

# HEATING AND AIR CONDITIONING

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## GENERAL INFORMATION

### INTRODUCTION

Both the heater and the heater/air conditioning systems share many of the same components. This group will deal with both systems together when component function is common, and separately when they are not.

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

All vehicles are equipped with a common heater-A/C unit housing assembly.

## GENERAL INFORMATION (Continued)

## SAFETY PRECAUTIONS AND WARNINGS

**WARNING: WEAR EYE PROTECTION WHEN SERVICING THE AIR CONDITIONING REFRIGERANT SYSTEM. SERIOUS EYE INJURY CAN RESULT FROM EYE CONTACT WITH REFRIGERANT. IF EYE CONTACT IS MADE, SEEK MEDICAL ATTENTION IMMEDIATELY.**

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

**LARGE AMOUNTS OF REFRIGERANT RELEASED IN A CLOSED WORK AREA WILL DISPLACE THE OXYGEN AND CAUSE SUFFOCATION.**

**THE EVAPORATION RATE OF REFRIGERANT AT AVERAGE TEMPERATURE AND ALTITUDE IS EXTREMELY HIGH. AS A RESULT, ANYTHING THAT COMES IN CONTACT WITH THE REFRIGERANT WILL FREEZE. ALWAYS PROTECT SKIN OR DELICATE OBJECTS FROM DIRECT CONTACT WITH REFRIGERANT. R-134a SERVICE EQUIPMENT OR VEHICLE A/C SYSTEM SHOULD NOT BE PRESSURE TESTED OR LEAK TESTED WITH COMPRESSED AIR.**

**SOME MIXTURES OF AIR and R-134a HAVE BEEN SHOWN TO BE COMBUSTIBLE AT ELEVATED PRESSURES. THESE MIXTURES ARE POTENTIALLY DANGEROUS AND MAY RESULT IN FIRE OR EXPLOSION CAUSING INJURY OR PROPERTY DAMAGE.**

**ANTIFREEZE IS AN ETHYLENE GLYCOL BASE COOLANT AND IS HARMFUL IF SWALLOWED OR INHALED. SEEK MEDICAL ATTENTION IMMEDIATELY IF SWALLOWED OR INHALED. DO NOT STORE IN OPEN OR UNMARKED CONTAINERS. WASH SKIN AND CLOTHING THOROUGHLY AFTER COMING IN CONTACT WITH ETHYLENE GLYCOL. KEEP OUT OF REACH OF CHILDREN AND PETS.**

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

**CAUTION: The engine cooling system is designed to develop internal pressure of 97 to 123 kPa (14 to 18 psi). Allow the vehicle to cool a minimum of 15 minutes before opening the cooling system. Refer to Group 7, Cooling System.**

## DESCRIPTION AND OPERATION

## AIR CONDITIONING COMPONENTS

*A/C PRESSURE TRANSDUCER*

The switch is located on the discharge line near the compressor. The pressure transducer functions as the refrigerant system pressure sensor. It supports the condenser/radiator fans and compressor functions.

*CLUTCH, PULLEY AND COIL*

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

*COMPRESSOR*

The compressor compresses the low pressure refrigerant vapor from the evaporator into a high pressure, high temperature vapor. The Nippondenso 10PA17 Compressor is used on all models. The system uses polyalkylene glycol synthetic refrigerant oil ND8 PAG.

*CONDENSER*

It is located in front of the engine cooling radiator. Its function is to cool the hot high pressure refrigerant gas. This causes it to condense into a high pressure liquid refrigerant.

*EVAPORATOR COIL*

The coil removes heat and dehumidifies the air before it enters the vehicle. The coil is located in the A/C housing.

*EVAPORATOR PROBE*

The evaporator temperature probe prevents condensate water on the evaporator coil from freezing and obstructing A/C system air flow. It does this by cycling the compressor clutch on and off. The switch is attached to the evaporator coil with the sensing probe inserted into the coil fins.

*EXPANSION VALVE:*

The valve is used to meter refrigerant into the evaporator in accordance with cooling requirements. The valve is located in front of the evaporator coil.

## DESCRIPTION AND OPERATION (Continued)

**HIGH PRESSURE RELIEF VALVE**

The valve is located at the rear of the compressor. The valve is used to prevent excessive high system pressure. The valve vents the system when a pressure of 3445-4135 kPa (500 - 600 psi) and above is reached. This prevents damage to the compressor and other system components. The valve closes with a minimum pressure of 2756 kPa (400 psi).

**FILTER/DRIER**

The drier is used to remove any traces of moisture from the refrigerant system. The filter is used to separate any foreign particles.

**REFRIGERANT LINES**

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

**SERVICE GAUGE PORT**

The high pressure gauge port is located on the compressor discharge line. The low pressure gauge port is located on the suction line.

**A/C PRESSURE TRANSDUCER**

The A/C Pressure Transducer functions as the refrigerant system pressure sensor. It supports the condenser/radiator fans and compressor functions. The pressure transducer is screwed attached to a valve on the discharge line near the compressor.

**A/C REFRIGERANT LINES**

The air conditioning lines used on this vehicle are made from reinforced rubber with a nylon liner on the inner walls. The ends of the A/C lines are made with light weight aluminum fittings or quick connects.

The A/C lines use special connectors called quick connects. There are four quick connects in the system. Two are located at the condenser and the other two are located at the expansion valve. Each quick connector has a clip installed on it.

**CAUTION:** Never attempt to remove a clip or disconnect a quick connect without reclaiming all refrigerant from the air conditioning system. The system must be empty.

All quick connects use two O-rings to seal the connection. The O-rings are made from a special type of rubber that is not affected by R-134a refrigerant. O-ring replacement is required whenever lines are removed and installed. Use only O-rings specified for this vehicle. Failure to use the correct type of O-ring will cause the connection to leak within a short period of time.

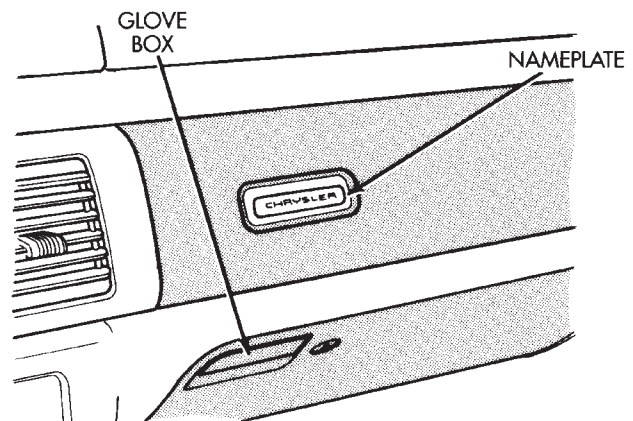
When it is necessary to open the refrigeration system, have everything needed to service the system ready. The system should not be left open any longer than necessary. Cap or plug all lines and fittings as soon as they are opened. This will prevent the entrance of dirt and moisture into the system.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

**WARNING: AVOID BREATHING A/C REFRIGERANT AND LUBRICANT VAPOR OR MIST. EXPOSURE MAY IRRITATE EYES, NOSE AND THROAT. USE ONLY APPROVED SERVICE EQUIPMENT MEETING SAE REQUIREMENTS TO DISCHARGE R-134a SYSTEM. IF ACCIDENTAL SYSTEM DISCHARGE OCCURS, VENTILATE WORK AREA BEFORE RESUMING SERVICE.**

**R-134a SERVICE EQUIPMENT OR VEHICLE A/C SYSTEM SHOULD NOT BE PRESSURE TESTED OR LEAK TESTED WITH COMPRESSED AIR. SOME MIXTURES OF AIR/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.**

**ATC IN-CAR TEMPERATURE SENSOR**

The ATC system uses various sensors which return electrical signals to the Body Control Module. The In-Car Temperature Sensor is used on ATC equipped vehicles only. It is located behind the name plate on the right side of the instrument panel (Fig. 1).



9424-86

**Fig. 1 Nameplate**

## DESCRIPTION AND OPERATION (Continued)

The In-Car Temperature Sensor is part of a motorized aspirator assembly that is mounted in the instrument panel. A small fan (in the sensor) draws air through an intake on the instrument panel (behind name plate). This air flows over a thermistor which measures interior vehicle temperatures (Fig. 2). The ATC system then makes adjustments to maintain the optimum passenger compartment comfort.

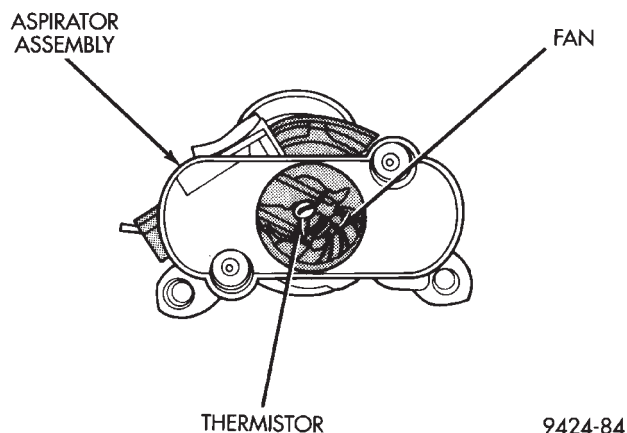


**Fig. 2 In-Car Temperature Sensor**

The In-Car sensor will automatically turn on when a vehicle door is opened. If the door is left open, the In-Car Sensor will automatically turn off within approximately 5 minutes. If the door is then closed, but there is no ignition start, the In-Car Sensor will automatically turn off after approximately 2 minutes. After the vehicle has been driven, the In-Car Sensor will turn off immediately when the ignition is turned off. The aspirator motor in the In-Car Sensor operates whenever the ignition switch is ON (even when the ATC system OFF button is pushed).

If the In-Car sensor is open or shorted on this system, the digital display will turn off. Then the system defaults to manual operation. Refer to Owner's Manual for system operating instructions.

The In-Car Temperature Sensor assembly is not serviceable and must be replaced if found to be defective.

### BLOWER MOTOR RESISTOR

Vehicles with manual air conditioning (Non-ATC) systems will have a blower motor resistor. The resistor is located on the lower right side of the heater housing.

### BLOWER MOTOR POWER MODULE

The blower motor power module is only used in vehicles equipped with Automatic Temperature Con-

trol (ATC). It is located on the lower right side of the heater housing.

The power module receives pulse width modulated signals from the Body Control Module. The power module varies voltage to the blower motor for different blower speeds based on the ATC software. There are 14 speeds and a blower off signal.

### COMPRESSOR

The compressor used on this vehicle is a Nippondenso 10PA17 R134a. This compressor uses an aluminum swash plate, teflon coated pistons and aluminum sleeved cylinder walls. One-way check valves are used to regulate refrigerant flow through the compressor.

**CAUTION:** A 10PA17 R-12 compressor looks identical to a 10PA17 R134a and will bolt up to this vehicle. It is extremely important that a R-134a compressor is identified prior to using compressor in question. Check tag located on compressor for model number.

Excessive noise that occurs when the air-conditioning is being used may be caused by:

- Loose Bolts
- Mounting Brackets
- Loose Compressor Clutch
- Excessive High Refrigerant Operating Pressure

Verify the following before compressor repair is performed:

- (1) Compressor drive belt condition
- (2) Proper refrigerant charge
- (3) Thermal expansion valve (TXV) operating correctly
- (4) Head pressure is normal

### ENGINE COOLING SYSTEM REQUIREMENTS

To maintain the performance level of the heating/air-conditioning system, the engine cooling system must be prepared as shown in this manual.

The use of a bug screen is not recommended. Any obstructions in front of the radiator or condenser can reduce the performance of the A/C and/or engine cooling system.

**WARNING: DO NOT OPEN COOLING SYSTEM WHEN HOT AS PERSONAL INJURY OR DAMAGE TO VEHICLE MAY RESULT.**

The engine cooling system is designed to develop internal pressure of 97 to 123 kPa (14 to 18 psi). Wait 15 minutes (after the engine is shut off), or until safe temperature and pressure is attained, before opening cooling system. Refer to Group 7, Cooling System. Coolant temperature can be checked using the scan tool (DRB).

## DESCRIPTION AND OPERATION (Continued)

The use of aluminum cylinder heads, intake manifolds, heater cores, and radiators, requires special corrosion protection. Use only Mopar® antifreeze or ethylene-glycol based antifreeze containing Alugard 340-2. This additive is necessary for best cooling system protection. To obtain the maximum life of the cooling system, mixing distilled water with ethylene-glycol type coolant is recommended.

**CAUTION: Do not add additional inhibitors, anti-rust products, or soluble oil (sold as “water pump lubricants”). These products may not be compatible with the radiator coolant.**

Refer to Group 7, Cooling System for cooling system procedures.

### EVAPORATOR PROBE

The evaporator probe is a temperature sensing element located at the coldest point on the face of the evaporator. Output from the probe is sampled by the Body Control Module (BCM). It is used to switch the A/C compressor clutch OFF before evaporator freeze up occurs. The clutch is switched OFF when the probe temperature reaches 0.94°C. (33.7°F.). It is allowed to switch ON when the probe temperature reaches 2.05°C. (35.7°F.).

The evaporator probe is located on the lower right side of the evaporator housing.

### EXPANSION VALVE

The expansion valve is located on the engine side of the dash panel, near the right shock tower.

The expansion valve can fail in three different positions (open, closed or restricted).

In an Open Position: this will result in a noisy compressor or no cooling. The cause can be a broken spring, broken ball or excessive moisture in the A/C system. If the spring or ball are found to be defective, replace the expansion valve. If excessive moisture is found in the A/C system, recycle the refrigerant.

In a Closed Position: There will be low suction pressure and no cooling. This may be caused by a failed power dome or excessive moisture in the A/C system. If the power dome on the expansion valve is found to be defective replace the expansion valve. If excessive moisture is found recycle the refrigerant.

A Restricted Orifice: There will be low suction pressure and no cooling. This may be caused by debris in the refrigerant system. If debris is believed to be the cause, recycle the refrigerant and replace the expansion valve and receiver/drier.

### FILTER - DRIER

The filter - drier is a receiver for reserve refrigerant. It also has a desiccant bag and a filter. This is

used to absorb moisture and filter the refrigerant as it passes through the filter - drier.

The filter - drier is located left of the A/C condenser. The A/C refrigerant must be removed from the system before removing the receiver/drier. Always use a refrigerant recovery machine.

Replace the filter - drier if an A/C system is left open for an extended period of time.

### HANDLING TUBING AND FITTINGS

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

**CAUTION: The system must be completely empty before opening any fitting or connection in the refrigeration system. Open fittings with caution even after the system has been emptied. If any pressure is noticed as a fitting is loosened, retighten fitting and evacuate the system again.**

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

The use of correct wrenches when making connections is very important. Improper wrenches or improper use of wrenches can damage the fittings.

The internal parts of the A/C system will remain stable as long as moisture-free refrigerant and refrigerant oil is used. Abnormal amounts of dirt, moisture or air can upset the chemical stability. This may cause operational troubles or even serious damage if present in more than very small quantities.

When opening a refrigeration system, have everything you will need to repair the system ready. This will minimize the amount of time the system must be opened. Cap or plug all lines and fittings as soon as they are opened. This will help prevent the entrance of dirt and moisture. All new lines and components should be capped or sealed until they are ready to be used.

All tools, including the refrigerant dispensing manifold, the manifold gauge set, and test hoses should be kept clean and dry.

## DESCRIPTION AND OPERATION (Continued)

**SIDE WINDOW DEMISTERS**

The side window demisters direct air from the heater assembly to the side windows. This is done when the mode selector is on FLOOR, DEFROST, MIX OR BI-LEVEL setting. The outlets are located on the top outboard corners of the doors.

**SUN SENSOR**

The sun sensor is only used on vehicles equipped with Automatic Temperature Control (ATC). The sensor is mounted on the top of the instrument panel below the instrument panel top cover (Fig. 3). This is not a thermistor type sensor but rather a photo diode. For this reason the sun sensor responds to sun light intensity rather than temperature. It is used to aid in determining proper mode door position, temperature door position and blower speed.

The sun sensor is not serviceable and must be replaced if found to be defective.

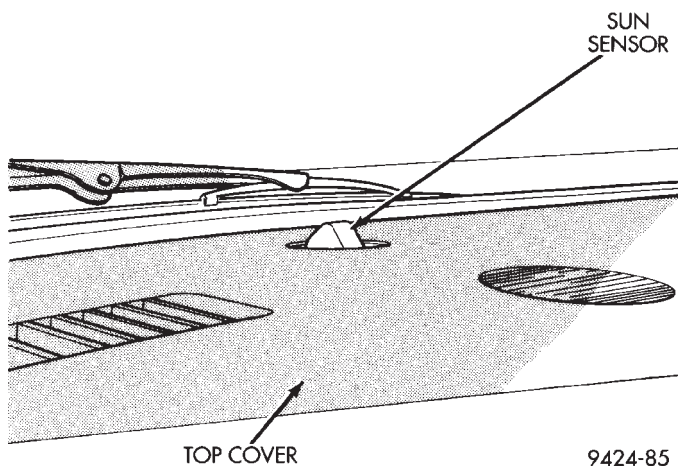


*Fig. 3 Sun Sensor*

**SYSTEM AIRFLOW**

The system draws outside air through the cowl opening at the base of the windshield. Then it goes into the plenum chamber above the Heater A/C unit housing and passes through the evaporator. At this point airflow can be directed either through or around the heater core. This is done by adjusting the blend-air door with the TEMP control on the control head. After the air passes the blend air door, the air flow is then directed from the PANEL, BI-LEVEL (panel and floor), and FLOOR - DEFROST outlets. Air flow velocity can be adjusted with the blower speed selector switch on the control head.

Ambient air intake can be shut off by closing the recirculating air door. This will recirculate the air that is already inside the vehicle. This is done by rotating the RECIRC. knob on the control head. Rotating the MODE control knob to the Defrost/Floor or Defrost setting on the control head will engage the

compressor. This will send refrigerant through the evaporator, and remove heat and humidity from the air before it goes through the heater core. The compressor can also be engaged by depressing the A/C button on the control head.

**DIAGNOSIS AND TESTING****A/C PERFORMANCE TEST**

The air conditioning system is designed to remove heat and humidity from the air entering the passenger compartment. The evaporator, located in the heater A/C unit, is cooled to temperatures near the freezing point. As warm damp air passes over the fins in the evaporator, moisture in the air condenses to water, dehumidifying the air. Condensation on the evaporator fins reduces the evaporators ability to absorb heat. During periods of high heat and humidity, an air conditioning system will be less effective. With the control module set to RECIRC, only air from the passenger compartment passes through the evaporator. As the passenger compartment air dehumidifies, A/C performance levels rise.

**PERFORMANCE TEST PROCEDURE**

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

**NOTE:** When connecting the service equipment coupling to the line fitting, verify that the valve of the coupling is fully closed. This will reduce the amount of effort required to make the connection.

- (1) Connect a tachometer and manifold gauge set. Attach a thermal couple to the evaporator line.
- (2) Set controls:

**MANUAL A/C**

- A/C ON
- Panel Recirculation
- Temperature to full cold
- High blower

**ATC (Automatic Temperature Control) System:**

- Rotate blower knob to high position (full clockwise)
- Rotate temperature knob to full cool position (full Counterclockwise)
- Push panel mode button
- Push REC (Recirculation) button (A/C and REC button should be lit)

## DIAGNOSIS AND TESTING (Continued)

**NOTE:** The word **AUTO** should not appear in the ATC display, confirming that the system is set manually.

(1) Start engine and hold at 1000 rpm with A/C clutch engaged.

(2) Engine should be warmed up with doors and windows closed.

(3) Insert a thermometer in the left center A/C outlet and operate the engine for five minutes. The A/C clutch may cycle depending on ambient conditions.

(4) With the A/C clutch engaged, compare the discharge air temperature to the A/C Performance Temperature chart (Fig. 4).

**ATC IN-CAR TEMPERATURE SENSOR**

(1) Perform air flow test.

(a) Turn ignition to the ON position and push the OFF button to stop the ATC system airflow. This will make it easier to observe paper in the Step 2.

(b) Place a small piece of tissue paper in front of the sensor opening. If the tissue sticks to the opening, the In-Car sensor is aspirating properly.

(2) Check if the electrical connection and connector are OK.

(3) Check for the two foam seals and their condition, it is absolutely necessary for proper sensor operation.

(a) Seal on the inside surface directly behind the nameplate.

(b) Seal (strip) located directly to the right of the right center duct opening (instrument panels with trim bezels).

**ATC SELF DIAGNOSTICS**

The ATC system can be diagnosed two ways. The scan tool (DRB) can be used or the vehicle's own control head display may be used. If the scan tool is to be used, refer to the proper LH Body Diagnostic Manual.

The control head can only be placed into the diagnostic mode while the engine is running and the vehicle is not moving. Set the control to a 75°F setting (so there is no confusion with 23-36 Diagnostic Trouble Codes).

To place the system into it's diagnostic mode, press and hold the floor, mix and defrost buttons (at the same time). The ATC head display will begin to blink (Fig. 5). When the control head display begins to blink release the floor, mix and defrost buttons. Once the control head enters diagnostic mode, the display

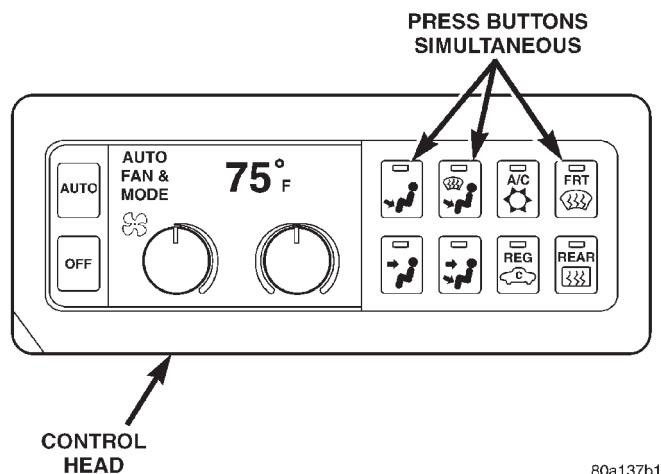
|                                                                      |                                   |                                   |                                    |                                    |                                    |
|----------------------------------------------------------------------|-----------------------------------|-----------------------------------|------------------------------------|------------------------------------|------------------------------------|
| <b>Ambient Temperature</b>                                           | 21°C<br>(70°F)                    | 26.5°C<br>(80°F)                  | 37.5°C<br>(90°F)                   | 37.5°C<br>(100°F)                  | 43°C<br>(110°F)                    |
| <b>Maximum Allowable Air Temperature at Center Left Panel Outlet</b> | 7°C<br>(45°F)                     | 9°C<br>(49°F)                     | 12°C<br>(54°F)                     | 13°C<br>(56°F)                     | 15°C<br>(59°F)                     |
| <b>Compressor Discharge Pressure</b>                                 | 772-<br>1448 kPa<br>(112-210 PSI) | 903-<br>1475 kPa<br>(131-214 PSI) | 1241-<br>1482 kPa<br>(180-215 PSI) | 1400-<br>1986 kPa<br>(203-288 PSI) | 1600-<br>2282 kPa<br>(232-331 PSI) |
| <b>Compressor Suction Pressure</b>                                   | 69-<br>255 kPa<br>(10-37 PSI)     | 117-<br>262 kPa<br>(17-38 PSI)    | 145-<br>324 kPa<br>(21-47 PSI)     | 193-<br>352 kPa<br>(28-51 PSI)     | 207-<br>365 kPa<br>(30-53 PSI)     |

9424-124

**Fig. 4 A/C Performance Temperature**

## DIAGNOSIS AND TESTING (Continued)

on the control head will continue to blink. This occurs until it completes its tests and calibrations. Then it will display any diagnostic trouble codes that are present in the BCM. If there are no diagnostic trouble codes the system will return to its normal operation as indicated by temperature display.



80a137b1

**Fig. 5 Entering Self-Diagnostic Mode**

Diagnostic trouble codes related to the ATC system will appear on the display in numerical form. The diagnostic trouble codes are stored in the BCM and diagnostic trouble code numbers can range between 23 and 36 (Fig. 6). The control head can only show one diagnostic trouble code at a time. Under certain circumstances more than one diagnostic trouble code could be in the memory. To scroll through any additional diagnostic trouble codes, press the panel button.

If diagnostic trouble codes are found, refer to the proper LH Body Diagnostic Manual for repair procedures.

