HEATING AND AIR CONDITIONING

CONTENTS

GENERAL INFORMATION

INDEX

A/C SYSTEM IDENTIFICATION

The terms Fixed Displacement Compressor and Variable Displacement Compressor will be used to describe the two types of A/C systems used throughout this Group. Refer to (Figs. 1, 2 and 3).

The Variable Displacement Compressor can be identified by the location of the high pressure line. It is mounted to the end of the compressor case (Fig. 3).

DESCRIPTION AND OPERATION

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

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 A/C-heater unit housing assembly. On heater only systems, the evaporator and recirculating air door are omitted (Fig. 4).

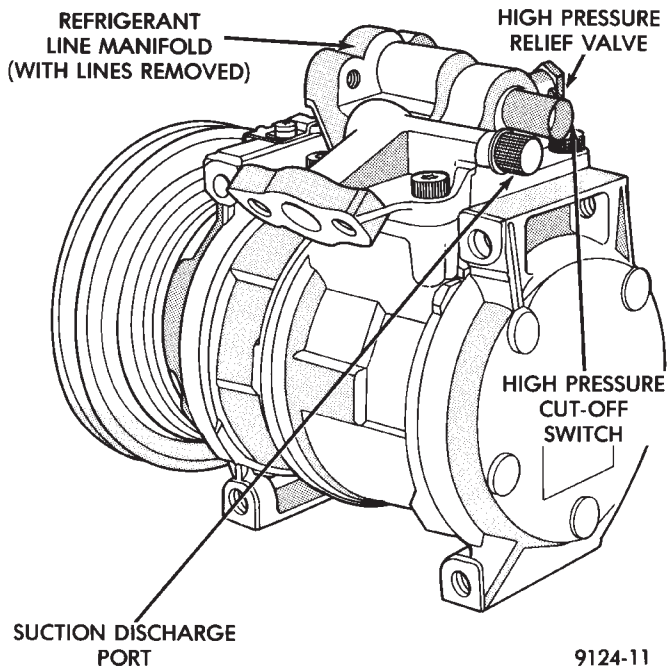


Fig. 1 Fixed Displacement Compressor—Model 10PA17

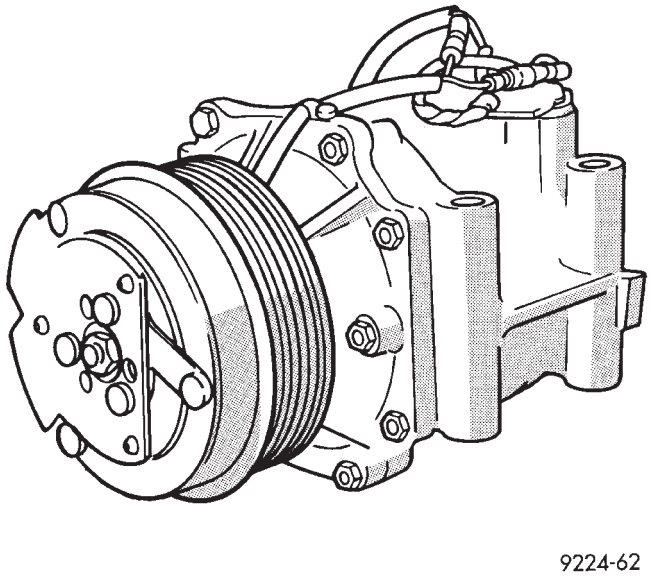


Fig. 2 Fixed Displacement Compressor—Model TR105

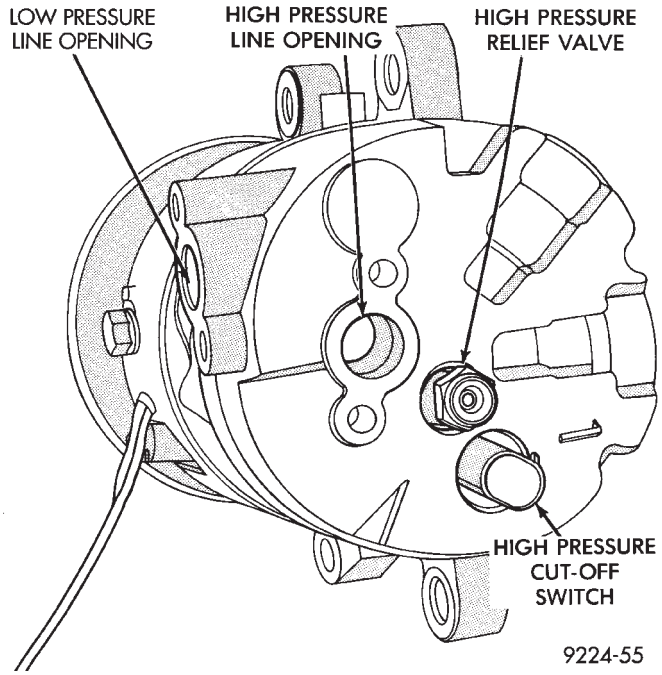


Fig. 3 Variable Displacement Compressor—Model 6C17

SYSTEM AIRFLOW

The system pulls outside (ambient) air through the cowl opening at the base of the windshield. Then it goes into the plenum chamber above the A/C-heater unit housing. On air-conditioned vehicles, the air passes through the evaporator. Air flow can be directed either through or around the heater core. This is done by adjusting the blend-air door with the TEMP control on the instrument panel. The air flow

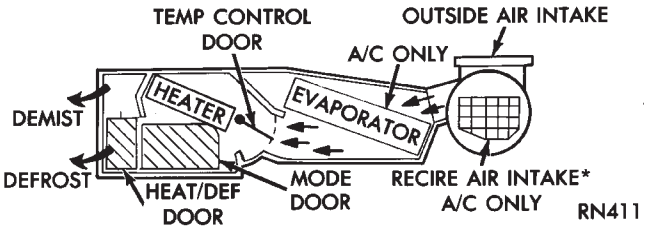


Fig. 4 Common Blend-Air Heater A/C System

can then be 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 instrument panel (Fig. 5).

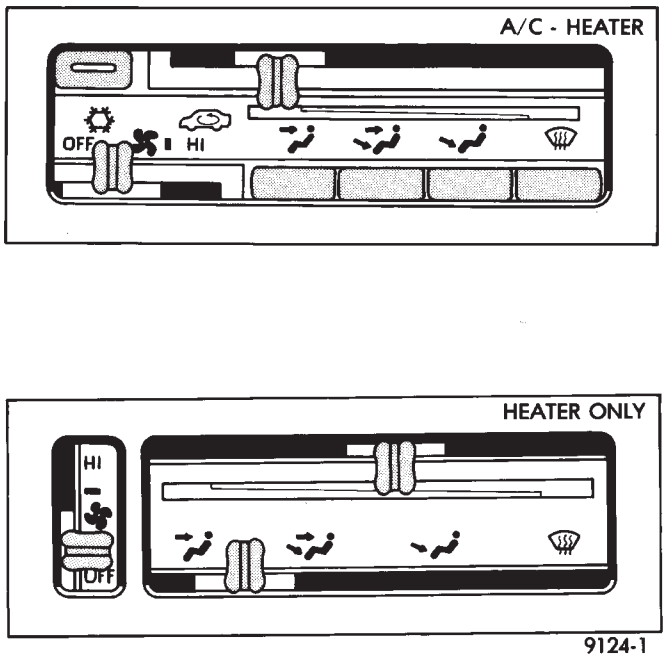


Fig. 5 Heater only or Heater—A/C Controls

On air-conditioned vehicles, 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 moving the TEMP control into the RECIRC position. Depressing the DEFROST or A/C button will engage the compressor. This will send refrigerant through the evaporator, and will remove heat and humidity from the air before it is directed through or around the heater core.

SIDE WINDOW DEMISTERS

The side window demisters direct air from the heater assembly. The outlets are located on the top outboard corners of the instrument panel. The Demisters operate when the A/C control mode selector is on FLOOR or DEFROST setting.

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 or engine cooling system.

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 (R-12) REFRIGERANT AT AVERAGE TEMPERATURE AND ALTITUDE IS EXTREMELY HIGH. AS A RESULT, ANYTHING THAT COMES IN CONTACT WITH THE REFRIGERANT WILL FREEZE. ALWAYS PROTECT SKIN OR DELICATE OBJECTS FROM DIRECT CONTACT WITH REFRIGERANT.

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

COOLING SYSTEM PRECAUTIONS

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

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.

The engine cooling system is designed to develop internal pressure of 97 to 123 kPa (14 to 18 psi). Allow the vehicle 15 minutes (or until a safe temperature and pressure are attained) before opening the cooling system. Refer to Group 7, Cooling System.

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.

The following precautions must be observed:

The system must be completely discharged before opening any fitting or connection in the refrigeration system. Open fittings with caution even after the system has been discharged. If any pressure is noticed as a fitting is loosened, allow trapped pressure to bleed off very slowly.

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.

Unified plumbing connections with aluminum gaskets cannot be serviced with O-rings. These gaskets are not reusable and do not require lubrication before installing.

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

The A/C system will remain chemical stabile as long as pure-moisture-free R-12 and refrigerant oil is used. Abnormal amounts of dirt, moisture or air can upset the chemical stability. This condition could cause operational troubles or even serious damage if present in more than very small quantities.

