

SERVICE MANUAL

DATSUN 280Z
MODEL S30 SERIES



NISSAN MOTOR CO., LTD.
TOKYO, JAPAN

SECTION AC

AIR CONDITIONING

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AC

DESCRIPTION

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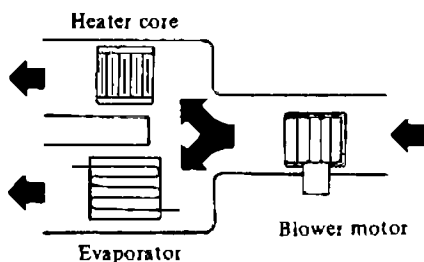
AIR FLOW AND VACUUM SYSTEM
AIR FLOW
VACUUM SYSTEM
ELECTRICAL CIRCUIT
BLOWER MOTOR OPERATION
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OUTLINE OF AIR CONDITIONER

The air conditioner is a combined unit of an evaporator, heater and blower and provides heating and cooling functions. In addition, it has bi-level and ventilation functions, enabling comfortable air conditioning at all seasons. Its control system consists of a mechanical system using cables and engine vacuum and electric system.

All units are housed in the dash panel, thereby assuring driving comfort.

The functional principle of this system is as shown in Figure AC-1.



AC227

Fig. AC-1 Principle of air flow

The component units of the air conditioner are installed in the engine room and passenger compartment; the compressor and condenser in the former and the unit comprising the evaporator, heater and blower and its control in the latter. The units in the passenger compartment are summarized as below:

Air intake housing

This housing is internally provided with an air intake door that takes in outside air.

Blower housing

The housing contains a blower motor, by which the air is blown to the heater and evaporator.

Evaporator housing

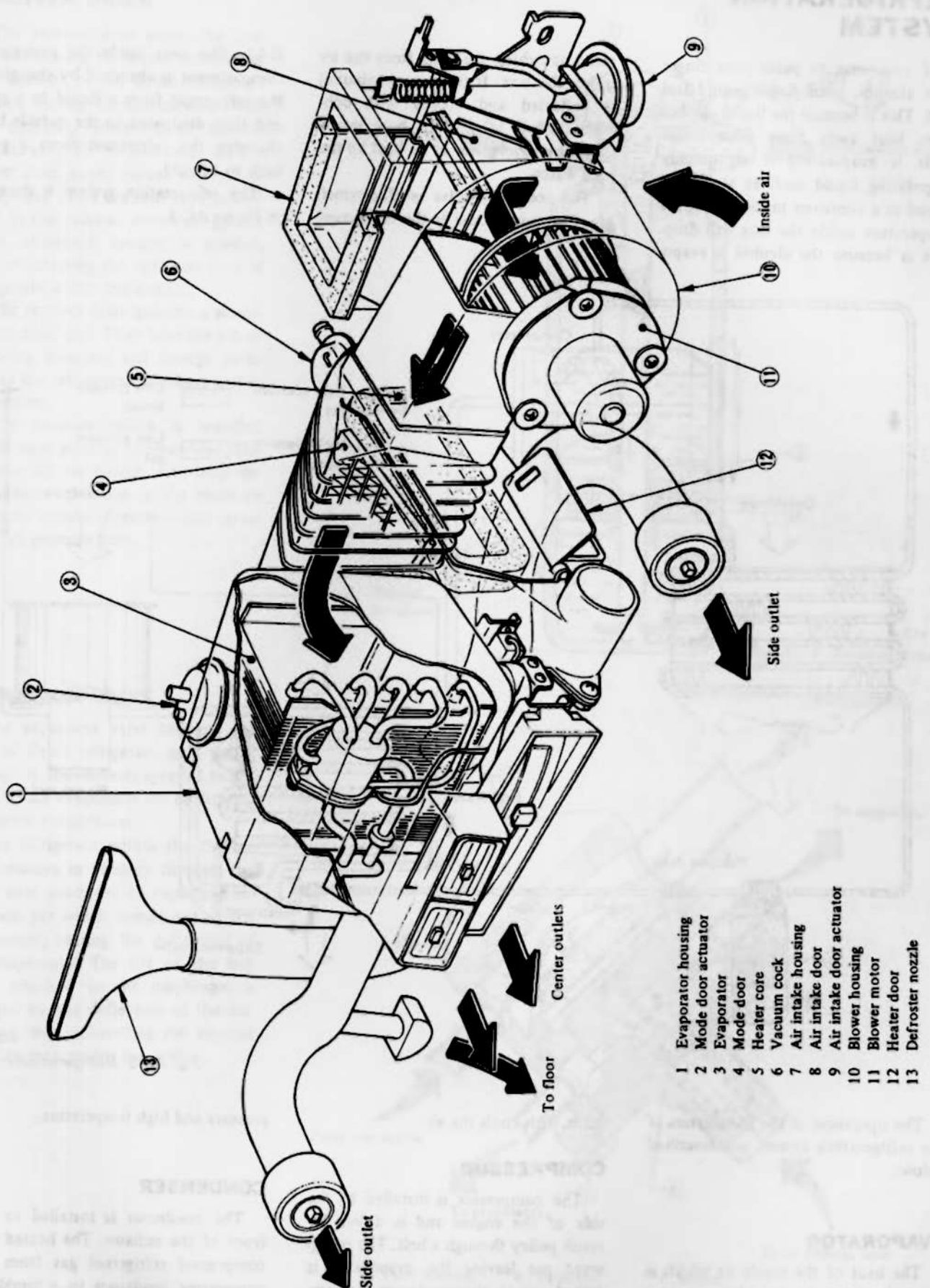
An evaporator is contained in this housing, which cools air passing through the fins with refrigerant circulating in the system.

Heater unit

A heater core is housed in the unit in which hot water from the engine runs to warm the air passing through the fins.

FEATURES

1. When the AIR lever is in the BI-LEVEL position, the mode door is set halfway between the full open and full close positions. Fresh air is drawn out from the outlets in the instrument panel and warm air from under the seats, thus providing ventilation and heating functions at the same time.
2. The mode door to divert air to the heater and the air intake door are opened or closed by means of the vacuum actuator.
3. The control of hot water to the heater is carried out by a vacuum-operating water cock and a water cock that controls the flow of hot water.
4. When the air conditioner is turned A/C, the temperature is adjusted automatically switching the compressor on or off by means of the thermostat.
5. The air conditioner can be operated with the fast idle control during idling.



AC779
 Fig. AC-2 Sectional view of air conditioner

REFRIGERATION SYSTEM

If you were to paint your finger with alcohol, your finger would feel cold. This is because the liquid alcohol takes heat away from your finger while it evaporates. If an quickly evaporating liquid such as alcohol is placed in a container inside a box, the temperature inside the box will drop. This is because the alcohol is evapo-

rated absorbing the heat from the air inside the box. If the gaseous alcohol is collected and cooled with cold water, it will be changed back into a liquid by absorption of its heat by the cold water.

The cooler operates on this principle. The liquid used is the refrigerant

R-12. The heat inside the passenger compartment is absorbed by the refrigerant from a liquid and then dissipated to the outside air by changing the refrigerant from a liquid back to a liquid.

The refrigeration system is shown in Figure AC-3.

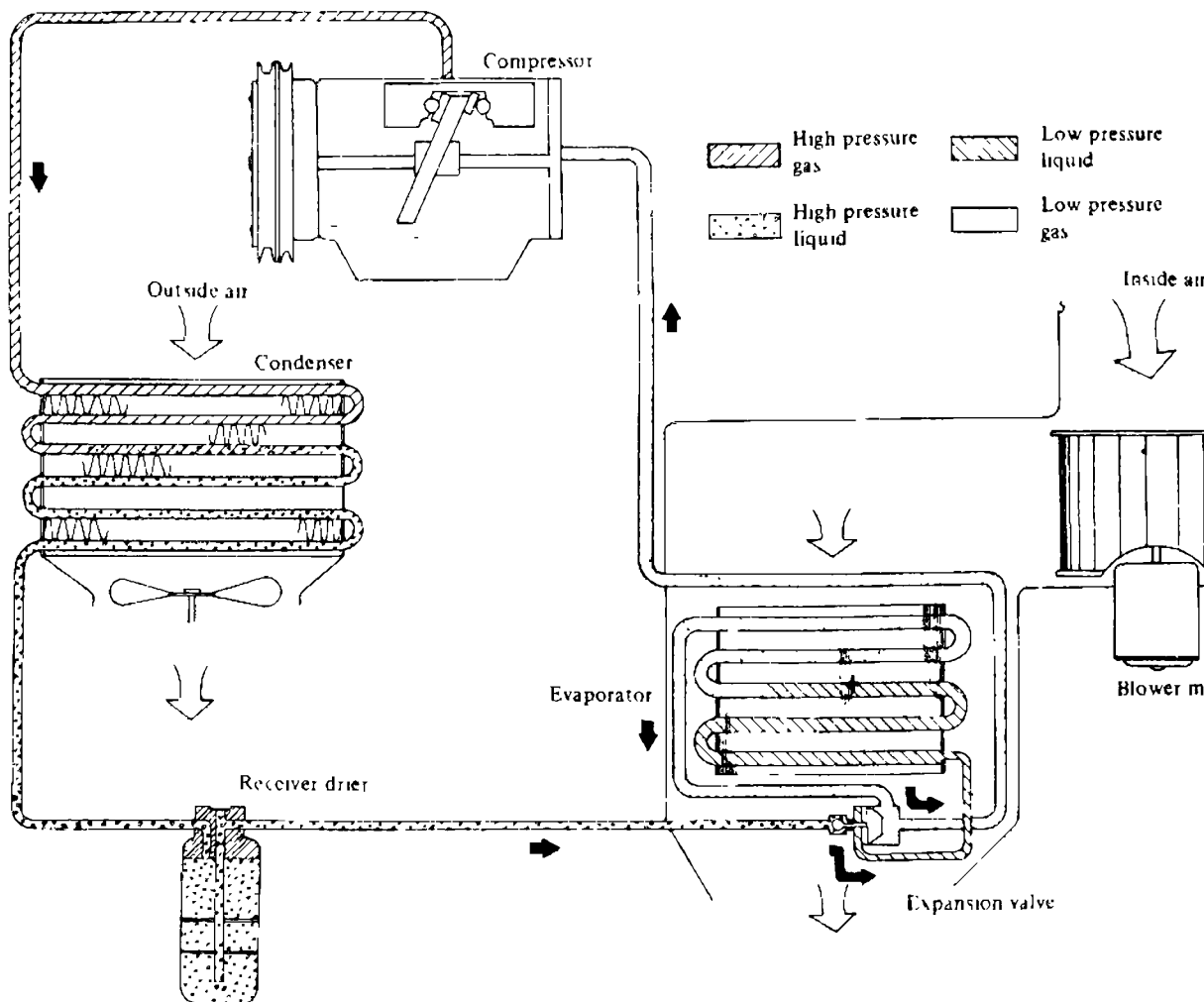


Fig. AC-3 Refrigeration

The operation of the five devices of the refrigeration system are described below.

EVAPORATOR

The heat of the inside air which is

rator. This cools the air.

COMPRESSOR

The compressor is installed to the side of the engine and is driven by crank pulley through a belt. The refrigerant gas leaving the evaporator is

pressure and high temperature

CONDENSER

The condenser is installed in front of the radiator. The high pressure compressed refrigerant gas

RECEIVER DRIER

The receiver drier serves the purpose of storing the liquid refrigerant. The amount of the liquid refrigerant flowing through the system varies with the operating condition of the air conditioner. To be accurate, the receiver drier stores excess amount of refrigerant when the heat load is lowered. It also releases stored refrigerant when additional cooling is needed, thus maintaining the optimum flow of refrigerant within the system.

The receiver drier includes a strainer and desiccant. They have the job of removing moisture and foreign particles as the refrigerant circulates within the system.

The pressure switch is installed beside sight glass of receiver drier. The purpose of the switch is to stop the compressor operation in the event an excessive system pressure builds up on the high pressure lines.

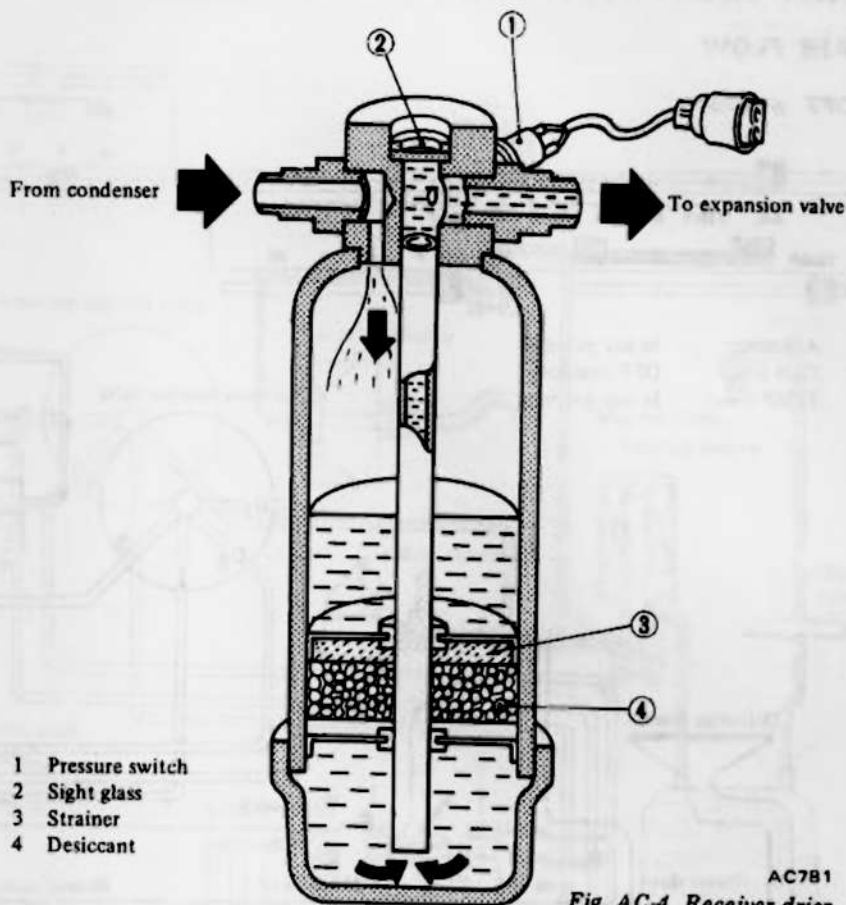


Fig. AC-4 Receiver drier

EXPANSION VALVE

The expansion valve restricts the flow of liquid refrigerant as it passes through it and delivers sprayed refrigerant to the evaporator for facilitating refrigerant evaporation.

The refrigerant within the thermo bulb changes in pressure through the super heat condition of vaporized refrigerant gas which comes out of the evaporator, causing the deflection of the diaphragm. The lift of the ball valve attached to the diaphragm is changed by the deflection of the diaphragm, thus controlling the amount of refrigerant passing the orifice.

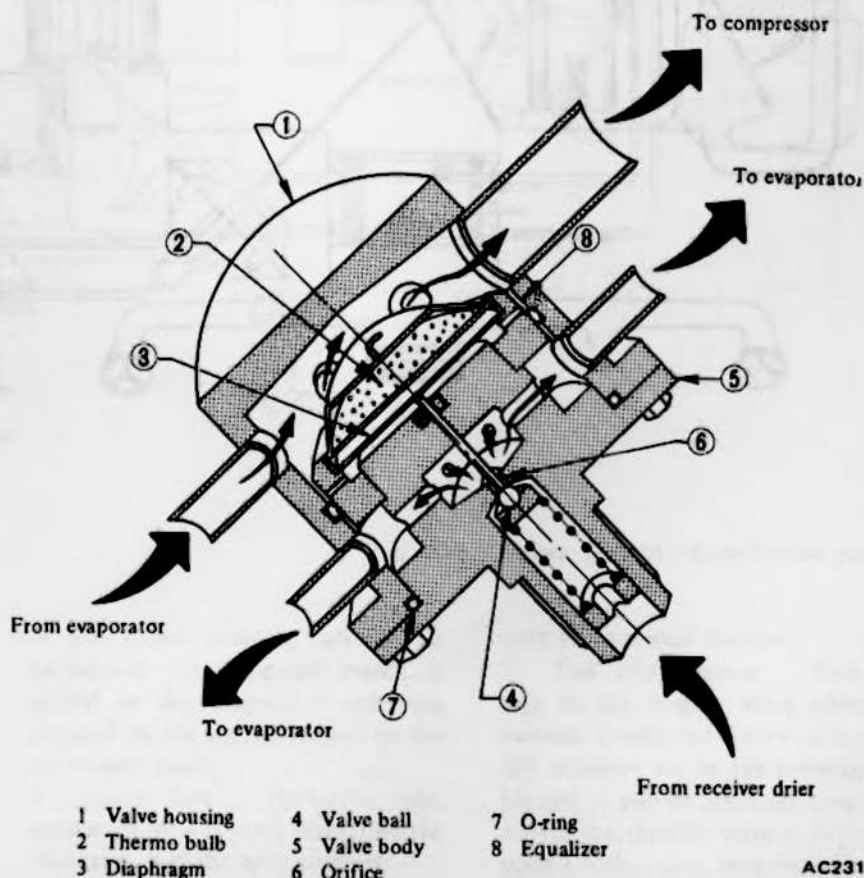


Fig. AC-5 Expansion valve

AIR FLOW AND VACUUM SYSTEM

AIR FLOW

OFF position

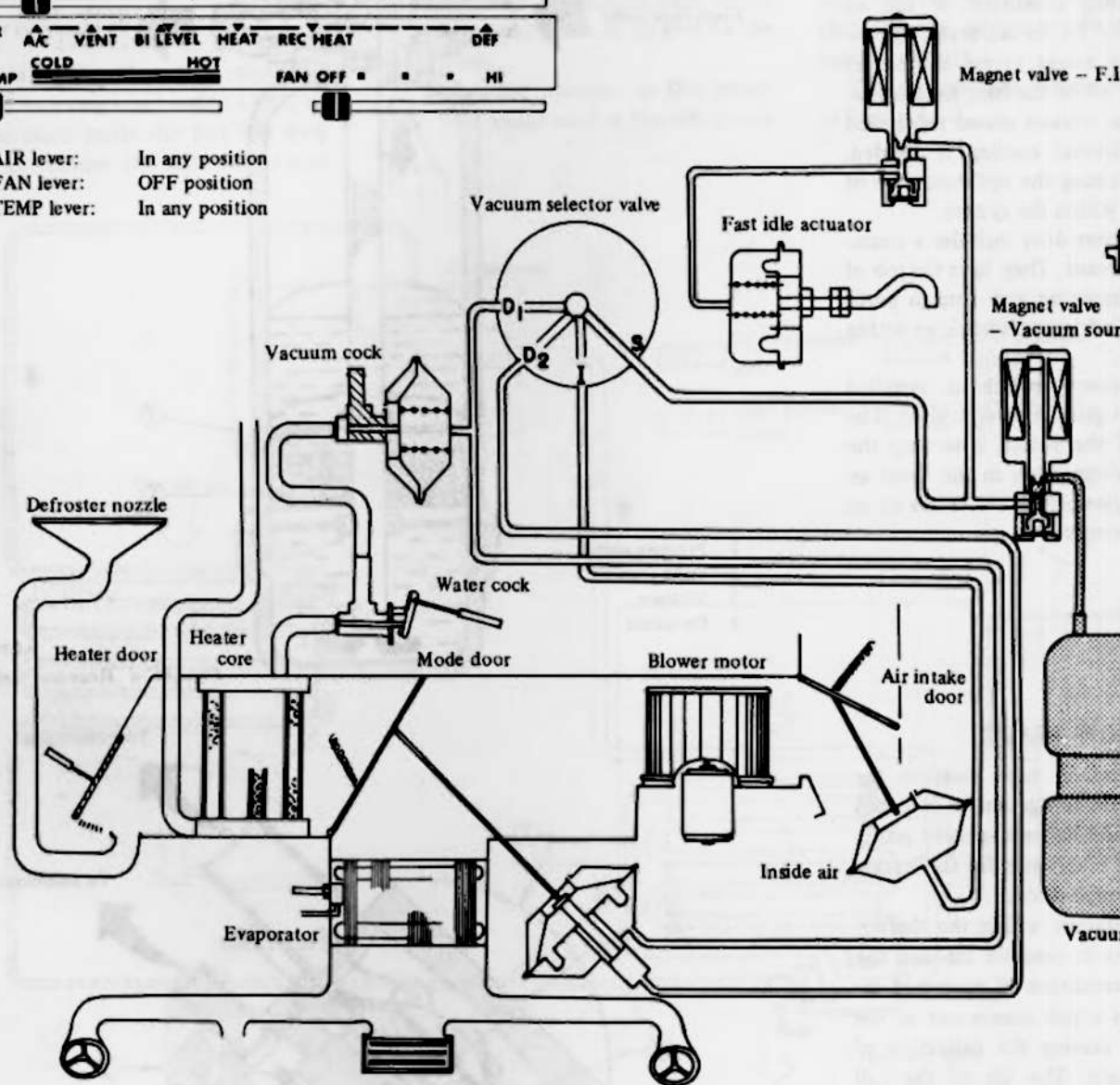
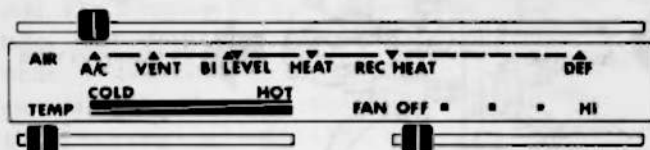
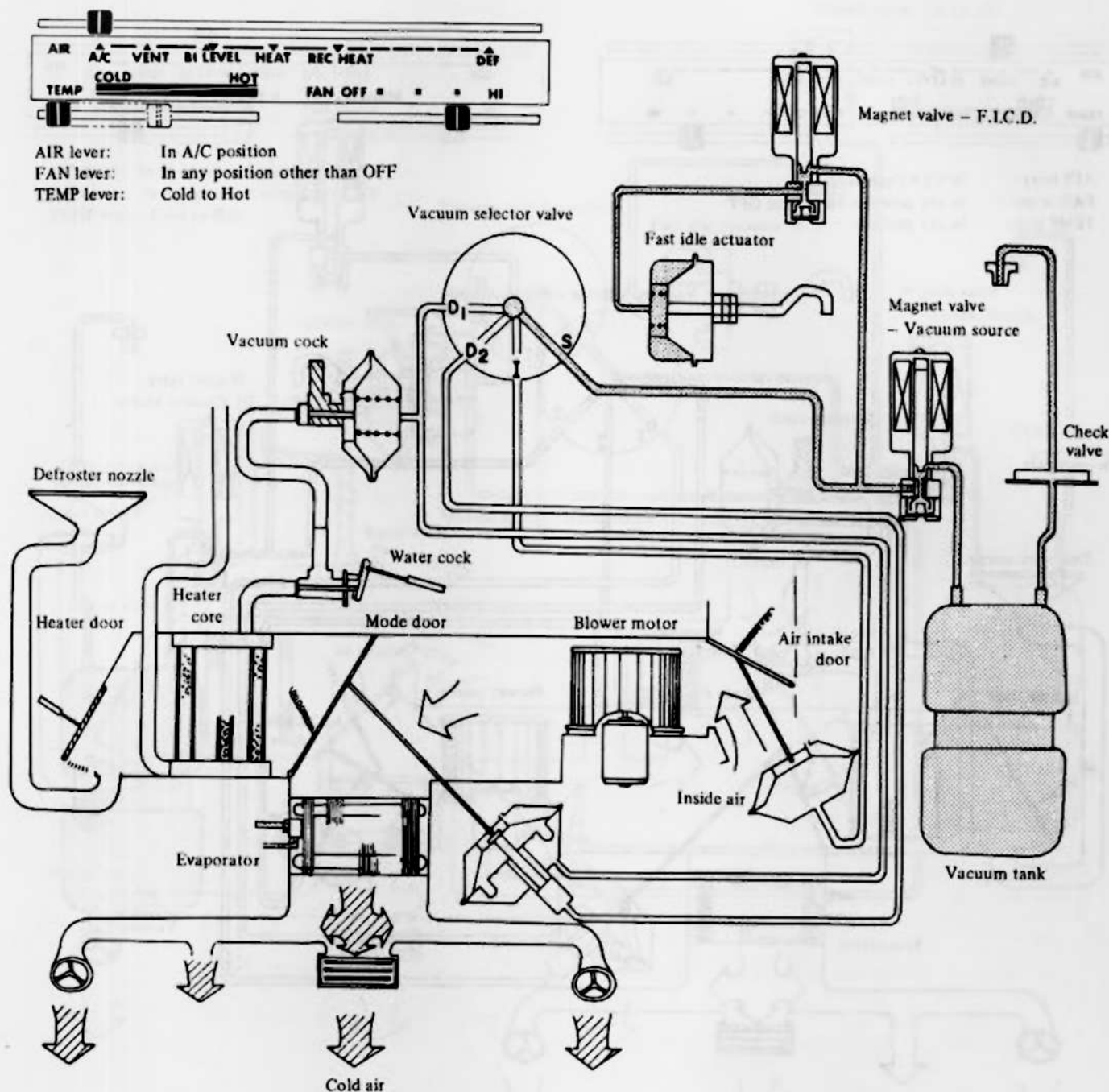


Fig. AC-6 Air flow - OFF

A/C (Air conditioner) position



AC783

Fig. AC-7 Air flow - A/C (Air Conditioner) position

When the AIR lever is set to the A/C position, vacuum and air flows are as shown in the schematic layout above.

1. Air intake door . . . The air intake door is in the closed position, shutting off outside air. Air is circulating inside the passenger compartment.
2. Mode door . . . The mode door is

in the closed position. All the air introduced from the air intake is cooled in the evaporator and then directed to the outlets located on the instrument panel.

3. Heater door . . . The heater door, connected by a control cable from the AIR lever, is in the open position.
4. Vacuum cock . . . The vacuum

cock is in the shut position.

5. Fast idle actuator . . . With passage to the magnet valve open, the vacuum introduced down to the fast idle actuator moves the actuator diaphragm to pull its operating lever. As a result, the throttle valve is moved to open a little wider, thus increasing the idling rpm.

Air Conditioning

VENT (Ventilation) position



AIR lever: In VENT position
 FAN lever: In any position other than OFF
 TEMP lever: In any position

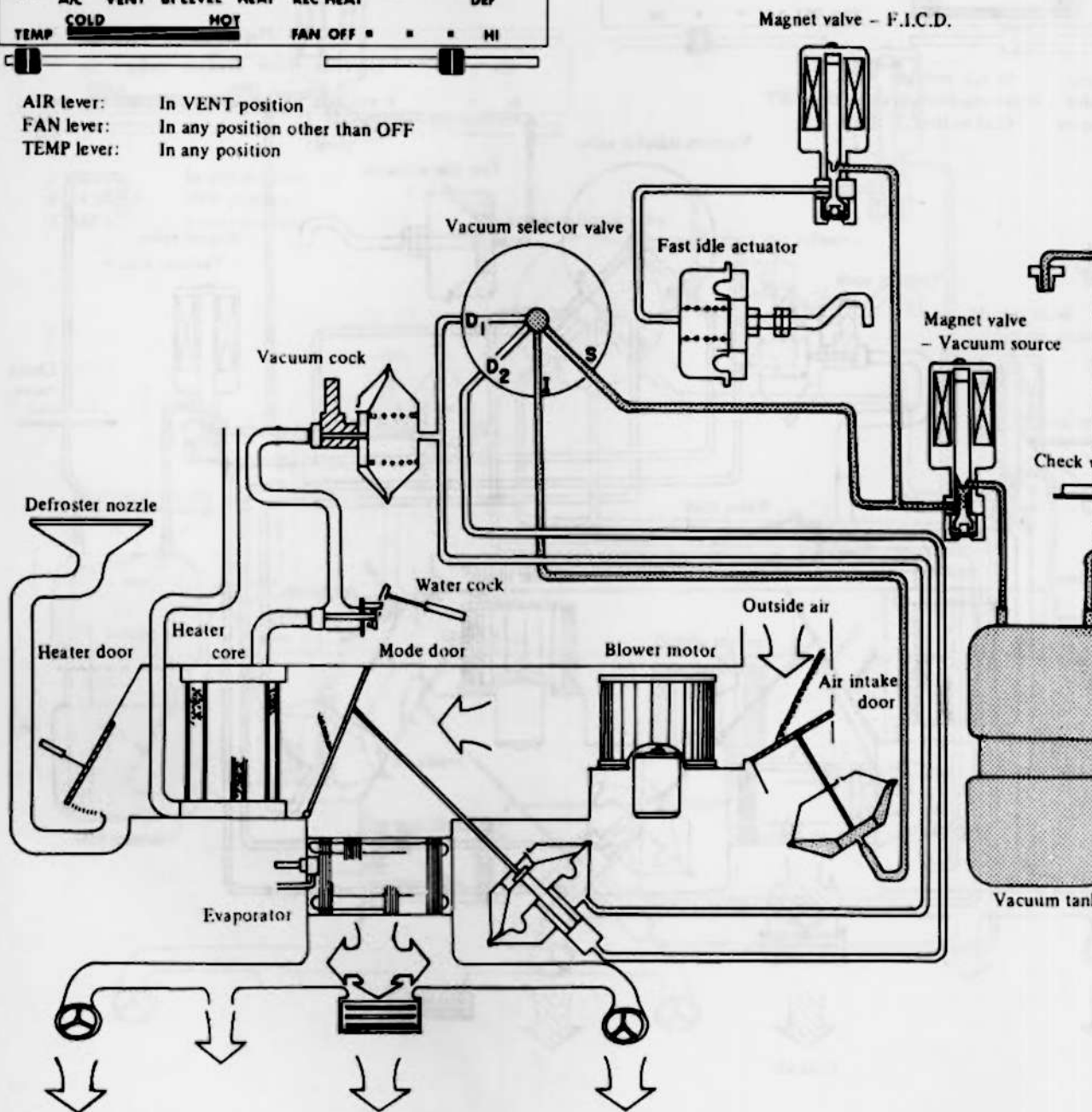


Fig. AC-8 Air flow - VENT (Ventilation) position

1. Air intake door... Vacuum is introduced to the actuator of the air intake door and causes an actuator movement to open the door.

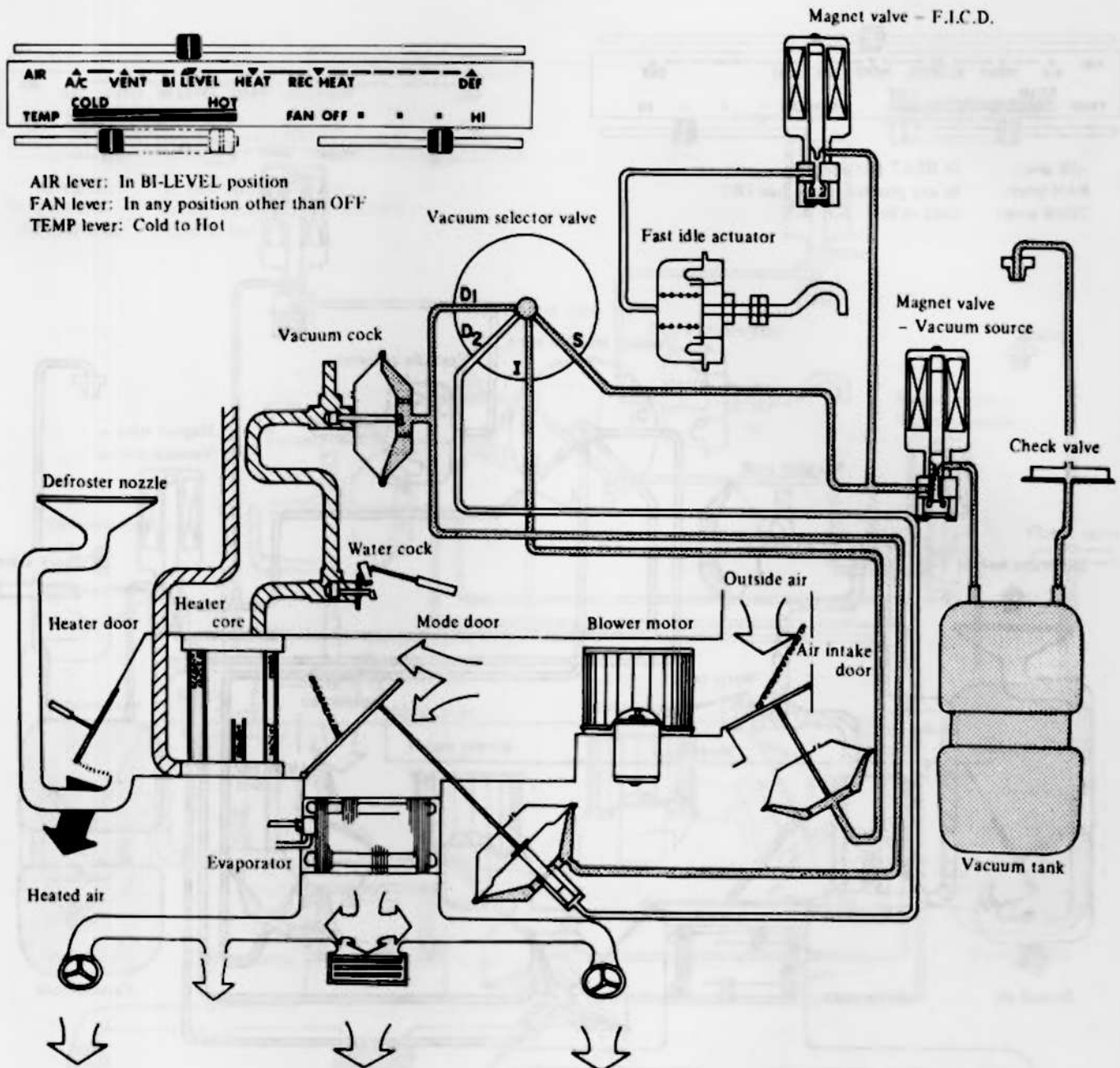
Thus it admits outside air into the

in the closed position. Outside air is directed to the outlets located on the instrument panel.

