

DATSUN 2005X MODEL S10 SERIES

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NISSAN MOTOR CO., LTD.

SECTION AC

AIR CONDITIONING

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AC

DESCRIPTION

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OUTLINE OF AIR CONDITIONER

This air conditioner consists of a heating unit and a cooling unit, controlled jointly by a single control mechanism. With the bi-level and ventilation functions provided, this air conditioner permits defrosting and dehumidifying, thus maintaining comfortable air conditioning in the passenger compartment for all seasons.

The cooling unit is connected to the inside air suction port of the heating unit and is secured at two places, on the dash upper panel and on the lower side of the dash panel.

The compressor, used to compress the refrigerant, is mounted on the engine block by a bracket.

The condenser is a device that cools the gaseous refrigerant sent from the compressor. It is mounted in front of the radiator in the engine compartment.

The receiver drier stores fluid refrigerant sent from the condenser and is mounted on the condenser and the radiator core support.

The air conditioner piping is made

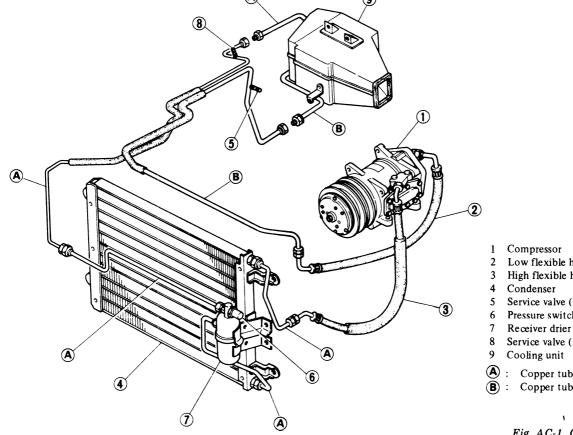
of two flexible hoses and five copper tubes.

Note: Compressor

Air conditioners used on the S10 models can be classified in two types according to the type of compressor.

The air conditioner installed on the production line at the Nissan plant uses a swash plate type (SWP123) compressor.

The air conditioner installed as a dealer option uses a crank type (SC206) compressor.



- Low flexible hose
- High flexible hose
- Service valve (Low pressure)
- Pressure switch
- Service valve (High pressure)
- Cooling unit
- Copper tube (High pressure)
- (B): Copper tube (Low pressure)

Fig. AC-1 Cooling system

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 a quickly evaporating liquid such as alcohol is placed in a container inside a box, the tem-

perature inside the box will drop. This is because the alcohol is evaporated 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 princi-

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

The refrigeration system is shown in Figure AC-2.

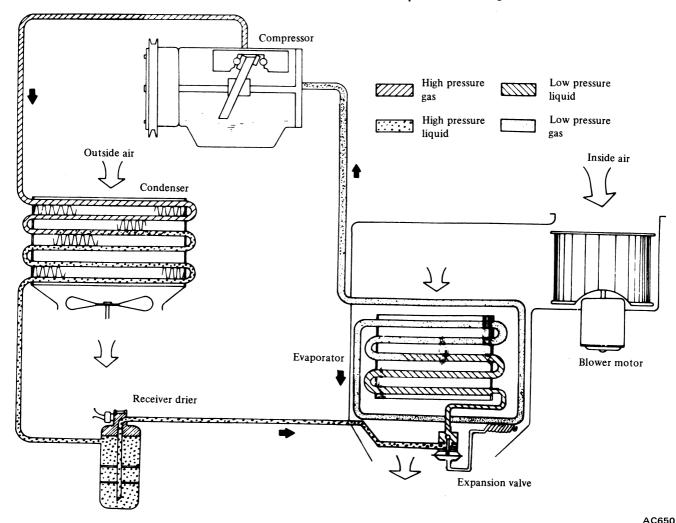


Fig. AC-2 Refrigeration cycle

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 forced out to the condenser by compressor and the low pressure refrigerant gas is compressed to a high pressure and high temperature.

The driving force is transmitted by an electrical clutch.

CONDENSER

The condenser is installed to the front of the radiator. The heated and compressed refrigerant gas from the compressor condenses to a liquid by being cooled by air passing between the fins of the condenser.

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 desiccating agent. They have

the job of removing moisture and foreign particles as the refrigerant circulates within the system.

The pressure safety valve is installed near the sight glass of the receiver drier. This valve releases pressure to the atmosphere if unusually high pressure builds up in the refrigeration system.

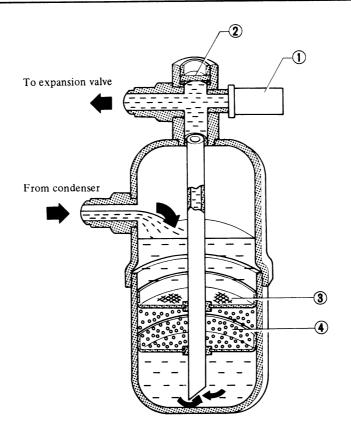
COOLING UNIT

The cooling unit includes an evaporator and an expansion valve. From the electrical point of view, the cooling unit consists of a thermo switch and a main relay.

The liquid refrigerant evaporates in the evaporator with the aid of the expansion valve. Consequently the air drawn by the blower motor is cooled in passing through the evaporator.

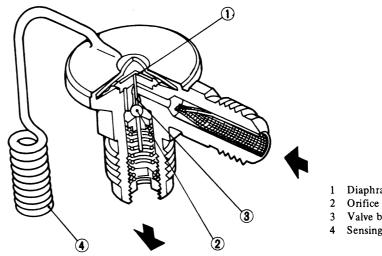
The expansion valve restricts the liquid refrigerant as it passes through it and delivers sprayed refrigerant to the evaporator for facilitating refrigerant evaporation.

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.



- Security valve
- Sight glass
- Strainer
- Desiccating agent

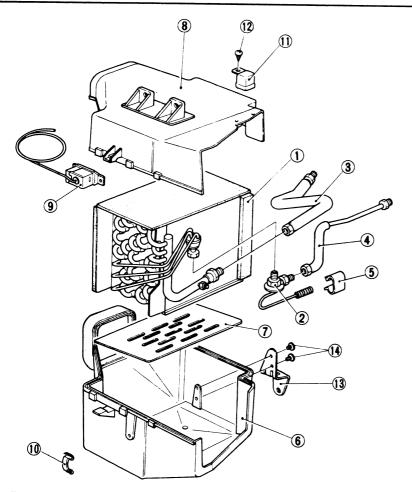
AC821 Fig. AC-3 Receiver drier



- Diaphragm
- Valve ball
- Sensing bulb

AC822

Fig. AC-4 Expansion valve



- 1 Evaporator
- 2 Expansion valve
- 3 Low pressure pipe
- 4 High pressure pipe
- 5 Clip

- 6 Lower case
- 7 Drainboard
- 8 Upper case9 Thermo switch
- 10 Clip

- 11 Heater motor relay
- 12 Screw
- 13 Bracket
- 14 Screw

AC823 Fig. AC-5 Cooling unit

VACUUM SYSTEM

MAGNET VALVE

The magnet valve is located between the fast idle dash pot and the intake manifold vacuum connector.

Valve closed

When current to the coil is interrupted, passage on the intake manifold side closes, leaving the fast idle dash pot side line open to the atmosphere.

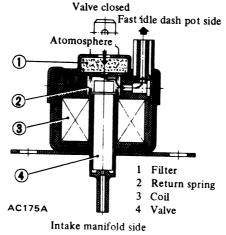


Fig. AC-6 Magnet valve — Closed

Valve open

While the magnet valve coil is energized by an electric current, it holds the valve needle in the raised position and vacuum is imposed on the fast idle dash pot from the intake manifold.

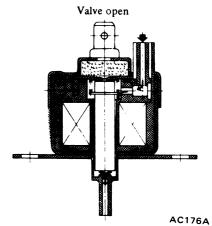


Fig. AC-7 Magnet valve — Open

FAST IDLE CONTROL DEVICE (F.I.C.D.)-FAST IDLE DASH POT

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 standstill.

The device is a vacuum actuator and is equipped with a diaphragm. The diaphragm deflects when vacuum pressure is applied, and as a result, the push rod attached to it is moved. The push rod is attached to the carburetor throttle lever. When the vacuum pressure acting on the diaphragm is lost, the diaphragm is returned to its original position.

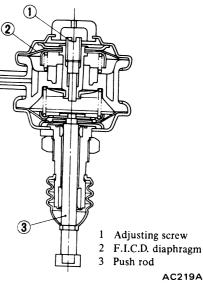


Fig. AC-8 Fast idle dash pot

ELECTRICAL CIRCUIT

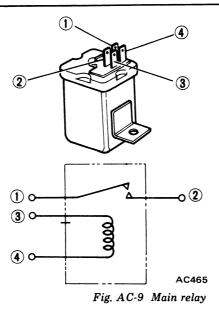
DESCRIPTION

The electrical system of the air conditioner has three switches, a resistor, a relay, a magnet valve, a fan motor and an electrical clutch for the compressor.

When both the ignition switch and fan switch are turned on, the heater motor relay is actuated and electric power is supplied to the fan motor and electrical clutch for the compressor. In such a case, the control lever is set in the A/C position. The speed of the blower motor is controlled by the fan switch with the aid of the resistors. The electrical clutch is actuated by the thermo switch and fan switch. At the same time, the magnet valve also operates to supply vacuum from the engine to the actuator of the F.I.C.D., thereby increasing the engine rpm at idling.



The heater motor relay is mounted on the cooling unit. When the ignition switch is ON, the control lever in the A/C position (microswitch: ON), and the fan switch also ON, then the relay contact is closed. Then, power from the battery is supplied to the fan motor and to the electrical clutch for the compressor.

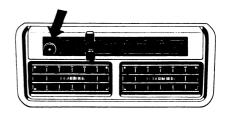


MICROSWITCH

The microswitch is installed on the A/C control bracket that is attached to the heater unit. When the control lever is set in the A/C position, the electrical circuit is turned to the A/C circuit. In other positions (VENT, BI-LEVEL, HEAT and DEF), it is turned to the HEATER circuit.

FAN SWITCH

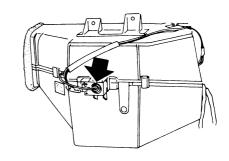
The fan switch is installed on the air conditioner control panel. This switch controls the four blower motor speeds through changeover of resistors.



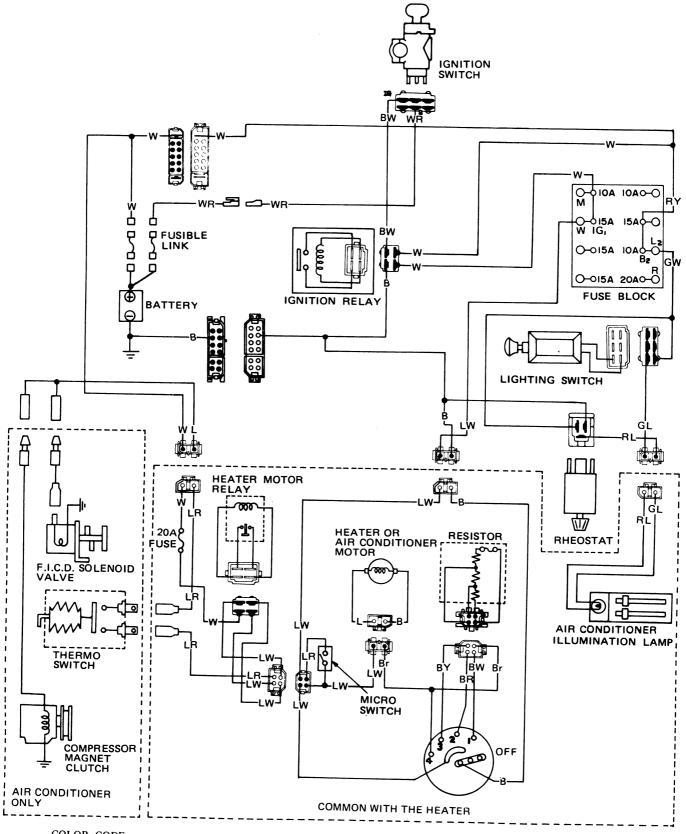
CM669 Fig. AC-10 Fan switch

THERMO SWITCH

The thermo switch is installed on the cooling unit. This switch is automatically turned off when the temperature of the air passing through the evaporator core lowers to the preset level $[-0.5^{\circ}C\ (31^{\circ}F)]$.



AC825 Fig. AC-11 Thermo switch



COLOR CODE

WR: White with red stripe

L: Blue

В : Black RYRed with yellow stripe LWBlue with white stripe BW Black with white stripe RLRed with blue stripe LR Blue with red stripe BY Black with yellow stripe GWGreen with white stripe

BR : Black with yellow stripe GW : Green with white stripe Br : Brown

W

: White AC227A
Fig. AC-12 Circuit diagram of air conditioner system

GENERAL SERVICE

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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 contacts the air. This points out the need for care not to expose it to atmosphere for an extended period of time.