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

VARIABLE COMPRESSOR AND COMPONENTS DIAGNOSTIC PROCEDURES

INDEX

GENERAL INFORMATION

The Variable Displacement Compressor (VDC) provides maximum A/C performance under most conditions. It is designed to operate continuously without any cycling of the compressor clutch. The compressor has a variable angle wobble plate with six axially oriented cylinders.

During vehicle A/C system operation, the compressor will change its displacement to match the vehicles A/C cooling demands. When the A/C system needs more cooling capacity, the compressor will increase its pumping capacity. This is done by increasing the wobble plate angle to increase the piston stroke. When the A/C system cooling demand is low, the compressor will decrease its pumping capacity by reducing the piston pumping stroke. The low cooling capacity will prevent evaporator from freezing.

COMPRESSOR IDENTIFICATION

The Variable Displacement Compressor can be identified by the location of the high pressure line. It is mounted to the end of the compressor case (Fig. 1).

VARIABLE DISPLACEMENT COMPRESSOR DIAGNOSIS

(1) Verify that refrigerant system is at full charge. Refer to the Refrigerant Service Procedures section in this Group.

(2) Perform A/C Performance Test. Refer to Heater and A/C Performance Test section in this Group.

(3) If performance is not acceptable, perform expansion valve tests. Refer to Expansion Valve Tests in this section.

(4) If expansion valve test is correct, refer to the Variable Displacement Compressor test charts.

COMPRESSOR NOISE

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

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

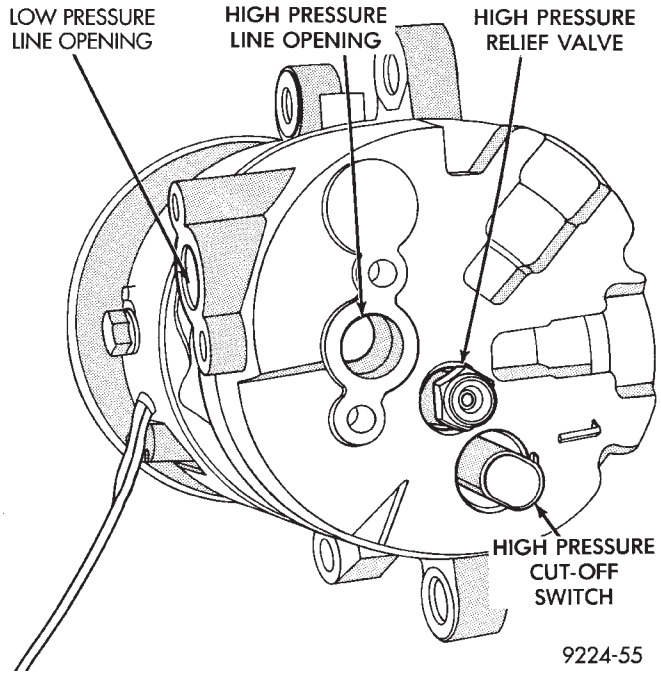


Fig. 1 Variable Displacement Compressor—Model 6C17

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

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

COMPRESSOR CLUTCH INOPERATIVE

The air-conditioning compressor clutch electrical circuit is controlled by the engine controller. The controller is located in the engine compartment outboard of the battery.

If the compressor clutch does not engage:

Verify refrigerant charge. Refer to Refrigerant Service Procedures in this section.

If the compressor clutch still does not engage:

Check for battery voltage at the differential pressure cut-off switch located on the expansion valve. If voltage is not detected, refer to:

(1) Group 8W, Wiring Diagrams.

VARIABLE DISPLACEMENT COMPRESSOR DIAGNOSIS

VERIFY REFRIGERANT SYSTEM CHARGE USING SIGHT GLASS METHOD

INSTALL MANIFOLD GAUGE SET- NOTE PRESSURES AND COMPARE TO PRESSURE RANGE GRAPH

ACCEPTABLE RANGE

ZONE - 1

ZONE - 2

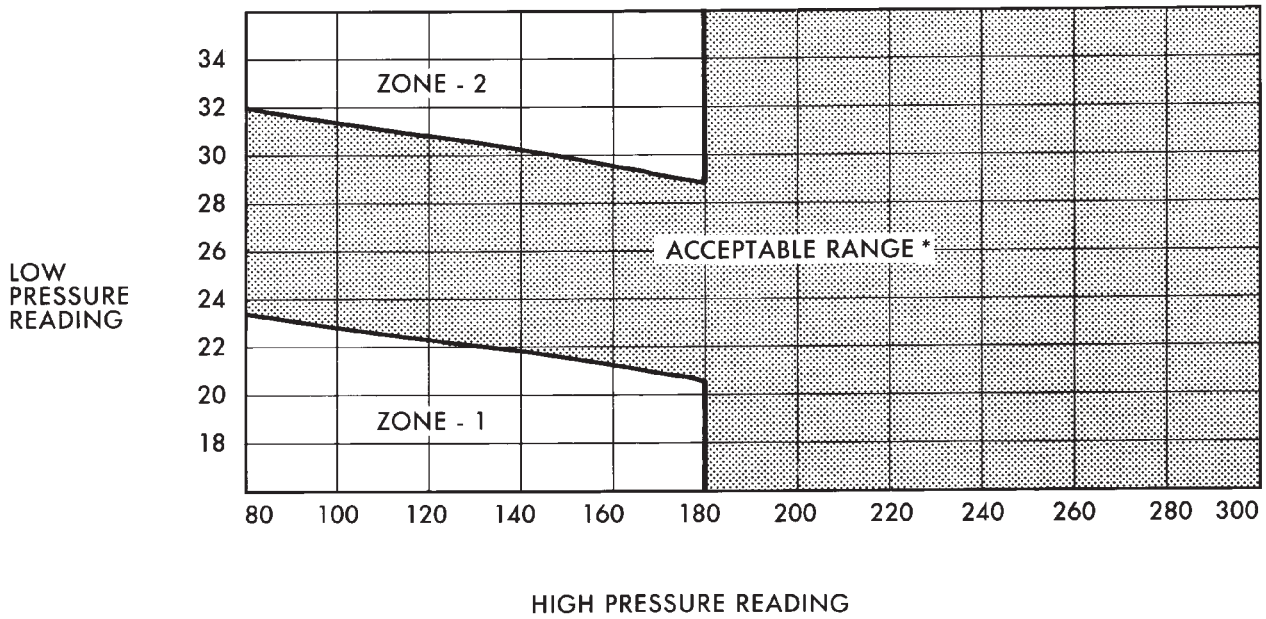
PERFORM A/C OVERALL PERFORMANCE TESTS

REPLACE VARIABLE DISPLACEMENT COMPRESSOR

SEE PERFORMANCE TEMPERATURE CHART
TEST AREA TEMP = 21° C (70° F) OR ABOVE
ENGINE SPEED = 1000 rpm
CONTROL SETTING = A/C, RECIRC, LOW BLOWER
DOORS AND WINDOWS CLOSED
GEAR SELECTOR = PARK OR NEUTRAL
SET PARK BRAKE OR EQUIVALENT
ELECTRICALLY BYPASS RADIATOR FAN CONTROL SWITCH

*IN THE ACCEPTABLE RANGE ABOVE 180 PSI THE COMPRESSOR IS AT 100% OUTPUT AND WILL FUNCTION LIKE A FIXED DISPLACEMENT COMPRESSOR