3. Heater door... The heater door is in the open position.

off the hot water at the cock.

5. Fast idle actuator... The vacuum flowing into the fast idle actuator is interrupted by the magnet valve.

BI-LEVEL position

AC785

Fig. AC-9 Air flow - BI-LEVEL position

1. Air intake door... Vacuum is imposed on the actuator of the air intake door and the door is in the open position.

2. Mode door... Vacuum is introduced only to D₁ of the double-action actuator and the door is allowed to open in its first-stage position. Outside air admitted from the air intake door thus flows both into the heater core

and the evaporator.

3. Heater door... The heater door is in the open position. Warm air heated by the core is directed toward occupant's feet in the passenger compartment.

4. Vacuum cock... Vacuum is imposed on the actuator, causing the cock to open. Hot water now circulates in the heater core.

5. Fast idle actuator... The actuator is not in operation.

Under the BI-LEVEL position, fresh outside air is discharged from the instrument air outlets while, from the heater outlets on the floor, warm air is produced.

Air Conditioning

HEAT position



AIR lever: In HEAT position
 FAN lever: In any position other than OFF
 TEMP lever: Cold to Hot

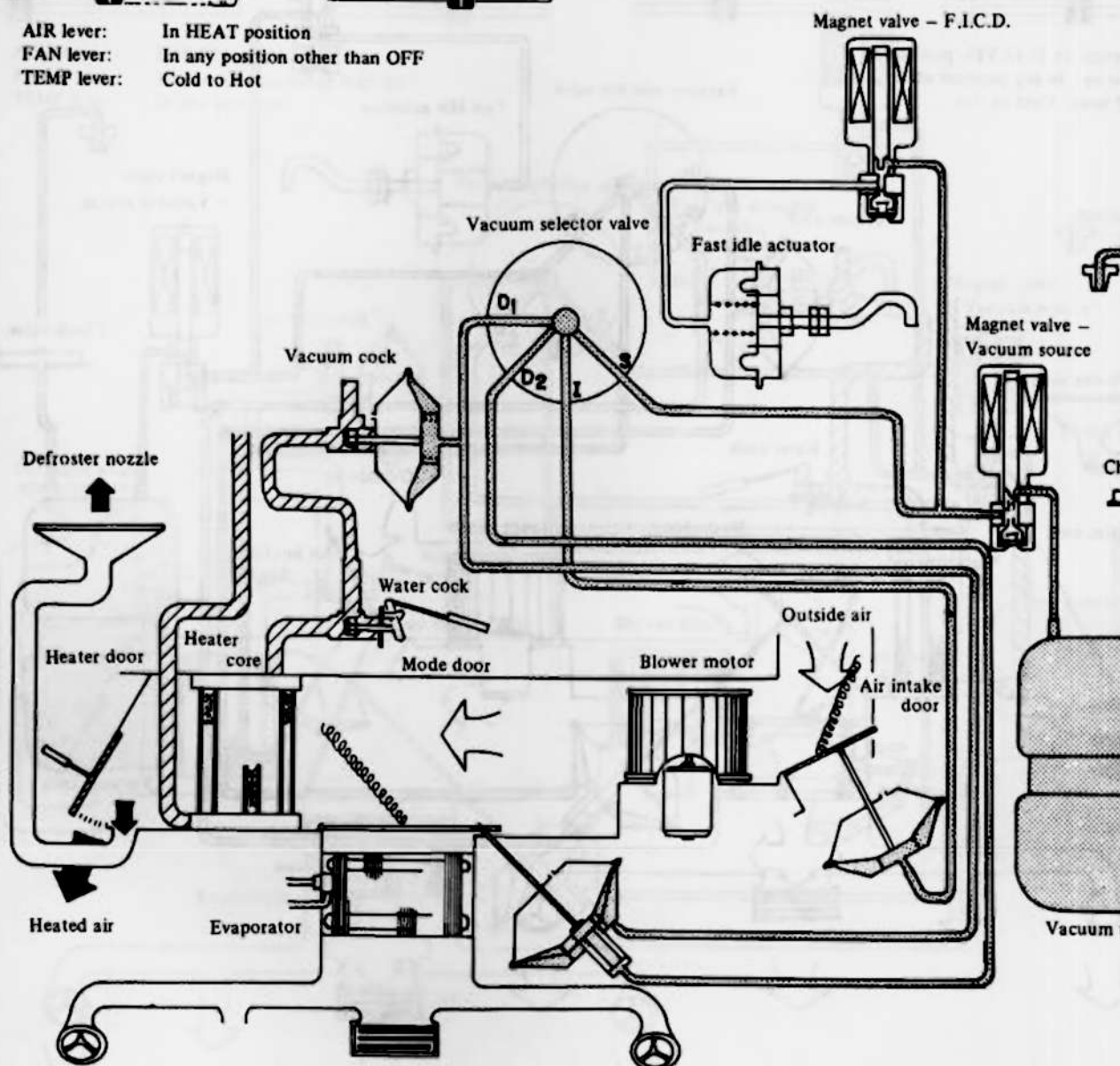


Fig. AC-10 Air flow - HEAT

1. Air intake door... Vacuum is imposed on the actuator of the air intake door and the door is in the open position.

2. Mode door... Vacuum is introduced both to D_1 and D_2 of the double-action actuator and the mode

heater core.

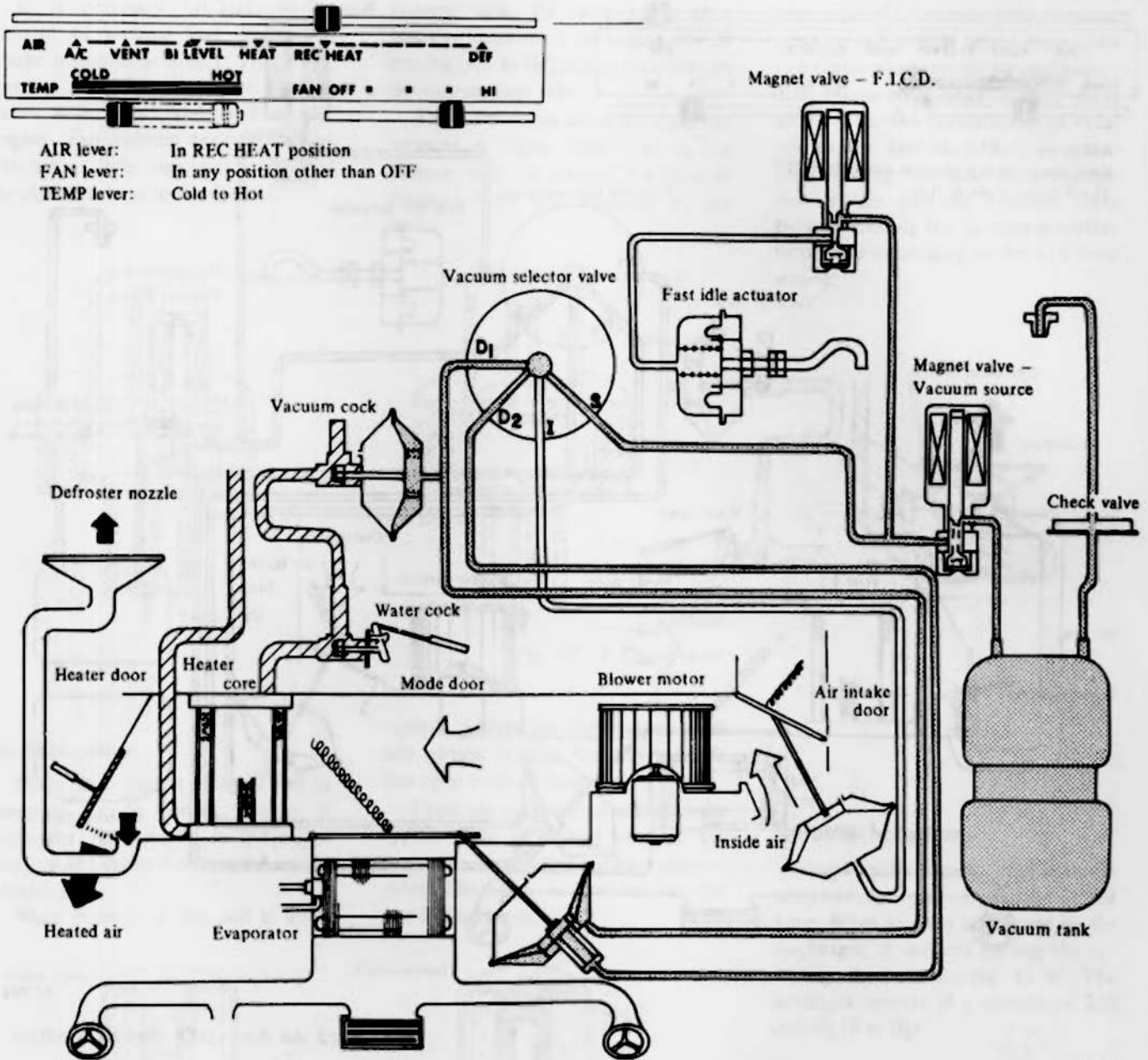
3. Heater door... The heater door is in the open position. Warm air heated by the core is discharged from the opening located above occupant's feet. A small portion of it goes to the

vacuum cock to open.

5. Fast idle actuator... The actuator is not in operation.

Temperature of the discharge varies with the amount of water

REC HEAT position



AC787

Fig. AC-11 Air flow - REC HEAT position

1. Air intake door ... The air intake door is in the closed position, shutting off outside air. Air is circulating inside the passenger compartment.
2. Mode door ... Vacuum is introduced both to D_1 and D_2 of the double-action actuator and the mode door is in its fully open position. All the outside air thus flows into the

heater core.

3. Heater door ... The heater door is in the open position. Warm air heated by the core is discharged from the opening located above occupant's feet. A small portion of it goes to the defroster nozzles.

4. Vacuum cock ... Vacuum is imposed on the actuator, causing the

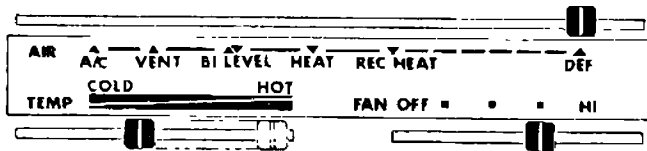
vacuum cock to open.

5. Fast idle actuator ... The actuator is not in operation.

Temperature of the discharge air varies with the amount of water flowing into the heater core via the water cock. The water cock is controlled by a control cable from the TEMP lever.

Air Conditioning

DEF (Defrost) position



AIR lever - In DEF position
 FAN lever - In any position other than OFF
 TEMP lever - Cold to Hot

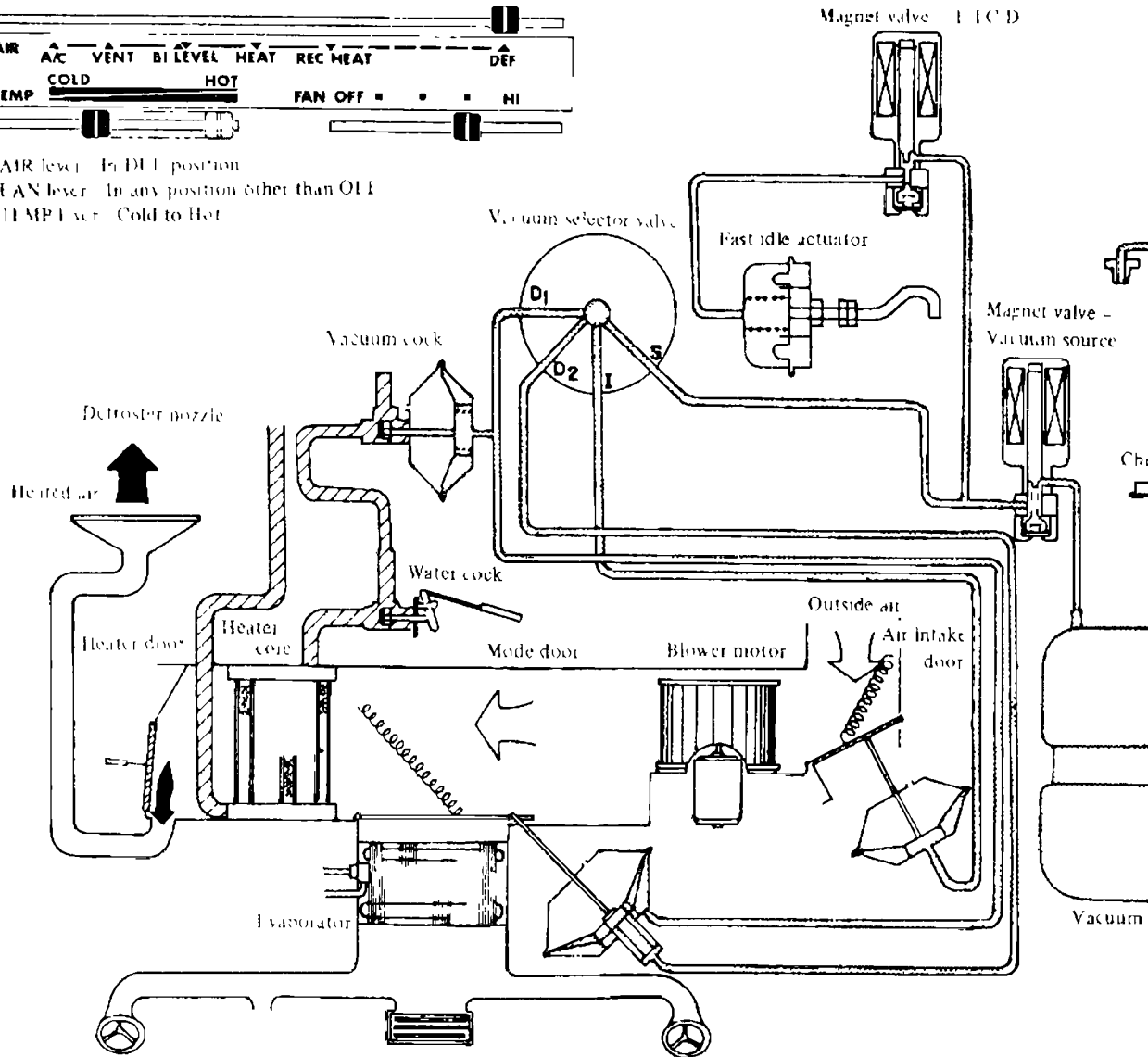


Fig. AC-12 Air flow - DEF (Defrost) position

1. Air intake door ... Vacuum is imposed on the actuator of the air intake door and the door is in the open position.

2. Mode door ... Vacuum is introduced both to D₁ and D₂ of the double-action actuator and the mode

door is in its fully open position.

3. Heater door ... The control cable of the heater door is connected to the AIR lever and holds the door in the closed position.

Warm air heated by the core goes to the defroster nozzles.

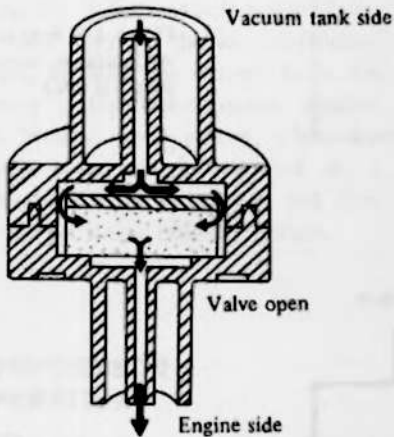
4. Vacuum cock ... Vacuum is imposed on the actuator of the vacuum cock and the cock is in the open position.

5. Fast idle actuator ... The fast idle actuator is not in operation.

VACUUM SYSTEM

Vacuum tank

It is necessary to control the amount of vacuum that the engine intake manifold produces. This is important since the amount of vacuum varies with speed and load of the engine. The vacuum tank stores the vacuum to help maintain a constant supply of vacuum to the system.



Check valve

The check valve is located between the engine intake manifold and the vacuum tank. Its valve opens at a negative pressure on the engine side 20 mm Hg (4/5 in Hg) higher than that on the vacuum tank side.

The valve closes when the manifold pressure is higher than that in the vacuum tank to prevent the flow of pressure from the manifold to the tank.

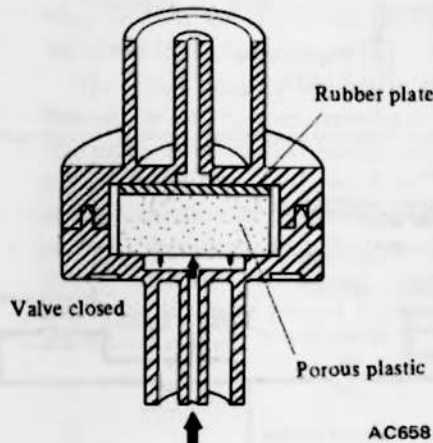


Fig. AC-13 Check valve

Vacuum selector valve

Vacuum distribution is controlled by the vacuum selector valve. The AIR lever directly actuates the vacuum selector valve. This valve consists of two plates which are facing each other. The plates have their mating faces grooved for the transmission of vacuum to the individual vacuum actuators. Moving the AIR lever changes the relative position between these grooves, causing the vacuum actuators to operate depending on the AIR lever setting.

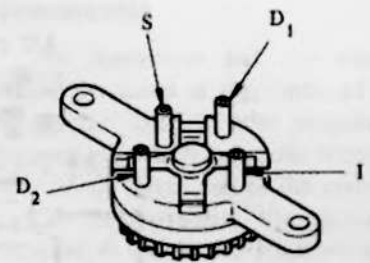


Fig. AC-15 Vacuum selector valve

Magnet valve

While the magnet valve's coil is energized by an electric current, it holds the valve needle in the raised position and vacuum is imposed on the selector side.

When current to the coil is inter-

rupted, passage on the vacuum tank side closes, leaving the selector side line open to the atmosphere.

There are two magnet valves in the system. One is located between the vacuum tank and the vacuum selector valve. The other is provided for the fast idle actuator.

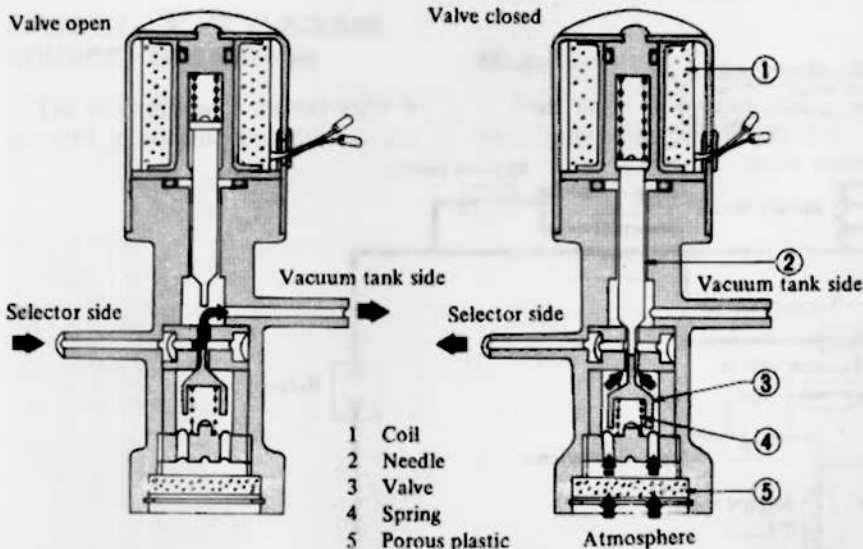


Fig. AC-14 Magnet valve

Vacuum actuator

Single-action and double-action actuators are used. Operation is the same. When vacuum is imposed on the diaphragm, it deflects moving the operating lever connected to it. The actuators operate at a vacuum of 200 mm Hg (8 in Hg).

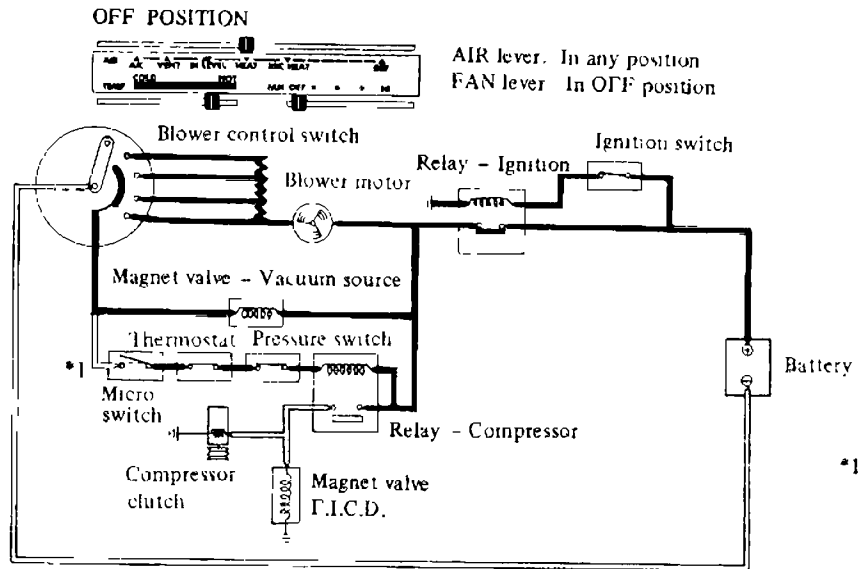
Fast idle control device (F.I.C.D.)

The fast idle control device increases engine idle speed so that the air conditioner continues to cool the passenger compartment even when the car is at a stand still.

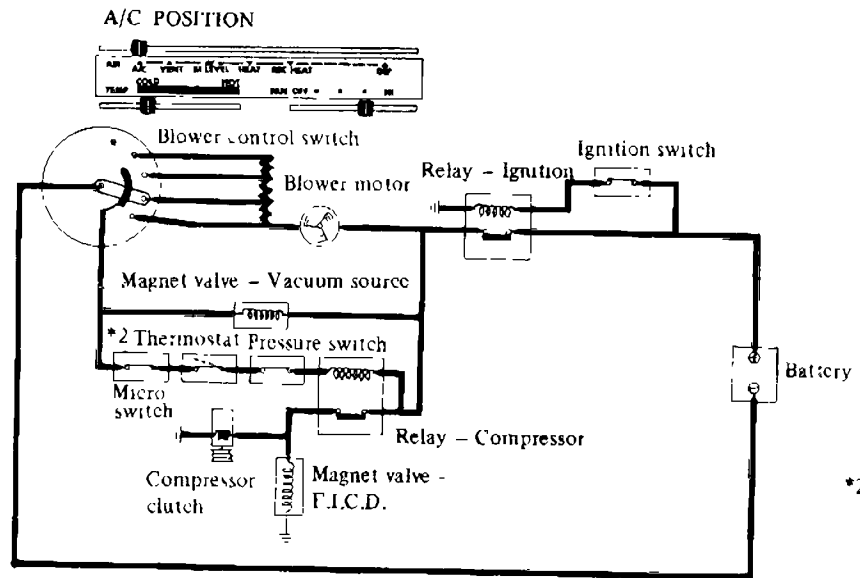
Vacuum water cock

This cock, too, has a vacuum actuator, by which two-stage operations of opening and closing the cock are performed. This cock opens and closes the passage of the cooling water which flows into the heater core.

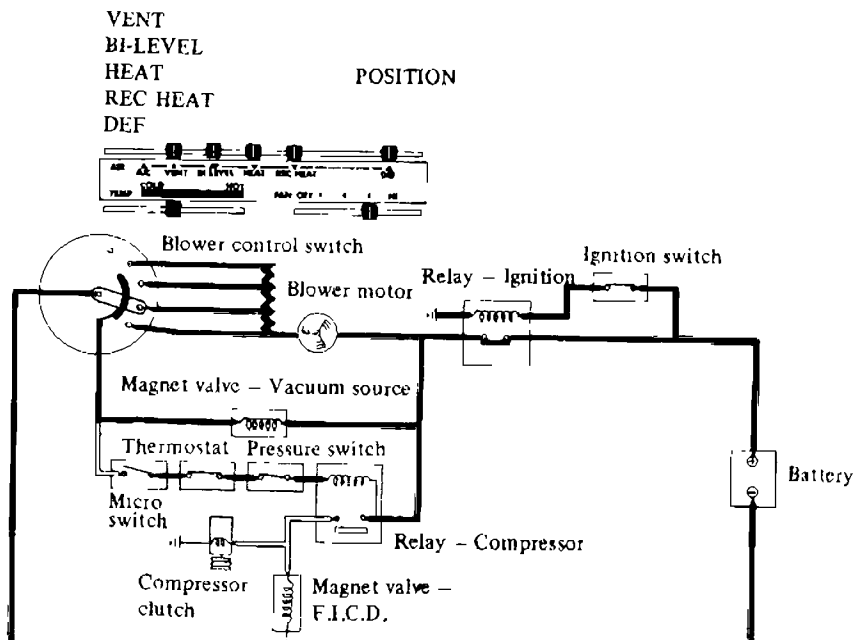
Air Conditioning



*1 - (When AIR lever is in A/C position, switch is ON)



*2 - (May be on or off, depending on switching the on or off)



ELECTRICAL CIRCUIT

The electrical system of the air conditioner is designed to control the ground circuit. In the following paragraphs are described the operations of the blower motor, compressor and magnet valves.

BLOWER MOTOR OPERATION

As the ignition switch is turned on, a power relay for the air conditioner closes, allowing the current from the battery to the blower motor, resistor and blower speed switch. When the blower speed switch is turned on, a ground circuit is completed and thus the blower motor begins to rotate.

COMPRESSOR OPERATION

The compressor circuit contains a compressor relay. The solenoid energizing circuit of the relay includes the blower speed switch, a micro switch, the thermostat and a pressure switch, all connected in series. On-off operations in these devices control current to the compressor clutch. This circuit also controls the magnet valve for the fast idle actuator.

MAGNET VALVE (VACUUM SOURCE) OPERATION

The vacuum source magnet valve is operated in conjunction with the on-

off of the blower speed switch. This valve controls vacuum supply to the vacuum-operated system.

Relay

Two relays are used. One is in the line between the blower motor and the battery. When the ignition switch is set at ON, the current flows through the solenoid to the ground, that is, the relay solenoid is energized so that the relay contacts are closed and the current flows to the blower motor.

The other relay is located in the line on the way to compressor clutch. The pressure switch, thermostat, micro switch and blower speed switch are in series connection in the line where the solenoid branches off. The current passes through the blower speed switch to the same ground circuit as the blower motor.

Blower speed switch

The blower speed switch is directly actuated by the FAN lever. The current passes through the resistor to the blower motor; then it passes through the blower speed switch to the ground. The speed of the blower motor is changed to four speeds with the FAN lever's position.

Magnet valve

This valve is opened and closed electrically by its electric solenoid.

Pressure switch

Installed in the receiver drier, the pressure switch interrupts current to the compressor clutch and stops the compressor operation whenever system pressure on the high pressure lines builds up abnormally. See Figure AC-4.

Micro switch

The micro switch is actuated by the AIR lever. This switch is on only when the AIR lever is set at A/C position.

Thermostat

The thermostat has one sensor, which is located in the center of the evaporator core of the evaporator housing and which senses the temperature of air forced out of the evaporator. In the thermostat, the contact is switched to ON and OFF according to the change in the temperature sensed by the sensor; in other words, the current which is sent to the compressor clutch is cut so as to stop the compressor's operation and to maintain steady the temperature of air forced out. One of the control cables from the TEMP lever changes the temperature setting for operation of the thermostat.

Compressor clutch

The compressor clutch engages and disengages the clutch disc electrically by the electric solenoid, and transmits the engine speed to the shaft of the compressor.

GENERAL SERVICE

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EVACUATING SYSTEM
CHARGING REFRIGERANT
CHECKING FOR LEAKS
HALIDE LEAK DETECTOR
ELECTRIC LEAK DETECTOR
REFRIGERANT LEVEL CHECK
SIGHT GLASS
PERFORMANCE TEST
COMPRESSOR OIL LEVEL CHECK
PERFORMANCE TEST
REFRIGERANT LEAKS

REFRIGERANT R-12

The refrigerant used in the air conditioner is generally called "Refrigerant-12 (R-12)". No other refrigerant than the above refrigerant should be used.

This refrigerant is usually available in a small can or a cylinder. In either case, it is liquefied under high pressure in the container.

Refrigerant evaporates easily (has a low evaporation point) and, moreover, since the latent heat of the refrigerant is large, it can absorb a large amount of heat when evaporating. Extreme care must be exercised when handling the refrigerant.

COMPRESSOR OIL

The "SUNISO 5GS" refrigeration lubricant should be used to assure the successful compressor operation. Use of oils other than recommended or mixing of the oil with other oils would cause chemical reaction or lead to lowered viscosity or deficient lubrication.

The oil absorbs moisture as it con-

MAINTENANCE

PERIODIC MAINTENANCE AND SEASON-IN INSPECTION

Both periodic maintenance and season-in inspection are most essential to enable the air conditioner to give full performance.

Perform the following checks.

1. Start engine and check refrigerant level through sight glass on receiver drier. For details, refer to relative topics under "Refrigerant Level Check".
2. Check the entire system for sign of refrigerant leaks. Refer to relative topics under "Checking for Leaks" and "Refrigerant Leaks".

If any trace of oil is noted at and around connection fittings, it is a sure indication that refrigerant is leaking. This condition can be corrected easily by retightening the joints. If any joint on line is suspected of small amount of leakage, use a leak detector to locate leaking points.

3. Check compressor drive belts for proper deflection.

Season-off

Observe the following maintenance

refrigerant leakage by performing checking for refrigerant gas before out of season.

2. Turn the compressor off for 10 minutes at least once a month while running the engine at 1,500 rpm.

GENERAL SERVICE INSTRUCTIONS

The servicing of the air conditioner should be carried out only by trained servicemen. This chapter describes essential points of service.

- If a large amount of dirt enters the system, they should be carried with refrigerant and clog the system or scratch parts. This points out the care in servicing the system disconnecting joints should be carried out in a clean place.
- Water should not be allowed inside the system. The refrigerant does not readily mix with water. However, the presence of a minute amount of water will cause a chemical reaction at high temperature which will in turn produce hydrochloric acid (HCl). Hydrochloric acid is highly corrosive to metals, the aluminum

- Water in the system will ice the orifice when the high pressure refrigerant is changed to low pressure refrigerant by expansion valve, etc., and will obstruct the refrigerant flow.

The following are general instructions to be closely observed in servicing the system.

1. When a system line is disconnected, plug the opening immediately. This is especially necessary to prevent moisture condensation from forming in the line and to keep out dirt and dust. It is also necessary to keep the line at and above surrounding air temperatures at all times. When connecting system lines, do not attempt to remove the plug from the opening until ready for immediate use.
2. Always keep the working place clean and dry and free from dirt and dust. Wipe clean water that comes into contact with the pipe joint before disconnecting.
3. Have all necessary tools in preparation beforehand and have tools clean and dry.
4. The compressor oil will easily absorb moisture when exposed to air. Immediately close the opening of the container after use. It is also necessary to observe the following notes:

CAUTION:

- a. The oil should not be transfused from a container into another, as the failure will possibly cause moisture to mix with the oil.
- b. The used oil should not be returned into a container.
- c. The oil should not be used if its state of preservation is not clear enough.