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 tips to allow the air conditioner to operate normally in the next season.

1. Keep the entire system free from

refrigerant leakage by periodically checking for refrigerant gas leak even out of season.

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

GENERAL SERVICE INSTRUCTIONS

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

- If a large amount of dirt and sand enter the system, they will be carried with refrigerant and may clog the system or scratch rotating parts. This points out the need for care in servicing the system. That is, disconnecting joints should be carried out in a clean place.
- Water should not be allowed to get inside the system. The refrigerant does not readily mix with water. However, the presence of even a minute amount of water will cause a chemical reaction at high temperature which will in turn produce hydrochloric acid (HCl). Since hydrochloric acid is highly corrosive to metals, the aluminum and copper piping, etc. will become corroded and the refrigeration system will become clogged.

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

- 1. When a system line is disconnected, plug the opening immediately. This is expecially 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. Using clean cloth, wipe off any 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.
- 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.
- 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:

- a. 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.
- b. 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 (125°F)] or drop it from a high height.
- c. 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.
- d. The refrigerant itself is non-flammable. 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.

e. 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 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 lowsides 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-13.

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.

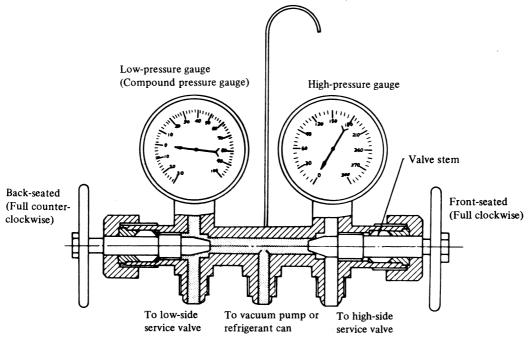


Fig. AC-13 Manifold gauge

AC243

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 refrigearnt.

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 opened during connection and disconnection of charging hoses and refrigerant will be forcefully discharged. Therefore, connect and disconnect charging hoses quickly while pressing flare nut of charging hose against service valve.

WARNING:

Work with fingers protected with cloth against frostbite by refrigerant.

- 3. Since close contact between the 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, always check packing prior to installing charging hose.

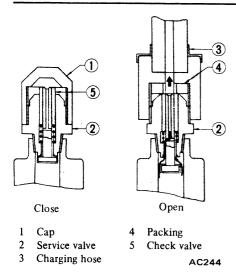
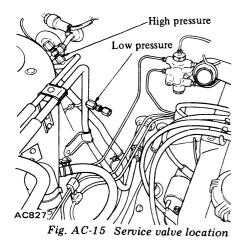


Fig. AC-14 Service valve

The two service valves are provided on the piping. See Figure AC-15.



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.

CAUTION: 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 firmly.
- 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-16.

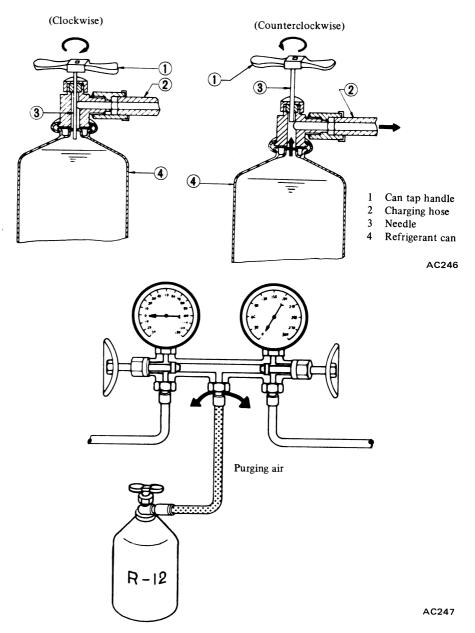


Fig. AC-16 Can tap and purging air

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 Figure AC-15.

3. Open both manifold gauge valves slightly and slowly discharge refrigerant from system. See Figure AC-17.

WARNING:

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

CAUTION:

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

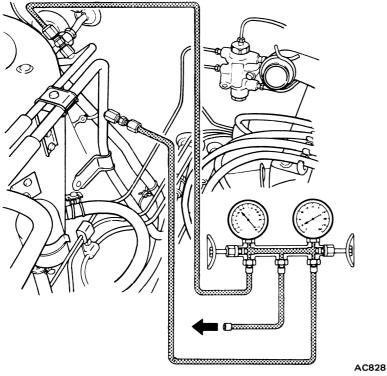


Fig. AC-17 Discharging system

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".
- 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-18.

- 5. When low-pressure gauge reading has reached to approximately 500 mm Hg (20 in Hg), slowly open high-pressure valve. See Figure AC-19.
- 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 it stand 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 evacuation according to the following table.

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

Note: Values show readings of the low-pressure gauge.

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

If the pressure rises or the specified 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 described in the followings.

- (1) Confirm that both valves of manifold gauge are fully closed and then disconnect center charging hose from vacuum pump.
- (2) Connect center hose to can tap in place of vacuum pump. Attach refrigerant can to can tap and pass refrigerant to manifold gauge.
- (3) Loosen the connection of center fitting of manifold gauge to purge air from center hose.
- (4) Open low-pressure valve of manifold gauge and charge refrigerant into system. After one can [about 0.4 kg (0.9 lb)] of refrigerant has been charged into system, close low-pressure valve.
- (5) Check for refrigerant leakage with a leak detector. Repair any leakages found. Refer to "Checking for Leaks" and "Refrigerant Leaks".
- (6) Confirm that both valves of manifold gauge are fully closed and then change center charging hose from can tap 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 evacuation of system. Next, charge refrigerant. Refer to "Charging Refrigerant".

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 Figure AC-15.

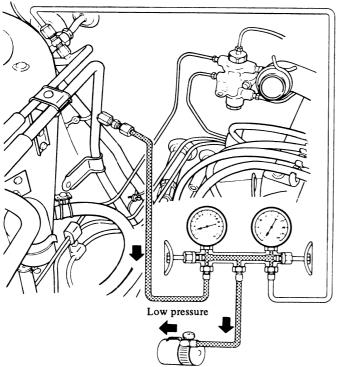


Fig. AC-18 Evacuating system - First step

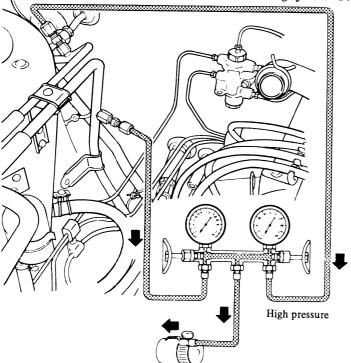


Fig. AC-19 Evacuating system - Second step

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 Figure AC-15.

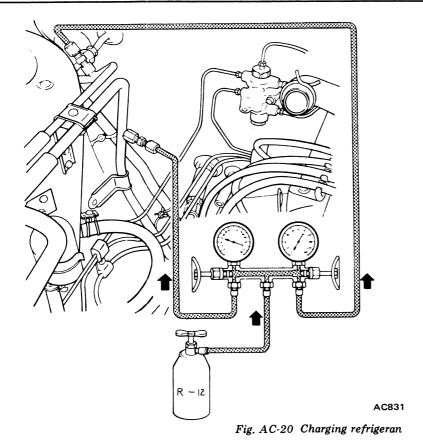
CAUTION:

- a. Be sure to purge air from the highand low-pressure charging hoses.
- 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-20.

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-21.

WARNING:

- Under any circumstances the refrigearnt can must not be warmed in water heated to a temperature of over 52°C (125°F).
- b. A blow torch or stove must never be used to warm up the can.



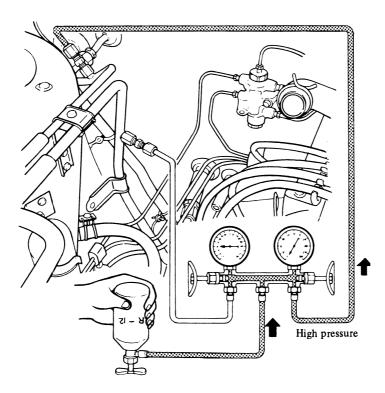
Immerse in water heated to about $40^{\circ}\text{C }(104^{\circ}\text{F})$. Note that hot water is dangerous.

Fig. AC-21 Charging refrigerant

CAUTION:

When charging liquefied refrigerant into the system with the can turned upside down to reduce charging time, charge it only through high pressure valve, but not through low-pressure valve.

After completion of charging, the compressor should always be turned several times manually. See Figure AC-22.

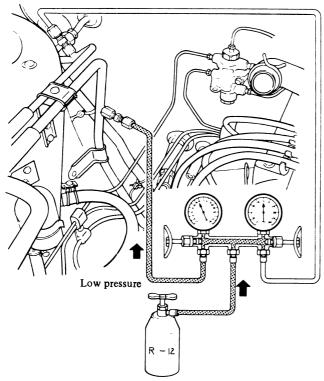


AC832 Fig. AC-22 Charging refrigerant

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.



AC833 Fig. AC-23 Charging refrigerant

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 control lever to A/C and FAN switch at maximum speed.
- (4) Charge refrigerant while controlling low-pressure gauge reading at 2.8 kg/cm² (40 psi) or less by turning in or out low-pressure valve of manifold gauge. See Figure AC-23.
- 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 can, be sure to purge air from inside charging hose.

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-24.



Measure the amount of charged refrigerant with a scale.

Make a note of the amount charged from can.

AC255

Fig. AC-24 Charging refrigerant

Refrigerant capacity

Unit: kg (lb)

Refrigerant	Minimum	Maximum
R-12	0.5 (1.1)	0.85 (1.87)

Note: The presence of bubbles in sight glass of receiver drier is an unsuitable method of checking the amount of refrigerant charged in 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 means of discharge pressure. Refer to "Refrigerant Level Check".

- 7. After the specified amount of refrigerant has been charged into system, close manifold gauge valves. Then detach charging hoses from service valves of system. Be sure to install valve cap to service valve.
- 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

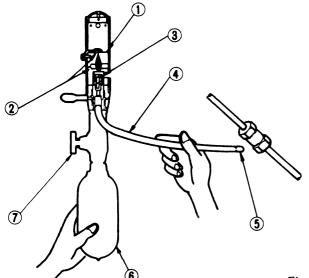
Conduct a leak test whenever leakage of refrigerant is suspected and when conducting service operations which are accompanied by disassembly or loosening of connection fittings.

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.



- 1 Copper reaction plate
- 2 Flame adjusting lines
- 3 Burner
- 4 Sampling tube
- 5 Strainer
- 6 Gas bomb
- 7 Flame adjuster

AC010 Fig. AC-25 Checking for leaks

	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 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.

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.

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.
- 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

- (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 pressures in accordance with the procedures as described "Performance Test".

- 1. Start the engine and hold engine speed at 1,500 rpm.
- 2. Set blower to maximum speed.
- 3. Check sight glass after the lapse of about five minutes. Judge according to the following table.

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.

				
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.	at intervals of 1 - 2 seconds. Almost transparent, Bubbles may appear when engine speed is raised and lowered.		No bubbles can be seen.
Drossus of many	AC256	AC257		AC258
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 of low pressure side.

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 compres-

sor 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.
- 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 SWP123, SC206 140 to 220 cc (4.7 to 7.4 US fl oz, 4.9 to 7.7 Imp fl 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
- 6. Discard the used oil and fill with the same amount of new oil. Add oil if found less than above amount.

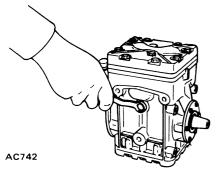


Fig. AC-26 Filler plug of SC206 compressor

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 cor-

rectly 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.
- Open the hood.
- 4. Connect manifold gauge to highand low-side service valves of the system. Refer to "Handling Manifold Gauge".
- 5. Set control lever to A/C.
- 6. Set blower to its highest speed.
- 7. Start the engine and hold engine speed at 1,500 rpm.
- 8. After the air conditioner has been operated for about 10 minutes, measure system pressures at high-pressure (discharge) side and low-pressure (suction) side.
- 9. Measure the temperature of discharge air at outlet grille.
- 10. Measure the temperature and humidity of the ambient air at a point 1 m (3 ft) front of condenser. However, a dry bulb and wet bulb must not be placed in direct sunlight.

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.

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 even if damage is slight.
- 3. Check compressor oil and add oil if required.
- 4. Charge refrigerant and recheck for gas leaks. If no leaks are found, evacuate and charge system.