PRESSURE RANGE GRAPH



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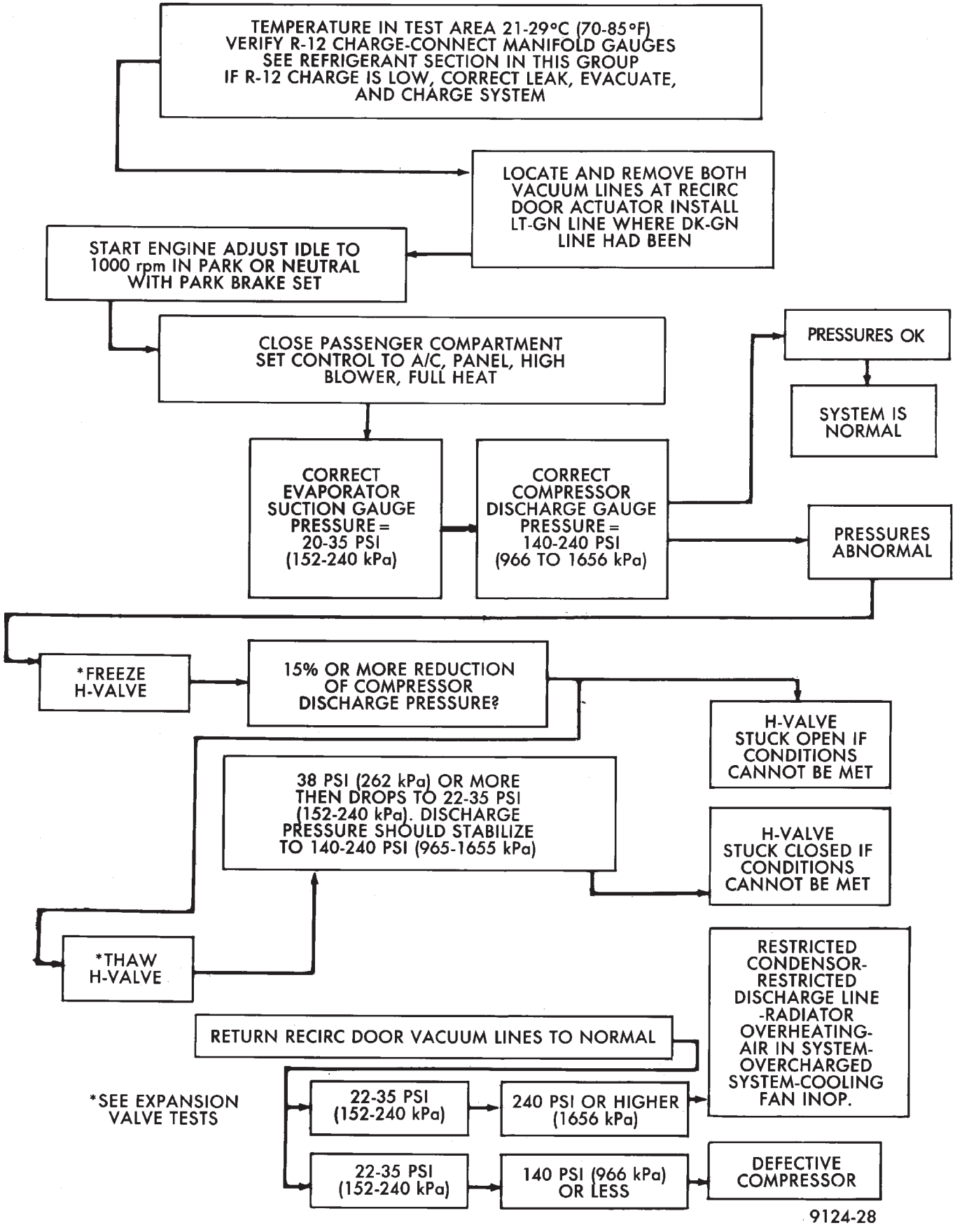
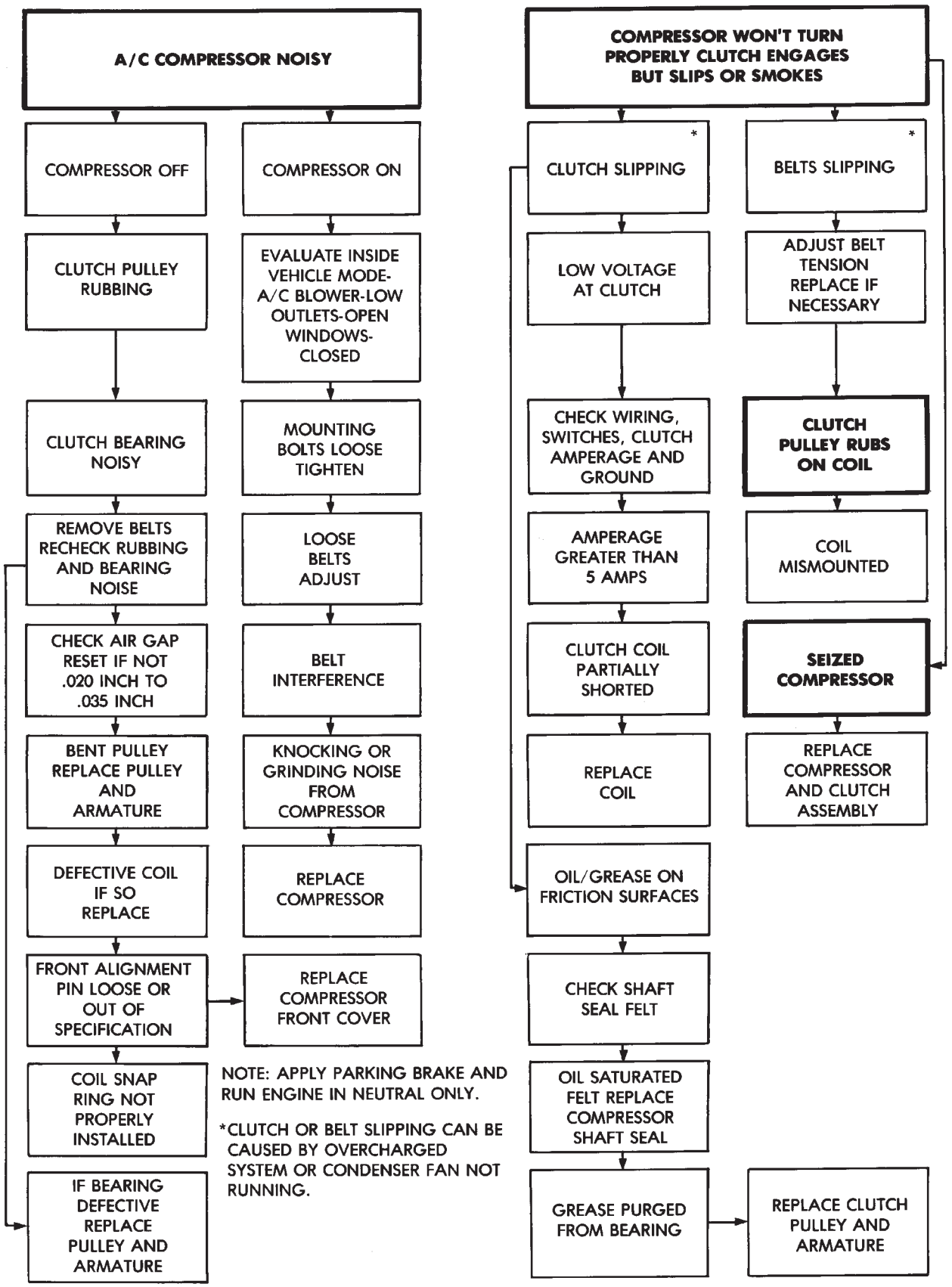
REFRIGERANT SYSTEM DIAGNOSIS—VARIABLE DISPLACEMENT COMPRESSOR



COMPRESSOR NOISE AND COMPRESSOR CLUTCH DIAGNOSIS



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(2) The appropriate Powertrain Diagnostic Procedures Manual for diagnostic information.

(3) The Compressor Clutch Diagnosis—Variable Displacement Compressor chart in this section.

(4) On 2.2 L Turbo III engines, check for battery voltage at the Thermal Limiter Switch located on the compressor.

If voltage is found at the cut-off and/or thermal limiter switch, reconnect switch. Then check for battery voltage between the compressor clutch connector terminals.

If voltage is detected, perform A/C Clutch Coil Tests. Refer to Clutch Coil Tests in this section.

CLUTCH COIL TESTS

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

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

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

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

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

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

DIFFERENTIAL PRESSURE CUT-OUT SWITCH DIAGNOSIS

The Differential Pressure Cut-Out (DPCO) Switch (Fig. 2) monitors the liquid refrigerant pressure on the liquid side of the system. The DPCO is located on the expansion valve. The expansion valve is black in color when a variable displacement compressor is used. The DPCO turns off voltage to the compressor clutch coil when liquid refrigerant pressure drops to levels that could damage the compressor. The DPCO is a sealed factory calibrated unit. It must be replaced if defective.

DPCO SWITCH TEST

The work area must not be below 10°C (50°F) to test the compressor clutch circuit.

(1) With gear selector in park or neutral, and park brake set, start engine and allow to idle.

(2) Raise hood and disconnect DPCO switch connector boot.

(3) Using a suitable jumper wire, jump across the terminals inside wire connector boot.

(4) If clutch does not engage, the wiring, fuse, relay, ambient switch, or high pressure cut-off switch can be defective. Refer to Group 8W, Wiring Diagrams.

(5) If clutch engages, connect a suitable manifold gauge set. Read low pressure gauge. At pressure 283 kPa (41 psi) and above, DPCO switch will complete the clutch circuit. If the low pressure gauge reads below 317 kPa (46 psi), the system is low on refrigerant charge or empty due to a leak. Refer to Testing For Refrigerant Leaks in the Refrigerant Service Procedures section.

(6) Install connector boot on switch and repeat step number 3. If the clutch does not engage, replace the DPCO switch.

AMBIENT SWITCH DIAGNOSIS

The ambient switch is a temperature sensor located in front of the condenser behind the grille. The ambient switch prevents the compressor from engaging in cold temperatures. The ambient switch is a sealed factory calibrated unit. It must be replaced if defective.

AMBIENT SWITCH TEST

(1) Disconnect ambient switch wire connector.

(2) Using a suitable ohm meter or continuity tester, test for continuity across the ambient switch terminals.

(a) At temperature above 10°C (50°F), the switch circuit should be complete.

(b) Chill the switch with ice to below 10°C (50°F) and test for continuity. The switch circuit should be open, with continuity not detected.

Replace ambient switch if defective.

