

WORKSHOP MANUAL

TF SERIES

HEATING AND AIR CONDITIONING

SECTION 1

ISUZU

ISUZU



International Service & Parts
Tokyo, Japan

N O T I C E

Before using this Workshop Manual to assist you in performing vehicle service and maintenance operations, it is recommended that you carefully read and thoroughly understand the information contained in Section - OA under the headings "GENERAL REPAIR INSTRUCTIONS" and "HOW TO USE THIS MANUAL".

All material contained in this Manual is based on the latest product information available at the time of publication.

All rights are reserved to make changes at any time without prior notice.

SECTION 1

HEATER AND AIR CONDITIONING

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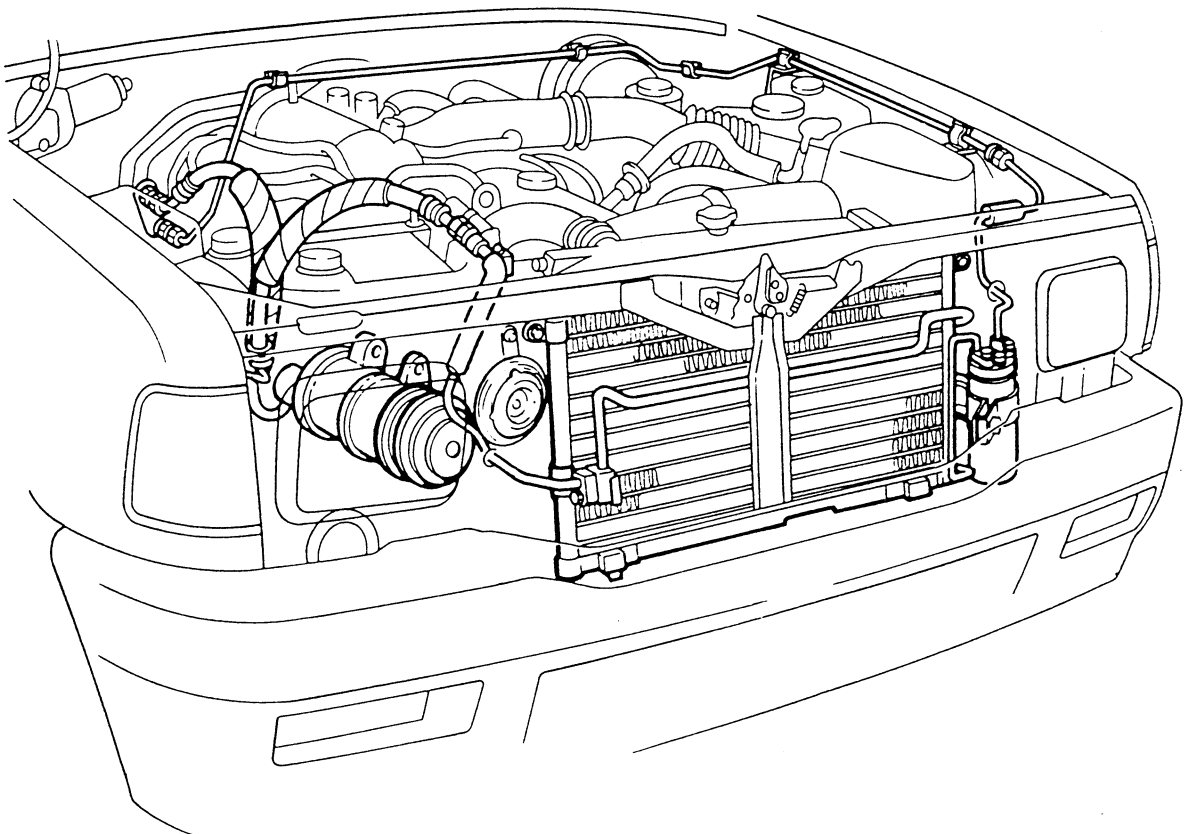
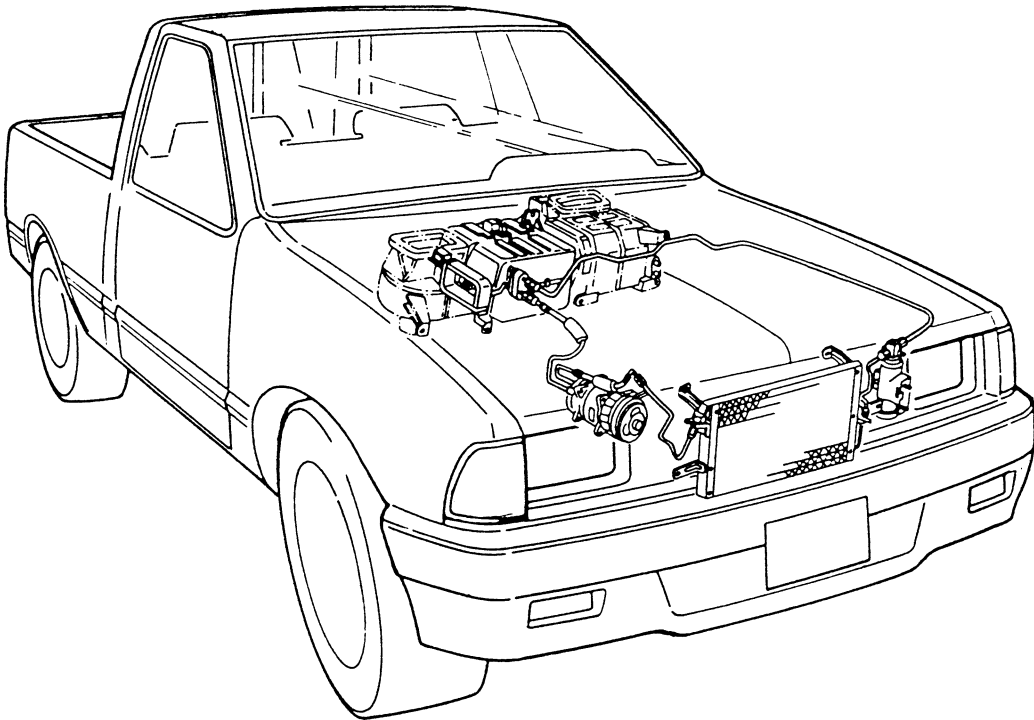
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GENERAL DESCRIPTION

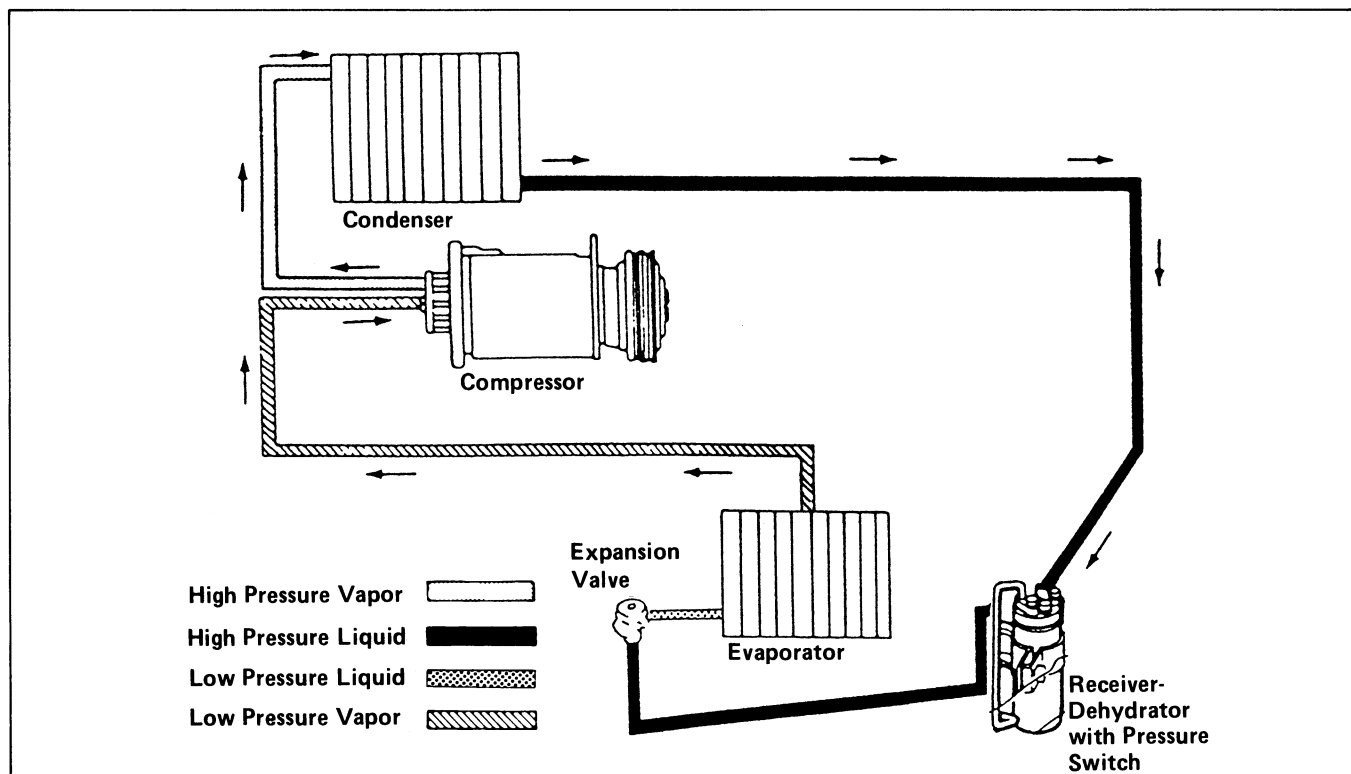
SYSTEM COMPONENTS

These illustrations are based on the LHD model



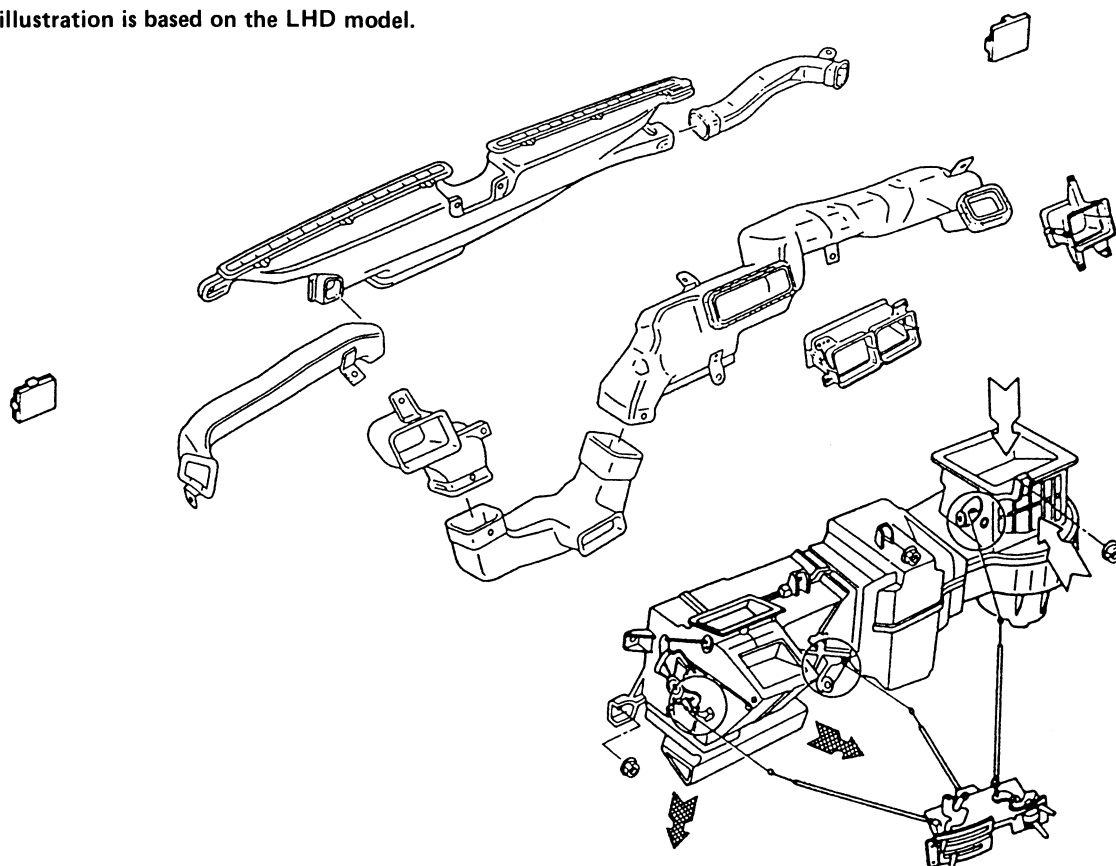
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SYSTEM COOLING LINE

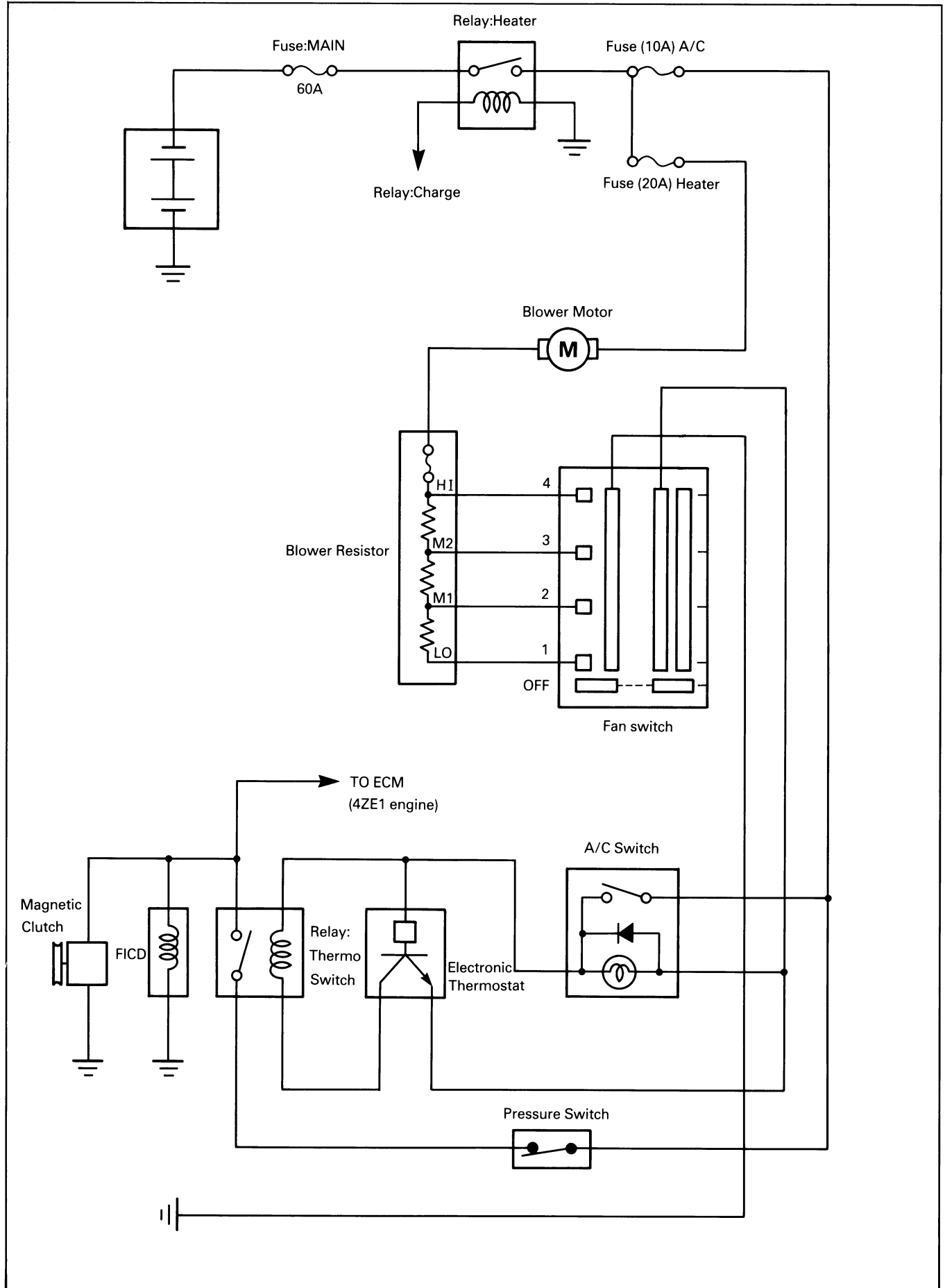


UNIT

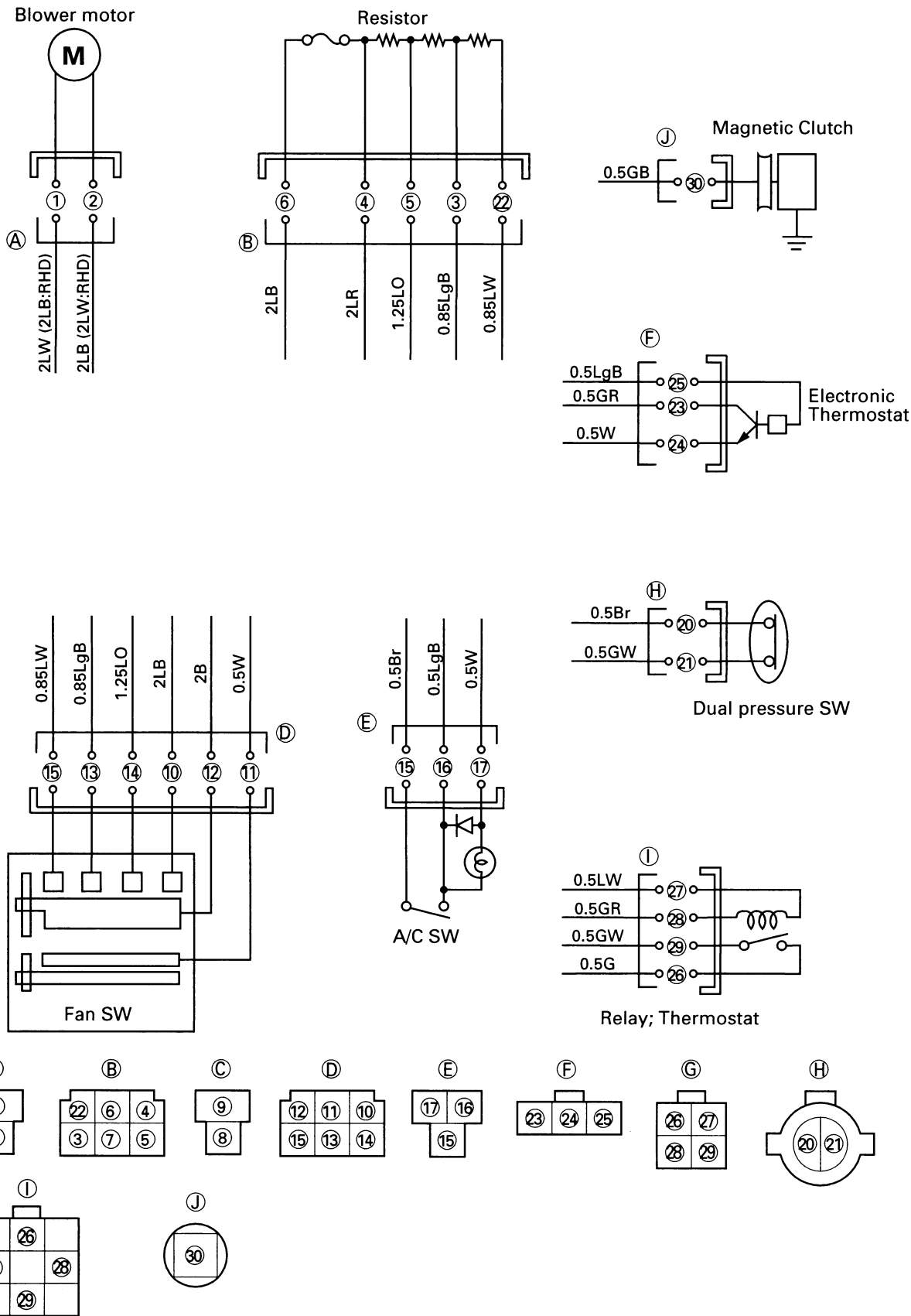
This illustration is based on the LHD model.