5. When connecting or disconnecting pipes from the refrigeration system, use two wrenches. One wrench is used for holding the fixing nut in place while the other for turning the mating flare nut. Failure to do so may result in a twisted tube or may damage connection.

6. Also use care not to give scratches to the seating surface at connections. A small scratch on the seating surface may be the cause of gas leakage. Before connecting pipes, be sure to

give coating of compressor oil to the seating surfaces.

SAFETY PRECAUTIONS

WARNING:

1. Since direct contact of the liquid refrigerant with your skin will cause frostbite, always be careful when handling the refrigerant. Wear gloves or wrap a piece of cloth around service valve to protect your fingers against frostbite by refrigerant. If any of the refrigerant should get into your eyes when charging the refrigerant, splash your eyes with cool water to raise the temperature gradually. Apply a protective film to the eye to avoid infection. Do not rub your eyes. Consult an eye specialist. Always wear goggles or glasses to protect your eyes when working around the system. Should refrigerant strikes your body, splash on cool water and apply a protective film.
2. The refrigerant service container has a safe strength. However, if handled incorrectly, it will explode. Therefore, always follow the instructions on the label. In particular, never store it in a hot location [above 52°C (126°F)] or drop it from a high height.
3. The refrigerant gas is odorless and colorless and breathing may become difficult due to the lack of oxygen. Since the refrigerant gas is heavier than air and will lay close to the floor, be especially careful when handling it in small, confined spaces.
4. The refrigerant itself is nonflammable. However, a toxic gas (phosgene gas) is produced when it contacts fire and special care is therefore required when checking for leaks in the system with a halide torch.
5. Do not steam clean on the system, especially condenser since excessively high pressure will build up in the system, resulting in explosion of the system.

The above precautions are essential in handling of Refrigerant-12, and their strict observation requires sufficient training. Therefore, it is of first importance that any other personnel than a well-trained serviceman should not be allowed to handle the refrigerant.

EVACUATING AND CHARGING SYSTEM

During servicing, use caution to keep air from getting into refrigerant. When air enters the system, all refrigerant must be evacuated from system prior to charging new refrigerant. Air in refrigerant has the following deleterious effects:

1. Since the condensation temperature of the air is extremely low, the air will not be condensed when refrigerant gas is condensed in the condenser, and the air will thus remain in gaseous form. Consequently, the effective thermal transmission area of condenser for refrigerant gas will be reduced and refrigerant gas to be condensed will be reduced. The pressure rise will become proportional to the volume of the air in system.
2. When air and refrigerant are mixed in system, a chemical reaction will be produced and hydrochloric acid which will adversely affect the aluminum, copper, iron, and other materials in system may be generated.

HANDLING MANIFOLD GAUGE

The pressure at the high- and low-sides of system should be measured when evacuating and charging refrigerant and when diagnosing trouble in the system. The manifold gauge is used for these purposes. A manifold gauge has two pressure gauges: a low pressure gauge and a high pressure gauge. These gauges are connected to the high- and low-side service valves of system through flexible charging hoses. The construction of manifold gauge is shown in Figure AC-17.

When valve stem is fully screwed, the valve is front-seated and valve path and the center path are blocked. When valve stem is backed off, the paths are opened.

Air Conditioning

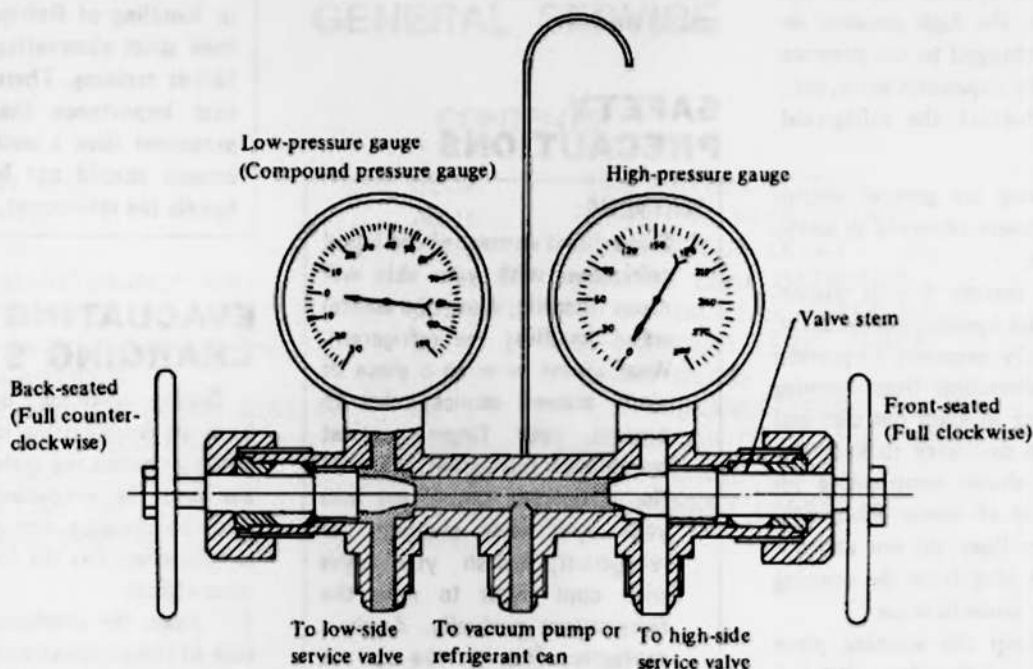


Fig. AC-17 Manifold

Connection to service valve

1. Fully close both valves of manifold gauge. Connect high- and low-pressure charging hoses to manifold gauge.
2. Remove caps from service valves. Connect high- and low-pressure charging hoses to service valves in system. The refrigerant gas will be discharged since check valve is open when pressing charging hose onto service valve.
3. Next, loosen the connection fitting of charging hose at manifold gauge side for 2 to 3 seconds to purge any air inside charging hose by the pressurized gas in system.

Disconnection from service valve

1. Fully close both valves of manifold gauge.
2. Disconnect two charging hoses from service valves. At this time, the gas will be discharged until check valve is closed. Therefore, disconnect hose quickly.

WARNING:

Work with fingers protected with cloth against frostbite by re-

HANDLING SERVICE VALVE

An automatic check valve is built into service valve. When this valve presses against the connection fitting, that is, when charging hose is connected to service valve, the valve is open. When charging hose is disconnected, the valve is closed automatically. Always observe the following usage precautions:

1. Always install valve cap after using service valve.

When high speed operation is performed without valve cap, a negative pressure will gradually build up at the low pressure side of system and air may be sucked in. In addition, dirt and dust will easily enter the valve resulting in foreign matter entering the system.

CAUTION:

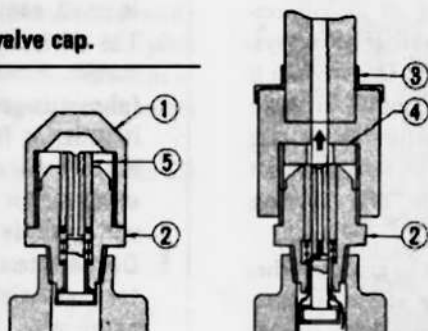
Do not overtighten valve cap.

2. Check valve will be half closed during connection and disconnection of charging hoses and refrigerant gas will be forcefully discharged. Therefore, connect and disconnect charging hoses quickly while pressing flare of charging hose against service valve.

WARNING:

Work with fingers protected with cloth against frostbite by refrigerant.

3. Since close contact between thread of valve cap and the thread of service valve will prevent gas leakage, keep these sections clean and free of scratches and damage.
4. Since packing of charging hose will be lost during long use, check packing prior to installing charging hose.



- 1 Cap
- 2 Service
- 3 Charging
- 4 Packing

HANDLING CAN TAP

A wide variety of can taps are available. The following procedures apply to conventional can taps.

For the correct usage, refer to the manufacturer's instructions.

CATUION:

Use can tap of good quality.

1. Connect charging hose to the center fitting of manifold gauge. At this time, confirm that both stems are fully turned in (front-seated).

2. Turn can tap handle fully counterclockwise so that the needle is pulled up.

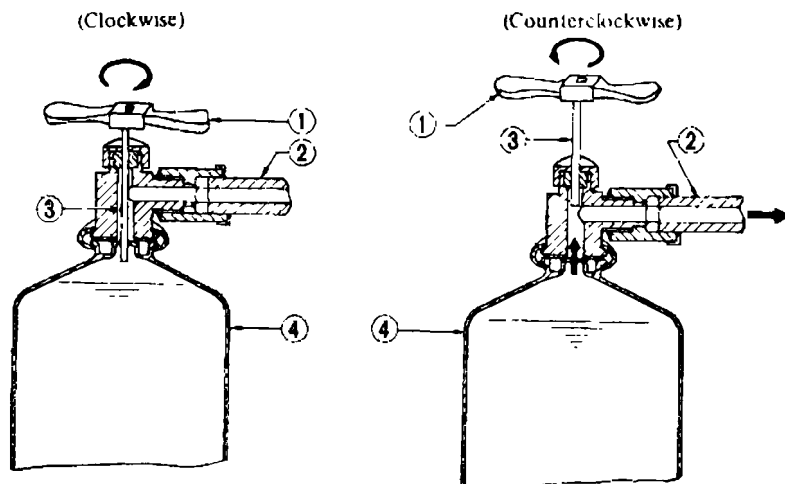
3. Attach can tap to refrigerant can.

4. Turn can tap handle fully clock-

wise to make a hole in refrigerant can.

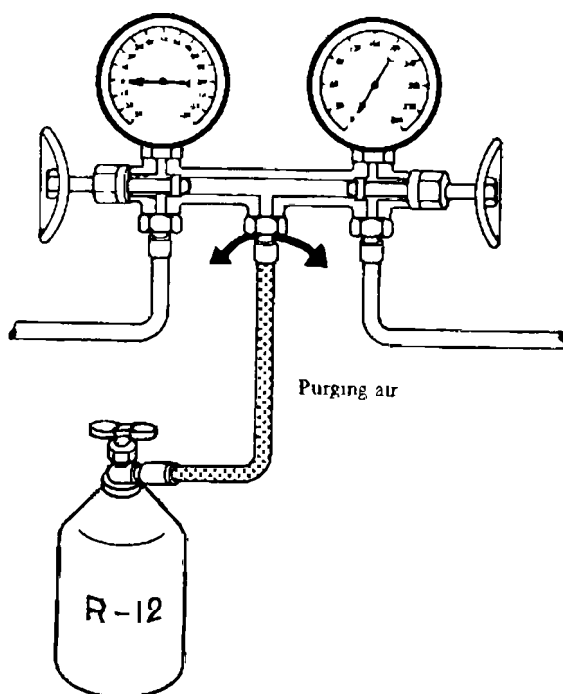
5. Turn the handle fully counterclockwise to raise the needle. Refrigerant gas will flow up to the center fitting of manifold gauge.

6. Loosen the connection at the center fitting of manifold gauge for a few seconds to purge air inside charging hose. See Figure AC-20.



AC246

Fig. AC-19 Can tap



AC247

Fig. AC-20 Purging air

Air Conditioning

DISCHARGING SYSTEM

The pressurized refrigerant gas inside system must be discharged to a pressure approaching atmospheric pressure prior to evacuating refrigerant inside system. This operation should be made to permit safe removal when replacing system components.

1. Close high- and low-pressure valves of manifold gauge fully.
2. Connect two charging hoses of manifold gauge to their respective service valves.

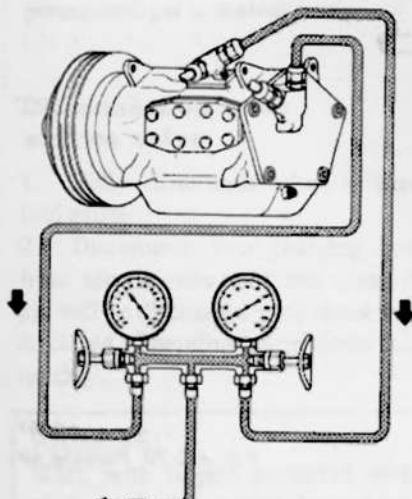
WARNING:

Securely connect high pressure (discharge) service valve to that of manifold gauge with a hose; also connect low pressure (suction) service valve to that of manifold gauge. For locations of high and low pressure (discharge and suction) service valves, see Fig. AC-35.

3. Open both manifold gauge valves slightly and slowly discharge refrigerant from system. See Figure AC-21.

WARNING:

Protect fingers with cloth against frostbite by refrigerant when connecting the charging hose to the service valve or disconnecting it therefrom.



Note: Do not allow refrigerant to rush out. Otherwise, compressor oil will be discharged along with refrigerant.

EVACUATING SYSTEM

1. Connect high- and low-pressure charging hoses of manifold gauge to their respective service valves of system and discharge refrigerant from system. Refer to "Discharge System".

WARNING:

Securely connect high pressure (discharge) service valve to that of manifold gauge with a hose; also connect low pressure (suction) service valve to that of manifold gauge. For locations of high and low pressure (discharge and suction) service valves, see Fig. AC-35.

2. When refrigerant has been discharged to a pressure approaching atmospheric pressure, connect center charging hose to a vacuum pump.
3. Close both valves of manifold gauge fully. Then start vacuum pump.
4. Open low-pressure valve and suck old refrigerant from system. See Figure AC-22.
5. When low-pressure gauge reading has reached to approximately 500 mm Hg (20 in Hg), slowly open high-pressure valve. See Figure AC-23.
6. When pressure inside system has dropped to 710 mm Hg (28 in Hg), fully close both of valves of manifold gauge and stop vacuum pump. Let stand it for 5 to 10 minutes in this state and confirm that the reading does not rise.

Note:

- a. The low-pressure gauge reads lower by 25 mm Hg (1 in Hg) per a 300 m (1,000 ft) elevation. Perform evacu-

Elevation m (ft)	Vacuum of s mm Hg (in
0 (0)	710 (28)
300 (1,000)	685 (27)
600 (2,000)	660 (26)
900 (3,000)	635 (25)

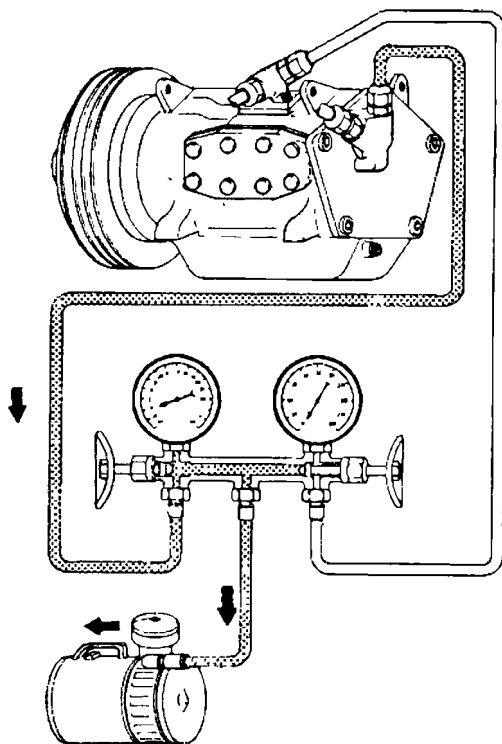
Note: Values show readings of low-pressure gauge.

- b. The rate of ascension of the pressure gauge should be less than 25 mm Hg (1 in Hg) in five minutes.

If the pressure rises or the system negative pressure can not be obtained, there is a leak in the system. In this case, immediately charge system with refrigerant and repair the leak as described in the followings.

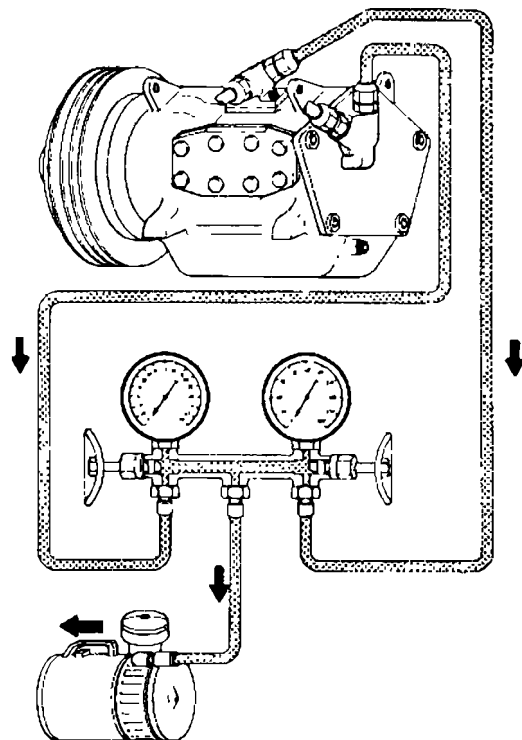
- (1) Confirm that both valves of manifold gauge are fully closed, then disconnect center charging hose from vacuum pump.
- (2) Connect center hose to vacuum pump in place of vacuum pump. Then open refrigerant can to can tap and add refrigerant to manifold gauge.
- (3) Loosen the connection of center fitting of manifold gauge to pump, then disconnect from center hose.
- (4) Open low-pressure valve of manifold gauge and charge refrigerant to system. After one can [about 0.9 lb] of refrigerant has been added into system, close low-pressure valve.
- (5) Check for refrigerant leak with a leak detector. Repair any leaks found. Refer to "Check for Leaks" and "Refrigerant Leaks".
- (6) Confirm that both valves of manifold gauge are fully closed, then change center charging hose to vacuum pump.
- (7) Open high- and low-pressure valves and operate vacuum pump to suck refrigerant from system. When the pressure in system has dropped to 710 mm Hg (28 in Hg), fully close both valves of manifold gauge.

7. The above operation completes the evacuation of system. Next



AC249

Fig. AC-22 Evacuating system - First step



AC250

Fig. AC-23 Evacuating system - Second step

CHARGING REFRIGERANT

1. Install manifold gauge to system.
Refer to "Handling Manifold Gauge".

WARNING:

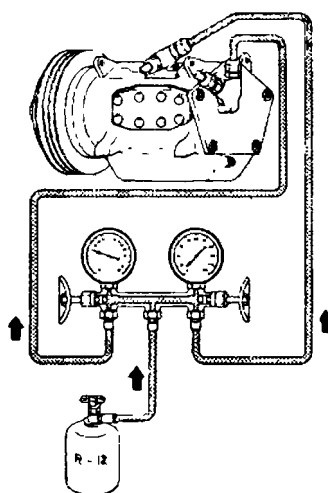
Securely connect high pressure (discharge) service valve to that of manifold gauge with a hose, also connect low pressure (suction) service valve to that of manifold gauge. For locations of high and low pressure (discharge and suction) service valves, see Fig. AC-35.

CAUTION:

- a. Be sure to purge air from the high- and low-pressure charging hoses.
- b. If air is mixed with refrigerant gas in system, evacuation of system should be performed. Refer to Evacuating System.

2. Attach center charging hose of manifold gauge to refrigerant can through can tap. Break seal of refrigerant can to allow refrigerant to enter manifold gauge. Loosen charging hose

- at the center fitting of manifold gauge and purge air from inside charging hose. Refer to "Handling Can Tap".
3. Open high- and low-pressure valves of manifold gauge and charge refrigerant into system. See Figure AC-24.



AC251

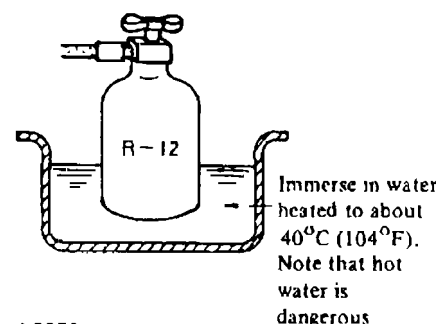
Fig. AC-24 Charging refrigerant

Note: When refrigerant charging speed is slow, immerse refrigerant can in

water heated to a temperature of about 40°C (104°F). However, note that this is dangerous when water is hot. See Figure AC-25.

WARNING:

- a. Under any circumstances the refrigerant can must not be warmed in water heated to a temperature of over 52°C (126°F).
- b. A blow torch or stove must never be used to warm up the can.



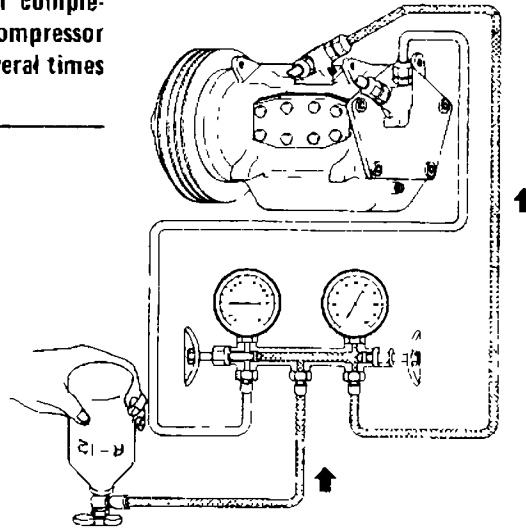
AC252

Fig. AC-25 Charging refrigerant

Air Conditioning

CAUTION:

When charging liquefied refrigerant into the system with the can turned upside down to reduce charging time, charge it only through high pressure (discharge) service valve, but not through low pressure (suction) service valve. See Fig. AC-26. After completion of charging, the compressor should always be turned several times manually.



AC253

Fig. AC-26 Charging refrigerant

4. If refrigerant charging speed slows down, charge it while running the compressor for ease of charging. After having taken the steps up to (3) above, proceed with charging in the following order.

(1) Shut off high pressure valve of manifold gauge.

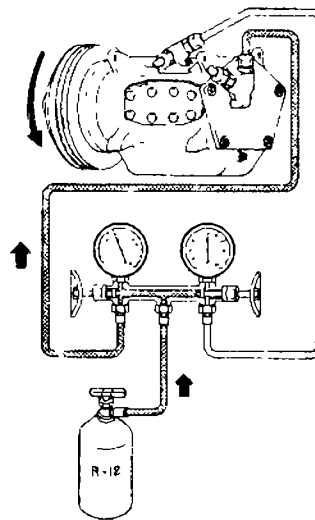
WARNING:

Never charge refrigerant through high pressure side of system since this will force refrigerant back into refrigerant can and can may explode.

(2) Run the engine at idling speeds below 1,500 rpm.

(3) Set the TEMP lever and FAN switch at maximum cool and maximum speed respectively.

(4) Charge refrigerant while controlling low-pressure gauge reading at 2.8 kg/cm² (40 psi) or less by turning



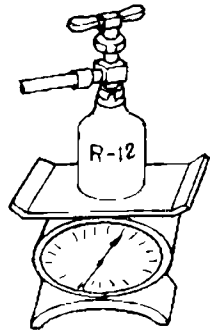
AC254

Fig. AC-27 Charging refrigerant

5. When refrigerant can is empty, fully close both valves of manifold gauge and replace refrigerant can with a new one.

Before opening manifold gauge valve to charge refrigerant from new

6. Charge the specified amount of refrigerant into system by weighing charged refrigerant with scale. Overcharging will cause discharge pressure to rise. See Figure AC-28.



Measure the amount of charged refrigerant with a scale. Make a note of the amount charged from can.

Fig. AC-28 Charging refrigerant

Refrigerant capacity

Unit: kg (lb)

Refrigerant	Minimum	Maximum
R-12	0.7 (1.5)	0.9 (2.0)

Note: The presence of bubbles in sight glass of receiver drier is an unsuitable method of checking amount of refrigerant charged into system. The state of the bubbles in sight glass should only be used for checking whether the amount of charged refrigerant is small or not. The amount of charged refrigerant can be correctly judged by reading of discharge pressure. Refer to "Refrigerant Level Check".

7. After the specified amount of refrigerant has been charged into system, close manifold gauge valves and detach manifold gauge from system.

8. Confirm that there are no leaks in system by checking with a leak detector.

Refer to "Checking for Leaks".

Note: Conducting a performance test prior to removing manifold gauge is a good service operation. Refer to "Performance Test".

CHECKING FOR LEAKS

Conduct a leak test whenever leakage of refrigerant is suspected and when conducting service operations which are accompanied by disassembly or loosening of connection fittings.

Refrigerant is a colorless, odorless gas and leakage from system is difficult to detect. Accordingly, the use of a leak detector facilitates check for leaks. Two methods of checking are

available; one employs a halide leak detector which burns propane gas or butane gas and the other is an electric type leak detector.

HALIDE LEAK DETECTOR

Since the propane leak detector and butane leak detector are the same in respect to their operation, this section describes the operation of the propane leak detector.

The copper screen is heated by the burning of propane. Refrigerant gas decomposes to color the flame when it contacts the heated screen. The gas to be checked is drawn into the sampling tube and sent out to the burner. A refrigerant leak can clearly be detected by variations in the color of the flame.

lb) of refrigerant, if necessary.

2. Light leak detector. Adjust the height of the flame between flame adjusting lines at the top and bottom of combustion tube. A reaction plate will immediately become red hot.

3. Place the end of sampling tube near the point of the suspected leak in system.

Note:

- a. Since refrigerant gas is heavier than air, small leaks can be easily detected by placing sampling tube directly below the check point.
- b. Suitable ventilation is required. If refrigerant gas is mixed with the surrounding air, leak detector will always indicate a response and detection of the actual leak will be difficult.
- c. Never hold leak detector at an angle.

WARNING:

- a. Never inhale the fumes produced by combustion of refrigerant gas since they are toxic.
- b. Never use halide torch in a place where combustible or explosive gas is present.

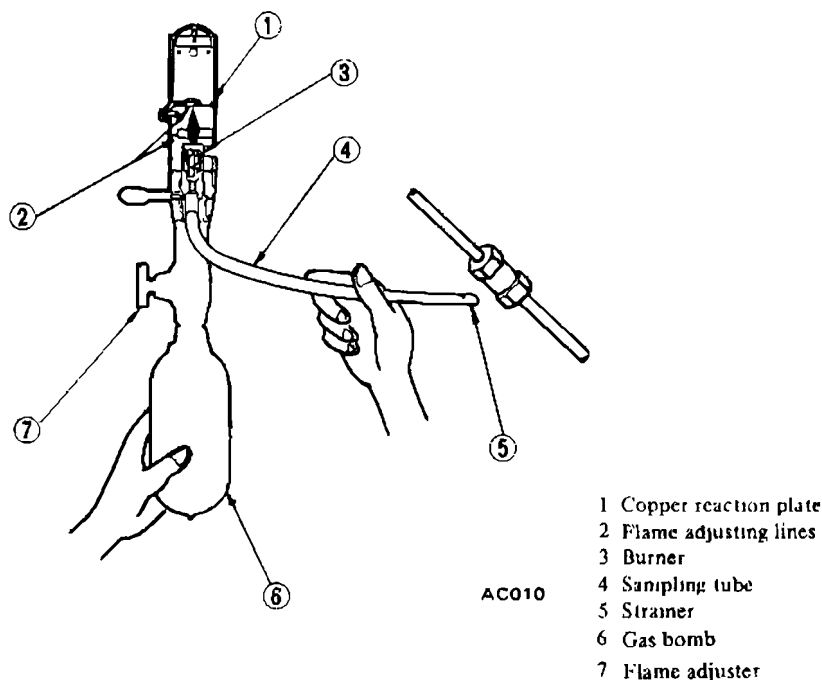


Fig. AC-29 Checking for leaks

4. The flame will be almost colorless when there is no refrigerant gas being burned. When there is a small refrigerant gas leak, the flame will be green or yellowgreen. When refrigerant gas leakage is large, the flame will be brilliant blue or purple. Since the color of the flame will be yellow when dust is being burned or there is aging scale on copper reaction plate, always keep the strainer of sampling tube and reaction plate clean.

5. Major check points

- (1) Compressor
 - Compressor shaft seal (rotate the compressor by hand)
 - Oil filler plug
 - Flexible hose connections
 - Rear cover and side cover gaskets.
 - Service valve
- (2) Condenser
 - Condenser pipe fitting
 - Condenser inlet and outlet pipe connections

	Propane type	Butane type
NO LEAK	Greenish blue	Pale blue
SMALL LEAK	Yellow	Bright blue
LARGE LEAK	Purple	Vivid green

1. Discharge refrigerant in one or two seconds to ascertain that system

has a sufficient pressure needed for leak detection. Charge with 0.4 kg (0.9

(3) Piping

- Flared section of high pressure and low pressure flexible hose.
- Pipe connections
- Service valve

(4) Evaporator housing

- Inlet and outlet pipe connections
- Expansion valve

ELECTRIC LEAK DETECTOR

For the operational procedures, refer to the instructions furnished with each electric leak detector.

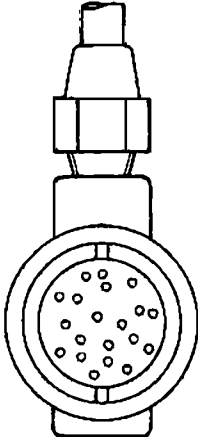
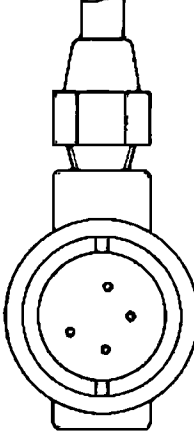
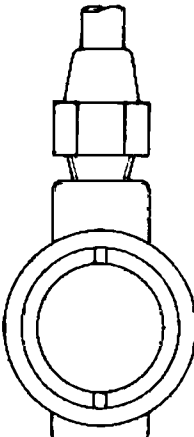
REFRIGERANT LEVEL CHECK

SIGHT GLASS

Sight glass is provided at the top of receiver drier. One guide for whether there is enough refrigerant in system is given by observing refrigerant flow through sight glass. However, this method is unsuitable for judging the amount of refrigerant. The correct

refrigerant level can be judged by measuring the system pressure in accordance with the procedure described "Performance Test".

1. Start the engine and hold at idle speed at 1,500 rpm.
2. Set AIR lever to A/C position.
3. Set blower to maximum.
4. Check sight glass after running of about five minutes. Judge according to the following table.

Amount of refrigerant Check item	Almost no refrigerant	Insufficient	Suitable	Too much refrigerant
Temperature of high pressure and low pressure pipes.	Almost no difference between high pressure and low pressure side temperature.	High pressure side is warm and low pressure side is fairly cold.	High pressure side is hot and low pressure side is cold.	High pressure side is abnormally hot.
State in sight glass.	Bubbles flow continuously. Bubbles will disappear and something like mist will flow when refrigerant is nearly gone.  AC256	The bubbles are seen at intervals of 1 - 2 seconds.  AC257	Almost transparent. Bubbles may appear when engine speed is raised and lowered. No clear difference exists between these two conditions.  A	No bubbles can be seen.
Pressure of system.	High pressure side is abnormally low.	Both pressures on high and low pressure sides are slightly low.	Both pressures on high and low pressure sides are normal.	Both pressures on high and low pressure sides are abnormally high.
Repair.	Stop compressor and conduct an overall check.	Check for gas leakage, repair as required, replenish and charge system.		Discharge refrigerant from service valve and recharge low pressure side.

Note:

- a. The bubbles seen through the sight glass are influenced by the ambient temperature. Since the bubbles are hard to show up in comparatively low temperatures below 20°C (68°F), it is possible that a slightly larger amount of refrigerant would be filled, if supplied according to the sight glass. Be sure to recheck the amount when it exceeds 20°C (68°F). In higher temperature the bubbles are easy to show up.
- b. When the screen in the receiver drier is clogged, the bubbles will appear even if the amount of refrigerant is normal. In this case, the outlet side pipe of the receiver drier becomes considerably cold.

PERFORMANCE TEST

Check for the amount of refrigerant in the system can be made by measuring pressure on discharge side.

The correct amount of refrigerant is in the system, if pressure on the discharge side is within the specified range. For details, refer to "Performance Test" described later.

Overcharging will show up in higher pressure on discharge side.

COMPRESSOR OIL LEVEL CHECK

The oil used to lubricate compressor circulates into system from the oil sump while compressor is operating. Therefore, to correctly measure compressor oil, the amount of oil flowing to system must be considered. If a considerable amount of leakage of refrigerant gas happens, the leakage of compressor oil is also considered. There will be no compressor oil leakage from a completely sealed system. When system operates under satisfying condition, the compressor oil level check is unnecessary.

