HEATING AND AIR CONDITIONING

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GENERAL INFORMATION

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HEATER AND A/C OPERATION

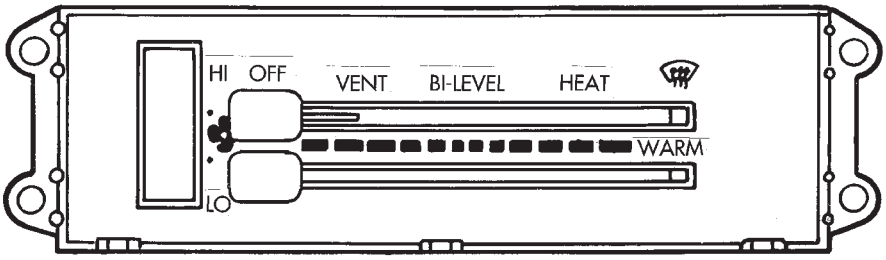
HEATER—XJ

A blend-air heating system is used in XJ vehicles. The temperature of heated air is controlled by regulating the quantity of air flow through the heater core. This is accomplished by blending outside air with heated air from the heater core to obtain the desired discharge temperature. A temperature control lever on the heater control determines air flow through the heater core. The lever uses a cable to operate the blend-air door. This door controls air flow through the core. Vacuum motors are used to actuate and position the remaining door in the system.

On left hand drive (LHD) XJ vehicles a water valve controls coolant flow to the heater core. The valve is vacuum operated. When vacuum is applied, the valve opens and coolant is directed through the heater core and back to the engine. When the water valve is closed (no vacuum applied) coolant flow bypasses the heater core back to the engine.

HEATING SCHEMATIC—XJ

HEATER CONTROL UNIT

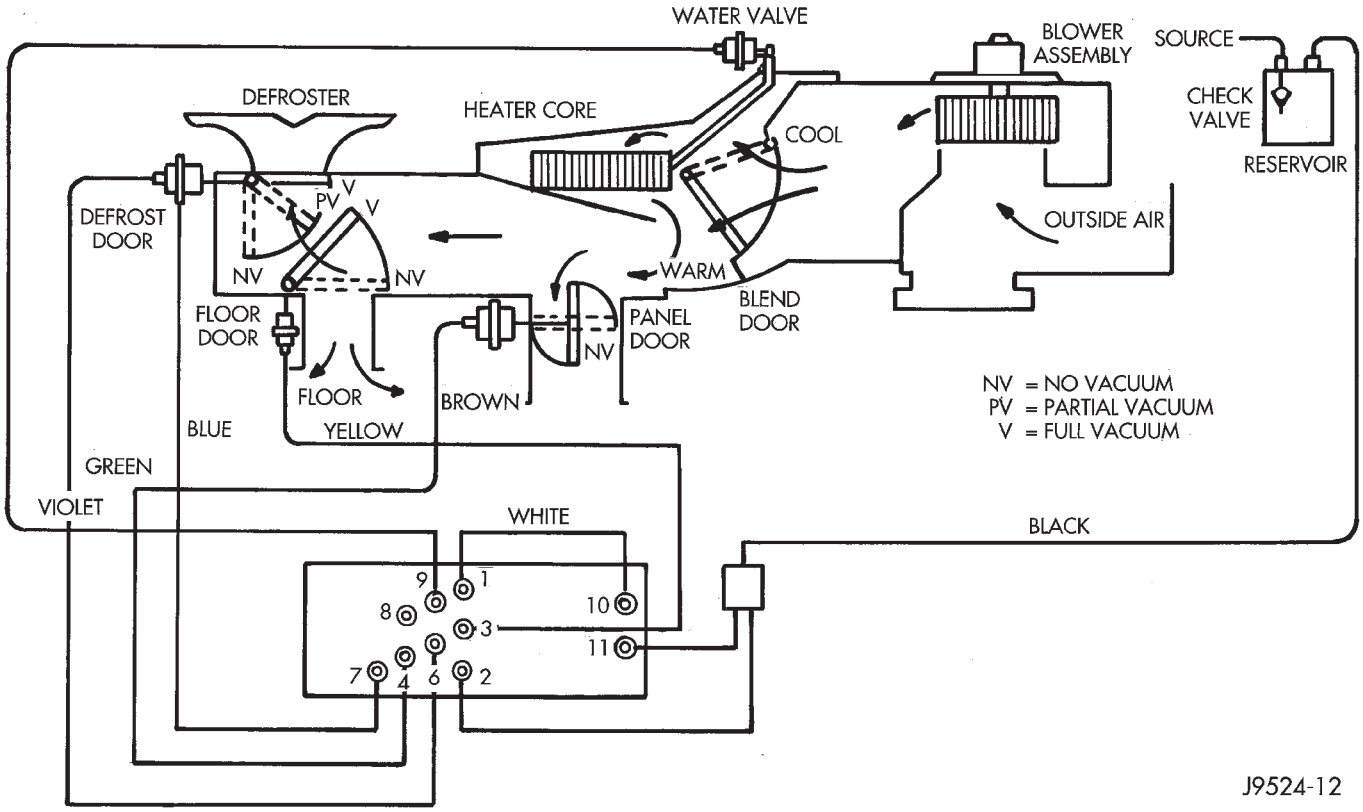


HEATER SYSTEM OPERATION

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	4	Open	Open	Closed	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



HEATER—YJ

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.

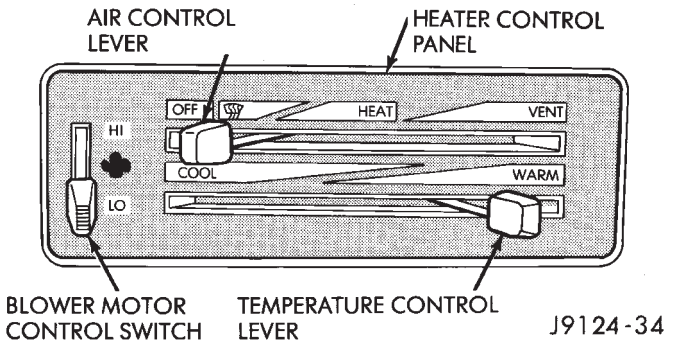


Fig. 1 Heater Control Panel

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.

DEFROSTING

The heater housing has a defroster door to divert heated air to the defroster duct and 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 diverts the heated air from the core to the defroster duct outlets.

If air control lever is moved to any position between heat and defrost, 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.

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

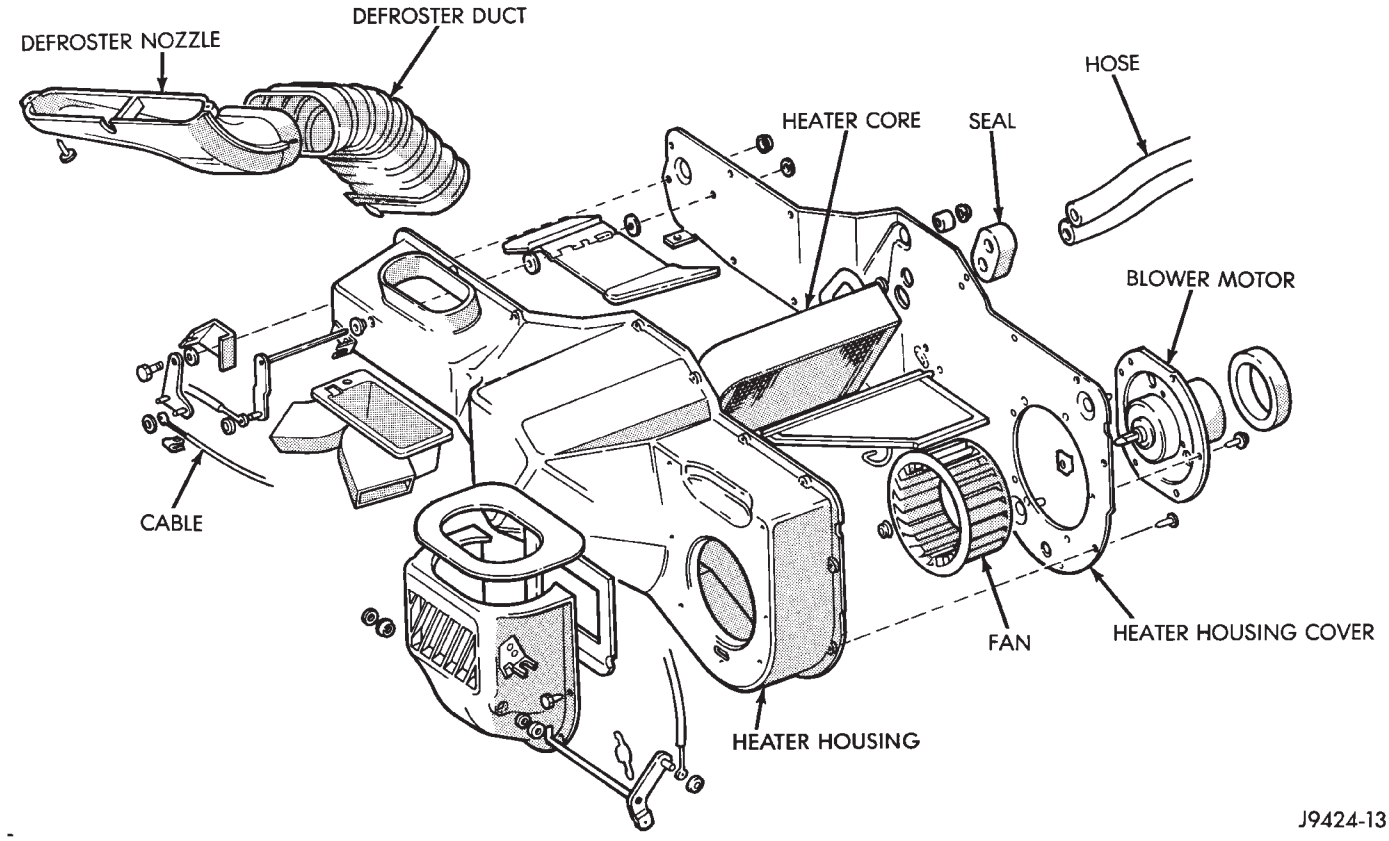


Fig. 2 Heating System Components

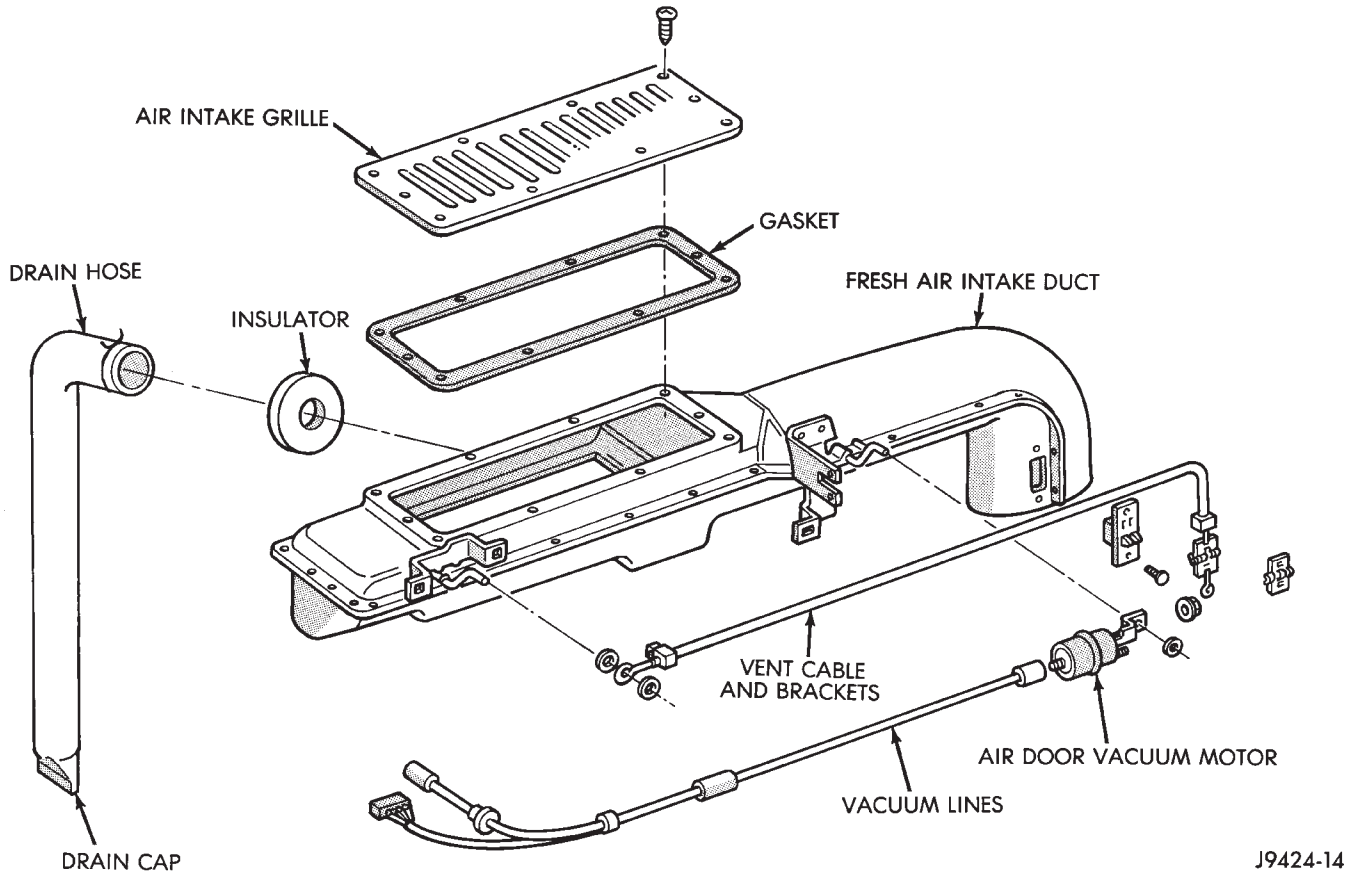


Fig. 3 Fresh Air Intake System Components

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.

AIR CONDITIONING

The compressor increases the pressure and temperature of the refrigerant. The heated refrigerant vapor is pumped into the condenser where it is cooled by 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 valve at all times. From the receiver, the high pressure liquid refrigerant passes to the expansion valve. The expansion valve meters refrigerant into the evaporator. The low pressure is maintained by the suction side of the compressor. As it enters the evaporator, the refrigerant begins to absorb 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. From the evaporator the vaporized refrigerant is drawn back to the compressor to repeat the cycle.

A/C COMPONENTS

COMPRESSOR: The SD7H15 Compressor is used on all models. The purpose of the compressor is to compress the low-pressure refrigerant vapor into a high pressure, high temperature vapor. The compressor is serviced as a assembly only.

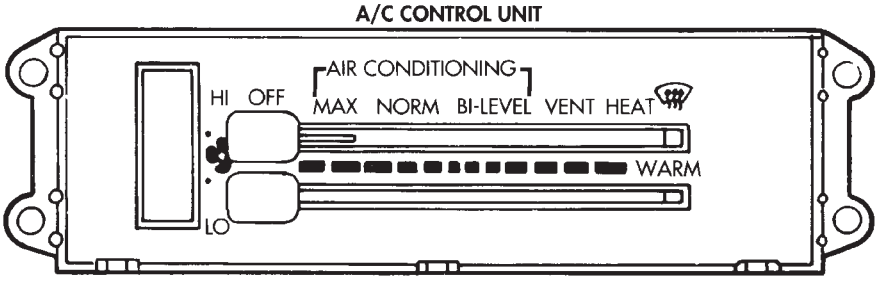
CLUTCH PULLEY AND COIL: They are mounted on the compressor and providing a way to drive the compressor. The compressor clutch and coil are the only serviced parts on the SD7H15 compressor. When the compressor is not in operation, the pulley free wheels on the clutch hub bearing. When the coil is energized the clutch plate is magnetically engaged with the pulley and turns the compressor shaft.

CONDENSER: The condenser is located in front of the engine radiator. Its function is to cool the hot high pressure refrigerant gas. This causes it to condense into high pressure liquid refrigerant.

EXPANSION VALVE: The expansion valve is located in the engine compartment on XJ vehicles. On YJ vehicles it is located behind the A/C housing. Its function is to meter refrigerant into the evaporator in accordance with cooling requirements.

