HEATING AND AIR CONDITIONING

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GENERAL INFORMATION

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A/C OPERATION

The compressor increases the pressure and temperature of the refrigerant. The heated refrigerant vapor is then pumped into the condenser where it cools by the air passing over the condenser fins. As the refrigerant cools in the condenser, it condenses into a liquid. Still under high pressure, the liquid refrigerant passes into the receiver. The receiver acts as a reservoir to furnish refrigerant to the expansion (H) valve at all times. From the receiver, the high pressure liquid refrigerant passes to the expansion (H) valve. The expansion (H) valve meters refrigerant into the evaporator where a low pressure is maintained by the suction side of the compressor. As it enters the evaporator, the refrigerant immediately begins to boil by absorbing heat from the air passing over the evaporator core. Having given up its heat to boil the refrigerant, the air is cooled and passes into the passenger compartment of the vehicle. From the evaporator the vaporized refrigerant is drawn back to the compressor to repeat the cycle.

REFRIGERANT (R-12)

It is illegal to release R-12 into the atmosphere.

SAFETY PRECAUTIONS

WARNING: EXTREME CARE MUST BE TAKEN TO PREVENT ANY LIQUID REFRIGERANT FROM COMING IN CONTACT WITH THE SKIN AND ESPECIALLY THE EYES. ALWAYS WEAR SAFETY GOGGLES WHEN SERVICING ANY PART OF THE REFRIGERANT SYSTEM. IF EYE CONTACT IS MADE, APPLY A FEW DROPS OF MINERAL OIL TO THE EYES AND FLUSH WITH WATER FOR SEVERAL MINUTES. SEEK MEDICAL ATTENTION IMMEDIATELY.

The refrigerant used in the air conditioner system is Refrigerant-12 (R-12). R-12 is nonexplosive, nonflammable, non-corrosive, has practically no odor and is heavier than air. Although it is classified as a safe refrigerant, certain precautions must be observed to protect the parts involved and the person who is working on the unit. Liquid R-12, at normal atmosphere pressures and temperatures, evaporates so quickly that it has the tendency to freeze anything it contacts.

WARNING: TO AVOID A DANGEROUS EXPLOSION, NEVER WELD OR STEAM CLEAN NEAR AIR CONDITIONING LINES OR COMPONENTS. DO NOT HEAT R-12 ABOVE 52°C (125°F).

The R-12 in the system is always under pressure. Because the system is tightly sealed, heat applied to any part could cause this pressure to build up excessively.

WARNING: LARGE AMOUNTS OF REFRIGERANT RELEASED IN A CLOSED WORK AREA WILL DISPLACE THE OXYGEN AND CAUSE SUFFOCATION. ALWAYS MAINTAIN GOOD VENTILATION SURROUNDING THE WORK AREA.

R-12 gas, under normal conditions, is non-poisonous.

WARNING: THE DISCHARGE OF R-12 GAS NEAR AN OPEN FLAME CAN PRODUCE A VERY POISONOUS GAS CALLED PHOSGENE. PHOSGENE IS GENERATED WHEN A FLAME-TYPE LEAK DETECTOR IS USED.

CAUTION: When charging an A/C system always keep the tank in an upright position. If the tank is on its side or upside down, liquid refrigerant will enter the system and may damage the compressor.

In most instances when charging or adding refrigerant, moderate heat is required to bring the pressure of the refrigerant above the pressure of the system. A bucket or large pan of hot water, not over 52°C (125°F), is all the heat required for this purpose. DO NOT heat the refrigerant container with a blow torch or any other means that would raise the temperature and pressure above this temperature.

CAUTION: DO NOT allow liquid refrigerant to touch bright metal. Refrigerant will tarnish bright metal and chrome surfaces. Refrigerant in combination with moisture is very corrosive and can cause extensive damage to all metal surfaces.

Avoid splashing the refrigerant on any surface.

RECYCLING

(R-12) refrigerant is a chloroflorocarbon (CFC) that can contribute to the depletion of the ozone layer in the upper atmosphere. Ozone filters out harmful radiation from the sun. To assist in protecting the ozone layer, Chrysler Corporation requires that an (R-12) refrigerant recovery device that meets SAE standard J1991 be used. Contact an automotive service equipment supplier for refrigerant recycling equipment that is available in your area. Refer to the operating instructions provided with the recycling equipment for proper operation.

SERVICE PRECAUTIONS

Never open or loosen a connection before discharging the system refrigerant.

A system which has been opened to replace a component or one which has discharged through leakage must be evacuated before charging.

Immediately after disconnecting a component from the system, seal the open fittings with a cap or plug.

Before disconnecting a component from the system, clean the outside of the fittings thoroughly.

DO NOT remove the sealing caps from a replacement component until ready to install.

Refrigerant oil will absorb moisture from the atmosphere if left uncapped. DO NOT open an oil container until ready to use and install the cap immediately after using. Store the oil only in a clean moisture-free container.

Before connecting an open fitting always install a new seal ring. Coat the fitting and seal with clean refrigerant oil before connecting.

When installing a refrigerant line avoid sharp bends. Position the line away from the exhaust or any sharp edges which may chafe the line.

Tighten fittings only to the specified torque. The copper and aluminum fittings used in the A/C system will not tolerate over tightening.

When disconnecting a fitting use a wrench on both halves of the fitting to prevent twisting of the refrigerant lines or tubes.

DO NOT open a refrigerant system or uncap a replacement component unless it is as close as possible to room temperature. This will prevent condensation from forming inside of a component which is cooler than the surrounding air.

Keep service tools and the work area clean. Contamination of A/C system through careless work habits must be avoided.

PRESSURE GAUGE AND MANIFOLD ASSEMBLY

Pressure Gauge and Manifold Assembly Tool C-3740-B (Fig. 1) is the most important tool used to service the air conditioning system. The gauge assembly is used to determine:

- System high side gauge pressures
- System low side gauge pressures
- The correct refrigerant charge
- System diagnosis

It is designed to provide simultaneous high and low side pressure indications, because these pressures must be compared to determine the correct system operation.

LOW SIDE GAUGE

The low side gauge is a compound gauge, which means that it will register both pressure and vacuum (Fig. 1). The compound gauge is calibrated 0-1034 kPa (0-150 psi) pressure and 0-760 mm (0-30 in.) of mercury vacuum. It is connected to the suction service valve to check the low side pressure or vacuum.

HIGH SIDE GAUGE

The high side gauge is used to check the pressure in the discharge side of the air conditioning system (Fig. 1).

MANIFOLD

The gauges are connected into the air conditioning systems through a manifold. The manifold has 3 connections (Fig. 1). The low side hose and fitting is connected directly below the low side gauge. The high side hose and fitting is connected below the high side gauge.

The center connection of the manifold is used for recovery and any other necessary service (Fig. 1). Both the high and low sides of the manifold have hand shutoff valves. The hand shutoff valves open or close the respective gauge connections to the center service connection or to each other (Fig. 1). The manifold is constructed so that pressure will be indicated on the gauges regardless of the hand valve position.

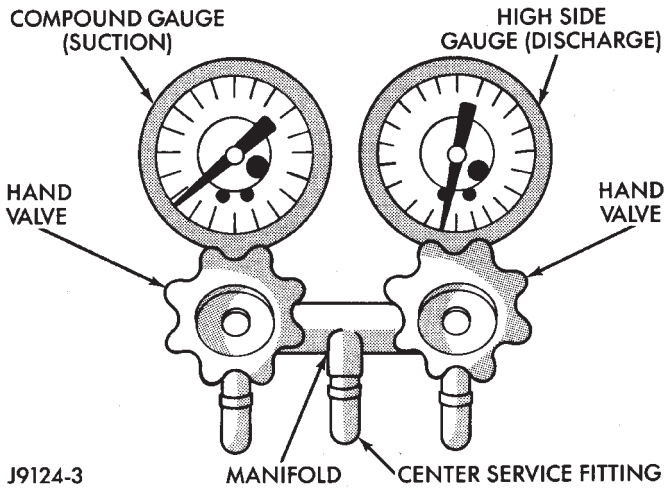

Fig. 1 Pressure Gauge and Manifold Assembly Tool C-3740-B

CONNECTING THE PRESSURE GAUGE AND MANIFOLD ASSEMBLY

Remove the protective caps from the service valve gauge ports and valve stems.

Close both of the hand valves on the gauge manifold set.

Connect the compound gauge hose to the compressor suction service valve gauge port (low-side).

Connect the high pressure gauge hose to the discharge service valve gauge port (high-side).

If necessary, to facilitate installation of the gauge set, loosen the service valve-to-compressor fitting and rotate the service valve slightly. DO NOT allow the hose to contact the engine or body components. Tighten the service valve-to-compressor fitting to 34 N•m (25 ft. lbs.) torque. Tighten the flange-type service valve screws to 20 N•m (15 ft. lbs.) torque.

Set both the service valve stems to the mid-position or the cracked-position. The gauges will indicate high and low side pressure respectively.

Purge any air from the high side test hose by opening the high side hand valve on the manifold for 3 to 5 seconds. The center connection on the manifold must be open.

Purge any air from the low side test hose by opening the low side hand valve on the manifold for 3 to 5 seconds. The center connection on the manifold must be open.

The air conditioning system may be operated with the gauge manifold assembly connected in this manner. The gauges will indicate respective operative pressures.

SERVICE VALVES

DESCRIPTION

The discharge (high pressure) and inlet (suction) service valves are used for diagnosis and recovery of the system. They are also used to isolate the system during component Removal and Installation.

The service valves are three-position valves (Fig. 2). Normal operating position for the valve stem is the back-seated (full-out) position. The stem is turned counterclockwise to place it in this position.

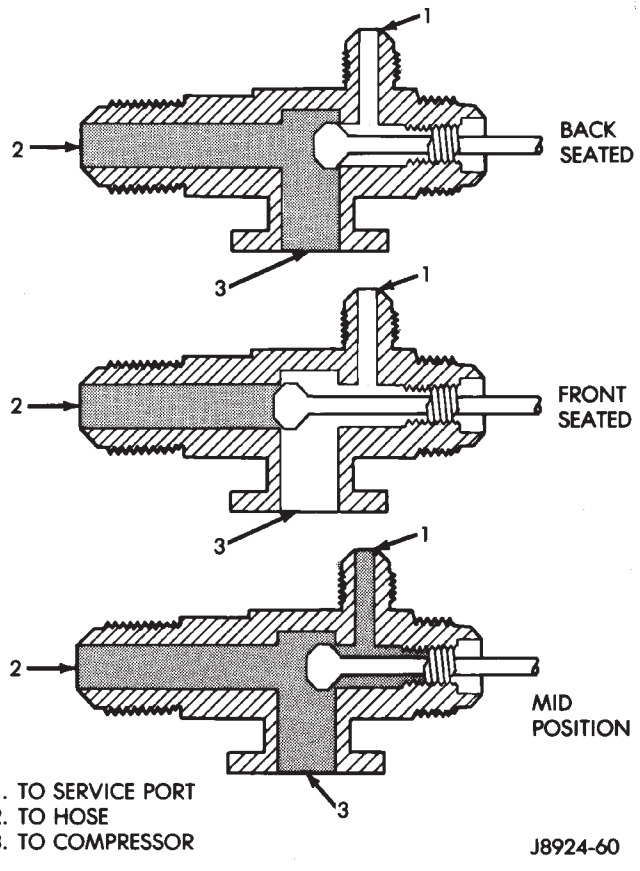

Fig. 2 Service Valve

The front seated (full-in) position is used to isolate the compressor from the system. The stem is turned clockwise to place it in this position.

In the mid-position the gauge port is open. This position is used for pressure testing and for recovery of the system.

DISCHARGE SERVICE VALVE ADAPTERS

On occasion, a service hose may not fit a service valve fitting. Adapters are available and can be used to achieve service valve connection (Fig. 3).

MANUFACTURER	STRAIGHT	RIGHT ANGLE	FLEX
Miller Tools	7763	7754	—
	C-4803	C-4843	—
Draf Tools	AC 354	—	AC 355

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Fig. 3 Discharge Service Valve Adapters

SYSTEM DISCHARGE

(R-12) refrigerant is a chlorofluorocarbon (CFC) that can contribute to the depletion of the ozone layer in the upper atmosphere. To help protect the ozone layer, an R-12 refrigerant recycling device must be used. Use this device when it is necessary to empty the refrigerant system. Contact an automotive service equipment supplier for refrigerant recycling equipment. Refer to the operating instructions provided with the recycling equipment for proper operation.

SYSTEM EVACUATION

The system must be evacuated whenever refrigerant has been discharged or when system refrigerant level has become abnormally low. A vacuum pump is used for the evacuation process.

The system must be evacuated to remove any moisture or air that may have collected in the system. If moisture is not removed from the system, it will combine with R-12 to form a highly corrosive substance.

VACUUM PUMP

The Vacuum Pump Tool C-4069-B and motor must be kept upright at all times to prevent oil spills.

(1) Connect the Pressure Gauge and Manifold Assembly Tool C-3740-B to the service valves.

(2) Discharge the system.

(3) Connect the center service hose on the gauge and manifold to the vacuum pump inlet fitting.

(4) Turn both manifold hand valves to the wide open position.

(5) Start the vacuum pump and observe the vacuum gauge reading.

(6) Test the system for leaks as follows:

- Close the manifold hand valves.
- Stop the vacuum pump and observe the vacuum reading.
- If the system is leak-free, vacuum will hold steady at the level indicated when the pump was stopped. If vacuum remains steady for 3-5 minutes, resume and continue evacuation for a minimum of 30 minutes.
- If the system has a leak, vacuum will fall off or rapidly drop to a 0 reading. If a leak exists, partially charge the system. Find and repair the leak and resume evacuation.

(7) Continue operating the pump for a minimum of 30 minutes after attaining lowest vacuum indicated on the gauge.

(8) Close the manifold hand valves and stop the vacuum pump.

(9) Disconnect the center service hose from the vacuum pump. The system is now ready for charging.

PORTABLE SERVICE STATION

The air conditioner service station is a self contained, portable unit. It is equipped with a vacuum pump, metering-charging cylinder, refrigerant supply, pressure and vacuum gauges, service hoses and control valves (Fig. 4).

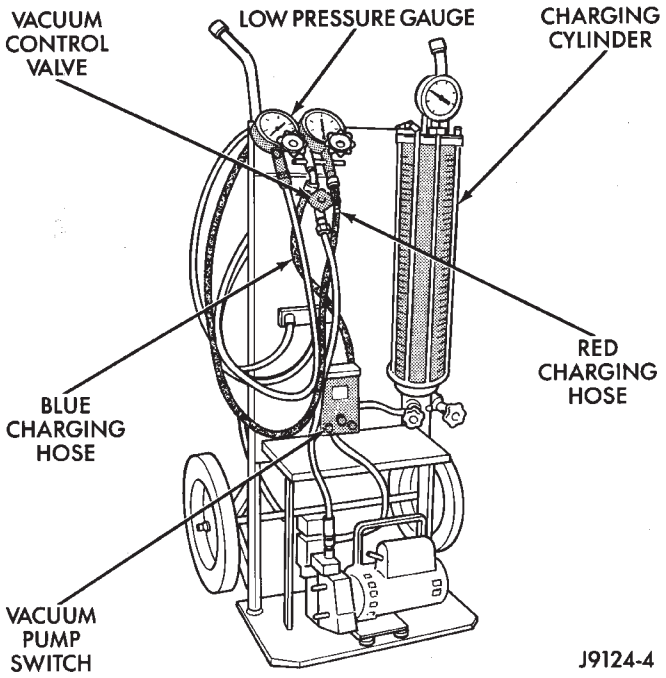

Fig. 4 Portable Service Station

(1) Turn the station vacuum pump control switch OFF (the switch is at the front of the station). The pump control switch must be OFF before connecting the station to an electrical power source.

(2) Close all the hand valves.
(3) Connect the red charging hose to the discharge service valve.
(4) Connect the blue charging hose to the inlet (suction) service valve.
(5) Discharge the system. Leave the suction and discharge service valves in the mid-position.

CAUTION: The system must be completely discharged into a recovery device before evacuating. If the system is still charged, refrigerant can enter and damage the vacuum pump.

(6) Connect the vacuum pump hose to the vacuum pump inlet.
(7) Open the low and high pressure control valves on the charging station.
(8) Start the vacuum pump. Open the vacuum control valve and note the vacuum reading.
(9) Test the system for leaks as follows:
- Close the manifold hand valves.
- Stop the vacuum pump and observe the vacuum reading.
- If the system is leak-free, vacuum will hold steady at the level indicated when the pump was stopped. If vacuum remains steady for 3-5 minutes, resume and continue evacuation for a minimum of 30 minutes.
- If the system has a leak, vacuum will fall off or rapidly drop to a 0 reading. If a leak exists, partially charge the system. Find and repair the leak and resume evacuation.

(10) Continue evacuating the system for a minimum of 30 minutes after attaining the lowest vacuum level.
(11) Fill the station charging cylinder while the system is evacuating.
(12) Close the vacuum control valve and stop the vacuum pump.
(13) Observe low pressure gauge to determine if a system leak exists. If the system is leak-free, the system is now ready for charging.

SYSTEM CHARGE

CHARGE CAPACITY

The recommended system charge is 1.1 kg (38 oz.) of R-12 refrigerant for XJ vehicles and 0.9 kg (32 oz.) for YJ vehicles.

Add an additional 28 grams (1 fluid oz.) of compressor oil to the system when a hose, receiver-drier, condenser, expansion valve or evaporator core is replaced.

PORTABLE SERVICE STATION

(1) Fill the station charging cylinder. Refrigerant should be observed rising in the cylinder sight glass.
(2) Slightly open the valve at the top of the cylinder when pressure in the charging cylinder and refrigerant supply tank are equal. This relieves head pressure allowing refrigerant to continue filling the cylinder.
(3) Observe the pressure gauge at the top of the cylinder. Rotate the plastic cover on the cylinder until the pressure heading column corresponds with the gauge pressure in-line with the sight glass.

FOR EXAMPLE:—The pressure gauge at the top of the cylinder indicates 483 kPa (70 psi). Locate the column with the pressure heading of 483 (70) and rotate the cover so the 483 (70) column aligns with the sight glass.

(4) When refrigerant reaches the correct level in the sight glass, close the right hand valve at cylinder base and on the refrigerant drum.
(5) Close the valve at the top of the charging cylinder.
(6) Check for bubbles in the refrigerant using the cylinder sight glass. If bubbles appear in the refrigerant, tilt the charging station rearward momentarily.
(7) Connect the heating element cord to the power pack receptacle and turn the heater switch ON.
(8) Allow the refrigerant to warm for about 10 minutes while the vacuum pump is operating.

WARNING: WEAR GOGGLES TO PROTECT THE EYES.

(9) Discharge and evacuate the system.
(10) Close the low pressure valve on the charging station.
(11) Fully open the left hand refrigerant control valve at the base of the cylinder and the high pressure valve on the charging station.
(12) Charge the system.
(13) Close the refrigerant control valve and the high pressure valve on the charging station.

CAUTION: DO NOT permit the liquid level to drop below 0 on the cylinder sight glass.

(14) Close the manifold gauges after completion of the charging operation and check the high and low side pressures.
(15) Check system operation.

CAUTION: DO NOT check system pressures until the high and low pressure valves on the charging station are closed. The low pressure gauge could be damaged if the valves are open.

(16) Close all the valves on the charging station and close the refrigerant drum valve when all the operations are completed.
(17) Back-seat the service valves by turning them fully counterclockwise. Install the quick seal caps on the valves afterward.

(18) Disconnect the charging hoses from the service valves.

COMPRESSOR OIL LEVEL

The compressor oil level must be checked and adjusted if the system has been discharged rapidly, or when a component has been replaced. If a replacement compressor is being installed, it must be filled with new compressor oil (Suniso 5GS, or equivalent).

The normal quantity of oil required for the compressor and entire system is 136 ml (4.6 fluid oz.) for SD 709 compressor. DO NOT overfill the compressor. Excessive amounts of oil in the system will hinder compressor operation and reduce A/C performance.

CAUTION: The compressor is a high speed unit. Satisfactory operation is dependent on sufficient lubrication; however, excess oil will hinder A/C performance.

Two oil level checking procedures are necessary. Use Procedure (A) when the compressor is being replaced and the system was discharged properly (no oil loss). Use Procedure (B) for routine maintenance or when checking oil level after replacing a system component.

In cases where rapid loss of refrigerant and oil occurred, the system must be evacuated and purged. Then the compressor must be filled with the necessary amount of oil to fill the entire system.

PROCEDURE A

(1) Remove the oil filler plug, discharge cap and suction port caps from the original and replacement compressor.

(2) Use a clean container to drain the oil from the replacement compressor. Drain the oil through the oil filler plug hole, the discharge and suction. Then rotate clutch front plate several times to push the oil on cylinder out to discharge chamber of cylinder head and drain the oil from discharge port.

(3) Drain the oil from the original compressor into a measuring cup or graduated beaker in the same way as Step 2. Note the amount of oil drained.

(4) Fill the replacement compressor with the same amount of oil drained from the original compressor plus 30 ml (1 fluid oz.).

FOR EXAMPLE:—If the old compressor contained 103.5 ml (3.5 fluid oz.) of oil, fill the replacement compressor with a total of 133 ml (4.5 fluid oz.) of oil.

PROCEDURE B

(1) Start the engine and operate the engine at idle.

(2) Operate the air conditioning system for 10 minutes to return the maximum amount of oil in the system to the compressor.

(3) Stop the engine and disconnect the magnetic clutch feed wire.

(4) Front-seat the discharge and suction service valves.

(5) Determine the mounting angle.

(a) Position an Angle Gauge across the flat surfaces of the front mounting ears.

(b) Center the bubble.

(c) Read the mounting angle to the closest degree.

(d) These vehicles should have 0° mounting angle.

(6) Remove the oil filler plug. Position internal parts by rotation of front plate counterweight to 30° angle (Fig. 5).

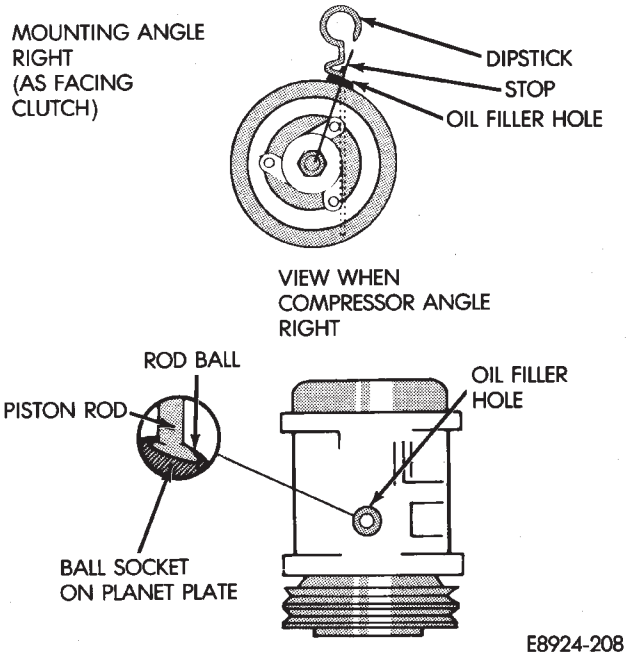

Fig. 5 Check Oil Level

(7) Insert the dipstick tool to its STOP position. The Dipstick Tool is part of Tool Kit 7851. The stop is the angle near the top of the dipstick. The bottom surface of the angle must be flush with the surface of the oil filler hole.

(8) Remove dipstick. Count increments of oil.

(9) Use mounting angle table to determine correct oil level for the compressor (Fig. 6).

(10) If the increments read on the dipstick do not match the table, add or subtract oil to the mid-range value.

FOR EXAMPLE:—If the mounting angle is 10° and the dipstick increment is 3, add oil in 30 ml (1 fluid oz.) increments until 5 is read on dipstick.