When checking the level of compressor oil or when replacing any component part of the system, use the following service procedure. This facilitates to return oil to compressor.

1. Operate compressor at engine idling speed (1,000 rpm or below) with controls set for maximum cooling

and high blower speed for 10 to 15 minutes in order to return compressor oil to compressor.

2. Stop the engine and discharge refrigerant of system and then remove compressor from the car.

3. Remove compressor drain plug.

Drain compressor oil from compressor oil sump and measure the amount.

4. Compressor oil is satisfactory if the following amount of oil remains in the compressor.

Residual oil:

85 to 128 gr (3 to 4 ½ oz)

5. Check the cleanliness of the oil. If the oil contains chips or other foreign material, clean oil sump with new oil.
6. Discard the used oil and fill with the same amount of new oil. Add oil if found less than above amount.

If compressor is inoperative due to defective compressor or heavy loss of refrigerant, remove compressor and repair as necessary. Then pour oil up to correct level and install on engine. After above steps have been completed, recheck oil level; drain oil to correct level if level is excessively high.

PERFORMANCE TEST

The cooling performance of the air conditioner changes considerably with changes in surrounding conditions. Testing must be performed using the correct method. This test is used to judge whether system is operating correctly and can also be used as a guide in checking for problems.

1. Park the car indoors or in the shade.
2. Open all the windows of the car fully. However, close the doors.
3. Open the hood.
4. Connect manifold gauge to high- and low-side service valves of the system. Refer to "Handling Manifold Gauge".
5. Set AIR lever to A/C position.
6. Set TEMP lever to max. cool position.

7. Set blower to its highest speed.

8. Start the engine and hold engine speed at 1,500 rpm.

9. After the air conditioner has been operated for about 10 minutes, measure system pressures at high-pressure (discharge) side and low-pressure (suction) side.

10. Measure the temperature of discharge air at outlet grille.

11. Measure the temperature and humidity of the ambient air at a point 1 m (3.3 ft) front of condenser. However, a dry bulb and wet bulb must not be placed in direct sunlight.

12. Check for any abnormalities by comparing the test results with standard pressure in "Performance Chart".

Note:

- a. The pressure will change in the following manner with changes in conditions:

- When blower speed is low, discharge pressure will drop.
- When the relative humidity of intake air is low, discharge pressure will drop.

- b. The temperature will change in the following manner with changes in conditions:

When the ambient air temperature is low, the outlet air temperature will become low.

If the test reveals that there is any abnormality in system pressure, isolate the cause and repair by reference to the "Trouble Diagnoses and Corrections".

REFRIGERANT LEAKS

If leaks are noticeable, leaky parts should be repaired. Then system should be filled with refrigerant. Do not operate compressor with refrigerant level excessively low.

If this caution is neglected, a burnt compressor will result since heavy loss of refrigerant usually indicates heavy loss of compressor oil.

Air Conditioning

If system has been exposed to atmosphere for an extended period of time, receiver drier must be replaced. If leaks are slight and no air is present in system, add refrigerant as necessary.

To detect leaks, refer to relative topics under "Checking for Leaks". Here is how leaks are stopped.

1. Check torque on the connection fitting and, if too loose, tighten to the proper torque. Check for gas leakage with a leak detector.

2. If leakage continues even after the fitting has been retightened, discharge refrigerant from system, disconnect the fittings, and check its seating

face for damage. Always replace if damage is slight.

3. Check compressor oil and replace if required.

4. Charge refrigerant and check for gas leaks. If no leaks are present, evacuate and charge system.

REMOVAL AND INSTALLATION

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MODE DOOR ACTUATOR	AC-31

REMOVAL AND INSTALLATION	
CONTROL ASSEMBLY	
REMOVAL AND INSTALLATION	
DISASSEMBLY AND ASSEMBLY	
ADJUSTMENT OF CONTROL CABLE	
HEATER COCK	
REMOVAL AND INSTALLATION	
THERMOSTAT	
REMOVAL AND INSTALLATION	
EXPANSION VALVE	
REMOVAL	
INSTALLATION	
EVAPORATOR HOUSING	
REMOVAL	
DISASSEMBLY AND ASSEMBLY	
INSPECTION	
INSTALLATION	
HEATER UNIT	
REMOVAL	
INSTALLATION	
VACUUM HOSE DIAGRAM	
WIRING HARNESS DIAGRAM	
CIRCUIT DIAGRAM FOR AIR	
CONDITIONER	
CIRCUIT DIAGRAM FOR	
ILLUMINATION LAMP	

COMPRESSOR

REMOVAL

1. Disconnect battery ground cable.
2. Remove air flow meter with air ducts.
3. Remove under cover

Note: This is to secure space for removal of compressor.

5. Loosen tension adjust bolt of idler pulley and remove compressor drive belt.
6. Disconnect compressor clutch wire at connector

charging system".

8. Remove high and low hoses from compressor

WARNING:

Gradually loosen discharge hose fitting, and remove it

Note: Use wrench to fix joint nut on compressor side, and then loosen flare nut of flexible hose with another wrench.

CAUTION:

Be sure to immediately put plugs in flexible hose opening and in compressor connection.

9. Jack up front of car, and remove bolts mounting compressor's lower side.

10. Lower car, and remove two bolts mounting compressor's top side. While doing this, hold compressor by hand to prevent it from falling down.

11. Holding compressor with both hands, horizontally move it toward rear of car and lift it out with clutch facing down.

12. In the same manner as described in "Compressor Oil Level Check" of "General Service", check amount and quality of oil in compressor.

CAUTION:

Do not attempt to operate the compressor on its side or upside down for more than 10 minutes, as the compressor oil will enter the low pressure chambers. If, under that condition, compressor should be operated suddenly, internal damages would result. To expel oil from chambers, hand-crank compressor several times in its installed condition.

Note: When storing a compressor, be sure to fill it with refrigerant through low pressure service valve and purge air from high pressure side service valve.

INSTALLATION

Installation of compressor is to be done in reverse sequence of removal, with attention paid to the following points:

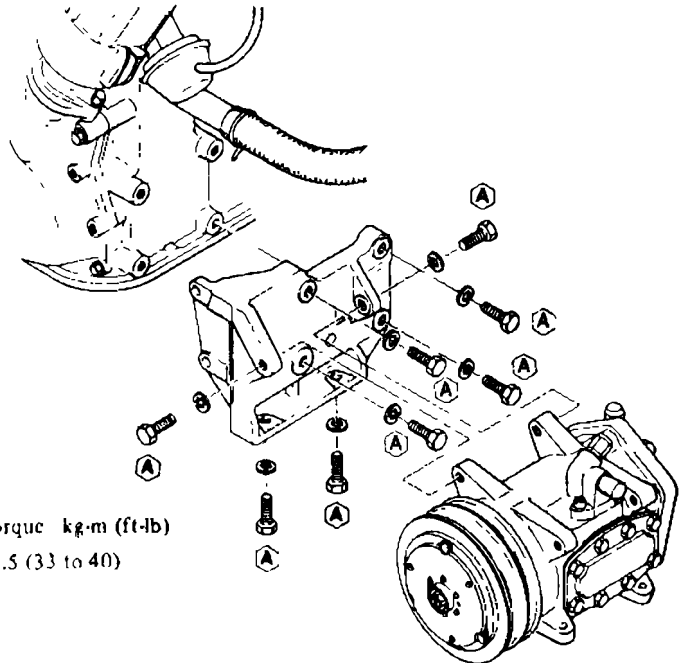
1. Oil in compressor to be installed should be equal in amount to what remained in compressor removed. New compressor contains prescribed amount of oil, before its installation, drain the excessive amount of oil.

2. Check tightening torque of bolt holding compressor bracket. Retighten bolt if necessary. See Figure AC-30.
3. Compressor plugs and flexible hose plugs should be kept in place until preparation of piping is completed.
4. Upon installation of compressor, turn compressor by hand a few turns.
5. As to tightening torque on piping

connection, refer to "Piping".

6. As to compressor drive belt tension, refer to "Idler Pulley and Compressor Drive Belt". Make sure that air pump drive belt and cooling fan belt have the specified deflection.

7. Evacuate and recharge system. Refer to "General Service" for "Evacuating and Charging System".



Tightening torque kg-m (ft-lb)

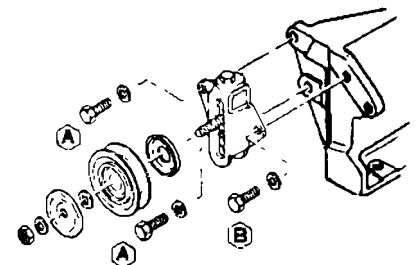
Ⓐ 4.5 to 5.5 (33 to 40)

AC791

Fig. AC-30 Compressor

8. Conduct leak test and make sure that there is no leak from connection.
9. Check air pump for operation. Make sure that hose piping of air pump is correctly connected.
10. Check engine idle speed.
11. Check "CO" percent at idle speed.

IDLER PULLEY AND COMPRESSOR DRIVE BELT



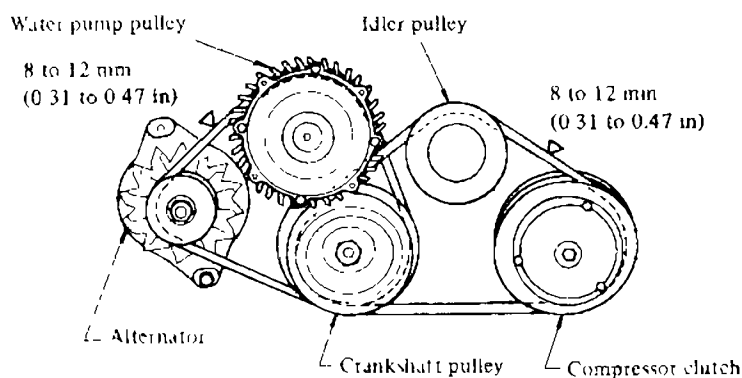
Tightening torque

Ⓐ: 0.9 to 1.2 kg-m
(6.5 to 8.7 ft-lb)

Ⓑ: 2.2 to 3.0 kg-m
(16 to 22 ft-lb)

AC792

Fig. AC-31 Idler pulley

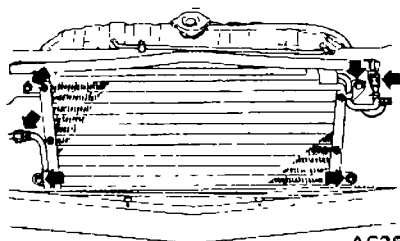


AC552

Fig. AC-32 Belt tension

ADJUSTMENT OF BELT TENSION

Normal compressor drive belt deflection is 8 to 12 mm (0.31 to 0.47 in) when moderate thumb pressure is applied midway between pulleys. Move idler pulley up or down by turning adjusting bolt to correct belt deflection.



AC262

Fig. AC-33 Removing condenser

CONDENSER

REMOVAL

1. Disconnect battery ground cable.
2. Remove engine hood.
3. Discharge system.
4. Remove air cleaner assembly and radiator expansion tank, and loosen air flow meter.
5. Disconnect inlet and outlet refrigerant lines from condenser.

CAUTION:

Pulge up all openings in condenser and system.

INSPECTION

Inspect joints of inlet and outlet pipes for cracks and scratches. Upon finding any problem which may cause gas to leak, repair or replace condenser.

Condenser fins or air passages clogged with dirt, insects or leaves will reduce cooling efficiency of condenser. In such a case, clean fins or air passages with compressed air.

CAUTION:

Do not clean condenser with steam. Be sure to use cold water or compressed air.

INSTALLATION

Installation of condenser is to be

done in reverse sequence of removal with notice paid to the following points:

1. When new condenser is replaced, be sure to add (0.31 to 0.47 in) of new oil thereto.
2. Keep piping plug in place immediately before piping work started.
3. As to tightening torque on connection, refer to "Piping".
4. As to evacuating and charging system, refer to "General Service".
5. Conduct leak test and make sure that there is no leak from condenser.

RECEIVER DRIER

REMOVAL AND INSTALLATION

1. Disconnect battery ground cable.
2. Discharge system. Refer to "General Service for Discharge System".
3. Disconnect pressure switch at connector.
4. Disconnect refrigerant line from receiver drier.

CAUTION:

Plug all pipe openings to entrance of dirt and moisture.

5. Remove receiver drier mounting screws and then remove receiver drier.
6. When replacing receiver drier with a new one, charge system with (0.31 to 0.47 in) of compressor oil.
7. Installation is to be done in reverse order of removal. With work taken off immediately before work is started, connect piping to receiver drier. As to tightening torque on piping, refer to "Piping".
8. As to evacuating and charging system, refer to "General Service".
9. Conduct leak test, and make sure that there is no leak from condenser.

PIPING

6. Remove four mounting bolts, then remove condenser from the car.

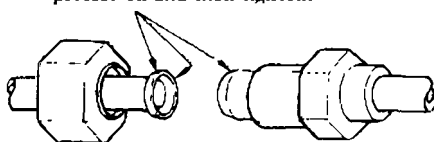
In replacing flexible hose and tube, be attentive to following points:

1. Before starting work, be sure to discharge system.
2. In disconnecting tubes, be sure to use two wrenches on both tubes.
3. Upon disconnecting tubes, plug all pipe openings immediately to prevent entrance of dirt and moisture.
4. Compressed air must never be used to clean dirty piping. Clean with refrigerant gas.
5. In connecting tubes, be sure to apply compressor oil to seating surface and then tighten tubes by prescribed tightening torque. See Figure AC-34.

CAUTION:

Be sure to use two wrenches when tightening a flare nut of tube.

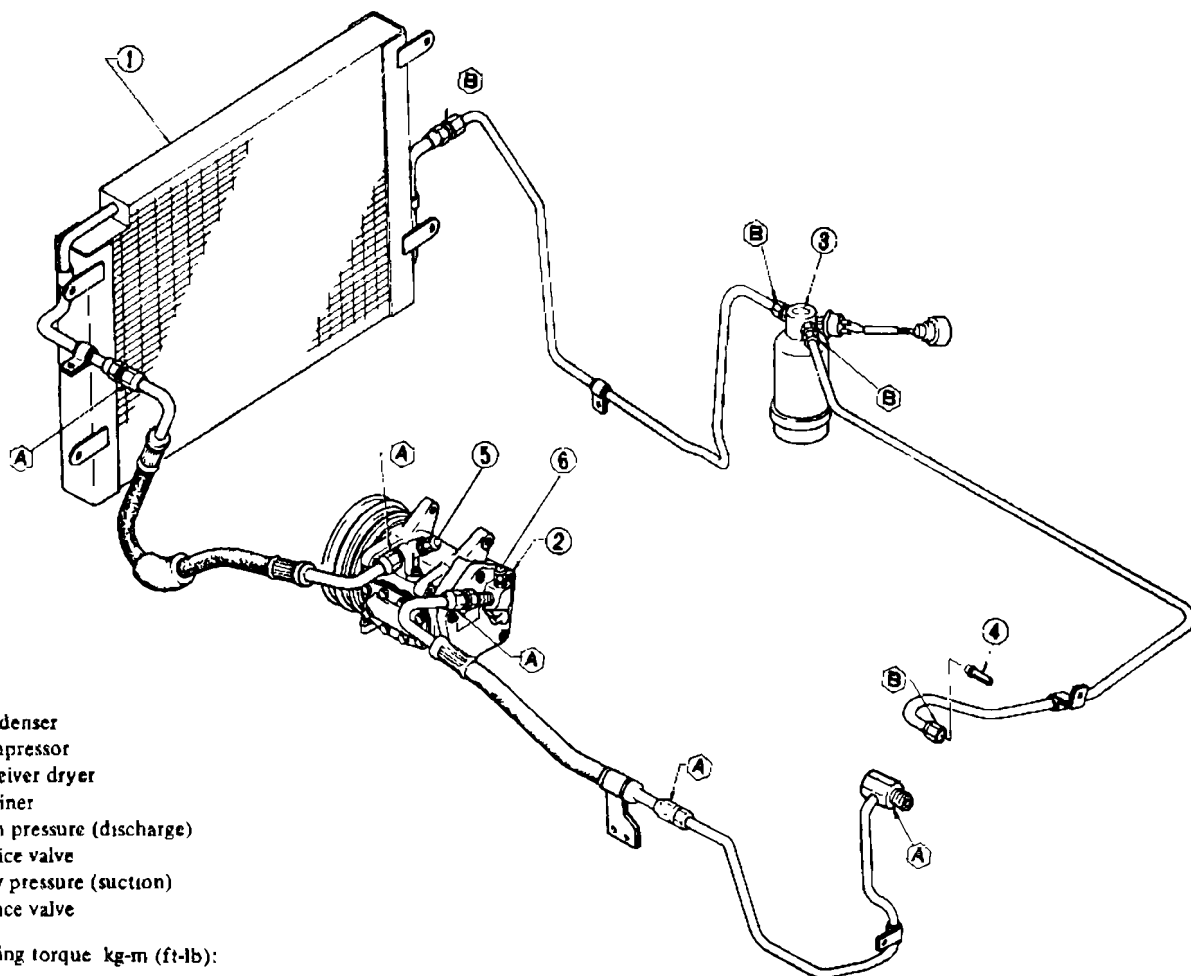
Coat seat surfaces with compressor oil and then tighten.



AC263

Fig. AC-34 Pipe connection

6. Make sure of proper clamping. Start engine and raise engine speed to inspect if there is vibration or unusual noise.
7. Conduct leak test and make sure that there is no leak from connection.
8. As to evacuating and charging system, refer to "General Service" for "Evacuating and Charging System".



- 1 Condenser
- 2 Compressor
- 3 Receiver dryer
- 4 Strainer
- 5 High pressure (discharge) service valve
- 6 Low pressure (suction) service valve

Tightening torque kg-m (ft-lb):

- Ⓐ: 4.5 to 5.0 (33 to 36)
 Ⓑ: 3.0 to 3.5 (22 to 25)

AC246A

Fig. AC-35 Refrigeration line

FAST IDLE ACTUATOR ADJUSTMENT OF IDLE SPEED

Engine model	Transmission	When A/C is OFF	When F.I.C.D is actuated
L28	Manual	800 rpm	800 rpm
	Automatic	700 rpm at "D" range	800 rpm at "N" range

The fast idle control device is used on car equipped with air conditioner to raise the idle speed automatically.

Use the following procedures when adjusting.

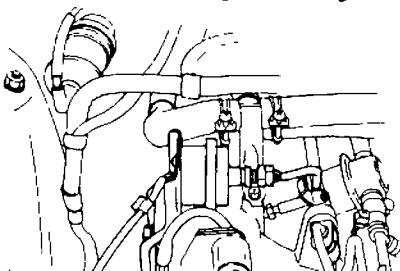
1. Run the engine until it reaches operating temperature.
2. With air conditioner in OFF (when compressor is not operated), make sure that engine is at correct idle speed
3. With air conditioner in ON (when F.I.C.D. is actuated), set the engine speed to 800 rpm using the following procedures as a guide.

(1) Adjust the F.I.C.D. lever stroke by means of length of lever until engine speed is 800 rpm.

On cars equipped with automatic transmission, make this adjustment with the shift control lever in the "N" position.

(2) Depress and release the accelerator pedal several times, and make sure that the engine speed reduces to 800 rpm as the pedal is released.

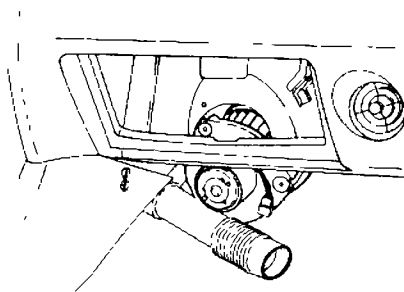
If correct adjustment is not made, repeat steps (1) and (2) above until the engine speed is 800 rpm at idling.



BLOWER MOTOR

REMOVAL AND INSTALLATION

1. Disconnect battery ground cable.
2. Remove glove box.
3. Remove defroster duct on the side of assistant's seat
4. Remove wiring connector of blower motor.
5. Remove three screws mounting blower motor, and take out motor from blower housing.



AC266

Fig. AC-37 Removing blower motor

Note:

- a. Between blower motor and blower housing are three spacers inserted. Be careful not to lose them.
- b. In removing blower motor, remember its direction carefully so that it is reinstalled properly.

AIR INTAKE DOOR ACTUATOR

REMOVAL AND INSTALLATION

1. Disconnect battery ground
2. Remove snap ring from actuator lever
3. Remove two mounting and actuator from air intake housing
4. Disconnect vacuum hose from actuator, and remove actuator.
5. Installation is to be done in reverse order of removal.

Note: Make sure that air intake door shuts off the outside air completely.

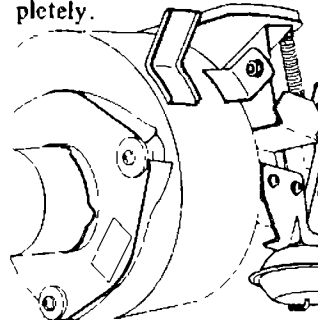
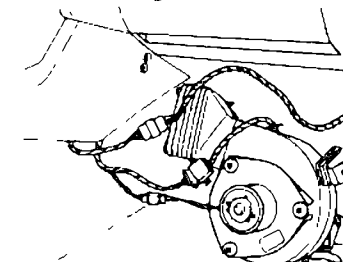


Fig. AC-38 Air intake door actuator

BLOWER HOUSING

REMOVAL AND INSTALLATION

1. Disconnect battery ground
2. Disconnect vacuum hose from intake door actuator.
3. Remove defroster duct located on the side of assistant's seat.
4. Remove two wiring connectors (one for blower motor, and the other for resistor).
5. Remove three bolts mounting blower housing assembly, one installed on upper side and two on lower side.
6. Remove blower housing from intake housing.



AC268

Fig. AC-39 Removing blower housing

VACUUM WATER COCK

REMOVAL AND INSTALLATION

1. Disconnect battery ground cable.
2. Drain engine coolant.
3. From engine compartment, remove inlet and outlet heater hoses by loosening clamps.
4. Remove blower housing as described under "Blower Housing".
5. Move "TEMP" control lever fully to "HOT" position.
6. Remove two hoses from heater cock by loosening clamps.
7. Remove two screws retaining heater cock to heater cock bracket, and remove heater cock.

Note: Make sure that capillary tube is neither twisted nor excessively bent.

8. Remove, at vacuum water cock, heater hose between heater core outlet and vacuum water cock.
9. Remove two screws from vacuum water cock and two screws from heater cock bracket.
10. Remove vacuum hose, and remove vacuum water cock and heater cock bracket as an assembly. Loosen screw securing vacuum water cock to heater cock bracket, and separate them.

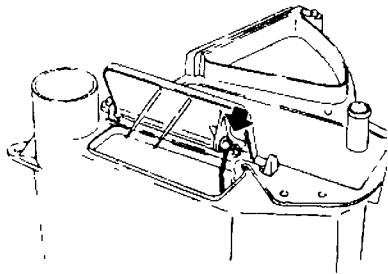
Remove heater hose from vacuum water cock.

11. Installation is in reverse order of removal.

HEATER CORE

REMOVAL AND INSTALLATION

1. Disconnect battery ground cable.
2. Drain engine coolant.
3. From engine compartment, remove inlet and outlet heater hoses by loosening clamps.
4. Remove blower housing as described under "Blower Housing".
5. Remove vacuum water cock as described under "Vacuum Water Cock".
6. Disengage control cable from heater door and remove heater door rod from heater door. See Figure AC-40.



BE020B

Fig AC 40 Removing heater door rod

7. Remove two screws from heater core side cover, and pull heater core out.

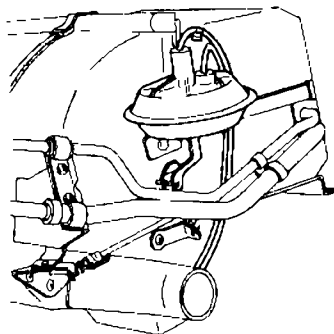
Note: When removing or installing core, keep heater door open; otherwise core will be damaged.

8. Unfasten clamps and remove heater hoses from heater core. Remove heater core side cover from core.
9. Installation is in reverse order of removal.

MODE DOOR ACTUATOR

REMOVAL AND INSTALLATION

1. Disconnect battery ground cable.
2. Remove two vacuum hoses from mode door actuator.
3. Remove snap ring from tip of actuator lever.
4. Remove two actuator mounting screws, and take out actuator.
5. Installation is in reverse sequence of removal.



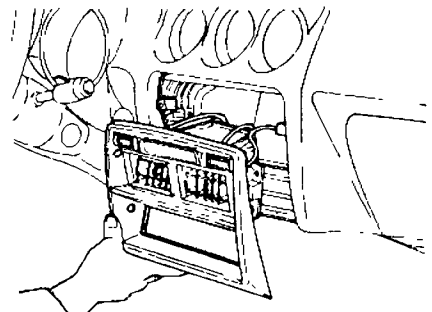
AC272

Fig. AC-41 Mode door actuator

CONTROL ASSEMBLY

REMOVAL AND INSTALLATION

1. Disconnect battery ground cable.
2. Remove console box.
3. Remove four screws retaining finisher, and pull out finisher forward. Disconnect wires at three (California models) or two (Non-California models) connectors, then remove finisher from instrument panel. See Figure AC-42.

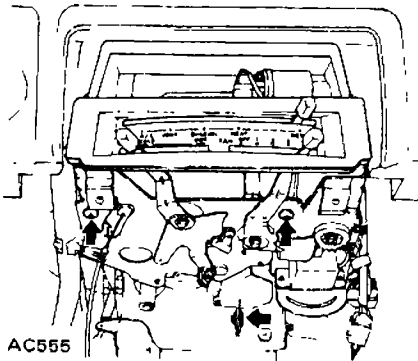


AC273

Fig AC-42 Removing finisher

4. Remove control cables from heater door and water cock.
5. Remove thermostat control rod from thermostat.
6. Remove four vacuum hoses from vacuum selector valve.
7. Remove three wire connectors of control assembly. (These connectors are for control panel illumination lamp, micro switch and fan speed switch.)
8. Remove two screws that retain control assembly to instrument panel reinforcement.
9. Remove four screws securing instrument panel reinforcement, and remove reinforcement.
10. Remove control assembly by removing two screws (upper side), "E"-ring (lower side). See Figure AC-43.

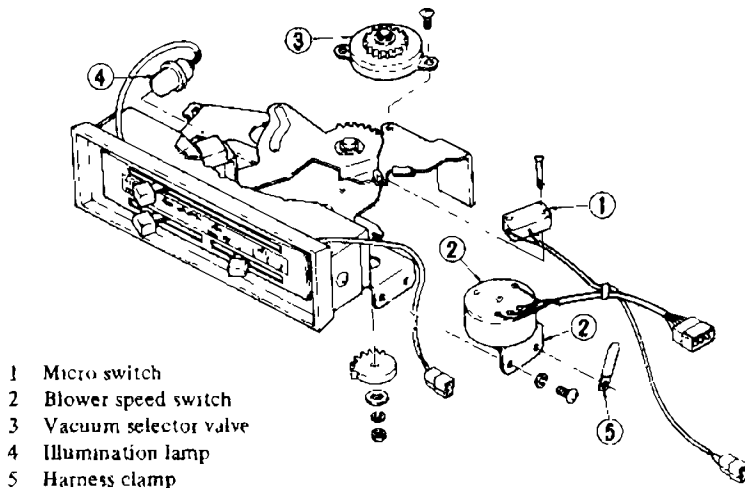
Air Conditioning



AC555

Fig. AC-43 Removing control assembly

DISASSEMBLY AND ASSEMBLY



AC556

- 1 Micro switch
- 2 Blower speed switch
- 3 Vacuum selector valve
- 4 Illumination lamp
- 5 Harness clamp

Fig AC-44 Exploded view of control assembly

ADJUSTMENT OF CONTROL CABLE

Heater door

Set AIR lever in DEF position. Hook control cable on heater door and fix cable with clamp so as to close heater door perfectly.

Water cock

Set TEMP lever in COLD position. Hook control cable on water cock and fix cable with clamp so as to get water cock closed completely.

Thermostat

Set TEMP lever in COLD position

11. In the reverse sequence of removal, reinstall control assembly.

As to adjustment of cable, refer to "Adjustment of Control Cable".

- As to connection of wiring harness, refer to "Wiring Harness Diagram".
- As to connection of vacuum hose, refer to "Vacuum Hose Diagram".

b. When bending capillary tube ensure that heater cock is full so as to prevent change in cock operation.

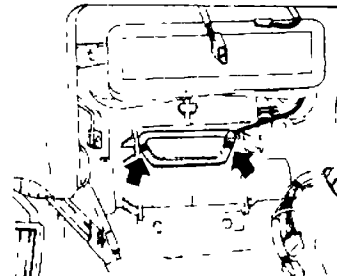


Fig. AC-45 Removing capillary

7. Remove heater hoses from cock by loosening clamps.

8. Remove two screws securing heater cock. Heater cock can be taken out.

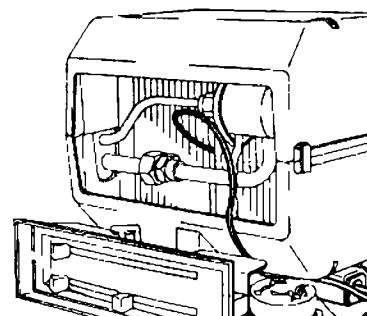
9. Installation is in reverse of removal.

THERMOSTAT REMOVAL AND INSTALLATION

1. Disconnect battery ground.
2. Remove console box.
3. Remove finisher. See AC-42.
4. Remove finisher bracket from 3-way air duct.
5. Remove control rod of thermostat.
6. From evaporator housing, remove thermostat together with bracket taking off two mounting screws.
7. Remove thermostat wiring at connector.
8. Pull out capillary tube from evaporator core and then take out thermostat.

CAUTION:

Capillary tube should not be bent sharply.



HEATER COCK REMOVAL AND INSTALLATION

1. Disconnect battery ground cable.
2. Drain engine coolant.
3. Remove blower housing as described under "Blower Housing".
4. Remove control assembly as described under "Control Assembly".
5. Remove four screws securing heater bracket to heater unit, and remove bracket.
6. Remove two screws securing capillary tube bracket to heater unit, and remove capillary tube.

Note:

1. Make sure that capillary tube is

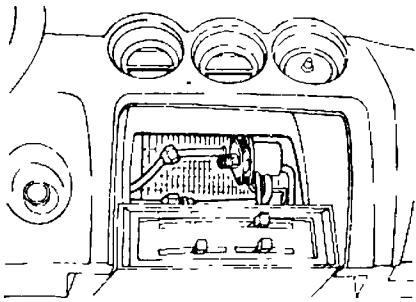
9. Installation is in reverse order of removal.

Capillary tube should be inserted by prescribed length in original position. Length to be inserted is 50 to 70 mm (1.97 to 2.76 in).

EXPANSION VALVE

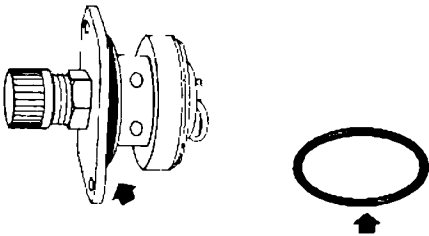
REMOVAL

1. Disconnect battery ground cable.
2. Discharge system.
3. Remove finisher. See Figure AC-42.
4. Remove finisher brackets and 3-way air duct.
5. Remove tube from expansion valve by removing flare nut.
6. Remove two mounting nuts, and pull out valve from expansion valve case. See Figure AC-47.



AC277

Fig. AC-47 Removing expansion valve



AC278

Fig AC-48 O-ring

INSTALLATION

1. Replace two O-rings with new ones.
2. Apply adequate compressor oil to new O-rings, and install them on expansion valve
3. Fit expansion valve to case, and install bolts and nuts thereon.

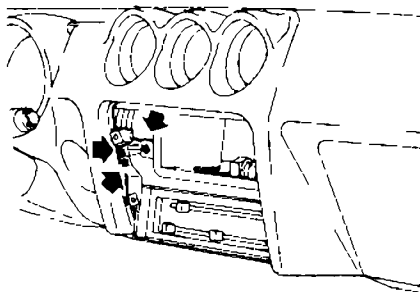
Note: In inserting valve into case, be sure to insert it parallelly to case without turning it. Never twist valve in the case, otherwise O-ring will be caused to twist.