AIR CONDITIONING SCHEMATIC—XJ

A/C CONTROL UNIT

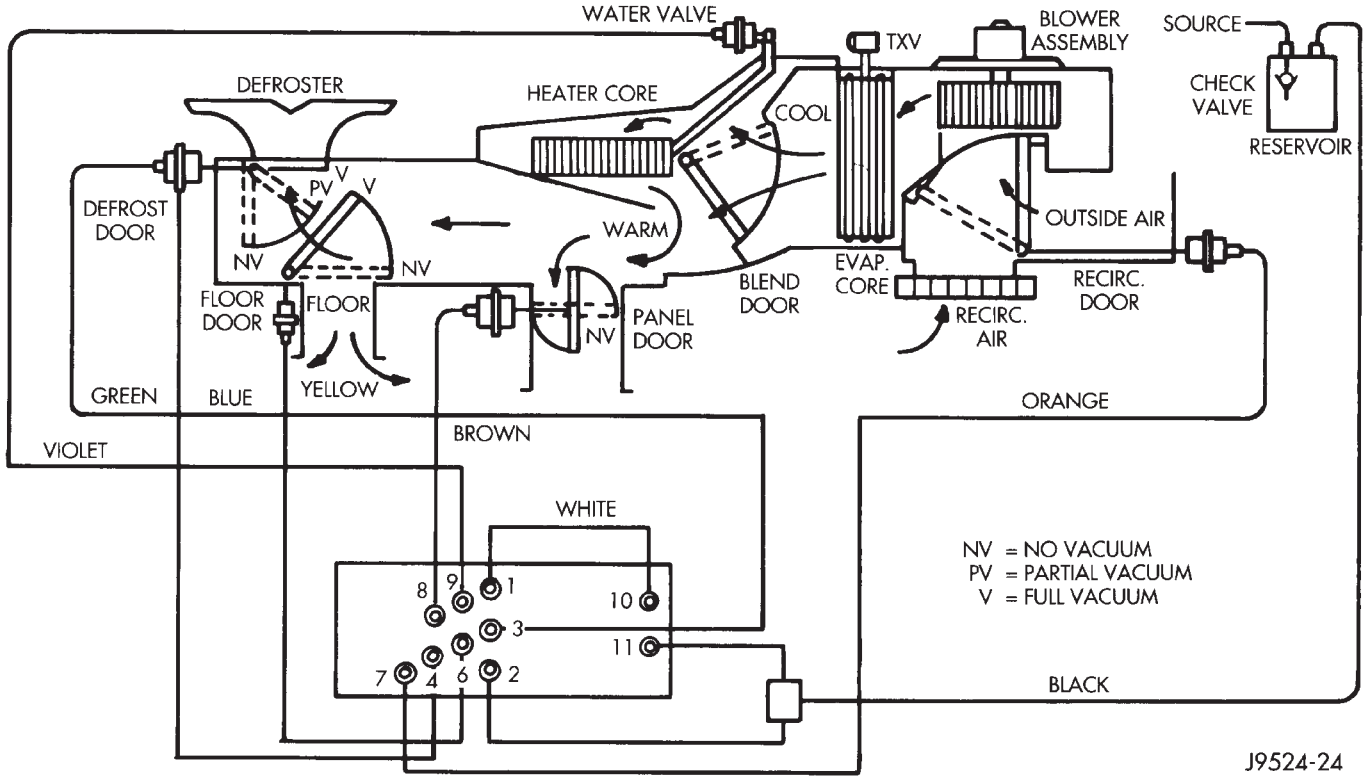


A/C SYSTEM OPERATION

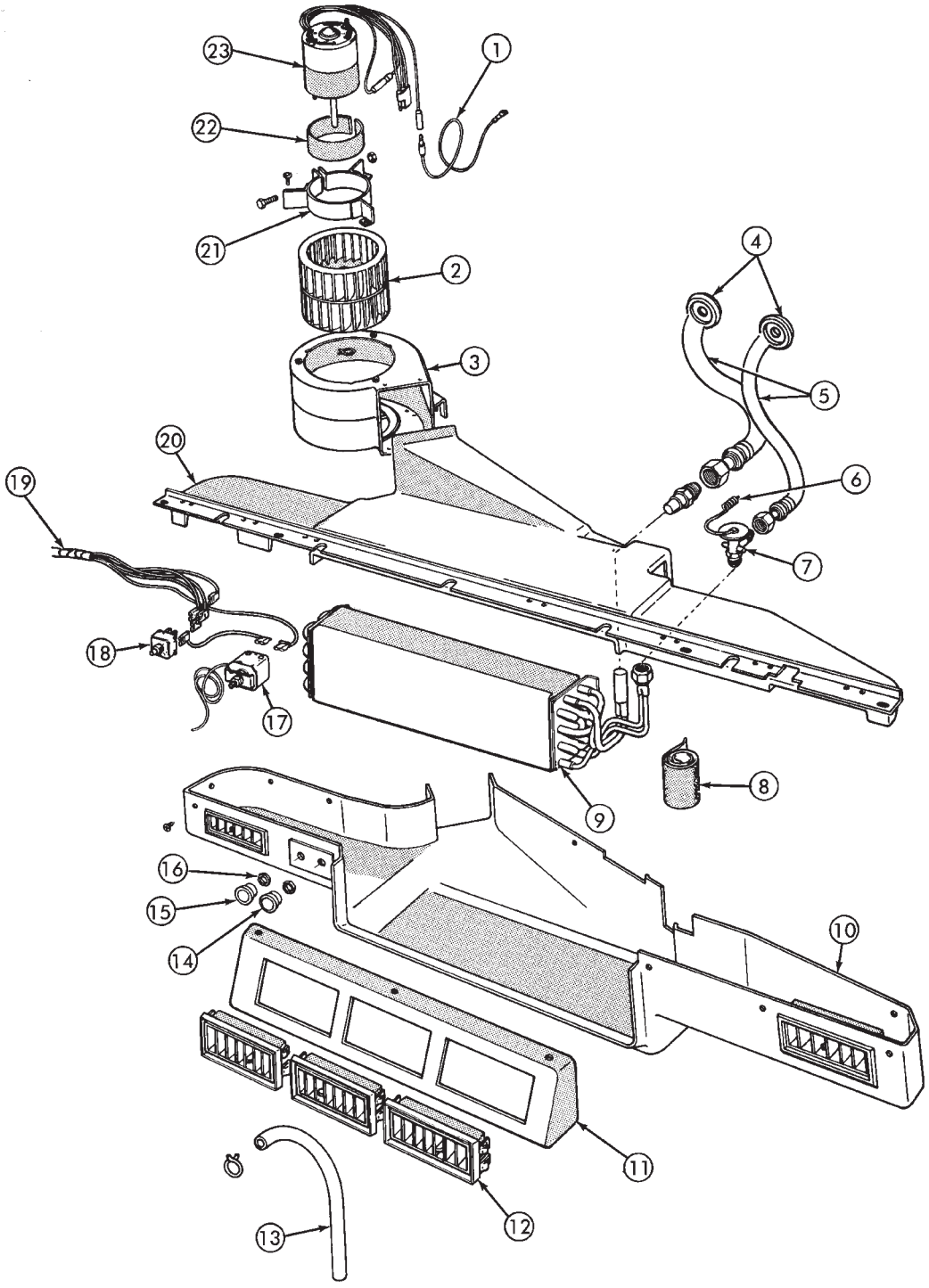
Mode Lever Position	Air Discharge	Blower Speeds	Recirc. Door	Panel Door	Floor Door	Defrost Door	A/C Cmp.	Water Valve
Off	Closed	None	Recirc.	Open	Indeter-minate	Open	Off	Closed
Max A/C	Panel Registers With Floor Bleed	4	Recirc.	Open	Bleed	Closed	On	Open (1)
Norm A/C	Panel Registers With Floor Bleed	4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



EVAPORATIVE HOUSING COMPONENTS—YJ



1. FEED WIRE
2. BLOWER FAN
3. BLOWER HOUSING
4. GROMMET
5. HOSE
6. CAPILLARY TUBE
7. EXPANSION VALVE
8. INSULATION
9. EVAPORATOR CORE
10. LOWER HOUSING
11. LOUVER PANEL
12. LOUVER
13. DRAIN TUBE
14. TEMPERATURE CONTROL KNOB
15. FAN CONTROL KNOB
16. NUT
17. THERMOSTAT
18. FAN CONTROL SWITCH
19. SWITCH HARNESS
20. UPPER HOUSING
21. BRACKET
22. INSULATION
23. BLOWER MOTOR

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EVAPORATOR COIL: The coil is located in the A/C housing. Its function is to remove heat and dehumidify the air before it enters the vehicle.

FIN SENSING CYCLING CLUTCH SWITCH: The switch is attached to the evaporator coil with the temperature sensing probe inserted into the coil fins. This switch controls evaporator temperature and prevents condensate water on the evaporator coil from freezing. It does this by sending signals to the Powertrain Control Module (PCM) to cycling the compressor clutch on and off. This switch is used on **XJ** only.

FILTER-DRIER: The drier is used to remove any traces of moisture from the refrigerant system. A sight glass is located on top of the filter drier. It is used as a diagnostic tool to observe refrigerant flow.

HIGH PRESSURE RELIEF VALVE: The valve is located on the filter drier. The valve is used to prevent excessive high pressure build of 3445 to 4135 kPa (500 to 600 psi) and above. This prevents damage to the compressor and other system components.

LOW-PRESSURE HIGH-PRESSURE CUT-OFF SWITCH: The switch is located on the filter drier and is wired in series with compressor clutch. When the pressure drops down to 193 kPa (28 psi) the switch interrupts the power to the compressor clutch. When the pressure increases above 3100 to 3375 kPa (450 to 490 psi) the switch interrupts the power to the compressor clutch.

THERMOSTAT: The thermostat is located in the evaporator housing. The thermostat temperature sensing probe is inserted into the evaporator coil. Its function is to cycles the compressor clutch on and off. This switch controls temperature and prevents condensate water on the evaporator coil from freezing. The thermostat is used on the **YJ** only.

REFRIGERANT LINES: The lines are used to carry the refrigerant between the various system components.

SERVICE PORTS: The high pressure service port is located on the discharge line near the compressor. The low pressure service port is located on the suction line near the compressor. These ports are used to attach A/C gauges. After servicing the refrigerant system, always install service port caps.

REFRIGERANT

XJ and YJ vehicles use a new type of refrigerant called R-134a. It is a non-toxic, non-flammable, clear color-less liquified gas.

R-134a refrigerant is not compatible with R-12 refrigerant. A small amount of R-12 in a R-134a system will cause compressor failure, oil sludge or poor air conditioning performance.

R-134a refrigerant requires a special type of compressor oil (SP20 PAG). When adding oil, make sure that it is designed to be used in a R-134a system and the SD7H15 compressor.

Service ports have been designed to ensure that the system is not accidentally filled with R-12 refrigerant.

REFRIGERANT EQUIPMENT

WARNING: EYE PROTECTION MUST BE USED WHEN SERVICING AN AIR CONDITIONING REFRIGERANT SYSTEM. TURN OFF (ROTATE CLOCKWISE) ALL VALVES ON THE EQUIPMENT BEING USED BEFORE PROCEEDING WITH THIS OPERATION. PERSONNEL INJURY CAN RESULT.

Chrysler Corporation recommends a (R-134a) recycling device that meets SAE standard J2210 be used when servicing the refrigerant system. 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.

MANIFOLD GAUGE SET

CAUTION: DO NOT use an R-12 manifold gauge set on an R-134a system. The refrigerants are not compatible and system damage will result.

A manifold gauge set (Fig. 1) may be needed in conjunction with the charging and or recovery/recycling device. The service hoses on the gauge set being used should have manual (turn wheel) or automatic back flow valves at the service port connector ends. This will prevent refrigerant from being release into the atmosphere.

LOW PRESSURE GAUGE HOSE

The low pressure hose (BLUE with BLACK STRIP) should be attached to the charging/service port. This port is located at the right front of the engine compartment in the condenser-to-evaporator line.

HIGH PRESSURE GAUGE HOSE

The high pressure hose (RED with BLACK STRIP) should be attached to the discharge/service port. This port is located on the compressor plumbing or manifold.

RECOVERY/RECYCLING/EVACUATION/ CHARGING HOSE

The center manifold hose (YELLOW or WHITE with BLACK STRIP) is used to recover, evacuate and charge the refrigerant system. When the low or high pressure valves on the manifold gauge set are opened, the refrigerant in the system will escape through this hose.

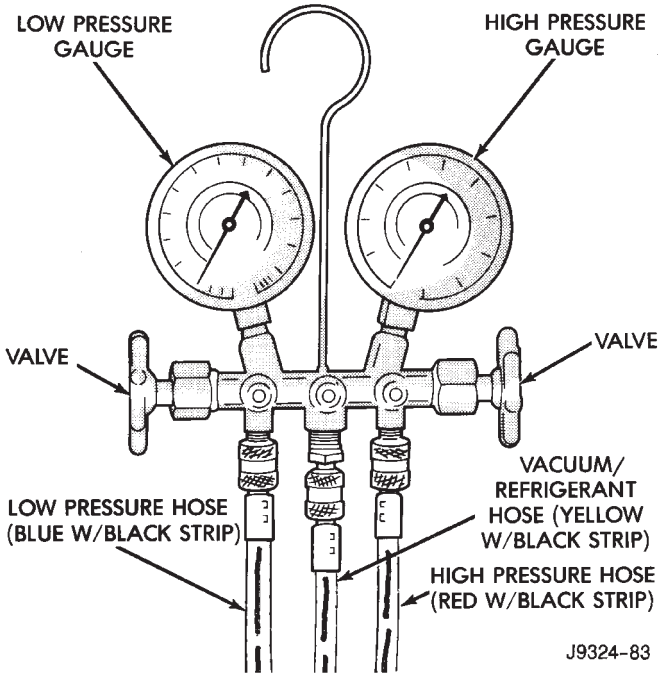

Fig. 1 Manifold Gauge Set

Refer to the Recovery/Recycling device operators manual for proper procedures.

WARNINGS, CAUTIONS AND SERVICE PRECAUTIONS

WARNINGS

WARNING: THE AIR CONDITIONING SYSTEM CONTAINS REFRIGERANT UNDER HIGH PRESSURE. SEVERE PERSONAL INJURY MAY RESULT FROM IMPROPER SERVICE PROCEDURES. REPAIRS SHOULD ONLY BE PERFORMED BY QUALIFIED SERVICE PERSONNEL.

WARNING: AVOID BREATHING A/C REFRIGERANT AND LUBRICANT VAPOR OR MIST. EXPOSURE MAY IRRITATE EYES, NOSE AND/OR THROAT. WEAR EYE PROTECTION WHEN SERVICING THE AIR CONDITIONING REFRIGERANT SYSTEM. SERIOUS EYE INJURY CAN RESULT FROM EYE CONTACT WITH REFRIGERANT. IF EYE CONTACT IS MADE, SEEK MEDICAL ATTENTION IMMEDIATELY.

WARNING: DO NOT EXPOSE REFRIGERANT TO OPEN FLAME. POISONOUS GAS IS CREATED WHEN REFRIGERANT IS BURNED. AN ELECTRONIC TYPE LEAK DETECTOR IS RECOMMENDED.

WARNING: IF ACCIDENTAL SYSTEM DISCHARGE OCCURS, VENTILATE THE WORK AREA BEFORE RESUMING SERVICE. LARGE AMOUNTS OF REFRIGERANT RELEASED IN A CLOSED WORK AREA WILL DISPLACE THE OXYGEN AND CAUSE SUFFOCATION.

WARNING: THE EVAPORATION RATE OF (R-134A) REFRIGERANT AT AVERAGE TEMPERATURE AND ALTITUDE IS EXTREMELY HIGH. AS A RESULT, ANYTHING THAT COMES IN CONTACT WITH THE REFRIGERANT WILL FREEZE. ALWAYS PROTECT SKIN OR DELICATE OBJECTS FROM DIRECT CONTACT WITH REFRIGERANT.

WARNING: R-134A SERVICE EQUIPMENT OR VEHICLE A/C SYSTEM SHOULD NOT BE PRESSURE TESTED OR LEAK TESTED WITH COMPRESSED AIR. SOME MIXTURES OF AIR AND R-134A HAVE BEEN SHOWN TO BE COMBUSTIBLE AT ELEVATED PRESSURES. THESE MIXTURES ARE POTENTIALLY DANGEROUS AND MAY RESULT IN FIRE OR EXPLOSION CAUSING INJURY OR PROPERTY DAMAGE.

CAUTIONS

CAUTION: Liquid refrigerant is corrosive to metal surfaces. Follow the operating instructions supplied with equipment being used.

CAUTION: DO NOT use R-12 equipment or parts on the R-134a system. Damage to the system will result.

CAUTION: Never add R-12 to a system designed to use R-134a. Damage to the system will result.

CAUTION: R-12 compressor oil can not be mixed with the R-134a compressor oil. They ARE NOT compatible.

CAUTION: Do not over charge refrigerant system. This will cause excessive compressor head pressure and can cause noise and system failure.

SERVICE PRECAUTIONS

Recover the refrigerant before opening any fitting or connection. Open fittings with caution even after the system has been discharged. Never open or loosen a connection before recovering the refrigerant.

The A/C system must always be evacuated before charging.

DO NOT open the refrigerant system or uncap a replacement component until you are ready to service the system. This will prevent contamination in the system.

Before disconnecting a component clean the outside of the fittings thoroughly to prevent contamination entering the system.

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

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

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

Tighten fittings only to the specified torque. The 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. This will prevent twisting of the refrigerant lines or tubes.

