1988

IMPORT SERVICE MANUAL

AIR CONDITIONING

RAM 50

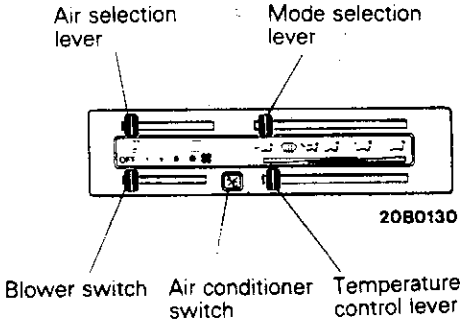
CHRYSLER MOTORS

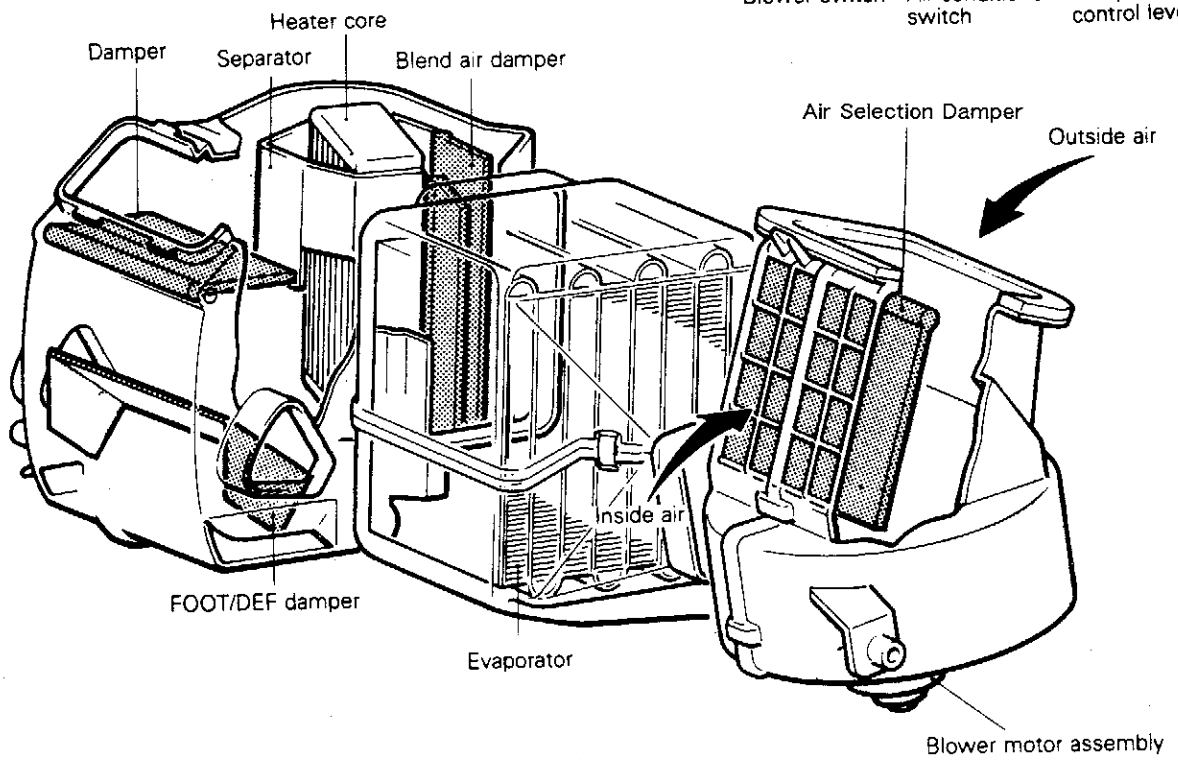
AIR CONDITIONING

GENERAL INFORMATION

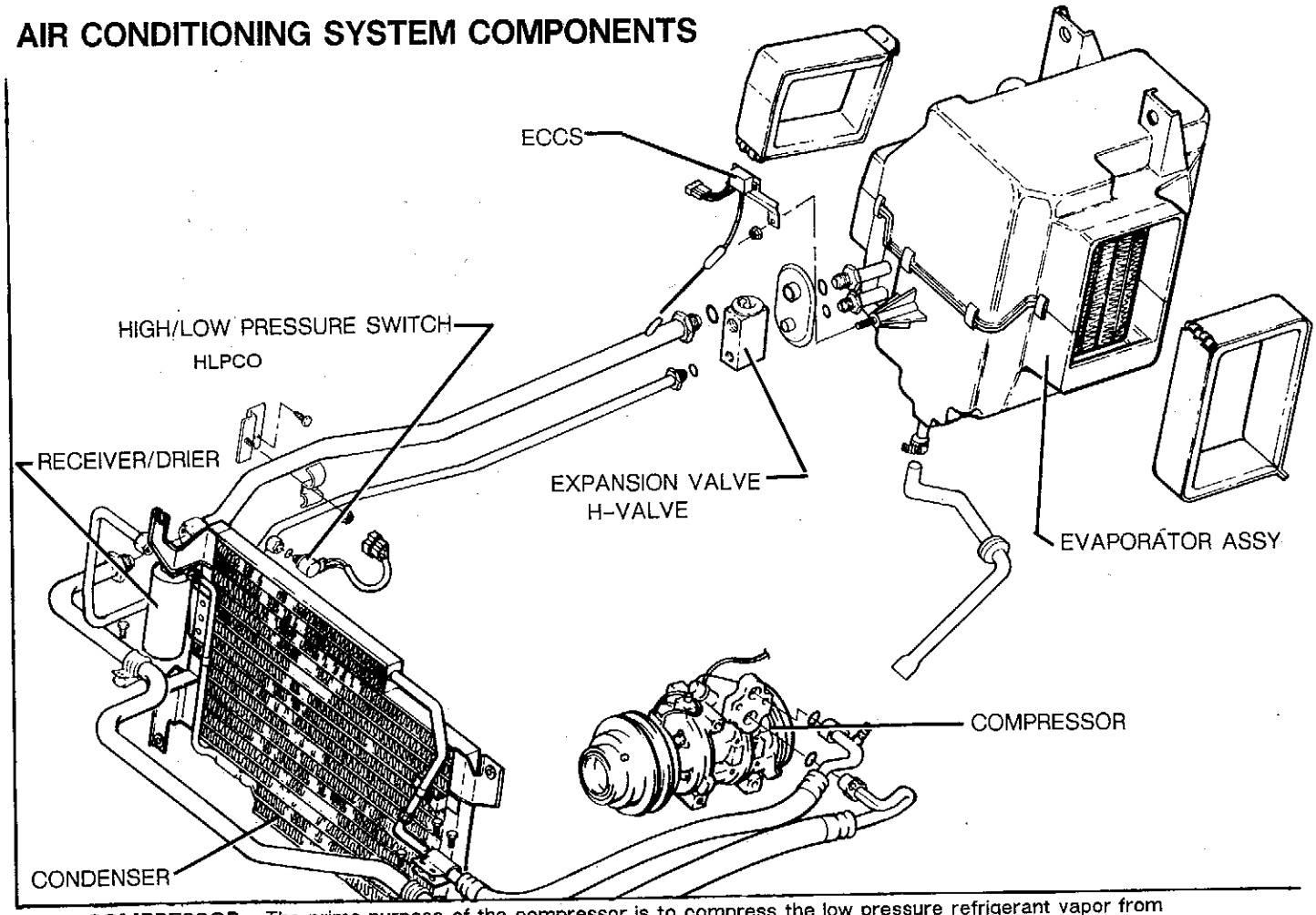
This air conditioning manual for Ram 50 supersedes all other information issued prior to 1988 production. For heater service, refer to Chrysler Service Manual Ram 50.

The air conditioner's function is to remove heat from the passenger compartment, then release the heat outside of the vehicle. When the air conditioner and blower switches are in the ON position, the air conditioner compressor clutch is energized. The Temperature Control lever adjusts the temperature inside the vehicle by positioning the Air Selector Damper. The position of the Air Selector Damper sets the mixing ratio of warm outside air to cooled inside air. The Mode Selection lever is set at and air will blow out from four directional vents. The Blower switch has four settings that control the amount of cooled air output. The Air Selector is set for outside air during normal operation or can be set for recirculation to maximize cooling efficiency.





AIR CONDITIONING SYSTEM COMPONENTS



COMPRESSOR - The prime purpose of the compressor is to compress the low pressure refrigerant vapor from the evaporator into a high pressure, high temperature vapor. The 10-cylinder DR1013C Compressor is used.

MAGNETIC CLUTCH - is mounted on the compressor, providing a convenient way to drive and discharge compressor according to cooling needs.

CONDENSER - is located in front of the radiator. Its function is to cool the hot, high pressure refrigerant gas, causing the gas to condense into high pressure liquid refrigerant.

RECEIVER DRIER - Is used to remove any traces of moisture from the refrigerant system. This component incorporates the sight glass.

SIGHT GLASS - is located at the top of the Receiver Drier; provided as a diagnostic tool to observe refrigerant flow and level.

THE HIGH/LOW PRESSURE SWITCH (HLPCO) - is located on the liquid line. Its function is to prevent damage to the air-conditioning system in the event that excessive pressures develop due to condenser airflow being restricted by, for example, leaves, newspapers, refrigerant overcharge, or air in the system. It also prevents damage to the compressor in case of system loss of refrigerant charge.

EXPANSION VALVE - The expansion valve is used for all applications. Its function is to meter refrigerant into the evaporator in accordance with cooling requirements.

EVAPORATOR COIL - is located in the unit and its function is to cool and dehumidify the air before it enters the vehicle.

ELECTRONIC CYCLING CLUTCH SWITCH (ECCS) - The electronic cycling clutch switch (ECCS) is located on the A/C plumbing at the H-valve. The ECCS prevents evaporator freeze-up by signaling the clutch to cycle the compressor on and off by monitoring the temperature of the suction line.

SERVICE VALVE - at the compressor and the discharge line. The valves are used to test and service the refrigerant system.

REFRIGERANT R-12 - is used and the maximum amount of charge is 907 grams (32 ounces).

COMPRESSOR OIL - used is Denso Oil 6. Maximum amount 80cc (2.7 fl.oz.) or equivalent. (Refrigeration oil, wax-free 500 SUS viscosity).

FUSIBLE PLUG - is located on the receiver drier. Its function is to prevent damage to the air-conditioning system in the event that excessive pressure develops due to condenser airflow being restricted by, for example, leaves, newspaper, refrigerant overcharge, or air in the system.

SPECIFICATIONS

GENERAL SPECIFICATIONS

Items	Specifications
Compressor	Model DR1013C(SWASH PLATE TYPE)
No. of cylinders and displacement cc (fl.oz.) Compressor oil cc (fl.oz.)	10 cylinders 134(4.5) DENSO oil 6 80cc (2.7)
Compressor Drive belt size (in.) 2.0L engine 2.6L engine	 37.5" 54"
Protective equipment High/Low pressure switch (HLPCO) Fusible Plug	 High: 385 psi, Low 28 psi Contacts close between 28 psi and 385 psi Burnout Temperature 221 degrees F
Freeze Up Prevention Electronic Cycling Clutch Switch(ECCS)	 Off: 31 F, On: 37 F
Refrigerant and quantity	R-12 910g (32 oz)

SERVICE SPECIFICATIONS

Items	Specifications
Standard value	
Amount of deflection of drive belt mm(in.) 2.0L engine 2.6L engine	 7 - 10 (.28 - .39) 9 - 12 (.35 - .47)

TORQUE SPECIFICATIONS

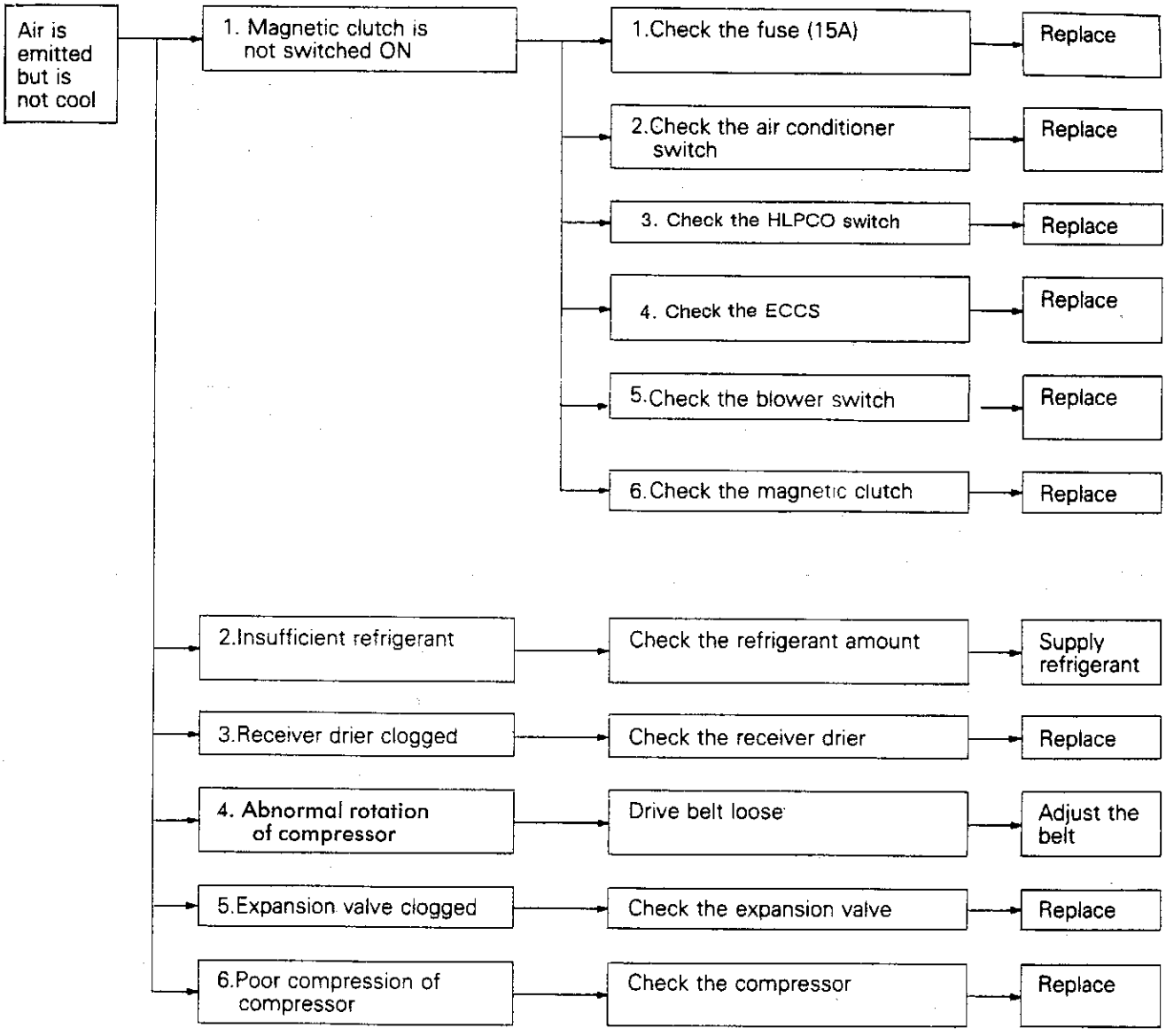
Items	Ft.Lbs.
Suction line to cooling unit	15 - 20 ft.lbs.
Liquid line to cooling unit	11 - 13 ft.lbs.
Liquid line to receiver drier	11 - 13 ft.lbs.
Suction line to suction line	21 - 27 ft.lbs.
Discharge line to condenser	15 - 29 ft.lbs.
Discharge line to compressor	15 - 18 ft.lbs.
Suction line to compressor	15 - 18 ft.lbs.
Compressor bracket tighten bolt(M8)	18 - 20 ft.lbs.
Compressor bracket tighten bolt(M10)	44 - 50 ft.lbs.
Compressor tighten bolt(M8)	18 - 20ft.lbs.