REMOVAL AND INSTALLATION

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COMPRESSOR

Air conditioners of the S10 model can be classified into two types, depending on the type of compressor. Air conditioners installed on the production line at the Nissan plant use the swash plate type (SWP123) compressor, while air conditioners installed as a dealer option use the crank type (SC206) compressor.

When servicing the compressor, be sure to confirm the compressor type, and refer to "Removal and Installation" instructions provided for that particular compressor.

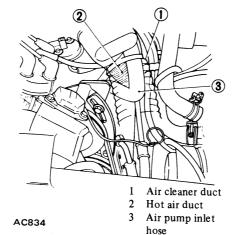


Fig. AC-27 Removing air cleaner duct, hot air duct and air pump inlet hose

- 4. Loosen idler pulley lock nut and tension adjusting bolt to slacken belt, and remove compressor drive belt.
- 5. Loosen air pump adjusting bolt and air pump mounting bolts and remove air pump drive belt.

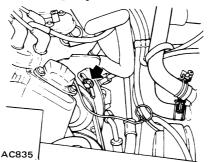


Fig. AC-28 Air pump adjusting bar

- 6. Remove bolts securing air pump adjusting bar to compressor.
- 7. Disconnect lead wire from compressor at connector.
- 8. Disconnect high and low pressure hoses from compressor.

CAUTION:

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

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

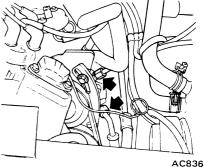


Fig. AC-29 Removing pressure hoses

9. Remove three bolts securing upper side of compressor.

SWP123 COMPRESSOR

REMOVAL

- 1. Disconnect battery ground cable.
- 2. Discharge refrigerant from air conditioning system. Refer to "Discharging System" Section of "General Service".
- 3. Disconnect air cleaner duct, hot air duct and air pump inlet air hose.

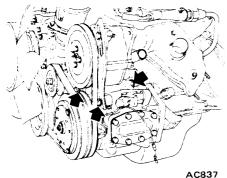


Fig. AC-30 Removing compressor upper side bolts

- 10. Jack up front side of car, and place stand under it.
- 11. Remove engine underside cover.
- 12. Remove tension rod and tension rod bracket. Refer to Section FA.

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, handcrank 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.

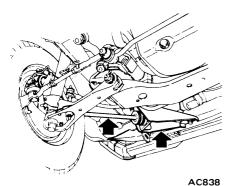


Fig. AC-31 Removing tension rod and tension rod bracket

13. Remove two bolts securing lower side of compressor, and take compressor out of car, downward.

INSTALLATION

Before installing compressor, be sure to check amount and quality of compressor oil by referring to "Compressor Oil Level Check" Section in "General Service." 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 just removed.
- (2) Coat sealing surface of joint with new compressor oil.
- (3) Check tightening torque of bolts holding compressor bracket, tension rod and tension rod bracket.

Tightening torque:

Compressor bracket to cylinder block:

3.7 to 5.1 kg-m (27 to 37 ft-lb)

Compressor to compressor bracket:

3.7 to 5.1 kg-m (27 to 37 ft-lb)

Tension rod end nut:

4.5 to 5.5 kg-m

(33 to 40 ft-lb)

Tension rod bracket bolt:

3.2 to 4.3 kg-m

(23 to 31 ft-lb)

Tension rod to transverse link:

4.9 to 6.3 kg-m (35 to 46 ft-lb)

- (4) Before installing compressor, turn compressor drive shaft manually a few turns.
- (5) Before installing compressor, make sure that there is no refrigerant leak from compressor.
- (6) Upon installation of compressor, conduct refrigerant leak test and make sure that there is no leak from any connection between compressor and flexible hose.
- (7) Evacuate and recharge system. Refer to "General Service" for "Evacuating and Charging System".

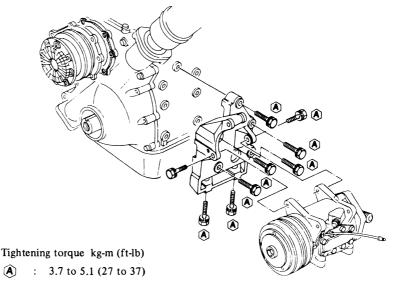


Fig. AC-32 Installing compressor

AC839

SC206 COMPRESSOR

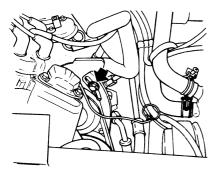
REMOVAL

- 1. Disconnect battery ground cable.
- 2. Discharge refrigerant from air conditioner system. Refer to "Discharging System" Section of "General Service".
- 3. Drain coolant from radiator.
- 4. Disconnect harness connector from radiator. Harness connector is located on left side of radiator upper tank.
- 5. Remove four screws securing radiator shroud, and place shroud on cooling fan.
- Remove radiator grille.

7. Remove radiator and also remove shround. Radiator and condenser are jointly tightened to radiator core support with four bolts on radiator grille side.

Note: After removal of four radiator mounting bolts, radiator is supported only by pipes and receiver drier bracket. Do not apply any large force to condenser or pipes.

- 8. Loosen alternator drive belt tension adjusting bolt and two alternator mounting bolts, and remove cooling fan drive belt.
- 9. Loosen idler pulley lock nut and compressor drive belt tension adjusting bolt, and remove compressor drive belt.
- 10. Disconnect air cleaner air duct.
- 11. Disconnect air cleaner hot air duct.
- 12. Disconnect air pump inlet and outlet hoses from air pump.
- 13. Loosen air pump drive belt tension adjusting bolt and air pump mounting bolts, and remove air pump drive belt.
- 14. Remove air pump adjusting bar.



AC835 Fig. AC-33 Air pump adjusting bar

- 15. Remove air pump from compressor bracket.
- 16. Disconnect lead wire from compressor.
- 17. Disconnect flexible hose (Ps) and flexible hose (Pd) at pipe joint.

Notes:

- a. When loosening flexible hose joint nut, be sure to use two wrenches.
- Be sure to immediately put plugs in flexible hose opening and pipe opening.

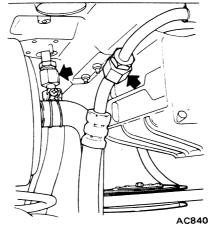


Fig. AC-34 Flexible hose joint

- 18. Raise car, and remove under cover.
- 19. Remove three bolts securing lower side of compressor.

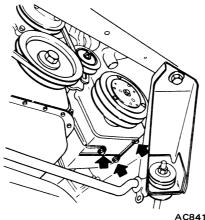
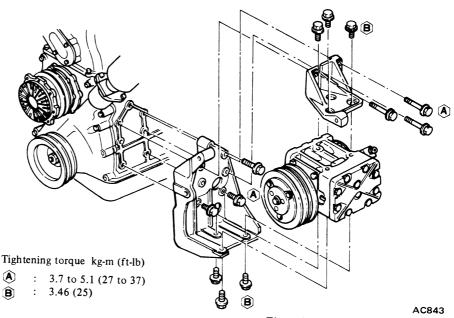


Fig. AC-35 Removing compressor bolts from underside of engine

- 20. Lower car, and remove three bolts securing compressor attachment to compressor bracket.
- 21. Take out compressor unit fitted with flexible hose and attachment, with compressor clutch facing up.

INSTALLATION

Before installing compressor, be sure to check quality and amount of compressor oil by referring to "Compressor Oil Level Check" Section in "General Service". Installation of compressor is to be done in reverse sequence of removal. Use the same care as for the SWP123 compressor. Refer to "Removal and Installation" of the SWP123 compressor.



IDLER PULLEY

ADJUSTMENT OF BELT TENSION

Normal compressor drive belt deflection is 8 to 12 mm (0.31 to 0.47 in) when 10 kg (22 lb) of thumb pressure is applied midway between crankshaft pulley and compressor pulley. Move idler pulley up or down by turning adjusting bolt to correct belt deflection.

1. Loosen idler pulley lock nut and turn adjusting bolt to obtain correct belt deflection. 2. After completing adjustment, securely tighten idler pulley lock nut.

REMOVAL AND INSTALLATION

- 1. Loosen idler pulley lock nut.
- 2. Loosen belt tension adjusting bolt and loosen belt tension.
- 3. Remove two bolts securing idler pulley assembly to cylinder block and one bolt securing it to compressor bracket, and remove idler pulley assembly.
- 4. Install idler pulley assembly in the reverse sequence of removal.

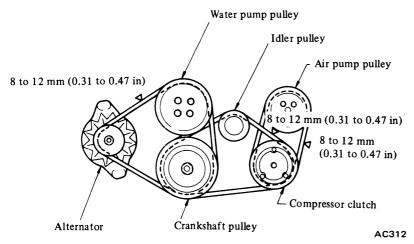
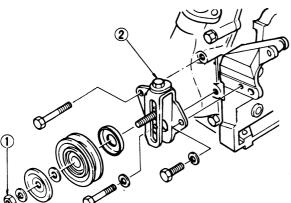


Fig. AC-37 Adjusting belt tension



- 1 Idler pulley attaching nut
- nut
 2 Belt tension adjusting
 bolt

Fig. AC-38 Removing idler pulley

COOLING UNIT REMOVAL AND INSTALLATION

- 1. Disconnect battery ground cable.
- 2. Discharge refrigerant from air

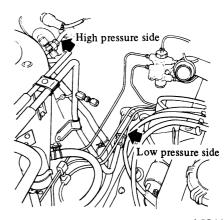
conditioning system. Refer to "Discharging System" Section in "General Service".

3. Disconnect high-pressure pipe and low-pressure pipe joints located at dash panel on engine compartment side.

CAUTION:

Immediately attach blind plug to pipe opening.

Note: When disconnecting pipe joint, be sure to use two wrenches.



AC844
Fig. AC-39 Disconnecting refrigeration
pipes

- 4. Remove grommet fixing highpressure pipe and low-pressure pipe to dash panel.
- 5. Remove package tray finisher by removing two screws on each side securing finisher to instrument panel and one screw securing it to cooling unit.
- 6. Remove glove box lid.
- 7. Remove glove box.
- 8. Remove right-hand side wind duct and defroster duct.

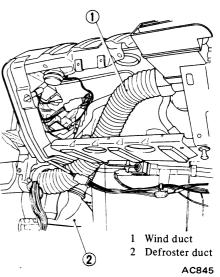


Fig. AC-40 Wind duct

- 9. Disconnect drain hose from cooling unit.
- 10. Remove screw securing cooling unit lower bracket to dash panel and two screws securing cooling unit to bracket on dash upper panel, lower cooling unit to floor.

CAUTION:

When removing two screws securing cooling unit to dash upper panel, be sure to hold cooling unit to prevent it from falling.

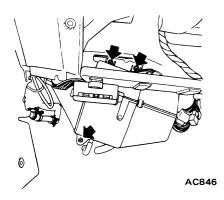


Fig. AC-41 Removing cooling unit

11. Disconnect cooling unit harness at connector.

One connector is colored green and is located at upper right corner of dash panel; the other is connected to harness from heating unit.

12. Install cooling unit in the reverse sequence of removal.

Note:

- a. Before connecting pipes, be sure to apply new compressor oil to each sealing surface.
- b. When connecting pipe, be sure to use two wrenches.

Tightening torque:

Joint nut for copper tube
High pressure side (3/8 in)
2.5 to 3.5 kg-m
(18 to 25 ft-lb)
Low pressure side (1/2 in)
2.5 to 4.0 kg-m
(18 to 29 ft-lb)

DISASSEMBLY AND ASSEMBLY

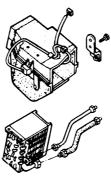


Fig. AC-42 Disassembling cooling unit

- 1. Disconnect cooling unit harness from respective connector of thermo switch and main relay.
- 2. Remove high pressure pipe fastening clip from upper cooling unit case.
- 3. Remove main relay from upper cooling unit case.
- 4. Remove four fixed springs that join upper and lower coooling unit cases, and then separate upper and lower cases.
- 5. Take out thermo switch and evaporator.
- 6. Remove insulating material that encases expansion valve, and remove clip securing temperature sensor in expansion valve. Remove expansion valve from evaporator.
- 7. Assemble cooling unit in the reverse sequence of disassembly.

Tightening torque: Expansion valve 5.0 kg-m (36 ft-lb)

CAUTION:

- a. When installing expansion valve to evaporator, use sufficient care so that temperature sensor can be mounted correctly to low pressure pipe.
- Use sufficient care so that temperature sensor of capillary tube of thermo switch can be installed correctly to evaporator.

INSPECTION

Evaporator

Check evaporator for leakage or

damage. If damaged, replace.

Expansion valve

Check expansion valve for leakage or clogging. If clogged, clean filter in expansion valve. If damaged, replace.

