HEATING AND AIR CONDITIONING

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GENERAL INFORMATION

HEATER AND AIR CONDITIONER

A manual temperature control type heating-air conditioning system is standard factory-installed equipment on this model. An electronically controlled Automatic Temperature Control (ATC) type heating-air conditioning system is an available factory-installed option.

All vehicles are equipped with a common heater-A/C housing assembly (Fig. 1). The system combines air conditioning, heating, and ventilating capabilities in a single unit housing mounted under the instrument panel.

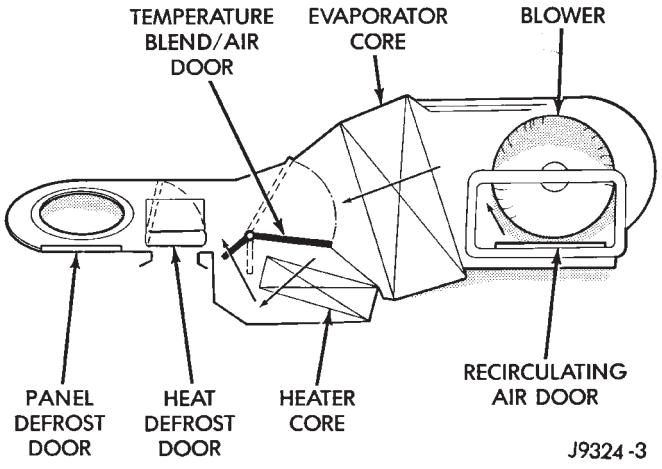


Fig. 1 Common Blend-Air Heater-Air ConditionerSystem

Outside fresh air enters the vehicle through the cowl top opening at the base of the windshield, and passes through a plenum chamber to the heater-A/C system blower housing. Air flow velocity can then be adjusted with the blower motor speed selector switch on the heater-A/C control panel. The air intake openings must be kept free of snow, ice, leaves, and other obstructions for the heater-A/C system to receive a sufficient volume of outside air.

Both the manual and ATC heater and air conditioner are blend-air type systems. In a blend-air system, a blend-air door controls the amount of cooled or unconditioned air is allowed to flow through, or around, the heater core. A temperature control knob on the heater-A/C control panel determines the discharge air temperature by energizing the blend-air door motor, which operates the blend-air door. This allows an almost immediate control of the output air temperature of the system.

The mode control knob on the heater-A/C control panel is used to direct the conditioned air to the selected system outlets. On manual temperature control systems, the mode control knob switches engine vacuum to control the mode doors, which are operated by vacuum actuator motors. On ATC systems, the mode control knob switches electrical current to control the mode doors, which are operated by electronic actuator motors.

The outside air intake can be shut off by selecting the recirculation mode with the mode control knob. This will open the recirculating air door and recirculate the air that is already inside the vehicle.

The air conditioner for all models is designed for the use of non-CFC, R-134a refrigerant. The air conditioning system has an evaporator to cool and dehumidify the incoming fresh or recirculated air prior to blending it with the heated air. This air conditioning system uses a fixed orifice tube in the condenser outlet line to meter refrigerant flow to the evaporator coil. To maintain minimum evaporator temperature and prevent evaporator freezing, a fixed pressure setting switch on the accumulator cycles the compressor clutch.

NOTE: This group covers both Left-Hand Drive (LHD) and Right-Hand Drive (RHD) versions of this model. Whenever required and feasible, the RHD versions of affected vehicle components have been constructed as mirror-image of the LHD versions. While most of the illustrations used in this group represent only the LHD version, the diagnostic and service procedures outlined can generally be applied to either version. Exceptions to this rule have been clearly identified as LHD or RHD, if a special illustration or procedure is required.

HEATER AND AIR CONDITIONER CONTROLS

The manual temperature control heater-A/C system uses a combination of electrical, and vacuum controls. The ATC heater-A/C system uses only electrical controls. These controls provide the vehicle operator with a number of setting options to help control the climate and comfort within the vehicle. Refer to the owner's manual for more information on the suggested operation and use of these controls.

Both heater-A/C control panels are located inboard of the instrument cluster on the instrument panel (Fig. 2). Both control panels have a temperature control knob, a mode control knob, a blower motor switch knob, and an air conditioning compressor pushbutton switch. The ATC control panel includes a Recirc pushbutton switch and a vacuum fluorescent display area.

The ATC control panel also includes the ATC controller. The ATC controller contains a microprocessor and uses internal programming along with hard-wired sensor inputs and messages received on the CCD data bus network to control the many functions and features of the ATC system.

GENERAL INFORMATION (Continued)

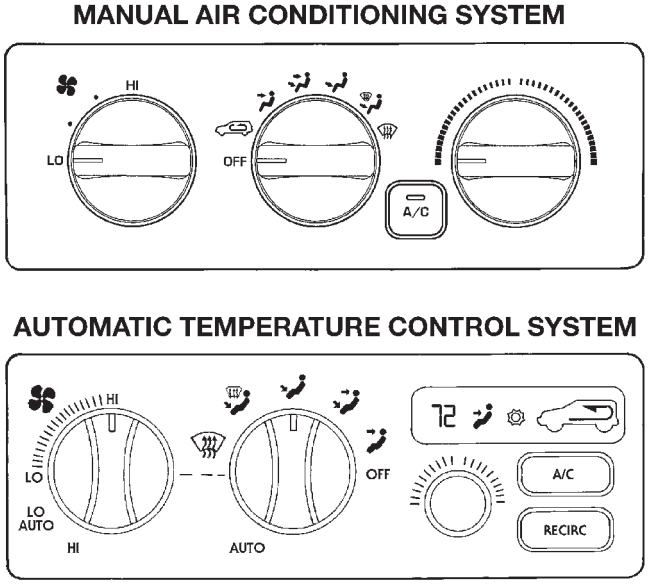


Fig. 2 Heater-Air Conditioner Control Panels

Both the manual heater-A/C control panel and the ATC control panel and controller units cannot be repaired. If faulty or damaged, the entire unit must be replaced.

SERVICE WARNINGS AND PRECAUTIONS

WARNING:

- **THE AIR CONDITIONING SYSTEM CONTAINS REFRIGERANT UNDER HIGH PRESSURE. SEVERE PERSONAL INJURY MAY RESULT FROM IMPROPER SERVICE PROCEDURES. REPAIRS SHOULD ONLY BE PERFORMED BY QUALIFIED SERVICE PERSONNEL.**
- **AVOID BREATHING THE REFRIGERANT AND REFRIGERANT OIL VAPOR OR MIST. EXPOSURE MAY IRRITATE THE EYES, NOSE, AND/OR THROAT. WEAR EYE PROTECTION WHEN SERVICING THE AIR CONDITIONING REFRIGERANT SYSTEM. SERIOUS EYE INJURY CAN RESULT FROM DIRECT CONTACT WITH THE REFRIGERANT. IF EYE CONTACT OCCURS, SEEK MEDICAL ATTENTION IMMEDIATELY.**
- **DO NOT EXPOSE THE REFRIGERANT TO OPEN FLAME. POISONOUS GAS IS CREATED WHEN REFRIGERANT IS BURNED. AN ELECTRONIC LEAK DETECTOR IS RECOMMENDED.**
- **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.**
- **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 THE SKIN OR DELICATE OBJECTS FROM DIRECT CONTACT WITH THE REFRIGERANT.**
- **THE R-134a SERVICE EQUIPMENT OR THE VEHICLE REFRIGERANT SYSTEM SHOULD NOT BE PRESSURE TESTED OR LEAK TESTED WITH COMPRESSED AIR. SOME MIXTURES OF AIR AND R-134a HAVE BEEN SHOWN TO BE COMBUSTIBLE AT ELEVATED PRESSURES. THESE MIXTURES ARE POTENTIALLY DANGEROUS, AND MAY RESULT IN FIRE OR EXPLOSION CAUSING INJURY OR PROPERTY DAMAGE.**

CAUTION:

- **Liquid refrigerant is corrosive to metal surfaces. Follow the operating instructions supplied with the service equipment being used.**
- **Never add R-12 to a refrigerant system designed to use R-134a. Damage to the system will result.**
- **R-12 refrigerant oil must not be mixed with R-134a refrigerant oil. They are not compatible.**
- **Do not use R-12 equipment or parts on the R-134a system. Damage to the system will result.**
- **Do not overcharge the refrigerant system. This will cause excessive compressor head pressure and can cause noise and system failure.**

In addition to the warnings and cautions listed above, the following precautions must also be observed whenever servicing the air conditioning system:

- Recover the refrigerant before opening any fitting or connection. Open the fittings with caution, even after the system has been discharged. Never open or loosen a connection before recovering the refrigerant.
- The refrigerant system must always be evacuated before charging.
- Do not open the refrigerant system or uncap a replacement component until you are ready to service the system. This will prevent contamination in the system.
- Before disconnecting a component, clean the outside of the fittings thoroughly to prevent contamination from entering the refrigerant system.
- Immediately after disconnecting a component from the refrigerant system, seal the open fittings with a cap or plug.
- Before connecting an open refrigerant fitting, always install a new seal or gasket. Coat the fitting and seal with clean refrigerant oil before connecting.

GENERAL INFORMATION (Continued)

- Do not remove the sealing caps from a replacement component until it is to be installed.
- When installing a refrigerant line, avoid sharp bends that may restrict refrigerant flow. Position the refrigerant lines away from exhaust system components or any sharp edges, which may damage the line.
- Tighten refrigerant fittings only to the specified torque. The aluminum fittings used in the refrigerant system will not tolerate overtightening.
- When disconnecting a refrigerant fitting, use a wrench on both halves of the fitting. This will prevent twisting of the refrigerant lines or tubes.
- Refrigerant oil will absorb moisture from the atmosphere if left uncapped. Do not open a container of refrigerant oil until you are ready to use it. Replace the cap on the oil container immediately after using. Store refrigerant oil only in a clean, airtight, and moisture-free container.
- Keep service tools and the work area clean. Contamination of the refrigerant system through careless work habits must be avoided.

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 will reduce the performance of the air conditioning and engine cooling systems.

COOLANT PRECAUTIONS

WARNING:

- **ANTIFREEZE IS AN ETHYLENE GLYCOL BASED COOLANT AND IS HARMFUL IF SWALLOWED OR INHALED. IF SWALLOWED, DRINK TWO GLASSES OF WATER AND INDUCE VOMITING. IF INHALED, MOVE TO A FRESH AIR AREA. SEEK MEDICAL ATTENTION IMMEDIATELY.**
- **WASH THE SKIN AND CLOTHING THOROUGHLY AFTER COMING IN CONTACT WITH ETHYLENE GLYCOL.**
- **KEEP OUT OF THE REACH OF CHILDREN AND PETS.**
- **DO NOT OPEN A COOLING SYSTEM WHEN THE ENGINE IS AT OPERATING TEMPERATURE. PERSONAL INJURY MAY RESULT.**
- **DO NOT STORE ENGINE COOLANT IN OPEN OR UNMARKED CONTAINERS.**
- **HOT ENGINE COOLANT CAN CAUSE SEVERE BURNS. DO NOT OPEN THE RADIATOR DRAIN COCK WHEN THE COOLING SYSTEM IS HOT AND PRESSURIZED. ALLOW THE COOLANT TO REACH TO ROOM TEMPERATURE BEFORE STARTING REPAIR OPERATIONS.**

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

REFRIGERANT HOSES/LINES/TUBES PRECAUTIONS

Kinks or sharp bends in the refrigerant plumbing will reduce the capacity of the entire system. High pressures are produced in the system when it is operating. Extreme care must be exercised to make sure that all refrigerant system connections are pressure tight.

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

There are two types of refrigerant fittings:

- All fittings with O-rings need to be coated with refrigerant oil before installation. Use only O-rings approved for use with R-134a refrigerant. Failure to do so may result in a leak.
- Unified plumbing connections with aluminum gaskets cannot be serviced with O-rings. The gaskets are not reusable and new gaskets do not require lubrication before installing.

Using the proper tools when making a refrigerant plumbing connection is very important. Improper tools or improper use of the tools can damage the refrigerant fittings. Always use two wrenches when loosening or tightening tube fittings. Use one wrench to hold one side of the connection stationary, while loosening or tightening the other side of the connection with a second wrench.

The refrigerant must be recovered completely from the system before opening any fitting or connection. Open the fittings with caution, even after the refrigerant has been recovered. If any pressure is noticed as a fitting is loosened, tighten the fitting and recover the refrigerant from the system again.

Do not discharge refrigerant into the atmosphere. Use an R-134a refrigerant recovery/recycling device that meets SAE Standard J2210.

The refrigerant system will remain chemically stable as long as pure, moisture-free R-134a refrigerant and refrigerant oil is used. Dirt, moisture, or air can upset this chemical stability. Operational troubles or serious damage can occur if foreign material is present in the refrigerant system.

GENERAL INFORMATION (Continued)

When it is necessary to open the refrigerant system, have everything needed to service the system ready. The refrigerant system should not be left open to the atmosphere 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 to be installed.

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 R-134a refrigerant.

DESCRIPTION AND OPERATION

ACCUMULATOR

The accumulator is mounted in the engine compartment between the evaporator coil outlet tube and the compressor inlet. Refrigerant enters the accumulator canister as a low pressure vapor through the inlet tube.

Any liquid, oil-laden refrigerant falls to the bottom of the canister, which acts as a separator. A desiccant bag is mounted inside the accumulator canister to absorb any moisture which may have entered and become trapped in the refrigerant system (Fig. 3).

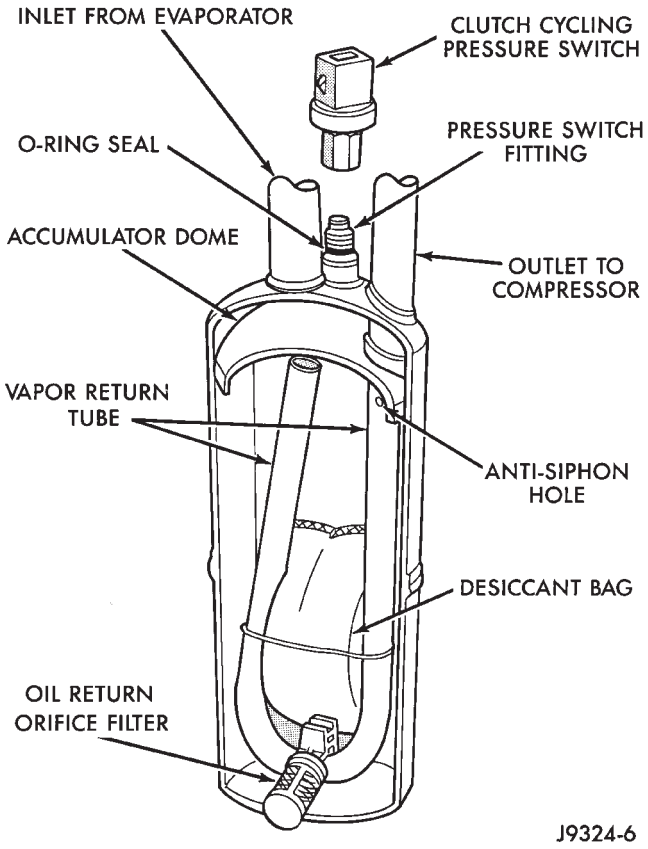


Fig. 3 Accumulator - Typical

AMBIENT TEMPERATURE SENSOR

Models with the optional Automatic Temperature Control (ATC) system use an input from the ambient temperature sensor. The sensor is located in front of the condenser and behind the grille on the center radiator support.

The ambient temperature sensor is hard-wired to the Body Control Module (BCM). The BCM places an ambient temperature message on the CCD data bus for use by the overhead console for the thermometer function, and for use by the ATC controller.

The ambient temperature sensor is a Negative Temperature Coefficient (NTC) thermistor or temperature sensitive resistor. The ATC controller uses this sensor input to monitor the outside air temperature. However, because heat from the radiator and condenser can affect the accuracy of this sensor input when the vehicle is not moving, this input is only used by the ATC system when the vehicle is in motion.

The ambient temperature sensor cannot be adjusted or repaired and, if faulty or damaged, it must be replaced.

BLOWER MOTOR

The blower motor and blower wheel are located in the passenger side end of the heater-A/C housing, below the glove box module. The blower motor controls the velocity of the air flowing through the heater-A/C housing by spinning a squirrel cage-type blower wheel within the blower housing at the selected speed. The blower motor and blower wheel can be serviced from the passenger compartment side of the housing. The blower motor circuit is protected by a fuse in the junction block.

The blower motor will only operate when the ignition switch is in the On position, and the heater-A/C mode control switch is in any position except Off. On models with the standard manual temperature control system, the blower motor speed is controlled by the blower motor switch and resistor. On models with the optional Automatic Temperature Control (ATC) system, the blower motor speed is controlled by the blower motor switch and the power module.

The blower motor and blower wheel cannot be repaired and, if faulty or damaged, they must be replaced. The blower motor and blower wheel are each serviced separately.

BLOWER MOTOR POWER MODULE

Models equipped with the optional Automatic Temperature Control (ATC) system have a blower motor power module. The power module allows infinitely variable blower motor speeds. The power module is mounted to the heater-A/C housing, under the instrument panel and just inboard of the blower motor, in

DESCRIPTION AND OPERATION (Continued)

the same location used for the blower motor resistor on manual temperature control systems. It can be accessed without removing any other components.

The power module output to the blower motor can be controlled manually by using the blower motor switch knob on the ATC heater-A/C control panel, or automatically by the circuitry of the ATC controller. In either case, the ATC controller sends the correct pulse width modulated signal to the power module to obtain the selected or programmed blower motor speed.

The power module cannot be repaired and, if faulty or damaged, it must be replaced.

BLOWER MOTOR RESISTOR

Models with the standard manual temperature control system have a blower motor resistor. The blower motor resistor is mounted to the heater-A/C housing, under the instrument panel and just inboard of the blower motor. It can be accessed without removing any other components.

The resistor has multiple resistor wires, each of which will change the resistance in the blower motor ground path to change the blower motor speed. The blower motor switch directs the ground path through the correct resistor wire to obtain the selected blower motor speed.

With the blower motor switch in the lowest speed position, the ground path for the motor is applied through all of the resistor wires. Each higher speed selected with the blower motor switch applies the blower motor ground path through fewer of the resistor wires, increasing the blower motor speed. When the blower motor switch is in the highest speed position, the blower motor resistor is bypassed and the blower motor receives a direct path to ground.

The blower motor resistor cannot be repaired and, if faulty or damaged, it must be replaced.

BLOWER MOTOR SWITCH

The heater-A/C blower motor is controlled by a rotary switch mounted in the heater-A/C control panel. On vehicles with manual temperature control systems, the switch allows the selection of four blower motor speeds, but will only operate with the ignition switch in the On position, and the heater-A/C mode control switch in any position except Off. On vehicles with Automatic Temperature Control (ATC) systems, the switch allows the selection of Lo Auto, Hi Auto, and an infinite number of manual speed settings between Lo and Hi.

On manual temperature control systems, the blower motor switch is connected in series with the blower motor ground path through the heater-A/C mode control switch. The blower motor switch directs this ground path to the blower motor through the blower motor resistor wires, or directly to the blower motor, as required to achieve the selected blower motor speed.

On ATC systems, the blower motor switch is just one of many inputs to the ATC controller. In the manual blower modes, the ATC controller adjusts the blower motor speed through the power module or the high speed blower motor relay as required by the selected blower switch position. In the auto blower modes, the ATC controller is programmed to select and adjust the blower motor speed through the power module or the high speed blower motor relay as required to achieve and maintain the selected comfort level.

The blower motor switch cannot be repaired and, if faulty or damaged, it must be replaced. The switch is serviced only as a part of the heater-A/C control assembly.

COMPRESSOR

The air conditioning system uses a Nippon Denso 10PA17 fixed displacement compressor on all models. A label identifying the use of R-134a refrigerant is located on the compressor. The purpose of the compressor is to compress the low-pressure refrigerant vapor from the evaporator into a high-pressure, high-temperature vapor.

The compressor cannot be repaired and, if faulty or damaged, it must be replaced.

COMPRESSOR CLUTCH

The compressor clutch is controlled by several components: the A/C compressor switch on the heater-A/C control panel, the ATC controller, the low pressure cycling clutch switch, the high pressure cut-off switch, the compressor clutch relay, and the Powertrain Control Module (PCM). The PCM may delay compressor clutch engagement for up to thirty seconds. Refer to Group 14 - Fuel System for more information on the PCM controls.

GASOLINE ENGINE

The compressor clutch assembly consists of a stationary electromagnetic coil, a hub bearing and pulley assembly, and a clutch plate (Fig. 4). The electromagnetic coil and pulley are retained on the compressor with snap rings. The clutch plate is mounted on the compressor shaft and secured with a bolt.

These components provide the means to engage and disengage the compressor from the engine serpentine accessory drive belt. When the clutch coil is energized, it magnetically draws the clutch into contact with the pulley and drives the compressor shaft. When the coil is not energized, the pulley freewheels on the clutch hub bearing, which is part of the pulley.

DESCRIPTION AND OPERATION (Continued)

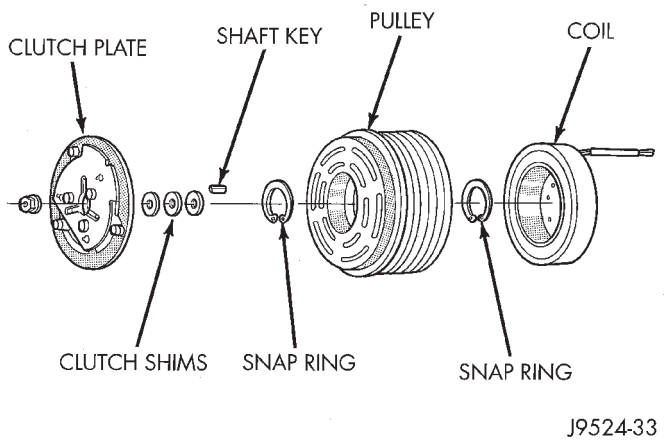


Fig. 4 Compressor Clutch - Gasoline Engine

The compressor clutch and coil are the only serviced parts on the compressor.

DIESEL ENGINE

The compressor clutch assembly consists of a stationery electromagnetic coil, a hub bearing and rotor assembly, and a clutch plate (Fig. 5). The electromagnetic coil and rotor are retained on the compressor with snap rings. The clutch plate is mounted on the compressor shaft and secured with a bolt.

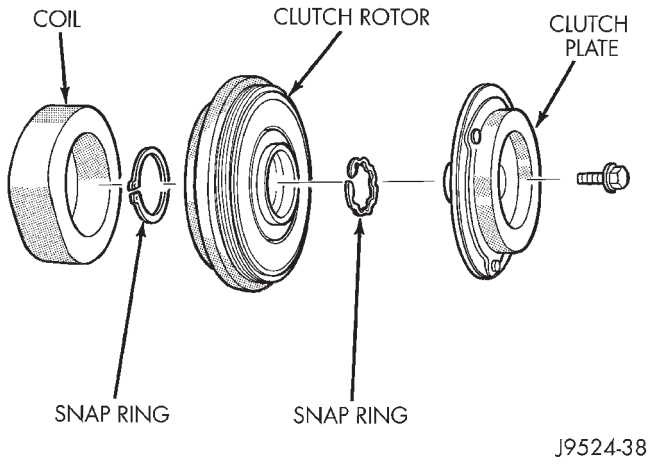


Fig. 5 Compressor Clutch - Diesel Engine

The compressor is mounted on the left side of the engine block behind the power steering pump. The compressor is driven by a splined shaft off the rear of the power steering pump. The splined shaft has a drive flange mounted to it which attaches to a drive spool. The spool links the compressor clutch plate to the steering pump drive flange. When the clutch coil is energized, it magnetically draws the clutch plate into contact with the rotor and drives the compressor shaft. When the coil is not energized, the rotor freewheels on the clutch hub bearing, which is part of the rotor. The compressor clutch and coil are the only serviced parts on the compressor.

COMPRESSOR CLUTCH RELAY

The compressor clutch relay is a International Standards Organization (ISO) micro-relay. The terminal designations and functions are the same as a conventional ISO relay. However, the micro-relay terminal orientation (footprint) is different, the current capacity is lower, and the relay case dimensions are smaller than those of the conventional ISO relay.

The compressor clutch relay is a electromechanical device that switches battery current to the compressor clutch coil when the Powertrain Control Module (PCM) grounds the coil side of the relay. The PCM responds to inputs from the A/C compressor switch on the heater-A/C control panel, the ATC controller, the low pressure cycling clutch switch, and the high pressure cut-off switch. See the Diagnosis and Testing section of this group for more information on the operation of the compressor clutch relay.

The compressor clutch relay is located in the Power Distribution Center (PDC) in the engine compartment. Refer to the PDC label for relay identification and location.

The compressor clutch relay cannot be repaired and, if faulty or damaged, it must be replaced.

CONDENSER

The condenser is located in front of the engine cooling radiator. It is a heat exchanger that allows the high-pressure refrigerant gas to give up its heat to the air passing over the condenser fins. This causes the refrigerant gas to condense into a high-pressure liquid refrigerant.