Refrigerant oil absorbs moisture from the atmosphere if left uncapped. DO NOT open a container of

oil until you are ready to use it. Install the cap immediately after using. Store the oil only in a clean moisture-free container.

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

COOLING SYSTEM

To maintain the performance level of the heating/air conditioning system, the engine cooling system must be properly maintained.

The use of a bug screen is not recommended. Any obstructions in front of the radiator or condenser can reduce the performance of the A/C and cooling system. If a bug screen is used it must be cleaned frequently.

COOLANT PRECAUTIONS

WARNING: ANTIFREEZE IS AN ETHYLENE GLYCOL BASE COOLANT AND IS HARMFUL IF SWALLOWED OR INHALED. IF SWALLOWED, DRINK TWO GLASSES OF WATER AND INDUCE VOMITING. IF INHALED, MOVE TO FRESH AIR AREA. SEEK MEDICAL ATTENTION IMMEDIATELY.

WARNING: WASH SKIN AND CLOTHING THOROUGHLY AFTER COMING IN CONTACT WITH ETHYLENE GLYCOL.

WARNING: KEEP OUT OF REACH OF CHILDREN AND PETS.

WARNING: DO NOT OPEN A COOLING SYSTEM WHEN THE ENGINE IS AT RUNNING TEMPERATURE. PERSONAL INJURY CAN RESULT.

WARNING: DO NOT STORE IN OPEN OR UNMARKED CONTAINERS.

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.

The engine cooling system is designed to develop internal pressure of 97 to 124 kPa (14 to 18 psi). Allow the vehicle 15 minutes to cool down (or until a safe temperature and pressure are attained) before opening the cooling system. Refer to Group 7, Cooling System.

REFRIGERANT HOSES/TUBES PRECAUTIONS

Kinks or sharp bends in the refrigerant tubing or hoses will reduce the capacity of the entire system. High pressures are produced in the system when it is operating. Extreme care must be exercised to make sure that all connections are pressure tight. Dirt and moisture can enter the system when it is opened for repair.

A good rule for the flexible hose lines is to keep the radius of all bends at least 10 times the diameter of the hose. Sharp bends will reduce the flow of refrigerant. The flexible hose lines should be routed so they are at least 80 mm (3 inches) from the exhaust manifold. It is a good practice to inspect all flexible hose lines at least once a year to make sure they are in good condition and properly routed.

REFRIGERANT SERVICE AND PERFORMANCE TEST

INDEX

LEAK TESTING REFRIGERANT

REVIEW WARNINGS AND CAUTIONS IN THIS GROUP BEFORE LEAK TESTING.

If A/C system is not cooling properly, determine if system is fully charged. Refer to Refrigerant System Diagnosis Chart. If the system is empty evacuate the A/C system and charge system with 0.283 kPa (0.6 lbs. or 10 oz.) R-134a refrigerant. Refer to Charging Refrigerant System for instructions. To detect a leak in the system, perform the following procedures.

(1) Position the vehicle in a wind free work area. This will aid in detecting small leaks.

(2) Bring A/C system up to operating temperature and pressure. This is done by allowing the engine to run with the A/C on for 5 to 7 minutes.

(3) Open hood 5 minutes prior to leak test. This will dissipate any accumulated refrigerant in the engine compartment.

(4) With the engine not running, use an R-134a Electronic Leak Detector and search for leaks. Move probe slowly along the bottom side of lines and fittings, because R-134a is heavier than air. Fittings, lines, or components that appear to be oily usually indicates a refrigerant leak.

(5) To inspect the evaporator core for leaks. Set the blower at low speed and the selector in PANEL and RECIRC mode check for leaks at CENTER panel outlets.

RECOVERING REFRIGERANT SYSTEM

REVIEW WARNINGS AND CAUTIONS IN GENERAL INFORMATION SECTION OF THIS GROUP BEFORE DISCHARGING SYSTEM.

R-134a refrigerant is a hydrofluorocarbon (HFC) that does not contain chlorine. R-134a refrigerant Recovery/Recycling Station that meets SAE standard J2210 must be used to recover the refrigerant. Refer to the operating instructions provided with the equipment for proper operation.

EVACUATING REFRIGERANT SYSTEM

REVIEW WARNINGS AND CAUTIONS IN GENERAL INFORMATION SECTION OF THIS GROUP BEFORE EVACUATING SYSTEM.

If the A/C system has been open to the atmosphere, it must be evacuated before the system can be charged. Moisture and air mixed with refrigerant will raise the compressor head pressure above acceptable operating levels. This will reduce the performance of the air conditioner and damage the compressor. Moisture will boil at near room temperature when exposed to vacuum. To evacuate the refrigerant system use following procedure:

(1) Connect a suitable charging station and manifold gauge set to the vehicle.

(2) Open the low and high side valves and start vacuum pump. When suction gauge reads 88 kPa (26 in. Hg) vacuum or greater, close all valves and turn off vacuum pump. If system fails to reach specified vacuum, the system has a leak that must be corrected. If system maintains the specified vacuum for 30 minutes, start the vacuum pump. Then open the suction and discharge valves and evacuate an additional 10 minutes.

(3) Close all valves. Turn off and disconnect the vacuum pump.

The system is now ready to be charged with refrigerant.

CHARGING REFRIGERANT SYSTEM

REVIEW WARNINGS AND CAUTIONS IN GENERAL INFORMATION SECTION OF THIS GROUP BEFORE CHARGING SYSTEM.

After the system has been tested for leaks and evacuated, a refrigerant charge can be injected into the system. Refer to refrigerant capacities for proper amount of refrigerant charge. Charge the system using a Recovery/Recycling/Charging Station approved for R-134a refrigerant. Refer to the instructions provided with the equipment for proper operation.

REFRIGERANT CHARGE CAPACITY

The R-134a system charge capacity is 0.9 kPa (32 oz.) for XJ and YJ vehicles.

REFRIGERANT OIL

It is important to have the correct amount of oil in the A/C system. This will ensure proper lubrication of the compressor. Too little oil will result in damage to the compressor. Too much oil will reduce the cooling capacity of the system.

The oil used in the SD7H15 compressor is a polyalkylene glycol synthetic oil SP-20 PAG, wax-free refrigerant oil. Only refrigerant oil of the same type should be used to service the system. Do not use any other oil. The oil container should be kept tightly capped until it is ready for use and then capped after use to prevent contamination. Refrigerant oil will quickly absorb any moisture it comes in contact with.

OIL LEVEL CHECK

It will not be necessary to check oil level in the compressor or to add oil unless there has been an oil loss. This may be due to a rupture or leak from a line, shaft seal, evaporator or condenser. Oil loss at a leak point will be evident by the presence of a wet, shiny surface around the leak.

When an A/C system is assembled at the factory, all components (except the compressor) are refrigerant oil free. After the system has been charged and operated, the oil in the compressor is dispersed through the system. The receiver-drier, evaporator, condenser and compressor will retain a significant amount of oil.

Refrigerant oil must be added when a receiver-drier, evaporator, condenser or compressor are replaced. When the compressor is replaced, the oil must be drained from the replaced compressor and measured. Drain all the oil from the new compressor. Add back into the new compressor the amount of oil that was drained out of the old compressor.

Add an additional 30 ml (1 fluid oz.) of compressor oil to the system when a receiver-drier, condenser or evaporator is replaced.

AIR CONDITIONING PERFORMANCE TESTS

Humidity has an important bearing on the temperature of the air delivered to the vehicle's interior. It is important to understand the effect humidity has on the performance of the system. When humidity is high, the evaporator has to perform a double duty. It must lower the air temperature and the temperature of the moisture carried in the air. Condensing the moisture in the air transfers a great deal of heat energy into the evaporator fins and tubing. This reduces the amount of heat the evaporator can absorb from the air. High humidity greatly reduces the evaporator's ability to lower the temperature of the air.

Evaporator capacity used to reduce the amount of moisture in the air is not wasted. Wringing some of the moisture out of the air entering the vehicle adds to the comfort of the passengers. However, an owner may expect too much from their air conditioning system on humid days. A performance test is the best way to determine whether or not the system is performing up to standard. This test also provides valuable clues to the possible cause of trouble.

Air temperature in test room must be 21°C (70°F) minimum for this test.

(1) Connect a Tachometer and manifold gauge set.

(2) Set A/C controls to Max A/C, temperature lever on full cool and blower on high.

(3) Start engine and adjust idle to 1,000 RPM with A/C clutch engaged.

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

(5) Insert a thermometer in the left center A/C outlet. Operate the A/C and engine for 5 minutes. The A/C clutch may cycle depending on ambient temperatures.

(6) After 5 minutes note the discharge air temperature. If the clutch cycles, take the reading before the clutch disengages.

(7) On LHD XJ vehicles open the hood and disconnect vacuum line going to the heater water control valve. Observe the valve arm for movement as the line is disconnected. Plug the vacuum line to prevent leakage. If it does not move repair vacuum circuit.

(8) Operate the A/C for 2 more minutes and take the discharge air temperature reading again. On XJ vehicles if the temperature increased by more than 2°C (5°F) check the blend air door cable for correct operation.

(9) Compare the discharge air temperature to the A/C Performance (Temperature and Pressure) Chart. If the discharge air temperature is high, refer to Refrigerant Leak Testing and Refrigerant System Diagnosis Chart.

(10) Compare the compressor discharge and suction pressures to the A/C Performance (Temperature and Pressure) Chart. If the compressor discharge or suction pressure is not normal, check the operation of the refrigerant system. Refer to Refrigerant System Diagnosis Chart.

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

The following chart have been developed for quick reference.

XJ PERFORMANCE TEMPERATURE AND PRESSURE CHART

Ambient Temperature	21°C (70°F)	27°C (80°F)	32°C (90°F)	38°C (100°F)	43°C (110°F)
Air Temperature At Center Panel Outlet	2- 7°C (36-44°F)	3- 8°C (38-46°F)	6- 12°C (42-53°F)	9- 16°C (48-60°F)	12- 20°C (54-68°F)
Evaporator Inlet Pressure At Charge Port	124 207 kPag	138 241 kPag	152 269 kPag	172 296 kPag	179 324 kPag
	18 30 psi	20 35 psi	22 39 psi	25 43 psi	26 47 psi
Compressor Discharge Pressure	1034 1516 kPag	1103 1620 kPag	1516 2136 kPag	1723 2205 kPag	1379 2344 kPag
	150 220 psi	160 235 psi	220 310 psi	250 320 psi	280 340 psi

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YJ PERFORMANCE TEMPERATURE AND PRESSURE CHART

Ambient Temperature	21°C (70°F)	27°C (80°F)	32°C (90°F)	38°C (100°F)	43°C (110°F)
Air Temperature At Center Panel Outlet	3- 8°C (38-46°F)	4- 10°C (39-50°F)	7- 13°C (44-55°F)	10- 17°C (50-62°F)	13- 21°C (56-70°F)
Evaporator Inlet Pressure At Charge Port	124 207 kPag	138 241 kPag	152 269 kPag	172 296 kPag	179 324 kPag
	18 30 psi	20 35 psi	22 39 psi	25 43 psi	26 47 psi
Compressor Discharge Pressure	1034 1516 kPag	1103 1620 kPag	1516 2136 kPag	1723 2205 kPag	1379 2344 kPag
	150 220 psi	160 235 psi	220 310 psi	250 320 psi	280 340 psi

J9424-47

PRESSURE DIAGNOSIS

CONDITION	POSSIBLE CAUSES	CORRECTION
LOW SIDE AND HIGH SIDE PRESSURE LOW	1. System refrigerant low. 2. Expansion valve is restricted.	1. Evacuate, leak test and charge system. 2. Replace the expansion valve.
LOW SIDE PRESSURE HIGH AND HIGH SIDE PRESSURE LOW	1. Internal leak in the compressor. 2. Cylinder head gasket is leaking. 3. Drive belt slipping.	1. Replace the compressor. 2. Replace the compressor. 3. Adjust the belt tension.
LOW SIDE AND HIGH SIDE PRESSURE HIGH	1. Condenser fins obstructed. 2. Air in the system. 3. Expansion valve is defective. 4. Loose or worn fan belt. 5. Refrigerant system overcharged.	1. Clean condenser fins. 2. Evacuate, leak test and charge system. 3. Replace the expansion valve. 4. Adjust or replace belt. 5. Recover refrigerant and recharge.
LOW SIDE PRESSURE LOW AND HIGH SIDE PRESSURE HIGH	1. Expansion valve is defective. 2. Restriction in refrigerant hose. 3. Restriction in receiver/drier. 4. Restriction in condenser.	1. Replace the expansion valve. 2. Check hoses for kinks and replace if necessary. 3. Replace receiver/drier. 4. Replace condenser.
LOW SIDE AND HIGH SIDE PRESSURES NORMAL INADEQUATE COOLING	1. Air in the system. 2. Excessive oil in system.	1. Evacuate, leak test and charge system. 2. Discharge and drain oil. Restore proper oil level. Evacuate, leak test and charge system.

J9524-10

PERFORMANCE DIAGNOSIS

CONDITION	POSSIBLE CAUSES	CORRECTION
COMPRESSOR NOISE	1. Broken valve or piston ring. 2. Refrigerant system overcharged. 3. Incorrect oil level. 4. Loose or worn fan belt.	1. Replace compressor. 2. Evacuate, leak test and charge system. 3. Discharge and drain oil. Restore proper oil level. Evacuate, leak test and charge system. 4. Adjust or replace belt.
EXCESSIVE VIBRATION	1. Incorrect belt tension. 2. Clutch loose. 3. Refrigerant system overcharged. 4. Pulley is misaligned.	1. Adjust belt tension. 2. Tighten clutch. 3. Recover refrigerant and recharge. 4. Align pulley.
CONDENSATION LEAKING INSIDE VEHICLE	1. Evaporator drain plugged or kinked.	1. Clean drain hose and check for proper installation.
FROZEN EVAPORATOR COIL	1. Faulty thermostat on YJ vehicle. 2. Faulty fin sensing cycling clutch switch XJ vehicle.	1. Check for proper installation and adjustment. Replace if necessary. 2. Check for proper installation. Replace if necessary.

J9524-11

HEATING AND AIR CONDITIONING TEST PROCEDURES

INDEX

AIR CONDITIONING CONTROLS—XJ VEHICLES

The A/C Compressor Clutch is controlled by several components: the Pressure Cut-Off Switch, Cycling Clutch Switch, Clutch Relay and Powertrain Control Module (PCM).

Powertrain Control Module may delay A/C clutch engagement up to 30 seconds.

Refer to Group 8W Wiring Diagrams for wiring and terminals. Use volt ohmmeter to test switches.

A/C COMPRESSOR CLUTCH

The clutch assembly consists of a stationary electromagnetic coil, hub bearing pulley assembly, and clutch plate. When the coil is energized the plate is magnetically engaged with the pulley and turns the compressor shaft.

A/C COMPRESSOR CLUTCH TEST

(1) Unplug clutch coil connector.

(2) Connect a jumper wire from the battery positive post to the clutch coil terminal. The clutch should engage, if not leave jumper wire connected and go to next step.

(3) Connect a jumper wire from clutch coil frame to chassis ground. The clutch should engage if not repair clutch coil ground or replace coil.

A/C COMPRESSOR CLUTCH RELAY

The A/C compressor clutch relay controls the 12-volt source to the A/C clutch. The relay is activated when the PCM receives a A/C request signal from the fin-sensed cycling clutch switch. The PCM then sends a ground signal to the relay. The relay is activated and sends 12-volts to the clutch coil which energizes the clutch. The relay is located in the power distribution center.

COMPRESSOR CLUTCH RELAY TEST

For test procedure refer to Powertrain Diagnostic Service Manual for A/C clutch relay circuit test.

LOW-PRESSURE HIGH-PRESSURE CUT-OFF SWITCH

The pressure cut-off switch is located on the filter drier and is wired in series with compressor clutch. The switch interrupts the power to the compressor clutch circuit when the pressure drops to 193 kPa (28 psi) or increases above 3100 to 3375 kPa (450 to 490 psi).

PRESSURE CUT-OFF SWITCH TEST

(1) Verify system has correct refrigerant charge.

(2) Turn ignition switch to RUN, A/C blower switch to ON and control set to MAX.

(3) Unplug pressure cut-off switch and test feed circuit from select switch. It should be battery voltage if not, repair open to select switch.

(4) Test for continuity between the switch terminals. If continuity is not present recover refrigerant from the system. Replace switch, evacuate and recharge system.

FIN SENSING CYCLING CLUTCH SWITCH

The switch is attached to the evaporator coil with the temperature sensing probe inserted into the coil fins. This switch prevents condensate water on the evaporator coil from freezing. It does this by sending signals to the PCM to cycling the compressor clutch on and off.

FIN-SENSED CYCLING CLUTCH SWITCH TEST

Test area ambient temperature should be around 21°C (70°F) for test.

(1) Verify system has correct refrigerant charge.

(2) Start Engine and turn on A/C.