RECEIVER DRIER

REMOVAL AND INSTALLATION

- 1. Disconnect battery ground cable.
- 2. Discharge refrigerant from air conditioning system. Refer to "Discharging System" Section in "General Service".
- 3. Remove radiator grille.
- 4. Disconnect pipes from receiver drier.

CAUTION:

Attach blind plug immediately to pipe opening and to receiver drier opening.

Note: When disconnecting pipe from receiver drier, use two wrenches.

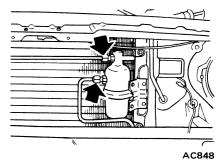


Fig. AC-43 Receiver drier

- 5. Remove two nuts securing receiver drier bracket to radiator core support on engine compartment side.
- 6. Remove two screws securing receiver drier bracket to condenser, and take out receiver drier.
- 7. Install in the reverse sequence of removal.

Tightening torque:

Joint nut for copper pipe to receiver drier: 2.5 to 3.5 kg-m (18 to 25 ft-lb)

INSPECTION

Check receiver drier for leakage or damage. If necessary, replace receiver drier and safety valve as an assembly.

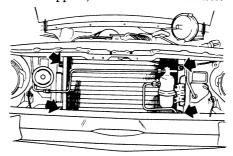
CONDENSER REMOVAL AND INSTALLATION

- 1. Disconnect battery ground cable.
- 2. Discharge refrigerant from air conditioning system. Refer to "Discharging System" Section in "General Service".
- 3. Remove radiator grille and hood lock stay.
- 4. Remove receiver driver. Refer to "Removal" of "Receiver Drier".
- 5. Disconnect pipes from condenser.

CAUTION:

- Use wrench to fix union on condenser, and then loosen flare nut of refrigerant line with another wrench.
- b. Plug up all openings in condenser and system.

6. Remove four screws securing condenser and radiator to radiator core support, and remove condenser.



AC849

Fig. AC-44 Removing condenser

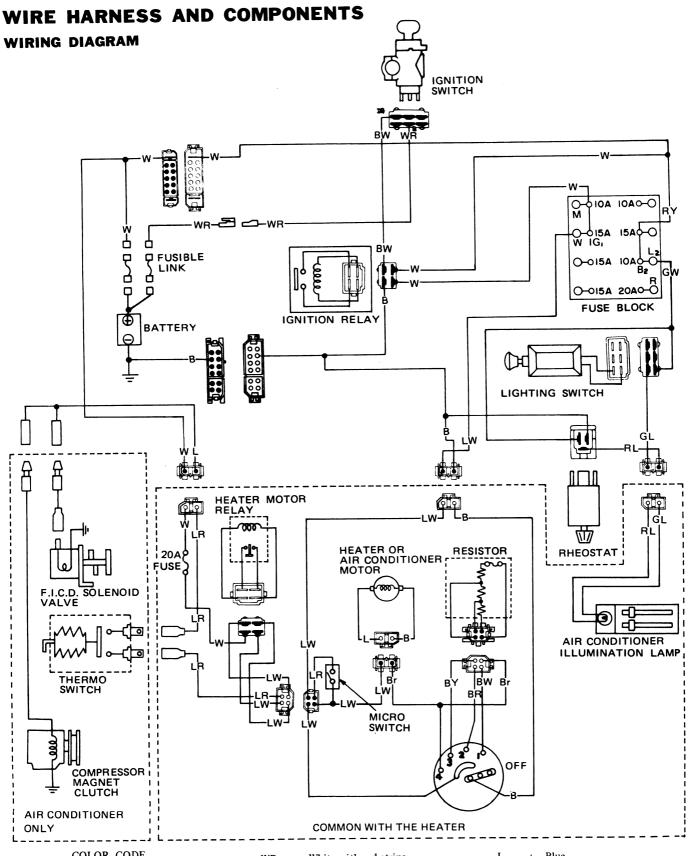
7. Install in the reverse sequence of removal.

INSPECTION

Check condenser for scratches or cracks. 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.



COLOR CODE White with red stripe WR

Blue with white stripe LW Red with yellow stripe RY В : Black LR Blue with red stripe Red with blue stripe RL : : Black with white stripe BW

Green with white stripe Br Brown GW: : Black with yellow stripe BY

BR

GL: Green with blue stripe : Black with red stripe : White Fig. AC-45 Wiring diagram

AC227A

MAINTENANCE

If cracks or deterioration is found on wire harness insulation, replace wire harness. When replacing or connecting wire, be sure to use resin flux solder or electrical connector. Cover jointed portion and exposed portion with insulating tape. Always use specified diameter of wire when replacing wire. Never use smaller diameter wire. Each harness and wire should be held securely by clip or other means so that the wires will not rub or be cut by vibration.

Note:

- a. Before inspection or replacement of electrical circuit and its components, disconnect battery terminals in the following sequence: Disconnect ground cable from negative (-) terminal and then disconnect positive cable from positive (+) terminal.
 - Before connecting cable to battery terminal, be sure to clean terminal with rag. Connect positive cable to positive (+) terminal and then connect ground cable to negative (-) terminal. Apply grease to these terminals to prevent rust formation.
- b. Do not use screwdrivers or any other service tool for continuity test. Always use test leads for this test.
- Never ground an open circuit or circuit with no load. Use a test lamp (12V-3W) or circuit tester as a load.

HEATER MOTOR RELAY

Removal and installation

Heater motor relay is installed to cooling unit. Remove heater motor relay after removing cooling unit.

- 1. Disconnect battery ground cable.
- 2. Remove cooling unit. Refer to "Removal and Installation" of "Cooling Unit".
- 3. Disconnect cooling unit harness from heater motor relay terminal.
- 4. Remove screws mounting heater motor relay to cooling unit, and remove heater motor relay.
- 5. Install heater motor relay in the reverse sequence of removal.

Inspection

Check heater motor relay for continuity by using circuit tester or test lamp. Continuity must be observed between terminals 3 and 4. When DC 12V is applied between terminals 3 and 4, continuity must be observed between terminals 1 and 2.

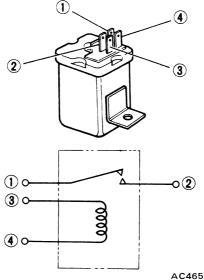
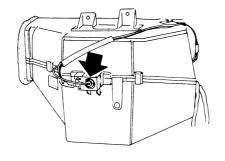


Fig. AC-46 Heater motor relay

THERMO SWITCH

Thermo switch is located on side face of cooling unit. Thermo switch is assembled between lower and upper cases of cooling unit. Remove cooling unit before removing thermo switch.



AC852 Fig. AC-47 Thermo switch

Removal and installation

- 1. Disconnect battery ground cable.
- 2. Remove cooling unit. Refer to "Removal and Installation" of "Cooling Unit".

- 3. Disconnect cooling unit harness from thermo switch terminal
- 4. Remove four fixing springs that join upper and lower cases, and then separate the cases.
- 5. Remove thermo switch from groove of upper and lower cases.
- 6. Install thermo switch in the reverse sequence of removal.

CAUTION:

Capillary tube of thermo switch is fitted in groove of cooling unit case. Use care not to bend or crush this tube.

Note: When installing, take heed so that temperature sensor of thermo switch capillary tube can be mounted correctly to evaporator.

Inspection

- 1. Using circuit tester or test lamp, check thermo switch for continuity between its two terminals. Continuity must be observed.
- 2. Place temperature sensing end of thermo switch capillary tube in atmosphere of -1° C (30°F), and check continuity between two terminals. Continuity must be observed.
- 3. Replace thermo switch if damaged.

BLOWER MOTOR

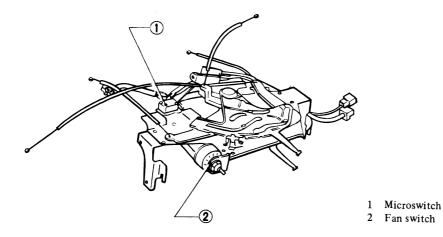
- 1. Disconnect battery ground cable.
- 2. Disconnect cooler duct and defroster duct on driver's seat from heating unit.
- 3. Disconnect blower motor lead wires at connector.
- 4. Remove screws securing blower motor to heating unit.
- 5. Remove blower motor and fan, as an assembly, from heating unit.
- 6. Install blower motor in the reverse sequence of removal.

FAN SWITCH AND MICROSWITCH

Removal and installation

- 1. Disconnect battery ground cable.
- 2. Remove vent cover from heating unit.

- 3. Disconnect control cable from each door and water cock. Remove cable clips attached to each cable.
- 4. Disconnect four lead wires from control at respective connector.
- 5. Remove three screws securing control assembly to heating unit, and pull out control assembly toward front.
- 6. Remove screws securing microswitch.
- 7. Remove nut securing fan switch.
- 8. Remove fan switch and microswitch as an assembly.
- 9. Install fan switch and microswitch in the reverse sequence of removal.



AC852 Fig. AC-48 Removing fan switch and microswitch

Inspection

Using circuit tester or test lamp, check fan switch and microswitch for continuity.

RESISTOR FOR FAN SWITCH

Removal and installation

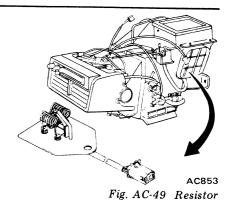
- 1. Disconnect battery ground cable.
- 2. Drain coolant from radiator.

Note: Set temperature control lever to HEAT position to open water cock before draining coolant.

- 3. Remove console box. Refer to Section BF of Service Manual.
- 4. Remove instrument panel. Refer to Section BF of Service Manual.
- 5. Remove cooling unit. Refer to "Removal and Installation" of "Cooling Unit".
- 6. Disconnect lead wire from resistor at connector.
- 7. Remove resistor from heating unit. Resistor is mounted to heater case by spring pressure.
- 8. Install resistor in the reverse sequence of removal.

Inspection

Check fuse for continuity and measure resistance of each coil. Refer to Continuity Diagram shown below.



MAGNET VALVE

Removal and installation

- 1. Disconnect battery ground cable.
- 2. Disconnect magnet valve lead wires and vacuum hoses.
- 3. Remove magnet valve securing screws and then remove magnet valve.

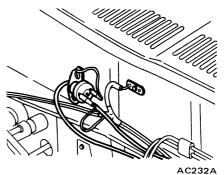


Fig. AC-50 Removing magnet valve

4. Installation is in the reverse order of removal.

Inspection

- 1. Using circuit tester or test lamp, check magnet valve for continuity between two terminals.
- 2. Start engine, set control lever in A/C position, and set fan switch to ON. Make sure that first idle actuator operates when engine is idling.

FAST IDLE DASH POT ADJUSTMENT OF IDLE SPEED

Transmission	When A/C is OFF.	When F.I.C.D. is actuated.
Manual	600 rpm	800 rpm
Automatic	600 rpm at "D" range	800 rpm at "N" range

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

Use the following procedures when adjusting.

- 1. Run 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 engine speed to 800 rpm using following procedures as a guide.
- (1) Put off cap and turn adjusting screw until engine speed is 800 rpm.

Clockwise:

Engine speed increases.

Counterclockwise:

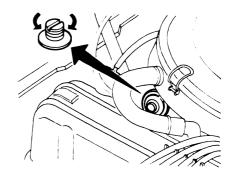
Engine speed decreases.

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

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

If correct adjustment is not made after making sure that engine speed is normal when throttle valve lever touches dash pot, repeat steps (1) and (2) above until engine speed is 800 rpm at idling. (Refer to Section EF for adjustment of engine speed when throttle valve lever touches dash pot.) (3) Install cap.

Adjusting screw



AC220A Fig. AC-51 Fast idle dash pot

REMOVAL AND INSTALLATION

- 1. Remove vacuum hose from fast idle dash pot.
- 2. Remove air cleaner assembly.
- 3. Remove attaching nuts, then fast idle dash pot.
- 4. Install fast idle dash pot in the reverse order of removal.
- 5. After installing, adjust fast idle dash pot. Refer to Adjustment of Idle Speed.

COMPRESSOR (SWP123)

CONTENTS

DESCRIPTION	ΔC-29	SIDE COVER	
COMPRESSOR CLUTCH	AC-23	SIDE COVER	AC-34
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INSPECTION		INSTALLATION	VC 34
INSTALLATION		REAR END COVER AND	AC-54
SHAFT SEAL		REAR CYLINDER HEAD	AC-34
REMOVAL	AC-32	DISASSEMBLY	VC 34
INSPECTION		INCRECTION	AC-35
INSTALLATION	AC-33	ACCELADIA	AC-35
DISCHARGE VALVE	AC-33	REPLACEMENT OF CYLINDER	AC-35
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INSTALLATION		INSTALLATION	AC-36
1101ALLA 11011	AC-33	SPECIAL SERVICE TOOLS (For SWP123)	AC-37

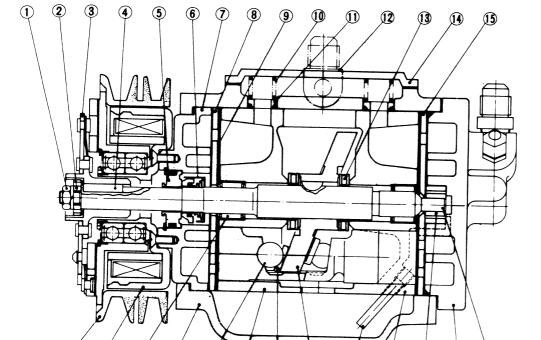
DESCRIPTION

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 crankshaft 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. tained.

