Electric cooling fan relay—Body ground)
	0V	Next, check wire (B/Y)
(B/Y)	12V	Next, check wire (G/R)
	0V	Repair wiring harness (METER fuse—Electric cooling fan relay)
(G/R)	12V	Repair wiring harness (Electric cooling fan relay—Refrigerant pressure switch)
	0V	Replace electric cooling fan relay

Step 4

1. Turn the ignition switch ON.
2. Turn the blower switch and the A/C switch ON.
3. Measure the voltage of the terminal-wires of the electric cooling fan motor.

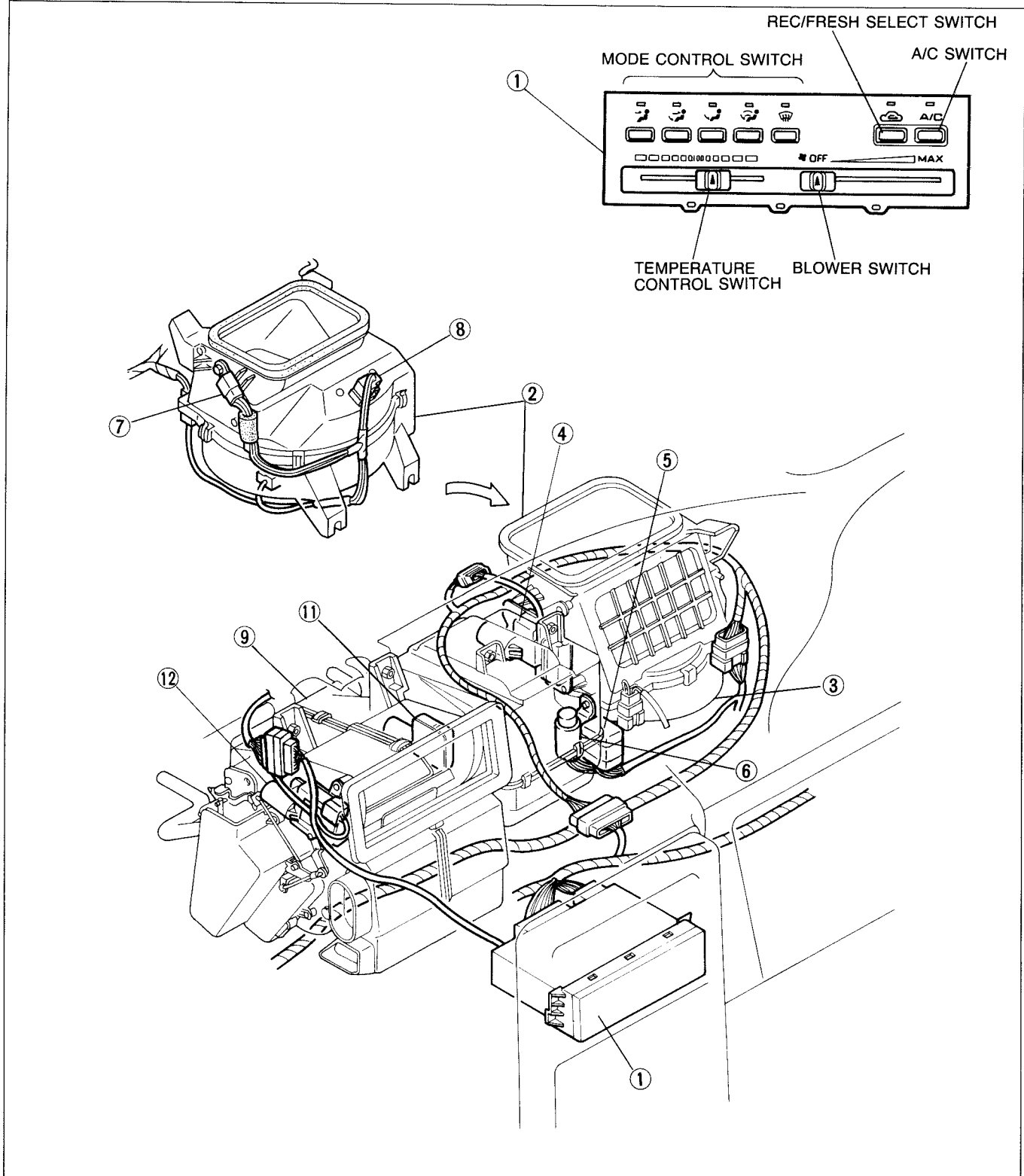


97U0UX-035

Wire	Voltage	Action
(Y)	12V	Next, check wire (Y/B)
	0V	Repair wiring harness (COOLING FAN fuse—Electric cooling fan motor)
(Y/B)	12V	Repair wiring harness (Electric cooling fan motor—Electric cooling fan relay)
	0V	Replace electric cooling fan motor

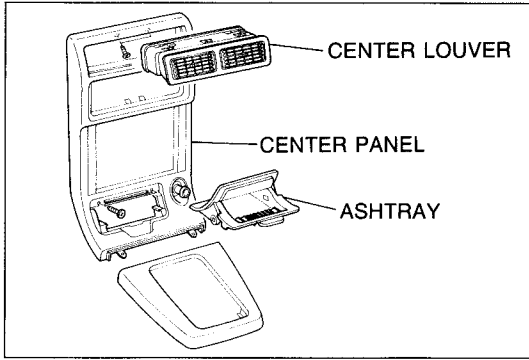
HEATER

STRUCTURAL VIEW

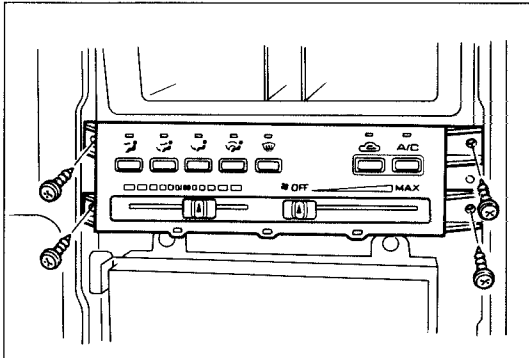


97U0UX-036

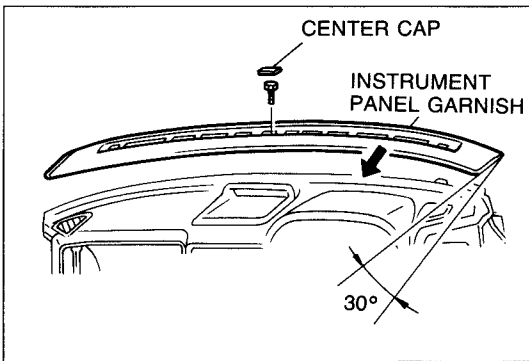
- | | |
|------------------------------|----------------------------------|
| 1. Logicon switch assembly | 7. Ign relay |
| 2. Blower unit | 8. Power transistor |
| 3. Blower motor | 9. Heater unit |
| 4. REC/FRESH select actuator | 10. Heater core (in heater unit) |
| 5. Heater relay | 11. Mode control actuator |
| 6. Ex-Hi relay | 12. Temperature control actuator |



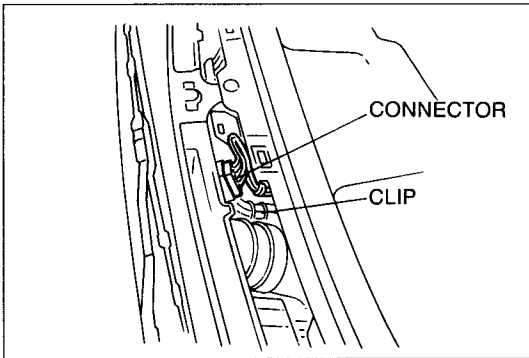
97U0UX-037



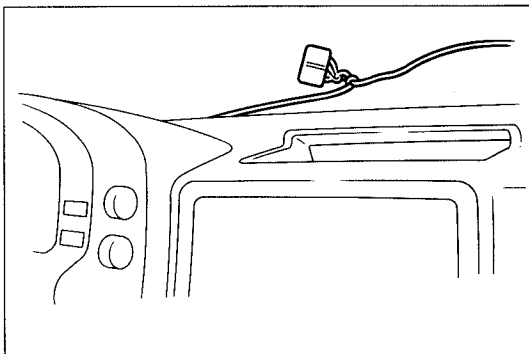
97U0UX-038



97U0UX-039



97U0UX-040



97U0UX-041

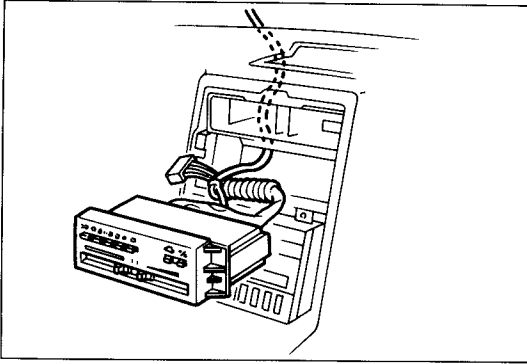
LOGICON SWITCH ASSEMBLY

Removal

1. Remove the center louver and ashtray.
2. Remove the screws.
3. Disconnect the cigarette lighter connector.
4. Remove the center panel.
5. Remove the screws.
6. Remove the center cap and the bolt.
7. Turn the instrument panel garnish toward the front about 30°, and then remove it.
8. Disconnect the logicon switch assembly connector and remove it from the clip.
9. Tie a string to the logicon switch assembly harness as shown.

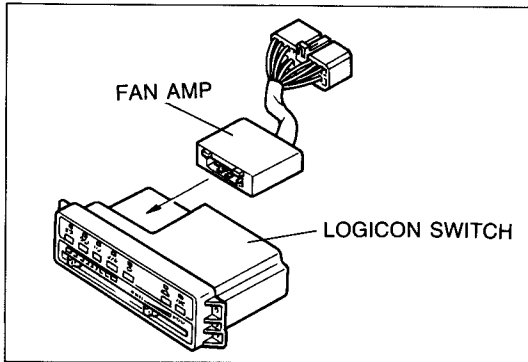
Note

The string will be used to pull the harness through the dash during installation.



97U0UX-042

10. Disconnect the logicon switch assembly connectors.
11. Remove the logicon switch assembly.



97U0UX-043

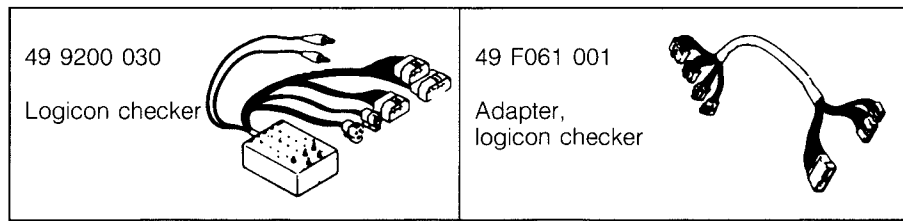
Disassembly and Assembly

Disassemble and assemble as shown.

Installation

Install in the reverse order of removal.

Inspection
Checking with logicon checker
Preparation
SST

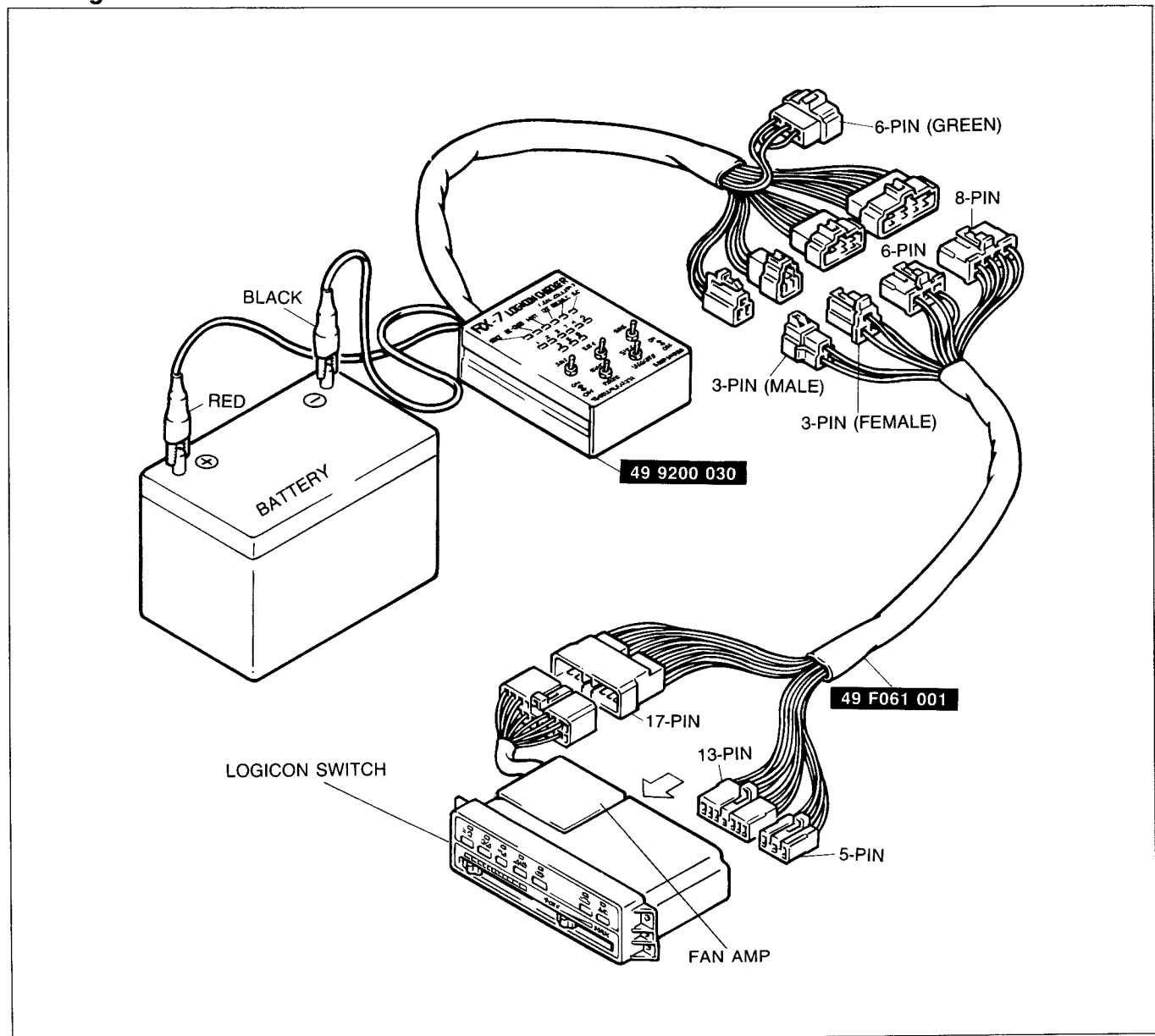


97U0UX-044

1. Remove the logicon switch assembly. (Refer to page U-21.)
2. Be sure the battery is fully charged.
3. Set each switch of the **SST (Logicon checker)** in the OFF position.
4. Connect the red wire to the positive battery cable, and the black wire to the negative battery cable.
5. Connect the **SSTs** as follows.

Note

The green connector of the SST need not be connected.



6. Set the power switch (SW1) to the ON position.
At this time red LEDs Nos.1, 3, 6, and 8 will illuminate if the REC/FRESH select switch is OFF.
If one of the logicon switches is ON, the corresponding green LED will illuminate.
7. Press the logicon switches in order, and verify that the corresponding green LED on the **SST (Logicon checker)** illuminates.
If the LED does not illuminate, replace the logicon switch assembly.

Note

- (1) The red No.1 LED will go off when the REC/FRESH select switch is turned ON while using the SST.
- (2) When the HEAT/DEF button is pushed ON, the red No.4 LED will illuminate. This indicates correct operation.

8. Perform the following checks:
 - (1) Verify that LED No.2 illuminates and LED No.3 goes out when the SW3 switch is set to the ON position.
 - (2) Verify that LED No.5 illuminates and LED No.6 goes out when the SW4 switch is set to the ON position.
 - (3) Verify that LED No.7 illuminates and LED No.8 goes out when the SW5 switch is set to the ON position.
 If the LEDs do not function as described above, replace the logicon switch assembly.
9. Set the illumination switch (SW2) to ON.
Perform the test described in step 5 and check to see if the indicator light of each logicon button is in the dimmed mode.
If not correct, replace the logicon switch assembly.

Logicon switch								SST (Logicon checker)																		
VENT	VENT/ HEAT	HEAT	HEAT/ DEF	DEF	A/C	REC	ILLUMI	Switch					RED LED				GREEN LED									
								SW1	SW2	SW3	SW4	SW5	1	2	3	5	6	7	8	VENT	VENT/ HEAT	HEAT	RED4	DEF	A/C	REC
X	X	X	X	X	X	X	X	○	X	X	X	X	○	X	○	X	○	X	○	X	X	X	X	X	X	X
X	X	X	X	X	X	○	X	○	X	X	X	X	X	X	○	X	○	X	○	X	X	X	X	X	X	○
○ LED illumination according to switch ON/OFF							X	X	○	X	X	X	X	○	X	○	X	○	X	○	○ LED illumination according to switch ON/OFF					X
X	X	X	○	X	X	X	○	○	○	X	X	X	○	X	○	X	○	X	○	X	X	X	○	X	X	X
X	X	X	○	X	X	X	X	○	X	○	X	X	○	○	X	X	○	X	○	X	X	X	○	X	X	X
X	X	X	○	X	X	X	X	○	X	X	○	X	○	X	○	○	X	X	○	X	X	X	○	X	X	X
X	X	X	○	X	X	X	X	○	X	X	X	○	○	X	○	X	○	○	X	X	X	X	○	X	X	X

○ ON X OFF

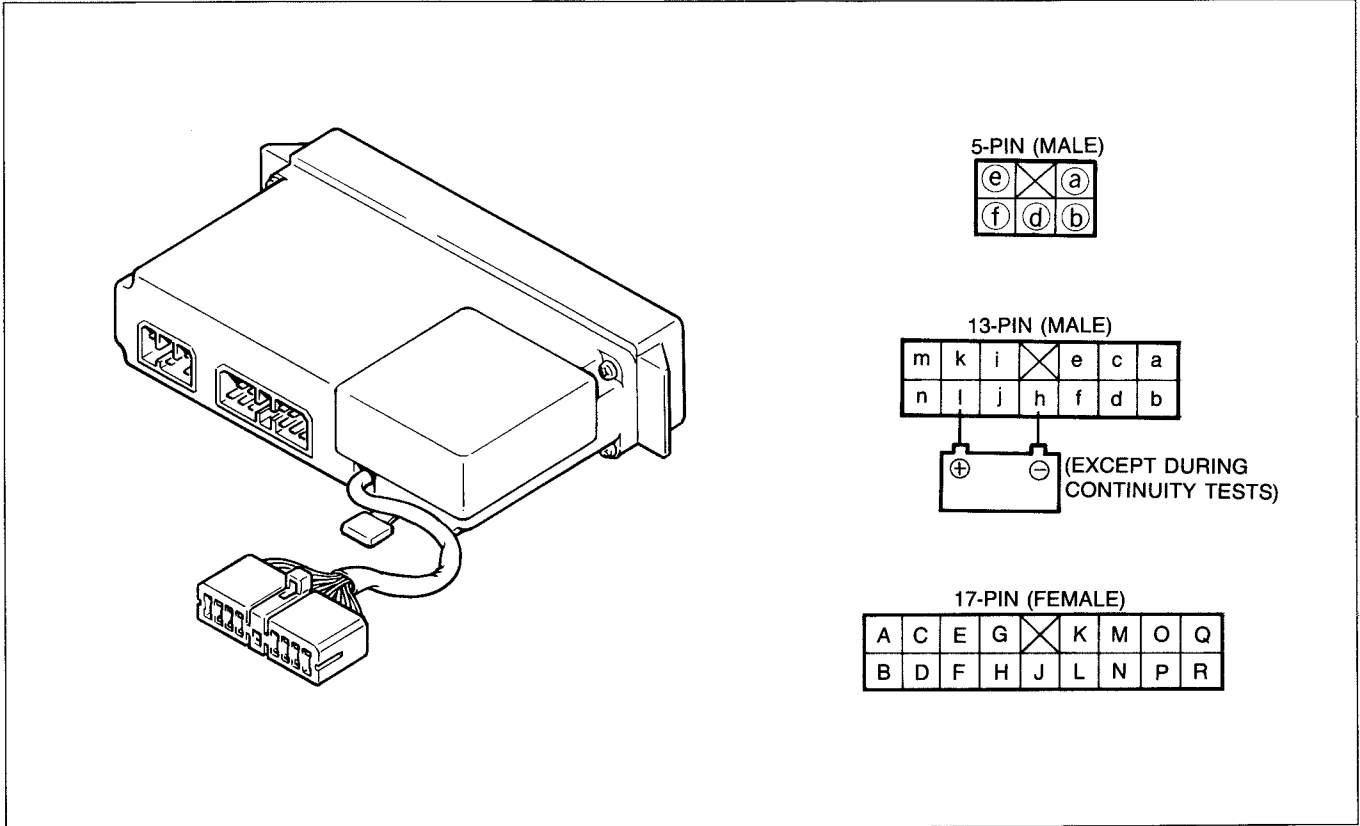
Checking logicon switch assembly circuit

Preparation

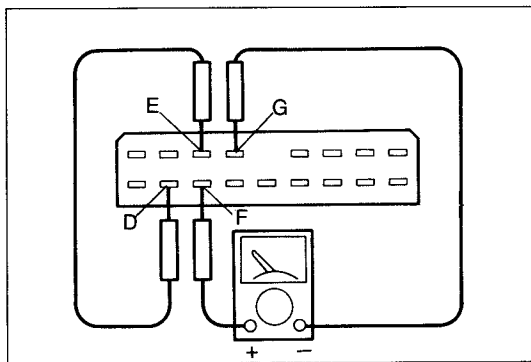
- Fully charged battery
- Jumper wire
- Circuit tester
- Test light

Note

Apply 12V to terminal I and ground terminal h except during the continuity tests.



97U0UX-047



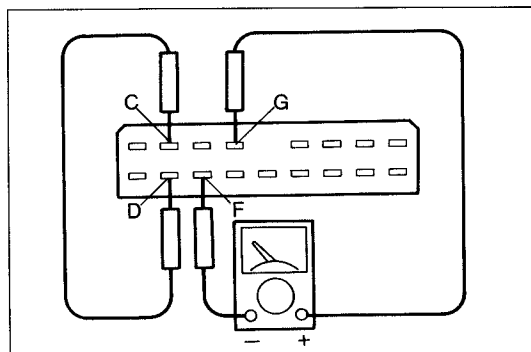
97U0UX-048

Checking temperature control circuit

1. Set the temperature control lever to the center position.
2. Connect a jumper wire between terminals D and E.
3. Measure the voltage between terminals F and G.