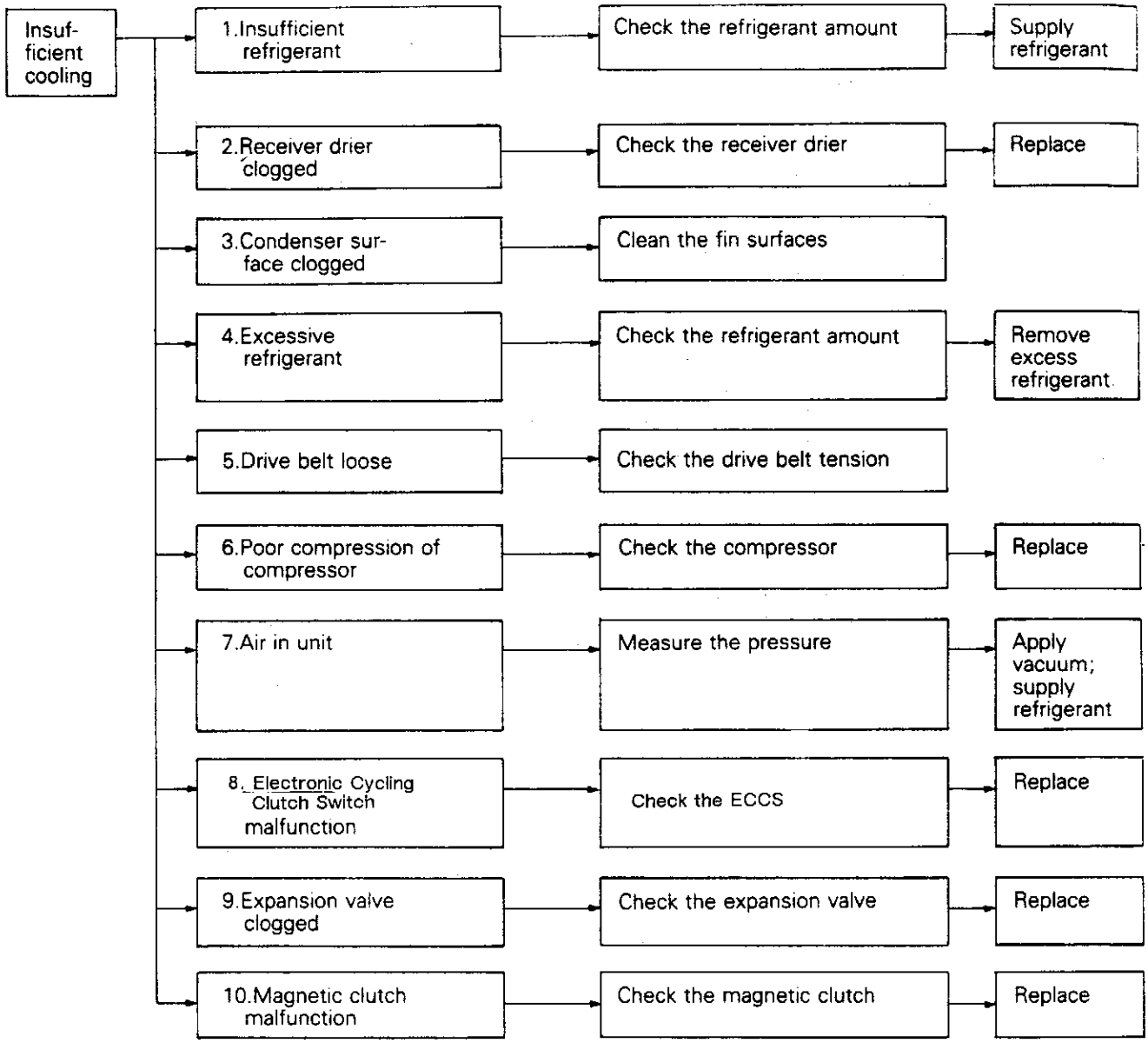
TROUBLESHOOTING

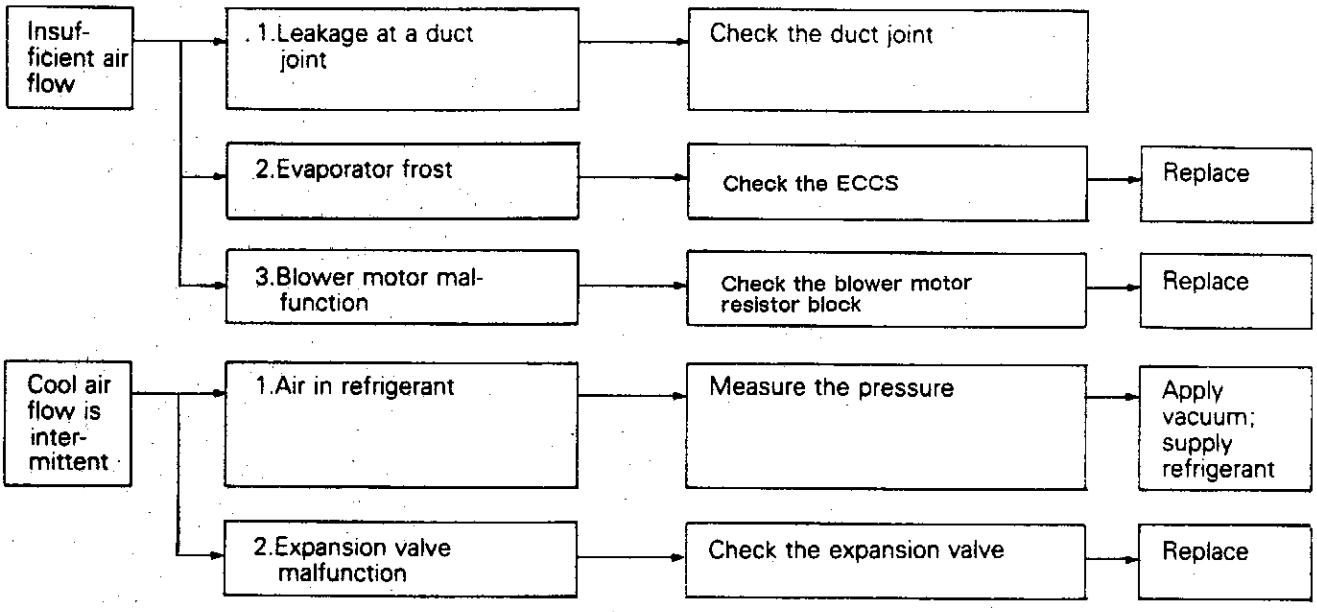
Before replacing or repairing air conditioning components, first determine if the malfunction is due to refrigerant charge, air flow, or is compressor related.

The following diagnostic charts have been developed as a quick reference aid in determining the cause of malfunction. If these charts do not satisfactorily describe the problem, refer to appropriate section for detailed explanation. After correcting the malfunction, check out the complete system to assure satisfactory performance.

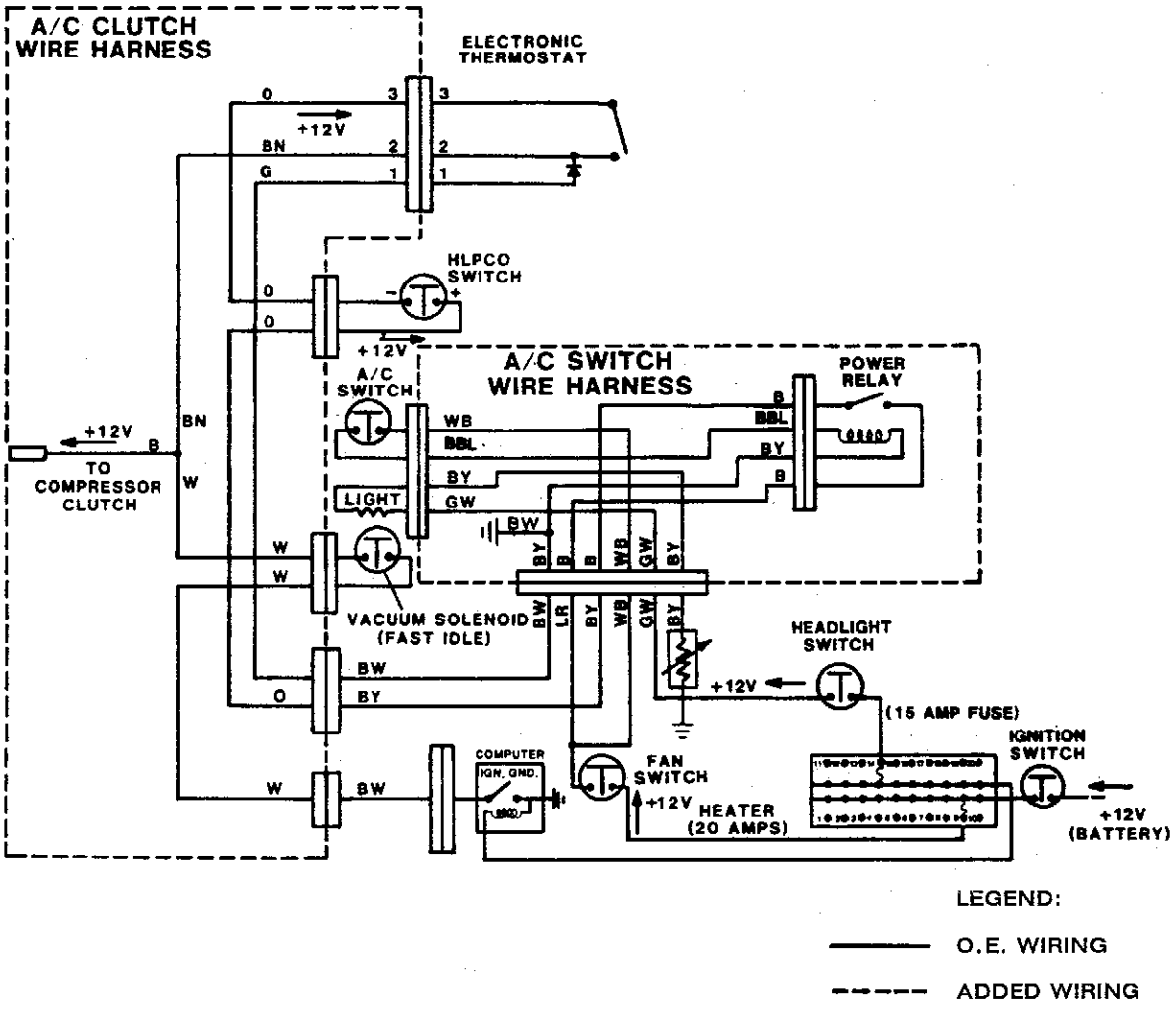
MALFUNCTION CAUSES AND REMEDIES (Numbers indicate checking/inspection order.)




Insuf-
ficient
cooling
1.Insufficient refrigerant
Check the refrigerant amount
Supply refrigerant
2.Receiver drier clogged
Check the receiver drier
Replace
3.Condenser surface clogged
Clean the fin surfaces
4.Excessive refrigerant
Check the refrigerant amount
Remove excess refrigerant
5.Drive belt loose
Check the drive belt tension
6.Poor compression of compressor
Check the compressor
Replace
7.Air in unit
Measure the pressure
Apply vacuum; supply refrigerant
8. Electronic Cycling Clutch Switch malfunction
Check the ECCS
Replace
9.Expansion valve clogged
Check the expansion valve
Replace
10.Magnetic clutch malfunction
Check the magnetic clutch
Replace



NOTE: REFER TO HEATER SECTION IN SERVICE MANUAL FOR ANY PROBLEMS WITH VENTILATION, BLOWER, CONTROL, WATER VALVE, OR DOOR ADJUSTMENTS.



OPERATION

BLOWER CONTROL

* Refer to *"HEATERS."*

COMPRESSOR CONTROL

* When the blower and air conditioner switches are turned on, current will flow to the HLPCO switch, the thermostat, the power relay coil, the low pressure switch, and the ground. The power relay will be magnetized and the power relay contact will close.

* Current will then flow to the power relay contact, the compressor, and the ground, and the compressor will begin to operate.

* The compressor will stop under the following conditions:

  1. When the evaporator temperature falls below 31 degrees F as detected by the ECCS.

  2. When pressure in the lines falls below 28 psi as detected by the HLPCO switch.

  3. When pressure rises above 385 psi as detected by the HLPCO switch.

SAFETY PRECAUTIONS

The refrigerant used in all air-conditioning installations is R-12. It is transparent and colorless in both the liquid and vapor state. Since it has a boiling point of -29.8 degrees C (-21.7 F) at atmospheric pressure, it will be a vapor at all normal temperatures and pressures. The vapor is heavier than air, nonflammable, and nonexplosive. It is nonpoisonous except when it is in direct contact with open flame. It is noncorrosive except when combined with water. The following precautions must be observed when handling R-12.