- 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 and noise and allowing high-speed operation.
- 4. Discharge per unit of compressor volume is quite high, resulting in high cooling capacity and superb cooling characteristics.



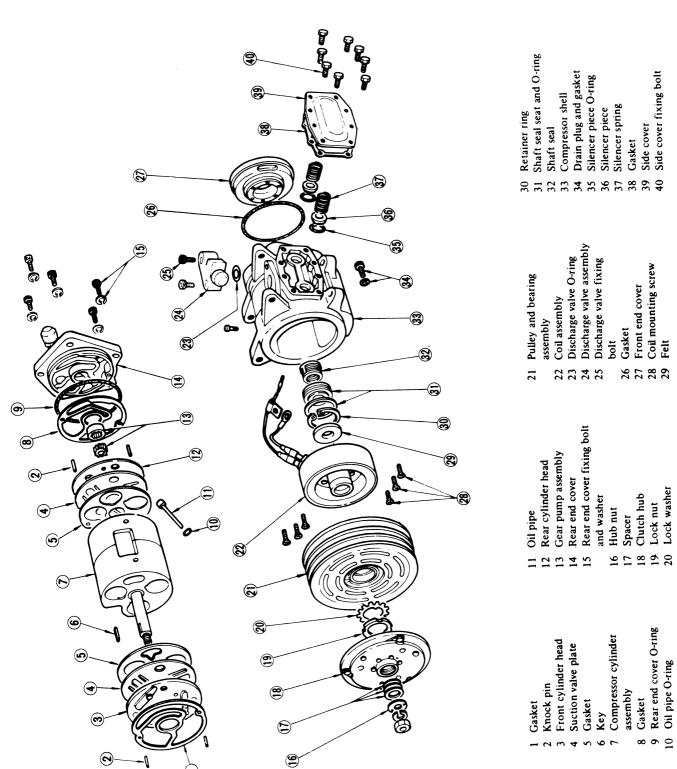
- Shaft nut
- Clutch hub nut
- Clutch hub
- 4 Key
- 5 Shaft seal seat
- 6 Shaft seal
- Front end cover
- Front cylinder head
- Suction valve plate
- Silencer spring 10
- Silencer piece
- 12 Discharge valve
- 13 Thrust bearing
- 14 Side cover
- Rear cylinder head 15
- Compressor shaft 16
- 17 Rear end cover
- Oil pump
- 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
- Pulley and bearing assembly

AC022A

Fig. AC-52 Sectional view

18)

(17)



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 seconds, 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.

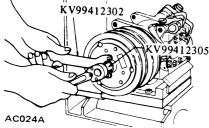


Fig. AC-54 Removing clutch hub nut

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.

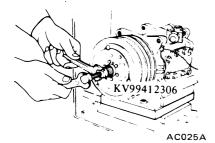


Fig. AC-55 Removing clutch hub

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

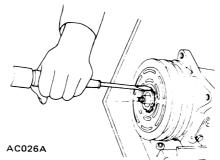


Fig. AC-56 Flattening lock washer tab

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

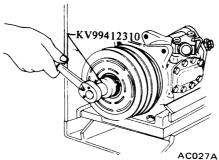


Fig. AC-57 Removing lock nut

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

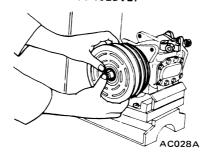


Fig. AC-58 Removing pulley

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



Fig. AC-59 Loosening coil mounting

8. Remove coil mounting screws and separate coil assembly.

INSPECTION

- 1. Check the friction surfaces of the clutch for damage due to excessive heat, or excessive grooving due to slippage. If necessary, replace coil, pulley and bearing assembly, and 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 opened binding leads.
- 4. When replacing compressor clutch assembly, do not forget break-in operation, accomplished by engaging and disengaging the clutch some thirty times. Break-in operation raises the 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, punchlock each at one location to prevent loosening. Correct tightening torque is 0.28 to 0.35 kg-m (2.0 to 2.5 ft-lb).

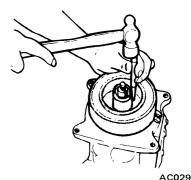


Fig. AC-60 Punch-locking

- 2. Using a plastic mallet, drive pulley and bearing assembly onto the neck of the installed coil assembly. Turn the pulley, making sure that 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, bend the tab with the screwdriver. Proceed carefully to avoid bearing cage damage. Correct

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

4. Fit key and clutch hub to the shaft. Select adjusting spacer which gives the correct clearance between the pulley and clutch hub.

Tighten hub nut to 1.8 to 2.1 kg-m (13 to 15 ft-lb)

5. Tighten shaft nut with locking agent in place.

Tightening torque:

1.6 to 1.7 kg-m (11.6 to 12.3 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.

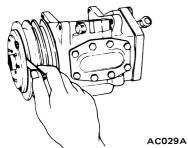


Fig. AC-61 Checking clutch hub-topulley clearance

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.

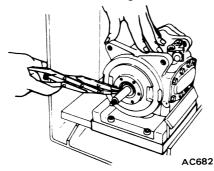


Fig. AC-62 Removing retainer ring

- 4. To remove shaft seal seat, proceed as follows:
- (1) Plug high (discharge) and low (suction) pressure openings of compressor with blind caps.
- (2) Connect charging hose to refrigerant can. Install Charge Nozzle KV994C1552 to other end of charging hose and insert it into hole in middle of blind cap at low pressure side.
- 5. Wrap shaft end with rag. Apply refrigerant pressure of 2 to 5 kg/cm² (28 to 71 psi) 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.
- If shaft seal seat is not plucked out, install it again and apply refrigerant pressure.

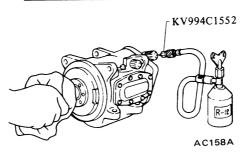


Fig. AC-63 Removing shaft seal seat

6. 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.

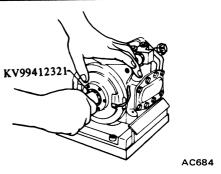


Fig. AC-64 Inserting special tool

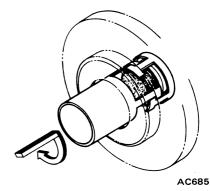


Fig. AC-65 Removing shaft seal

INSPECTION

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



Fig. AC-66 Checking shaft seal

2. Check O-ring and the carbon seal contact surface of shaft seal seat-for damage. Make sure that O-ring contact surface at front end cover is not damaged.

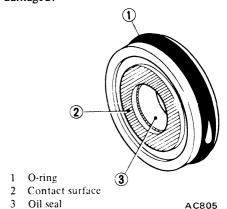


Fig. AC-67 Checking shaft seal seat

CAUTION:

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

Note: Do not re-use shaft seal seat and shaft seal.

INSTALLATION

- 1. Make sure that the shaft seal contact surface is free of dirt and amply lubricated with compressor 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.

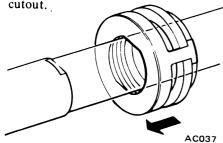


Fig. AC-68 Inserting shaft seal

- 4. Fit O-ring to the outside groove of shaft seal seat, making sure that it seats properly.
- 5. Apply an ample 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.

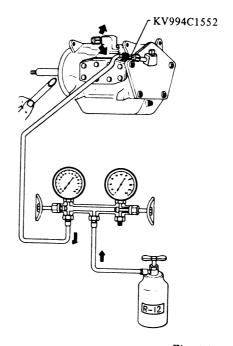
- 6. Using snap ring pliers, compress retainer ring and fit it into front end cover. Seat retainer ring firmly in the groove.
- 7. Install Shaft Handle Socket KV99412329 to compressor shaft and turn shaft 5 to 6 turns clockwise. Then, check for gas leakage as follows:
- (1) Plug high- and low-pressure joints on compressor with blind caps.

(2) Connect charging hose to low pressure gauge of manifold gauge. Install Charge Nozzle KV994C1552 to other end of charging hose and insert it into hole in middle of blind cap at low pressure side.

Connect center hose of manifold

gauge to referigerant can.

- (3) Open valve of can top, charge refrigerant from low pressure side and purge air from high pressure side by loosening blind cap.
- (4) Conduct a leak test. If there is a leak, remove and then install again.



AC159A

Fig. AC-69 Checking for gas leaks

DISCHARGE VALVE

REMOVAL

1. Using Allen Socket KV99412324, remove two hex. socket head bolts.

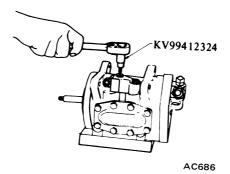


Fig. AC-70 Removing bolts

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

CAUTION:

Do not tap on compressor shaft.

INSPECTION

- 1. Check for scratched seating surface of discharge valve and of shell. 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 and O-ring, and install these parts in their proper positions on shell.
- 2. Using Allen Socket KV99412324, 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)

3. Conduct a gas leak test by referring to the topic "Installation" of "Shaft Seal".

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-71. Note that two silencer springs inside the cover will force up side cover.

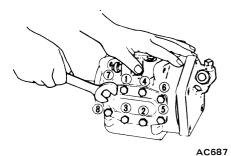


Fig. AC-71 Loosening cover mounting bolt

- 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.

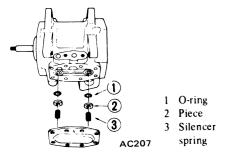


Fig. AC-72 Exploded view of silencer spring, pieces and O-ring

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 Orings.
- 3. Coat O-ring and the area around shell hole with an ample amount of compressor 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 compressor 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-65. Tightening torque is 1.8 to 2.0 kg-m (13 to 14 ft-lb).
- 6. Fill with compressor 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

- 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.

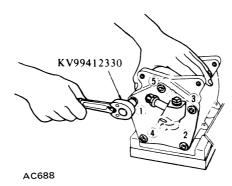


Fig. AC-73 Loosening bolts

3. Grasp rear end cover and carefully separate it from compressor. Tap the flange lightly and alternately as required with a plastic mallet. Do not tap on the compressor shaft.

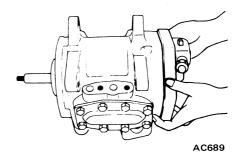


Fig. AC-74 Removing rear end cover

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

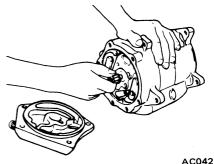


Fig. AC-75 Removing pump gear

- 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-76. With the nut in firm contact with the back side of cylinder head, tighten the bolt slowly to break loose the head.

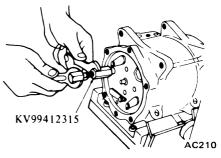


Fig. AC-76 Removing rear cylinder head

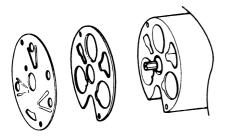
INSPECTION

- 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 compressor 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 compressor 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-77 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 compressor oil.

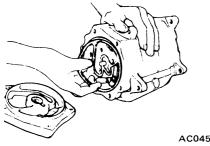


Fig. AC-78 Installing gasket

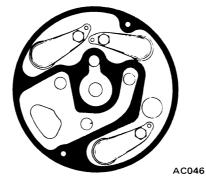
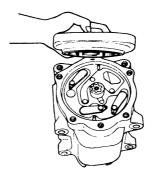


Fig. AC-79 Cylinder head and gasket

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



AC211

Fig. AC-80 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 compressor 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

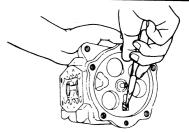
- 1. Drain oil.
- 2. Remove compressor clutch assembly. Refer to "Compressor Clutch".
- 3. Using snap ring pliers, remove

- shaft seal retainer ring. Then remove shaft seal seat. Refer to "Shaft Seal". Removal of shaft seal is not absolutely necessary. It may be removed when cylinder assembly is removed from 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, two 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

CAUTION:

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

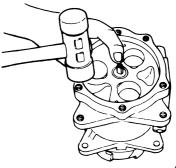
carefully as oil pipe is easily bent.



AC212

Fig. AC-81 Pulling out oil pipe

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



AC213

Fig. AC-82 Removing shell

8. Detach front end cover from cylinder assembly. Using a plastic mallet, drive end cover upward. Refrain from excessive force to avoid cover damage.

