HEATING AND AIR CONDITIONING

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GENERAL INFORMATION

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Heater System	1		

Both the heater and the heater/air conditioning systems share many of the same functioning components. This Group will deal with both systems together when component function is common and separately when they are not. The automatic temperature control (ATC) system diagnostics is dealt with separately.

For proper operation of the instrument panel controls (Fig. 1), refer to the Owner's Manual provided with the vehicle.

All vehicles are equipped with a common heater-A/C unit housing assembly (Fig. 2). On heater only systems, the evaporator coil is omitted and replaced with an air restrictor plate.

HEATER SYSTEM

All models use a Blend-Air type heater. Outside air enters the heater through the cowl opening and passes through a plenum chamber to the heater core. Air intake openings must be kept free of snow, ice and other obstructions for the heater system to pick up a sufficient volume of outside air. A temperature control door in the heater housing directs incoming air through and/or around the heater core. The amount of blend (heated and non-heated air) is determined by the setting of the temperature knob on the instrument panel. Direction of the blended air is controlled by the mode knob on the instrument panel.

The blower switch and resistor block controls the speed of the blower motor. This in turn controls the

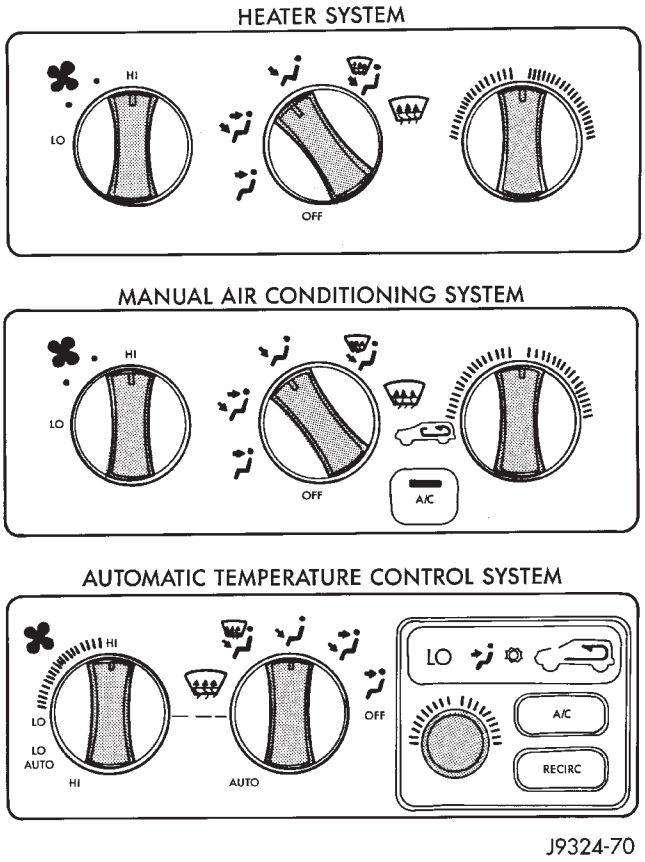

Fig. 1 Heater, Manual A/C and ATC Controls

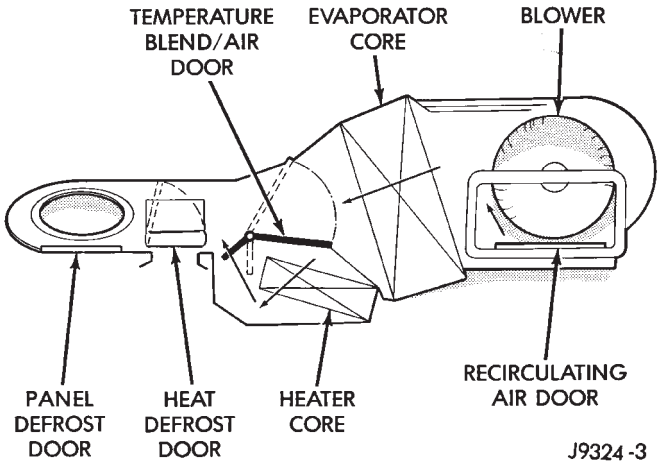

Fig. 2 Common Blend-Air Heater-A/C System

velocity of the air flow from the FLOOR (heater), DEFROST or PANEL outlets.

SIDE WINDOW DEMISTERS

The side window demisters direct air from the heater assembly. The outlets are located on the top left and right edges of the door panels. The Demisters operate when the control mode selector is on FLOOR, BI-LEVEL, FLOOR/DEFROST or DEFROST mode.

AIR CONDITIONING SYSTEM

The A/C system uses a 10PA17 fixed displacement compressor. A label identifying the use of R-134a refrigerant is located on the compressor.

CAUTION: DO NOT use an R-12 compressor on an R-134a system. The systems are not compatible.

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

The Automatic Temperature Control (ATC) system lets the operator change the passenger compartment comfort conditions. A computer, built into the control panel, regulates the desired temperature, air flow direction and blower speed. The operator may also select an AUTO mode feature in which the computer would select the blower speed and air flow direction. Refer to the Owner's Manual for proper operation.

SYSTEM AIRFLOW

Refer to Fig. 3 for the system airflow. The system pulls outside (ambient) air through the cowl opening at the base of the windshield. Then it goes into the plenum chamber above the heater-A/C unit housing. On air conditioned vehicles, the air passes through the evaporator. Air flow can be directed either through or around the heater core. This is done by adjusting the blend-air door with the TEMP control on the instrument panel. The air flow can then be directed from the PANEL, BI-LEVEL (panel and floor), FLOOR, FLOOR/DEFROST or DEFROST outlets. Air flow velocity can be adjusted with the blower speed selector switch on the instrument panel.

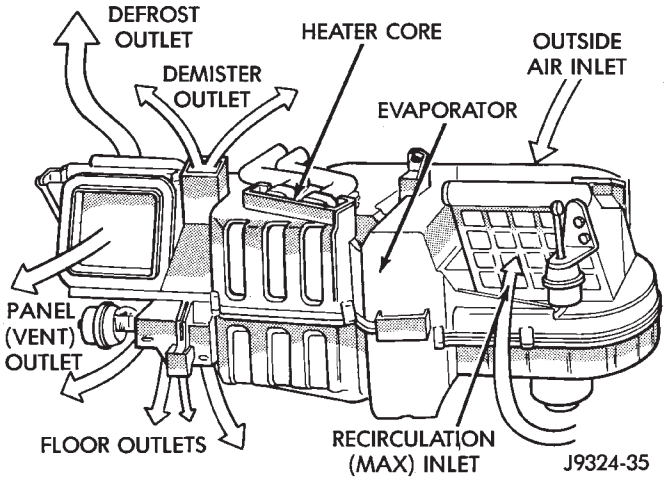

Fig. 3 Heater-A/C System Airflow (Front View)

On air conditioned vehicles, outside air can be shut off by opening the recirculating air door. This will recirculate the air that is already inside the vehicle. This is done by rotating the TEMP control knob into the RECIRC position.

REFRIGERANT

This vehicle uses a new type of refrigerant called R-134a. It is a non-toxic, non-flammable, clear colorless liquified gas.

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

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

The service port to charge the air conditioning system is located on the condenser to evaporator tube near the cowl panel. New service port couplers have been used to ensure that the system is not accidentally filled with the wrong refrigerant (R-12).

R-134a refrigerant requires a special type of compressor oil (ND8 PAG). When adding oil, make sure that it is designed to be used in a R-134a system.

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

Due to the different characteristics of R-134a it requires all new service procedures. Refer to Refrigerant Service Procedures in this section before making any repairs to the air conditioning system.

Chrysler Corporation recommends that an (R-134a) refrigerant recycling device that meets SAE standard J2210 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.

REFRIGERANT SAFETY PRECAUTIONS AND WARNINGS FOR R134a

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.

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.

COOLING SYSTEM

REQUIREMENTS

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/or the engine cooling system.

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.

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.

HANDLING TUBING AND FITTINGS

The air conditioning hoses used on this vehicle are made from reinforced rubber with a nylon liner on

the inner walls. The ends of the A/C hoses are made from light-weight aluminum and use new braze-less fittings.

The A/C hoses use special connectors called QUICK CONNECTS. Never attempt to disconnect a quick connect without discharging the air conditioning system. All quick connects use two O-rings to seal the connection. The O-rings are made from a special type of rubber that is not affected by R-134a refrigerant. If O-ring replacement is required be sure to use the correct type of O-ring. Failure to use the correct type of O-ring will cause the connection to leak within a short period of time.

Kinks in the refrigerant tubing or sharp bends in the refrigerant hose lines will greatly reduce the capacity of the entire system. High pressures are produced in the system when it is operating. Extreme care must be exercised to make sure that all connections are pressure tight. Dirt and moisture can enter the system when it is opened for repair or replacement of lines or components. The refrigerant oil will absorb moisture readily out of the air. This moisture will convert into acids within a closed system.

The following precautions must be observed:

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

(1) The refrigerant system must be completely discharged into a refrigerant recovery/recycling device before opening any fitting or connection. Open fittings with caution even after the system has been discharged. If any pressure is noticed as a fitting is loosened, allow trapped pressure to bleed off very slowly into an approved recycling device.

(2) DO NOT discharge refrigerant into the atmosphere. Use an R-134a refrigerant recycling device that meets SAE Standard J2210.

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

(4) The use of correct tools when making connections is very important. Improper tools or improper use of tools can damage the fittings.

(5) The A/C system will remain chemical stable as long as pure-moisture-free R-134a refrigerant oil is used. Abnormal amounts of dirt, moisture or air can upset the chemical stability. This condition could cause operational troubles or even serious damage if present in more than very small quantities.

(6) When it is necessary to open the refrigeration system, have everything needed to service the system ready. The system should not be left open any longer than necessary. Cap or plug all lines and fittings as soon as they are opened to prevent the entrance of dirt and moisture. All lines and components in parts stock should be capped or sealed until they are ready to be used.

(7) All tools, including the refrigerant recycling equipment, the manifold gauge set and test hoses should be kept clean and dry. All tools and equipment must be designed for the R-134a refrigerant.

COMPONENT DESCRIPTION

COMPRESSOR

The A/C system uses a Model 10PA17 fixed displacement compressor (Fig. 4 or 5). This compressor is a 10 piston double acting type. The compressor is mounted on the front right side of the 4.0L engine and on the front left side of the 5.2L engine. The compressor is driven by a serpentine drive belt. The system is lubricated with polyalkylene glycol synthetic wax-free refrigerant oil (ND8 PAG).

The clutch used on the compressor consists of three 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 attached to the compressor shaft and is retained with a compressor shaft bolt. Special service tools are required to remove and install the clutch plate on the compressor shaft.

EVAPORATOR CORE

The evaporator core is located in the heater-A/C unit (Fig. 4 or 5). It is the plate fin type with a multi-pass refrigerant flow path. A mixture of refrigerant and oil enters the bottom of the core. It then flows through the evaporator inlet tube and is routed so that it flows in a W pattern through the evaporator and out the outlet tube.

CONDENSER

The air conditioning condenser is an aluminum heat exchanger located in front of the radiator (Fig. 4 or 5). It cools compressed refrigerant gas. This is done by allowing air to pass over fins and tubes to extract heat and condense gas to liquid refrigerant as it is cooled.

The condenser inlet and outlet connections require a special service tool to disconnect the refrigerant lines from the condenser. To disconnect and reconnect the spring lock coupling, refer to SPRING LOCK COUPLING in this section.

SPRING LOCK COUPLING

The spring lock coupling (Fig. 4 or 5) is a refrigerant line coupling held together by a garter spring inside a circular cage. When the coupling is connected together, the flared end of the female fitting slips be-

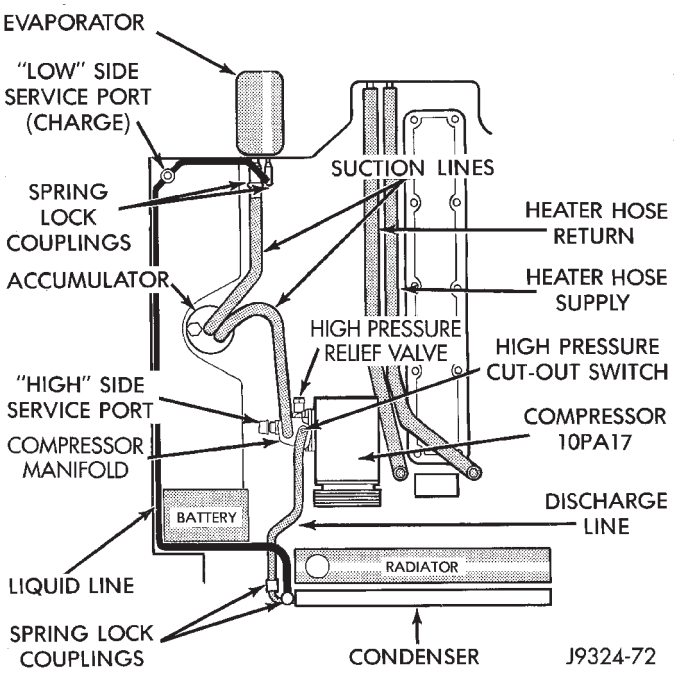

Fig. 4 Heater-A/C Components (4.0L Engine)

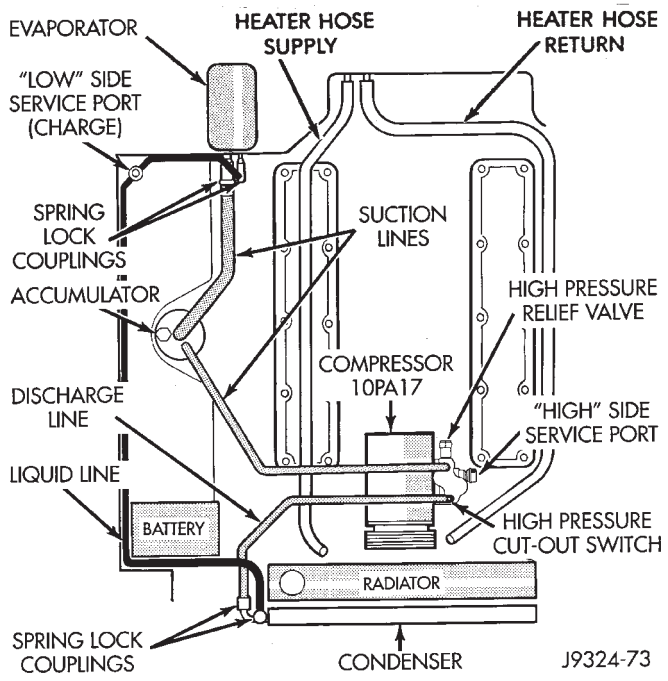

Fig. 5 Heater-A/C Components (5.2L Engine)

hind the garter spring inside the cage of the male fitting. The garter spring and cage prevent the flared end of the female fitting from pulling out of the cage.

Two O-rings are used to seal between the two halves of the coupling. These O-rings are made of special material that are compatible with R-134a refrigerant and must be replaced with an O-ring made of the same material. The O-rings normally used in refrigerant system connections are not the same material and should not be used with the spring lock coupling. Use only the O-rings listed in the parts book for the spring lock coupling.

A plastic indicator ring is used on spring lock couplings to indicate, during vehicle assembly, that the coupling is connected. Once the coupling is connected, the indicator ring is no longer necessary but will remain captive by the coupling near the cage opening.

The indicator ring may also be used during service operations to indicate connection of the coupling. After the coupling has been cleaned, new O-rings installed and lubricated with clean refrigerant oil, insert the tabs of the indicator ring into the cage opening. Connect the coupling together by pushing with a slight twisting motion. When the coupling is connected, the indicator ring will snap out of the cage opening. It will also remain captured on the coupling by the refrigerant line.

COUPLING DISCONNECT

(1) Discharge the refrigerant from the system using a recovery/recycling device.

(2) Fit the appropriate Spring Lock Coupling Tool from A/C Tool Kit 6125 (Fig. 6).

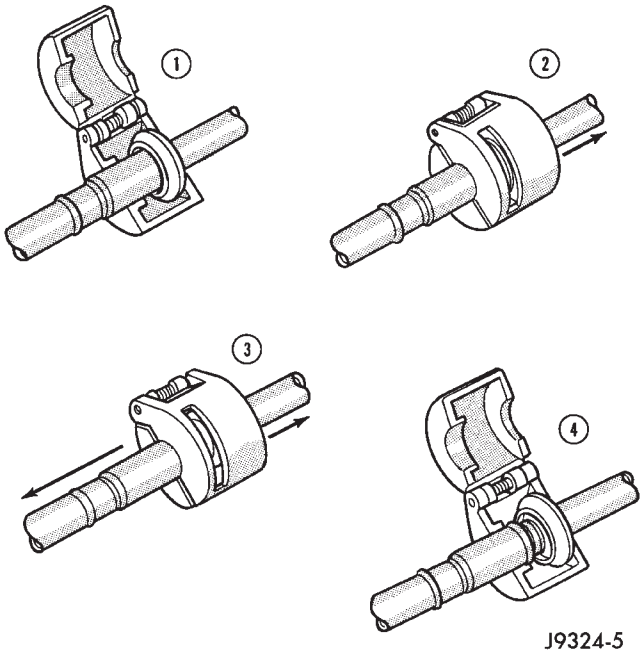

Fig. 6 Spring Lock Coupling Disconnect

(3) Close the tool and push into the open side of the cage to expand garter spring and release female fitting.

The garter spring may not release if the tool is cocked while pushing it into the cage opening.

(4) After garter spring is expanded, pull fittings apart within the tool.

(5) Remove the tool from the disconnected coupling.

(6) Separate the two ends of the coupling.

COUPLING CONNECT

(1) Check to ensure that the garter spring is in the cage of the male fitting. If the garter spring is missing, install a new spring by pushing it into the cage opening. If the garter spring is damaged, remove it from the cage with a small wire hook (do not use a screwdriver) and install a new spring.

(2) Clean all dirt or foreign material from both pieces of the coupling.

(3) Install new O-rings on the male fitting.

CAUTION: Use only the specified O-rings as they are made of a special material for the R-134a system. The use of any O-ring other than the specified O-ring may allow the connection to leak intermittently during vehicle operation.

(4) Lubricate the male fitting and O-rings and the inside of the female fitting with clean R-134a (ND8 PAG) refrigerant oil.

(5) Install the plastic indicator ring into the cage opening if indicator ring is to be used.

(6) Fit female fitting to male fitting and push until garter spring snaps over flared end of female fitting. If plastic indicator ring is used, it will snap out of the cage opening when the coupling is connected to indicate engagement.

(7) If indicator ring is not used, ensure coupling engagement. This is done by visually checking to be sure garter spring is over the flared end of female fitting.

ACCUMULATOR

The accumulator is mounted in the engine compartment on the right side of the vehicle (Fig. 4 or 5). The inlet tube of the accumulator attaches directly to the evaporator core outlet tube. Refrigerant enters the accumulator canister through the inlet tube. The liquid oil-laden refrigerant falls to the bottom of the canister which acts as a separator allowing refrigerant to enter the compressor suction line (Fig. 7).

A desiccant bag is mounted inside the suction accumulator canister to absorb any moisture which may be in the refrigerant system.

A fitting located on top of the canister is used to attach the clutch cycling pressure switch. A long travel Schrader-Type valve stem core is installed in the fitting opening. This is done to prevent refrigerant loss when the clutch cycling pressure switch is removed.

CAUTION: DO NOT use this fitting to charge the system or to check suction pressure.

To check the accumulator for excessive refrigerant oil, the oil must be poured from the accumulator and the hoses (refer to Accumulator Removal/Installation). This is done through the pressure switch fitting when the Schrader-Type valve stem is removed.

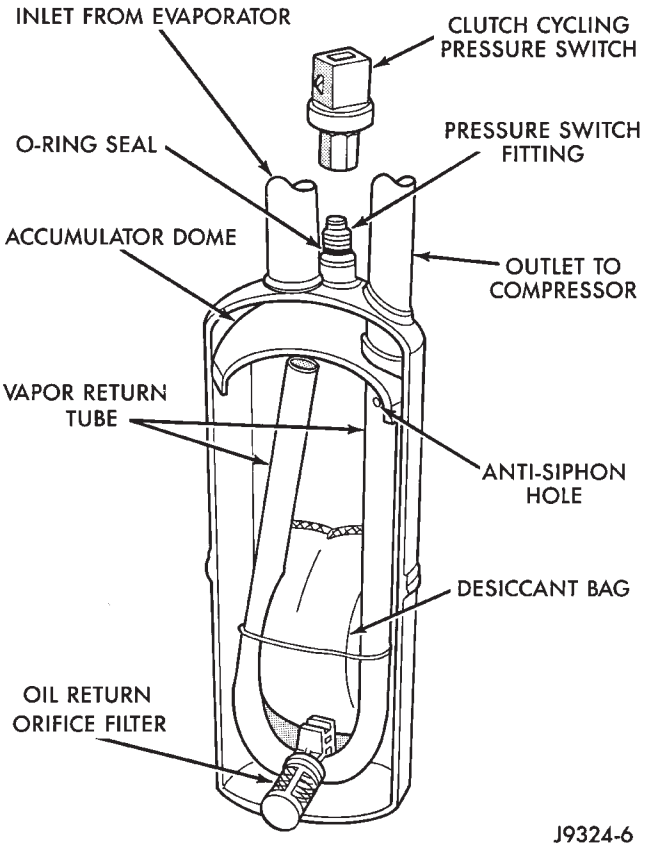

Fig. 7 Accumulator and Clutch Cycling Pressure Switch

REPLACE ACCUMULATOR WHEN:

- The accumulator is restricted, plugged or perforated.
- If there is evidence of moisture in the system (internal corrosion of metal lines or dark-thick refrigerant oil).
- The system is contaminated (such as if the compressor has seized).

DO NOT REPLACE ACCUMULATOR EVERY TIME IF:

- There is a loss of refrigerant charge.
- A component such as a condenser, evaporator or compressor (except as previously described) is changed.
- A dent is found in the outer shell of the accumulator.

CLUTCH CYCLING PRESSURE SWITCH

The clutch cycling pressure switch is mounted on a Schrader-Type valve fitting on the top of accumulator (Fig. 7). A valve depressor, is located inside the threaded end of the pressure switch. It presses in on the Schrader-Type valve stem as the switch is mounted and allows the suction evaporator outlet pressure inside the accumulator canister to control

switch operation. The electrical switch contacts are normally open when the suction evaporator outlet pressure is approximately 172 kPa (25 psi) or lower. They will close when the suction evaporator outlet pressure rises to approximately 296 kPa (43 psi) or above. Lower ambient temperatures, below approximately -1°C (30°F) during cold weather will also open the clutch cycling pressure switch contacts. This is due to the pressure/temperature relationship of the refrigerant in the system. The electrical switch contacts control the electrical circuit to the compressor magnetic clutch coil. When the switch contacts are closed, the clutch coil is energized and the A/C clutch is engaged to drive the compressor.

WHEN THE SWITCH CONTACTS ARE OPEN:

- The compressor magnetic clutch coil is de-energized.
- The A/C clutch is disengaged.
- The compressor does not operate.

The clutch cycling pressure switch, when functioning properly, will control the evaporator core refrigerant flow. This is at a point where the plate/fin surface temperature will be maintained slightly above freezing. This also prevents evaporator icing and the blockage of airflow.

FIXED ORIFICE TUBE

The fixed orifice tube is located in the liquid line near the condenser (Fig. 4 or 5). It has filter screens on the inlet and outlet ends of the tube body. The filter screens act as a strainer for the liquid refrigerant flowing through the fixed orifice opening. O-rings, on the tube body, prevent the high pressure liquid refrigerant from bypassing the orifice. Adjustments cannot be made to the fixed orifice tube. If it becomes clogged or damaged, replace the condenser to evaporator tube.

The fixed orifice tube assembly is the restriction between the high and low pressure liquid refrigerant. It meters the flow of liquid refrigerant into the evaporator core. Minimum evaporator temperature is controlled by sensing the pressure within the evaporator with a pressure-operated electric switch. The pressure switch controls compressor operation as necessary to prevent evaporator freeze-up.

The condenser to evaporator tube should be replaced whenever a compressor is replaced for lack of performance (internal damage).

HIGH PRESSURE RELIEF VALVE

A pressure relief valve is used to prevent excessive high pressure build up of 3445 to 4135 kPa (500 to 600 psi) and above. This will prevent damage to the compressor and other system components. The pressure relief valve is located on the rear end of the compressor manifold.

HIGH PRESSURE CUT-OUT SWITCH

The high pressure cut-out switch is located at the plumbing connection on the compressor manifold. When the discharge pressure reaches 3100 to 3375 kPa (450 to 490 psi), the switch interrupts the electrical power to the compressor clutch. This will prevent compressor operation when compressor discharge pressure approaches high levels.

SERVICE GAUGE PORT VALVES

Two Schrader-Type gauge ports are used with the refrigerant system. The high pressure service gauge port is located on the compressor manifold. The low pressure service gauge port is located on the condenser-to-evaporator refrigerant line near the back of the engine compartment.

After servicing the refrigerant system, install cap on service gauge port.

SYSTEM DIAGNOSTICS

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A/C PERFORMANCE TEST

The air conditioning system is designed to provide the passenger compartment with low temperature and low humidity air. The evaporator, located in the heater-A/C unit behind the instrument panel, is cooled to temperatures near the freezing point. As warm damp air passes over the fins in the evaporator, the air is cooled and moisture is removed to condense on the fins. During periods of high heat and humidity an A/C system will be more effective in the RECIRC mode. With the control set to RECIRC, only air from the passenger compartment passes through the evaporator. As the passenger compartment air dehumidifies, A/C performance levels improve.

Review Safety Precautions and Warnings before proceeding with this procedure. Air temperature in test room and in the vehicle must be 21°C (70°F) minimum for this test.

(1) Connect an engine tachometer and manifold gauge set.

(2) Set control to A/C, PANEL, RECIRC (temperature knob on full cool) and blower on HIGH.

(3) Start engine and hold at 1,000 RPM with A/C clutch engaged.

(4) Engine should be warmed up with windows and/or doors opened.

(5) Insert a thermometer in the left center A/C outlet and operate the engine for 5 minutes.

(6) The A/C clutch may cycle depending on ambient conditions. If clutch cycles, remove the clutch cycling pressure switch connector from the switch located on the accumulator (Fig. 1). Place a jumper wire across the terminals of the clutch cycling pressure switch connector.

(7) With the A/C clutch engaged, record the discharge air temperature and the compressor discharge pressure.