CAUTION

WEAR SAFETY GOGGLES WHEN SERVICING THE REFRIGERATION SYSTEM.

R-12 evaporates so rapidly at normal atmospheric pressures and temperatures that it tends to freeze anything it contacts. For this reason, extreme care must be taken to prevent any liquid refrigerant from contacting the skin and especially the eyes. Always wear safety goggles when servicing the refrigeration part of the air-conditioning system. Keep a bottle of sterile mineral oil handy when working on the refrigeration system; should any liquid refrigerant get into the eyes, use a few drops of mineral oil to wash them out. R-12 is rapidly absorbed by the oil. Next, splash the eyes with plenty of cold water. Call your doctor immediately even though irritation has ceased after treatment.

CAUTION

DO NOT HEAT R-12 ABOVE 52 DEGREES C (125 F).

In most instances, moderate heat is required to bring the pressure of the refrigerant in its container above the pressure of the system when charging or adding refrigerant. A bucket or large pan of hot water not over 52 degrees C (125 F) is all the heat required for this purpose. Do not heat the refrigerant container with a blowtorch or any other means that would raise temperature and pressure above this temperature. Do not weld or steam clean on or near system components or refrigerant lines.

CAUTION

KEEP R-12 CONTAINERS UPRIGHT WHEN CHARGING THE SYSTEM.

When metering R-12 into the refrigeration system, keep the supply tank or cans in an upright position. If the refrigerant container is on its side or upside down, liquid refrigerant will enter the system and damage the compressor.

CAUTION

ALWAYS WORK IN A WELL VENTILATED ROOM.

Good ventilation is vital in the working area. Always discharge the refrigerant into the service bay exhaust system or outside the building. Large quantities of refrigerant vapor in a small, poorly ventilated room can displace the air and cause suffocation. Although R-12 vapor is normally nonpoisonous, contact with an open flame can cause the vapor to become very poisonous. Do not discharge large quantities of refrigerant in an area having an open flame. A poisonous gas is produced when using the flame-type leak detector. Avoid inhaling fumes from the leak detector.

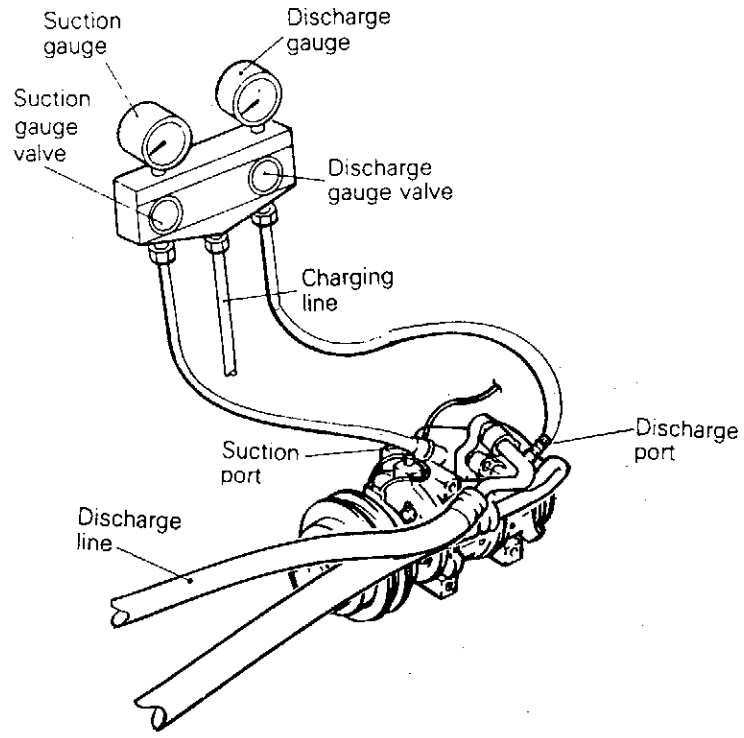
CAUTION

DO NOT ALLOW LIQUID REFRIGERANT TO TOUCH BRIGHT METAL.

Refrigerant will tarnish bright metal and chrome surfaces and, in combination with moisture, can severely corrode all metal surfaces.

SERVICE ADJUSTMENT PROCEDURES

MANIFOLD GAUGE SET INSTALLATION



Manifold gauge valves should be closed when connecting the manifold gauge set to the service port of the compressor and discharge hose. The suction gauge valve at the left is opened to provide a passage between the suction gauge and the center manifold outlet. The discharge gauge valve at the right is opened to provide a passage between the discharge pressure gauge and the center manifold outlet.

Detailed instructions for proper use of the gauge set manifold are contained in the text covering each test and service operation employing these gauges.

Suction Gauge: The left side of the manifold set is calibrated to register 0 to 1000 kPa (0 to 150psi). This gauge is connected to the suction port of the compressor.

Discharge Gauge: The center of the manifold set is calibrated to register 0 to 2100 kPa (0 to 300 psi). For all tests, this gauge is connected to the discharge port of the system.

Center Manifold Outlet: Provides the necessary connection for a long service hose used when discharging the system, using a vacuum pump to pull a vacuum before charging the system, and for connecting the supply of refrigerant when charging the system.

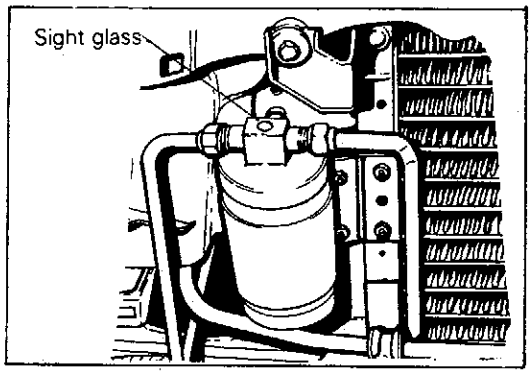
TEST PROCEDURES

RECEIVER DRIER

The receiver drier assembly consists of the drier reservoir and refrigerant level sight glass.

TO TEST THE RECEIVER DRIER

1. Operate the unit and check the plumbing temperature by touching the receiver drier outlet and inlet.
2. If there is a difference in the temperatures, the receiver drier is restricted. Replace the receiver drier.



SIGHT GLASS REFRIGERANT LEVEL TEST

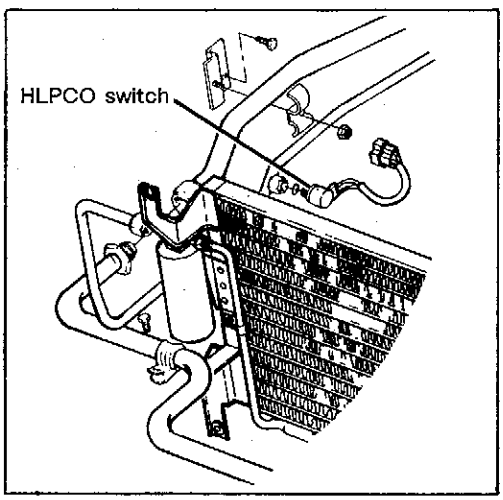
The sight glass is a refrigerant level indicator. To check the refrigerant level, clean the sight glass and start the vehicle engine. Push the air conditioner button to operate the compressor, place the blower switch to HIGH, and move the temperature lever to the extreme left. After operating for a few minutes in this manner, check the sight glass.

1. If the sight glass is clear, the magnetic clutch is engaged, the compressor discharge line is warm, and the compressor inlet line is cool, the system has a full charge.

2. If the sight glass is clear, the magnetic clutch is engaged, and there is no significant temperature difference between compressor inlet and discharge lines, the system has lost some refrigerant.

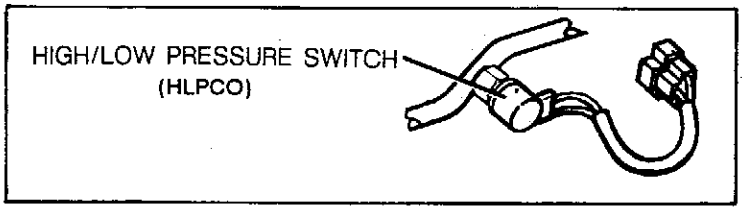
3. If the sight glass is clear and the magnetic clutch is disengaged, the clutch is faulty or the system is out of refrigerant. Perform low pressure switch test to determine condition. Check low pressure switch and clutch coil for electrical continuity.

4. If the sight glass shows foam or bubbles, the system could be low on charge. Occasional foam or bubbles are normal when the ambient temperature is above 43 degrees C (110 F) or below 21 degrees C (70 F). Adjust the engine speed to 1500 rpm. Block the airflow through the condenser to increase the compressor discharge pressure to 1422 to 1520 kPa (206 to 220 psi). If the sight glass still shows bubbles or foam, system charge level is low. The refrigerant system will not be low on charge unless there is a leak. Find and repair the leak. If the leak can be repaired without discharging the system, an oil level check is not necessary. Use the procedure for correcting low refrigerant level found in the refrigerant system service procedure section.



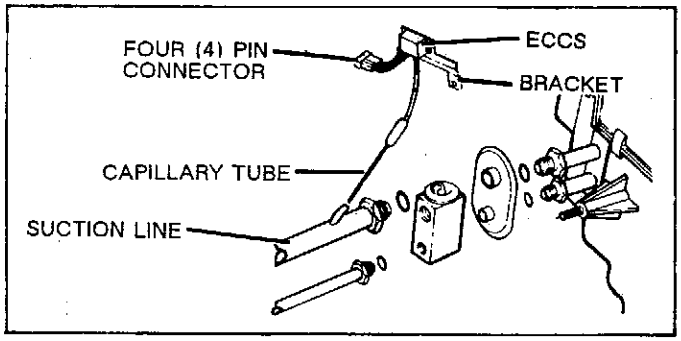
HIGH/LOW PRESSURE CUTOFF SWITCH (HLPCO)

The HLPCO switch, located on the liquid line, is wired in series with the magnetic clutch. It cuts off the electrical power supply to the clutch when refrigerant pressure goes above or below the control point of the switch. Whenever the system is inactivated by the low pressure switch due to refrigerant loss, refrigerant oil may have been lost; therefore, to prevent damage to the compressor due to operation without sufficient lubrication, the leak must be repaired and 15cc(0.5 fl.oz) of compressor oil added before final charge of the system. The switch is a sealed, factory-calibrated unit. No attempt should be made to adjust or otherwise repair it. If it is found to be faulty, it must be replaced.



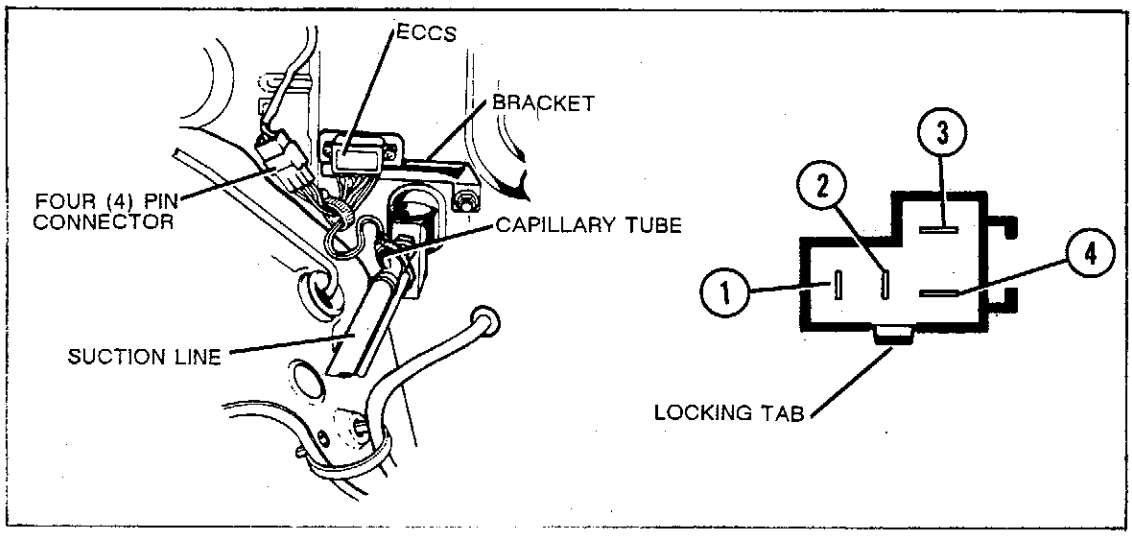
TO TEST THE HLPCO SWITCH (ENGINE OFF)

1. Jump the wire leads.
2. Position the air conditioner switch and blower switch to ON.
3. Momentarily turn the ignition switch on (do not crank the engine); listen for the compressor clutch engaging.
4. If the clutch does not engage, the ECCS or fuse may be faulty.
5. If the clutch engages, connect the manifold gauge set and read pressure. At a pressure of 28 psi or above, the switch must actuate the clutch. If pressure is below 28 psi, the refrigerant system is low in charge. For corrective action, refer to *REFRIGERANT LEAK REPAIR PROCEDURES*.
6. Reconnect boot on switch and perform Step 3. If the clutch does not engage, discharge the system, replace the switch, and recharge the system.



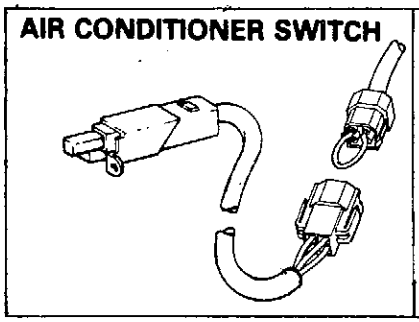
FREEZE UP CONTROL — ECCS

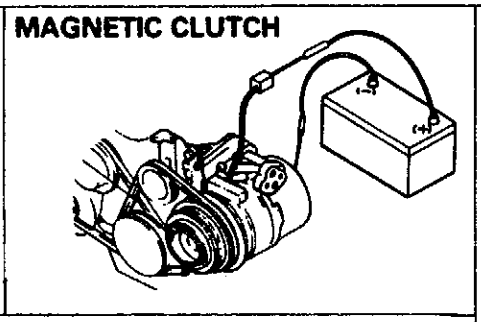
Evaporator freeze up is controlled by the ECCS inserted in the suction line. It is connected to the magnetic clutch of the compressor in series. When the temperature of the evaporator drops below 31 degrees F, the compressor is turned off.