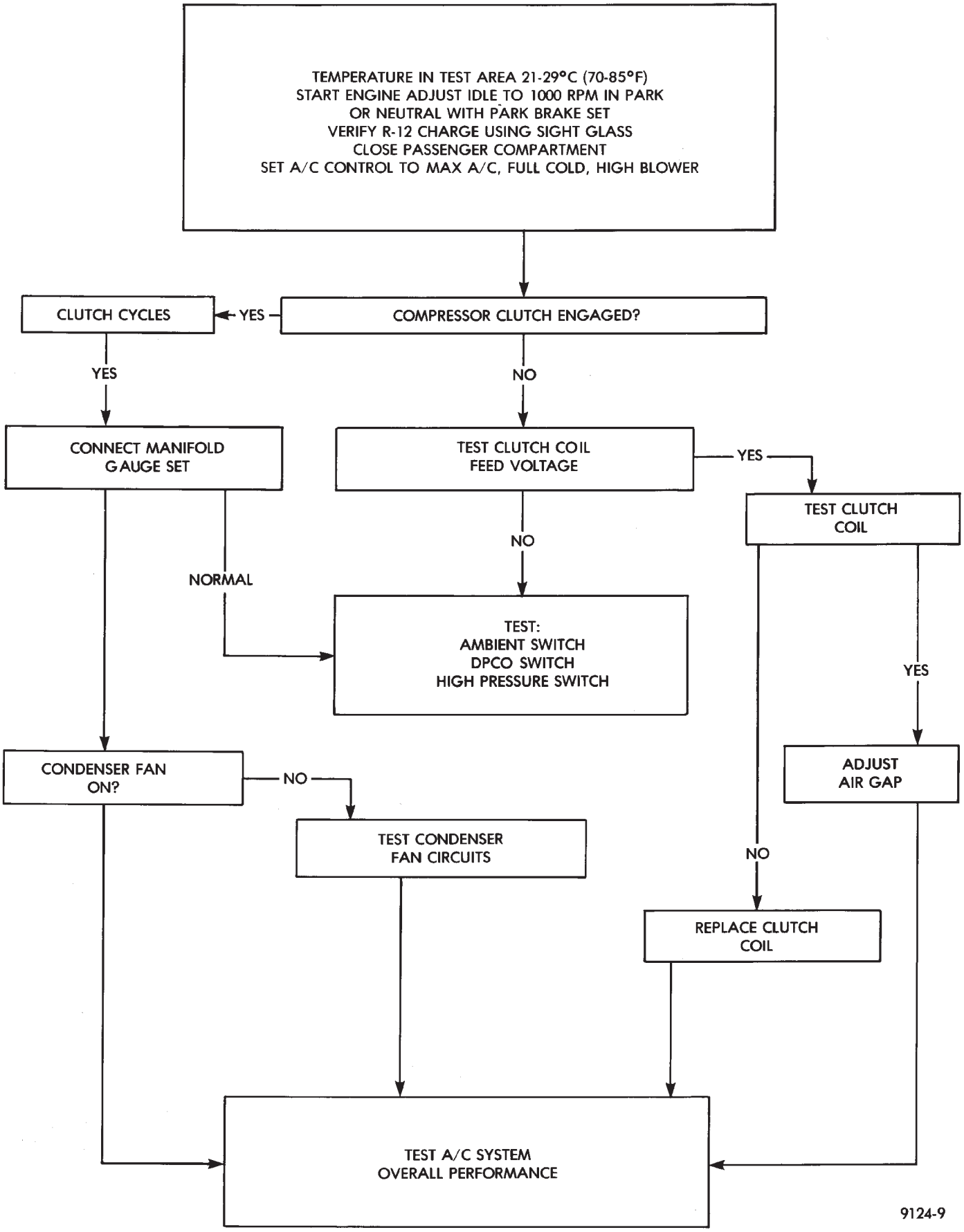
CONDENSER FAN CONTROL SWITCH DIAGNOSIS

The Fan Control Switch is located on the plumbing discharge line at the A/C compressor (Fig. 3). The fan control switch cycles the radiator/condenser fan on and off by monitoring the compressor discharge pressure. The radiator top tank temperature sensor can over ride the function of the fan control switch. It can cycle the radiator/condenser fan on and off depending on the engine temperature.

FAN CONTROL SWITCH TEST

Review Safety Precautions and Warnings before proceeding. Connect a manifold gauge set to the refrigerant system service ports. Work area temperature can not be below 21°C (70°F).

COMPRESSOR CLUTCH DIAGNOSIS—VARIABLE DISPLACEMENT COMPRESSOR—MODEL 6C17



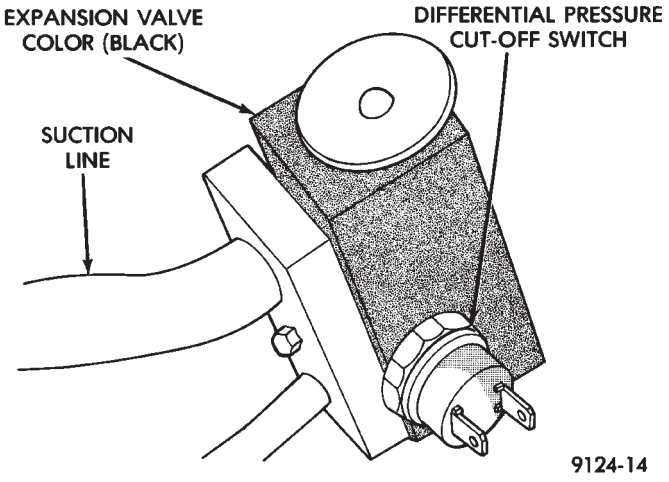


Fig. 2 Differential Pressure Cut-Out Switch

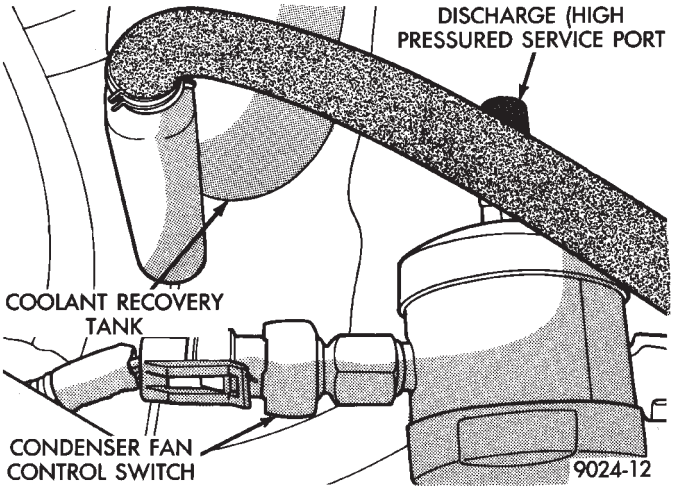


Fig. 3 Condenser Fan Control Switch

WARNING: AVOID RADIATOR/CONDENSER FAN BLADES WHEN WORKING IN THE RADIATOR AREA. FAN IS CONTROLLED BY TEMPERATURE AND CAN START ANY TIME IGNITION IS ON. PERSONAL INJURY CAN RESULT.

(1) Disconnect fan control switch wire connector.

(2) Using a suitable jumper wire, jump across terminals in wire connector.

(3) Connect a suitable continuity tester across fan control switch terminals.

(4) Start engine and set idle at 1300 rpm. The radiator fan should run constantly.

(5) Set the A/C controls to A/C and high blower.

(6) If the high pressure gauge reads below 1102 kPa (160 psi) there should be no continuity across the switch terminals.

CAUTION: Do not allow engine to overheat when radiator air flow is blocked.

(7) Block radiator air flow with a suitable cover to increase the high side pressure to at least 1585 kPa (230 psi). Electrical continuity should be detected across the fan control switch terminals.

(8) Remove cover from front of vehicle to allow high side pressure to decrease. When pressure drops below 1102 kPa (160 psi), continuity should cease.

If fan control switch is defective, replace it.

HIGH PRESSURE CUT-OUT SWITCH DIAGNOSIS

The High Pressure Cut Out (HPCO) switch is located on the rear cover of the Variable Displacement Compressor (Fig. 4). The function of the switch is to disengage the compressor clutch by monitoring the compressor discharge (high) pressure. The HPCO Switch is in the same circuit as the Differential Pressure Cut Out (DPCO) switch and Ambient Switch.

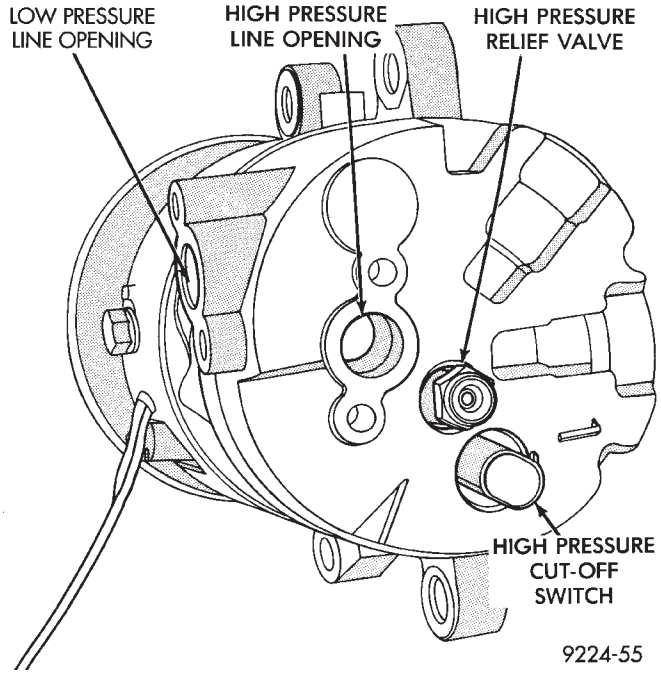


Fig. 4 Variable Displacement Compressor—Model 6C17

HIGH PRESSURE CUT-OUT SWITCH TESTS

Review Safety Precautions and Warnings before proceeding with this operation.