The condenser cannot be repaired and, if faulty or damaged, it must be replaced.

EVAPORATOR COIL

The evaporator coil is located in the heater-A/C housing, under the instrument panel. Refrigerant enters the evaporator as a low-temperature, low-pressure liquid. As air passes over the fins of the evaporator, the humidity in the air condenses on the fins, and the heat from the air is absorbed by the refrigerant. Heat absorption causes the refrigerant to become a low-pressure gas before it leaves the evaporator.

The evaporator coil cannot be repaired and, if faulty or damaged, it must be replaced.

FIXED ORIFICE TUBE

The fixed orifice tube is integral to the liquid line located between the outlet tube of the condenser and the inlet tube of the evaporator. The inlet and outlet ends of the tube have a screen to filter the refriger-

DESCRIPTION AND OPERATION (Continued)

ant. O-rings on the tube body prevent the refrigerant from bypassing the fixed orifice. The fixed orifice tube is used to meter the flow of liquid refrigerant into the evaporator coil.

The fixed orifice tube cannot be repaired and, if faulty or plugged, the liquid line unit must be replaced.

HEATER CORE

The heater core is located in the heater-A/C housing, under the instrument panel. It is a heat exchanger made of rows of tubes and fins. Engine coolant is circulated through heater hoses to the heater core at all times. As the coolant flows through the heater core, heat removed from the engine is transferred to the heater core fins and tubes.

Air directed through the heater core picks up the heat from the heater core fins. The blend air door allows control of the heater output air temperature by controlling how much of the air flowing through the heater-A/C housing is directed through the heater core. The blower motor speed controls the amount of air flowing through the heater-A/C housing.

The heater core cannot be repaired and, if faulty or damaged, it must be replaced.

HIGH PRESSURE CUT-OFF SWITCH

The high pressure cut-off switch is located on the discharge line near the compressor. This switch is connected in series between the low pressure clutch cycling switch and the Powertrain Control Module (PCM). This switch prevents compressor operation when the discharge line pressure approaches high levels.

When the discharge line pressure rises above 3100 to 3375 kPa (450 to 490 psi) the switch contacts open and interrupt the A/C request signal circuit to the PCM. The PCM responds by de-energizing the compressor clutch relay, which will cause the compressor clutch to disengage. The switch will close again when the pressure drops to 1860 to 2275 kPa (270 to 330 psi).

The high pressure cut-off switch is a factory-calibrated unit. The switch cannot be adjusted or repaired and, if faulty or damaged, it must be replaced.

HIGH PRESSURE RELIEF VALVE

The high pressure relief valve is located on the compressor manifold. The valve is used to prevent excessive system pressure. The valve vents the system when a pressure of 3445 to 4135 kPa (500 to 600 psi) and above, is reached. This prevents damage to the compressor and other system components due to condenser air flow being restricted or an overcharge of refrigerant. The valve closes with a minimum pressure of 2756 kPa (400 psi).

The high pressure relief valve vents only enough refrigerant to reduce system pressure, then re-seats itself. The majority of the refrigerant is conserved in the system. If the valve vents refrigerant, it does not mean the valve is faulty. The valve is only serviced as part of the compressor assembly, and must not be removed or otherwise disturbed.

HIGH SPEED BLOWER MOTOR RELAY

Models equipped with the optional Automatic Temperature Control (ATC) system have a high speed blower motor relay. The relay is a International Standards Organization (ISO)-type relay.

The high speed blower motor relay is a electromechanical device that switches battery current to the blower motor, bypassing the blower motor power module, when the relay coil is provided a ground signal by the ATC controller. See the Diagnosis and Testing section of this group for more information on the operation of the high speed blower motor relay.

The high speed blower motor relay is located on the passenger side outboard end of the heater-A/C housing, near the blower motor in the passenger compartment.

The high speed blower motor relay cannot be repaired and, if faulty or damaged, it must be replaced.

IN-VEHICLE TEMPERATURE SENSOR

Models equipped with the optional Automatic Temperature Control (ATC) system have an in-vehicle temperature sensor. The in-vehicle temperature sensor is located behind the glove box module, just inboard of the glove box and below the passenger side center panel outlet.

The in-vehicle temperature sensor is a Negative Temperature Coefficient (NTC) thermistor or temperature sensitive resistor. Air passing over a venturi in the heater-A/C housing creates a vacuum, which draws air from inside the vehicle past the sensor through an aspirator hose and tube. The sensor provides a signal to the ATC controller with a value that represents the temperature of the air inside the vehicle.

The ATC controller uses the in-vehicle temperature sensor signal input to adjust the blower speed, blend-air door position, and mode door selection in order to maintain the selected comfort level. The sensor cannot be adjusted or repaired and, if faulty or damaged, it must be replaced.

LOW PRESSURE CYCLING CLUTCH SWITCH

The low pressure cycling clutch switch is mounted on top of the accumulator. The switch is connected in

DESCRIPTION AND OPERATION (Continued)

series with the high pressure cut-off switch, between ground and the Powertrain Control Module (PCM).

The switch contacts open and close causing the PCM to turn the compressor clutch on and off. This regulates the system pressure and controls evaporator temperature. Controlling evaporator temperature prevents condensate water on the evaporator fins from freezing and obstructing air conditioning system air flow.

The switch contacts are normally open when the suction pressure is approximately 172 kPa (25 psi) or lower. The switch contacts will close when the suction 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 switch contacts. This is due to the pressure/temperature relationship of the refrigerant in the system.

The low pressure cycling clutch switch is a factory-calibrated unit. This switch cannot be adjusted or repaired. If faulty or damaged, the switch must be replaced.

REFRIGERANT

The R-134a refrigerant used in this air conditioning system is a non-toxic, non-flammable, clear, and colorless liquefied gas. R-134a refrigerant is not compatible with R-12 refrigerant in an air conditioning system.

Even a small amount of R-12 added to a R-134a refrigerant system, will cause compressor failure, refrigerant oil sludge, or poor air conditioning system performance. The refrigerant system service ports have been designed to ensure that the system is not accidentally filled with the wrong refrigerant (R-12).

REFRIGERANT LINE COUPLER

Spring-locking refrigerant line couplers are used to connect refrigerant lines and other components to the refrigerant system. The coupling is held together by a garter spring inside a circular cage.

When the coupling halves are connected, the flared end of the female fitting slips behind 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. Secondary clips are installed over the coupling at the factory for added blowoff protection.

O-rings are used to seal the coupling. These O-rings are compatible with R-134a refrigerant and must be replaced with O-rings made of the same material.

REFRIGERANT LINE

The refrigerant lines are used to carry the refrigerant between the various air conditioning system components. A barrier hose design is used for the air conditioning system on this vehicle.

The ends of the refrigerant hoses are made from lightweight aluminum, and use braze-less fittings. The refrigerant lines and hoses cannot be repaired and, if faulty or damaged, they must be replaced.

REFRIGERANT OIL

The oil used in the 10PA17 compressor is a polyalkylene glycol, synthetic (ND8 PAG), wax-free refrigerant oil. Use only refrigerant oil of the same type to service the system.

Refrigerant oil will absorb any moisture it comes in contact with, even moisture in the air. The oil container should be kept tightly capped until it is ready to be used. Then, cap the oil immediately after using, to prevent contamination.

REFRIGERANT SYSTEM SERVICE EQUIPMENT

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

WARNING: EYE PROTECTION MUST BE WORN WHEN SERVICING AN AIR CONDITIONING REFRIGERANT SYSTEM. TURN OFF (ROTATE CLOCKWISE) ALL VALVES ON THE EQUIPMENT BEING USED, BEFORE CONNECTING TO OR DISCONNECTING FROM THE REFRIGERANT SYSTEM. FAILURE TO OBSERVE THESE WARNINGS MAY RESULT IN PERSONAL INJURY.

A manifold gauge set may be needed with some charging and/or recovery/recycling devices (Fig. 6). 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 released 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 stripe) attaches to the suction service port. This port is located on the suction line, near the front of the engine compartment.

DESCRIPTION AND OPERATION (Continued)

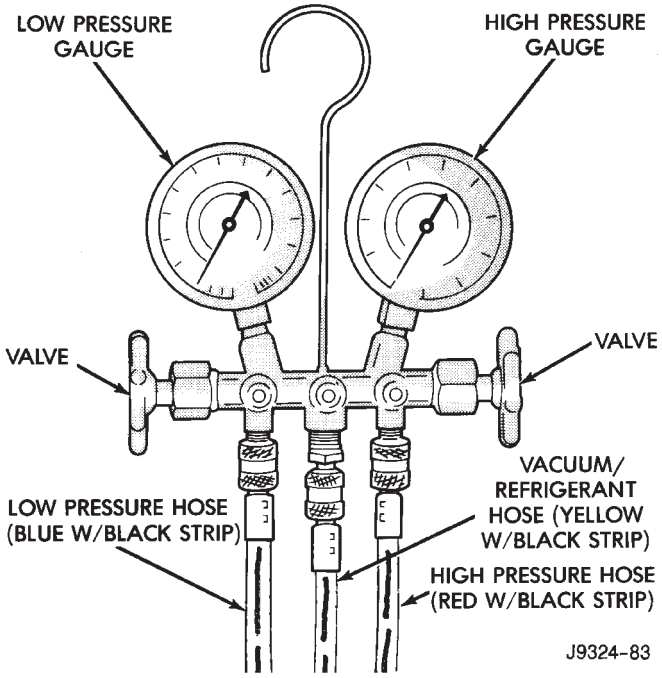


Fig. 6 Manifold Gauge Set - Typical

HIGH PRESSURE GAUGE HOSE

The high pressure hose (Red with Black stripe) attaches to the discharge service port. This port is located on the discharge line between the compressor and the condenser, near the front of the engine compartment.

RECOVERY/RECYCLING/EVACUATION/CHARGING HOSE

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

REFRIGERANT SYSTEM SERVICE PORTS

The refrigerant system service ports are used to charge, recover/recycle, evacuate, and test the air conditioning refrigerant system. Unique service port fitting sizes are used on the R-134a system, to ensure that the refrigerant system is not accidentally contaminated by the use of the wrong refrigerant (R-12), or refrigerant system service equipment.

The high pressure service port is located on the compressor manifold or plumbing, near the front of the engine compartment. The low pressure service port is located on the suction line, near the front of the engine compartment.

After servicing the refrigerant system, always reinstall the service port caps.

SOLAR SENSOR

Models equipped with the optional Automatic Temperature Control (ATC) system have a solar sensor. The solar sensor is mounted in the cowl top trim panel, on the top of the instrument panel near the passenger side defroster outlet. The sensor is a photo diode which responds to sunlight intensity, not to temperature.

The ATC controller uses the solar sensor input to calculate and compensate for the potential effects of heat gain in bright sunlight, and heat loss with an overcast sky or at night. It then adjusts the blower motor speed, blend air door position, and mode door position as needed to maintain the selected comfort level.

The solar sensor cannot be adjusted or repaired and, if faulty or damaged, it must be replaced.

VACUUM CHECK VALVE

A one-way vacuum check valve is installed in the accessory vacuum supply line near the vacuum tap on the engine intake manifold. This check valve helps to maintain the system vacuum needed to retain the selected heater-A/C mode settings. It prevents the engine from bleeding down system vacuum through the intake manifold during extended heavy engine load (low engine vacuum) operation.

The vacuum check valve cannot be repaired and, if faulty or damaged, it must be replaced.

VACUUM RESERVOIR

The vacuum reservoir is mounted in the engine compartment on the underside of the battery tray. Vacuum stored in the reservoir is used to operate the vacuum-controlled vehicle accessories during periods of low engine vacuum, such as when the vehicle is climbing a steep grade or under other high engine load operating conditions.

The vacuum reservoir cannot be repaired and, if faulty or damaged, it must be replaced.

DIAGNOSIS AND TESTING

A/C PERFORMANCE

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 housing 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 the moisture is removed as it condenses on the fins. During periods of high heat and humidity, an air conditioning system will be more effective in the Recirculation mode. With the system in the Recirculation mode, only air from the passenger compartment passes through the evapora-

DIAGNOSIS AND TESTING (Continued)

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)

Performance Temperature and Pressure

tor. As the passenger compartment air dehumidifies, the air conditioning system performance levels improve.

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

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

If the vehicle has the optional Automatic Temperature Control (ATC) system, and has intermittent operational problems or fault codes, be certain that the 16-way wire harness connector on the heater-A/C housing is properly seated (Fig. 7). To check this condition, unplug the two wire harness connector halves, then plug them in again. Historical fault codes that could be stored as a result of this unseated wire harness connector condition are Codes 36, 38, and 39.

Review the Service Warnings and Precautions in the front of this group before performing this procedure. The air temperature in the test room and in the vehicle must be a minimum of 21° C (70° F) for this test.

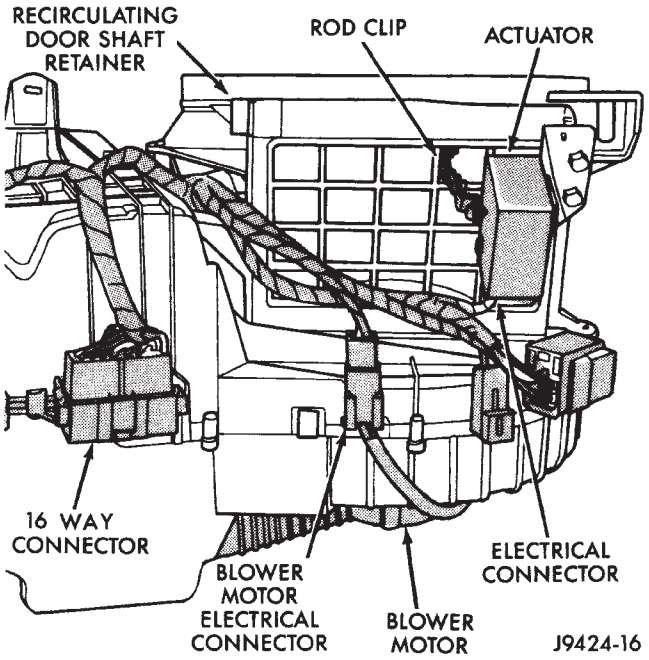


Fig. 7 16-Way Wire Harness Connector

(1) Connect a tachometer and a manifold gauge set.

(2) Set the heater-A/C controls in the A/C, Panel, and Recirculation positions, the temperature control knob in the full cool position, and the blower motor switch in the full High position.

(3) Start the engine and hold the idle at 1,000 rpm with the compressor clutch engaged.

(4) The engine should be at operating temperature. The doors and windows must be open.

(5) Insert a thermometer in the driver side center A/C (panel) outlet. Operate the engine for five minutes.

(6) The compressor clutch may cycle, depending upon the ambient temperature and humidity. If the clutch cycles, unplug the low pressure cycling clutch switch wire harness connector from the switch located on the accumulator (Fig. 8). Place a jumper

DIAGNOSIS AND TESTING (Continued)

wire between the two cavities of the low pressure cycling clutch switch wire harness connector.

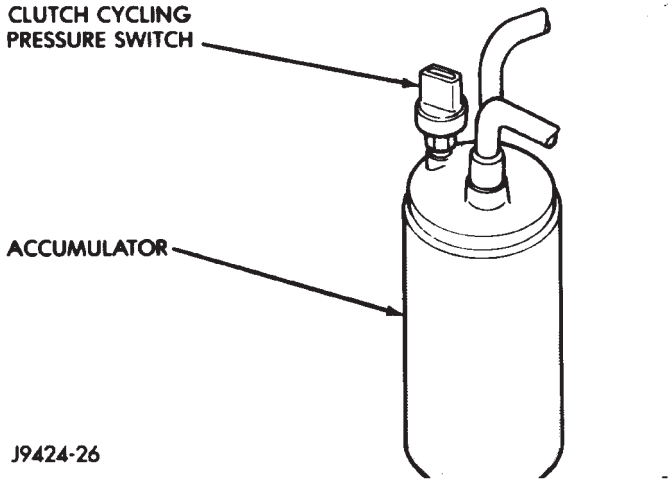


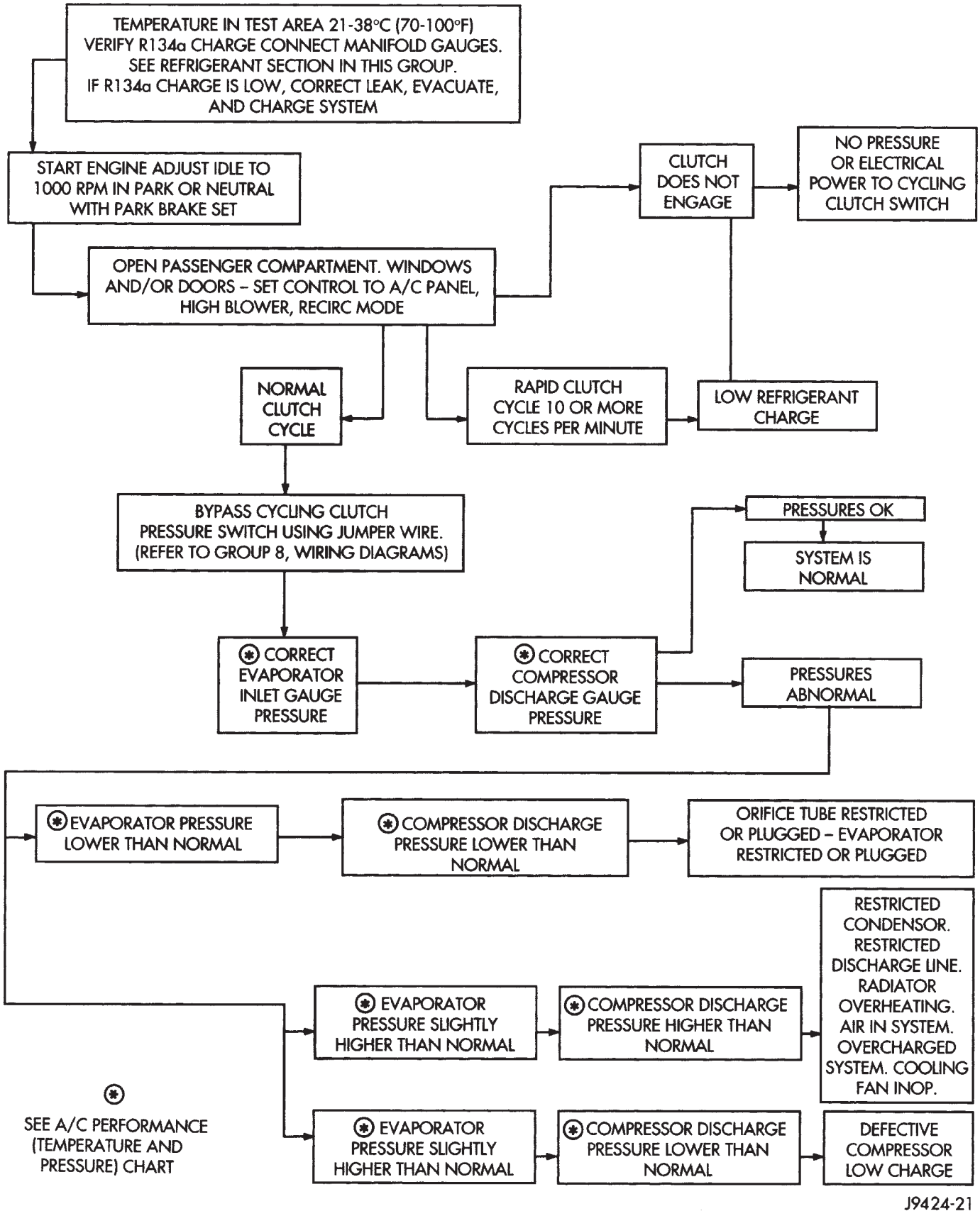
Fig. 8 Low Pressure Cycling Clutch Switch

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

(8) Compare the discharge air temperature to the Performance Temperature and Pressure chart. If the discharge air temperature is high, see Refrigerant System Leaks and Refrigerant System Charge in this group.

(9) Compare the compressor discharge pressure to the Performance Temperature and Pressure chart. If the compressor discharge pressure is high, see the Pressure Diagnosis chart.

DIAGNOSIS AND TESTING (Continued)



Pressure Diagnosis

DIAGNOSIS AND TESTING (Continued)

HEATER PERFORMANCE

PREPARATIONS

Review the Service Warnings and Precautions in the front of this group before performing the following procedures.

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

WARNING: DO NOT REMOVE THE RADIATOR CAP WHEN THE ENGINE IS AT OPERATING TEMPERATURE, PERSONAL INJURY MAY RESULT.

If the vehicle has been operated recently, wait fifteen minutes or longer before removing the radiator cap. Place a rag over the cap and turn it to the first safety stop. Allow any pressure to escape through the overflow tube. When the cooling system pressure stabilizes, remove the cap completely.

MAXIMUM HEATER OUTPUT

Engine coolant is delivered to the heater core through two heater hoses. With the engine idling at normal operating temperature, set the temperature control knob in the full hot position, the mode control knob in the Floor position, and the blower motor switch knob in the High speed position. Using a test thermometer, check the air temperature coming from the floor outlets. Compare the air temperature reading to the Heater Temperature Reference chart (Fig. 9).

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°

Fig. 9 Heater Temperature Reference

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

OBSTRUCTED COOLANT FLOW

Possible locations or causes of obstructed coolant flow:

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

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

MECHANICAL PROBLEMS

Possible locations or causes of insufficient heat:

- An obstructed cowl air intake.
- Obstructed heater system outlets.
- A blend-air door not functioning properly.

TEMPERATURE CONTROL

If the heater discharge air temperature cannot be adjusted with the temperature control knob on the heater-A/C control panel, the following could require service:

- The heater-A/C control panel.
- The blend air door actuator.
- The wire harness circuits for the heater-A/C control panel or the blend air door actuator.
- Improper engine coolant temperature.

VACUUM SYSTEM

Vacuum control is used to operate the mode doors in the manual temperature control system heater-A/C housing. Testing of the heater-A/C mode control switch operation will determine if the vacuum and electrical controls are functioning. However, it is possible that a vacuum control system that operates perfectly at engine idle (high engine vacuum) may not function properly at high engine speeds or loads (low engine vacuum). This can be caused by leaks in the vacuum system, or a faulty vacuum check valve.

A vacuum system test will help to identify the source of poor vacuum system performance, or vacuum system leaks. Before starting this test, stop the engine and make certain that the problem isn't a disconnected vacuum supply tube at the engine intake manifold or the vacuum reservoir.

Use an adjustable vacuum test set (Special Tool C-3707) and a suitable vacuum pump to test the heater-A/C vacuum control system. With a finger placed over the end of the vacuum test hose probe (Fig. 10), adjust the bleed valve on the test set gauge to obtain a vacuum of exactly 27 kPa (8 in. Hg.). Release and block the end of the probe several times to verify that the vacuum reading returns to the

DIAGNOSIS AND TESTING (Continued)

exact 27 kPa (8 in. Hg.) setting. Otherwise, a false reading will be obtained during testing.

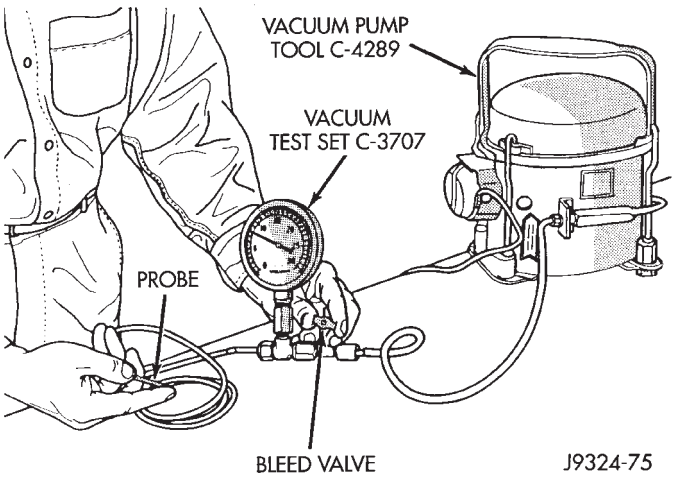


Fig. 10 Adjust Vacuum Test Bleed Valve

VACUUM CHECK VALVE

(1) Remove the vacuum check valve. The valve is located in the (black) vacuum supply hose near the engine intake manifold.

(2) Connect the test set vacuum supply hose to the heater side of the valve. When connected to this side of the check valve, no vacuum should pass and the test set gauge should return to the 27 kPa (8 in. Hg.) setting. If OK, go to step Step 3. If not OK, replace the faulty valve.

(3) Connect the test set vacuum supply hose to the engine vacuum side of the valve. When connected to this side of the check valve, vacuum should flow through the valve without restriction. If not OK, replace the faulty valve.

HEATER-A/C CONTROLS

(1) Connect the test set vacuum probe to the heater-A/C vacuum supply (black) hose in the engine compartment. Position the test set gauge so that it can be viewed from the passenger compartment.

(2) Place the heater-A/C mode control knob in each mode, one at a time, and pause after each selection. The test set gauge should return to the 27 kPa (8 in. Hg.) setting shortly after each selection is made. If not OK, a component or vacuum line in the selected mode's circuit has a leak. See the procedure in Locating Vacuum Leaks.