4. Tighten two mounting nuts horizontally.
5. Connect tube to expansion valve.
6. Work that follows is to be done in reverse order of removal.
7. Lastly, evacuate and recharge system. As to evacuating and charging system, refer to "Evacuating and Charging System".
8. Conduct leak test and ensure that there is no leak from connection.

EVAPORATOR HOUSING

REMOVAL

1. Disconnect battery ground cable.
2. Discharge system.
3. Remove console box.
4. Remove finisher. See Figure AC-42.
5. Remove two retaining screws of 3-way air duct.
6. Remove finisher brackets and instrument panel reinforcement. See Figure AC-49.



AC279

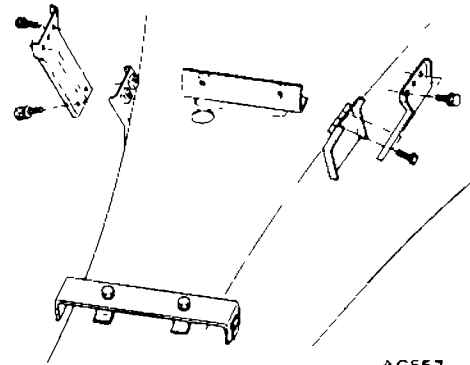
Fig. AC-49 Removing finisher brackets

7. From 3-way air duct, remove air ducts, then pull out 3-way air duct.
8. Disconnect both inlet and outlet tubes of evaporator.

CAUTION:

Upon disconnection of tubes, put plugs in their openings to keep dust and moisture out.

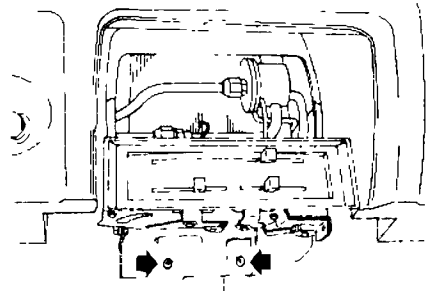
9. Remove retaining screw, grommet cover and grommet from tubes of evaporator.
10. Remove defroster ducts.
11. Remove instrument panel center stays. See Figure AC-50



AC557

Fig AC-50 Removing instrument panel center stays

12. Remove drain hose.
13. Remove brackets, installed on heater unit, of evaporator inlet and outlet tubes by removing two attaching screws.
14. Remove control cables from heater door and heater cock.
15. Remove four vacuum hoses from vacuum selector valve.
16. Remove four wiring connectors (for control panel illumination lamp, micro switch, fan speed switch and thermostat respectively).
17. Remove two attaching bolts installed on lower side of evaporator housing, and let evaporator housing fall down. See Figure AC-51
18. Pull out evaporator housing when it has come off bracket installed on heater unit.



AC281

Fig. AC-51 Removing evaporator housing

19. Separate control assembly from evaporator housing.

Air Conditioning

DISASSEMBLY AND ASSEMBLY

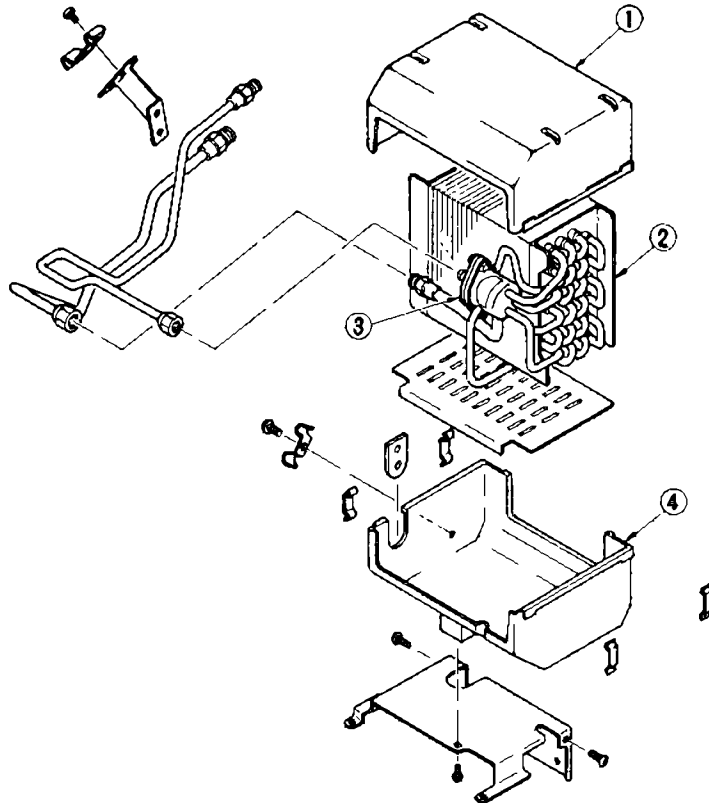
1. Remove four fixing clips of upper and lower cases.

2. Pull up upper case and separate it from lower case.

3. Cut off sealing packing with knife at the conjunction of cases.

4. Pull out thermostat capilla from evaporator core.

5. Pull out evaporator core from lower case.



- 1 Upper case
- 2 Evaporator core
- 3 Expansion valve
- 4 Lower case

AC282

Fig. AC-52 Exploded view of evaporator

INSPECTION

In case evaporator core or expansion valve have gas leaking, repair or replace it with a new one as necessary.

Dirt and nicotine accumulation on evaporator housing will go bad and smell. This means that you have to remove them from time to time to assure healthful fresh air inside car.

INSTALLATION

Installation should be done in reverse order of removal, with attention paid to following points:

1. When replacing evaporator with a new one, add 28 g (1 oz) of new compressor oil to new evaporator.
2. As to adjustment of cable, refer to "Adjustment of Control Cable" in "Control Assembly".

4. As to vacuum hose connection, refer to "Vacuum Hose Diagram".

5. As to evacuating and charging system, refer to section concerned in "General Service".

6. Conduct leak test and ensure that there is no gas leak from connection.

HEATER UNIT

REMOVAL

1. Disconnect battery ground cable.
2. Drain engine coolant.
3. Discharge system.
4. Remove hose clamp and disconnect heater hose from inlet and outlet tubes of heater unit.
5. Remove screw, grommet cover and grommet from tubes of heater unit.
6. Disconnect evaporator's inlet and outlet tubes.

evaporator.

8. Remove console box.

9. Remove finisher. See Figure AC-42.

10. Remove instrument panel reinforcement and finisher bracket.

11. Remove 3-way air duct. See Figure AC-49.

12. Remove glove box.

13. Remove blower housing. See Figure AC-49.

14. Remove evaporator housing. See Figure AC-52.

15. In engine compartment, remove two mounting nuts of heater unit.

16. In passenger compartment, remove heater unit mounting bolts. Remove each on upper and lower side. See Figure AC-53.

17. Remove brackets on upper and lower side of heater unit.

Slide heater unit out slightly.

INSTALLATION

1. Slightly insert heater unit into opening in instrument panel with heater cock facing toward engine, and turn it 90° until piping holes align properly. Be sure to remove upper brackets when inserting heater unit.
2. Tilting heater unit, fix upper bracket on side of driver's seat, and then that on side of assistant's seat.
3. Insert two vacuum hoses in mode door actuator.
4. Insert heater unit mounting bolts in dash panel, and temporarily put nuts on them from side of engine compartment.
5. On side of passenger compartment temporarily tighten two upper

attaching bolts.

6. Tighten two lower attaching bolts. Then tighten up other bolts and nuts which have been temporarily installed.
7. Install evaporator housing with control assembly.
8. Install blower housing.
9. Remaining work is to be done in reverse sequence of removal.
10. As to adjustment of cable, refer to "Adjustment of Control Cable" in "Control Assembly".
11. As to wiring harness connection, refer to "Wiring Harness Diagram".
12. As to vacuum hose connection, refer to "Vacuum Hose Diagram".
13. As to evacuating and charging

system, refer to section concerned in "General Service".

14. Conduct leak test and insure that there is no gas leak from connection.

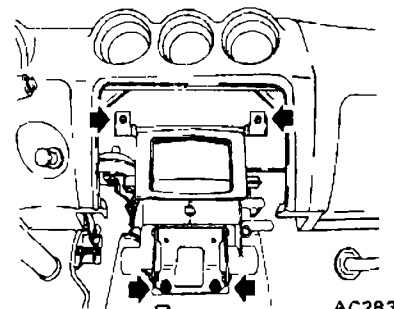
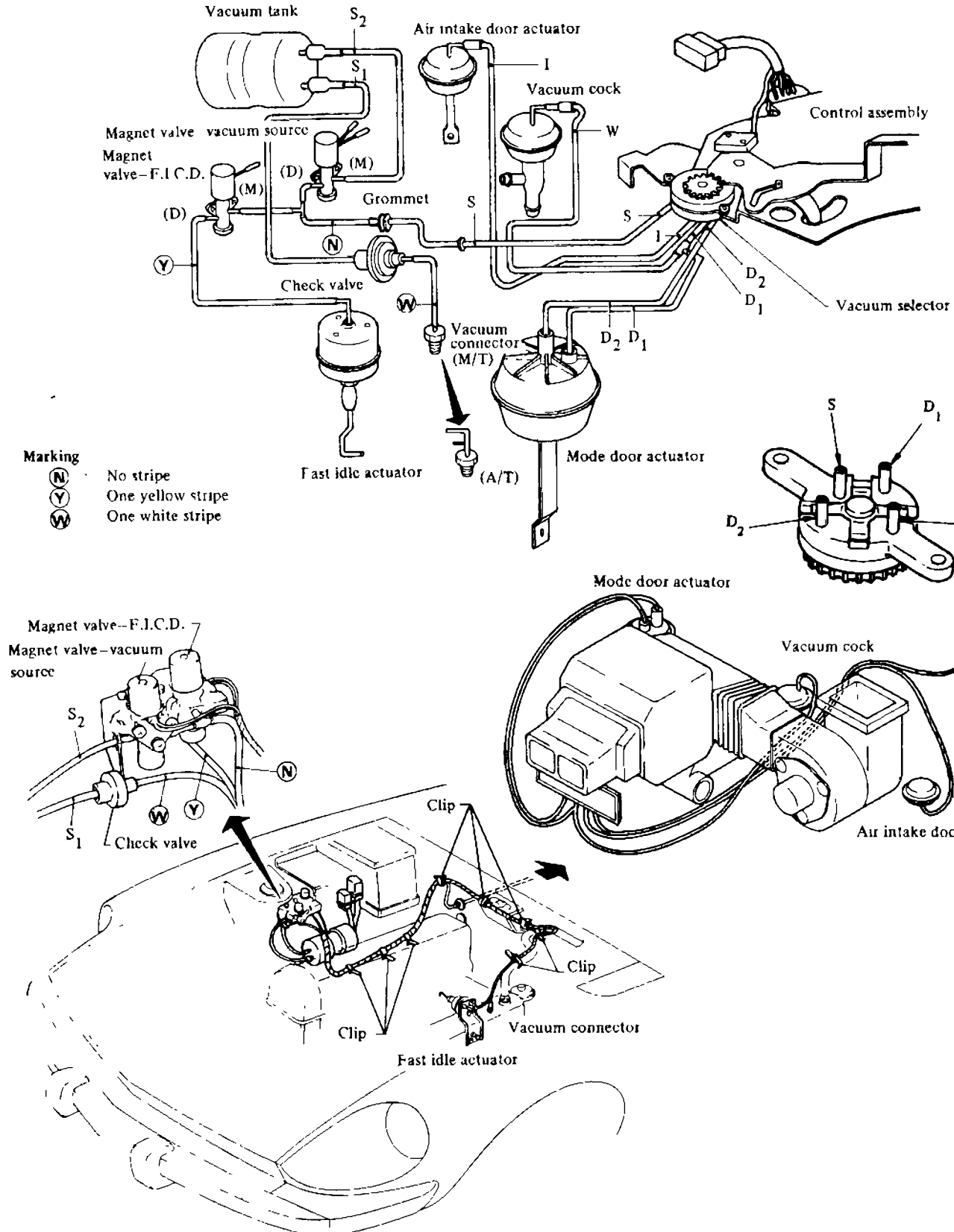
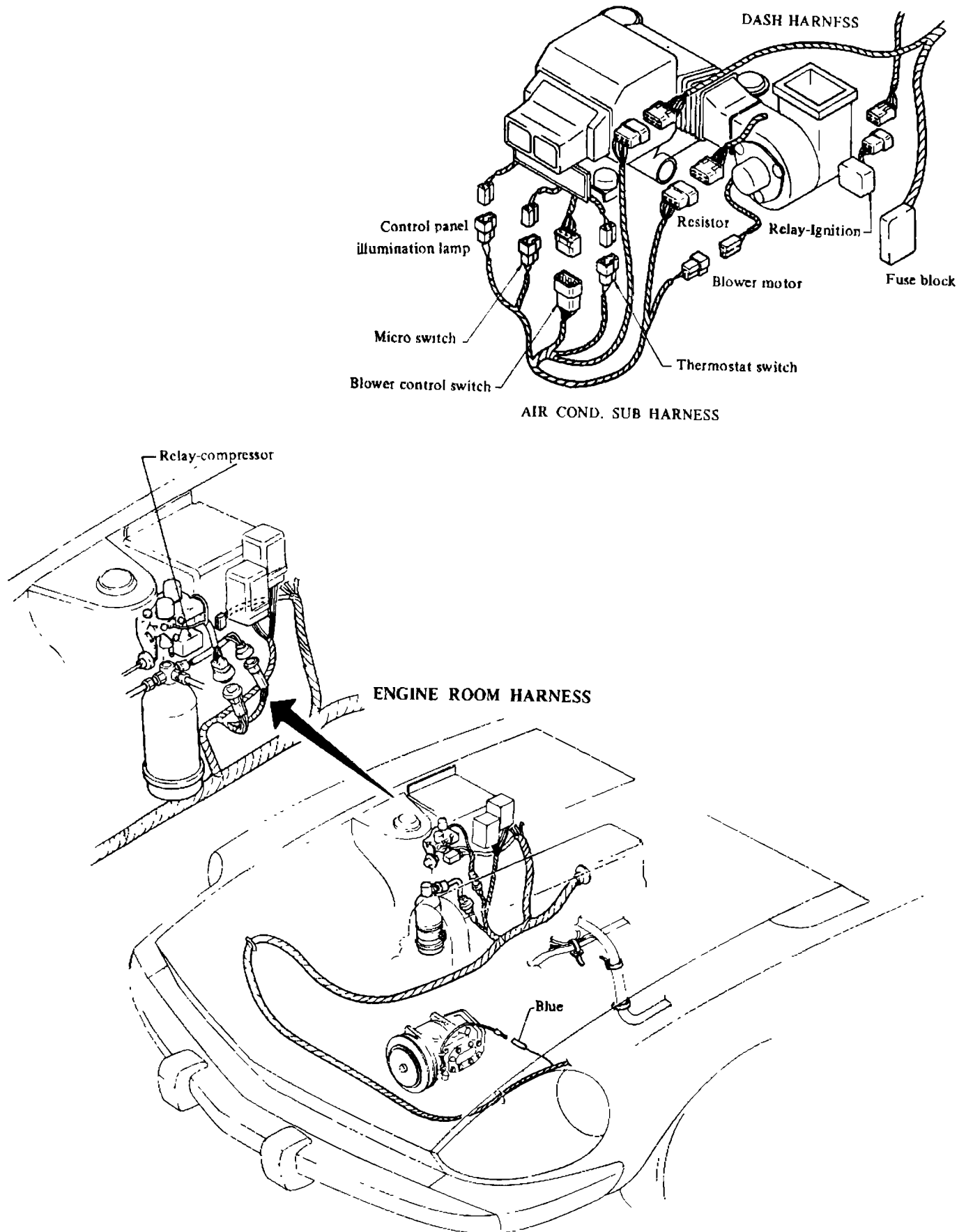


Fig. AC-53 Removing heater unit

VACUUM HOSE DIAGRAM



WIRING HARNESS DIAGRAM

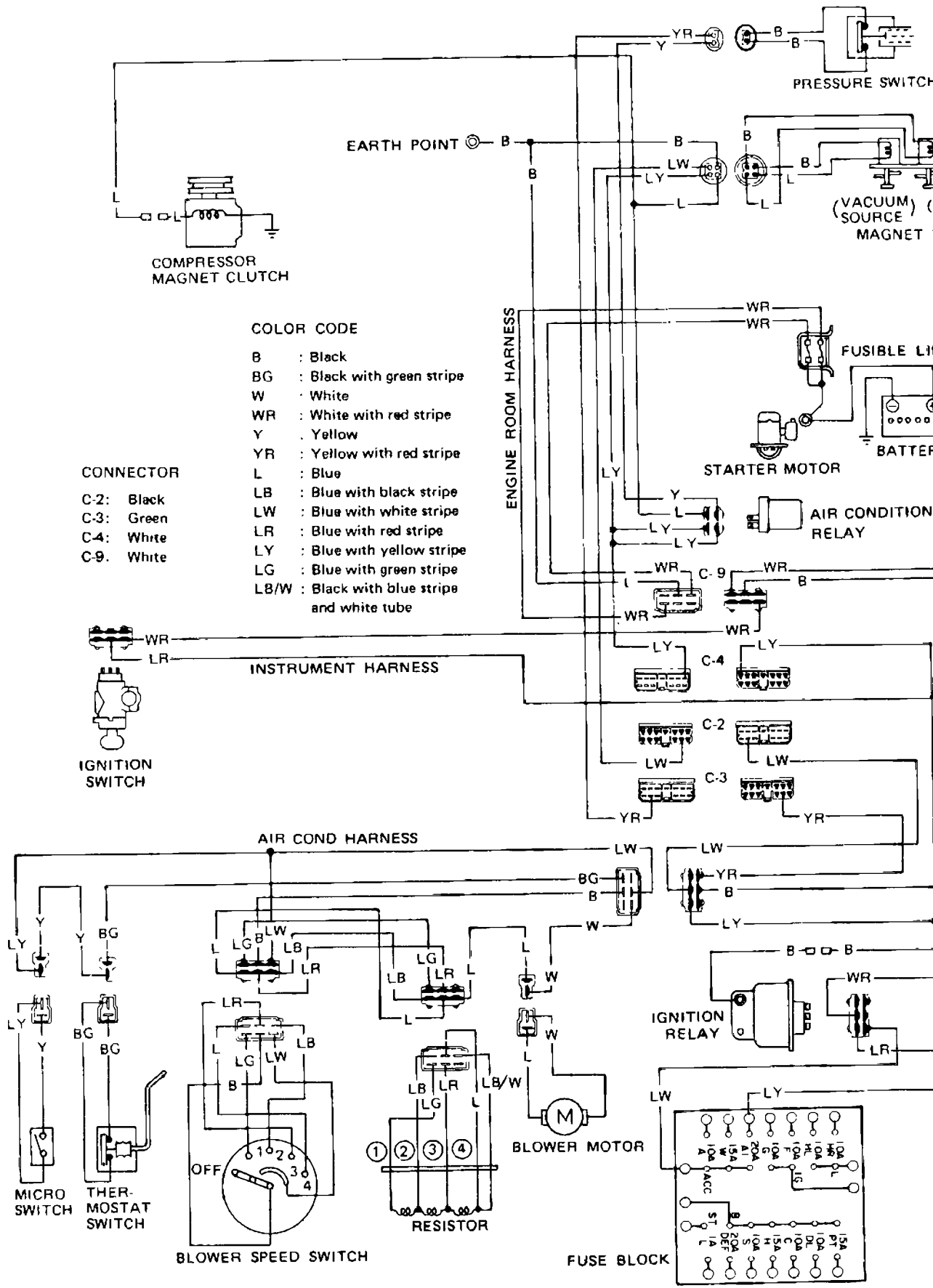


AC225A

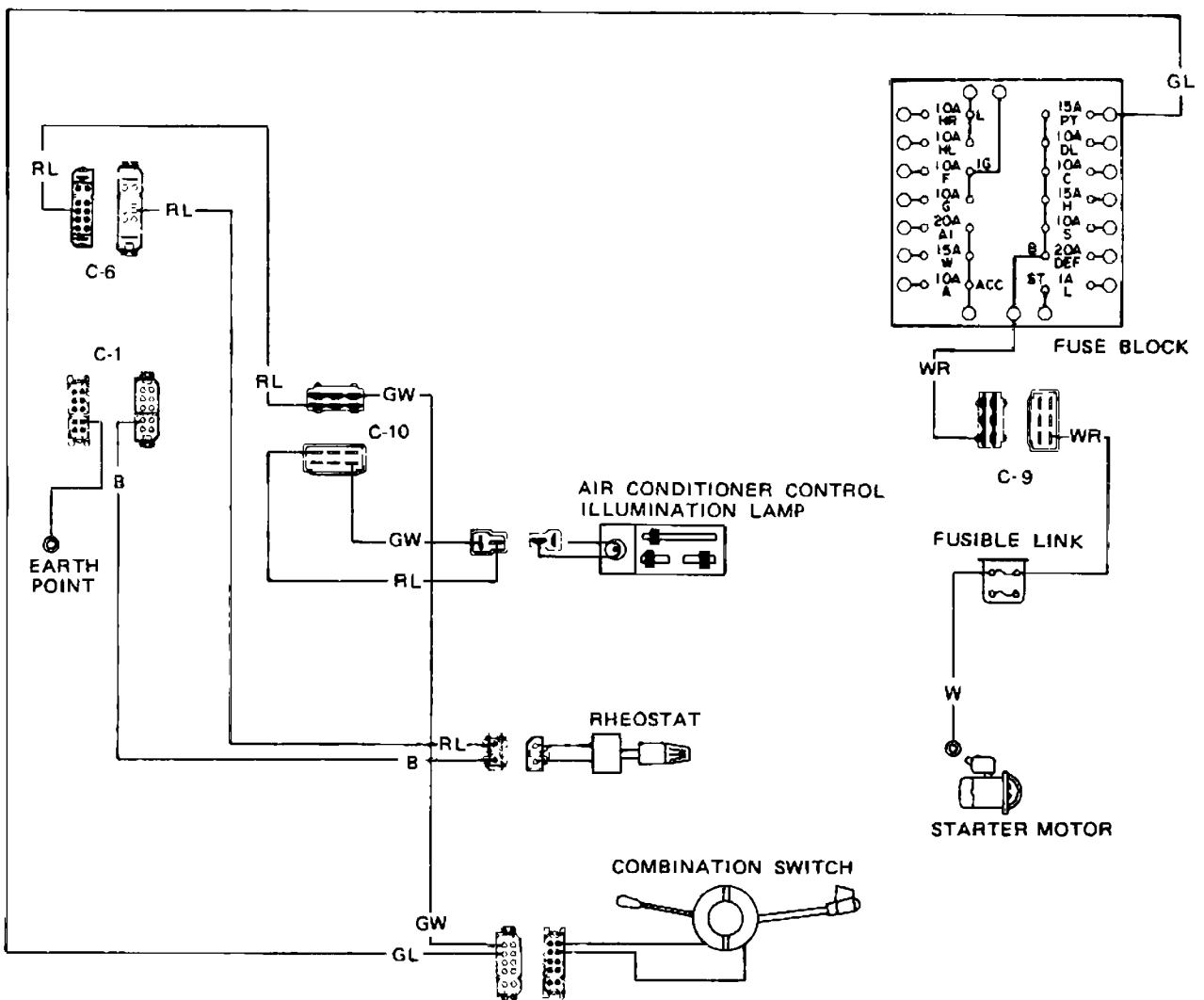
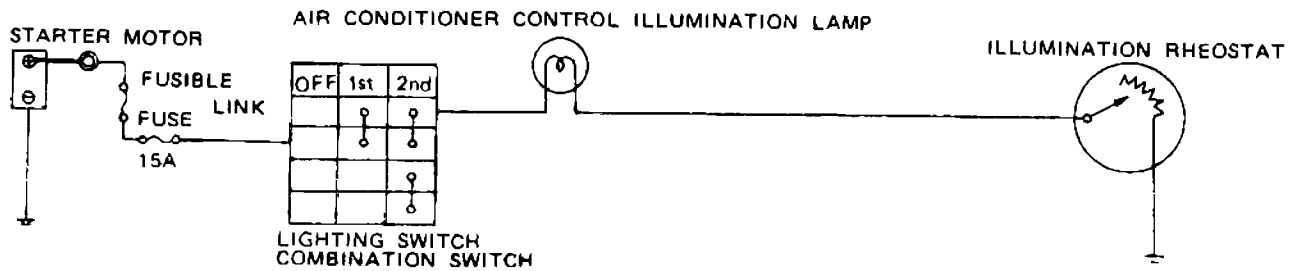
Fig. AC-55 Wiring harness diagram

Air Conditioning

CIRCUIT DIAGRAM FOR AIR CONDITIONER



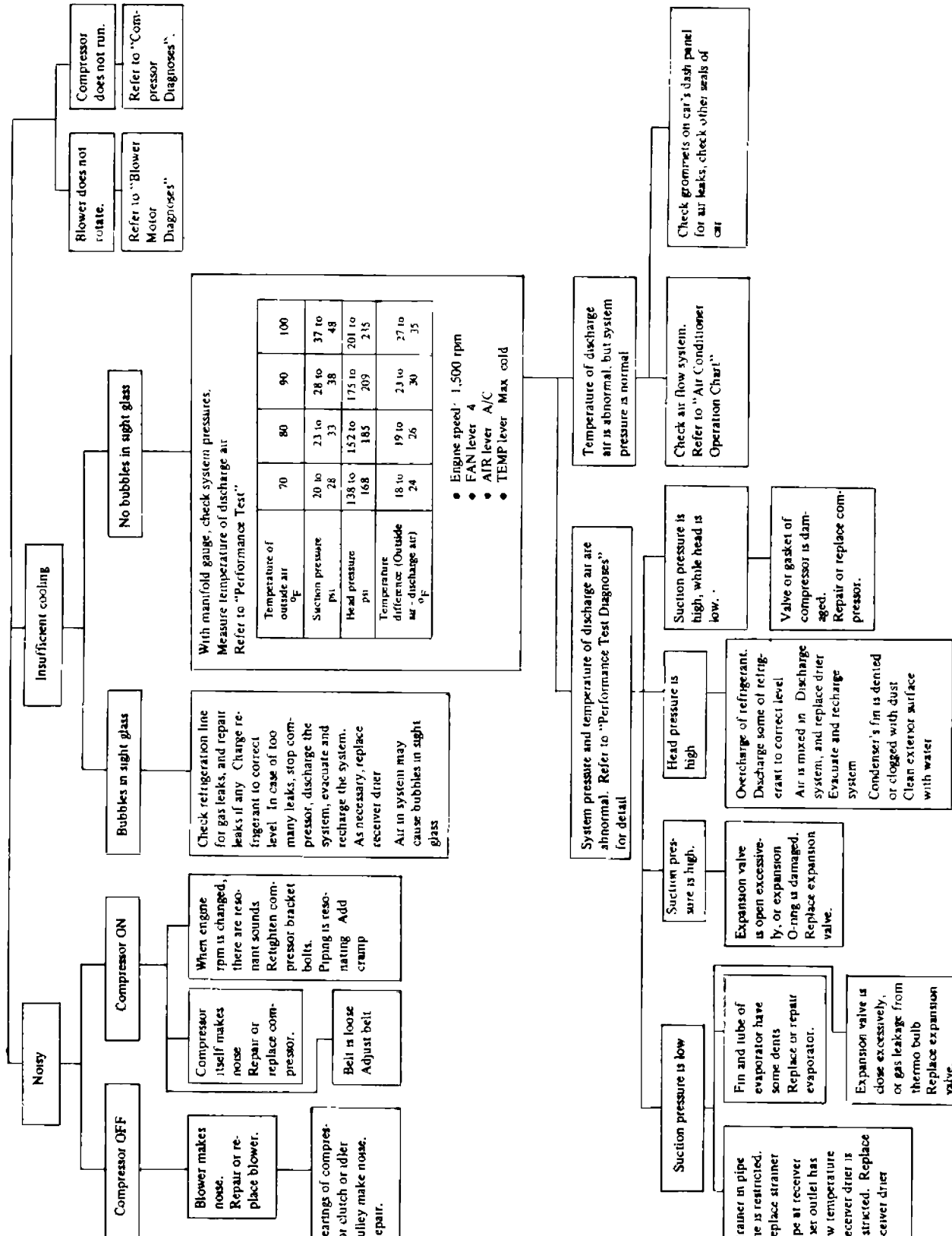
CIRCUIT DIAGRAM FOR ILLUMINATION LAMP



COLOR CODE

CONNECTOR	B : Black
	W : White
C-1: Blue	WR : White with red stripe
C-6: Black	RL : Red with blue stripe
C-9: White	GW : Green with white stripe
C-10: White	GL : Green with blue stripe

TROUBLE DIAGNOSES AND CORRECTIONS AIR CONDITIONER DIAGNOSES



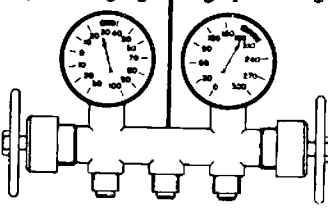
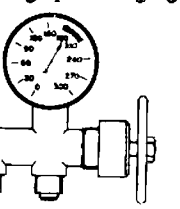
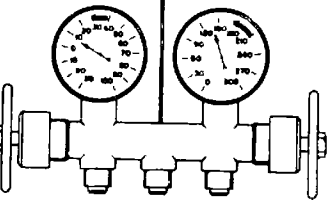
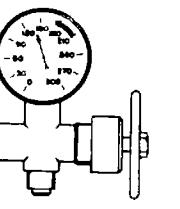
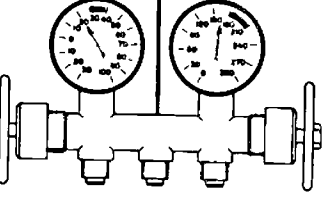
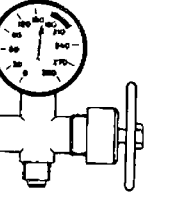
PERFORMANCE TEST DIAGNOSES

Of various conditions caused to the air conditioning system, the characteristics revealed on manifold gauge readings are shown in the following.

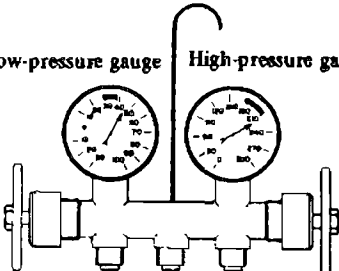
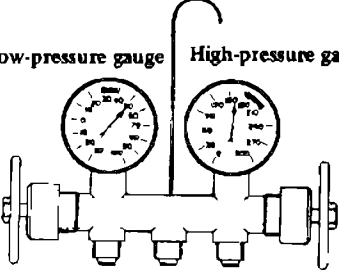
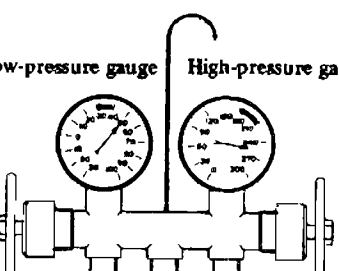
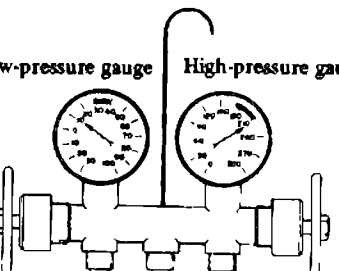
As to the method of a performance test, refer to the item of "Performance Test".

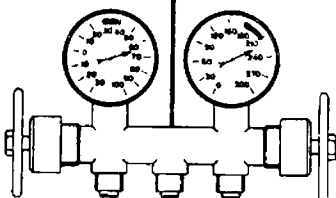
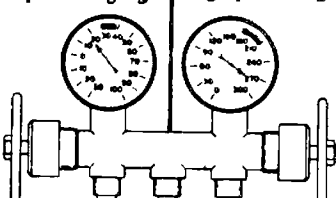
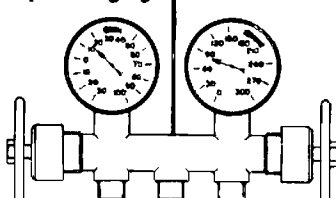
Each shaded area on the following

tables indicates a reading of the normal system when the temperature of outside air is 32.5°C (90°F).