The control head cannot display all diagnostic trouble codes stored with in the BCM. There may be other diagnostic trouble codes in the BCM not related to the ATC system. These codes can only be found using the scan tool.

| CODE | DESCRIPTION                             |
|------|-----------------------------------------|
| 23   | ATC Blend Door Feedback Failure         |
| 24   | ATC Mode Door Feedback Failure          |
| 25   | Ambient Sensor                          |
| 26   | ATC In-Car Sensor                       |
| 27   | Sun Sensor Failure                      |
| 31   | ATC Recirculation Door Stall Failure    |
| 32   | ATC Blend Door Stall Failure            |
| 33   | ATC Mode Door Stall Failure             |
| 34   | Engine Temperature Message not Received |
| 35   | Evaporator Sensor Failure               |
| 36   | ATC Head Communication Failure          |

9324-34

**Fig. 6 Diagnostic Trouble Code Chart for**

**ERASING DIAGNOSTIC TROUBLE CODES**

Diagnostic trouble codes can be cleared from the memory two ways:

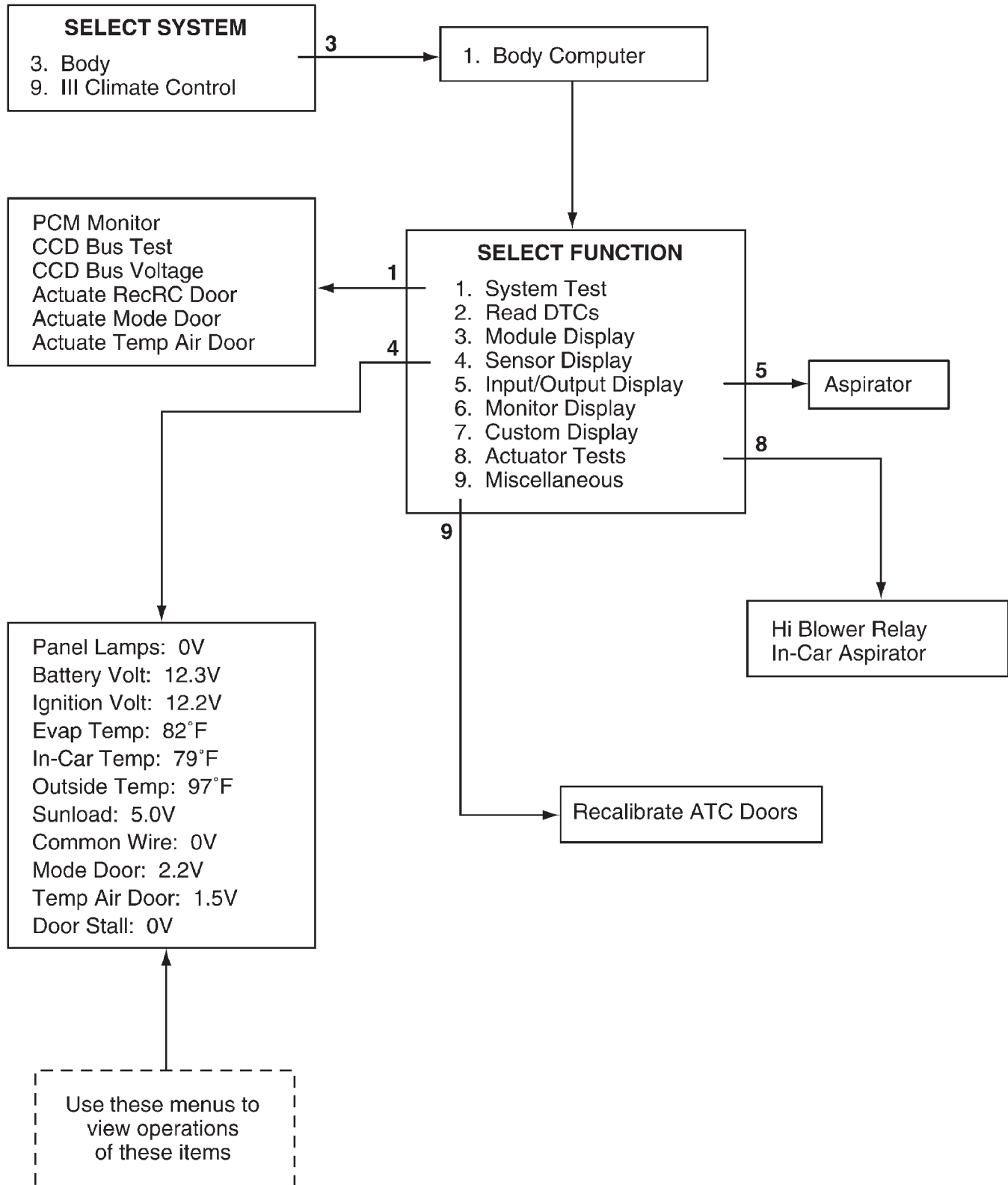
- The scan tool
- Power to the BCM can be disconnected for ten minutes (disconnect battery).

If the scan tool is to be used, refer to the proper LH Body Diagnostic Manual for procedures.

**CAUTION: Fault code 26 can be created if the sensor is disconnected while it is running; this will result in the control head display disappearing. To correct, clear fault code 26 from the body controller.**

The following Scan Tool Flow Charts are a sample of the areas that be tested with the scan tool. Using the Select System screen press 3 for Body, (Fig. 7) shows the items that can be tested. Pressing 9 for Climate Control, (Fig. 8) and (Fig. 9) shows the items that can be tested.

# DIAGNOSIS AND TESTING (Continued)

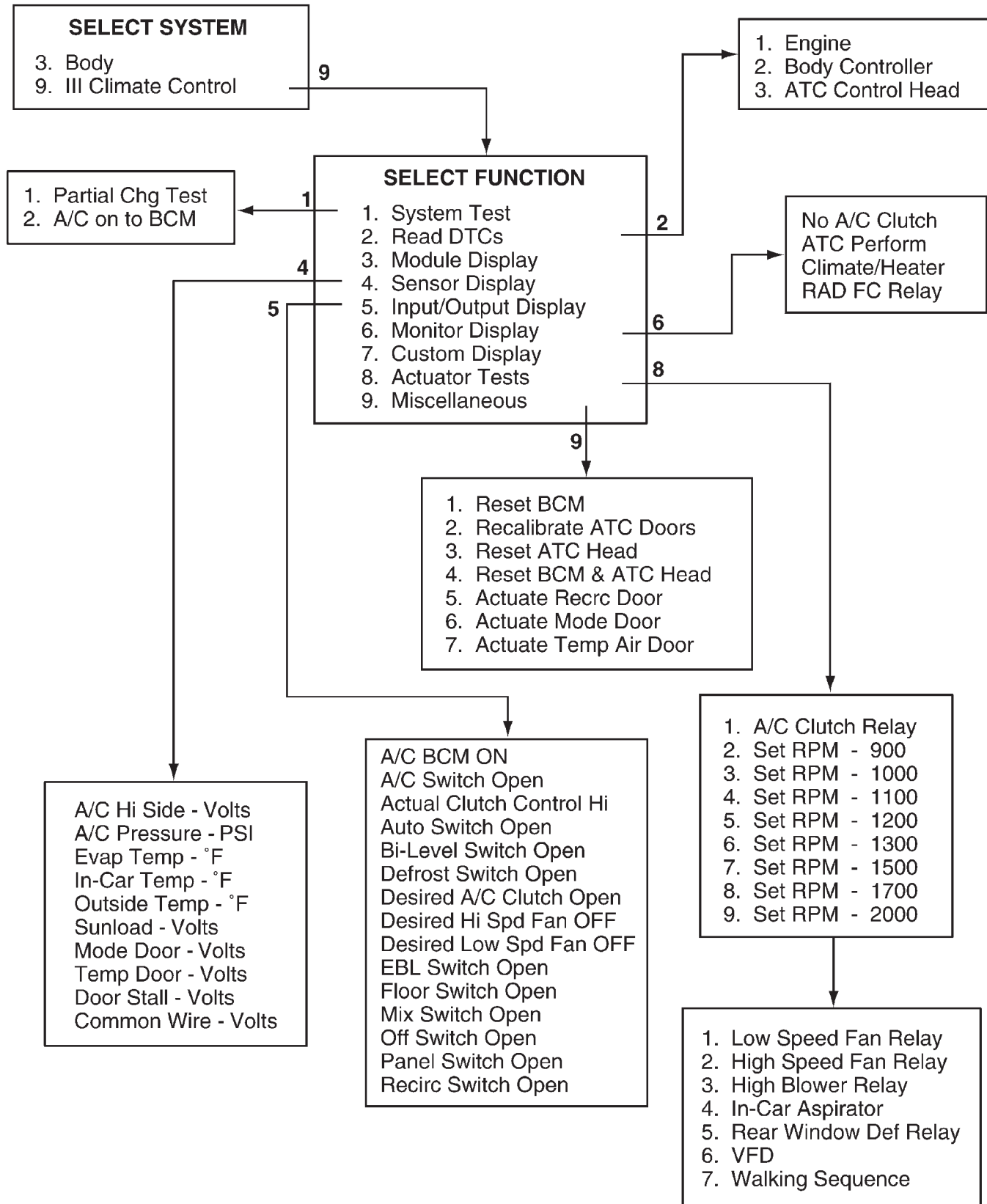


**NOTE: Most Climate Control Related items are listed.  
More items are actually in menus.**

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**Fig. 7 Scan Tool Flow Chart - ATC - 3 Body**

## DIAGNOSIS AND TESTING (Continued)

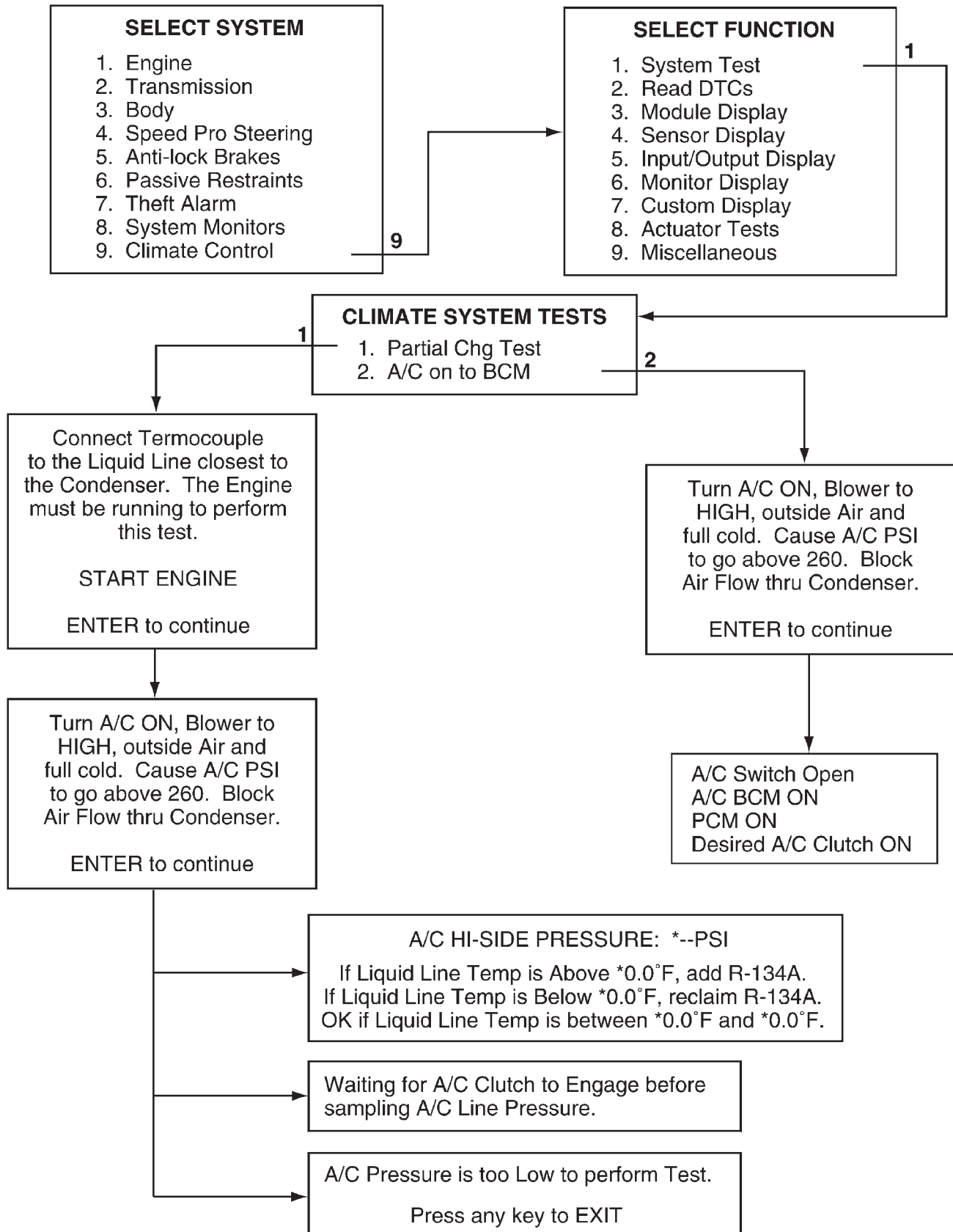


**NOTE: Most Climate Control Related items are listed.  
More items are actually in menus.**

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**Fig. 8 Scan Tool Flow Chart - ATC - 9 Climate Control**

## DIAGNOSIS AND TESTING (Continued)



\* The Temperature will vary with Pressure Change.

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**Fig. 9 Scan Tool Flow Chart - ATC - Climate System Test**

## DIAGNOSIS AND TESTING (Continued)

## HEATER PERFORMANCE TEST

## PRE-DIAGNOSTIC PREPARATIONS

Review Safety Precautions and Warnings in this group before performing the following procedures.

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

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

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

## MAXIMUM HEATER OUTPUT: TEST AND ACTION

Engine coolant is provided to the heater system by two 16 mm (5/8 inch inside diameter) heater hoses. With engine idling at normal running temperature, set the control to maximum heat, floor, and high blower setting. Using a test thermometer, check the air temperature coming from the floor outlets, refer to Temperature Reference chart.

## TEMPERATURE REFERENCE CHART

| Ambient | Temp.      | Minimum Floor | Outlet Temp. |
|---------|------------|---------------|--------------|
| 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°         |

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

## POSSIBLE LOCATIONS OR CAUSE OF OBSTRUCTED COOLANT FLOW

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

- (5) Air locked heater core.

- (6) If coolant flow is verified and outlet temperature is insufficient, a mechanical problem may exist.

## POSSIBLE LOCATION OR CAUSE OF INSUFFICIENT HEAT

- (1) Obstructed cowl air intake.
- (2) Obstructed heater system outlets.
- (3) Blend-air door not functioning properly.

## TEMPERATURE CONTROL

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

- (1) Blend-air door binding.
- (2) Faulty blend-air door motor.
- (3) Improper engine coolant temperature.
- (4) Faulty Instrument Panel Control.

## MANUAL A/C CONTROL SELF DIAGNOSTICS

The manual air conditioning system (Non-ATC Systems) have built in self diagnostics. Use the following procedures to access and test the system. All diagnostic trouble codes will be displayed through the rear window defogger switch LED light (Fig. 10).

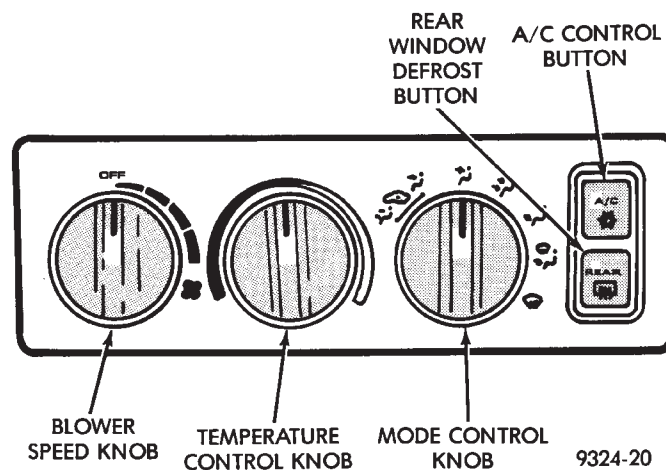


Fig. 10 Control Knobs

In order to perform any tests, the control head must be placed in its diagnostic mode. To access the diagnostic mode perform the following steps:

- (1) Start the engine and allow it to run during the entire test. The vehicle must not be moving during this test.
- (2) The left knob (Blower control) must be placed to any speed setting. Do not place the knob to the off position.
- (3) The center knob (Temp knob) must be placed in the full cool position.
- (4) The right knob (Mode control) must be placed in the defrost mode.
- (5) The A/C button on the control head can be in the on or off position.

## DIAGNOSIS AND TESTING (Continued)

(6) Press the rear window defogger switch and hold for three to five seconds. The rear window defogger switch light will begin to flash. Release the button when the light begins to flash. The system is now in the diagnostic mode. The following steps must be used to diagnose the system. To abort the diagnostic mode either:

- Turn the blower switch to the off position
- Push the A/C or rear window defogger button once
- Or change either the temperature selector or mode selector settings

(7) When the diagnostic mode is first entered, the rear window defogger switch will flash for approximately 30 seconds. During this time the actuators are being calibrated and checked. If calibration is successful the light will go out. If the rear window defogger switch light has gone out skip to Step 10 of this procedure. If the light remained on continue with this test.

(8) If there is an unsuccessful calibration, the rear window defogger switch light will remain on. This indicates that a problem is present in an actuator or there is an internal control head problem.

(9) To determine where the problem in the system is:

- Move the mode actuator knob to the mix position. If the rear window defogger switch light remains on this indicates that there is an internal problem with the control head. If the light goes out the control head electronics are good.

- Move the mode actuator knob to the floor position. If the rear window defogger switch light remains on this indicates that the blend door actuator wiring or HVAC blend (Temp) door has a problem. If the rear window defogger switch light goes off in this position indicates that the blend door actuator and circuits are good.

- Move the mode actuator knob to the Bi-Level position. If the rear window defogger switch light remains on this indicates that the mode actuator and/or circuit has a problem. If the rear window defogger switch light goes off in this position indicates that the mode actuator, HVAC mode door and circuits are good. The recirculation actuator can be checked after completing the following control knob test.

**CAUTION: Step 10 (mode actuator knob test) and step 11 (temperature knob test) cannot be performed if test in step 8 (unsuccessful calibration) occurs. One must fix problem of step 8 before testing mode and temperature knob operation.**

(10) To check the mode actuator knob perform the following:

- Run Calibration diagnostics.

- Place the mode actuator knob in the mix mode. The rear window defogger switch light should flash twice and then pause. It should continue this two flash sequence. This indicates that the mix mode has no problems.

- Place the mode actuator knob in the floor mode. The rear window defogger switch light should flash three times and then pause. It should continue this three flash sequence. This indicates that the floor mode has no problems.

- Place the mode actuator knob in the Bi-Level mode. The rear window defogger switch light should flash four times and then pause. It should continue this four flash sequence. This indicates that the Bi-Level mode has no problems.

- Place the mode actuator knob in the Panel mode. The rear window defogger switch light should flash five times and then pause. It should continue this five flash sequence. This indicates that the Panel mode has no problems.

- Place the mode actuator knob in the Recirculate Panel mode. The rear window defogger switch light should flash six times and then pause. It should continue this six flash sequence. This indicates that the Recirculate Panel mode has no problems.

- Place the mode actuator knob in the Recirculate Bi-Level mode. The rear window defogger switch light should flash seven times and then pause. It should continue this seven flash sequence. This indicates that the Recirculate Bi-Level mode has no problems.

(11) To check the temperature control knob perform the following:

- Place the mode actuator knob in the defrost position.

- Slowly turn the temperature control knob clockwise while observing the rear window defogger switch light. As you turn the knob clockwise the rear window defogger switch light should begin flashing. It will continue to flash faster as the knob is turned. Once the knob reaches full heat the rear window defogger switch light will go out.

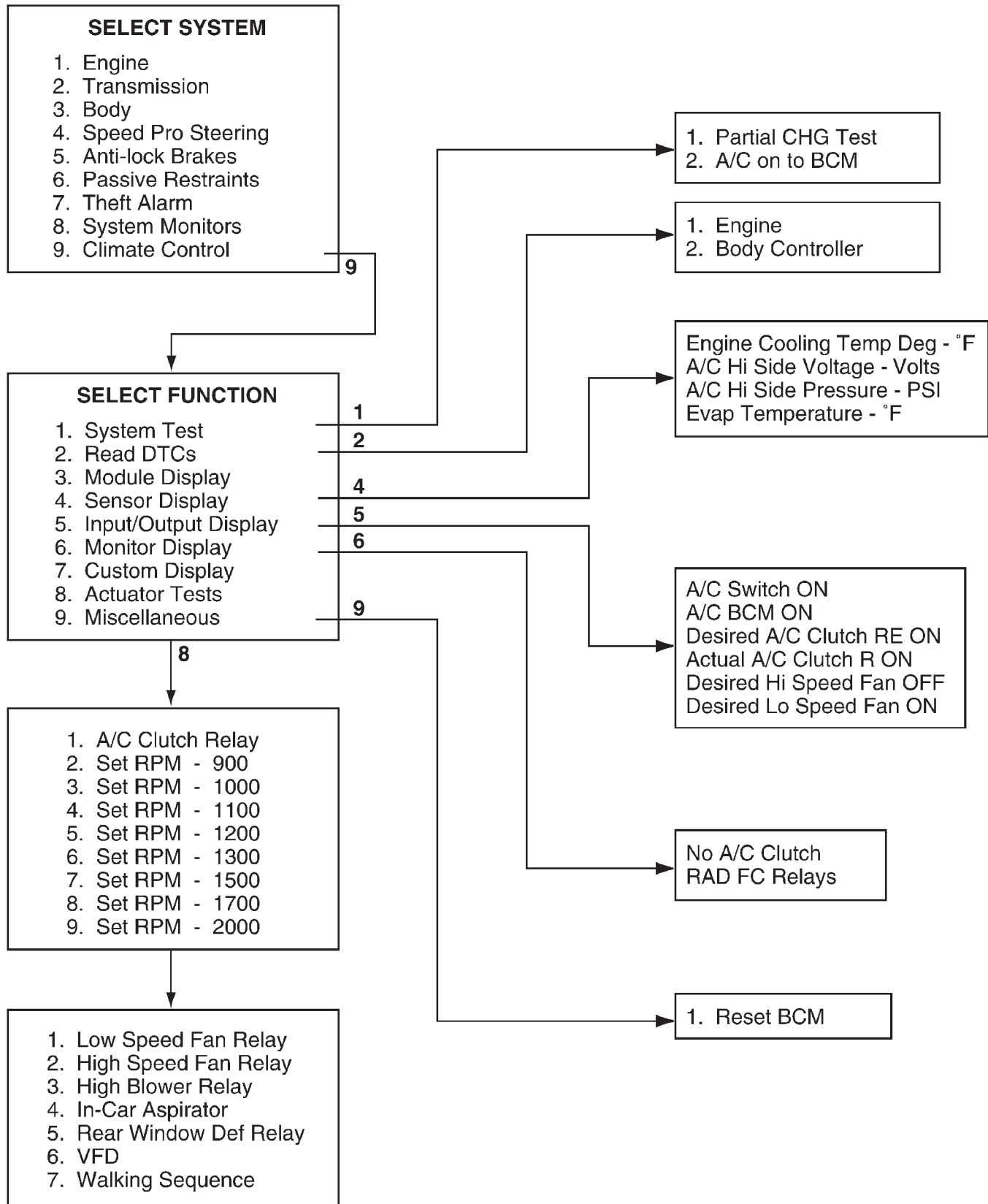
- Switch the mode actuator knob between panel and recirculate panel and observe the recirculation door for movement. If the door moves correctly the recirculation door actuator and circuits are good.

- To exit the diagnostic mode either turn off the blower or push the A/C or rear window defogger button once.

If the scan tool is to be used, refer to the proper LH Body Diagnostic Manual for proper procedures. The following Scan Tool Flow Chart is a sample of the items that can be tested with the scan tool (Fig. 11).

**NOTE: The scan tool cannot be used to check the manual - a/c control or manual - a/c, Hvac door operations.**

## DIAGNOSIS AND TESTING (Continued)



**NOTE: Most Climate Control Related items are listed.  
More items are actually in menus.**

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**Fig. 11 Scan Tool Flow Chart - Manual A/C Control**

## DIAGNOSIS AND TESTING (Continued)

### SUN SENSOR

The sun sensor is located so the sun hits the sensor in the same way that it hits the driver and the passenger. It is important that the area in front of the sensor be unobstructed. Check that the following items are not in the way of the sun sensor.