CAUTION: Do not use lubricant on the switch ports or in the holes in the plug, as lubricant will ruin the vacuum valve in the switch. A drop of clean water in the connector plug holes will help the connector slide onto the switch ports.

LOCATING VACUUM LEAKS

(1) Disconnect the vacuum connector from the back of the heater-A/C mode control switch on the control panel.

(2) Connect the test set vacuum hose probe to each port in the vacuum harness connector, one at a time, and pause after each connection (Fig. 11). The test set gauge should return to the 27 kPa (8 in. Hg.) setting shortly after each connection is made. If OK, replace the faulty mode control switch. If not OK, go to Step 3.

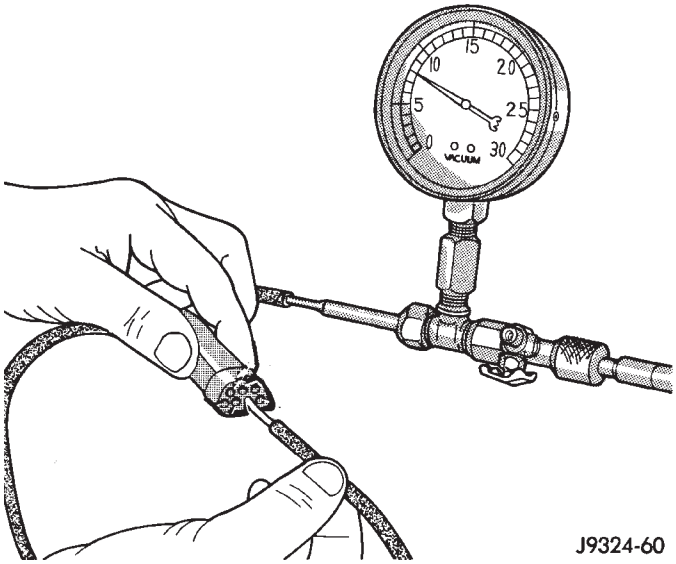


Fig. 11 Vacuum Circuit Test

(3) Determine the vacuum line color of the vacuum circuit that is leaking. To determine the vacuum line colors, refer to the Vacuum Circuits chart (Fig. 12).

(4) Disconnect and plug the vacuum line from the component (fitting, actuator, valve, switch, or reservoir) on the other end of the leaking circuit. Instrument panel disassembly or removal may be necessary to gain access to some components.

(5) Connect the test set hose or probe to the open end of the leaking circuit. The test set gauge should return to the 27 kPa (8 in. Hg.) setting shortly after each connection is made. If OK, replace the faulty disconnected component. If not OK, go to Step 6.

(6) To locate a leak in a vacuum line, leave one end of the line plugged and connect the test set hose or probe to the other end. Run your fingers slowly along the line while watching the test set gauge. The vacuum reading will fluctuate when your fingers contact the source of the leak. To repair the vacuum line, cut out the leaking section of the line. Then, insert the loose ends of the line into a suitable length of 3 mm (1/8-inch) inside diameter rubber hose.

DIAGNOSIS AND TESTING (Continued)

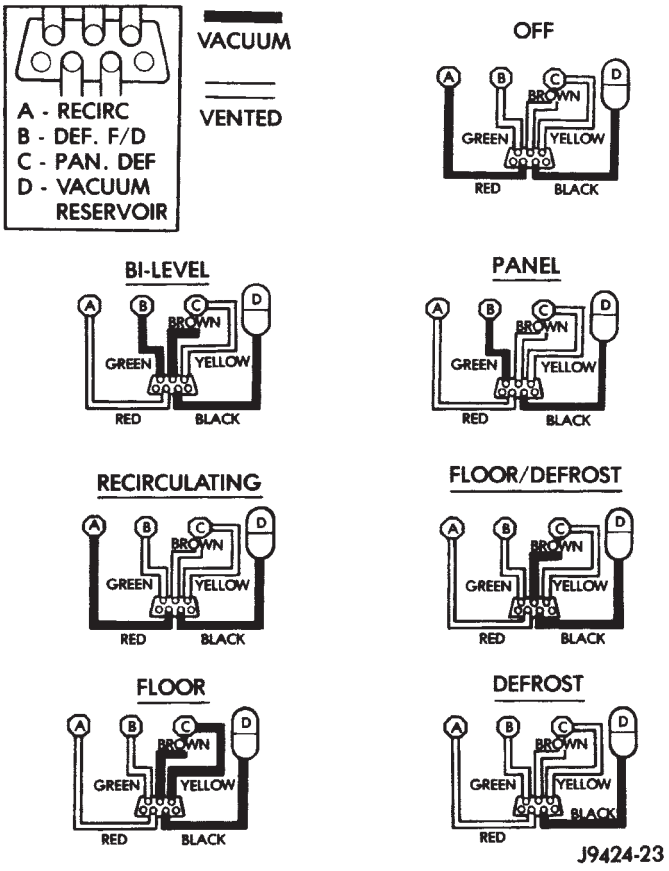


Fig. 12 Vacuum Circuits

ATC SYSTEM

The Automatic Temperature Control (ATC) controller has a system self-diagnostic mode. The controller is capable of troubleshooting each of its input and output circuits. When the controller detects a fault and places it in memory, an "Er" is momentarily displayed in the heater-A/C control panel vacuum fluorescent display area, but it will only be displayed once during each ignition cycle. The ATC controller is capable of three different types of self-diagnostic tests, as follows:

- Fault Code Tests
- Input Circuit Tests
- Output Circuit/Actuator Tests

The information that follows describes how to read the self-diagnostic display, how to enter the ATC controller self-diagnostic test mode, how to select the three self-diagnostic test types, and how to perform the three different tests.

SELF-DIAGNOSTIC DISPLAY

In the self-diagnostic mode, the test information is displayed in the vacuum fluorescent display area of the heater-A/C control. The area of the display where the temperature control comfort level is normally displayed is called the Test Selector. The Test Selector is used to display fault codes, identify the test mode, and show the values of the circuits being tested. The following information describes how the values in the Test Selector display should be interpreted.

(1) The Select Test mode will have only 00 displayed in the Test Selector, and no stick man will be displayed. This is the self-diagnostic mode from which the various tests may be selected.

(2) If the stick man floor arrow (bottom) is showing, the displayed Test Selector value will be a range of numbers below zero (Fig. 13).

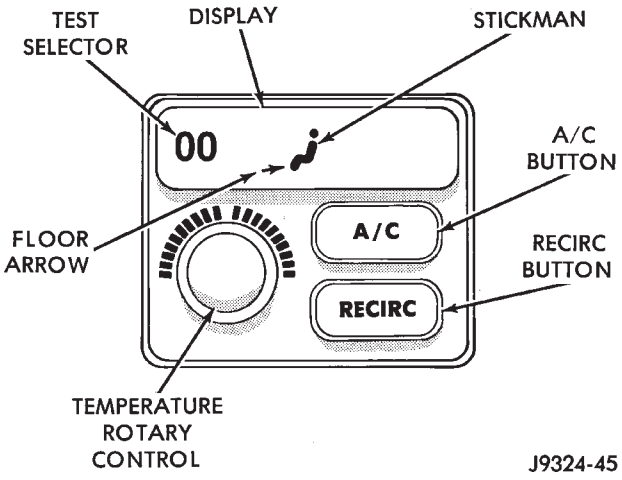


Fig. 13 Test Selector Values Below Zero

(3) If the stick man appears, but no arrows are showing, the displayed Test Selector value will be a range of numbers between zero and ninety-nine (Fig. 14).

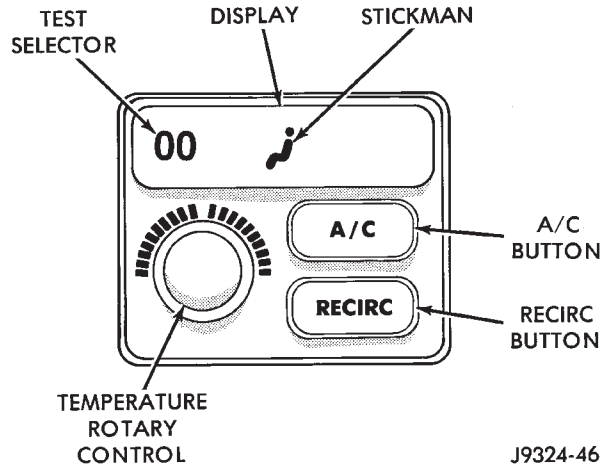


Fig. 14 Test Selector Values Between Zeroand Ninety-Nine

(4) If the stick man panel arrow (middle) is showing, the displayed Test Selector value will be a range of numbers between 100 and 199 (Fig. 15).

(5) If the stick man panel (middle) and defrost (top) arrows are showing, the displayed Test Selector

DIAGNOSIS AND TESTING (Continued)

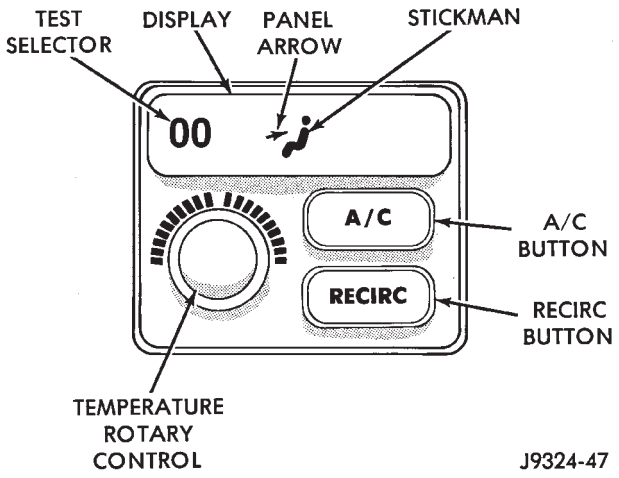


Fig. 15 Test Selector Values Between 100and 199

value will be a range of numbers between 200 and 255 (Fig. 16).

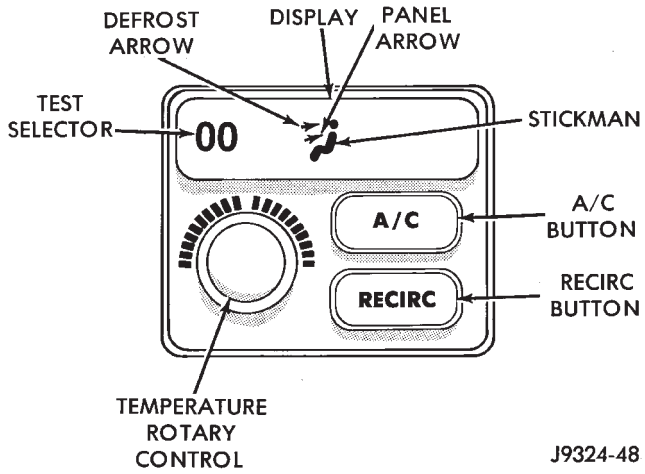


Fig. 16 Test Selector Values Between 200and 255

(6) t any time during the self-diagnostic tests, you may return to the Select Test mode by turning the temperature rotary control one click in either direction. Again, the stick man and arrows are not shown in the Select Test mode. At this point, you have the option of monitoring or testing another circuit (Fig. 17).

ENTERING THE ATC SELF-DIAGNOSTIC MODE

To enter the ATC self-diagnostic mode, perform the following:

(1) Depress the A/C and Recirc buttons at the same time and hold. Rotate the rotary temperature control knob clockwise one click.

(2) If you continue to hold the A/C and Recirc buttons depressed, you will see all of the display segments illuminate. If a segment fails to illuminate, the vacuum fluorescent display is faulty.

(3) After viewing the segment test, release the A/C and Recirc buttons. This will put the Test Selector

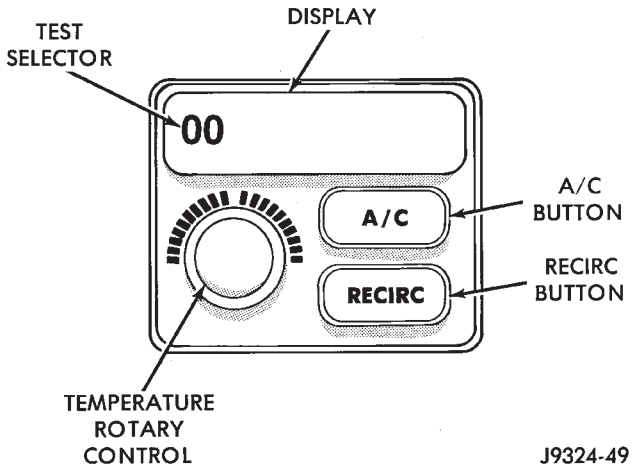


Fig. 17 Return to Select Test Mode

value at 00, and no stick man will be displayed. This is the Select Test mode. At this point a number of tests can be selected, however, the Fault Code Test should be performed first.

FAULT CODE TESTS

Fault codes are two-digit numbers that identify a circuit that is malfunctioning. There are two different kinds of fault codes.

1. **Current Fault Codes** - Current means the fault is present right now. There are two types of current faults: input faults, and system faults.
2. **Historical Fault Codes** - Historical or stored means the fault occurred previously, but is OK right now. A majority of historical fault codes are caused by intermittent wire harness or wire harness connector problems.

NOTE: 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.

RETRIEVING FAULT CODES

(1) To begin the Fault Code Tests you must be in the Select Test mode. With 00 displayed in the Test Selector and no stick man, push either the A/C or Recirc button.

(2) The stick man will appear indicating you have entered the Fault Code Tests. The values displayed in the Test Selector will range from 00 to 64.

(3) Fault codes will appear and repeat if there are more than one. Record all of the fault codes, then see the Current and Historical Fault Code charts for the descriptions. If there are no fault codes, the display value remains at 00.

(4) If a Fault Code 25 or 29 is displayed, the ATC control module must be replaced before any further testing is performed.

(5) For more detailed information about a fault code, see the Input Circuit Tests or the Output Circuit/Actuator Tests.

DIAGNOSIS AND TESTING (Continued)

Fail Code/Description	Circuit Description
00 = No Faults	
01 = Circuit open	In-Vehicle Temperature Sensor
02 = Circuit open	Solar Sensor Input Circuit
03 = Circuit open	Front Panel Blower/Fan Control Input
04 = Circuit open	Front Panel Mode Control Input
05 = Circuit open	Blend Air Door Feedback Circuit
06 = Circuit open	Mode Door Feedback Circuit
07 = Feedback too high	Blower/Fan Feedback Circuit
08 = Circuit shorted	In-Vehicle Temperature Sensor
09 = Circuit shorted	Solar Sensor Input Circuit
10 = Circuit shorted	Front Panel Blower/Fan Control Input
11 = Circuit shorted	Front Panel Mode Control Input
12 = Circuit shorted	Blend Air Door Feedback Circuit
13 = Circuit shorted	Mode Door Feedback Circuit
14 = Feedback too low	Blower/Fan Feedback Circuit
15 = Door not responding	Mode Door Feedback Circuit
16 = Door not responding	Blend Air Door Actuator Drive Circuit
17 = Door travel range too small	Mode Door Feedback Circuit
18 = Door travel range too large	Mode Door Feedback Circuit
19 = Door travel range too small	Blend Air Door Actuator Drive Circuit
20 = Door travel range too large	Blend Air Door Actuator Drive Circuit
21 = Calibration data error	Calibration and CPU Data
22 = BCM message missing	Collision Detection C2D Bus Inputs
23 = PCM message Missing	Collision Detection C2D Bus Inputs
24 = CPU error	Calibration and CPU Data
25 = Reserved	
26 = Reserved	
27 = Reserved	

Current Fault Codes

DIAGNOSIS AND TESTING (Continued)

Fail Code/Description	Circuit Description
28 = Circuit was open	In-Vehicle Temperature Sensor
29 = Circuit was open	Solar Sensor Input Circuit
30 = Circuit was open	Front Panel Blower/Fan Control Input
31 = Circuit was open	Front Panel Mode Control Input
32 = Circuit was open	Blend Air Door Feedback Circuit
33 = Circuit was open	Mode Door Feedback Circuit
34 = Feedback was too high	Blower/Fan Feedback Circuit
35 = Circuit was shorted	In-Vehicle Temperature Sensor
36 = Circuit was shorted	Solar Sensor Input Circuit
37 = Circuit was shorted	Front Panel Blower/Fan Control Input
38 = Circuit was shorted	Front Panel Mode Control Input
39 = Circuit was shorted	Blend Air Door Feedback Circuit
40 = Circuit was shorted	Mode Door Feedback Circuit
41 = Feedback was too low	Blower/Fan Feedback Circuit
42 = Door was not responding	Mode Door Feedback Circuit
43 = Door was not responding	Blend Air Door Actuator Drive Circuit
44 = Door travel range was too small	Mode Door Feedback Circuit
45 = Door travel range was too large	Mode Door Feedback Circuit
46 = Door travel range was too small	Blend Air Door Actuator Drive Circuit
47 = Door travel range was too large	Blend Air Door Actuator Drive Circuit
48 = Calibration data was in error	Calibration and CPU Data
49 = BCM message was missing	Collision Detection C2D Bus Inputs
50 = PCM message was Missing	Collision Detection C2D Bus Inputs
51 = CPU was in error	Calibration and CPU Data
52 = Reserved	
53 = Reserved	
54 = Reserved	

Historical Fault Codes

DIAGNOSIS AND TESTING (Continued)

CLEARING FAULT CODES

Current faults are cleared whenever the problem goes away. To clear a historical fault, depress and hold either the A/C or Recirc button for at least three seconds. The faults have been cleared when two horizontal bars appear in the display.

INPUT CIRCUIT TESTS

In the Input Circuit Test mode, the status of input circuits can be viewed and monitored. If a failure occurs within an input circuit the controller will display a "?" for unknown values, "OC" for an open circuit, or "SC" for a short circuit.

(1) To begin the Input Circuit Tests you must be in the Select Test mode.

(2) With 00 displayed in the Test Selector and no stick man, turn the rotary temperature control knob until the test number you are looking for appears in the Test Selector display. See the Circuit Testing charts for a listing of the test numbers, test items, test types, system tested, and displayed values.

(3) To see the circuit input values, depress the A/C or Recirc button. The values displayed will represent the input seen by the ATC controller.

OUTPUT CIRCUIT/ACTUATOR TESTS

In the Output Circuit/Actuator Test mode, the output circuits can be viewed, monitored, overridden, and tested. If a failure occurs in an output circuit, test the circuit by overriding the system. Test the actuator through its full range of operation. When the override control has been activated, the display will be flashing. The Test Selector will display feedback information about the output circuit being tested.

(1) To begin the Output Circuit/Actuator Tests you must be in the Select Test mode.

(2) With 00 displayed in the Test Selector and no stick man, turn the rotary temperature control knob until the test number you are looking for appears in the Test Selector display. See the Circuit Testing charts for a listing of the test numbers, test items, test types, system tested, and displayed values.

(3) To see the output value, depress the A/C or Recirc button. The values displayed will represent the output from the ATC controller.

(4) To enter the actuator test, depress the A/C or Recirc button. The display will blink, indicating you are in the actuator test mode. Manual tests are those in which you will have to depress and hold the A/C or Recirc button to control the output. Automatic tests are those in which you will have to depress the A/C or Recirc button once to generate the output.

DIAGNOSIS AND TESTING (Continued)

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 reinitalization. 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	Blend Door Feedback	I	Blend Door System	″OC″ ″SC″ 00-255
16	Blend Door Cold Stop	I	Blend Door System	″?″ 00-255
17	Blend Door Hot Stop	I	Blend Door System	″?″ 00-255

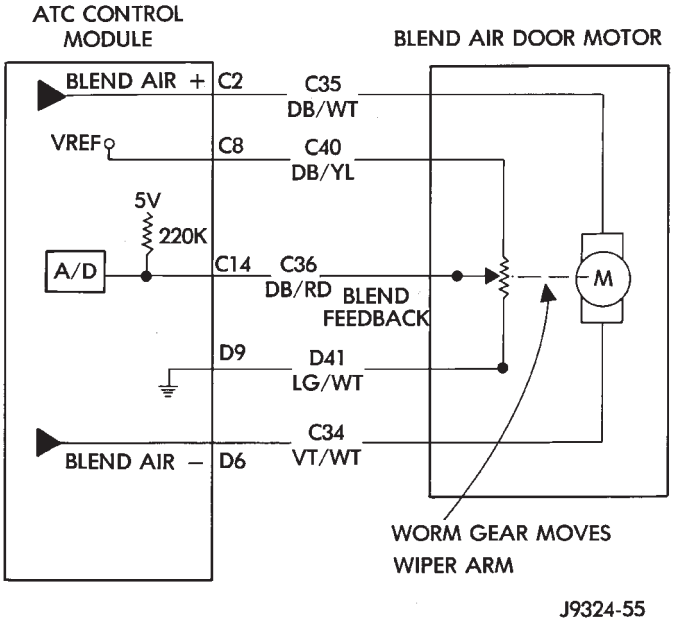
Circuit Testing

DIAGNOSIS AND TESTING (Continued)

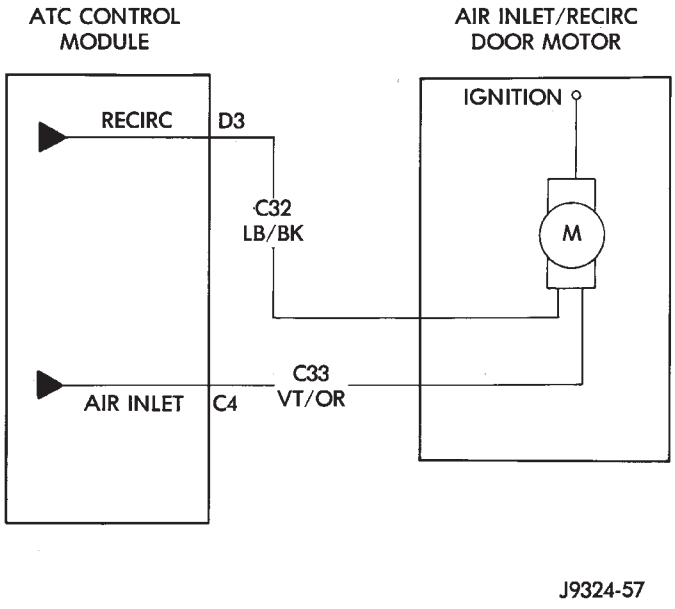
Test No.	Test Item	Test Type	System Tested	Displayed Values
18	In-Vehicle Temperature	I	Temperature Inputs	″OC″ ″SC″ -40 to +60 C (-40 to + 140 F)
19	Ambient Sensor	I	CCD	-40 to + 60 C (-40 to +140 F)
20	Solar Sensor A/D	I	Sun Intensity Input	″OC″ ″SC″ 00-255
21	Engine Coolant	I	CCD	″?″ -40 to + 185 C (-40 to +260 F)
22	Vehicle Speed (MPH/KPM)	I	CCD	″?″ 00-255
23	Engine RPM (x100)	I	CCD	00-82
24	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
25	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.
26	Blend Door Motor Lines	O/A	Blend Door System	00 = stopped (lines low) 01 = toward cold 02 = toward hot 03 = stopped (lines high)
27	Lights On	I	Headlight Switch	00 = OFF 01 = ON
28	Dimming	I	PWD System	″?″ 00-255
29	Dimming Level	O/A	Dimming System	″?″ 00-255
30	ROM & EEPROM			00 = FF
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

Circuit Testing (cont.)