(8) Compare the discharge air temperature to the A/C Performance (Temperature and Pressure) chart. If the discharge air temperature is high, refer to the Refrigerant Service Procedures (Refrigerant Leak Testing and Refrigerant Charge Check).

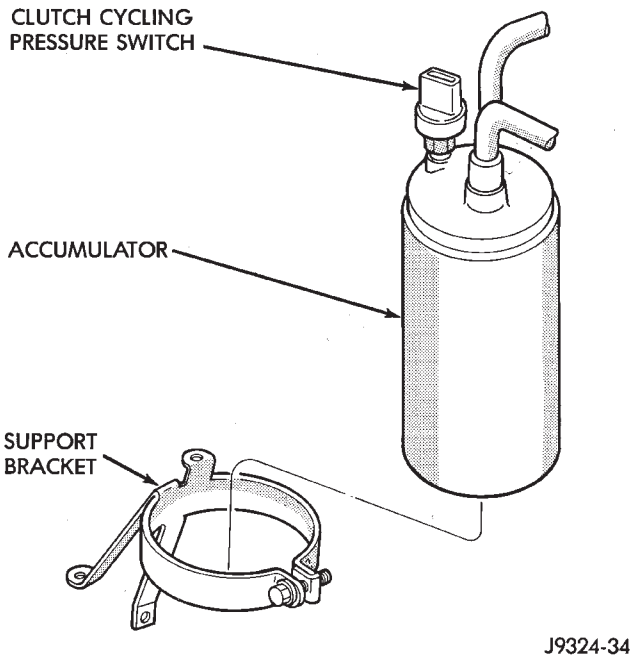

Fig. 1 Clutch Cycling Pressure Switch

(9) Compare the compressor discharge pressure to the A/C Performance (Temperature and Pressure) chart. If the compressor discharge pressure is high, refer to the Refrigerant Service Procedures (High Compressor Discharge Pressure).

REFRIGERANT SYSTEM

To check the operation of the refrigerant system, refer to Refrigerant System Diagnosis Chart.

VACUUM CONTROL

This control is used with the heater and A/C (manual) systems.

Use an adjustable Vacuum Test Gauge (C-3707) and a suitable vacuum pump to test heater-A/C control vacuum. With a finger placed over the end of test hose (Fig. 2), calibrate vacuum control valve on the test gauge to obtain -27 kPa (8 in. Hg.). Release and block the end of the test hose several times to verify vacuum setting.

A/C PERFORMANCE (TEMPERATURE AND PRESSURE)

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 to 3°C (27-38°F)	1 to 7°C (33-44°F)	3 to 9°C (37-48°F)	6 to 13°C (43-55°F)	10 to 18°C (50-64°F)
Evaporator Inlet Pressure at Charge Port	179-241 kPa (26-35 psi)	221-283 kPa (32-41 psi)	262-324 kPa (38-47 psi)	303-365 kPa (44-53 psi)	345-414 kPa (50-60 psi)
Compressor Discharge Pressure	1240-1655 kPa (180-240 psi)	1380-1790 kPa (200-260 psi)	1720-2070 kPa (250-300 psi)	1860-2345 kPa (270-340 psi)	2070-2690 kPa (300-390 psi)

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VACUUM TESTING THE ONE-WAY CHECK VALVE

(1) In the engine compartment, disconnect the Heater-A/C vacuum supply (black) hose. This hose passes through an opening in the dash panel.

(2) Remove the vacuum check valve. This valve is located on the (black) vacuum supply hose at the intake manifold.

(3) Connect test vacuum supply hose to the HEATER SIDE of the valve. In this direction the gauge should return to calibrated setting. If valve leaks vacuum in this direction, valve replacement is necessary.

(4) Connect test vacuum supply hose to the ENGINE VACUUM SIDE of the valve. Vacuum should flow through valve.

VACUUM TESTING THE HEATER-A/C CONTROLS

(1) Connect the test vacuum probe to the vehicles (black) vacuum supply hose. Position vacuum test gauge so it can be viewed from the passenger compartment.

(2) Position the heater-A/C control mode selector to DEFROST, FLOOR, BI-LEVEL, PANEL or RECIRC (with A/C). Pause after each selection. The test gauge should return to the calibrated setting of -27 kPa (8 in. Hg.) after each selection is made. If the gauge cannot achieve the calibrated setting, a vacuum circuit or component has a leak.

LOCATING VACUUM LEAKS

To locate a vacuum leak, disconnect 7-way vacuum connector behind the heater-A/C control panel (refer to Heater-A/C Control Panel Removal/Installation). Connect the calibrated vacuum hose probe to each port in the vacuum harness connector (Fig. 3). After each connection is made, the test gauge should return to calibrated setting. If all circuits function properly, replace heater-A/C control. If not, determine the color of the vacuum circuit that is leaking. To determine vacuum line colors, refer to the Vacuum Circuits chart for the heater and manual A/C units. Disconnect the vacuum actuator at the other end of the circuit. Instrument panel removal may be necessary to gain access to some components. Block the end of the disconnected vacuum line. The test gauge should return to calibrated setting. If not, that circuit has a leak and must be repaired or replaced. If test gauge returns to calibrated setting, the vacuum actuator must be replaced.

CONDENSATE WATER DRAINAGE

Condensate that accumulates in the bottom of the evaporator housing is drained from a drain hole in the heater-A/C unit. When the heater-A/C unit is installed in the vehicle, be sure that the drain hole is located properly in the dash panel. If the drain hole is out of position, water will drain into the passenger compartment. It is normal to see condensate drainage below the vehicle.

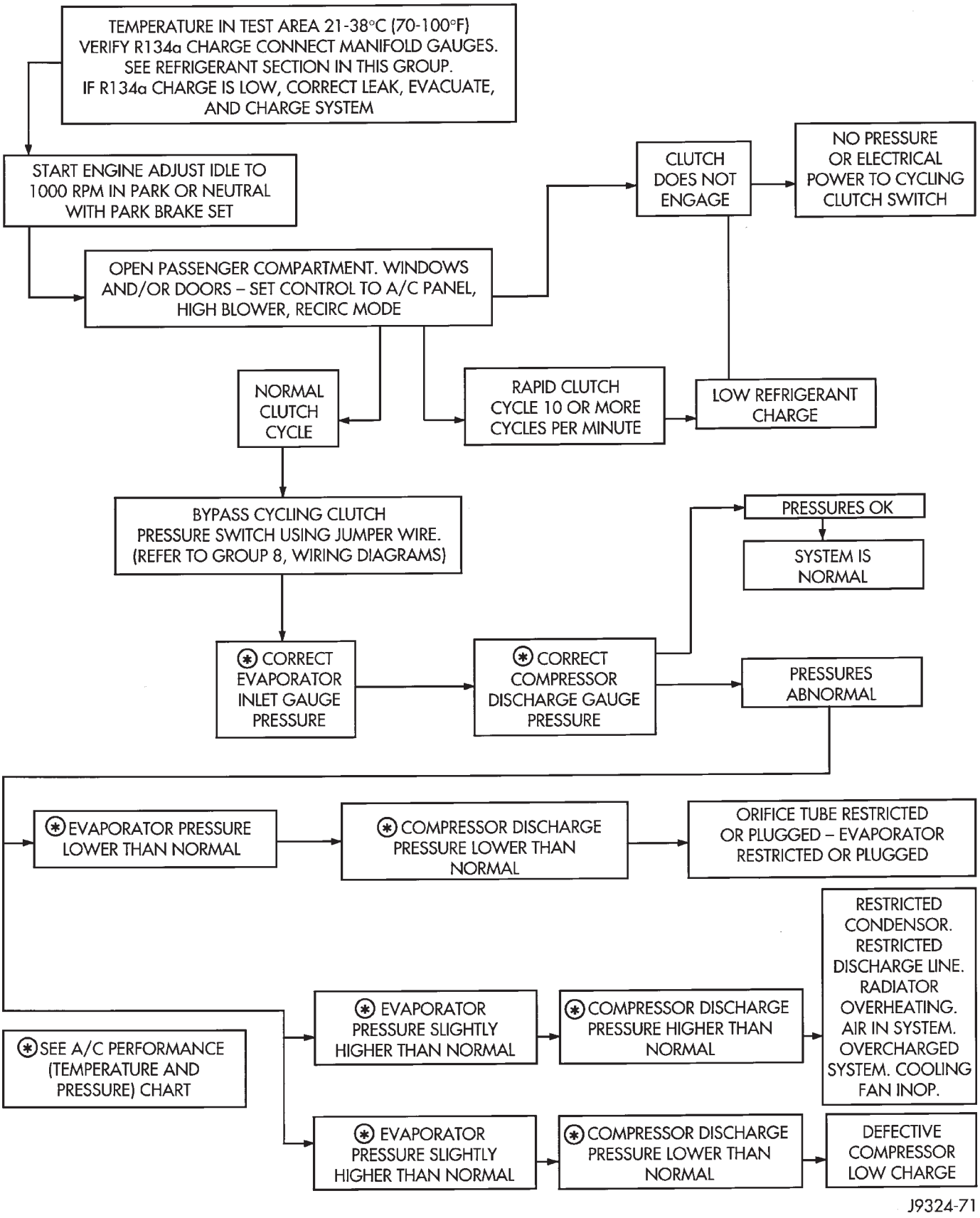
BLOWER MOTOR VIBRATION AND/OR NOISE DIAGNOSIS

The blower resistor supplies the blower motor with varied voltage (low and middle speeds) or battery voltage (high speed).

CAUTION: Stay clear of the blower motor and resistor (Hot). Do not operate the blower motor with the resistor block removed from the heater-A/C unit.

Refer to the Blower Motor Vibration/Noise chart in this section for diagnosis.

REFRIGERANT SYSTEM DIAGNOSIS



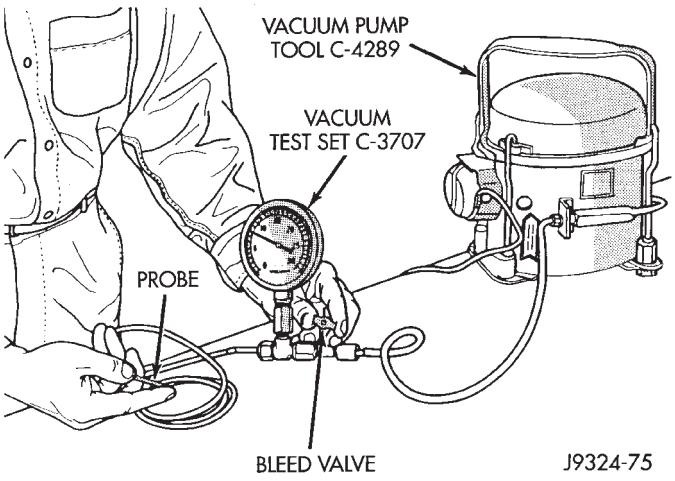


Fig. 2 Adjust Vacuum Test Bleed Valve

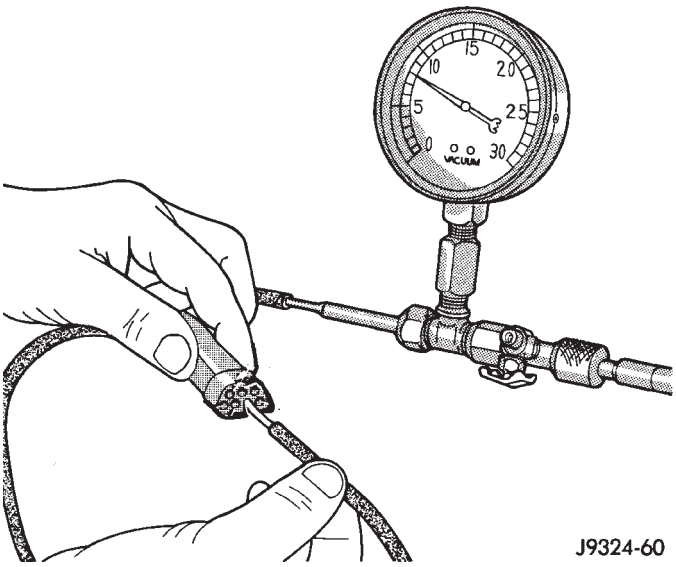


Fig. 3 Vacuum Circuit Test

BLOWER MOTOR ELECTRICAL DIAGNOSIS

Refer to the Blower Motor Electrical System Diagnosis chart in this section. Also refer to Group 8W, Wiring Diagrams for more information.

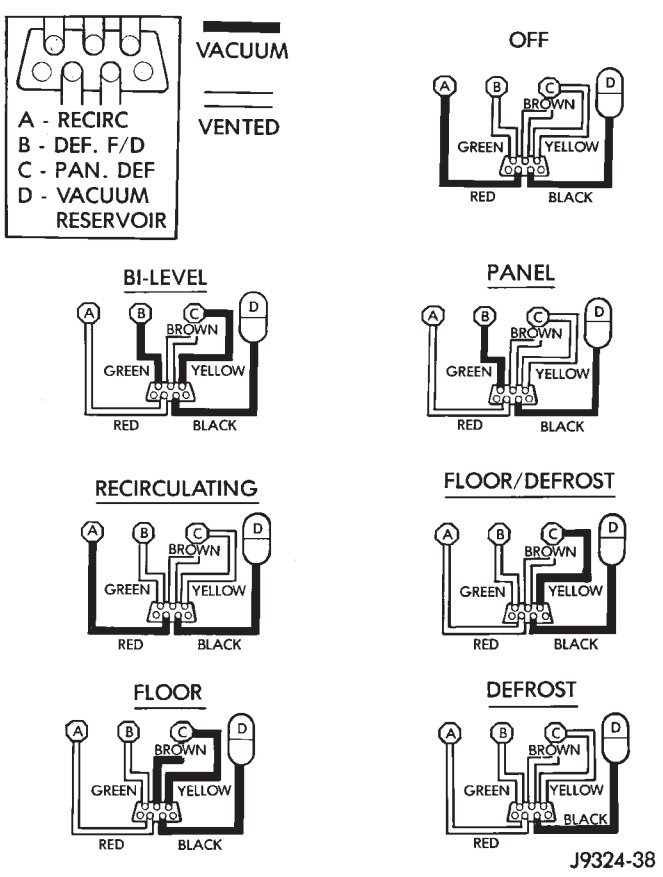
COMPRESSOR NOISE

Excessive noise that occurs when the air conditioning is being used, can be caused by:

- Loose bolts
- Mounting brackets
- Loose clutch
- Excessive high refrigerant system operating pressure

Verify compressor drive belt condition, proper refrigerant charge and head pressure before compressor repair is performed.

For noise diagnostic procedures, refer to the Compressor Noise and Compressor Clutch Diagnosis chart in this section.



COMPRESSOR CLUTCH INOPERATIVE

The air conditioning compressor clutch electrical circuit is controlled by the powertrain control module (Fig. 4).

If the compressor clutch does not engage, verify refrigerant charge.

If the compressor clutch still does not engage, check for battery voltage at the low pressure switch located on the accumulator. If voltage is not detected, refer to:

- Group 8W, Wiring Diagrams.
- The appropriate Powertrain Diagnostic Procedures Manual for diagnostic information.

If voltage is detected at the cut-off switch, reconnect switch. Then check for battery voltage between the compressor clutch connector terminals.

If voltage is detected, perform A/C Clutch Coil Tests.

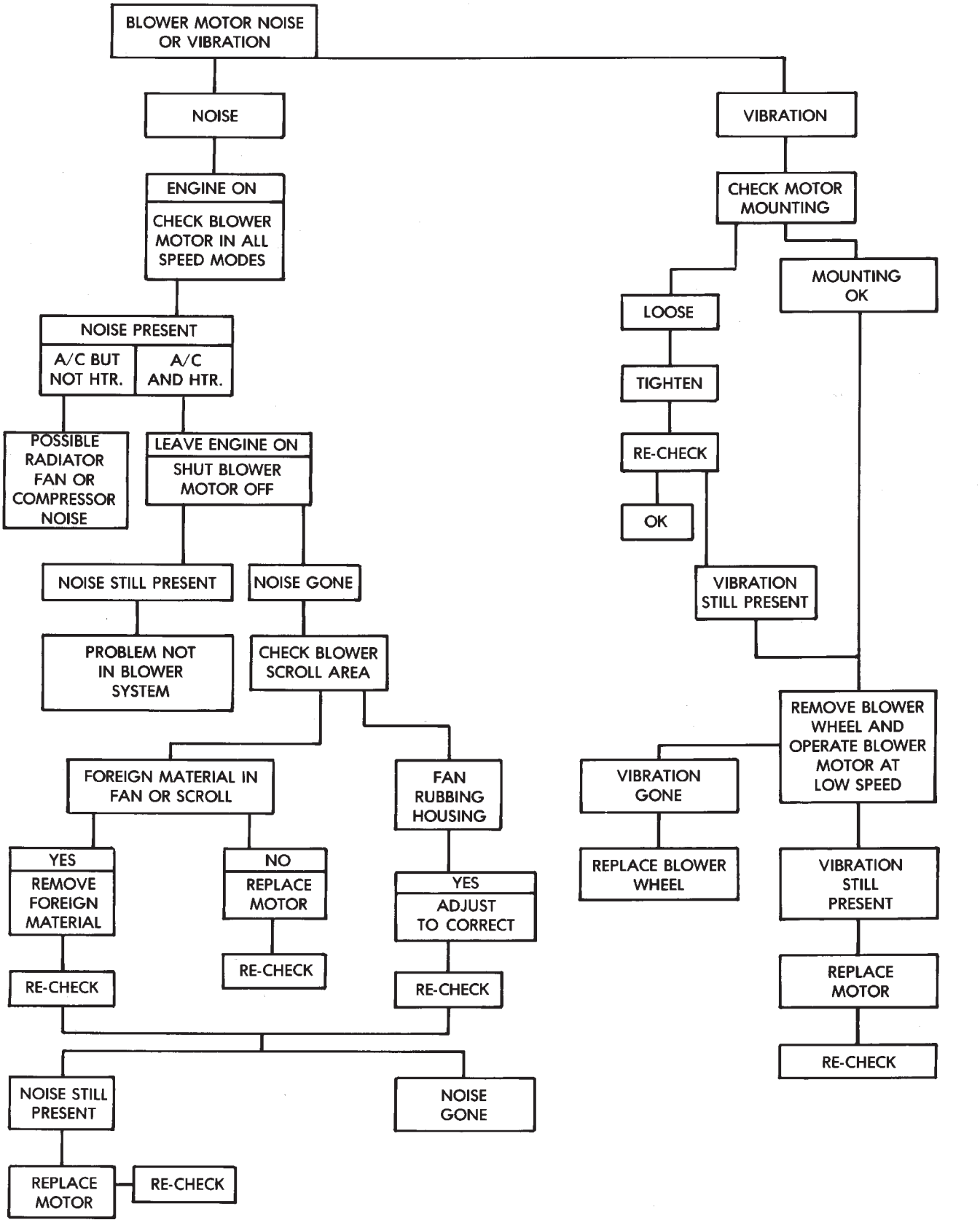
CLUTCH COIL TESTS

(1) Verify battery state of charge. Test indicator in battery should be green.

(2) Connect an ammeter (0-10 ampere scale) in series with the clutch coil terminal. Use a volt meter (0-20 volt scale) with clip leads measuring voltage across the battery and A/C clutch.

(3) With A/C control in A/C mode and blower at low speed, start the engine and run at normal idle.

BLOWER MOTOR NOISE/VIBRATION DIAGNOSIS



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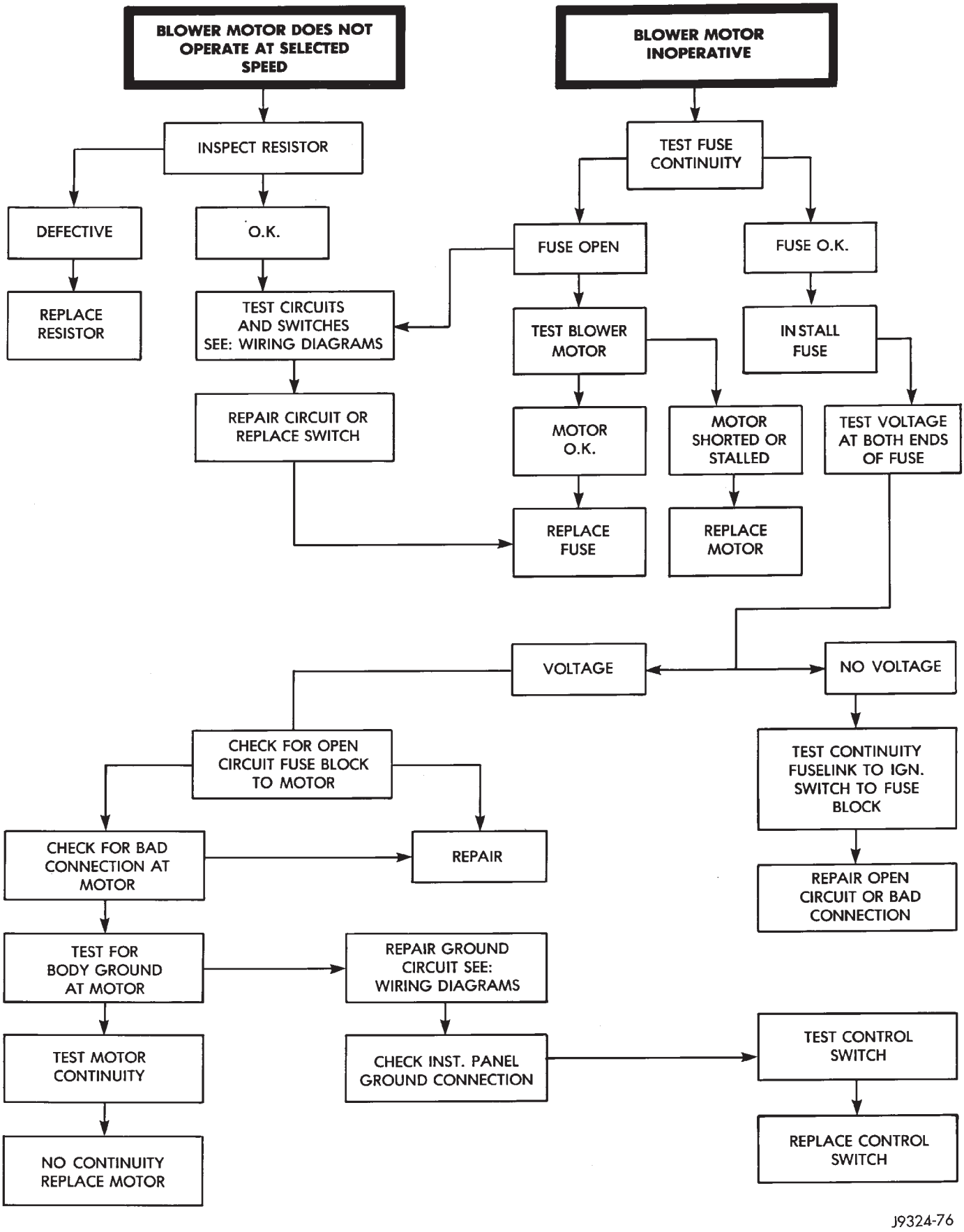
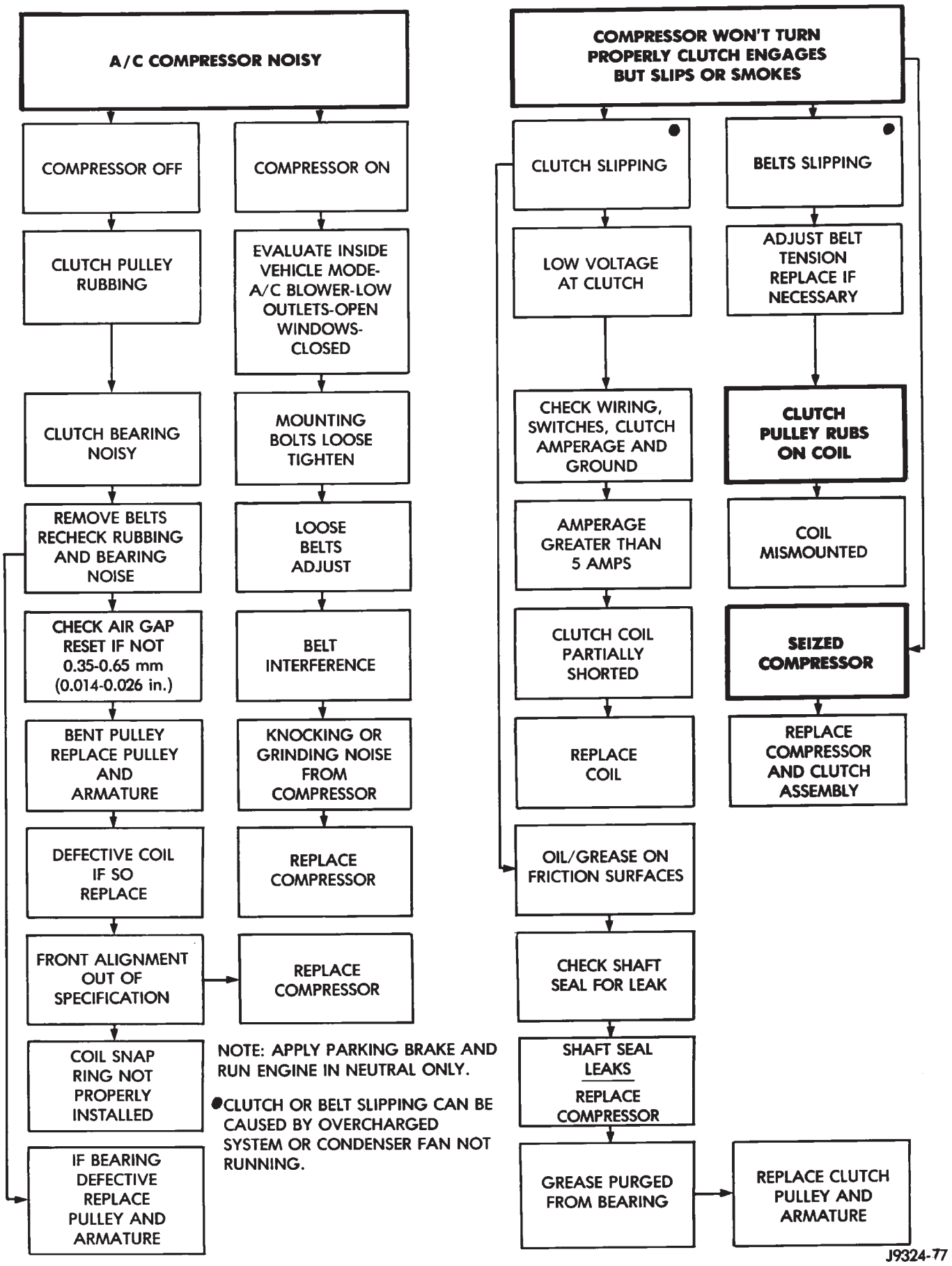
BLOWER MOTOR ELECTRICAL SYSTEM DIAGNOSIS



COMPRESSOR NOISE AND COMPRESSOR CLUTCH DIAGNOSIS



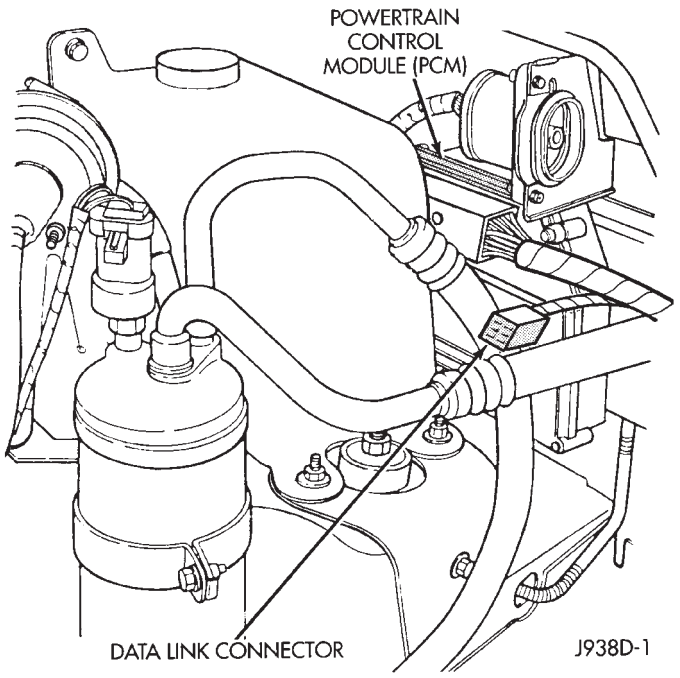


Fig. 4 Power Control Module Location

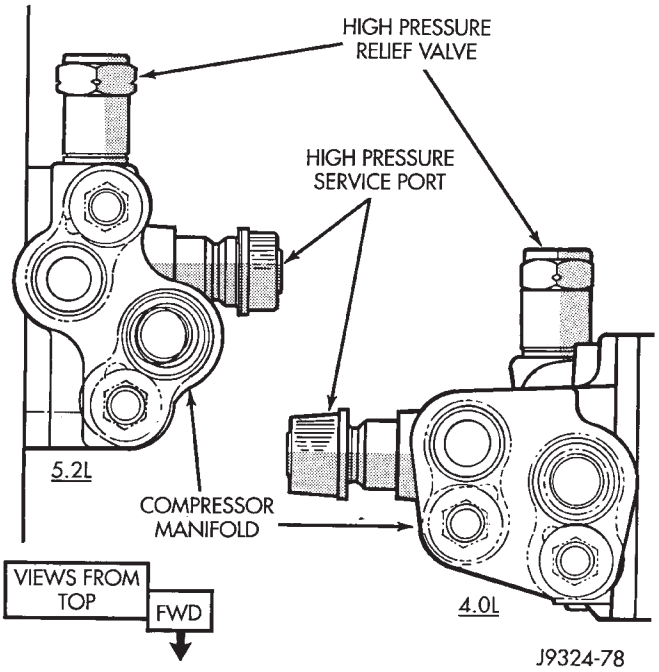


Fig. 5 High Pressure Relief Valve

(4) The A/C clutch should engage immediately and the clutch voltage should be within 2 volts of the battery voltage. If the A/C clutch does not engage, test the fusible link.