Terminal	Voltage
F—G	12V

4. If not as specified, replace the logicon switch.
If correct, go to the next step.

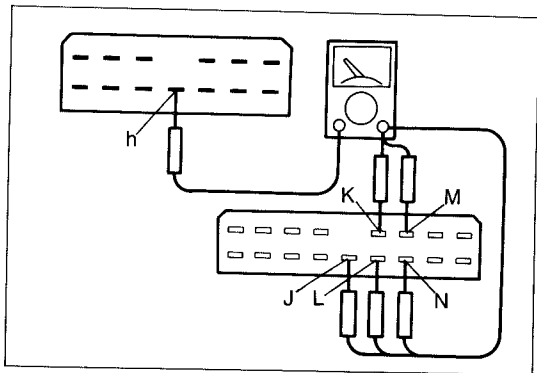


97U0UX-049

5. Disconnect the jumper wire.
6. Connect a jumper wire between terminals C and D.
7. Measure the voltage between terminals G and F.

Terminal	Voltage
G—F	12V

8. If not as specified, replace the logicon switch.



97U0UX-050

Continuity test

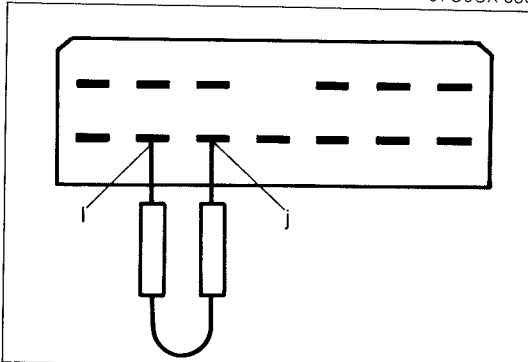
1. Check for continuity between the terminals as shown.

Condition	Terminal	Continuity
Push VENT switch	h—N	Yes
Push B/L switch	h—M	Yes
Push HEAT switch	h—L	Yes
Push H/D switch	h—K	Yes
Push DEF switch	h—J	Yes

2. If not as specified, replace the logicon switch.

Checking indicator lamps

1. Check for illumination of the indicator lamp as each switch is pushed.
2. If any lamp fails to illuminate, replace the logicon switch.
3. Connect a jumper wire between terminals I and J and verify that the indicator lamps dim.
4. If they do not, replace the logicon switch.



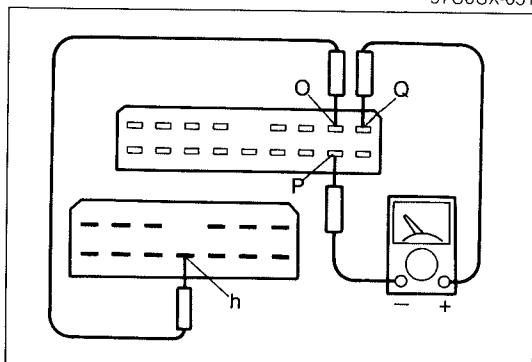
97U0UX-051

Checking mode control circuit

1. Connect a jumper wire between terminals h and O.
2. Measure the voltage between terminals P and Q.

Terminal	Voltage
P—Q	12V

3. If not as specified, replace the logicon switch. If correct, go to the next step.

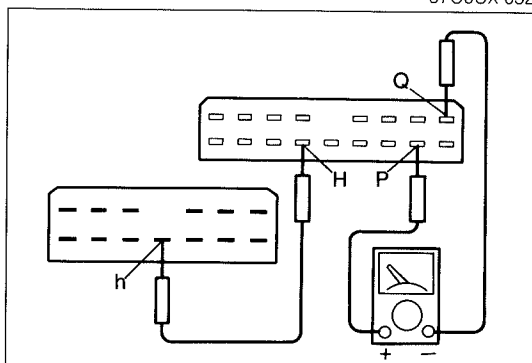


97U0UX-052

4. Disconnect the jumper wire.
5. Connect a jumper wire between terminals h and H.
6. Measure the voltage between terminals Q and P.

Terminal	Voltage
Q—P	12V

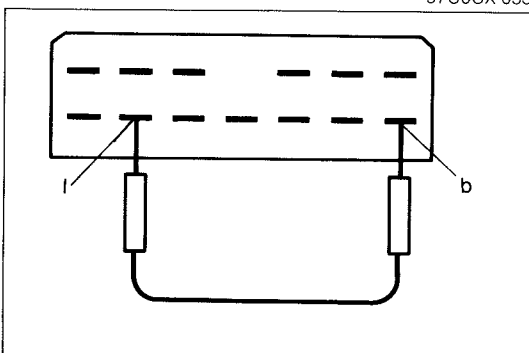
7. If not as specified, replace the logicon switch.



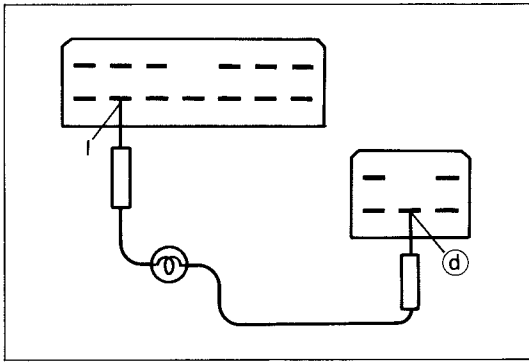
97U0UX-053

Checking unit illumination lamp

1. Connect a jumper wire between terminals b and I.
2. Check for illumination of the unit illumination lamps.
3. If there is no illumination of either lamp, replace the logicon switch.



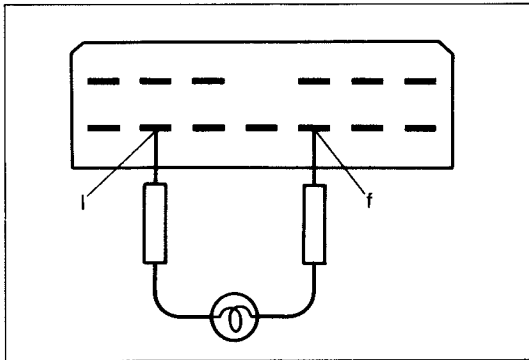
97U0UX-054



97U0UX-055

Checking heater relay output

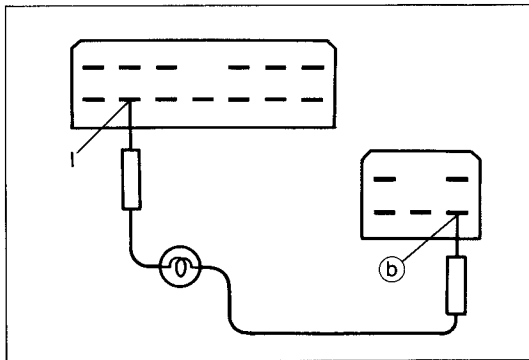
1. Connect a test light between terminals l and ⓓ.
2. Turn the blower switch ON.
3. If the test light does not light, check the fan amp. (Refer to page U-29.)
4. If the fan amp is OK, replace the logicon switch.



97U0UX-056

Checking A/C indicator lamp

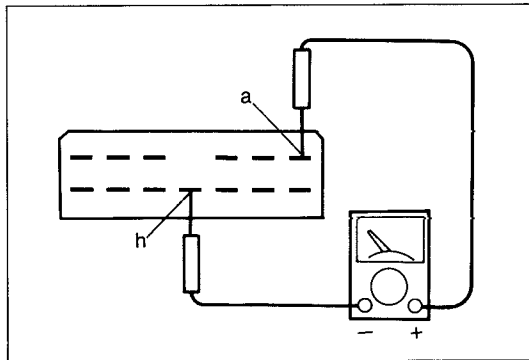
1. Connect a test light between terminals l and f.
2. Turn the blower switch ON.
3. If the test light does not light, check the fan amp. (Refer to page U-29.)
4. If the fan amp is OK, replace the logicon switch.



97U0UX-057

Checking Ex-Hi relay output

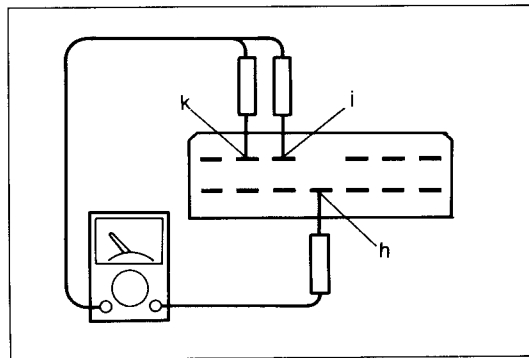
1. Connect a test light between terminals l and ⓑ.
2. Set the blower switch at maximum.
3. If the test light does not light, check the fan amp. (Refer to page U-29.)
4. If the fan amp is OK, replace the logicon switch.



97U0UX-058

Checking power transistor output

1. Measure the voltage at terminal a while turning the blower switch.
2. Verify that the voltage with the switch at maximum position is more than the voltage at OFF position. If not, check the fan amp. (Refer to page U-29.)
3. If the fan amp is OK, replace the logicon switch.



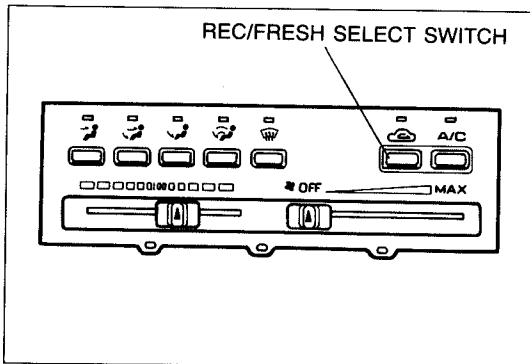
97U0UX-059

Checking REC/FRESH select switch

1. Check for continuity between terminals as shown.

REC/FRESH select switch	Terminal	Continuity
FRESH	h-i	Yes
REC	h-k	Yes

2. If not as specified, replace the logicon switch.



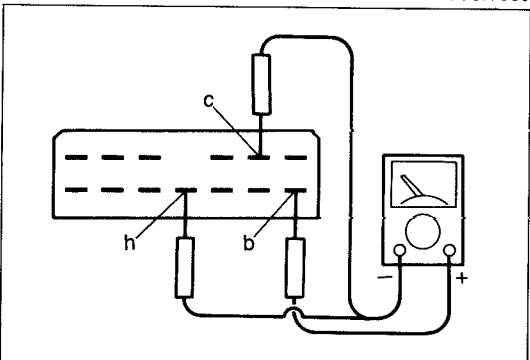
97U0UX-060

Checking REC/FRESH indicator lamp

1. Check indicator lamp operation as shown.

REC/FRESH select switch	Indicator lamp
FRESH	OFF
REC	ON

2. If not as specified, replace the logicon switch.



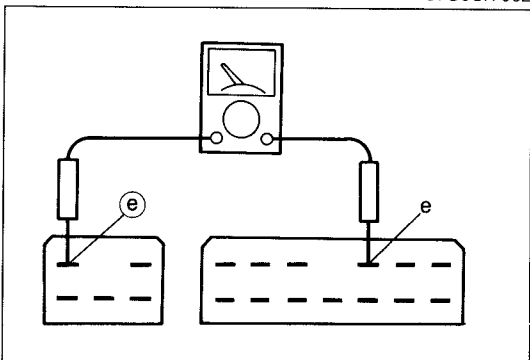
97U0UX-062

Checking REC/FRESH motor circuit

1. Connect a jumper wire between terminals c and h.
2. Measure the voltage between terminals h and d.

Terminal	Voltage
h-d	12V

3. If not as specified, replace the logicon switch.



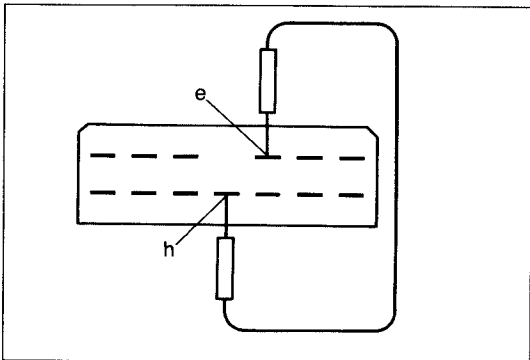
97U0UX-063

Checking A/C switch

1. Check for continuity between terminals e and (e) as shown.

A/C switch	Continuity
ON	Yes
OFF	No

2. If not as specified, replace the logicon switch.



97U0UX-064

Checking A/C indicator lamp

1. Connect a jumper wire between terminals h and e.
2. Check indicator lamp operation as shown.

A/C switch	Indicator lamp
ON	ON
OFF	OFF

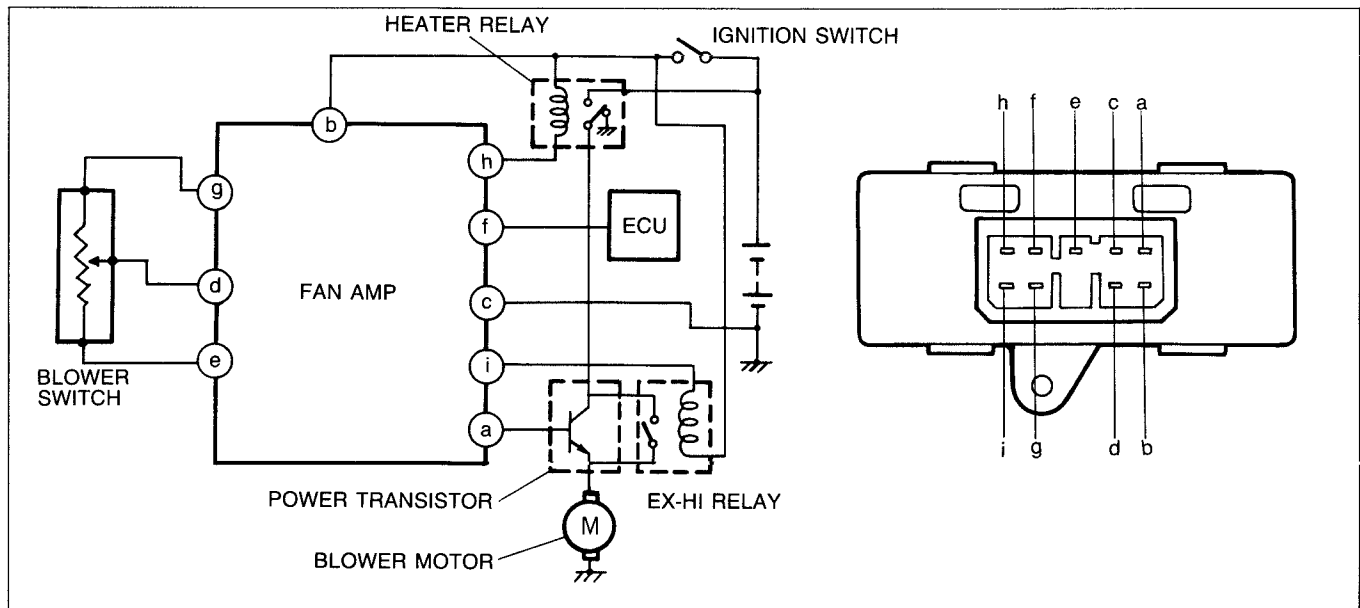
2. If not as specified, replace the logicon switch.

Checking fan amp

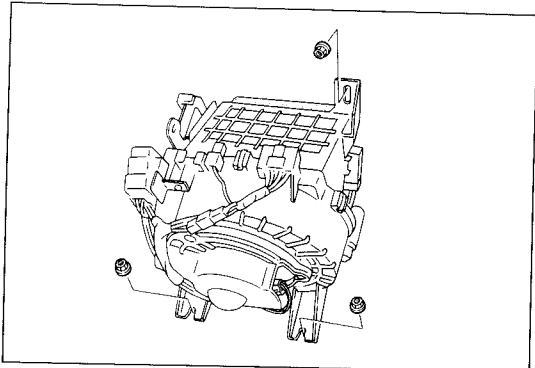
1. Turn the ignition switch ON.
2. Turn the A/C switch ON.
3. Measure the voltage at the terminal-wires of the fan amp as shown below.

Operation	Terminal	Voltage
Turn blower switch ON	f	Less than 2V
	h	Less than 2V
Turn blower switch OFF	f	12V
	h	12V
Turn blower switch from low to maximum	a	About 5—12V
Turn blower switch to maximum	i	Less than 2V
Turn blower switch to medium	i	12V

4. If not as specified, replace the fan amp.



97U0UX-065



97U0UX-066

BLOWER UNIT

Blower Unit Removal

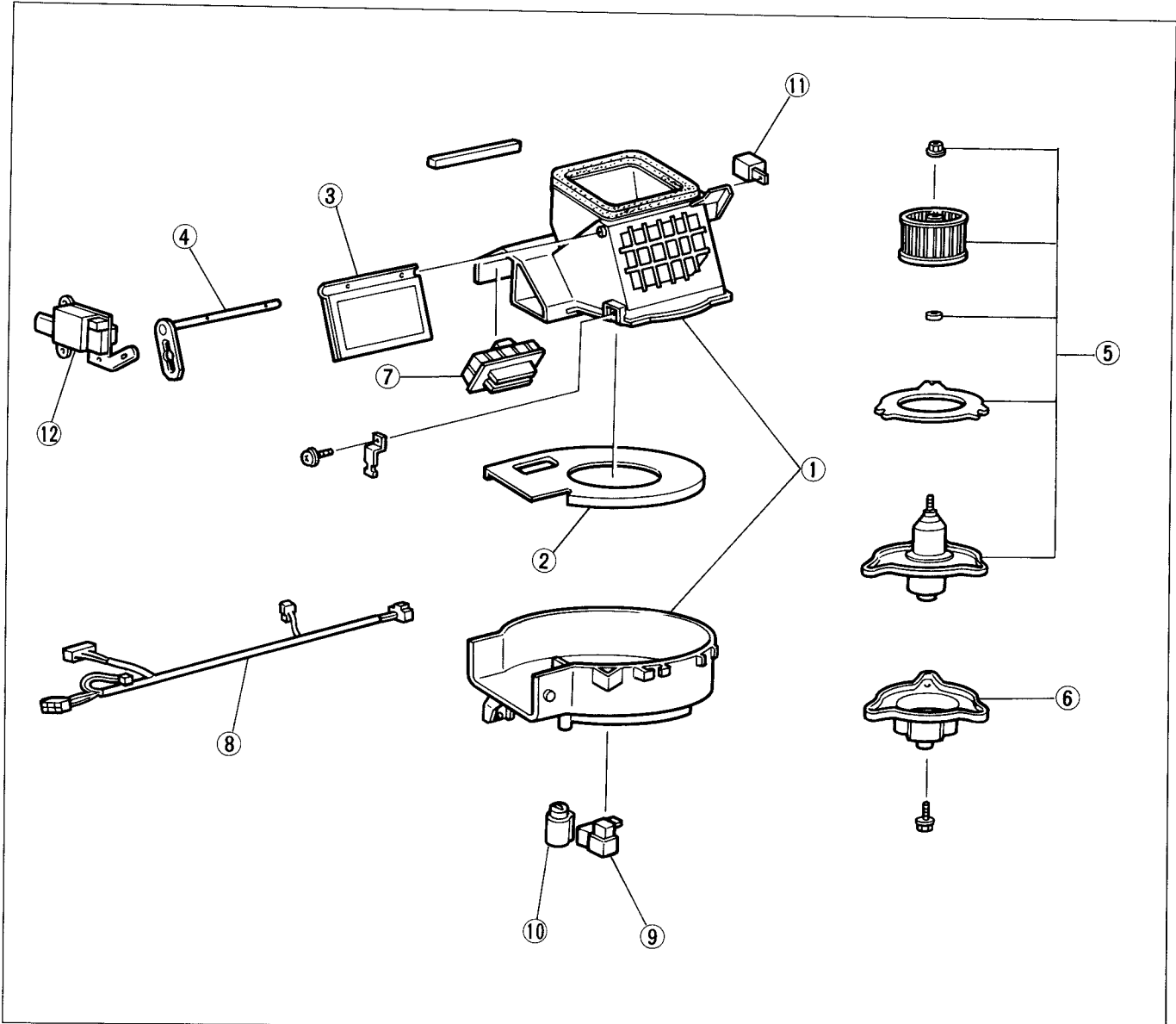
1. Remove the glove box and the lower panel.
(Refer to page S-9.)
2. Remove the nuts and the blower unit.

Installation

Install in the reverse order of removal.

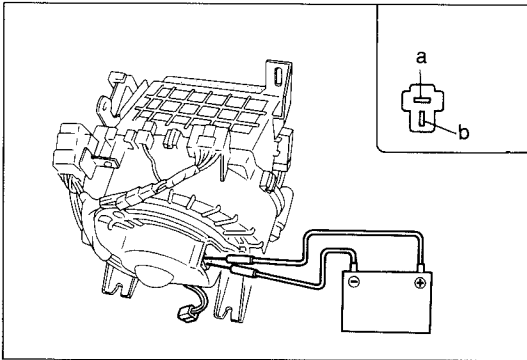
Disassembly and assembly

Disassemble and assemble as shown.



97U0UX-067

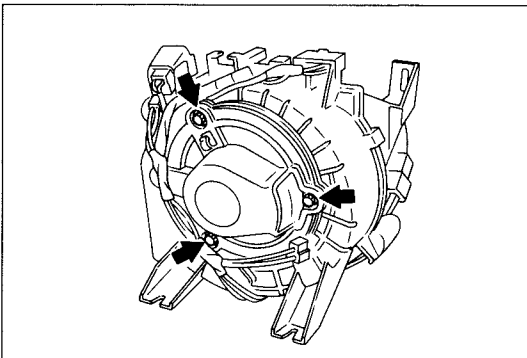
- | | |
|---------------------|-------------------------------|
| 1. Blower unit case | 7. Power transistor |
| 2. Flange assembly | 8. Blower unit harness |
| 3. Damper assembly | 9. Heater relay |
| 4. Shaft assembly | 10. Ex-Hi relay |
| 5. Blower motor | 11. Ign relay |
| 6. Motor cover | 12. REC/FRESH select actuator |



97U0UX-068

Blower Motor Inspection

1. Disconnect the blower motor connector.
2. Verify that the blower motor runs when applying 12V to terminal a and grounding terminal b.
3. If the blower motor does not run, replace it.



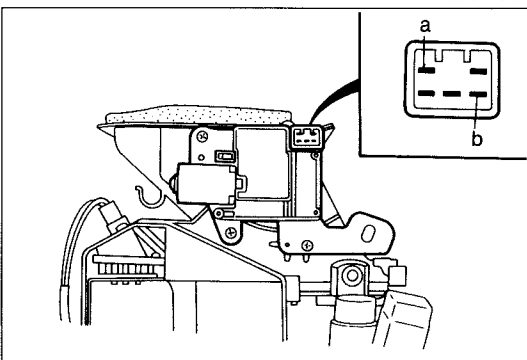
97U0UX-069

Removal

1. Disconnect the blower motor connector.
2. Remove the screws.
3. Remove the motor cover and the blower motor.

Installation

Install in the reverse order of removal.



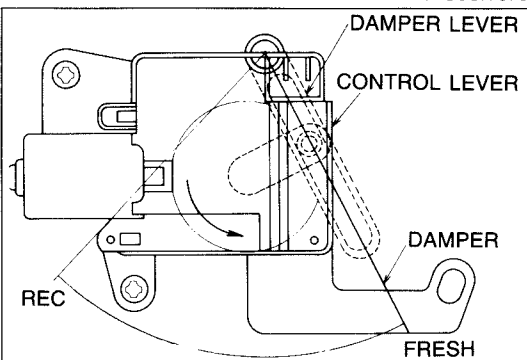
97U0UX-070

REC/FRESH Select Actuator Inspection

1. Remove the blower unit. (Refer to page U-30.)
2. Disconnect the REC/FRESH select actuator connector.
3. Check the actuator operation as shown.