(11) Check that the sealing O-ring is not twisted.

(12) Seat and O-ring must be clean.

MOUNTING ANGLE (DEGREE)	ACCEPTABLE OIL LEVEL INCREMENTS	MOUNTING ANGLE (DEGREE)	ACCEPTABLE OIL LEVEL INCREMENTS
0	3–5	40	7–9
10	4–6	50	8–10
20	5–7	60	9–11
30	6–8	90	10–12

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Fig. 6 Mounting Angle/Oil Level Table

(13) Install the compressor oil filler plug. Tighten the plug to 10 N•m (7 ft. lbs.) torque. DO NOT overtighten the plug to stop a leak.

SERVICE DIAGNOSIS—MECHANICAL

GENERAL

The reason for a decrease in cooling or heating efficiency must be understood before attempting repair or replacement of parts. Determined if the condition is the air conditioner, the heating system, its components or the in the air flow system.

The air conditioning system generally operates at peak efficiency at normal highway speeds. However, a slight reduction in A/C performance may be experienced in congested city driving conditions; especially when ambient temperatures are high.

When diagnosing a gradual decrease in A/C performance, remember to check condition of the condenser and radiator fins. Air flow blockage of either component, caused by dirt, foreign material or insects, will affect the air conditioning and engine cooling systems. Vehicles equipped with a protective screen, can restrict air flow to the radiator and condenser.

During high outside operating temperatures, a slight increase in engine coolant temperature will occur when the air conditioner is operating.

A/C PERFORMANCE TEST

The pressure developed on the high side and low side of the compressor indicates whether the system is operating properly.

WARNING: USE EXTREME CAUTION WHEN THE ENGINE IS OPERATING. DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.

WARNING: WEAR SAFETY GOGGLES WHEN SERVICING THE REFRIGERATION SYSTEM

(1) Attach an engine tachometer and refrigerant Pressure Gauge and Manifold Assembly Tool C-4740-A.

(2) Close both hand valves on the gauge and manifold assembly.

(3) Set both service hand valve stems to the mid-position.

(4) Engine should be warmed up with doors, windows and hood closed.

(5) Operate air conditioning system with the engine running at 1,000 RPM. Set the controls for maximum A/C, temperature control on full cool and blower switch on high.

(6) Insert a thermometer into center discharge air outlet and observe the air temperature. The temperature should be approximately 7°C (45°F) at 27°C (80°F) ambient temperature after 5 minutes of operation.

(7) Observe the high and low side pressures. The evaporator suction pressure should be 207-241 kPag (30-35 psig). The compressor discharge pressure should be 1103-1633 kPag (160-235 psig). It should be noted that high ambient temperature and humidity conditions will cause higher pressures and temperature conditions. If the clutch cycles, take readings before clutch disengages.

(8) If pressures are abnormal, refer to the Pressure and Performance Diagnosis Charts.

The following charts have been developed for quick reference. If the step by step method used is not completely understood, refer to the correct section of the Service Manual for more detailed information.

COMPRESSOR VALVE PLATE—LEAK TESTS

This test can be preformed with the compressor installed in the vehicle.

Discharge or Suction Valve Breakage—When compressor is operating at idle speed, compressor makes a "clacking" sound. Preform the Pressure Balancing Test.

Head Gasket Breakage—At idle speed, discharge pressure does not increase to normal condition and suction pressure is high. Preform the Pressure Balancing Test.

Pressure Balancing Test:

(1) Connect manifold gauge set to suction and discharge ports.

(2) Run compressor for 5 minutes at idle speed and stop.

(3) Measure elapsed time that discharge pressure is balanced to suction pressure. If less than 2 minutes, it is determined that discharge valve or head gasket is broken.

REFRIGERANT LEAK TEST

External leaks in the system can be located using an electronic detector.

The electronic leak detector is recommended because it is light, accurate and most important, does not expose the user to toxic gas fumes. An electronic leak detector will locate R-12 leaks as small as 15 ml (0.5 fluid oz.) per year.

WARNING: DO NOT USE A HALIDE TORCH. THE HALIDE TORCH REQUIRES AN OPEN FLAME FOR LEAK DETECTION. WHEN R-12 IS EXPOSED TO AN OPEN FLAME, IT TURNS INTO PHOSGENE GAS WHICH IS POISONOUS.

(1) Calibrate the detector as outlined in the manufacturer's instructions.

(2) Remove the flexible detector probe from the case.

(3) Turn the detector control switch ON.

PRESSURE DIAGNOSIS

CONDITION	POSSIBLE CAUSE	CORRECTION
LOW SIDE LOW — HIGH SIDE LOW	(1) System refrigerant is low. (2) Expansion valve is restricted.	(1) Evacuate, leak test and charge the system. (2) Replace the expansion valve.
LOW SIDE HIGH — HIGH SIDE LOW	(1) Internal leak in the compressor - worn. (2) Cylinder head gasket is leaking. (3) Drive belt slipping.	(1) Remove the compressor cylinder head and inspect the compressor. Replace the valve plate assembly if necessary. If the compressor pistons, rings or cylinders are excessively worn or scored, replace the compressor. (2) Install a replacement cylinder head gasket. (3) Adjust the belt tension.
LOW SIDE HIGH — HIGH SIDE HIGH	(1) Condenser fins obstructed. (2) Air in the system. (3) Expansion valve is defective. (4) Loose or worn fan belts. (5) Refrigerant overcharge.	(1) Clean the condenser fins. (2) Evacuate, leak test and charge the system. (3) Replace the expansion valve. (4) Adjust or replace the belts as necessary. (5) Bleed off refrigerant.
LOW SIDE LOW — HIGH SIDE HIGH	(1) Expansion valve is defective. (2) Restriction in the refrigerant hose. (3) Restriction in the receiver/drier. (4) Restriction in the condenser.	(1) Replace the expansion valve. (2) Check the hose for kinks—replace if necessary. (3) Replace the receiver/drier. (4) Replace the condenser.
LOW SIDE AND HIGH SIDE NORMAL (INADEQUATE COOLING)	(1) Air in the system. (2) Excessive oil in system.	(1) Evacuate, leak test and charge the system. (2) Discharge and drain oil. Restore proper oil level, evacuate, leak test and charge system.

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PERFORMANCE DIAGNOSIS

CONDITION	POSSIBLE CAUSE	CORRECTION
COMPRESSOR NOISE	(1) Broken valves.	(1) Replace the valve plate.
	(2) Overcharged.	(2) Discharge, evacuate and install the correct charge.
	(3) Incorrect oil level.	(3) Isolate the compressor and check the oil level. Correct as necessary.
	(4) Piston slap.	(4) Replace the compressor.
	(5) Broken rings.	(5) Replace the compressor.
	(6) Drive belt pulley bolts are loose.	(6) Tighten with the correct torque specification.
EXCESSIVE VIBRATION	(1) Incorrect belt tension.	(1) Adjust the belt tension.
	(2) Clutch loose.	(2) Tighten the clutch.
	(3) Overcharged.	(3) Discharge, evacuate and install the correct charge.
	(4) Pulley is misaligned.	(4) Align the pulley.
CONDENSATION DRIPPING IN THE PASSENGER COMPARTMENT	(1) Drain hose plugged or improperly positioned.	(1) Clean the drain hose and check for proper installation.
	(2) Insulation removed or improperly installed.	(2) Replace the insulation on the expansion valve and hoses.
FROZEN EVAPORATOR COIL	(1) Faulty thermostat or thermistor probe.	(1) Replace the thermostat or thermistor probe.
	(2) Thermostat capillary tube or thermistor improperly installed.	(2) Install the capillary tube or thermistor correctly.
	(3) Thermostat not adjusted properly.	(3) Adjust the thermostat.

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HEATING SYSTEM DIAGNOSIS

CONDITION	POSSIBLE CAUSE	CORRECTION
BLOWER MOTOR WILL NOT TURN AT ANY SPEED	(1) Blown fuse. (2) Loose connection. (3) Defective ground. (4) Faulty switch. (5) Faulty motor. (6) Faulty resistor.	(1) Replace fuse. (2) Inspect and tighten. (3) Clean and tighten. (4) Replace switch. (5) Replace motor. (6) Replace resistor.
BLOWER MOTOR TURNS AT ONE SPEED ONLY	(1) Faulty switch. (2) Faulty resistor.	(1) Replace switch. (2) Replace resistor.
BLOWER MOTOR TURNS BUT DOES NOT CIRCULATE AIR	(1) Intake blocked. (2) Fan not secured to the motor shaft.. (3) Outside air mode door inoperative.	(1) Clean intake. (2) Tighten securely. (3) a. Check and replace outside air door vacuum motor, if necessary. b. Check and repair vacuum controls, as required.
HEATER WILL NOT HEAT	(1) Coolant does not reach proper temperature. (2) Heater core blocked internally. (3) Heater core air-bound. (4) Blend-air door not in proper position.	(1) Check and replace thermostat if necessary. (2) Flush or replace core if necessary. (3) Purge air from core. (4) Adjust cable.
HEATER WILL NOT DEFROST	(1) Control cable adjustment incorrect or vacuum motor inoperative. (2) Defroster hose damaged or duct seal leakage.	(1) Adjust control cable or replace vacuum motor. (2) Replace defroster hose or correct duct seal.

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(4) Prepare the detector for use.

• Place the flexible probe tip near the leak port on the detector.

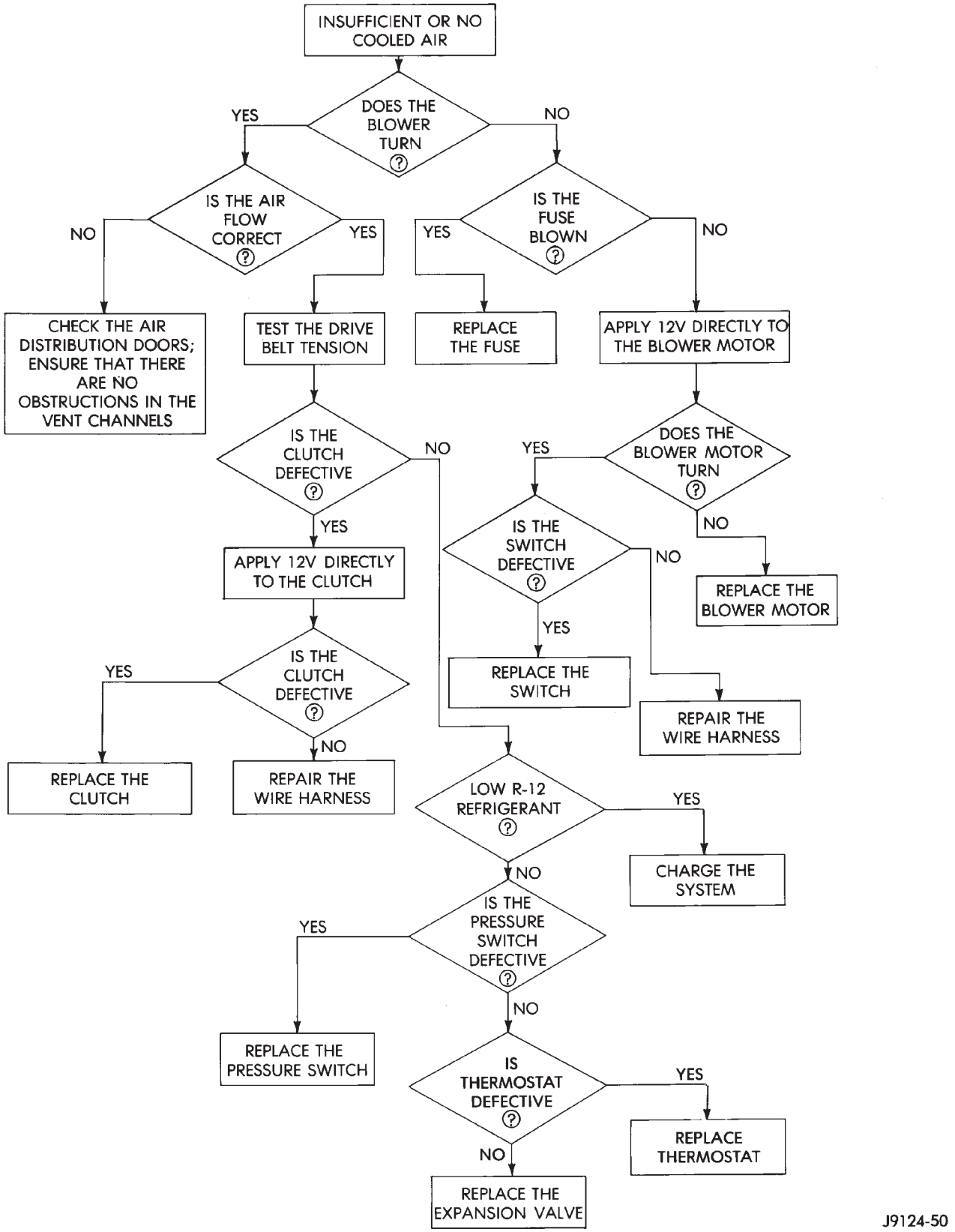
• Adjust the BAT thumb-wheel a few teeth at a time, until the light illuminates-then goes out when the tip is removed from the leak port.

(5) Begin leak testing. Move the flexible probe slowly under all suspect connections, joints and seals. Because R-12 refrigerant is heavier than air, leaks are more readily detected on the lower side of components being checked. The leak indicator light will illuminate when a leak is detected. The indicator light will go out if the probe tip is held near the leak point for an extended period.

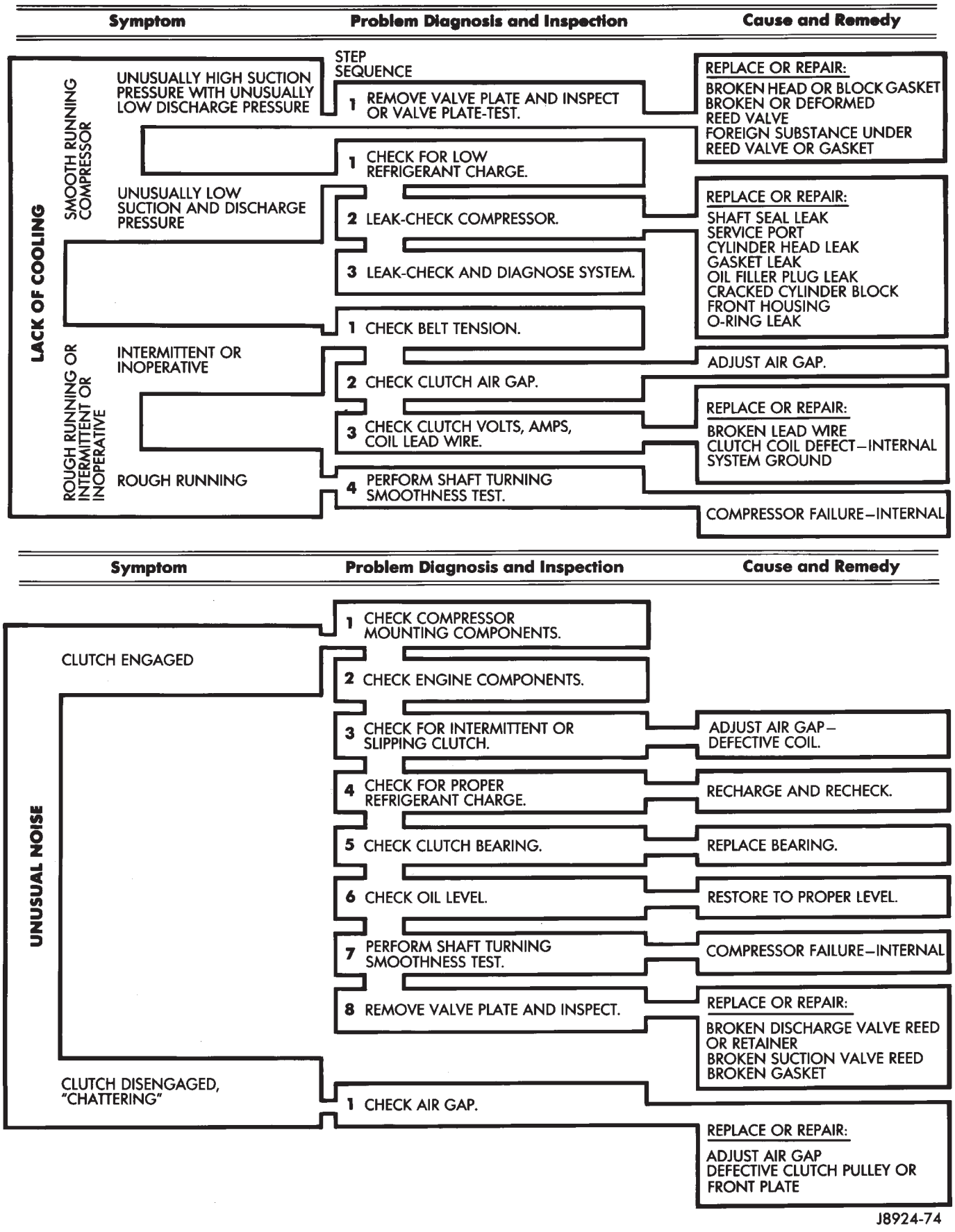
(6) Repair leaks as required.

(7) Evacuate and charge the system after leaks are corrected.

AIR CONDITIONING SYSTEM DIAGNOSIS



COMPRESSOR DIAGNOSIS



SERVICE DIAGNOSIS—ELECTRICAL

BLOWER CONTROLS—XJ VEHICLES

DESCRIPTION

The blower motor delivers air to the inside of the vehicle. Its speed is controlled by the blower switch and the blower resistors. With the switch in LO, part of the battery voltage is supplied to the motor through all of the resistors. The motor runs slowly. As the blower switch is moved to a higher speed, the switch allows more voltage to be applied to the blower motor, which will increase its speed. When the switch is in HI, the blower resistors are bypassed and battery voltage is applied directly to the blower motor. The motor runs at the fastest speed in this mode.

DIAGNOSIS

Refer to the Group 8W, Wiring Diagrams for complete system schematic.

1. BLOWER MOTOR INOPERATIVE

- Remove and inspect fuse. If the fuse is blown, replace fuse.

2. BLOWER MOTOR INOPERATIVE (HI Position)

Put the ignition switch in RUN, the select switch in HEAT and the blower switch on HI.

- Blower motor connector (Terminal A) should be battery voltage. If not go to next step.
- Blower motor connector (Terminal B) should be 0 ohms. If not, repair wire to ground.
- Blower switch connector (Terminal C) should be battery voltage. If battery voltage replace blower switch. If not, replace select switch.

3. BLOWER MOTOR INOPERATIVE (LO, M1 & M2 Positions)

Ignition switch in RUN, select switch in HEAT.

- Blower resistors connector (Terminal D) should be battery voltage. If not, replace select switch.
- Blower resistors connector (Terminal C) should be battery voltage. If not, replace blower switch.
- Blower resistors connector (Terminal A) should be battery voltage. If not, replace blower switch.
- Blower resistors connector (Terminal B) should be battery voltage. If not, replace blower resistor.

AIR CONDITIONING SYSTEM—XJ VEHICLES

DESCRIPTION

The A/C Compressor Clutch is belt-driven by the engine. A clutch, operated by a solenoid, automatically turns the compressor on and off to control evaporator icing.

The A/C Compressor Clutch operation is controlled by several components: the A/C Low-Pressure Switch, Thermostat Switch, Fuel Pump Relay, A/C Clutch Relay and the Engine Controller.

The A/C low pressure switch opens when there is not enough refrigerant in the system. When this happens, voltage is no longer present at the Engine Controller. The Engine Controller will turn off the A/C clutch relay. With the proper refrigerant level in the system, the low pressure switch remains closed.

When the evaporator temperature is low enough to ice the cooling coils, the thermostat switch opens. The Engine Controller will turn off the A/C clutch. The thermostat switch closes when the temperature rises. The Engine Controller will then turn the A/C clutch relay on again.

DIAGNOSIS

Refer to the Group 8W, Wiring Diagrams for complete system schematic.

With engine running, Engine Controller may delay A/C clutch up to 30 seconds.

1. A/C COMPRESSOR CLUTCH INOPERATIVE

Clutch connector disconnected.

- Jumper fused test lead, battery to clutch connector, clutch should operate. If not, replace compressor clutch assembly.

2. A/C LOW PRESSURE SWITCH

Ignition in RUN, A/C controls in MAX or NORM.

- Low pressure switch connector (Terminal A) should be battery voltage. If not, repair open to select switch.
- Low pressure switch connector (Terminal C) should be battery voltage. If not, check switch resistance and check freon pressure.

3. A/C CLUTCH RELAY

Engine RUNNING, A/C controls in MAX or NORM.

- Relay connector Pin 4 to ground should be battery voltage. If not, check fuse F6 in Power Distribution Center.
- Ground A/C clutch relay (Terminal 5) should have A/C compressor clutch engagement. If not, check Engine Controller Terminals 27, 28 and 34.

HEATING SYSTEM—YJ VEHICLES

DESCRIPTION

The blower motor circuit begins at a 25 amp fuse that receives its battery feed from the ignition switch. From the fuse the circuit extends to a micro-switch mounted on the heater control.

The micro-switch is normally closed is operated by a cam on the heater control lever. In all heater control lever positions, except OFF and VENT, the blower motor electrical circuit is complete. In the OFF and VENT positions the cam depresses the micro-switch lever opening the electrical circuit to the blower motor.

The blower switch allows the driver to select 1 of 3 blower speeds—low, medium and high. In the high speed position, the switch connects the motor directly to the battery source. The remaining 2 slower speeds are accomplished by routing the battery source through a resistor assembly.

The resistor and switch are wired in such a way that only a single wire is needed to operate the blower motor at 3 different speeds.

DIAGNOSIS

Refer to Group 8W, Wiring Diagrams for complete system schematic.

1. HEAT/OFF MICRO-SWITCH

Place selector lever in heat mode and turn ignition switch to RUN.

- Heat/Off micro-switch connector supply side should be battery voltage. If not, repair open from fuse No.12.
- Heat/Off micro-switch connector output side should be battery voltage. If not, replace Heat/Off micro-switch.

2. BLOWER SWITCH

Turn ignition switch to RUN and place selector lever in HEAT mode.

- Blower switch (terminal A) should be battery voltage. If not, repair open from HEAT/OFF switch connector output side to blower switch.
- Blower switch (terminal D) with blower switch in HI should be battery voltage. If not, replace blower switch.
- Blower switch (terminal C) with blower switch in LO should be battery voltage. If not, replace blower switch.
- Blower switch (terminal B) with blower switch in MED should be battery voltage. If not replace blower switch.

3. BLOWER RESISTOR

Turn ignition switch to RUN for voltage tests and turn ignition switch to OFF for resistance tests.

- Blower resistor (Terminal A) with blower switch in LO should be battery voltage. If not, repair open between blower switch and blower resistor.
- Blower resistor (Terminal C) with blower switch in MED should be battery voltage. If not, repair open between blower switch and blower resistor.
- Blower resistor (Terminal B) with blower switch in HI should be battery voltage. If not, repair open between blower switch and blower resistor.
- Blower resistor between Terminals A and B should be 3.25 ohms, if not replace blower resistor.
- Blower resistor between Terminals B and C should be 0.60 ohms. If not, replace blower resistor.
- Blower resistor between terminals A and C should be 2.65 ohms, if not replace blower resistor.

4. BLOWER MOTOR

Turn blower motor switch to HI and place selector lever in HEAT mode. Turn ignition switch to RUN for voltage tests or to OFF for resistance tests.

- Blower motor voltage should be battery voltage. If not, repair open from blower switch.
- Blower motor case to clean chassis ground should be 0 ohms. If not, repair/replace blower motor.

AIR CONDITIONING SYSTEM—YJ VEHICLES

DESCRIPTION

The air conditioning circuit consists of 3 segments; battery supply, blower motor and compressor clutch. The 3 segments have a common connection point at the blower switch.