(3) If the compressor clutch cycles ON and OFF 2 to 3 times per minute the cycling clutch switch is normal. The ambient temperature should be between 20°C-30°C (68°F-90°F). Above 32°C (90°F) the compressor clutch may stay engaged (non cycling) due to the high heat load, this condition is normal. If the compressor clutch fails to engage go to next step.

(4) Disconnect wiring harness connector from switch. With a volt meter test feed circuit from cut-

off switch for battery voltage. If no voltage is present test pressure cut-off switch. If voltage is present go to next step.

(5) With ohmmeter test harness connector ground circuit for continuity to ground. If circuit is open, (no continuity) repair ground circuit. If circuit test OK and clutch does not engage refer to Powertrain Diagnostic Service Manual for A/C clutch circuit test.

AIR CONDITIONING CONTROLS—YJ VEHICLES

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 circuit extends from the HTR/FAN fuse to the blower switch. From the blower switch, battery feed is routed to the blower motor and compressor clutch circuit.

Refer to Group 8W Wiring Diagrams for wiring schematic and terminals. Use volt ohmmeter to test switches.

COMPRESSOR CLUTCH

The clutch assembly consists of a stationary electromagnetic coil, hub bearing pulley assembly, and clutch plate. When the coil is energized the plate is magnetically engaged with the pulley and turns the compressor shaft.

COMPRESSOR CLUTCH TEST

(1) Unplug clutch coil connector.

(2) Connect jumper wire from battery positive post to clutch coil connector. The clutch should engage, if not leave jumper wire connected and go to next step.

(3) Connect jumper wire from clutch coil frame to chassis ground. The clutch should engage, if not repair clutch coil ground or replace coil.

A/C COMPRESSOR CLUTCH RELAY

The A/C compressor clutch relay controls the 12-volt source to the A/C clutch. The relay is activated when the PCM receives a A/C request signal. The PCM then sends a ground signal to the relay. The relay is activated and sends 12-volts to the clutch coil which energizes the clutch. The relay is located in the power distribution center.

COMPRESSOR CLUTCH RELAY TEST

For test procedure refer to Powertrain Diagnostic Service Manual for A/C clutch relay circuit test.

LOW-PRESSURE HIGH-PRESSURE CUT-OFF SWITCH

The pressure cut-off switch is located on the filter drier and is wired in series with compressor clutch. The switch interrupts the power to the compressor clutch circuit when the pressure drops to 193 kPa (28 psi) or increases above 3100 to 3375 kPa (450 to 490 psi).

PRESSURE CUT-OFF SWITCH TEST

(1) Turn ignition switch to RUN, A/C blower switch to ON and control set to MAX.

(2) Unplug pressure cut-off switch connector and test feed circuit from the thermostatic, should be battery voltage. If not, proceed to thermostatic control tests.

(3) Test for continuity between the switch terminals. If continuity is not present recover refrigerant system, replace switch, evacuate and recharge system.

THERMOSTATIC CONTROL

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.

THERMOSTATIC CONTROL TEST

(1) Turn ignition switch to RUN, A/C blower switch to ON and thermostatic control set to MAX cool.

(2) Test thermostatic control feed terminal from blower switch, should be battery voltage. If not repair open from blower switch.

(3) Test thermostatic control output terminal to pressure cut-out switch, should be battery voltage. If not, replace thermostatic control.

BLOWER MOTOR SWITCH

The blower switch controls blower motor speed. The blower motor segment consists of the 3 wires from the blower switch to the motor. 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.

BLOWER MOTOR SWITCH TEST

(1) Turn ignition to RUN position.

(2) Test battery side of fuse for battery voltage. If not, repair open from ignition switch.

(3) Test A/C blower switch feed circuit from fuse box should be battery voltage. If not, repair open from fuse panel.

(4) Test A/C blower switch LO terminal with blower switch in LO, should be battery voltage. If not, replace switch.

(5) Test A/C blower switch MED terminal with blower switch in MED, should be battery voltage. If not, replace switch.

(6) Test A/C blower switch HIGH terminal with blower switch in HIGH, should be battery voltage. If not, replace switch.

BLOWER MOTOR

The A/C blower motor is attached to the evaporator housing mounted under the instrument panel. The motor has a ground wire and 3 wires connect to the motor brushes. When voltage is applied to the separate brushes it provides the 3 blower speeds LO, MED, and HIGH.

BLOWER MOTOR TEST

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

(1) Test A/C blower motor ground terminal should be 0 ohms. If not, repair ground circuit.

(2) Test A/C blower motor connector LO terminal 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.

(3) Test A/C blower motor connector MED terminal 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.

(4) Test A/C blower motor connector HIGH terminal with blower switch in HIGH, should be battery voltage. If not, repair open from blower switch. If the blower motor is still inoperative, replace motor.

HEATER DIAGNOSIS

On LHD XJ vehicles a water valve controls coolant flow to the heater core. The valve is vacuum operated. When vacuum is applied, the valve opens and coolant is directed through the heater core and back to the engine. When the water valve is closed (no vacuum applied) coolant flow bypasses the heater core back to the engine.

The heating system receives its battery feed from the fuse box. On YJ vehicles the feed circuit runs to the HEATER/OFF switch and then to the BLOWER switch. On XJ vehicles the feed circuit runs to the HEAT/MODE switch and then to the BLOWER switch.

The blower speed is controlled by the blower switch and blower resistors. With the switch in LO, battery voltage is supplied to the motor through all of the resistors. The motor runs slowly. When the blower switch is moved to a higher speed, battery voltage increases to the blower motor which increase its speed. This is accomplished by bypassing some of the blower resistors. When the switch is in HI, blower resistors are bypassed and battery voltage is applied directly to the blower motor.

The following chart has been developed for quick reference.

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

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.

J9124-49

COMPRESSOR SERVICE

DESCRIPTION

The A/C system uses a Sanden SD7H15 compressor. The compressor is a 7 piston design.

The clutch used on the compressor consists of 3 basic components: the pulley and bearing hub, clutch plate and field coil (Fig. 1). The pulley and field coil are attached to the front of the compressor with tapered snap rings. The compressor has a splined shaft and the clutch plate is retained on the shaft with a self-locking nut.

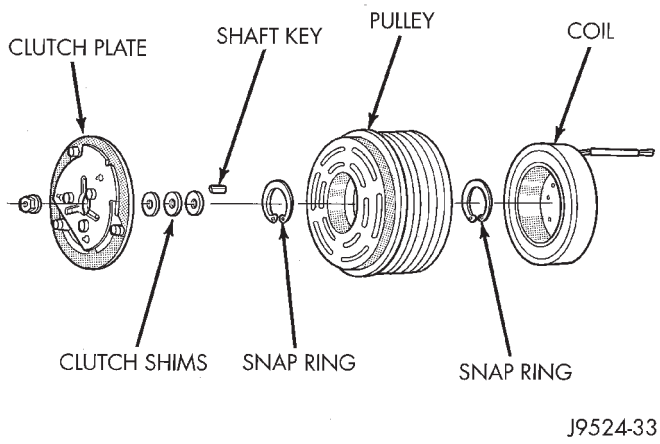

Fig. 1 Compressor Clutch

COMPRESSOR

REVIEW WARNINGS AND CAUTIONS IN THIS GROUP BEFORE PROCEEDING WITH THIS PROCEDURE.

REMOVAL

(1) Recover refrigerant from A/C system.
(2) Disconnect negative cable from battery.
(3) Disconnect the clutch lead wire.
(4) Remove the discharge and suction lines 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. 2 and 3).

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.

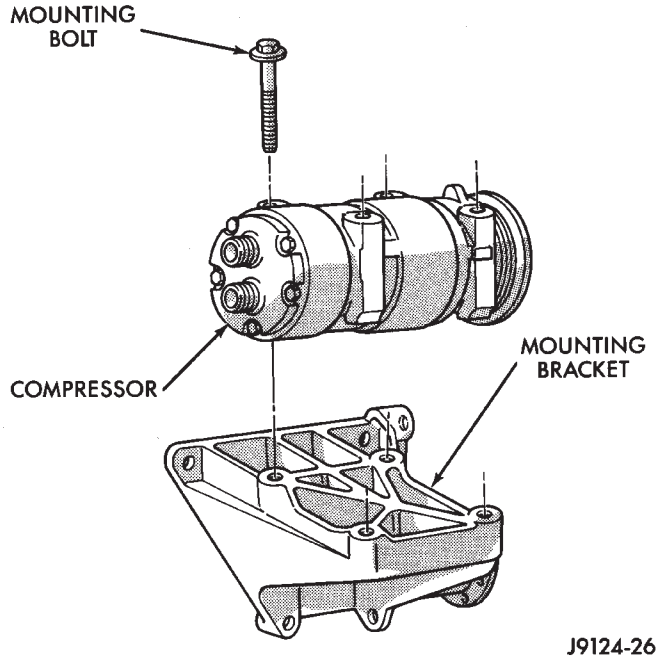

Fig. 2 Compressor and Mounting Bracket (LH Drive Vehicles)

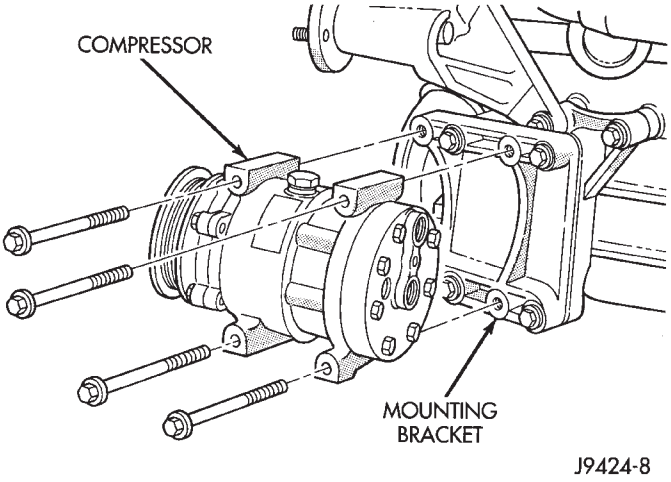

Fig. 3 Compressor and Mounting Bracket (RH Drive Vehicles)

(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).
- 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 lines on the compressor.
(6) Connect the clutch lead wire.
(7) Connect negative cable to battery.
(8) Evacuate, charge and test the system for leaks.

COMPRESSOR CLUTCH ASSEMBLY

The compressor clutch can be serviced in the vehicle.

REMOVAL

(1) Remove the serpentine drive belt (refer to Group 7, Cooling System for the proper procedure).

(2) Remove compressor mounting bolts and lift the compressor from the mounting bracket. Support the compressor to work on clutch.

(3) Insert the 2 pins of spanner C-4489 into holes of the clutch plate. Hold clutch plate stationary and remove hex nut (Fig. 4).

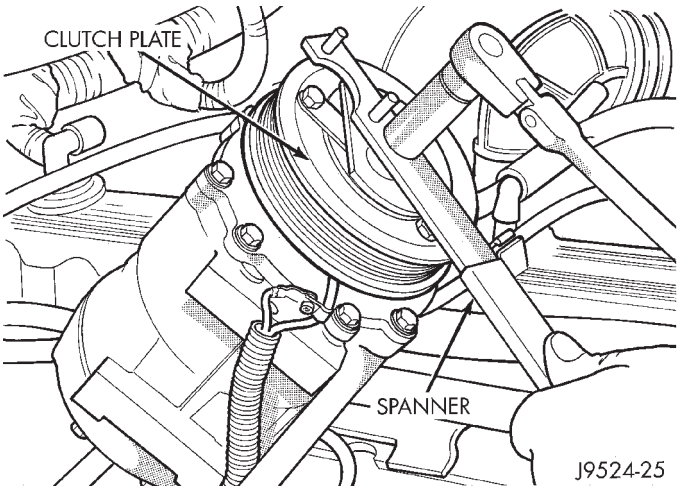

Fig. 4 Hex Nut Removal

(4) Remove clutch plate with puller 6461 (Fig. 5).

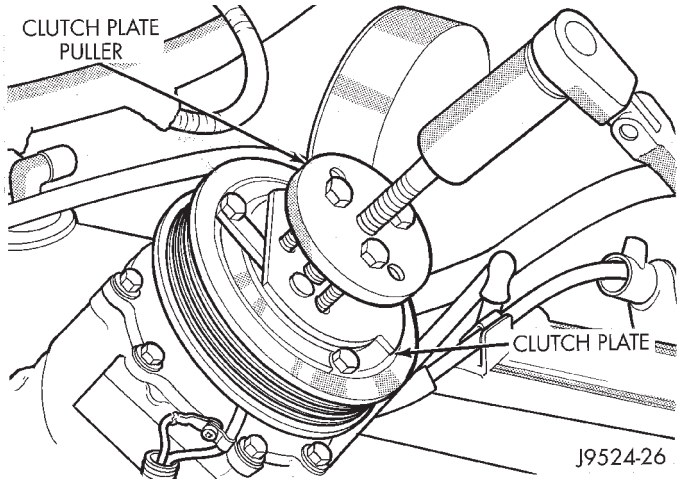

Fig. 5 Clutch Plate Puller

(5) Remove key and clutch shims.

(6) Remove the external front housing snap ring with snap ring pliers (Fig. 6).

(7) Install lip of rotor puller 6141-1 into the snap ring groove exposed in the previous step and install shaft protector 6141-2 (Fig. 7).

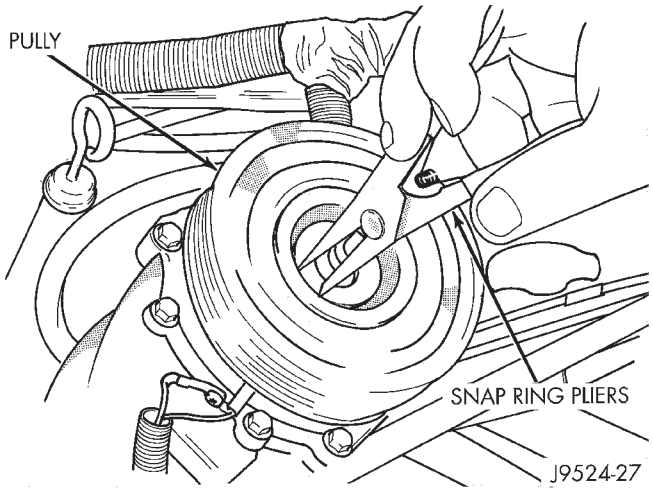

Fig. 6 External Snap Ring Removal

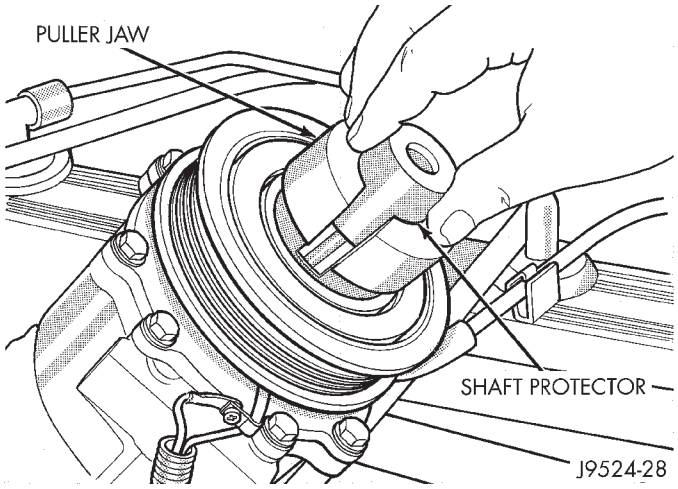

Fig. 7 Shaft Protector and Puller

(8) Install puller 6461 and through bolts into the jaws finger tight (Fig. 8). Turn puller center bolt clockwise until rotor pulley is free.

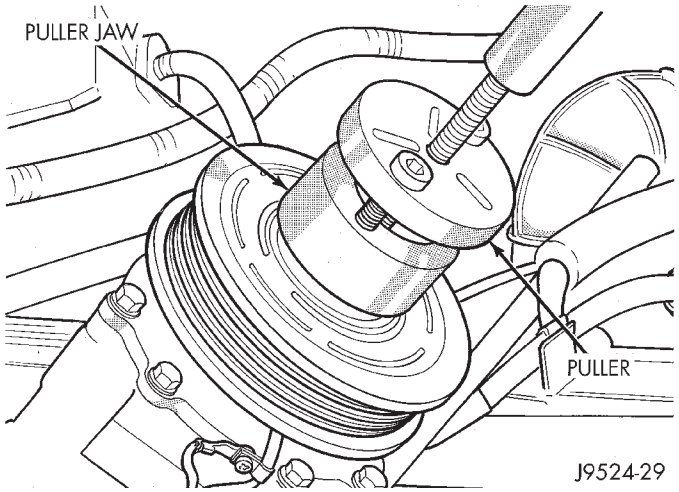

Fig. 8 Install Puller Plate

(9) Remove the screw and retainer from coil lead wire on compressor front housing (Fig. 9).