(5) The A/C clutch coil is acceptable if the current draw is 2.0 to 3.7 amperes at 11.5 to 12.5 volts at clutch coil. This is with the work area temperature at 21°C (70°F). If voltage is more than 12.5 volts, add electrical loads by turning on electrical accessories until voltage reads below 12.5 volts.

If coil current reads zero, the coil is open and should be replaced. If the ammeter reading is 4 amperes or more, the coil is shorted and should be replaced. If the coil voltage is not within two volts of the battery voltage, test clutch coil feed circuit for excessive voltage drop.

HIGH PRESSURE RELIEF VALVE

The high pressure relief valve is located on the compressor manifold (Fig. 5).

The high pressure relief valve vents only a small amount of refrigerant necessary to reduce system pressure and then reseats itself. This prevents damage to the air conditioning system if excessive pressure develops. Excessive pressure may be caused by condenser air flow blockage, refrigerant overcharge, or air and moisture in the system. The majority of the refrigerant is conserved in the system. The valve is calibrated to vent at a pressure of 3445 to 4135 kPa (500 to 600 psi). If a valve has vented a small amount of refrigerant, it does not necessarily mean the valve is defective.

HEATER OUTPUT TEST

PRE-DIAGNOSTIC PREPARATIONS

Review Safety Precautions and Warnings before performing the following procedures.

Check the radiator coolant level, drive belt tension and engine vacuum line connections. Also check radiator air flow and radiator fan operation. Start engine and allow to warm up to normal operating temperature.

WARNING: DO NOT REMOVE RADIATOR CAP WHEN ENGINE IS HOT, PERSONAL INJURY CAN RESULT.

If vehicle has been run recently, wait 15 minutes before removing cap. Place a rag over the cap and turn it to the first safety stop. Allow pressure to escape through the overflow tube. When the system stabilizes, remove the cap completely.

MAXIMUM HEATER OUTPUT

Engine coolant is provided to the heater system by 2 heater hoses. With engine idling at normal running temperature, set the control to maximum heat, floor and high blower setting. Using a test thermometer, check the air temperature coming from the floor outlets, refer to Temperature Reference chart.

If the floor outlet air temperature is low, refer to Group 7, Cooling System for coolant temperature specifications. Both heater hoses should be HOT to the touch. The coolant return hose should be slightly cooler than the supply hose. If coolant return hose is much cooler than the supply hose, locate and repair engine coolant flow obstruction in heater system.

TEMPERATURE REFERENCE CHART

Ambient Temperature		Minimum Heater System Floor Outlet Temperature	
Celsius	Fahrenheit	Celsius	Fahrenheit
15.5°	60°	62.2°	144°
21.1°	70°	63.8°	147°
26.6°	80°	65.5°	150°
32.2°	90°	67.2°	153°

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Possible locations or cause of obstructed coolant flow:

- Pinched or kinked heater hoses.
- Improper heater hose routing.
- Plugged heater hoses or supply and return ports at cooling system connections (refer to Group 7, Cooling System).
- Plugged heater core.

If proper coolant flow through heater system is verified and outlet air temperature is still low, a mechanical problem may exist.

Possible location or cause of insufficient heat:

- Obstructed cowl air intake.
- Obstructed heater system outlets.
- Blend-air door not functioning properly.

TEMPERATURE CONTROL

If temperature cannot be adjusted with the TEMP knob on the control panel, the following could require service:

- Blend-air door circuit.
- Improper engine coolant temperature.

AUTOMATIC TEMPERATURE CONTROL DIAGNOSTICS

The ATC controller is designed with on-board diagnostics which is capable of troubleshooting each input and output circuit of the controller. When a fault is detected and in memory, an "Er" is momentarily displayed, but only once during an ignition cycle. There are three different groups of testing features that this system is capable of:

(1) Fault Codes
(2) Input Circuit Testing
(3) Output Circuit Testing/Actuator Tests

DIAGNOSTICS TEST SELECTOR

The test selector is located in the same location as the temperature control point. The test selector is used to display fault codes, identify the test selection mode and is used to show the value of each circuit being tested.

(1) If the floor (bottom) arrow is showing, the test selector value will be a range of numbers below 0 (Fig. 6).

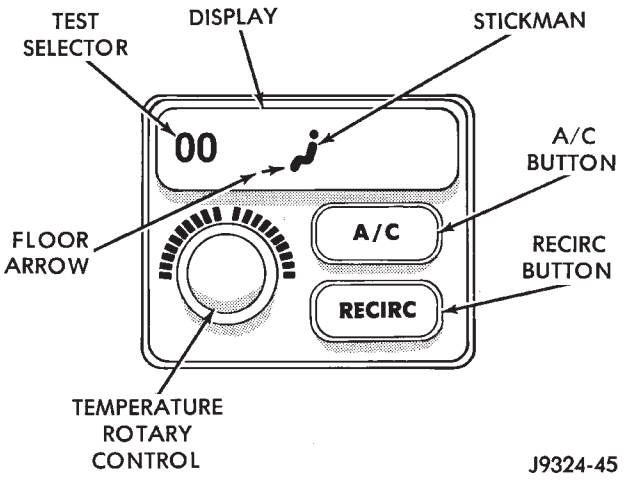

Fig. 6 Test Selector Values Below 0

(2) If the stickman shows no arrows, the test selector value will be a range of numbers between 0 and 99 (Fig. 7).

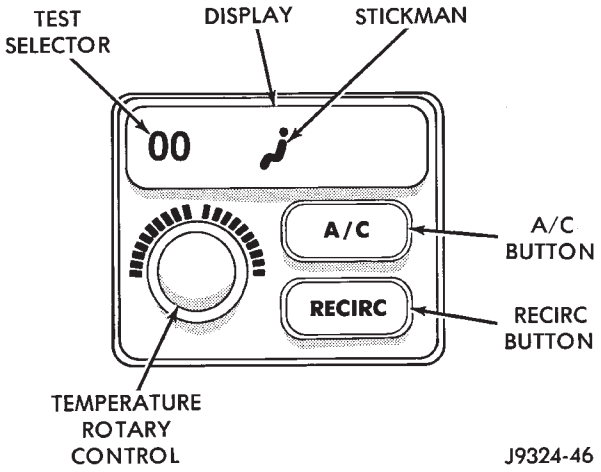

Fig. 7 Test Selector Values Between 0 and 99

(3) If the panel (middle) arrow is showing, the test selector value will be a range of numbers between 100 and 199 (Fig. 8).

(4) If the panel (middle) and defrost (top) arrows are showing, the test selector value will be a range of numbers between 200 and 255 (Fig. 9).

During diagnostics you may return to the test selector mode by simply turning the temperature (rotary) control one CLICK in either direction. Again the stickman and arrows are not shown in test selector mode. Also, you have the option of monitoring or testing another circuit (Fig. 10).

ENTER DIAGNOSTICS

To enter the diagnostics, perform the following:

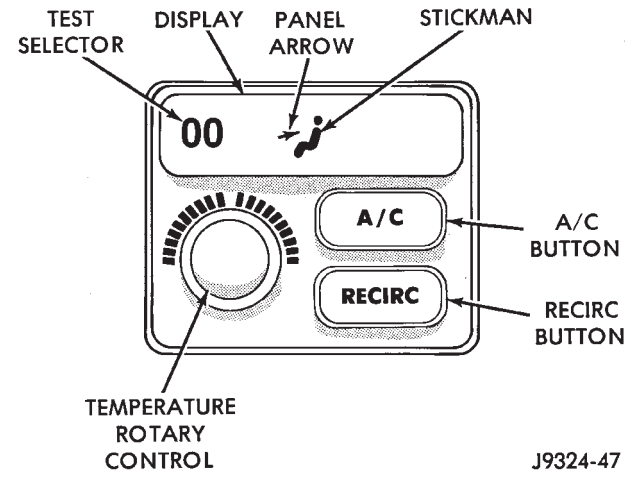

Fig. 8 Test Selector Values Between 100 and 199

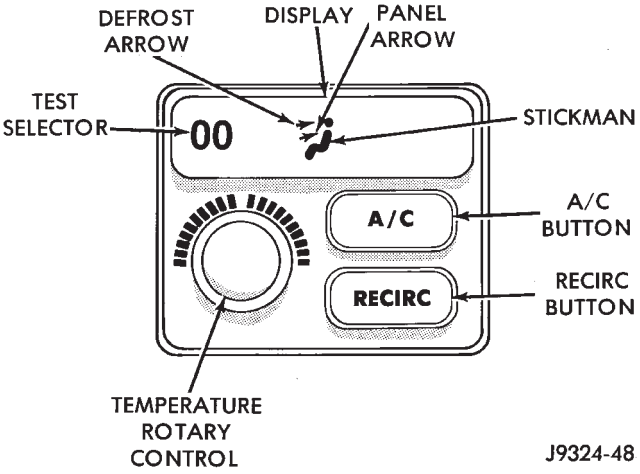

Fig. 9 Test Selector Values Between 200 and 255

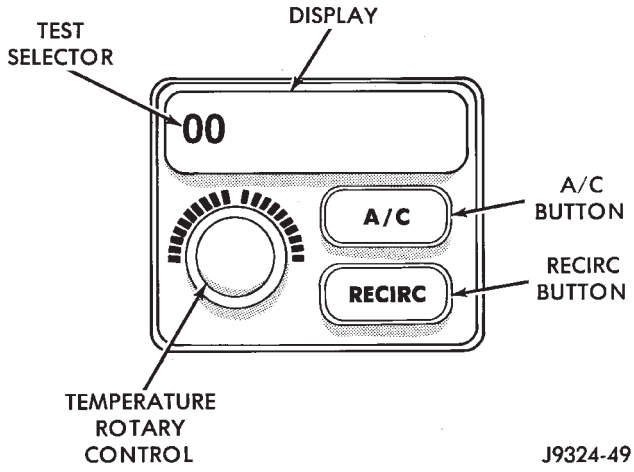

Fig. 10 Return to Test Selector Mode

(1) Depress the A/C and RECIRC buttons simultaneously and hold. Rotate the control knob clockwise one CLICK.

(2) If you continue to hold the A/C and RECIRC buttons you will see the display completely light up. This is the Segment Test.

(3) After viewing the Segment Test, release the A/C and RECIRC buttons. This will put the test selector at 00, the Select Test level.

At this point a number of tests can be performed. However, the Fault Code Diagnostics should be preformed now.

FAULT CODE DIAGNOSTICS

The codes are two digit numbers that identify which circuit is malfunctioning. There are two different kinds of fault codes.

(1) Current Fault Codes are divided into two categories; input faults and system faults. Current faults means they are present right now.

(2) Historical Fault Codes are referred to as historical faults or faults that are stored in memory. Historical faults are an indication that a circuit failed previously, but is OK right now. A majority of historical fault codes are caused by wiring or connector problems.

CAUTION: A battery disconnect will erase all faults stored in Read Available Memory (RAM). It is recommended that all faults be recorded before they are erased.

While 00 is displayed, push either A/C or RECIRC button. The stickman will appear indicating you have entered the fault section. The numbers displayed will range from 00 to 64.

Fault codes will appear and repeat if there are more than one. Record the fault codes and refer to the Current and Historical Fault Code Charts. If there are no fault codes, the display remains at 00.

If Fault Code 25 or 29 is displayed, the ATC Control Module must be replaced before any further testing is performed.

For more detailed information about a fault code, refer to the Input Circuit Testing or Output Circuit Testing/Actuator Tests.

CLEARING FAULT CODES

Current faults are cleared whenever the problem goes away. To clear the historical faults, press and hold either A/C or RECIRC for 3 seconds. The faults have cleared when 2 horizontal bars appear in the display screen.

CURRENT FAULTS

Fail Code/Description	Circuit Description
00 = No Faults	
01 = Circuit open	Ambient Temperature Sensor
02 = Circuit open	In-Vehicle Temperature Sensor
03 = Circuit open	Solar Sensor Input Circuit
04 = Circuit open	Front Panel Blower/Fan Control Input
05 = Circuit open	Front Panel Mode Control Input
06 = Circuit open	Blend Air Door Feedback Circuit
07 = Circuit open	Mode Door Feedback Circuit
08 = Feedback too high	Blower/Fan Feedback Circuit
09 = Circuit shorted	Ambient Temperature Sensor
10 = Circuit shorted	In-Vehicle Temperature Sensor
11 = Circuit shorted	Solar Sensor Input Circuit
12 = Circuit shorted	Front Panel Blower/Fan Control Input
13 = Circuit shorted	Front Panel Mode Control Input
14 = Circuit shorted	Blend Air Door Feedback Circuit
15 = Circuit shorted	Mode Door Feedback Circuit
16 = Feedback too low	Blower/Fan Feedback Circuit
17 = Dimming input error	Pulse Width Dimming PWD Input
19 = Door not responding	Mode Door Feedback Circuit
20 = Door not responding	Blend Air Door Actuator Drive Circuit
21 = Door travel range too small	Mode Door Feedback Circuit
22 = Door travel range too large	Mode Door Feedback Circuit
23 = Door travel range too small	Blend Air Door Actuator Drive Circuit
24 = Door travel range too large	Blend Air Door Actuator Drive Circuit
25 = Calibration data error	Calibration and CPU Data
26 = Coolant temp message missing	Collision Detection C2D BUS Inputs
27 = Vehicle speed message missing	Collision Detection C2D BUS Inputs
28 = Engine RPM message missing	Collision Detection C2D BUS Inputs
29 = CPU error	Calibration and CPU Data
30 = Reserved	
31 = Reserved	
32 = Reserved	

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HISTORICAL FAULTS

Fail Code/Description	Circuit Description
33 = Circuit was open	Ambient Temperature Sensor
34 = Circuit was open	In-Vehicle Temperature Sensor
35 = Circuit was open	Solar Sensor Input Circuit
36 = Circuit was open	Front Panel Blower/Fan Control Input
37 = Circuit was open	Front Panel Mode Control Input
38 = Circuit was open	Blend Air Door Feedback Circuit
39 = Circuit was open	Mode Door Feedback Circuit
40 = Feedback was too high	Blower/Fan Feedback Circuit
41 = Circuit was shorted	Ambient Temperature Sensor
42 = Circuit was shorted	In-Vehicle Temperature Sensor
43 = Circuit was shorted	Solar Sensor Input Circuit
44 = Circuit was shorted	Front Panel Blower/Fan Control Input
45 = Circuit was shorted	Front Panel Mode Control Input
46 = Circuit was shorted	Blend Air Door Feedback Circuit
47 = Circuit was shorted	Mode Door Feedback Circuit
48 = Feedback was too low	Blower/Fan Feedback Circuit
49 = Dimming input was in error	Pulse Width Dimming PWD Input
51 = Door was not responding	Mode Door Feedback Circuit
52 = Door was not responding	Blend Air Door Actuator Drive Circuit
53 = Door travel range was too small	Mode Door Feedback Circuit
54 = Door travel range was too large	Mode Door Feedback Circuit
55 = Door travel range was too small	Blend Air Door Actuator Drive Circuit
56 = Door travel range was too large	Blend Air Door Actuator Drive Circuit
57 = Calibration data was in error	Calibration and CPU Data
58 = Coolant temp message was missing	Collision Detection C2D BUS Inputs
59 = Vehicle speed message was missing	Collision Detection C2D BUS Inputs
60 = Engine RPM message was missing	Collision Detection C2D BUS Inputs
61 = CPU was in error	Calibration and CPU Data
62 = Reserved	
63 = Reserved	
64 = Reserved	

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INPUT CIRCUIT TESTING

After diagnostics is entered, the status of input circuits can be viewed or monitored. If a failure occurs within an input circuit the controller will display a "?" for unknown values, a "OC" for an open circuit and a "SC" for a shorted circuit.

Use the following steps to view the inputs into the controller:

(1) Enter the diagnostics mode.

(2) Turn the knob until the test you are looking for appears (refer to Circuit Testing chart).

(3) To see the input, press the A/C or RECIRC button. The digits displayed will represent the input seen by the controller.

OUTPUT CIRCUIT TESTING / ACTUATOR TESTS

After diagnostics is entered, you have the ability to view or monitor, override and test the output circuits. If a failure occurs within an output circuit it can be tested by overriding the system and testing it through its full range of operation. When the override control has been activated, the display will be flashing. The control will display feedback information about the circuit being tested.

Use the following steps to view the output commands from the controller:

(1) Enter the diagnostics mode.

(2) Turn the knob until the test you are looking for appears (refer to Circuit Testing chart).

(3) To see the output, press the A/C or RECIRC button. The digits displayed will represent the output from the controller.

(4) To enter the actuator test, press the A/C or RECIRC button. The display will blink, indicating you are in an actuator testing mode. Manual tests are those in which you will have to continuously press the A/C or RECIRC button to control the output. Press the A/C or RECIRC button once to run the automatic tests.

CIRCUIT TESTING

Test No.	Test Item	Test Type	System Tested	Displayed Values
01	Blower Control Switch (A/D)	I	Blower System	"?" "OC" "SC" 00-255
02	Blower Feedback	I	Blower System	"?" 00-255
03	Blower Speed	O/A	Blower System	00-255
04	Hi Blower Relay	O/A	Blower System	00 = OFF 01 = ON
05	Mode Control A/D	I	Mode Door System	"OC" "SC" 00-255
06	Mode Door Feedback	I	Mode Door System	"OC" "SC" 00-255
07	Panel Stop	I	Mode Door System	"?" 00-255 If "?" is displayed, activate Mode 11 to find panel stop position.
08	Defrost Stop	I	Mode Door System	"?" 00-255 If "?" is displayed, activate Mode 11 to find defrost stop position.
09	A/C Request	O/A	A/C System	00 = OFF 01 = ON
10	Mode Door Position	O/A	Mode Door System	00-255 It is possible to command the door position beyond the stops. The motor will try to move there.
11	Mode Motor	O/A	Mode Door System	Pressing A/C or RECIRC button for 3 sec. begins reinitialization. 00 = searching for panel stop 01 = searching for defrost stop 02 = moving toward panel 03 = moving toward defrost 04 = in position 05 = stalled moving toward panel 06 = stalled moving toward defrost 07 = feedback error
12	Mode Motor Drive Lines	O	Mode Door System	00 = stopped (lines low) 01 = toward defrost 02 = toward panel 03 = stopped (lines high)
13	Recirc Door	O/A	Recirc Door System	00 = continuous operation (lines grounded) 01 = fresh 02 = recirc. 03 = stopped (lines open)
14	In-Vehicle Temp. A/D	I	Temperature Inputs	"OC" "SC" 00-255
15	Ambient Sensor A/D	I	Temperature Inputs	"OC" "SC" 00-255
16	Blend Door Feedback	I	Blend Door System	"OC" "SC" 00-255
17	Blend Door Cold Stop	I	Blend Door System	"?" 00-255
18	Blend Door Hot Stop	I	Blend Door System	"?" 00-255

TEST TYPE: I = Input O = Output O/A = Output/Actuator

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CIRCUIT TESTING (CONT.)