- Windshield wipers that are adjusted too high.
- Stickers on the windshield that are directly in front of the sensor.
- Top cover which is not properly installed. The sun sensor should be 1/4 inch. above the top cover.
- Caps or papers which might cover the sensor.

Refer to the proper LH Body Diagnostic Manual for electrical test procedure.

### SYSTEM OIL LEVEL

It is important to have the correct amount of lubricant in the A/C system to ensure proper lubrication of the compressor. Too little lubricant will result in damage to the compressor. Too much lubricant will reduce the cooling capacity of the system and consequently result in higher discharge air temperatures.

The lubricant used in the compressor is polyalkylene glycol PAG lubricant. Only refrigerant lubricant approved for use with R-134a should be used to service the system. Do not use any other lubricant. The lubricant container should be kept tightly capped until it is ready for use. Refrigerant lubricant will quickly absorb any moisture it comes in contact with.

It is not necessary to check or add lubricant unless it has been lost. Lubricant loss at the leak point will be evident by the presence of a wet, shiny surface around the leak.

### REFRIGERANT OIL LEVEL CHECK

When an air conditioning system is first assembled, all components (except the compressor) are refrigerant oil free. After the system has been charged with (R-134a) refrigerant and operated, the oil in the compressor is dispersed through the lines and components. The evaporator, condenser, and receiver/drier will retain a significant amount of oil. Refer to the A/C Component Refrigerant Oil Capacities chart below. When a component is replaced, the specified amount of refrigerant oil must be added. When the compressor is replaced, the amount of oil that is retained in the rest of the system must be drained from the replacement compressor. When a line or component has ruptured and oil has escaped, the compressor should be removed and drained. The receiver/drier must be replaced along with the ruptured part. The oil capacity of the system, minus the amount of oil still in the remaining components, can be measured and poured into the suction port of the compressor.

Example: On an A/C system the evaporator retains 60 ml. (2 oz.). The condenser retains 30 ml. (1 oz.) of oil, and system capacity may be 150 ml. (5.00 oz.) of oil.

150 ml. minus 90 ml. equals 60 ml. (2.00 oz.).

| A/C COMPONENT REFRIGERANT OIL CAPACITIES |         |          |
|------------------------------------------|---------|----------|
| COMPONENT NAME                           | ml.     | oz.      |
| Total Air Conditioning System            | 150 ml. | 5.00 oz. |
| Condenser                                | 30 ml.  | 1.00 oz. |
| Evaporator                               | 59 ml.  | 2.00 oz. |
| Filter/Drier                             | 30 ml.  | 1.00 oz. |
| Line Blown                               | 44 ml.  | 1.50 oz. |

**CAUTION:** The refrigerant oil used in a R-134a A/C system is unique. Use only oils which were designed to work with R-134a refrigerant. The oil designated for this vehicle is SP15 PAG (polyalkylene glycol).

### VERIFY REFRIGERANT LUBRICANT LEVEL

(1) Discharge refrigerant system using a recycling/reclaiming equipment if a charge is present.

(2) Disconnect refrigerant lines from A/C compressor. Cap the open lines to prevent moisture from entering system.

(3) Remove compressor from vehicle.

(4) From suction and discharge ports on top of compressor, drain lubricant from compressor.

(5) Add system capacity minus the capacity of components that have not been replaced. Refer to the A/C Component Refrigerant Oil Capacities chart above. Add lubricant through the suction and discharge ports on compressor. This is not to exceed 150 ml. (5.00 oz.) in total.

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

(7) Most reclaim/recycling equipment will measure the lubricant being removed. This is the amount of lubricant to be added back to the system. If a new compressor is being installed, drain lubricant from old compressor, measure the amount drained and discard old lubricant. Drain the lubricant from the new compressor into a clean container. Return the amount of lubricant measured from the old compressor, plus the amount reclaimed from the system back into the new compressor.

## SERVICE PROCEDURES

### EVACUATING REFRIGERANT SYSTEM

**NOTE:** Special effort must be used to prevent moisture from entering the A/C system oil. Moisture in the oil is very difficult to remove and will cause a reliability problem with the compressor.

If a compressor designed to use R-134a refrigerant is left open to the atmosphere for an extended period of time. It is recommended that the refrigerant oil be drained and replaced with new oil or a new compressor be used. This will eliminate the possibility of contaminating the refrigerant system.

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

**NOTE:** When connecting the service equipment coupling to the line fitting, verify that the valve of the coupling is fully closed. This will reduce the amount of effort required to make the connection. If connection is still difficult to make refer to TSB #24-02-93.

(1) Connect a suitable charging station, refrigerant recovery machine, and a manifold gauge set with vacuum pump (Fig. 12).

(2) Open suction and discharge valves and start vacuum pump. The vacuum pump should run a minimum of 45 minutes prior to charge, to eliminate all moisture in system. When suction gauge reads -88 kPa (-26 in. Hg) vacuum or greater for 45 minutes, close all valves and turn off vacuum pump. If the system fails to reach specified vacuum, the refrigerant system likely has a leak that must be corrected. If the refrigerant system maintains specified vacuum for at least 30 minutes, start the vacuum pump, open the suction and discharge valves. Then allow the system to evacuate an additional 10 minutes.

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

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

### R-134a REFRIGERANT

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

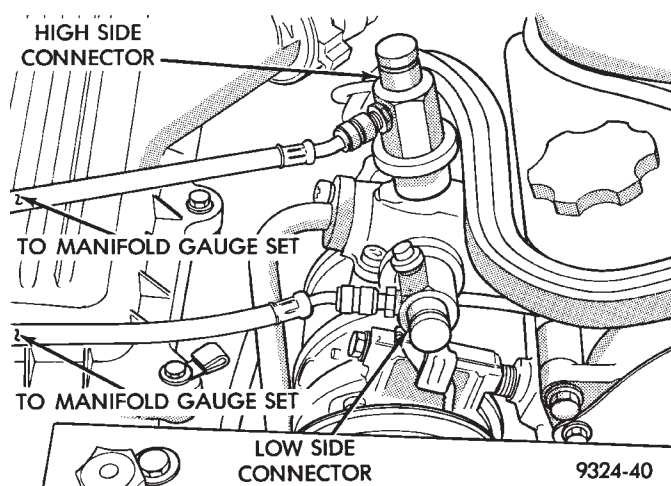


**Fig. 12 Gauge Set or Refrigerant Recovery Machine Hookup**

R-134a refrigerant is not compatible with R-12 refrigerant in an air conditioning system. Even a small amount of R-12 in a R-134a system could cause compressor failure, refrigerant oil sludging or poor performance. **Never add R-12 to a system designed to use R-134a. System failure will occur.**

Both of the service ports to charge the air conditioning system are located on the hoses (Fig. 13). New design of service ports have been used to ensure that the system is not accidentally filled with the wrong refrigerant (R-12).

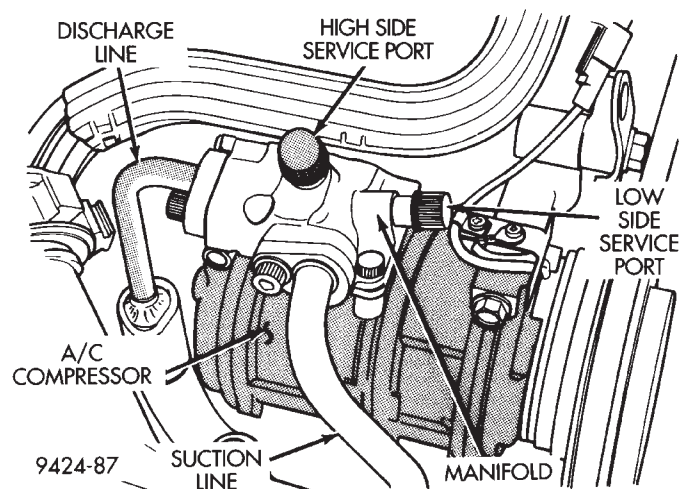


**Fig. 13 A/C Service Ports**

When servicing a system, it is required that an air conditioning charging recovery/recycling machine be used (Fig. 14). Contact an automotive service equipment supplier for proper equipment. Refer to the operating instructions provided with the equipment for proper operation.

A manifold gauge set (Fig. 15) must also be used in conjunction with the charging and/or recovery/recy-

## SERVICE PROCEDURES (Continued)

cling device. Only use gauges that have not been used for R-12. The service hoses on the gauge set should have manual (turn wheel) or automatic back flow valves at the service port connector ends. This will prevent refrigerant R-134a from being released into the atmosphere.

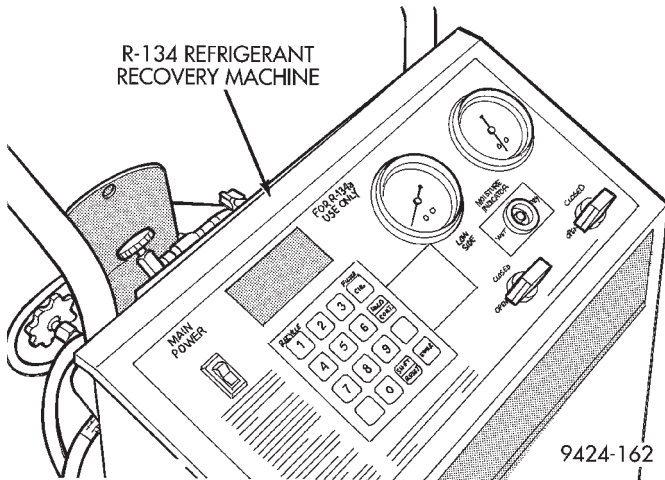


**Fig. 14 Refrigerant Recovery/Recycling Station - Typical**

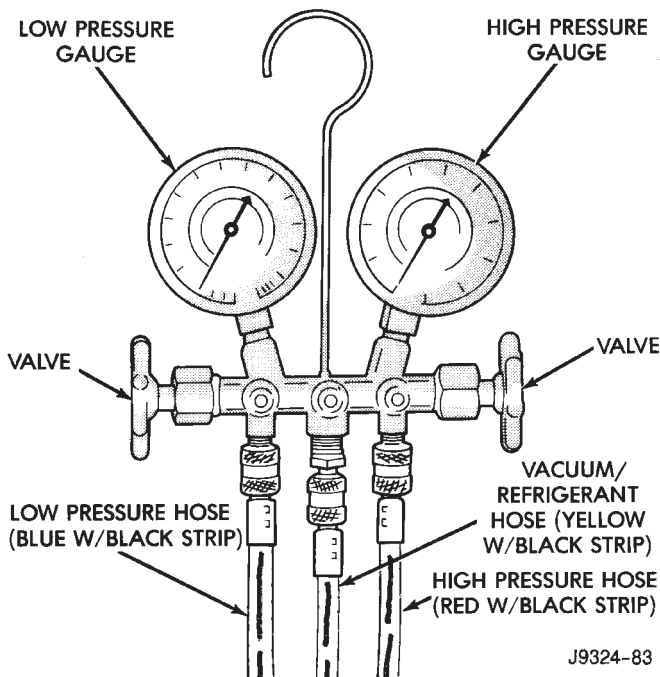


**Fig. 15 Manifold Gauge Set - Typical**

R-134a refrigerant requires a special type of compressor oil. When adding oil, make sure that it is designed to be used in a R-134a system. Refer to the label under the hood for proper oil and refrigerant charge levels (Fig. 16).

Due to the different characteristics of R-134a it requires all new service procedures.

**ATTENTION**

**R-134a** A/C REFRIGERANT  
FACTORY CHARGE 0.8kg(1.75lb)  
SERVICE PART No. 82300101

**SP10 PAG** COMPRESSOR OIL  
SERVICE PART No. 82300350

**WARNING: HIGH-PRESSURE REFRIGERANT SYSTEM TO BE SERVICED BY QUALIFIED PERSONNEL ONLY.**

CONSULT SERVICE MANUAL. IMPROPER SERVICE METHODS MAY CAUSE PERSONAL INJURY. SYSTEM MEETS SAFETY REQUIREMENTS OF SAE STANDARD J639.



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**Fig. 16 Underhood Label**

**WARNING: AVOID BREATHING A/C REFRIGERANT AND LUBRICANT VAPOR OR MIST. EXPOSURE MAY IRRITATE EYES, NOSE AND THROAT. USE ONLY APPROVED SERVICE EQUIPMENT MEETING SAE REQUIREMENTS TO RECLAIM R-134a SYSTEMS. IF ACCIDENTAL SYSTEM DISCHARGE OCCURS, VENTILATE WORK AREA BEFORE RESUMING SERVICE.**

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

The use of R-134a will have a positive environmental impact due to its zero ozone depletion and low global warming impact.

**THERMOCOUPLE PROBE**

To diagnose the LH A/C system, a temperature probe is required to measure liquid line temperature. The clamp-on type K probe shown in this manual is available through the Chrysler Professional Service Equipment (PSE) program. This probe is compatible with temperature-measuring instruments that accept Type K Thermocouples and have a miniature connector input. Other temperature probes are available through aftermarket sources. All references in this manual will reflect the use of the probe made available through the Professional Service Equipment program.

In order to use the temperature probe, a digital thermometer will be required. If a digital thermometer is not available, an adapter is available through the Professional Service Equipment program. It can convert any standard digital multimeter into a thermometer. This adapter is designed to accept any standard K-type thermocouple.

If a digital multimeter is not available, it can be ordered through Professional Service Equipment program.

## SERVICE PROCEDURES (Continued)

## SYSTEM CHARGE LEVEL

## TO CHECK OR FILL SYSTEM

The procedure below should be used to check and/or fill the refrigerant charge in the air conditioning system.

**NOTE:** The air conditioning system in this vehicle holds 0.794 Kg. (28 oz. or 1.75 lbs.) of R-134a refrigerant.

This procedure can be performed two different ways:

- With a scan tool (DRB) and a thermocouple (Fig. 17). Use the scan tool (DRB) diagnostic topic: Partial Charge Test. Refer to the proper Body Diagnostic Manual.
- Using a manifold gauge set (Fig. 18), a thermocouple and the Charge Determination Graph (Fig. 19). It is recommended to use the gauges or reclaim/recycle equipment.

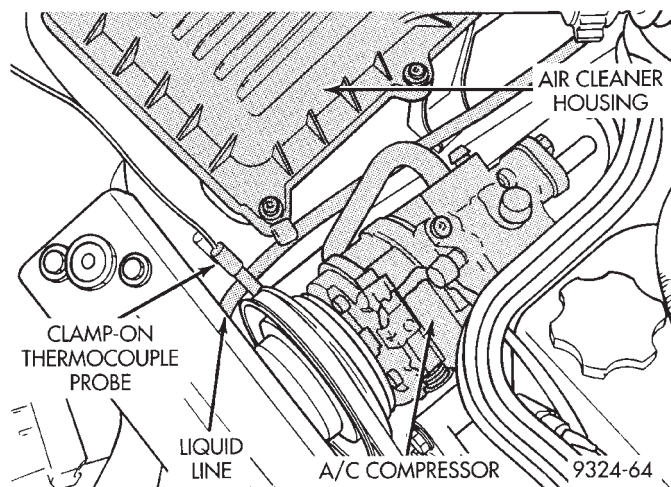


**Fig. 17 Thermocouple Attachment Point**

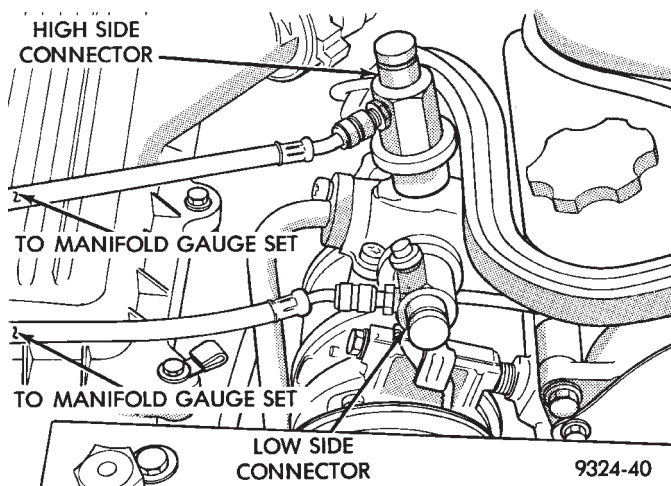


**Fig. 18 Manifold Gauge Hook-up**

**WARNING: AVOID BREATHING A/C REFRIGERANT AND LUBRICANT VAPOR OR MIST. EXPOSURE MAY IRRITATE EYES, NOSE AND THROAT. USE ONLY APPROVED SERVICE EQUIPMENT MEETING SAE REQUIREMENTS TO DISCHARGE R-134a SYSTEM. IF ACCIDENTAL SYSTEM DISCHARGE OCCURS, VENTILATE WORK AREA BEFORE RESUMING SERVICE.**

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

(1) Establish your preferred method of measuring compressor discharge pressure. Use a manifold gauge set or a scan tool.

(2) Attach a clamp-on thermocouple (P.S.E. 66-324-0014 or 80PK-1A) or equivalent to the liquid line (Fig. 17). It must be placed as close to the condenser outlet as possible to observe liquid line temperature. Refer to "Thermocouple Probe" in this section for more information on probe.

(3) The vehicle must be in the following modes:

- Transaxle in Park
- Engine Idling at 700 rpm
- A/C Controls Set to Outside Air
- Panel Mode
- Full Cool
- High Blower
- A/C Button in the ON position
- Vehicle Windows Open.
- Recirc button turned OFF on ATC equipped vehicles

(4) Operate system for a couple of minutes to allow the system to stabilize.

(5) Set system pressure to about 1793 kPa (260 psi) by blocking off the airflow to the front grill area. This will maintain a constant pressure and stop the cooling fans from alternating between high and low speeds.

(6) Observe Discharge pressure and Liquid line temperature. Using the Charge Determination Graph determine where the system is currently operating (Fig. 19). If the system is in the undercharged region, ADD 0.057 Kg. (2 oz.) to the system and recheck readings. If the system is in the overcharged region, RECLAIM 0.057 Kg. (2 oz.) from the system and recheck readings. Continue this process until the system readings are in the proper charge area on the Charge Determination Chart (Fig. 19).

(7) The scan tool procedure does not require the Charge Determination Graph. The correct liquid line temperature range is calculated by the scan tool automatically.

## SERVICE PROCEDURES (Continued)

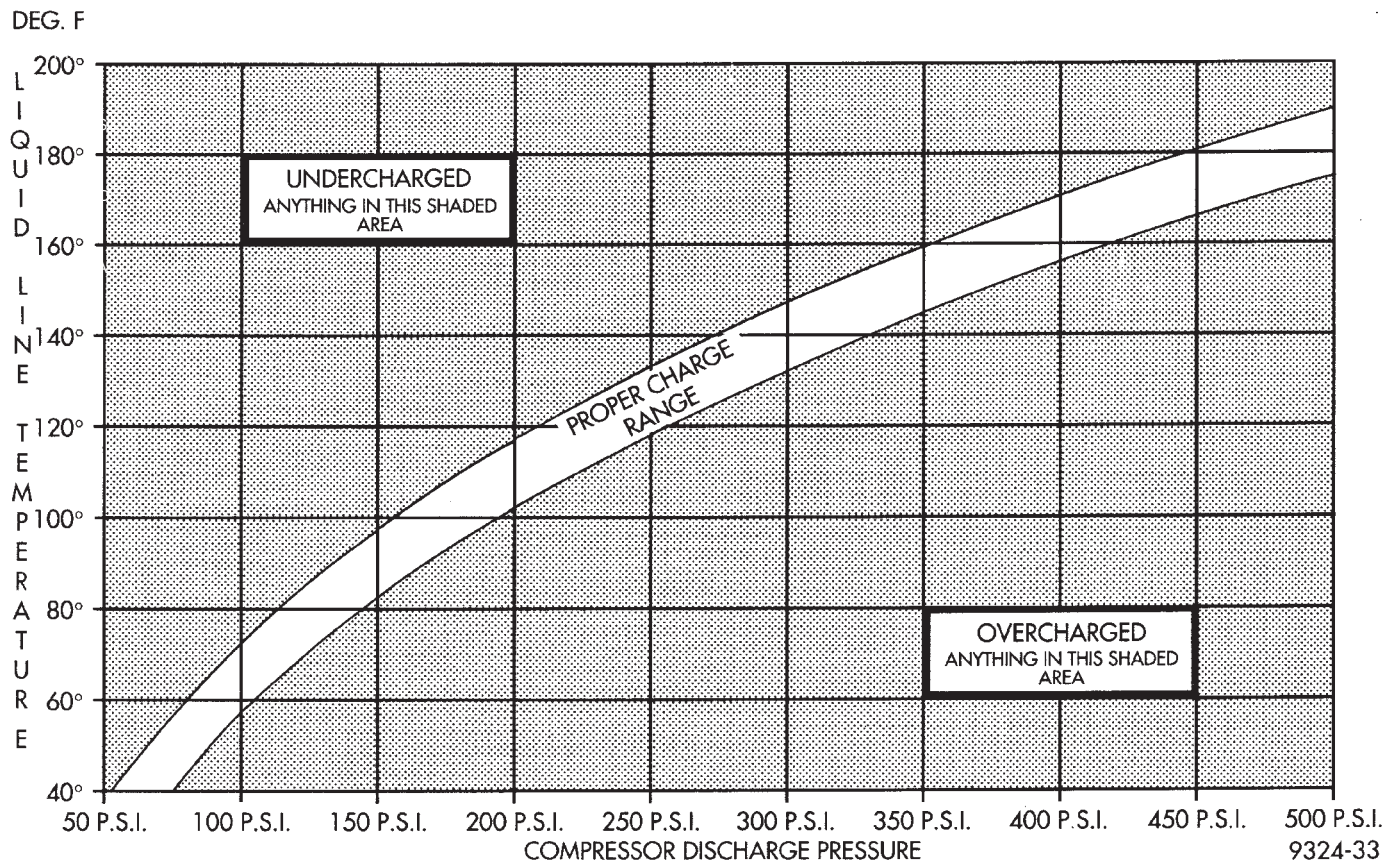


Fig. 19 Charge Determination Graph

## SYSTEM LEAK CHECKING

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

**AVOID BREATHING A/C REFRIGERANT AND LUBRICANT VAPOR OR MIST. EXPOSURE MAY IRRITATE EYES, NOSE AND THROAT. USE ONLY APPROVED SERVICE EQUIPMENT MEETING SAE REQUIREMENTS TO DISCHARGE R-134a SYSTEM. IF ACCIDENTAL SYSTEM DISCHARGE OCCURS, VENTILATE WORK AREA BEFORE RESUMING SERVICE.**

If the A/C system is not cooling properly, determine if the refrigerant system is fully charged with R-134a. This is accomplished by performing a system Charge Level-Check or Fill. If while performing this test A/C liquid line pressure is less than 207 kPa (30 psi) proceed to Empty Refrigerant System Leak Test. If liquid line pressure is greater than 207 kPa (30 psi) proceed to low refrigerant level leak test. If the

refrigerant system is empty or low in refrigerant charge, a leak at any line fitting or component seal is likely. A review of the fittings, lines and components for oily residue is an indication of the leak location. To detect a leak in the refrigerant system, perform one of the following procedures as indicated by the symptoms.

## EMPTY REFRIGERANT SYSTEM LEAK TEST

(1) Evacuate the refrigerant system to the lowest degree of vacuum possible (approx. 28 in Hg.). Determine if the system holds a vacuum for 15 minutes. If vacuum is held, a leak is probably not present. If system will not maintain vacuum level, proceed with this procedure.

(2) Prepare a .284 Kg. (10 oz.) refrigerant charge to be injected into the system.

(3) Connect and dispense .284 Kg. (10 oz.) of refrigerant into the evacuated refrigerant system.

(4) Proceed to Step 2 of Low Refrigerant Level Leak Test.

## LOW REFRIGERANT LEVEL LEAK TEST

(1) Determine if there is any (R-134a) refrigerant in the system.. Use the scan tool (DRB) partial charge test or pressure gauge liquid line temperature

## SERVICE PROCEDURES (Continued)

partial charge check. See system charge level check or fill for procedure.