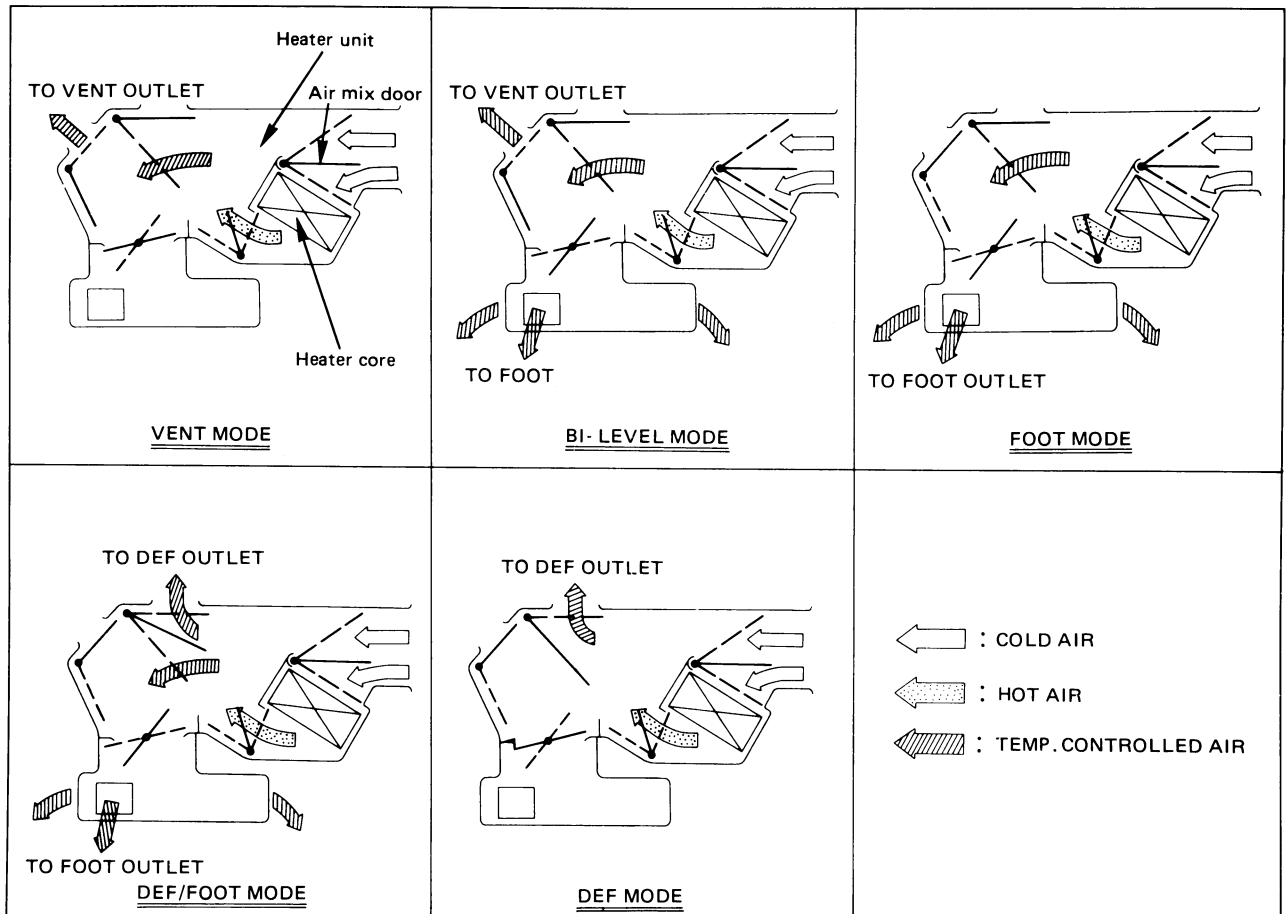
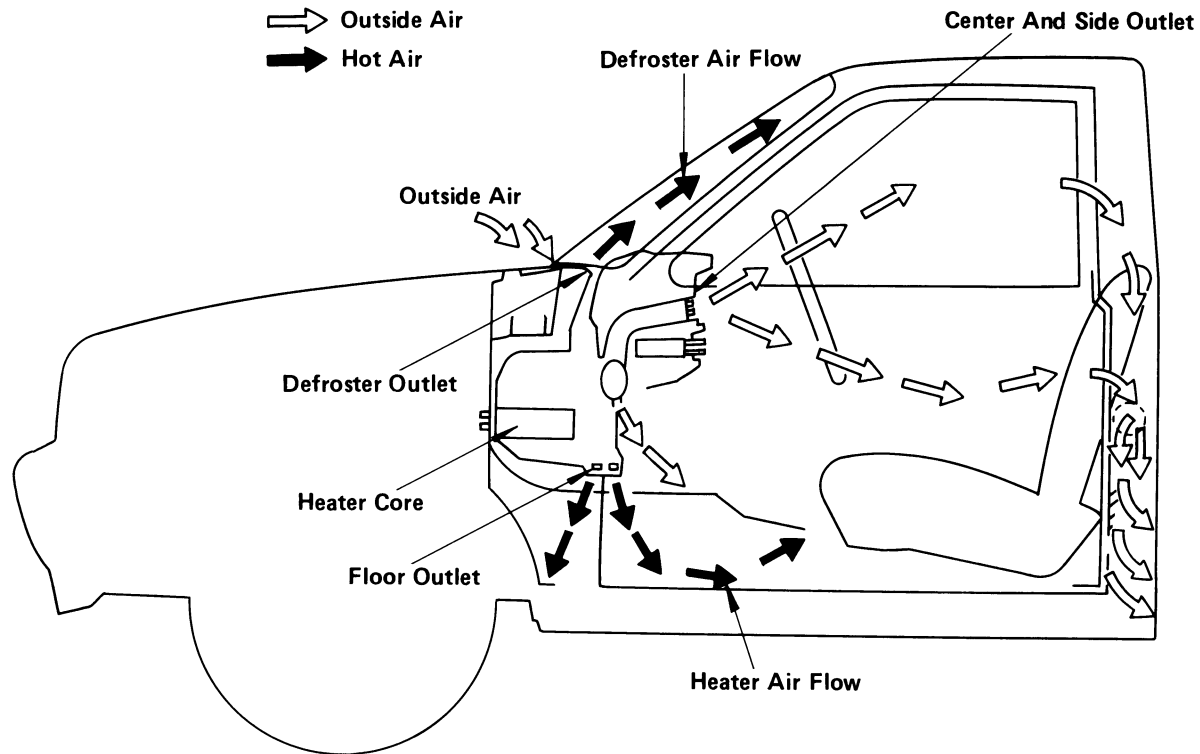
WIRING DIAGRAM



WIRING HARNESS TERMINAL POSITIONS



VENTILATION



MAIN DATA AND SPECIFICATIONS

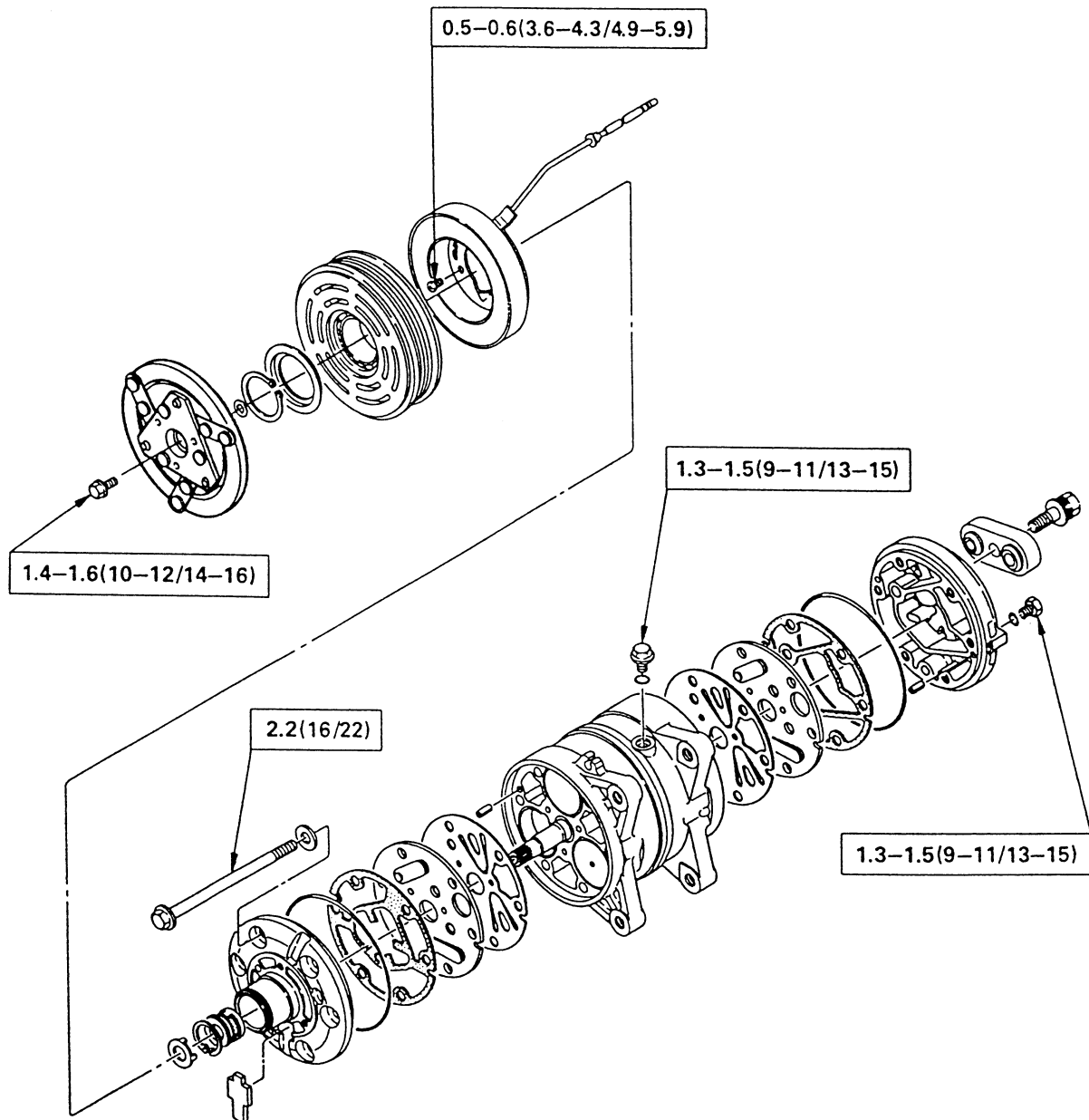
AIR COMPRESSOR		
Type		6 cylinder swash plate type
Displacement	cc (Imp fl oz)	147 (4.2)
Oil type		ZXL-100PG (ISUZU PART NO. 8-97101-338-0)
Oil capacity	cc (Imp fl oz)	150 (4.2)
Magnetic clutch		Type: Dry double disc dia. 135 mm (5.3 in.) (Gasoline) 125 mm (4.9 in.) (4J engine)
HEATING UNIT		
Type		Air mix type
Core dimension	mm (in.)	(L × H × W) 161 (6.34) × 163 (6.42) × 45 (1.77)
Capacity	(kcal./hr.)	3700 kcal./hr. (280 m ³ /hr.)
BLOER UNIT		
Type		Sirocco fan type
COOLING UNIT		
Type		Fin and tube evaporator
Evaporator element dimensions	mm (in.)	(L × H × W) 235 (9.25) × 224 (8.82) × 74 (2.91)
Evaporator capacity	(kcal./hr.)	4200 kcal./hr. (470 m ³ /hr.)
CONDENSER		
Type		Aluminium louvered fins
Capacity	(kcal./hr.)	9400 kcal./hr.
RECEIVER-DEHYDRATOR		
		Assembly includes sight glass and temperature sensitive device
REFRIGERANT		
		Type: R-134a Capacity: 0.65 kg (1.43 lbs.)
IDLE SPEED-UP CONTROL		
		Idle speed controlled by solenoid switch



SPECIAL PARTS FIXING NUTS AND BOLTS

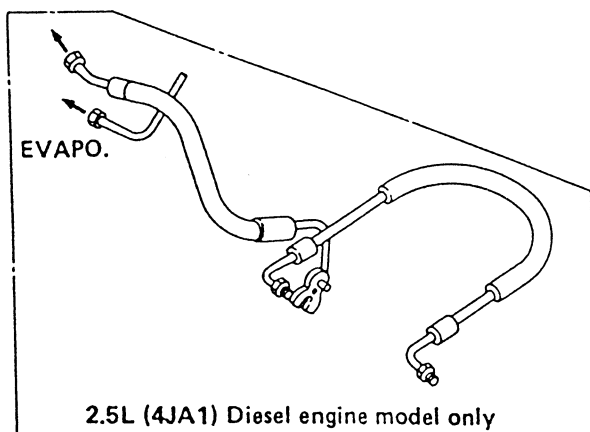
COMPRESSOR ASSEMBLY

kg·m (lb.ft./N·m)



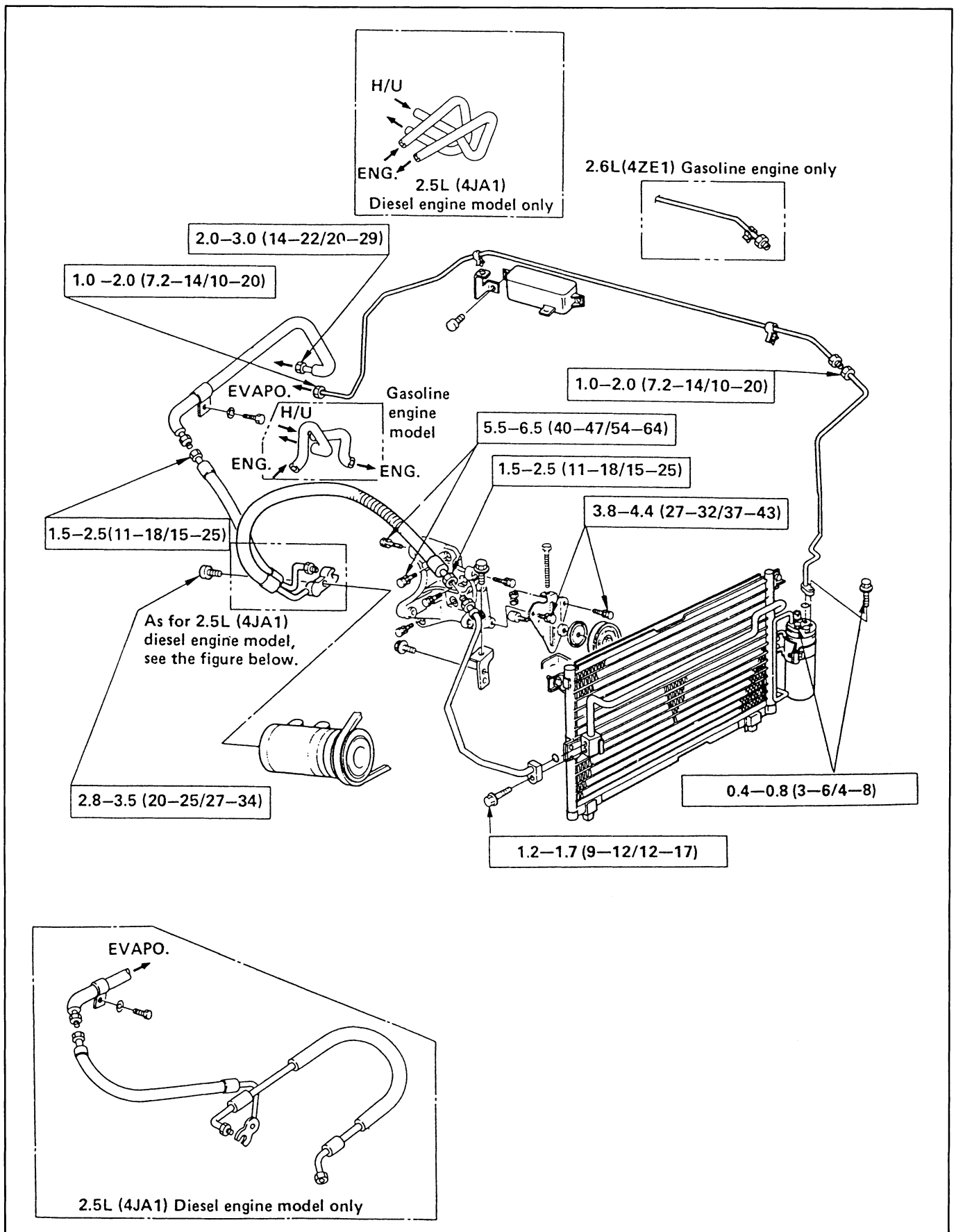
2.5L (4JA1) Diesel engine model only

A diagram showing a bent rod with a nut and washer at the end, labeled 'bent rod'.

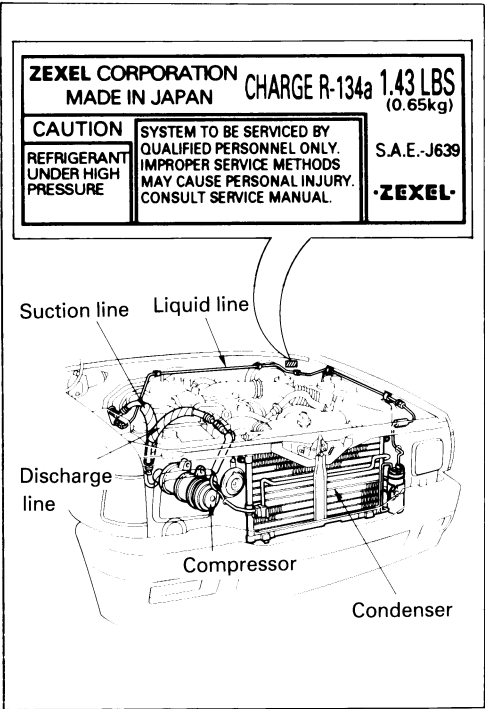


REFRIGERATION SYSTEM (RHD MODEL)

kg·m(lb.ft./N·m)



SERVICING



PRECAUTIONS FOR REFRIGERANT-134a (R-134a) AIR CONDITIONING SYSTEM

Vehicles that use Refrigerant-134a (R-134a) in the air conditioning system have a caution plate fixed to the rear wall of the engine compartment. Also, components designed solely for use with R-134a are so marked, to distinguish them from components designed solely for use with Refrigerant-12 (R-12).

R-12 and R-134a systems require different types of lubricating oil. Components designed solely for use with one refrigerant and oil type must never be interchanged with components designed solely for use with another refrigerant and oil type.

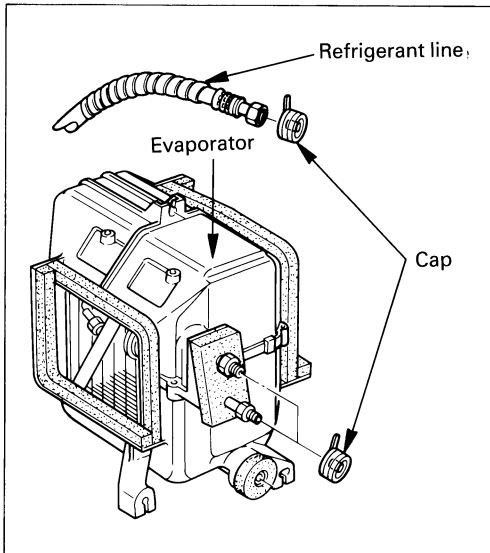
R-134a Refrigerant:

- R-134a differs entirely from R-12 in its composition and, therefore, the two should never be mixed. Always charge the specified amount of R-134a.
- The pressure characteristics of R-134a differ from those of R-12. The low pressure is lower, and the high pressure is higher.

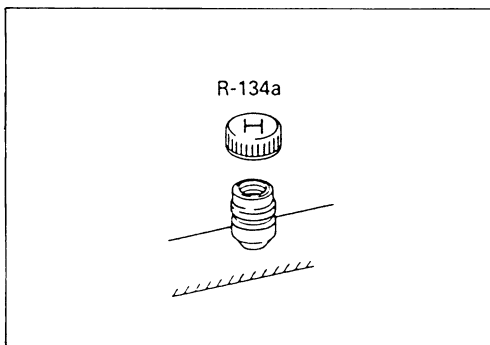
R-134a Compressor oil:

- The R-134a system requires a synthetic (PAG) compressor oil whereas the R-12 system requires a mineral compressor oil. The two oils must never be mixed.
- Compressor (PAG) oil varies according to compressor model. Be sure to use oil specified for the model of compressor.

Oil Specification	ZXL-100PG (ISUZU PART NO. 8-97101-338-0)
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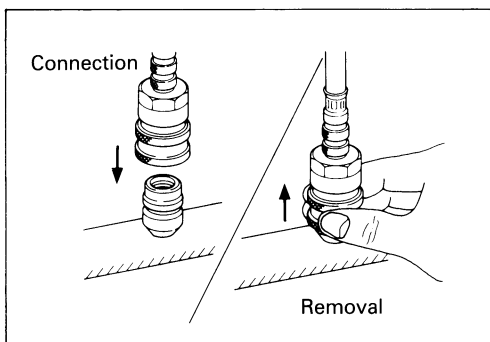


- The PAG compressor oil for the R-134a system tends to absorb moisture more quickly than mineral oil. When air conditioning parts are removed for servicing, all the open ends of parts and components must be sealed with caps to keep out contaminants.
- The PAG compressor oil must be stored in metal containers, not in plastic containers.



Service charge valve:

- The diameter of the service charge valve for the R-134a system is made larger than that for the R-12 system to prevent cross-contamination. In addition, the screw-in type joint of the R-12 system is replaced with a quick joint type in the R-134a system.



- To prevent refrigerant from escaping during installation and removal of charging hoses from the service charge valves, quick-joint type fittings are used.

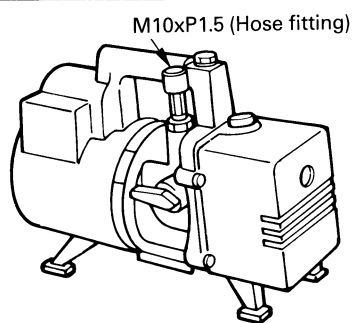
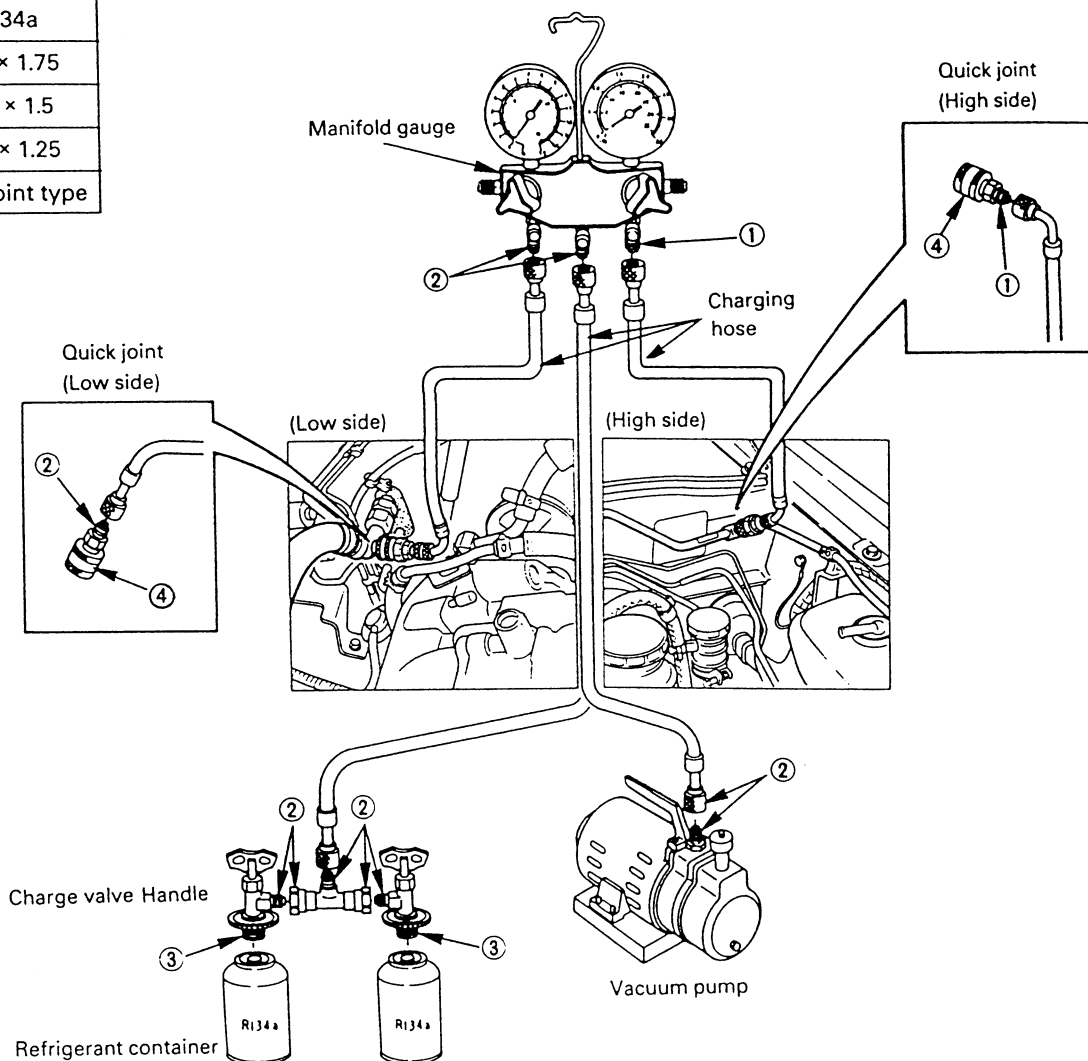
Connection: Push on firmly until locked (a "click" will be heard).

Removal: Hold the grip-ring and pull to remove.

- Air conditioning manifold gauges, charging hoses and other service tools designed exclusively for the R-134a system must be used with this vehicle.

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No.	R-134a
1	M12 × 1.75
2	M10 × 1.5
3	M14 × 1.25
4	Quick joint type

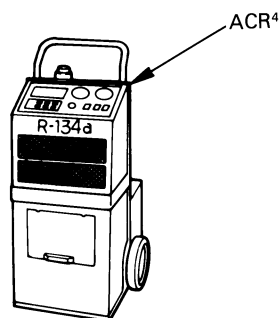


- Do not use the same vacuum pump for evacuating the R-134a and R-12 systems interchangeably (The vacuum pump hose fitting is a M10 × 1.5).
- R-134a vacuum pumps must have a positive shutoff valve.



CAUTION

Never use the same vacuum pump for both R-134a and R-12 systems, as cross contamination of compressor oil may occur.



Refrigerant Recovery, Recycling and Charging

- Avoid releasing the R-134a into the atmosphere. Use the ACR⁴ (R-134a Refrigerant Recovery/Recycling/Recharging/System) or equivalent to recover and recycle R-134a. Note that the ACR⁴ (or equivalent) is not interchangeable between the R-134a and R-12 systems.