The power supply segment of the circuit extends from the 25 amp HTR/FAN fuse to the blower switch. From the blower switch, battery feed is routed to the blower motor and compressor clutch segments of the circuit.

The blower motor segment consists of the 3 wires from the blower switch to the motor, the motor itself and the motor ground wire. Through the switch, the 3 wires connect the motor brushes to battery supply. When connected to battery feed, the separate brushes provide the 3 blower speeds—LO, MED, and HIGH.

In all blower switch positions except OFF, the compressor clutch segment of the circuit also receives battery feed. ON and OFF cycling of the compressor and therefore the temperature of the outlet air is regulated by the thermostatic control. A thermal sensor extends from the control to the evaporator housing. When the temperature of the evaporator drops below the set temperature, the thermostatic control opens the clutch circuit. The circuit remains open until evaporator temperature rises above the set temperature.

The compressor clutch segment of the circuit also contains a low pressure switch. If the pressure in the refrigerant system drops due to a leak, the circuit is opened to prevent damage to the compressor.

The last component in the compressor clutch segment of the circuit is the clutch coil. When the coil is connected to battery feed, its windings form an electromagnet that pulls the clutch hub against the clutch pulley.

DIAGNOSIS

BLOWER MOTOR

Refer to Group 8W, Wiring Diagrams for complete system schematic.

1. FUSE—Ignition in RUN.

- Heater blower motor operates. If not, check fuse No.12.

• Battery side of fuse No.12 should be battery voltage. If not, repair open from ignition switch.
• A/C blower switch (terminal A) should be battery voltage. If not, repair open from fuse No.12.

2. BLOWER SWITCH—Ignition in RUN.

• A/C blower switch (Terminal A) with blower switch in any position should be battery voltage. If not, repair open from fuse panel.
• A/C blower switch (Terminal L) with blower switch in LO should be battery voltage. If not, replace switch.
• A/C blower switch (Terminal M) with blower switch in MED should be battery voltage. If not, replace switch.
• A/C blower switch (Terminal H) with blower switch in HI should be battery voltage. If not, replace switch.

3. BLOWER MOTOR

Turn ignition switch to RUN for voltage tests and turn ignition switch to OFF for resistance tests.
• A/C blower housing to ground (Terminal G) should be 0 ohms. If not, repair ground connection. If the blower motor is still inoperative, replace motor.
• A/C blower motor connector (Terminal C) with blower switch in LO should be battery voltage. If not, repair open from blower switch. If the blower motor is still inoperative, replace motor.
• A/C blower motor connector (Terminal B) with blower switch in MED should be battery voltage. If not, repair open from blower switch. If the blower motor is still inoperative, replace motor.
• A/C blower motor connector (Terminal A) with blower switch in HI should be battery voltage. If not, repair open from blower switch. If the blower motor is still inoperative, replace motor.

COMPRESSOR CLUTCH

Refer to Group 8W, Wiring Diagrams for complete system schematic.

With engine running, Engine Controller may delay A/C clutch up to 30 seconds.

1. COMPRESSOR CLUTCH.

• Jumper wire from battery positive post to A/C compressor clutch connector (Terminal A), clutch should engage. If not, go to next step with jumper installed.
• Jumper wire from clutch coil frame to chassis ground, clutch should engage. If not, repair clutch coil ground or replace coil.

2. LOW PRESSURE SWITCH

Turn ignition switch to RUN, A/C blower switch to ON and thermostatic control set to MAX cool.
• A/C low pressure switch connector (Terminal A) should be battery voltage. If not, proceed to thermostatic control tests (Step 3).
• Jumper wire across A/C low pressure switch connector (Terminals A and B), clutch should engage. If not, check system refrigerant charge. If system is properly charged, replace A/C low pressure switch.

3. THERMOSTATIC CONTROL

Turn ignition switch to RUN, A/C blower switch to ON and thermostatic control set to MAX cool.
• Thermostatic control connector (Terminal A) should be battery voltage. If not, repair open from blower switch.
• Thermostatic control connector (Terminal B) should be battery voltage. If not, replace thermostatic control.
• A/C low pressure switch connector (Terminal A) should be battery voltage. If not, repair open from thermostatic control.

COMPRESSOR OVERHAUL

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DESCRIPTION

The A/C system uses a Sanden compressor. This compressor is a 7 piston design. Designated the SD-709, the compressor is mounted on the front right side of the engine and is driven by a serpentine belt. System lubrication is provided by 135cc ±15cc (4.6 cu. in. ±0.5 cu. in.) of 500 viscosity refrigerant oil.

The clutch used on the compressor consists of 3 basic components: the pulley, front plate and the field coil. The pulley and field coil are attached to the front head of the compressor with tapered snap rings. The hub is keyed to the compressor shaft and is retained on the shaft with a self-locking nut. Special service tools are required to remove and install the clutch plate on the compressor shaft.

COMPRESSOR ISOLATION

It is not necessary to discharge the system for compressor removal. The compressor can be isolated from the remainder of the system and eliminate the need for recharging when performing compressor service.

(1) Connect pressure gauge and manifold.
(2) Close both gauge hand valves.
(3) Mid-position both service valves.

WARNING: USE EXTREME CAUTION WHEN THE ENGINE IS OPERATING. DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.

(4) Start the engine and operate the air conditioning system.
(5) Turn the suction service valve slowly clockwise toward the front seated position.
(6) When pressure drops to zero, stop the engine and compressor and quickly finish front-seating the suction service valve.
(7) Front-seat the discharge service valve.
(8) Loosen the oil level check plug slowly to release any internal pressure in the compressor.

The compressor is now isolated from the remainder of the system.

The service valves can be removed from the compressor.

PURGING COMPRESSOR OF AIR

The compressor must be purged of air whenever it has been isolated for an oil level check or other service procedures without discharging the entire system.

(1) Cap the service gauge ports on both of the service valves.
(2) Back-seat the suction service valve to allow the system refrigerant to enter the compressor.
(3) Place the discharge service valve in the mid-position or cracked-position.
(4) Loosen the discharge service valve gauge port cap to permit the refrigerant to force any air out of the compressor.
(5) Back-seat the discharge service valve and tighten the gauge port cap.
(6) The compressor is now ready for service.

COMPRESSOR

REMOVAL

(1) Isolate the compressor.
(2) Disconnect negative cable from battery.
(3) Disconnect the clutch lead wire.
(4) Remove the discharge and inlet (suction) service valves from the compressor. Plug or tape all the openings.
(5) Remove the serpentine drive belt (refer to Group 7, Cooling System for the proper procedure).
(6) Remove the bolts and lift the compressor from the mounting bracket (Figs. 1 and 2).

INSTALLATION

If a replacement compressor is being installed; check the oil level. Add or subtract oil as necessary and install the magnetic clutch on the compressor.

(1) If the mounting bracket was removed, install the bracket to the block. Tighten the mounting bolts to 27 N•m (20 ft. lbs.) torque.
(2) Install the compressor on the mounting bracket. Tighten the bolts to 27 N•m (20 ft. lbs.) torque.
(3) Install the serpentine drive belt (refer to Group 7, Cooling System for the proper procedure).
(4) Tighten the serpentine drive belt to the specified tension.

- New belt tension—800-900 N (180-200 lb-f).

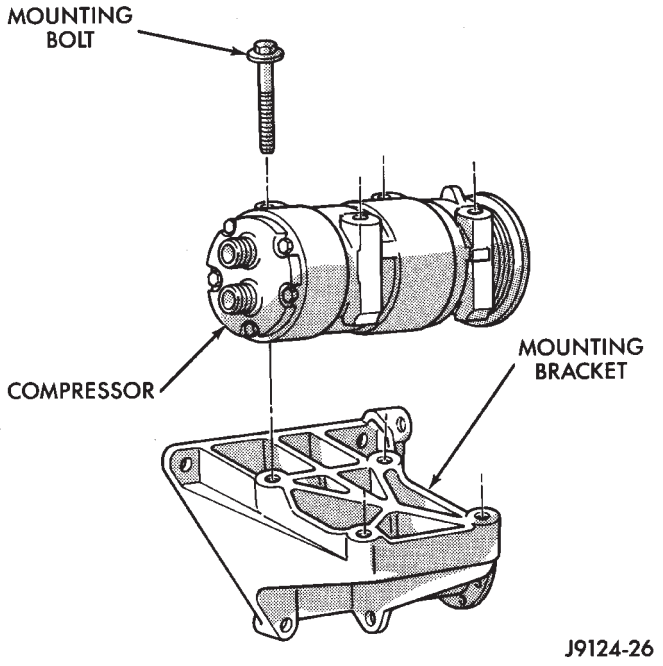

Fig. 1 Compressor and Mounting Bracket (LH Drive Vehicles)

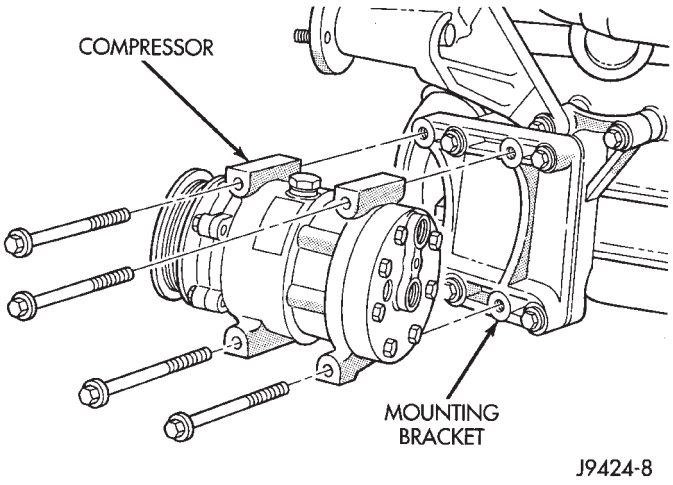

Fig. 2 Compressor and Mounting Bracket (RH Drive Vehicles)

- Used belt tension—623-712 N (140-160 lb-f).

(5) Remove the tape or plastic plugs from all the suction and discharge openings and install the service valves on the compressor.

(6) Connect the clutch lead wire.

(7) Connect negative cable to battery.

(8) Evacuate, charge and test the system for leaks.

MAGNETIC CLUTCH

The magnetic clutch consists of a stationary electro-magnetic coil and a rotating pulley and plate assembly.

The electromagnetic coil is retained on the compressor with a snap ring and is dimpled to maintain its position.

The pulley and plate assembly are mounted on the compressor shaft.

When the compressor is not in operation, the pulley free wheels on the clutch hub bearing. When the coil is energized the plate is magnetically engaged with the pulley and turns the compressor shaft.

REMOVAL

(1) Insert the 2 pins of the front plate spanner into any 2 threaded holes of the clutch front plate (Fig. 3). Hold clutch plate stationary. Remove hex nut with 19 mm (3/4 inch) socket (Fig. 3).

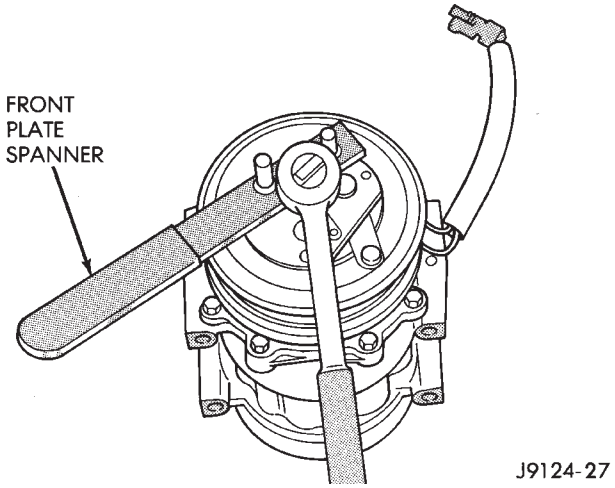

Fig. 3 Hex Nut Removal

(2) Remove clutch front plate using puller. Align puller center bolt to compressor shaft (Fig. 4). Thumb tighten the puller bolts into the threaded holes.

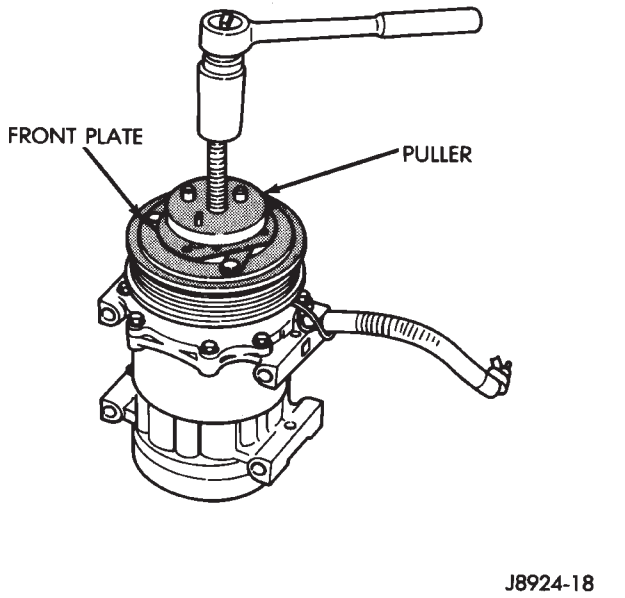

Fig. 4 Clutch Front Plate Removal

(3) Turn center bolt clockwise with 19 mm (3/4 inch) socket until front plate is loosened.

(4) Remove shaft key by lightly tapping it loose with a slot screwdriver and hammer (Fig. 5).

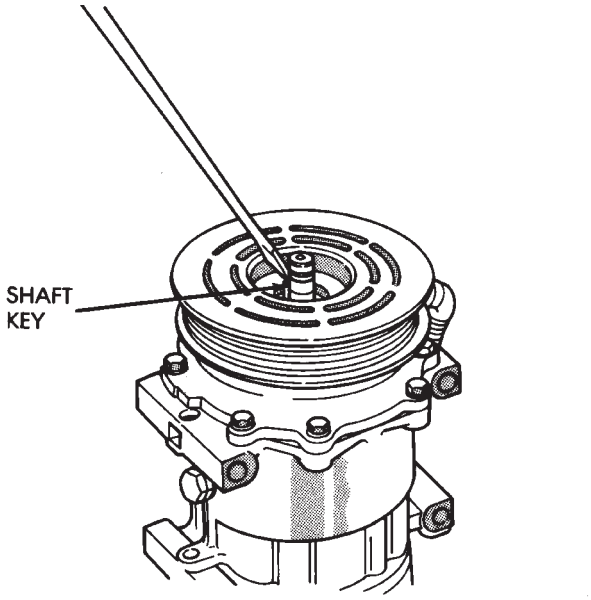

Fig. 5 Shaft Key Removal

(5) Remove the external front housing snap ring by using spread type snap ring pliers (Fig. 6).

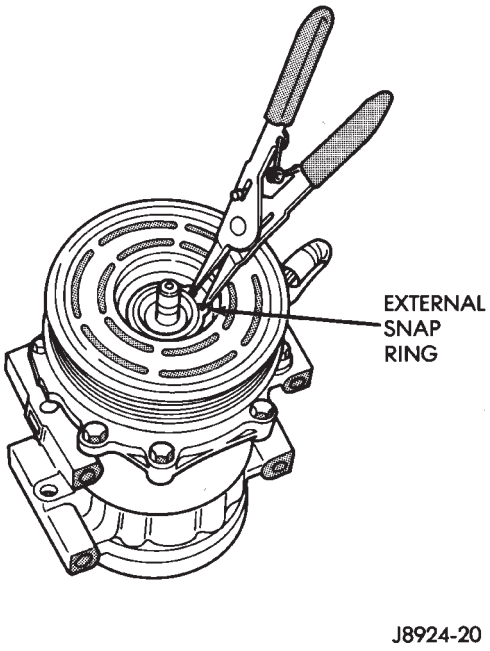

Fig. 6 External Snap Ring Removal

(6) Insert the lip of the jaws of the rotor puller into the snap ring groove exposed in the previous step (Fig. 7).

(7) Place rotor puller shaft protector over the exposed shaft.

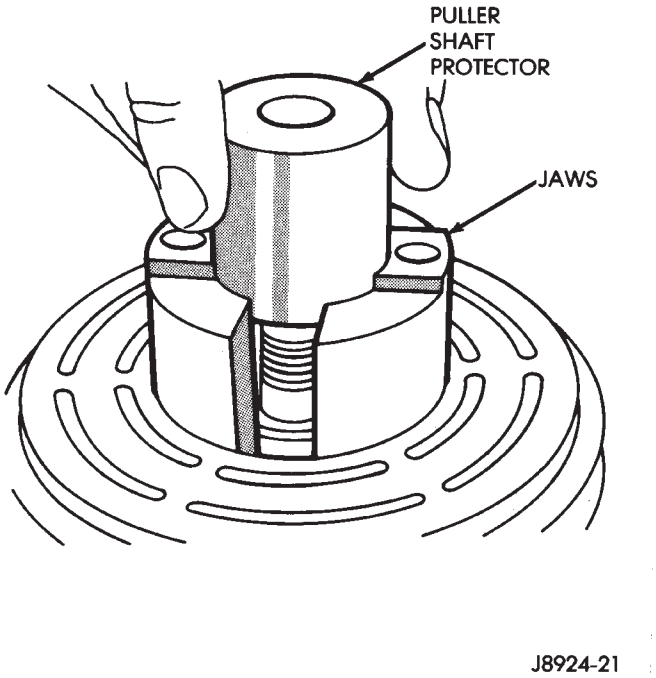

Fig. 7 Install Shaft Protector

(8) Install the puller plate and bolt (Fig. 8). 2 bolts go through the plate and into the jaws. Finger tighten bolts.

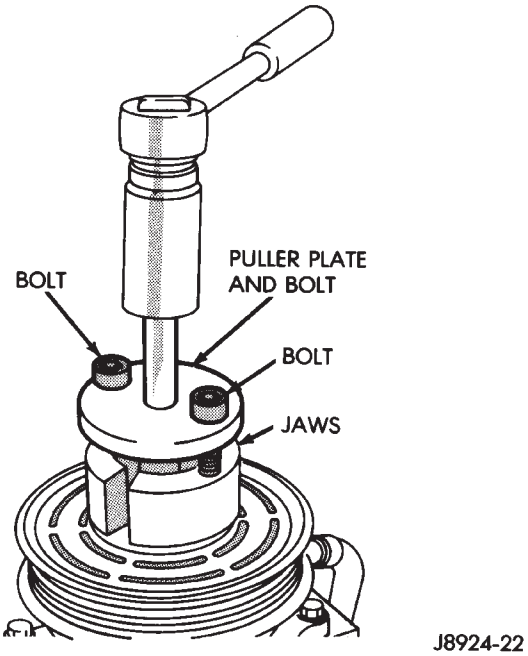

Fig. 8 Install Puller Plate

(9) Turn puller center bolt clockwise using 3/4 inch socket until rotor pulley is free.

(10) Loosen coil lead wire from clip on top of compressor front housing (Fig. 9).

(11) Using spread type snap ring pliers, remove snap ring and field coil (Fig. 10).

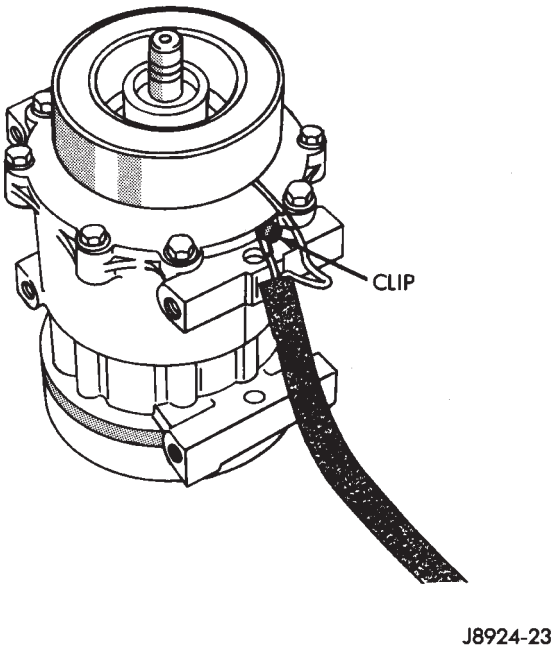

Fig. 9 Loosen Coil Lead Wire

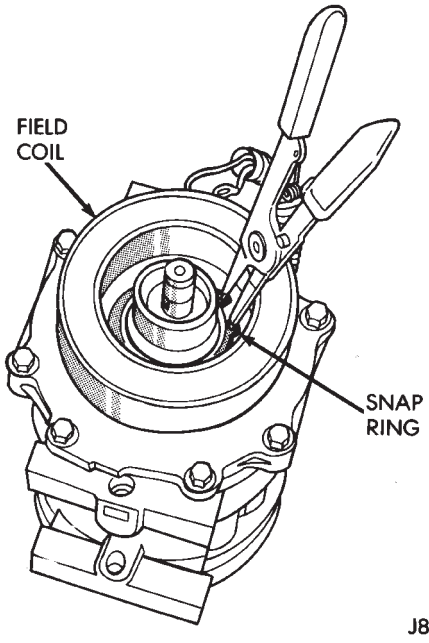

Fig. 10 Snap Ring and Field Coil Removal

INSTALLATION

(1) Install the field coil with the snap ring.

(2) Place coil lead wire under clip on top of compressor front housing and tighten the retaining screw.

(3) Support the compressor on the 4 mounting ears at the compressor rear. If a vise is being used, clamp only on the mounting ears. Never clamp on the compressor body.

(4) Align rotor assembly squarely on the front housing hub.

(5) Using Rotor Installer Set, place the ring part of the set into the bearing cavity (Fig. 11). Make certain the outer edge rests firmly on the rotor bearing inner race.

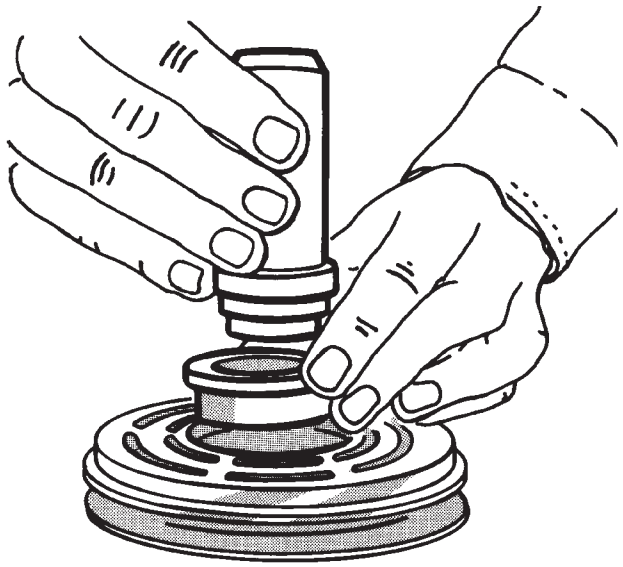

Fig. 11 Rotor Installer Set

(6) Place the tool set driver into the ring (Fig. 12).

(7) With a hammer, tap the end of the driver while guiding the rotor to prevent binding. Tap until the rotor bottoms against the compressor front housing hub. Listen for a distinct change of sound during the tapping process.

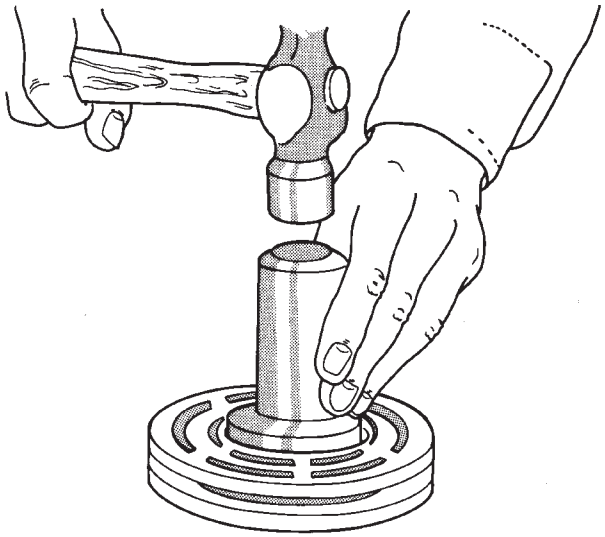

Fig. 12 Tool Set Driver

(8) Install external front housing snap ring with spread type snap ring pliers.