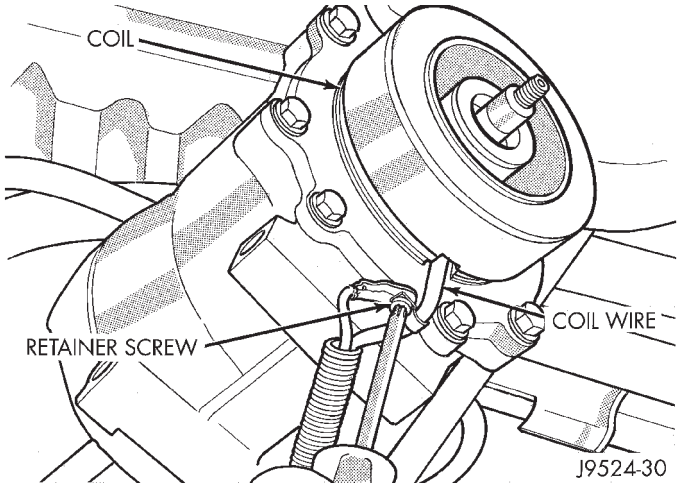

Fig. 9 Coil Lead Wire

(10) Remove snap ring from compressor hub and remove field coil (Fig. 10).

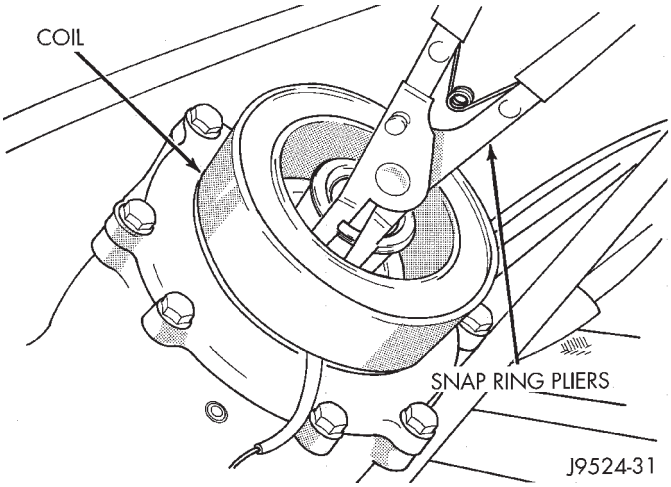

Fig. 10 Snap Ring and Field Coil Removal

INSTALLATION

(1) Install field coil and snap ring.

(2) Install coil harness retaining clip on compressor and tighten the retaining screw.

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

(4) Install pulley bearing assembly with Installer 6871 (Fig. 11).

Thread Installer on shaft then turn nut until pulley assembly is seated.

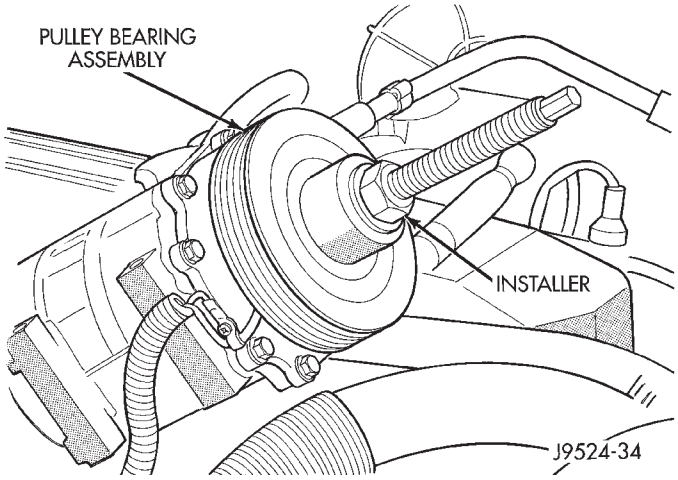

Fig. 11 Pulley Installer

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

(6) Install key and original clutch shims on compressor shaft.

(7) Install clutch plate with driver 6463 (Fig. 12). Install shaft nut and tighten to 14.4 N·m (10.5 ft. lbs.) torque.

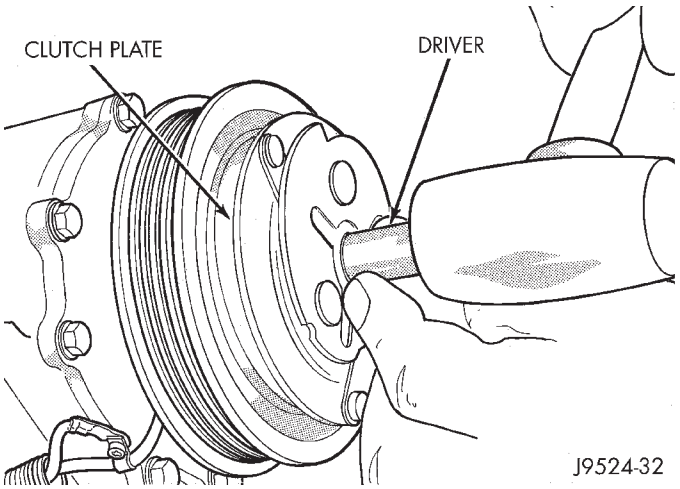

Fig. 12 Clutch Plate Driver

(8) Check air gap with feeler gauge (Fig. 13). If the air gap does not meet the specification add or subtract shims as required. The specification is 0.41-0.79 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.

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.

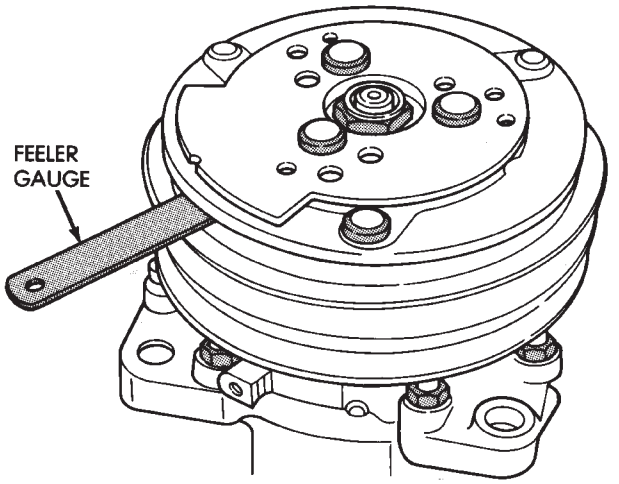

Fig. 13 Check Air Gap

COMPONENT SERVICE—XJ VEHICLES

INDEX

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 unit may be removed separately from under the instrument panel for service.

HEATER AND A/C CONTROL 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.

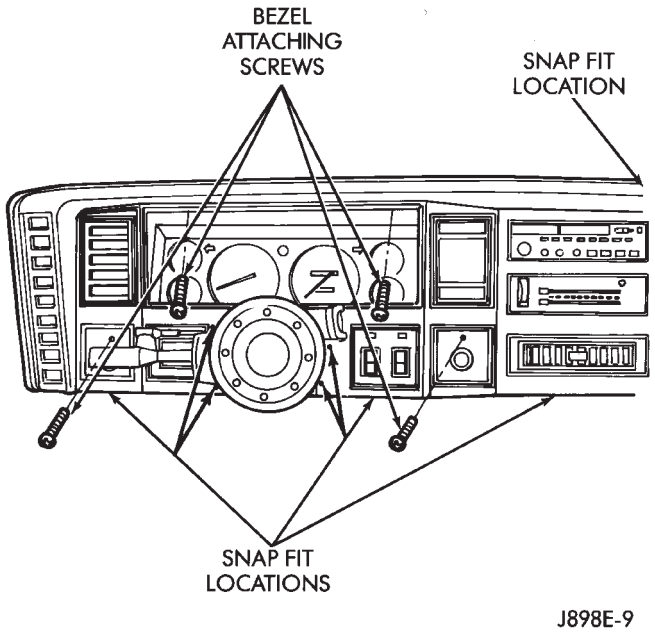

Fig. 1 Instrument Bezel

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

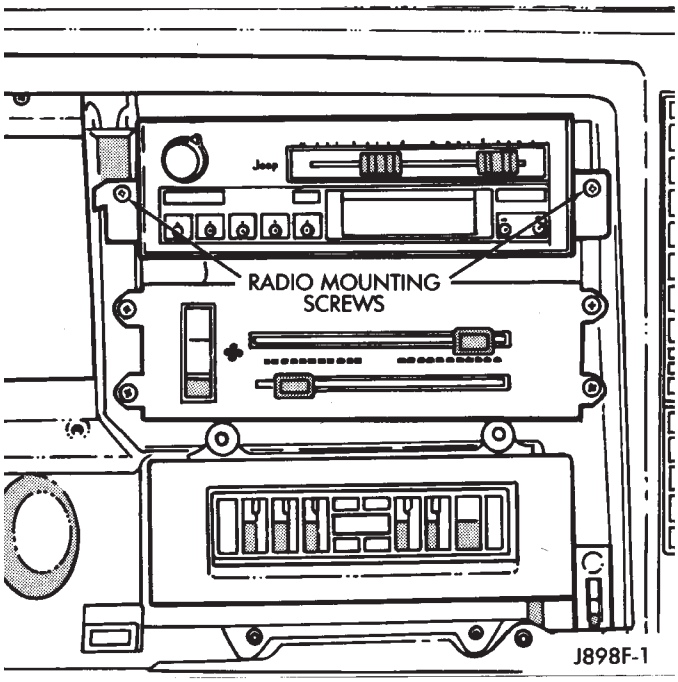

Fig. 2 Radio Mounting Screws

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

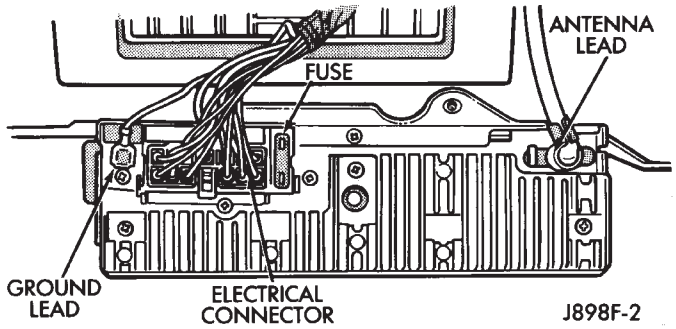

Fig. 3 Radio Wiring Harness

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

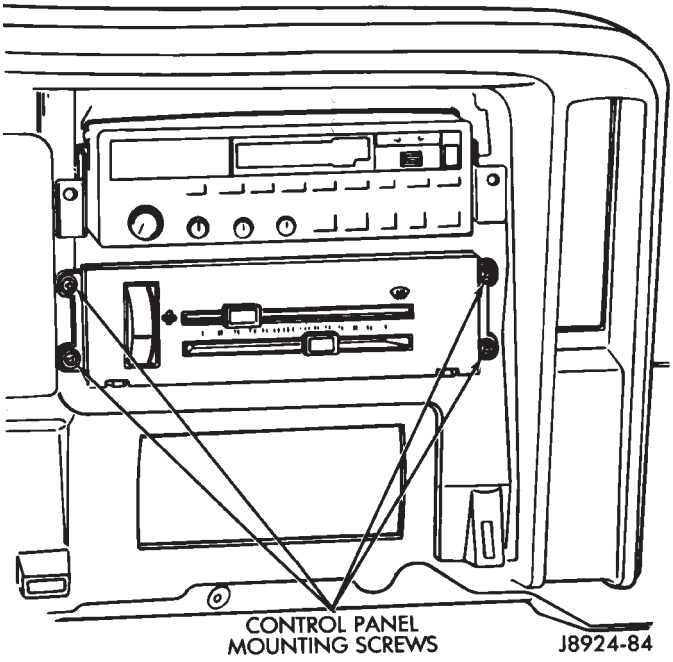

Fig. 4 Control Panel Mounting Screws

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

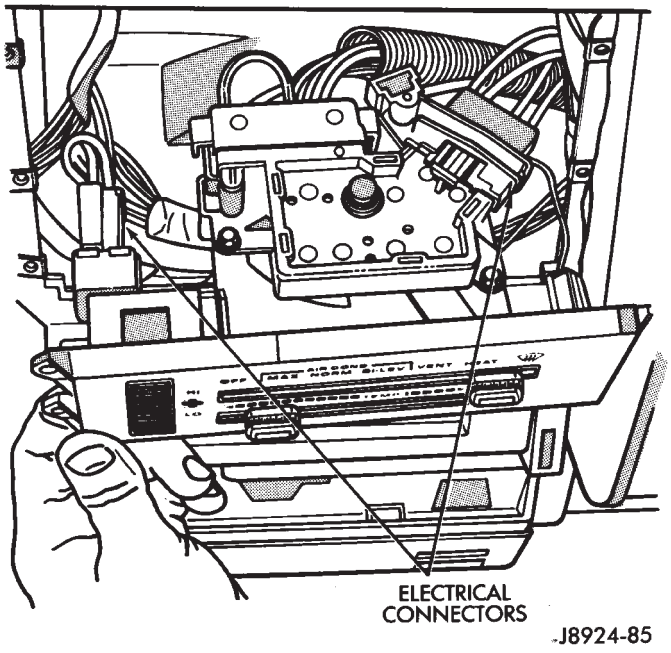

Fig. 5 Electrical Connectors

(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).

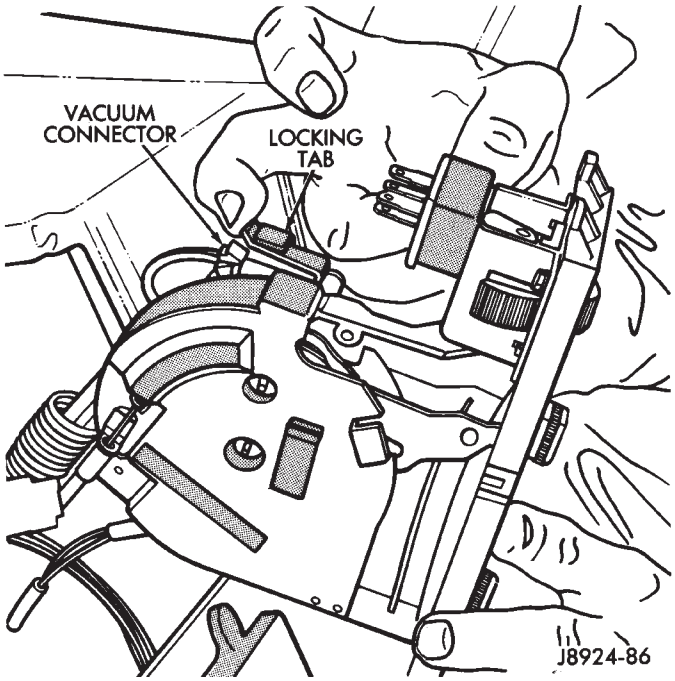

Fig. 6 Vacuum Hose Connector

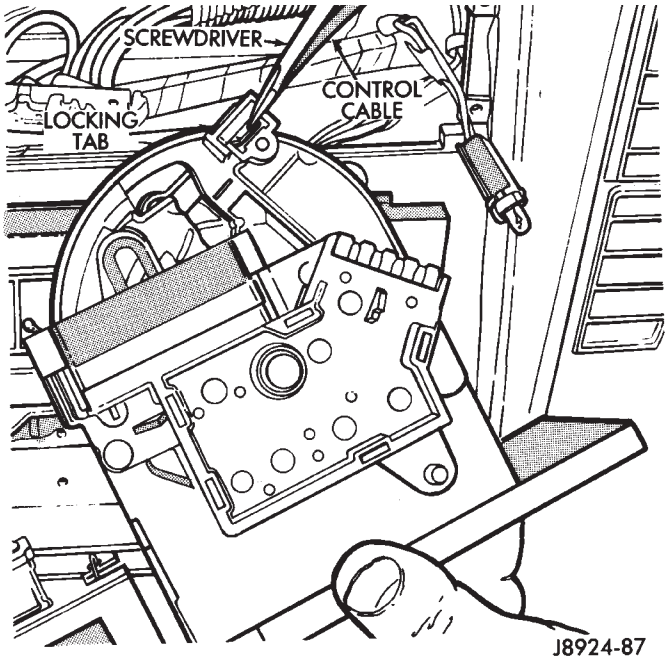

Fig. 7 Control Cable Locking Tab

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

BLOWER MOTOR/FAN REPLACEMENT

2.5L ENGINE

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

(2) Remove the blower motor mounting bolts (Fig. 10).

(3) Remove the blower motor and fan assembly.