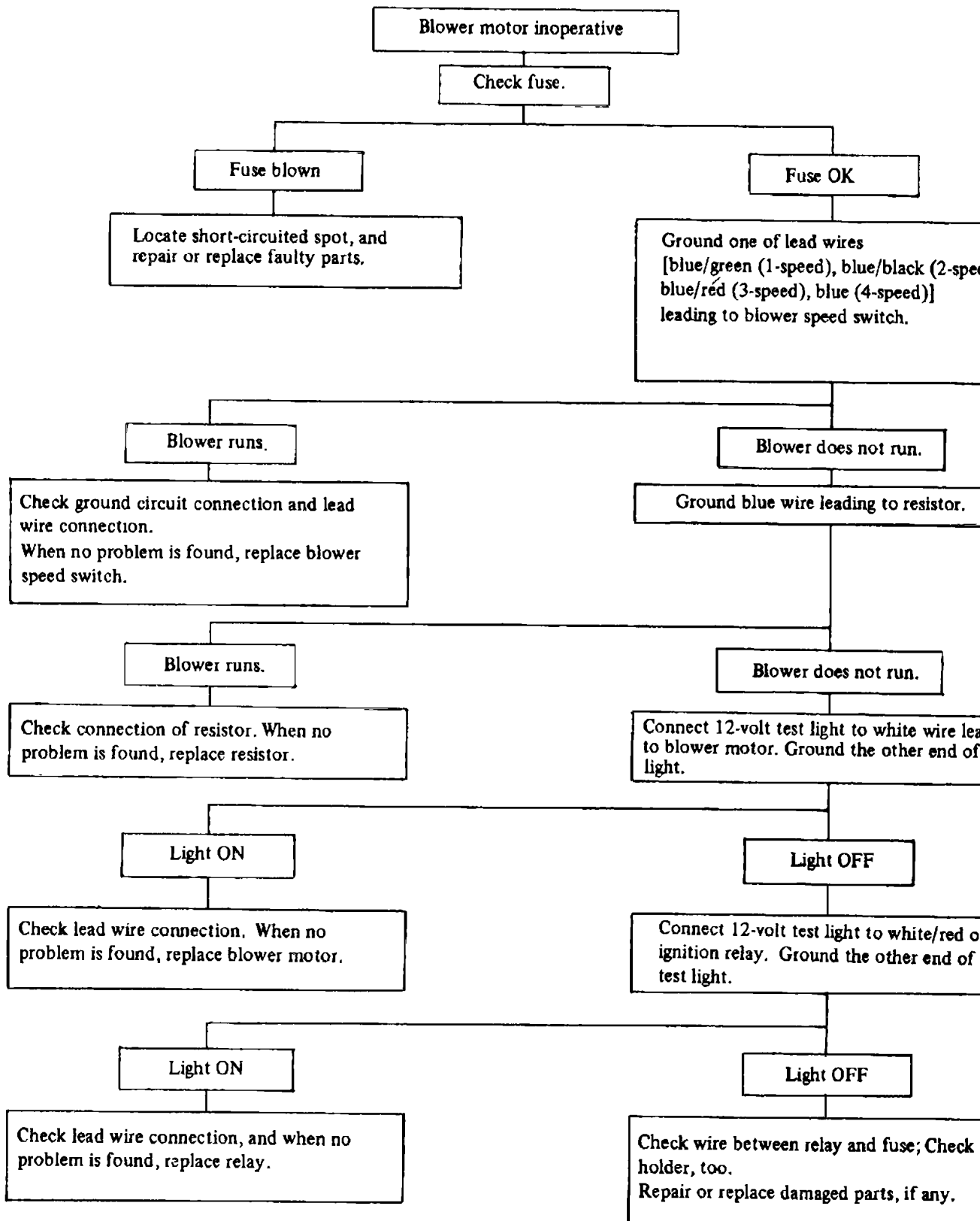
Condition	Probable cause	Corrective action
INSUFFICIENT REFRIGERANT CHARGE Low-pressure gauge  High-pressure gauge  AC287	Insufficient cooling. Bubbles appear in sight glass. Refrigerant is small, or leaking a little.	1. Leak test. 2. Repair leak. 3. Charge system. Note: Evacuate, as necessary, and recharge system.
ALMOST NO REFRIGERANT Low-pressure gauge  High-pressure gauge  AC288	No cooling action. In sight glass appear a lot of bubbles or something like mist. Serious refrigerant leak.	Stop compressor immediately. 1. Leak test. 2. Discharge system. 3. Repair leak(s). 4. Replace receiver drier if necessary. 5. Check oil level. 6. Evacuate and recharge system.
FAULTY EXPANSION VALVE Low-pressure gauge  High-pressure gauge  AC289	Slight cooling. Sweating or frosted expansion valve inlet. Expansion valve restricts refrigerant flow. • Expansion valve is clogged. • Expansion valve is inoperative. Valve stuck closed. Thermal bulb has lost charge.	If valve inlet reveals sweat or frost: 1. Discharge system. 2. Remove valve and clean it. Replace it if necessary. 3. Evacuate system. 4. Charge system. If valve does not operate: 1. Discharge system. 2. Replace valve. 3. Evacuate and charge system.

Air Conditioning

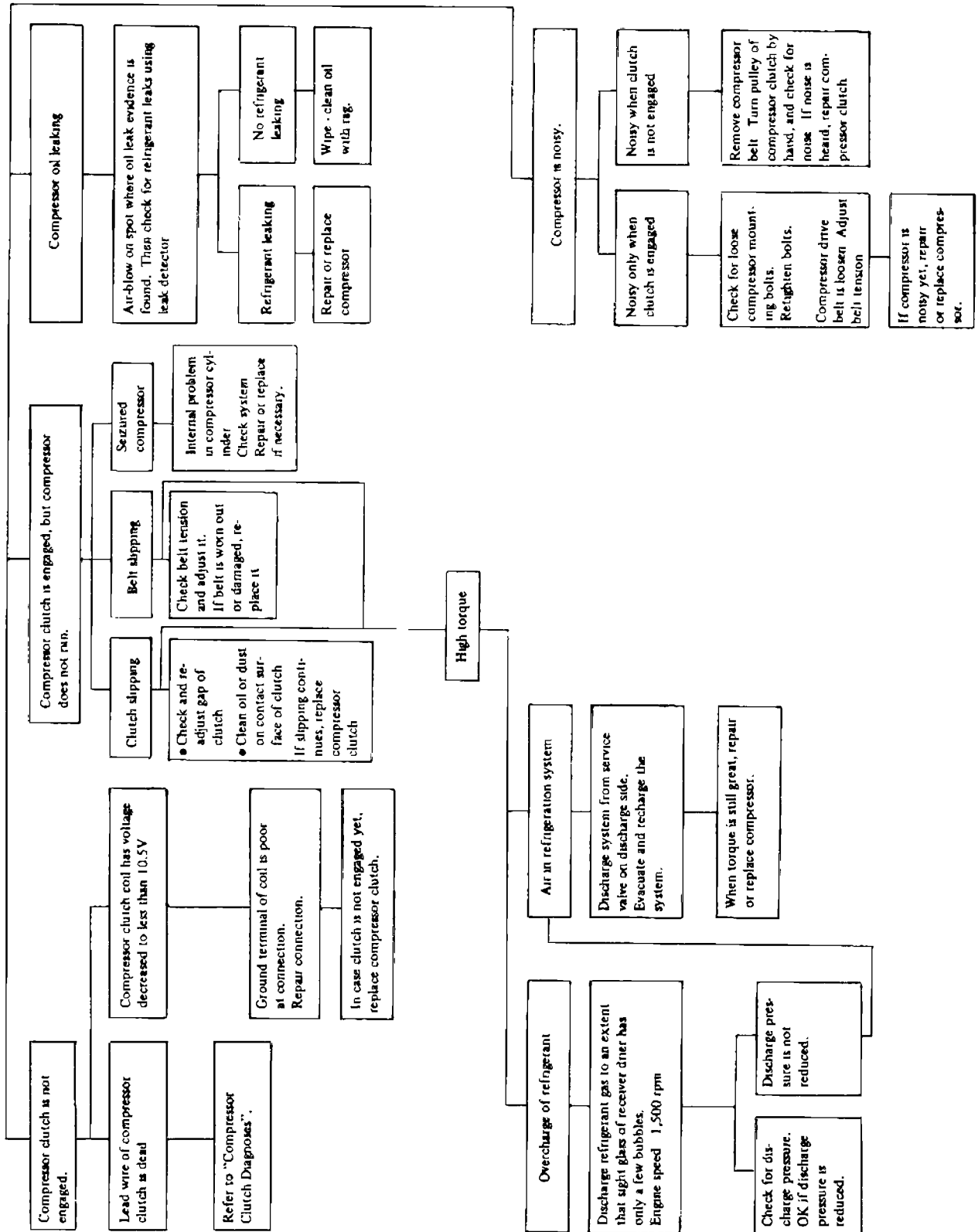
Condition	Probable cause	Corrective action
Low-pressure gauge High-pressure gauge  AC290	Insufficient cooling. Sweated suction line.	Expansion valve allows too much refrigerant through evaporator. Check valve for operation. If suction side does not show a pressure decrease, replace valve.
Low-pressure gauge High-pressure gauge  AC291	No cooling. Sweating or frosted suction line.	Faulty seal of O-ring in expansion valve. 1. Discharge system. 2. Remove expansion valve and replace O-ring. 3. Evacuate and recharge system.
AIR IN SYSTEM Low-pressure gauge High-pressure gauge  AC292		
MOISTURE IN SYSTEM Low-pressure gauge High-pressure gauge  AC293	After operation for a while, pressure on suction side may show vacuum pressure reading. During this condition, discharge air will be warm. As warning of this, reading shows 0.4 kg/cm² (6 psi) vibration.	Drier is saturated with moisture. Moisture has frozen at expansion valve. Refrigerant flow is restricted. 1. Discharge system. 2. Replace receiver drier (twice if necessary). 3. Evacuate system completely. (Repeat minute evacuating times.) 4. Recharge system.

Condition	Probable cause	Corrective action
FAULTY CONDENSER  Low-pressure gauge High-pressure gauge AC294 No cooling action: engine may overheat. Bubbles appear in sight glass of drier. Suction line is very hot.	Condenser is often found not functioning well.	● Check fan belt and fluid coupling. ● Check condenser for dirt accumulation. ● Check engine cooling system for overheat. ● Check for refrigerant overcharge. Note: If pressure remains high in spite of all above actions taken, remove and inspect the condenser for possible oil clogging.
HIGH PRESSURE LINE BLOCKED  Low-pressure gauge High-pressure gauge AC295 Insufficient cooling. Frosted high pressure liquid line.	Drier clogged, or restriction in high pressure line.	1. Discharge system. 2. Remove receiver drier or strainer and replace it. 3. Evacuate and charge system.
FAULTY COMPRESSOR  Low-pressure gauge High-pressure gauge AC296 Insufficient cooling.	Internal problem in compressor, or damaged gasket and valve.	1. Discharge system. 2. Remove and check compressor. 3. Repair or replace compressor. 4. Check oil level. 5. Replace receiver drier. 6. Evacuate and charge system.

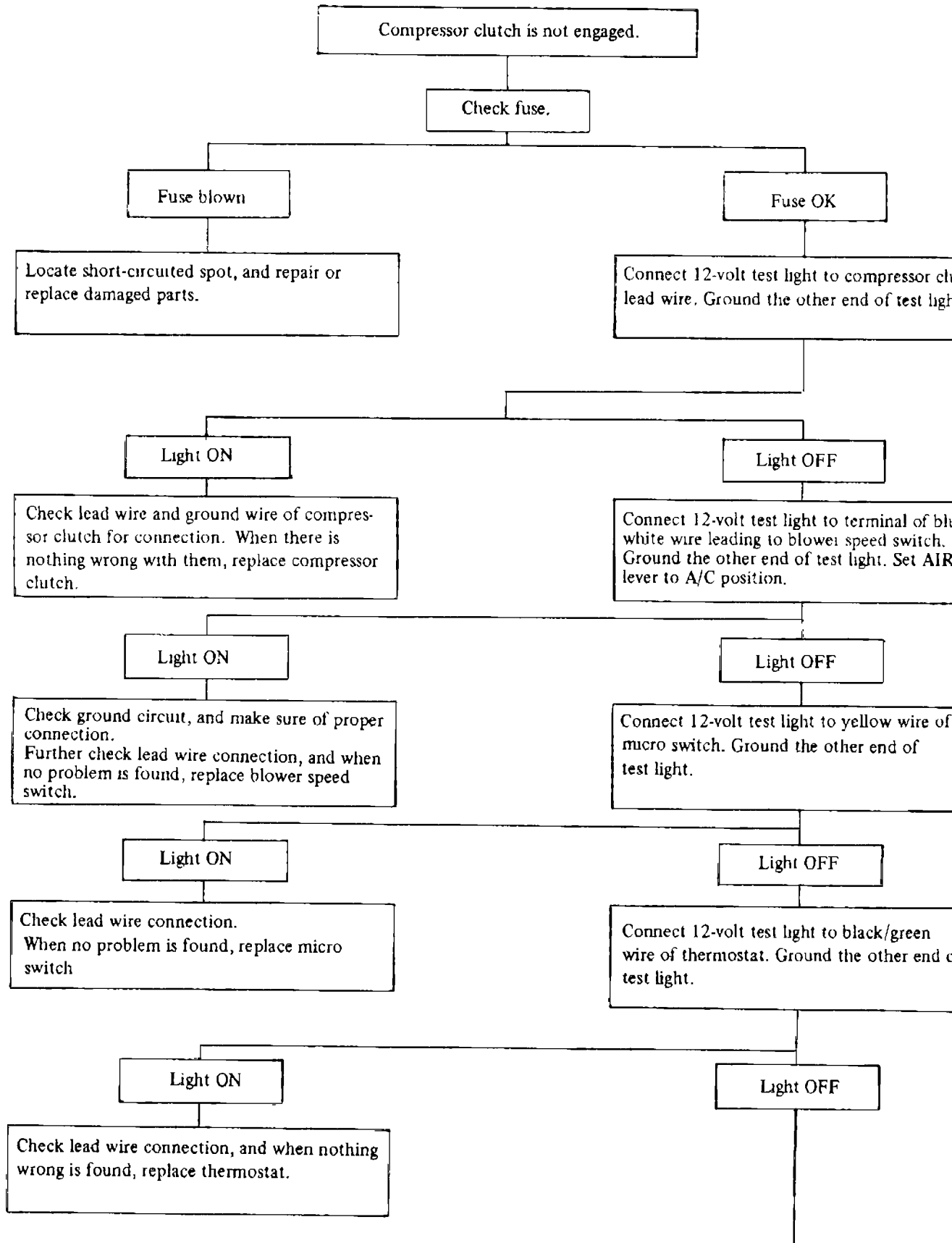
BLOWER MOTOR DIAGNOSES

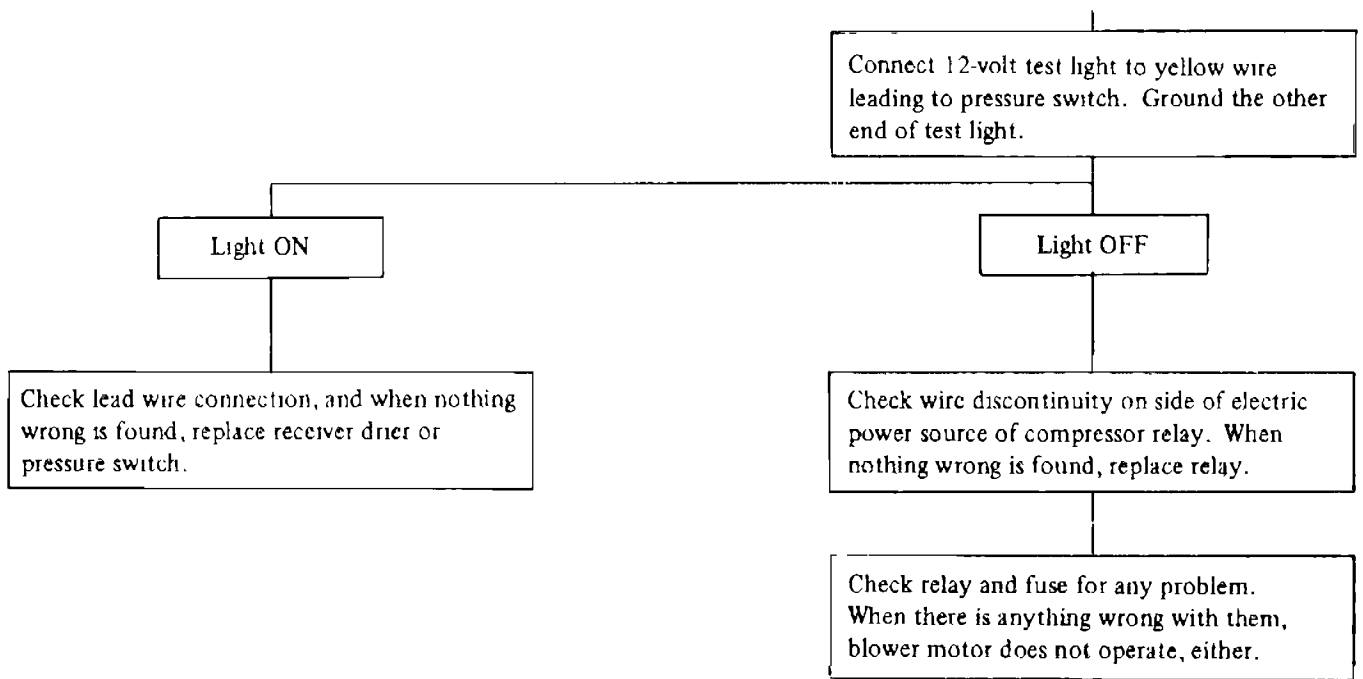


COMPRESSOR DIAGNOSES



COMPRESSOR CLUTCH DIAGNOSES





Air Conditioning

AIR CONDITIONER OPERATION CHART

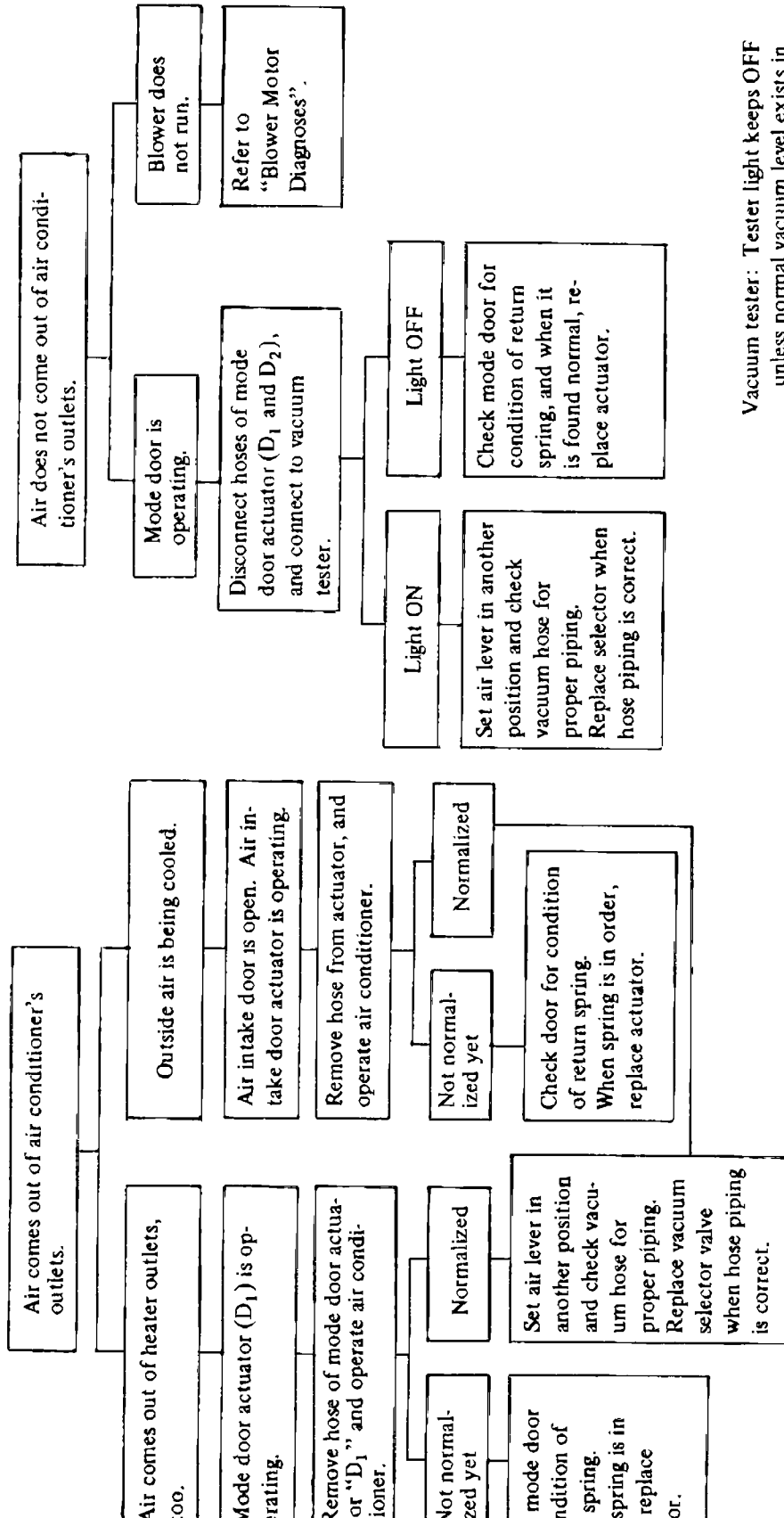
Control lever position			Operation	
AIR lever	FAN lever	TEMP lever	Item	Correct action
A/C Engine at idle	1 to 4	Cold	Discharge air Air intake door Mode door Air temperature Vacuum cock FICD Magnet valve Compressor Magnet clutch	Instrument – 100% Vacuum – OFF (Position of isolate outside air) Vacuum – OFF Cold Vacuum – OFF Vacuum – ON *1 Current – ON *1 ON *1 Current – ON *1 *1 – (May be on or off by switching thermostat on or off)
	OFF	Cold	Blower motor FICD Magnet valve Compressor Magnet clutch	OFF Vacuum – OFF Current – OFF OFF Current – OFF
VENT Engine at idle	1 to 4	At any position	Discharge air Air intake door Mode door Air temperature Vacuum cock Magnet valve	Instrument – 100% Vacuum – ON (Position of admit outside air) Vacuum – OFF Same as outside air Vacuum – OFF Current – ON
BI-LEVEL Engine at idle	1 to 4	Hot ↓ Cold	Discharge air Air intake door Mode door Air temperature Vacuum cock Water cock Magnet valve	Floor & Instrument Vacuum – ON (Position of admit outside air) Vacuum – ON (1 step) Floor – warm → cool Instrument – same as outside air Vacuum – ON Open → closed Current – ON

Air Conditioning

Control lever position			Operation	
AIR lever	FAN lever	TEMP lever	Item	Correct action
HEAT Engine at idle	1 to 4	Hot ↓ Cold	Discharge air Air intake door Mode door Air temperature Vacuum cock Water cock Magnet valve	Floor & defroster nozzle Vacuum – ON (Position of admitting outside air) Vacuum – ON (2 steps) Warm → cool Vacuum – ON Open → closed Current – ON
REC HEAT Engine at idle	1 to 4	Hot ↓ Cold	Discharge air Air intake door Mode door Air temperature Vacuum cock Water cock Magnet valve	Floor & defroster nozzle Vacuum – OFF (Position of isolating outside air) Vacuum – ON (2 steps) Warm → cool Vacuum – ON Open → closed Current – ON
DEF Engine at idle	1 to 4	Hot ↓ Cold	Discharge air Air intake door Mode door Heater door Air temperature Vacuum cock Water cock Magnet valve	Defroster nozzle Vacuum – ON (Position of admitting outside air) Vacuum – ON (2 steps) Open Warm Vacuum – ON Open → closed Current – ON

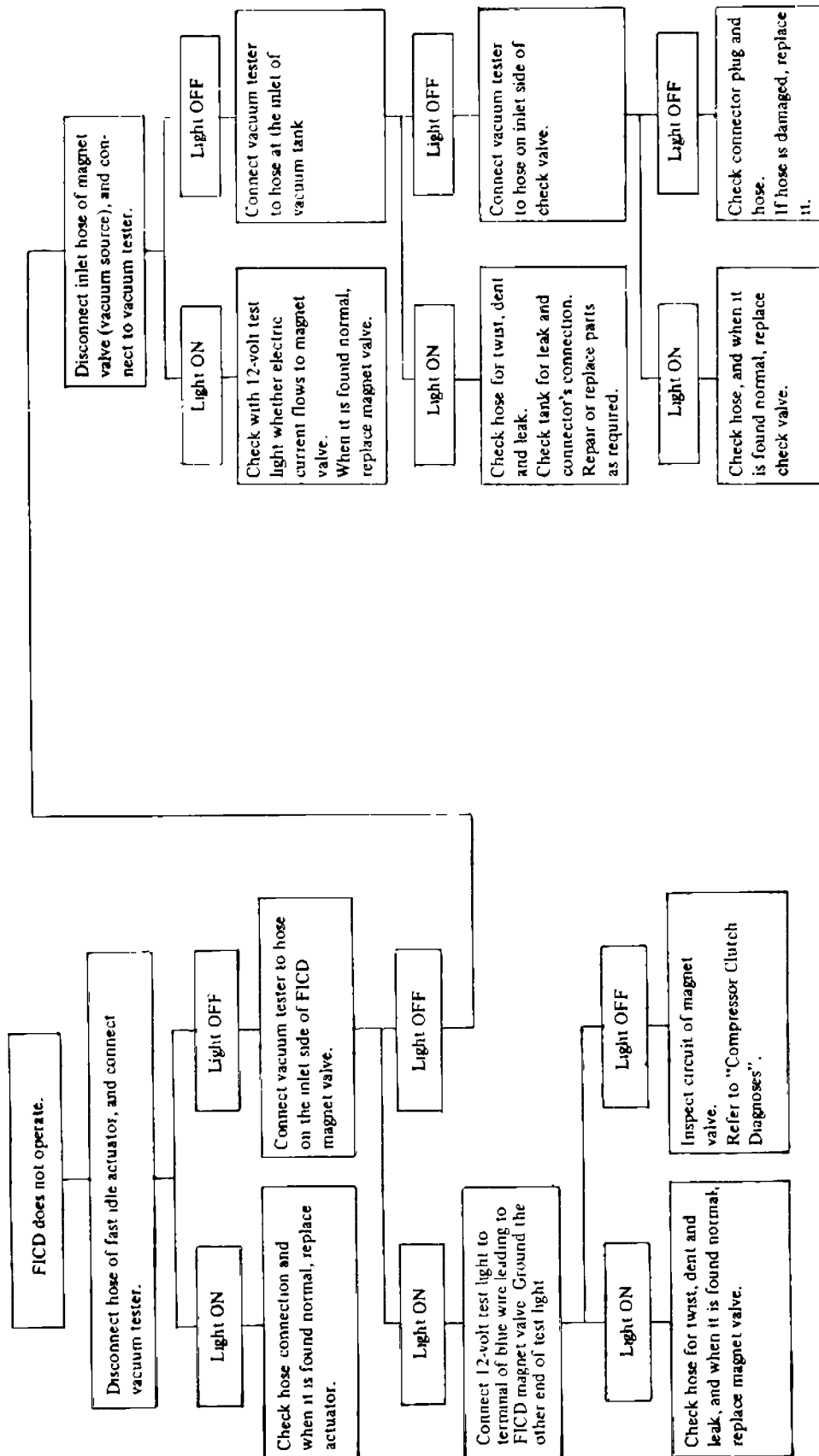
VACUUM SYSTEM DIAGNOSES

VACUUM SYSTEM DIAGNOSES -A/C POSITION



Vacuum tester: Tester light keeps OFF unless normal vacuum level exists in each check point.

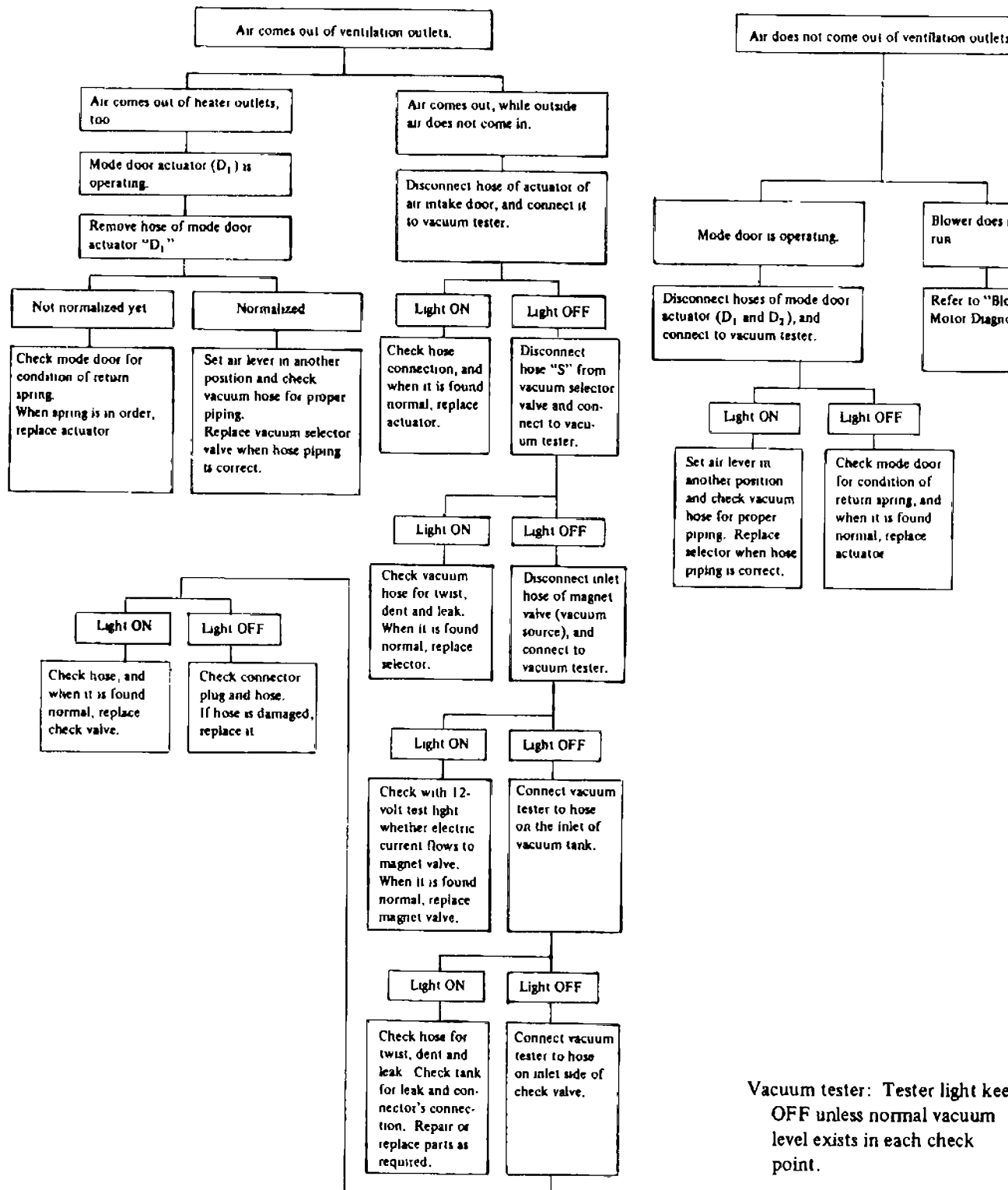
FAST IDLE CONTROL DEVICE DIAGNOSES (FICD)



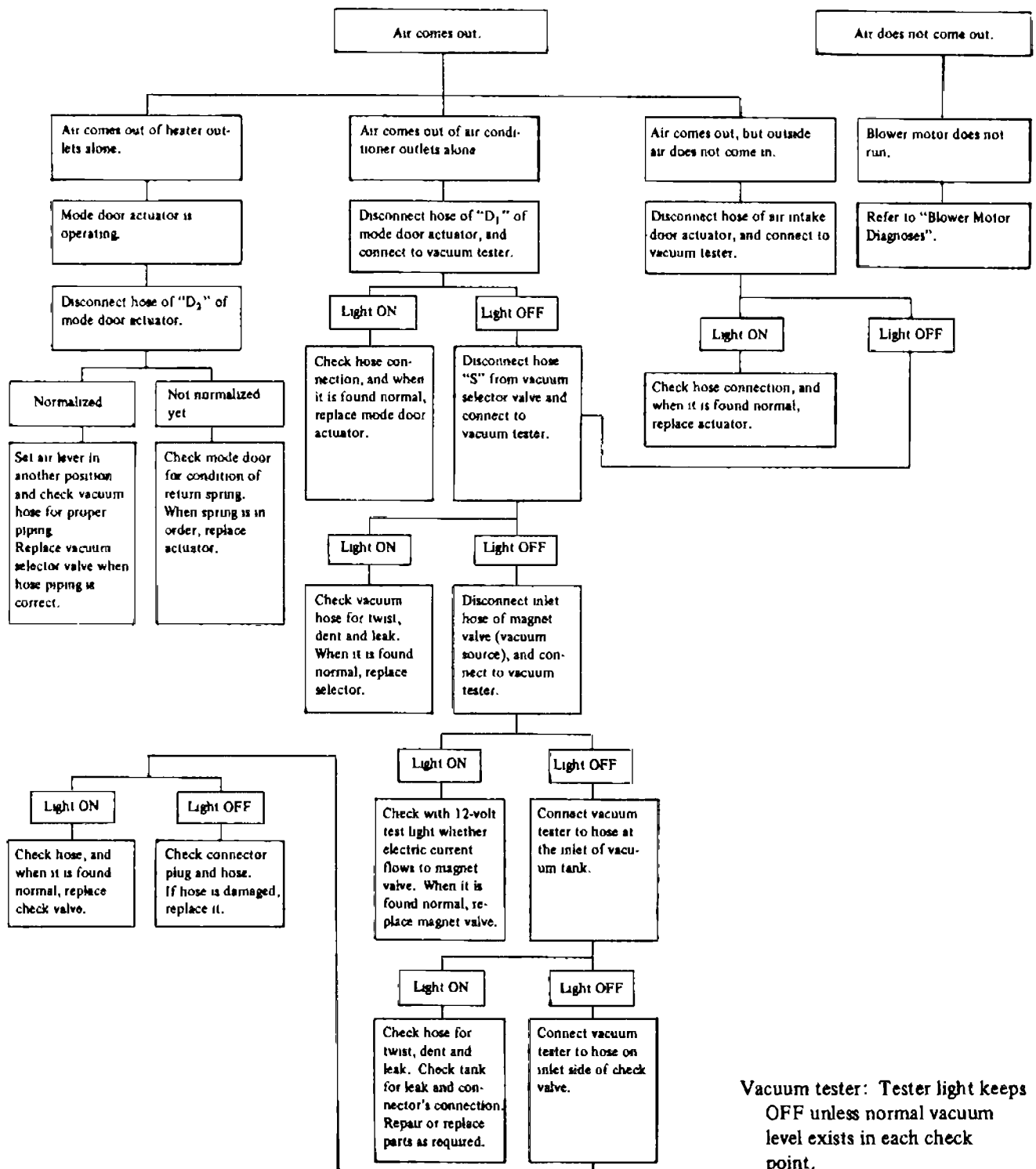
Vacuum tester: Tester light keeps OFF unless normal vacuum level exists in each check point.