(9) Install front plate assembly.

- Check that original clutch shims are in place on compressor shaft.
- Replace compressor shaft key.
- Align front plate keyway to compressor shaft key.

(10) Using shaft protector, tap front plate to shaft until it has bottomed to the clutch shims (Fig. 13). Listen for a distinct change of sound during the tapping process.

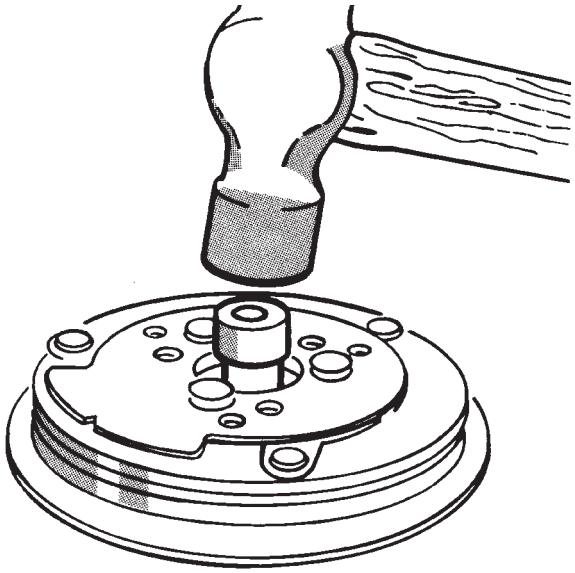

Fig. 13 Front Plate Installation

(11) Replace shaft hex nut. Tighten the hex nut to 37 N•m (27 ft. lbs.) torque.

(12) Check air gap with feeler gauge (Fig. 14). The specification is 0.406-0.787 mm (0.016-0.031 inch). If air gap is not consistent around the circumference, lightly pry up at the minimum variations. Lightly tap down at points of maximum variation.

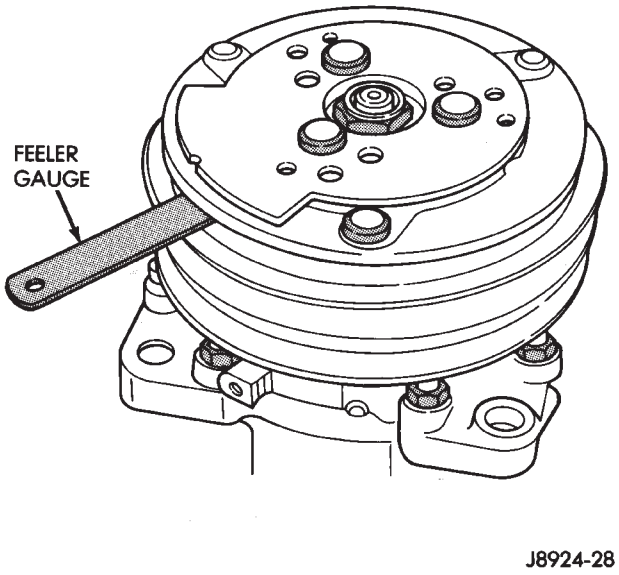

Fig. 14 Check Air Gap

The air gap is determined by the spacer shims. When installing the original or a new clutch assembly, try the original shims first. When installing a new clutch onto a compressor that previously did not have a clutch, use 0.040, 0.020, and 0.005 shims from the clutch accessory sack.

(13) If the air gap does not meet the specification given, add or subtract shims as required.

CLIMATE CONTROL SYSTEM—XJ VEHICLES

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DESCRIPTION

The Climate Control System combines air conditioning, heating and ventilating capabilities for vehicles equipped with air conditioning. Vehicles without air conditioning perform heating and ventilating functions without the air conditioning evaporator.

Both systems consist basically of 2 parts:

- Blower and Air Inlet Assembly
- Heater Core and Air Distribution Assembly

These assemblies, initially installed as a single unit, may be removed separately from under the instrument panel as required for service.

HEATER SYSTEM

The heater system is a blend air type. Outside air is heated and then blended in varying amounts with cooler outside air to obtain the desired discharge temperature. A heater coolant valve provides full flow to the heater core for all heating modes. The heater coolant valve remains closed for the ventilation mode, allowing discharge air to approach the outside ambient air temperature.

AIR CONDITIONING SYSTEM

The air conditioning system has an evaporator to cool and dehumidify the incoming outside air prior to blending with the heated air. The evaporator is in operation during the A/C mode and also in the defrost mode for defogging purposes. The evaporator is not in operation at ambient temperatures below approximately -1°C (30°F). To maintain minimum evaporator temperature, a fixed thermostat setting switch cycles the compressor clutch. The blower is operating the heater or air conditioning systems, except the OFF mode. In this mode (OFF) the blower and the outside air are shut off.

The cooling unit is mounted on the dash panel and the cooled air is discharged from the instrument panel registers. The registers are adjusted to provide general or localized cooling.

SIGHT GLASS

The sight glass is located on top of the receiver/drier. The sight glass provides a visual check of the system refrigerant level. A continuous stream of bubbles will appear in the sight glass when the system charge is low. Bubbles will not appear when the system is fully charged.

LOW PRESSURE SWITCH

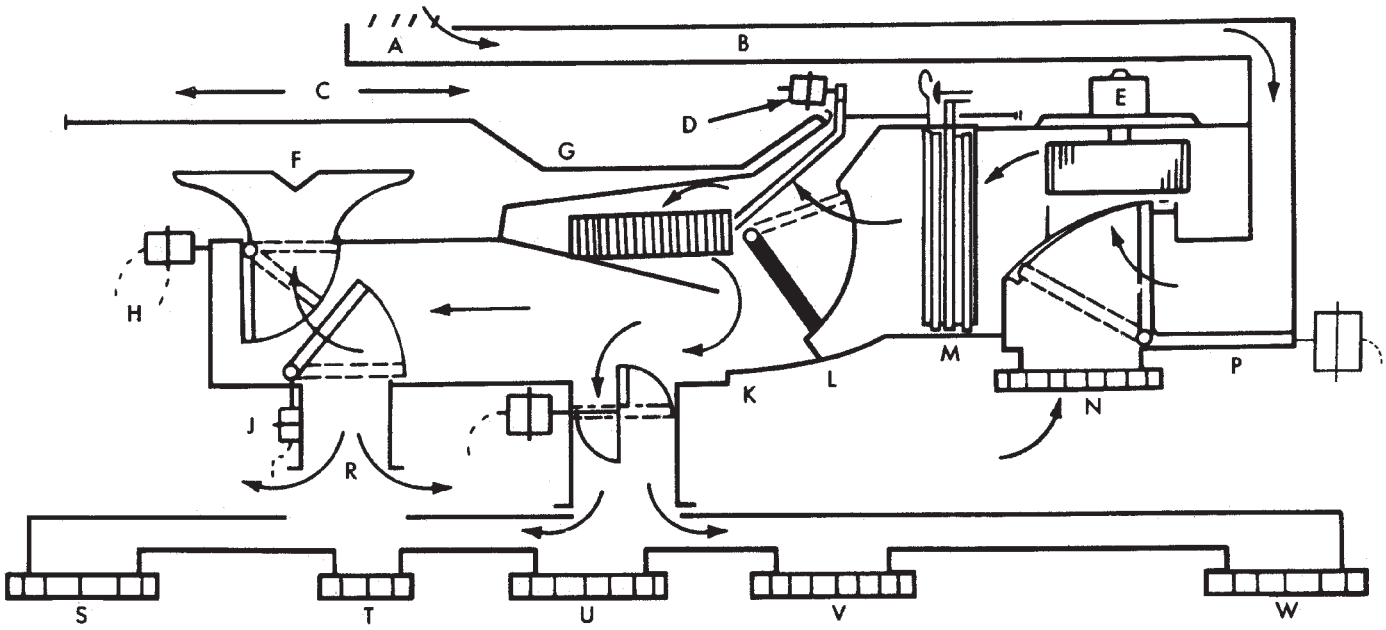
The low pressure switch disengages the magnetic clutch if the pressure in the system drops below 193 kPa (28 psi). This will occur with a loss in refrigerant or with cold ambient temperature.

HEATER VALVE

The heater valve regulates coolant flow to the heater core. It requires vacuum to shut off flow to the heater core.

These vehicles are equipped with a bypass-type heater water valve. When the heater valve is closed, coolant flow to the heater core is bypassed back to the engine. When the heater valve is open, coolant is directed through the heater core and back to the engine.

AIRFLOW DIAGRAM



A - OUTSIDE AIR INLET
B - COWL
C - DASH PANEL
D - WATER VALVE
E - BLOWER ASSEMBLY
F - DEFROSTER
G - HEATER CORE
H - DEFROSTER DOOR
J - FLOOR DOOR
K - PANEL DOOR
L - BLEND DOOR
M - EVAPORATOR CORE
N - RECIRCULATION AIR INLET
P - RECIRCULATION DOOR
R - FLOOR OUTLET
S - LEFT HAND REGISTER
T - LEFT HAND LAP COOLER
U - LEFT CENTER REGISTER
V - RIGHT CENTER REGISTER
W - RIGHT HAND REGISTER

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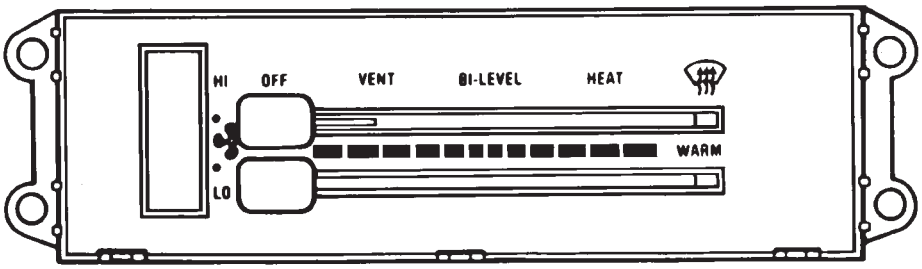
HEATING SCHEMATIC

HEATER CONTROL UNIT

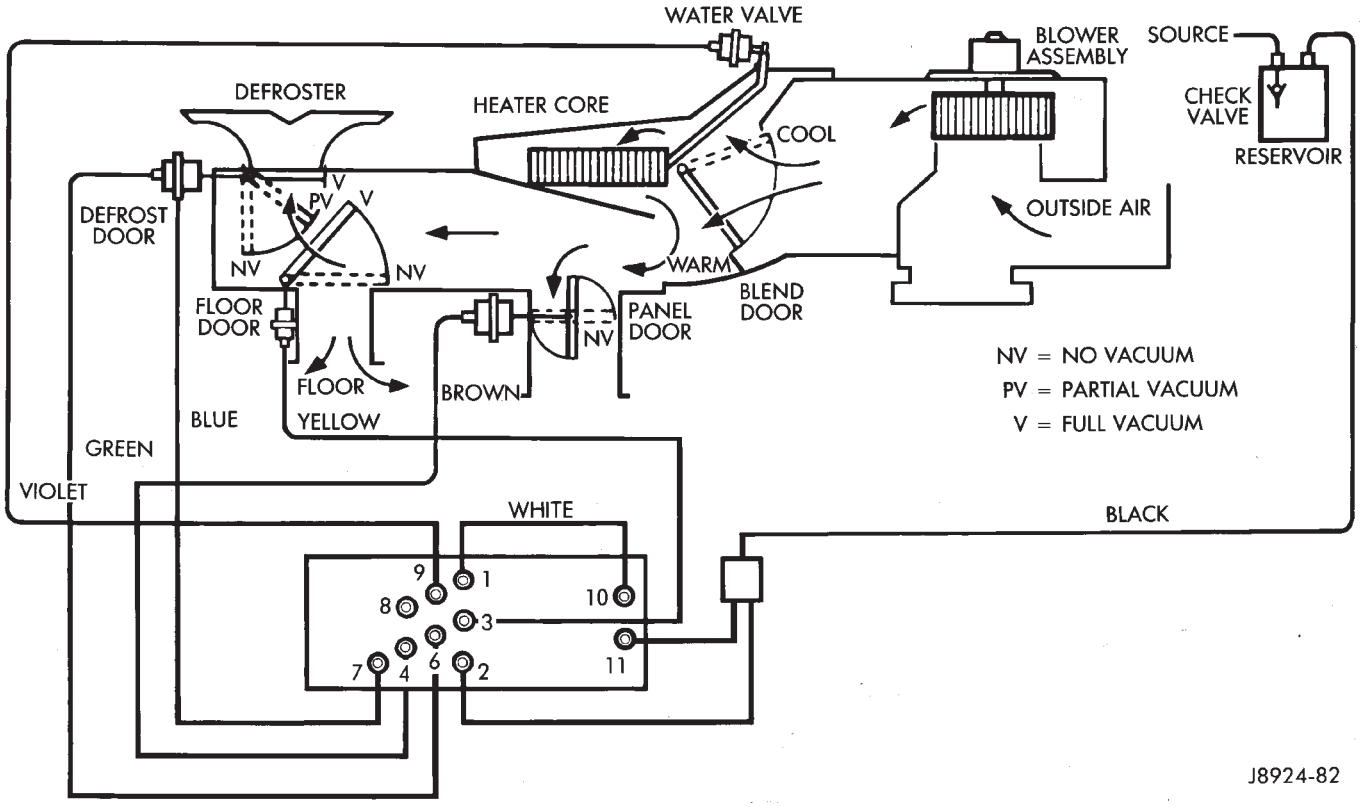


HEATER SYSTEM OPERATION

Mode Lever Position	Air Discharge	Blower Speeds	Panel Door	Floor Door	Defrost Door	Water Valve
Off	Closed	None	Closed	Closed	Closed	Closed
Vent	Panel Registers	4	Open	Closed	Closed	Closed
Bi-Level	Panel Registers and Floor With Def. Bleed	4	Open	Open	Bleed	Open (1)
Heat	Floor With Def. Bleed	4	Closed	Open	Bleed	Open (1)
	Defroster	4	Closed	Closed	Open	Open (1)

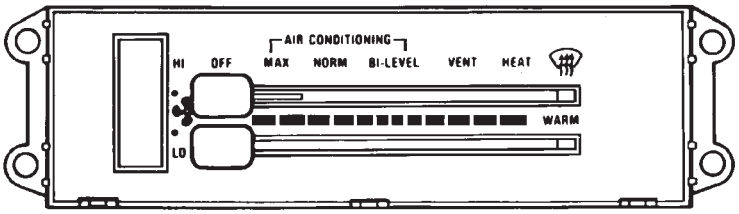
(1) WATER VALVE CLOSES IN FULL "COOL" TEMPERATURE LEVER POSITION.

HEATER CONTROL SYSTEM VACUUM SCHEMATIC



AIR CONDITIONING SCHEMATIC

A/C CONTROL UNIT

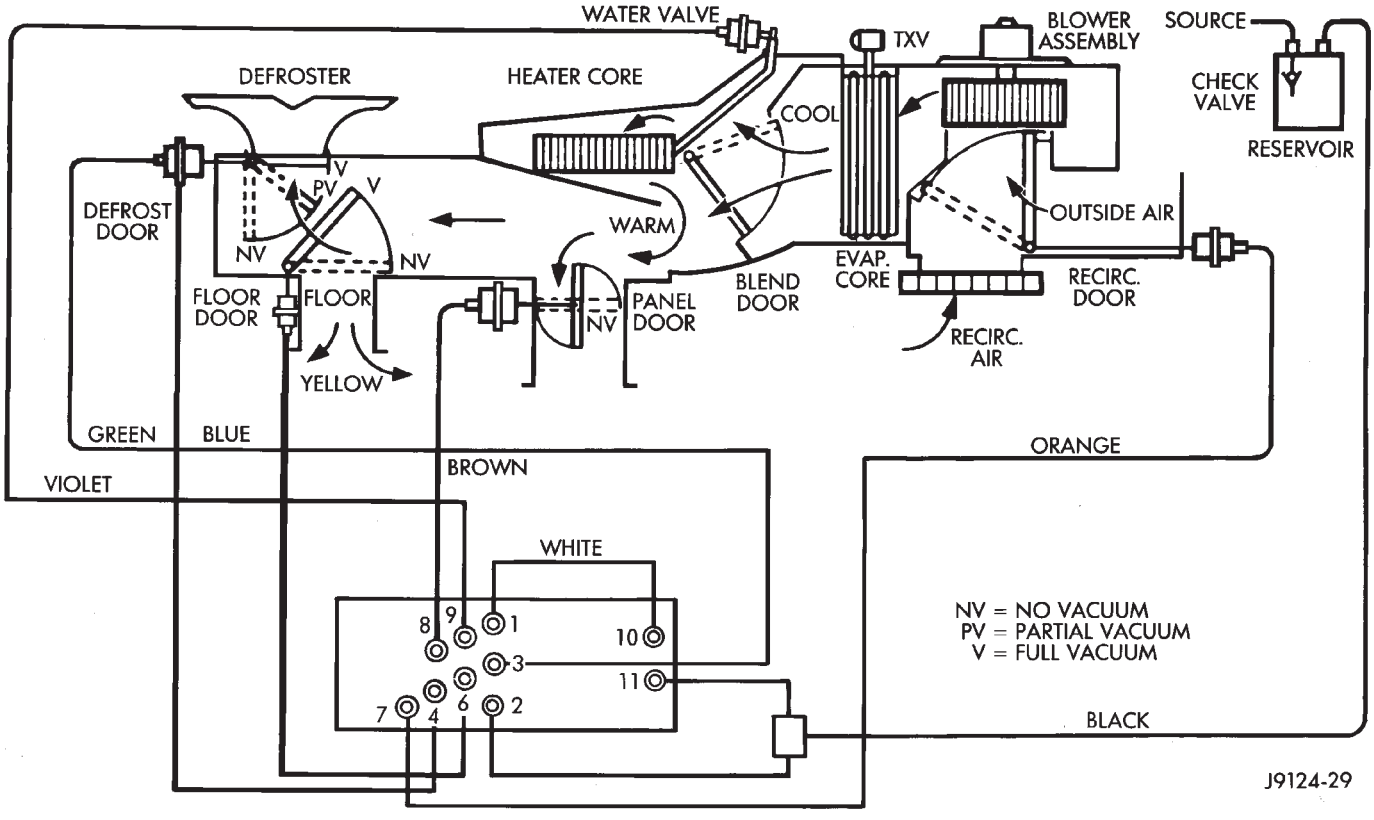


A/C SYSTEM OPERATION

Mode Lever Position	Air Discharge	Blower Speeds	Recirc. Door	Panel Door	Floor Door	Defrost Door	A/C Cmp.	Water Valve
Off	Closed	None	Recirc.	Open	Indeter-minate	Open	Off	Closed
Max A/C	Panel Registers With Floor Bleed	4	Recirc.	Open	Bleed	Closed	On	Open (1)
Norm A/C	Panel Registers With Floor Bleed	4	Outside	Open	Bleed	Closed	On	Open (1)
Bi-Level	Panel Registers and Floor With Def. Bleed	4	Outside	Open	Open	Bleed	On	Open (1)
Vent	Panel Registers With Floor Bleed	4	Outside	Open	Bleed	Closed	Off	Open (1)
Heat	Floor With Def. Bleed	4	Outside	Closed	Open	Bleed	Off	Open (1)
	Def. With Floor Bleed	4	Outside	Closed	Bleed	Open	On	Open (1)

(1) WATER VALVE CLOSES IN FULL COOL TEMPERATURE LEVER POSITION.

AIR CONDITIONING CONTROL SYSTEM VACUUM SCHEMATIC



HEATER AND A/C CONTROL PANEL REPLACEMENT

(1) Disconnect negative cable from battery.

(2) Remove the instrument panel bezel attaching screws and remove the instrument panel bezel (Fig. 1). Bezel is snap fit at locations shown.

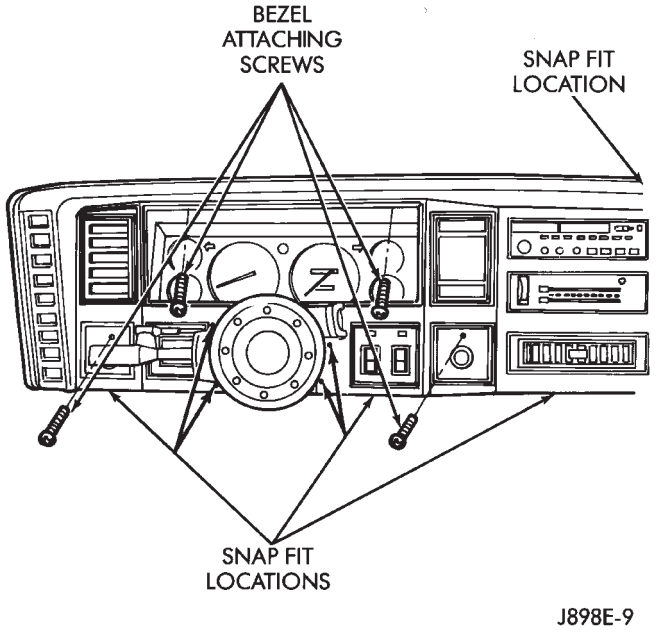


Fig. 1 Instrument Bezel

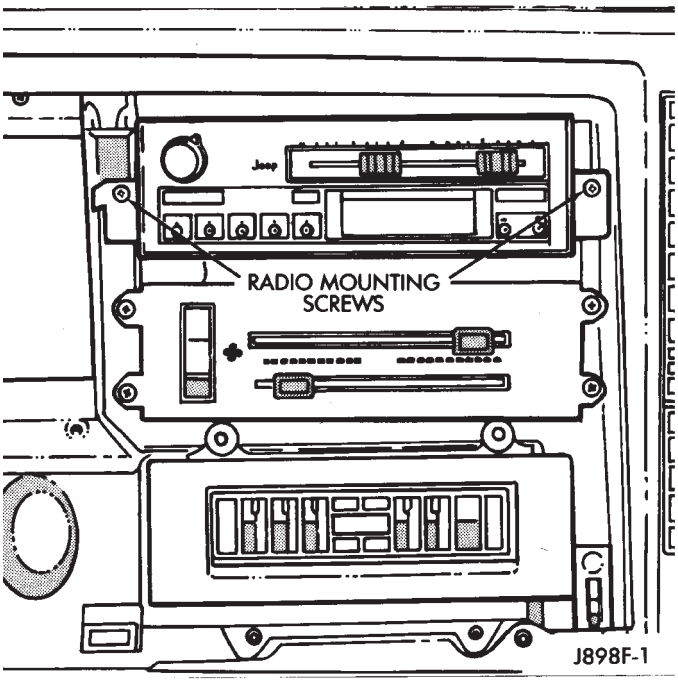


Fig. 2 Radio Mounting Screws

(3) Remove the radio attaching screws (Fig. 2).

(4) Disconnect the radio electrical connector, ground lead and antenna lead (Fig. 3).

(5) Remove the A/C-heater control panel screws (Fig. 4).