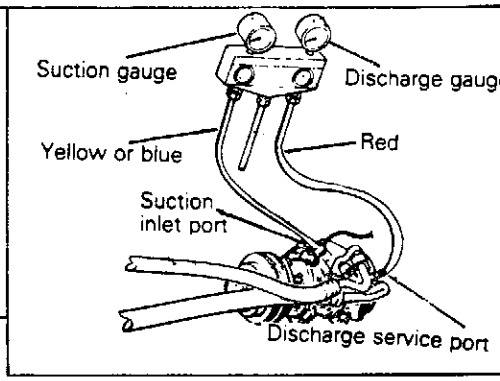


TO TEST THE ELECTRONIC CYCLING CLUTCH SWITCH (ECCS)

With the ambient temperature in the test area around 70 degrees F, supply 12 (+/- 1 volt) to pin 3 and ground pin 2. Test for continuity from pin 1 to 2. If the test shows continuity, proceed to *A/C COMPRESSOR CLUTCH INOPERATIVE* tests in this group. If no continuity is detected, replace the ECCS.







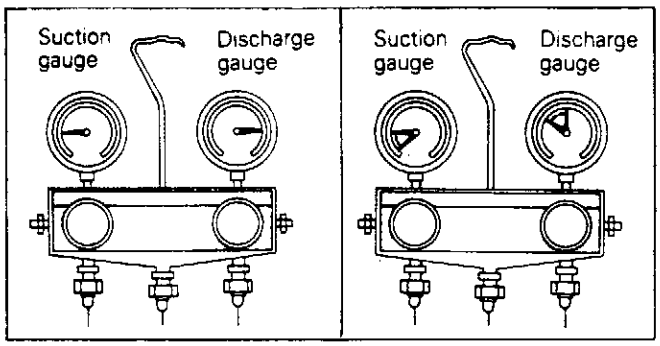
AIR CONDITIONER SWITCH

To Test The Air Conditioner Switch

1. Disconnect the harness connector for the air conditioner switch.
2. Jump the lead wire as shown.
3. Turn the blower switch on.
4. Momentarily turn the ignition switch on (do not crank the engine), listen for the clutch engaging.
5. If the clutch does not engage, ECCS, HLPCO switch, wiring, or fuse may be faulty.
6. If clutch engages, replace the switch.

MAGNETIC CLUTCH

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



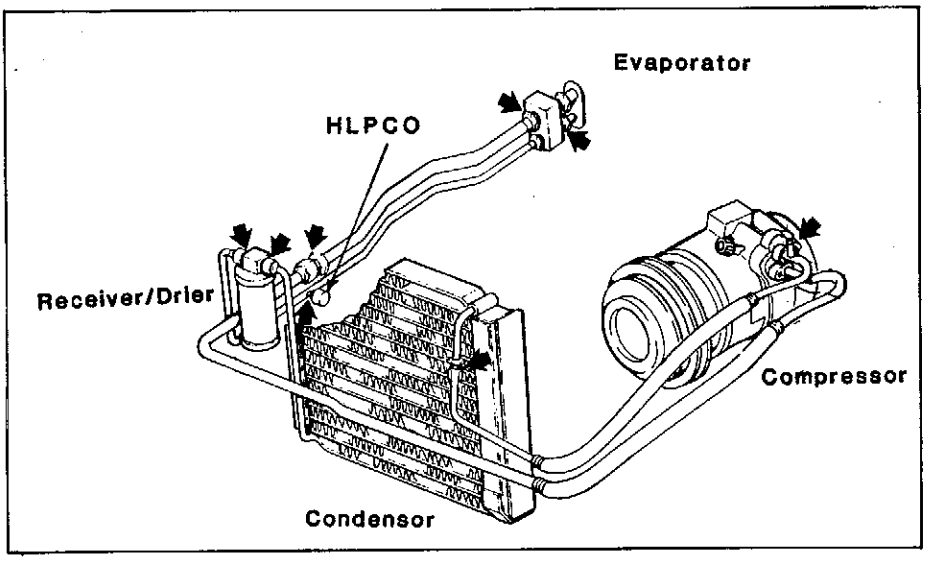
COMPRESSOR

1. Install the manifold gauge set and run the air conditioner.
2. If a pressure of approximately 490 kPa (71psi) is indicated on the discharge gauge side, the compressor has abnormal compression. Replace the compressor.
3. If a pressure of 294 to 392 kPa (43 to 59 psi) is indicated on the suction gauge side and a pressure of approximately 1961 kPa (284 psi) is indicated on the discharge gauge side, it is suspected that air is present in the air conditioning system. Discharge the system, evacuate, and recharge with specified amount of refrigerant.

RECHARGING CONDITION

* Cooler discharge temperature (evaporator): 30-35 degrees C (86-95 F)
* Engine revolutions: 2000 rpm
* Blower: HIGH

4. During operation of the air conditioner, cold air may stop flowing after the elapse of time and this state is maintained before cold air flows out again. If cold air stops flowing out with negative pressure indicated on the suction gauge side and a pressure of 588 to 980 kPa (85 to 142 psi) indicated on the discharge gauge side, it is suspected that water is present in the air conditioning system. Discharge the system. Replace receiver drier. Evacuate, check for leaks, and recharge with specified amount of refrigerant.



TESTING SYSTEM FOR LEAKS

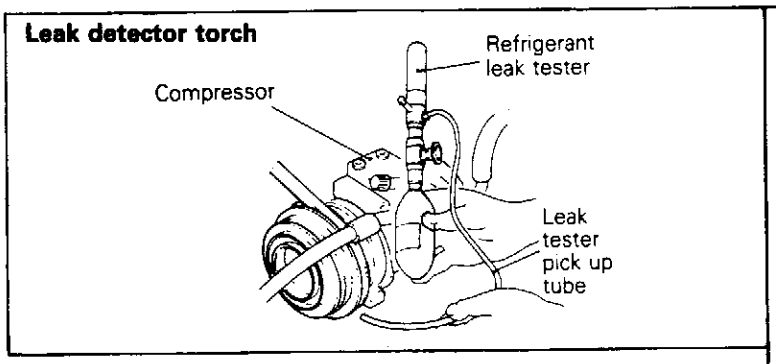
A leak is likely to occur where two components are connected together. See illustration for possible locations. The leak detector torch is a butane gas-burning torch used to locate a leak in any part of the refrigeration system. Refrigerant gas drawn into the sampling or sniffer hose will cause the flame to change color in proportion to the size of the leak. A very small leak will produce a flame varying from yellowish-green to bright green. A large leak will produce a brilliant blue flame.

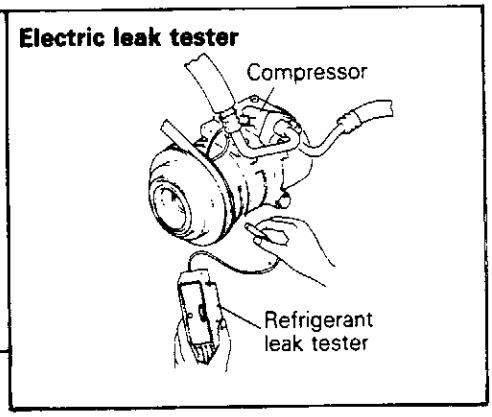
CAUTION

DO NOT USE THE LIGHTED DETECTOR IN ANY PLACE WHERE EXPLOSIVE GASES, DUST, OR VAPORS ARE PRESENT. DO NOT BREATHE THE FUMES THAT ARE PRODUCED BY THE BURNING OF REFRIGERANT GAS. LARGE CONCENTRATIONS OF REFRIGERANT IN THE PRESENCE OF A LIVE FLAME WILL BECOME DANGEROUSLY TOXIC.

If the flame remains bright yellow when the tester is removed from a possible leak point, insufficient air is being drawn in through the sampling tube or the copper reaction wire is dirty.

1. Assemble leak detector as shown. Be sure detector is seated tightly over torch gasket.
2. Holding torch upright, screw in butane charge (clockwise) until punctured. Do not use force.





3. Screw out butane charge (counterclockwise) about 1/4 turn.
4. Point torch away from body; then light escaping gas. Always keep torch in upright position.
5. Adjust flame by turning cartridge in or out as required.
6. Allow 30 seconds to heat copper reaction wire.

CAUTION

NEVER REMOVE BUTANE CHARGER WHILE TORCH IS LIGHTED OR IN THE PRESENCE OF ANY OPEN FLAME.

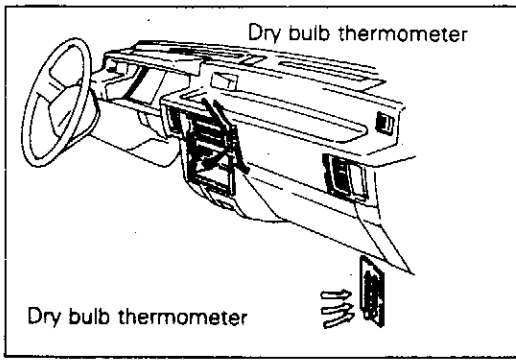
7. Examine all tube connectors and other possible leak points by moving the end of the sampling hose from point to point. Always keep torch in upright position. Since R-12 is heavier than air, it is good practice to place the open end of sampling hose directly below point being tested. Be careful not to pinch sampling tube since this will shut off air supply to flame and cause a color change.
8. Watch for a change in the color of the flame. Small leaks will produce a green color and large leaks a bright blue color. If leaks are observed at tube fittings, tighten the connections using the proper flare wrenches and retest.

NOTE: Gas leaks can also be detected by the electric leak tester which will sound a warning.

PERFORMANCE TEST

TEST

NOTE: Air temperature in test room must be 70 degrees F, minimum, for this test.



1. Connect a tachometer and manifold gauge set.
2. Set air-conditioner controls to maximum air conditioning, temperature lever to full cool, and blower on high.
3. Adjust engine to 1000 rpm, with air-conditioner clutch engaged.
4. Engine should be warmed up with doors, windows, and hood open.
5. Insert a thermometer on the left center air-conditioner outlet and operate the engine for 5 minutes.
6. Note the discharge air temperature.
7. If the discharge temperature cannot be met, refer to Troubleshooting Guide.

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

PERFORMANCE TEMPERATURE CHART

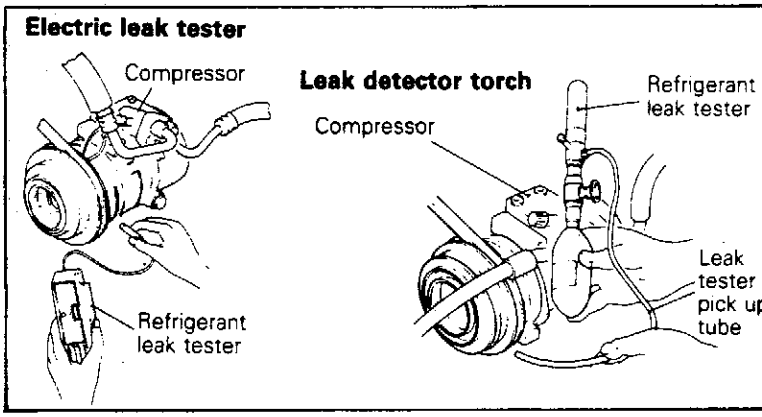
Garage ambient temperature	21 °C (70 °F)	26.5 °C (80 °F)	32 °C (90 °F)	37.5 °C (100 °F)	40.6 °C (105 °F)
Discharge air temperature	1.7–4.4 °C (35–40 °F)	1.7–5.0 °C (35–41 °F)	1.7–5.6 °C (35–42 °F)	1.7–6.1 °C (35–43 °F)	1.7–6.7 °C (35–44 °F)
Compressor discharge pressure	928–1,322 kPa (132–188 psi)	1,069–1,547 kPa (152–220 psi)	1,209–1,772 kPa (172–252 psi)	1,336–1,969 kPa (190–280 psi)	1,406–2,109 kPa (200–300 psi)
Evaporator suction pressure	127–148 kPa (18–21 psi)	131–162 kPa (18.6–23 psi)	134–176 kPa (19–25 psi)	135–188 kPa (19.2–26.8 psi)	136–194 kPa (19.4–27.6 psi)

REFRIGERANT LEAK REPAIR PROCEDURE

LOST CHARGE

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

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



CAUTION

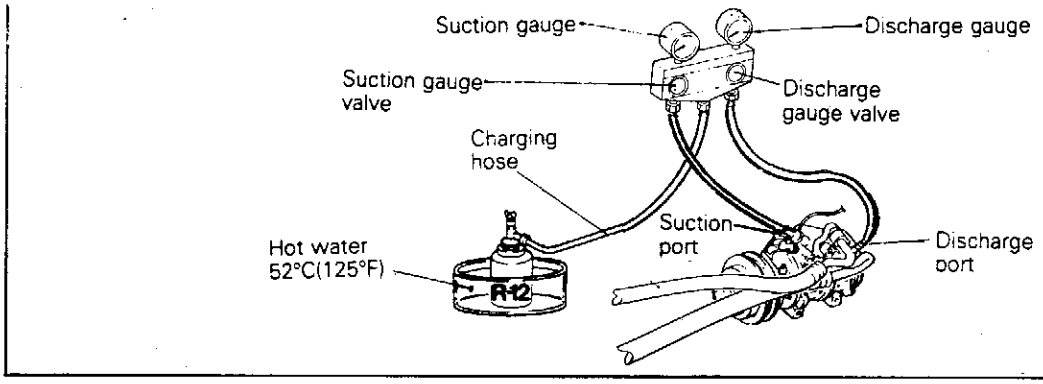
REPLACEMENT RECEIVER DRIER UNITS MUST BE SEALED WHILE IN STORAGE. THE DRIER USED IN THESE UNITS WILL SATURATE WATER QUICKLY UPON EXPOSURE TO THE ATMOSPHERE. WHEN INSTALLING A DRIER, HAVE ALL TOOLS AND SUPPLIES READY FOR QUICK REASSEMBLY TO AVOID KEEPING THE SYSTEM OPEN ANY LONGER THAN NECESSARY.

7. Evacuate and charge the system.

LOW CHARGE

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

CORRECTING LOW REFRIGERANT LEVEL



Since the refrigerant system is completely sealed, refrigerant level will not be low unless there is a leak in the system. Before adding refrigerant when the cause of low level is not known, the system should be tested for leaks. Assuming that leaks have been corrected without discharging the system, proceed with partial charge.

Install and connect manifold gauge set.