Terminal		Actuator operation
a	b	
Ground	12V	Motor operates

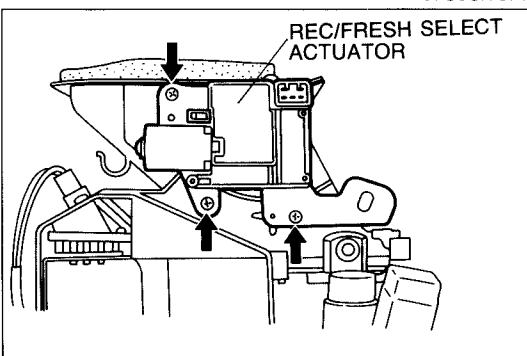
4. If not as specified, replace the actuator.



97U0UX-071

Link mechanism

The correct stopping position of the actuator lever is as shown.



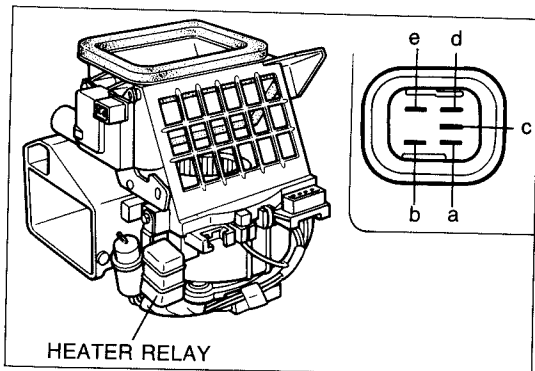
97U0UX-072

Removal

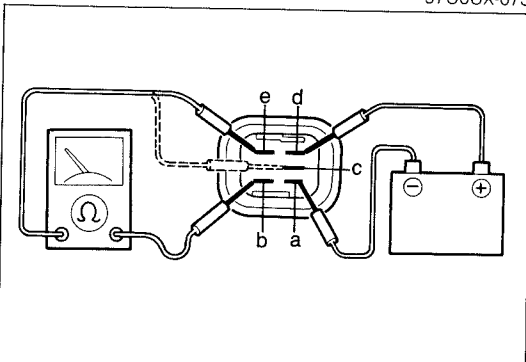
1. Remove the blower unit. (Refer to page U-30.)
2. Disconnect the REC/FRESH select actuator connector.
3. Remove the screws and remove the REC/FRESH actuator.

Installation

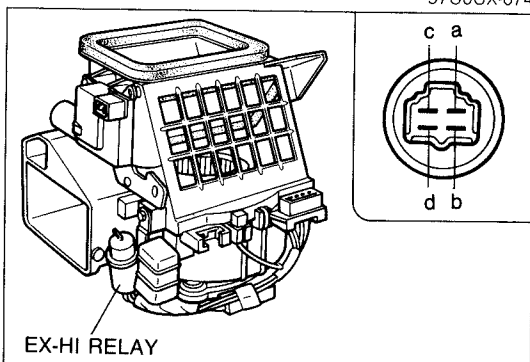
Set the damper lever to slide over the control lever, and install in the reverse order of removal.



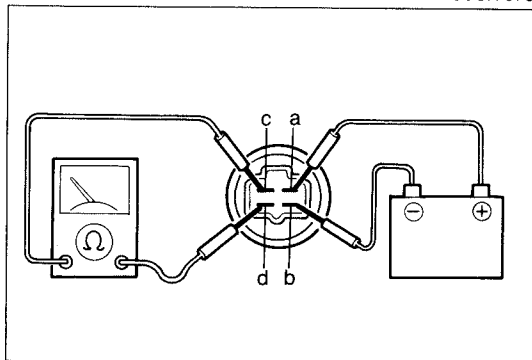
97U0UX-073



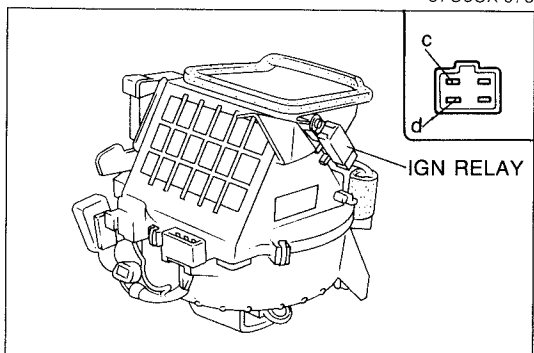
97U0UX-074



97U0UX-075



97U0UX-076



97U0UX-077

Heater Relay Inspection

1. Disconnect the heater relay connector.
2. Check continuity between terminals of the relay.

Terminal	Continuity	Action
b—e	Yes	Replace relay
	No	Check terminals b and c
b—c	Yes	Go to Step 3
	No	Replace relay

3. Apply 12V to terminal d and ground terminal a; then check for continuity between terminals of the relay.

Terminal	Continuity	Action
b—e	Yes	Check terminals b and c
	No	Replace relay
b—c	Yes	Replace relay
	No	Relay OK

Ex-Hi Relay Inspection

1. Disconnect the Ex-Hi relay connector.
2. Check for continuity between terminals c and d of the relay.

Terminal	Continuity	Action
c—d	Yes	Replace relay
	No	Go to Step 3

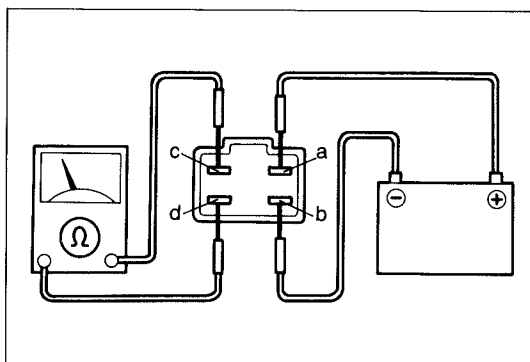
3. Apply 12V to terminal a and ground terminal b. Check for continuity between terminals c and d of the relay.

Terminal	Continuity	Action
c—d	Yes	Relay OK
	No	Replace relay

Ign Relay (except Non-Turbo M/T) Inspection

1. Remove the blower unit. (Refer to page U-30.)
2. Disconnect the Ign relay connector.
3. Check for continuity between terminals c and d of the relay.

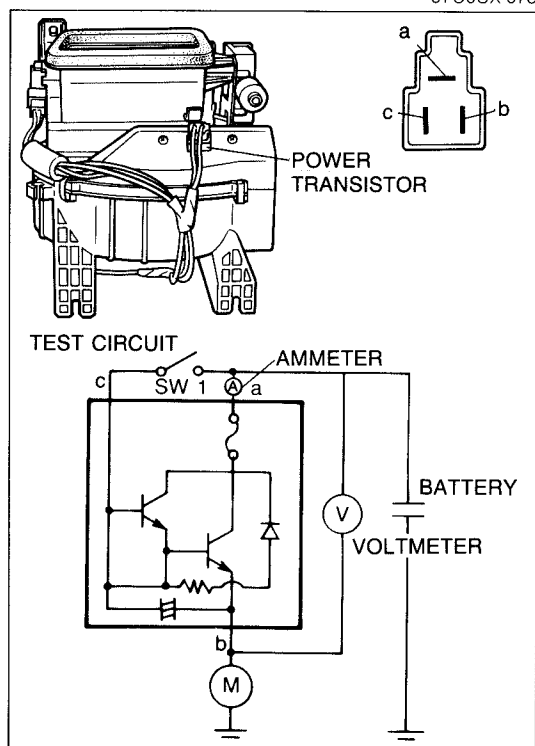
Terminal	Continuity	Action
c—d	Yes	Replace relay
	No	Go to Step 4



97U0UX-078

- Apply 12V to terminal a and ground terminal b. Check for continuity between terminals c and d of the relay.

Terminal	Continuity	Action
c—d	Yes	Relay OK
	No	Replace relay



97U0UX-079

Power Transistor Inspection

- Remove the blower unit. (Refer to page U-30.)
- Disconnect the power transistor connector.
- Make the test circuit.
- Measure the voltage between a and b terminals and the current as shown.

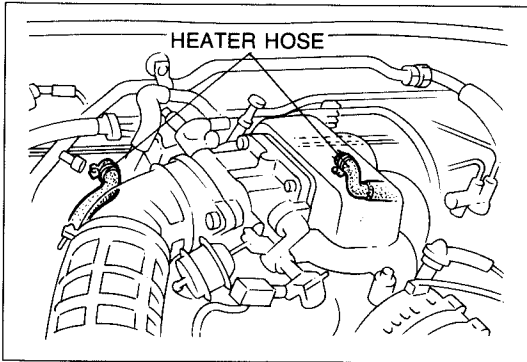
Note

When SW1 is ON, remove the ammeter and reconnect the circuit.

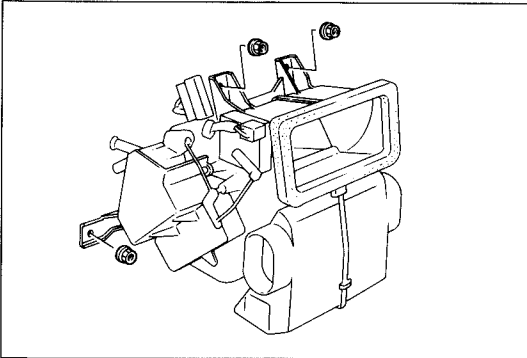
SW1	Current	V (a—b)
OFF	Less than 10 mA	
ON		Less than 3V

- If the voltage or current is not within specification, replace the power transistor.

U HEATER



97U0UX-080



97U0UX-081

HEATER UNIT

Heater Unit Removal

1. Drain the engine coolant. (Refer to Section E.)
2. Disconnect the heater hoses from the heater unit and remove the fire wall grommets.

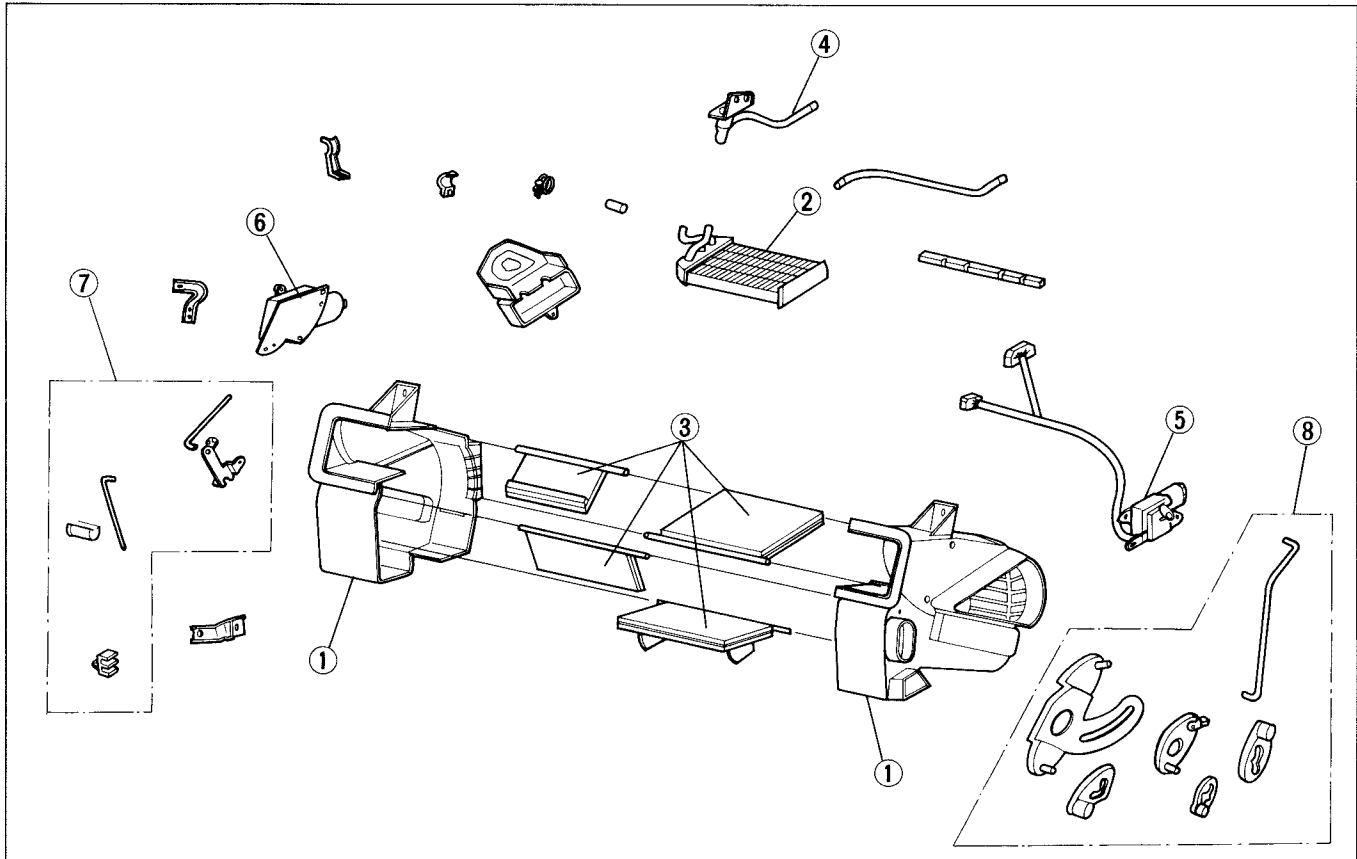
3. Remove the instrument panel. (Refer to page S-6.)
4. Remove the nuts and remove the heater unit.

Installation

Install in the reverse order of removal.

Disassembly and assembly

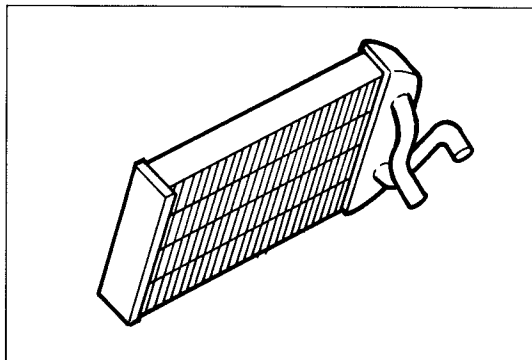
Disassemble and assemble as shown.



97U0UX-082

1. Heater unit case
2. Heater core
3. Damper assembly
4. Water valve

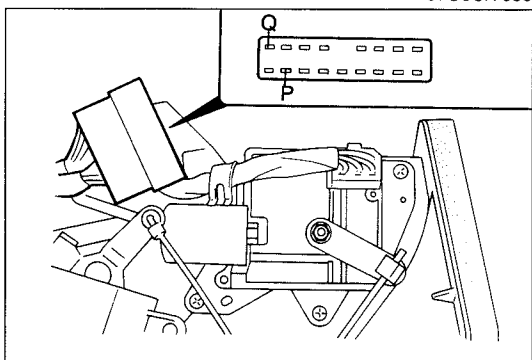
5. Mode control actuator
6. Temperature control actuator
7. Temperature control linkset
8. Mode control linkset



97U0UX-083

Heater Core Inspection

1. Check the heater core fins for blockage.
2. If the fins are clogged, clean them with compressed air.
3. Check the fittings for cracks or other damage.
4. Replace the heater core if necessary.



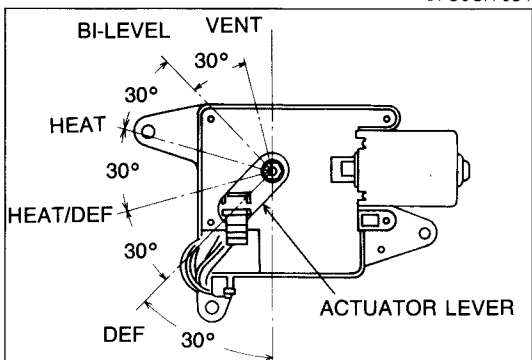
97U0UX-084

Mode Control Actuator Inspection

1. Remove the instrument panel. (Refer to page S-6.)
2. Disconnect the mode control actuator connector.
3. Check the actuator operation as shown.

Terminal		Actuator operation
P	Q	
12V	Ground	Motor rotates; stops at DEF position
Ground	12V	Motor rotates; stops at VENT position

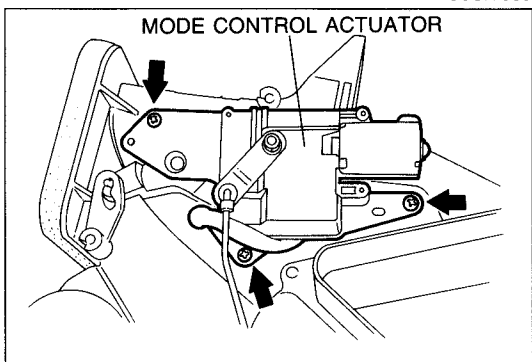
4. If not as specified, replace the actuator.



97U0UX-085

Link mechanism

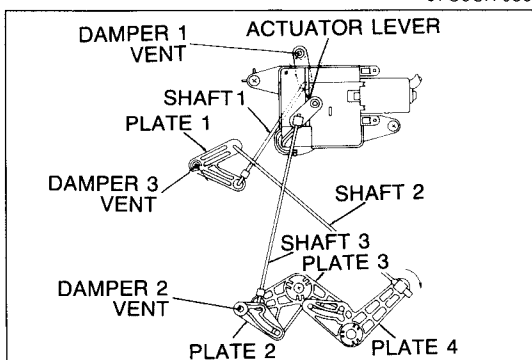
The correct stopping positions of the actuator lever are as shown in the figure.



97U0UX-086

Removal

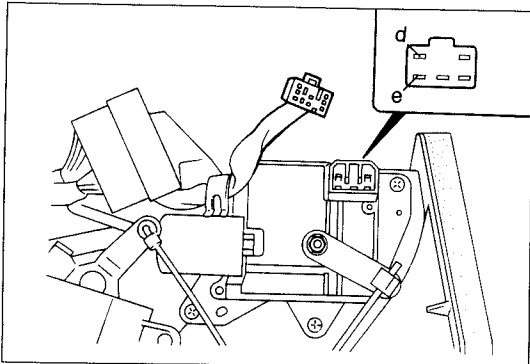
1. Remove the instrument panel. (Refer to S-6.)
2. Disconnect the mode control actuator connector and the temperature control actuator connector.
3. Remove the screws and remove the mode control actuator.



97U0UX-087

Installation

1. Install the actuator to the heater unit case.
2. Install shaft 2 to plate 4. Then, set damper 1 making sure it is completely shut (VENT position).
3. Set the control lever to the "VENT" position, and install shaft 3 to the actuator lever.



97U0UX-088

Temperature Control Actuator

Inspection

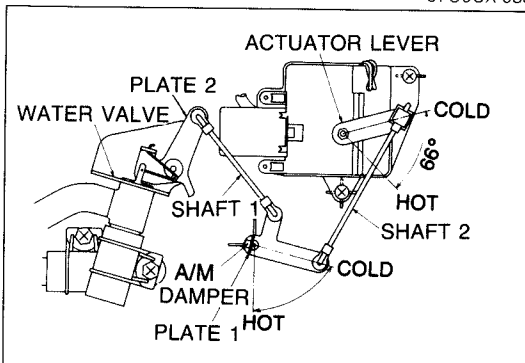
1. Remove the driver side lower panel and ducts.
2. Disconnect the temperature control actuator connector.
3. Check the actuator operation as shown.

Terminal		Actuator operation
d	e	
12V	Ground	Motor rotates; stops at maximum HOT position
Ground	12V	Motor rotates; stops at maximum COLD position

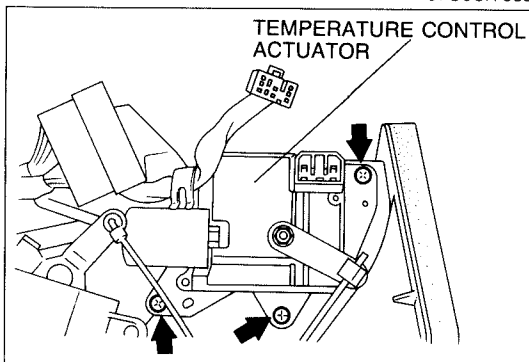
4. If not as specified, replace the actuator.

Link mechanism

The correct stopping positions of the actuator levers are as shown in the figure.



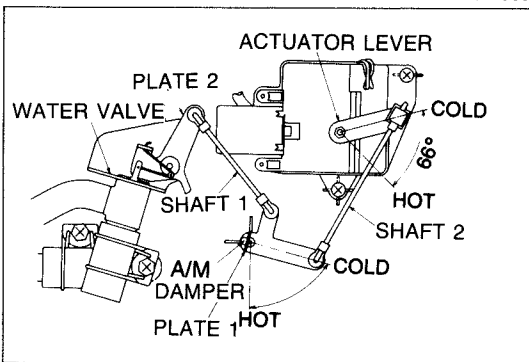
97U0UX-085



97U0UX-089

Removal

1. Remove the driver side lower panel and ducts.
2. Disconnect the temperature control actuator connector.
3. Remove the screws and remove the temperature control actuator.