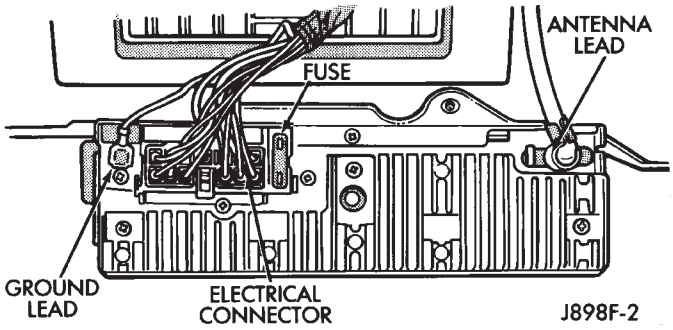


Fig. 3 Radio Wiring Harness

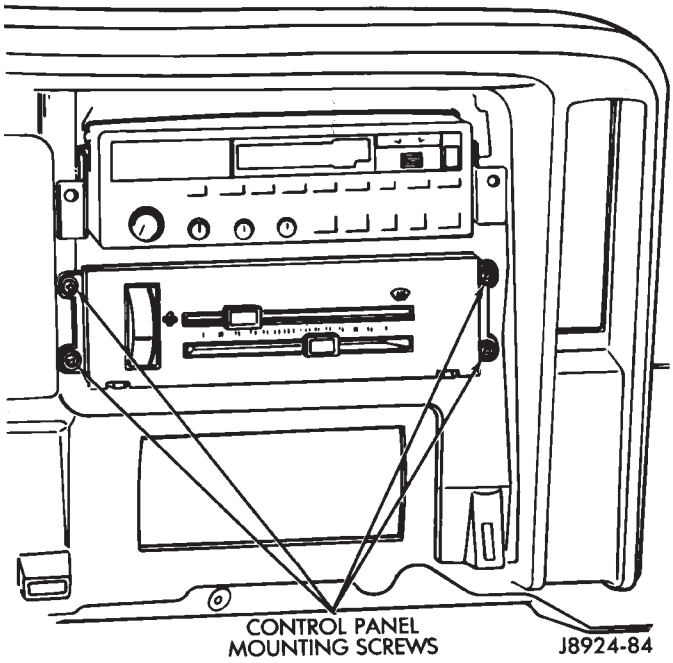


Fig. 4 Control Panel Mounting Screws

(6) Remove the electrical connectors (Fig. 5).

(7) Disconnect the vacuum hoses by releasing the locking tabs (Fig. 6).

(8) Remove the control cable locking tab by using a screwdriver to release the tab (Fig. 7).

(9) Remove the ring on the end of the control cable from the arm on the bottom of the control panel (Fig. 8).

To Install the A/C-heater control panel, reverse the removal procedures.

BLOWER MOTOR/FAN REPLACEMENT

The blower motor and fan are accessible and may be removed from the engine compartment.

2.5L ENGINE

(1) Disconnect the blower motor wires (Fig. 9).

(2) Remove the blower motor and fan assembly mounting screws (Fig. 10).

(3) Remove the blower motor and fan assembly.

(4) Remove the blower motor fan from the motor shaft for access to the motor attaching nuts (Fig. 11).

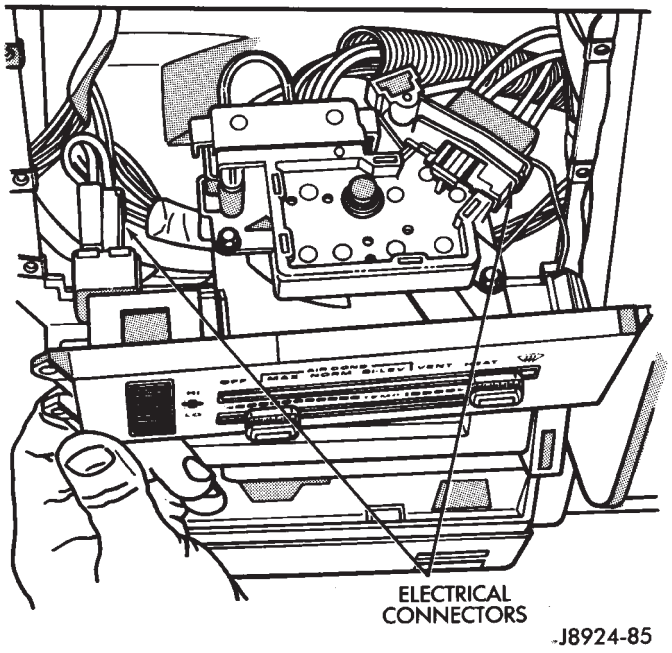


Fig. 5 Electrical Connectors

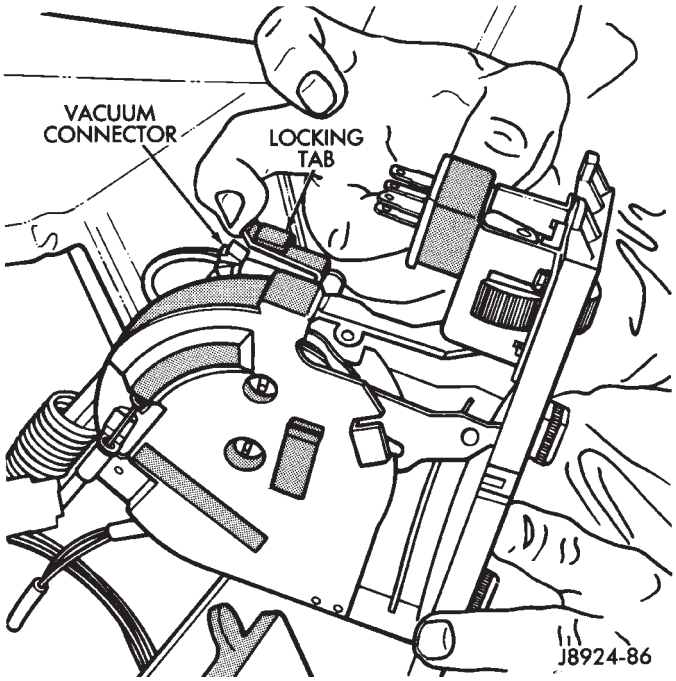


Fig. 6 Vacuum Hose Connector

To install the blower fan and motor, reverse the removal procedures.

4.0L ENGINE

(1) Remove the coolant bottle retaining strap and move bottle aside.

(2) Remove the coolant bottle bracket.

(3) Remove the anti-lock brake pump and bracket as an assembly (if equipped) and move the pump aside.

(4) Disconnect the blower motor wires (Fig. 9).

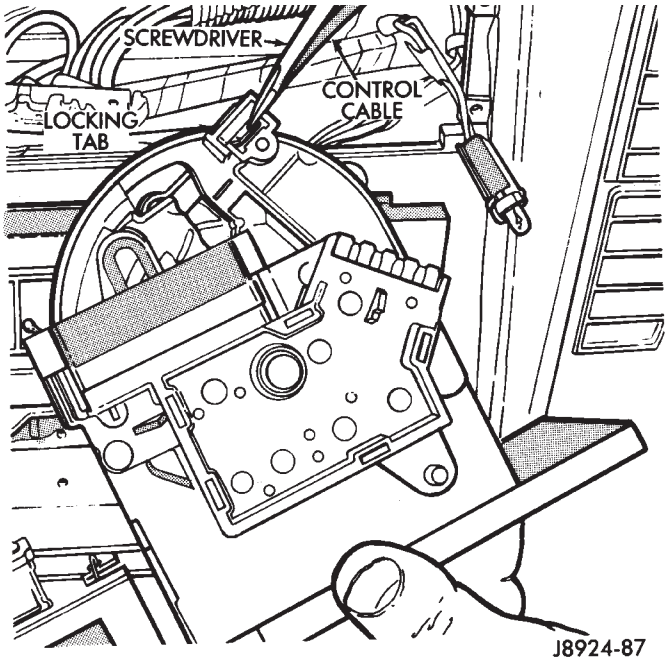


Fig. 7 Control Cable Locking Tab

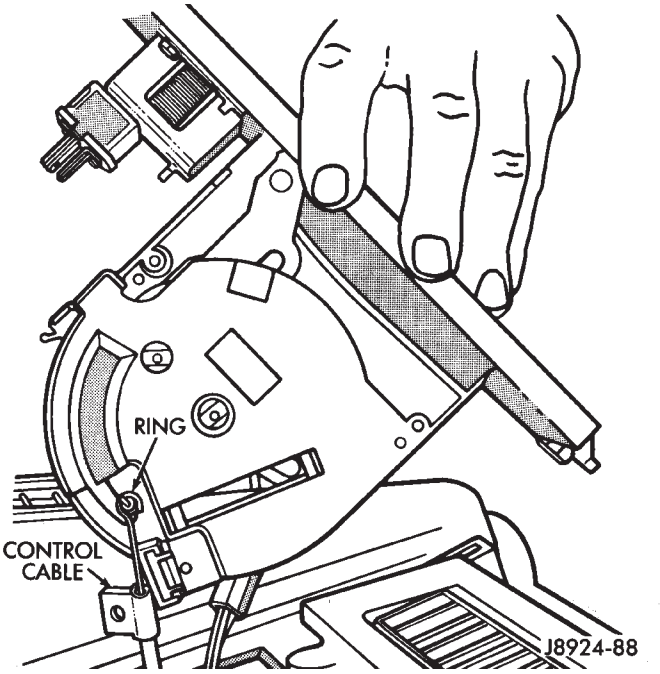


Fig. 8 Control Cable and Ring

(5) Remove the blower motor and fan assembly mounting screws (Fig. 10).

(6) Remove the blower motor and fan assembly.

(7) Remove the blower motor fan from the motor shaft for access to the motor attaching nuts (Fig. 11).

To install the blower fan and motor, reverse the removal procedures. **The ears (A) and (B) of the retainer clip must be over the flat surface on the motor shaft (Fig. 11).**

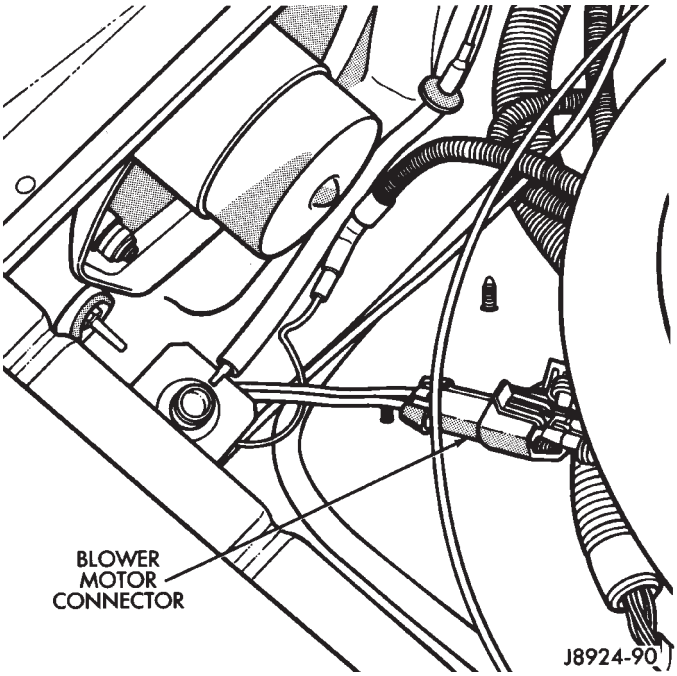


Fig. 9 Blower Motor Connector

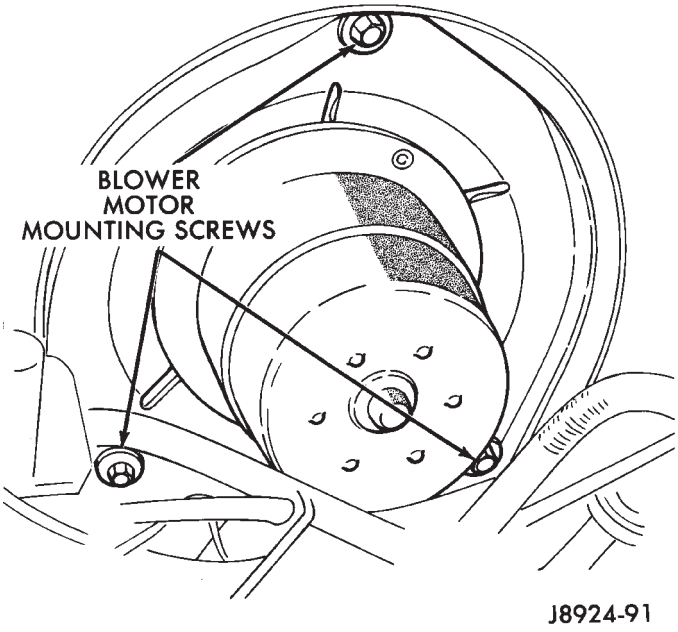


Fig. 10 Blower Motor Mounting Screws

HEATER CORE

REMOVAL

(1) Drain the radiator.

(2) Disconnect the heater hoses at the heater core inlet and outlet tubes.

(3) Remove the evaporator/blower housing.

(4) Remove the retaining screws and remove the heater core by pulling it straight out of the housing (Fig. 12).

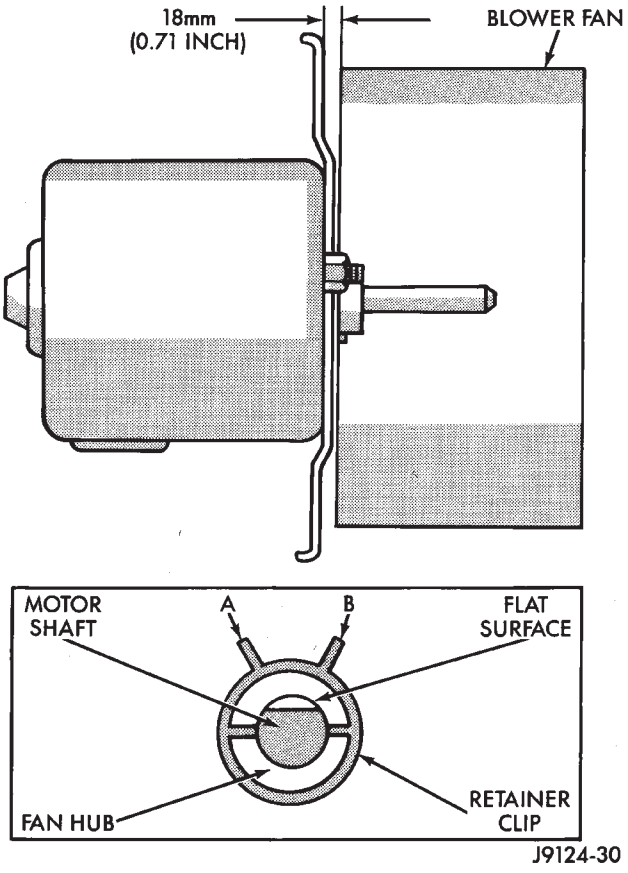


Fig. 11 Blower Fan

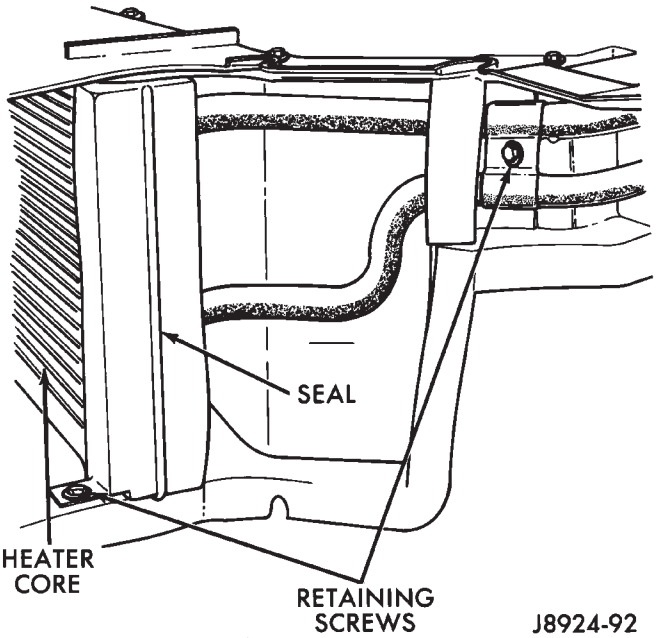


Fig. 12 Heater Core

INSTALLATION

(1) Install the heater core into the housing and install the screws.

(2) Install the evaporator/blower housing.

(3) Cement the seal into place in order to keep it from moving when the blower assembly is installed.

(4) Connect the heater hoses to the heater core.
(5) Fill the cooling system.

HEATER CORE HOUSING REPLACEMENT

(1) Remove the evaporator/blower housing.
(2) Remove the heater core.
(3) Remove the defroster duct.
(4) Disconnect the vacuum hoses from the heater core housing vacuum motors.
(5) Remove the heater housing retaining nuts in the engine compartment. Remove the heater core housing.
(6) Transfer the vacuum motors, etc. to the replacement housing.
To install the heater core housing, reverse the removal procedure.

DEFROSTER DUCT REPLACEMENT

REMOVAL

(1) Disconnect negative cable from battery.
(2) If equipped with center console remove the console as follows:
(a) MANUAL TRANSMISSION—Remove shift knob, boot and bezel.
(b) AUTOMATIC TRANSMISSION—Remove shift handle by pulling up. Remove the shift bezel.
(c) POWER MIRRORS—Pry mirror switch out of console cover (Fig. 13). Disconnect switch connector (Fig. 14).
(d) Remove console cover screws (Fig. 14).

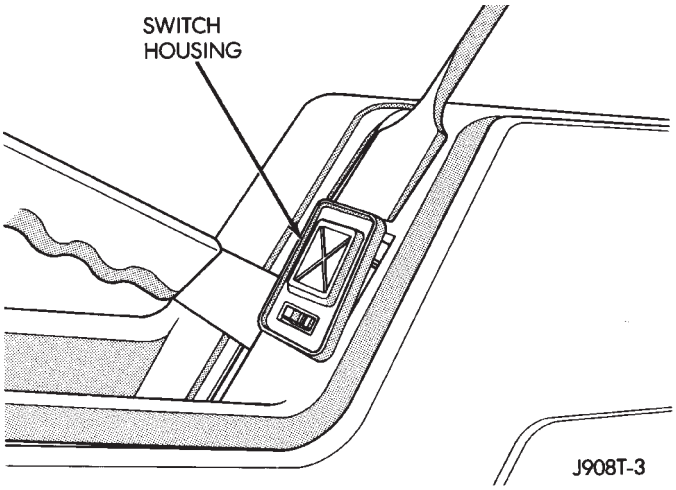


Fig. 13 Power Mirror Switch

(e) Remove console cover from base (Fig. 15).
(f) Remove console base (Fig. 15).
(3) Remove the lower instrument panel.
(4) Remove the left kick panel.
(5) Remove the instrument panel retaining bolt.
(6) Remove the instrument panel retaining bolts located at the steering column.
(7) Remove the right and left A-pillar trim.

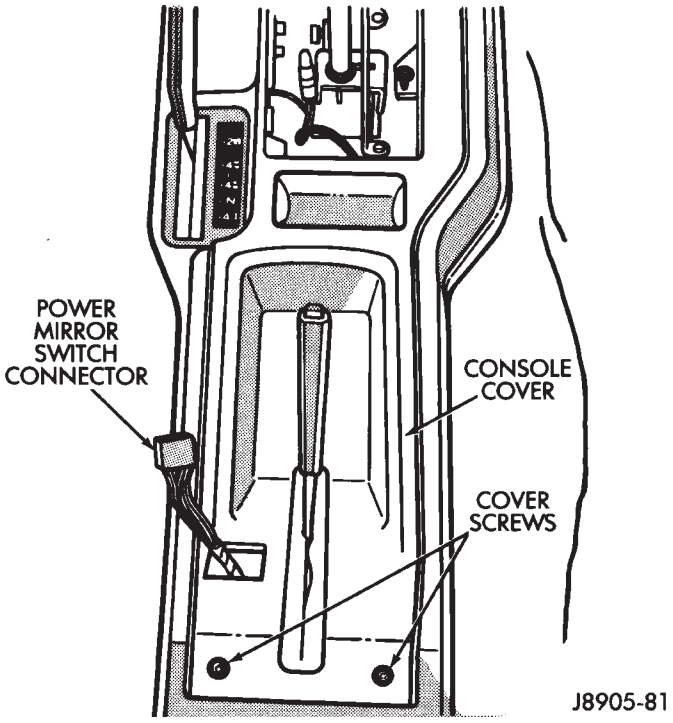


Fig. 14 Console Cover Screws and Power Mirror Switch Connector

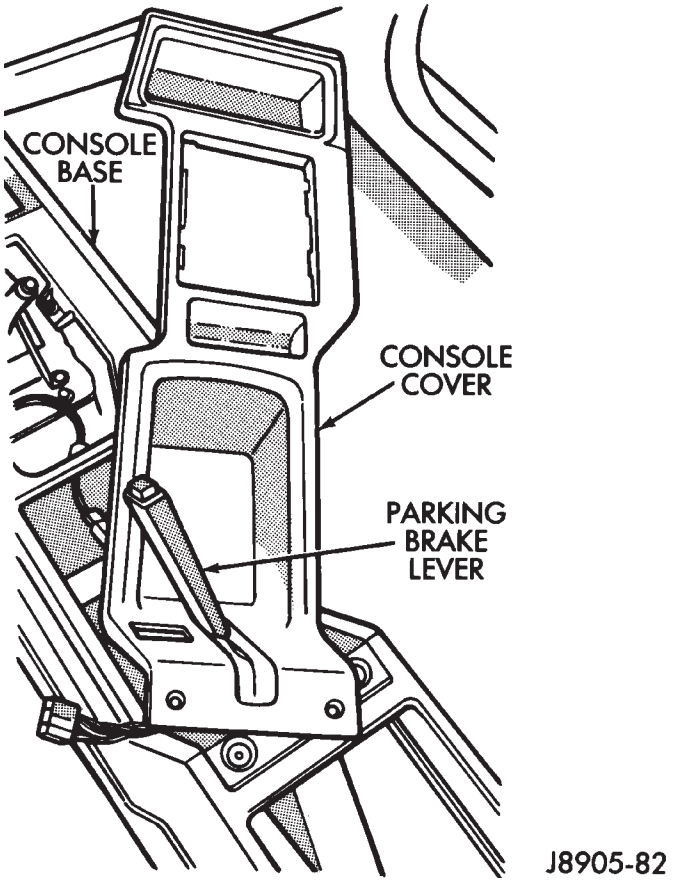


Fig. 15 Console Cover and Base

(8) Remove the defroster bezel attaching screws and bezel (Fig. 16).

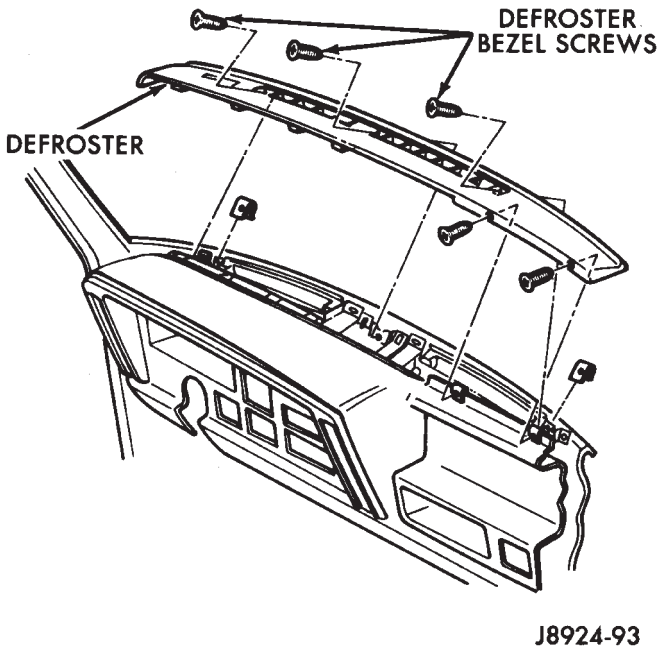


Fig. 16 Defroster Bezel

(9) Remove the instrument panel retaining screws.
(10) Lower the steering column.
(11) Pull the instrument panel, approximately 3 inches, away from the dash panel.
(12) Remove the defroster duct retaining screws. Remove the defroster duct.
(13) Disconnect the hoses.