Test No.	Test Item	Test Type	System Tested	Displayed Values
19	In-Vehicle Temperature	I	Temperature Inputs	"OC" "SC" -40 to +60 C (-40 to +140 F)
20	Ambient Sensor	I	Temperature Inputs	"OC" "SC" -40 to +60 C (-40 to +140 F)
21	Solar Sensor A/D	I	Sun Intensity Input	"OC" "SC" 00-255
22	Engine Coolant	I	CCD	"?" -40 to +185 C (-40 to +260 F)
23	Vehicle Speed (MPH/KPM)	I	CCD	"?" 00-255
24	Engine RPM (x100)	I	CCD	00-82
25	Blend Door Motor	O/A	Blend Door System	Pressing A/C or RECIRC button for 3 sec. begins reinitialization. 00 = searching for hot stop 01 = searching for cold stop 02 = moving to warmer 03 = moving to cooler 04 = in position 05 = stalled moving to warmer 06 = stalled moving to cooler 07 = feedback error
26	Blend Door Motor	O/A	Blend Door System	00-255 It is possible to command the door position beyond the stops. The motor will try to move there.
27	Blend Door Motor Lines	O/A	Blend Door System	00 = stopped (lines low) 01 = toward cold 02 = toward hot 03 = stopped (lines high)
28	Lights On	I	Headlight Switch	00 = OFF 01 = ON
29	Dimming	I	PWD System	"?" 00-255
30	Dimming Level	O/A	Dimming System	"?" 00-255
31	ROM & EEPROM			00-FF
32	ROM & EEPROM			00-FF
33	ROM & EEPROM			00-FF
34	ROM & EEPROM			00-FF
35	ROM & EEPROM			00-FF
36	ROM & EEPROM			00-FF
37	ROM & EEPROM			00-FF
38	ROM & EEPROM			00-FF

TEST TYPE: I = Input O = Output O/A = Output/Actuator

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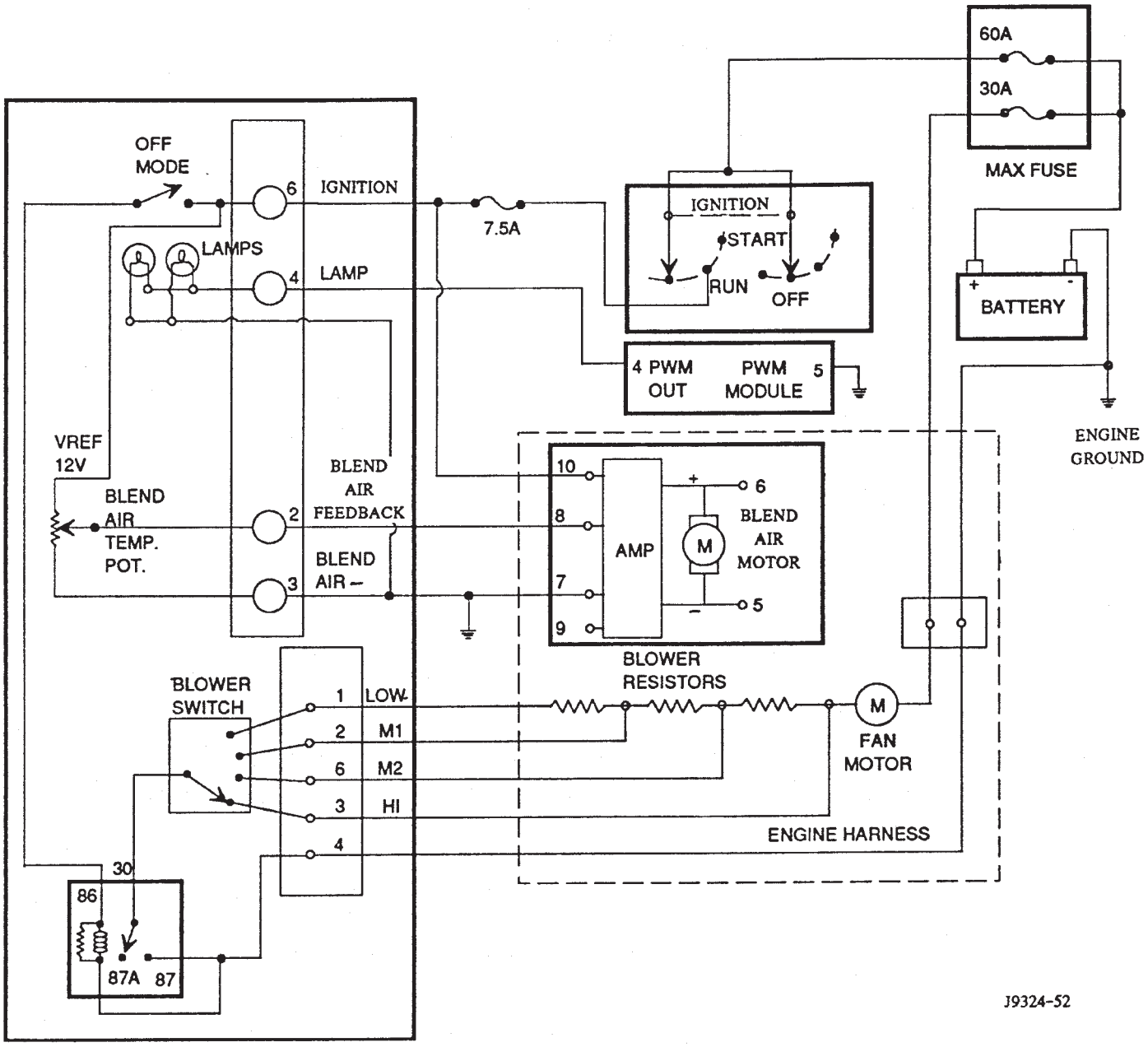
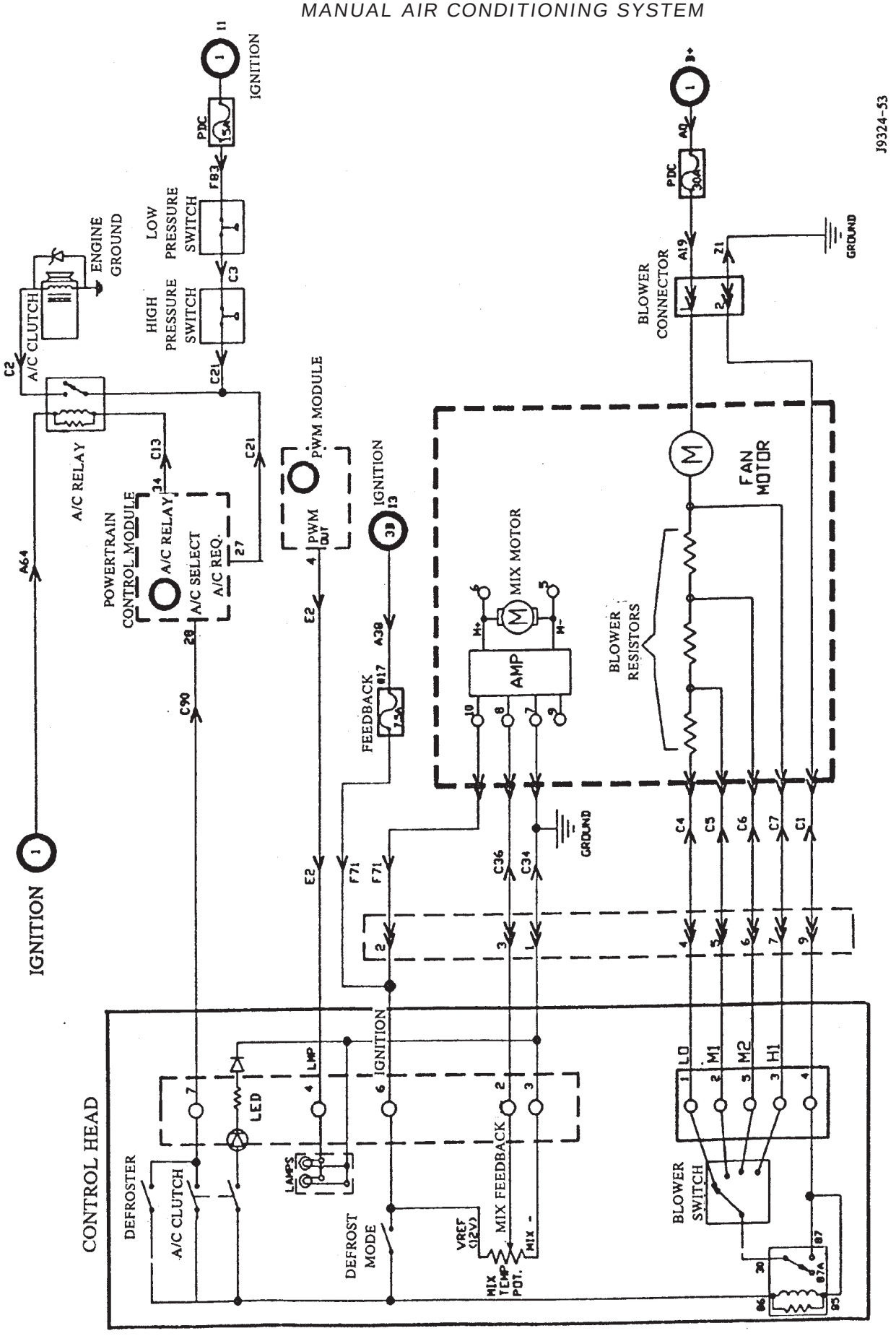
ELECTRICAL CIRCUITS

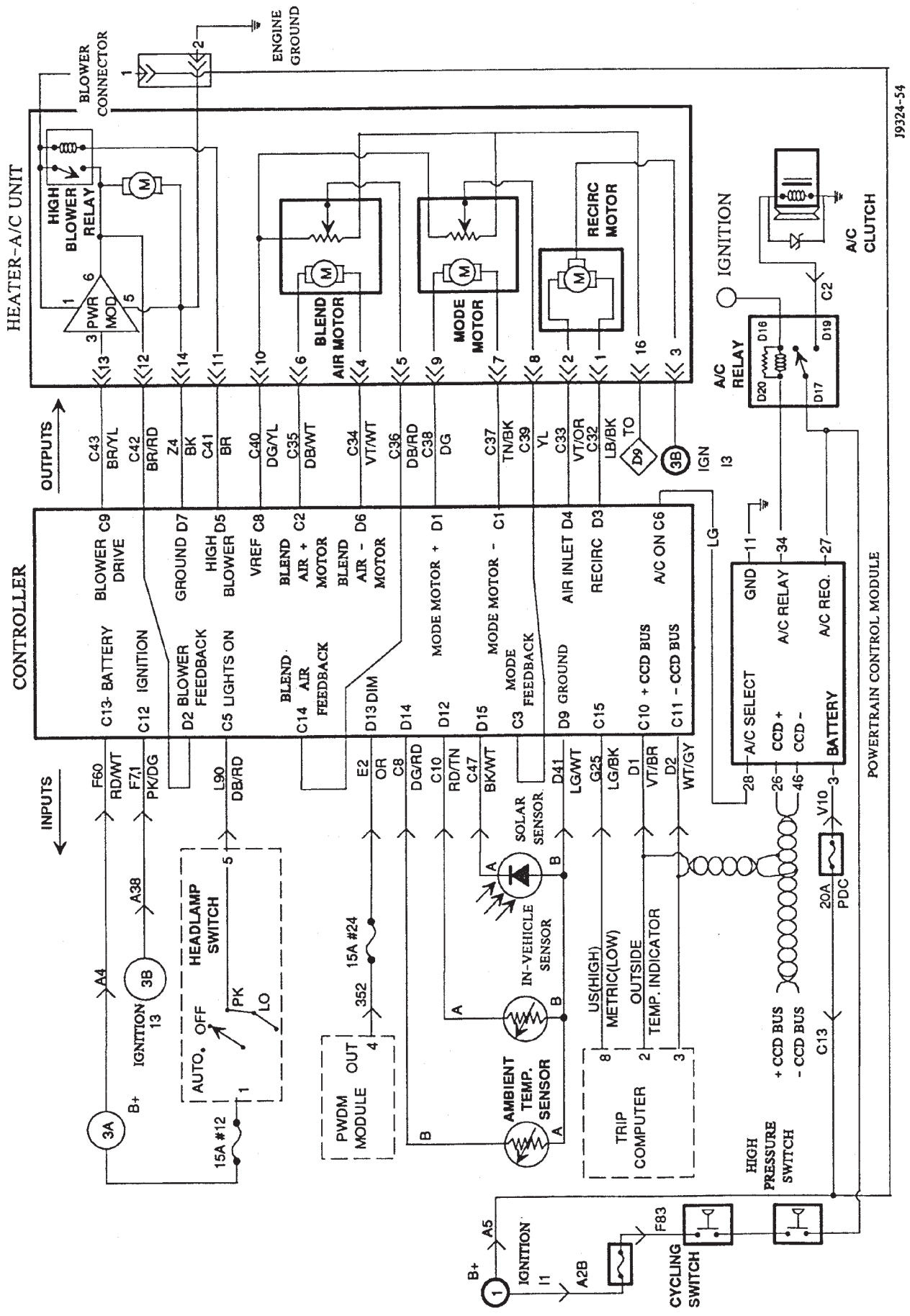
HEATER SYSTEM



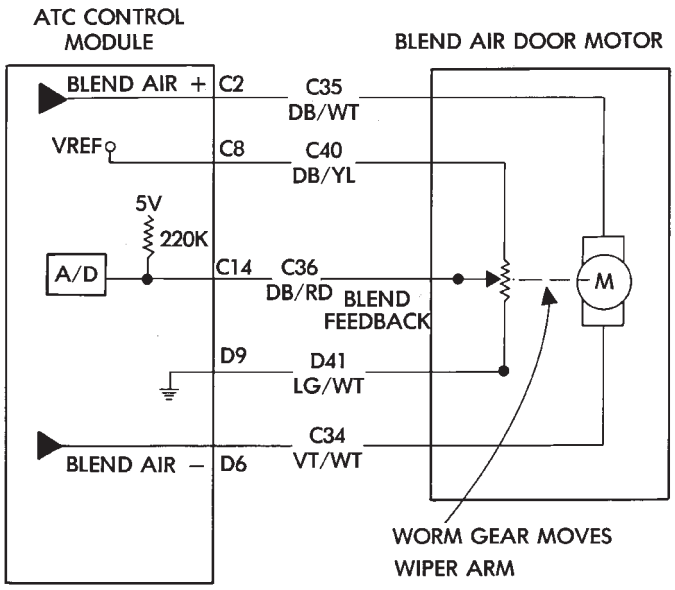
MANUAL AIR CONDITIONING SYSTEM



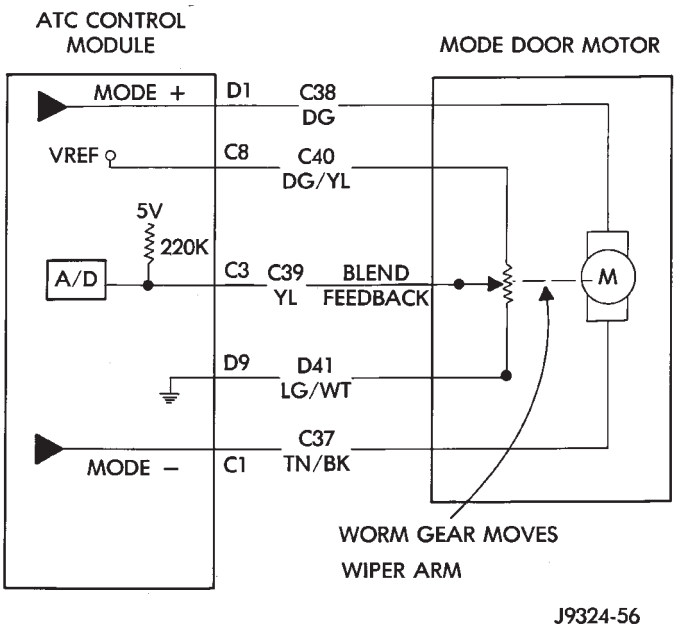
AUTOMATIC TEMPERATURE CONTROL SYSTEM



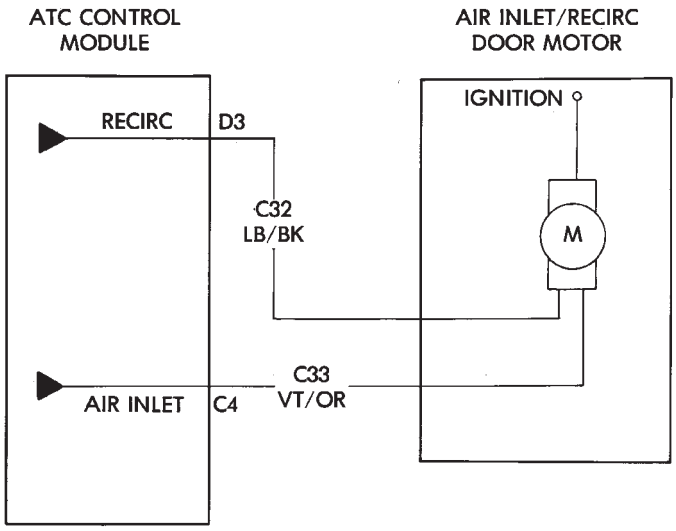
BLEND AIR DOOR ACTUATOR DRIVE CIRCUIT



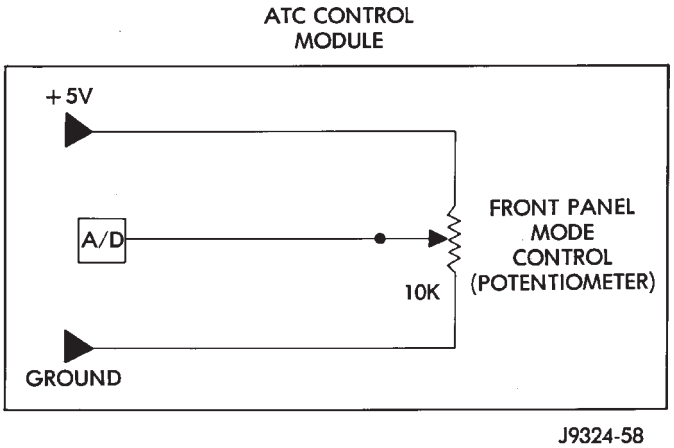
MODE DOOR ACTUATOR DRIVE CIRCUIT



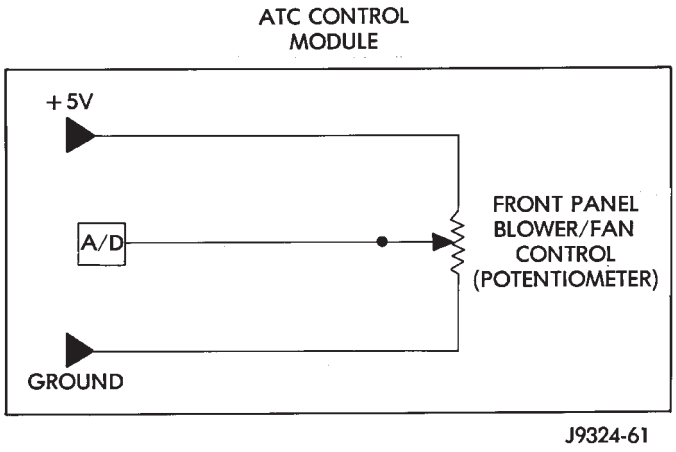
AIR INLET/RECIRC DOOR ACTUATOR DRIVE CIRCUIT



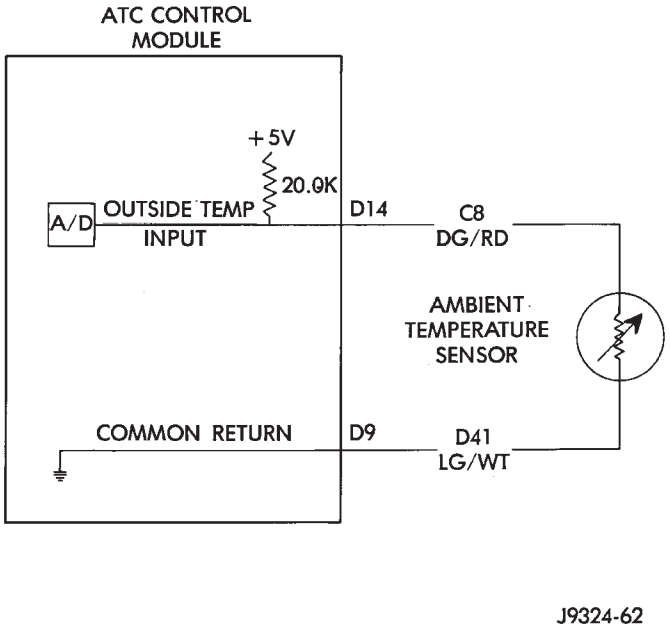
FRONT PANEL MODE CONTROL



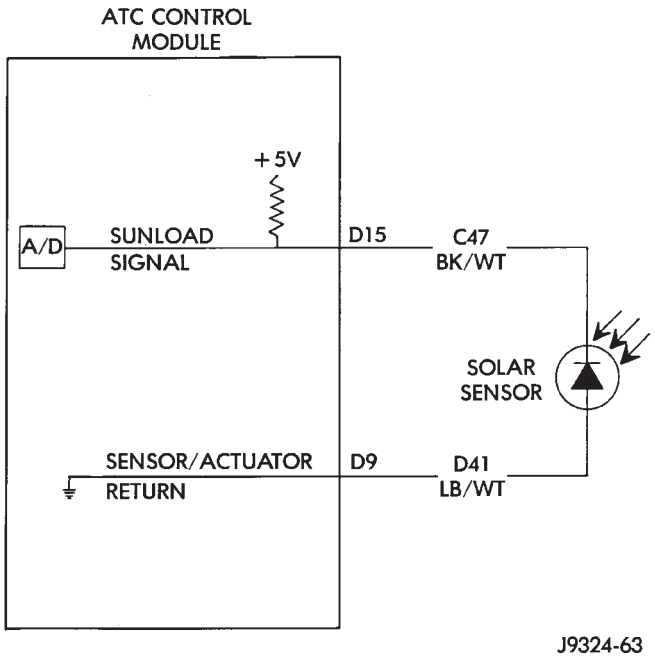
FRONT PANEL BLOWER/FAN CONTROL



AMBIENT TEMPERATURE SENSOR



SOLAR SENSOR



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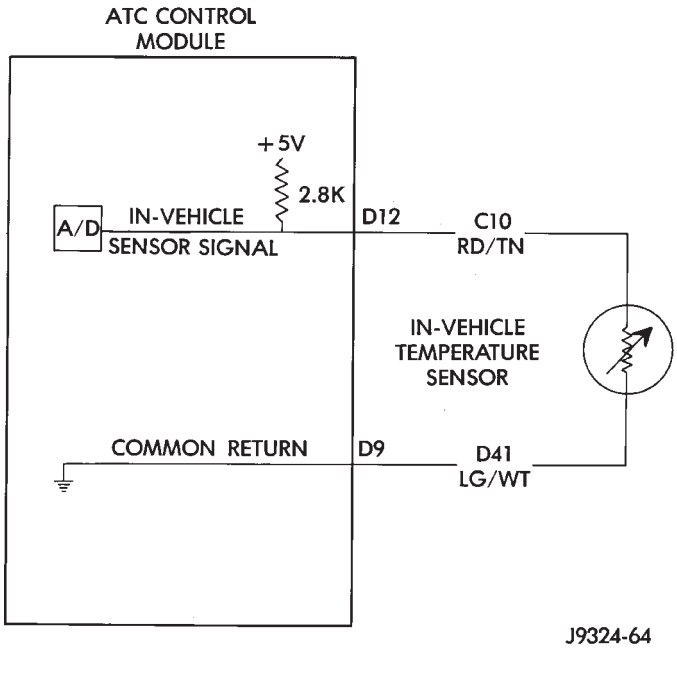
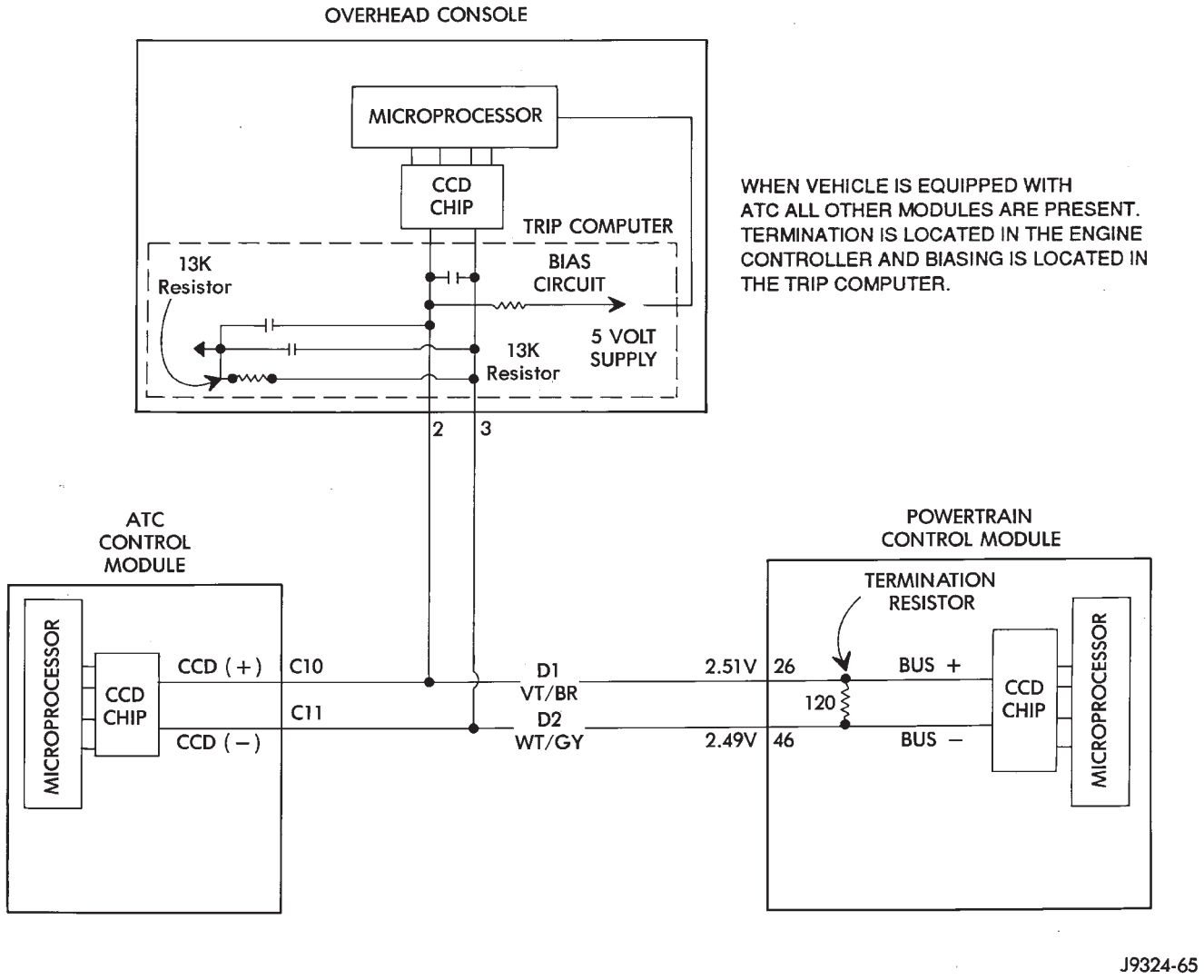


CHRYSLER COLLISION DETECTION BUS



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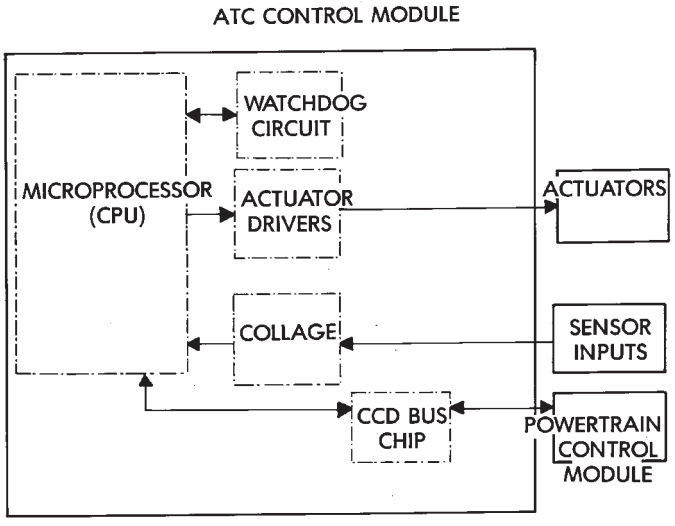
CALIBRATION AND CPU DATA



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REFRIGERANT SERVICE PROCEDURES

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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.

When servicing an air conditioning system, an A/C charging station and a refrigerant recovery/recycling device for R-134a should be used. This device must meet SAE standard J2210. Contact an automotive service equipment supplier for charging and refrigerant recycling/recovering equipment. Refer to the operating instructions provided with the equipment for proper operation.

A manifold gauge set (Fig. 1) must also be used 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.

MANIFOLD GAUGE SET CONNECTIONS

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.

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 rear of the engine compartment in the condenser-to-evaporator line.

CAUTION: NEVER try to attach the low pressure hose to the clutch cycling pressure switch port located on the accumulator.

CONNECTION

(1) Remove the service port cap from the charging/service port.