ACR⁴ (115V 60Hz) : 5-8840-0629-0 (J-39500-A)

ACR⁴ (220-240V 50/60Hz)

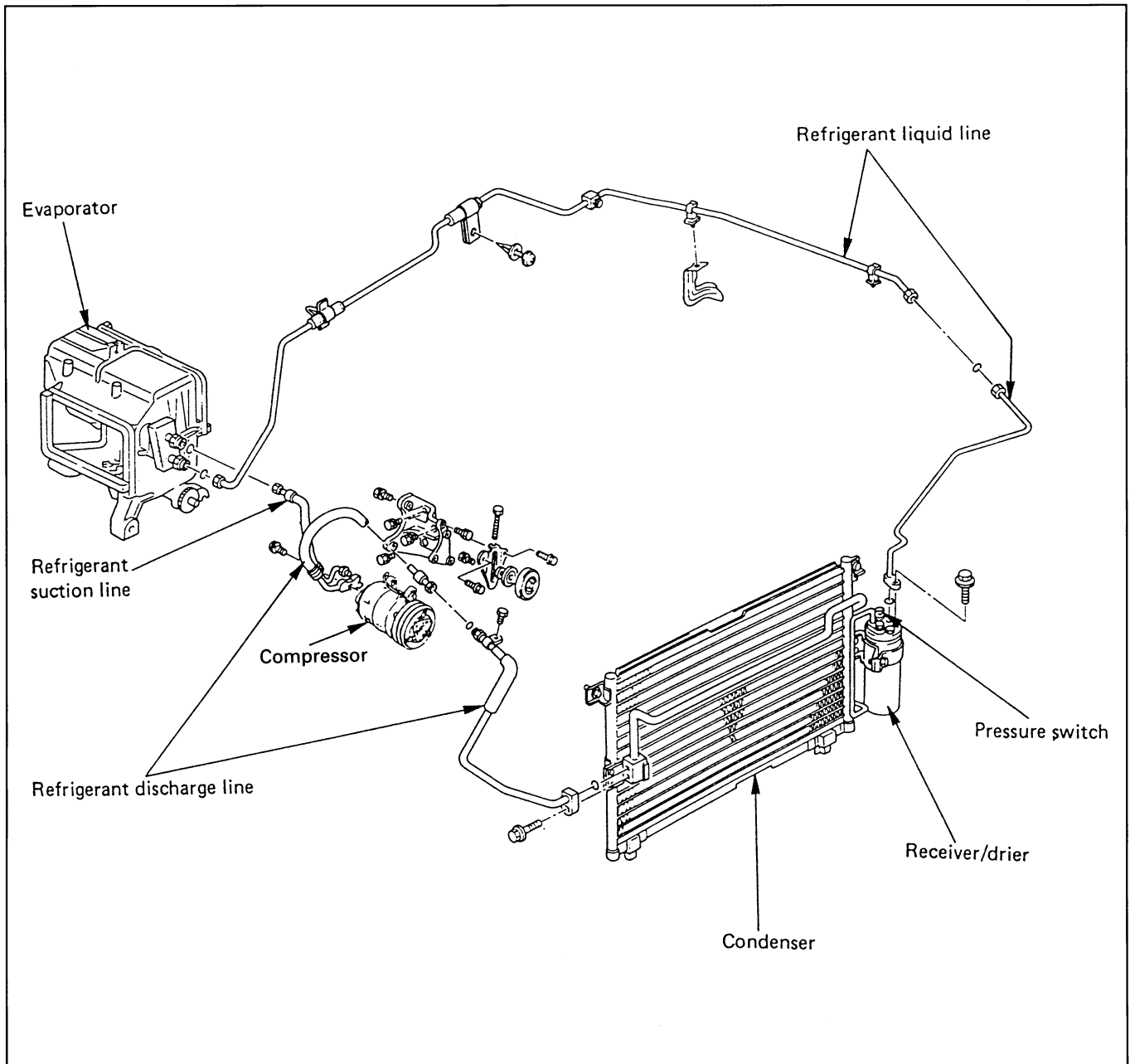
: 5-8840-0630-0 (J-39500-220A)

ACR⁴ (220-240V 50/60Hz Australian model)

: 5-8840-0631-0 (J-39500-220ANZ)

Refrigerant Leak Inspection

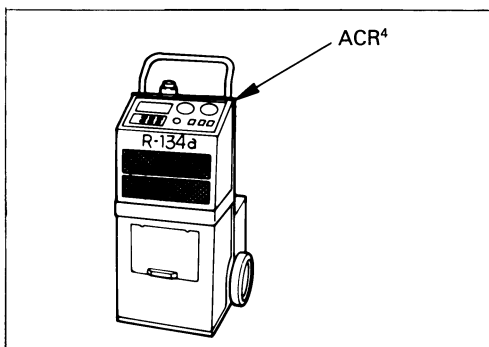
- The flame type gas leak detector for the R-12 system cannot be used with the R-134a system.
- The electric leak detector for the R-12 cannot be used with the R-134a system as the R-134a particles are far smaller than the R-12 molecules and, therefore, may not be always detected. Use leak detectors designed exclusively for the R-134a system.



PRECAUTIONS FOR REPLACEMENT OR REPAIR OF R-134a AIR CONDITIONING PARTS

There are certain procedures, practices and precautions that should be followed when servicing air conditioning systems:

- Keep your work area clean.
- Always wear safety goggles and protective gloves when working on refrigerant systems.
- Beware of the danger of carbon monoxide fumes caused by running the engine.
- Beware of discharged refrigerant in enclosed or improperly ventilated garages.
- Always disconnect the negative battery cable and discharge and recover the refrigerant whenever repairing the air conditioning system.
- When discharging and recovering the refrigerant, do not allow refrigerant to discharge too fast; it will draw compressor oil out of the system.
- Keep moisture and contaminants out of the system. When disconnecting or removing any lines or parts, use plugs or caps to close the fittings immediately.
Never remove the caps or plugs until the lines or parts are reconnected or installed.
- When disconnecting or reconnecting the lines, use two wrenches to support the line fitting, to prevent from twisting or other damage.
- Always install new O-rings whenever a connection is disassembled.
- Before connecting any hoses or lines, apply new specified compressor oil to the O-rings.
- When removing and replacing any parts which require discharging the refrigerant circuit, the operations described in this section must be performed in the following sequence:



- 1) Using the ACR⁴ (R-134a Refrigerant Recovery/Recycling/Recharging/System) or equivalent to thoroughly discharge and recover the refrigerant.

ACR⁴ (115V 60Hz) : 5-8840-0629-0 (J-39500-A)

ACR⁴ (220-240V 50/60Hz)

: 5-8840-0630-0 (J-39500-220A)

ACR⁴ (220-240V 50/60Hz Australian model)

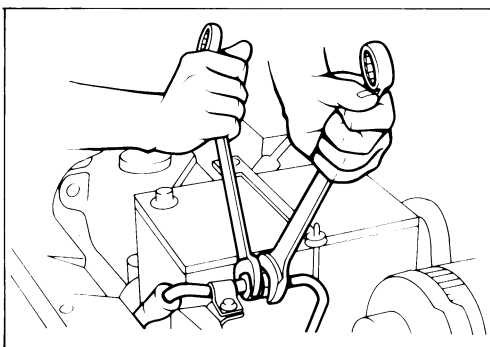
: 5-8840-0631-0 (J-39500-220ANZ)

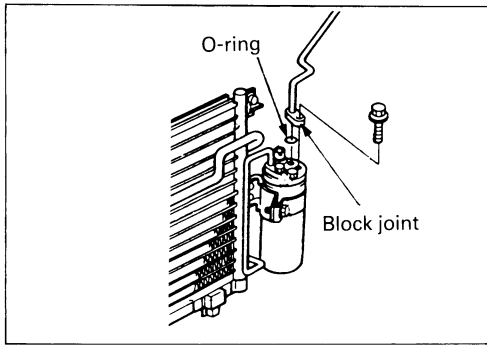
- 2) Remove and replace the defective part.
- 3) After evacuation, charge the air conditioning system and check for leaks.

REPAIR OF REFRIGERANT LEAKS

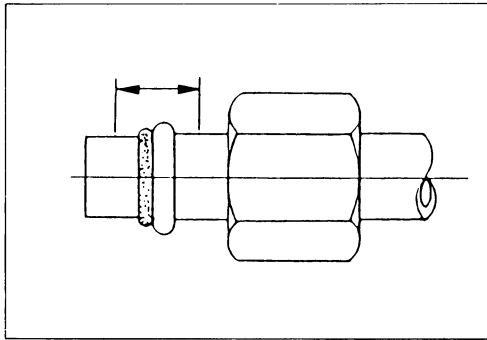
Refrigerant Line Connections

Install new O-rings, if required. When disconnecting or connecting lines, use two wrenches to prevent the connecting portion from twisting or becoming damaged.





When connecting the refrigerant line at the block joint, securely insert the projecting portion of the joint portion into the connecting hole on the unit side and secure with a bolt.

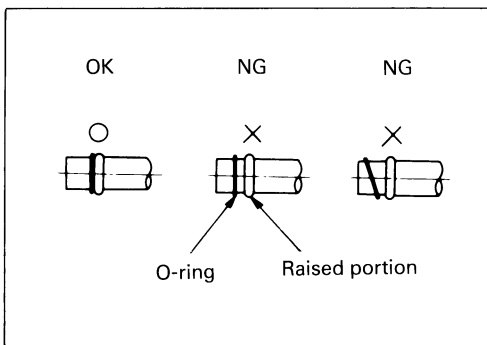


Apply specified compressor oil to the O-rings prior to connecting.

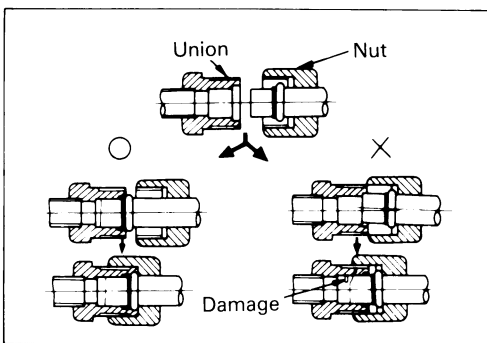


CAUTION:

Compressor (PAG) oil to be used varies according to compressor model. Be sure to apply oil specified for the model of compressor.



O-rings must be closely aligned with raised portion of refrigerant line.



Insert nut into union. First tighten nut by hand as much as possible. Then, tighten nut to specified torque.
(Refer to "Special Parts Fixing Nuts and Bolts" in this section)

LEAK AT REFRIGERANT LINE CONNECTIONS



- 1) Check the torque on the refrigerant line fitting and, if too loose, tighten to the specified torque.
 - Use two wrenches to prevent twisting and damage to the line.
 - Do not over tighten.
- 2) Perform a leak test on the refrigerant line fitting.
- 3) If the leak is still present, discharge and recover the refrigerant from the system.
- 4) Replace the O-rings.
 - O-rings cannot be reused. Always replace with new ones.
 - Be sure to apply specified compressor oil to the new O-rings.



- 5) Retighten the refrigerant line fitting to the specified torque.
 - Use two wrenches to prevent twisting and damage to the line.
- 6) Evacuate, charge and retest the system.

LEAK IN THE HOSE

If the compressor inlet or outlet hose is leaking, the entire hose must be replaced. Refrigerant hose must not be cut or spliced for repair.

- 1) Locate the leak.
- 2) Discharge and recover the refrigerant.
- 3) Remove the hose assembly.
 - Cap the open connections at once.
- 4) Connect the new hose assembly.
 - Use two wrenches to prevent twisting or damage to the hose fitting.
 - Tighten the hose fitting to the specified torque.



- 5) Evacuate, charge and test the system.

COMPRESSOR LEAKS

If leaks are located around the compressor shaft seal or shell, replace the compressor.



REPLACEMENT OF COMPONENT PARTS

When replacing system component parts, supply the following amount of oil to the component parts to be installed.

cc (Imp fl oz)

Component parts to be installed	Amount of oil
Evaporator	50 (1.4)
Condenser	30 (0.8)
Receiver/drier	30 (0.8)
Refrigerant line (one piece)	10 (0.3)

RECOVERY, RECYCLING, EVACUATION AND CHARGING

Handling Refrigerant-134a

Air conditioning systems contain R-134a.

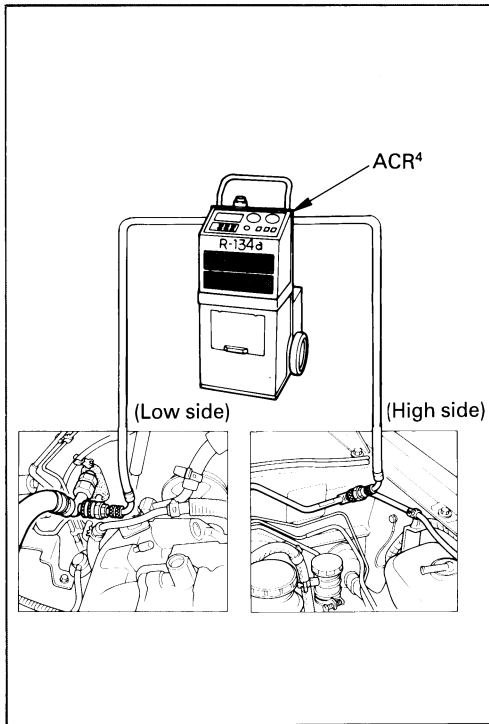
This is a chemical mixture which requires special handling procedures to avoid personal injury.

- Always wear safety goggles and protective gloves.
- Always work in a well-ventilated area. Do not weld or steam clean on or near any vehicle-installed air conditioning lines or components.
- If R-134a should come in contact with any part of the body, flush the exposed area with cold water and immediately seek medical help.
- If it is necessary to transport or carry any container of R-134a in a vehicle, do not carry it in the passenger compartment.
- If it is necessary to fill a small R-134a container from a large one, never fill the container completely. Space should always be allowed above the liquid for expansion.
- R-134a and R-12 should never be mixed as their compositions are not the same.
- R-134a PAG oil tends to absorb moisture more quickly than R-12 mineral oil and, therefore, should be handled more carefully.
- Keep R-134a containers stored below 40°C (100°F).



WARNING

- **SHOULD R-134a CONTACT YOUR EYE (S), CONSULT A DOCTOR IMMEDIATELY.**
- **DO NOT RUB THE AFFECTED EYE (S). INSTEAD, SPLASH QUANTITIES OF FRESH COLD WATER OVER THE AFFECTED AREA TO GRADUALLY RAISE THE TEMPERATURE OF THE REFRIGERANT ABOVE THE FREEZING POINT.**
- **OBTAIN PROPER MEDICAL TREATMENT AS SOON AS POSSIBLE. SHOULD THE R-134a TOUCH THE SKIN, THE INJURY MUST BE TREATED THE SAME AS SKIN WHICH HAS BEEN FROSTBITTEN OR FROZEN.**



REFRIGERANT RECOVERY

The refrigerant must be discharged and recovered by using the ACR⁴ (R-134a Refrigerant Recovery/Recycling/Recharging/System) or equivalent before removing or installing air conditioning parts.

ACR⁴ (115V 60Hz) : 5-8840-0629-0 (J-39500-A)

ACR⁴ (220-240V 50/60Hz)

: 5-8840-0630-0 (J-39500-220A)

ACR⁴ (220-240V 50/60Hz Australian model)

: 5-8840-0631-0 (J-39500-220ANZ)

- 1) Connect the high and low charging hoses of the ACR⁴ (or equivalent) as shown
- 2) Recover the refrigerant by following the ACR⁴ Manufacturer's Instructions.
- 3) When a part is removed, put a cap or a plug on the connecting portion so that dust, dirt or moisture cannot get into it.



REFRIGERANT RECYCLING

Recycle the refrigerant recovered by the ACR⁴ or equivalent. For the details of the actual operation, follow the steps in the ACR⁴ Manufacturer's Instructions.

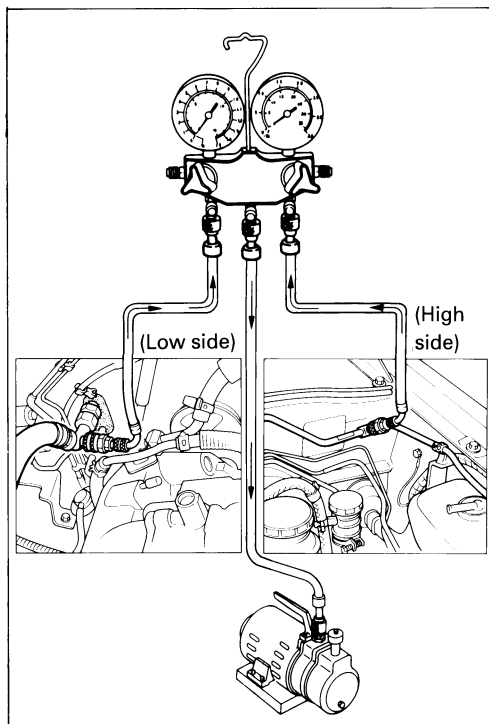
ACR⁴ (115V 60Hz) : 5-8840-0629-0 (J-39500-A)

ACR⁴ (220-240V 50/60Hz)

: 5-8840-0630-0 (J-39500-220A)

ACR⁴ (220-240V 50/60Hz Australian model)

: 5-8840-0631-0 (J-39500-220ANZ)



EVACUATION OF THE REFRIGERANT SYSTEM

Note:

Explained below is a method using a vacuum pump. Refer to the ACR⁴ (or equivalent) Manufacturer's Instructions when evacuating the system with ACR⁴ (or equivalent).

Air and moisture in the refrigerant will cause problems in the air conditioning system. Therefore, before charging the refrigerant, be sure to evacuate air and moisture thoroughly from the system.

- 1) Connect the gauge manifold.
 - High-pressure valve (HI)-Discharge-side
 - Low-pressure valve (LOW)-Suction-side
- 2) Discharge and recover the refrigerant.
- 3) Connect the center hose of the gauge manifold set to the vacuum pump inlet.

- 4) Operate the vacuum pump, open shutoff valve and then open both hand valves.
- 5) When the low-pressure gauge indicates approx. 750 mmHg (30 In.Hg), continue the evacuation for 5 minutes or more.
- 6) Close both hand valves and stop the vacuum pump.
- 7) Check to ensure that the pressure does not change after 10 minutes or more.
 - If the pressure changes, check the system for leaks.
 - If leaks occur, retighten the refrigerant line connections and repeat the evacuation steps.
- 8) If no leaks are found, again operate the vacuum pump for 20 minutes or more. After confirming that the gauge manifold pressure is at 750 mmHg (30 In.Hg), close both hand valves.
- 9) Close positive shutoff valve.
Stop the vacuum pump and disconnect the center hose from the vacuum pump.



CHARGING THE REFRIGERANT SYSTEM

There are various methods of charging refrigerant into the air conditioning system.

These include using the ACR⁴ (R-134a Refrigerant Recovery/ Recycling/Recharging/System) or equivalent and direct charging with a manifold gauge charging station.

ACR⁴ (115V 60Hz) : 5-8840-0629-0 (J-39500-A)

ACR⁴ (220-240V 50/60Hz)

: 5-8840-0630-0 (J-39500-220A)

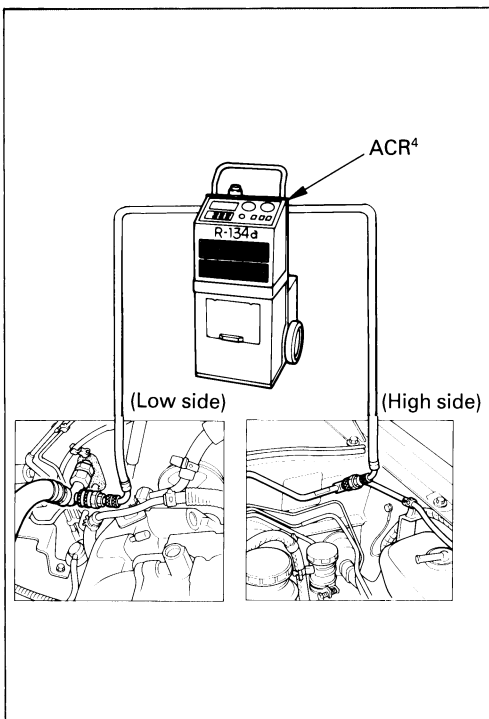
ACR⁴ (220-240V 50/60Hz Australian model)

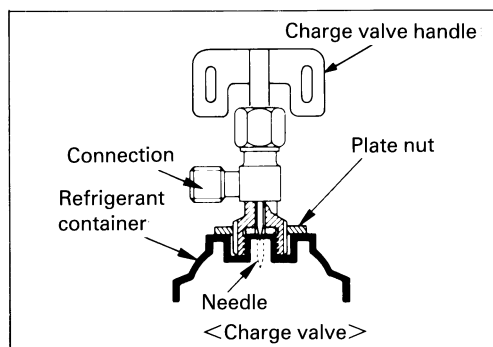
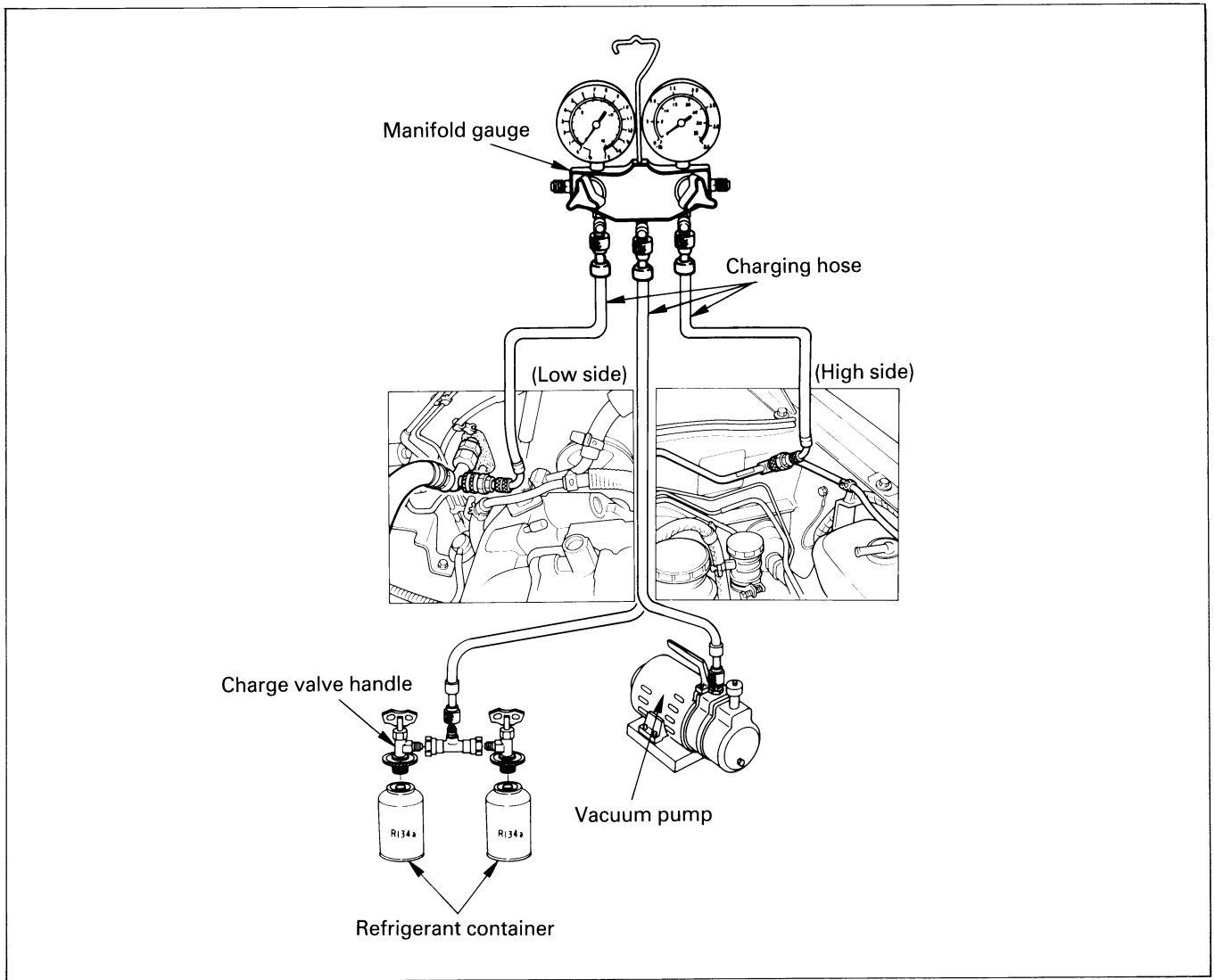
: 5-8840-0631-0 (J-39500-220ANZ)

Charging procedure

• ACR⁴ (or equivalent) method

For the charging of refrigerant recovered by ACR⁴, follow the Manufacturer's Instruction.