Connect a suitable manifold gauge set to the refrigerant system service ports. Work area temperature can not be below 21°C (70°F).

(1) Raise hood of vehicle.

(2) With gear selector in park or neutral, and park brake set, start engine and allow to idle at 1300 rpm.

(3) Set the A/C controls to A/C and High blower.

(6) If the high pressure gauge reads below 2963 kPa (430 psi) ±138 kPa (20 psi) the compressor clutch should be engaged.

CAUTION: Do not allow engine to overheat when radiator air flow is blocked.

(7) Block radiator air flow with a suitable cover to increase the high side pressure to at least 3100 kPa (450 psi). Compressor clutch should disengage.

(8) Remove cover from front of vehicle to allow high side pressure to decrease. When pressure drops below 1826 kPa (265 psi), compressor clutch should engage.

If High Pressure Cut-Out Switch is defective, replace it. Refer to Component Service Procedures in this Group.

BLACK EXPANSION VALVE TEST

Review Safety Precautions and Warnings before proceeding with this operation. The work area must be 21°C to 27°C (70°F to 85°F) when testing expansion valve. To test the expansion valve:

(1) Connect a charging station or manifold gauge set to the refrigerant system service ports. Verify the refrigerant charge level using the sight glass method.

(2) Disconnect and plug the vacuum line at the water control valve.

(3) Disconnect the wire connector at the differential pressure cut-off switch. Using a jumper wire, jump across the terminals inside the connector boot (Fig. 5).

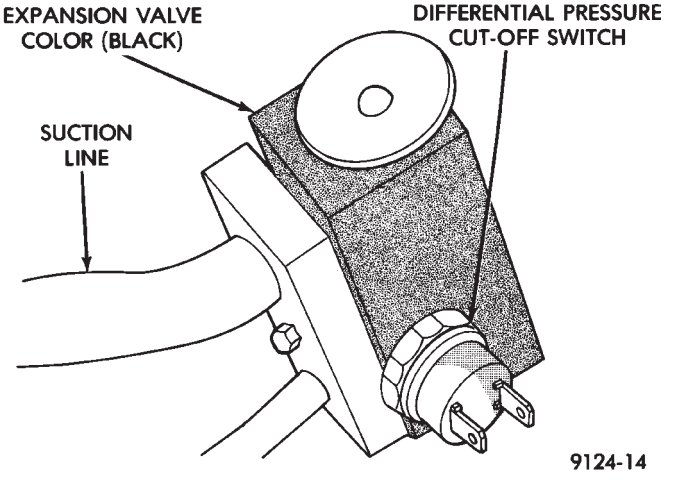


Fig. 5 Differential Pressure Cut-Out Switch

(4) Close all doors, windows and vents to the passenger compartment.

(5) Set heater-A/C control to A/C, full heat, FLOOR, and high blower.

(6) Start the engine and hold the idle speed (1000 rpm). After the engine has reached running temperature, allow the passenger compartment to heat up. This will create the need for maximum refrigerant flow into the evaporator.

(7) Discharge (high pressure) gauge should read 965 to 1655 kPa (140 to 240 psi) when the refrigerant charge is sufficient. If system cannot achieve proper pressure, replace the expansion valve. If pressure is correct, record reading and proceed with test.

WARNING: PROTECT SKIN AND EYES FROM CONTACTING CO_2 PERSONAL INJURY CAN RESULT.

(8) If discharge pressure is within specified range, freeze the expansion valve control head (Fig. 8) for 30 seconds. Use a super cold substance (liquid CO_2).**Do not spray R-12 Refrigerant on the expansion valve for this test. Refer to Refrigerant Recycling in the Refrigerant Service Procedures section.** If compressor discharge (high) pressure does not drop by 15% or more than the pressure recorded in step 7, replace the expansion valve. Allow the expansion valve to thaw. The discharge pressure should stabilize to the pressure recorded in step 7. If the pressure does not stabilize, replace the expansion valve.

When expansion valve tests are complete, refer to Heater and A/C Performance Tests and remove all test equipment before returning vehicle to use.

HIGH PRESSURE RELIEF VALVE (HPR) DIAGNOSIS

The HPR valve prevents damage to the air-conditioning system if excessive pressure develops. Excessive pressure may be caused by condenser air flow blockage, refrigerant overcharge, or air and moisture in the system.

(HPR) VALVE LOCATION

The HPR Valve is located on the compressor end plate. (Fig. 6).

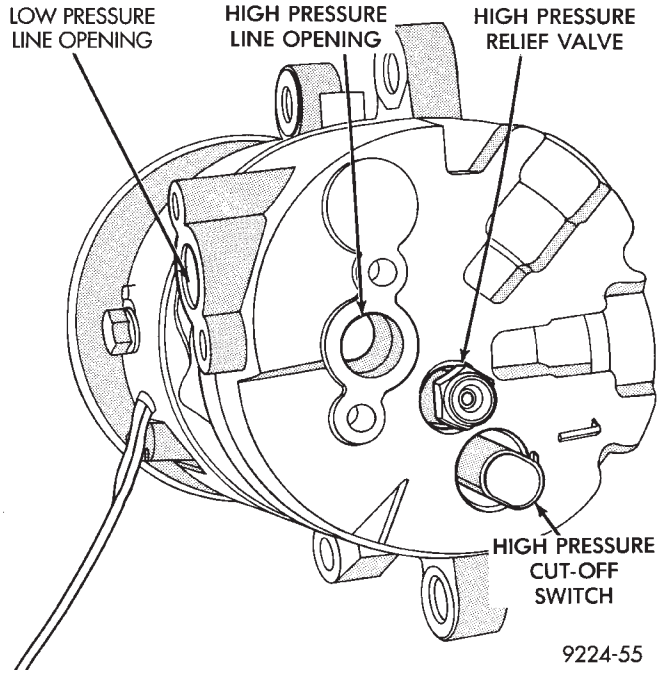


Fig. 6 High Pressure Relief Valve—Variable Displacement Compressor

The high pressure relief valve vents only a small amount of refrigerant necessary to reduce system pressure and then reseats itself. The majority of the

refrigerant is conserved in the system. The valve is calibrated to vent at a pressure of 3100 to 4140 Kpa (450 to 600 psi). If a valve has vented a small amount of refrigerant, it does not necessarily mean the valve is defective.

For (HPR) valve replacement, refer to Variable Displacement Compressor Service Procedures.