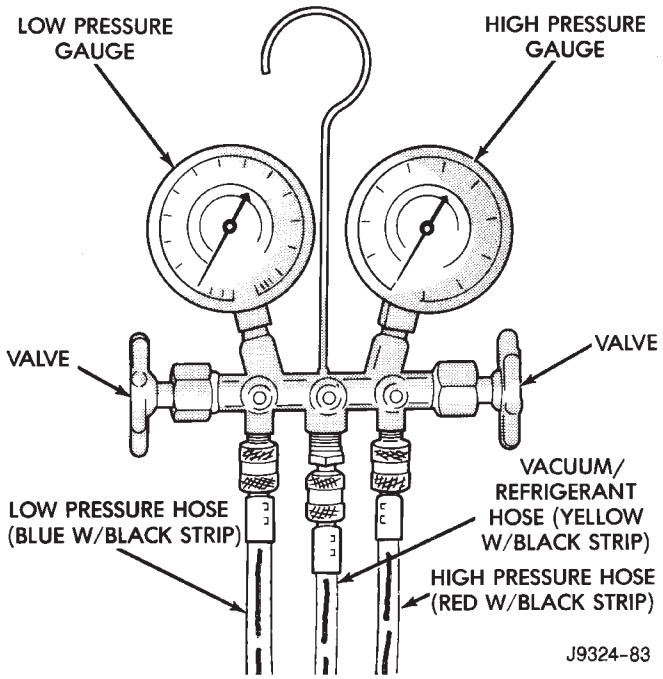

Fig. 1 Manifold Gauge Set

(2) Check all valves on the equipment being used to verify they are CLOSED.

(3) Inspect the hose gasket in the service port connector at the end of the hose (BLUE with BLACK STRIP). If the gasket is flawed, replace it.

(4) Attach the connector to the charging/service port.

DISCONNECT

(1) Close the connector knob.

(2) Remove the connector by releasing the quick connect fitting.

(3) Install the service port caps.

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 underside of the compressor manifold.

CONNECTION

(1) Remove the service port cap from the discharge/service port.

(2) Check all valves on the equipment being used to verify they are closed.

(3) Inspect the hose gasket in the service port connector at the end of the hose (RED with BLACK STRIP). If the gasket is flawed, replace it.

(4) Attach the connector to the discharge/service port.

DISCONNECT

(1) Close the connector knob.

(2) Remove the connector by releasing the quick connect fitting.

(3) Install the service port.

EVACUATION / RECOVERY / RECYCLING / CHARGING LINE CONNECTION

The center manifold hose (YELLOW or WHITE with BLACK STRIP) is used to discharge, recycle, 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.

This hose should be attached to an R-134a Recovery/Recycling device. Refer to the Recovery/Recycling devices operators manual for proper procedures.

REFRIGERANT LEAK TESTING

If the A/C system is not cooling properly, determine if the refrigerant system is fully charged with R-134a (refer to Refrigerant Charge Check). If the refrigerant system is empty or low in refrigerant charge, a leak at any line fitting or component seal is likely. To detect a leak in the refrigerant system, perform one of the following procedures:

CAUTION: Review Safety Precautions and Warnings in General Information section of this Group.

SYSTEM EMPTY

(1) Evacuate the A/C system.

(2) Prepare a 0.6 lbs. (10 oz.) R-134a refrigerant charge to be injected into the system. Refer to Charging Refrigerant System for instructions.

(3) Connect and dispense 0.6 lbs. (10 oz.) of refrigerant into the evacuated refrigerant system.

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

(5) With the engine not running, use an Electronic Leak Detector (R-134a refrigerant) and search for leaks (Fig. 2 or 3). Fittings, lines, or components that appear to be oily usually will indicate a refrigerant leak. To inspect the evaporator core for leaks, it is possible to insert the leak detector probe into the recirculating air door opening. With the blower at low speed and the selector in FLOOR and RECIRC mode check for leaks at left and right heater outlets.

LOW LEVEL

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

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

(3) With the engine not running, use an Electronic Leak Detector (R-134a refrigerant) and search for leaks (Fig. 2 or 3). Fittings, lines, or components that appear to be oily usually will indicate a refrigerant leak. To inspect the evaporator core for leaks, it is possible to insert the leak detector probe into the recirculating air door opening. With the blower at low speed and the selector in FLOOR and RECIRC mode check for leaks at left and right heater outlets.

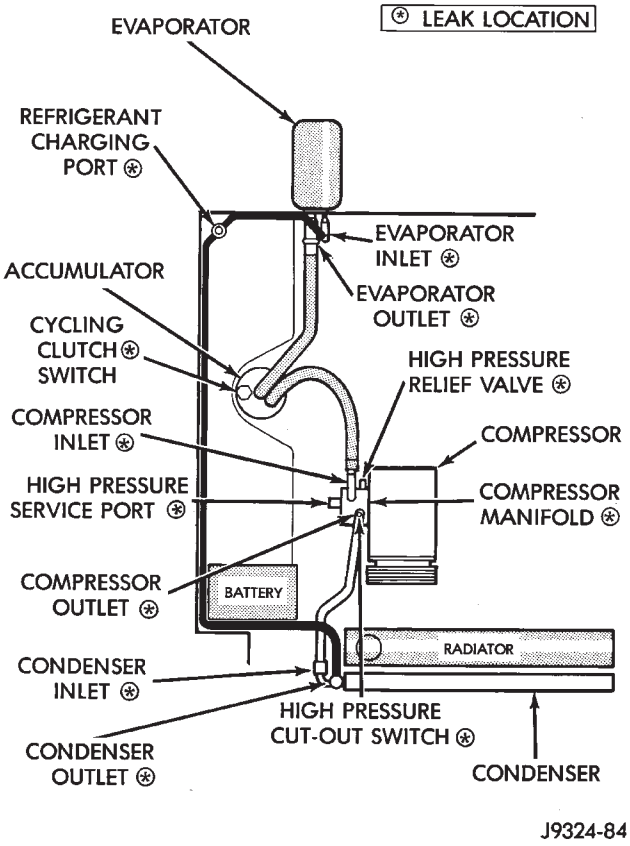

Fig. 2 Testing for A/C Leaks (4.0L Engine)

REFRIGERANT CHARGE CHECK

PREFERRED METHOD:

The most accurate method of charging the system is to discharge, evacuate and charge the system using a recovery/recycling device approved for R-134a refrigerant.

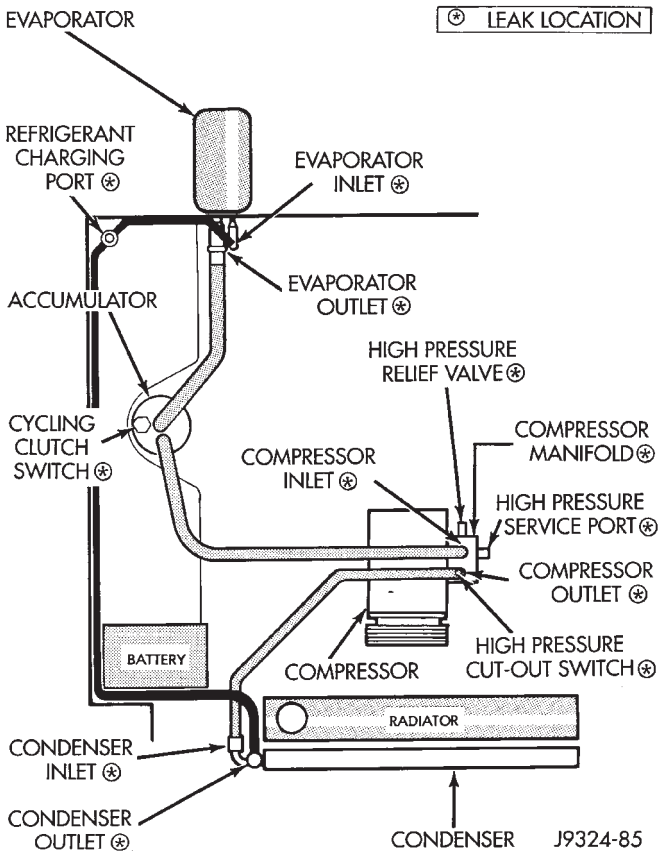

Fig. 3 Testing for A/C Leaks (5.2L Engine)

CAUTION: Review all Safety Precautions and Warnings before attempting to add refrigerant to the system. Do not add refrigerant to a system that is known to have a leak.

(1) Check for leaks (refer to Refrigerant Leak Testing). If found correct the leaks.

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.

(2) Attach manifold gauge set.

(3) Discharge the A/C system into a recovery/recycle device (refer to Discharging Refrigerant System).

(4) Evacuate the A/C system (refer to Evacuating Refrigerant System).

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

(5) Charge the A/C system with 1.75 lbs. (28 oz.) of R-134a refrigerant (refer to Charging Refrigerant System - System Empty).

ALTERNATIVE METHOD:

This method of adding partial charge requires the measuring of the temperature difference between the evaporator inlet and outlet tubes. If it was not necessary to discharge the refrigerant system, a partial refrigerant charge can be added.

CAUTION: Review all Safety Precautions and Warnings before attempting to add refrigerant to the system. Do not add refrigerant to a system that is known to have a leak.

(1) Check for leaks (refer to Refrigerant Leak Testing). If found correct the leaks.

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.

(2) Attach manifold gauge set.

(3) Attach the probes to the inlet and outlet tubes of the evaporator.

(a) If a single temperature probe device is used, attach the probe to the evaporator inlet tube just before the collar of the quick-connect fitting. Be sure the end of the probe makes contact with the bottom surface of the tube.

(b) If dual temperature probes are used, connect probe (1) to the evaporator inlet tube and probe (2) to the evaporator outlet tube. Be sure to connect the probe just before the collar of the quick-connect fittings. Be sure the end of the probes make contact with the bottom surface of the tubes. This tool will measure the temperature difference between the inlet tube and outlet tube.

(4) Open the windows and/or doors of the passenger compartment. Set the air conditioning controls to A/C, PANEL, RECIRC (temperature knob on full cool) and blower speed on HIGH.

(5) Start the engine and hold at 1,000 RPM. Allow the engine to warm up to normal operating temperature.

(6) The A/C clutch may cycle depending on ambient conditions. If clutch cycles, remove the clutch cycling pressure switch connector from the switch located on the accumulator (Fig. 4). Place a jumper wire across the terminals of the clutch cycling pressure switch connector.

(7) Hold the engine speed at 1,000 RPM.

(8) Allow 3 to 5 minutes for the A/C system to stabilize. Record the temperature difference between the evaporator inlet and outlet tubes. Allow the equipment to stabilize.

(a) If a single temperature probe device is used, record the temperature of the inlet tube. Remove the probe from the inlet tube and attach the probe to the outlet tube just before the quick-connect fitting. Be sure the end of the probe makes contact with the tube. Allow the equipment to stabilize. Record the temperature of the outlet line. Subtract the evaporator inlet temperature from the outlet temperature.

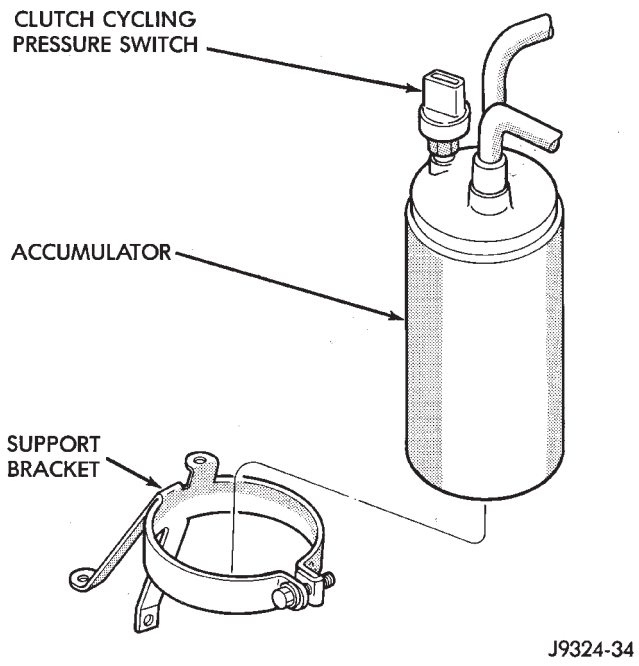

Fig. 4 Clutch Cycling Pressure Switch

(b) If dual temperature probes are used, record the temperature difference (probe 2 minus probe 1).

(9) Refer to the Low Charge Determination chart. Depending on the ambient temperature and the recorded differential temperature, you can determine the additional charge required. If the measured temperature differential (refer to Low Charge Determination chart) is higher than 22°C to 26°C (40°F to 47°F), add 0.90 lbs. (14 oz.). Allow 3 to 5 minutes for the system to stabilize. Record the lowest temperature difference between the evaporator inlet and outlet tubes and again refer to the Low Charge Determination chart to determine if additional charge is required.

(10) Record the compressor discharge pressure. If higher than the pressure in the Compressor Discharge Pressure chart, the system could be overcharged (refer to High Compressor Discharge Pressure). If the pressure is equal to or lower than the chart pressure, continue on with this procedure.

FOR EXAMPLE: The ambient temperature is 21°C (70°F). The evaporator INLET temperature is 12°C (54°F) and the evaporator OUTLET temperature is 10°C (50°F). The difference is OUTLET - INLET = -2°C (-4°F). With a -2°C (-4°F) temperature differential at 21°C (70°F) ambient temperature, the system is fully charged.

(11) Following the instructions provided with the charging equipment, charge through the service ports. Add enough refrigerant to bring the A/C system up to 1.75 lbs. (28 oz.).

(12) Remove the jumper wire from the clutch cycling pressure switch connector. Connect the clutch cycling pressure switch connector to the switch.

(13) Close all valves on the charging equipment and disconnect the hoses from the service ports. Install the service port caps.

HIGH COMPRESSOR DISCHARGE PRESSURE

Refer to the Compressor Discharge Pressure Diagnosis chart to determine the problem.

REPLACE VISCOUS FAN DRIVE

Refer to Group 7, Cooling System for the proper procedures.

SYSTEM OVERCHARGED

(1) Discharge the A/C system into a recovery/recycle device.

(2) Evacuate the A/C system.

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

(3) Charge the A/C system with 1.75 lbs. (28 oz.) of R-134a refrigerant.

RESTRICTION IN SYSTEM

(1) Discharge the A/C system into a recovery/recycle device.

(2) Replace the condenser-to-evaporator line (liquid line).

(3) Evacuate the A/C system.

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

(4) Charge the A/C system with 1.75 lbs. (28 oz.) of R-134a refrigerant.

REPLACE COMPRESSOR

(1) Discharge the A/C system into a recovery/recycle device.

(2) Remove the compressor (refer to Refrigerant Oil Level, Oil Level Check).

(3) Install a new 10PA17 (R-134a refrigerant) compressor.

(4) Replace the condenser-to-evaporator line (liquid line).

(5) Evacuate the A/C system.

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

(6) Charge the A/C system with 1.75 lbs. (28 oz.) of R-134a refrigerant.

DISCHARGING REFRIGERANT SYSTEM

R-134a refrigerant is a hydrofluorocarbon (HFC) that does not contain chlorine. R-134a refrigerant recycling device that meets SAE standard J2210 must be used to discharge the refrigerant system. Contact an automotive service equipment supplier for refrig-

LOW CHARGE DETERMINATION

Open the windows and/or doors of the passenger compartment. Set the air conditioning controls to A/C, PANEL, RECIRC (temperature knob on full cool) and blower speed on HIGH. Set the engine speed at 1,000 RPM.

Evaporator Outlet and Inlet Temperature Differential

- If Outlet is WARMER than Inlet, temperature differential is plus (+).
- If Outlet is COLDER than Inlet, temperature differential is minus (-).

See the example in the Refrigerant Charge Check (Alternative Method).

Added Amount of R134a to Properly Charge A/C System	Ambient Temperature				
	21°C (70°F)	27°C (80°F)	32°C (90°F)	38°C (100°F)	43°C (110°F)
	Differential Temperature				
0.90 lbs. (14 oz.)	+22°C (+40°F)	+23°C (+42°F)	+24°C (+43°F)	+25°C (+45°F)	+26°C (+47°F)
0.75 lbs. (12 oz.)	+12°C (+22°F)	+12°C (+23°F)	+13°C (+24°F)	+15°C (+26°F)	+16°C (+28°F)
0.60 lbs. (10 oz.)	+4°C (+8°F)	+5°C (+9°F)	+6°C (+10°F)	+7°C (+12°F)	+8°C (+13°F)
0.50 lbs. (8 oz.)	0°C (0°F)	+0°C (+1°F)	+1°C (+2°F)	+2°C (+3°F)	+3°C (+4°F)
0.40 lbs. (6 oz.)	-1°C (-2°F)	-1°C (-1°F)	+0°C (-0°F)	0°C (0°F)	0°C (0°F)
Recommended Charge	-2 to -6°C (-3 to -10°F)				

Note: A temperature differential of -2°C to -6°C (-3°F to -10°F) indicates an acceptable charge.

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COMPRESSOR DISCHARGE PRESSURE

Ambient Temperature	16°C (60°F)	21°C (70°F)	27°C (80°F)	32°C (90°F)	38°C (100°F)	43°C (110°F)
Compressor Discharge Pressure	1515 kPa (220 psi)	1655 kPa (240 psi)	1790 kPa (260 psi)	2070 kPa (300 psi)	2345 kPa (340 psi)	2690 kPa (390 psi)

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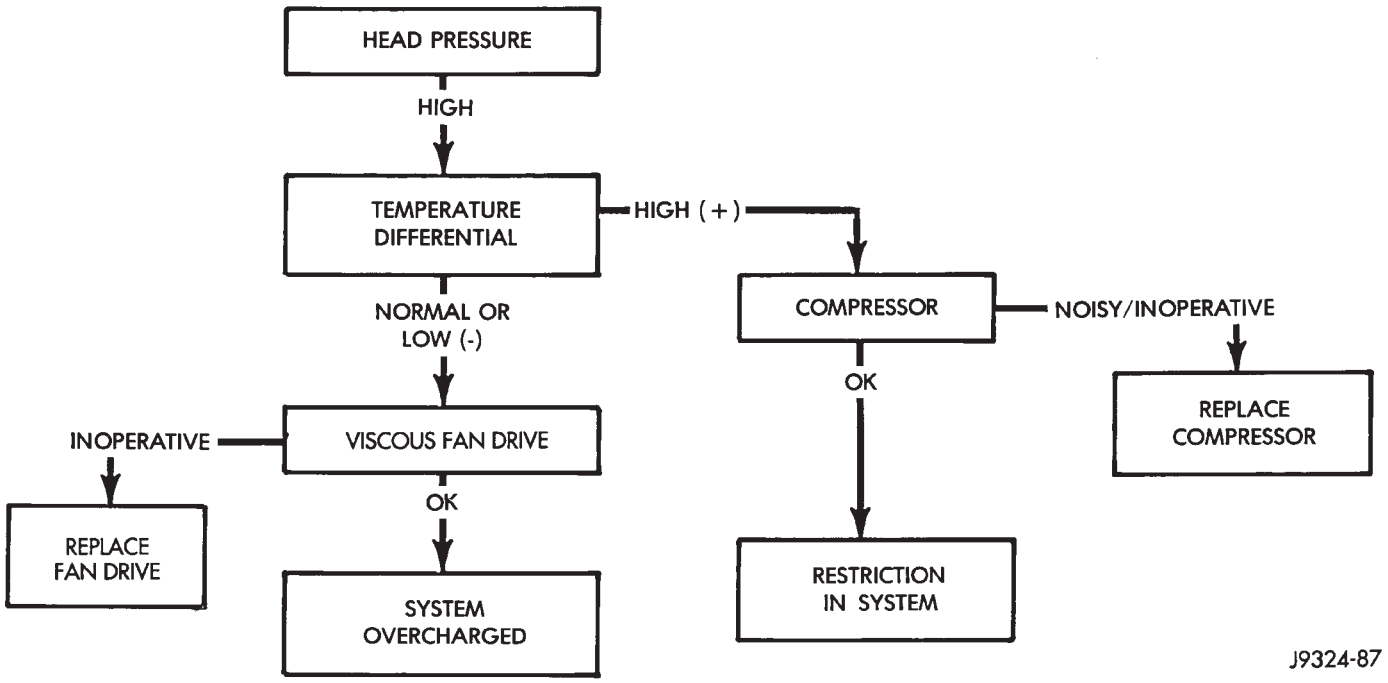
erant recycling equipment. Refer to the operating instructions provided with the recycling equipment for proper operation.

EVACUATING REFRIGERANT 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 the 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:

COMPRESSOR DISCHARGE PRESSURE DIAGNOSIS



(1) Connect a suitable charging station, refrigerant recovery machine and a manifold gauge set with vacuum pump.

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

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

The refrigerant system is prepared to be charged with refrigerant.

CHARGING REFRIGERANT SYSTEM—SYSTEM EMPTY

Review safety precautions and warnings before charging the refrigerant system.

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

After the system has been tested for leaks and evacuated, a refrigerant charge can be injected into the system.

(1) Connect manifold gauge set.

(2) Measure refrigerant (refer to capacities) and heat to 52°C (125°F) with the charging station. Refer to the instructions provided with the equipment being used. The proper charge is 1.75 lbs. (28 oz.).

(3) Open the low and high side valves. Open the charge valve to allow the heated refrigerant to flow into the system. When the transfer of refrigerant has stopped, close the suction and discharge valve.

(4) If all of the refrigerant charge did not transfer from the dispensing device, start engine and hold at idle (1,500 RPM). Set the A/C control to A/C, low blower speed and open windows. If the A/C compressor does not engage, test the compressor clutch control circuit and correct any failure. Refer to Group 8W, Wiring Diagrams.

(5) Open the low side valve to allow the remaining refrigerant to transfer to the system.

WARNING: TAKE CARE NOT TO OPEN THE DISCHARGE (HIGH-PRESSURE) VALVE AT THIS TIME.

(6) Close all valves and test the A/C system performance. Refer to Heater and A/C Performance Tests in this Group.

(7) Disconnect the charging station or manifold gauge set. Install the service port caps.

REFRIGERANT OIL LEVEL

It is important to have the correct amount of oil in the A/C system to 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 10PA17 compressor is a polyalkylene glycol synthetic oil (ND8 PAG), wax-free re-

frigerant 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 tightly capped after use to prevent contamination from dirt and moisture. Refrigerant oil will quickly absorb any moisture it comes in contact with.

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 ruptured line, shaft seal leakage, leakage from the evaporator, condenser leak, accumulator leakage or loss of refrigerant due to a collision. Oil loss at a leak point will be evident by the presence of a wet, shiny surface around the leak.

OIL LEVEL CHECK

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 with R-134a and operated, the oil in the compressor is dispersed through the lines and components. The evaporator, condenser and accumulator will retain a significant amount of oil (refer to the Refrigerant Oil Capacities chart).

When a component is replaced, the specified amount of refrigerant oil must be added. 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.

A/C REFRIGERANT OIL CAPACITIES

Component	ml	oz
A/C System	230	7.75
Accumulator	120	4
Condenser	30	1
Evaporator Care	60	2
Compressor	(see Oil Level Check)	

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When a refrigerant line or component has ruptured and it has released an unknown amount of oil. The A/C compressor should be removed and drained through the discharge and suction ports.

VERIFY REFRIGERANT OIL LEVEL

(1) Slowly discharge refrigerant system into a recovery/recycle device.

(2) Remove refrigerant lines from A/C compressor.

(3) Remove compressor from vehicle.

(4) From suction port on top of compressor, drain refrigerant oil from compressor.

(5) Add system oil capacity minus the capacity of components that have not been replaced. Refer to the Refrigerant Oil Capacity chart. Add oil through suction port on compressor.

(6) Install compressor, connect refrigerant lines, evacuate and charge refrigerant system.

COMPRESSOR SERVICE PROCEDURES

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COMPRESSOR

REMOVAL

The A/C compressor may be removed and repositioned without discharging the refrigerant system. Discharging is not necessary if removing the A/C compressor clutch/coil assembly, engine, cylinder head or generator.

WARNING: REFRIGERANT PRESSURES REMAIN HIGH EVEN THOUGH THE ENGINE MAY BE TURNED OFF. BEFORE REMOVING A FULLY CHARGED COMPRESSOR, REVIEW THE SAFETY PRECAUTIONS AND WARNINGS SECTION IN THIS GROUP. DO NOT TWIST OR KINK THE REFRIGERANT LINES WHEN REMOVING A FULLY CHARGED COMPRESSOR. SAFETY GLASSES MUST BE WORN.

(1) Disconnect the negative cable from the battery.
(2) Loosen and remove the serpentine belt (refer to Group 7, Cooling System).
(3) Disconnect compressor clutch wire lead.
(4) If the compressor must be removed from the vehicle, discharge the A/C system into a recovery/recycle device (refer to Refrigerant Service Procedures). Remove refrigerant lines from compressor.
(5) Remove compressor attaching bolts.
(6) Remove compressor. If refrigerant lines were not removed, lift compressor/clutch assembly and tie it to a suitable component.

INSTALLATION

(1) Position compressor on mount.
(2) Install and tighten the bolts to 27 N●m (20 ft. lbs.) torque.
(3) If refrigerant lines were removed, install the lines to the manifold. Use new O-rings.
(4) Evacuate the A/C system (refer to Refrigerant Service Procedures).
(5) If the compressor was removed from the vehicle:
(a) Charge the A/C system (refer to Refrigerant Service Procedures).
(b) Connect the compressor clutch wire lead.
(6) Install and tighten the serpentine belt (refer to Group 7, Cooling System).
(7) Connect the negative cable to the battery.

COMPRESSOR MANIFOLD

REMOVAL

(1) Disconnect the negative cable from the battery.
(2) Discharge the A/C system into a recovery/recycle device (refer to Refrigerant Service Procedures).
(3) Remove the A/C lines from the manifold.
(4) Remove the compressor manifold bolts.
(5) Remove the manifold.

INSPECTION

Check the manifold seal for damage. Replace seal if damaged.

INSTALLATION

(1) With the seal in place, position the manifold onto the compressor.
(2) Install and tighten the compressor manifold bolts to 25 N●m (19 ft. lbs.) torque.
(3) Using new O-rings, install the A/C lines to the manifold.
(4) Evacuate the A/C system (refer to Refrigerant Service Procedures).
(5) Charge the A/C system (refer to Refrigerant Service Procedures).
(6) Connect the negative cable to the battery.

COMPRESSOR CLUTCH / COIL ASSEMBLY

REMOVAL

Compressor assembly must be removed from mounting. Refrigerant discharge is not necessary.
(1) Disconnect the negative cable from the battery.
(2) Remove the compressor shaft bolt (Fig. 1). A band type oil filter removal tool can be placed around the clutch plate to aid in bolt removal.
(3) Tap the clutch plate with a plastic hammer and remove clutch plate and shim (Fig. 2).

CAUTION: Do not use screwdrivers between the clutch plate assembly and pulley to remove front plate. This may damage the front plate assembly.

(4) Remove pulley retaining snap ring with Snap Ring Pliers (C-4574) and slide pulley assembly off of compressor (Fig. 3).
(5) Remove coil wire clip screw and wire harness.