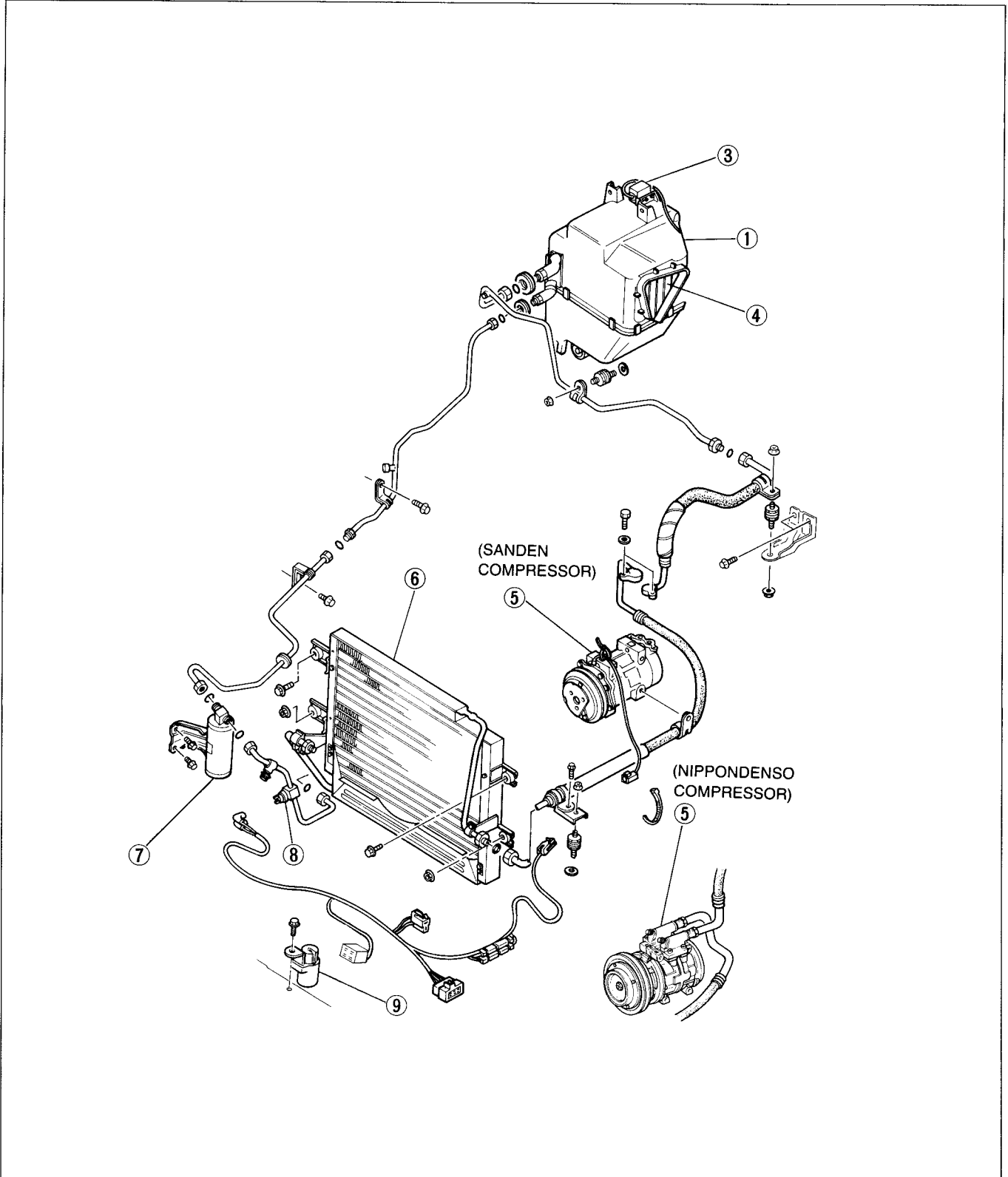
97U0UX-090

Installation

1. Confirm that the actuator lever is at maximum cold position.
2. Install the actuator on the heater unit case.
3. Set the water valve to the fully closed position, and install shaft 2 to the actuator lever.
4. Install in the reverse order of removal.

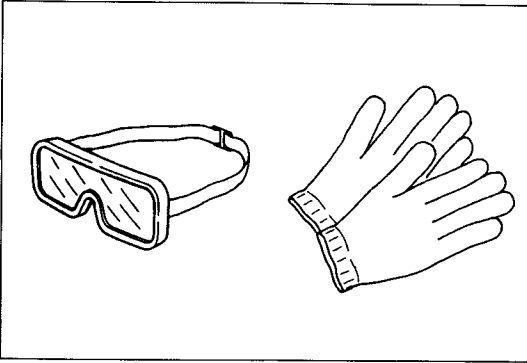
AIR CONDITIONER

STRUCTURAL VIEW

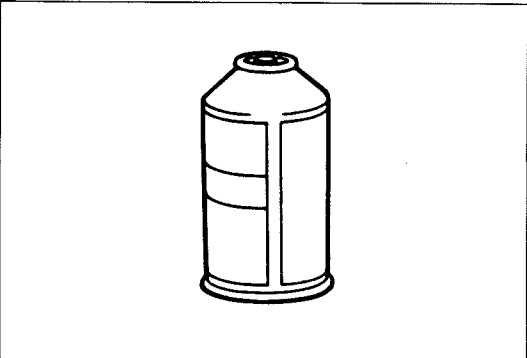


97U0UX-091

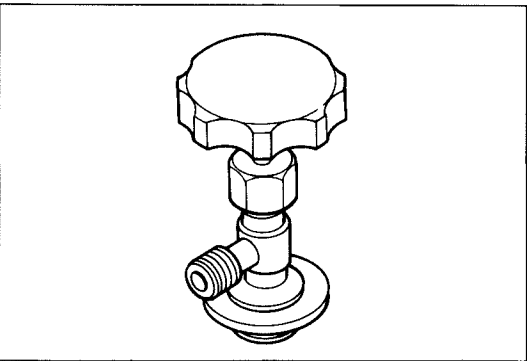
- | | |
|--------------------------------------|--------------------------------|
| 1. Cooling unit | 6. Condenser |
| 2. Expansion valve (in cooling unit) | 7. Receiver/drier |
| 3. Thermostatic switch | 8. Refrigerant pressure switch |
| 4. Evaporator | 9. A/C main relay |
| 5. Compressor | |



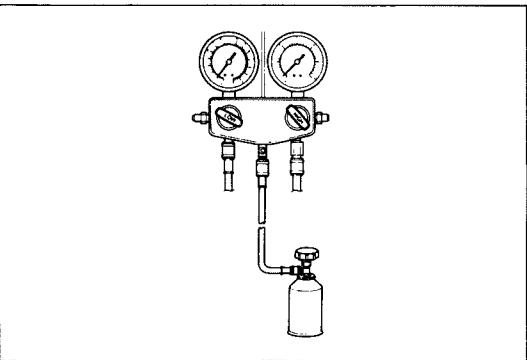
97U0UX-092



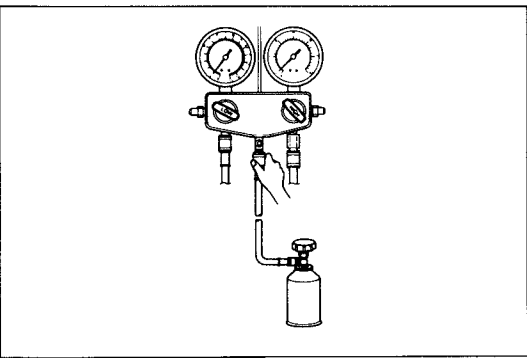
9MU0UX-126



97U0UX-093



9MU0UX-128



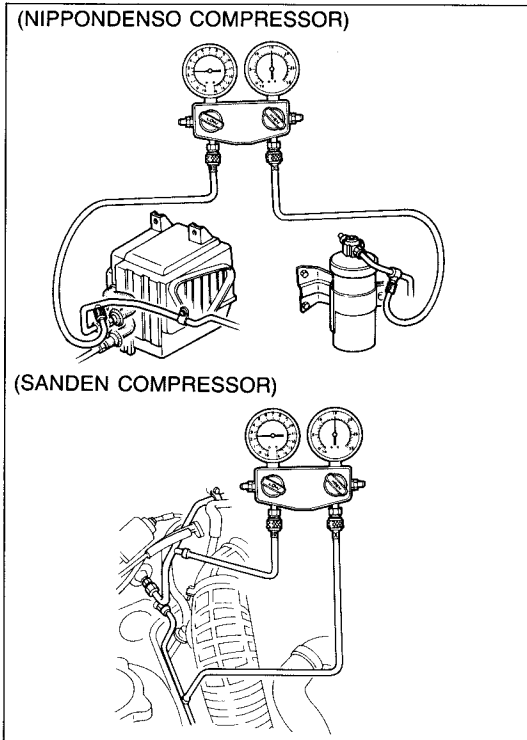
9MU0UX-129

SAFETY PRECAUTION

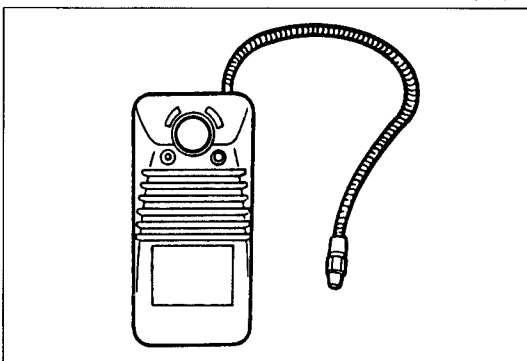
1. R-12 liquid refrigerant is highly volatile. A drop of it on the skin could result in localized frostbite. When handling the refrigerant, be sure to wear gloves.
2. If the refrigerant splashes into the eyes, wash them with clean water immediately. Always wear goggles or glasses to protect the eyes.
3. The R-12 container is a highly pressurized vessel. Never subject it to high heat, and be sure that the temperature where it is stored is below **52°C (125.6°F)**.
4. A halide leak detector is often used to check the system for refrigerant leakage. Remember that R-12, upon coming into contact with the flame, produces phosgene, a toxic gas. Always provide adequate ventilation.

REFRIGERANT CONTAINER SERVICE VALVE

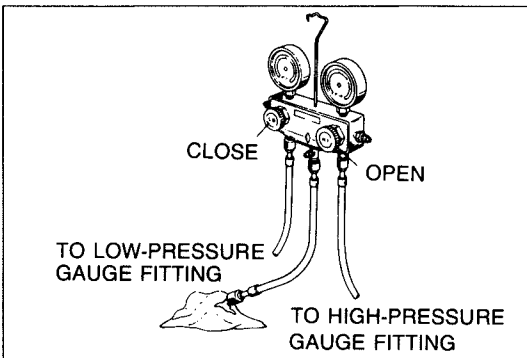
1. Turn the handle fully counterclockwise before connecting the valve to the refrigerant container.
2. Turn the outlet valve counterclockwise until it reaches its highest position.
3. Turn the outlet valve fully clockwise by hand. Connect the center hose to the valve fitting.
4. Turn the handle clockwise to puncture the sealed can.
5. Turn the handle fully counterclockwise to fill the center hose. Do not open the high- or low-pressure manual valves.
6. Loosen the hose nut connected to the center fitting of the manifold gauge. Allow air to escape until gas is expelled; then retighten the nut.



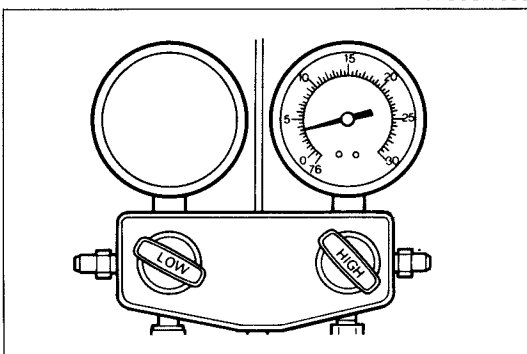
97U0UX-094



9MU0UX-253



97U0UX-096



96U16X-091

INSTALLATION OF MANIFOLD GAUGE SET

Note

Fittings for attaching the manifold gauge set are on the high- and low-pressure pipes.

1. Close both hand valves of the manifold gauge set.
2. Connect the low-pressure hose to the low-pressure gauge fitting and high-pressure hose to the high-pressure gauge fitting.
3. Tighten the hose nuts by hand only.

LEAK TEST

After evacuating the system (refer to page U-40), check for leaks.

1. Connect a full refrigerant container to the service valve.
2. Open the high-pressure manual valve to charge the system with refrigerant gas.

3. When the low-pressure gauge reads **98 kPa (1 kg/cm², 14 psi)**, close the high-pressure manual valve.
4. Use a gas leak detector to check the system for leaks. If a leak is found, repair the faulty component or connection; then evacuate the system again.

DISCHARGING

1. Connect the manifold gauge set to the refrigeration system.
2. Place the free end of the center hose on a shop towel.
3. Slowly open the high-pressure manual valve to allow the refrigerant to escape.

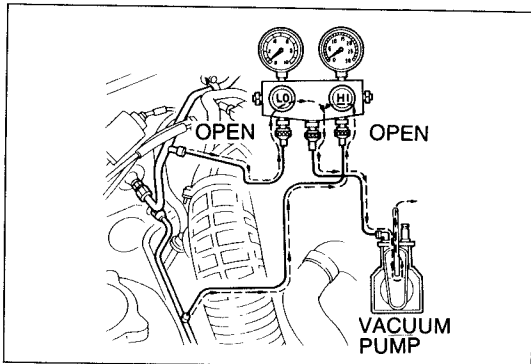
Caution

Open the valve only slightly.

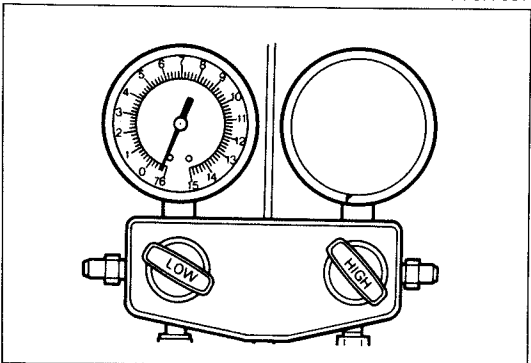
If refrigerant is allowed to escape too fast, the compressor oil will be drawn out of the system.

4. Check the shop towel to make sure no oil is being discharged. If oil is present, partially close the manual valve.
5. After the manifold gauge reading drops below **343 kPa (3.5 kg/cm², 50 psi)**, slowly open the low-pressure manual valve.
6. As the system pressure drops, gradually open both the high- and low-pressure manual valves until both gauges read **0 kPa (0 kg/cm², 0 psi)**.

U AIR CONDITIONER



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EVACUATION

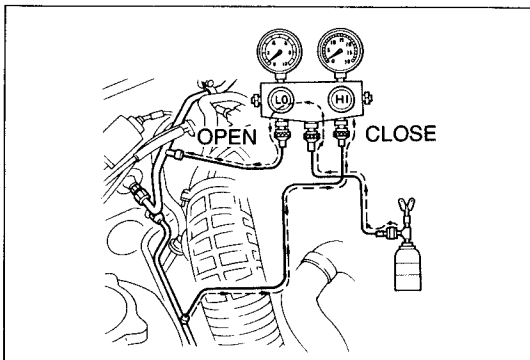
Whenever the refrigeration system has been exposed to the atmosphere, it must be purged of moisture and air.

1. Connect the manifold gauge set. (Refer to page U-39.)
2. Connect the center hose of the gauge set to the vacuum pump inlet.
3. Start the vacuum pump and open both manual valves.

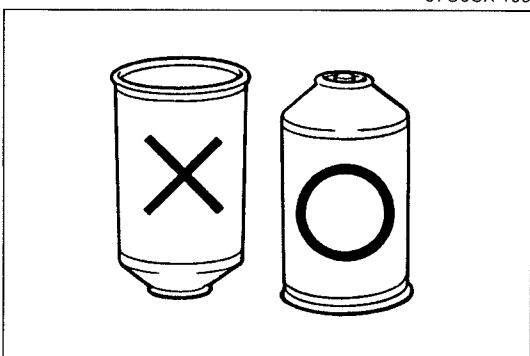
4. When the low-pressure gauge indicates approximately **600 mmHg (24 inHg)**, close both manual valves and stop the vacuum pump.
5. Verify that the pressure remains the same for **15 minutes** or more. If the pressure changes, check the system for leaks, and repair as necessary.

6. If no leaks are found, start the vacuum pump once again and open both manual valves to obtain **700 mmHg (27 inHg)**.
7. After the low-pressure gauge indicates lower than **700 mmHg (27 inHg)**, continue evacuating for **15 minutes**.
8. Close both manual valves and stop the vacuum pump.
9. Disconnect the hose from the vacuum pump.

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96U16X-098

CHARGING

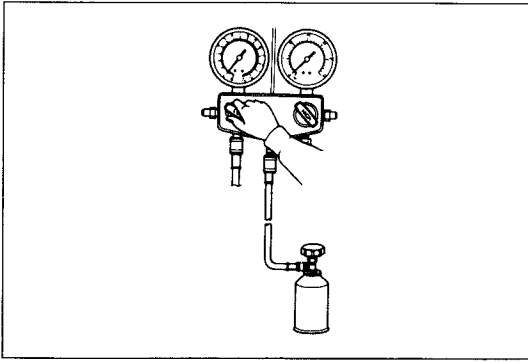
1. Close the high-pressure and low-pressure manual valves fully after the system is evacuated.
2. Install the refrigerant container service valve.
3. Open the low-pressure manual valve to charge the system with refrigerant gas.

Note

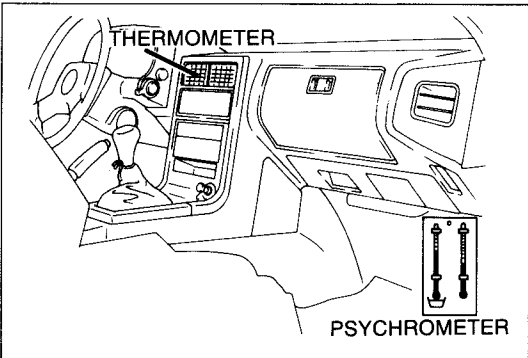
When charging of the system becomes slow, run the engine at fast idle and operate the air conditioner.

Caution

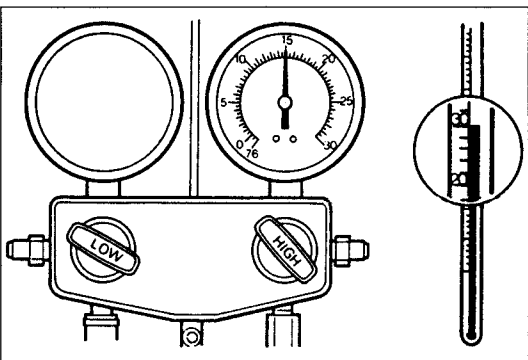
- a) Be sure to keep the container in the upright position to prevent liquid refrigerant from being charged into the system through the suction side, possibly damaging the compressor.
- b) Never open the high-pressure manual valve while charging the system with the A/C ON. Doing so may cause the refrigerant can to explode.



97U0UX-101



97U0UX-102



97U0UX-103

4. Charge the system with the specified amount of refrigerant.

Specified amount: 800 g (28.2 oz)

5. Close the low-pressure manual valve and the service valve of the refrigerant container.
6. Carry out a performance test (Refer to below.).
7. Stop the air conditioner and the engine.
8. Quickly disconnect both hoses from the gauge fittings.
9. Put the cap nuts on the gauge fittings.

PERFORMANCE TEST

After finishing repairs, conduct a performance test of the air conditioning system as follows.

1. Connect the manifold gauge set. (Refer to page U-39.)
2. Start the engine and keep the engine speed at **2,000 rpm**.
3. Operate the air conditioner at maximum cooling.
4. Open all windows and doors.
5. Place a dry-bulb thermometer in the center ventilator outlet.
6. Place a dry and wet thermometer close to the blower inlet.

7. Wait until the air conditioner outlet temperature stabilizes.

Stabilized condition

Blower inlet temperature: 25—35°C (77—95°F)

High pressure:

1,030—1,324 kPa (10.5—13.5 kg/cm², 149—192 psi)

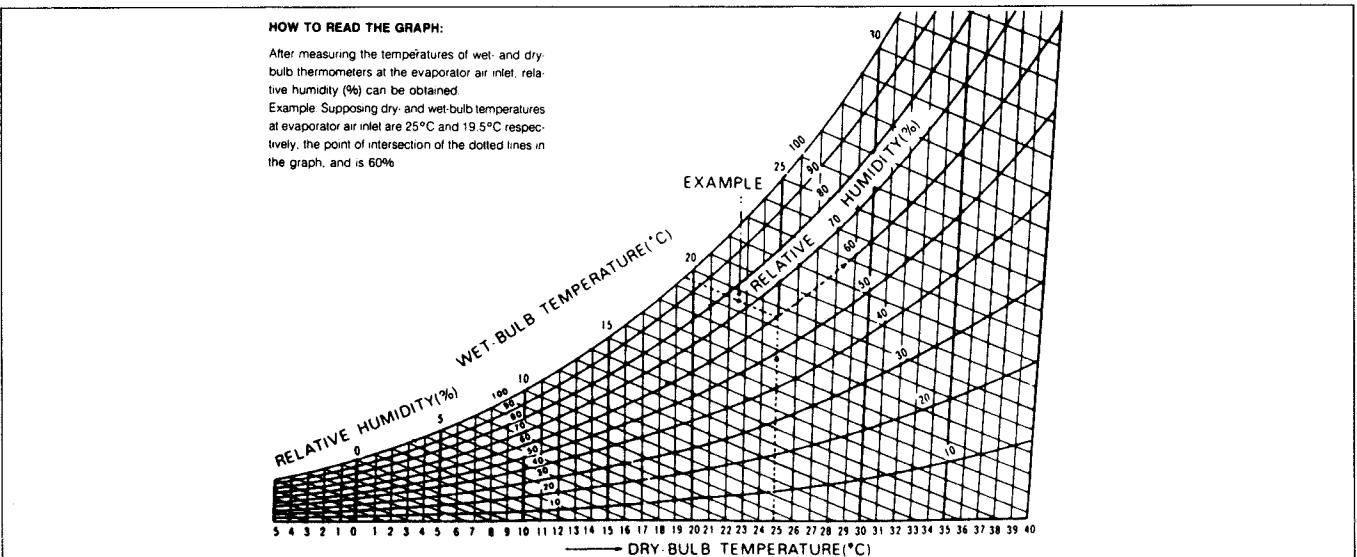
Note

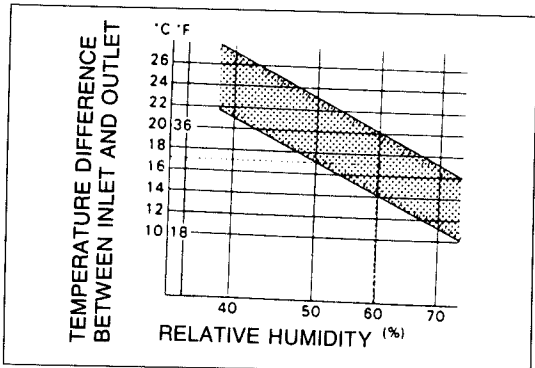
If the high pressure becomes too high, pour cool water on the condenser. If the high pressure is too low, cover the front of the condenser.

8. After the air conditioner stabilizes, read the dry and wet thermometer at the air inlet.

9. Calculate the relative humidity from the below chart by comparing the wet and dry bulb readings.

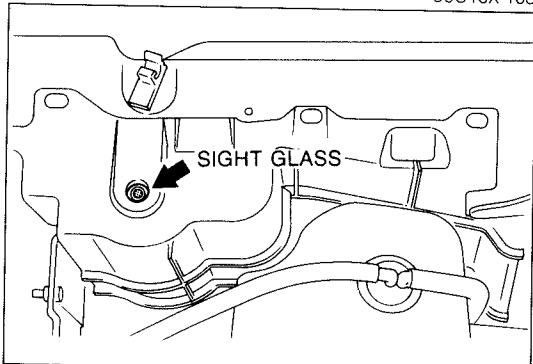
96U16X-102





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10. Read the dry thermometer at the air outlet, and calculate the difference between the inlet dry bulb and outlet dry bulb temperatures.
11. Verify that the intersection of the relative humidity and temperature difference is in the shaded zone.



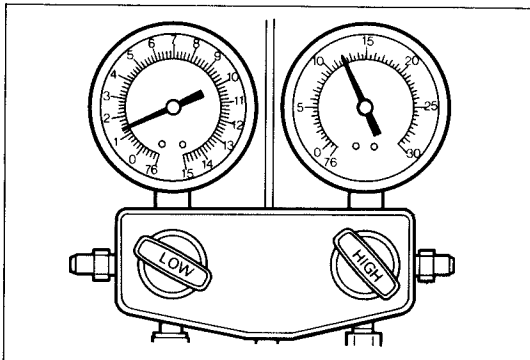
97U0UX-104

CHECKING REFRIGERANT CHARGE

1. Run the engine at a fast idle.
2. Operate the air conditioner at maximum cooling for a few minutes.
3. Determine the amount of refrigerant as shown below by observing the sight glass.