• **Direct charging with a manifold gauge charging station method**

Handling the charge valve handle when installing refrigerant container.

- 1) Before attaching the charge valve to the refrigerant container, turn the charge valve handle counterclockwise until the needle is fully retracted.
- 2) Turn the plate nut counterclockwise until it reaches its highest position relative to the charge valve.
- 3) Install the charge valve onto the refrigerant container.
- 4) Turn the plate nut clockwise and connect the center hose of the manifold gauge to the charge valve.
- 5) Tighten the plate nut sufficiently by hand. Then turn the charge valve handle clockwise to lower the needle and bore a hole in the refrigerant container.
- 6) Turn the charge valve handle counterclockwise to raise the needle. The refrigerant in the refrigerant container is charged into the air conditioning system by the operation of the manifold gauge.
 - Be absolutely sure not to reuse the emptied refrigerant container.

- 1) Make sure the evacuation process is correctly completed.
- 2) Connect the center-hose of the manifold gauge to the refrigerant container.
 - Turn the charge valve handle counterclockwise to purge the charging line and purge any air exiting in the center-hose of the manifold gauge.
- 3) Open the low-pressure hand valve and charge the refrigerant about 200 g (0.44 lbs.).
 - Make sure the high-pressure hand valve is closed.
 - Avoid charging the refrigerant by turning the refrigerant container upside down.
- 4) Close the low-pressure hand valve of the manifold gauge.
 - Check to ensure that the degree of pressure does not change.
- 5) Check the refrigerant leaks by using a R-134a leak detector.
 - If a leak occurs, repair the leak connection, and start all over again from the first step of evacuation.
- 6) If no leaks are found, open the low-pressure hand valve of the manifold gauge. Then continue charging refrigerant to the system.
 - When charging the system becomes difficult:
 - (1) Run the engine at 1,300~1,500 rpm and open the all vehicle doors.
 - (2) A/C switch is "ON".
 - (3) Set the fan control knob (fan switch) to its highest position.



WARNING

BE ABSOLUTELY SURE NOT TO OPEN THE HIGH-PRESSURE HAND VALVE. SHOULD THE HIGH-PRESSURE HAND VALVE BE OPENED, THE HIGH-PRESSURE REFRIGERANT GAS WOULD FLOW BACKWARD, AND THIS MAY CAUSE THE REFRIGERANT CONTAINER TO BURST.

- 7) When the refrigerant container is emptied, use the following procedure to replace it with a new refrigerant container.
 - (1) Close the low-pressure hand valve.
 - (2) Raise the needle upward and remove the charge valve.
 - (3) Reinstall the charge valve to the new refrigerant container.
 - (4) Purge any air existing in the center hose of the manifold gauge.
- 8) Charge the system to the specified amount and then close the low-pressure hand valve.

Refrigerant Specified Amount	g (lbs.)
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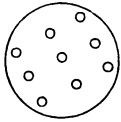
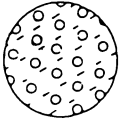
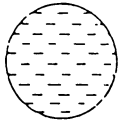
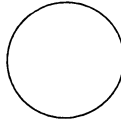
650 (1.43)

- A fully charged system is indicated by the sight glass on the receiver/drier being free of any bubbles (Refer to "Reading Sight Glass").
- Check the high and low pressure value of the manifold gauge.
- Check for refrigerant leaks by using a R-134a leak detector.

Immediately after charging refrigerant, both high and low pressures are slightly high and to the left of the gauge, but they settle down to the guide pressure valves as shown below:

- Ambient temperature; 30~35°C (86~95°F)
 - Guide pressure
 - High-pressure side;
Approx. 1373~1667 kPa (14~17 kg·cm²/199~242 PSI)
 - Low-pressure side;
Approx. 127~245 kPa (1.3~2.5 kg·cm²/18~36 PSI)
- 9) Close the low pressure hand valve and charge valve of the refrigerant container.
 - 10) Stop the air conditioning and the engine.
 - 11) Disconnect the high and low pressure hoses from the manifold gauge fittings.

Reading Sight Glass

High and low pressure pipe temperature	The high pressure pipe is hot and the low pressure pipe is cold. There is a distinct difference in temperature between them.	The high pressure pipe is warm and the low pressure pipe is cool. There is no great difference in temperature between them.	There is little difference in temperature between the high pressure pipe and the low pressure pipe.	The high pressure pipe is hot and the low pressure pipe is slightly warm. There is a difference in temperature between them.
Sight glass condition	Almost transparent. A flow of bubbles can be seen, but they disappear when the throttle is opened.	A flow of bubbles always can be seen. It appears sometimes transparent, and sometimes frothy.	Something like fog faintly can be seen.	Even at idle with the fan at "HI" (with the window fully open), the bubbles cannot be seen.
				
Air conditioning cycle condition	OK	NG (Not enough refrigerant)	NG (Almost no refrigerant)	NG (Too much refrigerant)

The sight glass provides accurate diagnosis only under the following conditions.

If the vehicle can be tested under these conditions, check the sight glass appearance and compare to the chart

- * Engine speed 1,500 RPM
- * A/C switch "ON"
- * Blower fan operating at highest speed
- * Air source selector lever at "RECIRC"
- * Temperature control lever at coldest position
- * Ambient temperature below 35°C (95°F) and humidity below 70% (See NOTE 1)
- * High side pressure less than 1667 kPa (17 kg·cm²/242 PSI) (See NOTE 2)

NOTE 1

If the vehicle cannot be moved to a testing location that meets these specifications, then the sight glass cannot be used for diagnosis. You must discharge and recover the refrigerant, then recharge the system with the specified amount of refrigerant.

Then continue checking the system performance.

NOTE 2

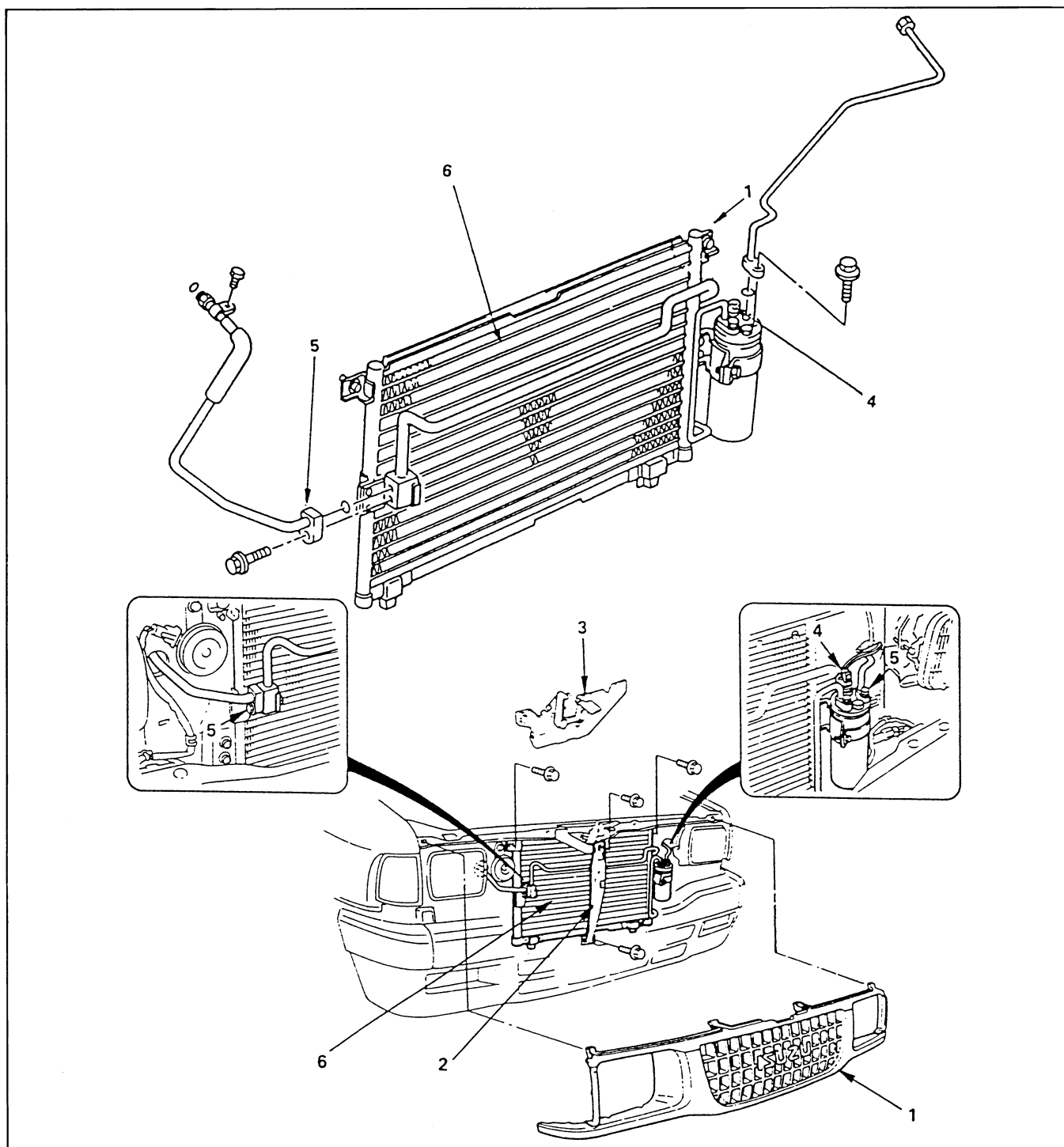
If the high side pressure is greater than stated, the sight glass cannot be used for diagnosis. You must discharge and recover the refrigerant, then recharge the system with the specified amount of refrigerant.

Then continue checking system performance.

CONDENSER



REMOVAL AND INSTALLATION



Removal Steps

1. Radiator grille
2. Engine hood front end stay
3. Engine hood lock
4. Pressure switch connector
5. Refrigerant line
6. Condenser

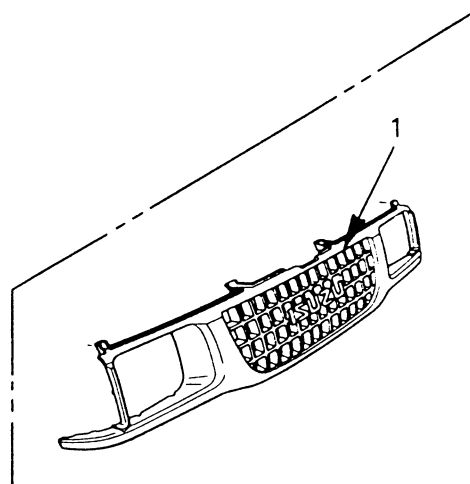
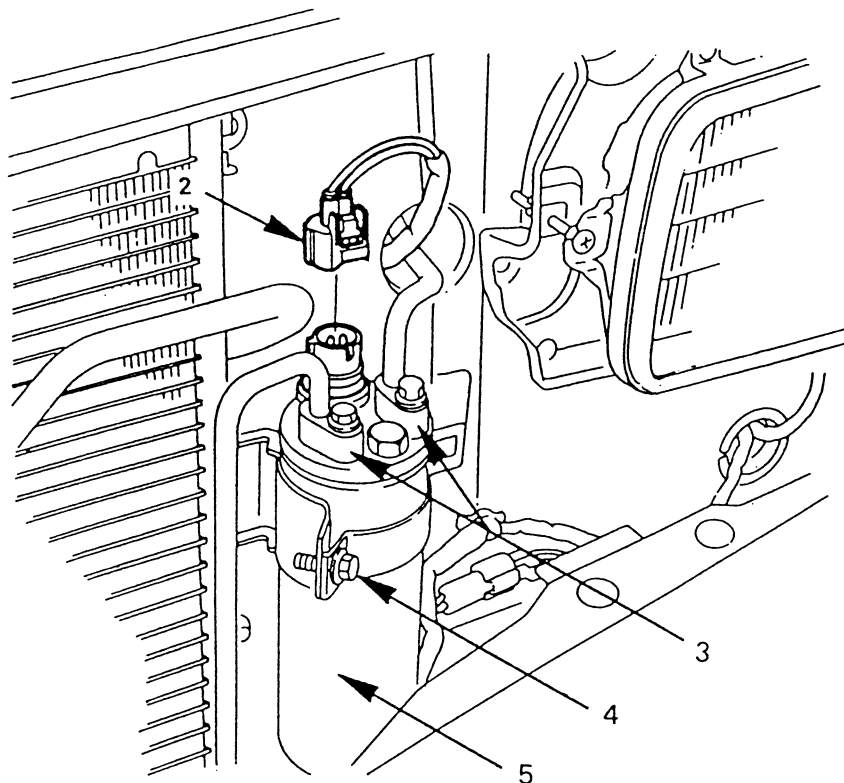
Installation Steps

To install, follow the removal procedure in reverse order.

RECEIVER DEHYDRATOR



REMOVAL AND INSTALLATION



Removal Steps

1. Radiator grille
2. Dual pressure switch connector
3. Refrigerant line
4. Bracket bolt
5. Receiver dehydrator

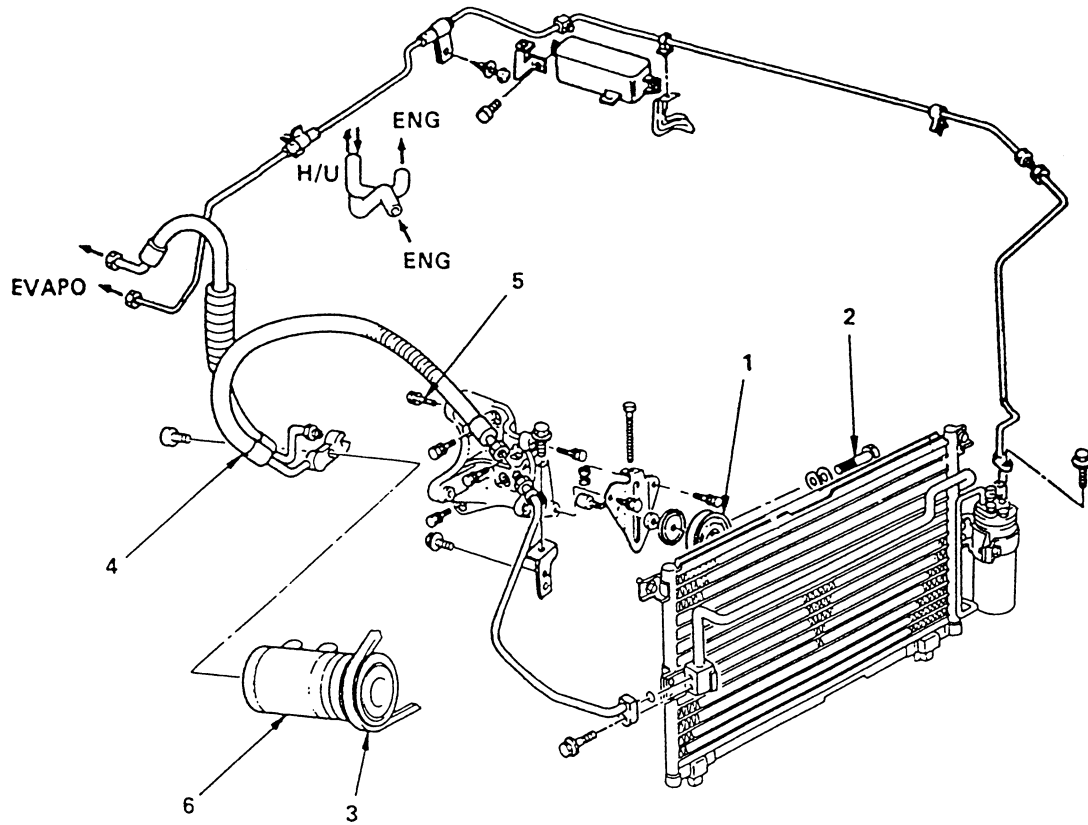
Installation Steps

To install, follow the removal procedure in reverse order.

COMPRESSOR



REMOVAL AND INSTALLATION



This illustration is based on the LHD gasoline engine model.

Removal Steps

1. Nut; idler pulley
2. Bolt; idler pulley tension
3. Belt
4. Compressor flex/hose
5. Bolt; compressor to bracket
6. Compressor assembly

Installation Steps

6. Compressor assembly
- ▲ 5. Bolt; compressor to bracket
- ▲ 4. Compressor flex/hose
- ▲ 3. Belt
2. Bolt; idler pulley tension
1. Nut; idler pulley



Important Operations — Installation



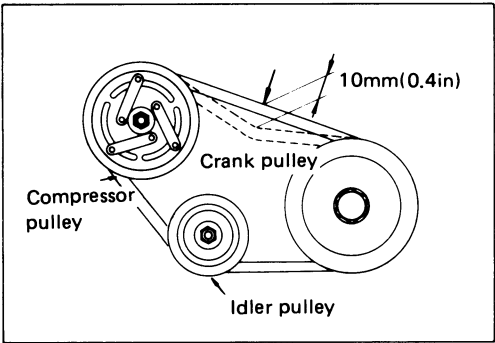
5. Bolt; Compressor to Bracket

Torque	kg-m(lb.ft./N·m)	5.5—6.5 (40—47/54—64)
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4. Compressor Flex/Hose

Torque	kg-m(lb.ft./N·m)	2.8—3.5 (20—25/27—34)
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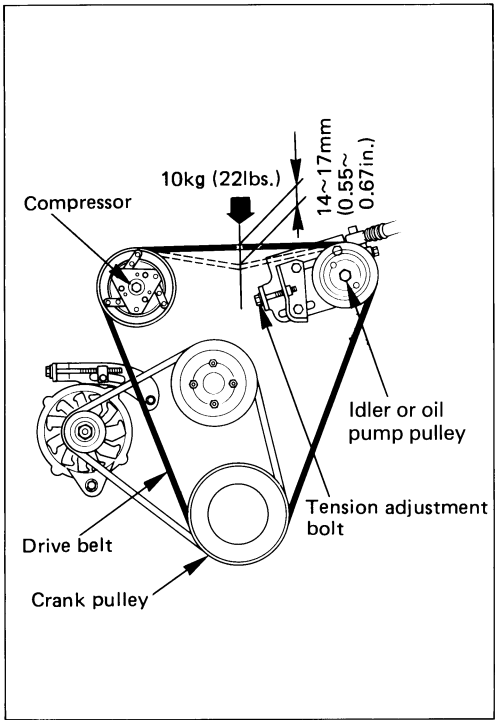


3. Compressor Belt

Check the drive belt tension.
Depress the drive belt mid-portion with a 10 kg (22 lb/98 N) force.

Gasoline Engine

Standard deflection	mm(in.)	10 (0.4)
---------------------	---------	----------



4J Engine

Standard deflection	mm (in)	14—17 (0.55—0.67)
---------------------	---------	----------------------

GENERAL REPAIR PROCEDURE

OIL SPECIFICATION

- The R-134a system requires a synthetic (PAG) compressor oil whereas the R-12 system requires a mineral compressor oil.
The two oils must never be mixed.
- Compressor (PAG) oil varies according to compressor model. Be sure to use oil specified for the model of compressor.

Specified Compressor Oil

ZXL-100PG
(ISUZU PART NO.8-97101-338-0)

HANDLING OF OIL

- The oil should be free from moisture, dust, metal powder, etc.
- Do not mix with other oil.
- The water content in the oil increases when exposed to the air. After use, seal oil from air immediately.
(R-134a PAG Compressor Oil absorbs moisture very easily than R-12.)
- The compressor oil must be stored in steel containers, not in plastic containers.

COMPRESSOR OIL CHECK

The Oil used to lubricate the compressor is circulating with the refrigerant.

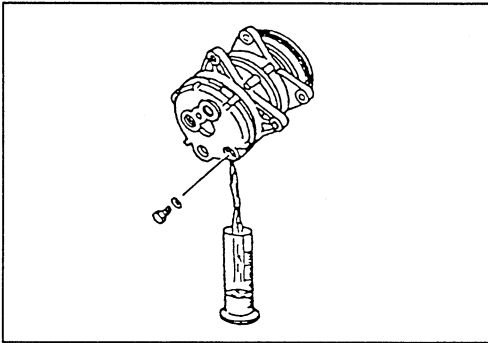
Whenever replacing any component of the system or a large amount of gas leakage occurs, add oil to maintain the original amount of oil.

Oil Capacity

Capacity total in system	DKS-15 CH	150 cc (5.0 fl.oz.)
Compressor (Service parts) charging amount	DKS-15 CH	150 cc (5.0 fl.oz.)

Checking and Adjusting for Used Compressor

- (1) Perform Oil return operation.
(Refer to "Oil Return Operation" in this section.)
- (2) Discharge refrigerant and remove the compressor.



- (3) Drain the compressor oil and measure the extracted oil with a measuring cylinder.
- (4) Check the compressor oil for contamination.
(Refer to "Contamination of Compressor Oil" in this section.)
- (5) Adjust oil level following the procedure below.

Type	Collected Amount	Charging Amount
DKS-15 CH	more than 90 cc (3.0 fl.oz.)	same as collected amount
	less than 90 cc (3.0 fl.oz.)	90 cc (3.0 fl.oz.)

- (6) Install the compressor, then evacuate, charge and perform oil return operation.
- (7) Check system operation.

When it is impossible to perform oil return operation, the compressor oil should be checked in the following order:

- (1) Discharge refrigerant and remove the compressor.
- (2) Drain the compressor oil and measure the extracted oil with a measuring cylinder.
- (3) Check the oil for contamination.
- (4) If more than 90 cc (3.0 fl.oz.) for DKS-15 CH type is extracted from the compressor, supply same amount of oil to the compressor to be installed.
If the amount of oil extracted is less than 90 cc (3.0 fl.oz.) for DKS-15 CH type recheck the compressor oil in the following order:
- (5) Supply 90 cc (3.0 fl.oz.) for DKS-15 CH type oil to the compressor and install it onto the vehicle.
- (6) Perform oil return operation.
- (7) Remove the compressor and recheck the amount of oil.
- (8) Adjust the compressor oil.

Checking and Adjusting for Compressor Replacement

150 cc (5.0 fl.oz.) for DKS-15 CH type of oil is charged in compressor (service parts).

So it is necessary to drain the proper amount of oil from new compressor.

- (1) Perform oil return operation.
- (2) Recover refrigerant and remove the compressor.
- (3) Drain the compressor oil and measure the extracted oil with a measuring cylinder.
- (4) Check the compressor oil for contamination.
- (5) Adjust oil level following the procedure below.

Type	Collected Amount	Charging Amount
DKS-15 CH	more than 90 cc (3.0 fl.oz.)	same as collected amount
	less than 90 cc (3.0 fl.oz.)	90 cc (3.0 fl.oz.)