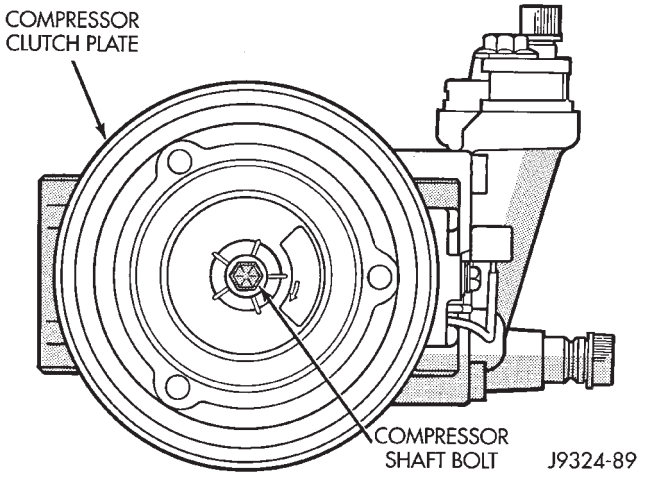

Fig. 1 Compressor Shaft Bolt and Clutch Plate

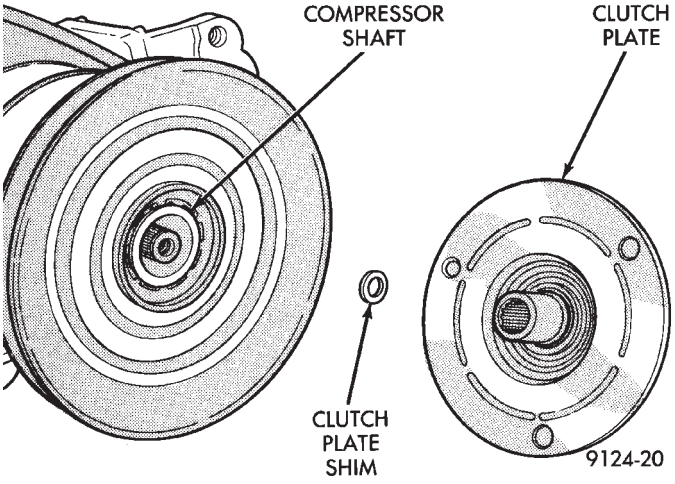

Fig. 2 Clutch Plate and Shim(s)

(6) Remove snap ring retaining field coil onto compressor housing (Fig. 4). Slide field coil off of compressor housing.

INSPECTION

Examine frictional faces of the clutch pulley and front plate for wear. The pulley and front plate should be replaced if there is excessive wear or scoring.

The friction surfaces are oily, inspect the shaft nose area of the compressor for oil and remove the felt from the front cover. If the compressor felt is saturated with oil, the shaft seal is leaking and will have to be replaced.

Check bearing for roughness or excessive leakage of grease. Replace bearing as required.

INSTALLATION

(1) Align pin in back of field coil with hole in compressor end housing and position field coil into place. Make sure that lead wires are properly routed and fasten with the wire clip retaining screw.

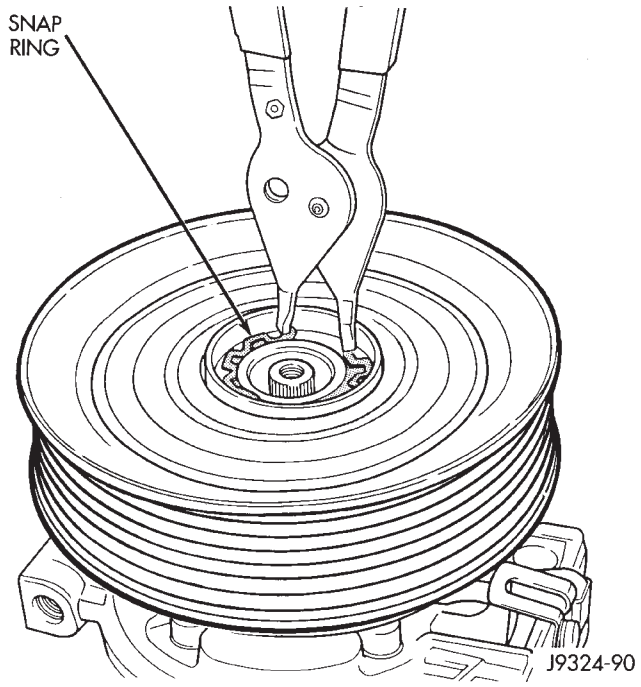

Fig. 3 Removing Pulley Snap Ring

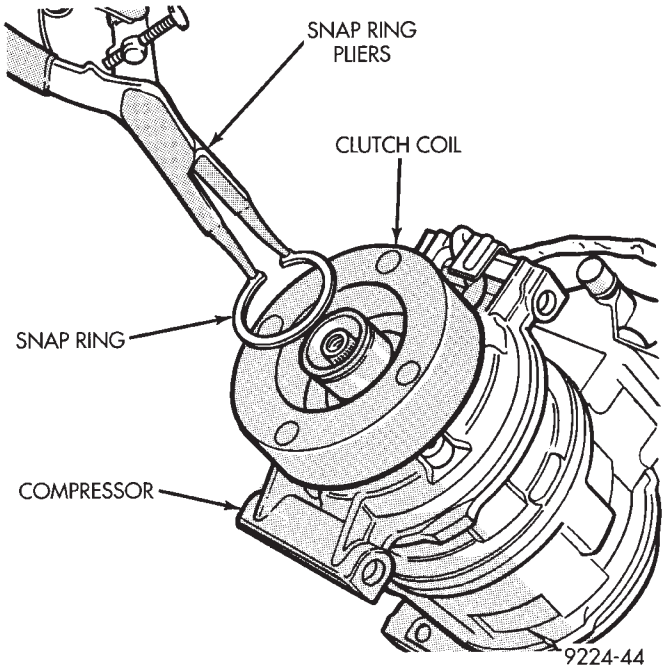

Fig. 4 Clutch Coil Snap Ring

(2) Install field coil retaining snap ring with Snap Ring Pliers (C-4574). The bevel side of the snap ring must be outward. Also both eyelets must be to the right or left of the pin on the compressor. Press snap ring to make sure it is properly seated in the groove.

CAUTION: If snap ring is not fully seated it will vibrate out, resulting in a clutch failure and severe damage to the front face of the compressor.

(3) Install pulley assembly to compressor. If necessary, tap gently with a block of wood on the friction surface (Fig. 5).

CAUTION: Do not mar the pulley frictional surface.

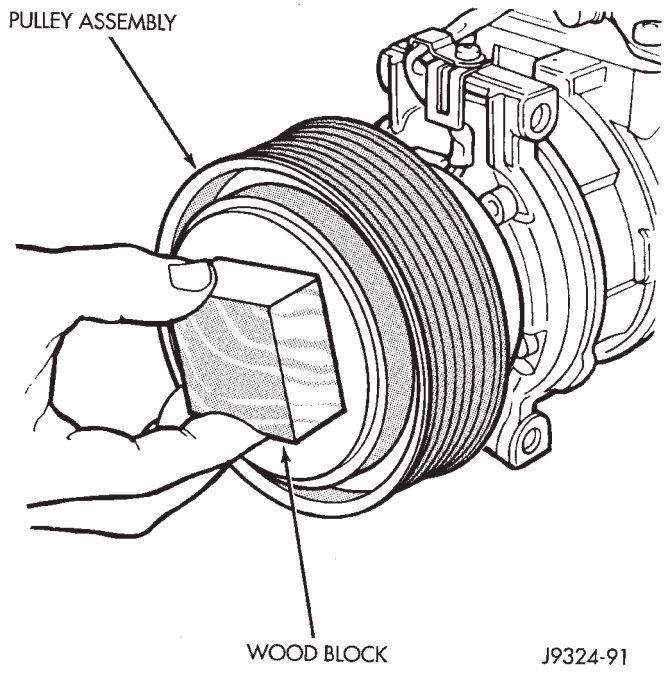

Fig. 5 Installing Pulley Assembly

(4) Install pulley assembly retaining snap ring (bevel side outward) with Snap Ring Pliers (C-4574). Press the snap ring to make sure it is properly seated in the groove.

(5) If the original front plate assembly and pulley assembly are to be reused, the old shim(s) can be used. If not, place a stack of shim(s) equal to the old shim(s) on the shaft against the shoulder.

(6) Install front plate assembly onto shaft.

(7) With the front plate assembly tight against the shim(s), measure the air gap between front plate and pulley face with feeler gauges. The air gap should be between 0.35 and 0.65 mm (.014 and .026 in.) If proper air gap is not obtained, add or subtract shims until desired air gap is obtained.

(8) Install compressor shaft bolt. Tighten bolt to 13 N●m (115 in. lbs.) torque.

Shims may compress after tightening shaft nut. Check air gap in four or more places to verify if air gap is still correct. Spin pulley for final check.

(9) Connect the negative cable to the battery.

CLUTCH BREAK-IN

After a new clutch has been installed cycle the A/C clutch 20 times (5 sec. on and 5 sec. off). During this procedure, set the system to the A/C mode, engine RPM at 1500 - 2000 and high blower speed. This procedure (burnishing) will seat the opposing friction surfaces and provide a higher clutch torque capability.

COMPRESSOR HIGH-PRESSURE RELIEF VALVE

REMOVAL

(1) Disconnect the negative cable from the battery.

(2) Discharge the A/C refrigerant system into a recovery/recycle device (refer to Refrigerant Service Procedures).

(3) Rotate the high pressure relief valve counterclockwise and separate relief valve from the vehicle (Fig. 6).

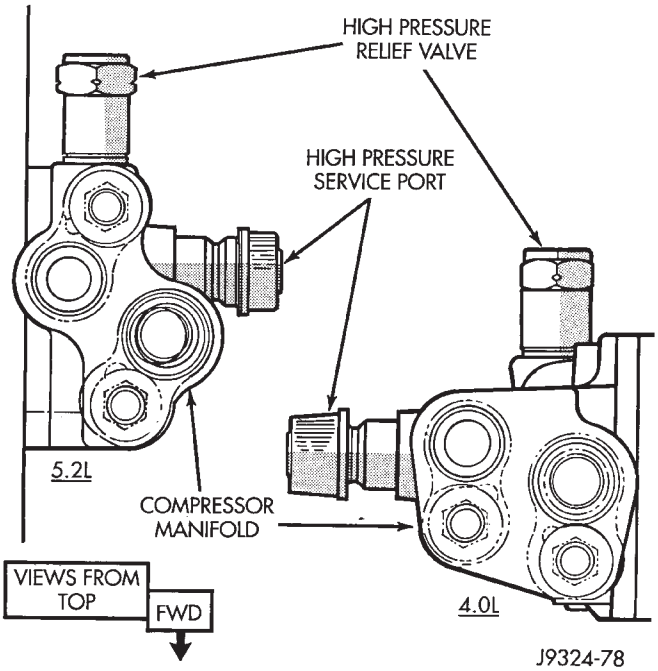

Fig. 6 High Pressure Relief Valve

INSTALLATION

(1) Install the high pressure relief valve.

(2) Evacuate the A/C system (refer to Refrigerant Service Procedures).

(3) Charge the A/C system (refer to Refrigerant Service Procedures).

(4) Connect the negative cable to the battery.

CLIMATE CONTROL SYSTEM

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CONTROL PANEL

REMOVAL

(1) Disconnect the negative cable from the battery.

(2) Remove ash tray.

(3) Remove screws holding center cluster bezel (Fig. 1).

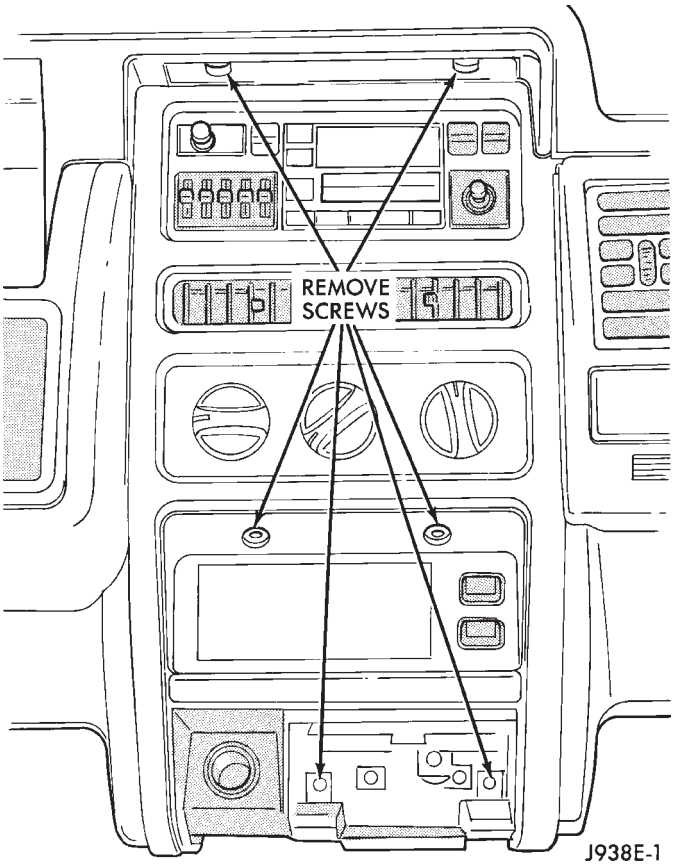

Fig. 1 Remove Center Bezel Retaining Screws

(4) Remove center bezel.

(5) Remove the control panel screws (Fig. 2).

(6) Remove the control panel.

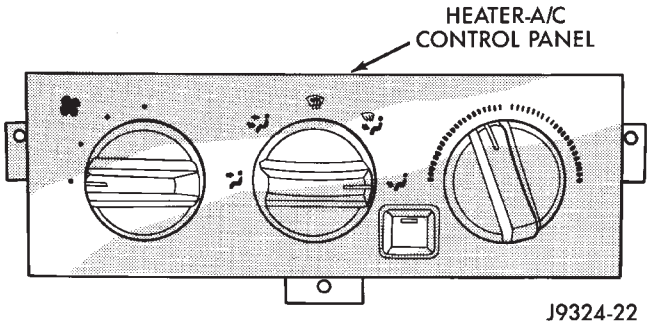

Fig. 2 Heater-A/C Control Panel

(7) Disconnect the electrical connector(s).

(8) Disconnect the vacuum connector on heater and manual A/C vehicles (Fig. 3).

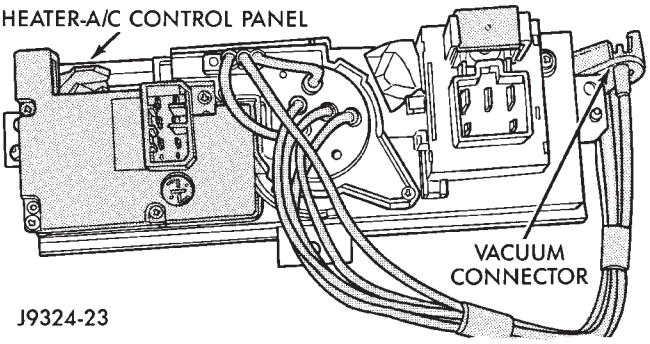

Fig. 3 Vacuum Connector

INSTALLATION

(1) If the vehicle is equipped with heater and manual A/C, connect the vacuum connector.

(2) Connect electrical connectors.

(3) Install control panel and tighten screws.

(4) Install center bezel.

(5) Install and tighten the center bezel screws.

(6) Install ash tray.

(7) Connect the negative cable to the battery.

BLOWER MOTOR AND WHEEL

The blower motor and wheel are located under the glove box and can be removed from the passenger compartment.

REMOVAL

(1) Disconnect the negative cable from the battery.
(2) Disconnect the blower motor cooling tube (Fig. 4).
(3) Remove the blower motor electrical connector from the retainer. Disconnect the electrical connector (Fig. 4).
(4) Remove the blower motor and wheel assembly mounting screws (Fig. 4).
(5) Remove the blower motor and wheel assembly.

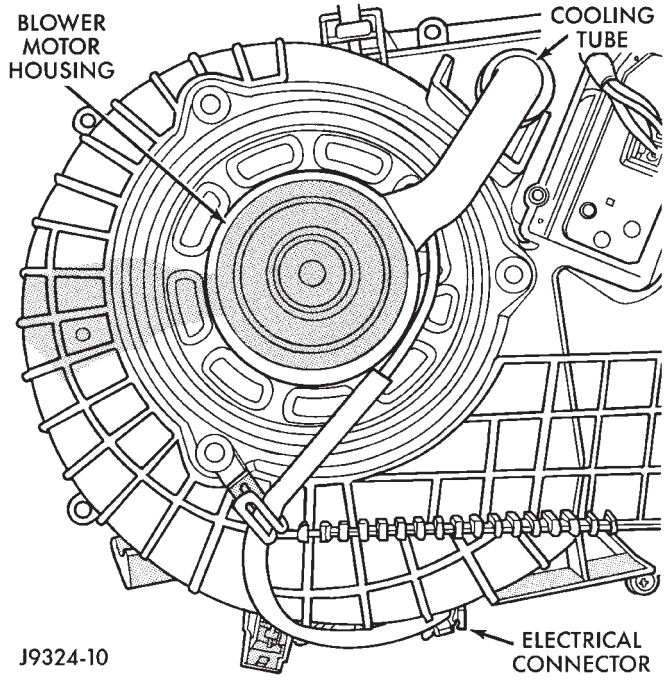

Fig. 4 Blower Motor

(6) Remove the blower motor wheel retainer clip (Fig. 5).
(7) Pull the blower motor wheel off of the blower motor shaft.

INSPECTION

Inspect the blower motor seal for damage.

INSTALLATION

(1) Press the blower motor wheel onto the blower motor shaft. Be sure the flat on the blower motor shaft lines up with the flat inside the wheel.
(2) Install the retainer clip. The ears of the retainer clip must be over the flat surface on the motor shaft.
(3) Be sure the seal is installed on the blower motor housing (Fig. 6).

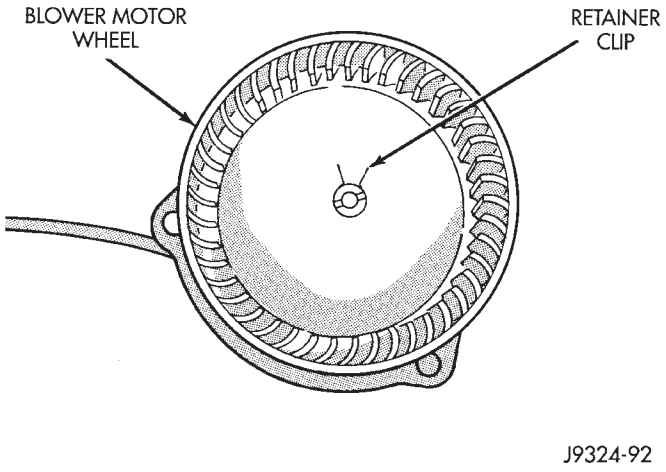

Fig. 5 Blower Motor Wheel

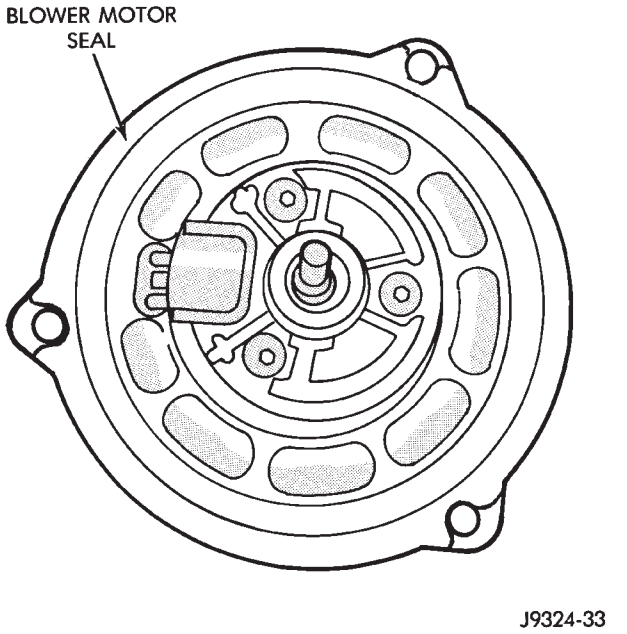

Fig. 6 Blower Motor Seal

(4) Install the blower motor and wheel assembly.
(5) Install and tighten blower motor and wheel assembly screws.
(6) Connect the electrical connector and install into the retainer.
(7) Connect the blower motor cooling tube.
(8) Connect the negative cable to the battery.

BLOWER MOTOR RESISTOR

The blower motor resistor is located under the glove box and can be removed from the passenger compartment.

REMOVAL

(1) Disconnect the negative cable from the battery.
(2) Remove the blower motor resistor connector(s).
(3) Remove the resistor retaining screws.
(4) Remove the blower motor resistor (Fig. 7).

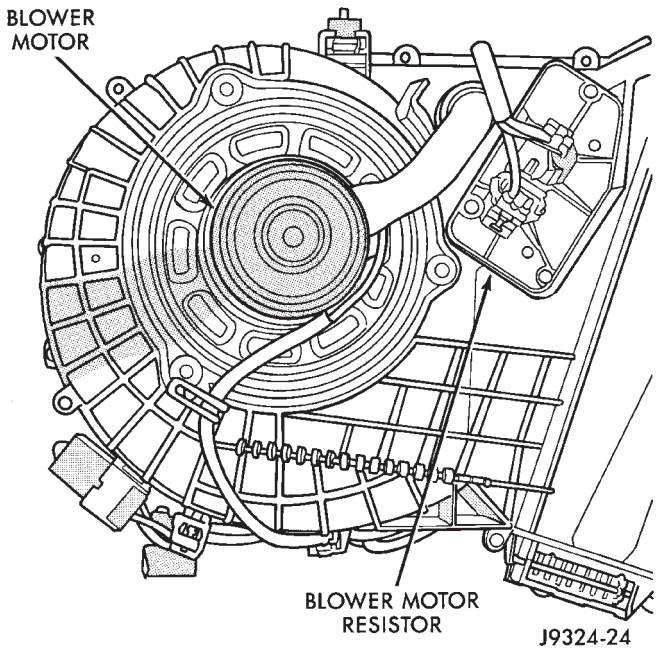

Fig. 7 Blower Motor Resistor (ATC Shown)

INSTALLATION

(1) Install the blower motor resistor. Install and tighten the screws.

(2) Connect the resistor connectors.

(3) Connect the negative cable to the battery.

HEATER—A/C UNIT

REMOVAL

(1) Disconnect the negative cable from the battery.

(2) Discharge the A/C system into a recovery/recycle device (refer to Refrigerant Service Procedures).

(3) Disconnect the A/C hoses from the evaporator lines (Fig. 8).

(4) Drain the cooling system (refer to Group 7, Cooling System).

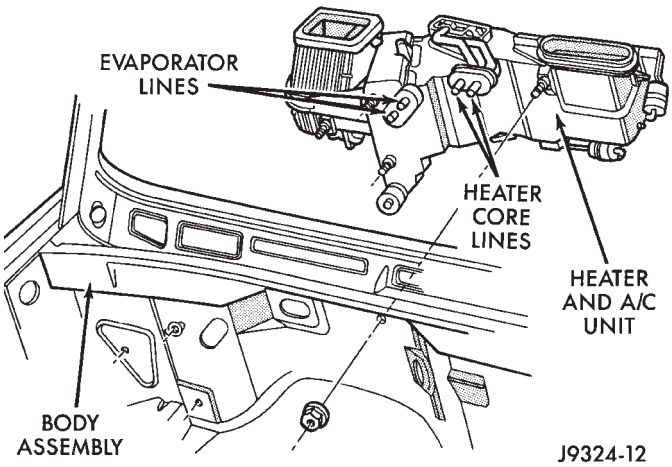

Fig. 8 Heater-A/C Unit (Shown from Engine Compartment)

(5) Disconnect the heater hoses from the heater core lines (Fig. 8).

(6) Remove the coolant reserve/overflow bottle (Fig. 9).

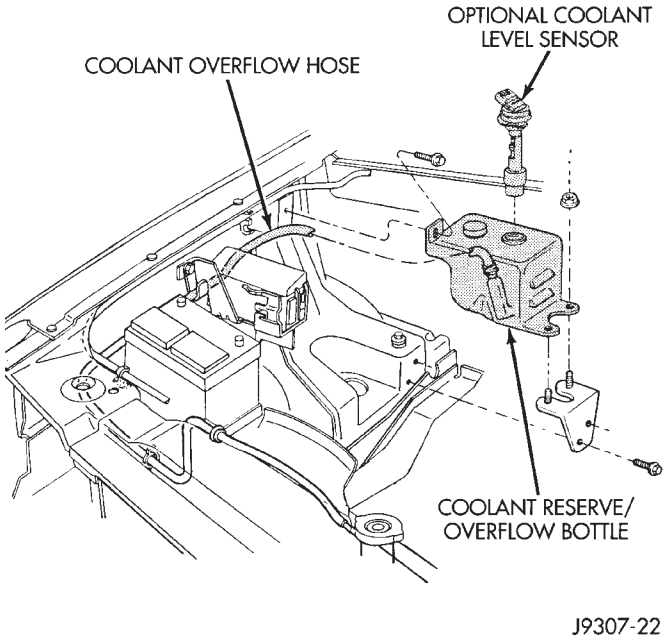

Fig. 9 Coolant Reserve/Overflow Bottle—Typical

(7) DO NOT disconnect the 60-way connector from the powertrain control module (PCM) - (Fig. 10). Remove the PCM and set aside.

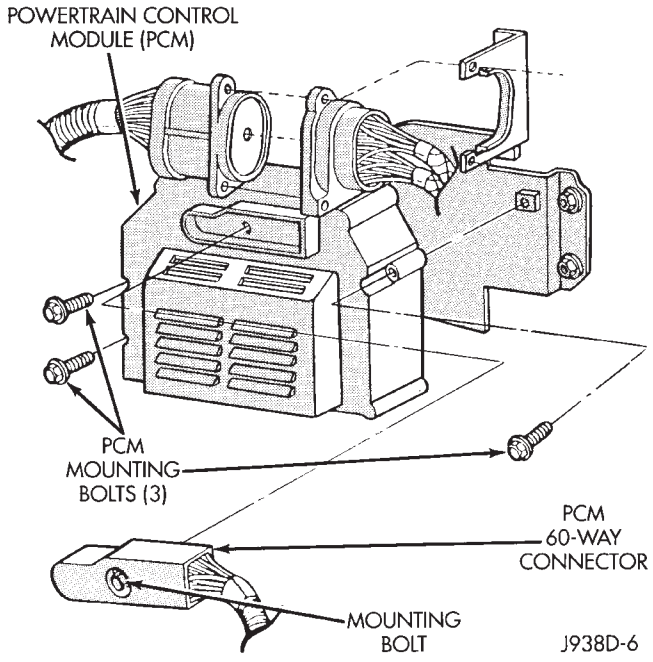

Fig. 10 Powertrain Control Module (PCM)

(8) Remove the attaching nuts from the studs on the engine compartment side of the dash panel (Fig. 8).