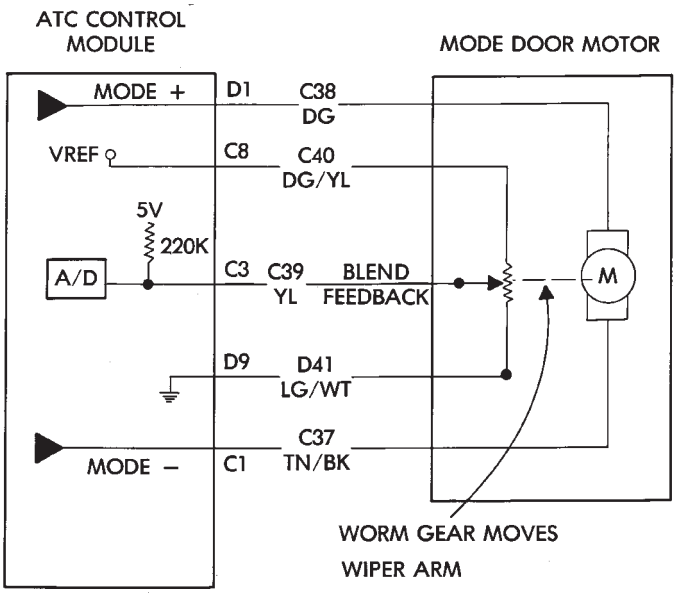
DIAGNOSIS AND TESTING (Continued)



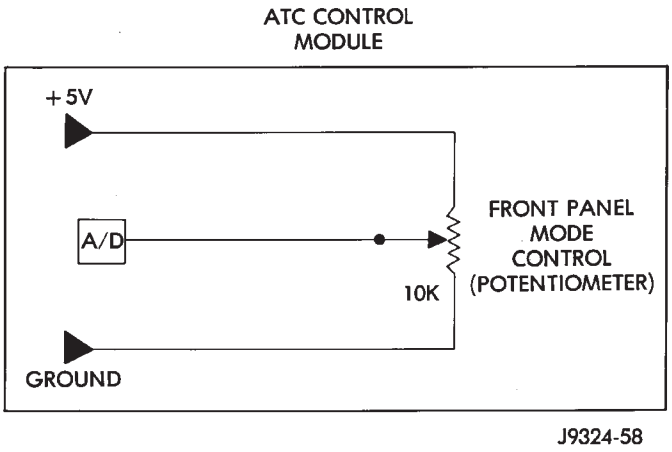
Blend Air Door Actuator Drive Circuit



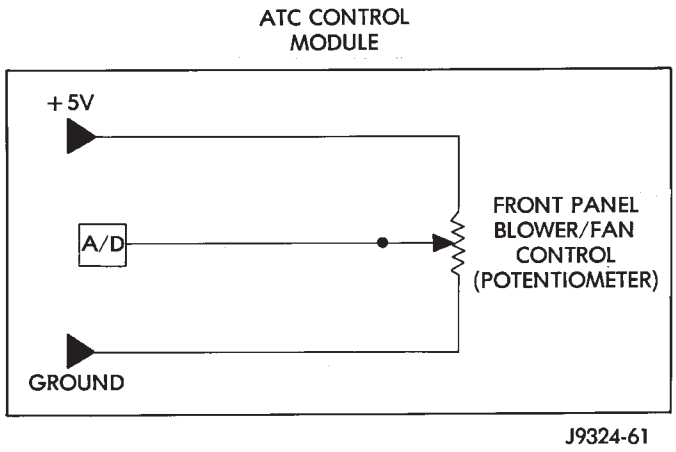
Air Inlet/Recirc Door Actuator DriveCircuit



Mode Door Actuator Drive Circuit

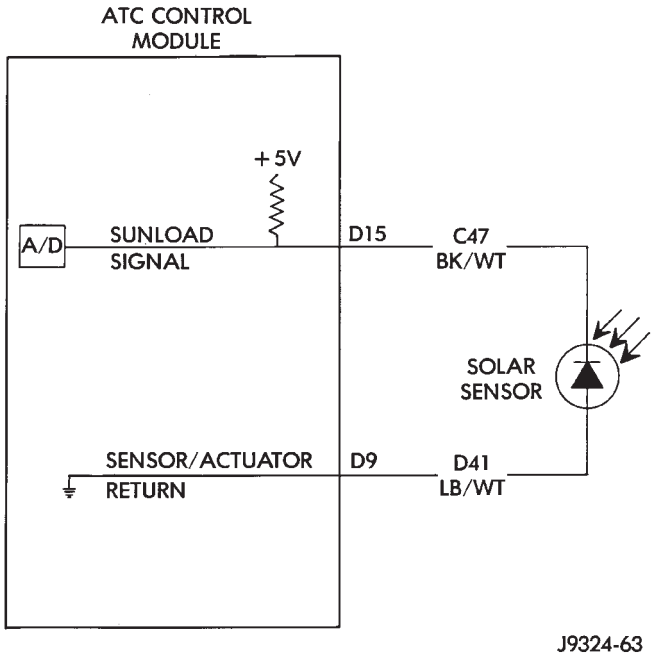


Front Panel Mode Control Circuit

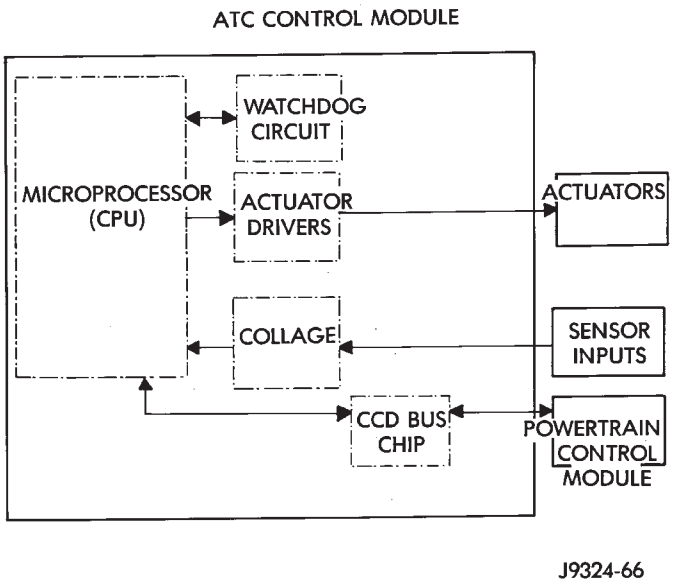


Front Panel Blower/Fan Control Circuit

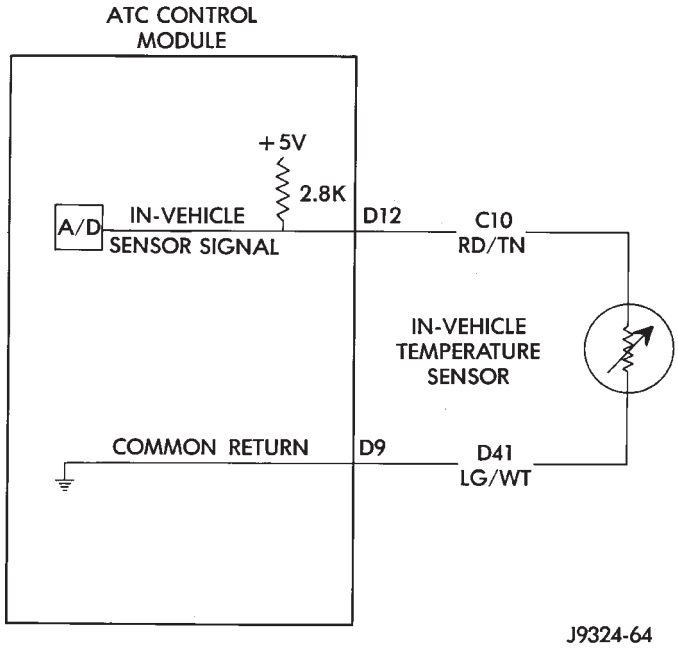
DIAGNOSIS AND TESTING (Continued)



Solar Sensor Circuit



Calibration and CPU Data



In-Vehicle Temperature Sensor Circuit

DIAGNOSIS AND TESTING (Continued)

BLOWER MOTOR

For circuit descriptions and diagrams, refer to 8W-42 - Air Conditioning/Heater in Group 8W - Wiring Diagrams. Possible causes of an inoperative blower motor include:

- Faulty fuse
- Faulty blower motor ground circuit wire harnesses or connectors
- Faulty blower motor resistor (manual temperature control)
- Faulty blower motor power module (ATC)
- Faulty blower motor switch
- Faulty heater-A/C mode control switch
- Faulty blower motor feed circuit wire harnesses or connectors
- Faulty blower motor.

Possible causes of the blower motor not operating in all speeds include:

- Faulty fuse
- Faulty blower motor switch
- Faulty blower motor resistor (manual temperature control)
- Faulty blower motor power module (ATC)
- Faulty high speed blower motor relay (ATC)
- Faulty ATC controller
- Faulty blower motor circuit wire harnesses or connectors.

VIBRATION

Possible causes of blower motor vibration include:

- Improper blower motor mounting
- Improper blower wheel mounting
- Blower wheel out of balance or bent
- Blower motor faulty.

NOISE

To verify that the blower is the source of the noise, unplug the blower motor wire harness connector and operate the heater-A/C system. If the noise goes away, possible causes include:

- Foreign material in the heater-A/C housing
- Improper blower motor mounting
- Improper blower wheel mounting
- Blower motor faulty.

BLOWER MOTOR RESISTOR

For circuit descriptions and diagrams, refer to 8W-42 - Air Conditioning/Heater in Group 8W - Wiring Diagrams.

To test the blower motor resistor, unplug the resistor wire harness connector. Each blower motor switch input terminal on the resistor must have continuity to the resistor output terminal, which is connected to the circuit going to the blower motor. If the blower motor resistor continuity does not check OK, replace the faulty resistor.

BLOWER MOTOR SWITCH

For circuit descriptions and diagrams, refer to 8W-42 - Air Conditioning/Heater in Group 8W - Wiring Diagrams. The blower motor switch is only serviced as a part of the heater-only or heater-A/C control assembly.

(1) Turn the ignition switch to the Off position. Remove the heater-A/C control from the instrument panel. Check for continuity between the ground circuit cavity of the control wire harness connector and a good ground. There should be continuity. If OK, go to Step 2. If not OK, repair the open circuit to ground as required.

(2) With the heater-A/C control wire harness connector unplugged, place the mode control switch knob in any position except the Off position. Check for continuity between the ground circuit terminal and each of the blower motor driver circuit terminals of the control as you move the blower switch to each of the four speed positions. There should be continuity at each driver circuit terminal in only one blower motor switch speed position. If OK, test and repair the blower driver circuits between the control connector and the blower motor resistor as required. If not OK, replace the faulty heater-A/C control unit.

COMPRESSOR

When investigating an air conditioning related noise, you must first know the conditions under which the noise occurs. These conditions include: weather, vehicle speed, transmission in gear or neutral, engine temperature, and any other special conditions.

Noises that develop during air conditioning operation can often be misleading. For example: What sounds like a failed front bearing or connecting rod, may be caused by loose bolts, nuts, mounting brackets, or a loose clutch assembly. Verify serpentine drive belt tension. Improper belt tension can cause a misleading noise when the compressor is engaged. The noise may not occur when the compressor is disengaged.

Drive belts are speed sensitive. At different engine speeds and depending upon belt tension, belts can develop noises that are mistaken for a compressor noise.

(1) Select a quiet area for testing. Duplicate the complaint conditions as much as possible. Switch the compressor on and off several times to clearly identify the compressor noise. Listen to the compressor clutch while engaged and disengaged.

(2) To duplicate a high-ambient temperature condition (high head pressure), restrict the air flow through the condenser. Install a manifold gauge set to make sure that the discharge pressure does not exceed 2070 kPa (300 psi).

DIAGNOSIS AND TESTING (Continued)

(3) Tighten all compressor mounting bolts, the clutch mounting nut, the clutch coil mounting screw or nut, and the serpentine drive belt to the correct specifications.

(4) Check the refrigerant system plumbing for rubbing or interference, which can cause unusual noises.

(5) Check the refrigerant system charge. See the Charging Refrigerant System procedure in this group.

(6) Check the compressor noise as in Step 1.

(7) If the noise still exists, loosen the compressor mounting bolts and tighten again. Repeat Step 1.

(8) If the noise continues, replace the compressor and repeat Step 1.

COMPRESSOR CLUTCH COIL

For circuit descriptions and diagrams, refer to 8W-42 - Air Conditioning/Heater in Group 8W - Wiring Diagrams. The battery must be fully-charged before performing the following tests. Refer to Group 8A - Battery for more information.

(1) Connect an ammeter (0 to 10 ampere scale) in series with the clutch coil terminal. Use a voltmeter (0 to 20 volt scale) with clip-type leads for measuring the voltage across the battery and the compressor clutch coil.

(2) With the heater-A/C mode control switch in any A/C mode, and the blower motor switch in the lowest speed position, start the engine and run it at normal idle.

(3) The compressor clutch coil voltage should read within two volts of the battery voltage. If there is voltage at the clutch coil, but the reading is not within two volts of the battery voltage, test the clutch coil feed circuit for excessive voltage drop and repair as required. If there is no voltage reading at the clutch coil, refer to the proper Powertrain Diagnostic Procedures manual for testing of the compressor clutch circuit. The following components must be checked and repaired as required before you can complete testing of the clutch coil:

- Fuses in the junction block and the Power Distribution Center
- Heater-A/C mode control switch
- Compressor clutch relay
- High pressure cut-off switch
- Low pressure cycling clutch switch
- Powertrain Control Module.

(4) The compressor clutch coil is acceptable if the current draw measured at the clutch coil is 2.0 to 3.9 amperes with electrical system voltage at 11.5 to 12.5 volts. This should only be checked with the work area temperature at 21° C (70° F). If system voltage is more than 12.5 volts, add electrical loads by turning on electrical accessories until the system voltage drops below 12.5 volts.

(a) If the clutch coil current reading is 4 amperes or more, the coil is shorted and should be replaced.

(b) If the clutch coil current reading is zero, the coil is open and should be replaced.

COMPRESSOR CLUTCH RELAY

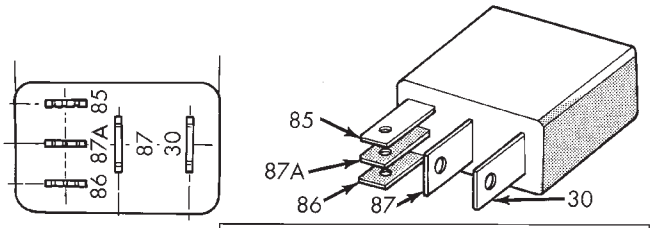
For circuit descriptions and diagrams, refer to 8W-42 - Air Conditioning/Heater in Group 8W - Wiring Diagrams.

The compressor clutch relay is located in the Power Distribution Center (PDC). Refer to the PDC label for relay identification and location. Remove the relay from the PDC to perform the following tests:

(1) A relay in the de-energized position should have continuity between terminals 87A and 30, and no continuity between terminals 87 and 30. If OK, go to Step 2. If not OK, replace the faulty relay.

(2) Resistance between terminals 85 and 86 (electromagnet) should be 75 ± 5 ohms. If OK, go to Step 3. If not OK, replace the faulty relay.

(3) Connect a battery to terminals 85 and 86. There should now be continuity between terminals 30 and 87, and no continuity between terminals 87A and 30. If OK, see the Relay Circuit Test procedure in this group. If not OK, replace the faulty relay.



TERMINAL LEGEND	
NUMBER	IDENTIFICATION
30	COMMON FEED
85	COIL GROUND
86	COIL BATTERY
87	NORMALLY OPEN
87A	NORMALLY CLOSED

9514-16

Compressor Clutch Relay

RELAY CIRCUIT TEST

For circuit descriptions and diagrams, refer to 8W-42 - Air Conditioning/Heater in Group 8W - Wiring Diagrams.

(1) The relay common feed terminal cavity (30) is connected to fused battery feed. There should be battery voltage at the cavity for relay terminal 30 at all times. If OK, go to Step 2. If not OK, repair the open circuit to the PDC fuse as required.

(2) The relay normally closed terminal (87A) is not used in this application. Go to Step 3.

(3) The relay normally open terminal cavity (87) is connected to the compressor clutch coil. There should

DIAGNOSIS AND TESTING (Continued)

be continuity between this cavity and the A/C compressor clutch relay output circuit cavity of the compressor clutch coil wire harness connector. If OK, go to Step 4. If not OK, repair the open circuit as required.

(4) The relay coil battery terminal (86) is connected to the fused ignition switch output (run/start) circuit. There should be battery voltage at the cavity for relay terminal 86 with the ignition switch in the On position. If OK, go to Step 5. If not OK, repair the open circuit to the junction block as required.

(5) The coil ground terminal cavity (85) is switched to ground through the Powertrain Control Module (PCM). There should be continuity between this cavity and the A/C compressor clutch relay control circuit cavity of the PCM wire harness connector at all times. If not OK, repair the open circuit as required.

HIGH PRESSURE CUT-OFF SWITCH

For circuit descriptions and diagrams, refer to 8W-42 - Air Conditioning/Heater in Group 8W - Wiring Diagrams.

(1) Verify that the refrigerant system is properly charged.

(2) Disconnect and isolate the battery negative cable.

(3) Unplug the high pressure switch wire harness connector and test for continuity between the switch terminals. There should be continuity. If OK, refer to the wiring diagrams and repair the circuits as required. If not OK, replace the faulty switch.

HIGH SPEED BLOWER MOTOR RELAY

RELAY TEST

For circuit descriptions and diagrams, refer to 8W-42 - Air Conditioning/Heater in Group 8W - Wiring Diagrams. Remove the relay from its wire harness connector as described in this group to perform the following tests:

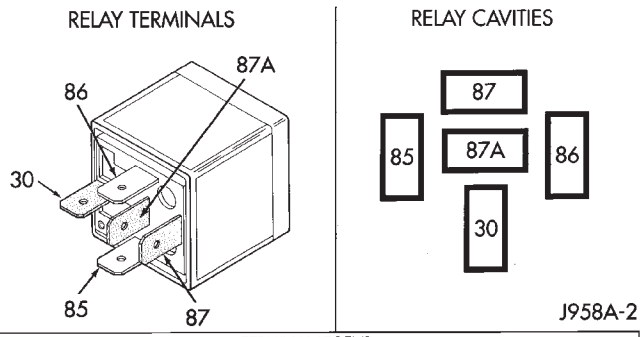
(1) A relay in the de-energized position should have continuity between terminals 87A and 30, and no continuity between terminals 87 and 30. If OK, go to Step 2. If not OK, replace the faulty relay.

(2) Resistance between terminals 85 and 86 (electromagnet) should be 75 ± 5 ohms. If OK, go to Step 3. If not OK, replace the faulty relay.

(3) Connect a battery to terminals 85 and 86. There should now be continuity between terminals 30 and 87, and no continuity between terminals 87A and 30. If OK, see the Relay Circuit Test in this group. If not OK, replace the faulty relay.

RELAY CIRCUIT TEST

For circuit descriptions and diagrams, refer to 8W-42 - Air Conditioning/Heater in Group 8W - Wiring Diagrams.



TERMINAL LEGEND	
NUMBER	IDENTIFICATION
30	COMMON FEED
85	COIL GROUND
86	COIL BATTERY
87	NORMALLY OPEN
87A	NORMALLY CLOSED

High Speed Blower Motor Relay

(1) The relay common feed terminal cavity (30) is connected to battery voltage and should be hot at all times. If OK, go to Step 2. If not OK, repair the open circuit to the Power Distribution Center (PDC) fuse as required.

(2) The relay normally closed terminal (87A) is connected to terminal 30 in the de-energized position, but is not used for this application. Go to Step 3.

(3) The relay normally open terminal (87) is connected to the common feed terminal (30) in the energized position. This terminal supplies battery voltage to the blower motor when the relay is energized by the ATC controller. There should be continuity between the cavity for relay terminal 87 and the high speed blower motor relay signal circuit cavity of the blower motor wire harness connector at all times. If OK, go to Step 4. If not OK, repair the open circuit to the blower motor as required.

(4) The coil battery terminal (86) is connected to battery voltage and should be hot at all times. If OK, go to Step 5. If not OK, repair the open circuit to the PDC fuse as required.

(5) The coil ground terminal (85) is connected to the electromagnet in the relay. It is grounded by the ATC controller when the blower switch is placed in the manual High blower speed position and/or when the ATC controller senses the need for High blower speed with the blower switch in the Hi Auto position. There should be continuity between the cavity for relay terminal 85 and the high speed blower motor relay control circuit cavity of the ATC controller wire harness connector at all times. If OK, see the ATC System tests in this group. If not OK, repair the open circuit as required.

LOW PRESSURE CYCLING CLUTCH SWITCH

Verify that the refrigerant system has the correct refrigerant charge. For circuit descriptions and dia-

DIAGNOSIS AND TESTING (Continued)

grams, refer to 8W-42 - Air Conditioning/Heater in Group 8W - Wiring Diagrams.

(1) Unplug the low pressure cycling clutch switch wire harness connector from the switch on the accumulator, and install a jumper wire between the two connector cavities.

(2) Connect a manifold gauge set to the refrigerant system service ports.

(3) Place the heater-A/C mode control switch knob in any A/C position and start the engine.

(4) Check the continuity between the two terminals of the low pressure switch. There should be continuity with a suction pressure reading of 296 kPa (43 psi) or above, and no continuity with a suction pressure reading of 172 kPa (25 psi) or below. If OK, test and repair the compressor clutch control circuit as required. If not OK, replace the faulty switch.

REFRIGERANT SYSTEM LEAKS

WARNING: REVIEW THE WARNINGS AND CAUTIONS IN THE FRONT OF THIS GROUP BEFORE LEAK TESTING THE SYSTEM.

If the air conditioning system is not cooling properly, determine if the refrigerant system is fully-charged. See A/C Performance in this group. If the refrigerant system is low or empty, a leak at a line, fitting, or component seal is likely. Fittings, lines, or components that appear to be oily indicate a possible refrigerant leak. To detect a leak in the refrigerant system, perform one of the following procedures:

SYSTEM EMPTY

(1) Evacuate the refrigerant system. See Refrigerant System Evacuate in this group.

(2) Connect and dispense 0.283 kPa (0.6 lbs. or 10 oz.) of R-134a refrigerant into the evacuated refrigerant system. See Refrigerant System Charge in this group.

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

(4) With the engine not running, use a electronic R-134a leak detector and search for leaks. Move the leak detector probe slowly along the bottom side of all lines and fittings, because R-134a is heavier than air.

(5) To inspect the evaporator coil for leaks, insert the leak detector probe into the center panel outlet. Set the blower motor switch to the lowest speed (A/C) position, and the mode control switch in the Recirculation mode.

SYSTEM LOW

(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 air conditioning system on for five minutes.

(3) With the engine not running, use a electronic R-134a leak detector and search for leaks. Move the leak detector probe slowly along the bottom side of all lines and fittings, because R-134a is heavier than air.

(4) To inspect the evaporator coil for leaks, insert the leak detector probe into the center panel outlet. Set the blower motor switch to the lowest speed (A/C) position, and the mode control switch in the Recirculation mode.

SERVICE PROCEDURES

REFRIGERANT RECOVERY

WARNING: REVIEW THE WARNINGS AND CAUTIONS IN THE FRONT OF THIS GROUP BEFORE RECOVERING REFRIGERANT.

R-134a refrigerant is a hydrofluorocarbon (HFC) that does not contain chlorine. A R-134a refrigerant recovery/recycling station that meets SAE Standard J2210 must be used to recover the refrigerant. Refer to the operating instructions provided with the equipment for proper operation.

REFRIGERANT SYSTEM EVACUATE

WARNING: REVIEW THE WARNINGS AND CAUTIONS IN THE FRONT OF THIS GROUP BEFORE EVACUATING THE SYSTEM.

If the refrigerant 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. Evacuating will boil the moisture out of the refrigerant system at near room temperature. To evacuate the refrigerant system, use the following procedure:

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

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

SERVICE PROCEDURES (Continued)

vacuum pump. Then open the suction and discharge valves and evacuate an additional ten minutes.

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

(4) The refrigerant system is now ready to be charged with refrigerant.

REFRIGERANT SYSTEM CHARGE

WARNING: REVIEW THE WARNINGS AND CAUTIONS IN THE FRONT OF THIS GROUP BEFORE CHARGING THE REFRIGERANT SYSTEM.

After the system has been tested for leaks and evacuated, a refrigerant charge can be injected into the system. See Refrigerant Charge Capacity for the proper amount of the refrigerant charge. Charge the system using a recovery/recycling/charging station approved for R-134a refrigerant. This device must meet SAE Standard J2210. Refer to the instructions provided with the equipment for proper operation.

REFRIGERANT CHARGE CAPACITY

The R-134a system charge capacity is 0.8 kg (1.75 lbs.).

PARTIAL CHARGE METHOD

WARNING: REVIEW THE WARNINGS AND CAUTIONS IN THE FRONT OF THIS GROUP BEFORE CHARGING THE REFRIGERANT SYSTEM.

The partial charge method is used to add a partial charge to a system that is low on refrigerant. To perform this procedure the evaporator inlet and outlet tube temperatures are measured. The temperature difference is measured with a temperature meter with one or two clamp-on thermocouple probes. The difference between the evaporator inlet and outlet tube temperatures will determine the amount of refrigerant needed.

Before adding a partial charge, check for refrigerant system leaks. See Refrigerant System Leaks in this group for the procedures. If a leak is found, make the necessary repairs before attempting a full or partial refrigerant system charge.

(1) Attach a manifold gauge set to the service ports.

(2) Attach the two clamp-on thermocouple probes to the inlet and outlet tubes of the evaporator coil.

a. If a single thermocouple probe is used, attach the probe to the evaporator inlet tube just before the collar of the refrigerant line connector fitting. The probe must make contact with the bottom surface of the inlet tube.

b. If dual thermocouple probes are used, attach probe 1 to the evaporator inlet tube, and probe 2 to the evaporator outlet tube. Attach both probes to the tubes just before the collar of the refrigerant line connector fittings. The probes must make contact with the bottom surfaces of the inlet and outlet tubes.

(3) Open all of the windows or doors of the passenger compartment. Set the air conditioning controls to A/C, Panel, Recirc (temperature control knob in the full cool position) and the blower motor switch on High.

(4) Start the engine and hold the engine idle speed at 1,000 rpm. Allow the engine to warm up to normal operating temperature.

(5) The compressor clutch may cycle, depending upon ambient temperature, humidity, and the refrigerant system charge level. If the compressor clutch cycles, unplug the wire harness connector from the low pressure cycling clutch switch on the accumulator. Install a jumper wire between the two cavities of the switch wire harness connector.