- (6) Evacuate, charge and perform oil return operation.
- (7) Check system operation.

CONTAMINATION OF COMPRESSOR OIL

Unlike engine oil, no cleaning agent is added to the compressor oil. Even if the compressor runs for a long period of time (approximately 1 season), the oil never becomes contaminated as long as there is nothing wrong with the compressor or its method of use.

Inspect the extracted oil for any of the following conditions:

- The capacity of the oil has increased.
- The oil has changed color to red.
- Foreign substances, metal powder, etc., are present in the oil.

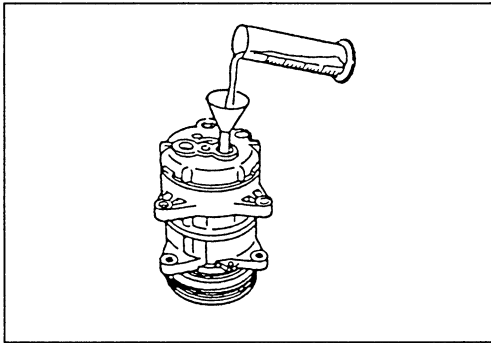
If any of these conditions exists, compressor oil is contaminated. Whenever contaminated compressor oil is discovered, the receiver/drier must be replaced.

OIL RETURN OPERATION

There is close affinity between the oil and the refrigerant. During normal operation, part of the oil recirculates with the refrigerant in the system.

When checking the amount of oil in the system, or replacing any component of the system, the compressor must be run in advance for oil return operation. The procedure is as follows:

- (1) Open the all doors and engine hood.
- (2) Start the engine and A/C switch is "ON" and Set the fan control knob at its highest position.
- (3) Run the compressor for more than 20 minutes between 800 and 1,000 rpm in order to operate the system.
- (4) Stop the engine.



REPLACEMENT OF COMPONENT PARTS

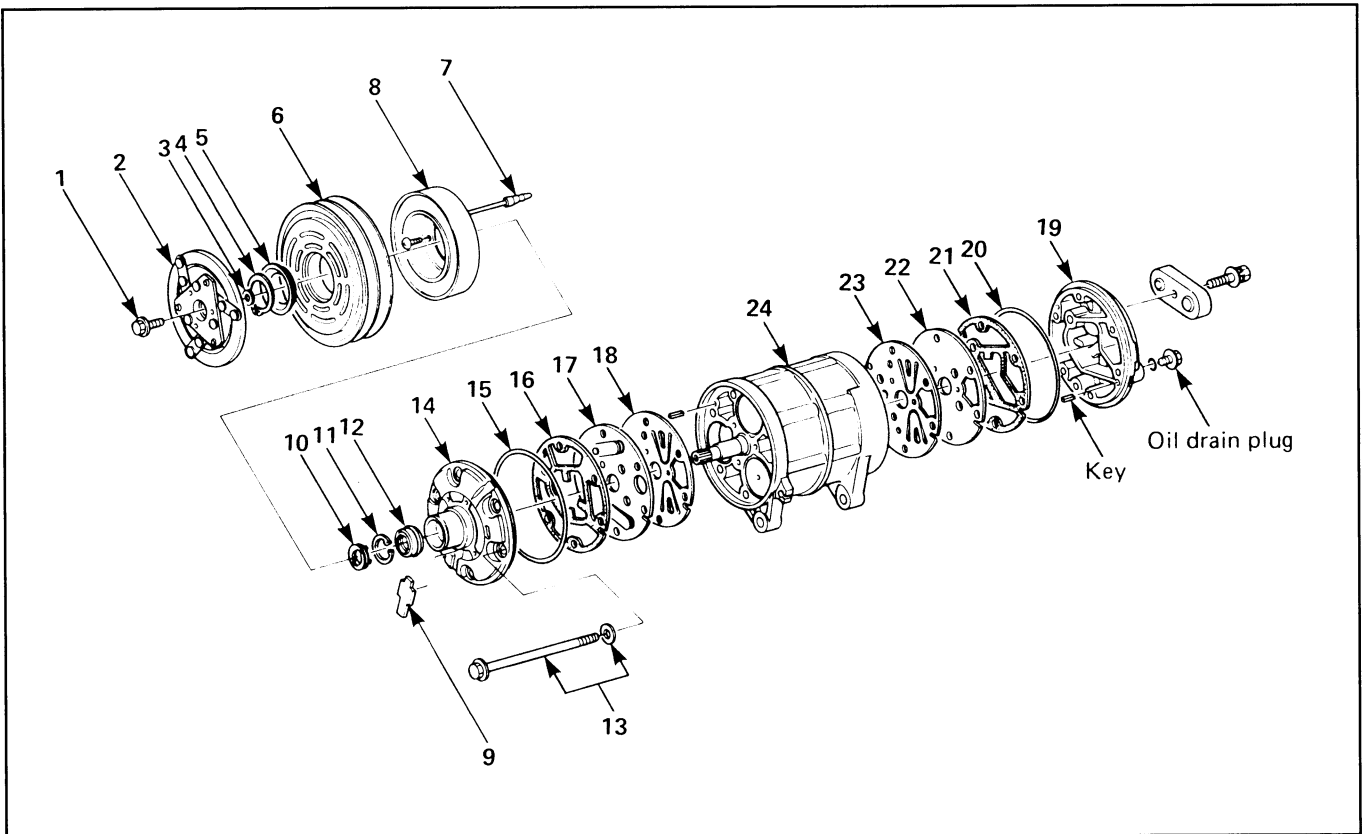
When replacing system component parts, supply the following amount of oil to the component parts to be installed.

Component parts to be installed	Amount of oil
Evaporator	50 cc (1.7 fl.oz.)
Condenser	30 cc (1.0 fl.oz.)
Receiver/drier	30 cc (1.0 fl.oz.)
Refrigerant line (One piece)	10 cc (0.3 fl.oz.)

Refrigeration oil must be replenished if more than two parts are removed at the same time. After installing these components, check compressor oil.

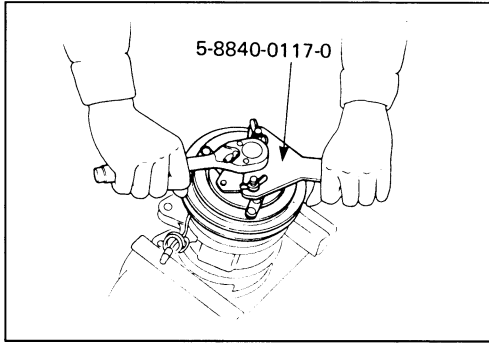


DISASSEMBLY



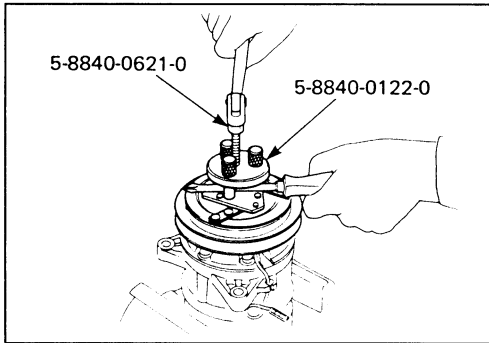
Disassembly Steps

- ▲ 1. Drive plate bolt
- ▲ 2. Drive plate
- 3. Shim(s)
- 4. Snap ring
- ▲ 5. Cover (If so equipped)
- ▲ 6. Pulley assembly
- 7. Lead wire connector
- ▲ 8. Field coil
- 9. Felt (If so equipped)
- ▲ 10. Shaft seal cover (If so equipped)
- ▲ 11. Snap ring
- ▲ 12. Shaft seal assembly
- 13. Through bolt with gasket
- ▲ 14. Front cylinder head
- ▲ 15. O-ring
- 16. Gasket
- 17. Front valve plate
- ▲ 18. Front suction valve
- ▲ 19. Rear cylinder head
- ▲ 20. O-ring
- 21. Gasket
- 22. Rear valve plate
- 23. Rear suction valve
- ▲ 24. Cylinder and shaft assembly

**Important Operations – Dissassembly****1. Drive Plate Bolt**

Using drive plate holder to prevent the drive plate from rotating, then remove the bolt.

Drive Plate Holder: 5-8840-0117-0 (J-33939)

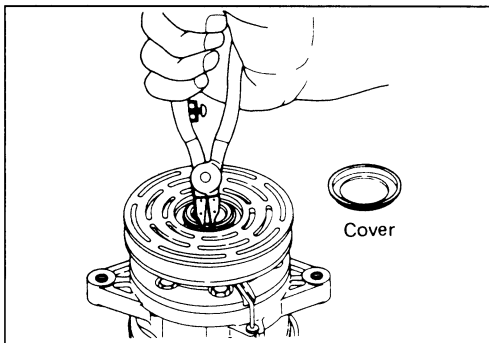
**2. Drive Plate**

Using drive plate puller and forcing screw to remove the drive plate.

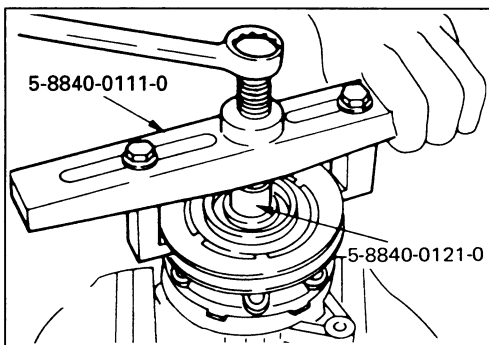
Drive Plate Puller: 5-8840-0122-0 (J-33944-A)

Forcing Screw: 5-8840-0621-0 (J-33944-4)

If the frictional surface shows signs of damage due to excessive heat, the drive plate and pulley should be replaced.

**5. Cover (If so equipped)**

Using snap ring pliers to remove the snap ring.

**6. Pulley Assembly**

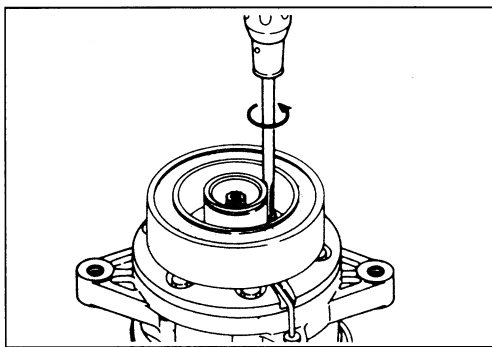
Using pulley puller pilot and pulley puller to remove the pulley assembly.

Pulley Puller Pilot: 5-8840-0121-0 (J-33943)

Pulley Puller: 5-8840-0111-0 (J-8433)

Check the appearance of the pulley assembly. If the frictional surface of the pulley shows signs of excessive grooving due to slippage, both the pulley and drive plate should be replaced. The frictional surfaces of the pulley assembly should be cleaned with a suitable solvent before reinstallation.

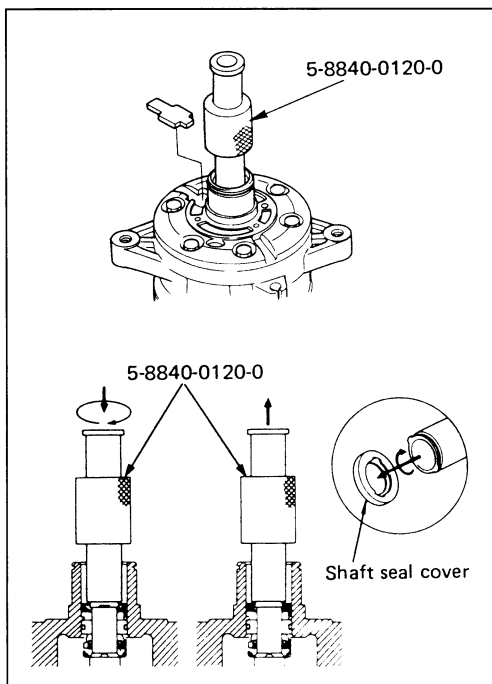




8. Field Coil

Loosen three screws and remove the field coil with lead wire.

Check coil for loose connector or cracked insulation.

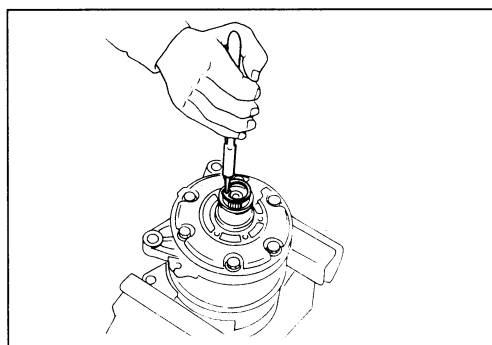


10. Shaft Seal Cover (If so equipped)

Using shaft seal remover to remove the shaft seal cover.

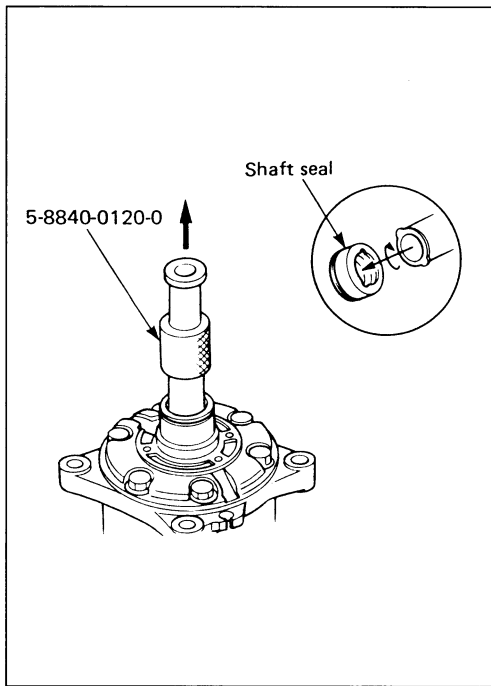
Engage the remover hook with the shaft seal cover groove and slowly draw the shaft seal cover out.

Shaft Seal Remover: 5-8840-0120-0 (J-33942)



11. Snap Ring

Using snap ring pliers to remove the snap ring.

**12. Shaft Seal Assembly**

Using shaft seal remover to remove the shaft seal assembly.

Engage the remover hook with the shaft seal assembly groove and slowly draw the shaft seal assembly out.

Shaft Seal Remover: 5-8840-0120-0 (J-33942)

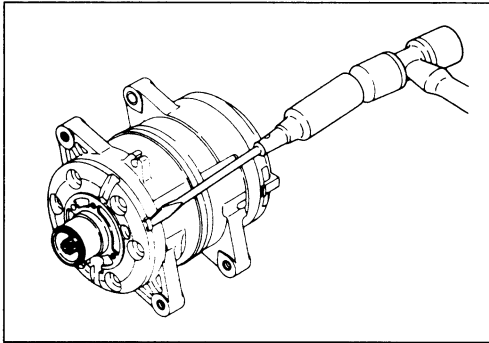


The shaft seal is precision-machined and its critical parts are finished to extremely close tolerances. The assembly must be handled with great care, it slips face demanding particularly careful handling.

The shaft seal can not be reused. Install a new shaft seal at reassembly.

Take care not to scratch or otherwise damage the shaft seal face.

Keep the shaft seal free from lint and dirt.

**14. Front Cylinder Head****15. O-ring**

Alternately tap the projections on the circumference of the front cylinder head with a screwdriver and a plastic hammer to remove the front cylinder head.

18. Front Suction Valve

Check the front valve plate for scratching and bending.

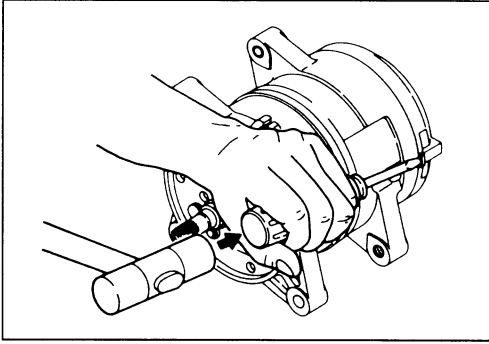
Check the front valve plate and the front cylinder head for nicks and burrs on the sealing surface.

Buff or replace the valve plate and cylinder head if nicks and burrs are present.

Check that the front valve plate passage is free from obstructions.

Check the front valve plate and the cylinder head for cracks.

Replace the valve plate and cylinder head if cracks are present.



19. Rear Cylinder Head

20. O-ring

Alternately tap the projections on the circumference of the rear cylinder head with a screwdriver and a plastic hammer to remove the rear cylinder head.



24. Cylinder and shaft assembly

Check the rear valve plate for scratching and bending.

Check the rear valve plate and the rear cylinder head for nicks and burrs on the sealing surface.

Buff or replace the valve plate and cylinder head if nicks and burrs are present.

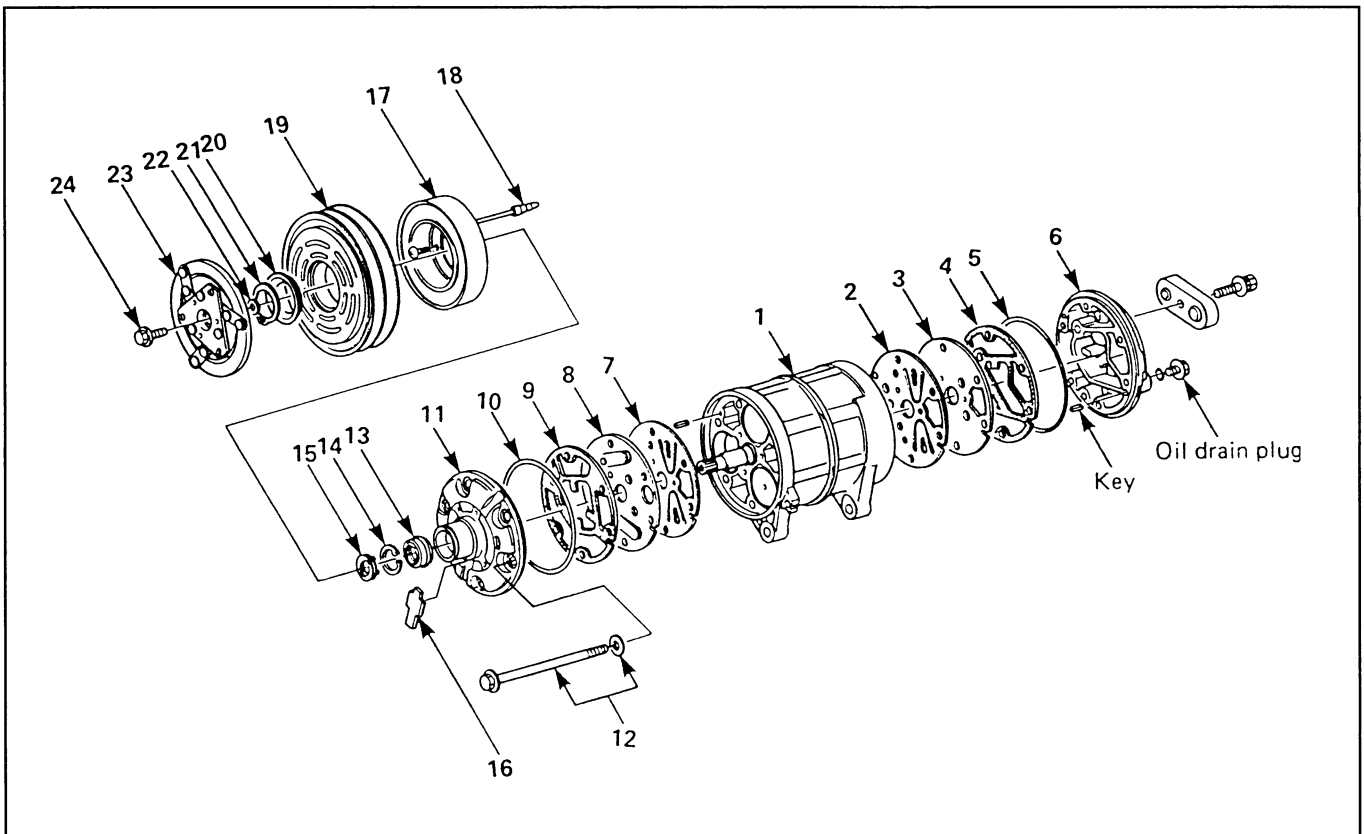
Check that the rear valve plate passage is free from obstructions.

Check the rear valve plate and the cylinder head for cracks.

Replace the valve plate and cylinder head if cracks are present.

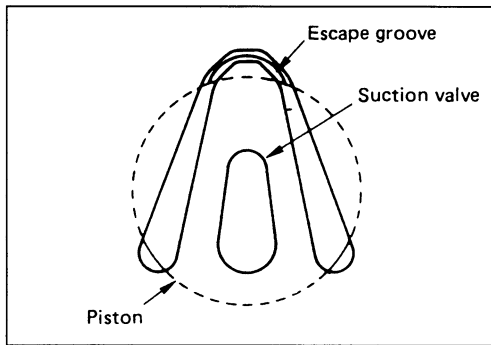


REASSEMBLY



Reassembly Steps

- ▲ 1. Cylinder and shaft assembly
- ▲ 2. Rear suction valve
- ▲ 3. Rear valve plate
- ▲ 4. Gasket
- ▲ 5. O-ring
- ▲ 6. Rear cylinder head
- ▲ 7. Front suction valve
- ▲ 8. Front valve plate
- ▲ 9. Gasket
- ▲ 10. O-ring
- ▲ 11. Front cylinder head
- ▲ 12. Through bolt with gasket
- ▲ 13. Shaft seal assembly
- ▲ 14. Snap ring
- ▲ 15. Shaft seal cover (If so equipped)
- ▲ 16. Felt (If so equipped)
- ▲ 17. Field coil
- ▲ 18. Lead wire connector
- ▲ 19. Pulley assembly
- ▲ 20. Cover (If so equipped)
- ▲ 21. Snap ring
- ▲ 22. Shim(s)
- ▲ 23. Drive plate
- ▲ 24. Drive plate bolt



Important Operation – Resassembly



1. Cylinder and Shaft Assembly

Clamp the cylinder shaft assembly in a vise. The rear side of the cylinder shaft assembly must be facing up.

2. Rear Suction Valve

Install the suction valve by aligning it with the spring pin and the cylinder valve relief grooves.

3. Rear Valve Plate

Install the valve plate to the suction valve by aligning it with the spring pin.

Note:

Do not mix up the front and rear valve plates.

4. Gasket

1) Apply a coat of new compressor oil to the new gasket.

2) Install the gasket to the valve plate.

5. O-ring

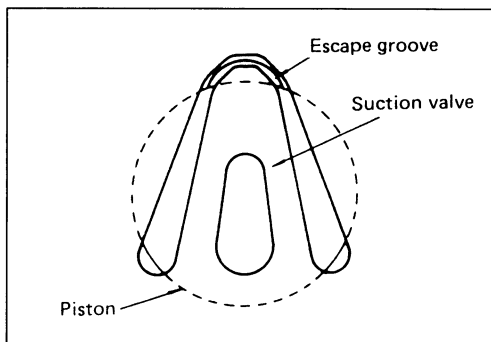
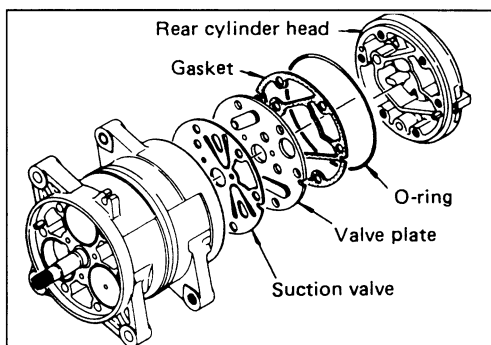
6. Rear Cylinder Head.

1) Apply a coat of new compressor oil to the new O-ring.

2) Install the O-ring to the rear cylinder head.