FIXED DISPLACEMENT COMPRESSOR AND COMPONENTS DIAGNOSTIC PROCEDURES

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COMPRESSOR IDENTIFICATION

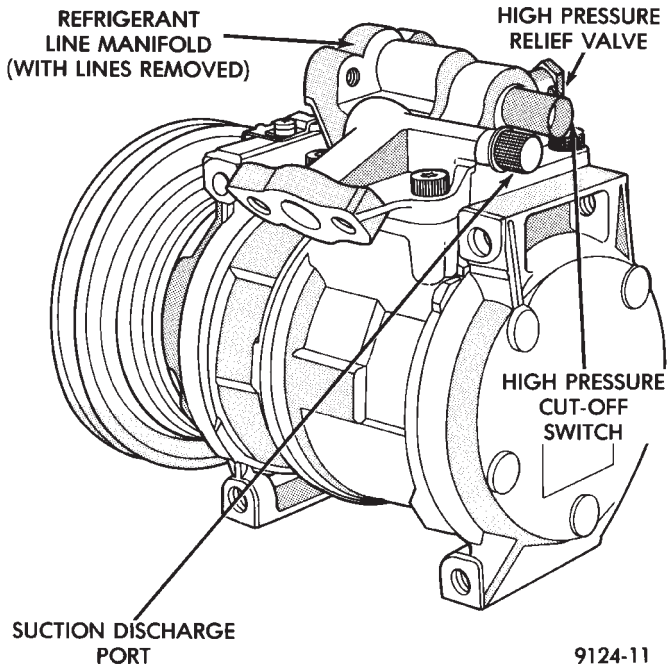


Fig. 1 Fixed Displacement Compressor—Model 10PA17

COMPRESSOR NOISE

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

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

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

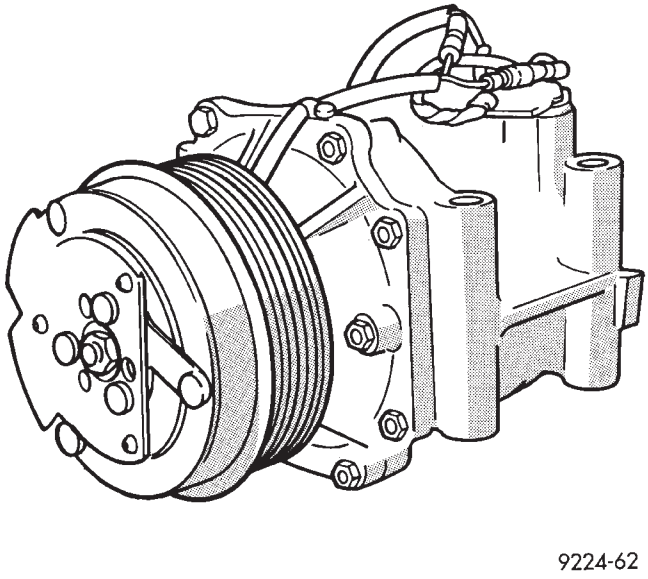


Fig. 2 Fixed Displacement Compressor—Model TR105

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

COMPRESSOR CLUTCH INOPERATIVE

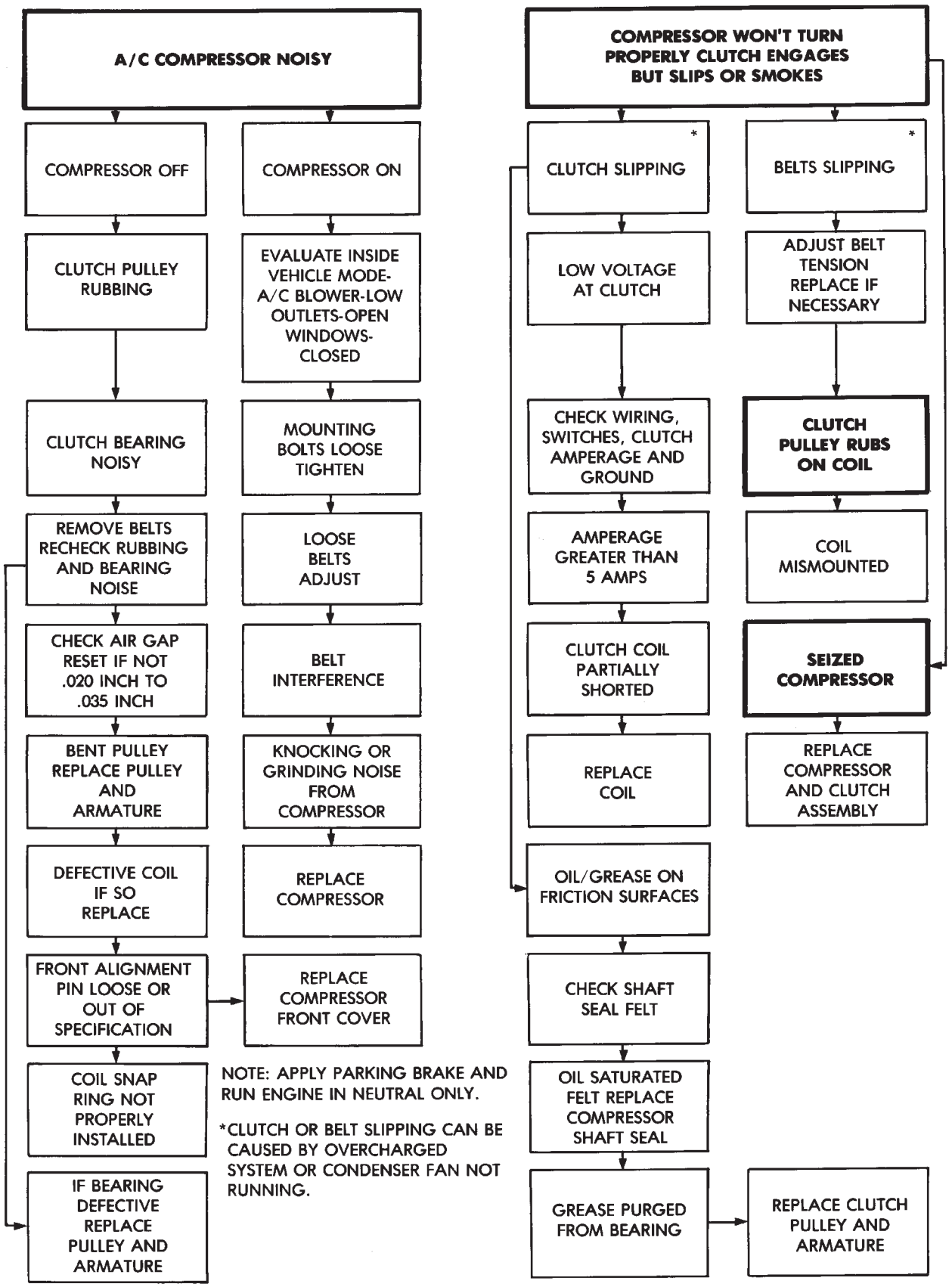
The air-conditioning compressor clutch electrical circuit is controlled by the engine controller. The controller is located in the engine compartment outboard of the battery.

If the compressor clutch does not engage:

Verify refrigerant charge.

If the compressor clutch still does not engage check for battery voltage at the low pressure or differential

COMPRESSOR NOISE AND COMPRESSOR CLUTCH DIAGNOSIS



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pressure cut-off switch located on the expansion valve. If voltage is not detected, refer to:

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

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

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

CLUTCH COIL TESTS

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

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

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

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

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

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

LOW-PRESSURE CUT-OFF SWITCH DIAGNOSIS

The Low Pressure Cut-Off (LPCO) Switch (Fig. 3) monitors the refrigerant gas pressure on the suction side of the system. The LPCO is located on the expansion valve, and the expansion valve is silver in color when a fixed displacement compressor is used. The LPCO turns off voltage to the compressor clutch coil when refrigerant gas pressure drops to levels that could damage the compressor. The LPCO is a sealed factory calibrated unit. It must be replaced if defective.

LPCO SWITCH TEST

The work area must not be below 10°C (50°F) to test the compressor clutch circuit.

(1) With gear selector in park or neutral and park brake set, start engine and allow to idle.

(2) Raise hood and disconnect LPCO switch connector boot.

(3) Using a suitable jumper wire, jump across the terminals inside wire connector boot.

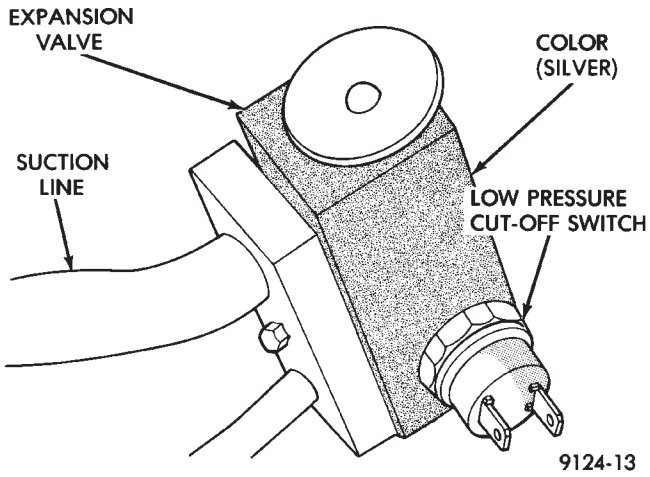


Fig. 3 Low Pressure Cut-Off Switch

(4) If the compressor clutch does not engage, the cycling clutch switch, wiring, relay, or fuse can be defective. Refer to Group 8W, Wiring Diagrams.

(5) If clutch engages, connect manifold gauge set. Read low pressure gauge. At pressure above 97 kPa (14 psi) and above, LPCO switch will complete the clutch circuit. If the low pressure gauge reads below 172 kPa (25 psi), the system is low on refrigerant charge or empty due to a leak. Refer to Testing For Refrigerant Leaks in the Refrigerant Service Procedures section.

(6) Install connector boot on switch and repeat step number 3. If the clutch does not engage, replace the LPCO switch.

THERMAL LIMITER SWITCH—MODEL TR105 COMPRESSOR

The Thermal Limiter Switch (Fig. 4) is bolted to the side of the compressor case. It measures compressor surface temperature and is used as a safety device to cut battery voltage to the compressor clutch coil. This is performed if compressor case temperature is excessive.

This switch is**NOT USED** to cycle the clutch coil. After the compressor has cooled to normal operating temperature, the switch will reset.

TESTING THERMAL LIMITER SWITCH

The switch can remain bolted to the compressor for testing.

(1) Disconnect the wiring connectors from the thermal limiter switch.

(2) Using an ohmmeter, check for continuity between the two wiring leads. If continuity is not detected, replace switch. Also check for possible compressor overheating.

- Switch cut-out (no continuity) occurs at 125°C ±3°C (255°F ±37°F).
- Switch cuts back in (continuity) at 110°C ±6°C (230°F ±42°F).