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

(3) Bring the refrigerant system up to operating temperature and pressure. This is done by allowing the engine to run for five minutes with the system set to the following:

- Transaxle in Park
- Engine Idling at 700 rpm
- A/C Controls Set in 100 percent outside air
- Blower switch in the high A/C position
- A/C in the ON position
- Open all windows

**CAUTION:** A leak detector designed for R-12 refrigerant will not detect leaks in a R-134a refrigerant system.

(4) Shut off the vehicle and wait 2 to 7 minutes. Then use an Electronic Leak Detector that is designed to detect R-134a type refrigerant and search for leaks. Fittings, lines, or components that appear to be oily usually indicates a refrigerant leak. To inspect the evaporator core for leaks, insert the leak detector probe into the drain tube opening or a heat duct.

If a thorough leak check has been completed without indication of a leak, proceed to System Charge Level.

## REMOVAL AND INSTALLATION

## A/C PRESSURE TRANSDUCER

The A/C Pressure Transducer functions as the refrigerant system pressure sensor. It supports the condenser/radiator fans and compressor functions. The pressure transducer is screwed attached to a valve on the discharge line near the compressor.

## AMBIENT TEMPERATURE SENSOR

The ambient air temperature sensor is located on the inside of the left front bumper beam (Fig. 20). This sensor will inform the ATC system of the ambient temperature outside the vehicle. This sensor is used by the ATC system to adjust blower speed, temperature offsets, evaporator temperatures and mode control.

The ambient sensor is not serviceable and must be replaced if found to be defective.

If this sensor fails the ATC system will use the battery temperature information as a back up.

To test Ambient Temperature Sensor, refer to proper LH Body Diagnostic Manual.

## REMOVAL

- (1) Remove sensor mounting screw.
- (2) Disconnect sensor wiring connector.

## INSTALLATION

For installation, reverse the above procedures.

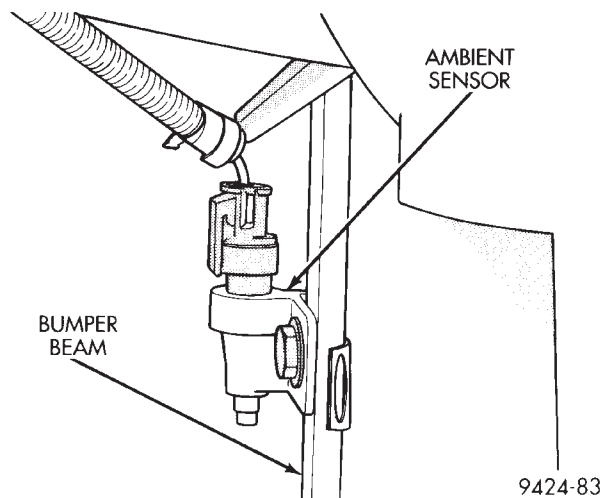


**Fig. 20 Ambient Sensor**

## ATC IN-CAR TEMPERATURE SENSOR

## REMOVAL

- (1) Remove right side instrument panel trim end cap (Fig. 21).
- (2) Remove right trim bezel from instrument panel (Fig. 22). It is held in place by friction and a screw.
- (3) Remove sensor retaining screws.
- (4) Pull out sensor from instrument panel and disconnect wiring.

## INSTALLATION

For installation, reverse the above procedures.

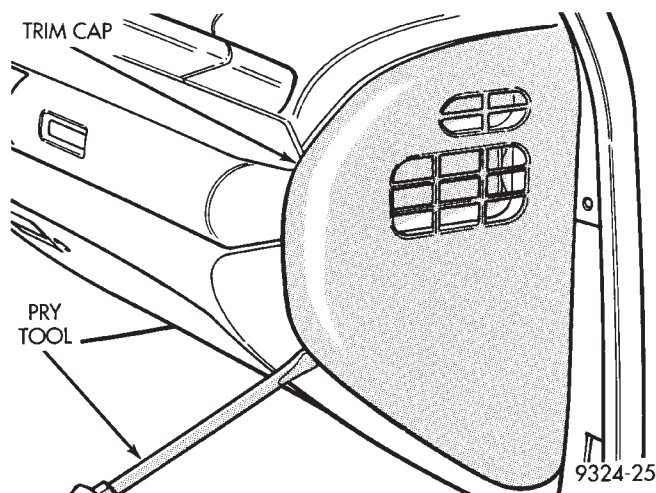
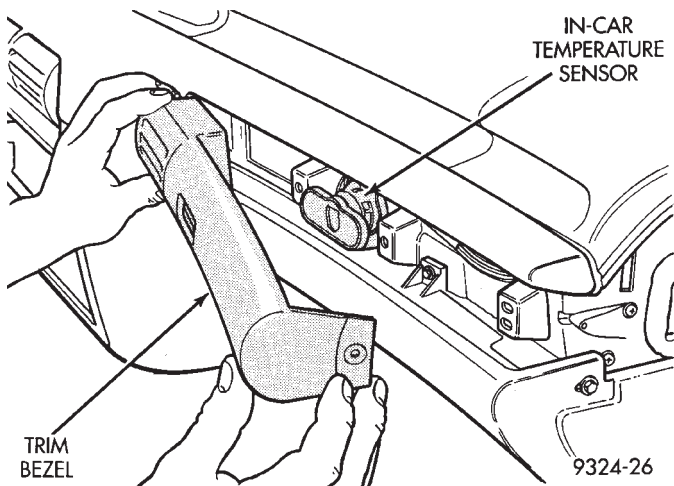
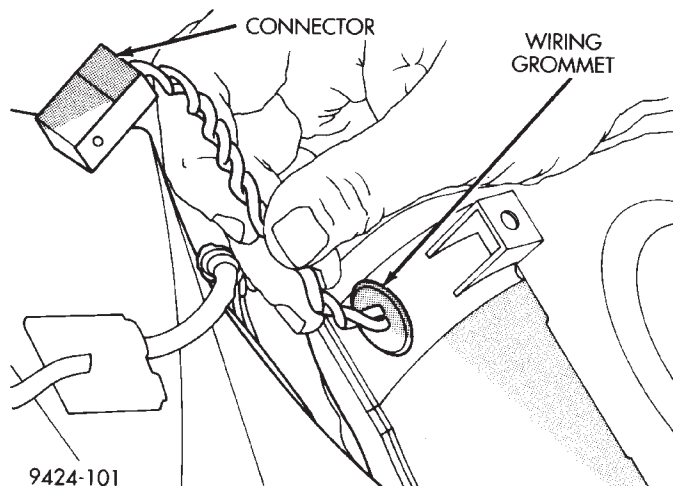


**Fig. 21 Trim Cap Removal**

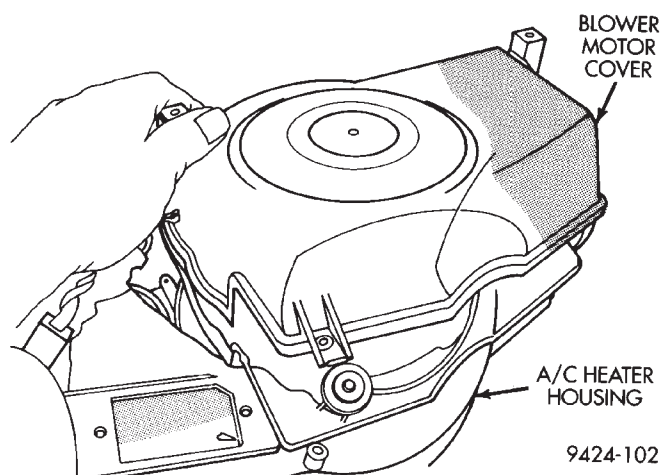
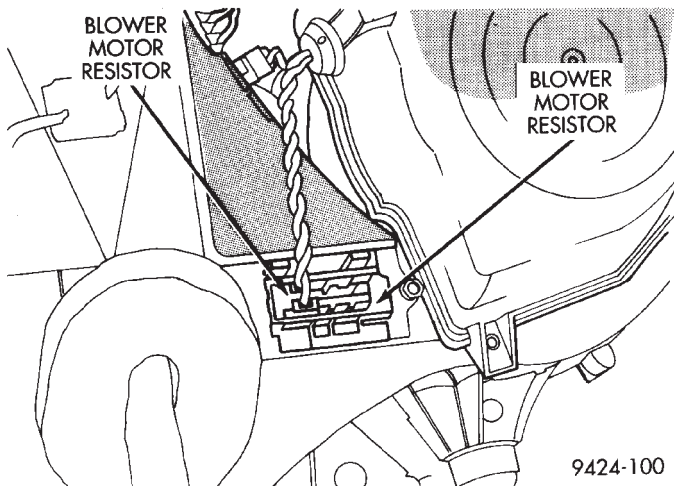
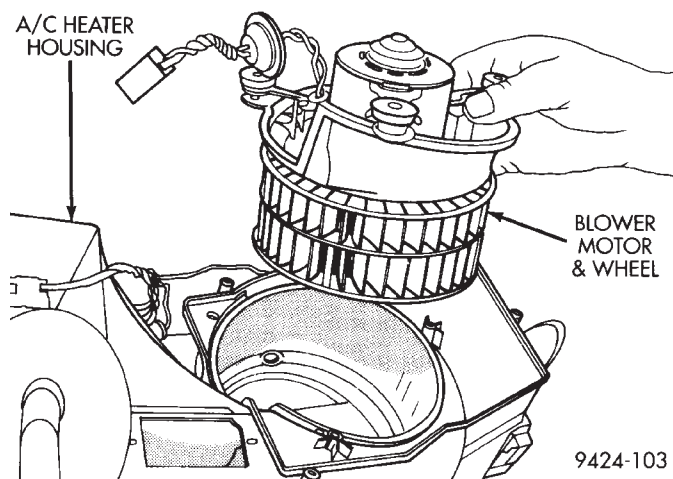
## REMOVAL AND INSTALLATION (Continued)

**Fig. 22 Trim Cap Removal****Fig. 24 Wiring Grommet****BLOWER MOTOR AND WHEEL ASSEMBLY**

The blower motor is located on the right side of the heater housing. The blower motor and the blower motor wheel must be replaced as an assembly.

**REMOVAL**

- (1) Disconnect battery.
- (2) Remove lower right under panel silencer duct.
- (3) Remove blower motor connector from resistor block (Fig. 23).
- (4) Squeeze blower motor wiring grommet and push grommet through blower motor housing cover (Fig. 24).
- (5) Remove blower motor housing cover (Fig. 25).
- (6) Remove blower motor retaining screws.
- (7) Lower blower motor from housing (Fig. 26).

**Fig. 25 Blower Motor Cover****Fig. 23 Blower Motor Wiring****Fig. 26 Blower Motor****INSTALLATION**

For installation, reverse the above procedures.

Some vehicles may exhibit a whistling noise from the heater housing unit. This noise is most noticeable with the fan in the mid-range speed and the blend

air door in the high temperature position. If this noise occurs, proceed with the Sealing Procedure.

## REMOVAL AND INSTALLATION (Continued)

## SEALING PROCEDURE

This repair involves sealing the seam between the upper and lower heater/AC housings.

- Remove the blower motor and wheel assembly.
- Apply strip caulking (Dum-Dum) to all seam areas around the blower wheel housing and evaporator housing. The seams can be reached from the blower motor opening. Do not add an excessive amount which will restrict airflow.

## BLOWER MOTOR RESISTOR

## REMOVAL

- (1) Remove lower right underpanel silencer/duct.
- (2) Disconnect wiring connectors on blower motor resistor.
- (3) Remove blower motor resistor retaining screws.
- (4) Pull blower motor resistor out of heater housing (Fig. 27).

## INSTALLATION

For installation, reverse the above procedures.

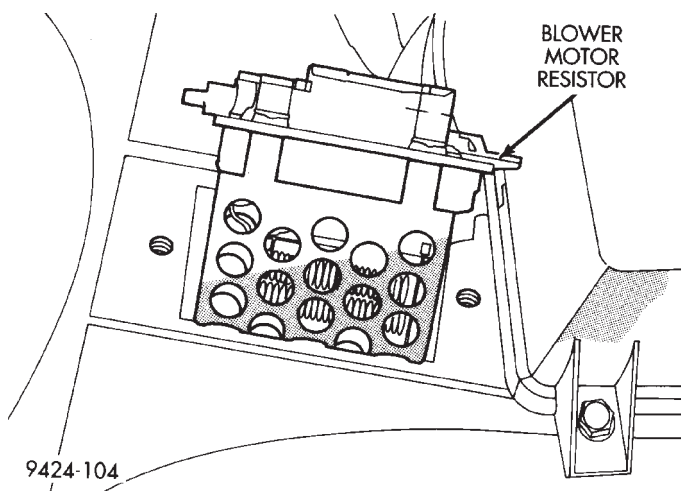


Fig. 27 Blower Motor Resistor

## BLOWER MOTOR WHEEL

The blower motor wheel is only serviced with the blower motor. The wheel and the motor are balanced as an assembly. If the blower motor wheel requires replacement, the blower motor must also be replaced. Refer to blower motor for replacement procedure.

## BLOWER MOTOR POWER MODULE

## REMOVAL

- (1) Remove lower right under panel access cover silencer duct.
- (2) Disconnect wiring connector on blower motor module.
- (3) Remove blower motor module retaining screws.
- (4) Pull blower motor module out of heater housing (Fig. 28).

## INSTALLATION

For installation, reverse the above procedures.

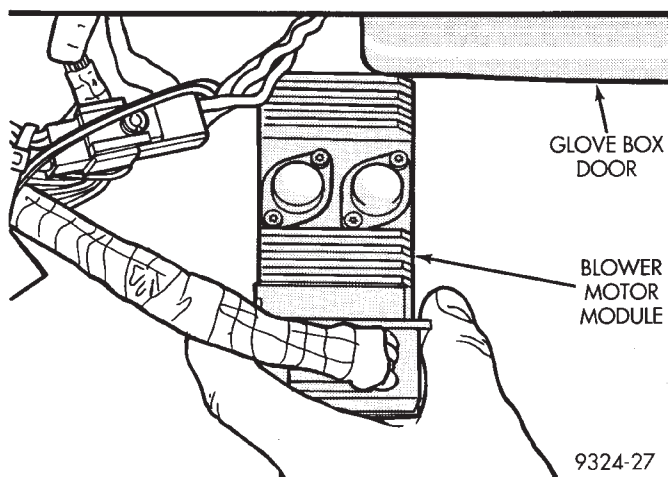


Fig. 28 Blower Motor Module Removal

## COMPRESSOR

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

**WARNING: REFRIGERANT PRESSURES REMAIN HIGH EVEN THOUGH THE ENGINE MAY BE TURNED OFF. DO NOT TWIST OR KINK THE REFRIGERANT LINES WHEN REMOVING A FULLY CHARGED COMPRESSOR. SAFETY GLASSES MUST BE WORN.**

## REMOVAL

- (1) Disconnect Negative battery cable.
- (2) Loosen and remove drive belts (refer to Group 7, Engine Cooling) and disconnect compressor clutch wire lead.
- (3) Remove refrigerant from the A/C system (with a refrigerant recovery machine) if the compressor is being replaced.
- (4) Remove refrigerant lines from compressor and disconnect electrical connector.
- (5) If system is left open place plug/cap over open lines.
- (6) Remove compressor attaching bolt.
- (7) Remove compressor. If refrigerant lines were not removed, lift compressor/clutch assembly and tie it to a suitable component.

## INSTALLATION

For installation, reverse the above procedures. Torque Compressor bolts to 28 N·m (21 ft. lbs.)

## REMOVAL AND INSTALLATION (Continued)

### COMPRESSOR HIGH-PRESSURE RELIEF VALVE

The high pressure relief valve is located on the A/C compressor manifold (Fig. 29).

#### REMOVAL

- (1) Remove refrigerant from A/C system using a refrigerant recovery machine.
- (2) Rotate the high pressure relief valve counter-clockwise and separate relief valve from the vehicle.

#### INSTALLATION

For installation, reverse the above procedures using a new O-ring seal. Evacuate and charge the refrigerant system. Torque 5/8" Hex to 13.5 N·m (10 ft. lbs.).

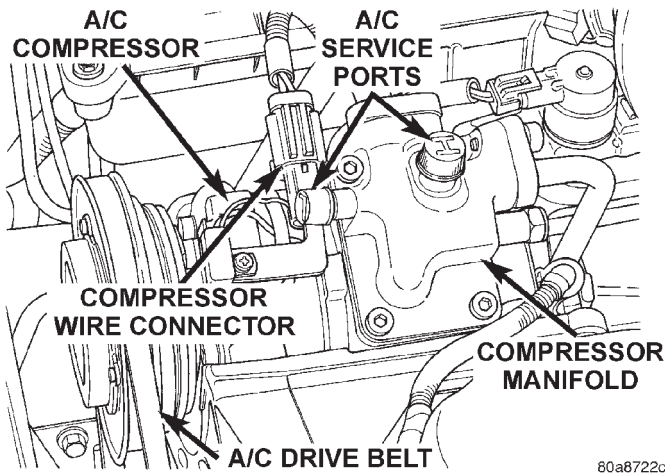


Fig. 29 High Pressure Relief Valve

### COMPRESSOR CLUTCH/COIL ASSEMBLY

#### REMOVAL

Compressor assembly must be removed from mounting. Although, refrigerant discharge is not necessary.

- (1) Remove the compressor shaft bolt (Fig. 30). A band type oil filter removal tool can be placed around the clutch plate to aid in bolt removal.
- (2) Tap the clutch plate with a plastic hammer and remove clutch plate and shim(s) (Fig. 31).

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

- (3) Remove pulley retaining snap ring with Snap Ring Pliers (C-4574), and slide pulley assembly off of compressor (Fig. 32).
- (4) Remove coil wire bracket/ground clip screw and wire harness.
- (5) Remove snap ring retaining field coil onto compressor housing (Fig. 33). Slide field coil off of compressor housing.

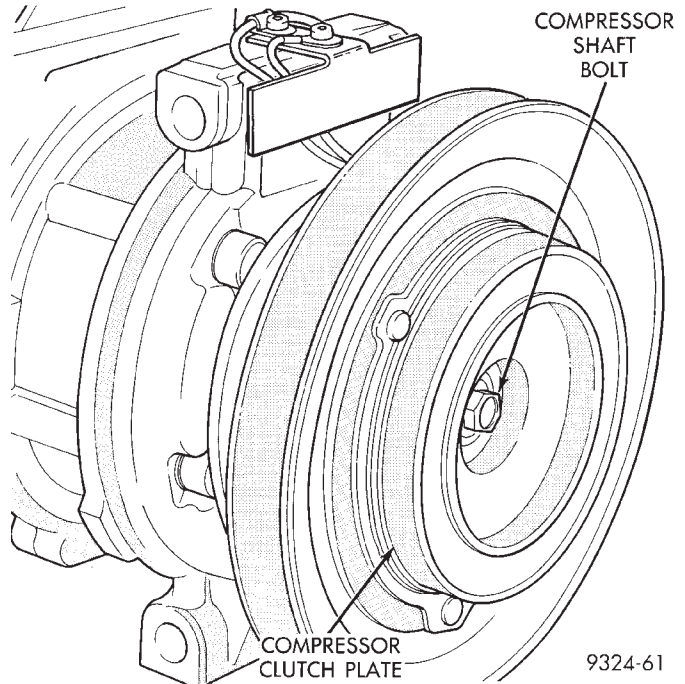


Fig. 30 Compressor Shaft Bolt and Clutch Plate

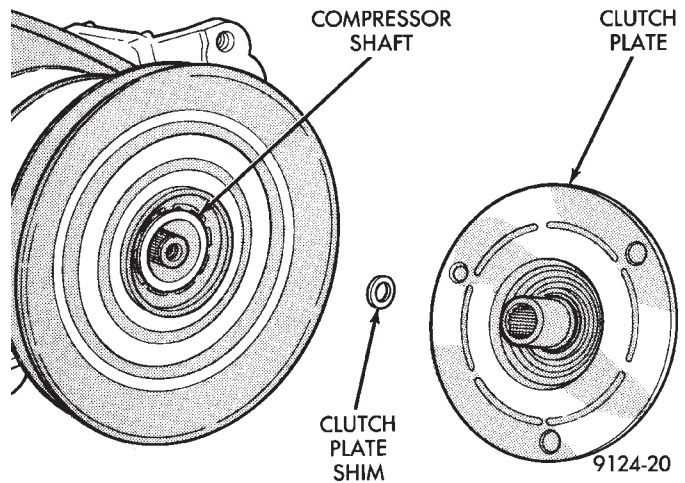


Fig. 31 Clutch Plate and Shim(s)

(6) Examine frictional faces of the clutch pulley and front plate for wear. The pulley and front plate should be replaced if there is excessive wear or scoring. If the friction surfaces are oily, inspect the shaft nose area of the compressor for oil and remove the felt from the front cover. If the compressor felt is saturated with oil, the shaft seal is leaking and will have to be replaced.

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

#### INSTALLATION

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

## REMOVAL AND INSTALLATION (Continued)

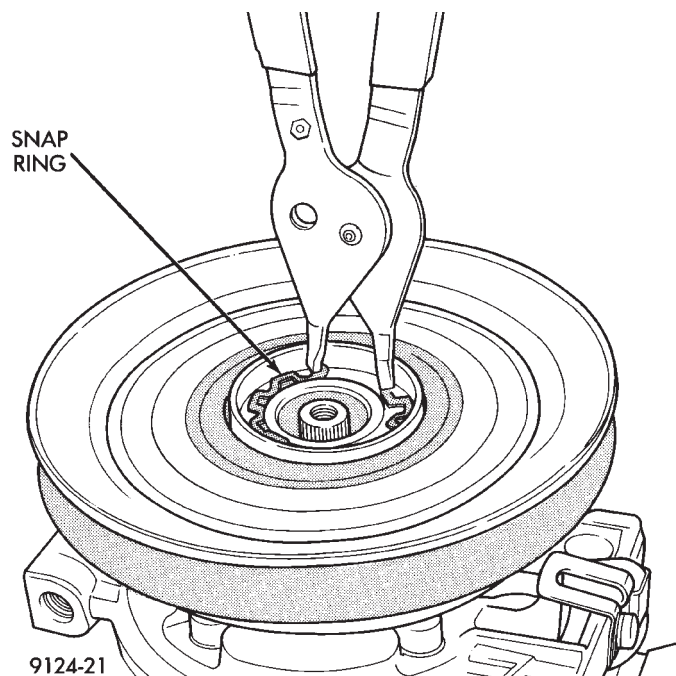


Fig. 32 Removing Pulley Snap Ring

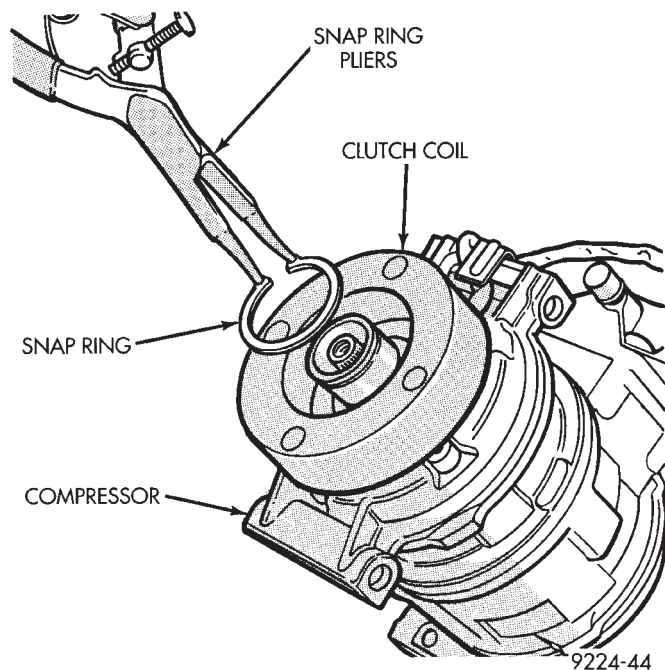


Fig. 33 Clutch Coil Snap Ring

fasten the diode and coil wire bracket with retaining screw.

(2) Install field coil retaining snap ring with Snap Ring Pliers (C- 4574). Press snap ring to make sure it is properly seated in the groove.

**NOTE:** The bevel side of the snap ring must be outward. Also both eyelets must be to the right or left of the pin on the compressor.

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

**Do not mar the pulley frictional surface.**

(3) Install pulley assembly to compressor. If necessary, tap gently with a block of wood on the friction surface (Fig. 34).