3) Install the rear cylinder head.

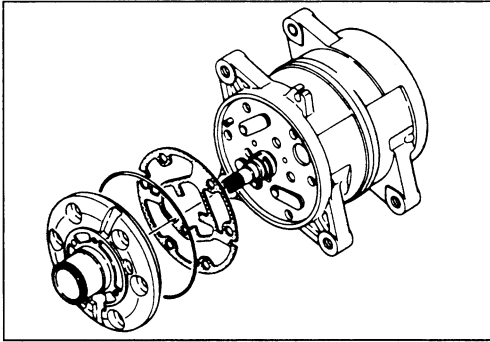
Tap the rear cylinder head into place with a plastic hammer.



7. Front Suction Valve

Set the cylinder shaft assembly with the front side facing up.

Install the suction valve by aligning it with the spring pin and the cylinder valve relief grooves.

**8. Front Valve Plate**

Install the valve plate to the suction valve by aligning it with the spring pin.

Note:

Do not mix up the front and rear valve plates.

**9. Gasket**

Apply new compressor oil to the new gasket.



Install the gasket to the valve plate by aligning it with the spring pin.

**10. O-ring****11. Front Cylinder Head**

Apply a coat of new compressor oil to the new O-ring.

Install the O-ring to the front cylinder head.

Install the front cylinder head.

Tap the front cylinder head into place with a plastic hammer.

**Note:**

When installing the cylinder head, be careful that the end of the drive shaft does not damage the shaft seal assembly surface in the cylinder head.

12. Through Bolt with Gasket

Gaskets cannot be reused. Always replace new ones.

Tighten the bolts to the specified torque a little at a time in the sequence shown in the illustration.



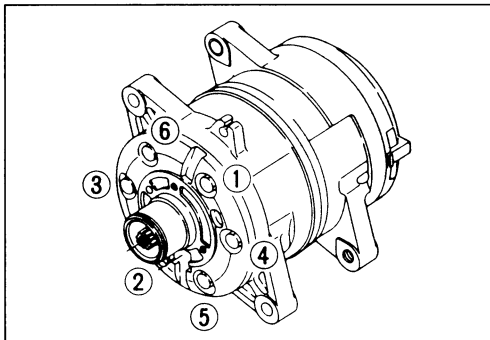
Through Bolt Torque

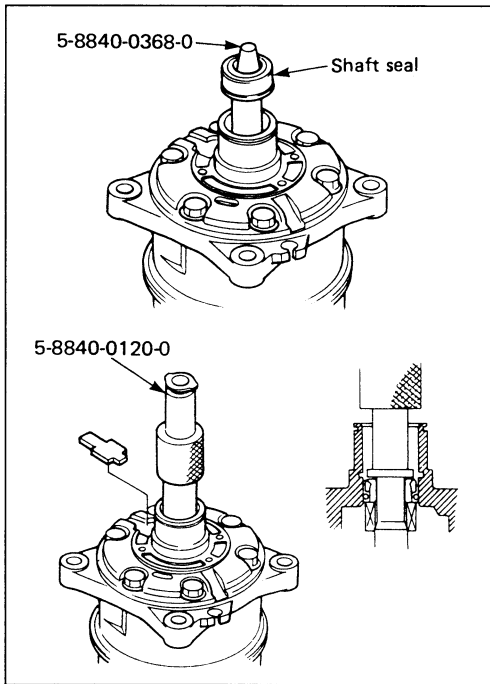
N·m (kg·m / lb·ft)

22 (2.2 / 16)



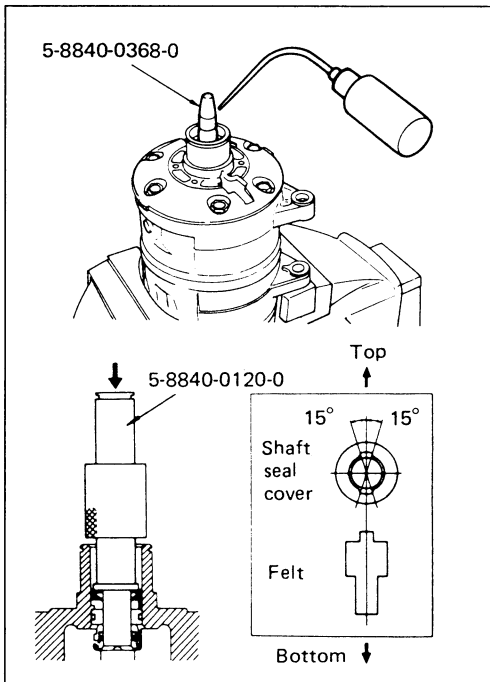
Rotate the compressor drive shaft two or three times to make sure that it moves smoothly.





13. Shaft Seal Assembly

- 1) Clean the sealing portion of the compressor and shaft seal.
- 2) Install the shaft seal guide onto the end of the drive shaft.
- 3) Shaft Seal Guide: 5-8840-0368-0 (J-34614)
- 4) Apply new compressor oil to the shaft seal guide.
- 5) Install the shaft seal onto the compressor drive shaft head by using shaft seal installer.
Shaft Seal Installer: 5-8840-0120-0 (J-33942)



15. Shaft Seal Cover (If so equipped)

16. Felt (If so equipped)

Clean the sealing portion of the compressor and shaft seal cover.

Install the shaft seal guide onto the end of the drive shaft.

Shaft Seal Guide: 5-8840-0368-0 (J-34614)

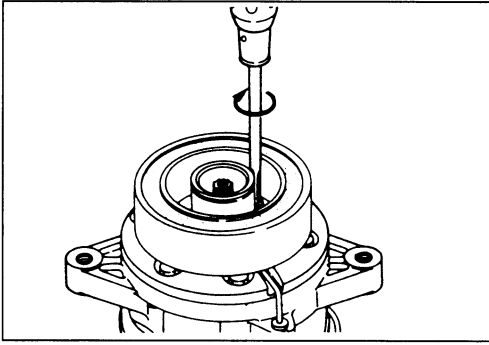
Apply new compressor oil to the shaft seal guide.

Install the shaft seal cover onto the drive shaft by using shaft seal installer.

The installation position of the shaft seal cover is shown in the illustration.

Shaft Seal Installer: 5-8840-0120-0 (J-33942)





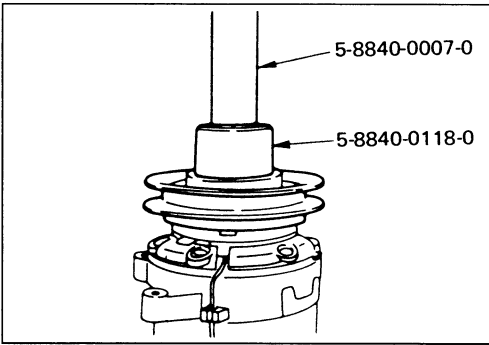
17. Field Coil

18. Lead Wire Connector

Install the field coil to the compressor.
Lead wire must be facing up.

Tighten the field coil fixing screws to the specified torque.

Torque kg·m (lb·ft / N·m)	0.5 (3.6 / 5.0)
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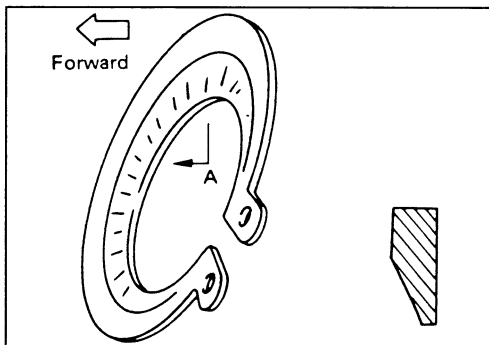


19. Pulley Assembly

Using pulley installer and drive handle to install the pulley assembly.

Pulley Installer: 5-8840-0118-0 (J-33940)

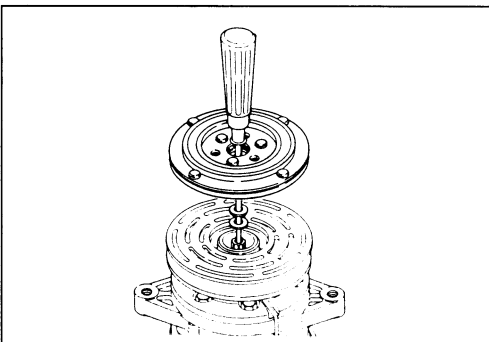
Drive Handle: 5-8840-0007-0 (J-8092)



20. Cover (If so equipped)

21. Snap Ring

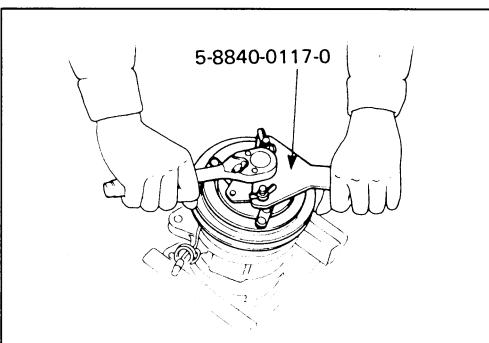
Install the snap ring with the inside indented portion facing out.



22. Shim(s)

23. Drive Plate

Install the drive plate to the compressor drive shaft together with the original shim(s).
Press the drive plate by hand.



24. Drive Plate Bolt

Using drive plate holder to prevent the drive plate from rotating.

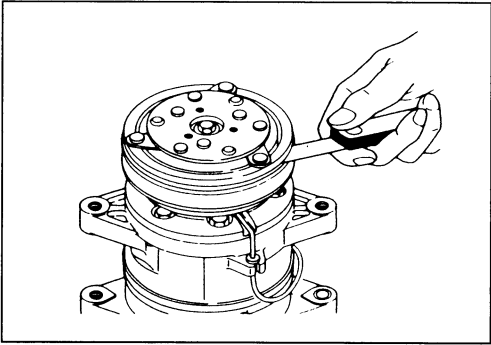
Drive Plate Holder: 5-8840-0117-0 (J-33939)

Tighten the bolt to the specified torque.

Torque kg·m (lb·ft / N·m)	1.5 (11 / 15)
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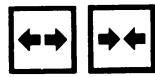


After tightening the bolt, check to be sure the pulley rotates smoothly.

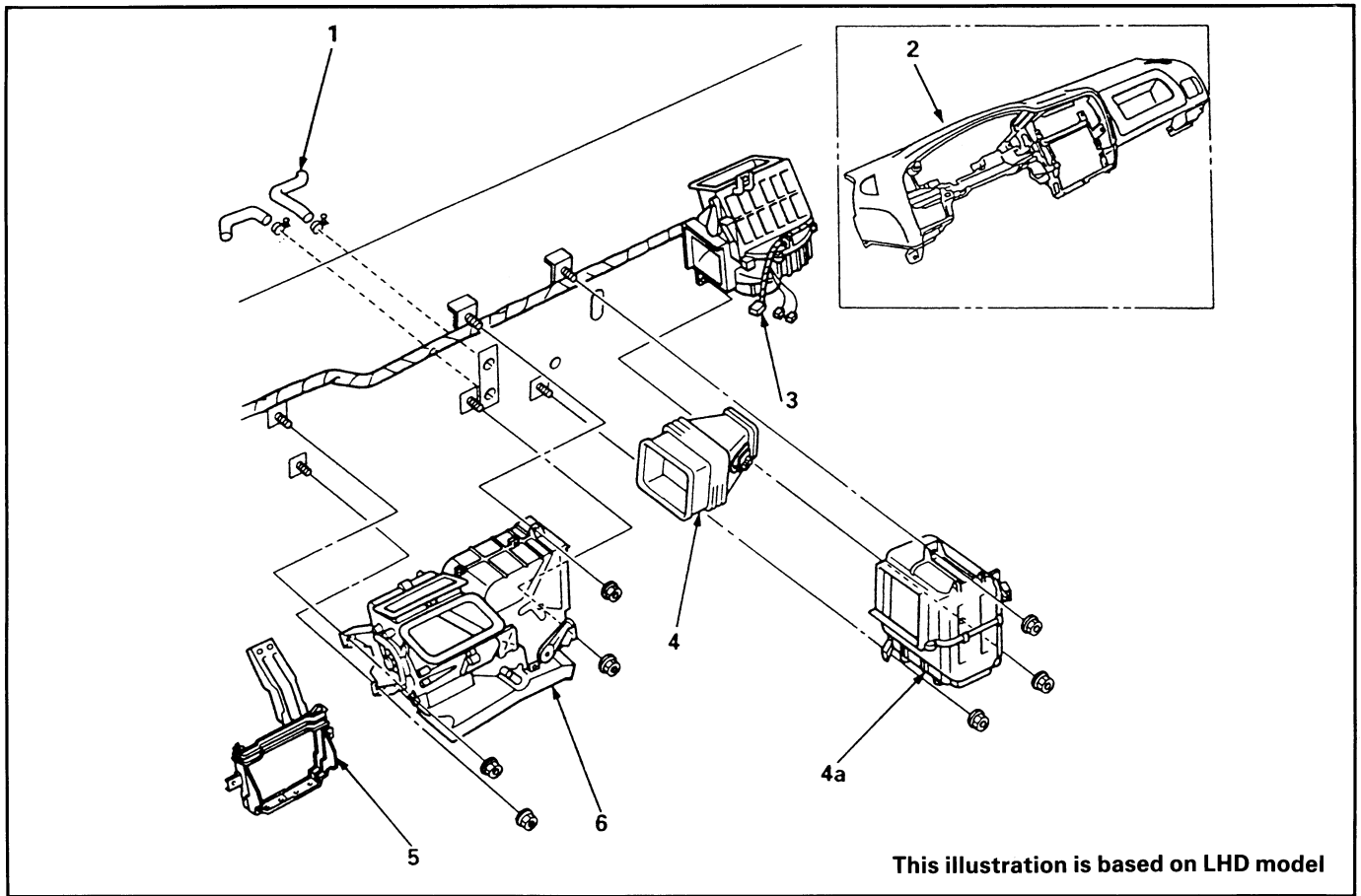


Check to be sure that the clutch clearance is between 0.3 – 0.6 mm (0.01 – 0.02 in).
If necessary, install adjusting shim(s).
Adjusting shims are available in the following thickness.

Thickness	0.1 mm (0.0039 in)
	0.3 mm (0.0118 in)
	0.5 mm (0.0197 in)



HEATER UNIT REMOVAL AND INSTALLATION

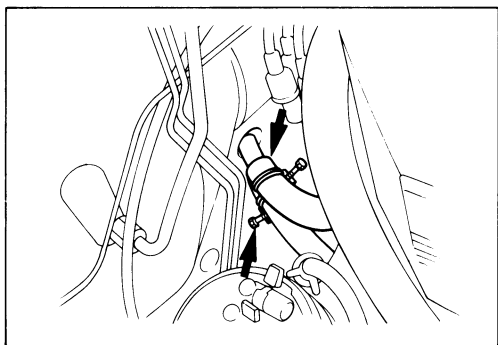


Removal Steps

- ▲ 1. Heater hose
- ▲ 2. Instrument panel assembly
- 3. Resistor connector
- 4. Duct
- 4a. Evaporator (A/C only)
- 5. Instrument panel stay
- 6. Heater unit

Installation steps

- 6. Heater unit
- 5. Instrument panel stay
- 4a. Evaporator (A/C only)
- 4. Duct
- 3. Resistor connector
- ▲ 2. Instrument panel assembly
- 1. Heater hose



Important Operations—Removal

1. Heater Hose

Disconnect the heater hoses at heater unit.

Place the drain pan under the vehicle.

2. Instrument Panel Assembly

Refer to section 2D "BODY" for instrument panel removal procedure.



Important Operation—Installation



2. Instrument Panel Assembly

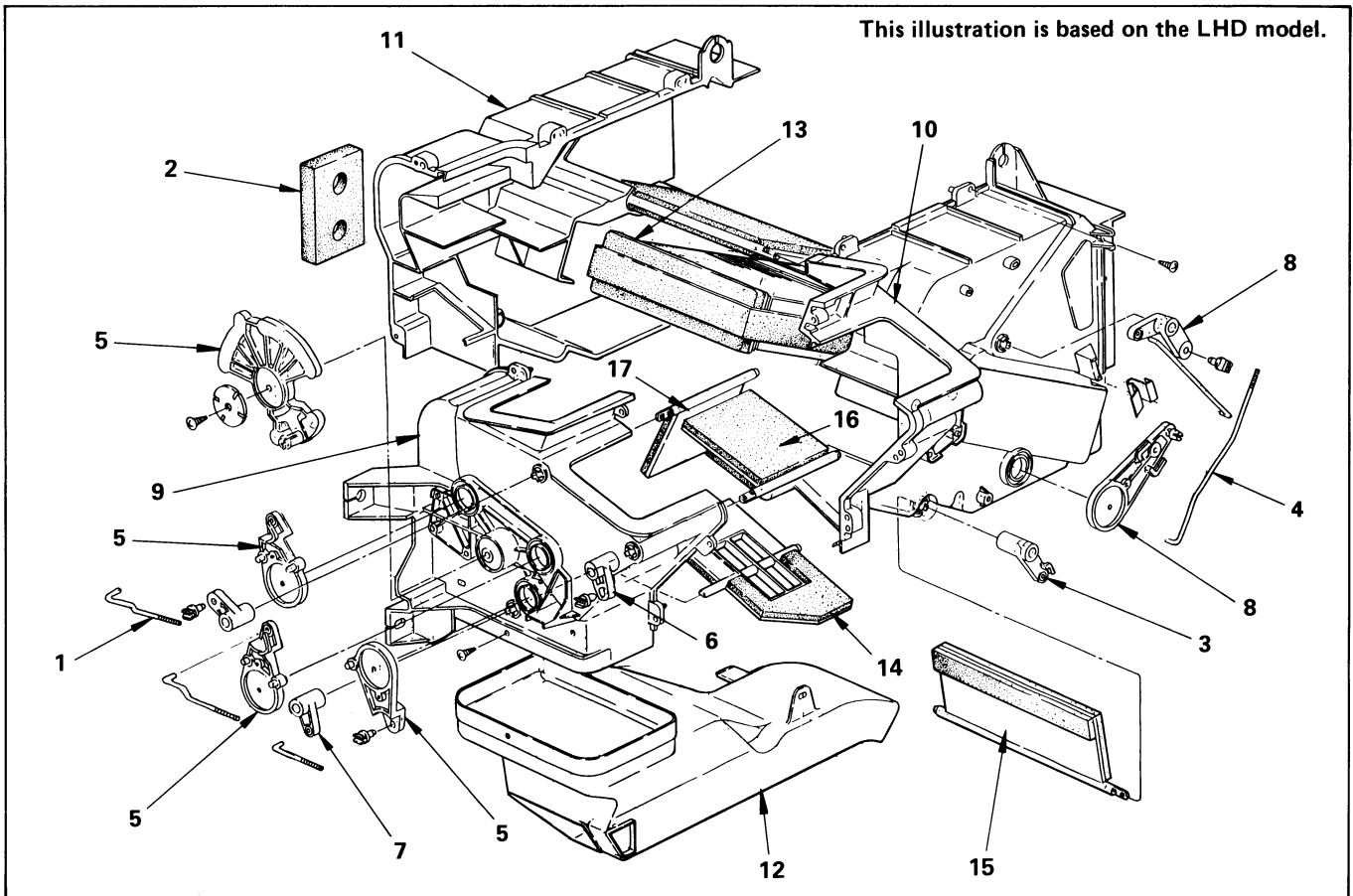
Adjust the heater control cables.

Refer to "CONTROL LEVER ASSEMBLY" in this section.



DISASSEMBLY AND REASSEMBLY

This illustration is based on the LHD model.



Disassembly Steps

1. Rod and lever; defroster door
2. Plate and seal
3. Lever; mix door
4. Link; main mode control
5. Relay link
6. Lever; vent door
7. Lever; heater door
8. Relay link mix door
9. Case; LH
10. Case; RH
11. Case; back
12. Duct
13. Core assembly
14. Door; heat foot
15. Door; heat mix
16. Door; side vent
17. Door; defroster

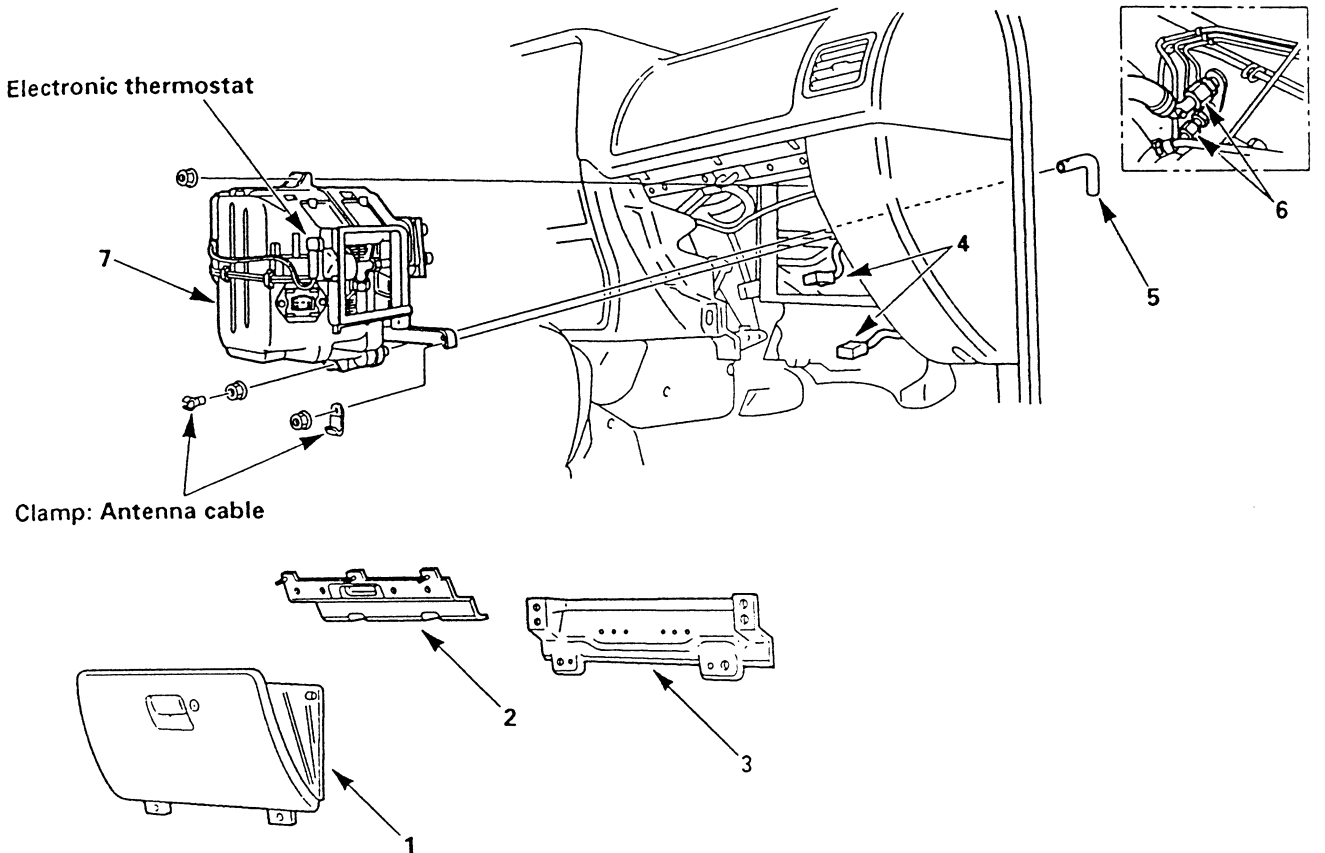
Reassembly Steps

To reassemble, follow the disassembly procedure in reverse order.