Item	Symptom	Amount of refrigerant	Action
1	Bubbles present in sight glass	Insufficient refrigerant	Check refrigerant pressure
2	No bubbles present in sight glass	Too much or proper amount of refrigerant	Turn air conditioner off, and watch bubbles (Refer to Items 3 and 4)
3	Immediately after air conditioner turned off, refrigerant in sight glass stays clear	Too much refrigerant	Check refrigerant pressure
4	When air conditioner turned OFF, refrigerant foams and then sight glass becomes clear	Proper amount of refrigerant	Refrigerant amount normal

9MU0UX-140



97U0UX-105

CHECKING REFRIGERANT PRESSURE

1. Connect the manifold gauge set. (Refer to page U-39.)
2. Operate the engine at 1,500 rpm and set the air conditioner to maximum cooling.
3. Measure the low and high pressures.

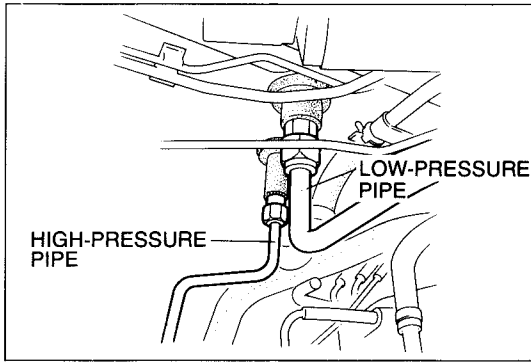
Normal pressure

Low pressure:

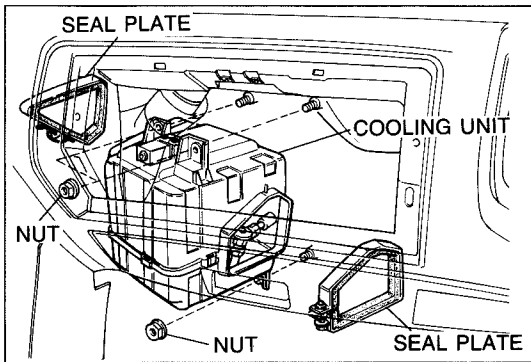
98—167 kPa (1.0—1.7 kg/cm², 14—24 psi)

High pressure:

1,030—1,324 kPa (10.5—13.5 kg/cm², 149—192 psi)



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97U0UX-107

COOLING UNIT

Cooling Unit Removal

1. Disconnect the negative battery cable.
2. Discharge the refrigerant system. (Refer to page U-39.)
3. Disconnect the low-pressure pipe and high-pressure pipe from the cooling unit.

Note

Immediately plug all open fittings to keep moisture out of the system.

4. Remove the grommets.
5. Remove the glove box and lower panel. (Refer to page S-9.)
6. Disconnect the drain hose.
7. Disconnect the thermoswitch connector.
8. Remove the seal plates.
9. Remove the nuts and remove the cooling unit.

Installation

Install in the reverse order of removal, noting the following.

Note

- a) Adjust and position the cooling unit so that its connections match those of the heater unit and the blower unit.
- b) Apply compressor oil to the O-rings on the fittings.
- c) Do not apply compressor oil to the fitting nuts.
- d) If the evaporator is replaced, add compressor oil to the compressor.

Compressor oil: 25—30 cc (1.5—1.8 cu in)

Tightening torque:

Low-pressure pipe

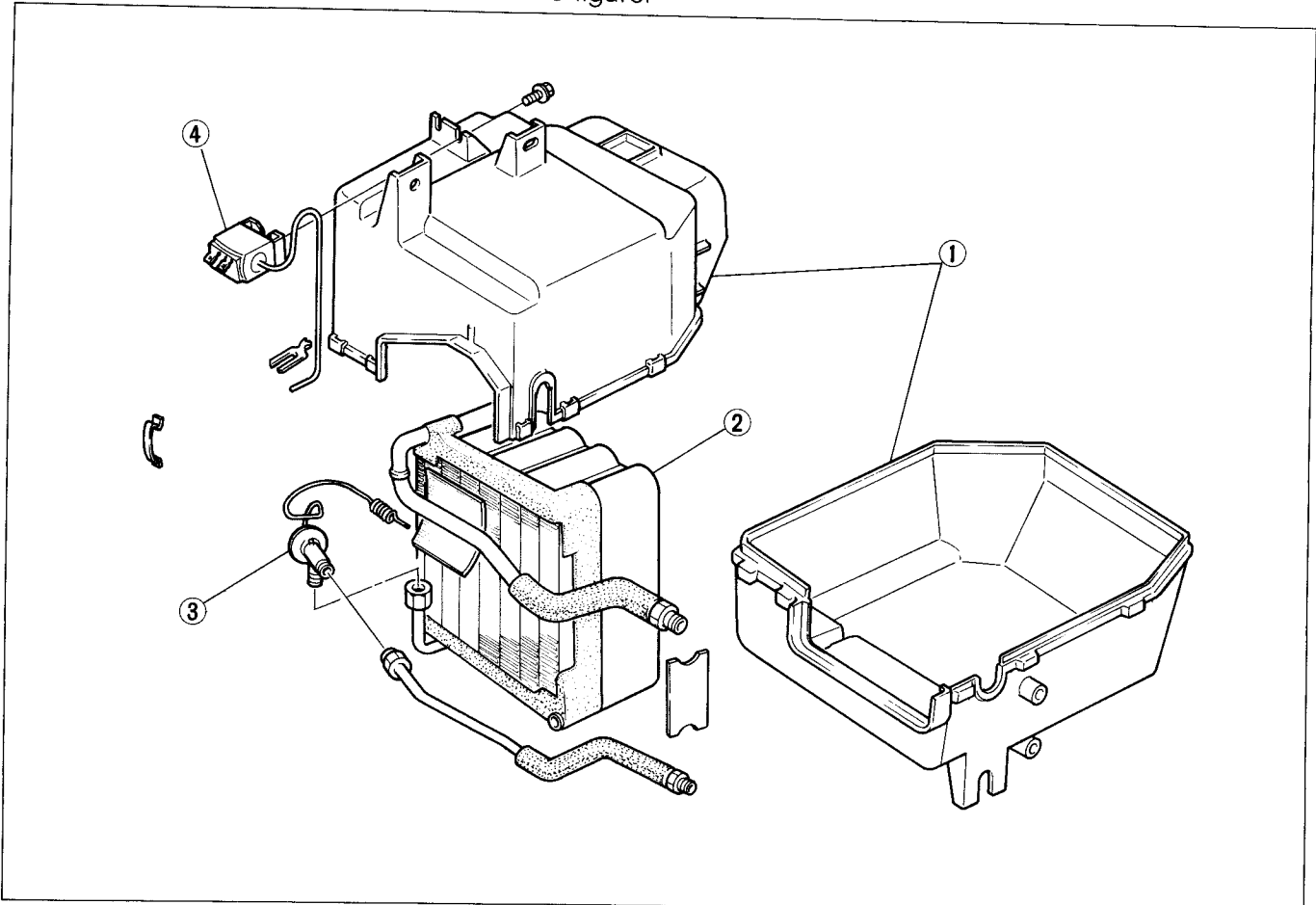
29—34 N·m (3.0—3.5 m·kg, 22—25 ft·lb)

High-pressure pipe

12—15 N·m (1.2—1.5 m·kg, 8.7—11 ft·lb)

Disassembly and assembly

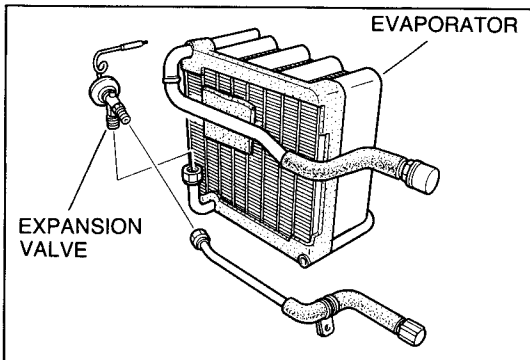
Disassemble and assemble as shown in the figure.



97U0UX-108

- 1. Cooling unit case
- 2. Evaporator

- 3. Expansion valve
- 4. Thermostatic switch



97U0UX-109

Expansion Valve

Note

Before replacement of the expansion valve, carefully check the refrigeration system. (Refer to troubleshooting information, page U-6.)

Removal

1. Remove the cooling unit. (Refer to page U-43.)
2. Disassemble the cooling unit. Remove the evaporator and expansion valve as an assembly.
3. Disconnect the inlet and outlet pipes.
4. Remove the capillary tube from the outlet pipe and remove the expansion valve.

Installation

Install in the reverse order of removal, noting the following.

Note

- a) Apply the compressor oil to the O-rings on the fittings.
- b) Do not apply the compressor oil to the fitting nuts.

Tightening torque

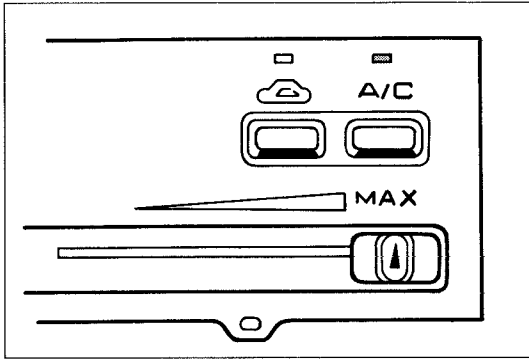
Inlet pipe:

13—15 N·m (1.3—1.5 m·kg, 9.4—11 ft·lb)

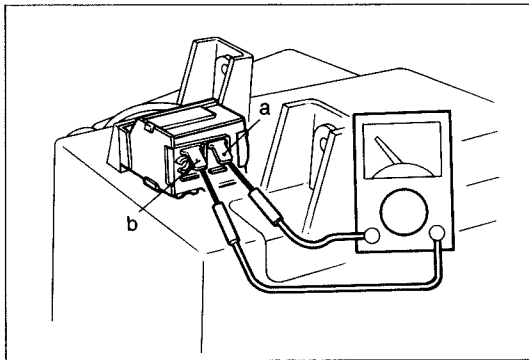
Outlet pipe:

21—25 N·m (2.1—2.5 m·kg, 15—18 ft·lb)

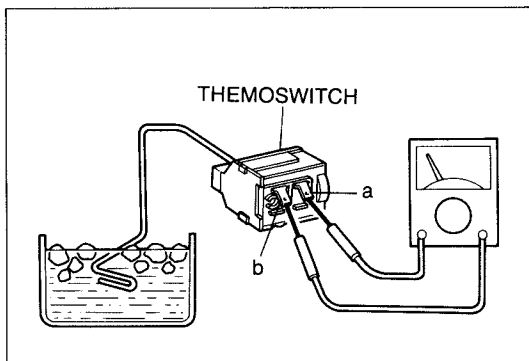
97U0UX-110



97U0UX-111



97U0UX-112



97U0UX-113

Thermostwitch

On-vehicle inspection

1. Remove the glove box and undercover.
(Refer to page S-9.)
2. Run the engine at idle.
3. Turn OFF the A/C switch and set the blower switch to maximum position. Operate the blower fan for a few minutes to warm the thermostwitch.
4. After a few minutes, turn OFF the blower switch and stop the engine.
5. Disconnect the thermostwitch connector and check for continuity between terminals of the switch.

Terminals	Continuity
a-b	Yes

6. If not as specified, replace the thermostwitch.

Removal

1. Remove the cooling unit. (Refer to page U-43.)
2. Disassemble the cooling unit and remove the thermostwitch.
(Refer to page U-44.)

Inspection

1. Immerse the sensing bulb in a container of ice water.
2. Check continuity between terminals of the switch as specified.

(Nippondenso compressor)

Terminals	Temperature	Continuity
a-b	Above 3.5°C ± 1.5 (38.3°F ± 2.7) -1.0 -1.8	Yes
	Below 1°C ± 1.5 (33.8°F ± 2.7) -0.5 -0.9	No

(Sanden compressor)

Terminals	Temperature	Continuity
a-b	Above 5°C (41°F)	Yes
	Below 1°C ± 1 (33.8°F ± 1.8)	No

3. If not as specified, replace the thermostwitch.

Installation

Install in the reverse order of the removal.

9MU0UX-150

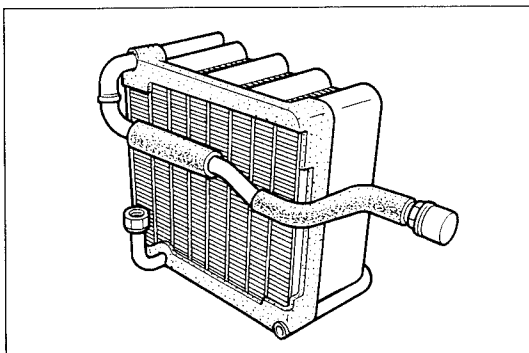
Evaporator Inspection

1. Check the evaporator fins for blockage. If the fins are clogged, clean them with compressed air.

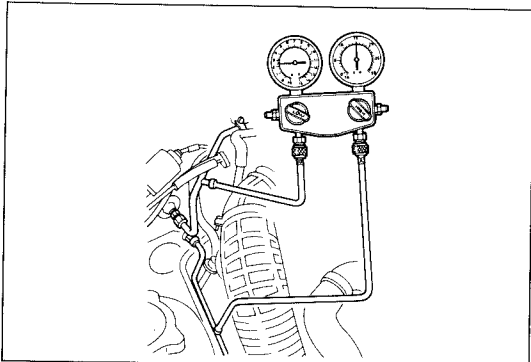
Caution

Never use water to clean the evaporator, the water could later freeze and cause incorrect operation.

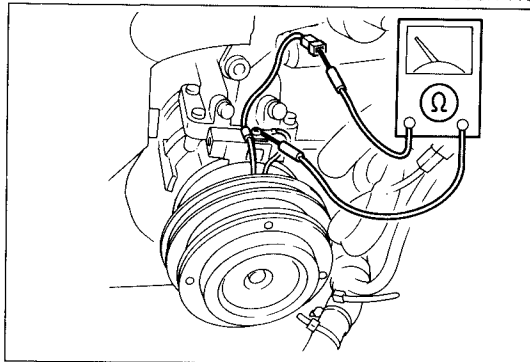
2. Check the fittings for cracks and damage, replace the evaporator if necessary.



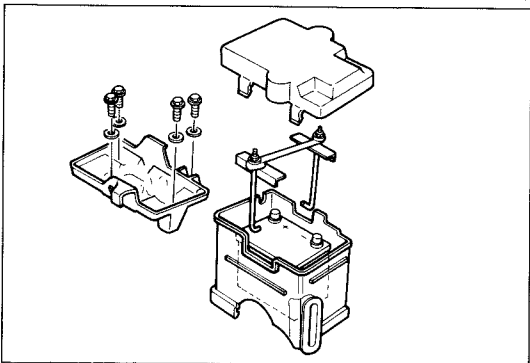
97U0UX-114



97U0UX-115

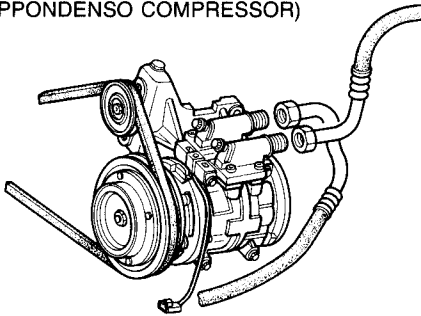


97U0UX-116

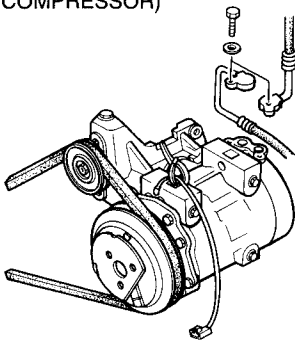


97U0UX-117

(NIPPONDENSO COMPRESSOR)



(SANDEN COMPRESSOR)



97U0UX-118

COMPRESSOR

On-vehicle Inspection

1. Install the manifold gauge set. (Refer to page U-39.)
2. Run the engine at fast idle.
3. Check the compressor for the following:
 - (1) High and low pressure normal.
Normal pressure: Refer to page U-42.
 - (2) Metallic sound from compressor. (Replace compressor.)
 - (3) Leakage from shaft seal.
Repair or replace as necessary.
4. Check the magnetic clutch for the following:
 - (1) Pressure plate and rotor for signs of oil.
 - (2) Clutch bearings for noise and grease leakage.
5. Check the resistance of the stator coil between the magnetic clutch connector and a ground with an ohmmeter.

Resistance at 20°C (68°F):

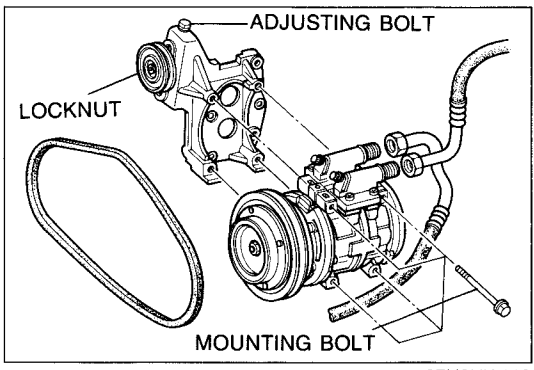
Nippondenso compressor: 2.9Ω

Sanden compressor : 3.05—3.35Ω

If not as specified, replace the stator.

Removal

1. Disconnect the battery cables.
2. Remove the battery and the battery box.
3. Disconnect the magnetic clutch connector.
4. Discharge the refrigeration system. (Refer to page U-39.)
5. Disconnect the low pressure and high pressure pipes from the compressor.




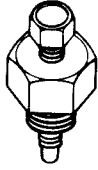
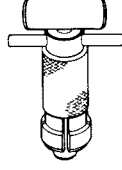

97U0UX-119

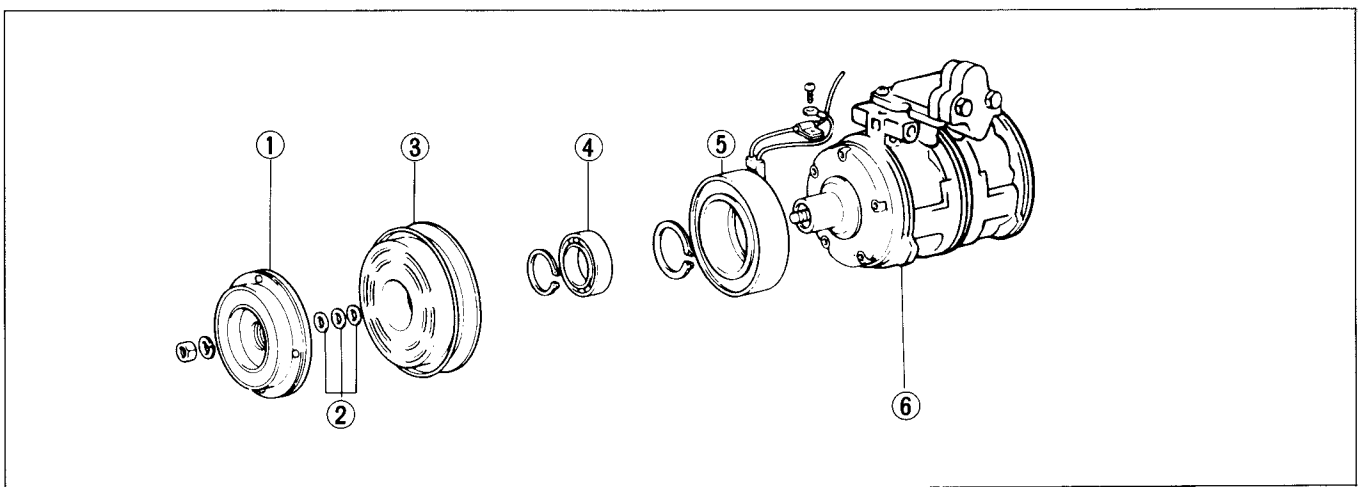
6. Loosen the locknut and the adjusting bolt. Remove the compressor drive belt.
7. Remove the mounting bolts and remove the compressor.

Disassembly and Assembly (Nippondenso compressor)

Preparation

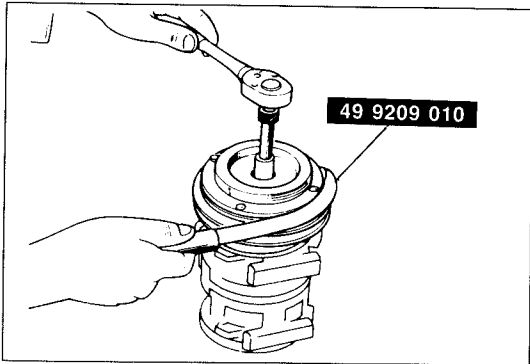
SST

<p>49 9202 010</p> <p>Holder, pressure plate</p> 	<p>49 9202 020</p> <p>Remover, pressure plate</p> 	<p>49 9202 030</p> <p>Remover, seal plate</p> 
<p>49 9202 040</p> <p>Remover, shaft seal</p> 	<p>97U0UX-120</p>	

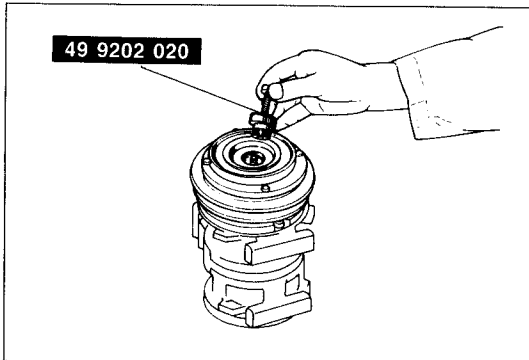


97U0UX-121

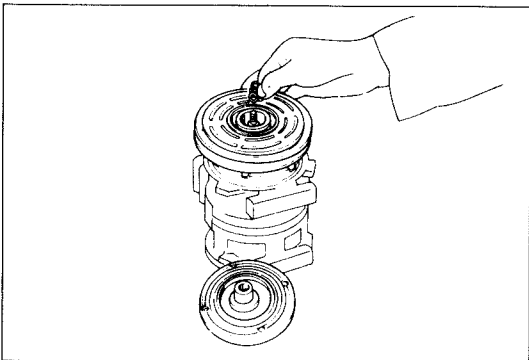
- | | |
|--|--|
| <ol style="list-style-type: none"> 1. Pressure plate 2. Shim 3. Rotor | <ol style="list-style-type: none"> 4. Rotor bearing 5. Stator 6. Compressor |
|--|--|



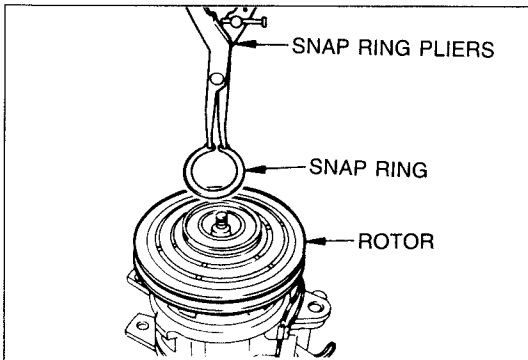
97U0UX-122



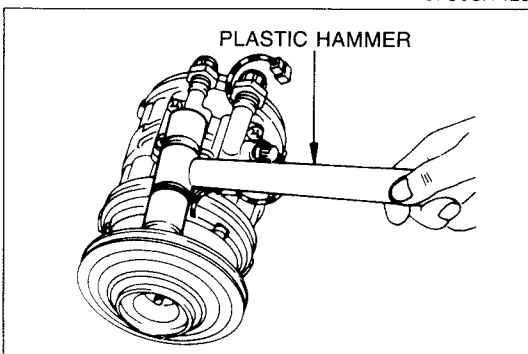
97U0UX-123



97U0UX-124



97U0UX-125



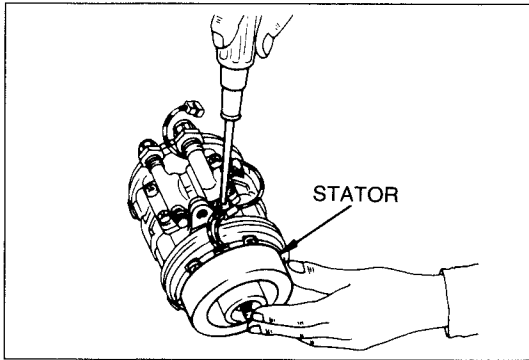
97U0UX-126

Magnetic clutch disassembly

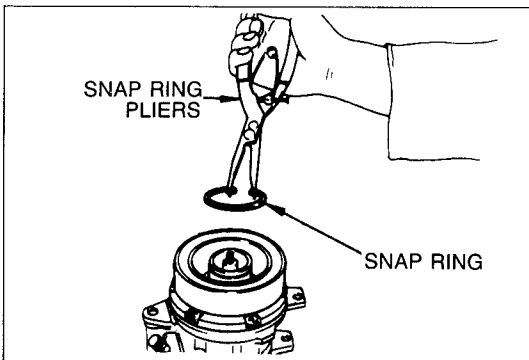
1. Hold the magnetic clutch with the **SST** and remove the shaft nut.
2. Remove the pressure plate with the **SST**.
3. Remove the shims from the shaft.
4. Remove the snap ring.
5. Remove the rotor by tapping it with a plastic hammer.