(6) Hold the engine idle speed at 1,000 rpm.

(7) Allow three to five minutes for the refrigerant system to stabilize, then record the temperatures of the evaporator inlet and outlet tubes.

c. If a single probe is used, record the temperature of the inlet tube. Then remove the probe from the inlet tube and attach it to the outlet tube just before the collar of the refrigerant line connector fitting. The probe must make contact with the bottom surface of the tube. Allow the thermocouple and meter time to stabilize, then record the temperature of the outlet tube. Subtract the inlet tube temperature reading from the outlet tube temperature reading.

d. If dual probes are used, record the temperatures of both the inlet and outlet tubes. Then subtract the inlet tube temperature reading from the outlet tube temperature reading.

(8) See the Low Charge Determination chart to determine the additional charge required. If the measured temperature differential is higher than 22° C to 26° C (40° F to 47° F), add 0.4 kg (14 oz.) of refrigerant.

(9) Allow three to five minutes for the refrigerant system to stabilize, then take a second set of thermocouple measurements. Record the temperature difference and see the Low Charge Determination chart (Fig. 18) to determine if an additional charge is required.

(10) Record the compressor discharge pressure. If the reading is higher than the pressure shown in the Compressor Discharge Pressure chart (Fig. 19), the system could be overcharged. If the reading is equal to, or lower, than the pressure shown in the chart, continue with this procedure.

(11) **EXAMPLE:** The ambient temperature is 21° C (70° F). The evaporator inlet tube temperature is

SERVICE PROCEDURES (Continued)

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)	21°C (80°F)	32°C (90°F)	38°C (100°F)	43°C (100°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 (+12°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)				

Fig. 18 Low Charge Determination

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)

Fig. 19 Compressor Discharge Pressure

12° C (54° F) and the evaporator outlet tube temperature is 10° C (50° F). Subtract the inlet tube temperature from the outlet tube temperature. The difference is -2° C (-4° F). With a -2° C (-4° F) temperature differential at 21° C (70° F) ambient temperature, the system is fully charged.

(12) Add enough refrigerant to bring the refrigerant system up to a full charge.

(13) Remove the jumper wire from the low pressure cycling clutch switch wire harness connector and plug the connector back into the switch.

REFRIGERANT OIL LEVEL

When an air conditioning system is assembled at the factory, all components (except the compressor) are refrigerant oil free. After the system has been charged and operated, the oil in the compressor is dispersed throughout the refrigerant system. The accumulator, evaporator, condenser, and compressor will each retain a significant amount of oil.

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

It will not be necessary to check the oil level in the compressor or to add oil, unless there has been an oil loss. This may be due to a rupture or leak from a refrigerant line, a compressor shaft seal, an evaporator, or a condenser. If a rupture occurs, add 30 ml (1 ounce) of oil to the system after the repair has been made. Oil loss at a leak point will be evident by the presence of a wet, shiny surface around the leak.

Refrigerant oil must be added when a accumulator, evaporator, or condenser are replaced. See the Refrigerant Oil Capacities chart. When a compressor is replaced, the oil must be drained from the old compressor and measured. Drain all the oil from the new compressor, then fill the new compressor with the same amount of oil that was drained out of the old compressor.

Refrigerant Oil Capacities		
Component	**ml**	**oz**
A/C System	230	7.75
Accumulator	120	4
Condenser	30	1
Evaporator	60	2
Compressor	drain and measure the oil from the old compressor - see text.	

REMOVAL AND INSTALLATION

REFRIGERANT LINE COUPLER

WARNING: REVIEW THE WARNINGS AND CAUTIONS IN THE FRONT OF THIS GROUP BEFORE PERFORMING THE FOLLOWING OPERATION.

REMOVAL

(1) Recover the refrigerant from the refrigerant system as described in this group.

(2) Remove the secondary clip from the coupler. Fit the appropriate spring lock refrigerant line coupler tool from the A/C Tool Kit (Special Tool 6125) to the coupler (Fig. 20).

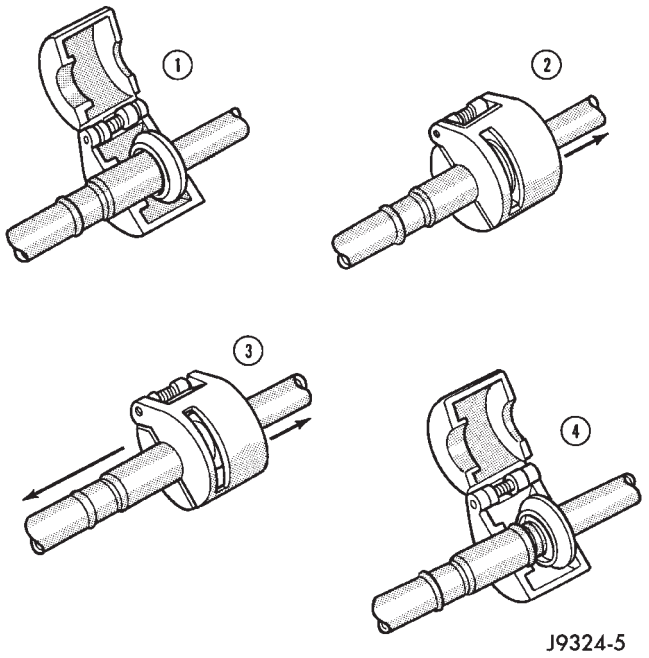


Fig. 20 Spring Lock Coupler Disconnect

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

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

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

(5) Remove the tool from the disconnected coupler.

(6) Separate the two ends of the coupler.

INSTALLATION

(1) Check to ensure that the garter spring is in the cage of the male coupler 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 garter spring.

(2) Clean any dirt or foreign material from both halves 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 other O-ring may allow the connection to leak intermittently during vehicle operation.

(4) Lubricate the male fitting and O-ring, and the inside of the female fitting with clean R-134a refrigerant oil. Use only refrigerant oil of the type recommended for the compressor in the vehicle.

(5) Fit the female fitting to the male fitting and push together until the garter spring snaps over the flared end of the female fitting.

(6) Ensure the coupler is fully engaged by pulling back on the lines on either side of the coupler.

(7) Install the secondary clip on the coupler.

COMPRESSOR

GASOLINE ENGINE

The compressor may be removed and repositioned without disconnecting the refrigerant lines or discharging the refrigerant system on models equipped with a gasoline engine. Discharging is not necessary if servicing the compressor clutch or clutch coil, the engine, the cylinder head, or the generator.

WARNING: REVIEW THE WARNINGS AND CAUTIONS IN THE FRONT OF THIS GROUP BEFORE PERFORMING THE FOLLOWING OPERATION.

REMOVAL

(1) Disconnect and isolate the battery negative cable.

(2) Loosen and remove the serpentine drive belt. Refer to Group 7 - Cooling System for the procedures.

REMOVAL AND INSTALLATION (Continued)

(3) Unplug the compressor clutch coil wire harness connector.
(4) Recover the refrigerant from the refrigerant system as described in this group.
(5) Remove the refrigerant lines from the compressor. Install plugs in, or tape over all of the open refrigerant fittings.
(6) Remove the bolts that secure the compressor to the mounting bracket, and lift the compressor from the mounting bracket.

INSTALLATION

NOTE: If a replacement compressor is being installed, be certain to check the oil level. See Refrigerant Oil Level in this group.

(1) If the compressor mounting bracket was removed, install the bracket to the engine. Tighten the mounting bolts to 27 N·m (20 ft. lbs.).
(2) Install the compressor on the mounting bracket. Tighten the bolts to 27 N·m (20 ft. lbs.).
(3) Remove the tape or plugs from all of the refrigerant fittings, and install the refrigerant lines on the compressor.
(4) Install the serpentine drive belt. Refer to Group 7 - Cooling System for the procedures.
(5) Plug in the compressor clutch coil wire harness connector.
(6) Connect the battery negative cable.
(7) Evacuate and charge the refrigerant system as described in this group.

DIESEL ENGINE

The compressor and clutch may only be removed as a unit on models equipped with a diesel engine.

WARNING: REVIEW THE WARNINGS AND CAUTIONS IN THE FRONT OF THIS GROUP BEFORE PERFORMING THE FOLLOWING OPERATION.

REMOVAL

(1) Disconnect and isolate the battery negative cable.
(2) Recover the refrigerant from the refrigerant system as described in this group.
(3) Unplug the compressor clutch coil wire harness connector.
(4) Remove the refrigerant line bracket from the engine valve cover.
(5) Remove the refrigerant lines from the compressor. Install plugs in, or tape over all of the open refrigerant fittings.
(6) Raise and support the vehicle.
(7) Remove the bolts that secure the compressor clutch drive spool to the power steering pump drive flange.
(8) Remove the four compressor mounting bolts and spacers, and remove the compressor and clutch unit from the engine block.
(9) Remove the compressor clutch and drive spool from the compressor as described in this group.

INSTALLATION

NOTE: If a replacement compressor is being installed, be certain to check the oil level. See Refrigerant Oil Level in this group.

(1) Install the compressor clutch and drive spool on the compressor as described in this group.
(2) Install the compressor on the engine block using the four mounting bolts and spacers. Tighten the bolts to 24 N·m (18 ft. lbs.).
(3) Install the bolts that secure the compressor clutch drive spool to the power steering pump drive flange. Tighten the bolts to 16 N·m (12 ft. lbs.).
(4) Lower the vehicle.
(5) Remove the tape or plugs from all of the refrigerant fittings, and install the refrigerant lines on the compressor.
(6) Install the refrigerant line bracket on the engine valve cover. Tighten the bolt to 5.6 N·m (50 in. lbs.).
(7) Plug in the compressor clutch coil wire harness connector.
(8) Connect the battery negative cable.
(9) Evacuate and charge the refrigerant system as described in this group.

COMPRESSOR CLUTCH

GASOLINE ENGINE

The refrigerant system can remain fully-charged during compressor clutch, pulley, or coil replacement on gasoline engine models. The compressor clutch can be serviced in the vehicle.

REMOVAL

(1) Disconnect and isolate the battery negative cable.
(2) Remove the compressor shaft bolt (Fig. 21). A band-type oil filter wrench may be used to aid in securing the clutch during bolt removal.
(3) Tap the clutch plate with a plastic mallet to release it from the splines on the compressor shaft. Remove clutch plate and shim(s) from the compressor shaft (Fig. 22).

REMOVAL AND INSTALLATION (Continued)

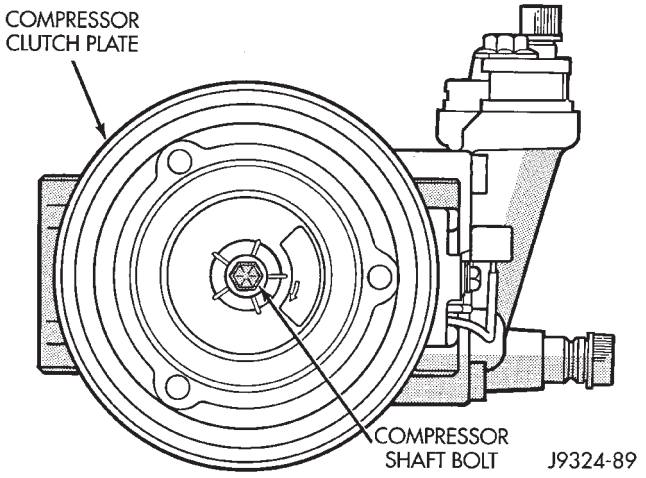


Fig. 21 Compressor Shaft Bolt

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

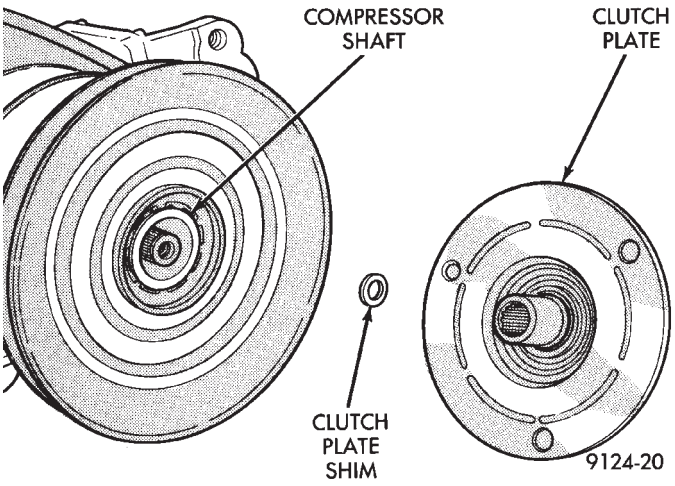


Fig. 22 Clutch Plate and Shim

(4) Remove the pulley retaining snap ring with snap ring pliers (Special Tool C-4574) and slide the pulley assembly off of the compressor (Fig. 23).

(5) Unplug the clutch coil wire harness connector. Remove the screw and retainer from the clutch coil wire harness on the compressor front housing.

(6) Remove the snap ring from the compressor hub and remove the clutch field coil (Fig. 24). Slide the clutch field coil off of the compressor hub.

INSPECTION

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

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

Check the clutch pulley bearing for roughness or excessive leakage of grease. Replace the bearing, if required.

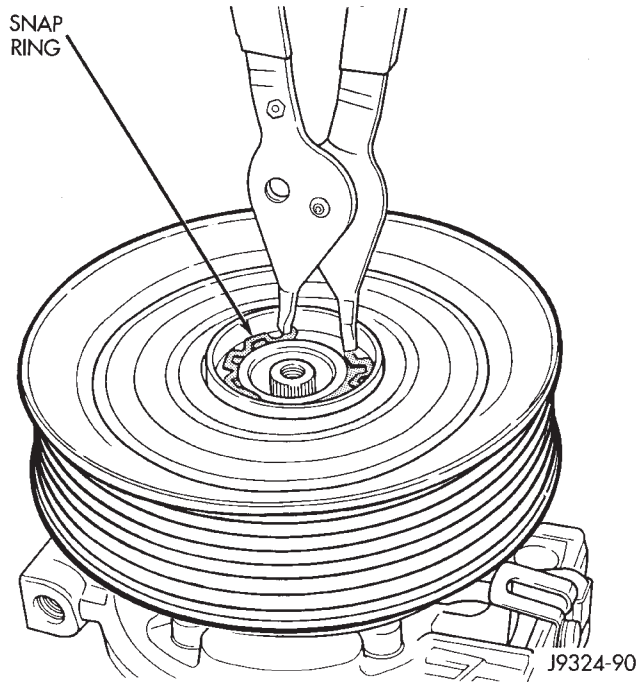


Fig. 23 Pulley Snap Ring Remove/Install

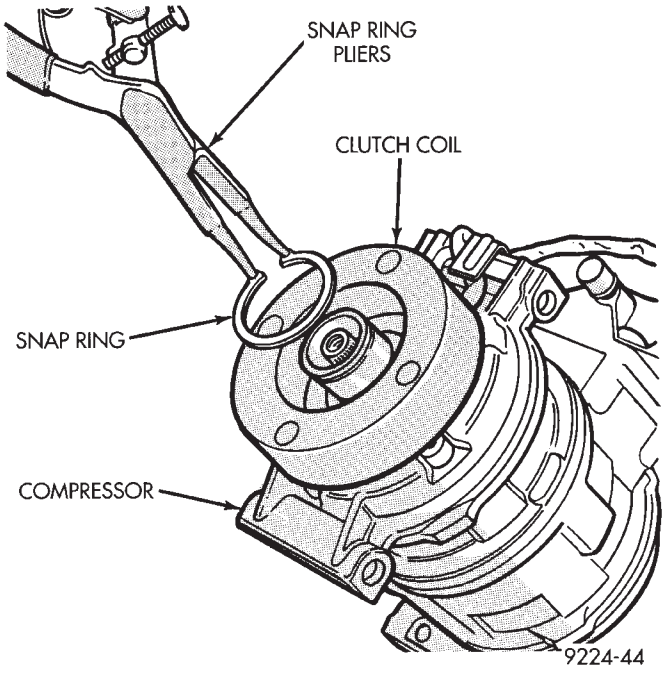


Fig. 24 Clutch Coil Snap Ring Remove/Install

INSTALLATION

(1) Align the dowel pin on the back of the clutch field coil with the hole in the compressor front housing and press the field coil into place.

REMOVAL AND INSTALLATION (Continued)

(2) Install the clutch coil wire harness retaining clip on the compressor front housing and tighten the retaining screw. Plug in the clutch coil wire harness connector.

(3) Install the clutch field coil and snap ring with snap ring pliers (Special Tool C-4574). The bevel side of the snap ring must be facing outward. Also, both eyelets of the snap ring must be to the right or left of the pin on the compressor. Press the snap ring to make sure it is properly seated in the groove.

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

(4) Install the pulley assembly onto the compressor. If necessary, place a block of wood on the friction surface and tap gently with a hammer (Fig. 25).

CAUTION: Do not mar the pulley friction surface.

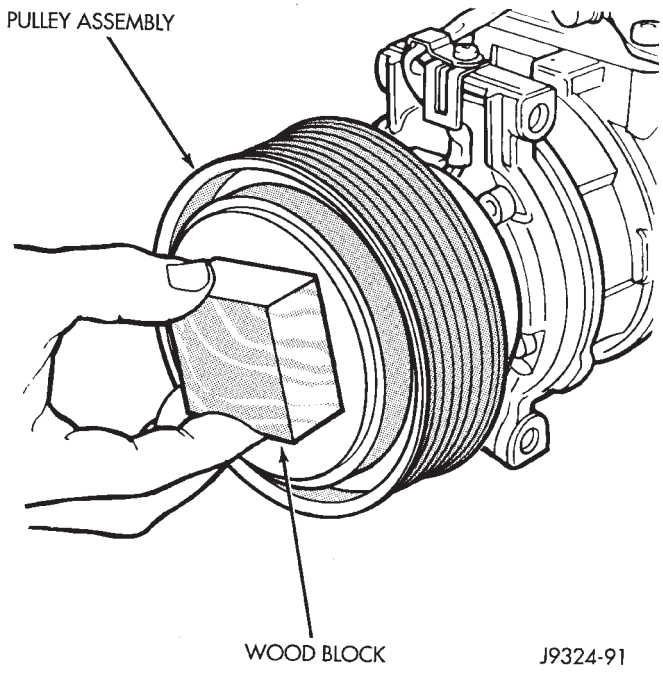


Fig. 25 Pulley Assembly Install

(5) Install the pulley assembly retaining snap ring (bevel side outward) with snap ring pliers (Special Tool C-4574). Press the snap ring to make sure it is properly seated in the groove.

(6) 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.

(7) Install the front plate assembly onto the shaft.

(8) With the front plate assembly tight against the shim(s), measure the air gap between the front plate and the pulley face with feeler gauges. The air gap should be 0.35 to 0.65 mm (0.014 to 0.026 in.). If the proper air gap is not obtained, add or subtract shims as needed until the desired air gap is obtained.

(9) Install the compressor shaft bolt. Tighten the bolt to 13 N·m (115 in. lbs.).

NOTE: The shims may compress after tightening the shaft bolt. Check the air gap in four or more places to verify the air gap is still correct. Spin the pulley before performing a final check of the air gap.

(10) Connect the battery negative cable.

CLUTCH BREAK-IN

After a new compressor clutch has been installed, cycle the compressor clutch approximately twenty times (five seconds on, then five seconds off). During this procedure, set the heater-A/C control to the A/C (Recirc) mode, the blower motor switch in the highest speed position, and the engine speed at 1500 to 2000 rpm. This procedure (burnishing) will seat the opposing friction surfaces and provide a higher compressor clutch torque capability.

DIESEL ENGINE

The refrigerant must be recovered from the refrigerant system during compressor clutch, drive, or coil replacement on diesel engine models. The compressor clutch cannot be serviced in the vehicle.

REMOVAL

(1) Remove the compressor and clutch from the vehicle as described in this group.

(2) Mount the compressor in a vise and remove the bolts that secure the drive spool to the drive plate.

(3) Remove the compressor drive plate with a spanner wrench (Special Tool 3281). Turn the drive plate counterclockwise to remove (Fig. 26).

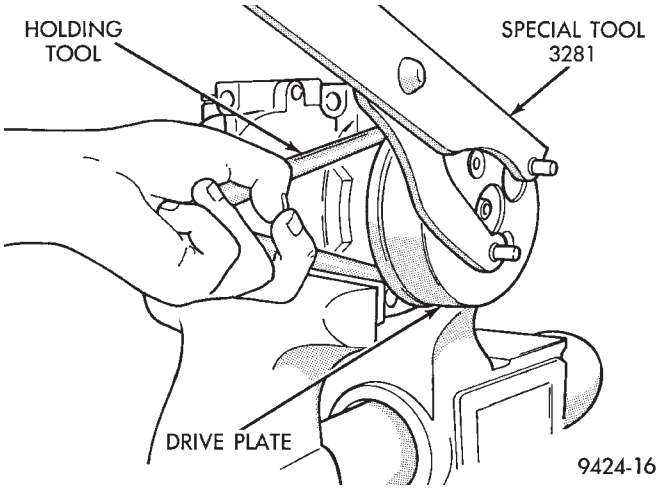


Fig. 26 Drive Plate Remove

REMOVAL AND INSTALLATION (Continued)

(4) Insert the two pins of the spanner wrench into two holes of the clutch plate. Hold the clutch plate stationary and remove the bolt that secures the clutch plate to the compressor shaft.

(5) Remove the clutch plate (Fig. 27).

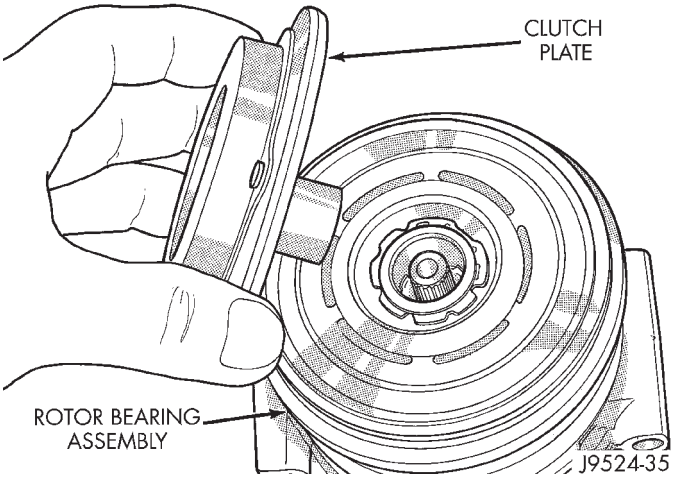


Fig. 27 Clutch Plate Remove/Install

(6) Remove the external snap ring from the front compressor housing hub with snap ring pliers and remove the clutch rotor and bearing assembly (Fig. 28).

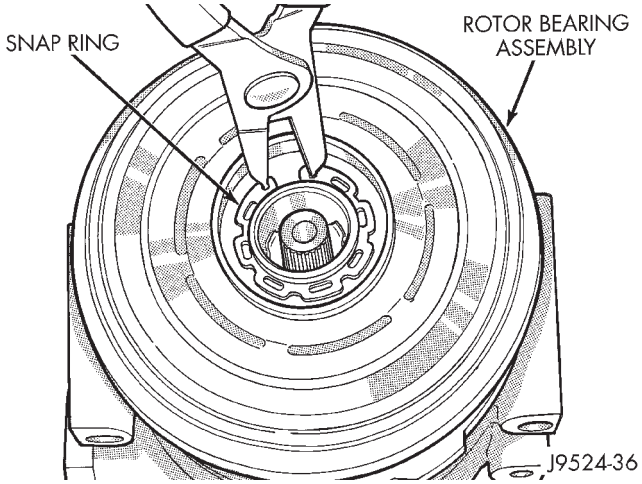


Fig. 28 External Snap Ring Remove/Install

(7) Remove the screw and retainer from the clutch coil wire harness on the compressor front housing.

(8) Remove the snap ring from the compressor hub and remove the clutch field coil (Fig. 29). Slide the clutch field coil off of the compressor hub.

INSPECTION

Examine the friction surfaces of the clutch drive plate and the clutch plate for wear. The drive plate and clutch plate should be replaced if there is excessive wear or scoring.

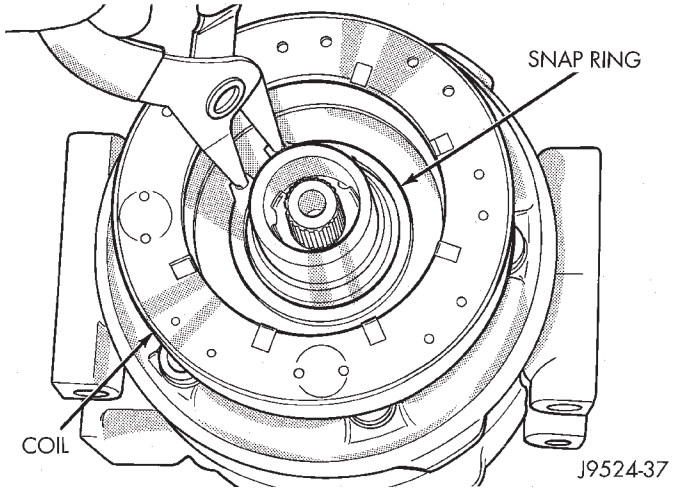


Fig. 29 Clutch Coil Snap Ring Remove/Install

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

Check the clutch drive plate bearing for roughness or excessive leakage of grease. Replace the bearing, if required.