EVAPORATOR REMOVAL AND INSTALLATION

This illustration is based on LHD model



Removal Steps

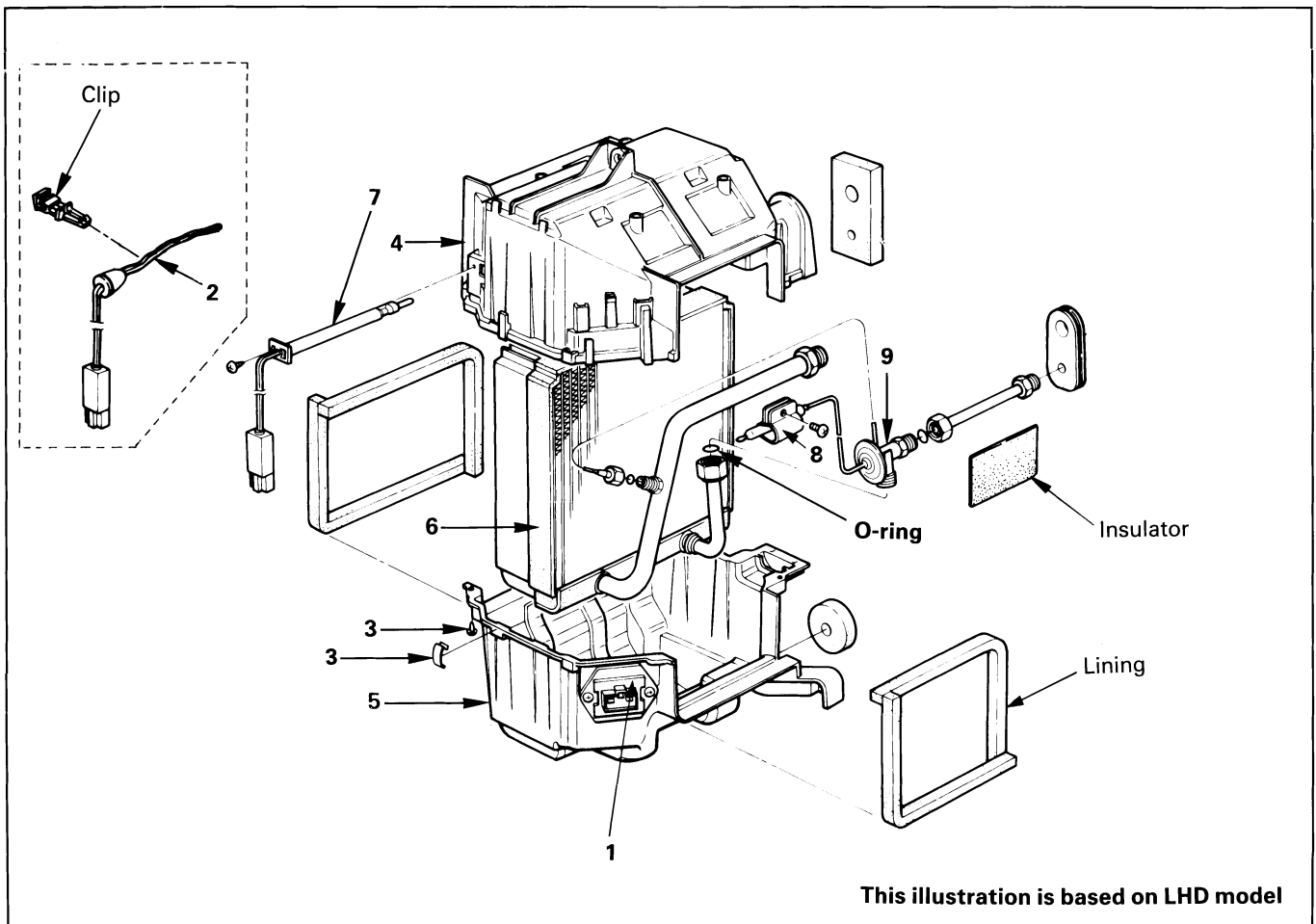
1. Glove box
2. Glove box cover
3. Passenger knee bolster reinforcement
4. Resistor and electronic thermostat connector
5. Drain hose
6. Refrigerant line
7. Evaporator assembly

Installation Steps

To install, follow the removal procedure in reverse order.



DISASSEMBLY AND REASSEMBLY

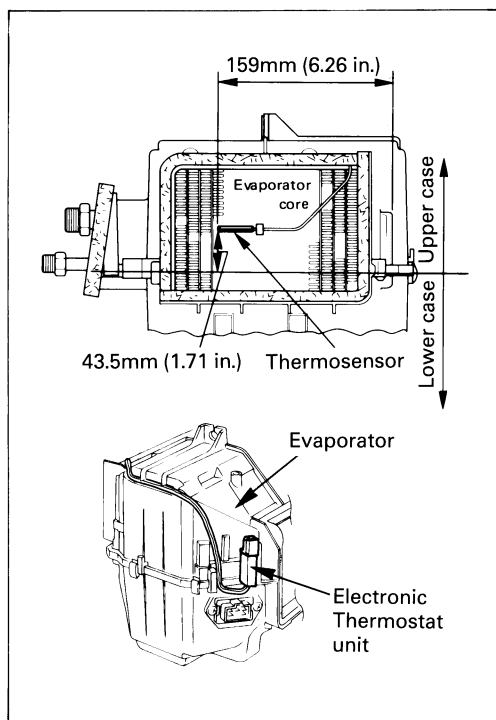


Disassembly Steps

1. Resistor
2. Electronic thermostat (Clip type)
3. Attaching parts
4. Case; upper
5. Case; lower
6. Core assembly
7. Electronic thermostat (Bracket type)
8. Clip; sensing tube
9. Expansion valve assembly

Reassembly Steps

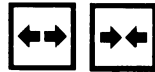
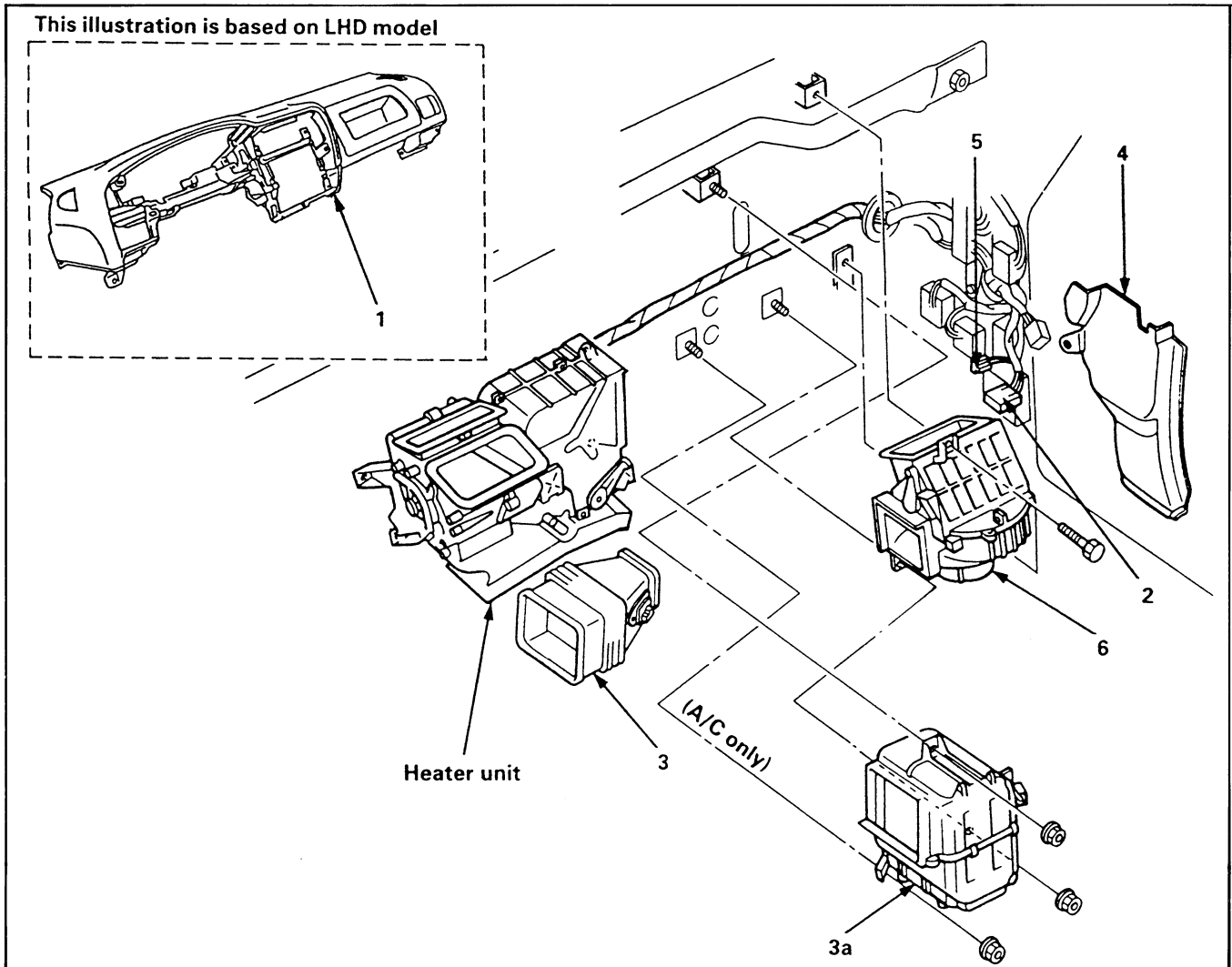
9. Expansion valve assembly
8. Clip; sensing tube
7. Electronic thermostat (Bracket type)
6. Core assembly
5. Case; lower
4. Case; upper
3. Attaching parts
- ▲ 2. Electronic thermostat (Clip type)
1. Resistor



Important Operation — Reassembly

2. Electronic Thermostat (Clip type)

- 1) Install the electronic thermostat to the evaporator core specified position with the clip.
- 2) Thermostat sensor must not interfere with the evaporator core.

BLOWER UNIT ASSEMBLY**REMOVAL AND INSTALLATION****Removal Steps**

1. Instrument panel assembly
2. Resistor connector
3. Duct
- 3a. Evaporator (A/C only)
4. Dash side trim panel
5. Blower motor connector
6. Blower unit assembly

Installation Steps

6. Blower unit assembly
5. Blower motor connector
4. Dash side trim panel
- 3a. Evaporator (A/C only)
3. Duct
2. Resistor connector
- ▲ 1. Instrument panel assembly



Important Operation—Installation



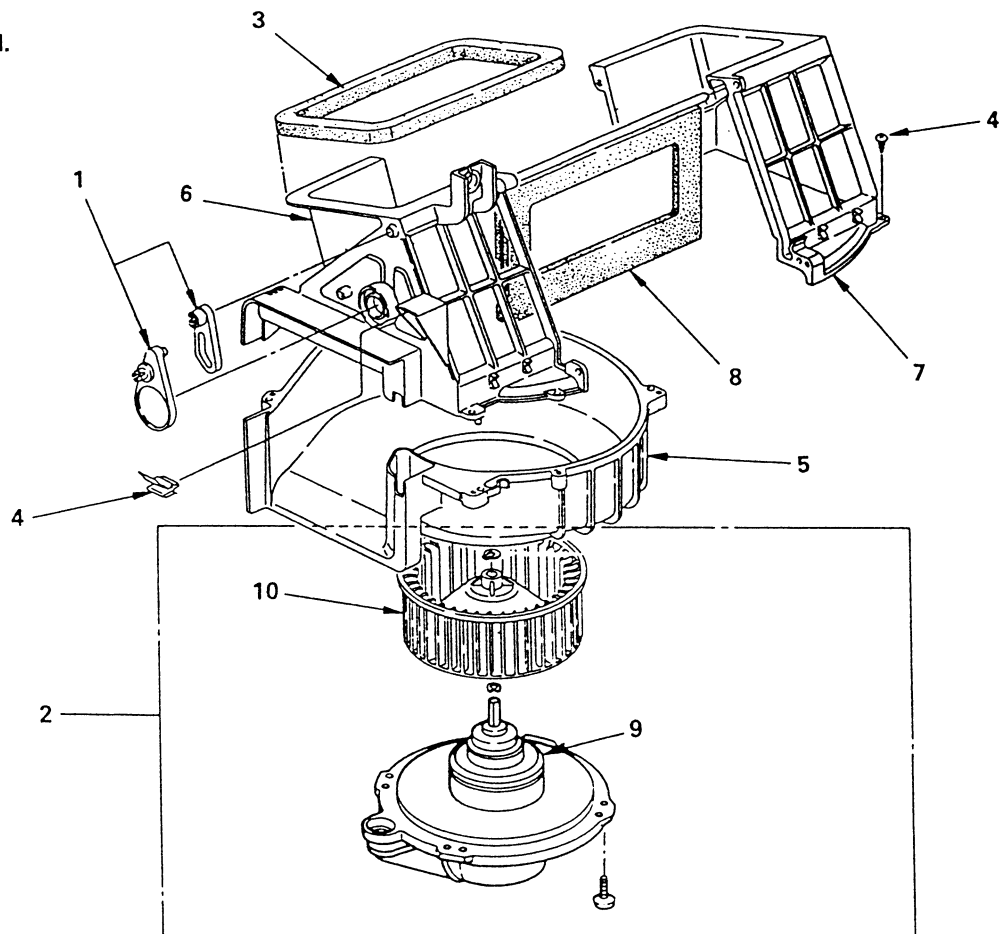
1. Instrument Panel Assembly

Adjust the blower control cable.
Refer to "CONTROL LEVER ASSEMBLY" in this section.



DISASSEMBLY AND REASSEMBLY

This illustration is based on the LHD model.



Disassembly Steps

1. Lever; door
2. Blower motor assembly
3. Seal
4. Attaching parts
5. Case; lower
6. Case; LH
7. Case; RH
8. Door, blower unit
9. Fan; blower motor
10. Blower motor

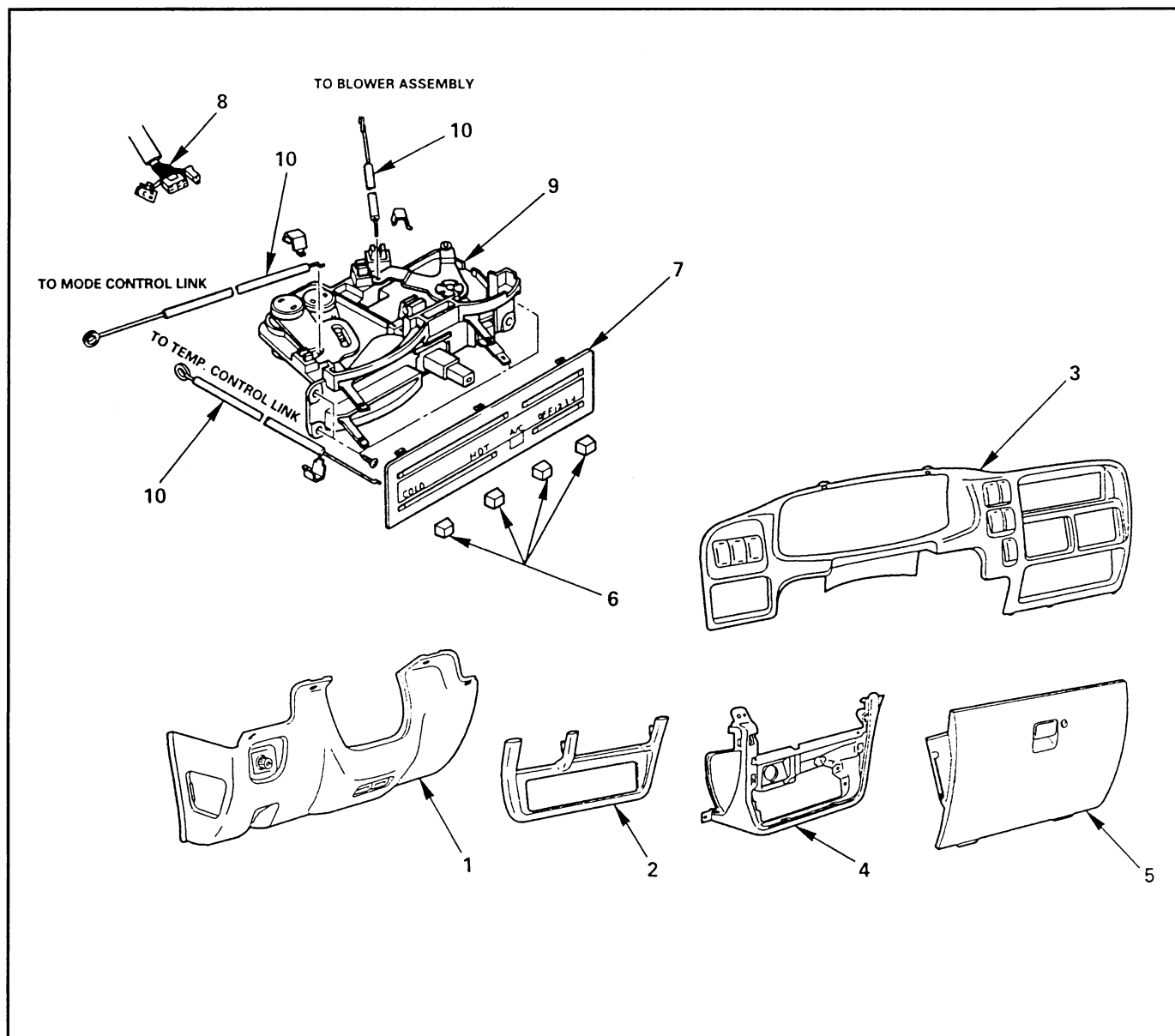
Reassembly Steps

10. Blower motor
9. Fan; blower motor
8. Door, blower unit
7. Case; RH
6. Case; LH
5. Case; lower
4. Attaching parts
3. Seal
2. Blower motor assembly
1. Lever; door

CONTROL LEVER ASSEMBLY



REMOVAL AND INSTALLATION

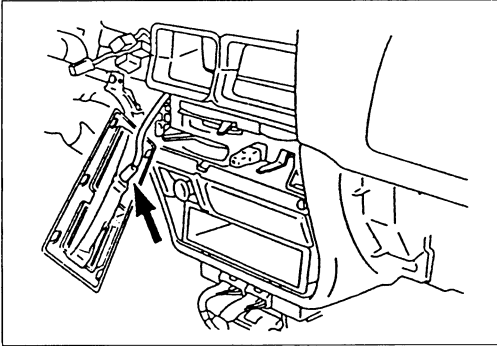


Removal Steps

1. Instrument panel driver lower cover assembly
2. Lower cluster assembly
3. Meter cluster assembly
4. Instrument panel lower center cover assembly
5. Glove box
6. Knobs
- ▲ 7. Heater bezel
- ▲ 8. Fan control lever and / or A/C switch connector
9. Control lever assembly
- ▲ 10. Cables

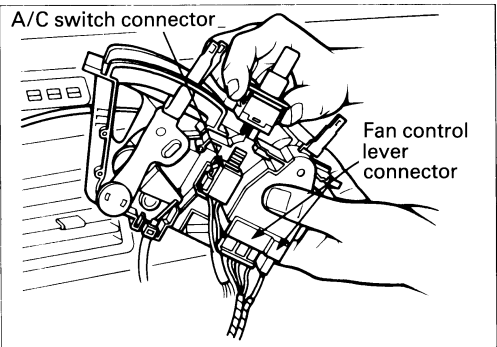
Installation Steps

10. Cables
9. Control lever assembly
8. Fan control lever and / or A/C switch connector
7. Heater bezel
- ▲ 6. Knobs
5. Glove box
4. Instrument panel lower center cover assembly
3. Meter cluster assembly
2. Lower cluster assembly
1. Instrument panel driver lower cover assembly



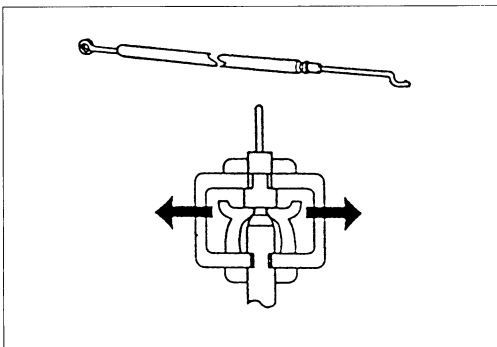
Important Operation—Removal

7. Heater Bezel

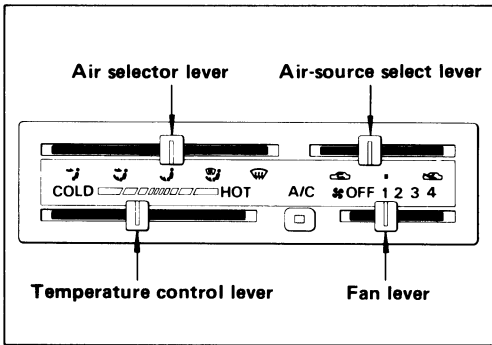
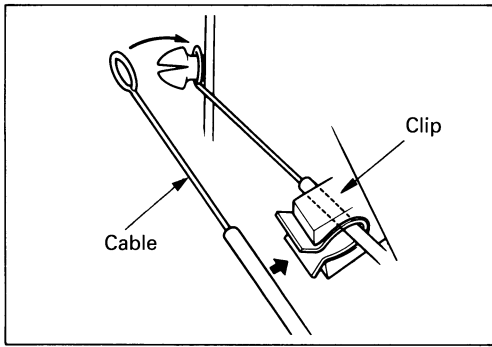


8. Fan and A/C Switch Connector

Pull the control lever assembly out and disconnect the connectors.



10. Cables



Important Operation—Installation



6. Control Lever Assembly

Adjust the control cables.

Air source control cable (Blower unit)

- (1) Slide the control lever to the left.
- (2) Connect the control cable at the "CIRC" position and fix it with the clip.

Temperature control cable (Heater unit)

- (1) Slide the control lever to the left.
- (2) Connect the control cable at the "COLD" position and fix it with the clip.

Air select control cable (Heater unit)

- (1) Slide the control lever to the right.
- (2) Connect the control cable at the "DEFROST" position and fix it with the clip.

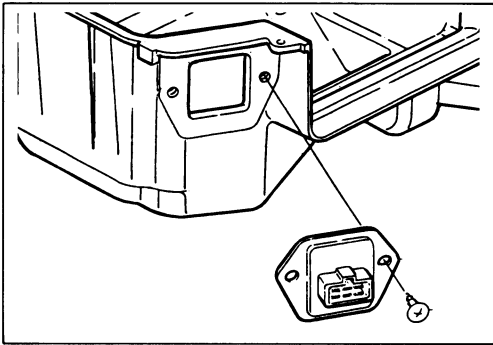


Check operation.

BEZEL	(AIR SELECTOR CABLE)	(TEMPERATURE CONTROL CABLE)	(AIR SOURCE SELECT CABLE)
LHD			
RHD			



INSPECTION AND REPAIR

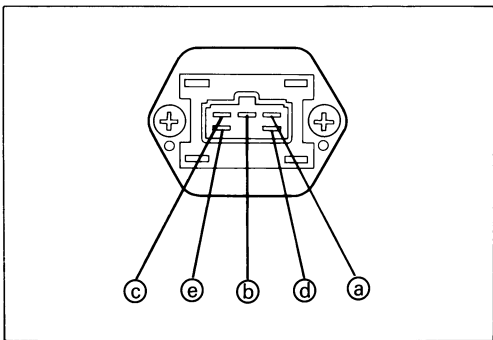


Resistor

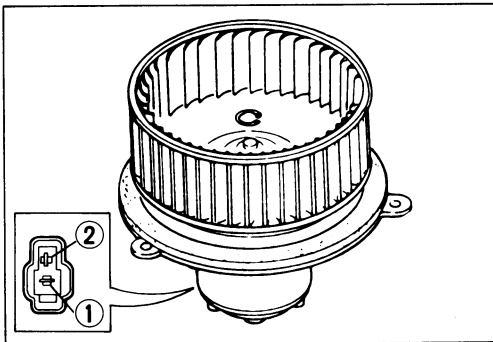
As for air-conditioning model, fixed on right side of the evaporator unit.