(9) Remove the instrument panel (refer to Group 23, Body).

(10) Remove the defrost duct (Fig. 11).

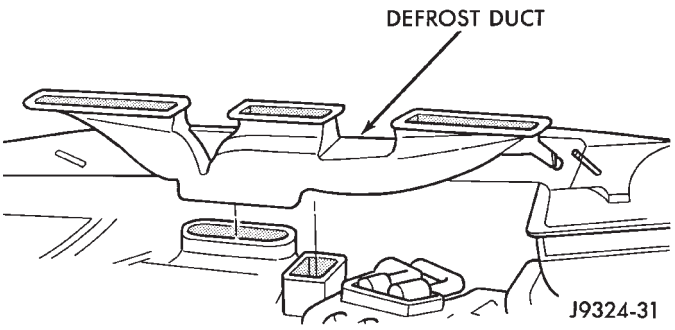

Fig. 11 Defrost Duct

(11) Disconnect the rear floor heat duct from the center adaptor heat duct (Fig. 12).

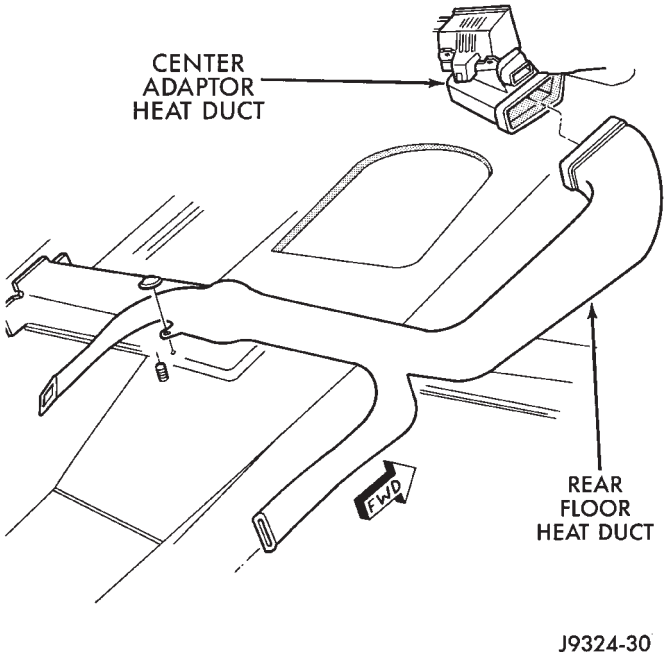

Fig. 12 Rear Floor Heat Duct

(12) Disconnect the electrical connections.

(13) Remove the attaching nuts from the studs in the passenger compartment side of the dash panel (Fig. 13).

(14) Remove the heater-A/C unit from the vehicle.

INSTALLATION

(1) Position the heater-A/C unit into the dash panel. Be sure the drain tube is positioned in the dash panel drain hole.

(2) Install the passenger compartment attaching nuts (Fig. 13). Tighten the nuts to 4.5 N•m (40 in. lbs.) torque.

(3) Install the attaching nuts on the engine compartment side of the dash panel (Fig. 8). Tighten the nuts to 7 N•m (60 in. lbs.) torque.

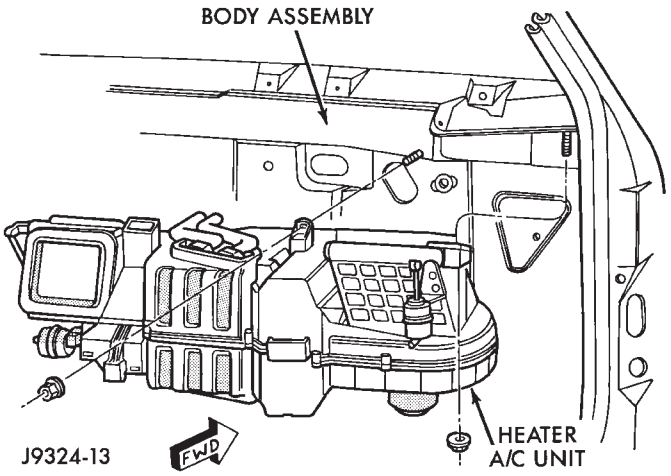

Fig. 13 Heater-A/C Unit (Shown from Passenger Compartment)

(4) Connect the heater hoses to the heater core lines.

(5) Connect the A/C hoses to the evaporator lines.

(6) Install the coolant reserve/overflow bottle.

(7) Install the powertrain control module (PCM).

(8) Install the defrost duct.

(9) Connect the rear floor heat duct to the center adaptor heat duct.

(10) Connect the electrical connectors.

(11) Install the instrument panel (refer to Group 23, Body).

(12) Fill the cooling system (refer to Group 7, Cooling System).

(13) Evacuate the A/C system (refer to Refrigerant Service Procedures).

(14) Charge the A/C system (refer to Refrigerant Service Procedures).

(15) Connect the negative cable to the battery.

(16) Start the vehicle and check for proper operation of the heater and A/C system.

HEATER CORE

REMOVAL

(1) Remove the heater-A/C unit from the vehicle (refer to Heater-A/C Unit Removal).

(2) Remove the heater core retaining screws.

(3) Pull the heater core straight out of the housing (Fig. 14).

INSTALLATION

(1) Install the heater core into the housing.

(2) Position the clips over the heater core tubes. Install and tighten the screws.

(3) Install the heater-A/C unit into the vehicle (refer to Heater-A/C Unit Installation).

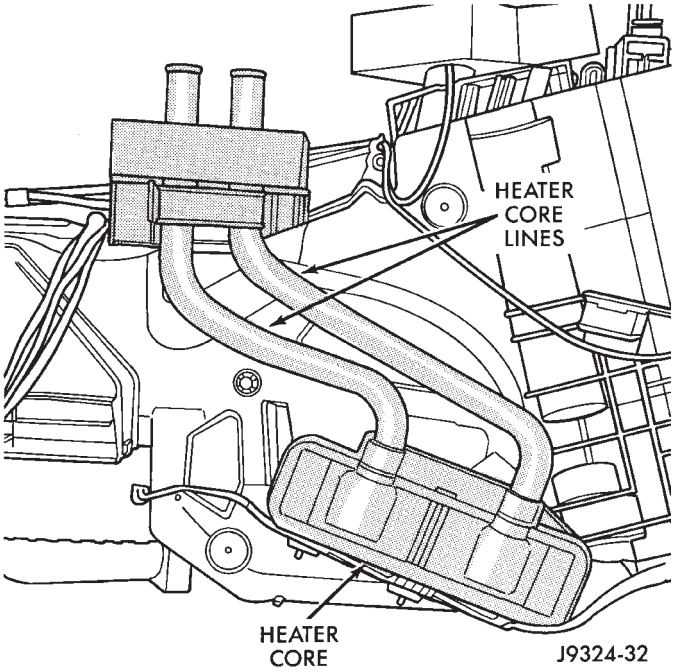

Fig. 14 Heater Core

EVAPORATOR CORE

REMOVAL

(1) Remove the heater-A/C unit from the vehicle (refer to Heater-A/C Unit Removal).

(2) Turn the heater-A/C unit upside down.

(3) Remove the retaining screws holding the two halves together. Remove the center adaptor heat duct (Fig. 15) and remove the screw.

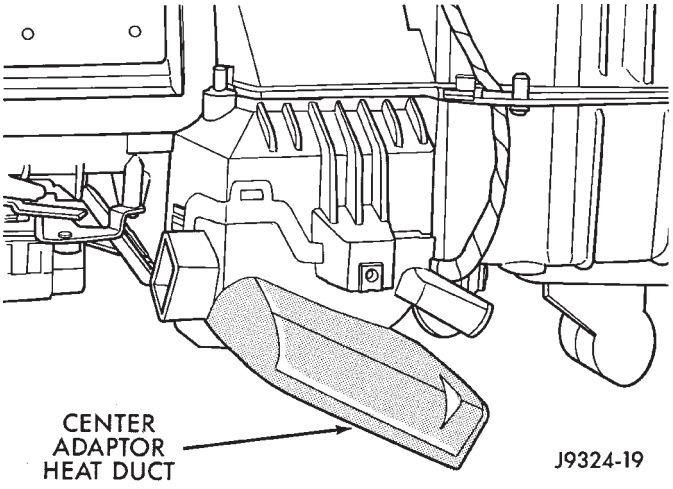

Fig. 15 Center Adaptor Heat Duct

(4) Carefully turn the heater-A/C unit over. Remove the top half of the unit (Fig. 16).

(5) Remove the evaporator out of the unit.

INSTALLATION

(1) Position the evaporator in the bottom half of the heater-A/C unit.

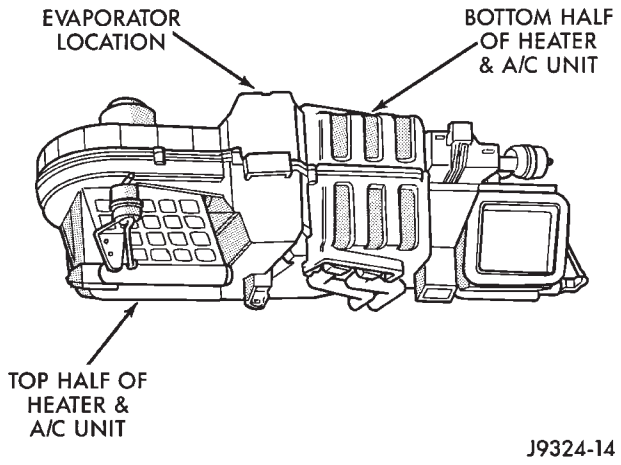

Fig. 16 Evaporator Location in Heater-A/C Unit (Upside Down)

(2) Position the top half of the heater-A/C unit in place. Carefully turn the unit over. Install and tighten the retaining screws.

(3) Snap on the center adaptor heat duct.

(4) Install the heater-A/C unit into the vehicle (refer to Heater-A/C Unit Installation).

(5) If the evaporator was replaced, add 2 ounces of ND8 PAG refrigerant oil to the air conditioning system.

RECIRCULATING AIR DOOR ACTUATOR

REMOVAL

(1) Remove the instrument panel (refer to Group 23, Body).

(2) Disconnect the vacuum line (Fig. 17) or electrical connector (Fig. 18).

(3) Disconnect the actuating rod clip (Figs. 17 and 18).

(4) Remove the actuator retaining screws.

(5) Remove the actuator (Fig. 17 or 18).

INSTALLATION

(1) Position the actuator on the heater-A/C unit. Install and tighten the screws.

(2) Connect the rod and rod clip to the door lever.

(3) Connect the vacuum line (heater and manual A/C) or the electrical connector (ATC).

(4) Install the instrument panel (refer to Group 23, Body).

RECIRCULATING AIR DOOR

REMOVAL

(1) Remove the heater-A/C unit from the vehicle (refer to Heater-A/C Unit Removal).

(2) Disconnect the actuating rod clip (Fig. 17 or 18).

(3) Pry the recirculating door shaft retainer from the shaft (Fig. 17 or 18).

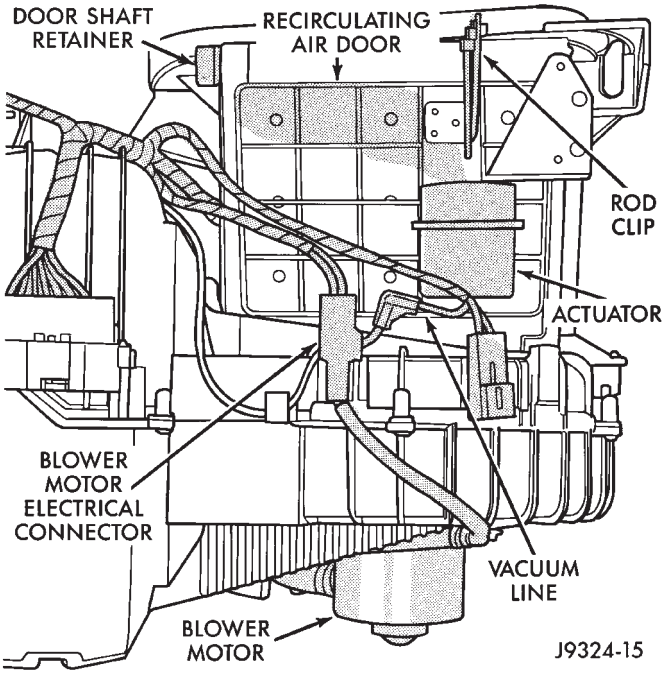

Fig. 17 Recirculating Air Door Actuator (Heater and Manual A/C)

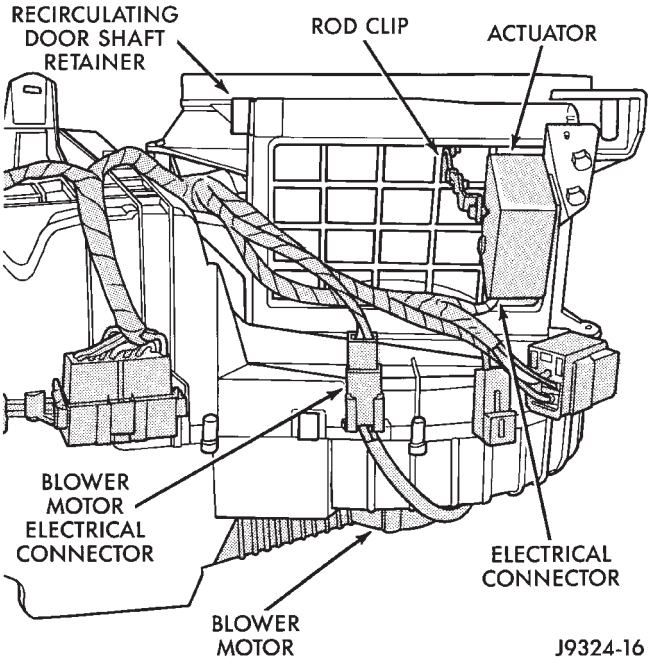

Fig. 18 Recirculating Air Door Actuator (ATC)

(4) Remove the recirculating door through the top opening.

INSTALLATION

(1) Install the recirculating door through the top opening and position in place.

(2) Press the recirculating door shaft retainer onto the shaft.

(3) Connect the rod and rod clip to the door lever.

(4) Install the heater-A/C unit into the vehicle (refer to Heater-A/C Unit Installation).

TEMPERATURE / BLEND AIR DOOR MOTOR

The temperature/blend air door motor is located under the instrument panel and can be removed from the passenger compartment.

REMOVAL

(1) Disconnect the electrical connector (Fig. 19).

(2) Remove the retaining screws.

(3) Remove the temperature/blend air door motor (Fig. 19).

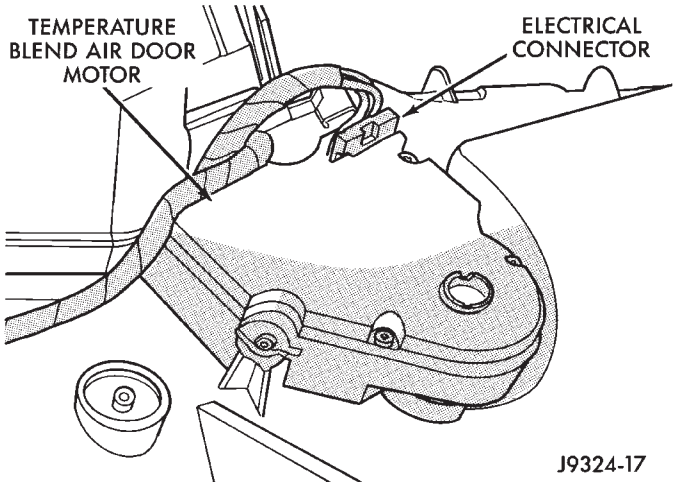

Fig. 19 Temperature/Blend Air Door Motor

INSTALLATION

(1) Position the motor over the door connection.

(2) Install and tighten the retaining screws.

(3) Connect the electrical connector.

TEMPERATURE / BLEND AIR DOOR

REMOVAL

(1) Remove the heater-A/C unit from the vehicle (refer to Heater-A/C Unit Removal).

(2) Turn the heater-A/C unit upside down.

(3) Remove the retaining screws holding the two halves together. Remove the center adaptor heat duct (Fig. 20) and remove the screw.

(4) Disconnect the electrical connectors.

(5) Remove the bottom half of the heater-A/C unit (Fig. 21).

(6) Remove the door (Fig. 21).

(7) To replace the door-to-motor pivot connection, the motor must be removed.

INSTALLATION

(1) If removed, install the door-to-motor pivot connection. Position the motor and tighten the screws.

(2) Install the door.

(3) Position the top half of the heater-A/C unit onto the bottom. Be sure the door pivot pins align with the pivot holes.

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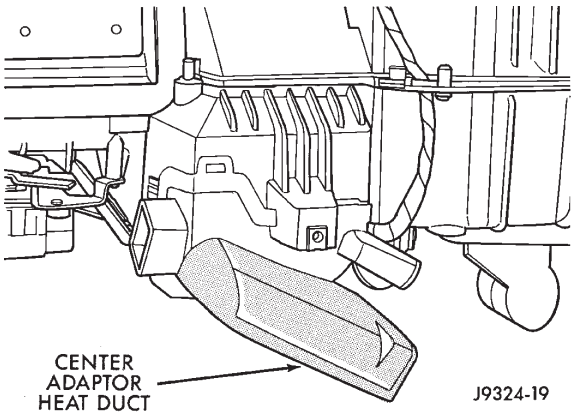

Fig. 20 Center Adaptor Heat Duct

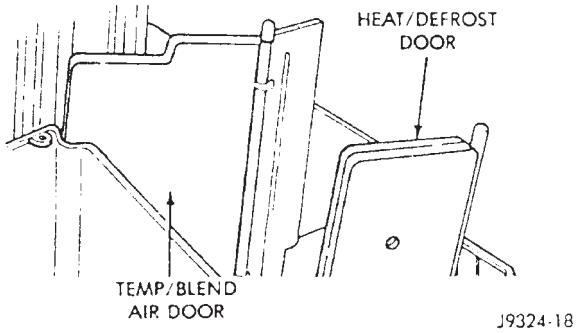

Fig. 21 Temperature/Blend Air Door

(4) Carefully turn the heater-A/C unit over. Install and tighten the screws.
(5) Snap on the lower center air duct.
(6) Connect the electrical connectors.
(7) Install the heater-A/C unit into the vehicle (refer to Heater-A/C Unit Installation).

HEAT / DEFROST DOOR ACTUATOR

This actuator is used only on the heater and manual A/C units.

REMOVAL

(1) Remove the heater-A/C unit from the vehicle (refer to Heater-A/C Unit Removal).
(2) Turn the heater-A/C unit upside down.
(3) Disconnect the vacuum line (Fig. 22).
(4) Separate the door pivot connection from the door pivot pin (Fig. 22).
(5) Remove the retaining screws.
(6) Remove the heat/defrost door actuator (Fig. 22).

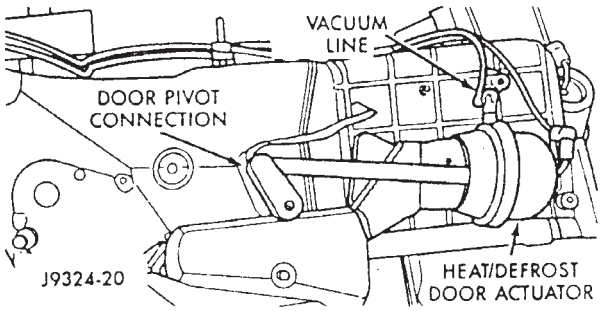

Fig. 22 Heat/Defrost Door Actuator

INSTALLATION

(1) Install the heat/defrost door actuator.
(2) Install and tighten the retaining screws.
(3) Press the door pivot connection onto the door pivot pin.
(4) Connect the vacuum line.
(5) Install the heater-A/C unit into the vehicle (refer to Heater-A/C Unit Installation).

HEAT / DEFROST - PANEL / DEFROST DOOR MOTOR

This motor is used only on models equipped with the optional Automatic Temperature Control (ATC) system.

REMOVAL

(1) Disconnect and isolate the battery negative cable.
(2) Remove the three screws that secure the upper and lower steering column shrouds to the steering column and remove the shrouds.
(3) Remove the cluster bezel, instrument panel center bezel, instrument panel top cover, steering column opening cover, knee blocker, left instrument panel end cap and left lower instrument panel trim from the instrument panel. Refer to Group 8E - Instrument Panel and Gauges for the procedures.
(4) Remove the two bolts that secure the center instrument panel support bracket to the left side of the floor pan transmission tunnel.
(5) Remove the two bolts that secure the center instrument panel support bracket to the instrument panel.
(6) Remove the center instrument panel support bracket from the vehicle.
(7) Unplug the wire harness connector from the motor (Fig. 23).
(8) Remove the three screws that secure the motor to the bottom of the heater-A/C housing.
(9) Remove the motor from the housing.

INSTALLATION

(1) Position the heat/defrost - panel/defrost door motor to the bottom of the heater-A/C housing.
(2) Install and tighten the three screws that secure the motor to the housing.
(3) Plug in the wire harness connector to the motor.
(4) Position the center instrument panel support bracket to the instrument panel.
(5) Install and tighten the two bolts that secure the center instrument panel support bracket to the instrument panel.
(6) Install and tighten the two bolts that secure the center instrument panel support bracket to the left side of the floor pan transmission tunnel.
(7) Install the cluster bezel, instrument panel center bezel, instrument panel top cover, steering column opening cover, knee blocker, left instrument panel end cap and left lower instrument panel trim from the instrument panel. Refer to Group 8E - Instrument Panel and Gauges for the procedures.
(8) Install the upper and lower steering column shrouds onto the steering column.
(9) Connect the battery negative cable.

HEAT / DEFROST DOOR

REMOVAL

(1) Remove the heater-A/C unit from the vehicle (refer to Heater-A/C Unit Removal).
(2) Turn the heater-A/C unit upside down.
(3) Separate the door pivot connection from the door pivot pin.

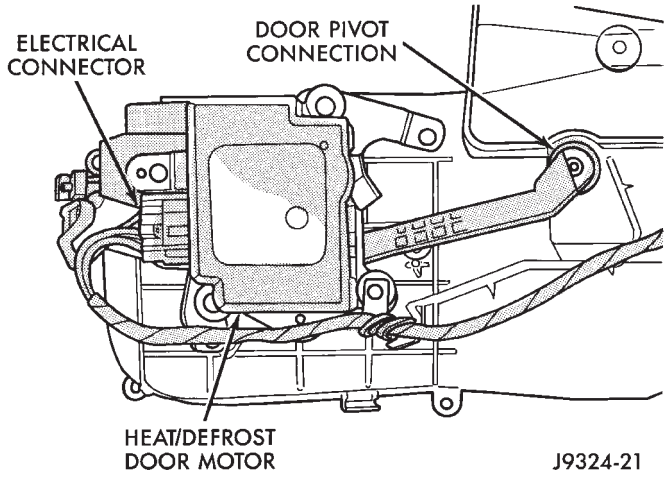

Fig. 23 Heat/Defrost Door Motor

(4) Disconnect the electrical connector or the vacuum line.

(5) Remove the retaining screws holding the two halves together. Remove the center adaptor heat duct (Fig. 24) and remove the screw.

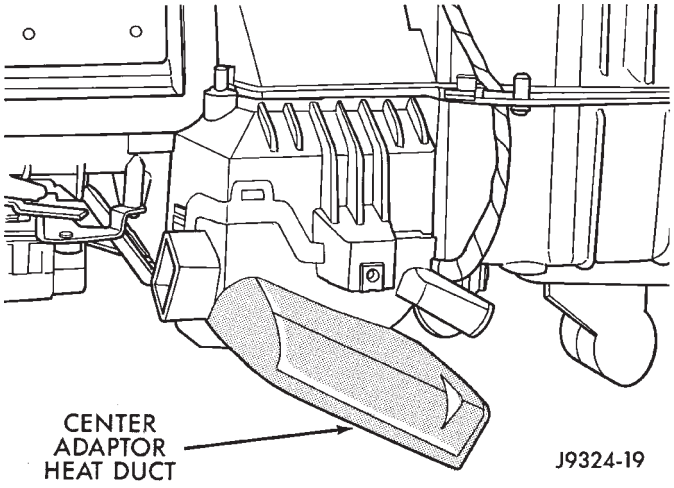

Fig. 24 Center Adaptor Heat Duct

(6) Remove the bottom half of the heater-A/C unit.

(7) Remove the door (Fig. 25).

INSTALLATION

(1) Position the door in the hole.

(2) Press the door pivot connection onto the door pivot pin.

(3) Position the top half of the heater-A/C unit onto the bottom. Be sure the door pivot pins align with the pivot holes.

(4) Carefully turn the heater-A/C unit over. Install and tighten the screws.

(5) Snap on the lower center air duct.

(6) Connect the electrical connectors.

(7) Install the heater-A/C unit into the vehicle (refer to Heater-A/C Unit Installation).

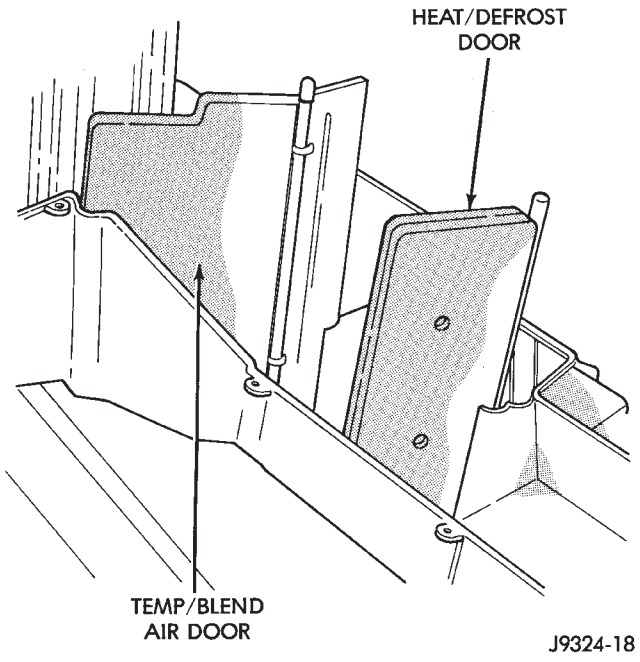

Fig. 25 Heat/Defrost Door

PANEL / DEFROST DOOR ACTUATOR

This actuator is used only on the heater and manual A/C units.