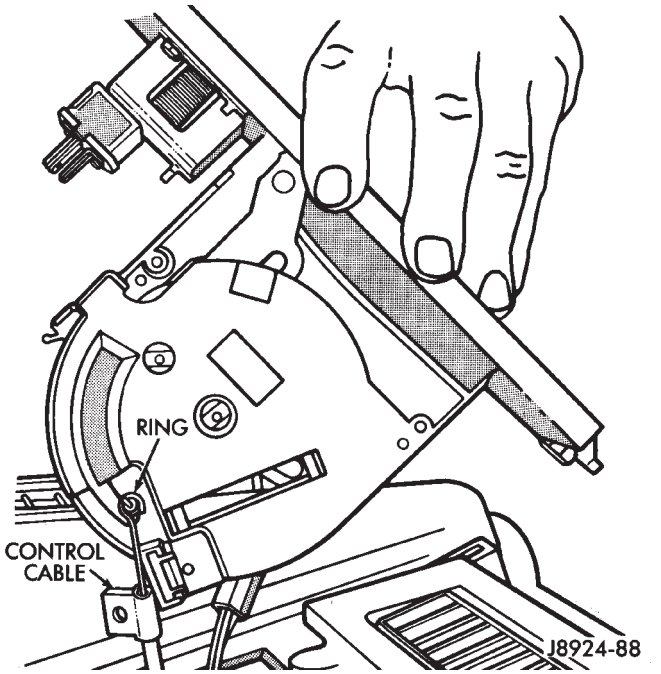

Fig. 8 Control Cable and Ring

(4) 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.

4.0L ENGINE

(1) Remove the washer fluid tank.

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

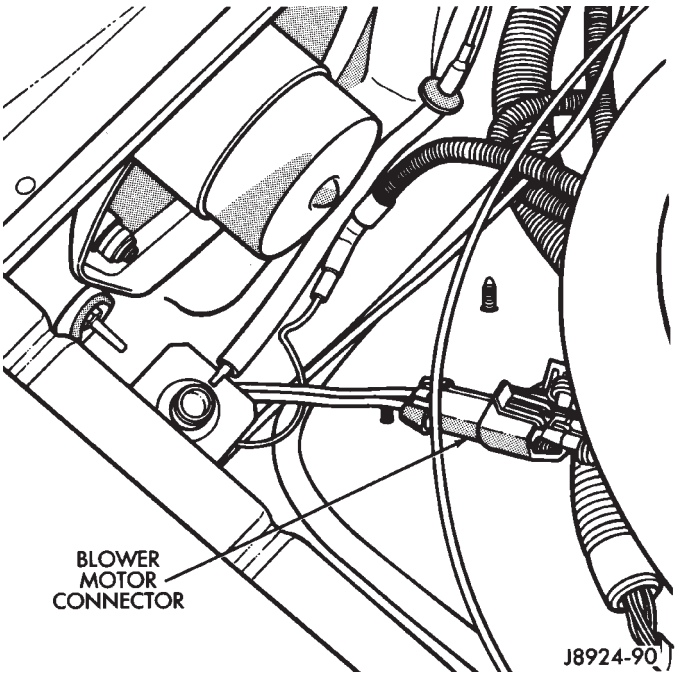

Fig. 9 Blower Motor Connector

(3) Remove the blower motor mounting bolts (Fig. 10).

(4) Remove the blower motor and fan assembly.

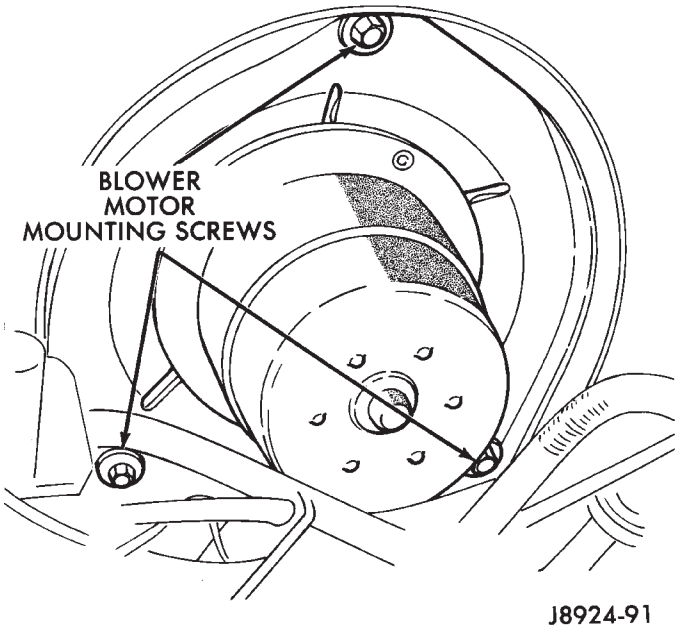

Fig. 10 Blower Motor Mounting Screws

(5) 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).**

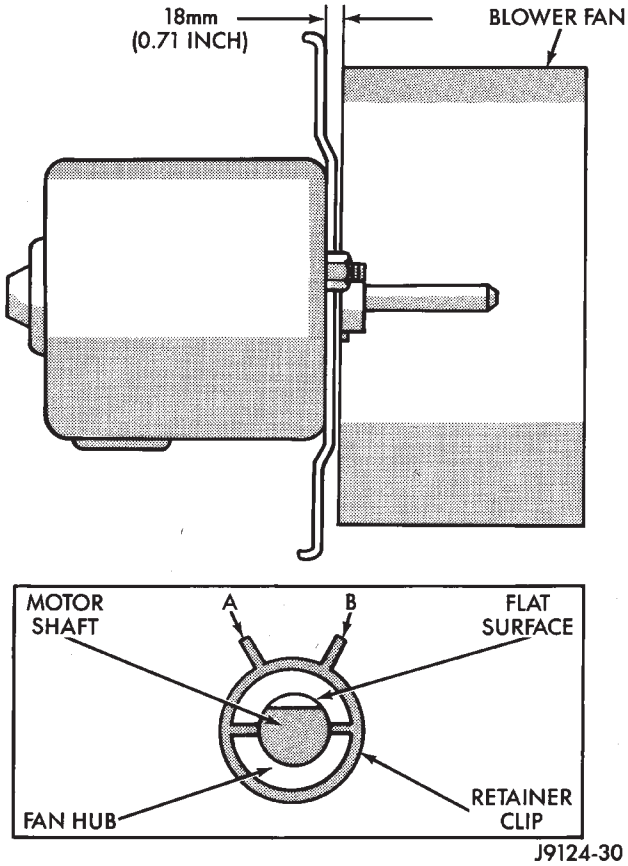

Fig. 11 Blower Fan

HEATER CORE

REVIEW WARNINGS AND CAUTIONS IN THIS GROUP BEFORE PERFORMING THIS OPERATION.

REMOVAL

(1) Drain the radiator.
(2) Disconnect heater hoses at heater core tubes.
(3) Remove heater/evaporator housing side cover.
(4) Remove retaining screws and remove heater core by pulling it straight out of the housing (Fig. 12).

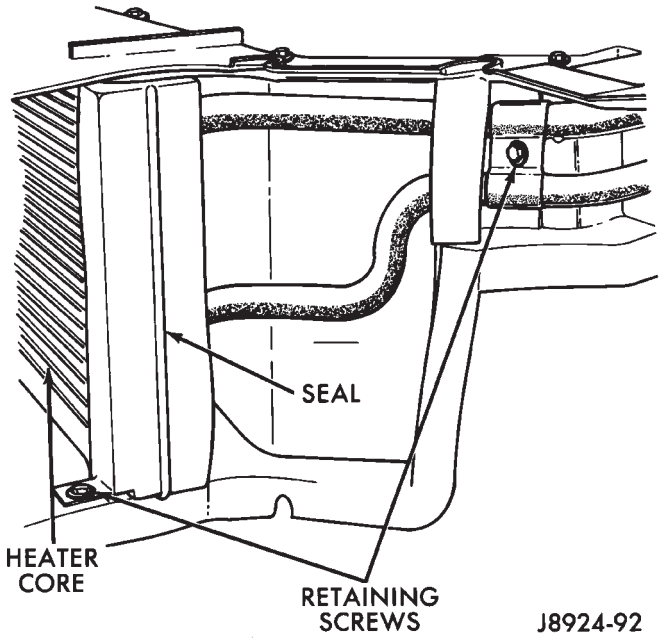

Fig. 12 Heater Core

INSTALLATION

(1) Install the heater core into the housing and install the screws.
(2) Install the evaporator/blower housing side cover.
(3) Install heater hoses to the heater core.
(4) Fill the cooling system.

HEATER HOUSING REPLACEMENT

REVIEW WARNINGS AND CAUTIONS IN THIS GROUP BEFORE PERFORMING THIS OPERATION.

REMOVAL

(1) Disconnect negative cable from battery.
(2) Remove center console. Refer to Group 23 body for procedure.
(3) Remove instrument panel refer to Group 23.
(4) Remove heater hoses.
(5) Recover refrigerant system and remove A/C lines if equipped.
(6) Remove heater/evaporator housing side cover.
(7) Remove the heater core.
(8) Remove the defroster duct.
(9) Disconnect the vacuum hoses from the heater core housing vacuum motors.
(10) Remove the housing retaining nuts in the engine compartment. Remove the heater core housing.

INSTALLATION

(1) Transfer the vacuum motors, etc. to the replacement housing.
(2) Install the heater core housing and heater housing retaining nuts in the engine compartment.
(3) Install the vacuum hoses.
(4) Install the defroster duct.
(5) Install the heater core.
(6) Install heater/evaporator housing side cover.
(7) Remove heater hoses.
(8) Install A/C lines if equipped and evacuate and charge refrigerant system.
(9) Remove instrument panel refer to Group 23.
(10) Install center console. Refer to Group 23 body for procedure.
(11) Install negative cable from battery.
(12) Fill coolant system.

HEATER/DEFROSTER/INSTRUMENT PANEL OUTLET VACUUM MOTOR REPLACEMENT

(1) Remove center console. Refer to Group 23 body for procedure.
(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. 13).

To install a vacuum motor, reverse the removal procedure.

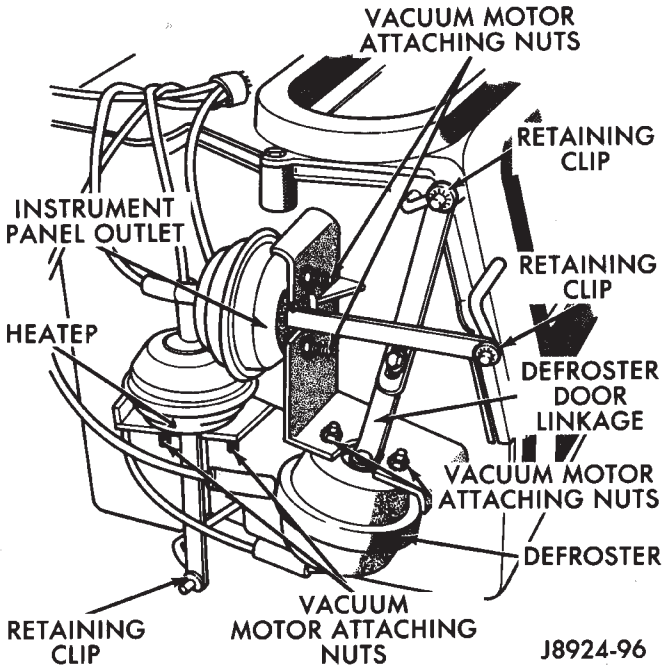

Fig. 13 Vacuum Motor

A/C RECIRCULATING DOOR VACUUM MOTOR REPLACEMENT

(1) Remove the vacuum motor cover (Fig. 14).

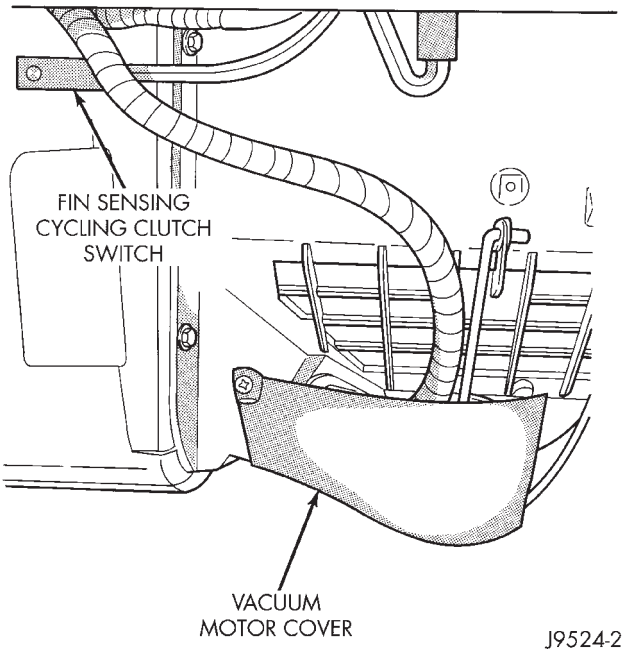

Fig. 14 Vacuum Door Motor Cover

(2) Disconnect the vacuum hose (Fig. 15).

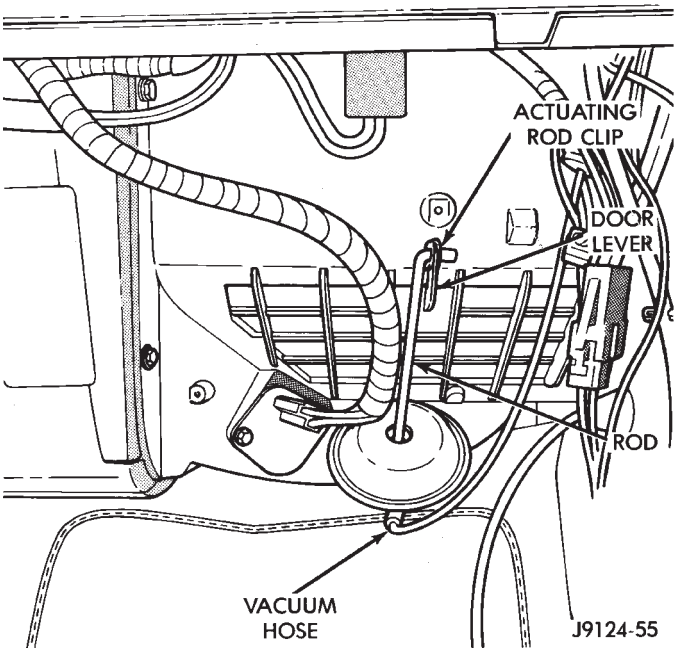

Fig. 15 Vacuum Door Motor

(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 FILTER DRIER—2.5L ENGINES

REVIEW WARNINGS AND CAUTIONS IN THIS GROUP BEFORE PERFORMING THIS OPERATION.

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) Recover refrigerant from the system and disconnect A/C lines from the condenser.

(5) Unplug the harness from the pressure cut-off switch (Fig. 16).

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

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

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

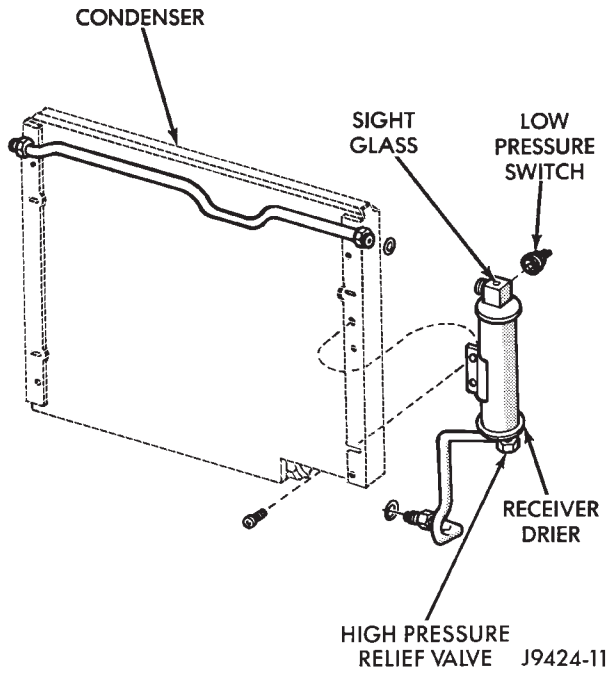

Fig. 16 Condenser Filter Drier—LHD 2.5L Engine

INSTALLATION

Add 30 ml (1 fluid oz.) of refrigerant oil to the A/C system if the condenser or filter drier is replaced.

(1) Remove the plugs from the filter drier openings. Install filter 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. 16).
(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) Fill coolant system (Refer to cooling for proper procedure).
(9) Evacuate and charge the A/C system.

CONDENSER—4.0L ENGINES

REVIEW WARNINGS AND CAUTIONS IN THIS GROUP BEFORE PERFORMING THIS OPERATION.

REMOVAL

(1) Recover refrigerant from the system.
(2) Remove the upper radiator support.
(3) Remove the fan shroud and remove electric fan from the radiator (Fig. 17). Refer to Group 7 Cooling for procedure.