INSTALLATION

(1) Align the dowel pin on the back of the clutch field coil with the hole in the compressor front housing and press the field coil into place.

(2) Install the clutch coil wire lead retaining clip on the compressor front housing and tighten the retaining screw.

(3) Install the clutch field coil and snap ring with snap ring pliers. The bevel side of the snap ring must be facing outward. Press the snap ring to make sure it is properly seated in the groove.

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

(4) Check that the original clutch spacer shims are in place on the compressor shaft and install the clutch plate. Replace the shaft bolt and tighten to 14.4 N·m (10.5 ft. lbs.).

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

(5) Check the air gap with a feeler gauge (Fig. 30). If the air gap does not meet the specification add or

REMOVAL AND INSTALLATION (Continued)

subtract shims as required. The specification is 0.41 to 0.79 mm (0.016 to 0.031 inch). If the air gap is not consistent around the circumference, lightly pry up at the points of minimum variation. Lightly tap down at the points of maximum variation.

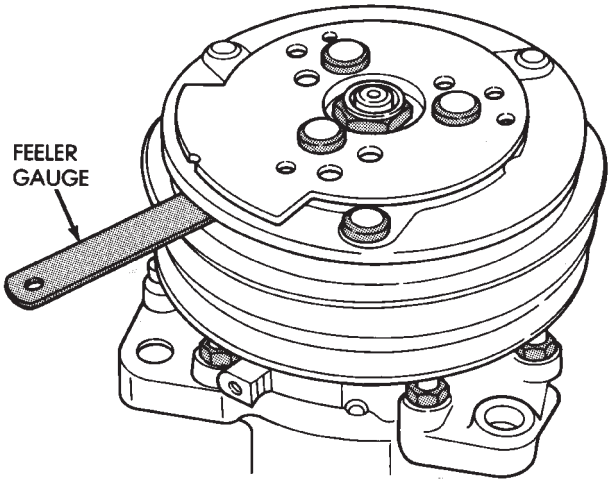


Fig. 30 Check Air Gap

(6) Install the drive plate onto the clutch and tighten to 98 N·m (72 ft. lbs.).

(7) Install the drive spool onto the drive plate. Tighten the drive spool bolts to 16 N·m (12 ft. lbs.).

(8) Reverse the remaining removal procedures to complete the installation.

CLUTCH BREAK-IN

After a new compressor clutch has been installed, cycle the compressor clutch approximately twenty times (five seconds on, then five seconds off). During this procedure, set the heater-A/C control to the A/C (Recirc) mode, the blower motor switch in the highest speed position, and the engine speed at 1500 to 2000 rpm. This procedure (burnishing) will seat the opposing friction surfaces and provide a higher compressor clutch torque capability.

COMPRESSOR CLUTCH RELAY

(1) Disconnect and isolate the battery negative cable.

(2) Remove the cover from the Power Distribution Center (PDC) (Fig. 31).

(3) Refer to the label on the PDC for compressor clutch relay identification and location.

(4) Unplug the compressor clutch relay from the PDC.

(5) Install the compressor clutch relay by aligning the relay terminals with the cavities in the PDC and pushing the relay firmly into place.

(6) Install the PDC cover.

(7) Connect the battery negative cable.

(8) Test the relay operation.

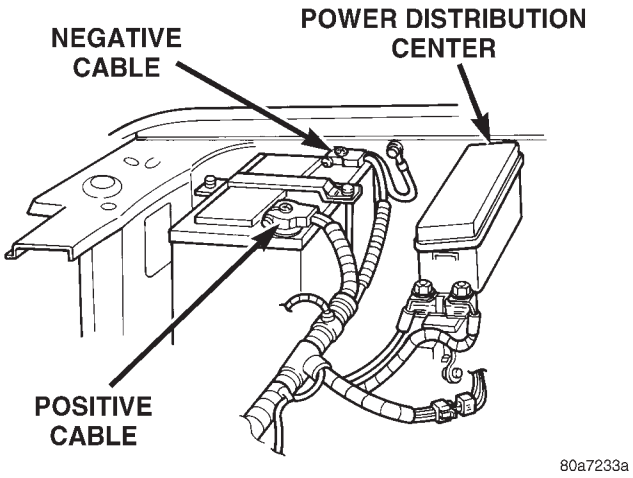


Fig. 31 Power Distribution Center

HIGH PRESSURE CUT-OFF SWITCH

REMOVAL

(1) Disconnect and isolate the battery negative cable.

(2) Unplug the wire harness connector from the switch (Fig. 32).

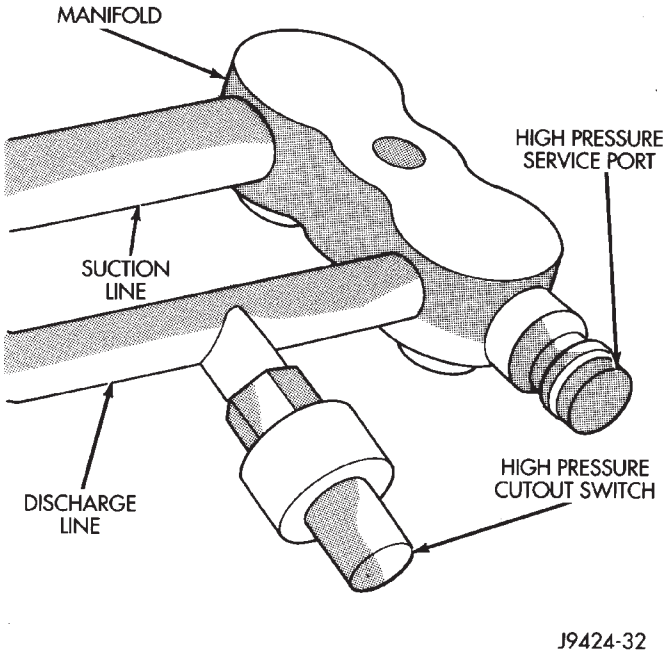


Fig. 32 High Pressure Cut-Off Switch - Typical

(3) Unscrew the switch from the discharge line fitting.

INSTALLATION

(1) Install and tighten the switch.

(2) Plug the wire harness connector into the switch.

(3) Connect the battery negative cable.

REMOVAL AND INSTALLATION (Continued)

HIGH PRESSURE RELIEF VALVE

WARNING: REVIEW THE WARNINGS AND CAUTIONS IN THE FRONT OF THIS GROUP BEFORE PERFORMING THE FOLLOWING OPERATION.

REMOVAL

(1) Disconnect and isolate the battery negative cable.
(2) Recover the refrigerant from the refrigerant system as described in this group.
(3) Turn the relief valve counterclockwise to remove it from the compressor manifold (Fig. 33).
(4) Either install a plug in, or tape over the open fitting on the compressor manifold.

INSTALLATION

(1) Remove the plug or tape from the compressor manifold fitting.
(2) Install the high pressure relief valve in the compressor manifold.
(3) Evacuate and charge the refrigerant system as described in this group.
(4) Connect the battery negative cable.

CONDENSER

WARNING: REVIEW THE WARNINGS AND CAUTIONS IN THE FRONT OF THIS GROUP BEFORE PERFORMING THE FOLLOWING OPERATION.

CAUTION: When removing the condenser note the locations of all of the radiator and condenser air seals. These seals are used to direct air through the condenser and radiator. They must be installed in their original locations to prevent engine overheating (Fig. 34).

REMOVAL

(1) Disconnect and isolate the battery negative cable.
(2) Recover the refrigerant from the refrigerant system as described in this group.
(3) Disconnect the refrigerant lines from the condenser. Install plugs in, or tape over all of the open refrigerant fittings.
(4) Remove the radiator grille panel. Refer to Group 23 - Body for the procedures.
(5) Remove the upper bolts from the two radiator braces (Fig. 35).
(6) Remove the two nuts that secure the radiator to the crossmember (Fig. 36).
(7) Reach through the grille opening and remove the bolt that secures the lower hood latch support to the lower front crossmember.

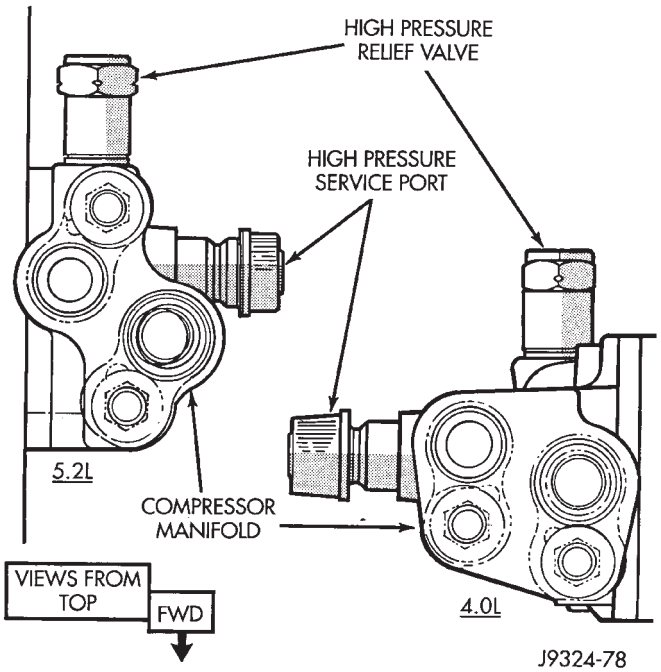


Fig. 33 High Pressure Relief Valve - Typical

(8) The radiator upper crossmember can be adjusted left or right through the use of its slotted mounting holes. Before removal, mark the original position of the crossmember.
(9) Remove the remaining bolts that secure 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 it to the side.
(10) Remove the four bolts that secure the lower condenser.
(11) Remove the two bolts that secure the upper condenser.
(12) Carefully remove the condenser from the vehicle.

INSTALLATION

(1) Carefully position the condenser in the vehicle.
(2) Install and tighten the two bolts that secure the upper condenser.
(3) Install and tighten the four bolts that secure the lower condenser.
(4) Align the radiator upper crossmember with the scribe marks. Install and tighten the bolts that secure the radiator upper crossmember to the body.
(5) Install and tighten the nuts that secure the radiator to the upper crossmember.
(6) Reach through the grille opening to install and tighten the bolt that secures the lower hood latch support to the lower front crossmember.
(7) Install and tighten the two bolts that secure the radiator braces to the upper radiator crossmember.

REMOVAL AND INSTALLATION (Continued)

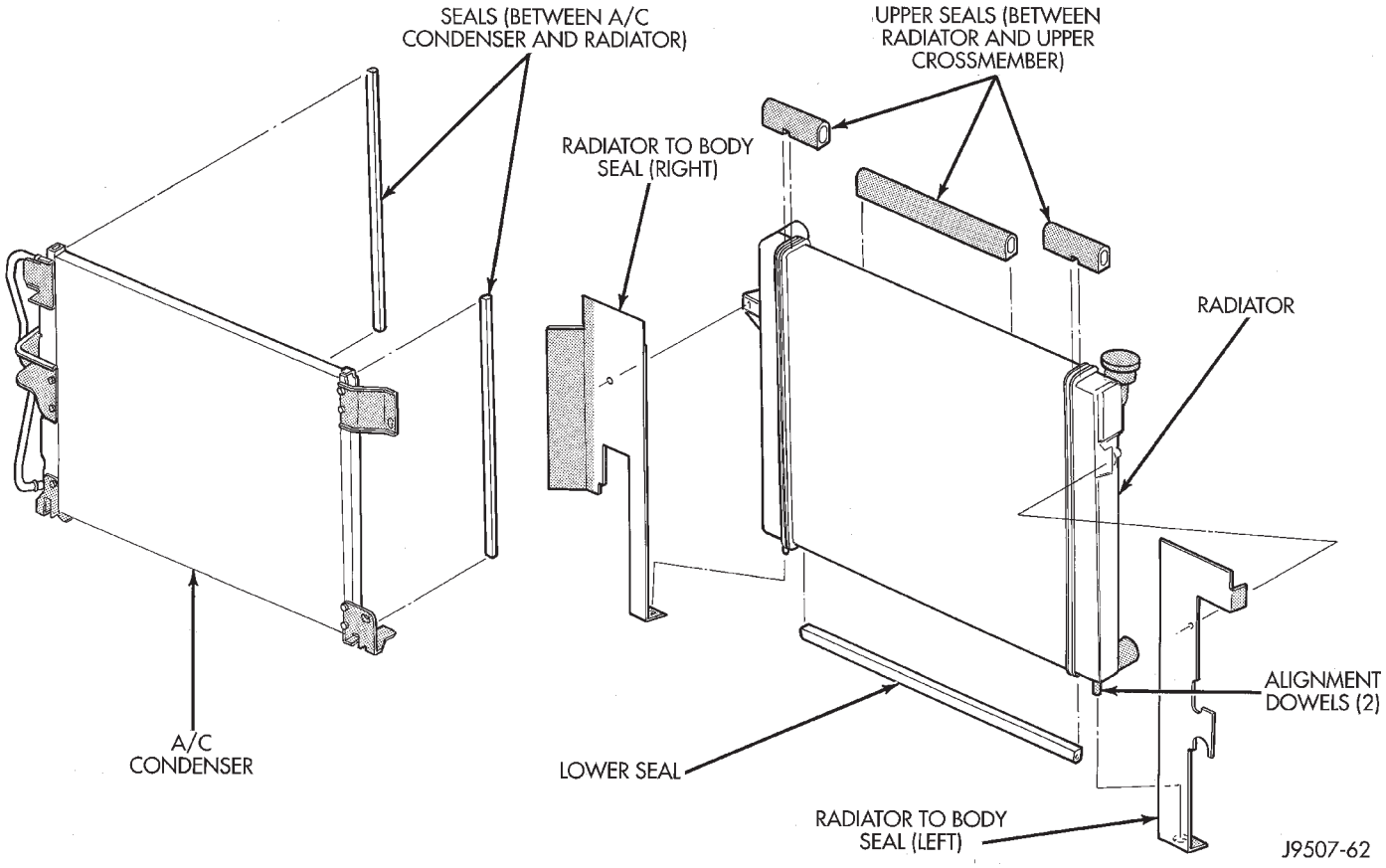


Fig. 34 Air Seals

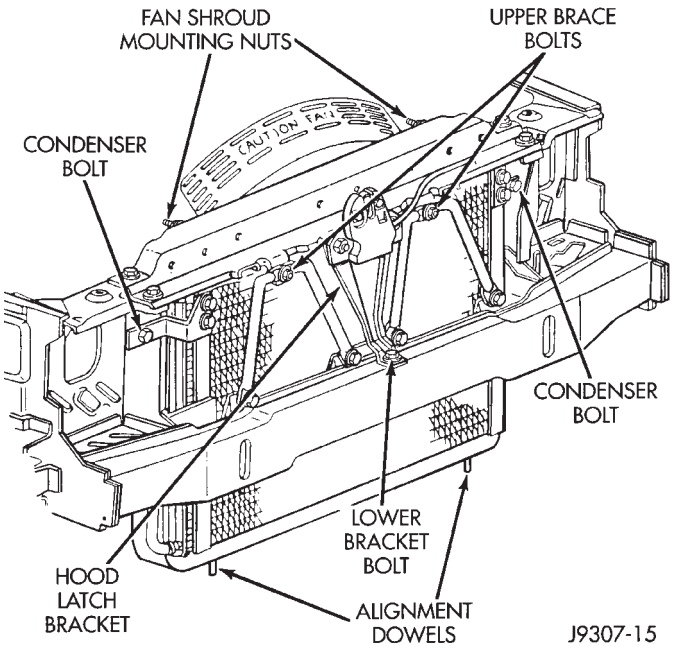


Fig. 35 Condenser Mounting

(8) Install the grille panel.

(9) Remove the plugs or tape from the open refrigerant line fittings and connect the refrigerant lines to the condenser.

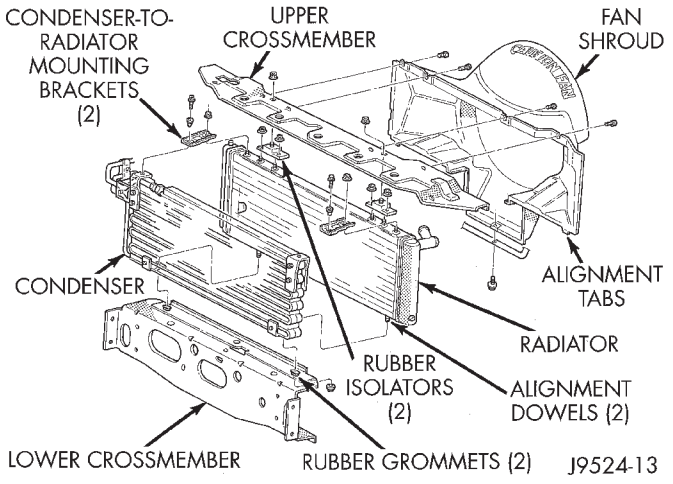


Fig. 36 Radiator Upper Crossmember - Typical

(10) Evacuate the refrigerant system as described in this group.

(11) Charge the refrigerant system as described in this group.

(12) Connect the battery negative cable.

NOTE: If the condenser is replaced, add 30 ml (1 oz.) of refrigerant oil to the refrigerant system.

REMOVAL AND INSTALLATION (Continued)

FIXED ORIFICE TUBE

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

WARNING: REVIEW THE WARNINGS AND CAUTIONS IN THE FRONT OF THIS GROUP BEFORE PERFORMING THE FOLLOWING OPERATION.

REMOVAL

(1) Disconnect and isolate the battery negative cable.

(2) Recover the refrigerant from the refrigerant system as described in this group.

(3) Disconnect the refrigerant line couplers at the condenser outlet line and the evaporator inlet line. Install plugs in, or tape over all of the open refrigerant fittings.

(4) Remove the liquid line from the vehicle.

INSTALLATION

(1) Remove the plugs or tape from the refrigerant line fittings. Connect the liquid line at the evaporator inlet line and the condenser outlet line.

(2) Evacuate and charge the refrigerant system as described in this group.

(3) Connect the battery negative cable.

ACCUMULATOR

WARNING: REVIEW THE WARNINGS AND CAUTIONS IN THE FRONT OF THIS GROUP BEFORE PERFORMING THE FOLLOWING OPERATION.

REMOVAL

(1) Disconnect and isolate the battery negative cable.

(2) Recover the refrigerant from the refrigerant system as described in this group.

(3) Disconnect the refrigerant lines from the accumulator. Install plugs in, or tape over all of the open refrigerant fittings.

(4) Unplug the wire harness connector from the low pressure cycling clutch switch (Fig. 37).

(5) Loosen the screw that secures the accumulator band to the support bracket.

(6) Remove the accumulator.

INSTALLATION

(1) Install the accumulator band screw in the support bracket.

(2) Tighten the band screw in the support bracket.

(3) Plug the wire harness connector into the low pressure cycling clutch switch.

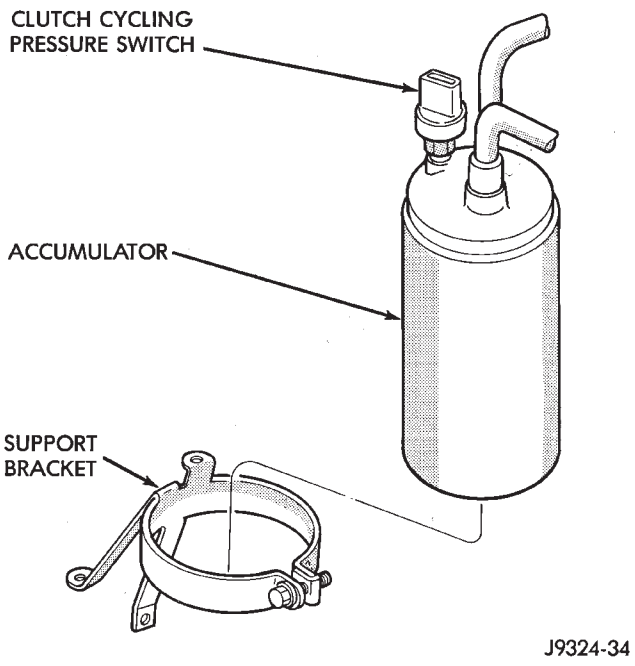


Fig. 37 Accumulator and Bracket

(4) Remove the plugs or tape from the refrigerant line fittings. Connect the refrigerant lines to the accumulator.

(5) Evacuate and charge the refrigerant system as described in this group.

(6) Connect the battery negative cable.

NOTE: If the accumulator is replaced, add 120 ml (4 oz.) of refrigerant oil to the refrigerant system.

LOW PRESSURE CYCLING CLUTCH SWITCH

(1) Disconnect and isolate the battery negative cable.

(2) Unplug the wire harness connector from the switch.

(3) Unscrew the switch from the fitting on the accumulator.

(4) Reverse the removal procedures to install.

AMBIENT TEMPERATURE SENSOR

(1) Disconnect and isolate the battery negative cable.

(2) Remove the radiator grille unit. Refer to Group 23 - Body for the procedures.

(3) Locate the temperature sensor, on the radiator support behind the grille (Fig. 38).

(4) Unplug the temperature sensor wire harness connector.

(5) Remove the temperature sensor mounting bolt and remove the sensor.

(6) Reverse the removal procedures to install.

REMOVAL AND INSTALLATION (Continued)

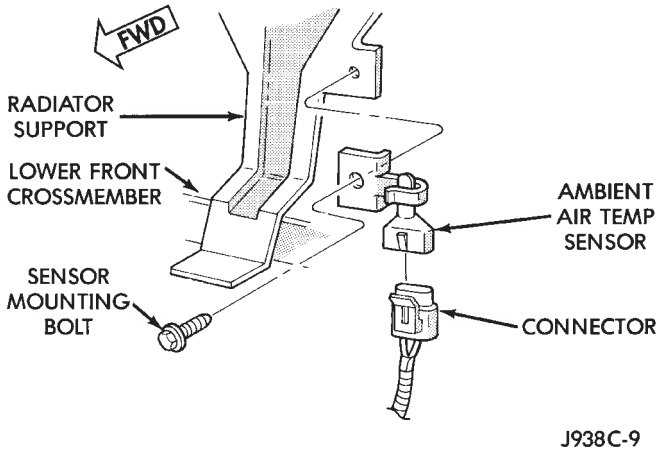


Fig. 38 Temperature Sensor Remove/Install

VACUUM CHECK VALVE

(1) Unplug the vacuum supply line at the intake manifold.

(2) Note the orientation of the check valve in the vacuum line for correct installation.

(3) Unplug the valve from the vacuum supply line fittings.

(4) Reverse the removal procedures to install.

VACUUM RESERVOIR

(1) Remove the battery from the battery tray. Refer to Group 8A - Battery for the procedures.

(2) Remove the five screws that secure the battery tray to the vehicle.

(3) Pull up the battery tray far enough to unplug the vacuum harness connector from the reservoir (Fig. 39).

(4) Remove the battery tray and vacuum reservoir from the vehicle as a unit.

(5) Remove the two screws that secure the vacuum reservoir to the battery tray.

(6) Remove the vacuum reservoir from the battery tray.

(7) Reverse the removal procedures to install.

HEATER-A/C CONTROL

WARNING: ON VEHICLES EQUIPPED WITH AIR-BAGS, REFER TO GROUP 8M - PASSIVE RESTRAINT SYSTEMS BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, OR INSTRUMENT PANEL COMPONENT DIAGNOSIS OR SERVICE. FAILURE TO TAKE THE PROPER PRE-CAUTIONS COULD RESULT IN ACCIDENTAL AIR-BAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

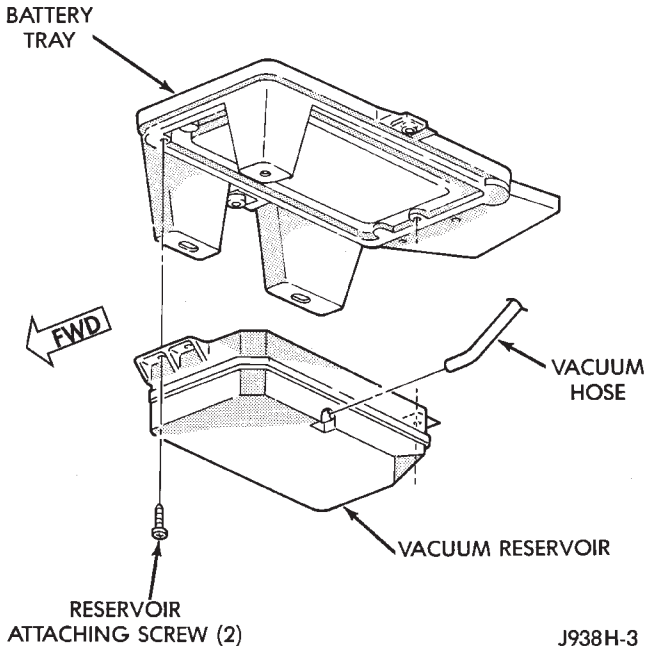


Fig. 39 Vacuum Reservoir Remove/Install

REMOVAL

(1) Disconnect and isolate the battery negative cable.