INSTALLATION

(1) Connect the hoses.
(2) Install the defroster duct. Install the defroster duct retaining screws.
(3) Position the instrument panel into the dash panel.
(4) Position the steering column.
(5) Install the instrument panel retaining screws.
(6) Install the defroster bezel attaching screws and bezel.
(7) Install the right and left A-pillar trim.
(8) Install the instrument panel retaining bolts located at the steering column. Tighten the steering column retaining nuts to 27 N•m (20 ft. lbs.) torque.
(9) Install and tighten the instrument panel retaining bolt.
(10) Install the left kick panel.
(11) Install the lower instrument panel.
(12) If equipped with center console, install the console as follows:
(a) Install console base.
(b) Install console cover to base.
(c) Install and tighten console cover screws.
(d) POWER MIRRORS—Snap mirror switch into the console cover. Connect switch connector.
(e) MANUAL TRANSMISSION—Install shift knob, boot and bezel.
(f) AUTOMATIC TRANSMISSION—Install the shift bezel. Install shift handle by pushing down.
(13) Connect negative cable to battery.

HEATER CONTROL CABLE REPLACEMENT

(1) Remove the heater control panel.
(2) Remove the clip and the cable self-adjusting clip from the blend air door lever at the bottom of the evaporator/blower housing (Fig. 17). Then remove the cable by squeezing the tabs with needle nose pliers being careful not to break the housing.
To install the heater control cable, reverse the removal procedure.

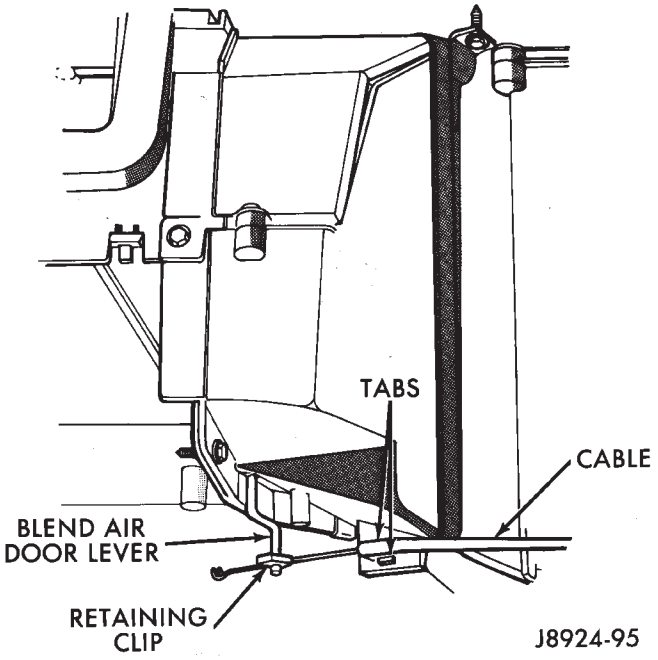


Fig. 17 Heater Control

HEATER/DEFROSTER/INSTRUMENT PANEL OUTLET DOOR VACUUM MOTOR REPLACEMENT

(1) If equipped with center console remove the console as follows:
(a) MANUAL TRANSMISSION—Remove shift knob, boot and bezel.
(b) AUTOMATIC TRANSMISSION—Remove shift handle by pulling up. Remove the shift bezel.
(c) POWER MIRRORS—Pry mirror switch out of console cover (Fig. 13). Disconnect switch connector (Fig. 14).
(d) Remove console cover screws (Fig. 14).
(e) Remove console cover from base (Fig. 15).
(f) Remove console base.
(2) Remove the lower instrument panel.
(3) Disconnect the vacuum hose(s) from the vacuum motor.
(4) Remove the vacuum motor attaching nuts and remove the vacuum motor from the bracket.

(5) Remove the vacuum motor linkage retaining clip and remove the rod from the door actuating lever (Fig. 18).

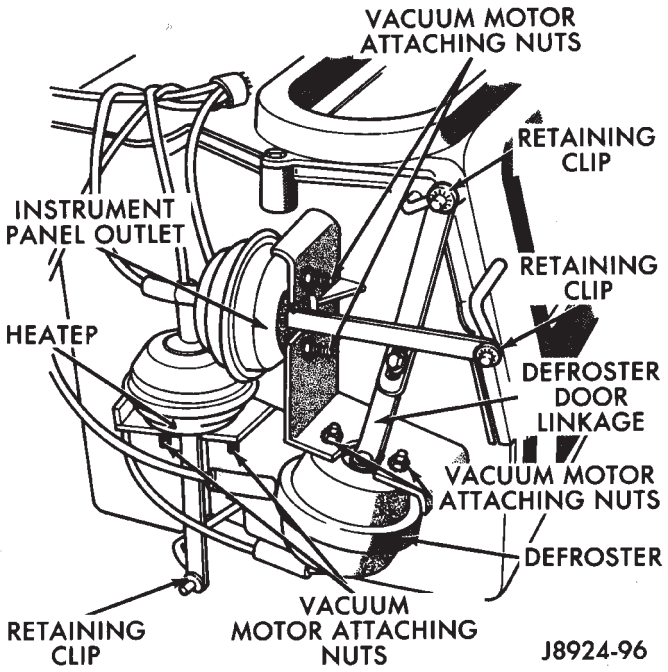


Fig. 18 Vacuum Motor

To install a vacuum motor, reverse the removal procedure.

A/C RECIRCULATING AIR DOOR VACUUM MOTOR REPLACEMENT

(1) Remove the vacuum motor cover (Fig. 19).

(2) Disconnect the vacuum hose (Fig. 20).

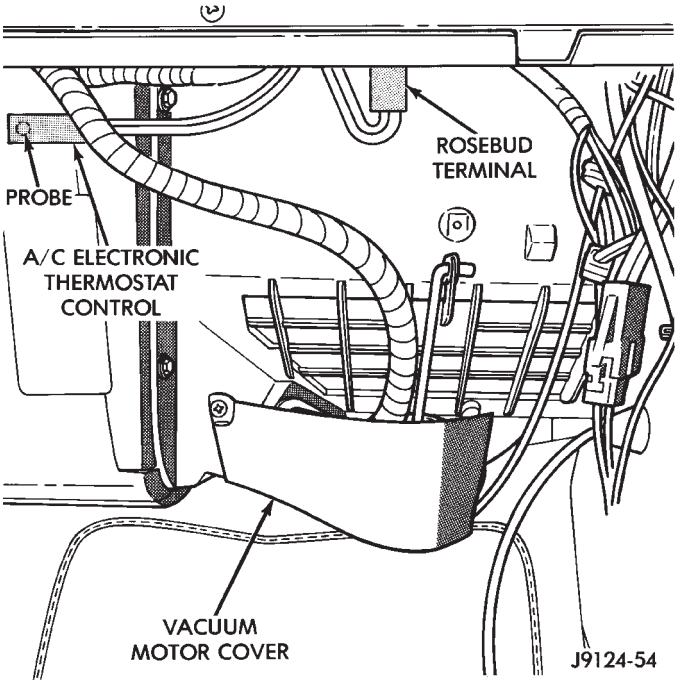


Fig. 19 Vacuum Door Motor Cover

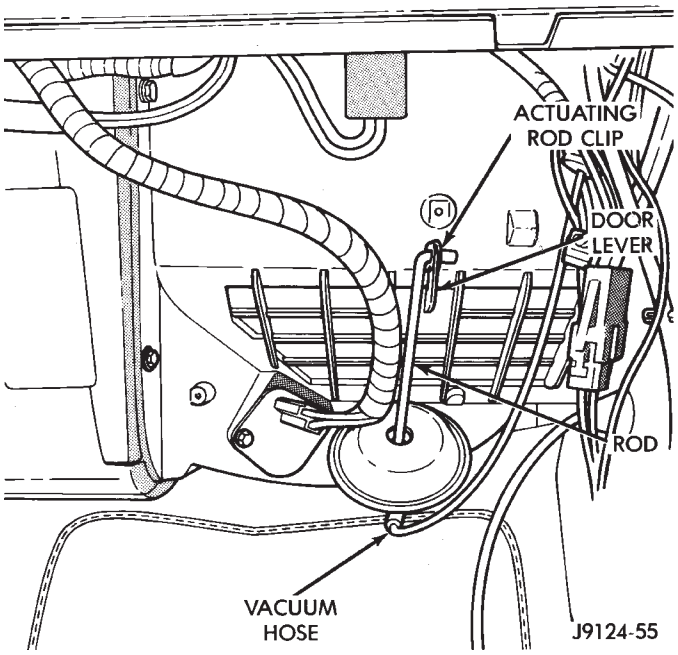


Fig. 20 Vacuum Door Motor

(3) Remove the actuating rod clip and disengage the rod from the door lever.

(4) Remove the vacuum motor retaining nuts and then remove the vacuum motor.

To install the motor, reverse the removal procedures.

CONDENSER/RECEIVER DRIER—2.5L ENGINES

REMOVAL

(1) Drain the radiator.

(2) Disconnect the fan shroud and the radiator hoses.

(3) Disconnect the transmission cooler lines (if equipped with automatic transmission).

(4) Evacuate the A/C system. Disconnect the A/C hoses from the condenser.

(5) Unplug the harness from the low pressure switch (Fig. 21).

(6) Remove the radiator and condenser as an assembly.

(7) Remove the retaining bolts and separate the condenser from the radiator.

(8) Remove the receiver/drier from the condenser. **Keep receiver/drier openings plugged at all times to prevent moisture from entering the receiver/drier.**

INSPECTION

When servicing a condenser for a leak at the bottom, inspect the lower crossmember for an ID tag. This tag may rub against the condenser. If the condition exists, remove the tag prior to installing a new condenser.

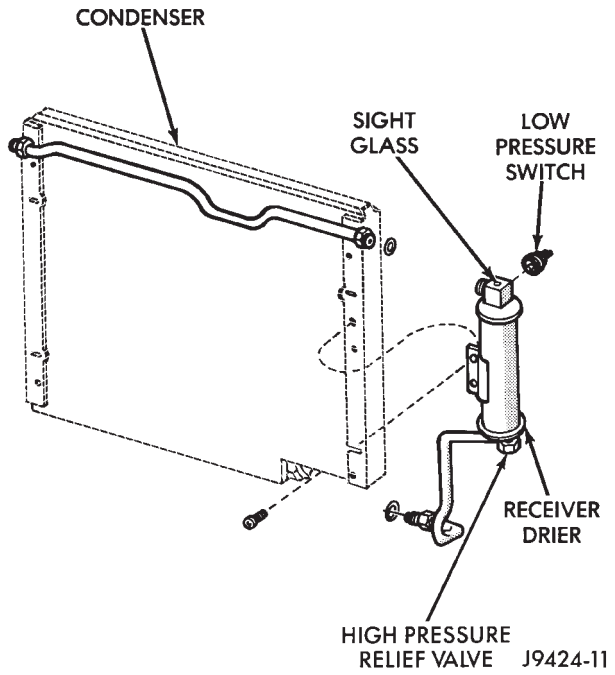


Fig. 21 Condenser Receiver Drier—2.5L Engine

INSTALLATION

(1) Remove the plugs from the receiver/drier openings. Install receiver/drier into the condenser.

(2) Install the condenser to the radiator. Tighten the retaining bolts.

(3) Install the radiator and condenser as an assembly (refer to Group 7, Cooling System for the proper procedure).

(4) Plug the harness into the low pressure switch (Fig. 21).

(5) Connect the A/C hoses to the condenser.

(6) Connect the transmission cooler lines (if equipped with automatic transmission).

(7) Connect the fan shroud and the radiator hoses.

(8) Add 30 ml (1 fluid oz.) of refrigerant oil to the system if the condenser was replaced.

(9) Fill the cooling system.

(10) Charge the A/C system.

CONDENSER—4.0L ENGINES

REMOVAL

(1) Disconnect the fan shroud and electric fan from the radiator.

(2) Remove the upper crossmember and bracket.

(3) Evacuate the A/C system, disconnect the A/C hoses from the condenser and plug the openings.

(4) Remove the attaching hardware and brackets securing the condenser to the radiator.

(5) Remove the condenser.

INSPECTION

When servicing a condenser for a leak at the bottom, inspect the lower crossmember for an ID tag. This tag may rub against the condenser. If the condition exists, remove the tag prior to installing a new condenser.

INSTALLATION

(1) Install the condenser.

(2) Remove the plugs from the openings. Connect the A/C hoses to the condenser.

(3) Install the upper crossmember and bracket.

(4) Connect the fan shroud and electric fan to the radiator.

(5) Add 30 ml (1 fluid oz.) of refrigerant oil to the A/C system if the condenser was replaced.

(6) Charge the A/C system.

RECEIVER DRIER—4.0L ENGINES

REMOVAL

(1) Evacuate the A/C system, disconnect the A/C hoses from the receiver dryer and plug the openings (Fig. 22).

(2) Unplug the harness from the low pressure switch.

(3) Remove the nut attaching the receiver dryer to the side sill weld stud.

(4) Remove the receiver dryer.

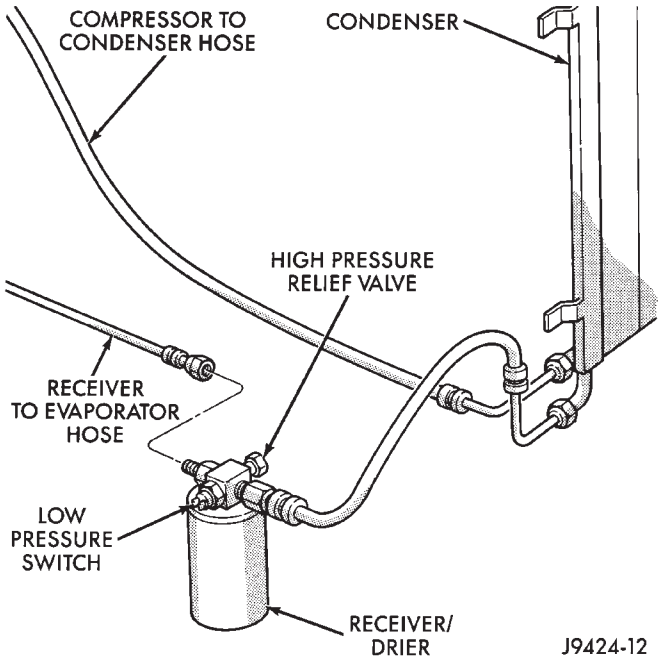


Fig. 22 Receiver Dryer—4.0L Engine

INSTALLATION

(1) Install the receiver dryer.

(2) Install and tighten the nut attaching the receiver dryer to the side sill weld stud.

(3) Plug the harness to the low pressure switch.

(4) Remove the plugs the openings. Connect the A/C hoses to the receiver dryer.

(5) Charge the A/C system.

EVAPORATOR/BLOWER HOUSING

REMOVAL

(1) Disconnect negative cable from battery.

(2) Discharge the A/C system as described in this section and disconnect the A/C hoses from the expansion valve.

(3) Disconnect the blower motor wires and the vent tube.

(4) If equipped with center console remove the console as follows:

(a) MANUAL TRANSMISSION—Remove shift knob, boot and bezel.

(b) AUTOMATIC TRANSMISSION—Remove shift handle by pulling up. Remove the shift bezel.

(c) POWER MIRRORS—Pry mirror switch out of console cover (Fig. 13) and disconnect switch connector (Fig. 14).

(d) Remove console cover screws (Fig. 14).

(e) Remove console cover from base (Fig. 15).

(f) Remove console base.

(5) Remove the lower instrument panel.

(6) Disconnect the electrical connections at the blower motor resistors and the A/C thermostat. Disconnect the vacuum hose at the vacuum motor (Fig. 23).

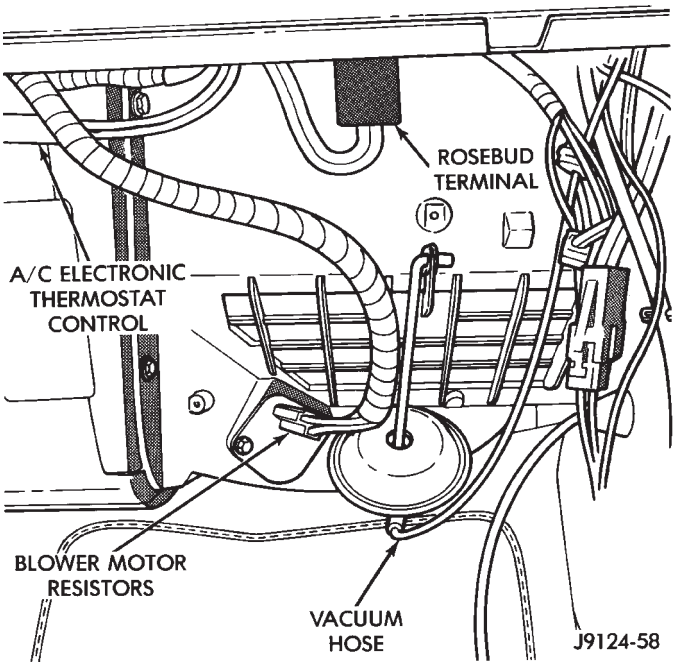


Fig. 23 Evaporator Housing Components

(7) Cut the plastic retaining strap that retains the evaporator/blower housing to the heater core housing (Fig. 24).

(8) Disconnect and remove the heater control cable.

(9) Remove the clip at the rear of the blower housing flange and remove the retaining screws.

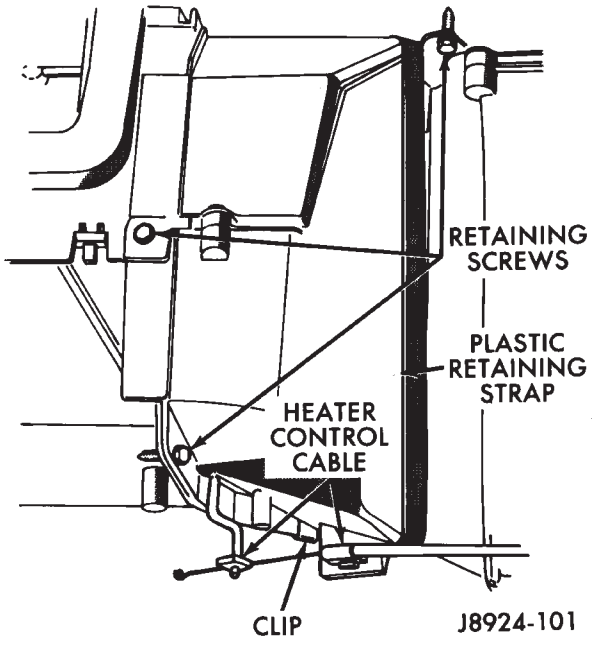


Fig. 24 Evaporator Housing

(10) Remove the housing attaching nuts from the studs on the engine compartment side of the dash panel (Fig. 25). Remove the evaporator drain tube.

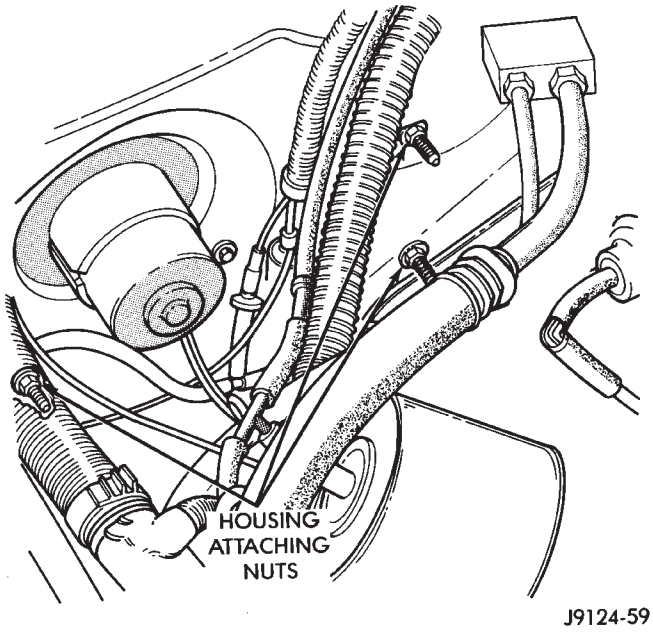


Fig. 25 Evaporator Housing Mounting

(11) Remove the right kick panel and then remove the instrument panel support bolt.

(12) To disengage the housing studs from the dash panel, gently pull out on the right side of the dash. Then rotate the housing downward and toward the rear of the vehicle. Remove the evaporator/blower housing.

INSTALLATION

(1) Position the evaporator/blower housing into place, being sure to line up the housings using the provided alignment tabs (Figs. 26 and 27).

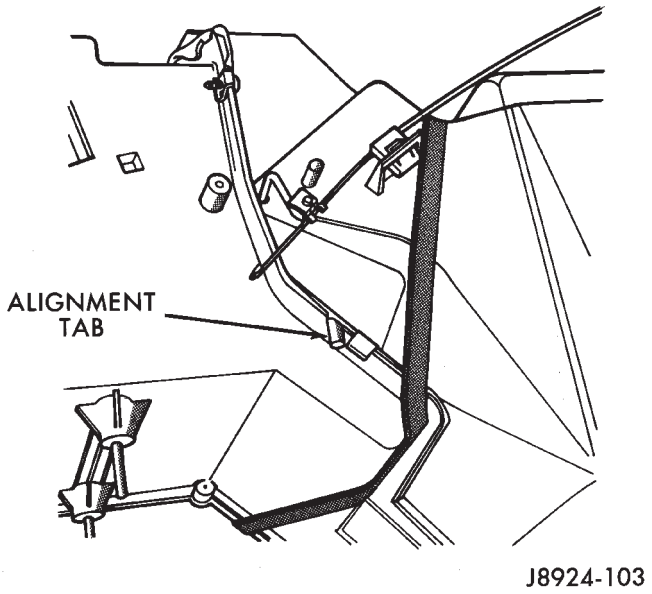


Fig. 26 Evaporator Housing Alignment Tab

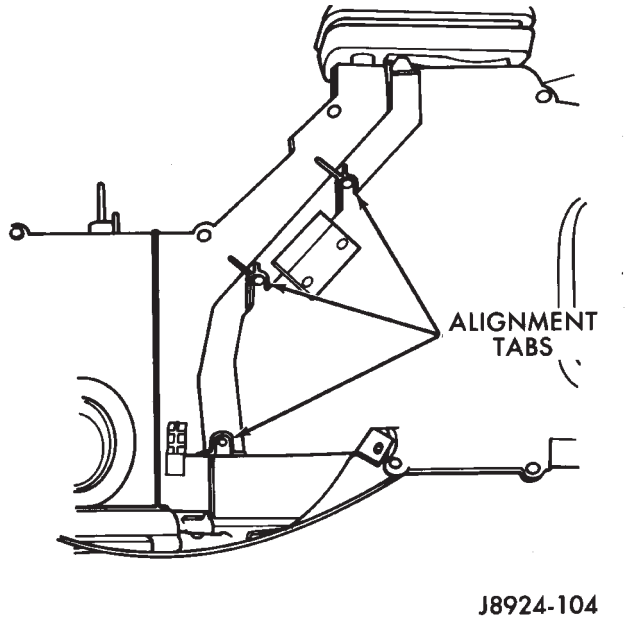


Fig. 27 Evaporator Housing

(2) Install the housing retaining screws and the rear housing clip (Fig. 25).

CAUTION: When installing the evaporator/blower housing, DO NOT trap wires between the housing fresh air inlet and the dash panel (right side of housing).

(3) Install the housing retaining nuts on the engine compartment side of the dash panel (Fig. 25).

(4) Connect the A/C hoses to the expansion valve and connect the heater blower motor wires.

(5) Attach the wire connections at the blower motor resistors and the A/C thermostat (Fig. 23).

(6) Connect the vacuum hose at the vacuum motor and attach the heater control cable.

(7) Install the instrument panel bolt and the kick panel.

(8) Install the lower instrument panel and screws.

(9) Install the console (if equipped).

(10) Connect negative cable to battery.

(11) Evacuate and charge the A/C system as outlined in this section.

(12) Start the vehicle and check for proper operation at all vacuum motors.