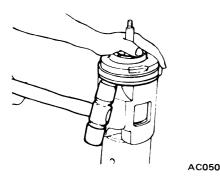


Fig. AC-83 Removing front end cover

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. Do not deform suction valve plate in removing suction valve plate. 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 compressor 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.

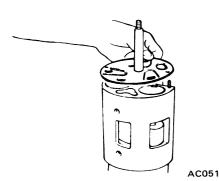


Fig. AC-84 Installing suction valve plate



AC052
Fig. AC-85 Installing cylinder head

- 2. Align shaft seal with the shaft cutaway. Firmly seat shaft seal at the shaft land. Attempt to turn shaft seal to the left and right, confirming that it is seated properly.
- 3. Place gasket on cylinder head and install front end cover. Coat gasket with compressor oil beforehand. Gasket differs for the front and rear. Make sure that the correct gasket is used. After completing this work, gasket protruding from front end cover and cylinder head should be adjusted by hand.

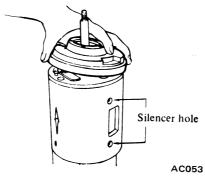


Fig. AC-86 Installing front end cover

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.

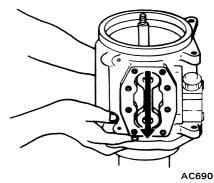


Fig. AC-87 Installing shell

- 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.

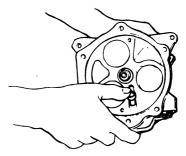


Fig. AC-88 Installing oil pipe

- 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. Fill with compressor oil, 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".

SPECIAL SERVICE TOOLS (For SW123)

		Kent-Moore No.			Kent-Moore No.
Tool nu	mber & tool name	Reference page or Fig. No.	Tool n	umber & tool name	Reference page or Fig. No.
KV99412302	Clutch hub wrench	J 94878-1	KV99412312	Puller pilot	J 25472
		Fig. AC-54			Page AC-31 Fig. AC-58
KV99412305	Hub nut socket	J 24878-2	KV99412321	Shaft seal remover and	J 26067
		Fig. AC-54	To the state of th	installer	Fig. AC-64
KV99412306	Clutch hub puller	J 24878-3	KV99412322	Shaft seal pilot	J 25473
		Fig. AC-55			Page AC-33
KV99412310	Lock nut socket	J 24878-4	KV99412329	Shaft handle socket	J 26072
		Fig. AC-57	6		Page AC-33
KV99412313	Puller adapter	J 26066	KV99412324	Allen socket	
		Page AC-31 Fig. AC-58			Fig. AC-70

		Kent-Moore No.			Kent-Moore No.
Tool number & tool name		Reference page or Fig. No.	Tool number & tool name		Reference page or Fig. No.
KV99412327	Silencer piece installer		KV99412315	Cylinder head remover	
		Page AC-34			Fig. AC-76
KV99412328	O-ring installer		KV994C1552	Charge nozzle	
		Page AC-34			Fig. AC-69
KV99412330	Allen socket				
		Fig. AC-73			

COMPRESSOR (SC206)

CONTENTS

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INSPECTION	AC-40	REMOVAL	
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REMOVAL	AC-41	SPECIAL SERVICE TOOLS (For SC206)	
INSTALLATION		1 2 2 3 2 3 2 3 (1 31 3 2 2 3)	/

DESCRIPTION

Model SC206 is a crank type compressor specially designed, with mini-

mum size and light weight, for use on compact vehicles.

The compressor crankshaft is driven by a belt from the crankshaft pulley

through the electromagnetic clutch. Two pistons, positioned in line, are actuated by connecting rods connected to the crankshaft.

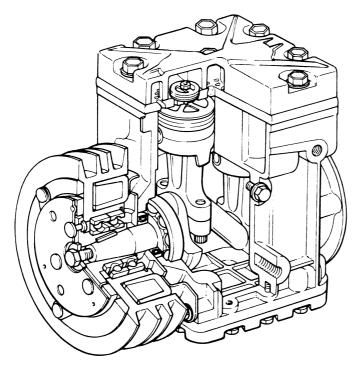


Fig. AC-89 Sectional view of compressor

AC855

Clutch wheel bearing Snap ring 3 Clutch wheel assembly (11)4 Magnet coil 5 Shaft scal assembly 6 Service valve 7 Flange valve O-ring Cylinder head Cylinder head gasket 10 Cylinder gasket Valve plate assembly Base plate gasket Base plate 14 O-ring Oil filler plug 1.5 16 Clutch assembly Compressor assembly (16) (17)

Fig. AC-90 Exploded view of compressor

Discharge and suction valves are mounted in the valve liner between the crankcase and cylinder head.

As a lubricant, SUNISO 5GS is used. Simplified positive pressure lubrication utilizes existing pressure differential between suction intake and crankcase to provide a film of lubricating oil to bearings. All internal components have been designed to provide more than adequate lubrication to cylinder walls, connecting rod bearings and seal assembly. The result is improved lubrication, lower seal temperatures, reduced oil pumping and a reduction in the number of moving parts.

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 0.4 to 0.6 mm (0.016 to 0.024 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 oil or dirt with clean lint-free cloth.
- 3. Make sure that terminal voltage at magnetic coil is above 10.5V.

REMOVAL

1. Using Clutch Spanner Wrench, hold clutch hub. With suitable socket wrench, remove bolt retaining clutch hub to crankshaft.

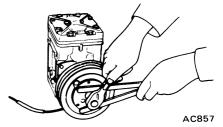


Fig. AC-91 Removing bolt

2. Then, using Clutch Removing Bolt, remove clutch assembly from crankshaft.

CAUTION:

Be careful not to damage key on compressor crankshaft.

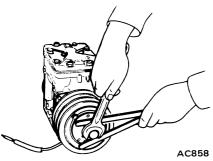


Fig. AC-92 Removing clutch assem bly

Loosen four electromagnetic coil mounting screws. Coil assembly can then be taken out easily.

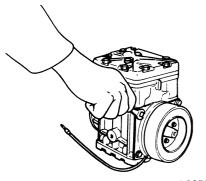


Fig. AC-93 Removing magnetic clutch

INSTALLATION

1. Locate the electromagnetic coil at the correct position on compressor housing. Then, secure four electromagnetic coil mounting screws.

Tightening torque:

Electromagnetic coil mounting screws:

0.7 kg-m (5.1 ft-lb)

Install the clutch assembly on the crankshaft.

Note: Key should be set on crankshaft before installing clutch assembly.

3. Using Clutch Spanner Wrench, hold clutch hub. With socket wrench, secure clutch hub securing bolt.

Tightening torque:

Clutch hub securing bolt:

1.5 kg-m (11 ft-lb)

DISASSEMBLY

Remove two snap rings retaining bearing. They are located inside of clutch wheel.

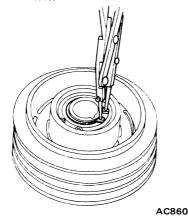


Fig. AC-94 Removing snap rings

Using Clutch Wheel Remover KV99100700 and conventional puller, remove V-pulley with bearings from clutch wheel.

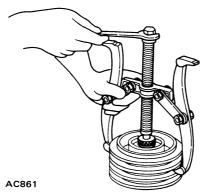
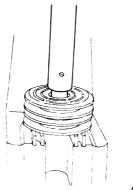


Fig. AC-95 Removing V-pulley from clutch assembly

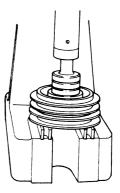
Using Bearing Remover ST33061000, press clutch wheel bearings out from clutch wheel.



AC862 Fig. AC-96 Removing clutch wheel bearing

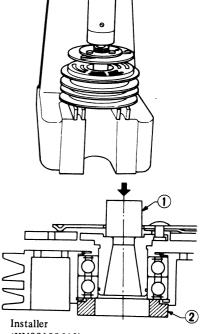
ASSEMBLY

1. Press bearings into V-pulley with Bearing Installer ST02371000.



AC863 Fig. AC-97 Installing bearings

- 2. Install outer snap ring in groove of V-pulley.
- 3. Using Installer KV99100610 and Stopper ST33061000, press clutch wheel into V-pulley.
- 4. Install inner snap ring in groove of clutch wheel.



- (KV99100610)
- Stopper (ST33061000)

AC864

Fig. AC-98 Installing clutch wheel

INSPECTION

1. Check friction surface of clutch for damage due to excessive heat, or excessive grooving due to slippage. If necessary, replace clutch wheel and V-pulley as a set.

2. The clearance between V-pulley and clutch wheel should be 0.4 to 0.6 mm (0.016 to 0.024 in).

If not, replace clutch wheel assembly.

- 3. Oil or dirt on friction surfaces of clutch wheel and V-pulley should be cleaned with a clean lint-free cloth or suitable solvent.
- 4. Check coil for shorted or opened lead wire. Pay particular attention to grounding part of coil. If there is no continuity, replace electromagnetic coil.

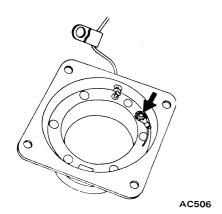


Fig. AC-99 Grounding point of coil

5. If clutch assembly must be replaced, remember that break-in operation is necessary. The break-in operation consists of engaging and disengaging the clutch some tirty times.

SHAFT SEAL ASSEMBLY

The shaft seal assembly of this compressor is of a simplified design, yet tight sealing and long lasting.

REMOVAL

It is recommended that the compressor be removed from the car for shaft seal replacement.

1. Remove oil filler plug with O-ring and drain the compressor oil.

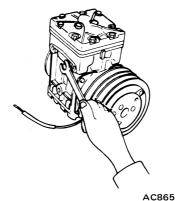
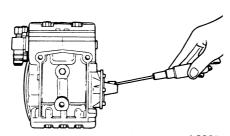


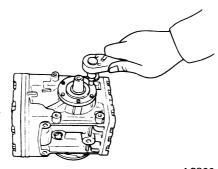
Fig. AC-100 Removing filler plug

- 2. Remove clutch. Refer to Compressor Clutch Removal.
- 3. Remove shaft key from crank-shaft.



AC807 Fig. AC-101 Removing shaft key

4. Remove seal plate.



 $\begin{array}{ccc} & \text{AC866} \\ \textit{Fig. AC-102} & \textit{Removing seal plate} \end{array}$

5. With Compressor Seal Puller, pull out seal gland and discard.

CAUTION:

- a. Discard all parts of the seal including the O-ring.
- b. Do not use a screwdriver to pry shaft seal from shaft as damage to shaft may result.

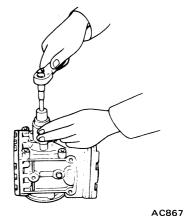
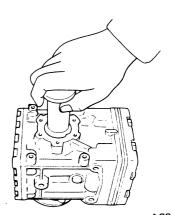


Fig. AC-103 Removing shaft seal

INSTALLATION

- 1. Clean shaft and seal cavity with clean lint-free cloth.
- 2. Dip seal gland in clean refrigerant oil.
- 3. Push seal assembly, except carbon ring, over end of shaft with carbon ring retainer facing out.
- 4. Move seal assembly into position on shaft.



AC868
Fig. AC-104 Inserting shaft seal
assembly

5. Place carbon ring in ring retainer so lapped surface is facing outward.

Note: The indentions in outside edge of carbon ring must engage driving lugs and be firmly seated in retainer.

6. Install new O-ring in groove of seal plate.

Note: Use refrigeration oil to make it adhere to surface.

7. Space seal plate with equal clearance around shaft and insert cap screws.

Tighten these screws evenly.

Tightening torque:

Seal plate securing cap screws:

0.7 to 1.0 kg-m (5.1 to 7.2 ft-lb)

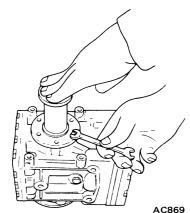


Fig. AC-105 Spacing seal plate and tightening cap screws

- 8. Install clutch. Refer to Compressor Clutch Installation.
- 9. Charge lubricant.
- 10. Install oil filler plug together with O-ring.

CAUTION:

Use new O-ring when installing oil filler plug.

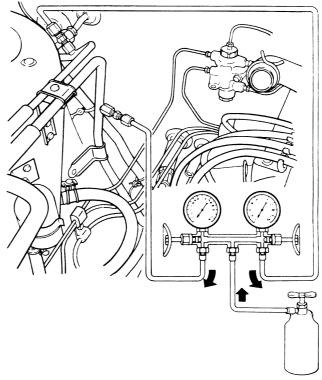
INSPECTION

Check for gas leakage as follows:

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

Connect refrigerant can to middle hose of manifold gauge.