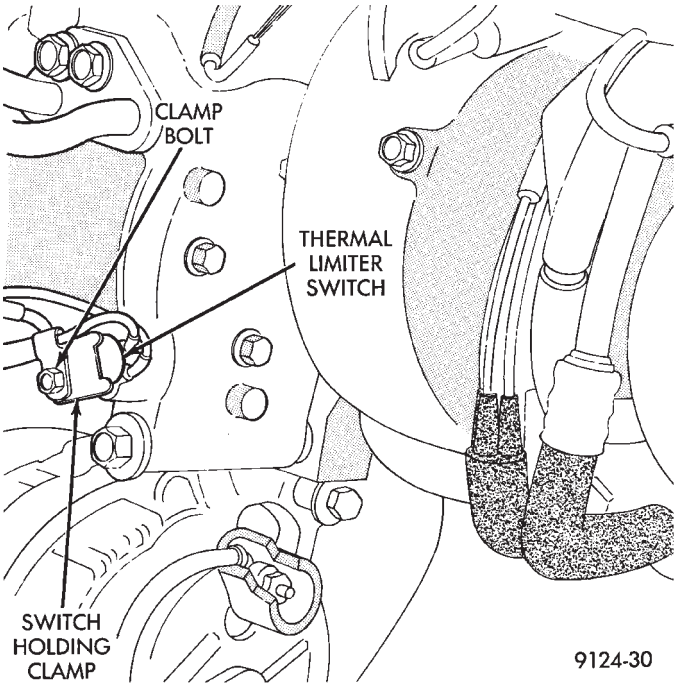


Fig. 4 Thermal Limiter Switch

To replace switch, refer to Thermal Limiter Switch.

FIN-SENSING CYCLING CLUTCH SWITCH DIAGNOSIS

The Fin-Sensing Cycling Clutch Switch (FCCS) (Fig. 5) is located in the heater-A/C unit housing near the blower motor and placed in the evaporator fins. The FCCS prevents evaporator condensate freeze-up. This is done by cycling the compressor clutch OFF when evaporator temperature drops below freeze point. It cycles ON when the evaporator temperature rises above freeze point. The FCCS uses a thermistor probe in a capillary tube inserted between the evaporator fins in the heater-A/C unit housing. If the compressor clutch does not cycle, and all other clutch circuit components test correct, test the switch. Refer to Fin-Sensing Cycling Clutch Switch Tests.

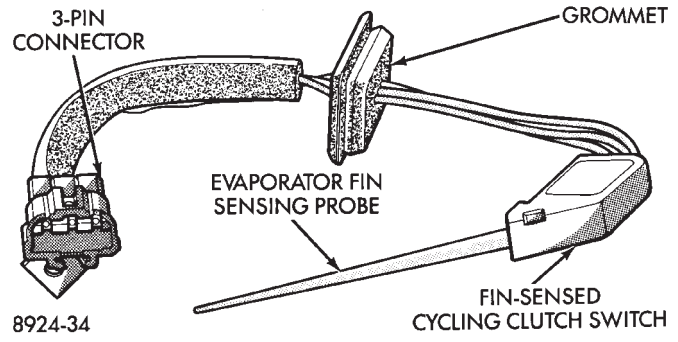


Fig. 5 Fin-sensing Cycling Clutch Switch

FIN-SENSING CYCLING CLUTCH SWITCH TESTS

At temperatures above 32°C (90°F) the compressor clutch may engage continuously and not cycle. This is due to evaporator temperature above the freezing point.

The work area and vehicle must be between 21°C (70°F) and 32°C (90°F) when testing the Fin-sensing Cycling Switch.

(1) Disconnect the 3-wire connector from switch lead located behind the glove box.

(2) Test for voltage between pin #1 to pin #3 on the wire harness connector (Fig. 6). If voltage is not detected, refer to the Front Wheel Drive Car-Wiring Diagrams Service Manual. If voltage is detected, jump pin #1 to pin #3 using a jumper wire. Compressor clutch should engage.

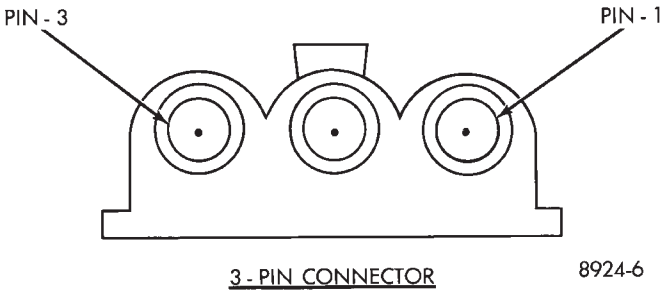


Fig. 6 Fin-sensing Cycling Clutch Switch Harness Connector

(3) If compressor clutch engages, test for continuity from terminal pin #1 to pin #3 of the switch lead connector. Continuity should be detected. If not, replace the Fin-sensing Cycling Clutch Switch.

FIXED DISPLACEMENT COMPRESSOR REFRIGERANT SYSTEM

Refer to the Refrigerant System Diagnosis chart in this section.

SILVER EXPANSION VALVE TEST

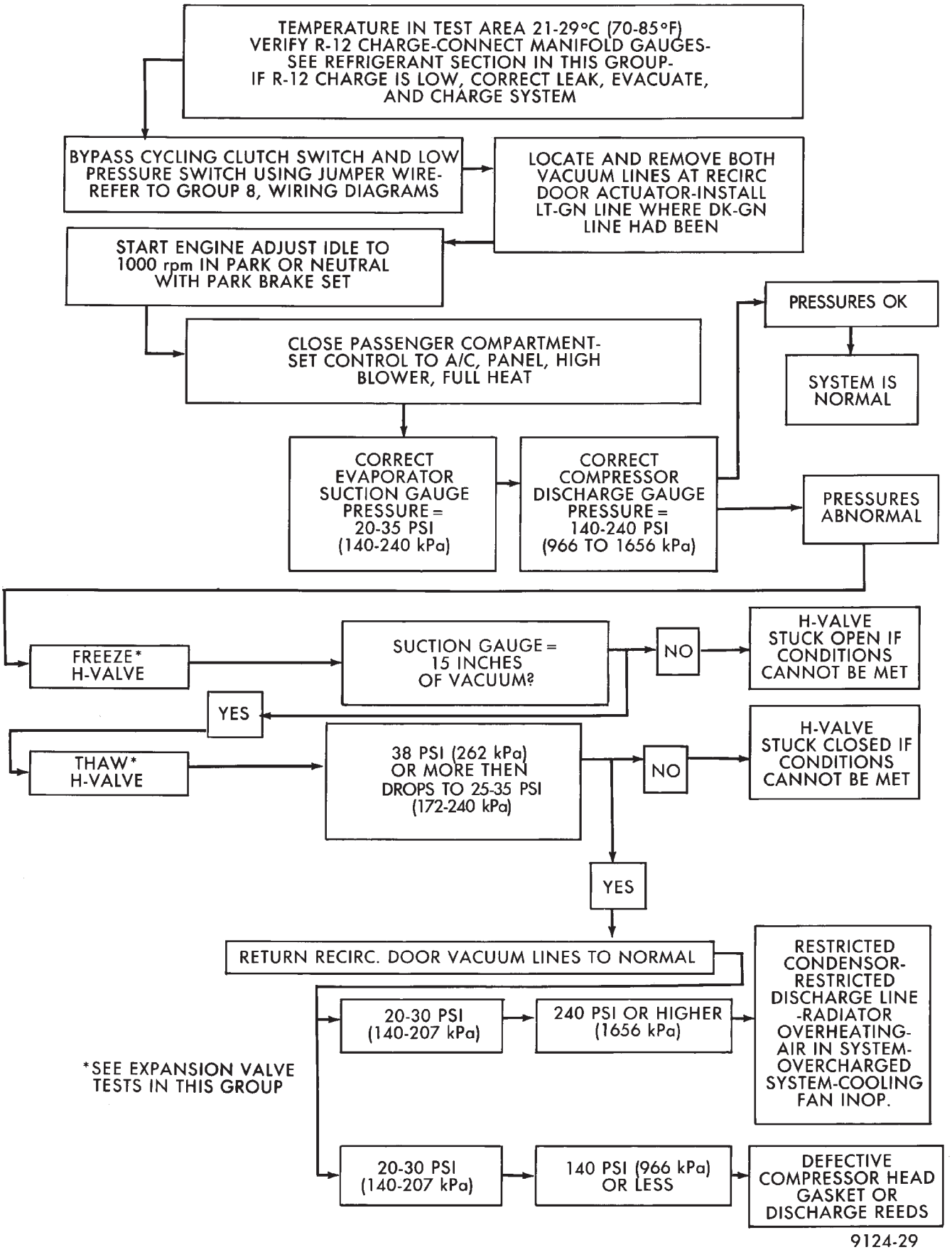
Expansion valve tests should be performed after compressor tests.

Review Safety Precautions and Warnings in the General Information section of this Group. The work area and vehicle must be 21°C to 27°C (70°F to 85°F) when testing expansion valve. To test the expansion valve:

(1) Connect a charging station or manifold gauge set to the refrigerant system service ports. Verify the refrigerant charge level using the sight glass method.

(2) Disconnect and plug the vacuum line at the water control valve.

REFRIGERANT SYSTEM DIAGNOSIS



(3) Disconnect wire connector at low pressure cut-off switch (Fig. 7). Using a jumper wire, jump terminals inside wire connector boot.