REMOVAL

(1) Remove the heater-A/C unit from the vehicle (refer to Heater-A/C Unit Removal).

(2) Disconnect the vacuum line (Fig. 26).

(3) Separate the door pivot connection from the door pivot pin (Fig. 26).

(4) Remove the retaining screws.

(5) Remove the panel/defrost door actuator (Fig. 26).

INSTALLATION

(1) Install the panel/defrost door actuator.

(2) Install and tighten the retaining screws.

(3) Press the door pivot connection onto the door pivot pin.

(4) Connect the vacuum line.

(5) Install the heater-A/C unit into the vehicle (refer to Heater-A/C Unit Installation).

PANEL / DEFROST DOOR

REMOVAL

(1) Remove the instrument panel (refer to Group 23, Body).

(2) Remove the defrost duct (Fig. 27).

(3) Disconnect the actuating rod (Fig. 26 or 28).

(4) Pry the panel/defrost door shaft retainer from the shaft (Fig. 26 or 28).

(5) Remove the door through the top opening.

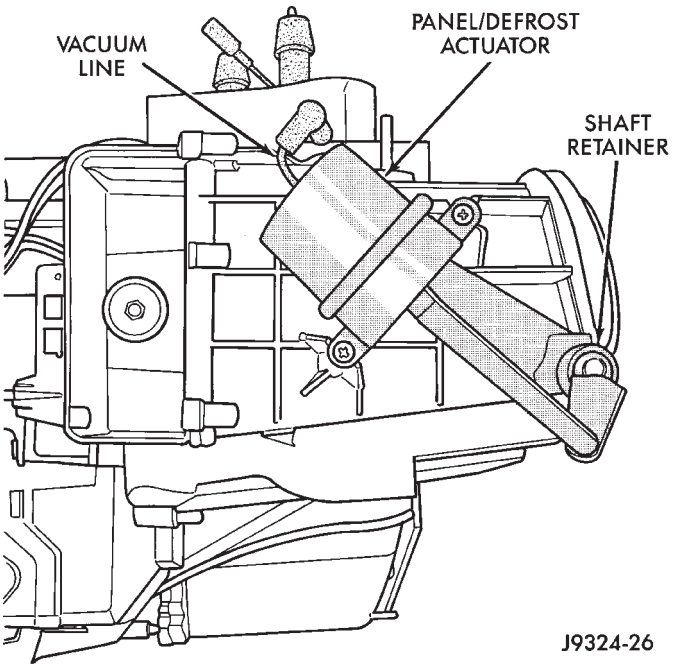

Fig. 26 Panel/Defrost Door Actuator (Heater and Manual A/C)

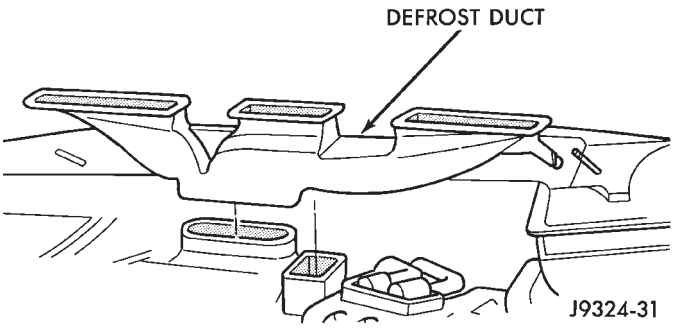

Fig. 27 Defrost Duct

INSTALLATION

(1) Install the panel/defrost door through the top opening and position in place.

(2) Press the door shaft retainer onto the shaft.

(3) Connect the rod and rod clip to the door lever.

(4) Install the defrost duct.

(5) Install the instrument panel (refer to Group 23, Body).

SOLAR SENSOR

This sensor is used only on the ATC units. It is amber in color and located right of center in the defrost grille.

REMOVAL

(1) Pop out the defrost grille (Fig. 29).

(2) Remove the solar sensor from the defrost grille (Fig. 29).

(3) Disconnect the solar sensor connector (Fig. 29).

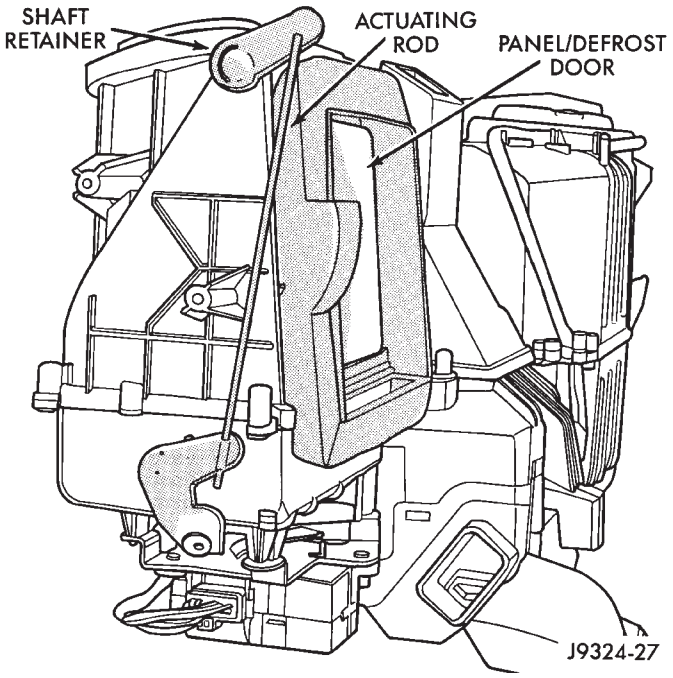

Fig. 28 Panel/Defrost Door (ATC)

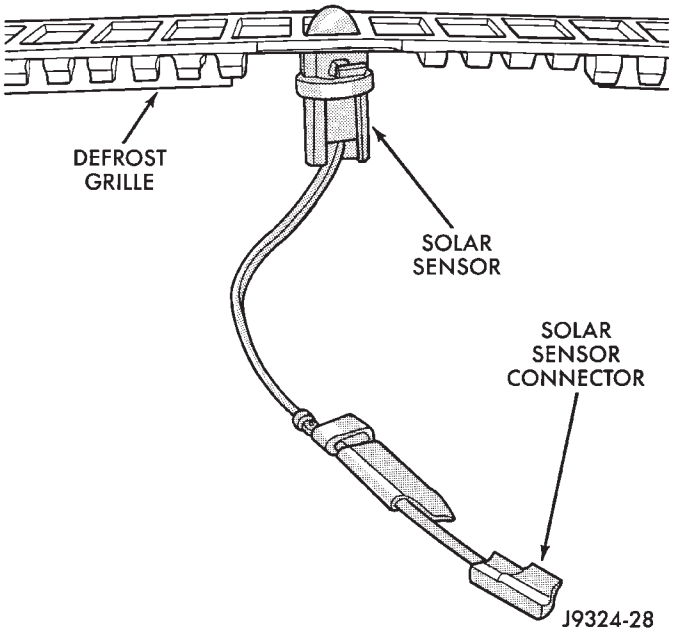

Fig. 29 Solar Sensor

INSTALLATION

(1) Connect the solar sensor connector.

(2) Install the solar sensor into the defrost grille.

(3) Press the defrost grille into the instrument panel.

IN-VEHICLE TEMPERATURE SENSOR

This sensor is used only on the ATC units.

REMOVAL

(1) Remove the instrument panel (refer to Group 23, Body).

(2) Disconnect the sensor tube from the sensor assembly and the heater-A/C unit (Fig. 30).

(3) Remove the sensor assembly screws from the instrument panel bracket. Remove the sensor assembly.

(4) Disconnect the in-vehicle temperature sensor from the sensor assembly (Fig. 30).

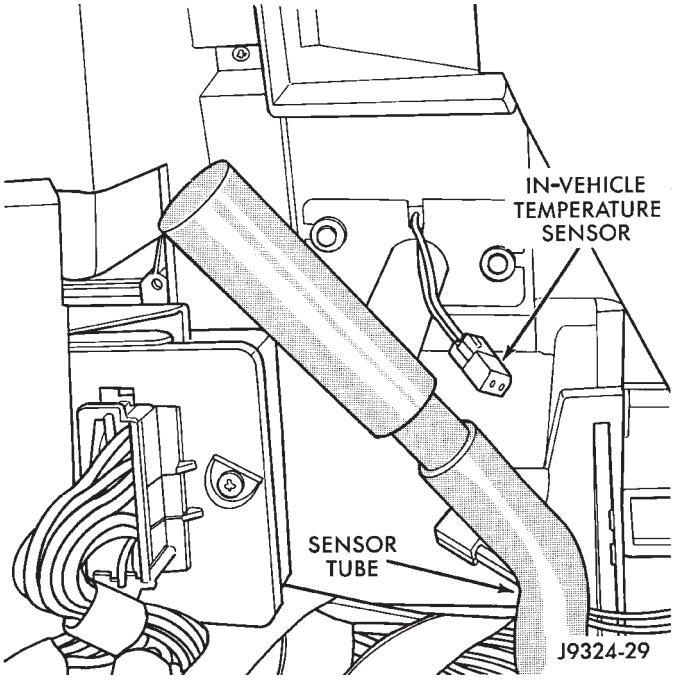

Fig. 30 In-Vehicle Temperature Sensor

INSTALLATION

(1) Connect the in-vehicle temperature sensor to the sensor assembly.

(2) Install the sensor assembly to the instrument panel bracket. Tighten the screws.

(3) Connect the sensor tube to the sensor assembly and the heater-A/C unit.

(4) Install the instrument panel (refer to Group 23, Body).

AMBIENT AIR TEMPERATURE SENSOR

This sensor is used only on the ATC units.

REMOVAL

(1) Remove the grille.

(2) Disconnect the ambient air temperature sensor connector (Fig. 31).

(3) Remove the sensor (Fig. 31).

INSTALLATION

(1) Install the ambient air temperature sensor.

(2) Connect the sensor.

(3) Install the grille.

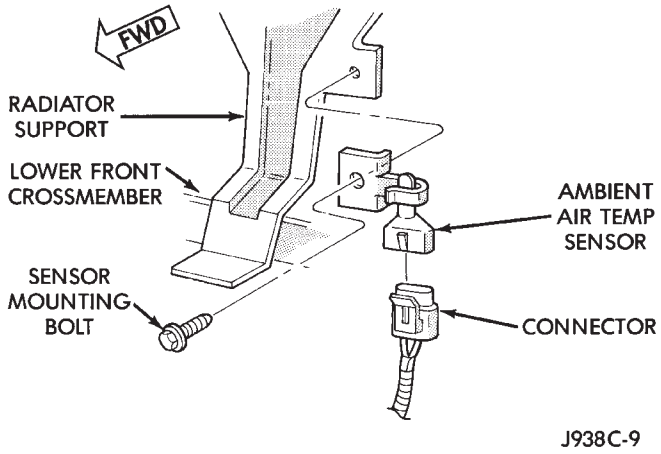

Fig. 31 Ambient Air Temperature Sensor

DEFROSTER DUCT

REMOVAL

(1) Remove the instrument panel (refer to Group 23, Body).

(2) Remove the defroster duct retaining screws.

(3) Remove the defroster duct (Fig. 32).

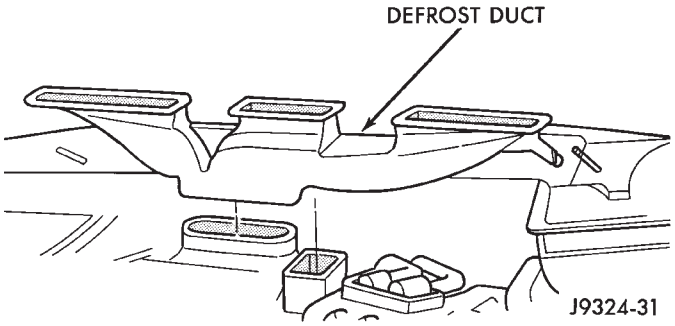

Fig. 32 Defrost Duct

INSTALLATION

(1) Install the defroster duct.

(2) Install and tighten the defroster duct retaining screws.

(3) Install the instrument panel (refer to Group 23, Body).

REAR FLOOR HEAT DUCT

REMOVAL

(1) Remove the center console (refer to Group 23, Body).

(2) Remove the passenger seat (refer to Group 23, Body).

(3) Remove the passenger side door trim (refer to Group 23, Body).

(4) Roll carpet back.

(5) Remove the stud nut (Fig. 33).

(6) Disconnect the rear floor heat duct from the center adaptor heat duct (Fig. 33).

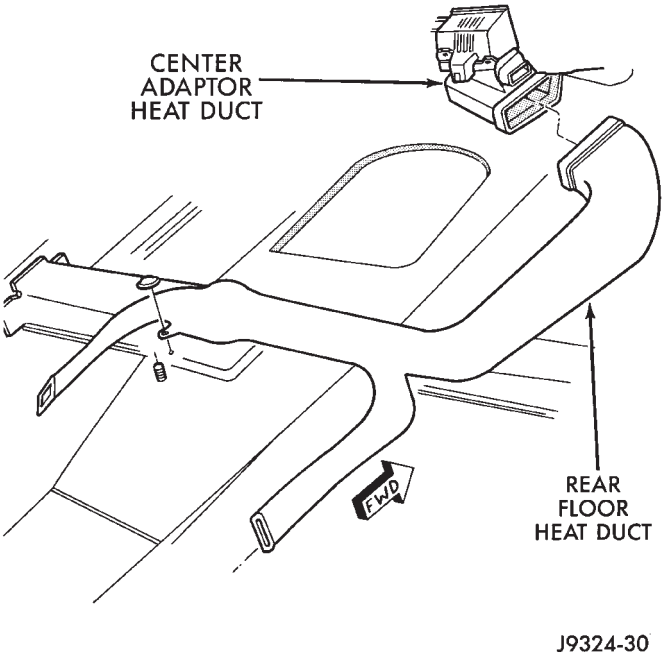

Fig. 33 Rear Floor Heat Duct

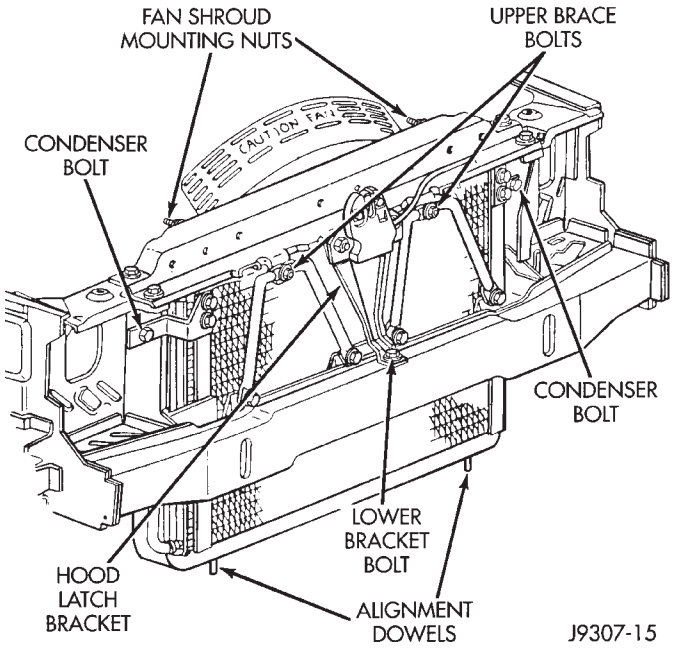

Fig. 34 Radiator—A/C Condenser Mounting—Typical

INSTALLATION

(1) Connect the rear floor heat duct to the center adaptor heat duct.

(2) Install and tighten the stud nut.

(3) Position carpet over duct and onto the floor.

(4) Install the passenger side door trim (refer to Group 23, Body).

(5) Install the passenger seat (refer to Group 23, Body).

(6) Install the center console (refer to Group 23, Body).

CONDENSER

REMOVAL

(1) Disconnect the negative cable from the battery.

(2) Discharge the A/C system into a recovery/recycle device (refer to Refrigerant Service Procedures).

(3) Disconnect the A/C hoses from the condenser. Plug the openings.

(4) Remove the grille.

(5) Remove the upper brace bolts from the two radiator braces (Fig. 34).

(6) Remove the two crossmember-to-radiator mounting nuts (Fig. 35).

(7) Working through grille opening, remove the bolt securing lower part of hood latch support brace to lower frame crossmember (Fig. 34).

(8) The radiator upper crossmember (Fig. 35) can be adjusted left or right through the use of slotted holes. Before removal, mark the original position of the crossmember.

(9) Remove the remaining bolts securing the radiator upper crossmember to the body. Do not remove the hood latch or hood latch cable from the crossmember. Lift the crossmember straight up and lay to the side (Fig. 35).

(10) Remove the four lower condenser attaching bolts.

(11) Remove the two upper condenser attaching bolts (Fig. 35).

(12) Carefully remove the condenser from the vehicle.

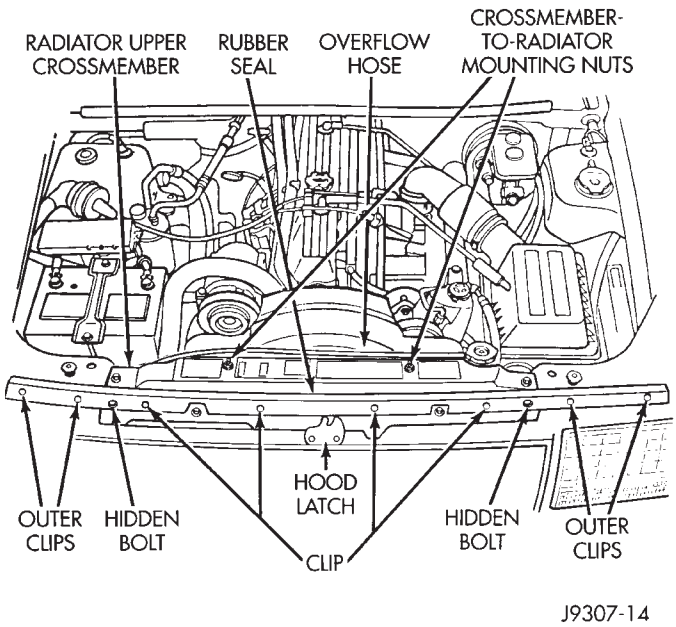

Fig. 35 Radiator Upper Crossmember—Typical

INSTALLATION

(1) Carefully position the condenser into the vehicle.

(2) Install and tighten the two upper condenser attaching bolts.

(3) Install and tighten the four lower condenser attaching bolts.

(4) Align the radiator upper crossmember with the scribe marks. Install and tighten the radiator upper crossmember bolts to the body.

(5) Install and tighten the radiator upper crossmember mounting nuts.

(6) Working through grille opening, install and tighten the bolt securing lower part of hood latch support brace to lower frame crossmember.

(7) Install and tighten the two upper bolts holding the radiator brace to the upper radiator crossmember.

(8) Install the grille.

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

(10) Evacuate the A/C system (refer to Refrigerant Service Procedures).

(11) Add 1 ounce of refrigerant oil to the A/C system if the condenser was replaced.

(12) Charge the A/C system (refer to Refrigerant Service Procedures).

(13) Connect the negative cable to the battery.

ACCUMULATOR

REMOVAL

(1) Disconnect the negative cable from the battery.

(2) Discharge the A/C system into a recovery/recycle device (refer to Refrigerant Service Procedures).

(3) Disconnect the A/C hoses from the compressor and the evaporator. Plug the openings.

(4) Unplug the harness from the low pressure switch (Fig. 36).

(5) Loosen the support bracket screw (Fig. 36).

(6) Remove the accumulator (Fig. 36).

INSTALLATION

(1) Install the accumulator in the support bracket.

(2) Tighten the support bracket screw.

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

(4) Remove the plugs from the A/C hoses. Connect the A/C hoses to the compressor and the evaporator.

(5) Evacuate the A/C system (refer to Refrigerant Service Procedures).

(6) Charge the A/C system (refer to Refrigerant Service Procedures).

(7) Connect the negative cable to the battery.

LIQUID LINE

The fixed orifice tube is located in the liquid line near the condenser. It has filter screens on the inlet and outlet ends of the tube body. If the fixed orifice tube is plugged, the liquid line must be replaced.

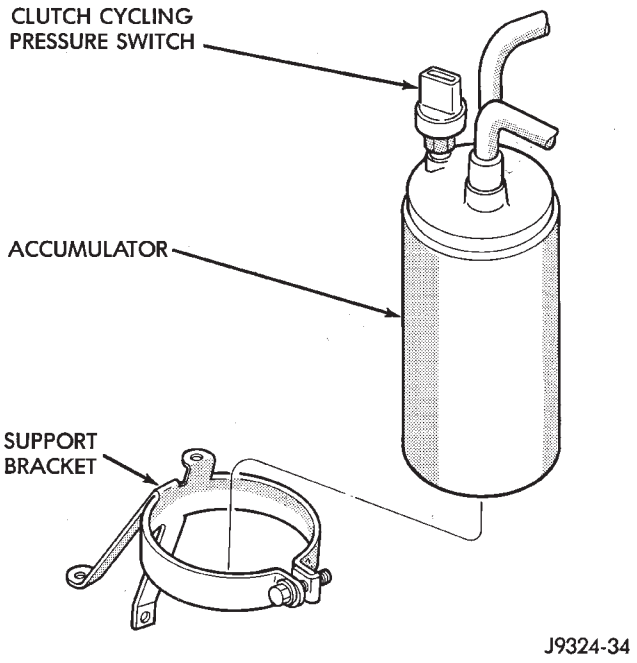

Fig. 36 Accumulator and Bracket

REMOVAL

(1) Disconnect the negative cable from the battery.

(2) Discharge the A/C system into a recovery/recycle device (refer to Refrigerant Service Procedures).

(3) Disconnect the quick-connect fittings at the evaporator and the condenser.

(4) Remove the liquid line.

INSTALLATION

(1) Install the liquid line.

(2) Connect the quick-connect fittings at the evaporator and the condenser.

(3) Evacuate the A/C system (refer to Refrigerant Service Procedures).

(4) Charge the A/C system (refer to Refrigerant Service Procedures).

(5) Connect the negative cable to the battery.

DISCHARGE LINE

REMOVAL

(1) Disconnect the negative cable from the battery.

(2) Discharge the A/C system into a recovery/recycle device (refer to Refrigerant Service Procedures).

(3) Disconnect the quick-connect fitting at the condenser.

(4) Remove the discharge line-to-compressor manifold bolt. Discard the O-ring.

INSTALLATION

(1) Using a new O-ring, install the discharge line-to-compressor manifold bolt.

(2) Connect the quick-connect fitting at the condenser.
(3) Evacuate the A/C system (refer to Refrigerant Service Procedures).
(4) Charge the A/C system (refer to Refrigerant Service Procedures).
(5) Connect the negative cable to the battery.

HIGH PRESSURE CUT-OUT SWITCH

The high pressure cut-out switch is located on the discharge line connection at the compressor manifold.

REMOVAL

(1) Disconnect the negative cable from the battery.
(2) Remove the connector from the switch.
(3) Unscrew the switch.

INSTALLATION

(1) Install and tighten the switch.
(2) Install the connector onto the switch.
(3) Connect the negative cable to the battery.

VACUUM RESERVOIR

The vacuum reservoir is located under the battery tray.

REMOVAL

(1) Remove the battery (refer to Group 8B, Battery/Starter/Generator Service).
(2) Disconnect the vacuum hose (Fig. 37).
(3) Remove the battery tray and vacuum reservoir assembly (refer to Group 8B, Battery/Starter/Generator Service).
(4) Remove the reservoir attaching screws (Fig. 37). Remove the vacuum reservoir from the battery tray.

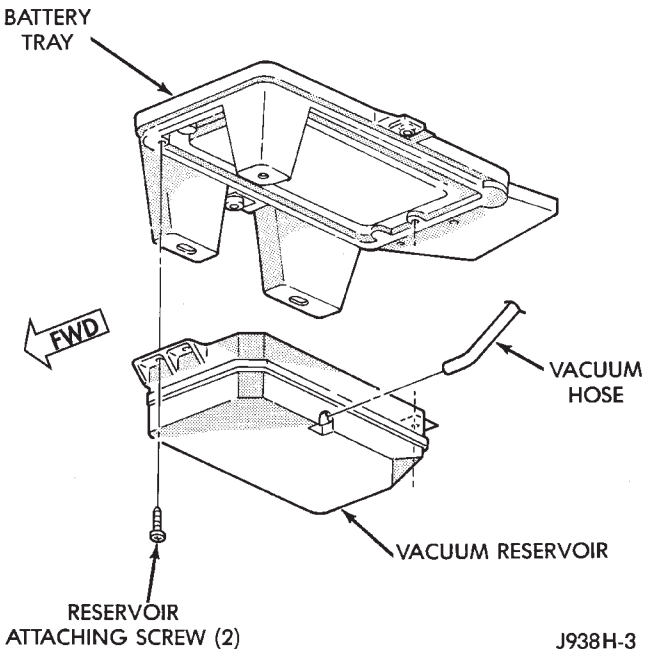

Fig. 37 Vacuum Reservoir

INSTALLATION

(1) Position the vacuum reservoir to the battery tray. Install and tighten the vacuum reservoir screws.
(2) Install the battery tray and vacuum reservoir assembly (refer to Group 8B, Battery/Starter/Generator Service).
(3) Connect the vacuum hose.
(4) Install the battery (refer to Group 8B, Battery/Starter/Generator Service).

TORQUE SPECIFICATIONS

Description	Torque
Compressor Manifold Bolts	25 N•m (19 ft. lbs.)
Compressor Mounting Bolts	27 N•m (20 ft. lbs.)
Compressor Shaft Bolt	13 N•m (115 in. lbs.)

Description	Torque
Heater-A/C Unit Attaching Nuts	
Passenger Compartment Side	5 N•m (40 in. lbs.)
Engine Compartment Side	7 N•m (60 in. lbs.)

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