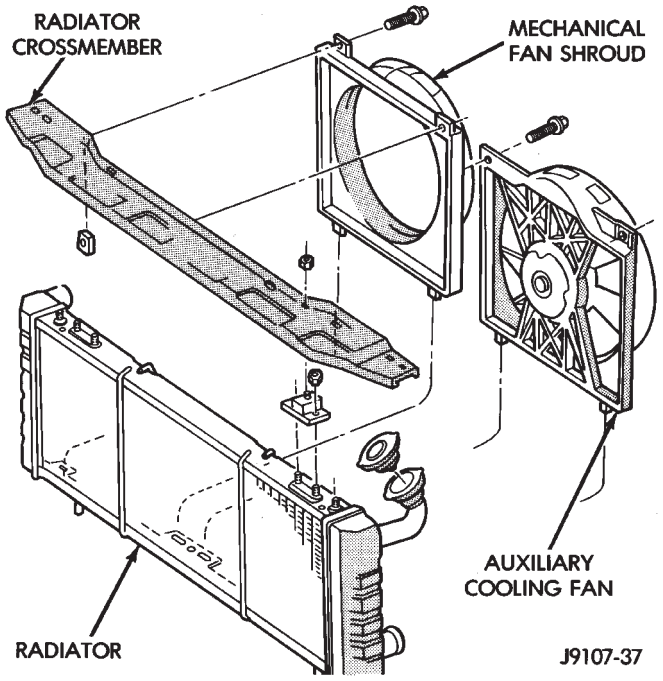

Fig. 17 Fan and Shroud

(4) Remove fan from engine. Refer to Group 7 Cooling for procedure.
(5) Remove air cleaner assembly. Refer to Group 14 Fuel System for procedure.
(6) Remove grille.
(7) Remove brackets holding condenser to the radiator.
(8) Carefully lift radiator and move toward engine.
(9) Remove A/C line brackets from the condenser and disconnect A/C lines and plug the openings.
(10) Remove condenser.

INSTALLATION

Add 30 ml (1 fluid oz.) of refrigerant oil to the A/C system if the condenser is replaced.
(1) Install the condenser to radiator and install in vehicle.
(2) Remove the plugs from the openings. Connect the A/C hoses to the condenser.
(3) Install the upper radiator support.
(4) Connect the fan shroud and electric fan to the radiator.
(5) Connect the transmission cooler lines (if equipped with automatic transmission).
(6) Fill coolant system (Refer to cooling for proper procedure).
(7) Evacuate and charge the A/C system.

FILTER DRIER—4.0L ENGINES

REVIEW WARNINGS AND CAUTIONS IN THIS GROUP BEFORE PERFORMING THIS OPERATION.

REMOVAL

(1) Recover refrigerant from A/C system. Disconnect A/C lines from filter drier and plug the openings (Fig. 18).
(2) Unplug the harness from the low pressure switch.
(3) Remove the nut attaching the filter drier to the side sill weld stud.
(4) Remove the filter drier.

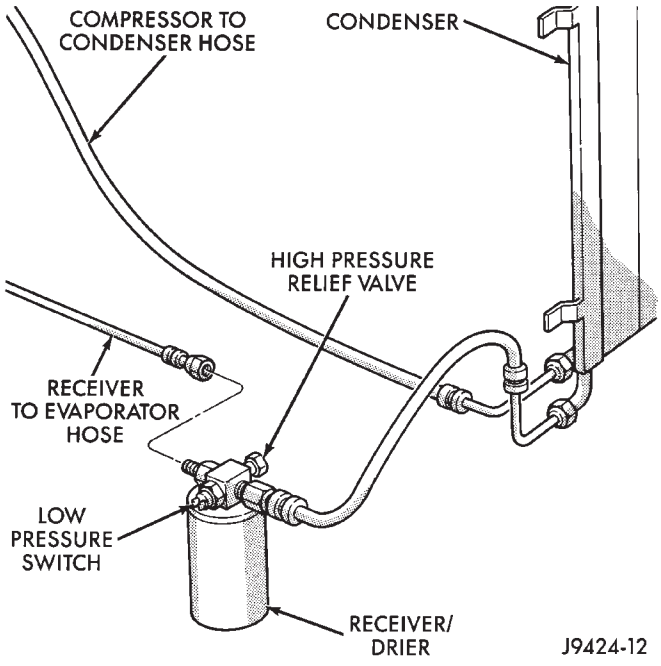

Fig. 18 Condenser and Filter Drier—LHD 4.0L Engine

INSTALLATION

Add 30 ml (1 fluid oz.) of refrigerant oil to the A/C system if the filter drier is replaced.

(1) Install the filter drier.
(2) Install and tighten the nut attaching the filter drier 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) Evacuate and charge the A/C system.

EVAPORATOR/BLOWER HOUSING

REVIEW WARNINGS AND CAUTIONS IN THIS GROUP BEFORE PERFORMING THIS OPERATION.

REMOVAL

(1) Disconnect negative cable from battery.
(2) Recover refrigerant from A/C system and disconnect A/C lines from the expansion valve.
(3) Disconnect the blower motor wires and the vent tube.
(4) Remove center console. Refer to Group 23 body for procedure.
(5) Remove the lower instrument panel.
(6) Disconnect the electrical connections at the blower motor resistors and cycling clutch switch. Disconnect the vacuum hose at the vacuum motor (Fig. 19).

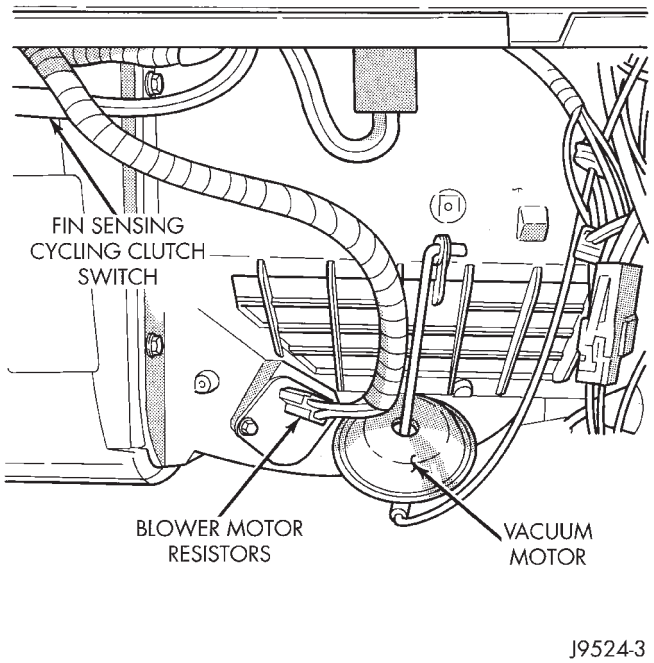

Fig. 19 Evaporator Housing Components

(7) Cut the plastic retaining strap that retains the evaporator/blower housing to the heater core housing (Fig. 20).
(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.

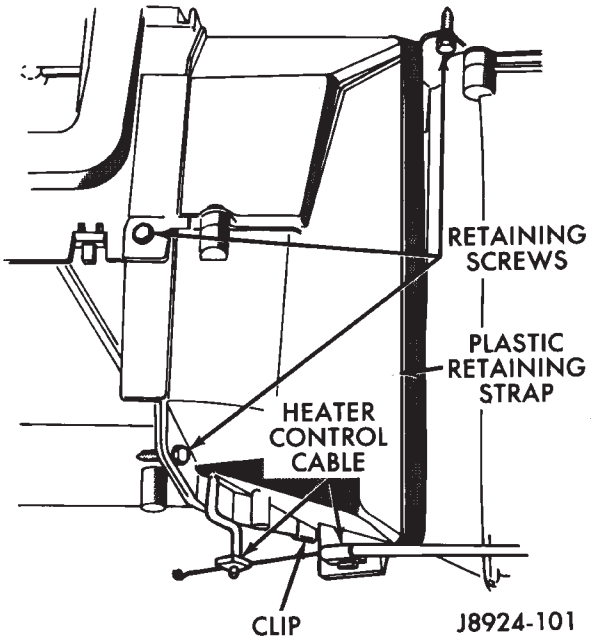

Fig. 20 Evaporator Housing

(10) Remove the housing attaching nuts from engine compartment side of the dash panel (Fig. 21). Remove evaporator drain tube.

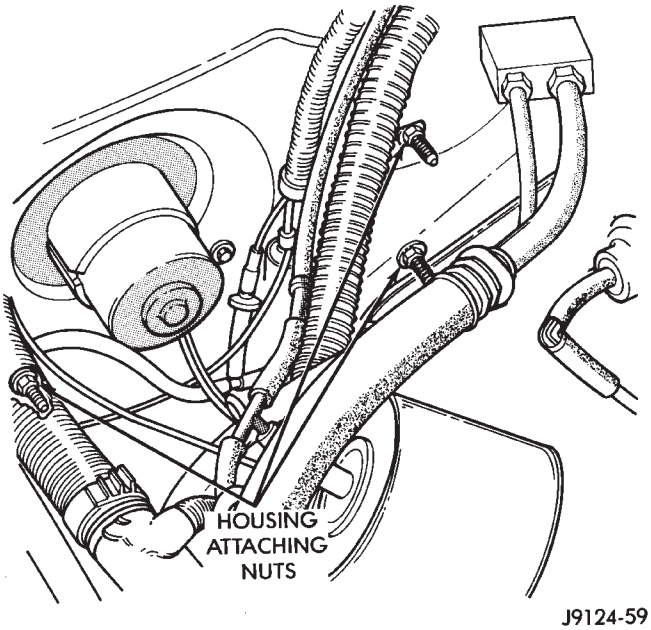

Fig. 21 Evaporator Housing Mounting

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

INSTALLATION

(1) Position evaporator/blower housing into place, being sure to line up the housings using the provided alignment tabs (Figs. 22 and 23).

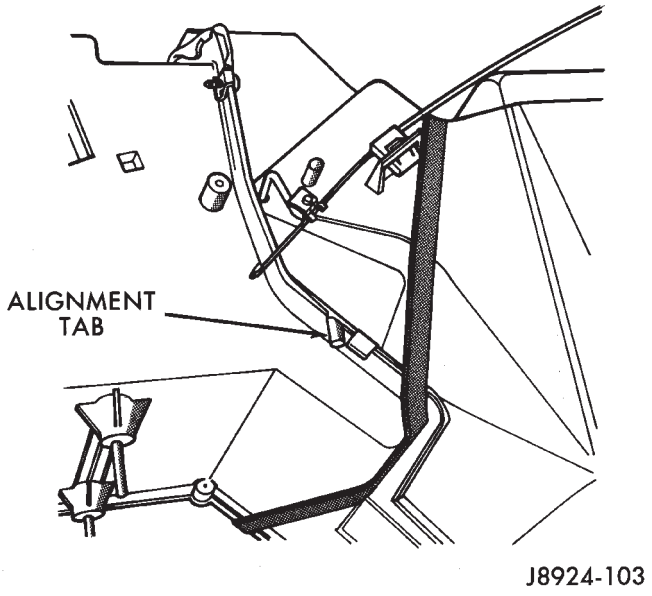

Fig. 22 Evaporator Housing Alignment Tab

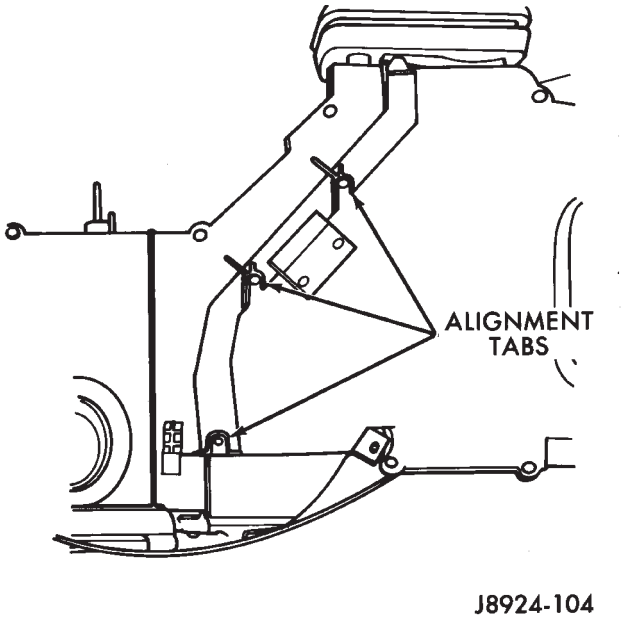

Fig. 23 Evaporator Housing

(2) Install housing retaining screws and rear housing clip.

CAUTION: When installing evaporator/blower housing, DO NOT trap wires between fresh air inlet housing and dash panel.

(3) Install housing retaining nuts on the engine compartment side of the dash panel.
(4) Connect the A/C hoses to the expansion valve and connect the heater blower motor wires.
(5) Attach wire connections at blower motor resistors and cycling clutch switch.
(6) Connect vacuum hose at the vacuum motor and attach heater control cable.
(7) Install instrument panel bolt and kick panel.
(8) Install lower instrument panel.
(9) Install the console.
(10) Connect negative cable to battery.
(11) Evacuate and charge A/C system.
(12) Start the vehicle and check for proper operation at all vacuum motors.

EVAPORATOR COIL

REVIEW WARNINGS AND CAUTIONS IN THIS GROUP BEFORE PERFORMING THIS OPERATION.

REMOVAL

(1) Remove the evaporator/blower housing.
(2) Remove the top housing retaining screws. Remove the top of the evaporator housing (Fig. 24).

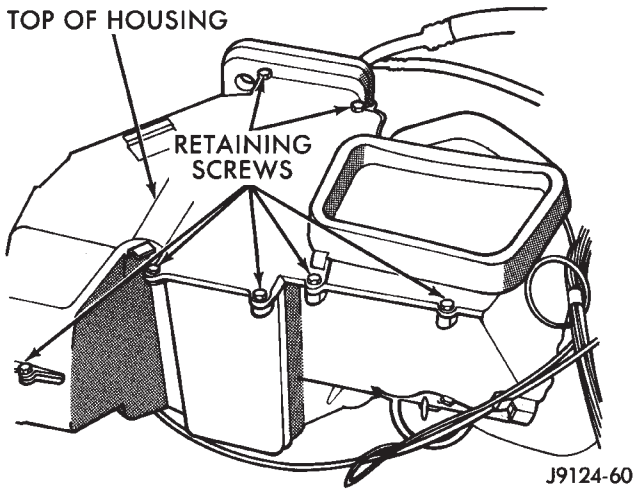

Fig. 24 Top of Housing

(3) Remove the cycling clutch switch from evaporator.
(4) Remove evaporator retaining screws and lift the evaporator out of the housing (Fig. 25).

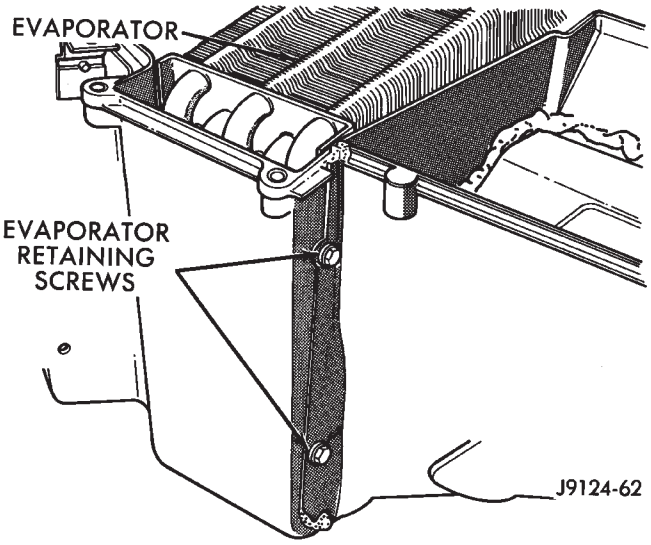

Fig. 25 Evaporator

(5) Remove expansion valve from the evaporator.

INSTALLATION

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

(1) Install expansion valve on evaporator.

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

(3) Install cycling clutch switch into evaporator. Install the top of the evaporator housing.

(4) Install the evaporator/blower housing.

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

EXPANSION VALVE

REVIEW ALL WARNINGS AND CAUTIONS IN THIS GROUP BEFORE PERFORMING THIS OPERATION.

REMOVAL

(1) Recover refrigerant from A/C system.

(2) Remove the coolant bottle and bracket.

(3) Disconnect A/C hoses from the expansion valve (Fig. 26).

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

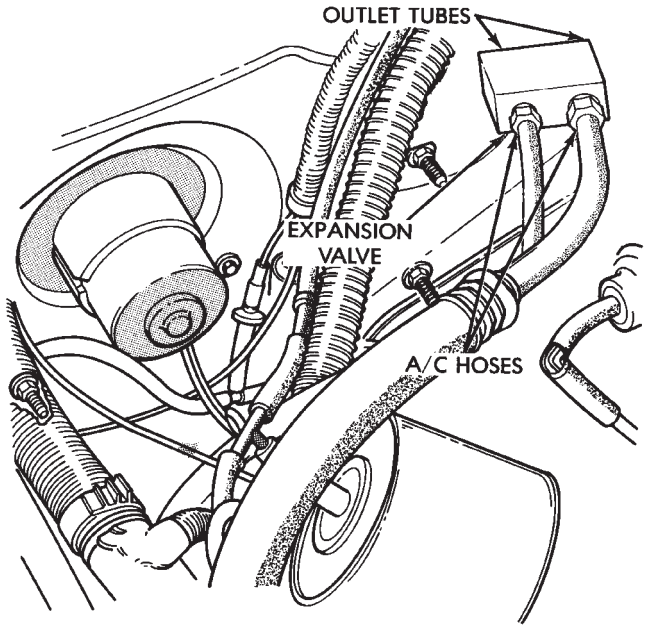

Fig. 26 Expansion Valve

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.