Note

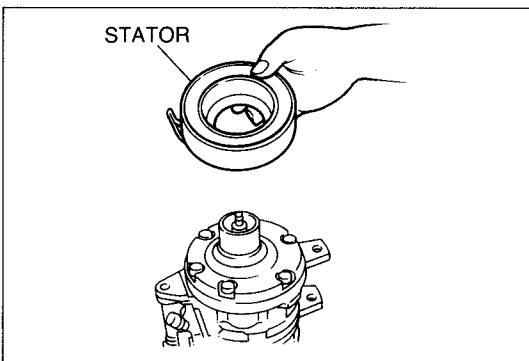
Do not damage the pulley when tapping the rotor.



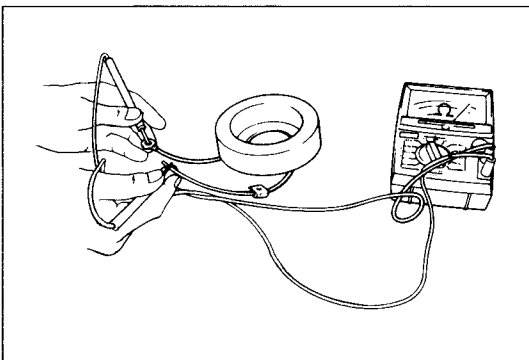
97U0UX-127



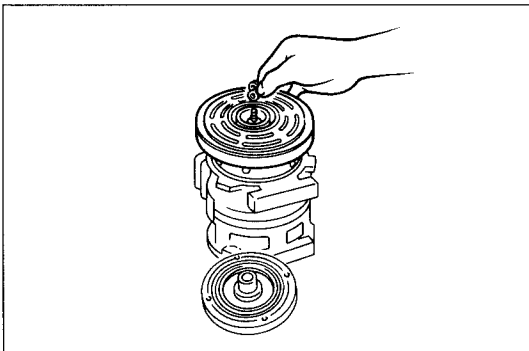
97U0UX-128



97U0UX-129



97U0UX-130



97U0UX-131

6. Remove the stator lead wires from the compressor housing.

7. Remove the snap ring holding the stator.

8. Remove the stator from the compressor housing.

Inspection

1. Pressure plate and rotor.

(1) Inspect the pressure plate and contact surfaces for wear, scoring and other damage.

If the pressure plate and rotor surfaces are excessively worn or scored, replace them.

(2) Check the rotor bearings for wear and grease leakage. Replace defective bearings.

2. Stator

Measure the resistance of stator coil with an ohmmeter.

Resistance: 2.9Ω at 20°C (68°F)

If not correct, replace the stator.

Magnetic clutch assembly

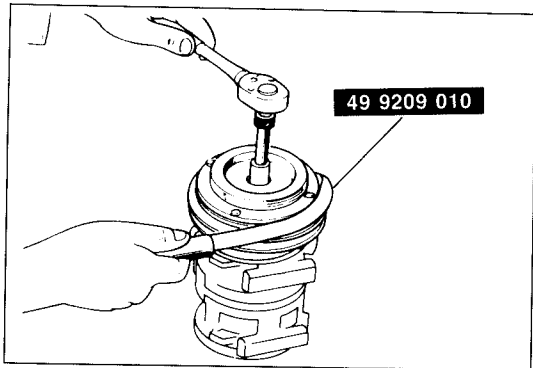
Assemble in the reverse order of disassembly, referring to the **Assembly Note**.

Assembly note

1. Adjust the clearance between the pressure plate and rotor by installing shims on the compressor shaft.

Clearance: 0.7—0.9mm (0.028—0.035 in)

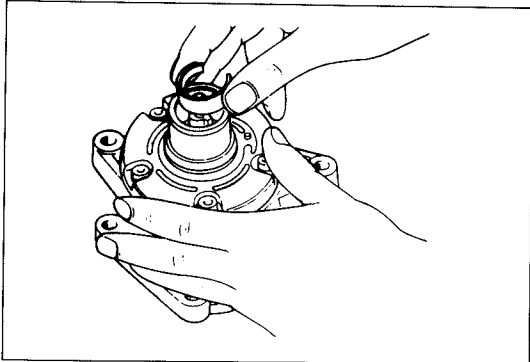
Part No.	Thickness
B001 76 729	0.1mm (0.004 in)
B001 76 731	0.2mm (0.008 in)
B001 76 732	0.5mm (0.020 in)



97U0UX-132

2. Tighten the shaft nut using the **SST** and a torque wrench.

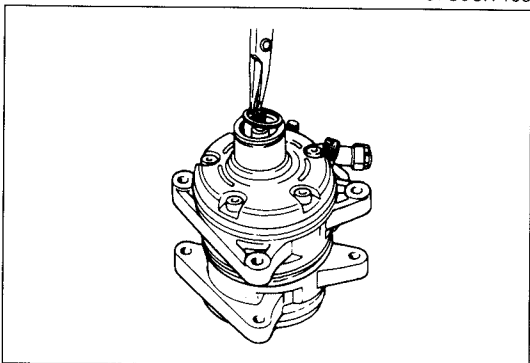
Tightening torque: 20 N·m (2.0 m·kg, 14 ft·lb)



97U0UX-133

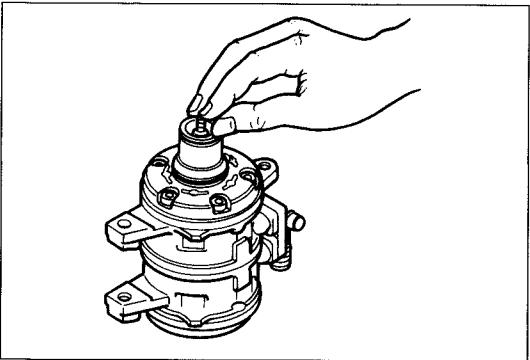
Shaft seal removal

1. Remove the felt.



97U0UX-134

2. Remove the clip.

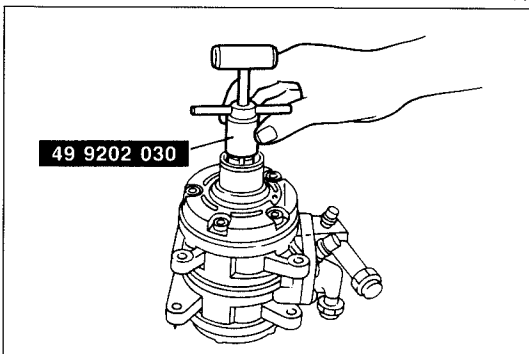


97U0UX-135

3. Remove the shaft key with a screwdriver.

Note

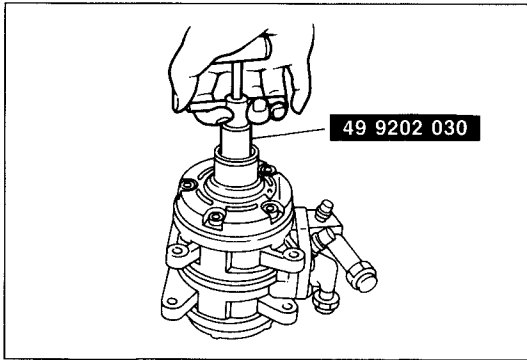
Do not damage the shaft or key.



97U0UX-136

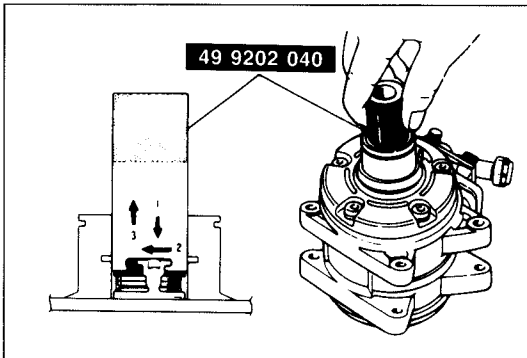
4. Remove the seal plate.

(1) Set the **SST** against the shaft and push the holder ring downward.



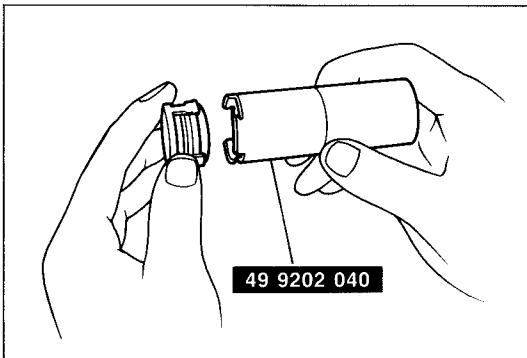
97U0UX-137

(2) Pull up the **SST** and remove the seal plate.



97U0UX-138

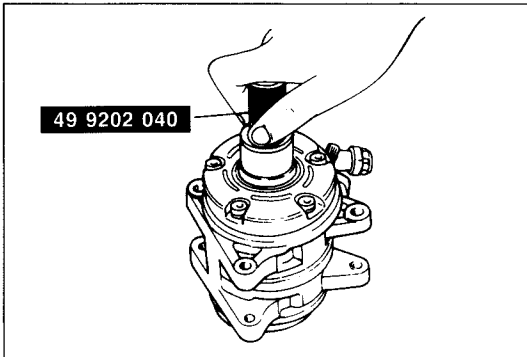
5. Remove the shaft seal.
Set the **SST** against the shaft. Turn the **SST** clockwise while lifting it.



97U0UX-139

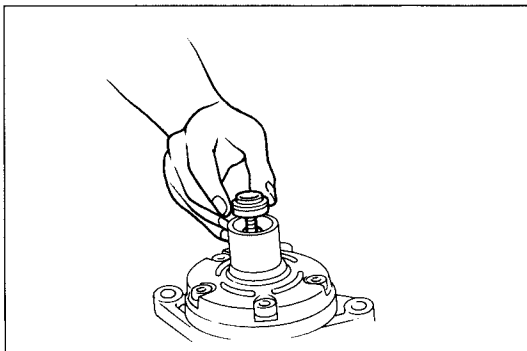
Shaft seal installation

1. Fit the shaft seal onto the **SST**.



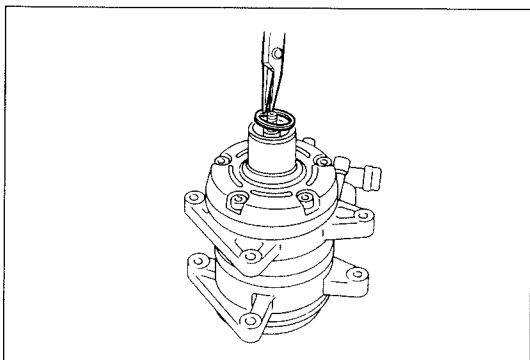
97U0UX-140

2. Apply compressor oil to the compressor bore and the seal.
Insert the **SST**. Turn the **SST** counterclockwise while lightly pressing downward.



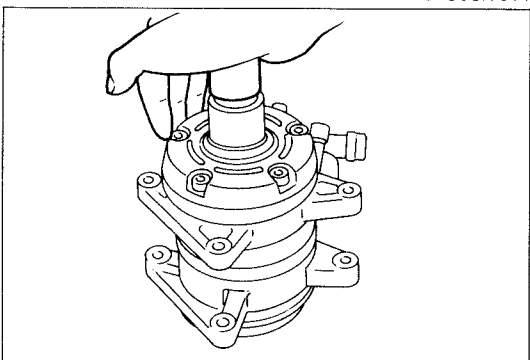
97U0UX-141

3. Set the seal plate into position.



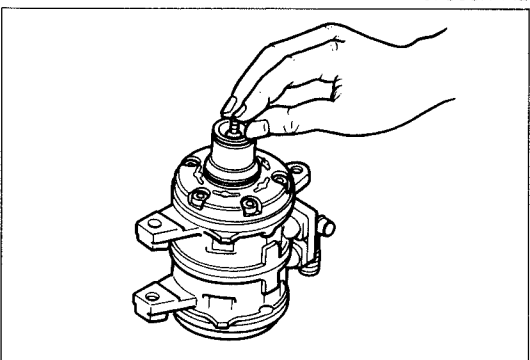
97U0UX-014

4. Set the snap ring into position.



97U0UX-142

5. Press the seal plate in with a 21 or 22mm deep socket.

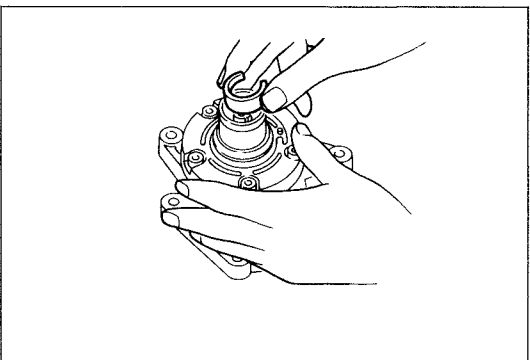


97U0UX-143

6. Install the shaft key in the shaft.

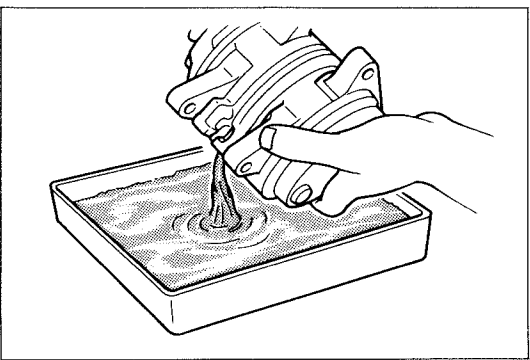
Note

Do not damage the shaft or key.



97U0UX-062

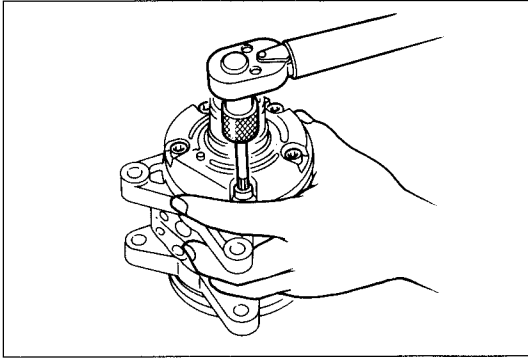
7. Install the felt.



97U0UX-144

Front housing removal

1. Drain the compressor oil into a container.

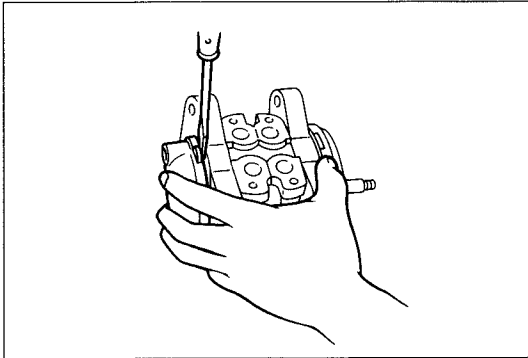


97U0UX-145

2. Remove the front housing.
 - (1) Remove the through bolts with an Allen wrench.
 - (2) Using a hammer and punch, remove the front housing by tapping on the protrusion.

Caution

Do not scratch the sealing surface of the front housing.



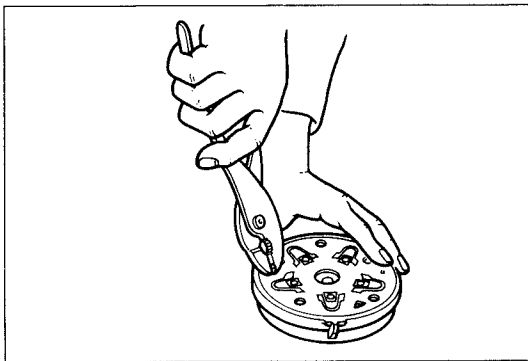
97U0UX-146

Rear housing removal

1. Using a hammer and punch, remove the rear housing by tapping on the protrusion.

Caution

Do not scratch the sealing surface of the rear housing.

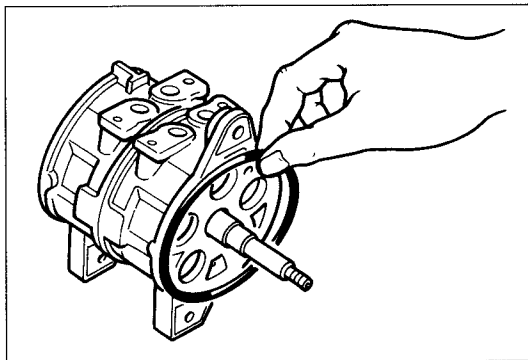


97U0UX-147

2. Remove the locating pins from front and rear housings.

Note

The locating pins may have stayed in the cylinder block.

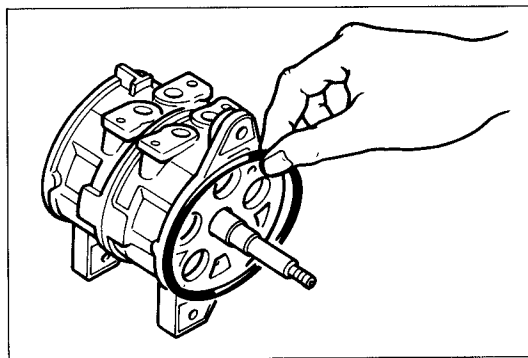


97U0UX-148

3. Remove the suction and discharge valve plate assemblies from the front and rear housings.

Note

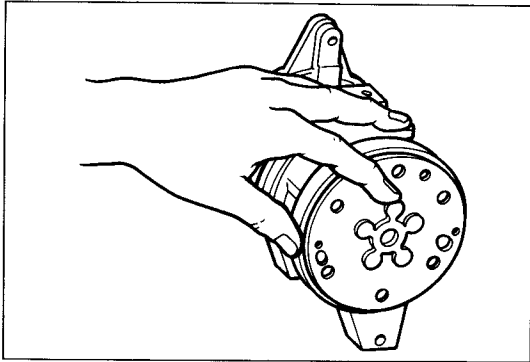
Discard the O-rings.



97U0UX-149

Rear housing assembly

1. Install the locating pins in the front and rear of the cylinder block.
2. Lubricate new O-rings with compressor oil and install them onto the front and rear of the cylinder block.

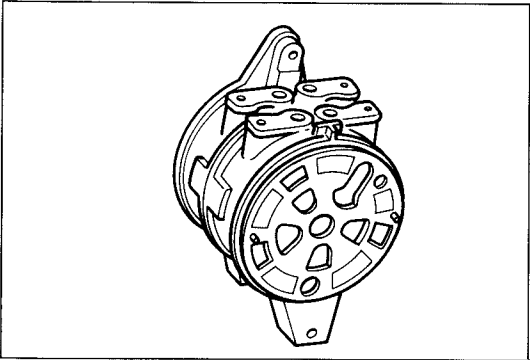


97U0UX-150

3. Install the suction valve over the rear locating pins of the cylinder block.

Note

The front and rear suction valves are the same.

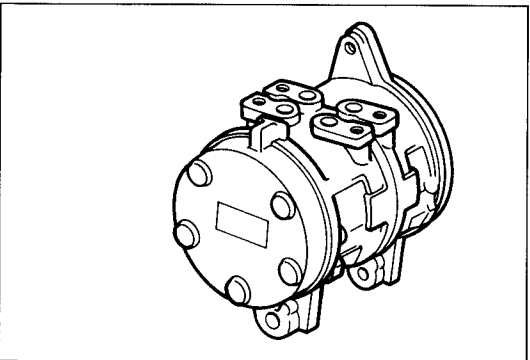


97U0UX-151

4. Install the rear valve plate, discharge valve, and metal gasket over the locating pins on the rear of the cylinder block.

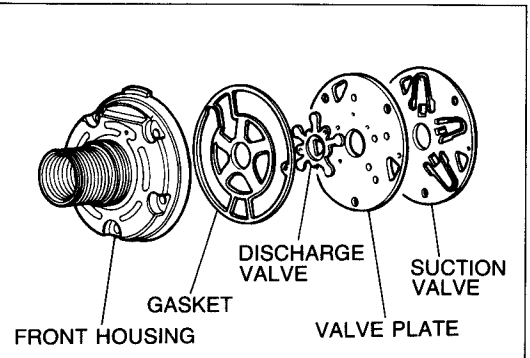
Note

The rear valve plate is marked R.



97U0UX-152

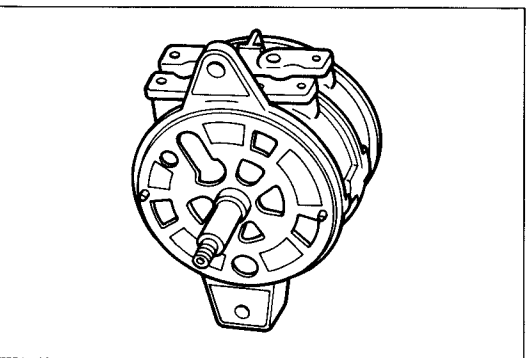
5. Install the rear housing to the cylinder block.