- 3. Open valve of can tap, and charge refrigerant. Loosen oil filler plug at side of compressor to purge air out of compressor.
- 4. Turn shaft 5 or 6 turns. Then confirm that pressure does not decrease on low pressure gauge. If gauge indicates a pressure decrease, there is a leak. Conduct a leak test. Under such a condition, remove and then install parts again.



AC854

Fig. AC-106 Checking for gas leakage

CYLINDER HEAD AND VALVE PLATE

Insufficient refrigerant compression is likely to be caused by damaged head gasket or damaged valves.

Prior to servicing the head and valve plate, both service valves should be opened to free any gas pressure which may be in the compressor.

REMOVAL

1. Remove the remaining bolts in the head.



Fig. AC-107 Removing cylinder head holts

2. Remove valve plate and head from cylinder by prying or tapping

under the ears which extend from valve plate.

If head and valve plate adhere, hold head and tap valve plate ears away from head with a soft hammer.

CAUTION:

Do not hit or tap head to separate head and valve plate because damage to head may result.

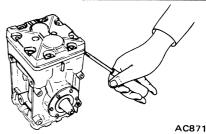


Fig. AC-108 Removing valve plate and head

3. When removing the gaskets, use a sharp-edged knife.

CAUTION:

- a. In removing head gasket, be very careful not to damage machined sealing surface.
- b. Do not reuse gaskets.

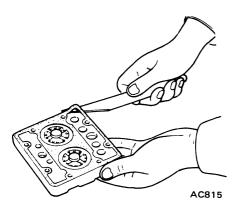
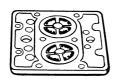


Fig. AC-109 Removing gasket

INSTALLATION

Valves and valve plates are furnished only as a complete assembly.



AC872 Fig. AC-110 Value plate assembly

1. Apply a thin film of clean refrigeration oil on area of crankcase to be covered by cylinder gasket.

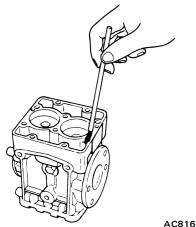


Fig. AC-111 Applying clean refrigeration oil

2. Place cylinder gasket in position on cylinder so dowel pins in crankcase go through dowel pin holes in cylinder gasket.

- 3. Apply a thin film of clean refrigeration oil to top and bottom valve plate areas to be covered by gaskets.
- 4. Place valve plate in position on cylinder gasket so discharge valve assemblies (i.e. smaller diameter assemblies with restrainer over valve reed) are facing up and locating dowel pins go through dowel pin holes in valve plate.

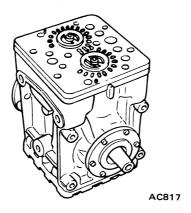


Fig. AC-112 Placing valve plate

- 5. Place head gasket in position on valve plate so dowel pins go through dowel pin holes in gasket.
- 6. Apply a thin film of clean refrigeration oil on the machined surface of cylinder head which matches head gasket.
- 7. Place head on cylinder head gasket so dowel pins go into dowel pin holes in head.
- 8. Tighten screws according to Sequence Chart.

Tightening torque:
Cylinder head screws:
2.1 to 3.2 kg
(15 to 23 ft-lb)

DISCHARGE AND SUCTION VALVES

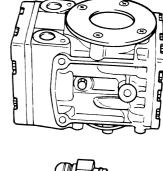
Discharge and suction valves are located on rear side of compressor.

REMOVAL

1. Remove each screw securing discharge and suction valves, using Torx Driver Bit.

2. Pull out each discharge and suction valve.

Note: Memorize mounted direction of discharge and suction valves to ensure correct reassembling.





AC873

Fig. AC-113 Removing discharge and suction valves

INSTALLATION

1. Attach new O-ring to each cylindrical portion of discharge and suction valves.

Note: Apply clean lubricant to O-ring so that it can be fitted tightely to cylindrical portion and crankcase hole.

- 2. Insert each discharge and suction valves into correct valve port in crankcase by matching it with mark on cylinder head.
- 3. Set each valve in the same position as it was before removal, and tighten screws with specified torque.

Tightening torque:

Discharge and suction valves:

2.1 to 3.2 kg-m

(15 to 23 ft-lb)

SPECIAL SERVICE TOOLS (For SC206)

	Kent-Moore No.		Kent-Moore No.
Tool number & tool name	Reference page or Fig. No.	Tool number & tool name	Reference page or Fig. No.
KV99100700 Clutch wheel remover		Clutch removing bolt	J 26344
			Fig. AC-92
KV991006S0 Clutch wheel installer set	② J25797-2	Compressor seal puller	J 10549
① KV99100610 Installer ② ST33061000 Stopper	Fig. AC-98		Fig. AC-103
		Torx driver bit	J 24392
			Page AC-43
ST02371000 Bearing installer		Oil dip stick	J 10545
	Fig. AC-97		
Clutch spanner wrench	J 24878-1		
(a) (b) (c) (c) (c) (c) (c) (c) (c) (c) (c) (c	Fig. AC-91		

SERVICE DATA AND SPECIFICATIONS

Model		SWP123	SC206
Displacement	cc (cu in)		100 (6.10)
Cylinder (Bore x stroke)	mm (in)	,	47.6 × 28.1 (1.874 × 1.106)
Direction of rotation (Viewed from drive	end)		Clockwise
Lubricating oil			
Type Capacity	cc (US fl oz, Imp fl oz)		SUNISO 5GS 237 (8.0, 8.3)
Clutch hub to pulley clearance	mm (in)	0.5 to 0.8	0.4 to 0.6 (0.016 to 0.024)

F.I.C.D. adjustment

Transmission	When A/C is OFF.	When F.I.C.D. is actuated	
Manual	600 rpm	800 rpm	
Automatic	600 rpm at "D" range	800 rpm at "N" range	

Refrigerant

Type		R12	R12
Capacity	kg (lb)	0.5 to 0.85 (1.1 to 1.87)	0.5 to 0.85 (1.1 to 1.87)

Tightening torque

Compressor

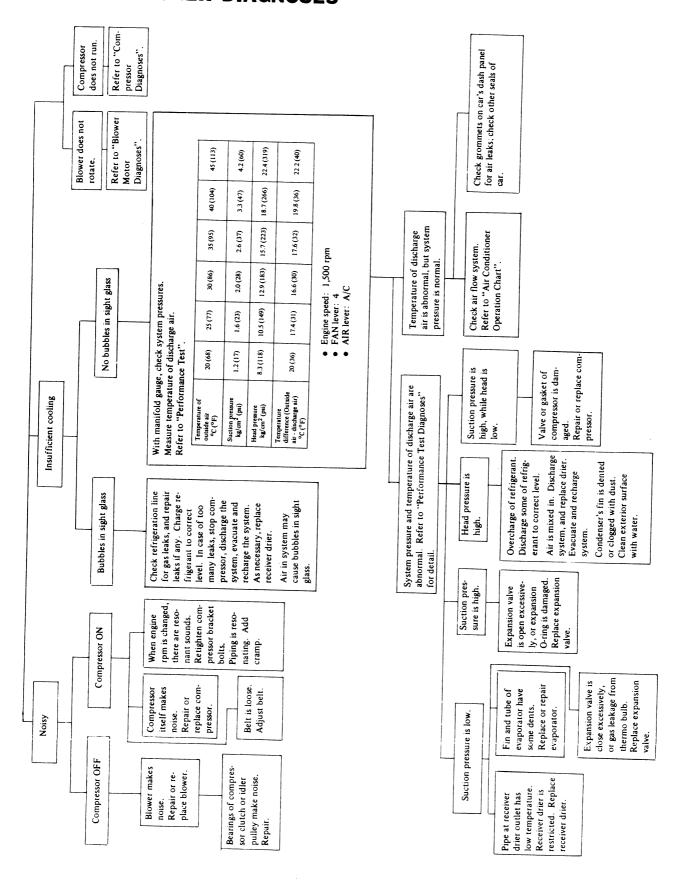
Rear end cover bolt	kg-m (ft-lb) 3	3 0 to 3 5 (22 to 25)	
Side cover bolt	kg-m (ft-lb) 1		_
Coil screw	kg-m (ft-lb) 0		_
		2.0 to 2.5)	_
Clutch hub nut (Bolt)	kg-m (ft-lb) 1	.8 to 2.1 (13 to 15)	1.5 (11)
Shaft nut	kg-m (ft-lb) 1		-10 (11)
Oil plug		11.6 to 12.3)	_
. 0	kg-m (ft-lb) 1	•	-
Discharge valve assembly bolt	kg-m (ft-lb) 1	.8 to 2.0 (13 to 14)	
Seal plate cap screw		_	0.7 to 1.0 (5.1 to 7.2)
Head and service valve	kg-m (ft-lb)	-	2.1 to 3.2 (15 to 23)
Compressor bracket to cylinder block	kg-m (ft-lb) 3.	.7 to 5.1 (27 to 37)	3.7 to 5.1 (27 to 37)
Mounting screw	kg-m (ft-lb) 3.		_

Air Conditioning

Compressor to compressor bracket	kg-m (ft-lb)	3.7 to 5.1 (27 to 37)	3.5 (25)
Joint nut copper tube and flexible hose			
High pressure (3/8 in)	kg-m (ft-lb)	2.5 to 3.5 (18 to 25)	2.5 to 3.5 (18 to 25)
Low pressure (½ in)	kg-m (ft-lb)	2.5 to 4.0 (18 to 29)	2.5 to 4.0 (18 to 29)

TROUBLE DIAGNOSES AND CORRECTIONS

AIR CONDITIONER DIAGNOSES



AIR CONDITIONER OPERATION CHART

Control lever position		tion	Operation		
AIR lever	FAN lever	TEMP lever	Item	Correct action	
A/C Engine at idle	1 to 4	COLD HOT At any position	Discharge air Air intake door Mode door Floor door Air temperature Cock Air mix door FICD Magnet valve Compressor Compressor clutch	Instrument — 100% Position of isolating outside air A/C position Shut COLD HOT OFF OPEN At any position Vacuum ON * Current ON * Current ON * * 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	1 to 4	COLD	Discharge air Air intake door Mode door Floor door Air temperature Cock Air mix door	Instrument – 100% Position of admitting outside air A/C (VENT) position DEF position Same as outside air OFF At any position	
BI-LEVEL Engine at idle	1 to 4	HOT COLD	Discharge air Air intake door Mode door Floor doorq Air temperature Cock Air mix door	Floor & instrument Position of admitting outside air BILEVEL position Heat position Floor: WARM COOL Instrument: Same as outside air OFF OPEN At any position	

Air Conditioning

Co	Control lever position		Operation		
AIR lever	FAN lever	TEMP lever	Item	Correct action	
			Discharge air	Floor – 80%	
				Defroster nozzle – 20%	
			Air intake door	Position of admitting outside air	
HEAT	1.4	НОТ	Mode door	Shut position	
Engine at idle	1 to 4	COLD	Floor door	Heat position	
			Air temperature	WARM COOL	
			Cock	OPEN OFF	
			Air mix door	At any position	
	HOT 1 to 4 COLD		Discharge air	Defroster nozzle – 90%	
		1 to 4	Air intake door	Position of admitting outside air	
DEF			Mode door	Shut position	
Engine at idle			Floor door	Defroster position	
luie			Air temperature	WARM COOL	
			Cock	OPEN OFF	
			Air mix door	At any position	
			Blower motor	OFF	
	OFF	OFF	Air intake door	Position of isolating outside air	
	011		Mode door	Shut position	
OFF		At any	Floor door	Heat position	
	(1 to 4)	position	Discharge air	Floor – 80%	
			Air temperature	WARM COOL	
			Cock	OEPN OFF	
			Air mix door	At any position	

PERFORMANCE TEST DIAGNOSES

Of various conditions caused to the air conditioning system, the characteristics revealed on manifold gauge reading 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 (91°F).

			· · · · · · · · · · · · · · · · · · ·
Condition		Probable cause	Corrective action
INSUFFICIENT REFRIGERANT	CHARGE		
Low-pressure gauge High-pressure gauge	Insufficient cooling. Bubbles appear in sight glass.	Refrigerant is small, or leaking a little.	 Leak test. Repair leak. Charge system. Note: Evacuate, as necessary, and recharge system.
ALMOST NO REFRIGERANT			Stop compressor immediately.
Low-pressure gauge High-pressure gauge	No cooling action. In sight glass appear a lot of bubbles or something like mist.	Serious refrigerant leak.	 Leak test. Discharge system. Repair leak(s). Replace receiver drier if necessary. Check oil level. Evacuate and recharge system.
AC288			
FAULTY EXPANSION VALVE			
Low-pressure gauge High-pressure gauge	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.