(2) Using a trim stick or other suitable wide flat-bladed tool, pry gently around the edges of the inboard switch pod bezel and remove the bezel.

(3) Remove the three screws that secure the heater-A/C control to the instrument panel (Fig. 40).

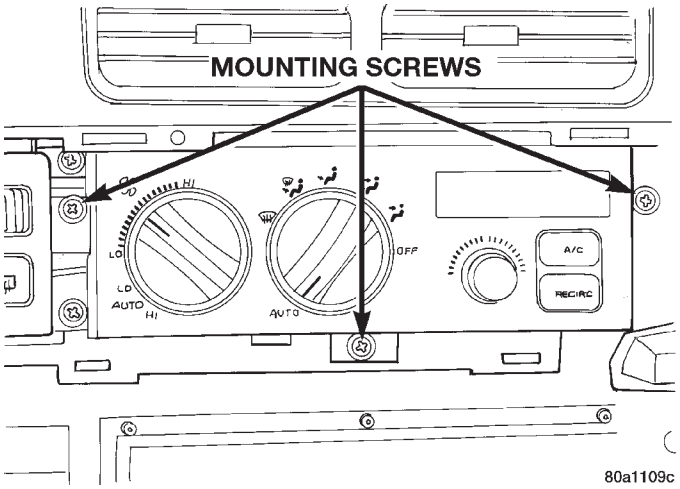


Fig. 40 Heater-A/C Control Remove/Install

(4) Pull the heater-A/C control out from the instrument panel far enough to access the connectors on the back of the control.

(5) Unplug the wire and/or vacuum harness connectors from the back of the heater-A/C control (Fig. 41).

REMOVAL AND INSTALLATION (Continued)

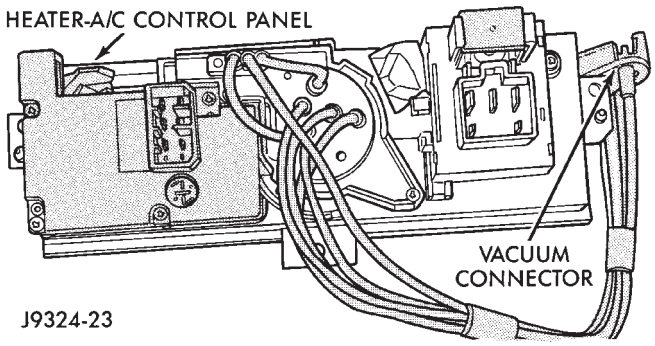


Fig. 41 Heater-A/C Control Connectors - Typical

(6) Remove the heater-A/C control from the instrument panel.

INSTALLATION

(1) Connect the vacuum and wire harness connectors to the heater-A/C control.

(2) Install the heater-A/C control to the instrument panel and secure with three screws.

(3) Install the inboard switch pod bezel.

(4) Connect the battery negative cable.

SOLAR SENSOR

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

WARNING: ON VEHICLES EQUIPPED WITH AIRBAGS, REFER TO GROUP 8M - PASSIVE RESTRAINT SYSTEMS BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, OR INSTRUMENT PANEL COMPONENT DIAGNOSIS OR SERVICE. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

REMOVAL

(1) Disconnect and isolate the battery negative cable.

(2) Using a trim stick or other suitable wide flat-bladed tool, pry gently along the edge of the instrument panel cowl top trim panel to release the snap clip retainers (Fig. 42).

(3) Lift the cowl top trim panel far enough to reach underneath it to access the solar sensor, which is located between the passenger side and center defroster outlets.

(4) Use a twisting motion to remove the solar sensor from the cowl top trim panel (Fig. 43).

(5) Pull the sensor out far enough to access the wire harness connector and unplug it from the instrument panel wire harness.

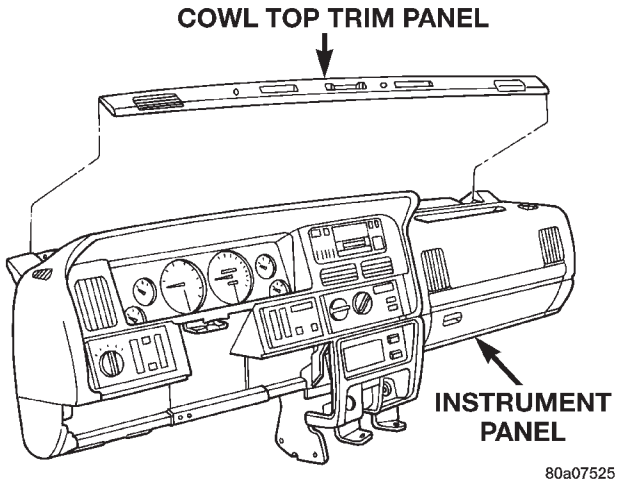


Fig. 42 Cowl Top Trim Remove/Install

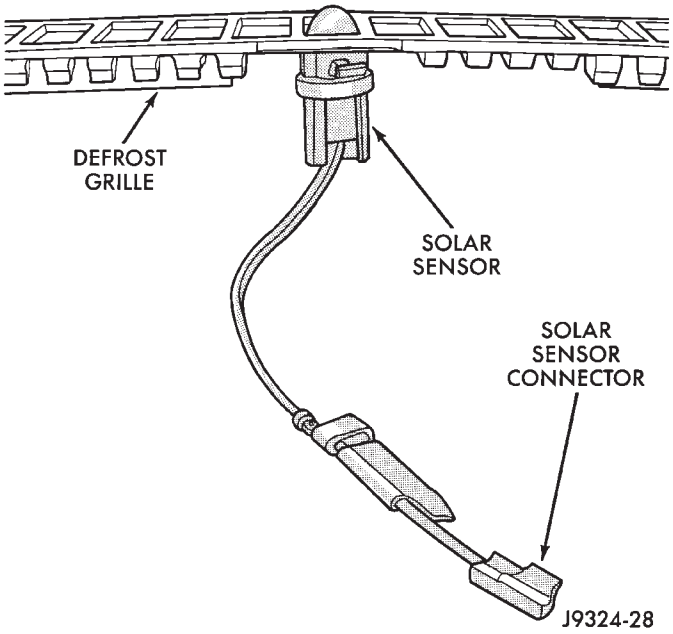


Fig. 43 Solar Sensor

INSTALLATION

(1) Plug in the solar sensor wire harness connector.

(2) Install the solar sensor into the cowl top trim panel.

(3) Press the cowl top trim panel down until the snap clip retainers engage in the top of the instrument panel.

(4) Connect the battery negative cable.

IN-VEHICLE TEMPERATURE SENSOR

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

REMOVAL AND INSTALLATION (Continued)

WARNING: ON VEHICLES EQUIPPED WITH AIR-BAGS, REFER TO GROUP 8M - PASSIVE RESTRAINT SYSTEMS BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, OR INSTRUMENT PANEL COMPONENT DIAGNOSIS OR SERVICE. FAILURE TO TAKE THE PROPER PRE-CAUTIONS COULD RESULT IN ACCIDENTAL AIR-BAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

REMOVAL

(1) Disconnect and isolate the battery negative cable.

(2) Remove the glove box module. Refer to Group 8E - Instrument Panel Systems for the procedures.

(3) Disconnect the aspirator hose at the in-line splice connector near the passenger side of the floor pan transmission tunnel and under the instrument panel (Fig. 44).

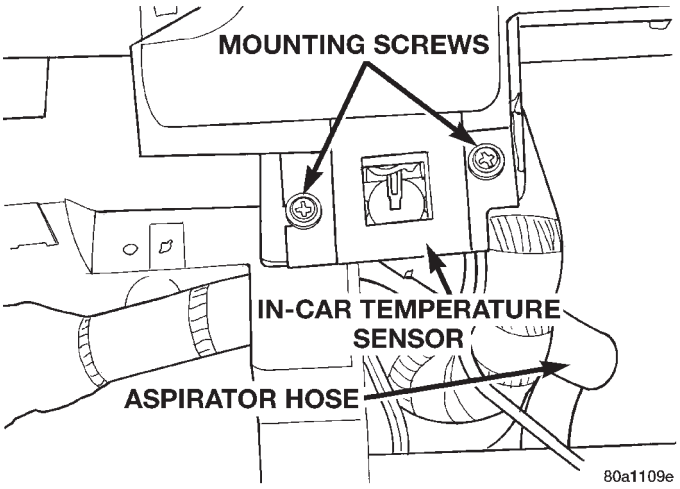


Fig. 44 In-Vehicle Temperature Sensor

(4) Reach behind the sensor and unplug the wire harness connector.

(5) Remove the two screws that secure the sensor assembly to the instrument panel.

(6) Remove the sensor assembly from the instrument panel.

INSTALLATION

(1) Insert the in-vehicle temperature sensor into the instrument panel.

(2) Install two screws to secure the sensor to the instrument panel.

(3) Plug in the sensor wire harness connector.

(4) Connect the aspirator hose to the in-line splice connector.

(5) Install the glove box module. Refer to Group 8E - Instrument Panel Systems for the procedures.

(6) Connect the battery negative cable.

BLOWER MOTOR

REMOVAL

(1) Disconnect and isolate the battery negative cable.

(2) Disconnect the blower motor cooling tube (Fig. 45).

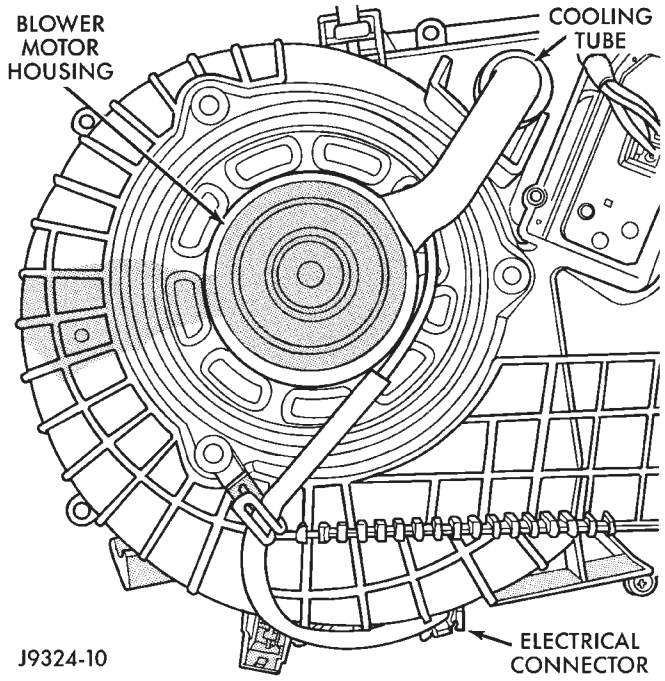


Fig. 45 Blower Motor

(3) Remove the blower motor wire harness from the retainer. Unplug the wire harness connector from the blower motor.

(4) Remove the screws that secure the blower motor and wheel assembly to the heater-A/C housing.

(5) Remove the blower motor and wheel from the heater-A/C housing.

(6) Remove the blower motor wheel retainer clip and remove the wheel from the blower motor shaft (Fig. 46).

INSTALLATION

(1) Press the blower motor wheel hub onto the blower motor shaft. Be sure the flat on the shaft lines up with the flat inside the hub.

(2) Install the retainer clip. The ears of the retainer clip must be over the flat surface on the motor shaft.

(3) Be certain that the blower motor seal is installed on the blower motor housing (Fig. 47).

(4) Install the blower motor in the heater-A/C housing.

(5) Install and tighten the screws that secure the blower motor to the heater-A/C housing.

REMOVAL AND INSTALLATION (Continued)

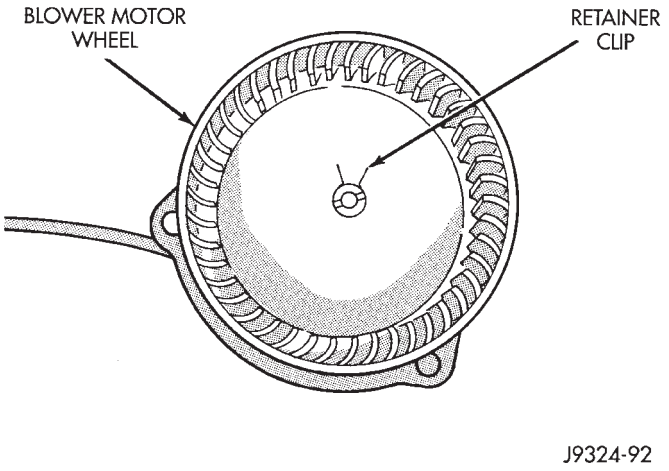


Fig. 46 Blower Motor Wheel

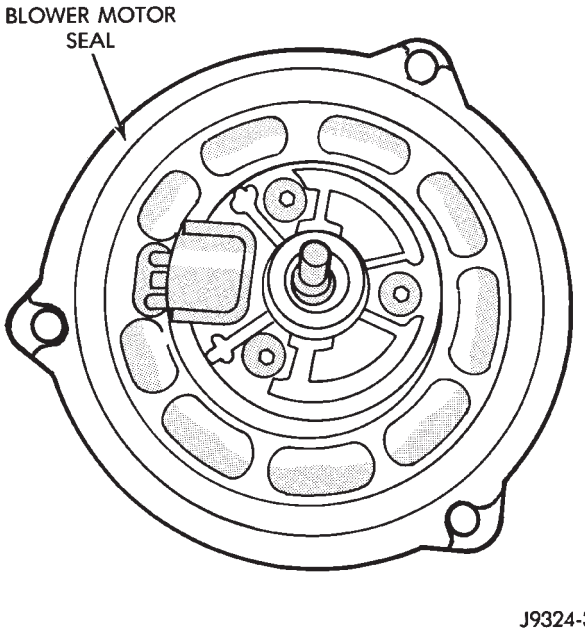


Fig. 47 Blower Motor Seal

(6) Plug the wire harness connector into the blower motor and install the wire harness into the retainer.

(7) Connect the blower motor cooling tube.

(8) Connect the battery negative cable.

BLOWER MOTOR RESISTOR AND POWER MODULE

REMOVAL

(1) Disconnect and isolate the battery negative cable.

(2) Unplug the blower motor resistor/power module wire harness connector.

(3) Remove the screws that secure the resistor/power module to the heater-A/C housing.

(4) Remove the blower motor resistor/power module (Fig. 48).

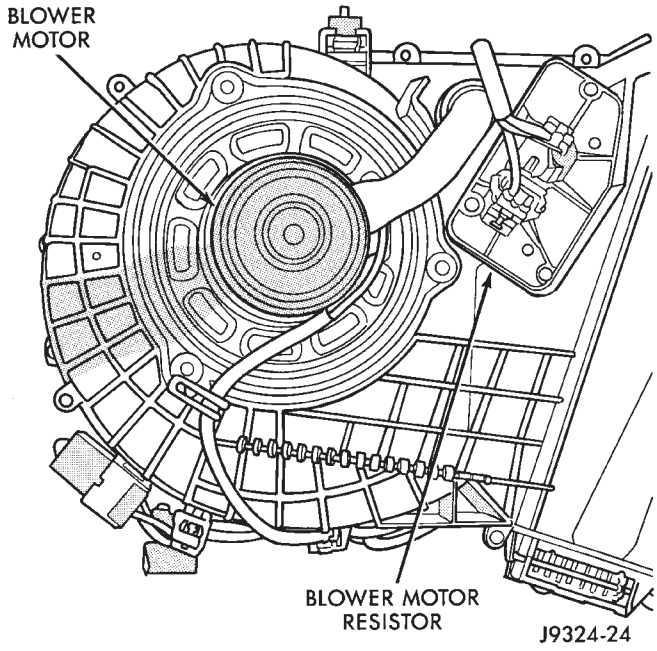


Fig. 48 Blower Motor Resistor or Power ModuleRemove/Install

INSTALLATION

(1) Install the blower motor resistor/power module to the heater-A/C housing. Install and tighten the screws.

(2) Plug in the resistor/module wire harness connector.

(3) Connect the battery negative cable.

HIGH SPEED BLOWER MOTOR RELAY

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

WARNING: ON VEHICLES EQUIPPED WITH AIRBAGS, REFER TO GROUP 8M - PASSIVE RESTRAINT SYSTEMS BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, OR INSTRUMENT PANEL COMPONENT DIAGNOSIS OR SERVICE. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

REMOVAL

(1) Disconnect and isolate the battery negative cable.

(2) Locate the blower motor relay near the outboard end of the heater-A/C housing under the passenger side of the instrument panel (Fig. 49).

REMOVAL AND INSTALLATION (Continued)

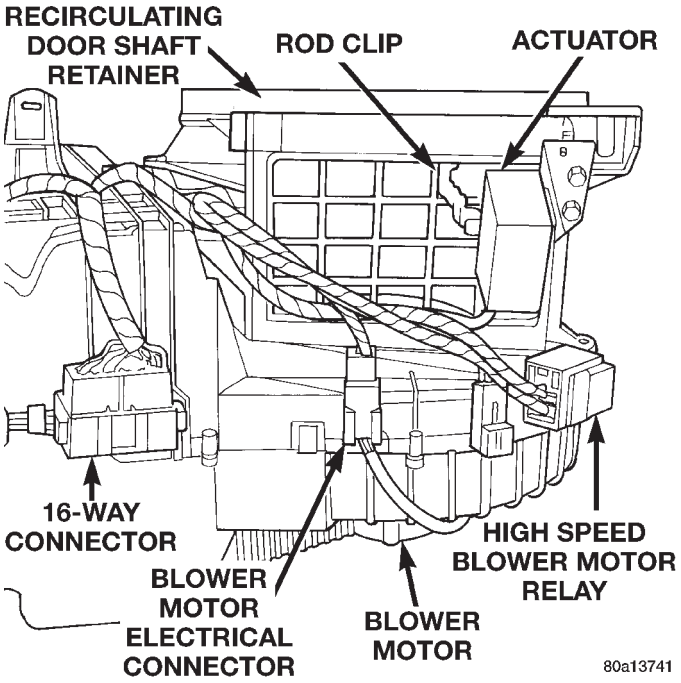


Fig. 49 High Speed Blower Motor Relay

(3) Unclip the blower motor relay wire harness connector from the side of the heater-A/C housing.

(4) Unplug the blower motor relay from the connector.

INSTALLATION

(1) Align the blower motor relay terminals with the cavities in the blower motor relay wire harness connector.

(2) Push the relay firmly into the connector.

(3) Clip the blower motor relay and connector back onto the heater-A/C housing.

(4) Connect the battery negative cable.

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 and isolate the battery negative cable.

(2) Unplug the wire harness connector from the motor (Fig. 50).

(3) Remove the screws that secure the motor to the heater-A/C housing.

(4) Remove the temperature/blend air door motor.

INSTALLATION

(1) Position the motor over the door connection.

(2) Install and tighten the screws that secure the motor to the heater-A/C housing.

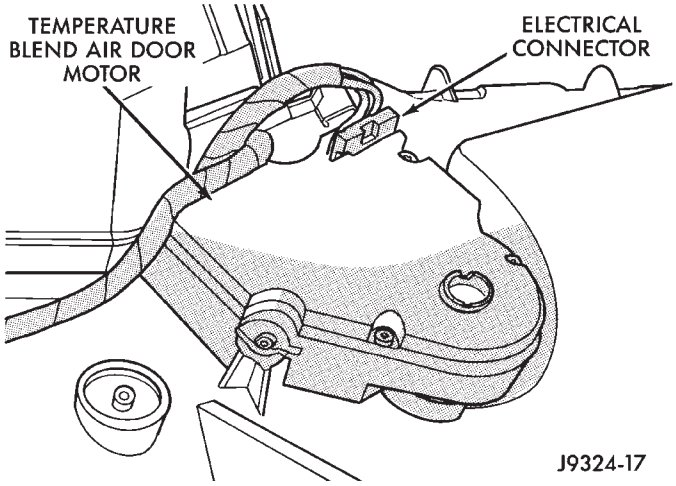


Fig. 50 Temperature/Blend Air Door Motor

(3) Plug in the wire harness connector to the motor.

(4) Connect the battery negative cable.

DUCTS AND OUTLETS

DEFROSTER DUCT

(1) Remove the instrument panel from the vehicle as described in Group 8E - Instrument Panel Systems.

(2) Remove the three screws that secure the defroster duct to the instrument panel armature.

(3) Remove the defroster duct.

(4) Reverse the removal procedures to install.

DEMISTER DUCTS

(1) Remove the defroster duct as described in this group.

(2) Remove the four screws that secure the demister ducts to the instrument panel armature.

(3) Remove the demister ducts.

(4) Reverse the removal procedures to install.

PANEL DUCTS

(1) Remove the demister ducts as described in this group.

(2) Remove the four screws that secure the panel ducts to the instrument panel armature.

(3) Remove the panel ducts.

(4) Reverse the removal procedures to install.

FLOOR DUCTS

(1) Remove the center floor console as described in Group 23 - Body.

(2) Remove the right front seat as described in Group 23 - Body.

(3) Remove the right side front door opening trim as described in Group 23 - Body.

(4) Roll back the floor carpeting.

REMOVAL AND INSTALLATION (Continued)

(5) Remove the nut that secures the floor duct to the stud on the floor pan transmission tunnel (Fig. 51).

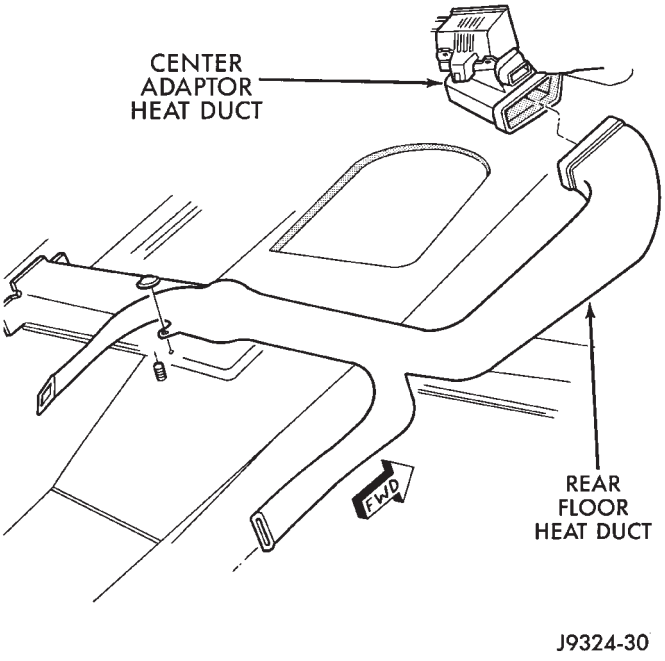


Fig. 51 Floor Duct Remove/Install

(6) Disconnect the floor duct from the center adaptor duct.

(7) Remove the floor duct from the vehicle.

(8) Reverse the removal procedures to install.

DEMISTER OUTLETS

(1) Using a trim stick or other suitable wide flat-bladed tool, pry the edge of the outlet away from the instrument panel top pad.

(2) To install, push the outlet firmly into the hole in the instrument panel top pad.

PANEL OUTLETS

The driver side and center panel outlets are only serviced as part of the instrument cluster bezel unit. The passenger side panel outlets are available for service.

(1) Remove the instrument panel top pad as described in Group 8E - Instrument Panel Systems.

(2) Remove the two screws that secure each outlet to the top pad.

(3) Remove the outlet from the top pad.

(4) Reverse the removal procedures to install.

PANEL/DEFROST DOOR

REMOVAL

(1) Disconnect and isolate the battery negative cable.

(2) Remove the instrument panel as described in Group 8E - Instrument Panel Systems.

(3) Disconnect the panel/defrost door actuating rod (Fig. 52) or (Fig. 53).