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

**NOTE:** The bevel side of the snap ring must be facing outward.

(5) If the original front plate assembly and pulley assembly are to be reused, the old shim(s) can be used. If not, place a trial stack of shims, 2.54 mm (0.10 in.) thick, on the shaft against the shoulder.

(6) Install front plate assembly onto shaft.

(7) If installing a new front plate and/or pulley assembly, the gap between front plate and pulley face must be checked. Use the following procedure:

(a) Attach a dial indicator to front plate so that movement of the plate can be measured.

(b) With the dial indicator zeroed on the front plate, energize the clutch and record the amount of movement.

(c) The readings should be 0.35 to 0.65 mm (0.014 to 0.026 in.). If proper reading is not obtained, add or subtract shims until desired reading is obtained.

(8) Install compressor shaft bolt. Tighten to  $17.5 \pm 2$  N·m ( $155 \pm 20$  in. lbs.).

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

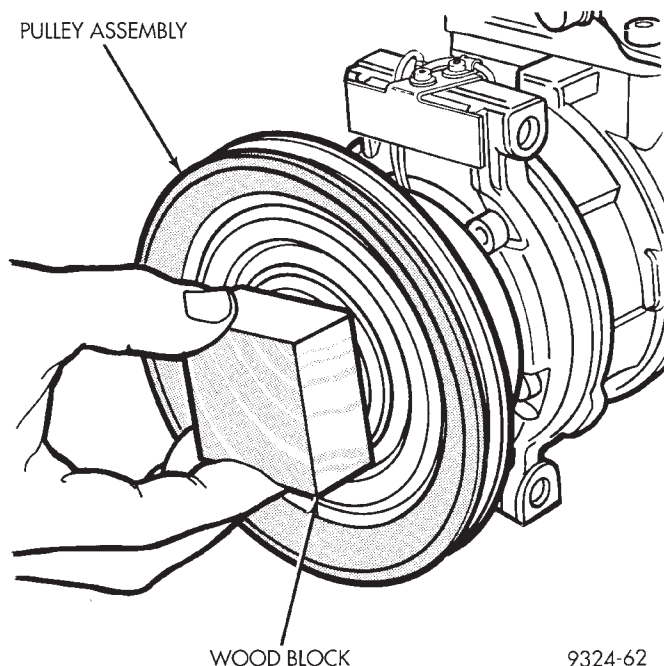


Fig. 34 Installing Pulley Assembly

## REMOVAL AND INSTALLATION (Continued)

**CLUTCH BREAK-IN**

After new clutch installation, cycle the A/C clutch 20 times (5 seconds ON and 5 seconds OFF). During this procedure, set the system to the A/C mode, engine rpm at 1500-2000, and high blower speed. This procedure (burnishing) will seat the opposing friction surfaces and provide a higher clutch torque capability.

**NOTE:** Excessive clutch gap will result in clutch slippage or non-engagement.

**CONDENSER**

The condenser is located between the radiator and the front bumper. The condenser can be serviced without having to drain the cooling system or remove the radiator.

CONCORD, INTREPID, VISION

**REMOVAL**

- (1) Remove refrigerant from the A/C system using a refrigerant recovery machine.
- (2) Disconnect and cap A/C lines at the condenser.
- (3) Remove condenser mounting bolts and unscrew 3/4 inch nut at filter - drier.
- (4) Remove screw from condenser inlet tube bracket and spread bracket open. The filter- drier comes out separate from the condenser.

**CAUTION:** Avoid bending or breaking condenser inlet tube when lifting condenser from the vehicle.

- (5) Lift condenser from vehicle.

**INSTALLATION**

For installation, reverse the above procedures.

**LHS**

The cooling module assembly must be removed to service the condenser. Removing the condenser using other methods may cause damage to the condenser and/or radiator assembly.

**REMOVAL**

- (1) Disconnect negative battery cable.
- (2) Remove sight shield (Fig. 35).
- (3) Remove right and left headlamp modules. Refer to Group 23 Body for removal procedure.
- (4) Drain engine cooling system. Refer to Group 7 Engine Cooling for proper procedure.
- (5) Remove refrigerant from A/C system using a recovery machine.
- (6) Disconnect and cap A/C lines at condenser.
- (7) Remove upper radiator crossmember (Fig. 36).
- (8) Remove hose clamps and hoses from radiator.

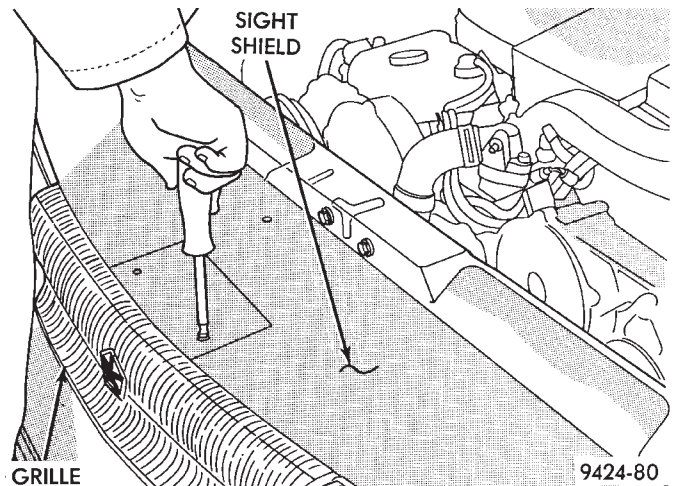


**Fig. 35 Sight Shield Removal**

(9) Disconnect automatic transaxle cooler line hoses from cooler. Temporarily plug cooler lines after removal.

(10) Disconnect fan wiring connector from RFI Module.

(11) Remove upper radiator mounting screws to body. Access to mounting screws can be obtained through hole in headlamp module bracket.

(12) Lift entire cooling module from vehicle.

**CAUTION:** Avoid bending or breaking condenser inlet tube, and do not damage radiator cooling fins or coolant tubes during module removal.

(13) Remove air conditioning condenser attaching screws (Fig. 37) located at front of radiator to separate radiator from condenser.

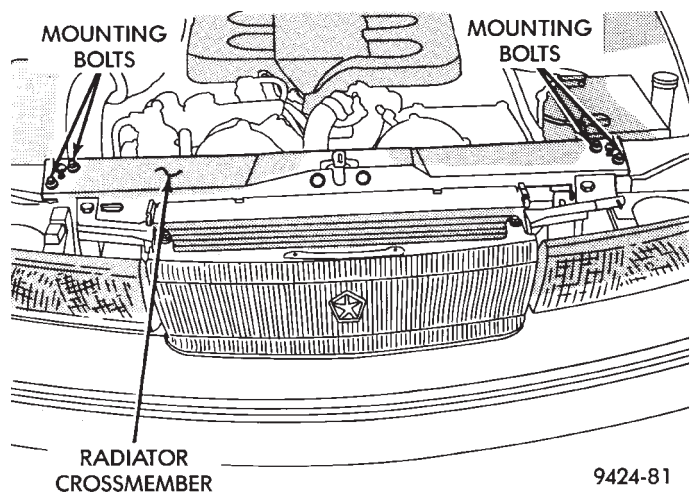


**Fig. 36 Radiator Crossmember**

**INSTALLATION**

For installation, reverse the above procedures. Then charge system and check for leaks.

## REMOVAL AND INSTALLATION (Continued)

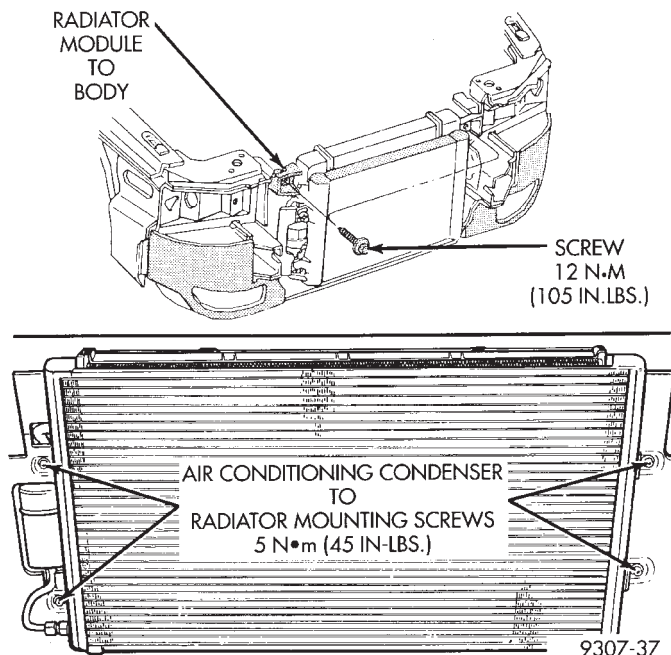


Fig. 37 Condenser Mounting Screw Location

## CONTROL HEAD

The control head is located below the radio (Fig. 38). The control head replacement procedures are the same regardless of the type of system.

## REMOVAL

- (1) Place the ignition key in the OFF position before removing control head.
  - (2) Remove trim bezel.
  - (3) Remove control head retaining screws.
  - (4) Pull control head out of instrument panel.
- Then disconnect the two connectors on the rear of control head and remove control head.

## INSTALLATION

For installation, reverse the above procedures.

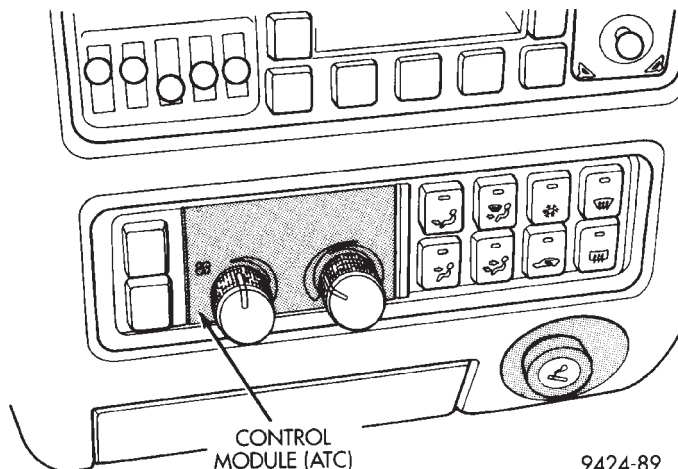


Fig. 38 Control Head

## DISCHARGE LINE

## REMOVAL

- (1) Remove refrigerant from the A/C system using a refrigerant recovery machine.
- (2) Disconnect A/C pressure transducer wire harness.
- (3) Remove quick connect clip and disconnect quick connect at condenser using special tool.

**CAUTION:** Cap all lines that are not being replaced and cap the expansion valve tubes.

- (4) Disconnect line at A/C compressor using a 6 mm allen wrench.

## INSTALLATION

For installation, reverse the above procedures. Then, tighten bolts to 25 N·m (18 ft. lbs.).

## EVAPORATOR

The Heater A/C housing must be removed from the vehicle when replacing the evaporator.

## REMOVAL

- (1) Disconnect battery.

**CAUTION:** The refrigerant must be removed from the system before removing Heater-A/C housing. Use a refrigerant recovery machine.

- (2) Remove heater housing from vehicle. Refer to Heater-A/C Housing Removal and Installation in this section for procedure.
- (3) Remove recirculation door actuator (Fig. 39).
- (4) Remove recirculation door and housing (Fig. 40).
- (5) Remove upper housing retaining screws (Fig. 41).
- (6) Remove upper half of heater housing (Fig. 42).
- (7) Lift evaporator out of lower housing (Fig. 43).
- (8) Transfer evaporator probe. Place the evaporator probe in the same location as on the previous evaporator.

## INSTALLATION

For installation, reverse the above procedures.

## EVAPORATOR PROBE

The evaporator probe is located on the lower right side of the heater housing.

## REMOVAL

- (1) Disconnect battery.
- (2) Remove right under panel silencer.
- (3) Disconnect wiring connector for evaporator probe.

# REMOVAL AND INSTALLATION (Continued)

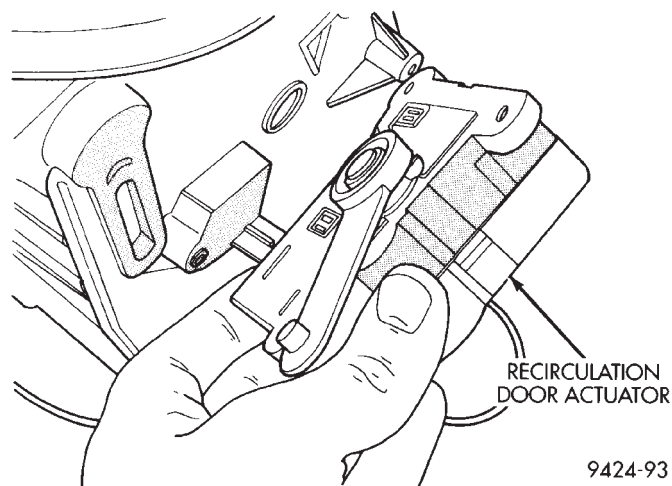


**Fig. 39 Recirculation Door Actuator**

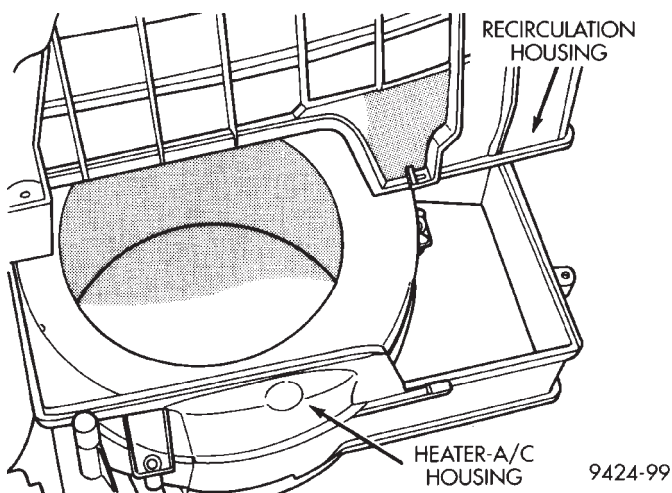


**Fig. 40 Recirculation Housing**

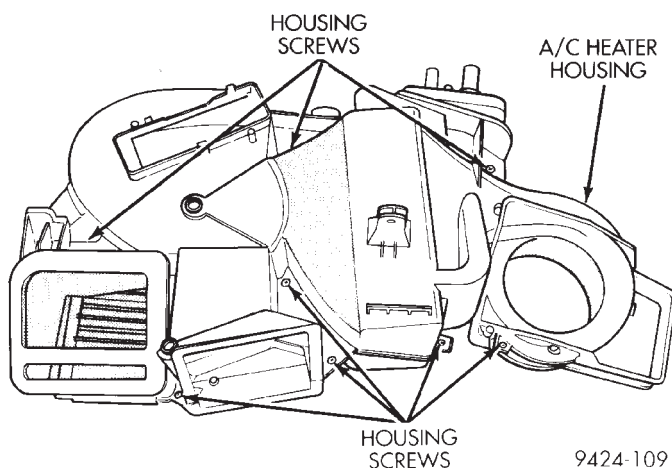


**Fig. 41 Housing Retaining Screws**

(4) At center of heater housing, locate evaporator probe access plate. Using a flat blade pry tool, pull back on the locking tab. Twist the access plate

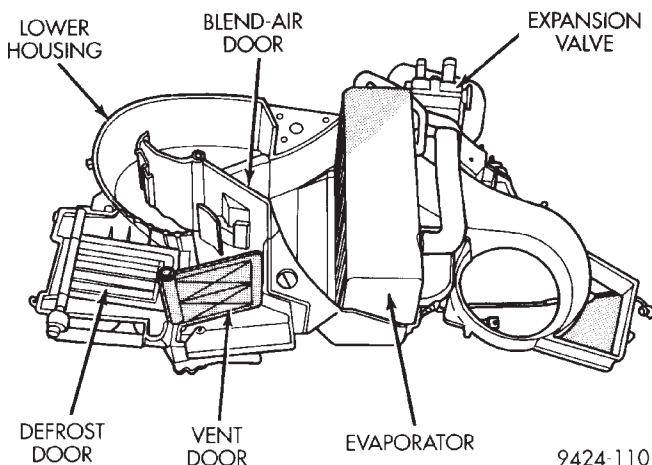


**Fig. 42 Lower Housing**

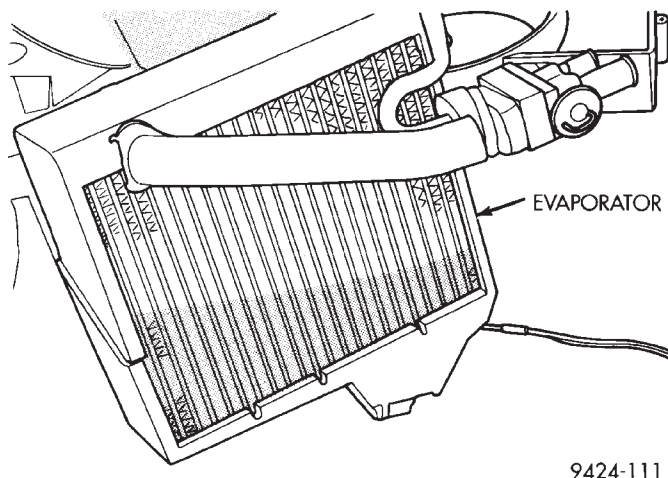


**Fig. 43 Evaporator**

counter clockwise one-quarter turn and remove plate (Fig. 44).

(5) Pull probe out of evaporator core. This plate must be pushed inside the A/C unit and orientated in such a way that the plate can be removed.

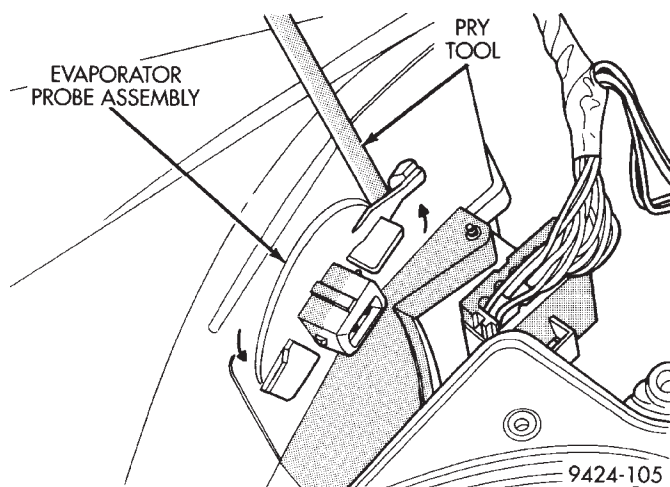


**Fig. 44 Evaporator Probe**

## REMOVAL AND INSTALLATION (Continued)

## INSTALLATION

(1) Install new probe into the evaporator. **The new probe must not go into the same hole (in the evaporator core) that the old probe was removed.** The evaporator is manufactured with three holes for probe insertion. Insert the probe in the uppermost hole (Fig. 45).

- (2) Install evaporator probe access panel.
- (3) Connect probe wiring harness.
- (4) Reconnect battery.

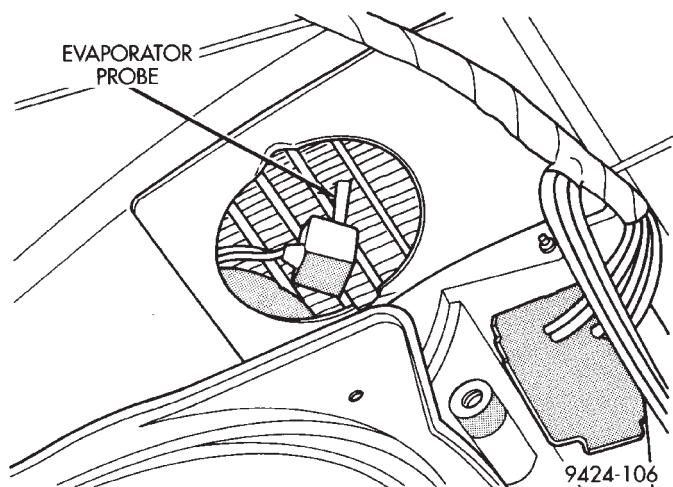


Fig. 45 Evaporator Probe Needle

## EXPANSION VALVE

The expansion valve is located on the engine side of the dash panel, near the right shock tower.

The expansion valve can fail in three different positions (open, closed or restricted).

In an Open Position: this will result in a noisy compressor or no cooling. The cause can be a broken spring, broken ball or excessive moisture in the A/C system. If the spring or ball are found to be defective, replace the expansion valve. If excessive moisture is found in the A/C system, recycle the refrigerant.

In a Closed Position: There will be low suction pressure and no cooling. This may be caused by a failed power dome or excessive moisture in the A/C system. If the power dome on the expansion valve is found to be defective replace the expansion valve. If excessive moisture is found recycle the refrigerant.

A Restricted Orifice: There will be low suction pressure and no cooling. This may be caused by debris in the refrigerant system. If debris is believed to be the cause, recycle the refrigerant and replace the expansion valve and receiver/drier.

## REMOVAL

(1) Remove refrigerant from the A/C system using a refrigerant recovery machine.

(2) Remove engine air inlet tube and the air distribution duct on vehicles equipped with 3.5 liter engine.

(3) Disconnect A/C lines from expansion valve. Use special tool 7193 to disconnect quick connector on expansion valve.

(4) Remove two retaining bolts from expansion valve.

(5) Remove expansion valve (Fig. 46).

(6) Remove expansion valve gasket.

**CAUTION: Always install a new gasket when replacing expansion valve.**

## INSTALLATION

For installation, reverse the above procedures. Tighten the new expansion valve to proper torque specification.

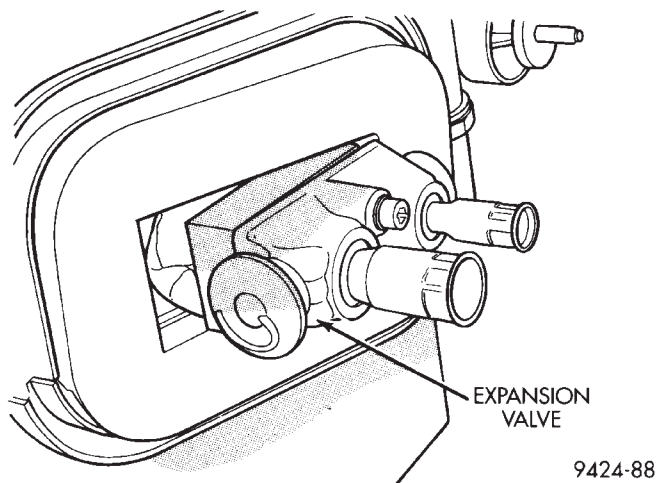


Fig. 46 Expansion Valve

## FILTER - DRIER

**CAUTION: When installing new filter - drier do not leave open to atmosphere for a long period of time. Receiver/drier contains moisture absorbing materials which will absorb moisture in the atmosphere.**

## REMOVAL

(1) Remove refrigerant from A/C system using a refrigerant recovery machine.

(2) Remove condenser bolt from module.

(3) Remove filter - drier nut from condenser.

(4) Remove filter - drier quick connect clip and disconnect quick connect (liquid line to filter - drier).

(5) Remove drier from vehicle.

(6) Cap liquid line and condenser threaded fitting while system is open to prevent moisture from entering system.

## REMOVAL AND INSTALLATION (Continued)

## INSTALLATION

For installation, reverse the above procedures.

## HEATER CORE

The unit housing must be removed from the vehicle to service the heater core.

## REMOVAL

- (1) Disconnect battery.
- (2) Remove unit housing from vehicle. Refer to Unit Housing Removal and Installation in this section for procedure.
- (3) With the unit housing out of the vehicle, pull back heater core retaining clips. Then pull the heater core out of the heater housing (Fig. 47).

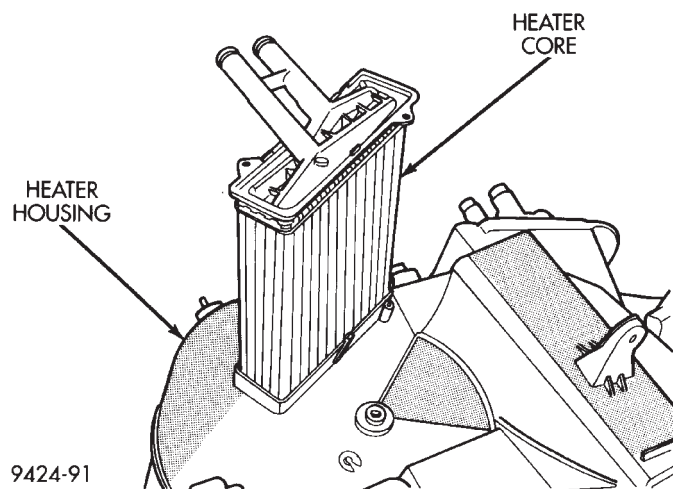


**Fig. 47 Heater Core Removal**

## INSTALLATION

- (1) Push new heater core into the unit housing.
- (2) Fasten heater core to unit housing with screws provided with new heater core (Fig. 48).
- (3) Install unit housing into vehicle.
- (4) Reconnect battery.