Air Conditioning

VACUUM SYSTEM DIAGNOSES-VENT POSITION

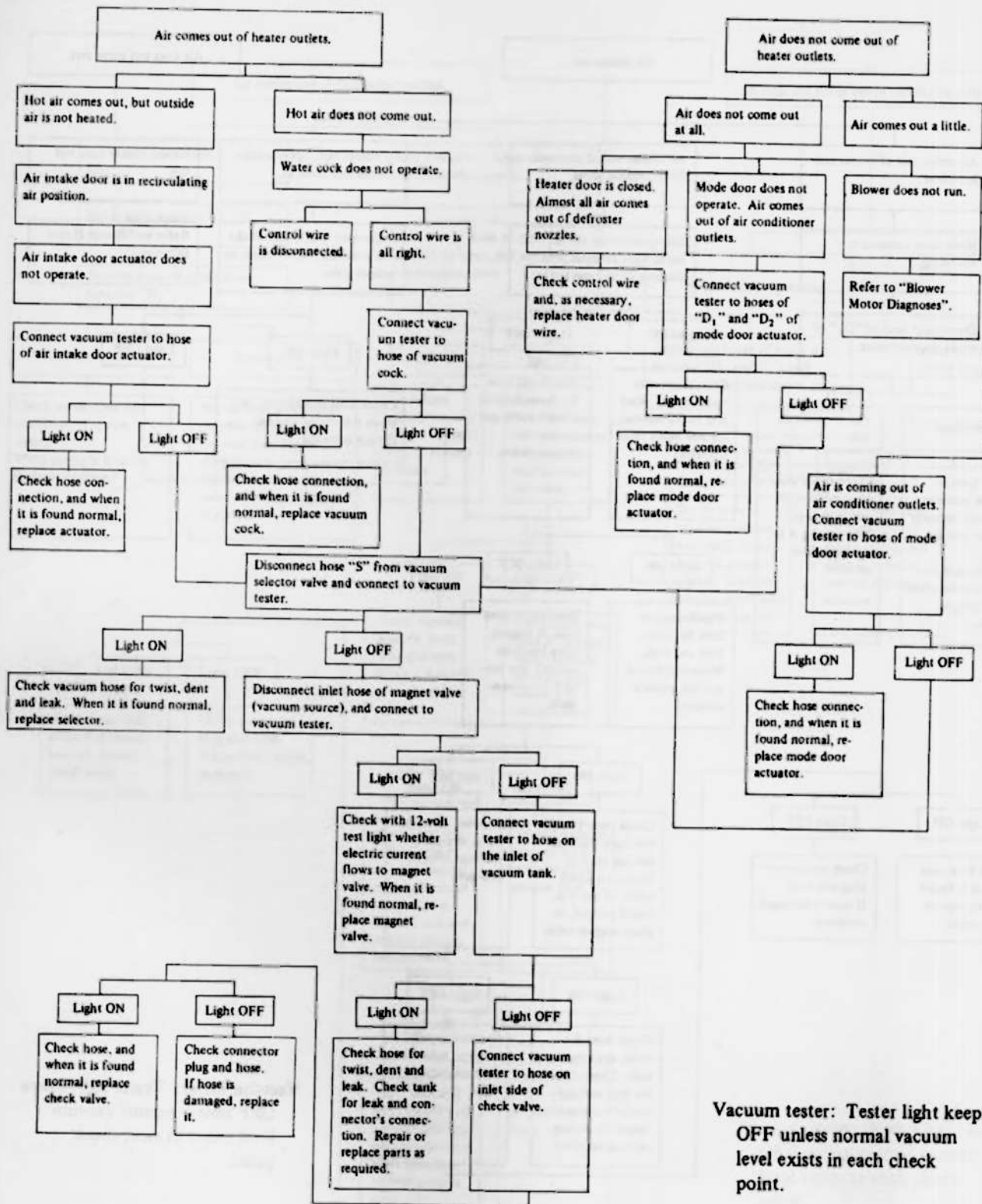


VACUUM SYSTEM DIAGNOSES-BI-LEVEL POSITION

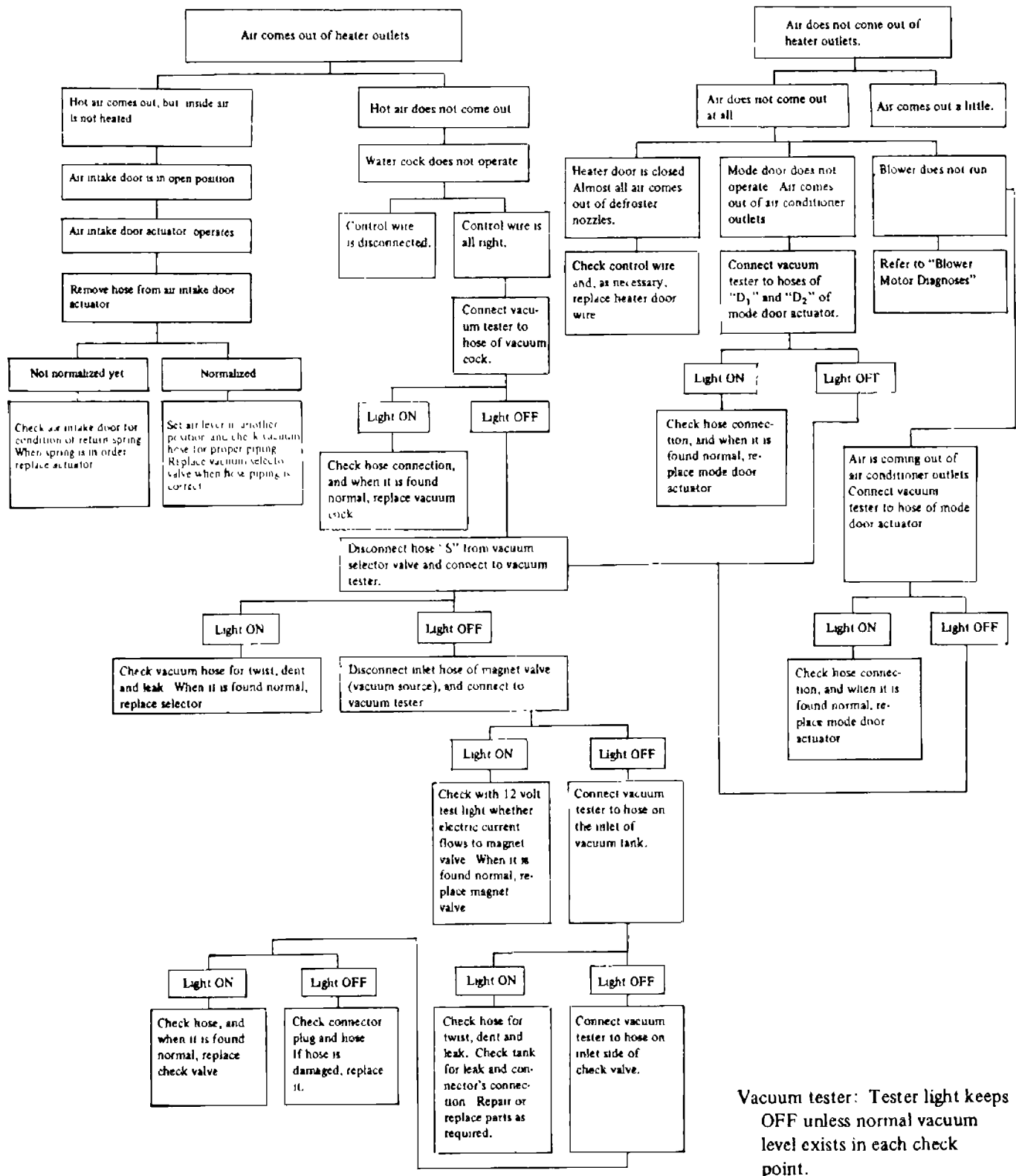


Air Conditioning

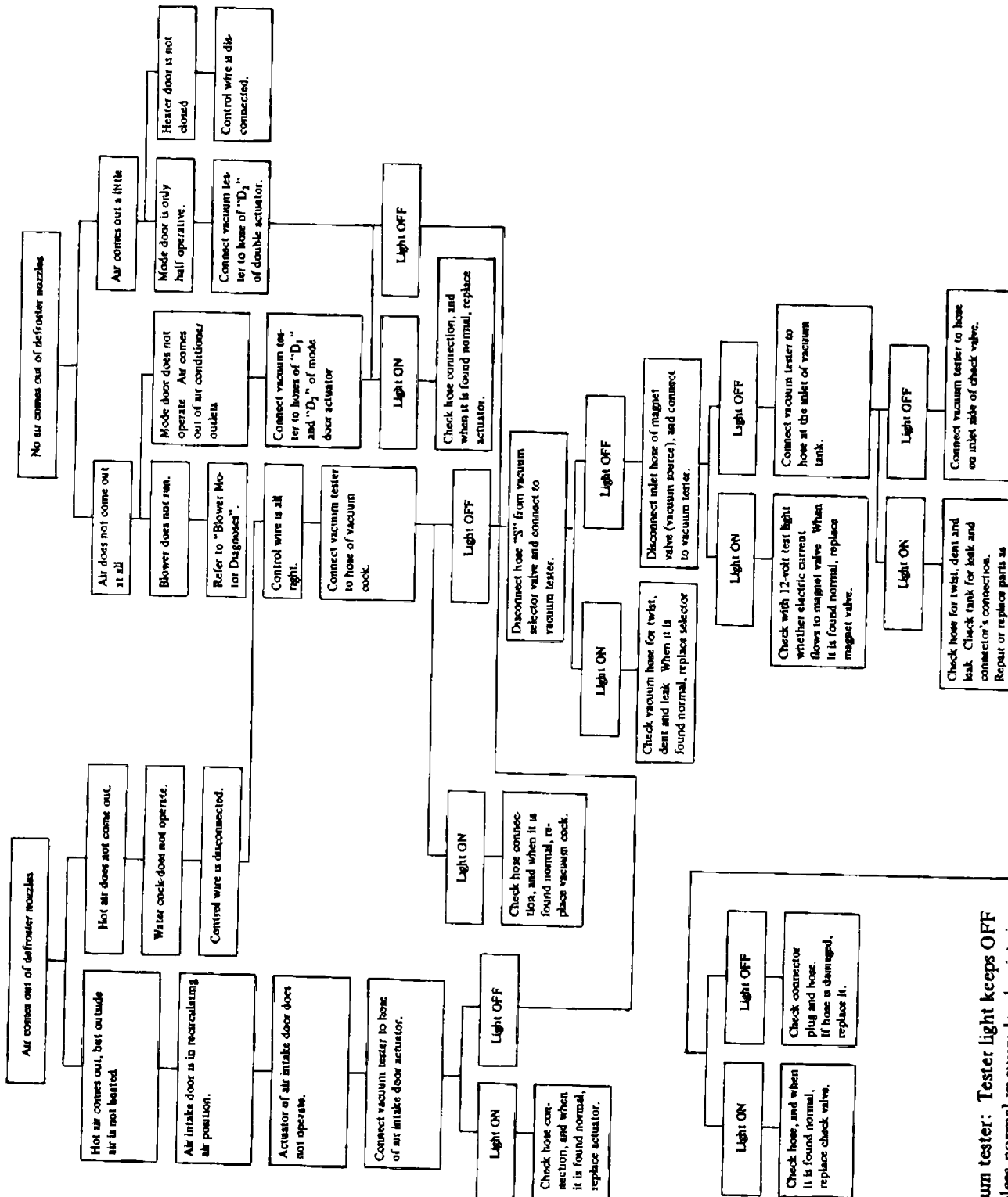
VACUUM SYSTEM DIAGNOSES - HEAT POSITION



VACUUM SYSTEM DIAGNOSES - REC HEAT POSITION



VACUUM SYSTEM DIAGNOSES -DEFROST POSITION



PERFORMANCE CHART

Engine speed : 1,500 rpm
 FAN lever : 4
 AIR lever : A/C
 TEMP lever : Max. cold

Ambient air		Discharge air temperature °C (°F)	Pressure High (Discharge side) kg/cm ² (psi)	Pressure Low (Suction side) kg/cm ² (psi)
Relative humidity	Air temperature °C (°F)			
80	21.0 (70)	11.0 to 14.0 (52.0 to 57.0)	11.8 to 13.9 (168 to 198)	2.0 to 2.5 (28 to 36)
	26.5 (80)	16.0 to 20.0 (61.0 to 68.0)	13.0 to 15.3 (185 to 218)	2.3 to 2.8 (33 to 40)
	32.5 (90)	19.5 to 24.5 (67.0 to 76.0)	14.6 to 17.3 (208 to 246)	2.7 to 3.4 (38 to 48)
	38.0 (100)	23.0 to 27.5 (73.0 to 82.5)	16.5 to 19.2 (235 to 273)	3.4 to 3.9 (48 to 55)
	43.5 (110)	26.0 to 32.0 (79.0 to 90.0)	18.7 to 21.3 (266 to 303)	4.3 to 4.8 (61 to 68)
70	21.0 (70)	9.5 to 13.0 (49.0 to 55.0)	10.8 to 12.8 (154 to 182)	1.7 to 2.3 (24 to 33)
	26.5 (80)	14.0 to 18.0 (57.0 to 64.0)	11.8 to 14.2 (168 to 202)	2.0 to 2.6 (28 to 37)
	32.5 (90)	17.5 to 22.0 (63.5 to 71.5)	13.5 to 16.0 (192 to 228)	2.4 to 3.0 (34 to 43)
	38.0 (100)	21.0 to 25.5 (70.0 to 78.0)	15.4 to 17.9 (219 to 255)	3.0 to 3.6 (43 to 51)
	43.5 (110)	24.0 to 29.0 (75.0 to 84.0)	17.5 to 20.0 (249 to 284)	3.9 to 4.5 (55 to 64)
60	21.0 (70)	7.5 to 11.0 (46.0 to 52.0)	9.7 to 11.8 (138 to 168)	1.4 to 2.0 (20 to 28)
	26.5 (80)	12.0 to 16.0 (54.0 to 61.0)	10.7 to 13.0 (152 to 185)	1.6 to 2.3 (23 to 33)
	32.5 (90)	15.5 to 19.5 (60.0 to 67.0)	12.3 to 14.7 (175 to 209)	2.0 to 2.7 (28 to 38)
	38.0 (100)	18.5 to 23.0 (65.0 to 73.0)	14.1 to 16.5 (201 to 235)	2.6 to 3.4 (37 to 48)
	43.5 (110)	21.5 to 26.0 (70.5 to 79.0)	16.2 to 18.8 (230 to 267)	3.4 to 4.3 (48 to 61)
50	21.0 (70)	6.0 to 9.5 (43.0 to 49.0)	8.7 to 10.8 (124 to 154)	1.1 to 1.7 (16 to 24)
	26.5 (80)	10.0 to 14.0 (50.0 to 57.0)	9.6 to 11.8 (137 to 168)	1.3 to 2.0 (18 to 28)
	32.5 (90)	13.5 to 17.5 (56.0 to 63.5)	11.0 to 13.5 (156 to 192)	1.6 to 2.4 (23 to 34)
	38.0 (100)	16.0 to 21.0 (61.0 to 70.0)	12.8 to 15.4 (182 to 219)	2.2 to 3.0 (31 to 43)
	43.5 (110)	19.0 to 24.0 (66.0 to 75.0)	15.0 to 17.5 (213 to 249)	3.1 to 3.9 (44 to 55)
40	21.0 (70)	4.0 to 7.5 (39.0 to 45.5)	7.6 to 9.7 (108 to 138)	0.8 to 1.4 (11 to 20)
	26.5 (80)	8.0 to 12.0 (46.0 to 54.0)	8.4 to 10.7 (119 to 152)	1.0 to 1.6 (14 to 23)
	32.5 (90)	11.5 to 15.5 (53.0 to 60.0)	9.8 to 12.3 (139 to 175)	1.3 to 2.0 (18 to 28)
	38.0 (100)	14.0 to 18.5 (57.0 to 65.0)	11.4 to 14.1 (162 to 201)	1.9 to 2.6 (27 to 37)
	43.5 (110)	16.5 to 21.5 (62.0 to 71.0)	13.7 to 16.2 (195 to 230)	2.8 to 3.4 (40 to 48)
30	21.0 (70)	2.5 to 6.0 (36.5 to 43.0)	6.6 to 8.7 (94 to 124)	0.5 to 1.1 (7 to 16)
	26.5 (80)	6.0 to 10.0 (43.0 to 50.0)	7.2 to 9.6 (102 to 137)	0.7 to 1.3 (10 to 18)
	32.5 (90)	9.0 to 13.5 (48.0 to 56.0)	8.5 to 11.0 (121 to 156)	1.0 to 1.6 (14 to 23)
	38.0 (100)	12.0 to 16.0 (54.0 to 61.0)	10.3 to 12.8 (146 to 182)	1.6 to 2.2 (23 to 31)
	43.5 (110)	14.5 to 19.0 (58.0 to 66.0)	12.4 to 15.0 (176 to 213)	2.6 to 3.1 (37 to 44)

Note: These data are based on the results when air conditioner has been in operation approximately for 10 minutes.

COMPRESSOR

CONTENTS

DESCRIPTION	AC-58
COMPRESSOR CLUTCH	AC-60
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INSPECTION	AC-60
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REMOVAL	AC-61
INSPECTION	AC-61
INSTALLATION	AC-61
DISCHARGE VALVE	AC-62
REMOVAL	AC-62
INSPECTION	AC-62
INSTALLATION	AC-62
SIDE COVER	AC-63

REMOVAL
INSPECTION
INSTALLATION
REAR END COVER AND REAR CYLINDER HEAD DISASSEMBLY
INSPECTION
ASSEMBLY
REPLACEMENT OF CYLINDER REMOVAL
INSTALLATION
SERVICE DATA AND SPECIFICATIONS
TROUBLE DIAGNOSES AND CORRECTIONS

DESCRIPTION

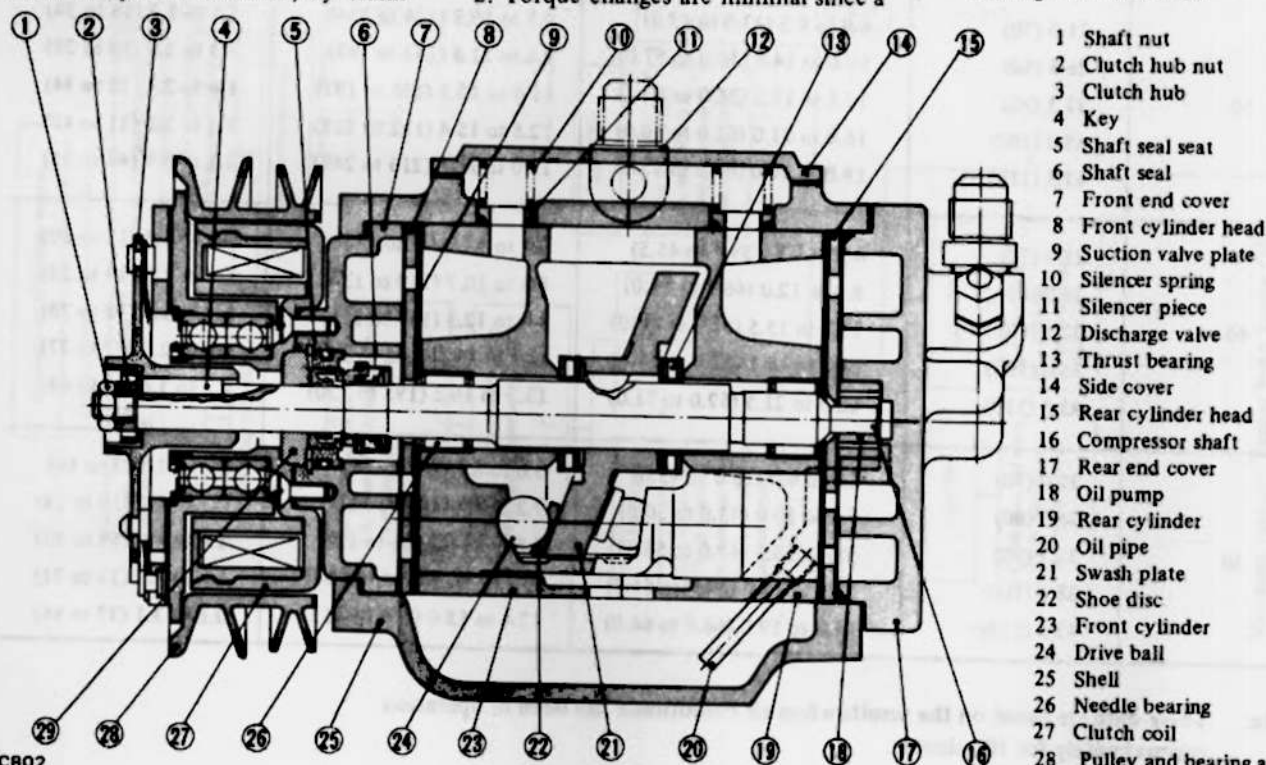
Model SWP123 is a swash plate type compressor. As with conventional crank type compressors, reciprocating pistons compress incoming gas. The principal difference between these two types of compressors lies in the way in which the piston is driven, by crank-

shaft rotation on the one hand and by swash plate rotation on the other. When the swash plate compressor is used in air conditioning system, the following advantages are obtained.

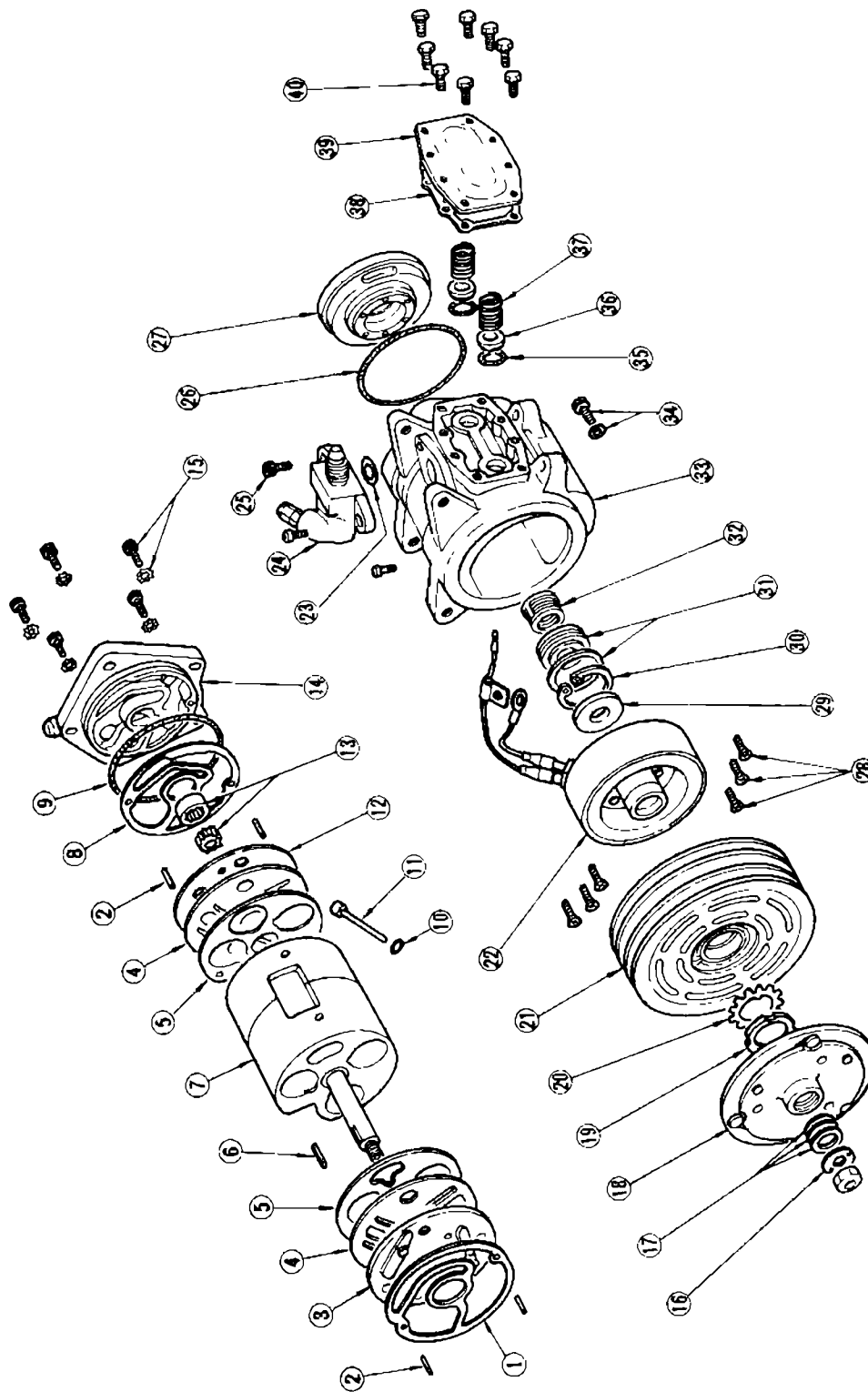
1. The shape is cylindrical, facilitating installation.
2. Torque changes are minimal since a

number of cylinders are used.

3. Complete mechanical balance is possible, limiting vibration noise and allowing high-speed operation.
4. Discharge per unit of compressed volume is quite high, resulting in high cooling capacity and superior cooling characteristics.



- 1 Shaft nut
- 2 Clutch hub nut
- 3 Clutch hub
- 4 Key
- 5 Shaft seal seat
- 6 Shaft seal
- 7 Front end cover
- 8 Front cylinder head
- 9 Suction valve plate
- 10 Silencer spring
- 11 Silencer piece
- 12 Discharge valve
- 13 Thrust bearing
- 14 Side cover
- 15 Rear cylinder head
- 16 Compressor shaft
- 17 Rear end cover
- 18 Oil pump
- 19 Rear cylinder
- 20 Oil pipe
- 21 Swash plate
- 22 Shoe disc
- 23 Front cylinder
- 24 Drive ball
- 25 Shell
- 26 Needle bearing
- 27 Clutch coil
- 28 Pulley and bearing assembly



- 1 Gasket
- 2 Knock pin
- 3 Front cylinder head
- 4 Suction valve plate
- 5 Gasket
- 6 Key
- 7 Compressor cylinder assembly
- 8 Gasket
- 9 Rear end cover O-ring
- 10 Oil pipe O-ring

- 11 Oil pipe
- 12 Rear cylinder head
- 13 Gear pump assembly
- 14 Rear end cover
- 15 Rear end cover fixing bolt and washer
- 16 Hub nut
- 17 Spacer
- 18 Clutch hub
- 19 Lock nut
- 20 Lock washer

- 21 Pulley and bearing assembly
- 22 Coil assembly
- 23 Discharge valve O-ring
- 24 Discharge valve assembly
- 25 Discharge valve fixing bolt
- 26 Gasket
- 27 Front end cover
- 28 Coil mounting screw
- 29 Felt

- 30 Retainer ring
- 31 Shaft seal and O-ring
- 32 Shaft seal
- 33 Compressor shell
- 34 Drain plug and gasket
- 35 Silencer piece O-ring
- 36 Silencer piece
- 37 Silencer spring
- 38 Gasket
- 39 Side cover
- 40 Side cover fixing bolt

Fig. AC-59 Exploded view
AC803

COMPRESSOR CLUTCH

The most likely source of problem is clutch slippage. Factors are listed here. Exercise ample care.

1. Clearance between clutch hub and pulley should be 0.5 to 0.8 mm (0.020 to 0.031 in) at all peripheral points.
2. Make sure that there is no oil or dirt on friction surfaces of clutch disc (clutch hub) and pulley. Remove any oil or dirt with a dry rag.
3. Make sure that terminal voltage at magnetic coil is above 10.5V.

REMOVAL

CAUTION:

Do not leave compressor on its side or upside down for more than 10 minutes, as compressor oil will enter low pressure chamber.

1. Using Clutch Hub Wrench KV99412302, hold clutch hub. With suitable socket wrench, remove shaft nut from shaft.
2. Then, using Hub Nut Socket KV99412305, remove clutch hub nut. Remove spacers.

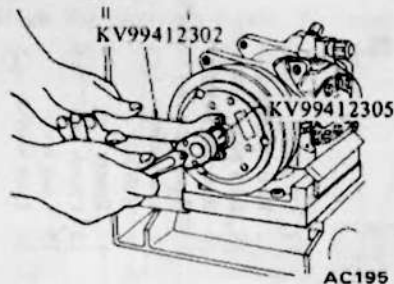
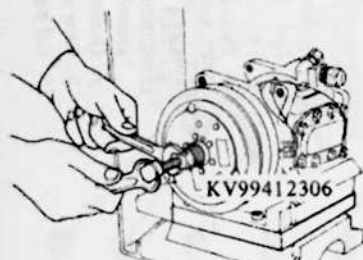


Fig. AC-60 Removing clutch hub nut

3. Using Clutch Hub Puller KV99412306, remove clutch hub. Thread tool into the bore of clutch hub, hold tool with wrench, and then thread in center bolt.