As for heater only model, fixed on right side of the duct placed between blower unit and heater unit.

Replace the resistor with a new one if the coil is found to be open or if the resistance value deviates from the specified range.



Terminal	Resistance
a — b	2.40 Ω
b — d	0.90 Ω
b — e	0.28 Ω
b — c	—

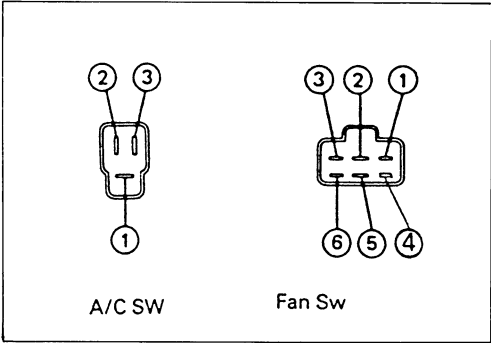


Blower motor

Check blower motor for smooth rotation.

Connect the battery positive terminal to the No.1 (No.2: RHD) terminal of the blower motor and negative to the No.2 (No.1: RHD).

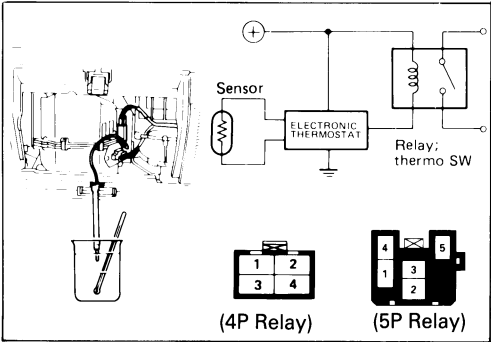
Be sure to check to see if the blower motor operates correctly.



Fan switch and A/C switch

Check for continuity between switch connector terminals.

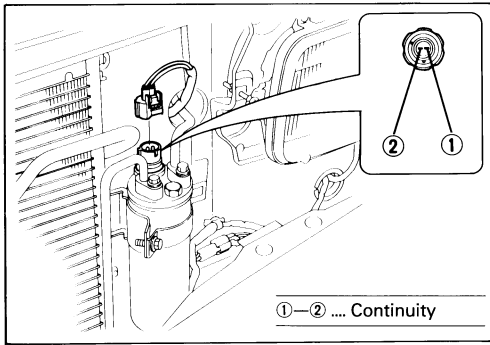
Connector No.		FAN SW						FAN SW		A/C SW		
		1	2	3	4	5	6	1	2	1	2	3
SW Position												
Blower motor	OFF											
	1	○	○		○							
	2	○	○			○						
	3	○	○				○					
A/C	OFF										○	○
	ON									○	○	○



Thermo switch

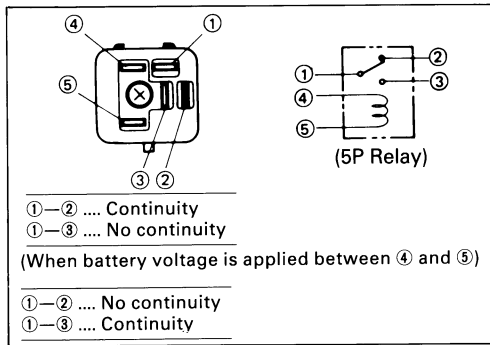
- (1) Remove the thermosensor from the evaporator.
- (2) A/C is "ON".
- (3) Set the atmospheric temperature of the thermosensor to the following condition.
- (4) Confirm that the thermo switch relay is activated when the condition is met.

Ambient Temperature	Thermo switch relay
Below $3.5 \pm 0.5^{\circ}\text{C}$ ($38.3 \pm 0.9^{\circ}\text{F}$)	OFF
Above $5.0 \pm 0.5^{\circ}\text{C}$ ($41.0 \pm 0.9^{\circ}\text{F}$)	ON



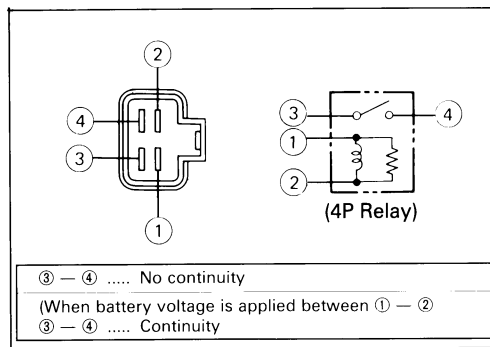
Pressure switch

Check for continuity between pressure switch side connector terminals.



Heater and thermo switch relay.

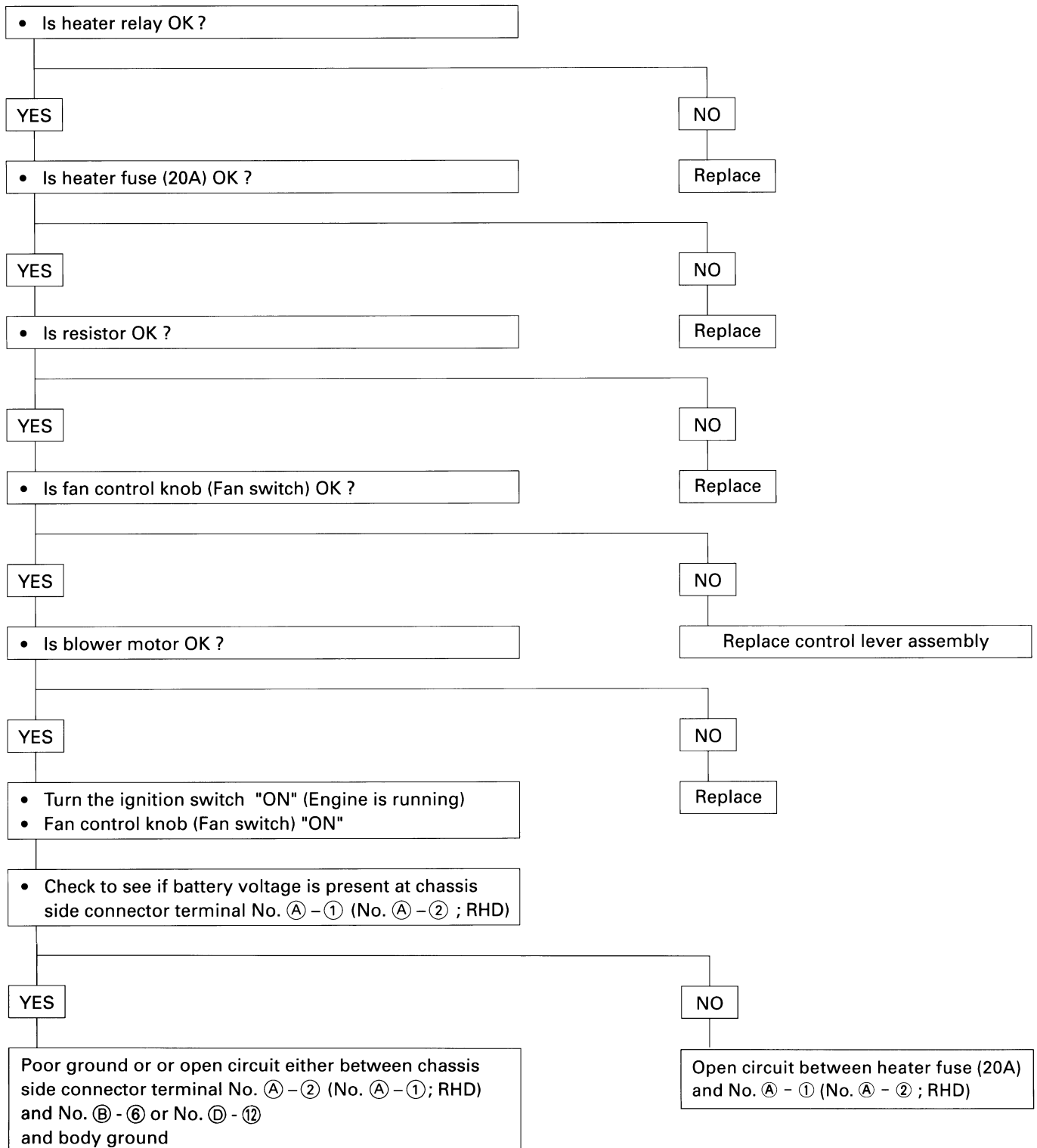
Check for continuity between relay side connector terminals.



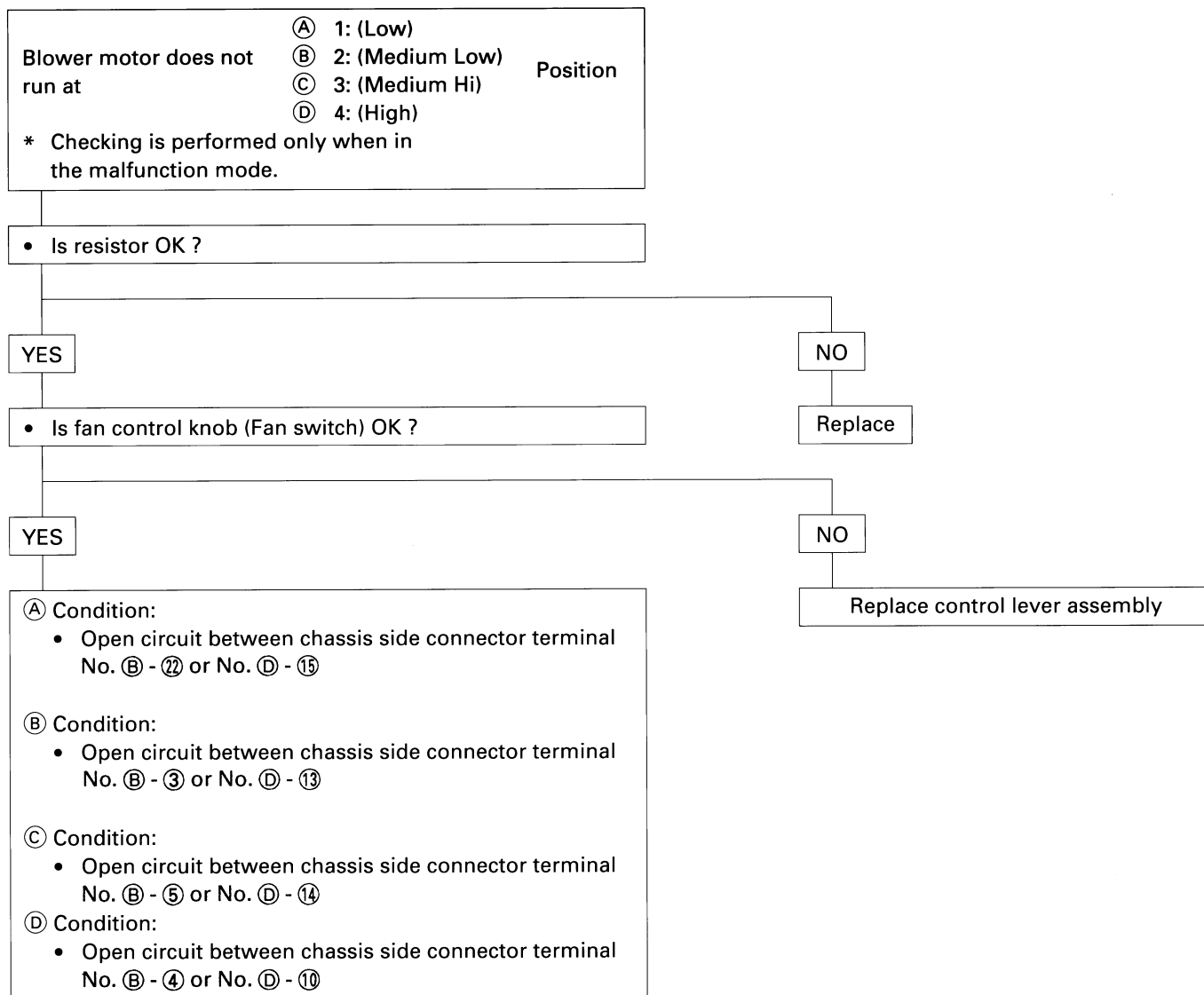
TROUBLESHOOTING

1. Trouble of Fan Control System
 - 1-A Blower motor would not rotate totally
 - 1-B Blower motor does not rotate in certain position
 - 1-C Blower motor does not stop at "OFF" position
2. Trouble of Air-Conditioning System
 - 2-A Magnetic clutch would not engage
 - 2-B Refrigeration system defective

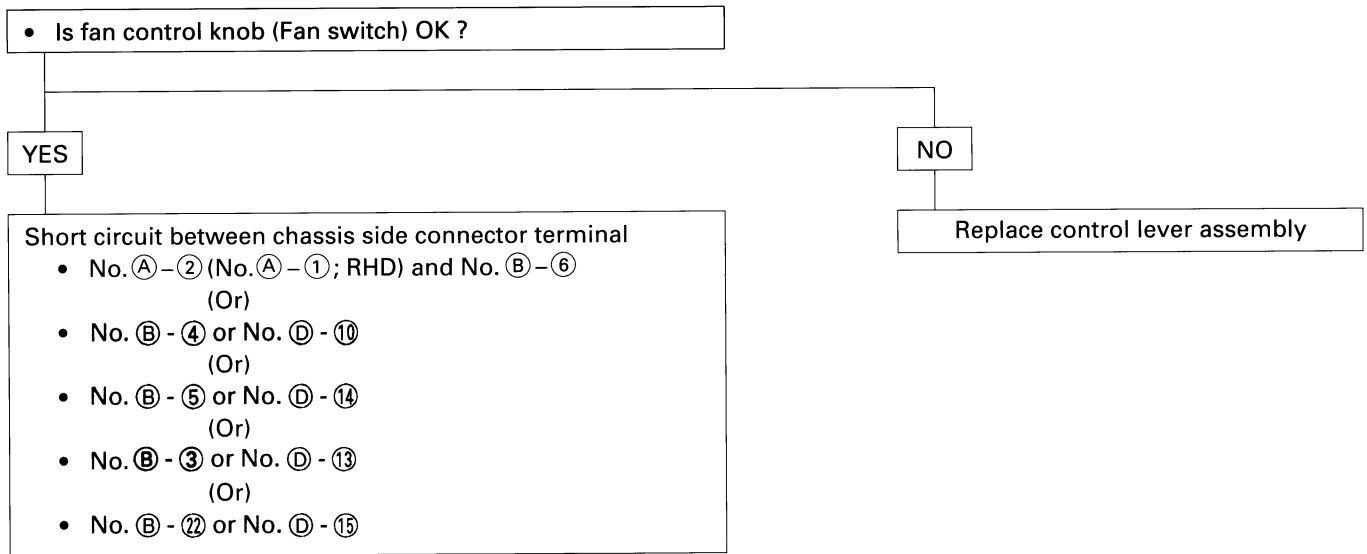
1-A BLOWER MOTOR WOULD NOT ROTATE TOTALLY (Refer to "WIRING HARNESS TERMINAL POSITIONS" in this section.)



1-B BLOWER MOTOR DOES NOT ROTATE IN CERTAIN POSITION **(Refer to "WIRING HARNESS TERMINAL POSITIONS" in this section.)**

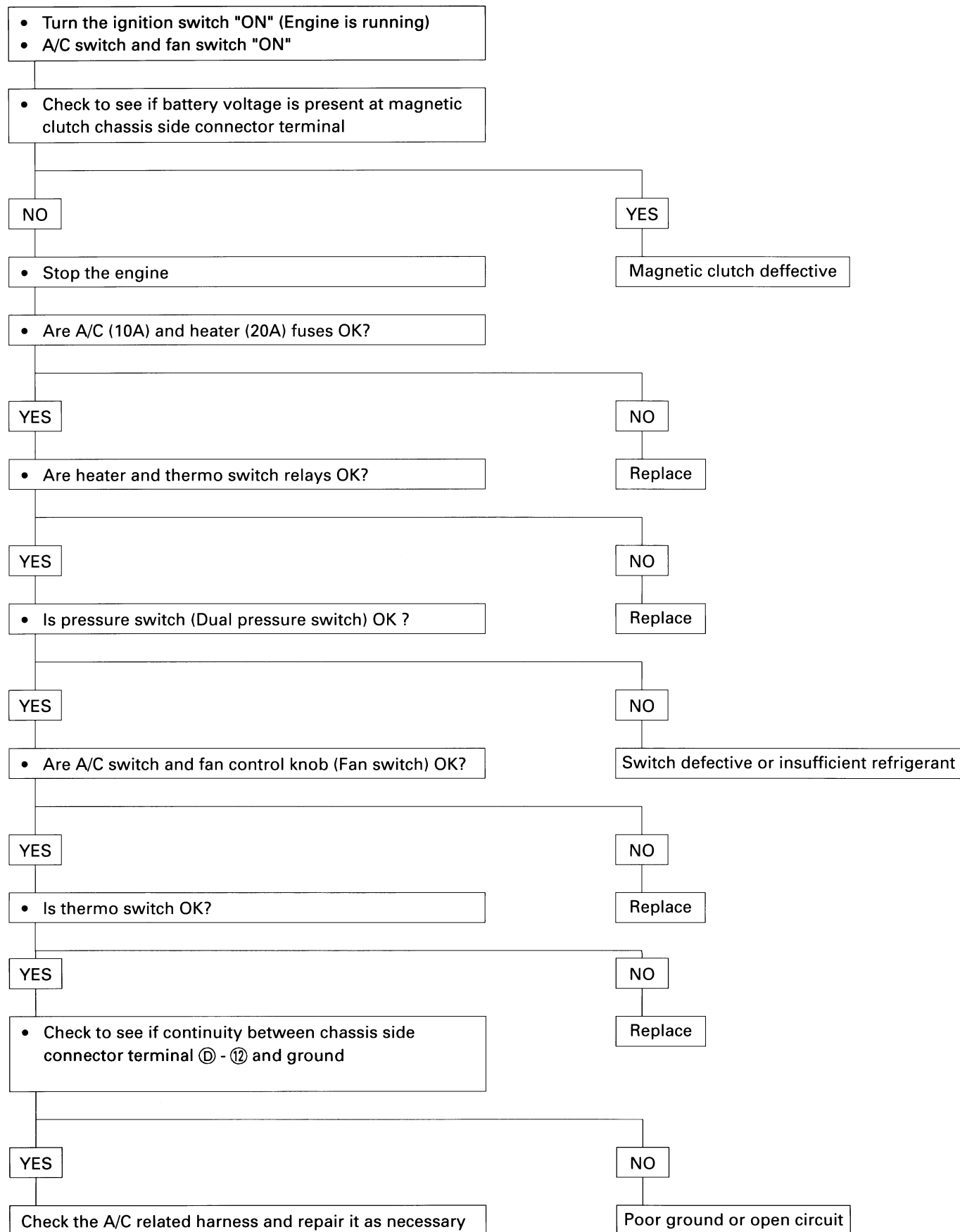


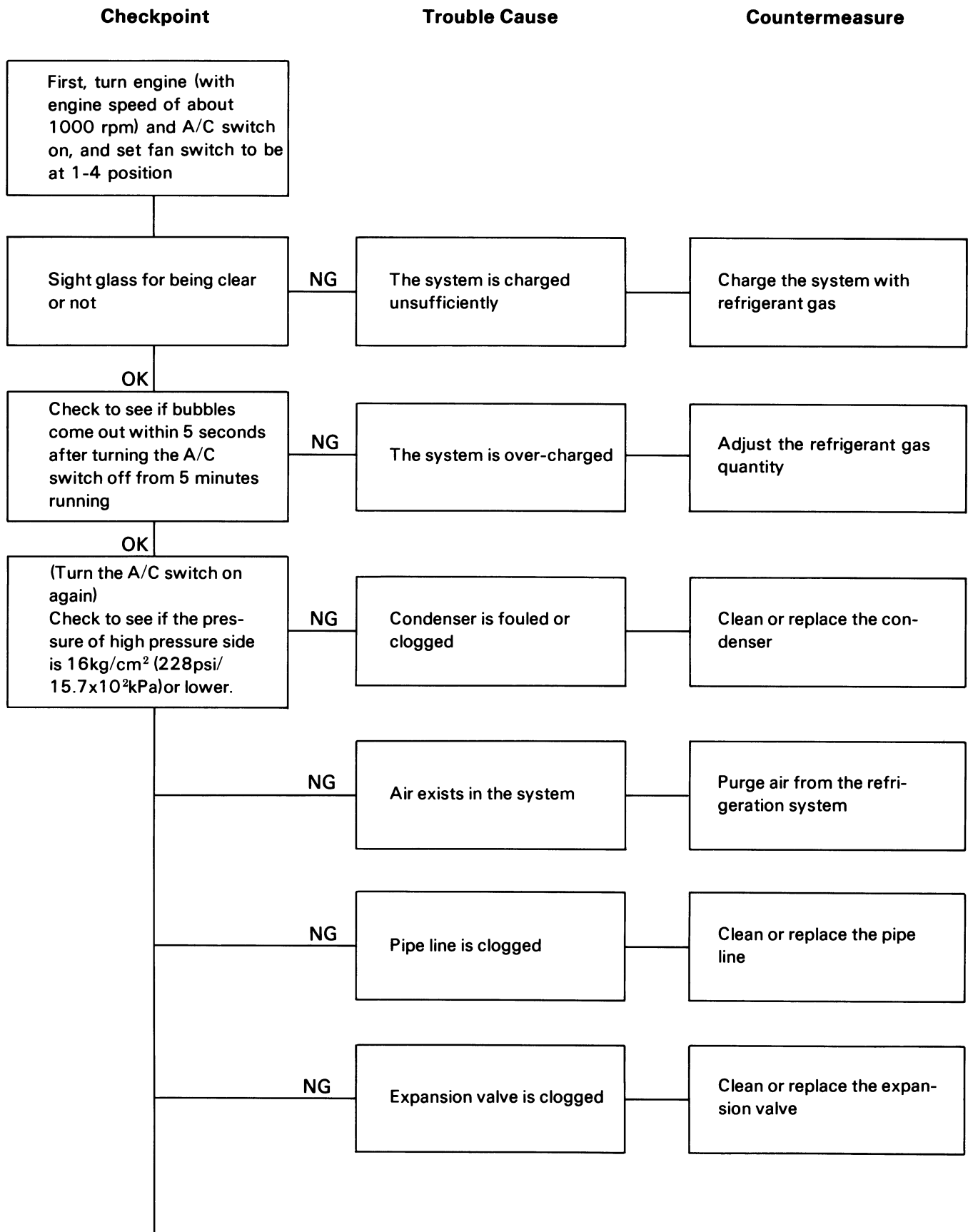
1-C BLOWER MOTOR DOES NOT STOP AT "OFF" POSITION (Refer to "WIRING HARNESS TERMINAL POSITIONS" in this section.)



2-A MAGNETIC CLUTCH WOULD NOT ENGAGE

(Refer to "WIRING HARNESS TERMINAL POSITIONS" in this section.)



2-B REFRIGERATION SYSTEM DEFECTIVE

Continued on the next page

Checkpoint		Trouble Cause	Countermeasure
Continued from the previous page			
OK			
Check to see if the pressure of low pressure side is about 2.1 kg/cm ² (30psi/ 2.1x10 ² kPa)	NG	Compressor is faulty	Repair or replace the compressor
	NG	Expansion valve is defective	Replace the expansion valve