97U0UX-153

Front housing assembly

1. Install the front suction valve over the locating pins on the front of the cylinder block.

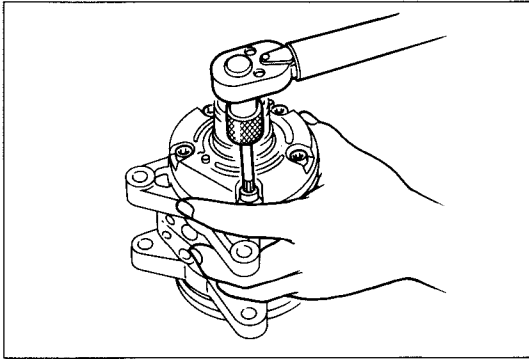


97U0UX-154

2. Install the front valve plate, discharge valve, and metal gasket over the locating pins on the front of the cylinder block.

Note

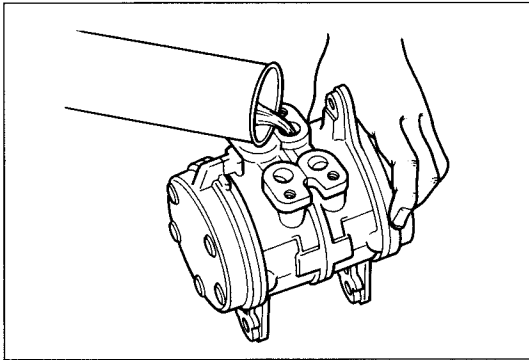
The front valve plate is marked F.



97U0UX-155

- Align the front housing on the locating pins of the cylinder block. Tighten the bolts gradually in two or three steps.

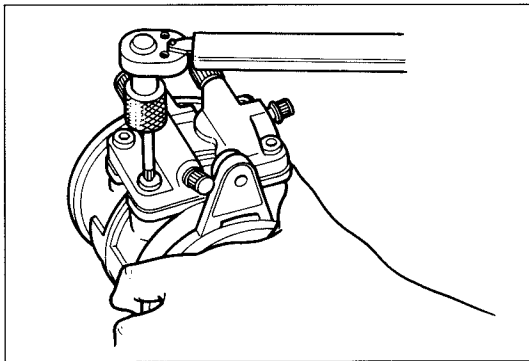
Tightening torque: 25 N·m (2.6 m·kg, 19 ft·lb)



97U0UX-156

- Install the shaft seal. (Refer to page U-51.)
- Pour new compressor oil into the compressor.

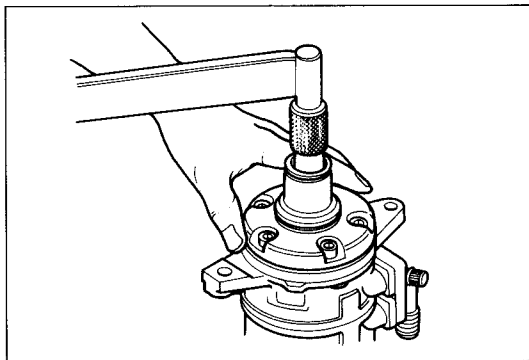
Capacity: 60—100 cc (3.7—6.1 cu in)



97U0UX-157

- Lubricate new O-rings with compressor oil and install them onto the service valves. Install the service valves to the compressor with an Allen wrench.

**Tightening torque:
25—26 N·m (2.5—2.7 m·kg, 18—20 ft·lb)**



97U0UX-158

- Install the shaft nut onto the shaft and check the rotating torque.


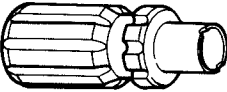


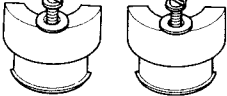
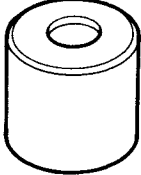
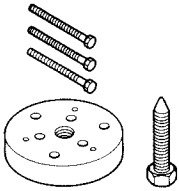
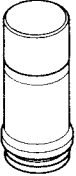
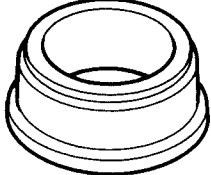


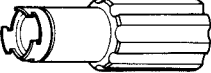
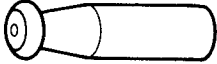
Tightening torque: 20 N·m (2.0 m·kg, 14 ft·lb)

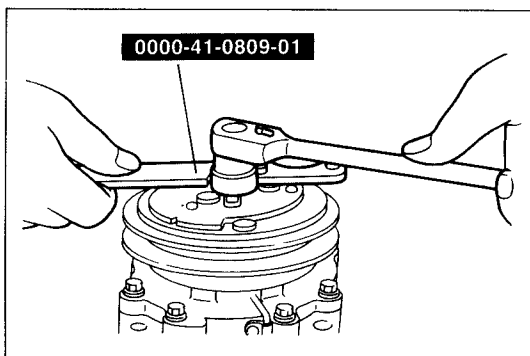
- Install the magnetic clutch (Refer to page U-49.)

Disassembly and Assembly (Sanden compressor)

Preparation

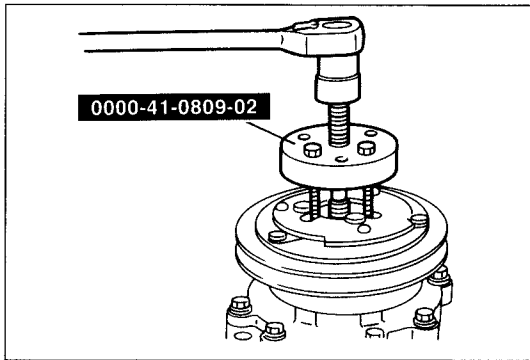
SST

<p>0000-41-0809-01 Holder, clutch</p> 	<p>0000-41-0810-73 Remover & installer, seal seat</p> 	<p>0000-41-0804-57 Universal Puller Body</p> 
<p>0000-41-0804-51 Universal Puller Arbor</p> 	<p>0000-41-0810-76 Removal set, pulley & clutch</p> 	<p>0000-41-0810-77 Clutch Pilot</p> 
<p>0000-41-0809-02 Puller, clutch plate</p> 	<p>0000-41-0804-43 Installer, clutch rotor bearing</p> 	<p>0000-41-0810-59 Clutch Rotor Driver</p> 
<p>0000-41-0809-10 Shaft Protector Pilot</p> 	<p>0000-41-0804-12 Remover, O-ring</p> 	<p>0000-41-0812-11 Remover & installer, seal</p> 
<p>0000-41-0812-13 Protector, seal sleeve</p> 	<p>97U0UX-159</p>	



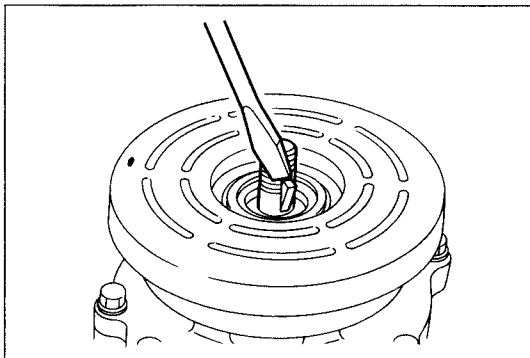
Magnetic clutch removal

1. Insert the two pins of the **SST** into any two threaded holes of the pressure plate. Hold the pressure plate stationary, and remove the nut.



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- Remove the pressure plate with the **SST**. Align the puller center bolt to compressor shaft. Hand tighten the three puller bolts into the threaded holes. Turn the center bolt clockwise until the pressure plate is loosened.

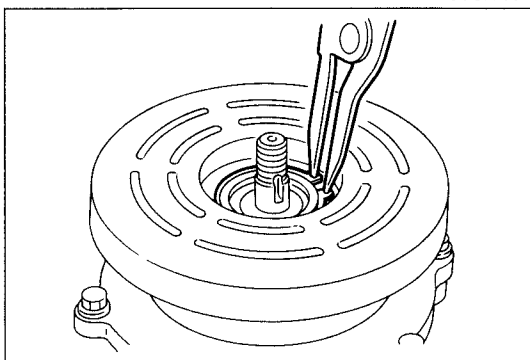


9BU0UX-094

- Remove the shaft key by lightly tapping it loose with a screwdriver and hammer.

Note

Steps 1 thru 3 must be performed before servicing either the shaft seal or clutch assembly.

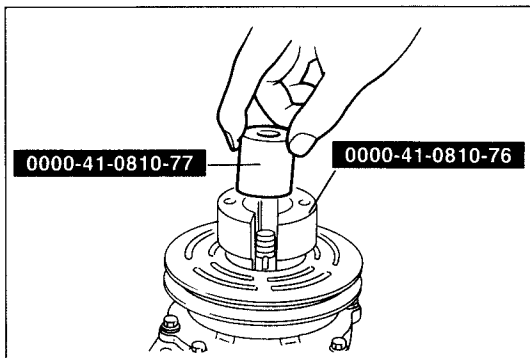


9BU0UX-095

- Remove the external front housing snap ring with snap-ring pliers.

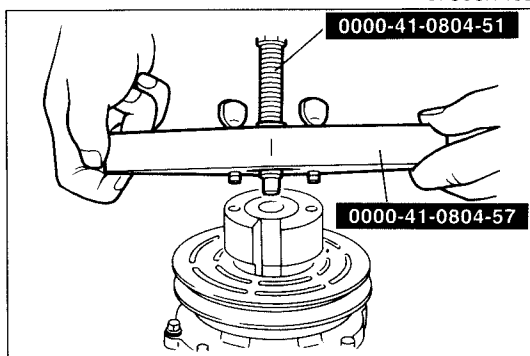
Note

Some compressors may have two snap rings in front, one on front housing and the other securing the clutch bearing. Remove both snap rings.



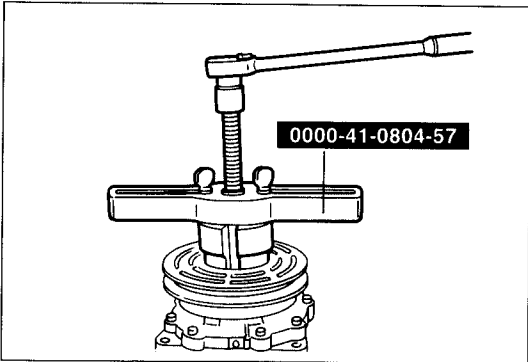
97U0UX-185

- Remove the rotor.
 - Insert the lip of the **SST** puller jaws into the snap ring groove.
 - Place the **SST** over the shaft.

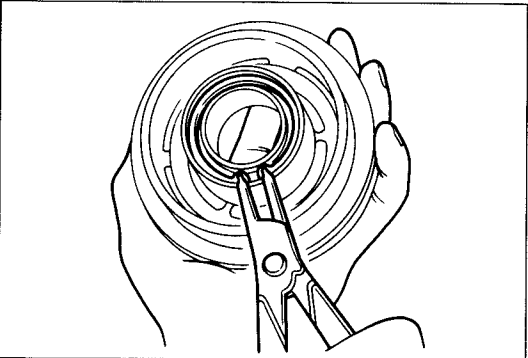


9BU0UX-097

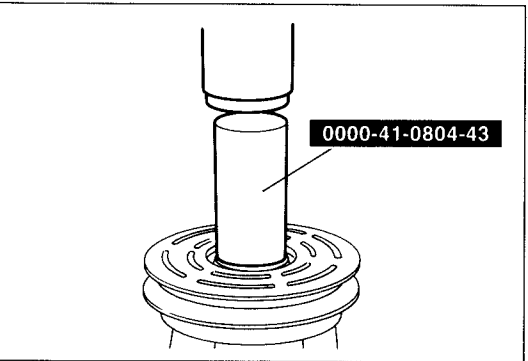
- Place the **SST** handle onto the puller jaws.
 - Finger tighten the securing bolts into the puller jaws.



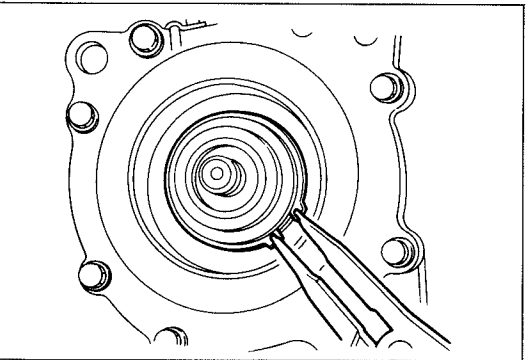
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9BU0UX-100



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- (5) Hold the **SST** handle stationary and turn the puller center bolt clockwise until the rotor is free.

Clutch bearing removal

1. Remove the magnetic clutch. (Refer to page U-56.)
2. Remove the bearing retaining snap-ring with snap-ring pliers.

Note

Some rotors have the snap-ring in the front; this ring should have been removed in Step 4.

3. Using the **SST**, press the bearing from the rotor.

Note

Press the bearing out toward the snap-ring side.

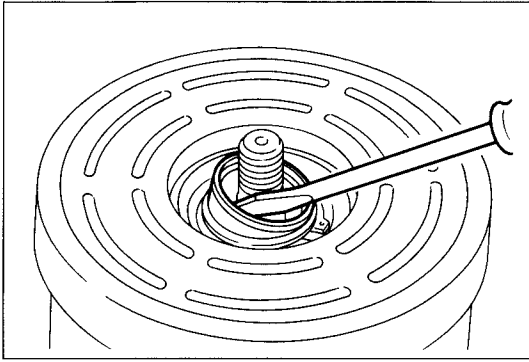
4. Install the new bearing in the reverse order of removal.

Stator removal

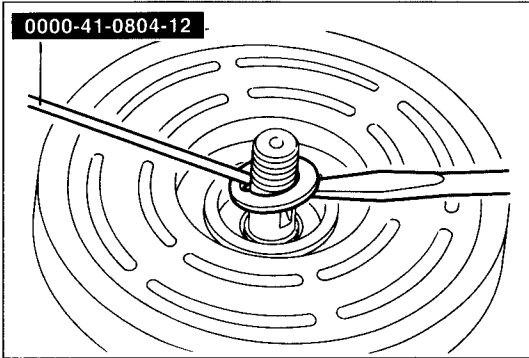
1. Remove the magnetic clutch. (Refer to page U-56.)
2. Remove the stator lead wire from the clip atop the compressor front housing.
3. Remove the snap-ring and stator using snap-ring pliers.
4. Install the new stator in the reverse order of removal.

Note

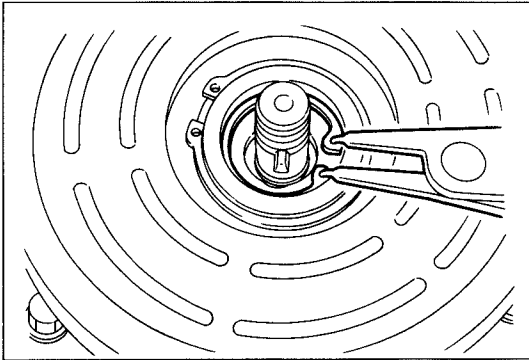
The stator flange protrusion must match the hole in the front housing to prevent stator movement and to correctly locate the lead wire.



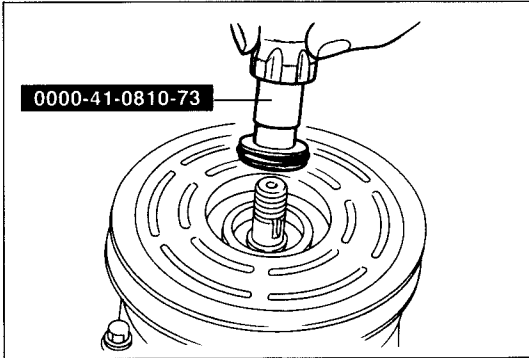
97U0UX-163



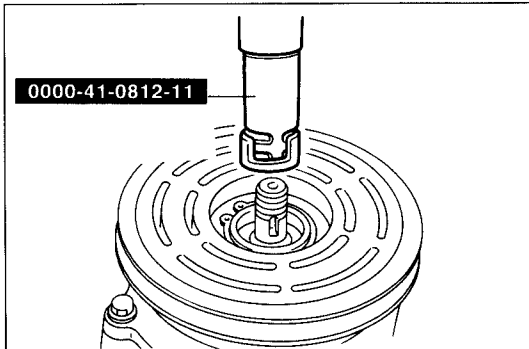
9BU0UX-103



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9BU0UX-105



9BU0UX-106

Shaft seal removal

1. Follow Steps 1 thru 3 under **Magnetic clutch removal**. (Refer to pages U-56 and U-57.)

Note

Shaft seal replacement should be done on the bench. Never use any old parts of the shaft seal assembly. Replace the complete seal assembly.

2. Pry out the felt ring with a screwdriver, being careful not to damage the shaft housing.
3. Remove the clutch shims. Use the **SST** and a small screwdriver as shown to prevent the shim from binding on shaft.

4. Remove the shaft seal seat retaining snap ring with snap-ring pliers.

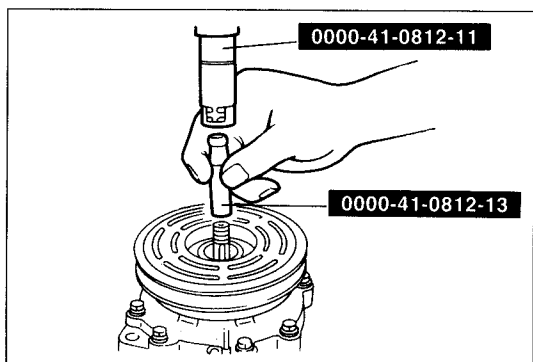
5. Remove the shaft seal seat with the **SST**.

6. Insert the **SST** against the seal assembly. Press down against the seal spring and twist the tool until feeling it engage in the slots of the seal cage. Lift out the seal assembly.

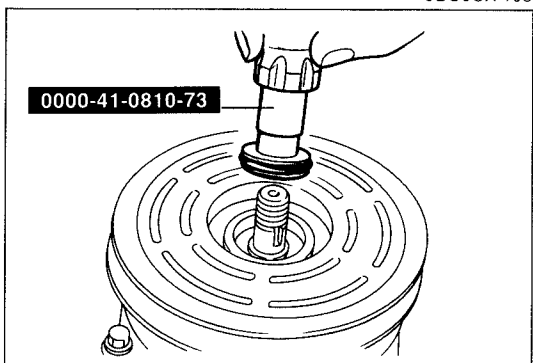
Shaft seal replacement

1. Clean the seal cavity thoroughly.
 - (1) Clean thoroughly with a "lint-free" or synthetic cloth and clean refrigerant oil. Then blow out with dry pressurized air.
 - (2) Make sure all foreign substances are thoroughly removed.

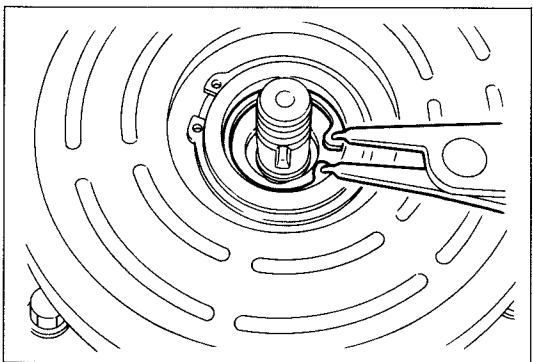
9BU0UX-107



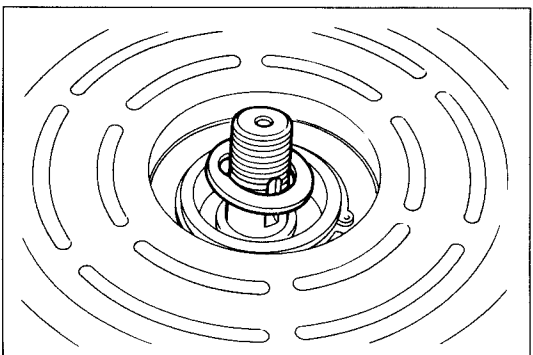
9BU0UX-108



9BU0UX-109



9BU0UX-110



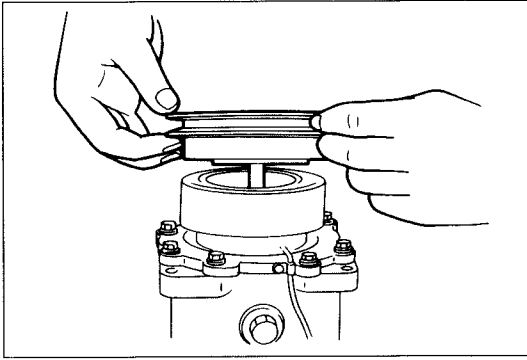
97U0UX-164

2. Insert the **SST** over the compressor shaft.
3. Do not touch the new seal lip surfaces. Dip the mating surfaces in clean refrigerant oil before proceeding.
4. Engage the slots of the **SST** to the new seal cage; then insert the seal assembly firmly into place in the compressor seal cavity. Twist the tool in the opposite direction to disengage it from the seal cage. Remove the **SST**.

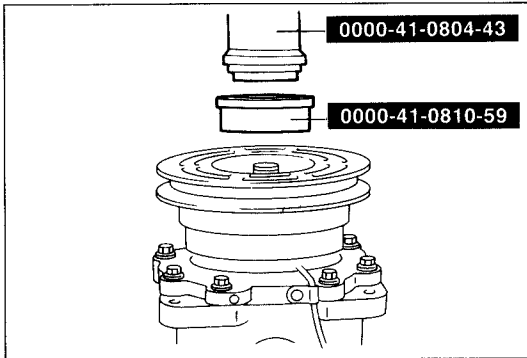
5. Place the new seal seat onto the **SST**. Coat the seat and O-ring with clean refrigerant oil and install them into the cavity. Press the seat lightly against the seal; then remove the **SST**.

6. Install the snap ring with the beveled edge facing outward (away) from the compressor. It may be necessary to lightly tap the snap ring to securely position it in its groove.

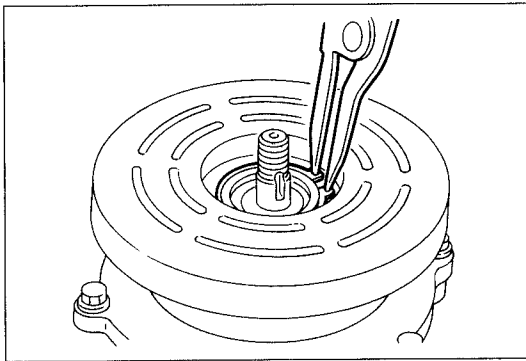
7. Install the clutch spacer shims that were removed.
8. Tap a new felt ring into place.
9. Install the pressure plate as outlined under **Magnetic clutch installation**. (Refer to page U-61.)