1. Close both gauge set manifold valves.
2. Connect the suction gauge test hose to the suction port of the compressor. Connect the discharge gauge test hose to the discharge port.
3. Connect one end of long test hose to center manifold outlet, other end to refrigerant dispensing manifold.
4. Close two dispensing manifold valves and open remaining dispensing manifold valve. Remove protective cap from opened valve.
5. Screw a can of R-12 to the opened manifold valve. Be sure gasket is in place and in good condition. Tighten refrigerant can and manifold locking nut to insure a good seal. Do not overtighten; 8 to 11 Nm (6 to 8 ft. lbs) is sufficient if gasket is in good condition.
6. Turn manifold valve (above the refrigerant can) completely clockwise to puncture the can. This closes the valve and seals the refrigerant in the can.

CAUTION

NEVER HEAT SMALL CANS OF REFRIGERANT OVER 52 DEGREES C (125 F) AS THEY MAY EXPLODE.

7. Place the refrigerant in a large pan of water heated to 52 degrees C (125 F). Place pan of water containing the refrigerant can on an accurate scale so the amount of refrigerant added may be weighed. Open the refrigerant manifold valve.
8. **Purge all air from the test hose.** Air in the system will be trapped in the condenser, causing abnormally high discharge pressures, and will interfere with condensation of the refrigerant.
9. Slightly loosen both test hoses at the gauge set manifold. Tighten the hoses as soon as the air is purged.
10. Slightly loosen charging hose connection at gauge set manifold. This will purge air from the charging hose. Tighten connection as soon as air is purged.
11. With vehicle windows open and hood up, operate engine at 1500 rpm and jump the switch terminals located on pressure switch so the clutch will remain engaged.
12. Place air-conditioner control to air condition and place the blower switch on high.
13. If necessary, block the condenser to maintain a discharge pressure of 1422 to 1520 kPa (206 to 220 psi). System must be charged through the evaporator suction service ports as follows:

    a) Slowly open the suction service gauge valve. Meter flow of refrigerant by adjusting the suction service gauge valve so that pressure registered at the suction service gauge does not exceed 345 kPa (50 psi). Keep refrigerant container upright.

    b) Add refrigerant gas until no foam is visible at the sight glass. Then add an additional 170 kPa (6 oz.).

    c) Close the suction gauge valve.

CAUTION

TOO MUCH REFRIGERANT IN THE SYSTEM CAN CAUSE ABNORMALLY HIGH DISCHARGE PRESSURES. CARE MUST BE USED SO THAT THE EXACT RECOMMENDED AMOUNT OF REFRIGERANT IS ADDED AFTER FOAM CLEARS IN THE SIGHT GLASS.

    d) Close dispensing manifold valve. Remove test hoses and adapters from the service ports of compressor, install protective caps at service ports, and reconnect wiring.

    e) Check system performance.

DISCHARGING THE SYSTEM

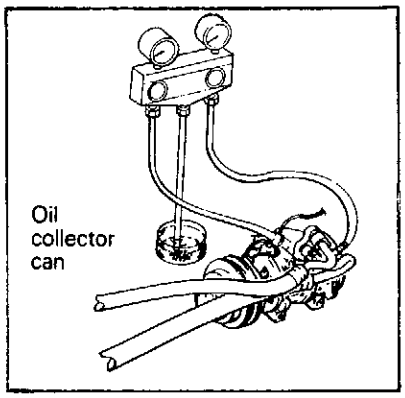
Since the air-conditioning refrigerant system is pressurized, it will be necessary to completely discharge the system (in a well ventilated area) before replacing any refrigerant component. The procedure is as follows:

1. Install manifold gauge set. Make sure the gauge set valves are closed before attaching the hoses to the refrigerant system.

2. Install a long hose to the manifold gauge set connector. Run this hose to the oil collector can near a shop exhaust system. A good oil collector can may be made from a large empty coffee can with a plastic top. Slit the plastic top in the from of a "Y" to make an entrance for the refrigerant hose and an exit for the gas.

3. Open the compressor discharge and suction line pressure valves and blow the refrigerant into the oil collection can. Watch to make sure the hose does not blow out of the collector can.

4. When the system has been completely discharged, measure the amount of oil collected in the can. The amount of oil measured should be added to the refrigerant system before it is recharged. Add new oil; discard used oil.



CAUTION

IT IS IMPORTANT TO HAVE THE CORRECT AMOUNT OF OIL IN THE REFRIGERANT SYSTEM.

Too little oil will provide inadequate compressor lubrication and cause a compressor failure. Too much oil will increase discharge air temperature. When a DR1013C compressor is installed at the factory, it contains 80cc (2.7 fl.oz.) of refrigerant oil. While the air-conditioning system is in operation, the oil is carried through the entire system by the refrigerant. Some of this oil will be trapped and retained in various parts of the system. When the following system components are changed, it is necessary to add oil to the system to replace the oil being removed with the component.

Compressor - 45cc (1.5 fl.oz.)
Condenser - 15cc (0.5 fl.oz.)
Evaporator - 25cc (0.8 fl.oz.)
Line - 15cc (0.5 fl.oz.)
Receiver Drier - 0cc (0 fl.oz.)

EVACUATING THE SYSTEM

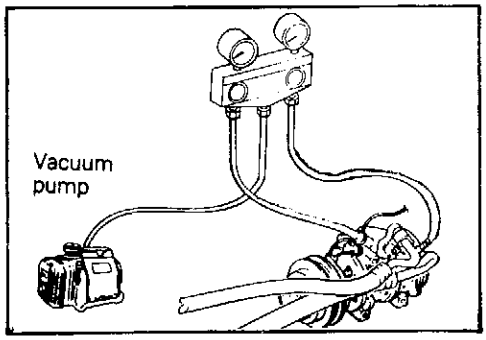
Whenever the system has been opened to the atmosphere, it is absolutely essential that the system be evacuated or "vacuumed" to remove all air and moisture. Air in the refrigerant system causes high compressor discharge pressure, a loss in system performance, and oxidation of the compressor oil into gum and varnish. Moisture in the refrigerant system can cause the expansion valve to malfunction. Under certain conditions, water can react with the refrigerant to form destructive acids. It is necessary to adhere to the following procedure to keep air and moisture out of the system.

1. Install manifold gauge set. Make sure the gauge set valves are closed before attaching the hoses to the refrigerant system.

2. Discharge the system slowly if the manifold gauge set indicates pressure in the system.

3. Connect a long test hose from the gauge set manifold center connector to a vacuum pump.

4. Open both manifold gauge set valves.



5. Start the vacuum pump and operate until the evaporator suction gauge registers at least -101 kPa (29.9 in. of vacuum). If at least -101 kPa (29.9 in. of vacuum) cannot be obtained, either the system has a leak or the vacuum pump is defective. Check the vacuum pump. If the pump proves to be functioning properly, the system has a leak. Charge the system with one can (14 oz.) of refrigerant. Locate and repair all leaks. Discharge the refrigerant and evacuate the system.

6. Continue to operate the pump for at least five minutes.

7. Close manifold valves. Turn off the vacuum pump and observe evaporator suction gauge for two minutes. The vacuum level should remain constant. If the vacuum falls off, the system has a leak. Charge the system with one pound of refrigerant. Locate and repair all leaks. Discharge the system and repeat evacuation procedure.

CHARGING THE SYSTEM

The refrigerant system must have been evacuated using the previous procedure before charging. Charge using only R-12 refrigerant. R-12 is available in bulk tanks or small cans. Follow the safety precautions for handling R-12 as listed in the beginning of this group.

CHARGING WITH SMALL CANS

When using disposable cans of this type, follow carefully the can manufacturer's instructions.

CAUTION

NEVER USE THESE CANS TO CHARGE INTO THE HIGH PRESSURE SIDE OF THE SYSTEM (COMPRESSOR DISCHARGE PORT) OR INTO A SYSTEM THAT IS AT HIGH TEMPERATURE, BECAUSE THE HIGH SYSTEM PRESSURES COULD BE TRANSFERRED INTO THE CHARGING CAN, CAUSING IT TO EXPLODE.

Keep the refrigerant manifold valves capped when not in use. Keep a supply of extra refrigerant-can-to-refrigerant-manifold gaskets on hand so that gaskets can be replaced periodically. This will insure a good seal without excessive tightening of the can or the manifold nuts.

1. Attach center hose from manifold gauge set to refrigerant dispensing manifold. Turn refrigerant manifold valves completely counterclockwise so they are fully open. Remove protective caps from refrigerant manifold.

2. Screw refrigerant cans into manifold. Be sure manifold-to-can gasket is in place and in good condition. Tighten can and manifold nuts to 8 to 11 Nm (6 to 8 ft.lbs.).

3. Turn refrigerant manifold valves completely clockwise to puncture the cans and close the manifold valves.

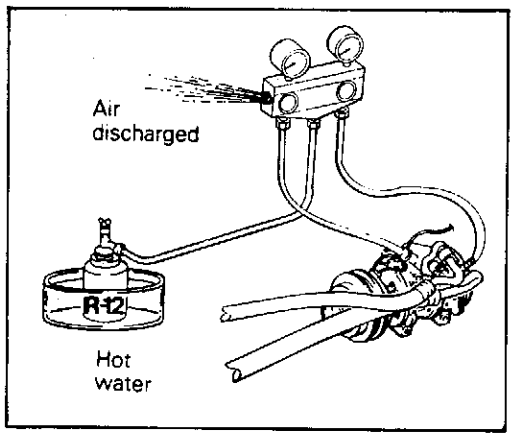
4. Purge air from the charging line by loosening the charging hose at the gauge set manifold and turning one of the refrigerant valves counterclockwise to release refrigerant. When the refrigerant gas starts escaping from the loose connection, retighten the hoses.

CAUTION

NEVER HEAT SMALL REFRIGERANT CANS OVER 52 DEGREES C (125 F) AS THEY MAY EXPLODE.

5. Fully open all refrigerant manifold valves being used and place the cans of refrigerant into a pan containing 52-degree C (125 F) water to warm the charging can and aid in the transfer of the charge into the system. Place the water pan and refrigerant cans on a scale and note the weight.

6. Total refrigerant charge requires 2-1/2 cans (14 oz R-12 per can).



6. Jump the low pressure switch terminals located on the liquid line near the condenser so the clutch will remain engaged.

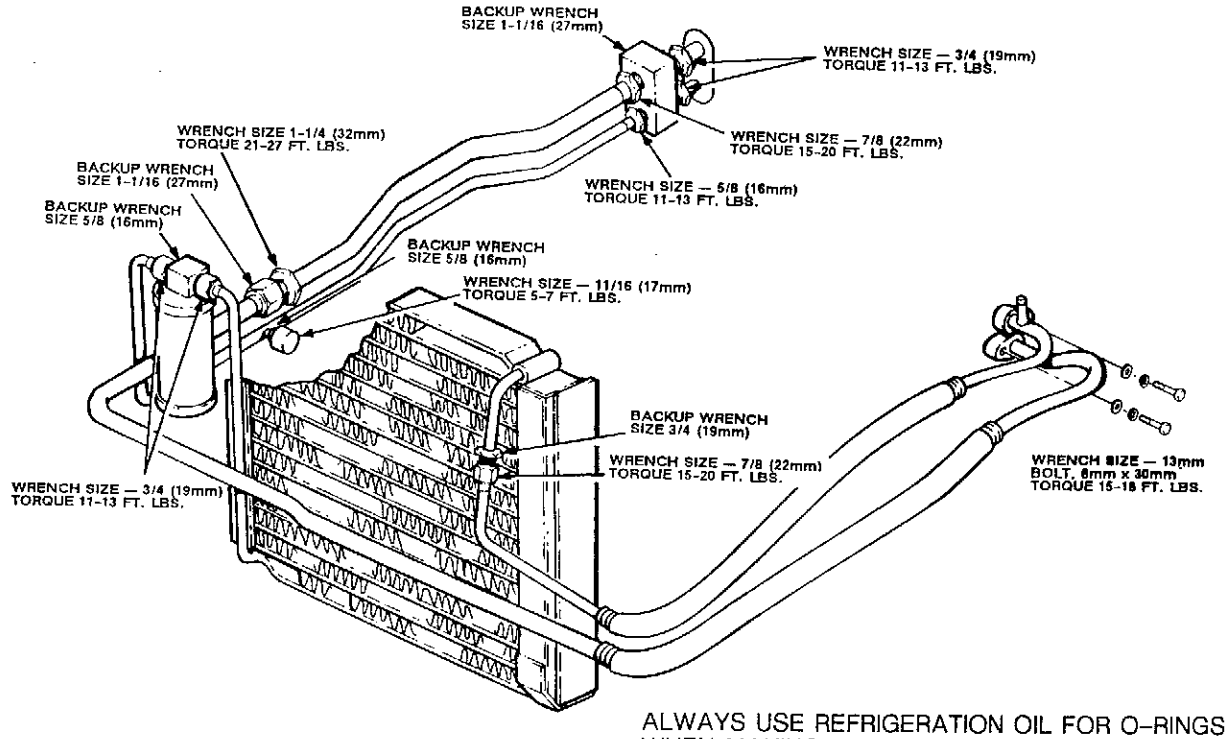
7. Start the engine and move the air-conditioner switch to ON and blower switch to LOW. The pressure switch will prevent the clutch from engaging until refrigerant is added to the system. If the clutch does engage, replace the switch before proceeding any further.

8. Charge through the suction side of the system by slowly opening the suction manifold valve. Adjust the valve as necessary so charging pressure does not exceed 35 kPa (59 psi). Maintain the temperature of the water in the pan by adding warm water as necessary. Note the weight of water added, to ensure accuracy when determining amount of refrigerant added to system.

9. Adjust engine speed to a fast idle of approximately 1500 rpm.

10. When specified refrigerant charge of 910g (32 oz.) has entered the system, close the gauge set and refrigerant manifold valves and reconnect wiring. Each can contains 397g (14 oz.) of R-12. Use 2-1/2 cans.

HANDLING TUBING AND FITTINGS



ALWAYS USE REFRIGERATION OIL FOR O-RINGS WHEN MAKING PLUMBING CONNECTIONS.

Kinks in the refrigerant plumbing or sharp bends in the refrigerant hose lines will greatly reduce the capacity of the entire system. High pressures are produced in the system when it is operating. Extreme care must be exercised to make sure that all connections are pressure tight. Dirt and moisture can enter the system when it is opened for repair or replacement of lines or components. The following precautions must be observed.

The system must be completely discharged before opening any fitting or connection in the refrigeration system.