4. With an ordinary screwdriver, flatten lock washer tab.

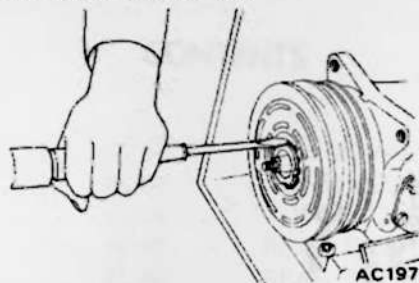


Fig. AC-62 Flattening lock washer tab

5. Using Lock Nut Socket KV99412310, loosen lock nut. Remove lock nut and lock washer.

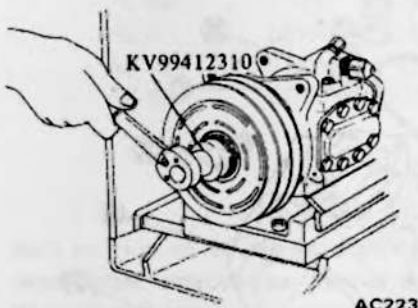


Fig. AC-63 Removing lock nut

6. Remove pulley and bearing assembly. When the assembly can not be removed by hand, use a puller, Puller Adapter KV99412313 and Puller Pilot KV99412312.

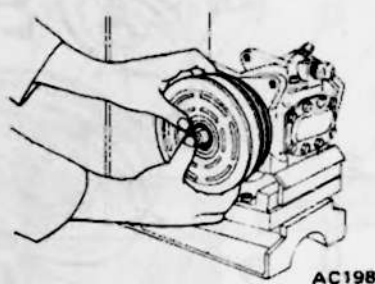
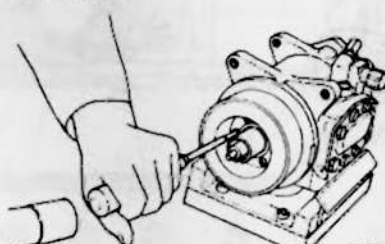


Fig. AC-64 Removing pulley

7. Using an impact tool, loosen six coil mounting screws. Use of the impact tool is advisable as screws have been caked.



8. Remove coil mounting screw. Separate coil assembly.

INSPECTION

1. Check the friction surfaces of clutch for damage due to excessive heat, or excessive grooving due to slippage. If necessary, replace pulley and bearing assembly, clutch hub as a set.
2. Oil or dirt on the friction surfaces should be cleaned with a suitable solvent and a dry rag.
3. Check coil for shorted or open winding leads.
4. When replacing compressor clutch assembly, do not forget break-in operation, accomplished by engaging and disengaging the clutch some times. Break-in operation raises level of transmitted torque.

INSTALLATION

1. Using a Phillips screwdriver, tighten coil assembly mounting screws in an alternating pattern. After screws have been firmly tightened, pull lock each at one location to pre-loosen. Correct tightening torque 0.28 to 0.35 kg-m (2.0 to 2.5 ft-lb).

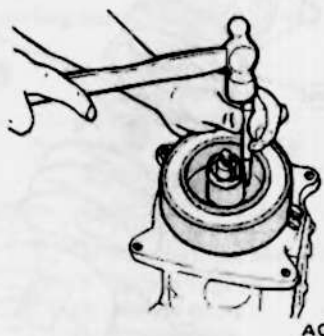


Fig. AC-66 Punch-loc

2. Using a plastic mallet, drive pulley and bearing assembly onto neck of the installed coil assembly. Turn the pulley, making sure there is no noise and that rotation is free. Also make sure that there is no pulley play.

3. Position lock washer and lock nut in place. Using Lock Nut Socket KV99412310, tighten lock nut firmly. With lock washer tab and lock nut, cutouts matched, hand the tab

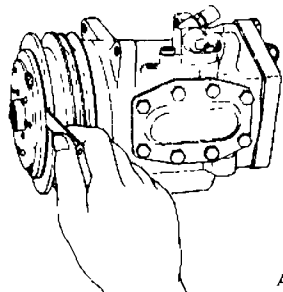
tightening torque is 2.5 to 2.8 kg-m (18 to 20 ft-lb).

4. Install clutch hub onto shaft with key in place. Select a suitable adjusting spacer to obtain specified clearance between pulley and clutch hub.

Apply a coat of locking agent to hub nut, and tighten nut to 1.8 to 2.1 kg-m (13 to 15 ft-lb).

5. Apply a coat of locking agent to shaft nut, and tighten nut to 1.6 to 1.7 kg-m (11 to 12 ft-lb).

6. Using a thickness gauge, measure the clutch hub-to-pulley gap. If the gap is 0.5 to 0.8 mm (0.020 to 0.031 in), adjustment is correct



AC200

Fig. AC-67 Checking clutch hub-to-pulley clearance

Note: If the specified gap is not obtained, replace adjusting spacer and readjust.

SHAFT SEAL

To prevent refrigerant leakage at the cylinder shaft exit point, tightness must be maintained at friction surfaces between shaft seal and shaft seal seat and at contact surfaces between shaft seal seat and front end cover. Use extreme care in removing or assembling seals not to damage the sealing surfaces. Discard the old seals. Do not re-use them.

REMOVAL

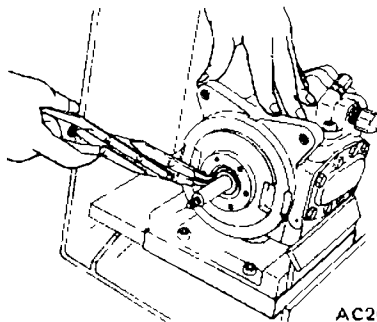
The system must be discharged beforehand. When compressor is removed, do not turn it on its side or upside down without first draining the oil. Remove dirt from the exterior. Clean the workbench to be used, tools and your hands.

1. Remove drain plug, thereby draining the oil.

2. Remove clutch hub, pulley and bearing assembly, and coil assembly. Proceed according to information

under "Compressor Clutch".

3. Using snap ring pliers, compress and remove retainer ring.



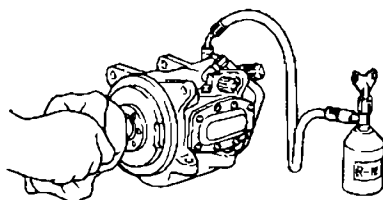
AC201

Fig. AC-68 Removing retainer ring

4. Wrap shaft end with rag. Apply refrigerant pressure of 2 to 5 kg/cm² through low pressure line of compressor until shaft seal seat is received at rag.

CAUTION:

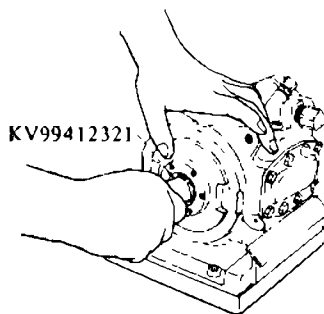
- a. Do not use air to prevent entry of moisture, dust, etc.
- b. If shaft seal seat is not plucked out, install it again and apply refrigerant pressure.



AC804

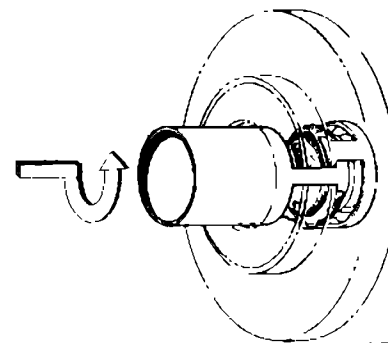
Fig. AC-69 Removing shaft seal seat

5. Insert Shaft Seal Remover & Installer KV99412321 through the open end of front end cover. Depress the carbon seal and hook the tool at the case projection of shaft seal. Slowly pull out the tool, thereby removing shaft seal.



AC203

Fig. AC-70 Inserting special tool

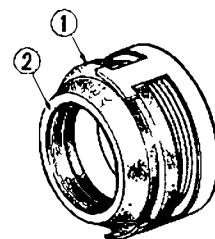


AC034

Fig. AC-71 Removing shaft seal

INSPECTION

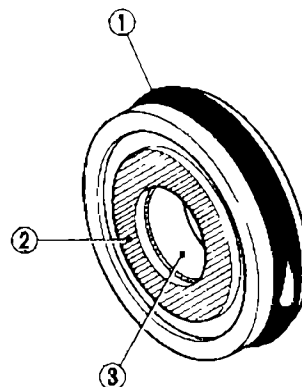
1. Check the carbon seal surface of shaft seal for damage.



AC035

Fig. AC-72 Checking shaft seal

2. Check mating surfaces of O-ring and shaft seal seat for scratches or damage. Make sure that oil seal inside shaft seal seat is properly coated with grease.



AC805

Fig. AC-73 Checking shaft seal seat

INSTALLATION

Note: Do not reuse shaft seal seat and shaft seal.

Air Conditioning

CAUTION:

In placing a new seal on the work bench, make sure that the contact surface faces upward. Take necessary steps to avoid damage.

1. Make sure that the shaft seal contact surface is free of dirt and amply lubricated with oil.
2. Cap Shaft Seal Pilot KV99412322 to the top end of compressor shaft.
3. Using Shaft Seal Remover & Installer KV99412321, insert shaft seal with shaft seal case and shaft cutout aligned.

Apply force to turn the seal somewhat to the left and right. Insure that shaft seal seats properly in the shaft cutout.

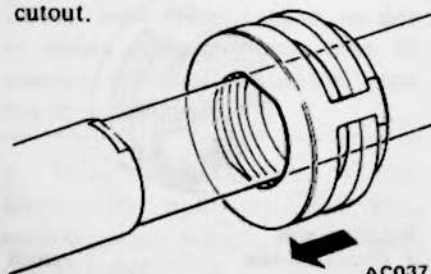


Fig. AC-74 Inserting shaft seal

4. Fit O-ring to the outside groove of shaft seal seat, making sure that it seats properly.
5. Apply a generous coat of oil to

contact surface and shaft seal seat so that seat easily slides on inner side of front end cover.

Also apply a thin coat of grease or oil to shaft. Push shaft seal seat into front end cover until it bottoms up to land.

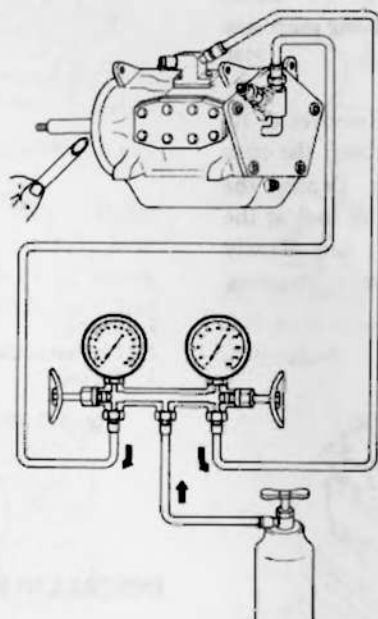
6. Compress retainer ring with pliers, and fit it into recess on front end cover. Wipe shaft clean of excess grease or oil.
7. Then, check for gas leakage as follows:

- (1) Plug high- and low-pressure joints on compressor with blind caps.
- (2) Connect charging hoses in the lines between manifold gauge and high- and low-pressure service valves.

Connect refrigerant can to the middle hose of manifold gauge.

- (3) Open valve of can tap, and charge refrigerant. Loosen oil plug on compressor to purge air out of compressor.

- (4) Install Shaft Handle Socket KV99412329 to the shaft of compressor, and turn the shaft 5 to 6 turns in the clockwise direction. Then, confirm that pressure does not decrease on the low pressure gauge. If the gauge indicates a pressure decrease, there is a leak. Conduct a leak test. Under such a condition, remove and then install parts again.



- (5) Install compressor clutch assembly according to information under "Installation" of "Compressor Clutch".

- (6) Fill with oil.

DISCHARGE VALVE

CAUTION:

Do not leave compressor on its side upside down for more than 10 minutes, as compressor oil will enter the low pressure chamber.

REMOVAL

1. Using Allen Socket KV99412322, remove two hex. socket head bolts.

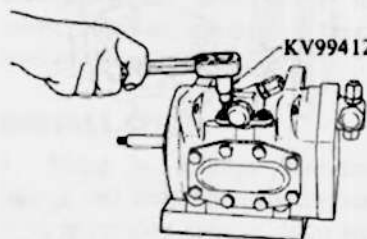


Fig. AC-76 Removing

2. Remove discharge valve.
3. Discard the old O-ring.

INSPECTION

1. Check for scratched seating face of discharge valve and of shell O-ring. Do not re-use the old O-ring.
2. Replace discharge valve which is scratched.
3. If a scratch is found on the groove of shell O-ring, replace shell.

INSTALLATION

1. Apply a coating of compressor oil to the groove of discharge valve O-ring, and install these parts in the proper positions on shell.
2. Using Allen Socket KV99412322, secure discharge valve to shell with two hex. socket head bolts.

Tightening torque:

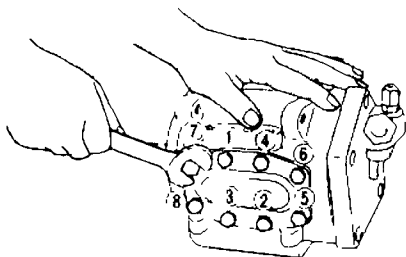
1.8 to 2.0 kg-m
(13 to 14 ft-lb)

SIDE COVER

REMOVAL

Discharge the system before beginning work. Work may be carried out with compressor mounted. If compressor is to be removed, first drain oil. Unless oil has been drained, do not turn compressor on its side or upside down.

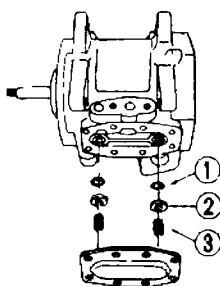
1. Drain oil.
2. Loosen and remove eight side cover mounting bolts in an alternate pattern as shown in Figure AC-77. Note that two silencer springs inside the cover will force up side cover.



AC206

Fig. AC-77 Loosening cover mounting bolt

3. Remove side cover and side cover gasket. Discard the gasket.
4. Remove silencer springs, pieces, and O-rings. Do not damage O-ring surface of silencer piece during this process. Discard used O-rings.



- 1 O-ring
- 2 Piece
- 3 Silencer spring

AC207

Fig. AC-78 Exploded view of silencer spring, pieces and O-ring

INSPECTION

1. Make sure that side cover gasket surface and shell gasket surface are not damaged.
2. Make sure that silencer pieces and shell contact surfaces in contact with O-ring are not damaged.
3. Do not reuse old gasket and O-rings.

INSTALLATION

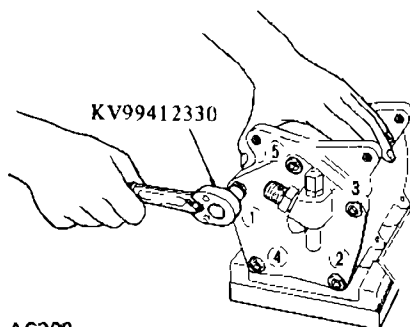
1. Place the mounting surface of side cover upward.
2. Make sure that holes of cylinder and shell are aligned and install O-rings.
3. Coat O-ring and the area around shell hole with an ample amount of oil. Using O-ring Installer KV99412328, install O-ring into the shell hole. Then install silencer piece with Silencer Piece Installer KV99412327.
4. Coat the gasket surface of shell with oil and position gasket and side cover.
5. Hold side cover in place by hand and thread in eight mounting bolts. Tighten these bolts evenly in an alternating pattern as shown in Figure AC-77. Tightening torque is 1.8 to 2.0 kg-m (13 to 14 ft-lb)
6. Fill with oil.
7. Upon completion of the above operations, conduct a gas leak test by referring to the item "Installation" under the topic "Shaft Seal".

REAR END COVER AND REAR CYLINDER HEAD

Before beginning work, remove dirt from the exterior of the detached compressor. Clean the workbench to be used, tools, and your hands.

DISASSEMBLY

1. Drain oil.
2. Using Allen Socket KV99412330, remove five rear end cover mounting bolts. Starting at the top, loosen all bolts one turn in an alternating pattern. Then remove bolts in turn.



AC208

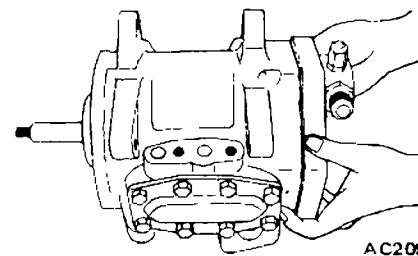
Fig. AC-79 Loosening bolts

AC-63

3. Grasp rear end cover and carefully separate it from compressor. Tap the flange lightly and alternately as required with a plastic mallet.

CAUTION:

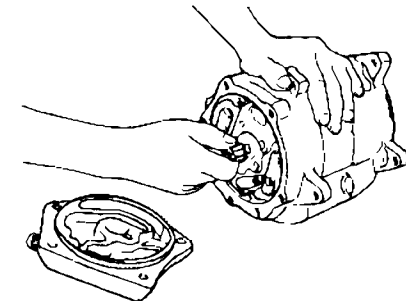
Do not tap on the compressor shaft.



AC209

Fig. AC-80 Removing rear end cover

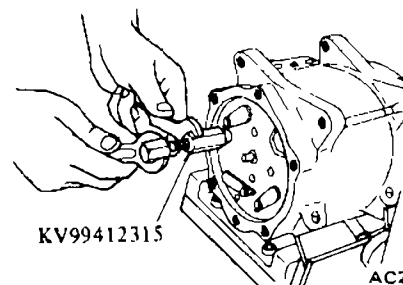
4. Remove pump gear. Do not allow pump gear to damage the surface.



AC042

Fig. AC-81 Removing pump gear

5. Remove O-ring, gasket and two pins. Discard the O-ring and gasket.
6. Remove rear cylinder head, suction valve plate and gasket. Discard the gasket. Carefully remove suction valve plate, avoiding deformation.
7. When removal proves difficult, use Cylinder Head Remover KV99412315. Insert this tool into hole in cylinder head as shown in Figure AC-82. With the nut in firm contact with the back side of cylinder head, tighten the bolt slowly to break loose the head.



AC210

Fig. AC-82 Removing rear cylinder head

Air Conditioning

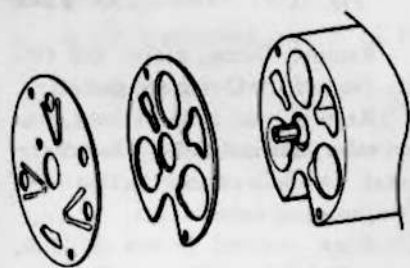
INSPECTION

1. Do not reuse old gasket and O-ring.
2. Make sure that the gasket contact surface is free of damage.
3. If replacement of rear end cover connector and check valve is necessary, replace rear end cover with a new one.
4. Check suction valve plate and cylinder head for broken valves.
5. Check pump gear for wear and damage.

ASSEMBLY

Using clean oil, remove dirt and other matter from end cover, cylinder head and suction valve plate. Clean the workbench.

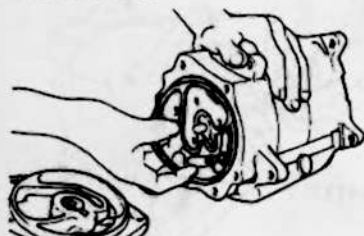
1. Using suitable blocks, position compressor with the front face downward and the rear upward.
2. Insert two pins in the rear of cylinder.
3. Coat both surfaces of cylinder head gasket with oil and align gasket with cylinder.
4. Install suction valve plate, making sure that the three valves properly align with cylinders and gasket cutouts.



AC224

Fig. AC-83 Cutouts of cylinder and gasket

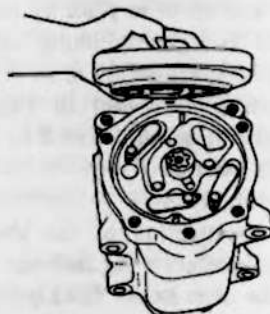
5. Install cylinder head, gasket, and O-ring in the order listed. Coat gasket and O-ring beforehand with an ample amount of oil.



AC046

Fig. AC-85 Cylinder head and gasket

6. Fit pump gear to rear end cover.
7. Carefully fit rear end cover to the rear of compressor.



AC211

Fig. AC-86 Installing rear end cover

8. Using Allen Socket KV99412330, tighten up five bolts in an alternating pattern, starting at the top. Do not forget lock washers. Then, using torque wrench, tighten these bolts to 3.0 to 3.5 kg-m (22 to 25 ft-lb) in the same sequence.
9. Fill with oil.
10. Upon completion of the above operation, conduct a leak test by referring to the topic under "Shaft Seal".

REPLACEMENT OF CYLINDER

Before proceeding, remove all dirt and other matter from the detached compressor. Clean the workbench, tools, and your hands. Lay out parts in the order in which they were removed, in space set aside for this purpose. This procedure facilitates reassembly.

REMOVAL

1. Drain oil.
2. Remove compressor clutch assembly.

shaft seal retainer ring. Then remove shaft seal seat. Refer to "Shaft Seal Removal". Removal of shaft seal is not absolutely necessary. It may be removed when the cylinder assembly is removed from the front end cover. In fact, this approach facilitates work.

4. Remove side cover. Refer to "Side Cover".
5. Remove rear end cover. Refer to "Rear End Cover and Rear Cylinder Head". Remove O-ring, gasket, pins, cylinder head, suction valve plate, and gasket in the order listed. This exposes the rear part of cylinder.
6. Using long nose pliers or other suitable tool, pull out oil pipe. Proceed carefully as oil pipe is easily broken.

CAUTION:

Unless oil pipe has been removed, do not attempt the following steps.

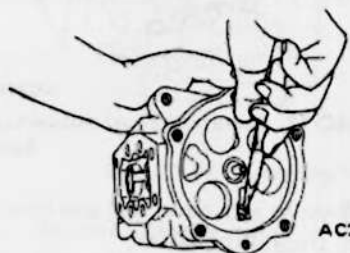


Fig. AC-87 Pulling out oil pipe

7. With the front facing downward, support compressor shell. Using a plastic mallet, tap at the rear end of shell flange, driving shell straight downward. Discard front end cover and gasket.

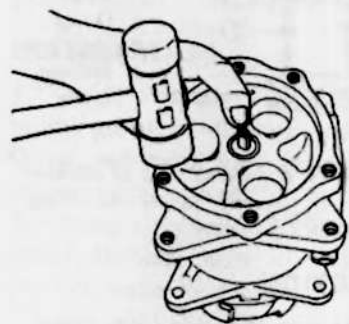
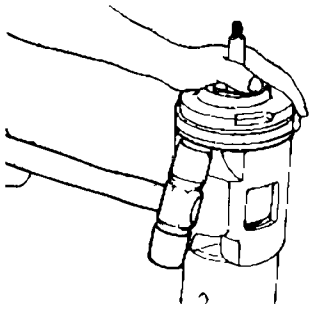


Fig. AC-88 Removing front end cover



AC050

Fig. AC-89 Removing front end cover

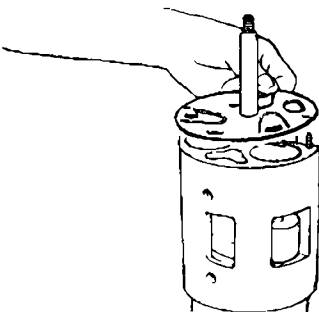
9. Remove shaft seal from the shaft.
10. Remove two pins, gasket, cylinder head, suction valve plate, and gasket. In removing two pins, proceed carefully to avoid cylinder head damage. Discard old gasket.

CAUTION:

Do not deform suction valve plate when removing it.

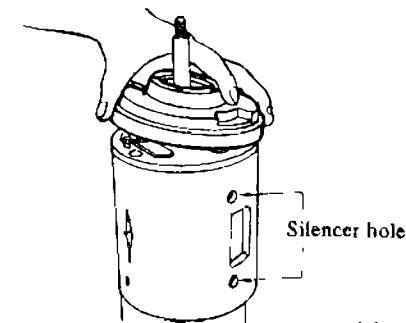
INSTALLATION

1. Using suitable blocks, face cylinder assembly upward. Insert two pins. Position gasket and suction valve plate in the order listed while making sure that three valves of suction valve plate are aligned with the cylinder and gasket cutouts. Coat gasket with oil prior to assembly. Gaskets and suction valve plates are the same for front and rear. The cylinder head with the smaller numbers of holes goes to the front. Do not mix front and rear parts.



AC051

Fig. AC-90 Installing suction valve plate

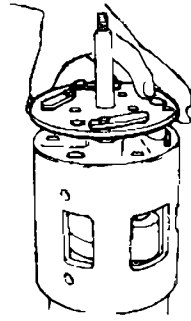


AC053

Fig. AC-92 Installing front end cover

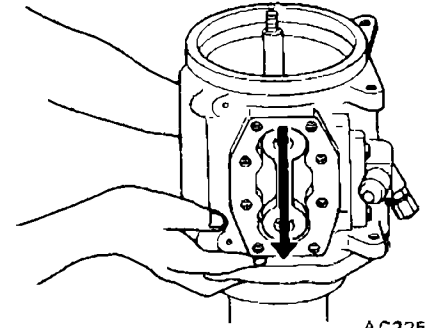
4. Fit gasket to front end cover. Then bring the shell into place over the cylinder assembly. At this time, make sure that the two holes of side cover and the cylinder holes are matched. Note that later adjustment will no longer be possible, as inside and outside diameters of these are not perfectly round. Note that moving the shell up and down may cause the gasket to slip out of place.

AC-65



AC052

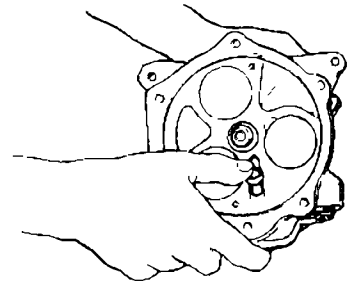
Fig. AC-91 Installing cylinder head



AC225

Fig. AC-93 Installing shell

5. Turn over the assembled shell and cylinder assembly, that is, face the front downward.
6. Coat oil pipe and O-ring with an ample amount of oil. Insert oil pipe at the rear of the cylinder. After making sure that the hole lines are matched as specified in step (4), continue with step (6) work.



AC226

Fig. AC-94 Installing oil pipe

7. Continue with work up to installation of rear end cover, according to "Installation" under "Rear End Cover and Rear Cylinder Head".
8. Continue with work up to installation of side cover, according to "Installation" under "Side Cover".
9. Install shaft seal seat according to instructions in "Installation" under "Shaft Seal".
10. Install and adjust compressor clutch according to instructions in "Installation" under "Compressor Clutch".
11. Charge compressor oil 270 cc (9.1 US fl oz, 9.5 Imp fl oz), and tighten oil plug with copper gasket in place.

Tightening torque.

1.8 to 2.0 kg-m
(13 to 14 ft-lb)

12. Conduct a leak test by referring to the topic under "Shaft Seal".

SERVICE DATA AND SPECIFICATIONS

Specifications

Type	Swash plate
Model	SWP123
Displacement cc (cu in)	123 (7.51)
Cylinder	
bore x stroke mm (in)	32 x 25.4 (1.26 x 1.00)
Direction of rotation	Clockwise (viewed from drive end)
Lubricating oil type cc (US fl oz, Imp fl oz)	SUNISO 5GS 270 (9.1, 9.5)
Refrigerant	R-12
Weight with compressor clutch approx. kg (lb)	11.6 (25.6)

Tightening torque

	kg-m (ft-lb)
Rear end cover bolt	3.0 to 3.5 (22 to 25)
Side cover bolt	1.8 to 2.0 (13 to 14)
Coil screw	0.28 to 0.35 (2.0 to 2.5)
Clutch hub nut	1.8 to 2.1 (13 to 15)
Shaft nut	1.6 to 1.7 (11 to 12)
Oil plug	1.8 to 2.0 (13 to 14)
Discharge valve assembly bolt	1.8 to 2.0 (13 to 14)

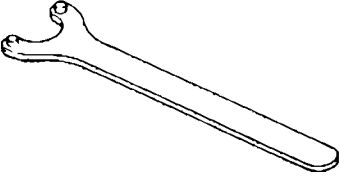
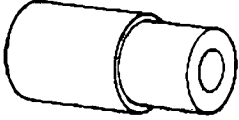
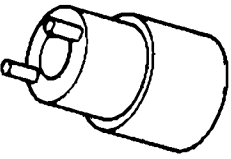
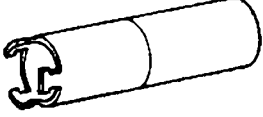
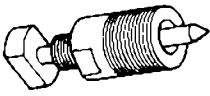
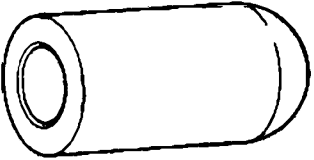
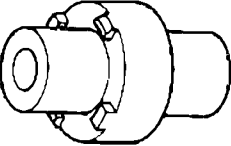
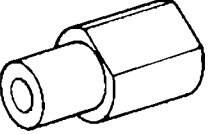
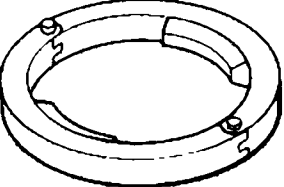
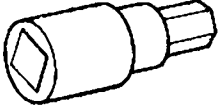
Adjustment specifications

Clutch hub to pulley clearance mm (in)	0.5 to 0.8 (0.020 to 0.031)
Shaft end play mm (in)	0 to 0.02 (0 to 0.0008)

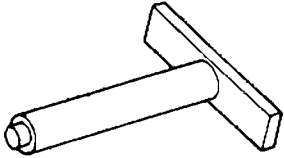
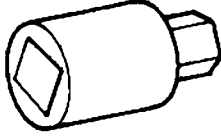
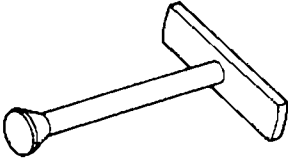
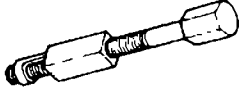
TROUBLE DIAGNOSES AND CORRECTIONS

Condition	Probable cause	Corrective action
Noise from compressor	Broken delivery valve. Broken suction valve. Worn shoe disc. Oil level high. Broken radial bearing. Broken thrust bearing. Contact between pulley and clutch hub. Loose bracket bolt, cracked or broken bracket.	Replace cylinder head. Replace suction valve plate. Replace cylinder assembly. Adjust oil level. Replace cylinder assembly. Replace cylinder assembly. Adjust clearance. Tighten bolt or replace bracket.
Rough rotation. (can be sensed by hand) Roughness. Seizure Erratic operation	Broken radial bearing. Worn shaft, bearing fault. Lack of lubrication.	Replace cylinder assembly. Replace cylinder assembly. Check and add oil or replace cylinder assembly.
Compressor locked.	Broken piston. Burned shoe disc.	Replace cylinder assembly. Replace cylinder assembly.
Hot compressor.	Ruptured oil pipe O-ring. Broken delivery valve. Ruptured gasket.	Replace O-ring. Replace cylinder head. Replace.
Compressor gas leakage.	Gas leaking from magnetic clutch mounting. Gas leaking from check valve. Gas leaking between end cover (R) and shell. Gas leaking between end cover (F) and shell.	Replace shaft seal and shaft seal seat. Replace discharge valve or rear end cover. Replace O-ring. Replace front end cover gasket.
Compressor clutch does not operate.	Open coil or leads. Poor terminal contact.	Replace compressor clutch or leads. Clean dirt from terminals, etc.

SPECIAL SERVICE TOOLS

Tool number & tool name	Kent-Moore No.	Tool number & tool name	Kent-Moore No.
	Reference page or Fig. No.		Reference page or Fig. No.
KV99412302 Clutch hub wrench 	J 24878-1 Fig. AC-60	KV99412312 Puller pilot 	J 25472 Page A
KV99412305 Hub nut socket 	J 24878-2 Fig. AC-60	KV99412321 Shaft seal remover and installer 	J 26066 Fig. AC-60 Page A
KV99412306 Clutch hub puller 	J 24878-3 Fig. AC-61	KV99412322 Shaft seal pilot 	J 25472 Page A
KV99412310 Lock nut socket 	J 24878-4 Fig. AC-63 Page AC-60	KV99412329 Shaft handle socket 	J 26072 Page A
KV99412313 Puller adapter 	J 26066 Page AC-60	KV99412324 Allen socket 	— Fig. A Page A

Air Conditioning

Tool number & tool name	Kent-Moore No.	Tool number & tool name	Kent-Moore No.
	Reference page or Fig. No.		Reference page or Fig. No.
KV99412327 Silencer piece installer 	—	KV99412330 Allen socket 	—
	Page AC-63		Fig. AC-79 Page AC-64
KV99412328 O-ring installer 	—	KV99412315 Cylinder head remover 	—
	Page AC-63		Fig. AC-82