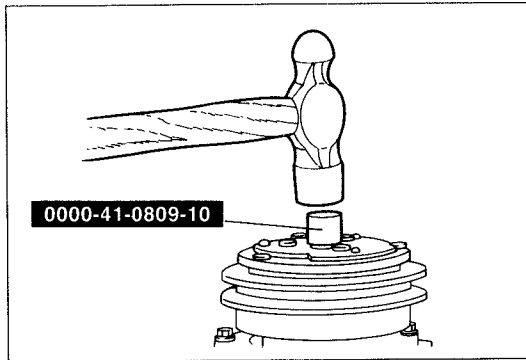
9BU0UX-112



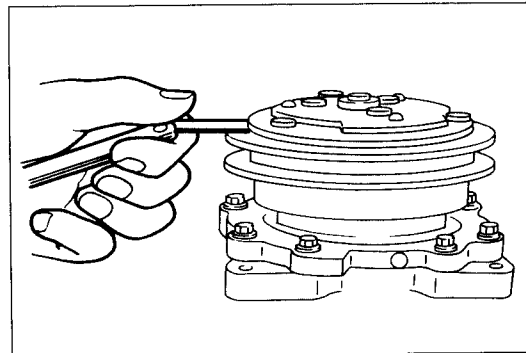
9BU0UX-113



9BU0UX-114



9BU0UX-115



97U0UX-187

Magnetic clutch installation

1. Install the rotor.

- (1) Support the compressor on the mounting ears at the rear of the compressor. If using a vise, clamp only on the mounting ears—NEVER ON THE COMPRESSOR BODY.
- (2) Align the rotor assembly squarely on the front housing hub.

- (3) Place the **SST** collar into the bearing cavity. Make certain the outer edge rests firmly on the rotor bearing outer race. Place the other **SST** into the first **SST** as shown.
- (4) Tap the end of the **SST** with a hammer while holding the rotor to prevent binding. Tap until the rotor bottoms against the compressor front housing hub. Listen for a distinct change of sound during the tapping process.

2. Install the internal bearing snap ring (if used) with snap-ring pliers.

3. Install the external front housing snap ring with snap-ring pliers.

4. Install the front plate assembly.

- (1) Check that the original clutch shims are in place on the compressor shaft.
- (2) Install the compressor shaft key.

(3) Align the front plate keyway to the compressor shaft key.

- (4) Tap the front plate onto the shaft with the **SST** until it has bottomed against the clutch shims. Note a distinct sound change.

5. Install the shaft hex nut.

Tightening torque:

34—44 N·m (3.5—4.5 m·kg, 25—33 ft·lb)

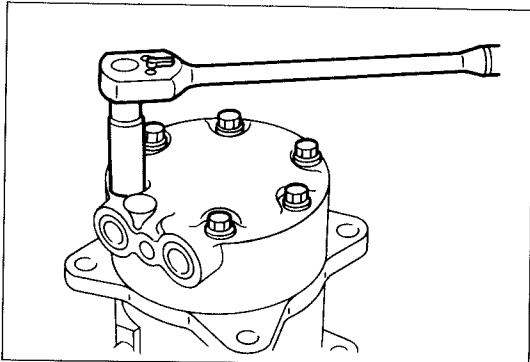
6. Measure the clearance between the pressure plate and the rotor with a feeler gauge. If the air gap is not consistent around the circumference, lightly pry up at the minimum variations. Lightly tap down at points of maximum variation.

Clearance: 0.4—0.8mm (0.016—0.031 in)

Note

The clearance is determined by the spacer shims. When installing a new clutch assembly, try the original shims first. When installing a new clutch onto a compressor that previously did not have a clutch, use the .040, .020, and .005 shims from the clutch accessory kit.

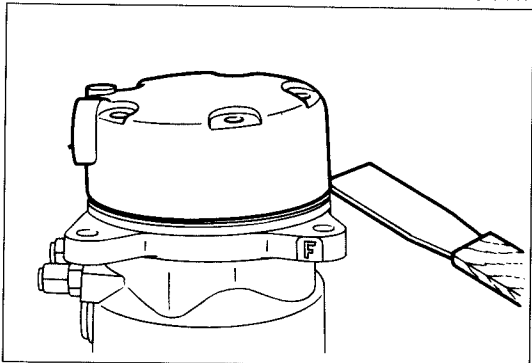
If the clearance does not meet the specification in Step 6, add or subtract shims by repeating Steps 4 and 5.



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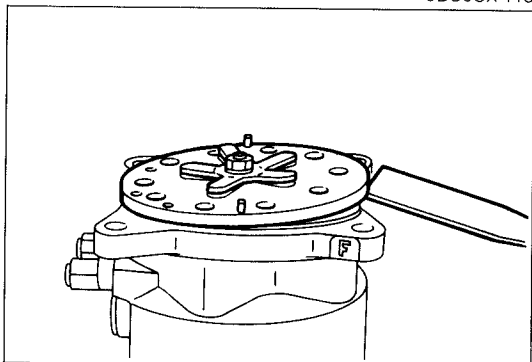
Cylinder head and valve plate removal

1. Remove the cylinder head bolts.



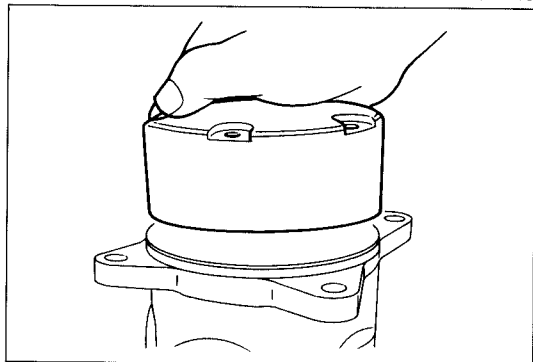
9BU0UX-118

2. Use a small hammer and a gasket scraper to tap the outer edge of the cylinder head until it frees from the valve plate. Inspect the parts for damage.



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3. Position the gasket scraper between the outside edge of the valve plate and the cylinder block and lightly tap the valve plate loose. Inspect the reed valves and discharge retainer. Discard assembly if any portion is damaged.



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Installing cylinder head, valve plate & gaskets

When installing the head or valve plate, use the new gaskets provided in the parts kit.

Note

If the oil was drained, pour new compressor oil into the compressor.

Capacity: 135 cc (8.2 cu in)

Cylinder head only

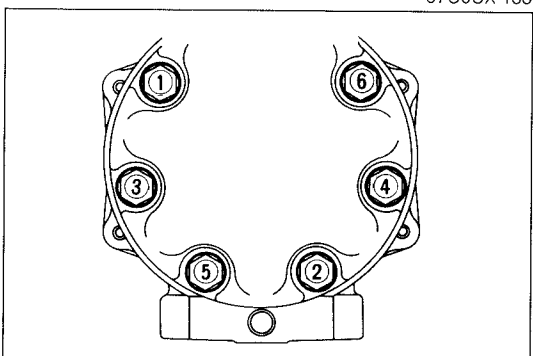
1. Inspect the valve plate for damage and remove all old gasket material.

(1) Coat the top of the valve plate with clean refrigerant oil. Position a new gasket over the valve plate locating pins. Align the gasket holes to the oil equalizer and orifice opening.

(2) The cylinder head fittings must be pointing upward or be in line with the oil filler plug.

(3) The valve plate locating pins must be securely in the locating holes in the cylinder head.

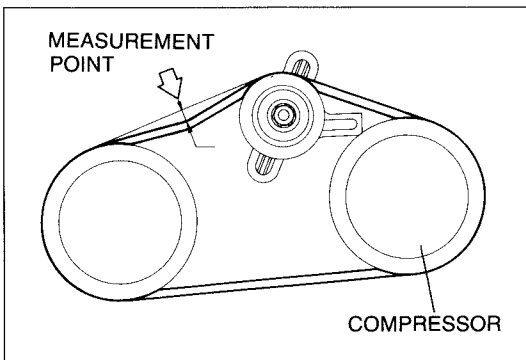
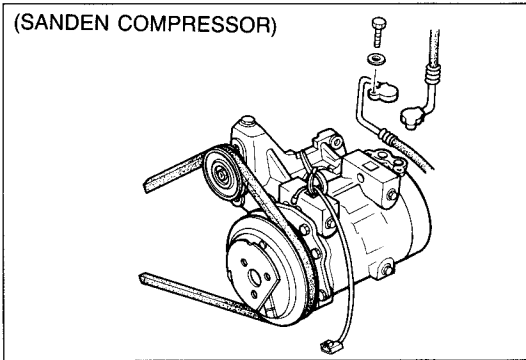
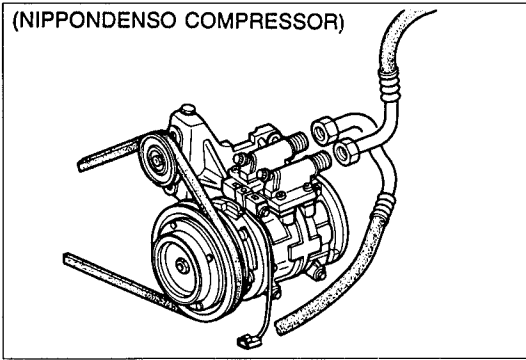
(4) Install the cylinder head bolts finger tight; then tighten in the sequence shown.



9BU0UX-121

Tightening torque:

29—39 N·m (3.0—4.0 m·kg, 22—29 ft·lb)



Installation

Install in the reverse order of removal, noting the following:

Tightening torque:

(Nippondenso compressor)

Compressor mounting bolts:

20—29 N·m (2.0—3.0 m·kg, 14—22 ft·lb)

Low-pressure pipe:

29—34 N·m (3.0—3.5 m·kg, 22—25 ft·lb)

High-pressure pipe:

20—25 N·m (2.0—2.5 m·kg, 14—18 ft·lb)

(Sanden compressor)

Compressor mounting bolts:

20—29 N·m (2.0—3.0 m·kg, 14—22 ft·lb)

Low-pressure pipe:

20—29 N·m (2.0—3.0 m·kg, 14—22 ft·lb)

High-pressure pipe:

20—29 N·m (2.0—3.0 m·kg, 14—22 ft·lb)

Adjustment

Adjust the drive belt deflection and tension.

Note

Apply moderate pressure (98 N [10 kg, 22 lb]) midway between the pulleys when adjusting the belt deflection.

The belt tension can be measured between any two pulleys.

Drive belt deflection

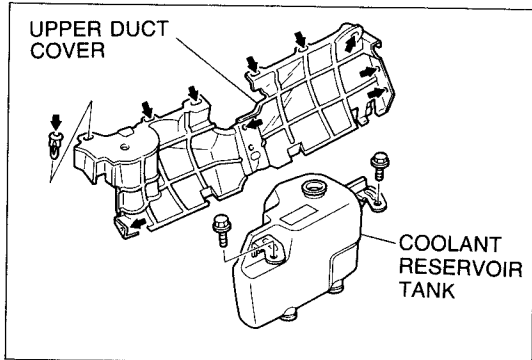
New belt : 6—8mm (0.24—0.31 in)

Used belt: 8—9mm (0.31—0.35 in)

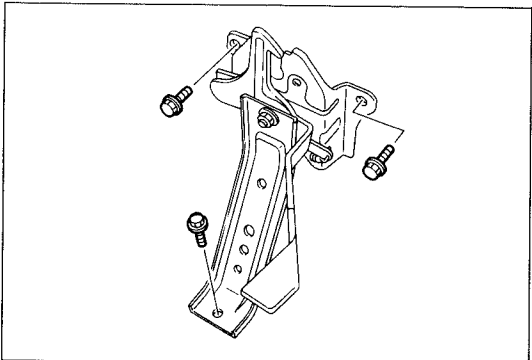
Drive belt tension

New belt : 392—540 N (40—55 kg, 88—121 lb)

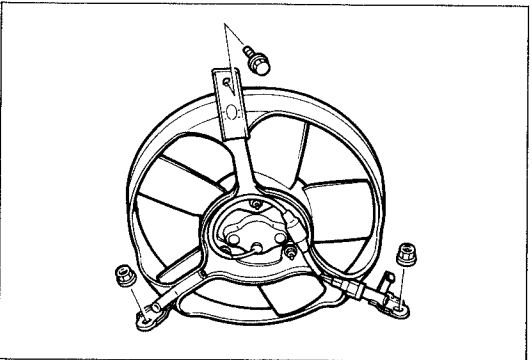
Used belt: 284—363 N (29—37 kg, 63.8—81.4 lb)



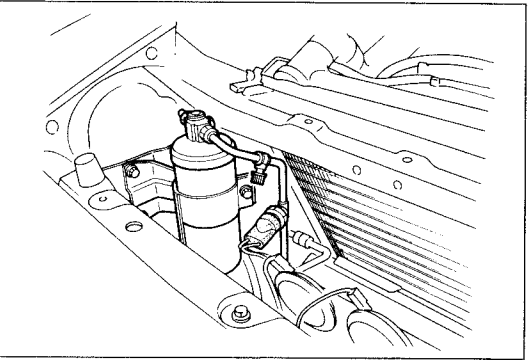
97U0UX-168



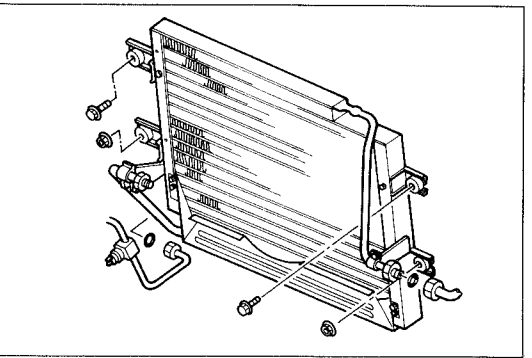
97U0UX-169



97U0UX-170



97U0UX-171



97U0UX-172

CONDENSER

Removal

1. Discharge the refrigerant system. (Refer to page U-39.)
2. Remove the coolant reservoir tank.
3. Remove the plastic clips and remove the upper duct covers.

4. Remove the hood lock assembly.

5. Remove the electric cooling fan.

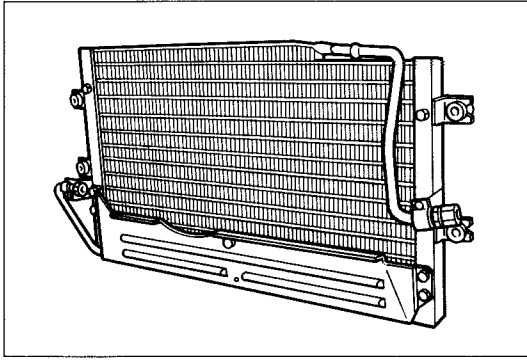
6. Remove the receiver/drier. (Refer to page U-65.)

7. Disconnect the discharge tube and the liquid tube.

Note

Immediately plug the open fittings to keep moisture out of the system.

8. Remove the condenser.



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Inspection

Check the condenser for the following and repair or replace as necessary.

- (1) Cracks, damage, or refrigerant leakage.
- (2) Bent fins.
- (3) Distorted or damaged condenser inlet or outlet.

Installation

Install in the reverse order of removal, referring to the **Installation Note**.

Installation note

- a) Apply new compressor oil to the O-rings before connecting the fittings.
- b) Do not apply compressor oil to the fittings.
- c) If the condenser is replaced, add compressor oil.

Compressor oil: 25—30 cc (1.53—1.83 cu in)

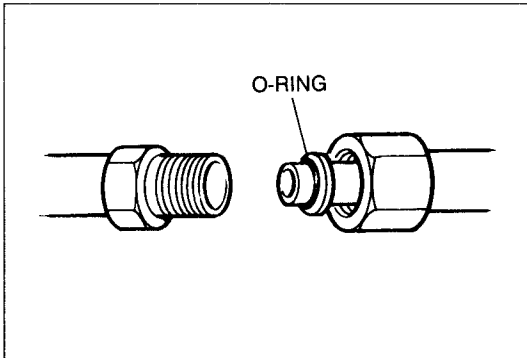
Tightening torque:

Discharge tube:

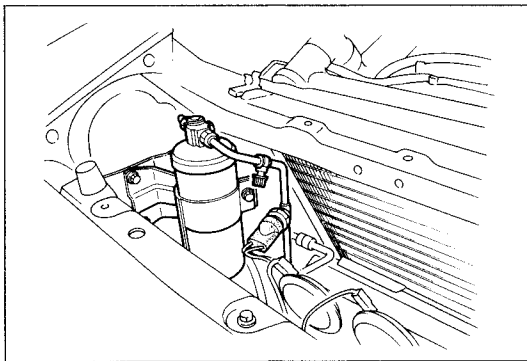
20—25 N·m (2.0—2.5 m·kg, 14—18 ft·lb)

Liquid tube:

12—25 N·m (1.2—2.5 m·kg, 8.7—18 ft·lb)



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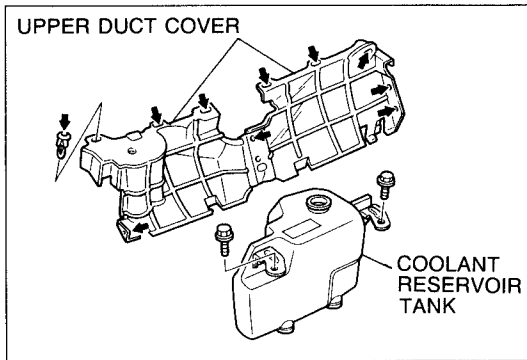


97U0UX-175

RECEIVER/DRIER

On-vehicle Inspection

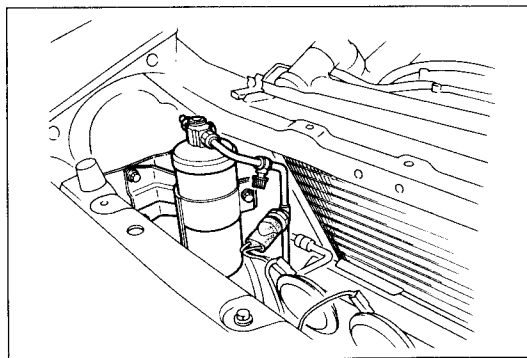
1. Check for oil stains on the fittings.
2. If staining is found, replace the O-ring at the fitting.
3. Charge the system and check for leaks.
(Refer to page U-40.)
4. If leakage is found, check and replace the receiver/drier or piping.



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Removal

1. Discharge the refrigerant system. (Refer to page U-39.)
2. Remove the coolant reservoir tank.
3. Remove the plastic clips and remove the upper duct covers.



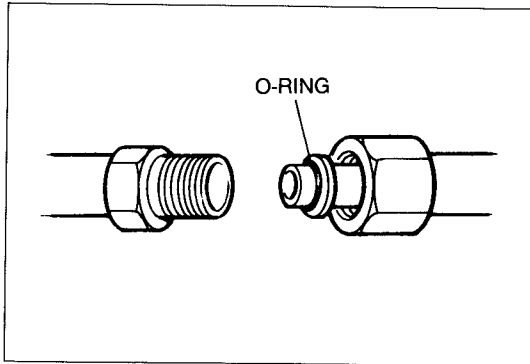
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4. Disconnect the liquid pipes.

Note

Immediately plug the open fittings to keep moisture out of the system.

5. Remove the bolt and remove the receiver/drier.



97U0UX-178

Installation

Install in the reverse order of removal, referring to the **Installation Note**.

Installation note

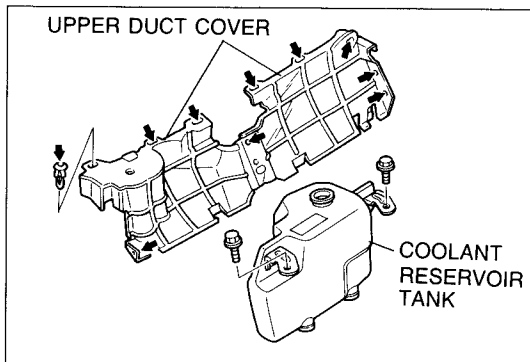
- Apply new compressor oil to the O-rings before connecting the fittings.
- Do not apply compressor oil to the fittings.
- If the receiver/drier is replaced, add compressor oil.

Compressor oil: 15—20 cc (0.9—1.2 cu in)

Tightening torque:

Liquid pipes:

12—15 N·m (1.2—1.5 m·kg, 8.7—11 ft·lb)

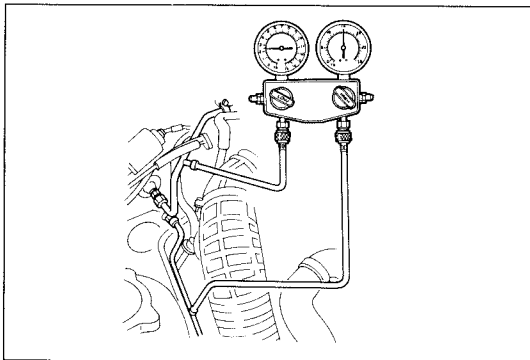


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REFRIGERANT PRESSURE SWITCH

Inspection

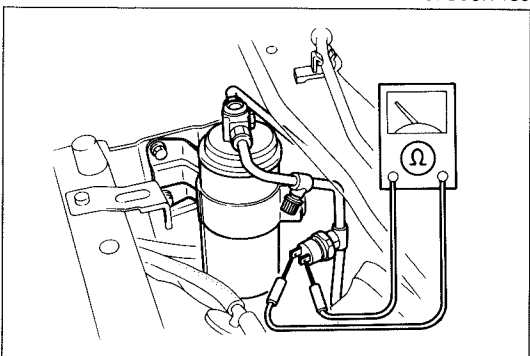
- Remove the coolant reservoir tank.
- Remove the plastic clips and remove the upper duct covers.



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- Install the manifold gauge set. (Refer to page U-39.)
- Measure the refrigerant pressure.

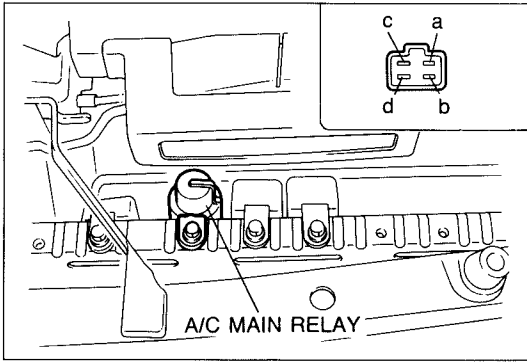
Pressure	Action
More than 2.3 kg/cm ²	Go to Step 5
Less than 2.3 kg/cm ²	Charge with refrigerant; then go to Step 5



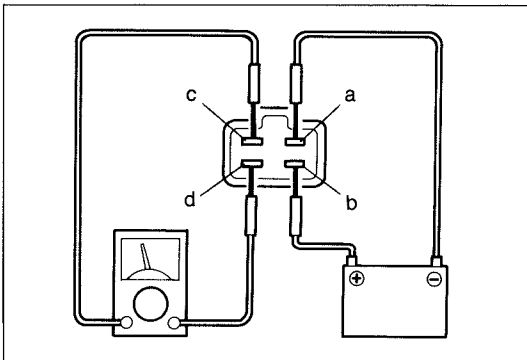
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- Check for continuity of the refrigerant pressure switch.

Continuity	Action
Yes	Refrigerant pressure switch OK
No	Replace refrigerant pressure switch



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A/C MAIN RELAY

Inspection

1. Remove the mounting bolt.
2. Disconnect the A/C main relay connector.
3. Check for no continuity between terminals c and d.

Terminal	Continuity
c—d	No

4. If not as specified, replace the relay.
If correct, go to the next step.

5. Apply **12V** to terminal b and ground terminal a.
6. Check for continuity between terminals c and d.

Terminal	Continuity
c—d	Yes

7. If not as specified, replace the relay.