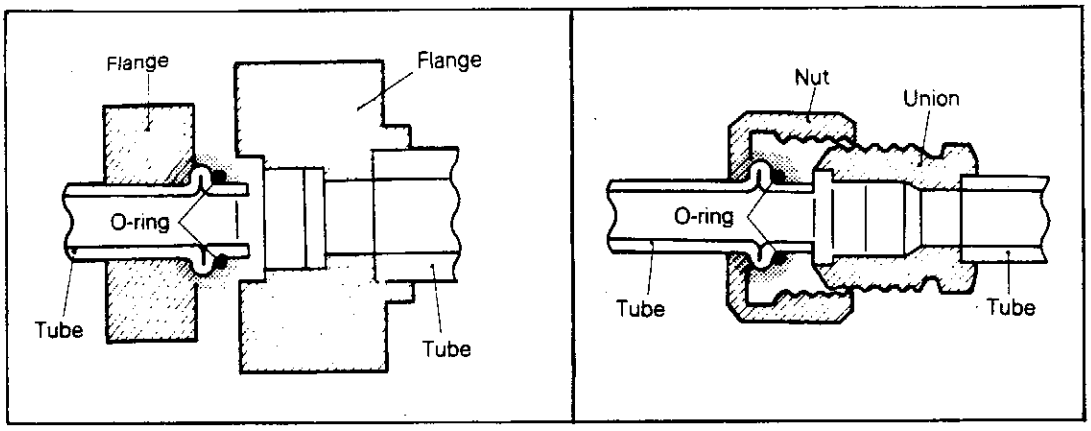
Open fittings with caution even after the system has been discharged. If any pressure is noticed as a fitting is loosened, allow trapped pressure to bleed off very slowly.

Never attempt to rebend formed lines to fit. Use the correct line for the installation you are servicing. A good rule for the flexible hose lines is to keep the radius of all bends at least 10 times the diameter of the hose. Sharper bends will reduce the flow of refrigerant. The flexible hose lines should be routed so they are at least 80mm (3 inches) from the exhaust manifold. It is a good practice to inspect all flexible hose lines at least once a year to make sure they are in good condition and properly routed. All plumbing connections use o-rings which are not reusable.

O-RING INSTALLATION

1. Clean sealing surface.
2. Make sure o-ring does not have any scratches.
3. Use refrigeration oil to cover o-ring.
4. Connect fitting, install fastener, and torque to amount shown in illustration.

The internal part of the refrigeration system will remain in a state of chemical stability as long as pure, moisture-free R-12 and refrigerant oil is used. Abnormal amounts of dirt, moisture, or air can upset the chemical stability and cause operational troubles or even serious damage if present in more than minute quantities. When it is necessary to open the refrigeration system, have everything you will need to service the system ready so the system will not be left open any longer than necessary. Cap or plug all lines and fittings as soon as they are opened to prevent the entrance of dirt and moisture. All lines and components in parts stock should be capped or sealed until they are ready to be used. All tools, including the refrigerant dispensing manifold, the gauge set manifold, and test hoses should be kept clean and dry.



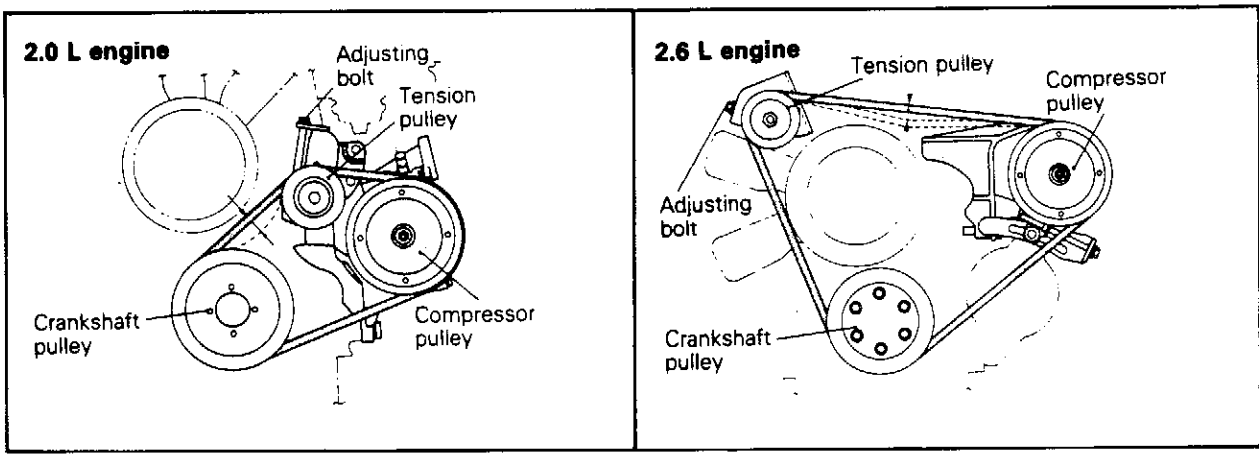
COMPRESSOR DRIVE BELT ADJUSTMENT

Satisfactory performance of the air-conditioning system is dependent upon drive belt conditions and tension. If the proper tensions are not maintained, belt slipping will greatly reduce air-conditioning performance and drive belt life. To avoid such adverse affects, the following service procedure should be followed.

1. Any belt that has operated for a minimum of one-half hour is considered to be a used belt. Adjust air-conditioning drive belt at time of new-car preparation.
2. Check drive belt tension at regular service intervals and adjust as needed.

Standard Value:

2.0 L engine 7 - 10 mm (.28 - .39 in.)
2.6 L engine 9 - 12 mm (.36 - .47 in.)



COMPRESSOR NOISE

When investigating an air-conditioning noise, you must first know the conditions when the noise occurs. These conditions are: weather, vehicle speed, in gear or neutral, engine temperature, and any other special conditions. Noises that develop during air-conditioning operation can often be misleading. For example, what sounds like a failed front bearing or connecting rod may be caused by loose bolts, nuts, mounting brackets, or a loose clutch assembly.

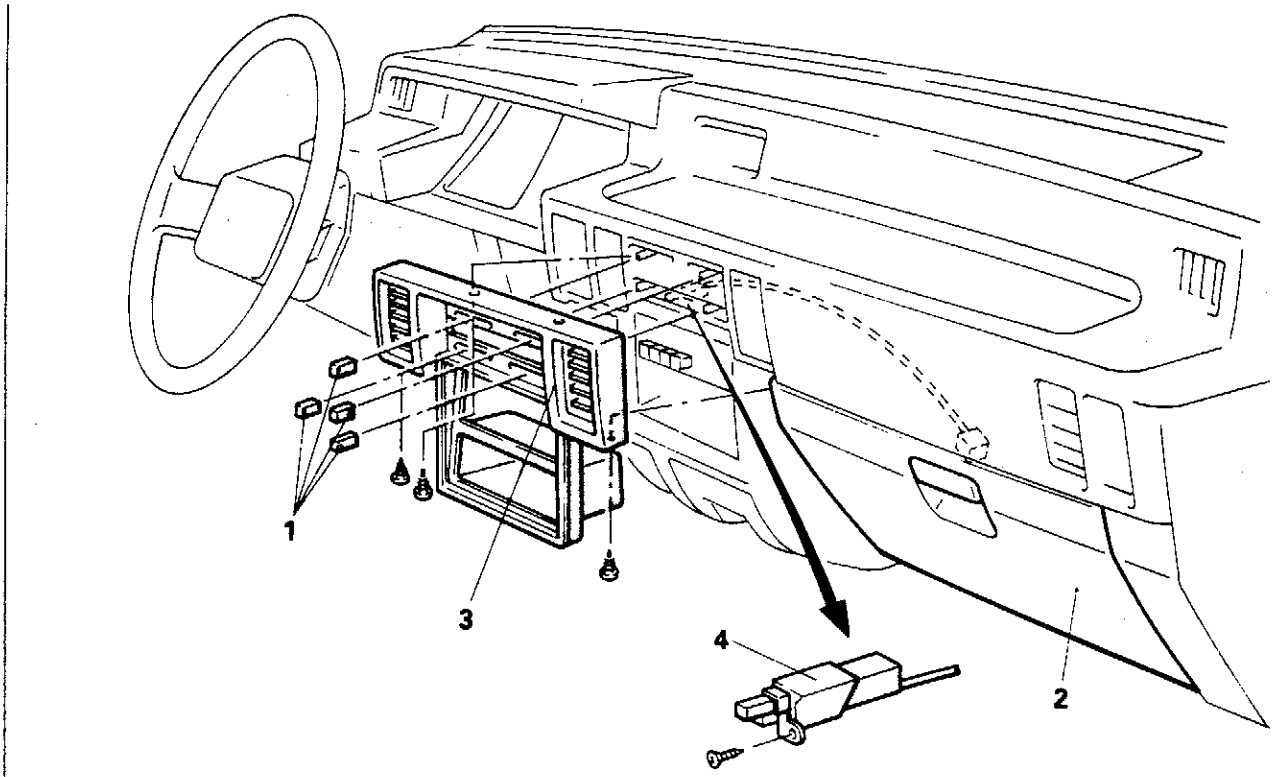
Verify accessory drive belt tension (power steering, alternator, or air pump). Improper accessory drive belt tension can cause a misleading noise when the compressor is engaged and little or no noise when the compressor is disengaged. Drive belts are speed sensitive. That is, at different engine speeds, and depending upon belt tension, belts can develop unusual noises that are often mistaken for mechanical problems within the compressor.

ADJUSTMENT PROCEDURES

1. Select a quiet area for testing. Duplicate conditions as much as possible. Switch compressor on and off several times to clearly identify compressor noise. To duplicate high ambient conditions (high head pressure), restrict airflow through the condenser. Install manifold gauge set to make sure discharge pressure does not exceed 2070 kPa (300 psi).
2. Tighten all compressor mounting bolts, clutch mounting bolt, and compressor drive belt. Check to assure coil is tight (no rotation or wobble).
3. Check refrigerant hoses for rubbing or interference that can cause unusual noises.
4. Check refrigerant charge (See *CHARGING THE SYSTEM*).
5. Recheck the compressor noise as in Step 1.
6. If noise still exists, loosen compressor mounting bolts and retorque. Repeat Step 1.
7. If noise continues, replace compressor and repeat Step 1.

AIR CONDITIONER SWITCH

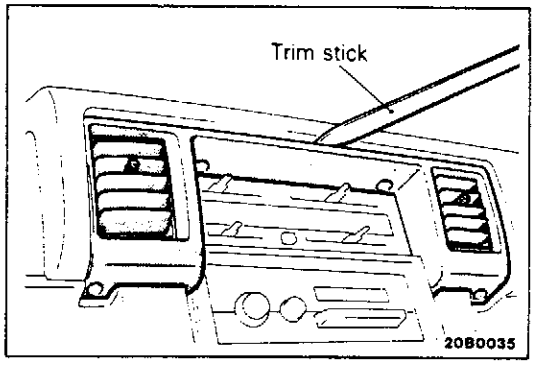
REMOVAL AND INSTALLATION



Removal steps

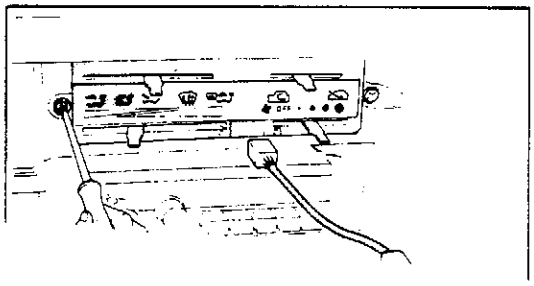
1. Knobs
2. Glove box
◆◆ 3. Center panel
◆◆ 4. Air conditioner switch

NOTE
(1) Reverse the removal procedures to reinstall.
(2) ◆◆ : Refer to "Service Points of Removal".



REMOVAL OF CENTER PANEL

After removal of the attaching screws, use the trim stick to remove the upper side of the center panel.



REMOVAL OF AIR CONDITIONER SWITCH

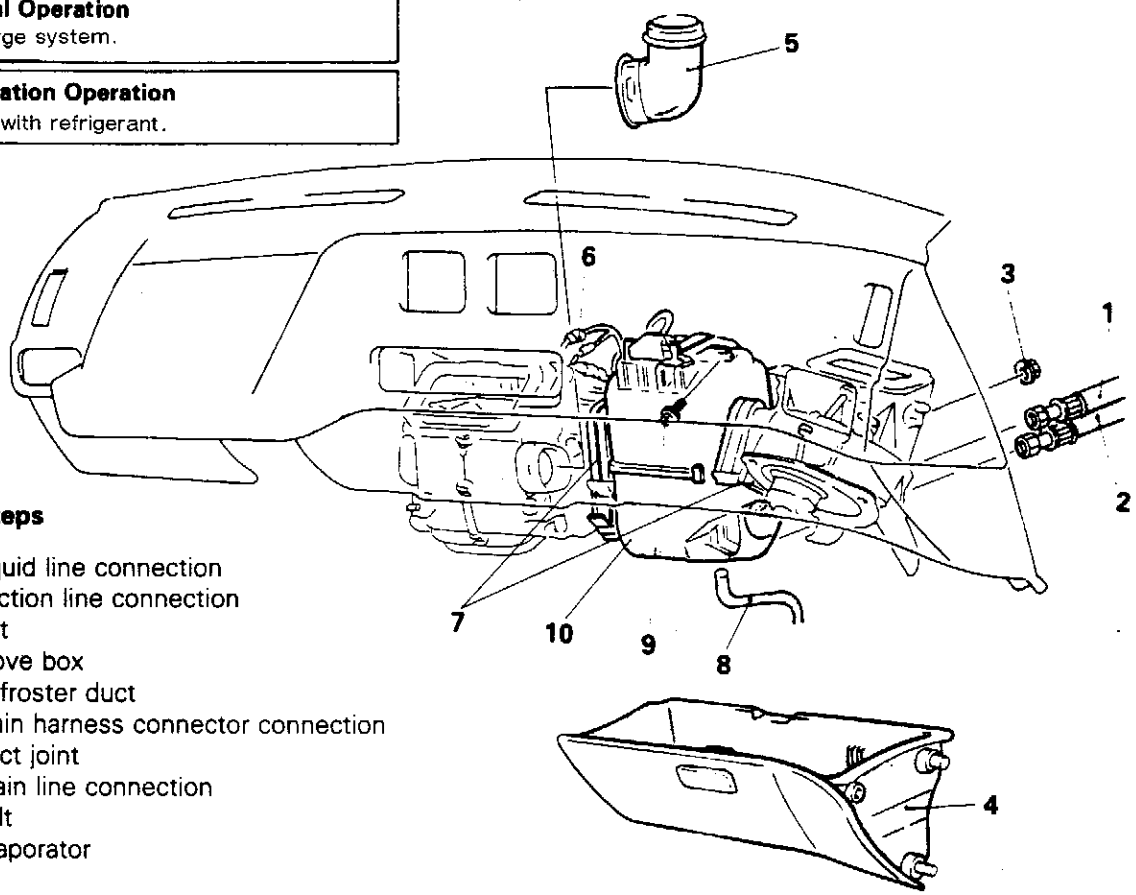
Raise the panel and draw the air-conditioner switch out forward.