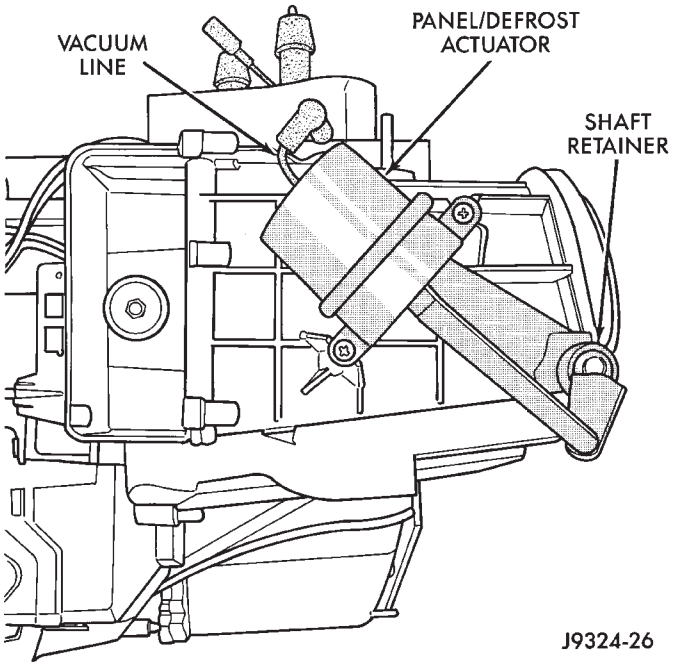


Fig. 52 Panel/Defrost Door - Manual

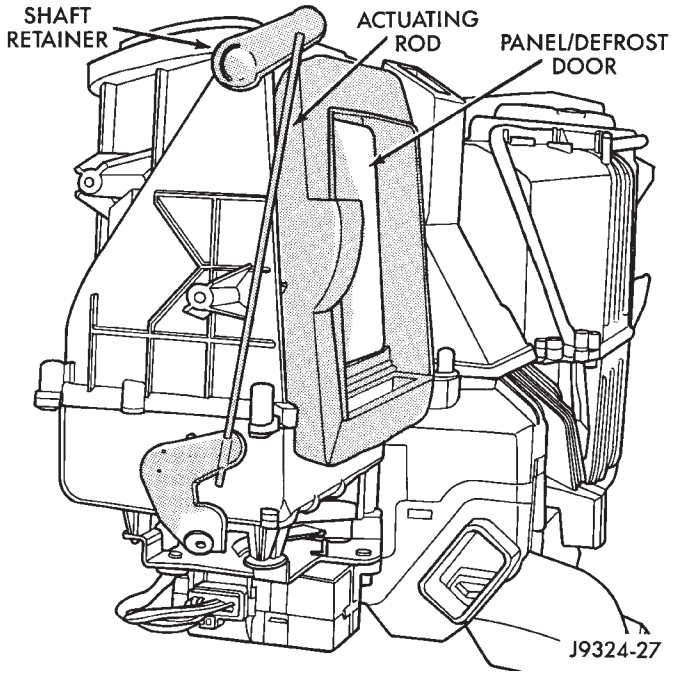


Fig. 53 Panel/Defrost Door - ATC

(4) Pry the panel/defrost door pivot shaft retainer from the pivot shaft.

(5) Remove the door through the top opening of the heater-A/C housing.

REMOVAL AND INSTALLATION (Continued)

INSTALLATION

(1) Install the panel/defrost door through the top opening and place into position in the heater-A/C housing.

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

(3) Connect the actuating rod and rod clip to the shaft retainer.

(4) Install the instrument panel as described in Group 8E - Instrument Panel Systems.

(5) Connect the battery negative cable.

RECIRCULATING AIR DOOR ACTUATOR

REMOVAL

(1) Disconnect and isolate the battery negative cable.

(2) Remove the instrument panel as described in Group 8E - Instrument Panel Systems.

(3) Unplug the actuator vacuum harness connector (Fig. 54) or wire harness connector (Fig. 55), as equipped.

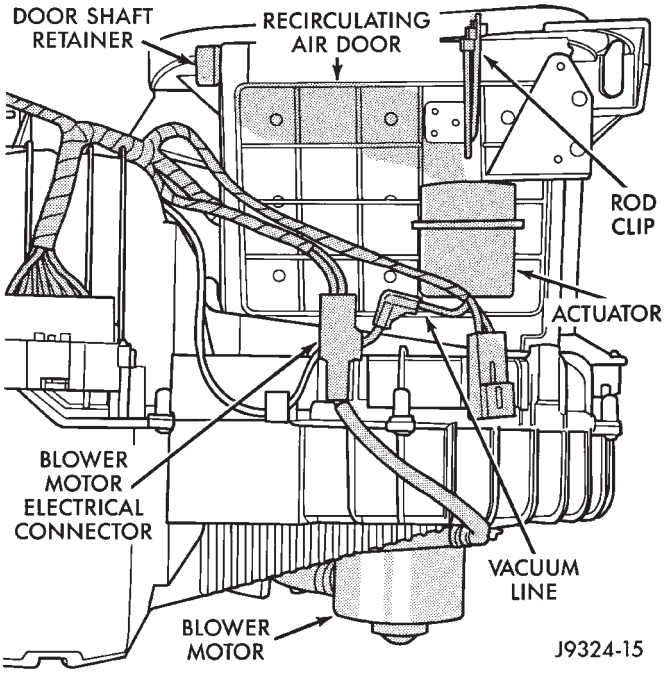


Fig. 54 Recirculating Air Door Actuator -Manual

(4) Disconnect the actuating rod clip.

(5) Remove the screws that secure the actuator to the heater-A/C housing.

(6) Remove the actuator from the heater-A/C housing.

INSTALLATION

(1) Position the actuator on the heater-A/C housing.

(2) Install and tighten the screws that secure the actuator to the housing.

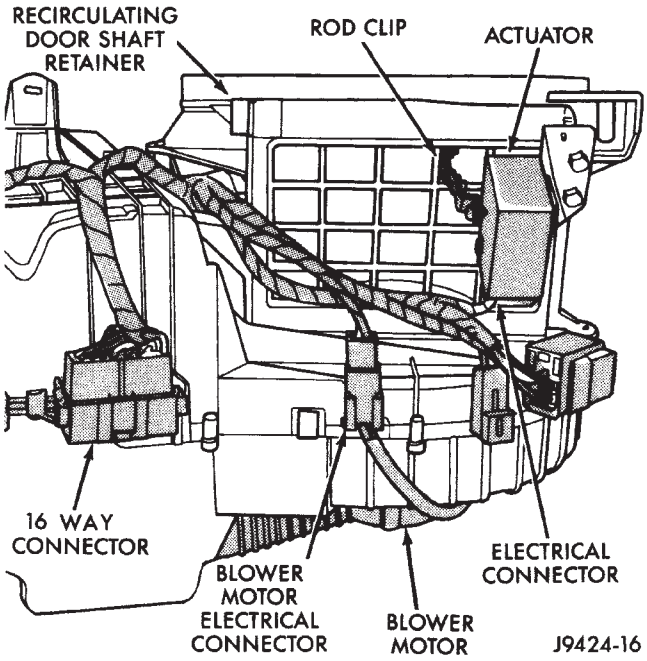


Fig. 55 Recirculating Air Door Actuator -ATC

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

(4) Plug in the vacuum harness connector or the wire harness connector to the actuator, as equipped.

(5) Install the instrument panel as described in Group 8E - Instrument Panel Systems.

(6) Connect the battery negative cable.

HEATER-A/C HOUSING

REMOVAL

(1) Disconnect and isolate the battery negative cable.

(2) Recover the refrigerant from the refrigerant system as described in this group.

(3) Disconnect the refrigerant lines from the evaporator tubes (Fig. 56). Install plugs in, or tape over all of the open refrigerant fittings.

(4) Drain the cooling system. Refer to Group 7 - Cooling System for the procedures.

(5) Disconnect the heater hoses from the heater core tubes.

(6) Remove the coolant reserve/overflow bottle.

(7) Remove the Powertrain Control Module (PCM) and set it aside. Do not unplug the PCM wire harness connectors.

(8) Remove the heater-A/C housing mounting nuts from the studs on the engine compartment side of the dash panel.

(9) Remove the instrument panel. Refer to Group 8E - Instrument Panel Systems for the procedures.

(10) Disconnect the rear floor heat duct from the center adaptor (Fig. 57).

REMOVAL AND INSTALLATION (Continued)

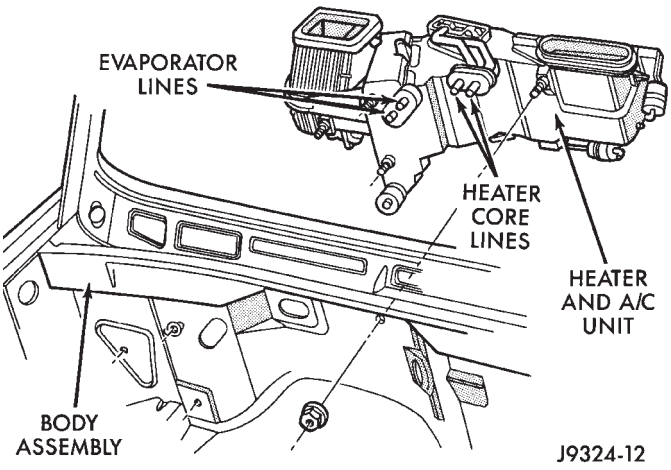


Fig. 56 Heater-A/C Housing

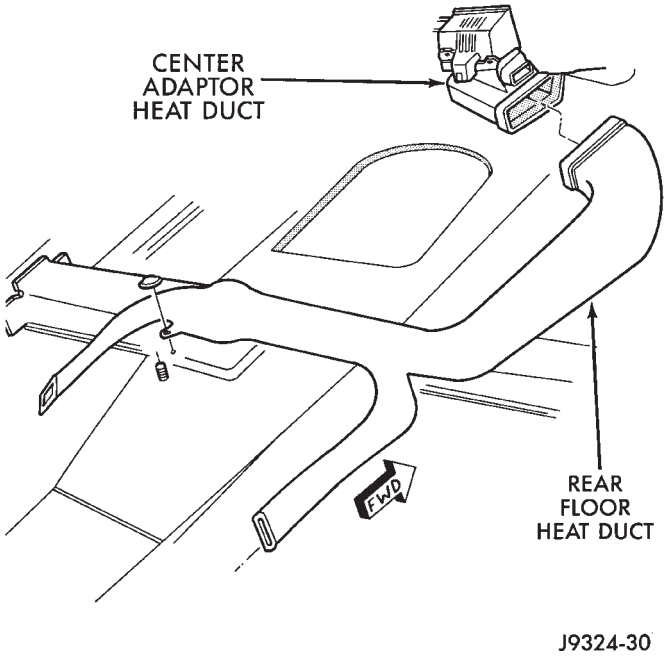


Fig. 57 Rear Floor Heat Duct

(11) Unplug the heater-A/C housing wire harness connectors.

(12) Remove the heater-A/C housing mounting nuts from the studs on the passenger compartment side of the dash panel (Fig. 58).

(13) Remove the heater-A/C housing from the vehicle.

INSTALLATION

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

(2) Install the mounting nuts to the studs on the passenger compartment side of the dash panel. Tighten the nuts to 4.5 N·m (40 in. lbs.).

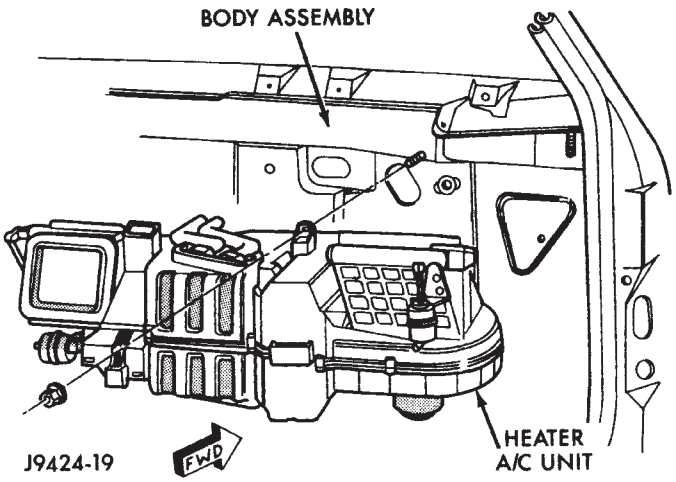


Fig. 58 Heater A/C Housing Remove/Install

(3) Install the mounting nuts to the studs on the engine compartment side of the dash panel. Tighten the nuts to 7 N·m (60 in. lbs.).

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

(5) Unplug or remove the tape from the refrigerant fittings, and connect the refrigerant lines to the evaporator tubes.

(6) Install the coolant reserve/overflow bottle.

(7) Install the PCM.

(8) Connect the rear floor heat duct to the center adaptor. Check that the carpet is not interfering with any duct outlets.

(9) Plug in the heater-A/C housing wire harness connectors.

(10) Install the instrument panel. Refer to Group 8E - Instrument Panel Systems for the procedures.

(11) Fill the cooling system. Refer to Group 7 - Cooling System for the procedures.

(12) Evacuate and charge the refrigerant system as described in this group.

(13) Connect the battery negative cable.

(14) Start the vehicle and check for proper operation of the heating and air conditioning systems.

HEATER CORE

REMOVAL

(1) Remove the heater-A/C housing as described in this group.

(2) Remove the screws that secure the heater core to the heater-A/C housing.

(3) Pull the heater core straight out of the housing (Fig. 59).

INSTALLATION

(1) Install the heater core into the heater-A/C housing.

REMOVAL AND INSTALLATION (Continued)

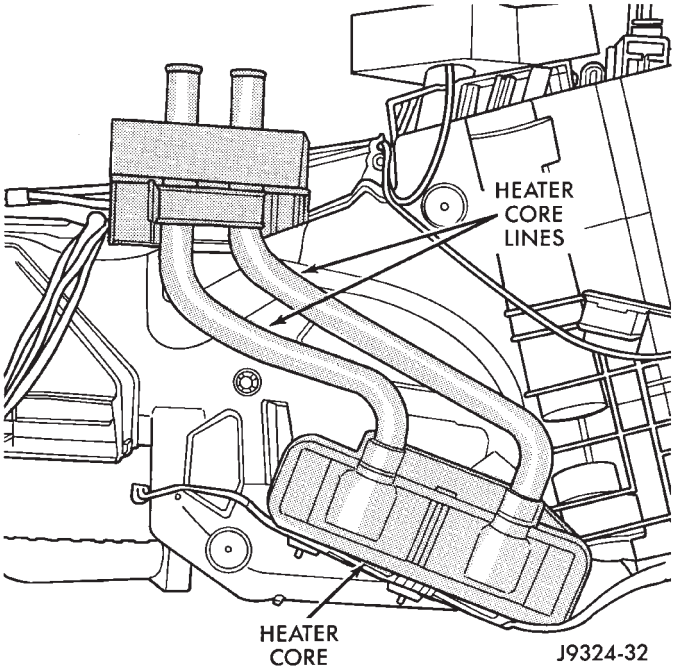


Fig. 59 Heater Core

(2) Position the retainer clips over the heater core tubes. Install and tighten the screws that secure the heater core in the heater-A/C housing.

(3) Install the heater-A/C housing as described in this group.

EVAPORATOR COIL

REMOVAL

(1) Remove the heater-A/C housing as described in this group.

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

(3) Remove the screws that secure the two housing halves together. Unsnap the center heat duct adaptor from the lower housing and remove the screw hidden by the adaptor.

(4) Carefully turn the heater-A/C housing over. Remove the top half of the housing (Fig. 60).

(5) Lift the evaporator coil from the heater-A/C housing.

INSTALLATION

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

(2) Position the top half of the heater-A/C housing over the bottom half. Carefully turn the housing over. Install and tighten the screws that secure the two housing halves to each other.

(3) Snap on the center heat duct adaptor.

(4) Install the heater-A/C housing as described in this group.

NOTE: If the evaporator was replaced, add 2 ounces of refrigerant oil to the refrigerant system.

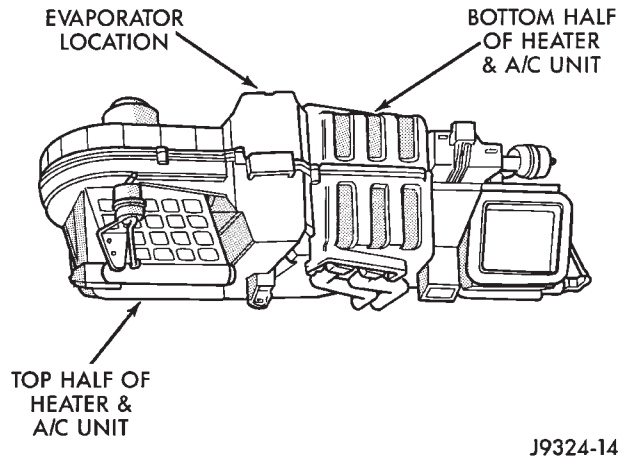


Fig. 60 Evaporator Coil Location in Heater-A/ CHousing (Upside Down)

HEAT/DEFROST DOOR ACTUATOR

This actuator is used only on models equipped with the standard manual temperature control system.

REMOVAL

(1) Remove the heater-A/C housing from the vehicle as described in this group.

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

(3) Unplug the vacuum harness connector from the actuator (Fig. 61).

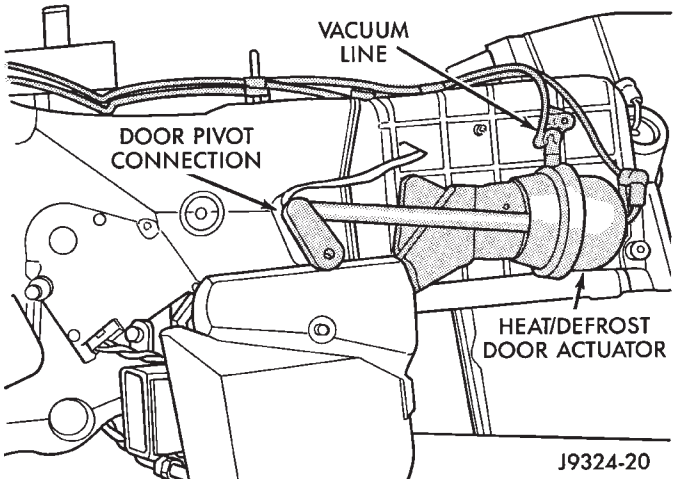


Fig. 61 Heat/Defrost Door Actuator

(4) Separate the door pivot connection from the door pivot pin.

(5) Remove the screws that secure the actuator to the heater-A/C housing.

(6) Remove the heat/defrost door actuator.

INSTALLATION

(1) Install the heat/defrost door actuator.

(2) Install and tighten the screws that secure the actuator to the heater-A/C housing.

REMOVAL AND INSTALLATION (Continued)

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

(4) Plug in the vacuum harness connector to the actuator.

(5) Install the heater-A/C housing as described in this group.

PANEL/DEFROST DOOR ACTUATOR

This actuator is used only on models equipped with the standard manual temperature control system.

REMOVAL

(1) Remove the heater-A/C housing as described in this group.

(2) Unplug the vacuum harness connector from the panel/defrost door actuator (Fig. 62).

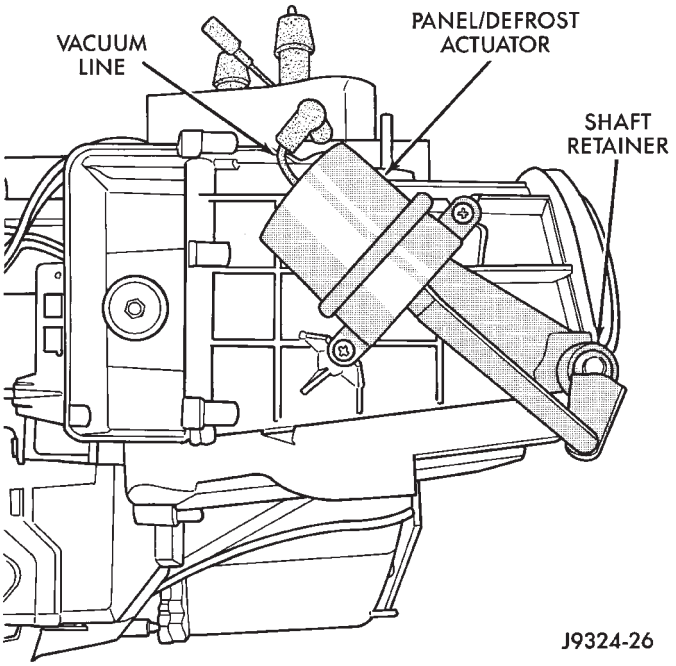


Fig. 62 Panel/Defrost Door Actuator

(3) Separate the actuator door pivot connection from the door pivot pin.

(4) Remove the screws that secure the actuator to the heater-A/C housing.

(5) Remove the panel/defrost door actuator.

INSTALLATION

(1) Install and tighten the screws that secure the panel/defrost door actuator to the heater-A/C housing.

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

(3) Plug in the vacuum harness connector to the actuator.

(4) Install the heater-A/C housing as described in this group.

HEAT/DEFROST AND PANEL/DEFROST DOOR MOTOR

These motors are used only on models equipped with the optional Automatic Temperature Control (ATC) system.

REMOVAL

(1) Remove the heater-A/C housing from the vehicle as described in this group.

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

(3) Unplug the wire harness connector from the motor (Fig. 63).

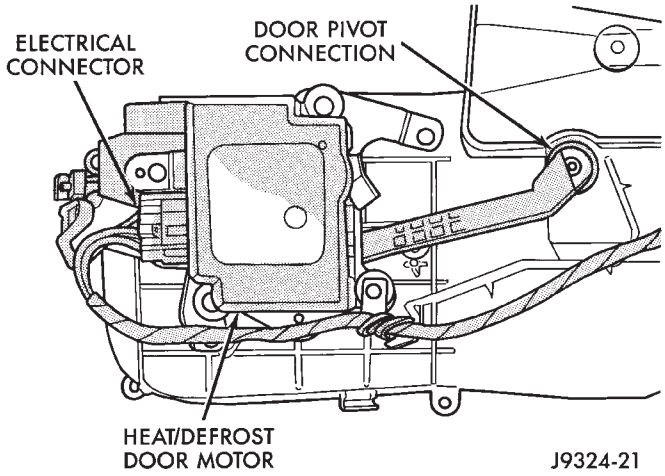


Fig. 63 Heat/Defrost - Panel/Defrost DoorMotor

(4) Remove the screws that secure the motor to the heater-A/C housing.

(5) Remove the motor from the housing.

INSTALLATION

(1) Position the heat/defrost or panel/defrost door motor on the heater-A/C housing.

(2) Install and tighten the screws that secure the motor to the housing.

(3) Plug in the wire harness connector to the motor.

(4) Install the heater-A/C housing as described in this group.

HEAT/DEFROST DOOR

REMOVAL

(1) Remove the heater-A/C housing as described in this group.

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

(3) Separate the actuator door pivot connection from the door pivot pin.

(4) Unplug the vacuum harness connector from the actuator, or unplug the wire harness connector from the motor, as equipped.

(5) Remove the screws that secure the two halves of the heater-A/C housing to each other. Remove the

REMOVAL AND INSTALLATION (Continued)

center heat duct adaptor to access and remove the final screw.

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

(7) Remove the heat/defrost door.

INSTALLATION

(1) Position the door pivot pin in the pivot hole.

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

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

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

(5) Snap on the center heat duct adaptor.

(6) Plug in the vacuum harness connector to the actuator, or the wire harness connector to the motor, as equipped.

(7) Install the heater-A/C housing as described in this group.

RECIRCULATING AIR DOOR

REMOVAL

(1) Remove the heater-A/C housing as described in this group.

(2) Remove the recirculating air door actuator rod retainer clip.

(3) Pry the recirculating air door pivot shaft retainer from the shaft.

(4) Remove the recirculating air door through the top opening of the heater-A/C housing.

INSTALLATION

(1) Install the recirculating air door through the top opening of the heater-A/C housing and position it in place.

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

(3) Connect the recirculating air door actuator rod and retainer clip to the door lever.

(4) Install the heater-A/C housing as described in this group.

TEMPERATURE/BLEND AIR DOOR

REMOVAL

(1) Remove the heater-A/C housing as described in this group.

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

(3) Remove the screws securing the two housing halves to each other. Remove the center heat duct adaptor to access and remove the final screw.

(4) Remove the bottom half of the heater-A/C housing.

(5) Remove the temperature control door (Fig. 64).

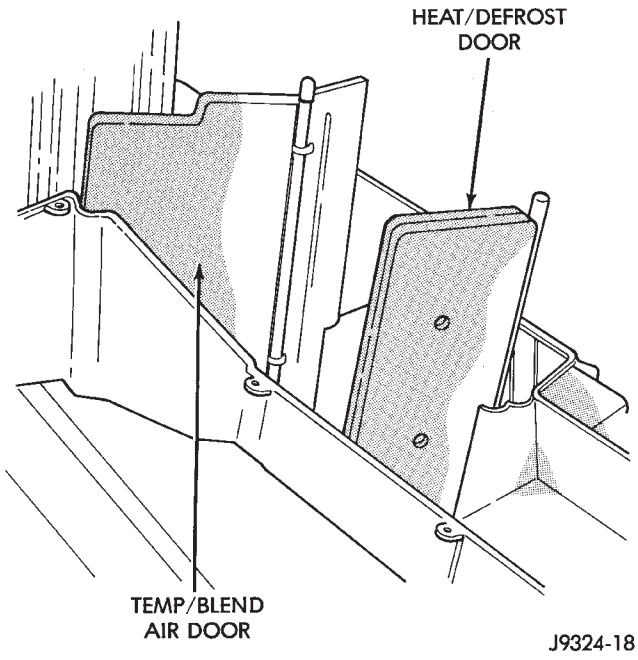


Fig. 64 Temperature Control (Blend Air) Door

NOTE: To reinstall the door-to-motor pivot connection, the motor must be removed from the heater-A/C housing as described in this group.

INSTALLATION

(1) If the door was removed, install the removed motor to the pivot connection. Position the motor on the heater-A/C housing and tighten the screws.

(2) Install the temperature control door.

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

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

(5) Snap on the center heat duct adaptor.

(6) Install the heater-A/C housing as described in this group.