Condition		Probable cause	Corrective action	
ow-pressure gauge	High-pressure gauge	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	No cooling. Sweating or frosted suction line.	Faulty seal of O-ring in expansion valve.	 Discharge system. Remove expansion valve and replace Oring. Evacuate and replace system.
AIR IN SYST	EM			
Low-pressure gauge	High-pressure gauge	Insufficient cooling. Sight glass shows occasional bubbles.	Air mixed with refrigerant in system.	 Discharge system. Replace receiver drier. Evacuate and charge system.
	AC292			
MOISTURE IN	N SYSTEM			
Low-pressure gauge	High-pressure gauge	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/cm ² (6 psi) vibration.	Drier is saturated with moisture. Moisture has frozen at expansion valve. Refrigerant flow is restricted.	 Discharge system. Replace receiver drier (twice if necessary). Evacuate system completely. (Repeat 30-minute evacuating three times.) Recharge system.
	AC293			

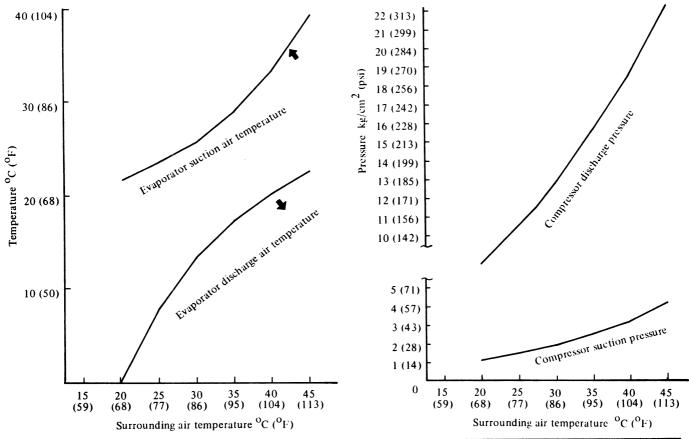
Air Conditioning

Condition		Probable cause	Corrective action
FAULTY CONDENSER			
Low-pressure gauge High-pressure gauge	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 BLOCK	ŒD		
Low-pressure gauge High-pressure gauge	Insufficient cooling. Frosted high pressure liquid line.	Drier clogged, or restriction in high pressure line.	Discharge system. Remove receiver drier or strainer and replace it. Evacuate and charge system.
FAULTY COMPRESSOR Low-pressure gauge High-pressure gauge	Insufficient cooling.	Internal problem in compressor, or damaged gasket and valve.	Discharge system. Remove and check compressor. Repair or replace compressor.
AC296			4. Check oil level.5. Replace receiver drier.6. Evacuate and charge system.

PERFORMANCE TEST STANDARD PEFORMANCE

The air conditioner on the model S10 has the following performance

characteristics when all systems are in good condition.



Outside air temperature °C (°F)	Discharge air temperature °C (°F)	Discharge pressure (High pressure) kg/cm² (psi)	Suction pressure (Low pressure) kg/cm² (psi)
20 (68)	0 (32)	8.3 (118)	1.2 (17)
25 (77)	7.6 (46)	10.5 (149)	1.6 (23)
30 (86)	13.4 (56)	12.9 (183)	2.0 (28)
35 (95)	17.4 (63)	15.7 (223)	2.6 (37)
40 (104)	20.2 (68)	18.7 (266)	3.3 (47)
45 (113)	22.8 (73)	22.4 (319)	4.2 (60)

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

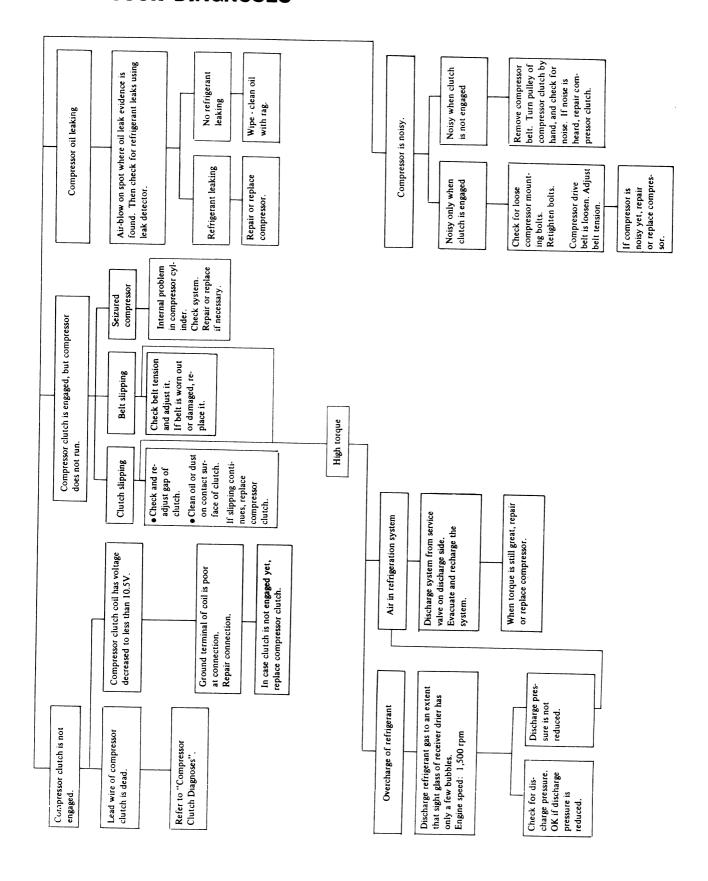
Conditions: Test location: Room or shadow

Hood : Open
All windows : Fully open
Humidity : 60 %
Engine speed : 1,500 rpm

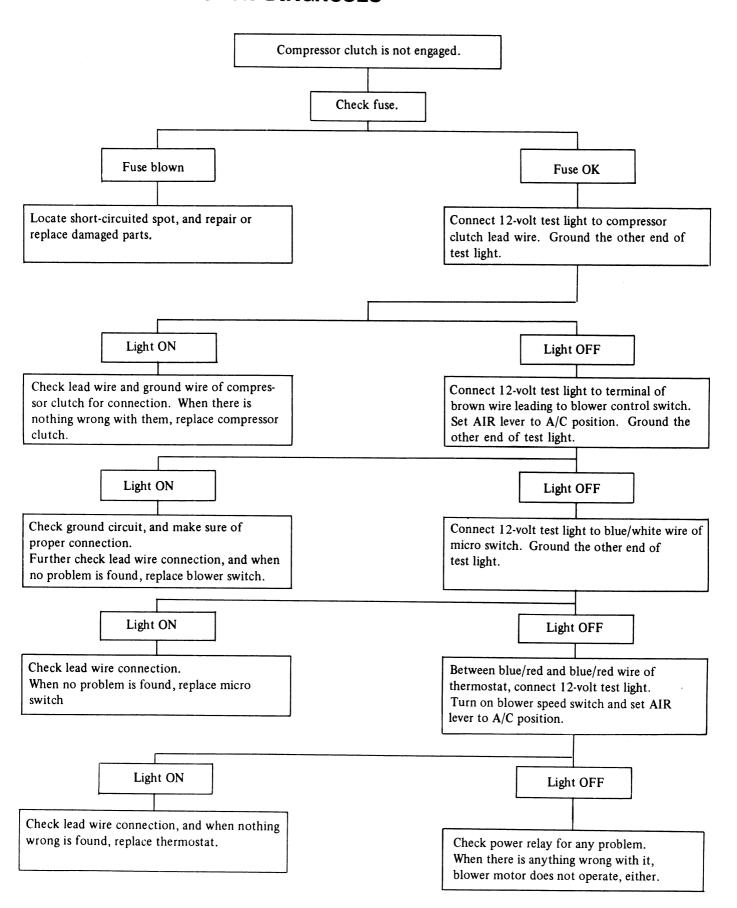
Fan knob : Hi

Temp knob : Max. cool

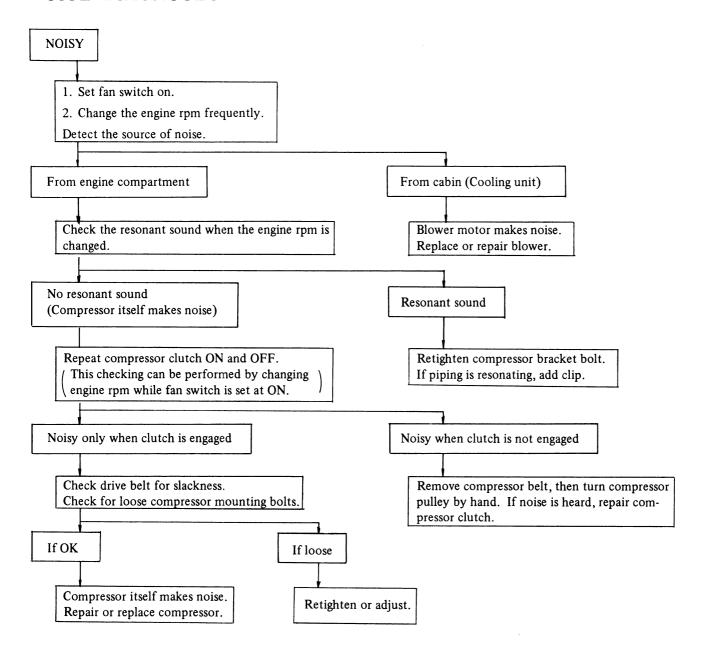
COMPRESSOR DIAGNOSES



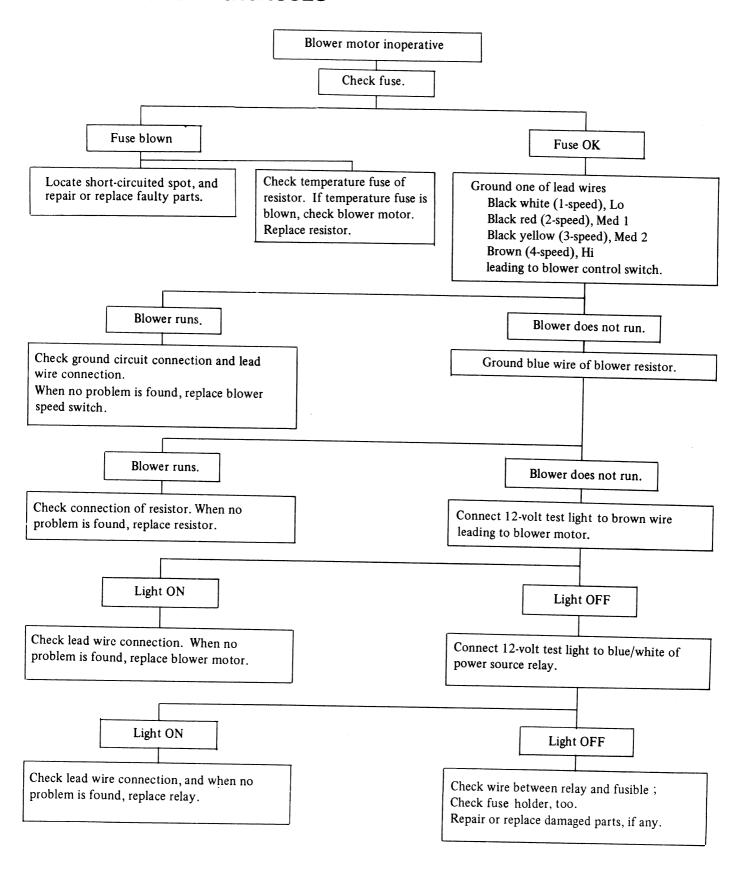
COMPRESSOR CLUTCH DIAGNOSES



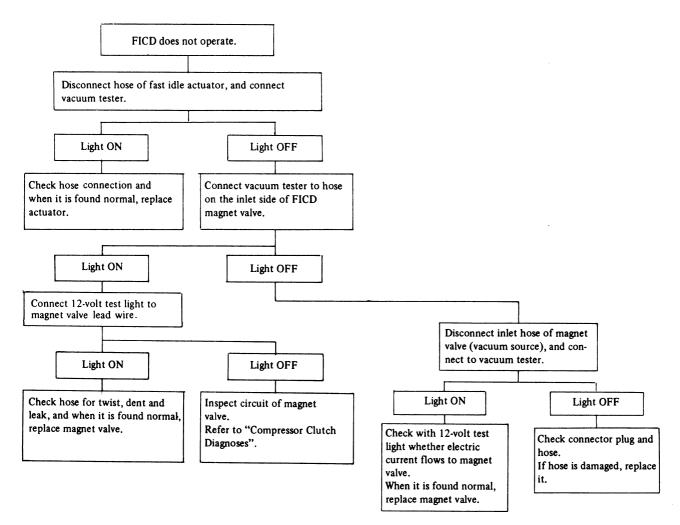
NOISE DIAGNOSES



BLOWER MOTOR DIAGNOSES



FAST IDLE CONTROL DEVICE DIAGNOSES (FICD)



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