EVAPORATOR

REMOVAL AND INSTALLATION

Pre-removal Operation
- Discharge system.

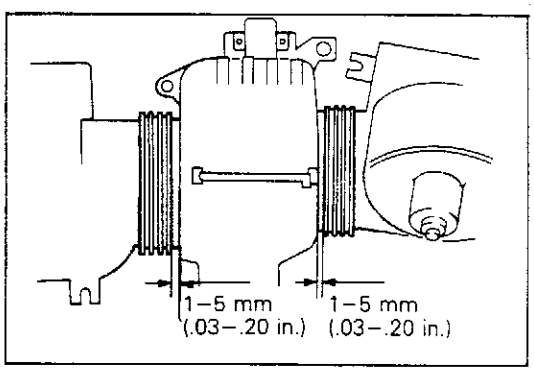
Post-installation Operation
- Charge with refrigerant.

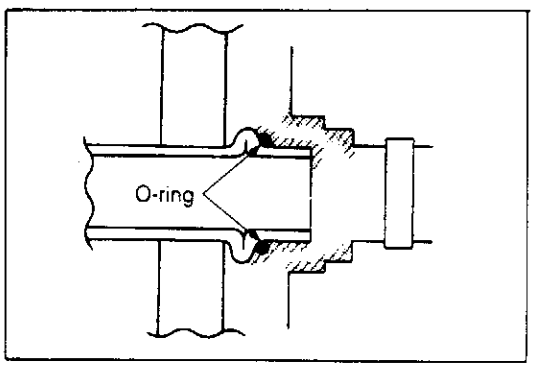


Removal steps

- ◆◆1. Liquid line connection
- ◆◆2. Suction line connection
- 3. Nut
- 4. Glove box
- 5. Defroster duct
- 6. Main harness connector connection
- ◆◆7. Duct joint
- 8. Drain line connection
- 9. Bolt
- 10. Evaporator

NOTE
(1) Reverse the removal procedures to reinstall.
(2) ◆◆ : Refer to "Service Points of Installation".





CAUTION

IF THE PLUMBING IS DISCONNECTED, CAP THE ENDS WITH A BLANK PLUG TO PREVENT ENTRY OF DUST, DIRT, AND WATE

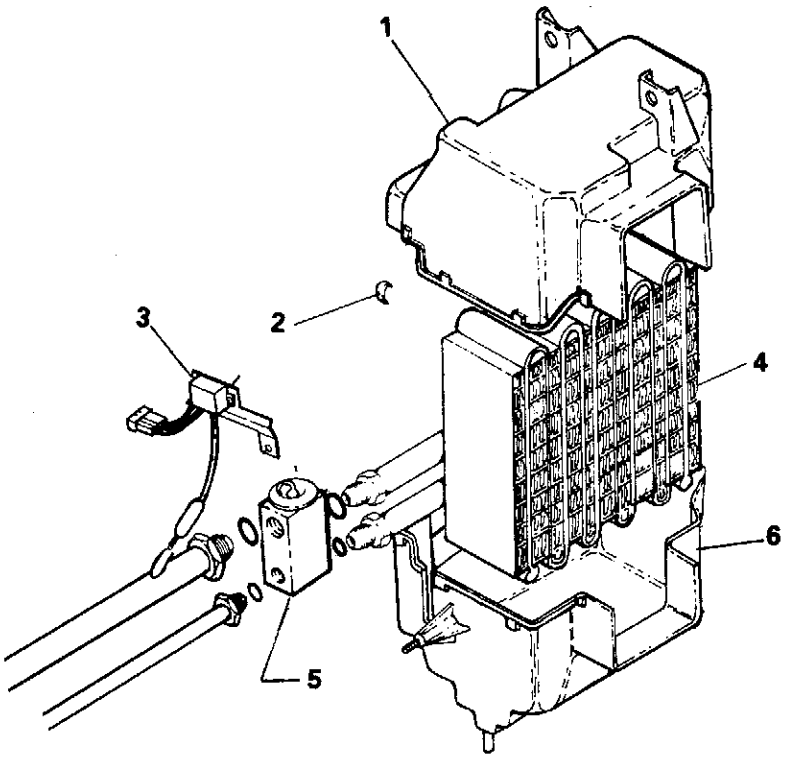
INSTALLATION OF DUCT JOINT

After installation of the duct joints, adjust the clearance between evapora and duct joint all around to the dimension shown in the illustration.

APPLICATION OF COMPRESSOR OIL TO SUCTION LINE/LIQUID LINE

Apply compressor oil to portions indicated before installing the liquid line and suction flexible hose.

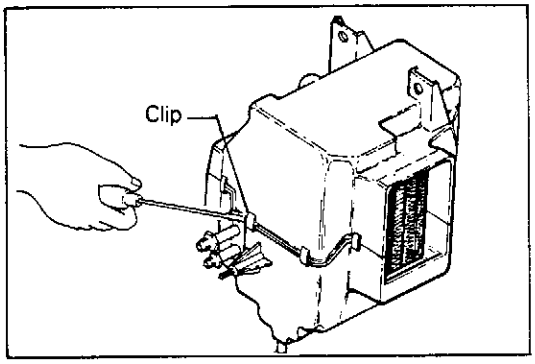
DISASSEMBLY AND REASSEMBLY



Disassembly steps

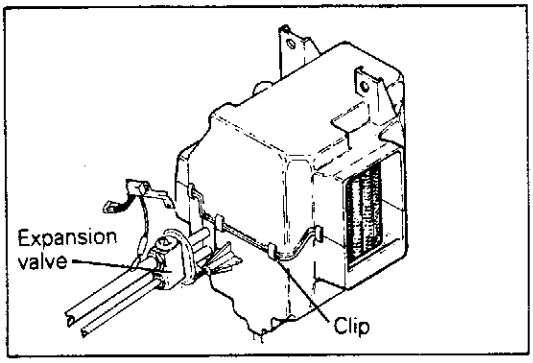
1. Evaporator case (Upper)
◆◆ 2. Clip
◆◆ 3. ECCS
4. Evaporator assembly
◆◆ ◆◆ 5. Expansion valve
6. Evaporator case (lower)

NOTE
(1) Reverse the disassembly procedures to reassemble.
(2) ◆◆ : Refer to "Service Points of Disassembly".
(3) ◆◆ : Refer to "Service Points of Reassembly".



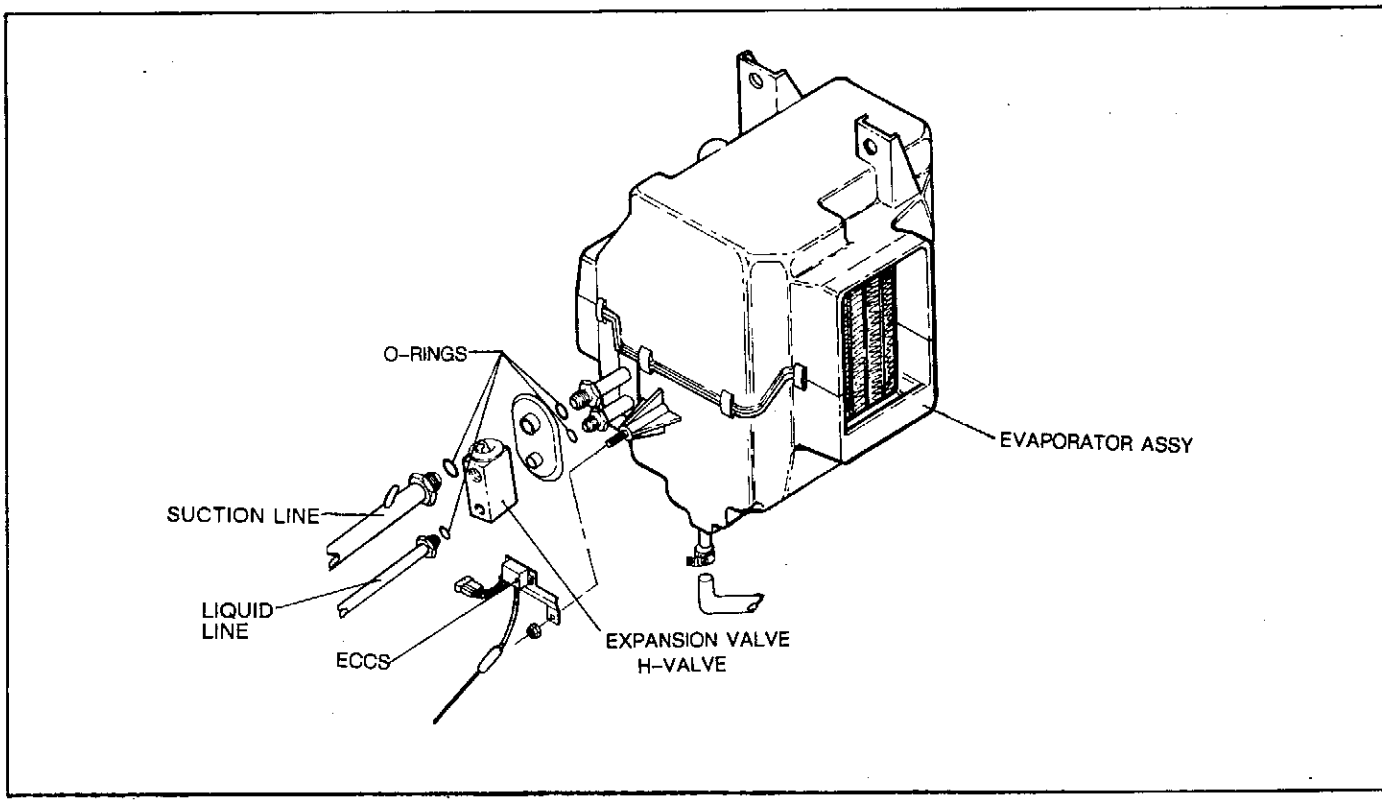
REMOVAL OF CLIP

Remove the clips with a flat-bladed screwdriver covered with a shop towe to prevent damage to case surfaces.



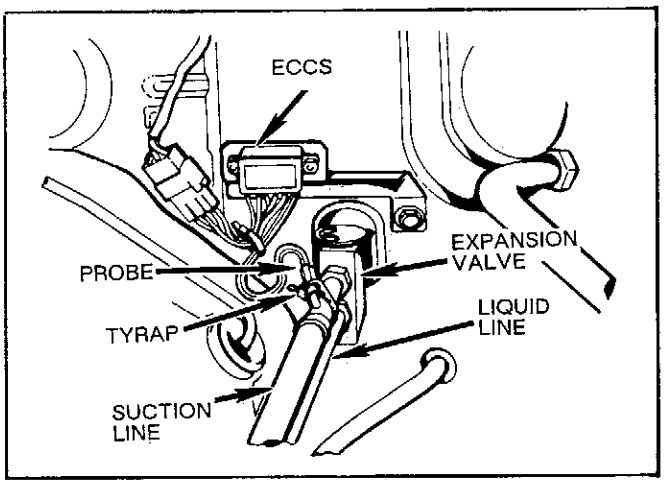
REMOVAL OF EXPANSION VALVE

Use two wrenches to loosen the nuts on the plumbing connections (for both the inlet and outlet) at the engine compartment side of the firewall and loosen the nuts on the plumbing connections (for both in inlet and outlet) from the evaporator.



APPLICATION OF COMPRESSOR OIL TO EXPANSION VALVE

Apply compressor oil to the o-rings and install the expansion valve to the evaporator assembly.



INSTALLATION OF THE ELECTRONIC CYCLING CLUTCH SWITCH (ECCS)

REMOVAL AND INSTALLATION

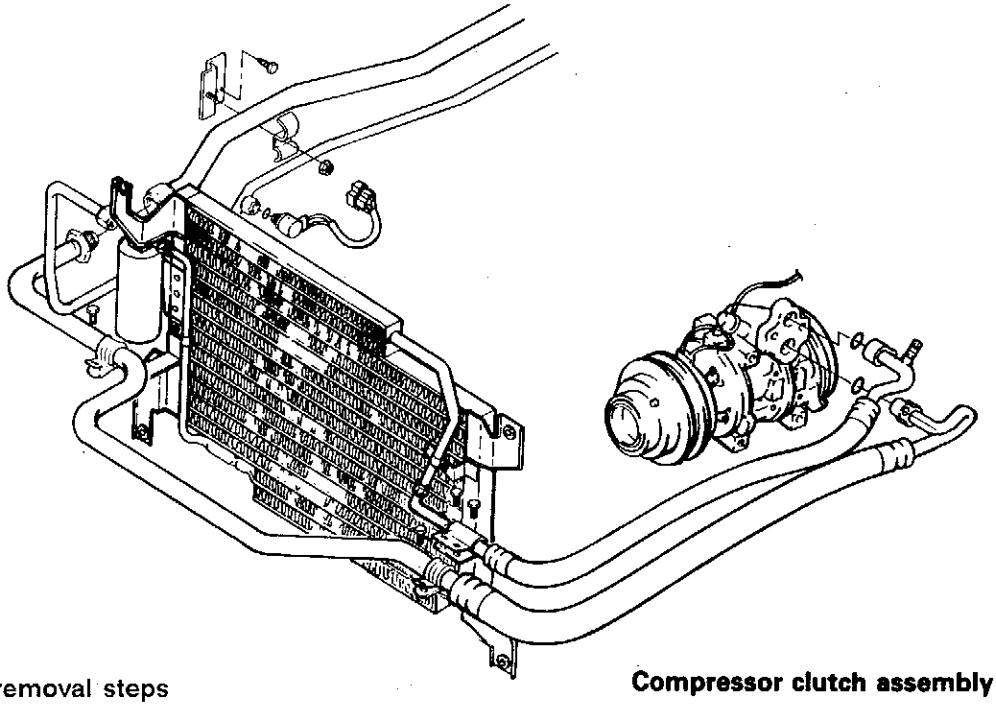
1. Locate and disconnect the 4-pin connector at the ECCS.
2. Remove the tie strap securing the capillary tube splice to the suction line.
3. Remove two (2) attaching screws securing the switch to the bracket above the H-valve.
4. Separate the switch from the bracket and slip the capillary tube from the well on the suction line. The capillary tube well is filled with a special temperature-conductive grease. Try to save all of the special grease and reuse it when reinstalling the switch.
5. To reinstall, reverse the preceding operation.