EVAPORATOR COIL

REMOVAL

(1) Remove the evaporator/blower housing.

(2) Remove the top housing retaining screws. Remove the top of the evaporator housing (Fig. 28).

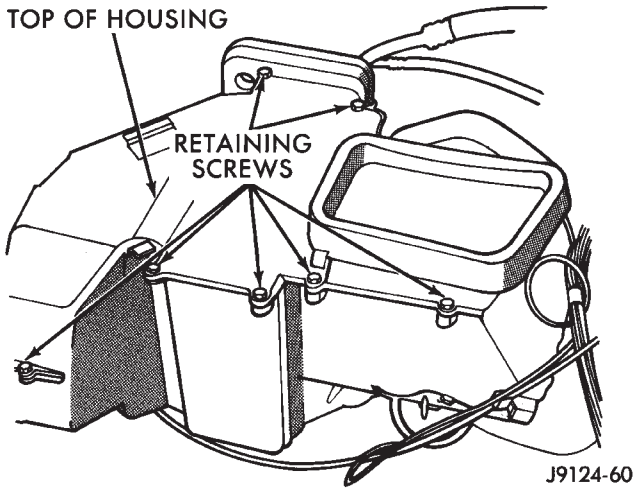


Fig. 28 Top of Housing

(3) Remove the thermostatic switch and capillary tube after removing the top of the evaporator housing.

(4) Remove the evaporator retaining screws and lift the evaporator out of the housing (Fig. 29).

(5) Remove the expansion valve from the evaporator.

INSTALLATION

(1) Install the expansion valve into the evaporator.

(2) Position the evaporator in the housing. Install and tighten the evaporator retaining screws (Fig. 29).

(3) Install the thermostatic switch and capillary tube. Install the top of the evaporator housing.

(4) Position the top of the evaporator housing in place. Install and tighten the top housing retaining screws.

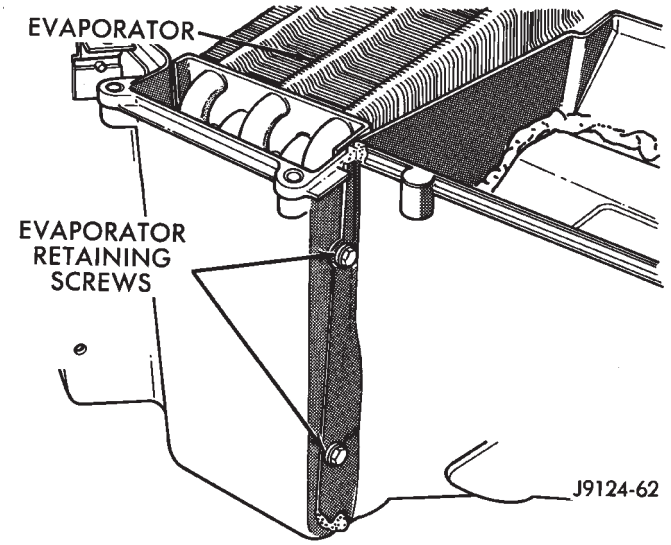


Fig. 29 Evaporator

(5) Install the evaporator/blower housing.

(6) Add 30 ml (1 fluid oz.) of refrigerant oil to the air conditioning system if the evaporator was replaced.

EXPANSION (H) VALVE

REMOVAL

(1) Discharge the A/C system.

(2) Remove the coolant bottle and bracket.

(3) Disconnect A/C hoses from the expansion valve (Fig. 30).

(4) Disconnect the expansion valve from the evaporator core inlet and outlet tubes. Remove the expansion valve.

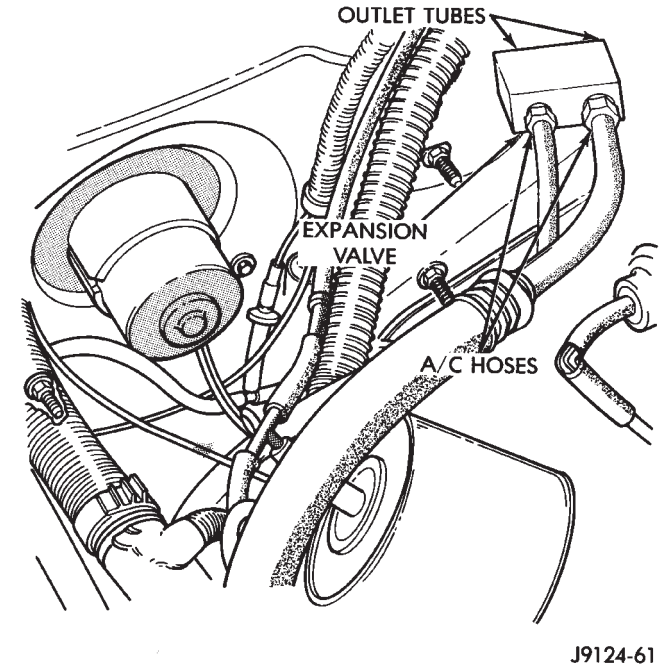


Fig. 30 Expansion (H) Valve

INSTALLATION

(1) Install the expansion valve. Connect the expansion valve to the evaporator core inlet and outlet tubes.

(2) Connect A/C hoses to the expansion valve (Fig. 30).

(3) Install the coolant bottle and bracket.

(4) Charge the A/C system.

(5) Preform the leak test.

BLOWER MOTOR RESISTORS REPLACEMENT

(1) Remove the vacuum motor cover retaining screw and lower the cover.

(2) Remove the blower motor resistor connector, remove the resistor retaining screws, and then remove the resistor.

To install the blower motor resistor reverse the removal procedures.

TEMPERATURE CONTROL THERMOSTAT

REMOVAL

(1) Disconnect negative cable from battery.

(2) If equipped with center console remove the console as follows:

(a) MANUAL TRANSMISSION—Remove shift knob, boot and bezel.

(b) AUTOMATIC TRANSMISSION—Remove shift handle by pulling up. Remove the shift bezel.

(c) POWER MIRRORS—Pry mirror switch out of console cover (Fig. 31) and disconnect switch connector (Fig. 32).

(d) Remove console cover screws (Fig. 32).

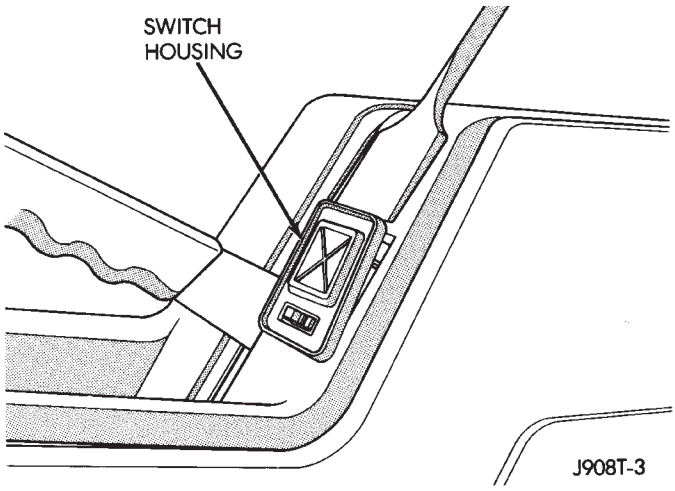


Fig. 31 Power Mirror Switch

(e) Remove console cover from base (Fig. 33).

(f) Remove console base (Fig. 33).

(3) Remove the lower instrument panel.

(4) Pull the rosebud terminal out of the housing (Fig. 34).

(5) Disconnect the electrical connection.

(6) Remove the wires from the retaining clip.

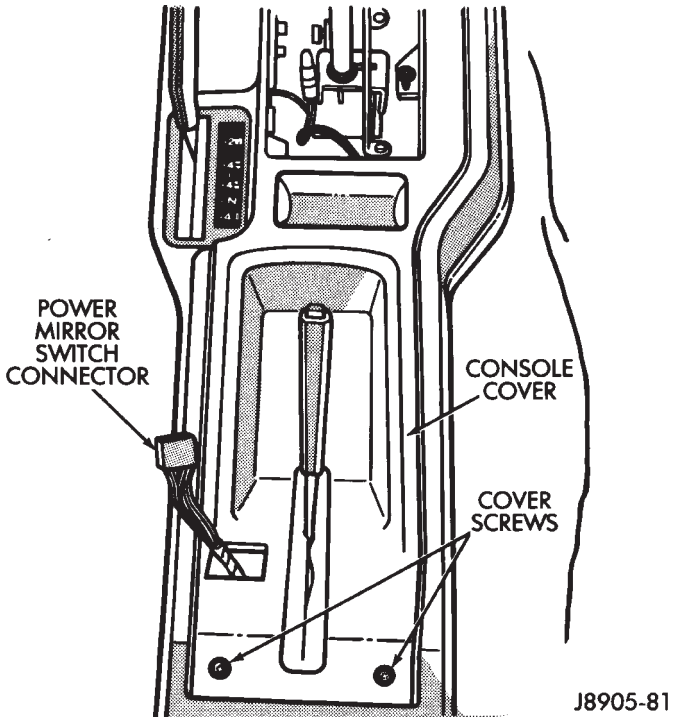


Fig. 32 Console Cover Screws and Power Mirror Switch Connector

(7) Carefully remove the thermostat probe/thermostat electronic cycling switch from the tube guide hole (Fig. 34).

INSTALLATION

(1) Carefully insert the thermostat probe into the tube guide hole until the thermostat electronic cycling switch body butts up against the housing.

(2) Connect the rosebud terminal (Fig. 34).

(3) Snap the terminal into the hole in the housing.

(4) Install the wires into the retaining clip.

(5) Reverse the removal procedures for the remainder of the installation.

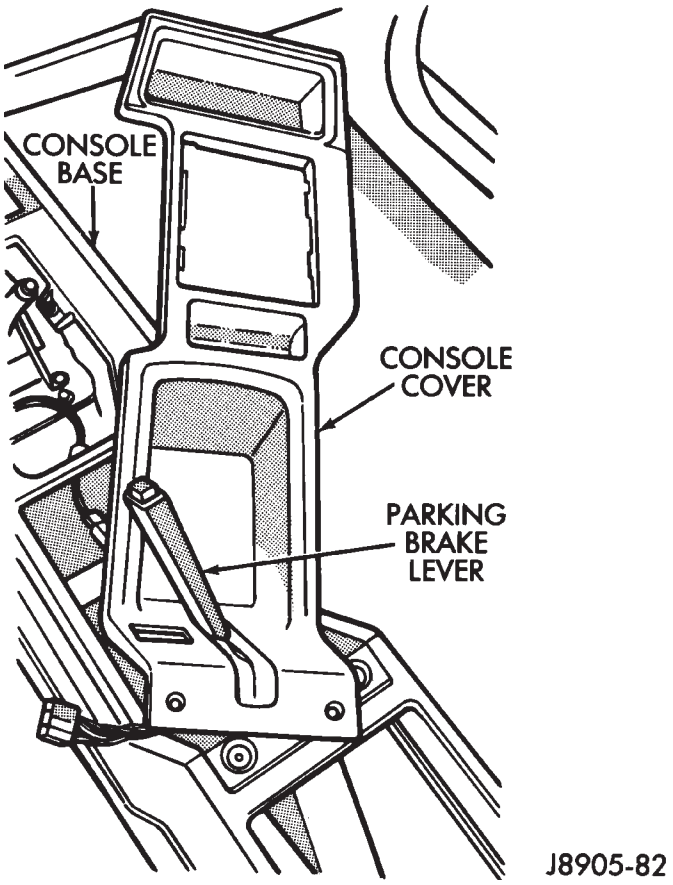


Fig. 33 Console Cover and Base

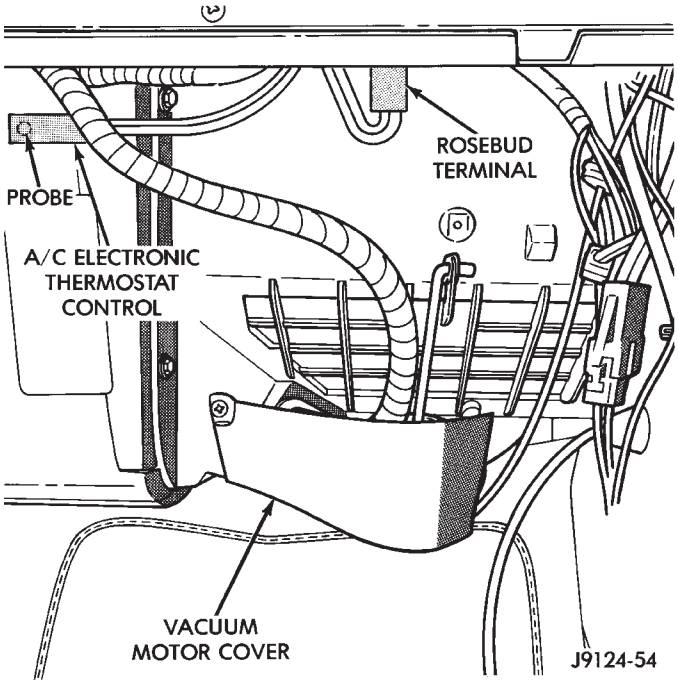


Fig. 34 Thermostat Electronic Cycling Switch and Probe

CLIMATE CONTROL SYSTEM—YJ VEHICLES

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DESCRIPTION (HEATING)

A blend-air heating system is used in YJ vehicles. The blend-air system provides a constant flow of engine coolant through the heater core.

The temperature of heated air entering the passenger compartment is controlled by regulating the quantity of air flow through the heater core. This is accomplished by blending a controlled amount of unheated air from outside the vehicle with heated air from the heater core.

HEATER/DEFROSTER OPERATION

The heater core is connected to the engine cooling system. It operates on the circulation of heated engine coolant through the core and a supply of fresh air drawn in through the intake grille on the cowl. Engine coolant flows through the heater core at all times.

The heater controls are on the heater control panel (Fig. 1).

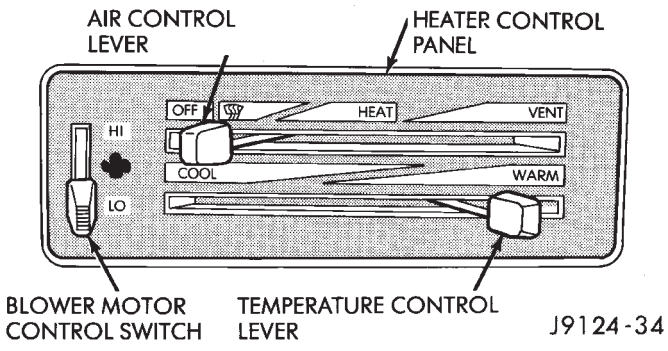

Fig. 1 Heater Control Panel

The air control lever (Fig. 1) operates a door in the fresh air intake duct. The door controls the amount of fresh air flow into the heater housing and core. When the lever is in the OFF position, the intake door is closed preventing air flow into the housing.

The temperature control lever (Fig. 1) determines air flow through the heater core. The lever operates the heater housing blend-air door which controls air flow through the core.

The blower motor is operated by the control switch (Fig. 1). The switch provides 3 blower speeds for increased air flow in heat or defrost mode.

HEATING

Maximum air flow and heater output occurs when the air control lever is in HEAT position and the temperature control lever is in WARM position. The blend-air door is closed and all intake air is directed through the heater core in this operating mode (Fig. 2).

Temperature regulation of the heated air is determined by position of the temperature control lever. Moving the control lever from WARM to an in-between position, opens the blend-air door in the heater housing. As the door opens, unheated outside air is drawn into the system and blended with heated air from the core.

DEFROSTING

The heater housing contains a defroster door to divert heated air to the defroster duct and windshield outlets (Fig. 2). Defrost air flow is controlled by the air control lever.

For defroster operation, the air control lever must be moved to the defrost detent. The detent is identified by the defrost symbol on the control panel. In this position, the defroster door in the heater housing diverts all heated air (from the core) to the defroster duct windshield outlets.

If the air control lever is moved to any position between the heat and defrost detents, the defroster door does not close completely. In this mode, the door remains partially open causing heated air to be divided equally between the heat and defrost outlets.

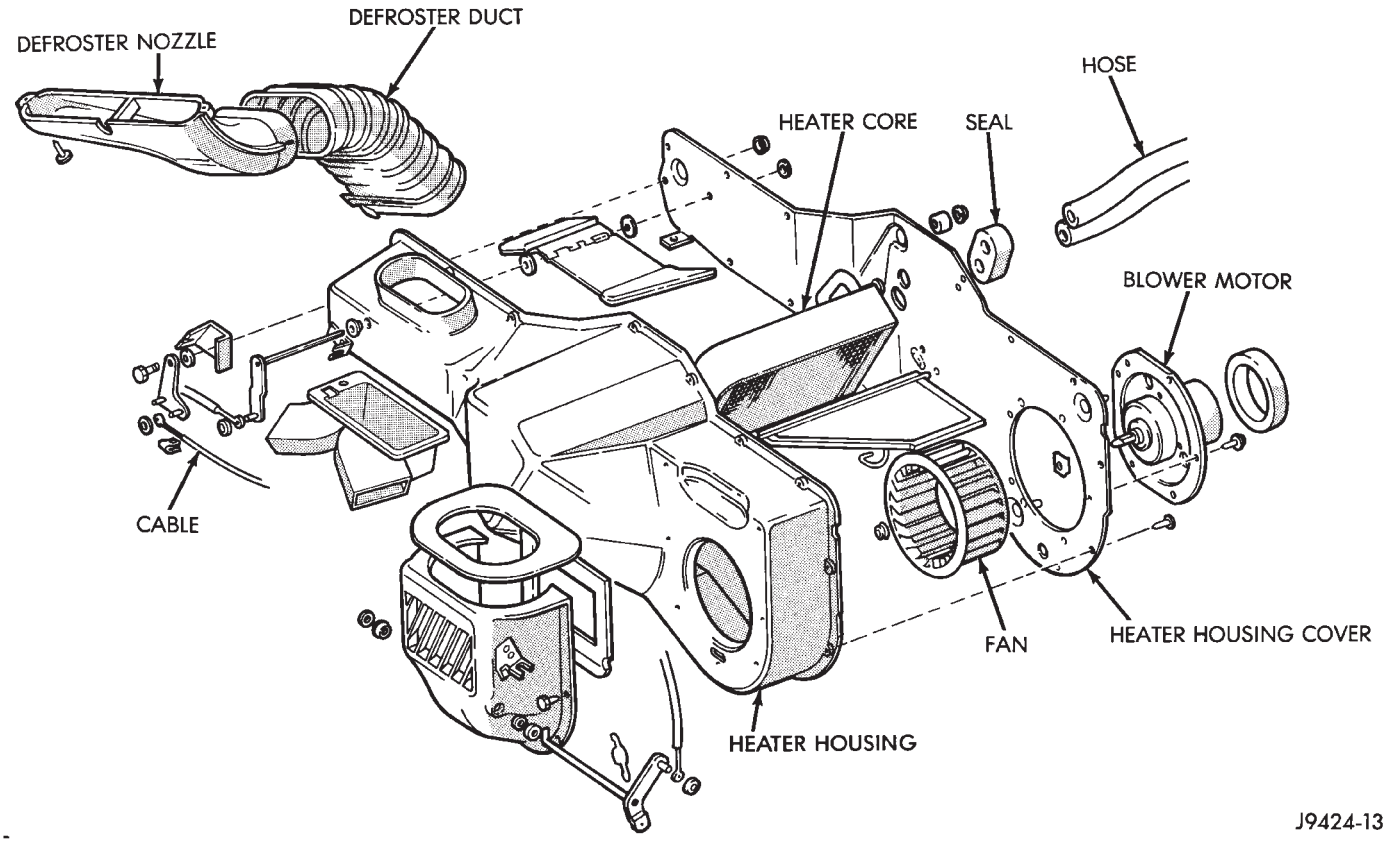

Fig. 2 Heating System Components

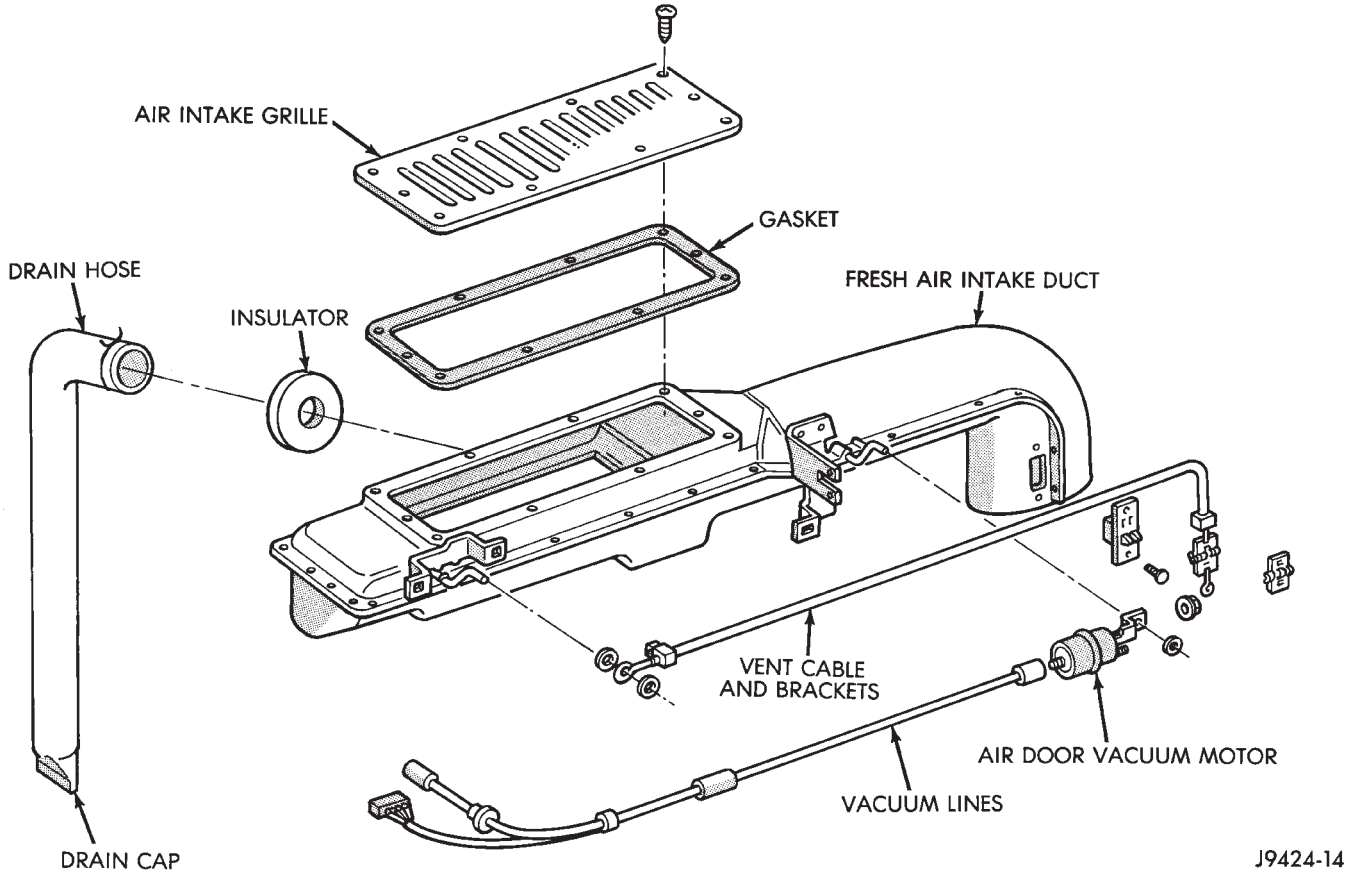

Fig. 3 Fresh Air Intake System Components

FRESH AIR VENTILATION

The fresh air ventilating system (Fig. 3) is operated by the air control lever. When the lever is moved to VENT position, outside air from the cowl intake flows into the heater housing. Incoming air is directed into the vehicle interior through vent doors in the housing.