(3) Install the coolant bottle and bracket.

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

(5) Preform the leak test.

BLOWER MOTOR RESISTORS REPLACEMENT

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

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

To install the blower motor resistor reverse the removal procedures.

FIN SENSING CYCLING CLUTCH SWITCH

REMOVAL

(1) Disconnect negative cable from battery.

(2) If equipped with center console remove the console. Refer to Group 23 body for proper procedure.

(3) Remove lower instrument panel.

(4) Pull the rosebud terminal out of the housing (Fig. 27).

(5) Disconnect the electrical connection.

(6) Remove the wires from the retaining clip.

(7) Carefully remove the thermostat cycling clutch switch from the evaporator (Fig. 27).

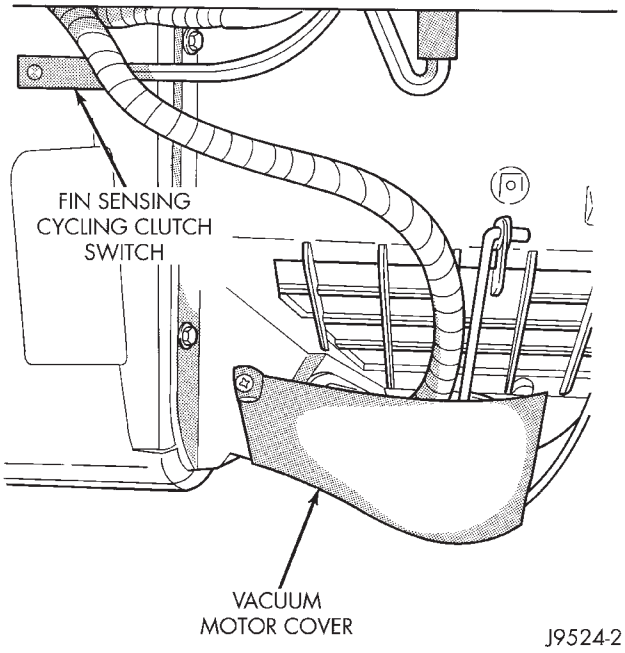

Fig. 27 Fin Sensing Cycling Clutch Switch

INSTALLATION

(1) Carefully install cycling switch.

(2) Connect the electrical connection.

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

(4) Install wiring connections.

(5) Install lower instrument panel.

(6) Install console if equipped.

(7) Install negative battery cable.

COMPONENT SERVICE—YJ VEHICLES

INDEX

DESCRIPTION

The air conditioning evaporator housing is mounted to the bottom of instrument panel. The evaporator, blower motor, thermostat, and expansion valve are located in the evaporator housing. The compressor, condenser, receiver-dryer and refrigerant lines are located in the engine compartment.

The heater housing is mounted to the dash panel behind the instrument panel.

HEATER CONTROL REPLACEMENT

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

(2) Remove instrument cluster bezel.

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

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

(5) Remove control panel.

To install control panel, reverse the removal procedures.

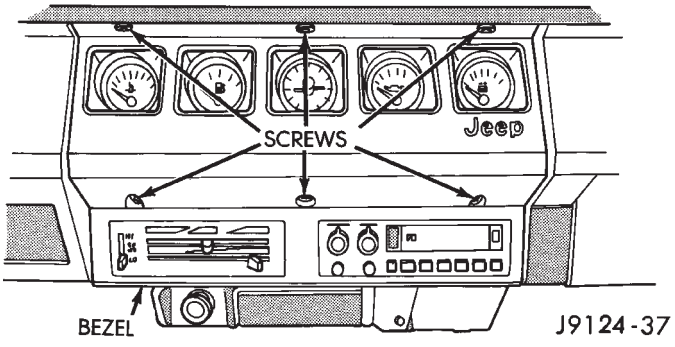

Fig. 1 Instrument Cluster Bezel

BLOWER MOTOR/AIR DOOR MOTOR SWITCH REPLACEMENT

(1) Remove heater control panel (Fig. 2).

(2) Remove air door motor switch.

(3) Remove control knob from the blower switch.

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

(5) Remove switch from the control panel.

To install switches, reverse the removal procedures.

VENT DOOR CONTROL CABLES

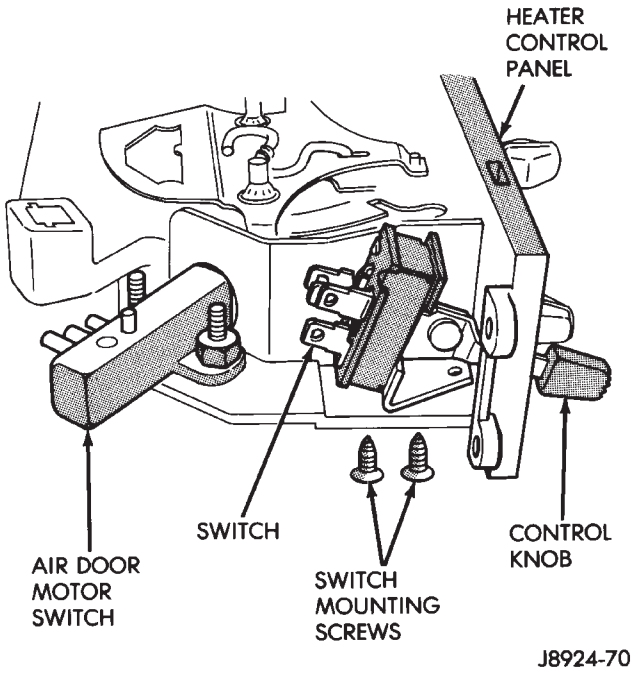

Fig. 2 Control Switches

REMOVAL

(1) Disconnect cable from the vent door.

(2) Disconnect 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. 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) Install the cables to the heater control panel.
(2) Connect 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 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

REVIEW ALL WARNINGS AND CAUTIONS IN THIS GROUP BEFORE PERFORMING THIS OPERATION.

REMOVAL

(1) Drain coolant from the radiator.
(2) Disconnect heater hoses.
(3) Disconnect vent door cables.
(4) Disconnect blower motor wire.
(5) Disconnect defroster duct.
(6) Remove nuts that attach the heater housing studs to the engine compartment side of the dash panel.
(7) Remove 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 heater hosing cover from the housing.
(9) Remove heater core from the housing.

INSTALLATION

(1) Install the heater core into the housing and install the cover on the housing.
(2) Position 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 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 defroster duct to the housing.
(6) Connect blower motor wire.
(7) Connect vent door control cables.
(8) Connect heater hoses.
(9) Fill cooling system.
(10) Check system operation.

BLOWER MOTOR (HEATING)

REMOVAL

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

INSTALLATION

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

DEFROSTER NOZZLE AND DUCT

REVIEW ALL WARNINGS AND CAUTIONS IN THIS GROUP BEFORE PERFORMING THIS OPERATION.

REMOVAL

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

INSTALLATION

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

(11) Connect the heater hoses.
(12) Fill cooling system.

FRESH AIR DOOR VACUUM MOTOR

REMOVAL

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

INSTALLATION

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

FRESH AIR INTAKE DUCT

REVIEW WARNINGS AND CAUTIONS IN THIS GROUP BEFORE PERFORMING THIS OPERATION.

REMOVAL

(1) Drain coolant from the radiator.
(2) Disconnect heater hoses.
(3) Remove nuts attaching the heater housing studs to the dash panel from inside the engine compartment.
(4) Disconnect speedometer cable.
(5) Remove glove box and assist handle.
(6) Tilt heater housing back and pull it rearward and out from under the instrument panel.
(7) Disconnect vent cables.
(8) Remove windshield bracket bolts and lower windshield.
(9) Remove fresh air intake grille from the cowl.
(10) Remove fresh air intake duct.

INSTALLATION

(1) Install fresh air intake duct.
(2) Install defroster nozzle and duct.
(3) Raise and secure the windshield.
(4) Install fresh air grille on the cowl.
(5) Install vent cables.
(6) Position heater housing on the dash panel. Be sure all the housing studs extend through the dash panel.
(7) Install seals on the blower motor and heater core inlet and outlet tubes.
(8) Install 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 glove box and assist handle.
(10) Connect speedometer cable.
(11) Connect heater hoses.
(12) Fill cooling system.

TEMPERATURE CONTROL THERMOSTAT

REMOVAL

(1) Remove mounting bolts and 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) Install temperature control thermostat. Insert thermostat capillary tube into the evaporator coil a minimum of 50 mm (2 inch).

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.

A/C CONDENSER

REVIEW WARNINGS AND CAUTIONS IN THIS GROUP BEFORE PERFORMING THIS OPERATION.

REMOVAL

(1) Recover refrigerant from A/C system.
(2) Drain the radiator.
(3) Remove fan shroud and radiator.
(4) Disconnect A/C line from the condenser.
(5) Remove 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 condenser and receiver-drier as an assembly.
(8) Remove receiver-drier from the condenser, if necessary.

INSTALLATION

Add 30 ml (1 fluid oz.) of refrigerant oil to the A/C system if the condenser is replaced.
(1) Attach receiver-drier to the condenser.
(2) Install condenser and connect A/C line to the receiver-drier.

(3) Install condenser attaching screws.
(4) Connect condenser A/C line.
(5) Install radiator and fan shroud.
(6) Fill coolant system (Refer to cooling for proper procedure).
(7) Evacuate, charge and leak test the air conditioning system.

RECEIVER-DRIER REPLACEMENT

REVIEW ALL WARNINGS AND CAUTIONS IN THIS GROUP BEFORE PERFORMING THIS OPERATION.

REMOVAL

(1) Recover refrigerant from A/C system.
(2) Disconnect A/C lines from the receiver-drier.
(3) Remove receiver-drier attaching screws and remove receiver-drier.

INSTALLATION

(1) Position receiver-drier in place and install receiver-drier attaching screws.
(2) Connect A/C lines to receiver-drier.
(3) Evacuate, charge and leak test the air conditioning system.

EVAPORATOR AND HOUSING

REVIEW ALL WARNINGS AND CAUTIONS IN THIS GROUP BEFORE PERFORMING THIS OPERATION.

REMOVAL

(1) Recover refrigerant from A/C system.
(2) Disconnect A/C lines.
(3) Remove hose clamps and dash grommet retaining screws.
(4) Remove the evaporator housing-to-instrument panel attaching screws and the housing mounting bracket screw (Fig. 3).

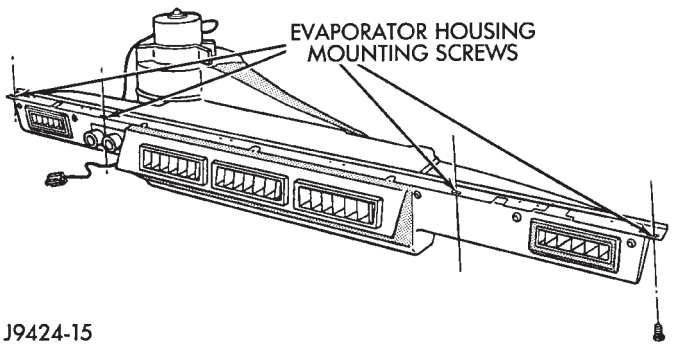

Fig. 3 Evaporator Housing

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

The evaporator core, control switches, expansion valve, blower motor and housing can be serviced after removing evaporator housing (Fig. 4).

INSTALLATION

Add 30 ml (1 fluid oz.) of refrigerant oil to the A/C system if the evaporator is replaced.
(1) Install evaporator into housing and install upper housing.
(2) Push A/C hoses through the grommet openings and install the hose grommet by pushing it toward the engine compartment.
(3) Install hose grommet attaching screws.
(4) Raise evaporator housing and install the evaporator housing-to- instrument panel attaching screws.
(5) Install A/C lines.
(6) Evacuate, charge and leak test the system.

EXPANSION VALVE

REVIEW WARNINGS AND CAUTIONS IN THIS GROUP BEFORE PERFORMING THIS OPERATION.

REMOVAL

(1) Recover refrigerant from A/C system.
(2) Remove 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 inlet and outlet hose fittings, and remove the capillary tube clamp.
(6) Disconnect and remove the expansion valve.

INSTALLATION

(1) Clean evaporator tubing to provide a positive contact with the expansion valve capillary tube.
(2) Install expansion valve.
(3) Clamp the capillary tube at the marked location on the evaporator tubing.
(4) Connect 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 expansion valve, inlet hose fitting and capillary tube with insulation.
(6) Install 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.

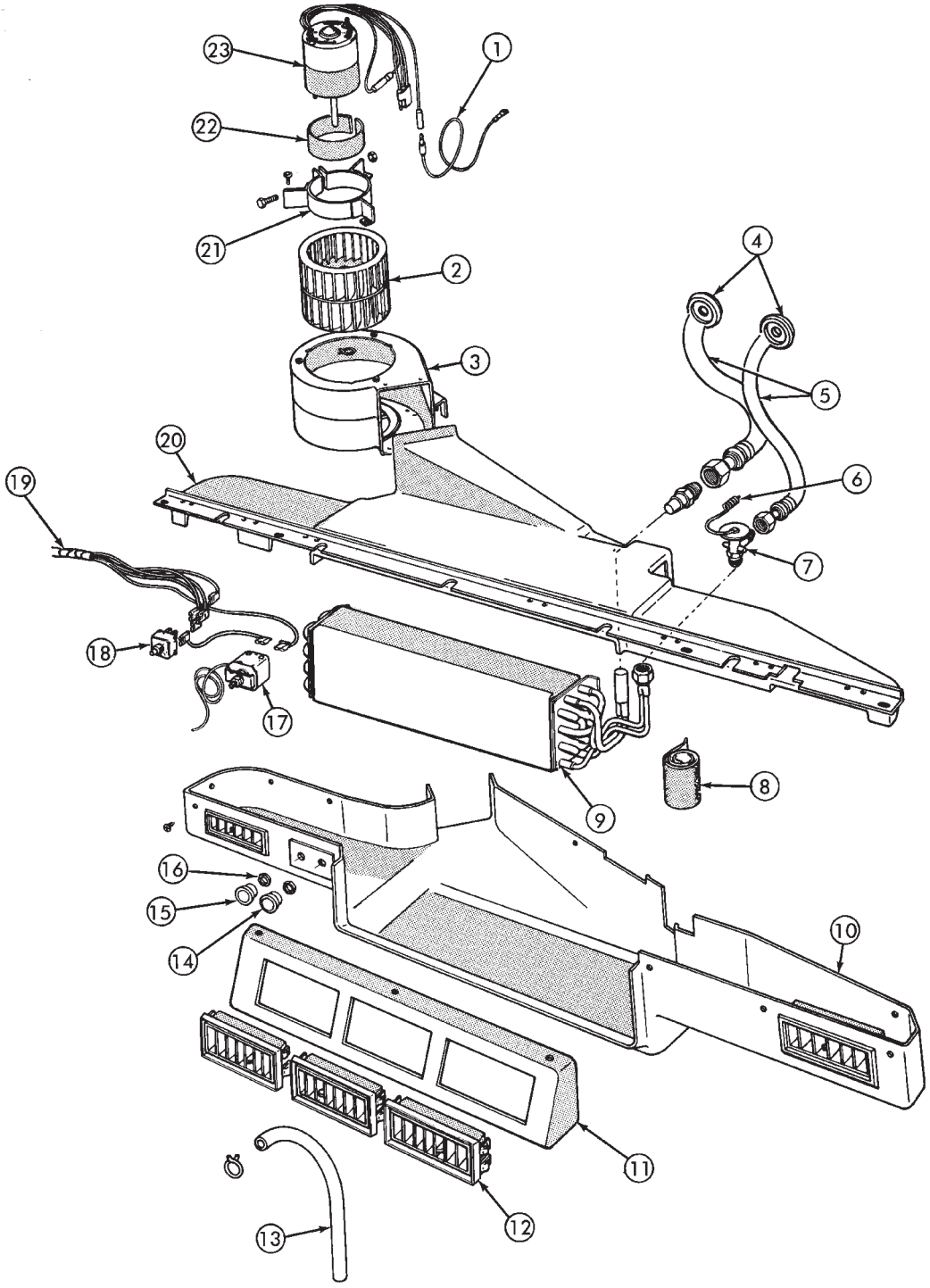

Fig. 4 Evaporative Housing and Components

TORQUE SPECIFICATIONS

AIR CONDITIONING

DESCRIPTION	TORQUE
Compressor	
Mounting Bolts	27 N·m (20 ft. lbs.)
Bracket Bolts	27 N·m (20 ft. lbs.)
Shaft Nut	14.4 N·m (10.5 ft. lbs.)