RECEIVER, CONDENSER, COMPRESSOR, CLUTCH ASSEMBLY

REMOVAL AND INSTALLATION

Pre-removal Operation
- Discharge system.
- Remove the radiator grille.

Post-installaiton Operaiton
- Install the radiator grille.
- Charge with specified refrigerant charge.
- Adjust the tension of the air-conditioner drive belt.



Receiver drier removal steps

1. Receiver drier bracket
2. Receiver drier

Condenser removal steps

3. Condenser mounting bolt
4. Condenser

Compressor clutch assembly removal steps

5. Tension adjusting bolt
6. Drive belt
7. Compressor clutch assembly mounting bolt
8. Compressor clutch assembly

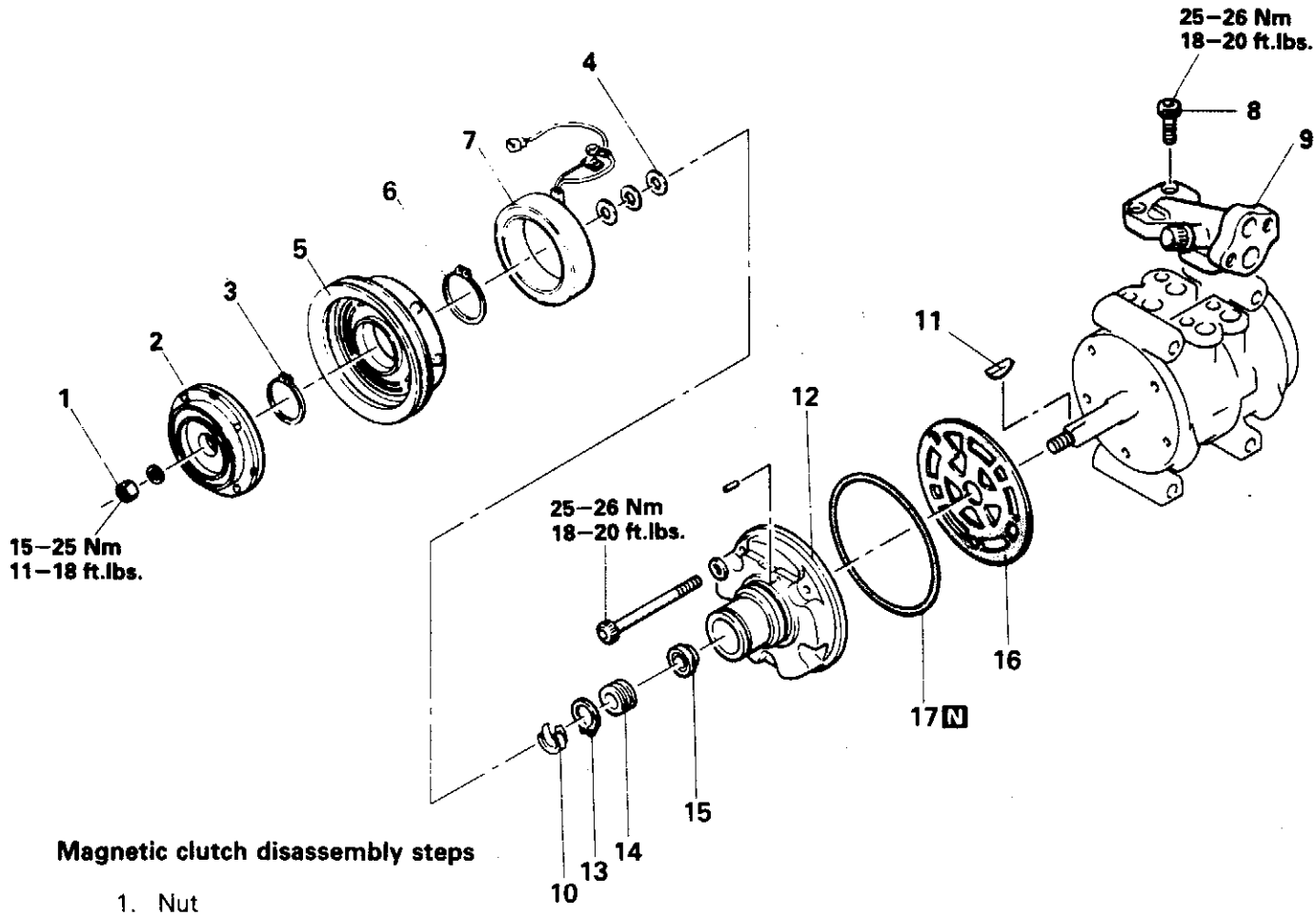
NOTE
Reverse the removal procedures to reinstall.

CAUTION

IF THE HOSES OR PIPES ARE DISCONNECTED, CAP THE HOSES OR PIPES WITH A BLANK PLUG TO PREVENT ENTRY OF DUST, DIRT, AND WATER.

COMPRESSOR

DISASSEMBLY AND REASSEMBLY



Magnetic clutch disassembly steps

1. Nut
◆◆ Adjustment of clutch clearance
2. Clutch hub
3. Snap ring
4. Shims
◆◆ 5. Rotor assembly
6. Snap ring
◆◆ 7. Clutch coil

Compressor front housing and service valve disassembly steps

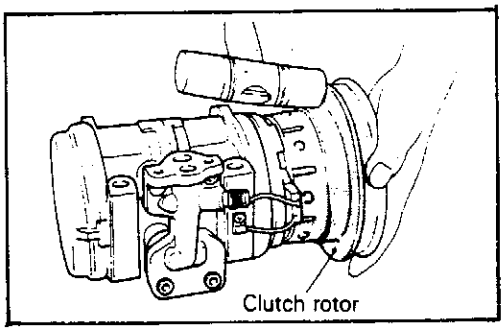
8. Through bolt
◆◆ Refilling of compressor oil
9. Flange fitting assembly
10. Dust seal
◆◆ 11. Woodruff key
◆◆ 12. Front housing
13. Snap ring
◆◆ ◆◆ 14. Shaft plate
◆◆ ◆◆ 15. Shaft seal
16. Gasket
17. O-ring

NOTE
(1) Reverse the disassembly procedures to reassemble.
(2) ◆◆ : Refer to "Service Points of Disassembly".
(3) ◆◆ : Refer to "Service Points of Reassembly".
(4) N : Non-reusable parts

SERVICE POINTS OF DISASSEMBLY

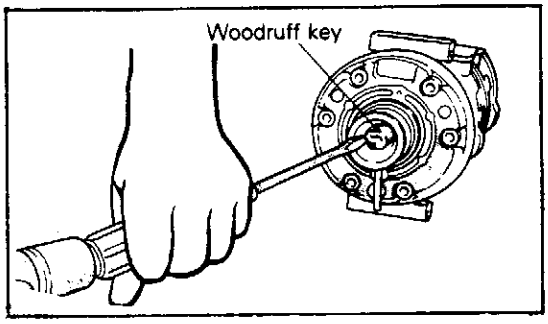
REMOVAL OF ROTOR ASSEMBLY

It may be necessary to lightly tap the rotor with a plastic hammer.



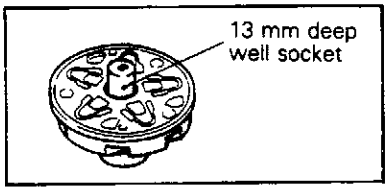
REMOVAL OF WOODRUFF KEY

Using a screwdriver, remove the woodruff key.



REMOVAL OF SHAFT PLATE/SHAFT SEAL

Using a 13mm deep-well socket, press shaft seal and shaft plate out of the front housing.



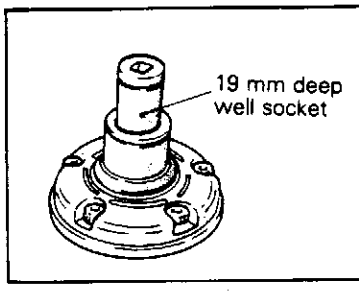
INSPECTION

* Check the surface of the clutch hub for scoring or bluing.
* Check the surface of the rotor for scoring or bluing.
* Check the sealing surfaces for cracks, scratches, and deformities.
* Check the front housing for cracks or scoring on the sealing surfaces.
* Check the compressor shaft for scoring.

INSTALLATION OF SHAFT SEAL

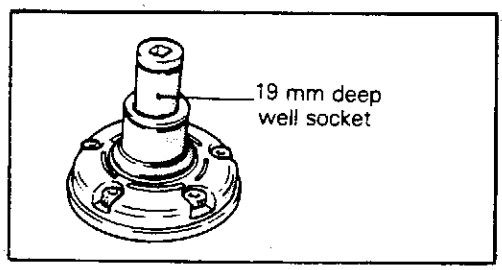
NOTES

1. Do not touch the sealing surfaces of shaft seal carbon ring and shaft plate.
2. The shaft seal and shaft plate should be replaced as a set.
3. Lubricate shaft seal and front housing bore with compressor oil.
4. Press in, by hand, using a 19mm deep-well socket.



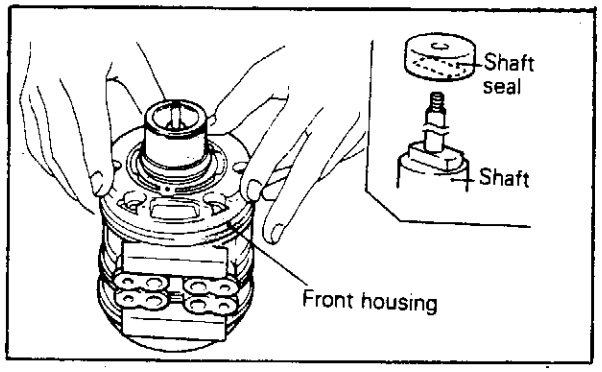
INSTALLATION OF SHAFT PLATE

Press in, by hand, using a 19mm deep-well socket.



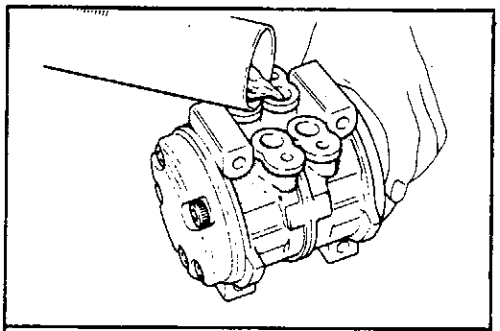
INSTALLATION OF FRONT HOUSING

Install the front housing over the locating pins in the compressor.



REFILL THE COMPRESSOR WITH OIL

Fill 45cc (1.5 fl.oz.) or 80cc (2.7 fl.oz.) compressor oil into the suction hole side and install the flange fitting assembly. **When only the compressor has been removed: 45cc(1.5 fl.oz.). When replacing the whole refrigerant system: 80cc (2.7 fl.oz.). Use only refrigeration oil, wax free, 500 SUS viscosity.**



INSTALLATION OF CLUTCH COIL

The coil must be aligned with the pin in the compression housing.

- **ADJUSTMENT OF CLUTCH CLEARANCE**

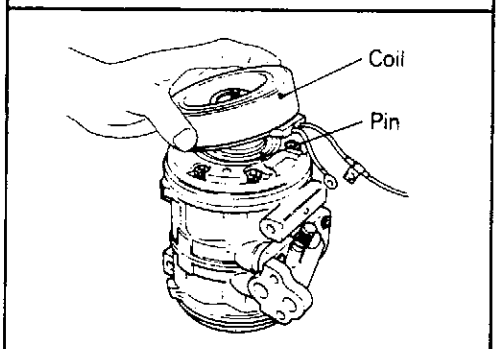
(1) Check the pressure plate to rotor clearance as illustrated.

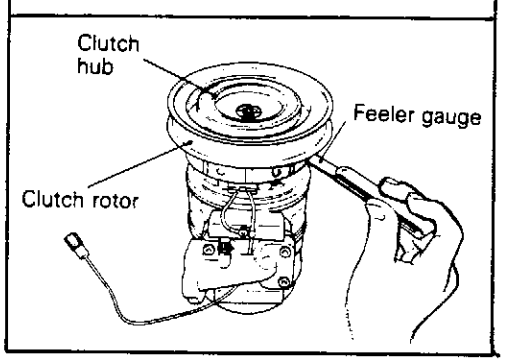
Pressure plate to rotor clearance :
0.4—0.7 mm (.016—.028 in.)

NOTE
Remove clearance adjusting shims to decrease clutch clearance. Add shims selected from the following table to increase clutch clearance.

Clearance Adjustment Shims

Part No.	Thickness
CSA935F100	0.1 mm (.004 in.)
CSA935F100A	0.2 mm (.008 in.)
CSA935F100B	0.5 mm (.020 in.)





(2) Turn the rotor by hand to confirm that it rotates freely.

UNITED STATES

CHRYSLER MOTORS

The special service tools referred to herein are required for certain service operations. These special service tools or their equivalent, if not obtainable through a local source are available through the following outlet.

Miller Special Tools, Division of Utica Tool Company, Inc., 32615 Park Lane, Garden City, Michigan 48135, U.S.A.

CANADA

CHRYSLER CANADA LTD.

The special service tools referred to herein are required for certain service operations. These special service tools or their equivalent, if not obtainable through a local source are available through the following outlet.

C & D Riley Enterprises, Ltd., P.O. Box 243, Amherstburg, Ontario N9V 2Z4.

INTERNATIONAL

CHRYSLER INTERNATIONAL S.A.

The special service tools referred to herein are required for certain service operations. These special service tools or their equivalent, if not obtainable through a local source are available through the following outlet.

Miller Special Tools, Division of Utica Tool Company, Inc., 32615 Park Lane, Garden City, Michigan 48135, U.S.A.