A door in the intake duct controls air flow into the duct. The door is operated by a vacuum motor. The motor is controlled by a vacuum switch in the heater control panel. The vent air doors are opened and closed by a cable and linkage operated by the air control lever. Fresh air intake occurs only when the lever is in the VENT position.

HEATER CONTROL PANEL REPLACEMENT

(1) Remove the instrument cluster bezel attaching screws (Fig. 4).

(2) Remove the instrument cluster bezel.

(3) Remove the screws attaching the heater control panel to the instrument panel.

(4) Slide the control panel outward and disconnect the cables, vacuum hoses and electrical wires from the control panel.

(5) Remove the control panel.

To install the control panel, reverse the removal procedures.

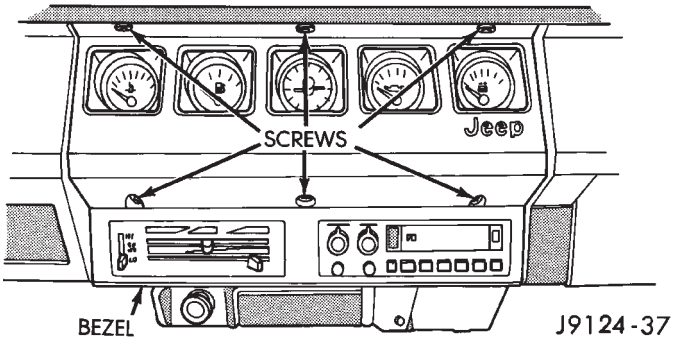

Fig. 4 Instrument Cluster Bezel

BLOWER MOTOR/AIR DOOR MOTOR SWITCH REPLACEMENT

(1) Remove the heater control panel (Fig. 5).

(2) Remove the air door motor switch.

(3) Remove the control knob from the blower switch.

(4) Remove the screws that attach the switch to the control panel.

(5) Remove the switch from the control panel.

To install the switches, reverse the removal procedures.

VENT DOOR CONTROL CABLES

REMOVAL

(1) Disconnect the cable from the vent door.

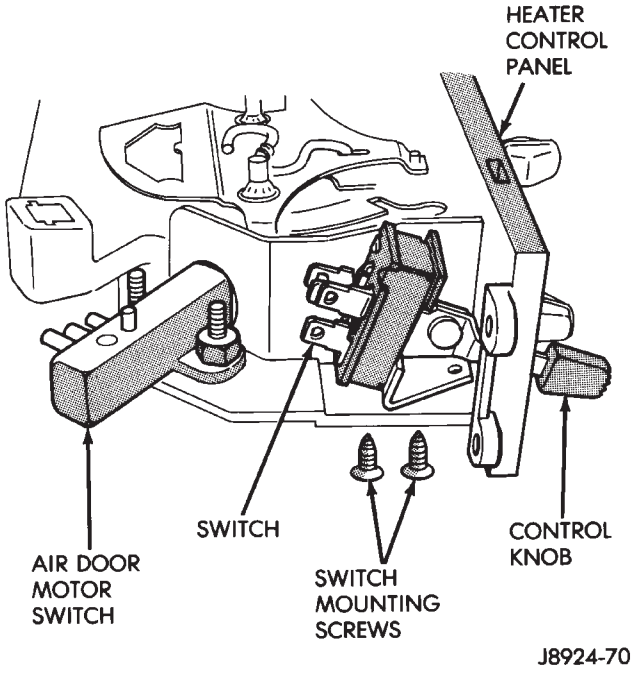

Fig. 5 Control Switches

(2) Disconnect the cable from the heater control panel lever. The cables are attached to the control panel levers with plastic tabs. Press the tabs together and lift the cable upward to disengage it from the lever.

(3) Remove the cable. The clip on the cable wire has 2 functions. It attaches the cable to the vent door and is also the self adjusting mechanism. Because the left cable operates the right cable, the cables must be installed as outlined to maintain the self adjusting feature and ensure proper vent door operation.

INSTALLATION

(1) To install the cables, connect the cables to the heater control panel.

(2) Connect the right vent door cable. DO NOT connect the left door cable at this time.

(3) Open and close the right vent door (one time) using the air control lever on the heater control panel.

(4) Connect the left vent door cable.

(5) Open and close both vent doors with the air control lever. Verify that both vent doors open at the same time.

HEATER CORE AND HOUSING

REMOVAL

WARNING: HOT ENGINE COOLANT CAN CAUSE SEVERE BURNS. DO NOT OPEN THE RADIATOR DRAIN COCK WHEN THE COOLING SYSTEM IS HOT AND PRESSURIZED. ALLOW THE COOLANT TO DECREASE TO ROOM TEMPERATURE BEFORE STARTING REPAIR OPERATIONS.

(1) Drain approximately 1.9 liters (2 qts) of coolant from the radiator. Drain the coolant into a clean container.
(2) Disconnect the heater hoses.
(3) Disconnect the vent door cables.
(4) Disconnect the blower motor wire.
(5) Disconnect the defroster duct.
(6) Remove the nuts that attach the heater housing studs to the engine compartment side of the dash panel.
(7) Remove the heater housing assembly by tilting it downward, to disengage it from the defroster duct. Pull it rearward and out from under the instrument panel.
(8) Remove the heater hosing cover from the housing.
(9) Remove the heater core from the housing.

INSTALLATION

(1) Install the heater core in the housing and install the cover on the housing.
(2) Position the heater housing on the dash panel. Be sure the housing studs all extend through the dash panel.
(3) Install the seals on the heater core outlet and inlet tubes and over the blower motor housing.
(4) Install the attaching nuts on the housing studs.

CAUTION: DO NOT over tighten the attaching nuts. The housing could become distorted causing air leaks and improper heater door operation. Tighten the nuts alternately and evenly until 2 stud threads are visible beyond each nut.

(5) Connect the defroster duct to the housing.
(6) Connect the blower motor wire.
(7) Connect the vent door control cables.
(8) Connect the heater hoses.
(9) Fill and bleed the cooling system.
(10) Check system operation.

BLOWER MOTOR (HEATING)

REMOVAL

(1) Remove the heater housing.
(2) Remove the blower motor-to-heater housing attaching screws/nuts.
(3) Remove the blower motor from the housing.

INSTALLATION

(1) Position the blower motor into the housing.
(2) Install and tighten the blower motor-to-heater housing attaching screws/nuts.
(3) Install the heater housing.
(4) Check blower motor and heater operation.

DEFROSTER NOZZLE AND DUCT

REMOVAL

WARNING: HOT ENGINE COOLANT CAN CAUSE SEVERE BURNS. DO NOT OPEN THE RADIATOR DRAIN COCK WHEN THE COOLING SYSTEM IS HOT AND PRESSURIZED. ALLOW THE COOLANT TO DECREASE TO ROOM TEMPERATURE BEFORE STARTING REPAIR OPERATIONS.

(1) Drain approximately 1.9 liters (2 qts) of coolant from the radiator. Drain the coolant into a clean container.
(2) Disconnect the heater hoses.
(3) Remove the nuts attaching the heater housing studs to the engine compartment side of the dash panel.
(4) Disconnect the speedometer cable.
(5) Remove the glove box.
(6) Tilt the heater housing back and pull it rearward and out from under the instrument panel.
(7) Disconnect the vent control cables.
(8) Remove the fresh air intake grille from the cowl.
(9) Remove the fresh air intake duct.
(10) Lower the windshield.
(11) Remove the defroster nozzle attaching screws and remove the nozzle and duct.

INSTALLATION

(1) Install the defroster nozzle and duct.
(2) Raise and secure the windshield.
(3) Install the fresh air intake duct.
(4) Install the fresh air intake grille on the cowl.
(5) Install the vent cables.
(6) Position the heater housing on the dash panel. Be sure all the housing studs extend through the dash panel.
(7) Install the seals on the blower motor and the heater core inlet and outlet tubes.
(8) Install the attaching nuts on the housing studs.

CAUTION: DO NOT over tighten the attaching nuts. The housing could become distorted causing air leaks and improper heater door operation. Tighten the nuts alternately and evenly until 2 stud threads are visible beyond each nut.

(9) Install the glove box.
(10) Connect the speedometer cable.
(11) Connect the heater hoses.

(12) Fill and bleed the cooling system.

FRESH AIR DOOR VACUUM MOTOR

REMOVAL

(1) Remove the glove box and assist handle.
(2) Disconnect the vacuum hose from the motor.
(3) Remove the motor lever retaining clip.
(4) Remove the motor attaching nuts and remove the motor from the fresh air duct.

INSTALLATION

(1) Position the motor on the fresh air duct and install the motor attaching nuts.
(2) Align the motor lever with the air door lever and install the lever retaining clip.
(3) Connect the vacuum hose to the motor.
(4) Install the glove box and assist handle.

FRESH AIR INTAKE DUCT

REMOVAL

WARNING: HOT ENGINE COOLANT CAN CAUSE SEVERE BURNS. DO NOT OPEN THE RADIATOR DRAIN COCK WHEN THE COOLING SYSTEM IS HOT AND PRESSURIZED. ALLOW THE COOLANT TO DECREASE TO ROOM TEMPERATURE BEFORE STARTING REPAIR OPERATIONS.

(1) Drain approximately 1.9 liters (2 qts) of coolant from the radiator. Drain the coolant into a clean container.
(2) Disconnect the heater hoses.
(3) Remove the nuts attaching the heater housing studs to the dash panel from inside the engine compartment.
(4) Disconnect the speedometer cable.
(5) Remove the glove box and assist handle.
(6) Tilt the heater housing back and pull it rearward and out from under the instrument panel.
(7) Disconnect the vent cables.
(8) Remove the fresh air intake grille from the cowl.
(9) Remove the fresh air intake duct.

INSTALLATION

(1) Install the fresh air intake duct.
(2) Install the defroster nozzle and duct.
(3) Raise and secure the windshield.
(4) Install the fresh air grille on the cowl.
(5) Install the vent cables.
(6) Position the heater housing on the dash panel. Be sure all the housing studs extend through the dash panel.
(7) Install the seals on the blower motor and heater core inlet and outlet tubes.
(8) Install the attaching nuts on the heater housing studs.

CAUTION: DO NOT over tighten the attaching nuts. The housing could become distorted causing air leaks and improper heater door operation. Tighten the nuts alternately and evenly until 2 stud threads are visible beyond each nut.

(9) Install the glove box and assist handle.
(10) Connect the speedometer cable.
(11) Connect the heater hoses.
(12) Fill and bleed the cooling system.

DESCRIPTION (AIR CONDITIONING)

The evaporator, blower fan and motor, thermostat, expansion valve, capillary tube, air outlets and system controls are located in the evaporator housing. The evaporator housing is mounted under the instrument panel. The compressor, condenser, receiver-dryer and refrigerant lines are located in the engine compartment.

A rotary-type compressor with magnetic clutch operated drive pulley is used for all vehicles equipped with air conditioning.

SIGHT GLASS

A sight glass is located on the top of the receiver-drier (Fig. 6). The sight glass provides a visual check of system refrigerant level. A continuous stream of bubbles will appear in the sight glass when system charge is low. Bubbles will not appear when the system is fully charged.

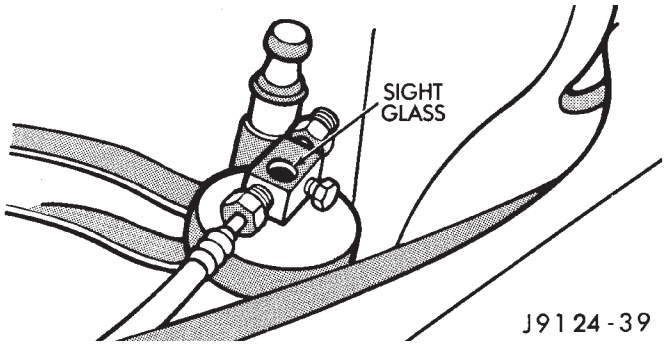

Fig. 6 Sight Glass (Typical)

A/C CONTROL PANEL

FAN SWITCH

The fan switch may be serviced by removing the access plate located on the lower evaporator core housing.

TEMPERATURE CONTROL THERMOSTAT

REMOVAL

(1) Lower the evaporator housing.
(2) Remove the attaching screws holding the top and bottom housings together.
(3) Separate the housings.
(4) Remove the thermostat.

INSTALLATION

(1) When installing a replacement temperature control thermostat, insert the capillary tube into the evaporator coil a minimum of 50 mm (2 inch) (Fig. 7).

CAUTION: Handle the tube with care to avoid bends or kinks that could cause the thermostat to malfunction.

(2) Assemble the housing and install the attaching screws. DO NOT over tighten the attaching screws.
(3) Install the evaporator housing.

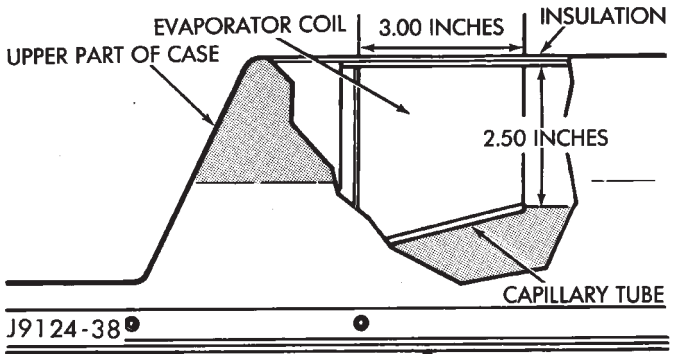

Fig. 7 Temperature Control Thermostat

A/C CONDENSER

REMOVAL

WARNING: DO NOT LOOSEN THE RADIATOR DRAIN COCK WHEN THE COOLING SYSTEM IS HOT AND PRESSURIZED. HOT COOLANT CAN CAUSE SERIOUS BURNS.

(1) Discharge the system slowly to prevent loss of compressor oil.
(2) Drain the radiator. Drain the coolant into a clean container.
(3) Remove the fan shroud and radiator.
(4) Disconnect the pressure pipe fitting from the condenser.
(5) Remove the condenser attaching screws and tilt the bottom of the condenser toward the engine. **Plug all the condenser openings to prevent entry of dirt or moisture.**
(6) Working from under the vehicle, disconnect the receiver-drier to-evaporator hose fitting from the receiver-drier.
(7) Remove the condenser and receiver-drier as an assembly.
(8) Remove the receiver-drier from the condenser, if necessary.

INSTALLATION

(1) If the condenser is replaced, add 30 ml (1 fluid oz.) of refrigerant oil to the system.
(2) Attach the receiver-drier to the condenser.
(3) Place the condenser in position and connect the hose fitting to the receiver-drier.
(4) Install the condenser attaching screws.
(5) Connect the condenser pressure pipe fitting.
(6) Install the radiator and fan shroud.
(7) Fill the cooling system.
(8) Evacuate, charge and leak test the air conditioning system.

RECEIVER-DRIER REPLACEMENT

REMOVAL

(1) Discharge the system slowly to prevent loss of compressor oil.
(2) Disconnect the evaporator and condenser hose fittings from the receiver-drier.
(3) Remove the receiver-drier attaching screws. Remove the receiver-drier.

INSTALLATION

(1) Position the receiver-drier in place. Install and tighten the receiver-drier attaching screws.
(2) Connect the evaporator and condenser hose fittings to the receiver-drier.
(3) Charge the system.
(4) Preform the leak test on the system.

EVAPORATOR AND HOUSING

REMOVAL

(1) Discharge the system. **Discharge the system slowly to prevent loss of compressor oil.**
(2) Disconnect the inlet (suction) hose.
(3) Disconnect the receiver-drier-to-evaporator hoses.
(4) Remove the hose clamps and dash grommet retaining screws.
(5) Remove the evaporator housing-to-instrument panel attaching screws and the housing mounting bracket screw (Fig. 8).

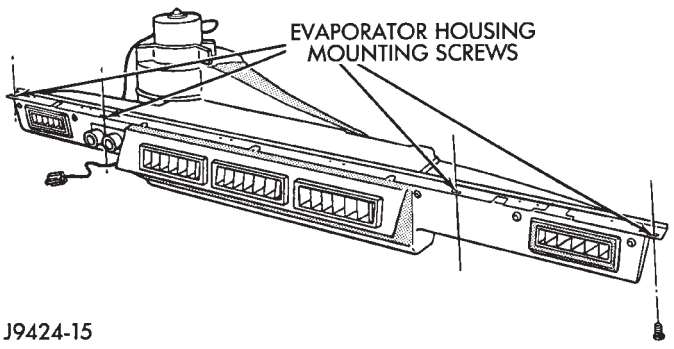

Fig. 8 Evaporator Housing

(6) Lower the evaporator housing and pull the hoses and hose grommet through the dash opening.

The blower motor, blower motor housing, evaporator core, control switches and expansion valve can all be serviced after removing the evaporator housing (Fig. 9).

INSTALLATION

(1) If the evaporator is replaced, add 30 ml (1 fluid oz.) of refrigerant oil to the system.

(2) Push the hoses through the grommet openings and install the hose grommet by pushing it toward the engine compartment.

(3) Install the hose grommet attaching screws.

(4) Raise the evaporator housing. Install the evaporator housing-to- instrument panel attaching screws and the evaporator housing mounting bracket screw.

(5) Install the hose clamps.

(6) Connect the receiver-drier hoses.

(7) Connect the inlet (suction) hose.

(8) Evacuate, charge and leak test the system.

EXPANSION (H) VALVE

REMOVAL

(1) Discharge the system slowly to prevent loss of compressor oil.

(2) Remove the evaporator housing.

(3) Remove the insulation wrapped around the suction hose fitting, expansion valve and evaporator tubing.

(4) Mark the capillary tube location on the evaporator tubing.

(5) Disconnect the inlet and outlet hose fittings, and remove the capillary tube clamp.

(6) Disconnect and remove the expansion valve.

INSTALLATION

(1) Clean the evaporator tubing to provide a positive metal-to-metal contact for the replacement expansion valve capillary tube.

(2) Install the replacement expansion valve.

(3) Clamp the capillary tube at the marked location on the evaporator tubing.

(4) Connect the inlet and outlet hose fittings. **The capillary tube must be securely clamped and have positive metal-to-metal contact with the evaporator tubing.**

(5) Wrap the expansion valve, inlet hose fitting and capillary tube with insulation.

(6) Install the evaporator housing.

(7) Evacuate, charge and leak test the system.

A/C BLOWER MOTOR

It is not necessary to discharge the system to service the blower motor. The evaporator housing need only be lowered for access to the blower motor attaching screws.

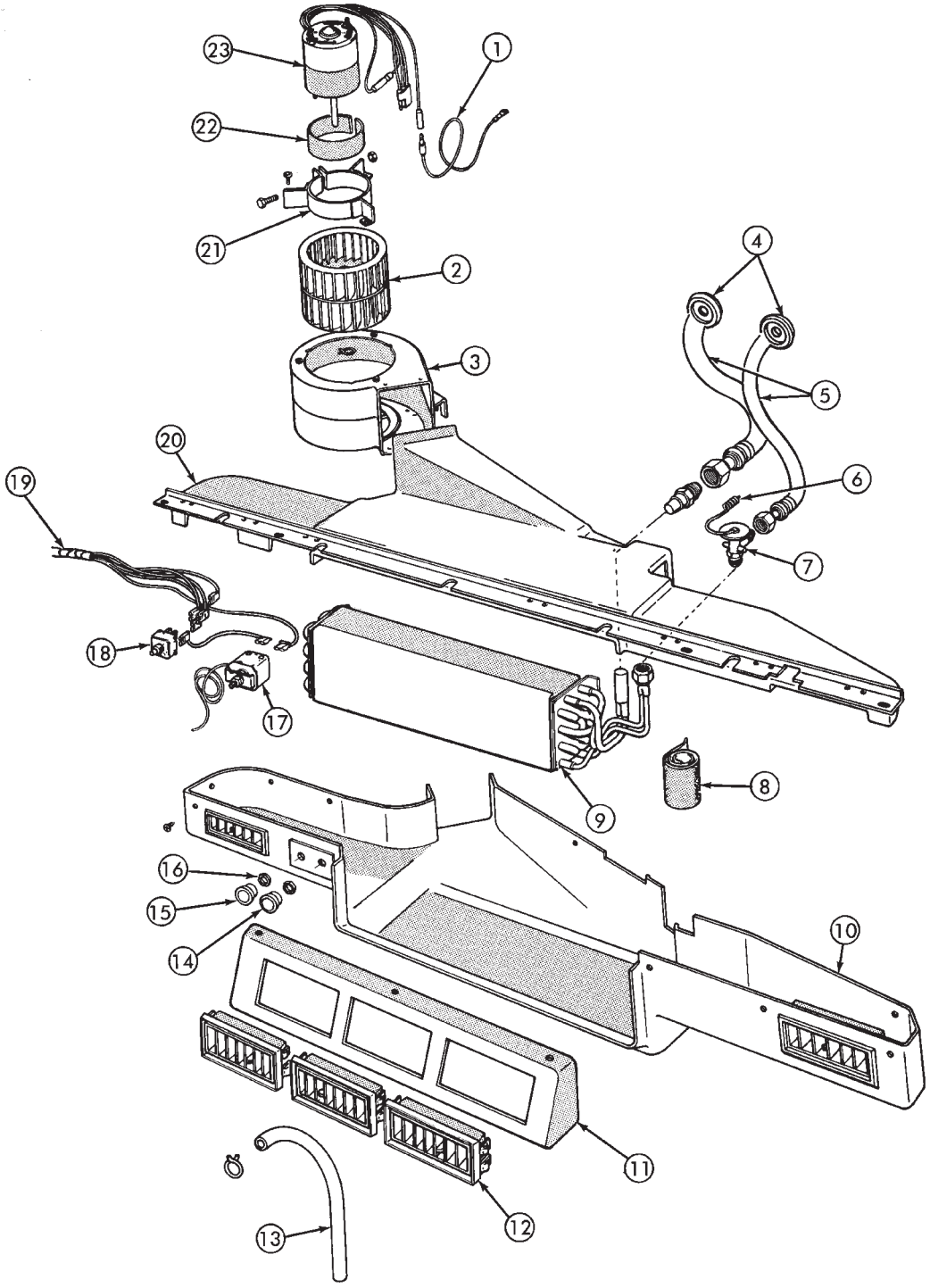

Fig. 9 Evaporative Housing and Components

TORQUE SPECIFICATIONS

DESCRIPTION	TORQUE
Compressor Cylinder Head Bolts	32 N•m (24 ft. lbs.)
Compressor Mounting Bolts	27 N•m (20 ft. lbs.)
Compressor Mounting Bracket Bolts	27 N•m (20 ft. lbs.)
Compressor Oil Filter Plug	10 N•m (7 ft. lbs.)
Condenser Screws – 2.5L	6 N•m (55 in. lbs.)
4.0L	2 N•m (20 in. lbs.)
Condenser Nuts – 4.0L	3 N•m (26 in. lbs.)
Discharge/Suction Hose Fitting O-Ring Type	33 N•m (24 ft. lbs.)
Evaporator/Receiver Hose Coupling	14 N•m (10 ft. lbs.)
Expansion Valve-to-Evaporator Connection	24 N•m (18 ft. lbs.)

DESCRIPTION	TORQUE
Heater Hose Clamps Worm Type	3.4 N•m (30 in. lbs.)
Heater Housing/Dash Panel Stud Nuts	6 N•m (55 in. lbs.)
Magnetic Clutch Hex Nut	37 N•m (27 ft. lbs.)
Receiver Screws – 2.5L	3.7 N•m (33 in. lbs.)
4.0L	7 N•m (62 in. lbs.)
Service Valve/Compressor Fitting**	34 N•m (25 ft. lbs.)
Service Valve Screws Flange Type	20 N•m (15 ft. lbs.)
Steering Column Retaining Nuts	27 N•m (20 ft. lbs.)

** Wet Torque – Lubricate the service valve coupling threads and O-ring with compressor oil.

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