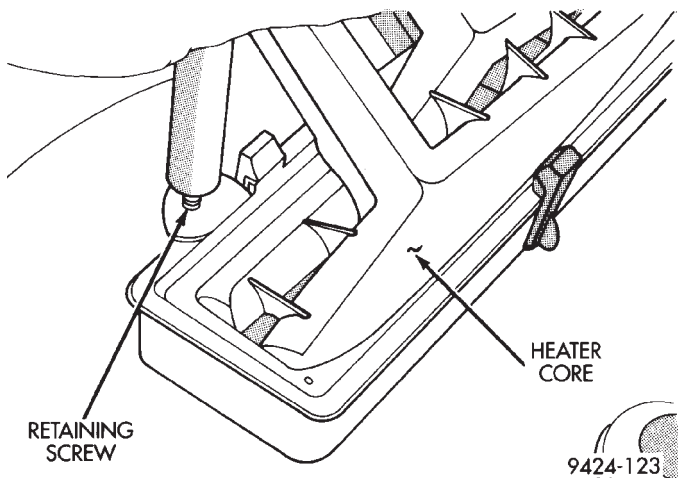


**Fig. 48 Heater Core**

## LIQUID LINE

## REMOVAL

- (1) Remove refrigerant from the A/C system using a refrigerant recovery machine.
- (2) Remove engine air inlet tube.
- (3) Remove A/C quick connect clips at all locations.
- (4) Disconnect quick connectors on expansion valve. Remove suction line from expansion valve and swing out of the way of the liquid line. Use special tool 7193 to disconnect quick connector.

**CAUTION:** Cap all lines that are not being replaced, cap the expansion valve tubes and cap all condenser tubes.

- (5) Disconnect liquid line from the receiver/drier. It may be necessary to disconnect radiator upper cross-member and A/C discharge line quick connect.
- (6) Remove the liquid line from the vehicle.

## INSTALLATION

For installation, reverse the above procedures.

## MODE DOOR ACTUATOR

The mode door actuator is an electric motor. It mechanically positions the A/C unit panel/bi-level door and the floor/defrost door. This actuator contains a feedback strip which allows the computer control to know the exact position of the mode door at all times. The mode door actuator is not serviceable and must be replaced if found to be defective.

The mode door actuator is located on the lower left side of the heater housing (Fig. 49).

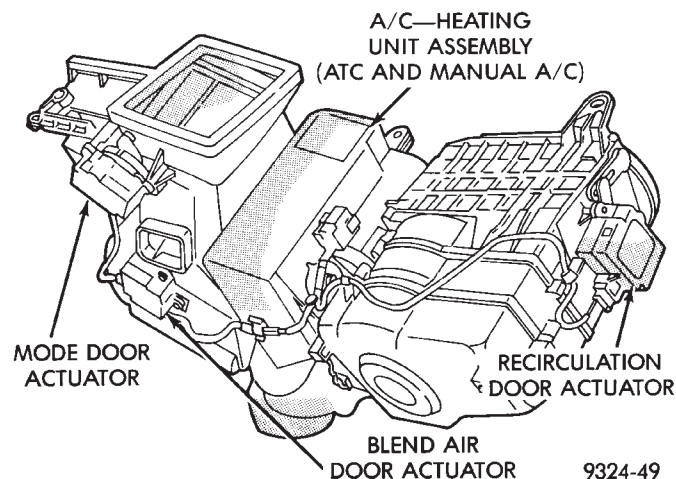


**Fig. 49 Mode Door Actuator Location**

## REMOVAL

- (1) Remove left and right underpanel silencer/ducts.
- (2) Remove floor console.
- (3) Remove center floor heat adaptor duct.

## REMOVAL AND INSTALLATION (Continued)

- (4) Remove rear seat heat forward adaptor duct.
- (5) Loosen center support bracket and pry rearward to gain access to the actuator.
- (6) Remove actuator retaining screws. Then pull actuator straight down. Upon removal, note the shaft position of the actuator, because the shaft on this motor is keyed. When installing new actuator, its shaft must be positioned in the same location.
- (7) Remove electrical connection on actuator.

## INSTALLATION

For installation, reverse the above procedures.

## RECIRCULATION DOOR ACTUATOR

The recirculation door actuator is located on the right side of the heater housing (Fig. 50).

The recirculation door actuator is an electric motor. It mechanically positions the recirculation door in either the open or closed position. The recirculation door actuator does not have a feedback signal. The outside Air/Recirc door actuator is not serviceable and must be replaced if found to be defective.

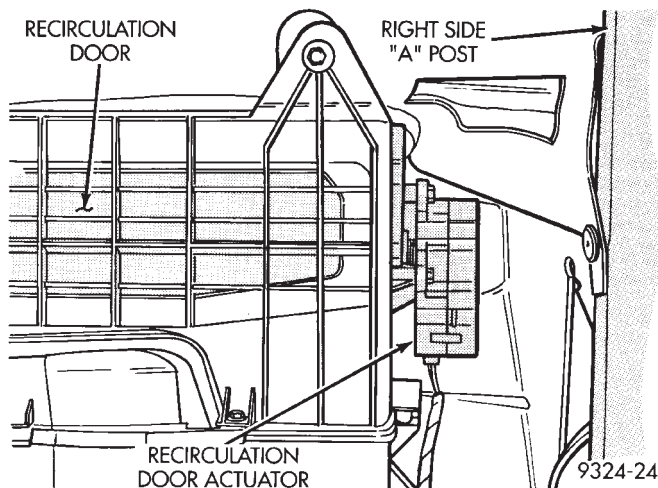


**Fig. 50 Recirculation Door Actuator**

## REMOVAL

- (1) Disconnect battery.
- (2) Remove floor console or instrument panel center lower cover.
- (3) Remove lower instrument panel assembly.
- (4) Remove body controller at right side of instrument panel.
- (5) Remove actuator retaining screws. Pull actuator straight off recirculation door shaft. Upon removal, note the shaft position of the actuator, because the shaft on this motor is keyed. When installing new actuator, its shaft must be positioned in the same location.
- (6) Disconnect electrical connection.

## INSTALLATION

For installation, reverse the above procedures.

## SUCTION LINE

## REMOVAL

- (1) Remove refrigerant from the A/C system using a refrigerant recovery machine.
- (2) Remove quick connect clip and disconnect quick connect at expansion valve end.

**CAUTION:** Cap all lines that are not being replaced and cap the expansion valve tubes.

- (3) Disconnect line at compressor end using a 6 mm allen wrench.

- (4) Remove line by pulling rear end of line up out of vehicle with compressor end following through the tie-rod area.

## INSTALLATION

For installation, reverse the above procedures. Tighten bolts to 25 N·m (18 ft. lbs.).

## SUN SENSOR

## REMOVAL

- (1) Remove instrument top cover.
- (2) Remove Sun Sensor mounting screws.
- (3) Lift sensor out of instrument panel and disconnect wiring.

## INSTALLATION

**CAUTION:** The sun sensor must protrude approximately 1/4 inch above the instrument panel top cover. This will ensure proper operation.

- (1) For installation, reverse the above procedures.
- (2) Some ATC equipped vehicles may exhibit a lack of passenger comfort in sunny weather. This will not occur in night operation. This most likely occur in the early afternoon. Verify that the ATC system is functioning properly. Inspect the location of the sun sensor. The sun sensor must protrude approximately 1/4 inch above the instrument panel top cover to insure proper operation. If the sensor does not protrude 1/4 inch, perform the following procedure:
  - Confirm that the top cover is properly installed
  - Remove the top cover
  - Remove fasteners from sun sensor
  - Install one 1/4-20 nut per fastener under the sun sensor so that it is shimmed higher
  - Reinstall the sun sensor. Do not overtighten screw. If a longer screw is required, use 8-15x1 inch.

## REMOVAL AND INSTALLATION (Continued)

## SERVICE PORT VALVE CORES

The service port valve cores are located on the top of the manifold (High Side) and front side of the manifold (Low Side).

## REMOVAL

(1) Remove the valve caps. Remove refrigerant from A/C system using a refrigerant recovery machine.

(2) Using a standard valve core tool, remove the valve core. **Be careful to prevent any dirt/debris from entering the valve core opening or getting on the replacement valve core.**

(3) When assembling the new valve core into the manifold, the core should be oiled with clean ND8 PAG compressor oil.

**CAUTION:** A valve that is not fully seated can lead to damage to the valve during evacuation and charge. This can result in system refrigerant discharge while uncoupling the charge adapters.

(4) Install valve core into manifold. Torque to 30 N·m (22 ft. lbs.).

(5) Evacuate and charge the A/C system.

## INSTALLATION

For installation, reverse the above procedures.

## TEMPERATURE DOOR ACTUATOR

The blend-air (temperature) door actuator is an electric motor which mechanically positions the temperature door. A feedback strip in the actuator allows the computer control to know the exact position of the temperature door at all times. The blend-air door actuator is not serviceable and must be replaced if found to be defective.

The temperature door actuator is located at the bottom of the heater housing at the center tunnel.

## REMOVAL

(1) Remove left and right underpanel silencer/ducts.

(2) Remove two screws from actuator which are accessible from the right side of center stack.

(3) Remove one screw from actuator on left side.

(4) Pull actuator straight down from shaft and disconnect electrical connection (Fig. 51). Upon removal, note the shaft position of the actuator, because the shaft on this motor is keyed (Fig. 52). When installing new actuator, its shaft must be positioned in the same location.

## INSTALLATION

For installation, reverse the above procedures.

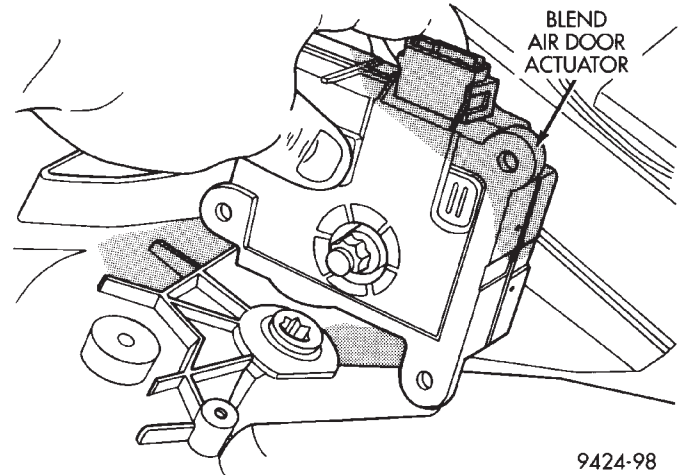


*Fig. 51 Blend-Air Door Actuator*

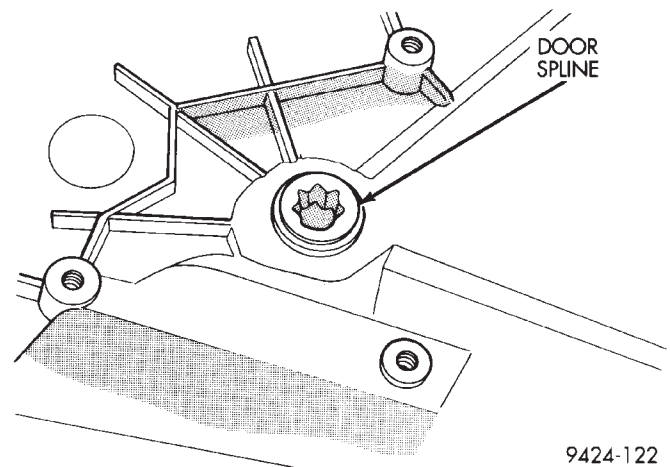


*Fig. 52 Blend-Air Door Spline*

## UNIT HOUSING

## REMOVAL

(1) Disconnect battery. This must be done to prevent accidental air bag deployment.

(2) Using an A/C recovery unit, remove all R-134a refrigerant from the A/C system.

(3) Remove air cleaner hose and air distribution duct from the engine.

(4) Drain the engine cooling system.

(5) Disconnect heater hoses at the dash panel. Plug the heater core inlet and outlet tubes to prevent anti-freeze from spilling on the vehicle interior during removal. If an appropriate plug cannot be found pull back carpet and use caution when removing unit. Keep the heater tubes elevated to prevent spillage of coolant.

(6) Remove both A/C lines from expansion valve. Use special tool 7193 to disconnect quick connectors on A/C lines. Refer to A/C line removal in this section for complete procedure. After removing lines cap the expansion valve openings and the A/C hose openings.

## REMOVAL AND INSTALLATION (Continued)

This will prevent any dirt or moisture from entering the refrigerant system during servicing.

**CAUTION:** The lubricant used in this air conditioning system absorbs moisture readily (similar to brake fluid). Do not leave any portion of the system open for extended periods of time.

(7) Remove the three retaining nuts from the studs. These studs project through the dash panel into the engine compartment.

(8) Remove right and left instrument panel end caps. These caps are held in place by a series of clips.

(9) Remove right and left interior door post kick panel.

(10) Remove right side bezel from instrument panel (Fig. 53).

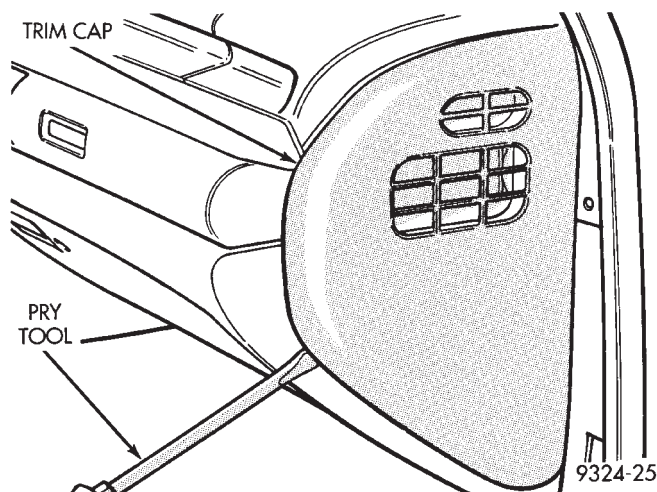


**Fig. 53 Right Side Bezel Removal**

(11) Remove the radio center bezel which is held in place by six clips. This can be done by carefully prying the bezel from the instrument panel.

(12) Remove the radio. Remove the heater A/C control head from the panel and place in a safe area.

(13) Remove the center instrument panel bezel (Fig. 54). This bezel is held in place by four clips. It can be removed by carefully prying it from the instrument panel.

(14) Remove center console from vehicle (if equipped).

(15) If the vehicle is equipped with a right side air bag, the glove box must be lowered. The glove box assembly can be lowered by pressing in on the sides of the glove box. This will release the glove box and allow access to air bag mounting screws. There are four screws located behind the glove box. Remove these screws and then close the glove box.

(16) Remove lower bolster retaining screws.

(17) Carefully lower the bolster and disconnect the trunk release and glove box light wiring. Then remove the lower bolster from the vehicle.

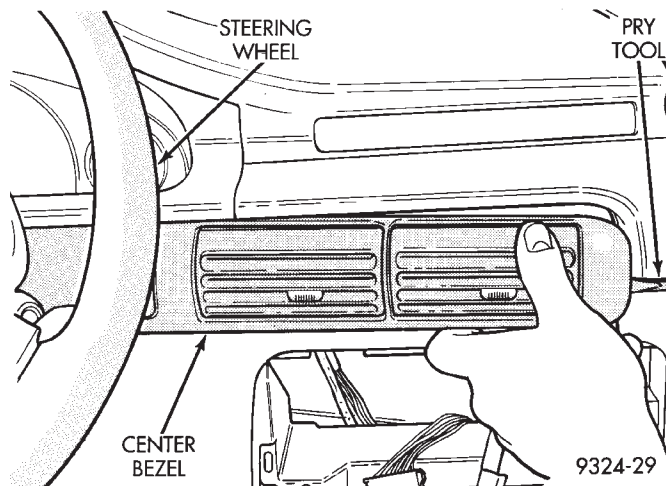


**Fig. 54 Center Bezel Removal**

(18) Remove the instrument panel top cover (Fig. 55). It is held in place by retainer clips at both ends of the cover. To remove carefully pry upward at one end of the cover until the clip is disengaged. Proceed to the opposite side and gradually pry the rear edge of the top cover along the entire width of the panel.

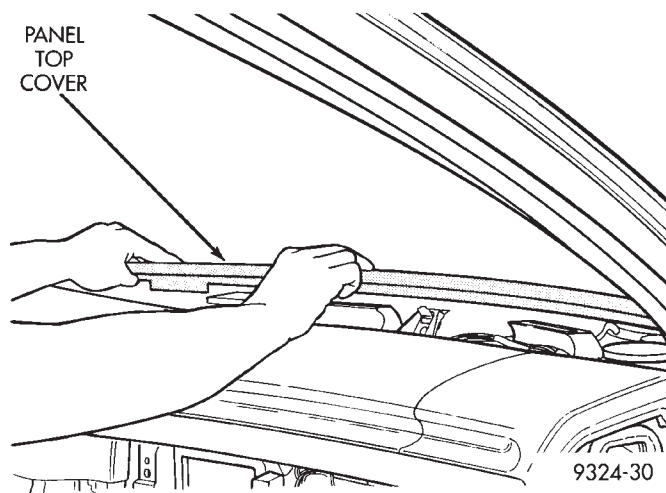


**Fig. 55 Panel Top Cover**

(19) Remove right and left windshield pillar trim covers.

(20) Remove five bolts that hold instrument panel to the cowl. These bolts are located at the base of the windshield.

(21) Disconnect the scan tool (DRB) connector from brace.

(22) Remove instrument panel ground strap. This strap is located on the lower left side of the center console.

(23) Remove left knee blocker support bracket. This will allow access to the 60 way wiring connector.

(24) Remove under column duct and left floor duct.

(25) Disconnect 60 way wiring connector. Then disconnect all related wiring connectors.

**REMOVAL AND INSTALLATION (Continued)**

- (26) Disconnect fuse panel wiring connectors.
- (27) Disconnect the brake light switch connector.
- (28) Remove steering column covers from steering column.
- (29) Remove steering column retaining bolts and allow the steering column to lower to the floor. Do not completely remove the column from the vehicle.
- (30) Remove wiring from the steering column.
- (31) Remove air bag connectors.
- (32) Remove right side floor air duct.
- (33) Disconnect 10 way connector, blower module connector and blower motor connector.
- (34) Remove body controller from vehicle.
- (35) Disconnect right side connector and antenna connector.

(36) Remove right and left side upper instrument panel mounting screws located in door jam.

(37) Remove upper instrument panel from the vehicle. The upper instrument panel will be removed with all harnesses and gauges still in the panel. It is recommended that two people handle the upper panel while removing.

(38) Remove air duct for rear heater vents. It is held in place by a bracket/push pin near the rear of the duct.

(39) Remove the air bag module and brace from the vehicle.

(40) Remove three attaching bolts which holds the heater housing to the dash panel.

(41) Carefully roll the heater housing out of the vehicle.

(42) After removing the heater housing, remove the drain tube from the heater housing. The drain tube should be installed from underneath the vehicle after the heater housing is reinstalled into the vehicle.

**INSTALLATION**

For installation, reverse the above procedures.

**DISASSEMBLY AND ASSEMBLY****UNIT HOUSING RECONDITION**

Heater-A/C unit housing must be removed from vehicle before performing this operation. Refer to Unit Housing Removal and Installation.

The heater a/c unit housing need not be disassembled to remove the heater core. Refer to Heater Core Removal and Installation.

**DISASSEMBLE**

- (1) Place heater-A/C unit assembly on workbench.
- (2) Pull back on retaining tabs and remove heater core from housing.

- (3) Remove recirculation door actuator wiring (Fig. 56). Remove actuator from recirculation housing (Fig. 57).

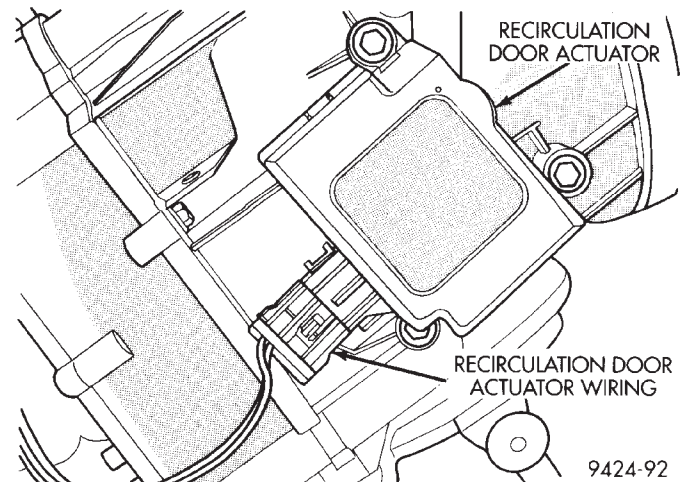


**Fig. 56 Recirculation Door Actuator Wiring**

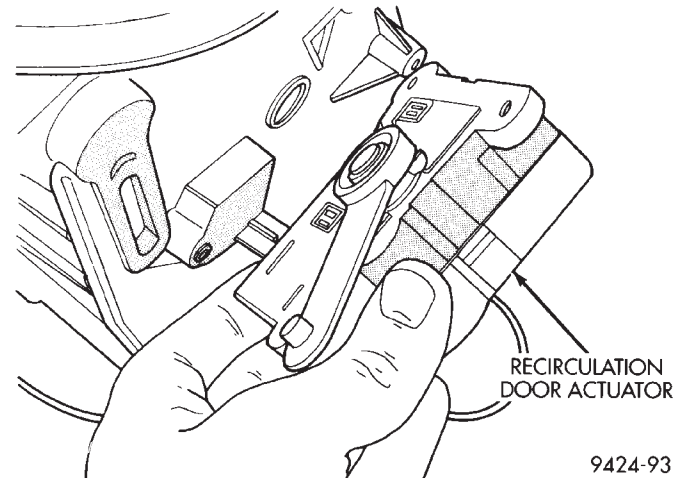


**Fig. 57 Recirculation Door Actuator**

- (4) Remove lower distribution housing (Fig. 58). Remove mode door actuator (Fig. 59).

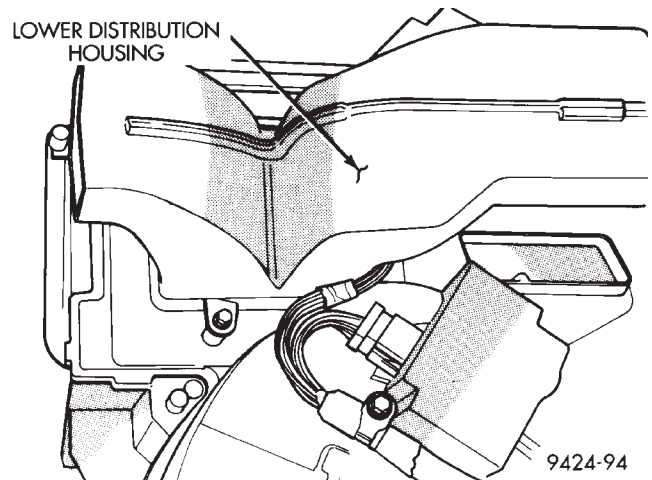
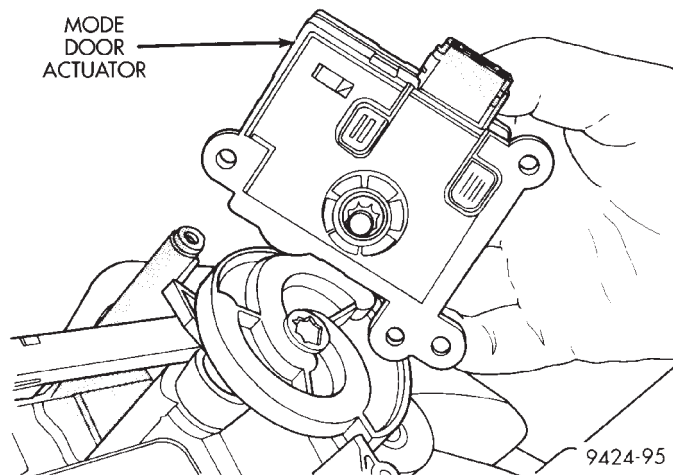
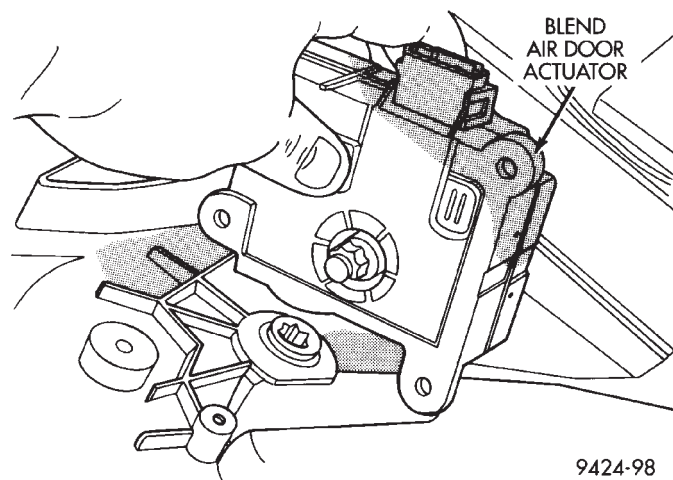


**Fig. 58 Lower Distribution Housing**

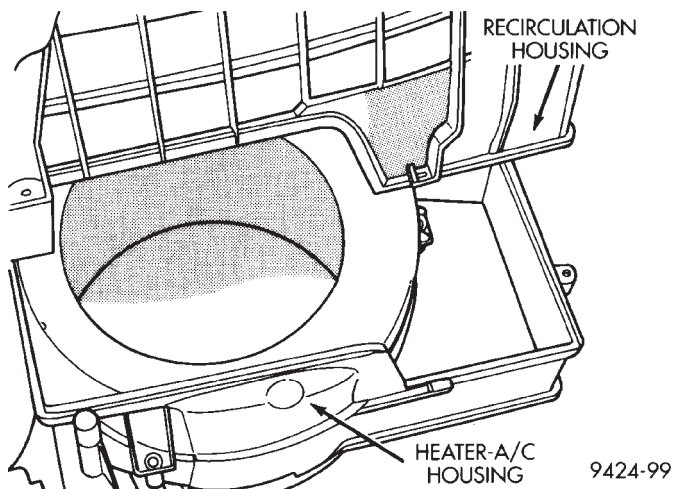
## DISASSEMBLY AND ASSEMBLY (Continued)

**Fig. 59 Mode Door Actuator**

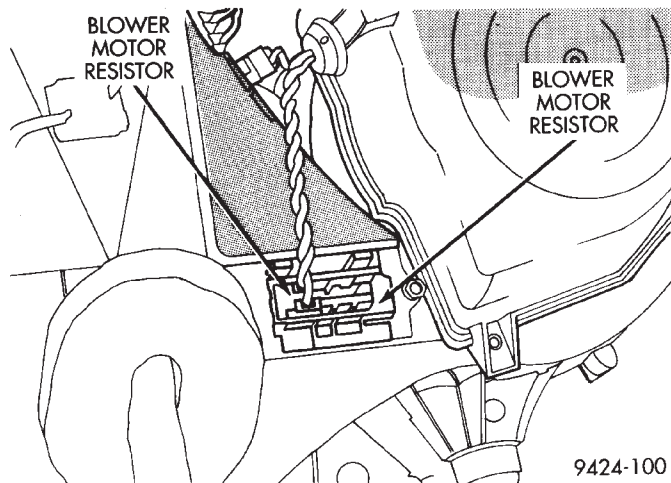
(5) Remove blend air door actuator (Fig. 60).

**Fig. 60 Blend-Air Door Actuator**

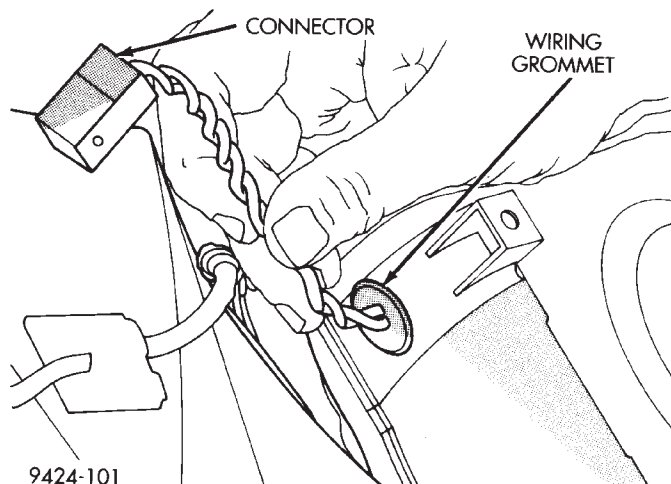
(6) Remove recirculation housing screws and clip (Fig. 61).

**Fig. 61 Recirculation Housing**

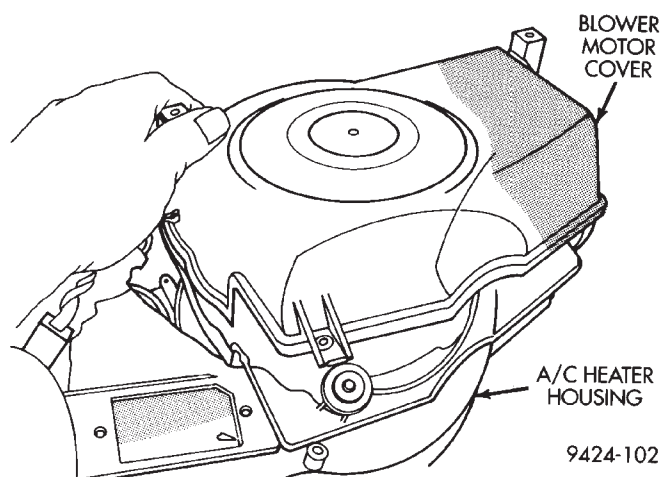
(7) Remove blower motor wiring at resistor (Fig. 62).

**Fig. 62 Blower Motor Wiring**

(8) Squeeze blower motor wiring grommet and push grommet through blower motor cover (Fig. 63).

**Fig. 63 Blower Wiring Grommet**

(9) Remove blower motor cover (Fig. 64).

**Fig. 64 Blower Motor Cover**

## DISASSEMBLY AND ASSEMBLY (Continued)

(10) Remove screws at blower motor mounts. Remove motor (Fig. 65).

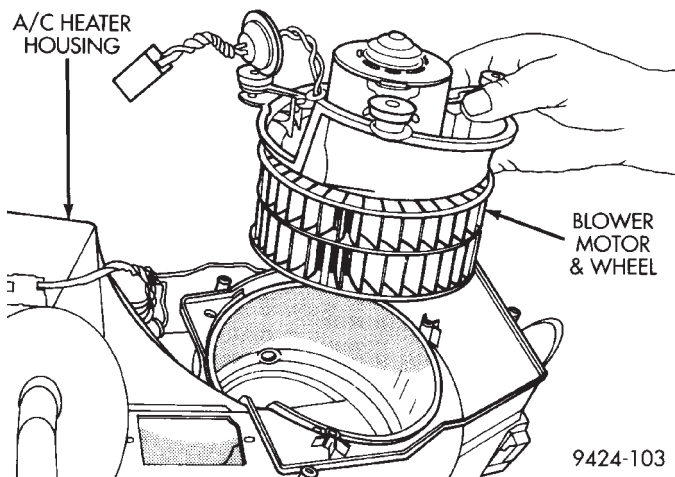


**Fig. 65 Blower Motor Removal**

(11) Remove blower motor resistor (Fig. 66).

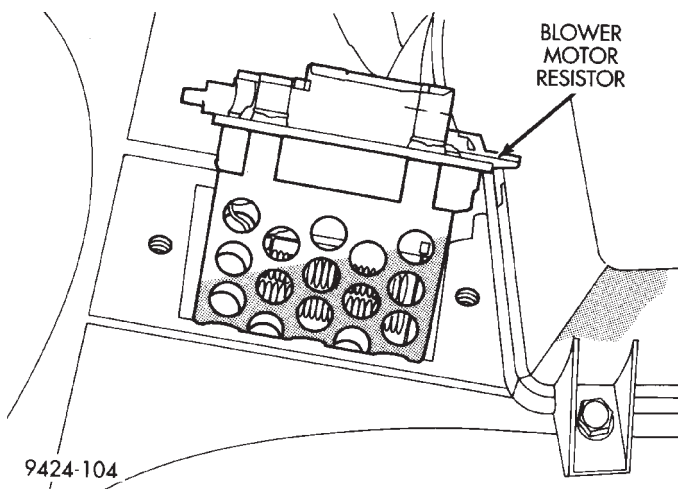


**Fig. 66 Blower Motor Resistor**

(12) Remove wiring at evaporator temperature probe.

(13) Using a screwdriver, pry up on tab at evaporator probe (Fig. 67). Twist probe counterclockwise and push tab into the housing.

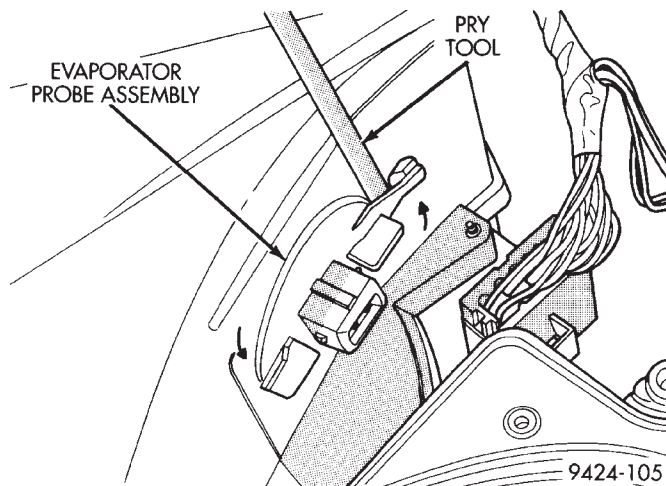


**Fig. 67 Evaporator Probe**

(14) Pull the evaporator probe needle out of the evaporator fins (Fig. 68). Remove the evaporator probe through the opening at the blower motor housing.

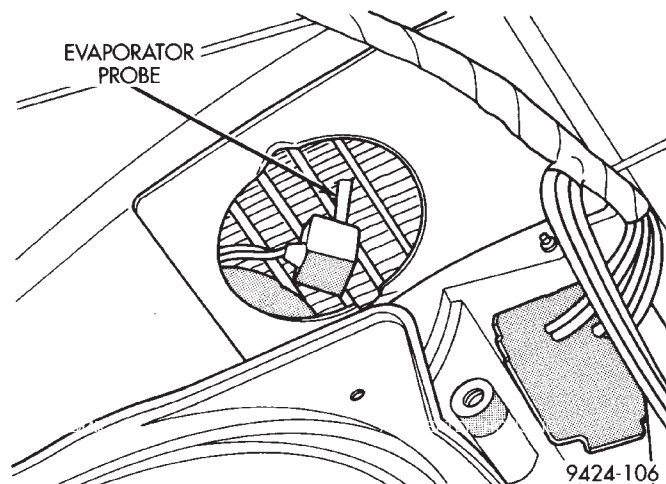


**Fig. 68 Evaporator Probe**

(15) Remove vent door seal from housing (Fig. 69).

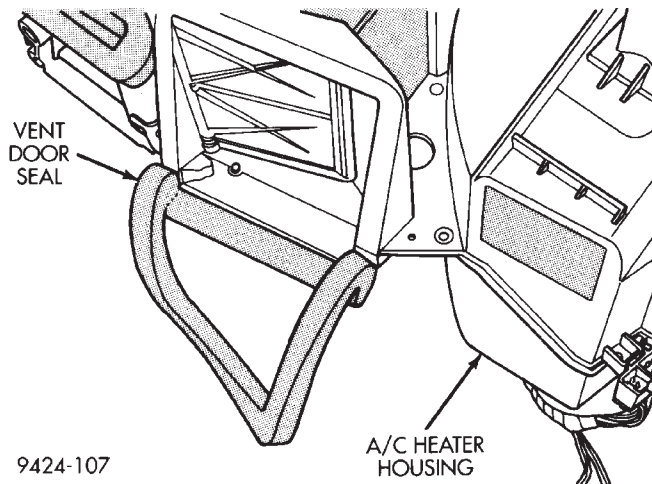


**Fig. 69 Vent Door Seal**

## DISASSEMBLY AND ASSEMBLY (Continued)

- (16) Remove evaporator seal from housing (Fig. 70).

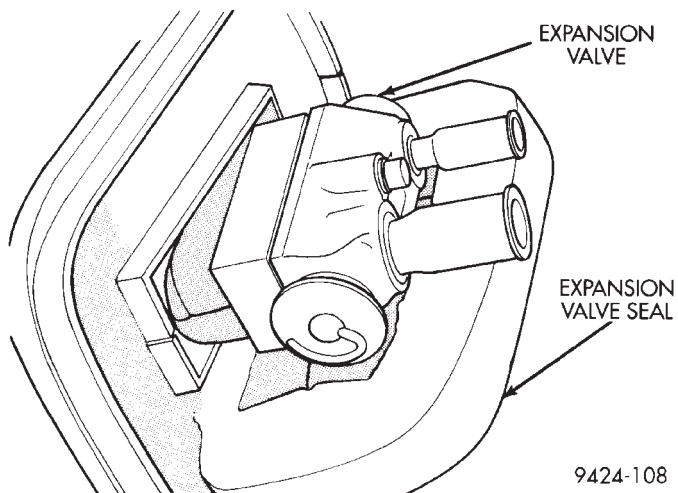


**Fig. 70 Evaporator Seal**

- (17) Remove upper housing screws and clips (Fig. 71).

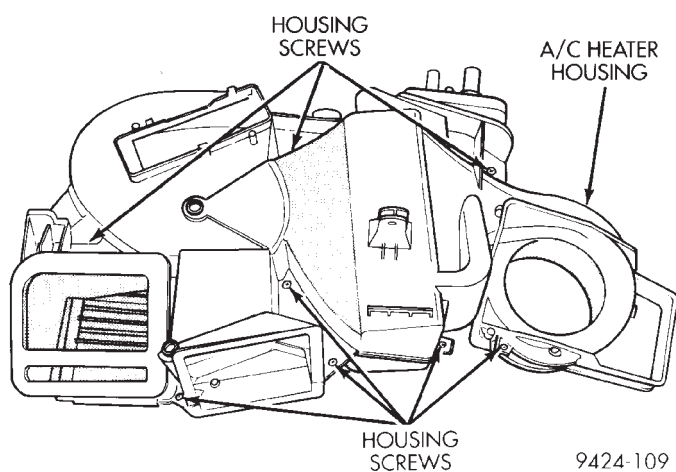


**Fig. 71 A/C Housing Screws**

- (18) Separate upper housing from lower housing (Fig. 72).

- (19) Remove evaporator assembly from lower housing (Fig. 73).

- (20) Remove blend air door from lower housing (Fig. 74).

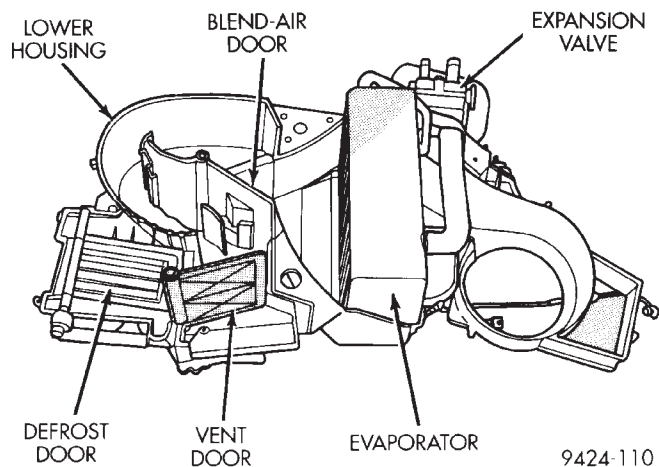


**Fig. 72 Lower Housing**

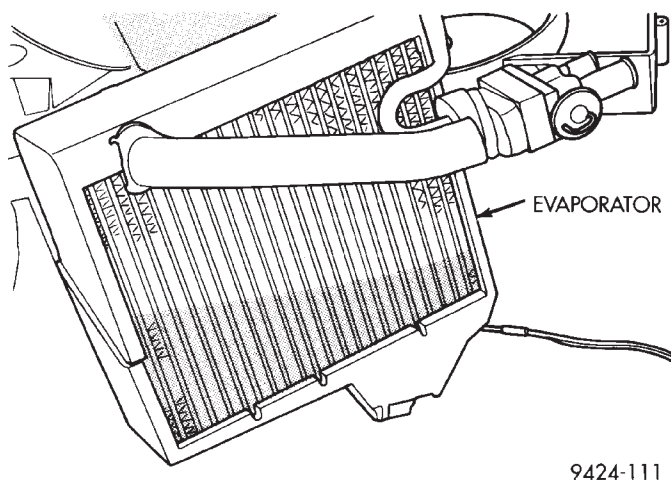


**Fig. 73 Evaporator Removal**

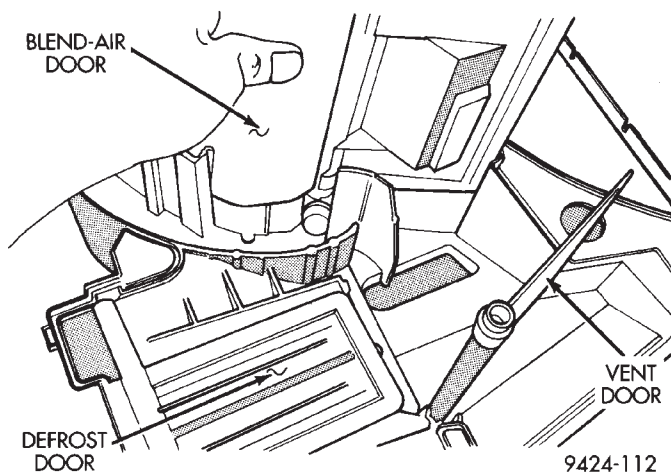


**Fig. 74 Blend-Air Door**

## DISASSEMBLY AND ASSEMBLY (Continued)

(21) Using a flat blade screwdriver, pinch in the retaining tab at the base of the vent door (Fig. 75). Pull up on door and remove from housing (Fig. 76).

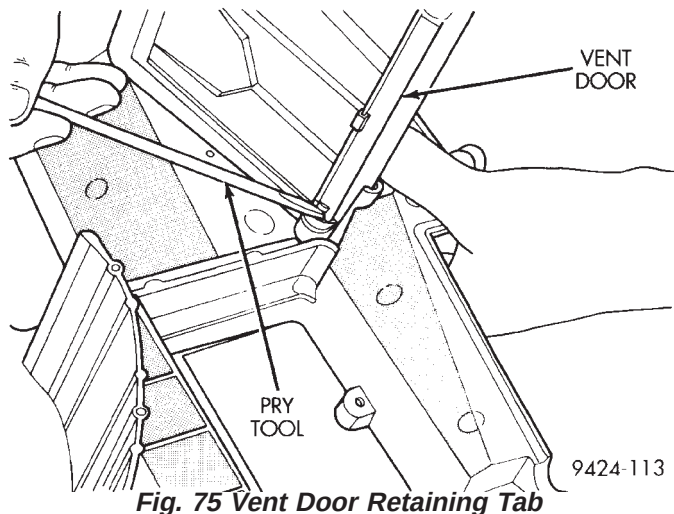


**Fig. 75 Vent Door Retaining Tab**

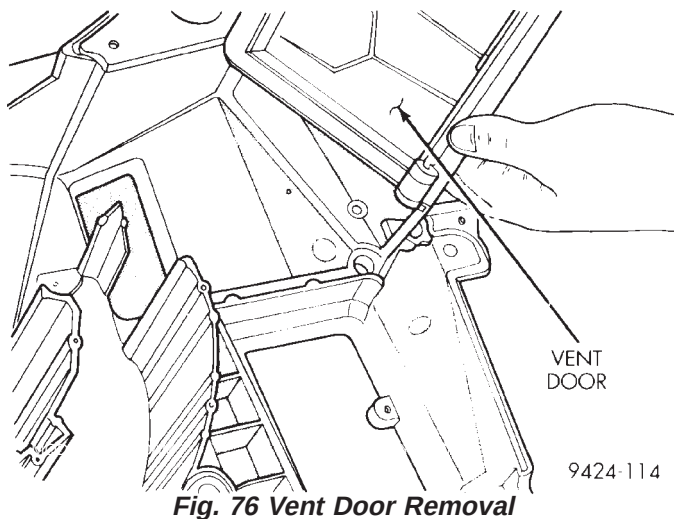


**Fig. 76 Vent Door Removal**

(22) Remove mode door actuating cam (Fig. 77) and (Fig. 78).

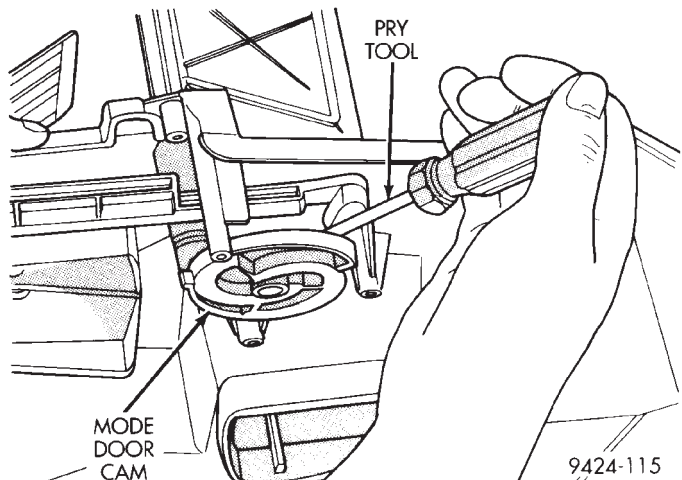


**Fig. 77 Mode Door Actuating Cam Removal Using Pry Tool**

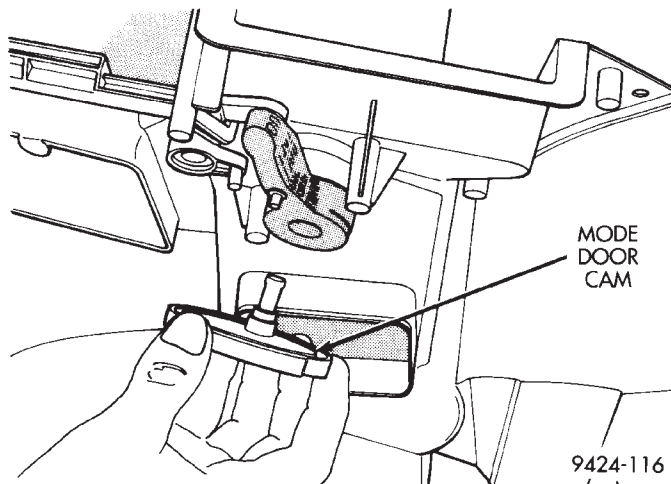


**Fig. 78 Cam Removal**

(23) Remove screw at defrost door actuating arm (Fig. 79). Remove defrost door link from arm.

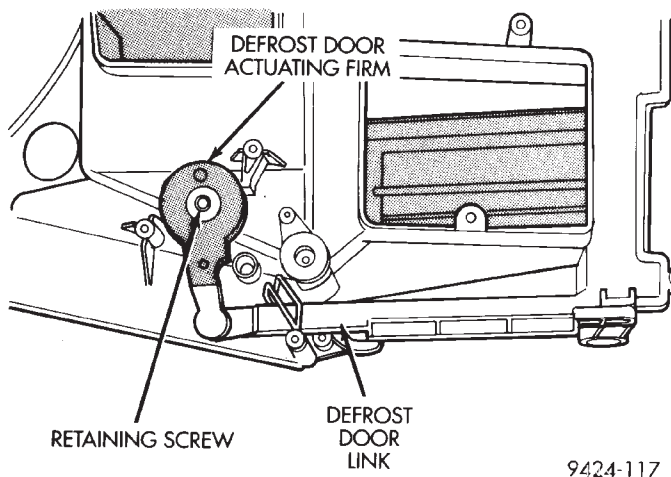


**Fig. 79 Defrost Door Actuating Arm Screw**

(24) Remove defrost door arm from lower housing (Fig. 80).

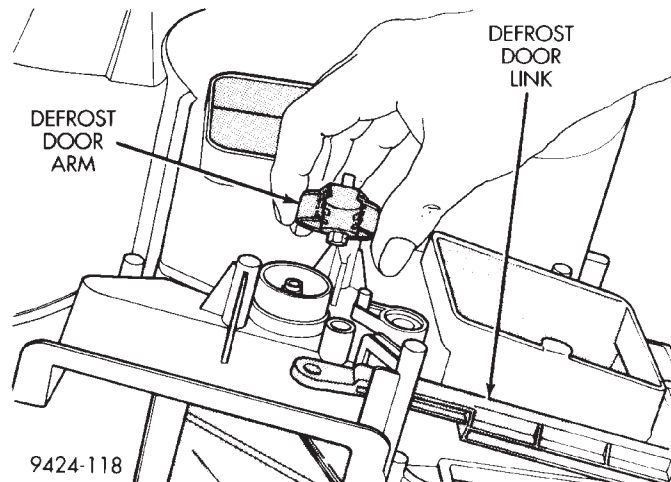


**Fig. 80 Defrost Door Arm**

## DISASSEMBLY AND ASSEMBLY (Continued)

(25) Remove link and defrost door from housing (Fig. 81).

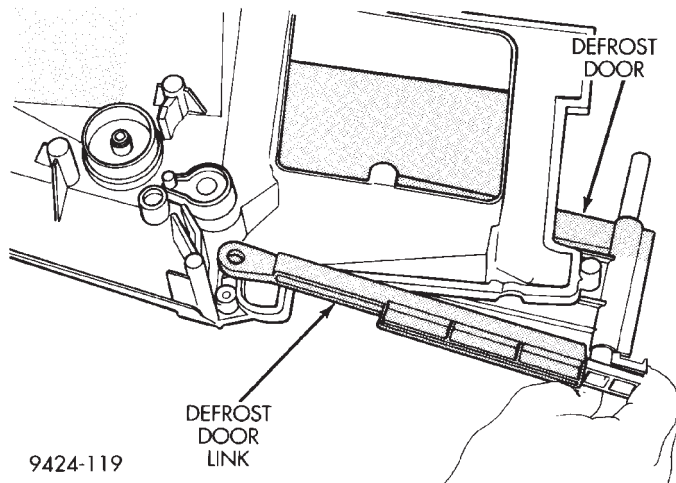


**Fig. 81 Defrost Door And Link**

(26) Remove defrost door link from door (Fig. 82).

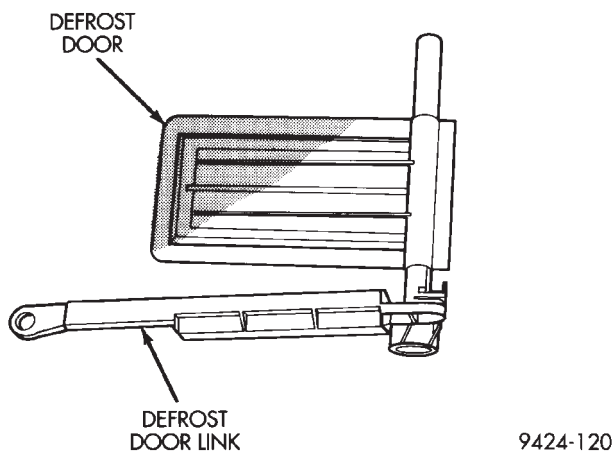


**Fig. 82 Link Removal From Door**

(27) Remove vent door actuating arm from lower housing (Fig. 83).

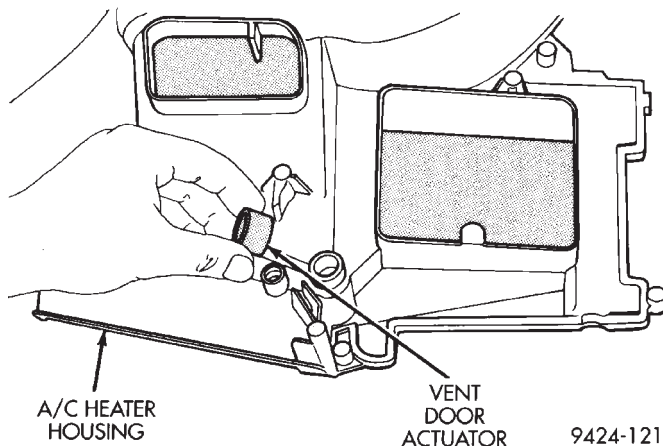


**Fig. 83 Vent Door Actuating Arm**

## ASSEMBLE

- (1) Install vent door actuating arm to lower housing.
- (2) Install defrost door link to defrost door.
- (3) Install door and link into A/C housing (Fig. 84).

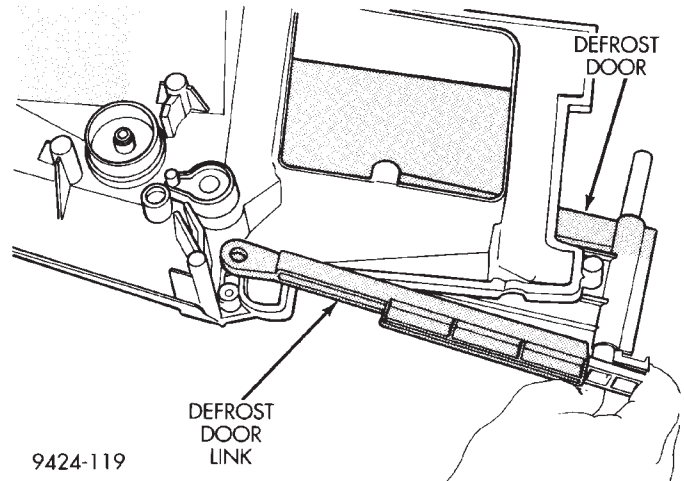


**Fig. 84 Defrost Door and Link**

- (4) Install defrost door actuating arm and retaining screw at housing (Fig. 85).

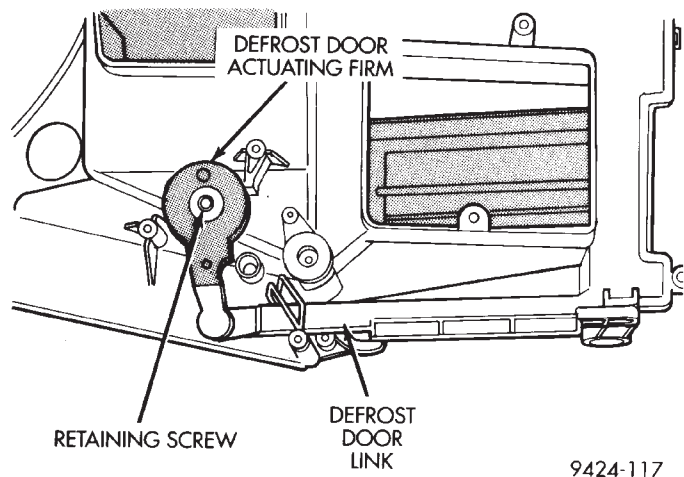
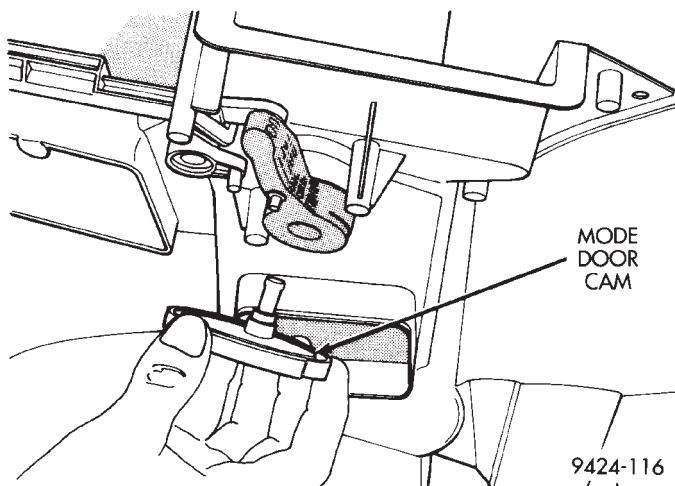


**Fig. 85 Defrost Door Actuating Arm And Screw**

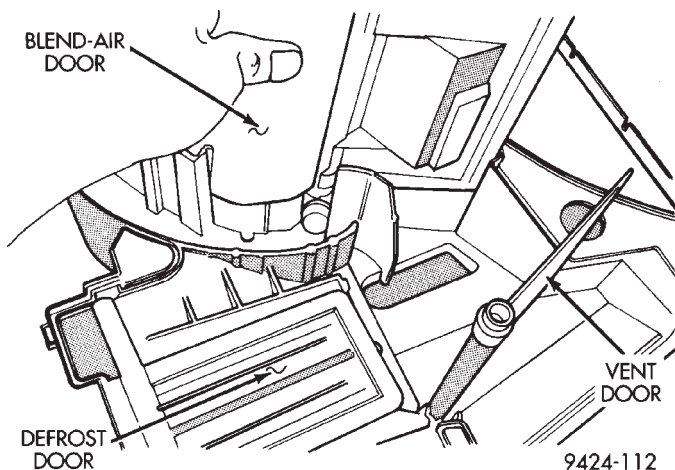
- (5) Install defrost door link to actuating arm.
- (6) Line up the slots to the pegs on the mode door cam. Install the mode door cam (Fig. 86).

## DISASSEMBLY AND ASSEMBLY (Continued)

**Fig. 86 Mode Door Cam**

(7) Turn housing over and snap in the vent door to the vent door arm.

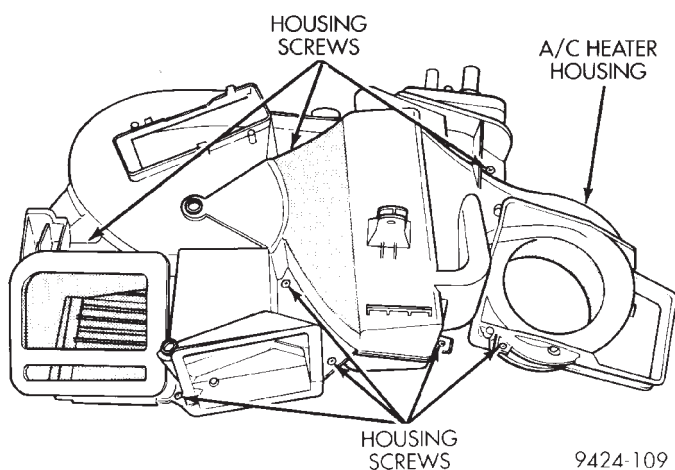
(8) Install blend-air door in the housing (Fig. 87).

**Fig. 87 Blend-Air Door**

(9) Install evaporator into the lower housing.

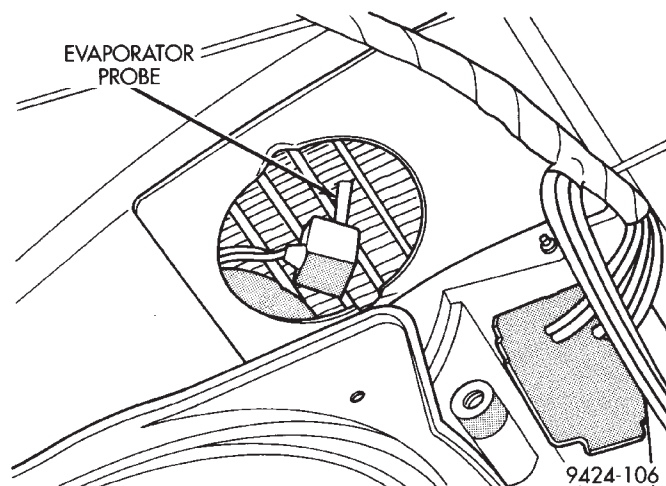
(10) Install upper housing onto lower housing.

(11) Install screws to retain the upper housing to the lower housing (Fig. 88).

**Fig. 88 Housing Screws**

(12) Install evaporator and vent door seals onto the A/C housing.

(13) Install evaporator probe assembly into the housing. Insert probe needle into evaporator (Fig. 89).

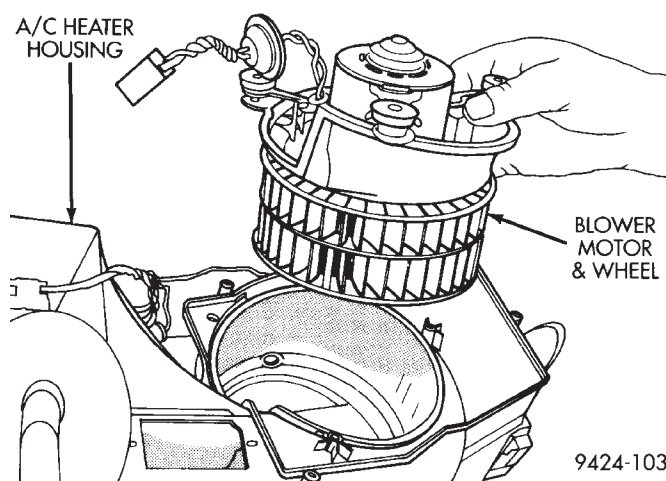
**Fig. 89 Probe Needle Into Evaporator**

(14) Position the evaporator probe assembly at the housing face. Twist assembly clockwise to lock tab into slot on housing face.

(15) Install wiring at evaporator temperature probe.

(16) Install blower motor resistor.

(17) Install blower motor into housing (Fig. 90). Install blower motor mounting screws.

**Fig. 90 Blower Motor**

## DISASSEMBLY AND ASSEMBLY (Continued)

(18) Thread the blower motor wiring through the blower motor cover. Install the blower motor cover (Fig. 91).

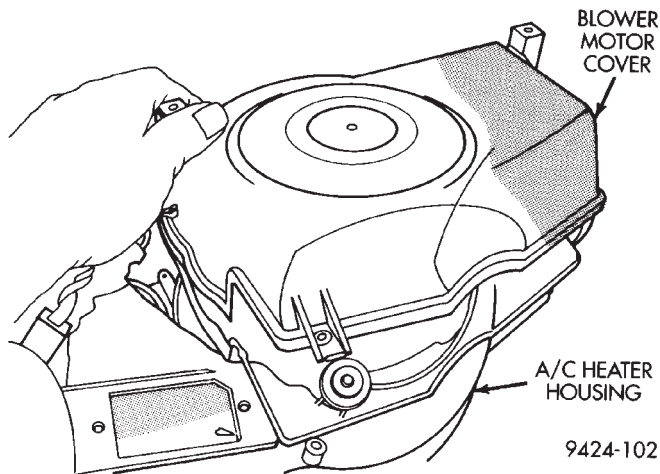


**Fig. 91 Blower Motor Cover**

(19) Seat blower motor wiring grommet at blower motor cover (Fig. 92).

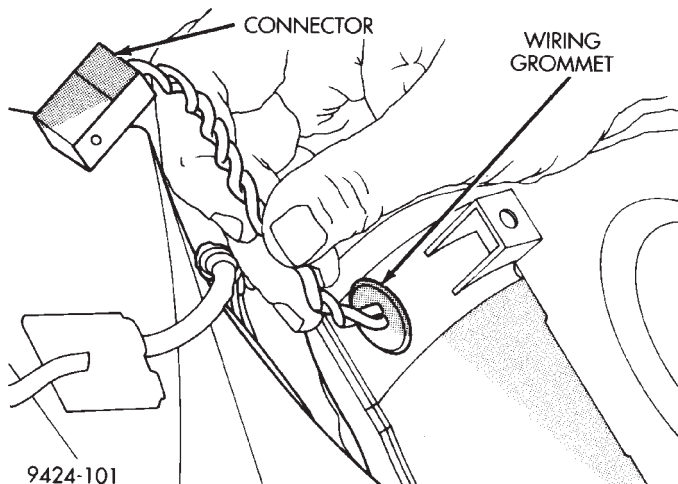


**Fig. 92 Blower Wiring Grommet**

(20) Install blower motor wiring to the blower motor resistor.

(21) Position recirculation housing to A/C housing (Fig. 93). Install retaining screws and clip.

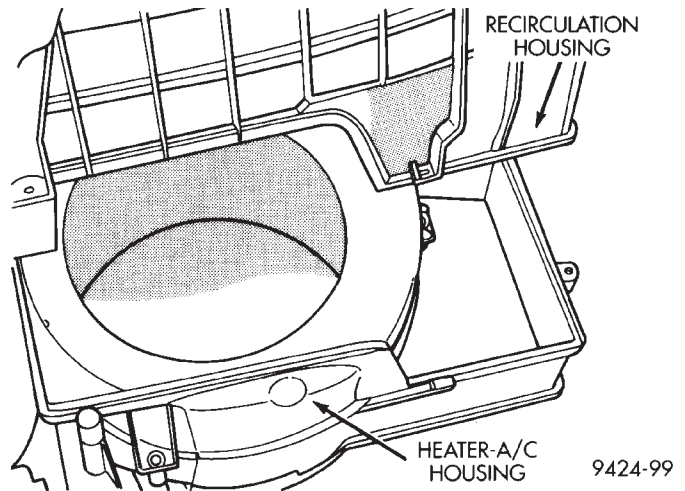


**Fig. 93 Recirculation Housing**

(22) Install blend-air door actuator (Fig. 94).

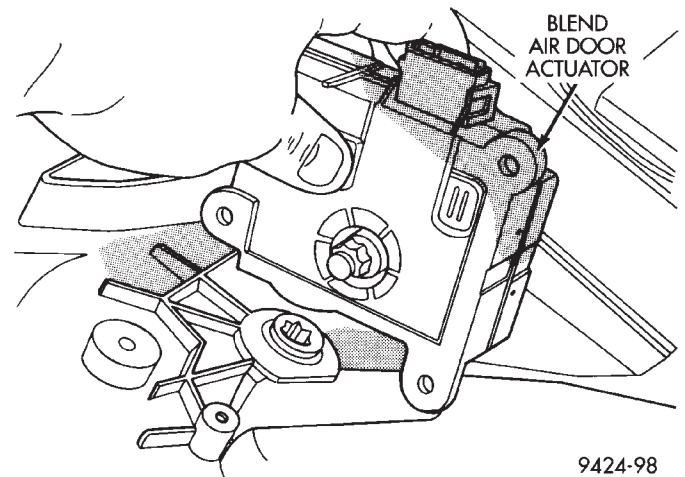


**Fig. 94 Blend-Air Door Actuator**

(23) Install mode door actuator (Fig. 95).

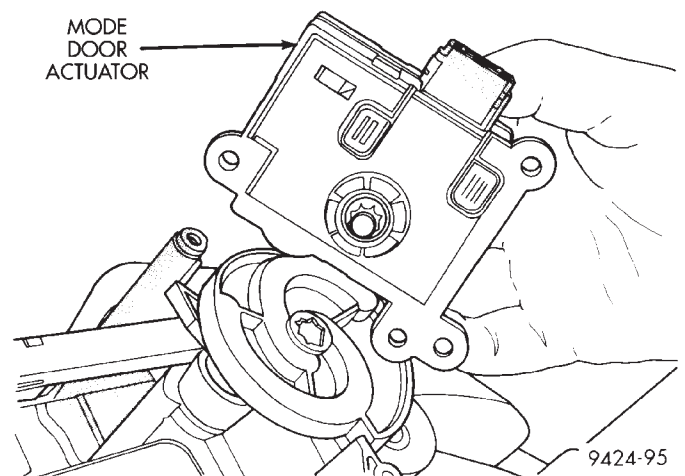


**Fig. 95 Mode Door Actuator**

## DISASSEMBLY AND ASSEMBLY (Continued)

(24) Install lower distribution housing (Fig. 96).

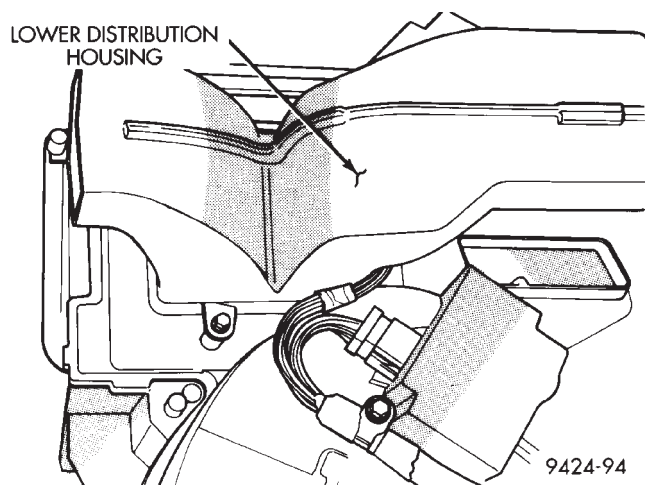


**Fig. 96 Lower Distribution Housing**

(25) Install recirculation door actuator and wiring (Fig. 97).

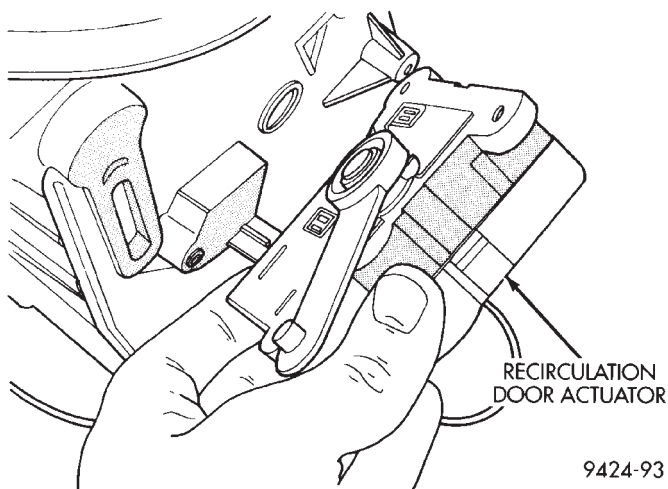


**Fig. 97 Recirculation Door Actuator**

(26) Install heater core into A/C housing (Fig. 98). Retain core with screws (Fig. 99).

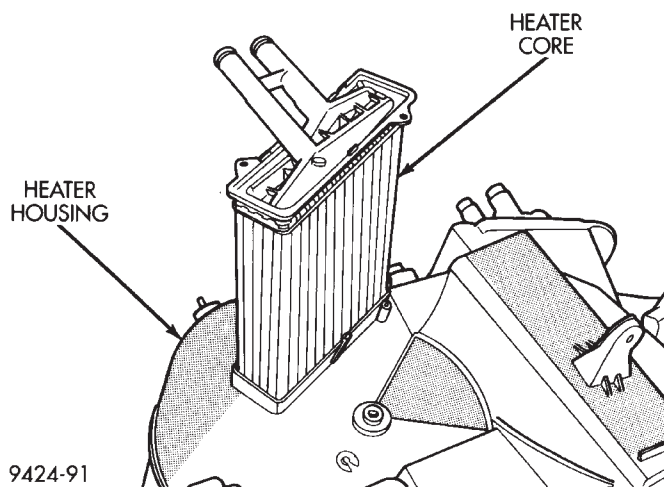


**Fig. 98 Heater Core**

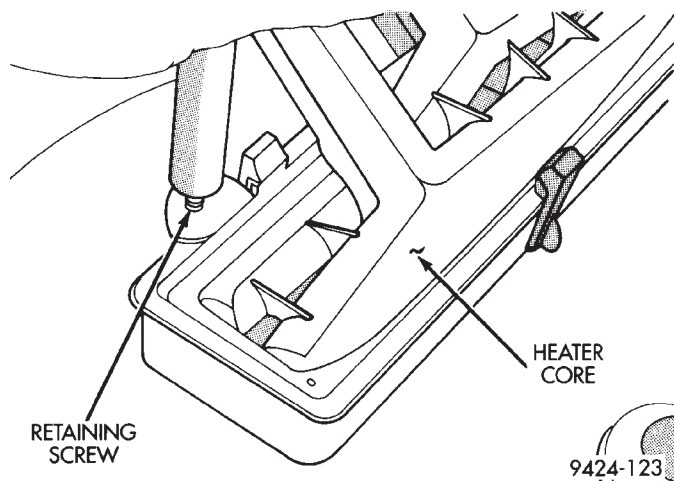


**Fig. 99 Heater Core Retaining Screws**