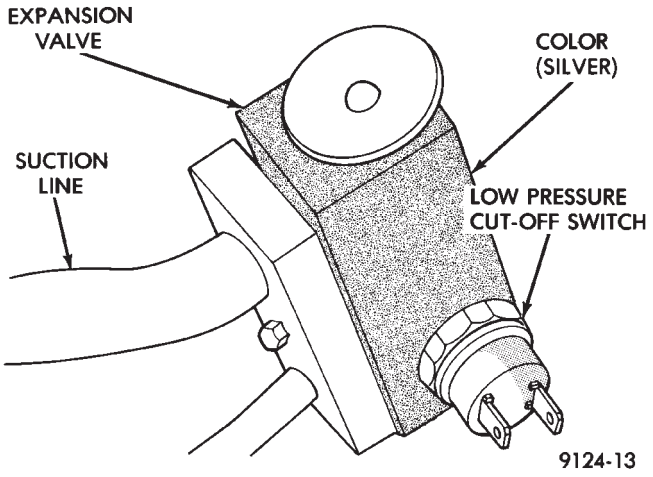


Fig. 7 Low Pressure Cut-Off Switch

(4) Close all doors, windows and vents to the passenger compartment.

(5) Set heater-A/C control to A/C, full heat, FLOOR, and high blower.

(6) Start the engine and hold the idle speed (1000 rpm). After the engine has reached running temperature, allow the passenger compartment to heat up. This will create the need for maximum refrigerant flow into the evaporator.

(7) If the refrigerant charge is sufficient, discharge (high pressure) gauge should read 965 to 1655 kPa (140 to 240 psi). Suction (low pressure) gauge should read 140 kPa to 207 kpa (20 psi to 30 psi). If system cannot achieve proper pressure readings, replace the expansion valve. If pressure is correct, proceed with test.

WARNING: PROTECT SKIN AND EYES FROM CONTACTING CO_2 PERSONAL INJURY CAN RESULT.

(8) If suction side low pressure is within specified range, freeze the expansion valve control head (Fig. 8) for 30 seconds. Use a super cold substance (liquid CO_2). **Do not spray R-12 Refrigerant on the expansion valve for this test.** Suction side low pressure should drop to -50 kPa (-15 in. Hg) If not, replace expansion valve.

(9) Allow expansion valve to thaw. The low pressure gauge reading should stabilize at 140 kPa to 240 kPa (20 psi to 30 psi). If not, replace expansion valve.

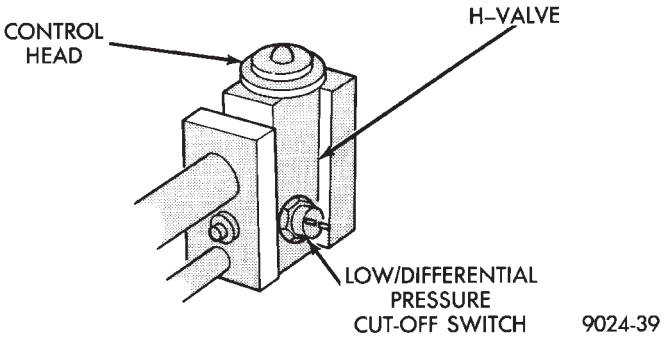


Fig. 8 Expansion Valve

When expansion valve test is complete, test A/C overall performance. Refer to the Heater and A/C Performance Test in this section. Remove all test equipment before returning vehicle to use.

HIGH PRESSURE RELIEF VALVE (HPR) DIAGNOSIS

The HPR valve prevents damage to the air-conditioning system if excessive pressure develops. Excessive pressure may be caused by condenser air flow blockage, refrigerant overcharge, or air and moisture in the system.

(HPR) VALVE LOCATION

The HPR Valve is located on the discharge line at the A/C compressor (Fig. 9).

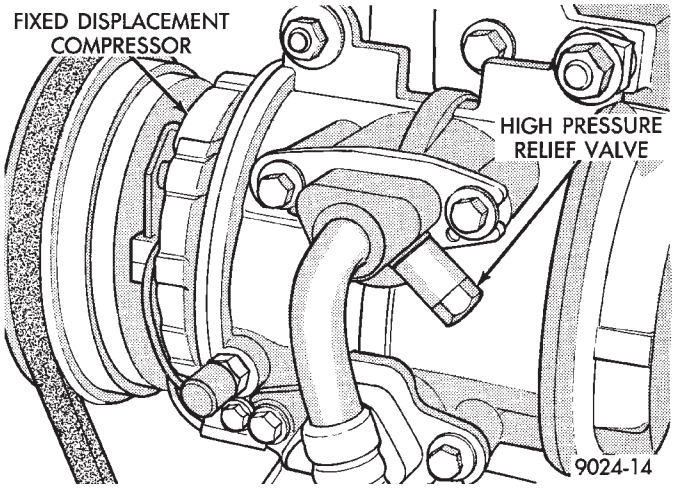


Fig. 9 High Pressure Relief Valve— Typical

The high pressure relief valve vents only a small amount of refrigerant necessary to reduce system pressure and then reseats itself. The majority of the refrigerant is conserved in the system. The valve is calibrated to vent at a pressure of 3100 to 4140 Kpa (450 to 600 psi). If a valve has vented a small amount of refrigerant, it does not necessarily mean the valve is defective.

For (HPR) valve replacement, refer to Fixed Displacement Compressor Service Procedures section.

VACUUM CONTROL SYSTEM DIAGNOSIS

GENERAL INFORMATION

Use an adjustable Vacuum Test Gauge (C-3707) and a suitable vacuum pump to test heater A/C control vacuum. With a finger placed over the end of test hose (Fig. 1), calibrate vacuum control valve on the test gauge to obtain -27 kPa (8 in. Hg.). Release and block the end of the test hose several times to verify vacuum setting.

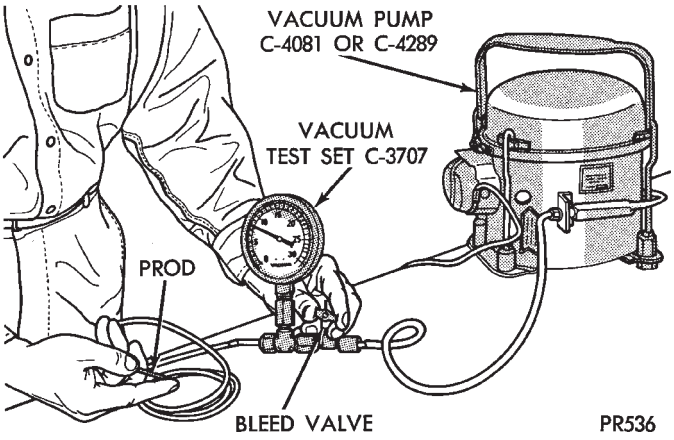


Fig. 1 Adjust Vacuum Test Bleed Valve

VACUUM TESTING THE ONE-WAY CHECK VALVE

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

(2) Remove the vacuum check valve. This valve is located on the (black) vacuum supply hose at the brake power booster.

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

(4) Connect test vacuum supply hose to the **engine vacuum side** of the valve. Vacuum should flow through valve.

VACUUM TESTING THE HEATER-A/C CONTROLS

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

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

LOCATING VACUUM LEAKS

To locate a vacuum leak, disconnect 7-way vacuum connector behind the instrument panel at the heater A/C control. For removal and installation of heater A/C control panel, refer to the Switch and Panel Component Service section of Group 8E, Instrument Panel. Connect the calibrated vacuum hose prod (Fig. 4) to each port in the vacuum harness connector (Fig. 2). The brown, bi-level, vacuum circuit has a metal fiber restrictive device located in the line. More reaction time is required for the test gauge to return to calibrated setting. After each connection is made, the test gauge should return to calibrated setting. If all circuits function properly, replace control mode vacuum switch. If not, determine the color of the vacuum circuit that is leaking. To determine vacuum line colors, refer to the Vacuum Circuits-Heater or Heater A/C Control chart in this section. Disconnect the vacuum actuator at the other end of the circuit. (Instrument panel removal may be necessary to gain access to some components). Block the end of the disconnected vacuum line. The test gauge should return to calibrated setting. If not, that circuit has a leak and must be repaired or replaced. If test gauge returns to calibrated setting, the vacuum actuator must be replaced.

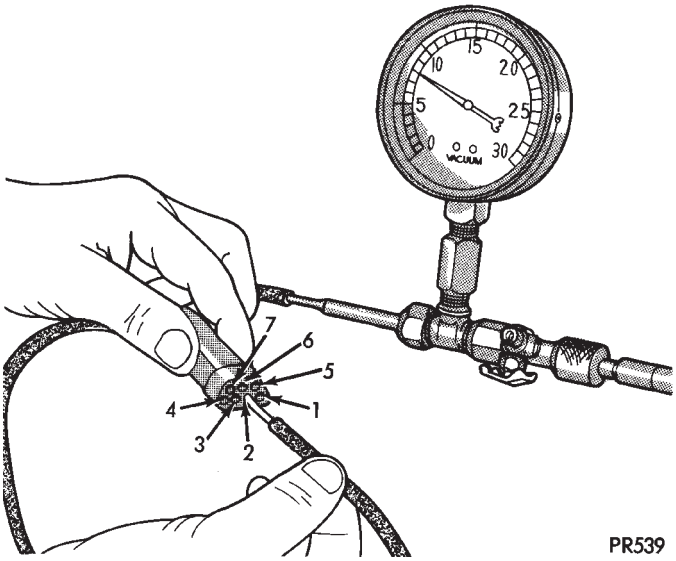
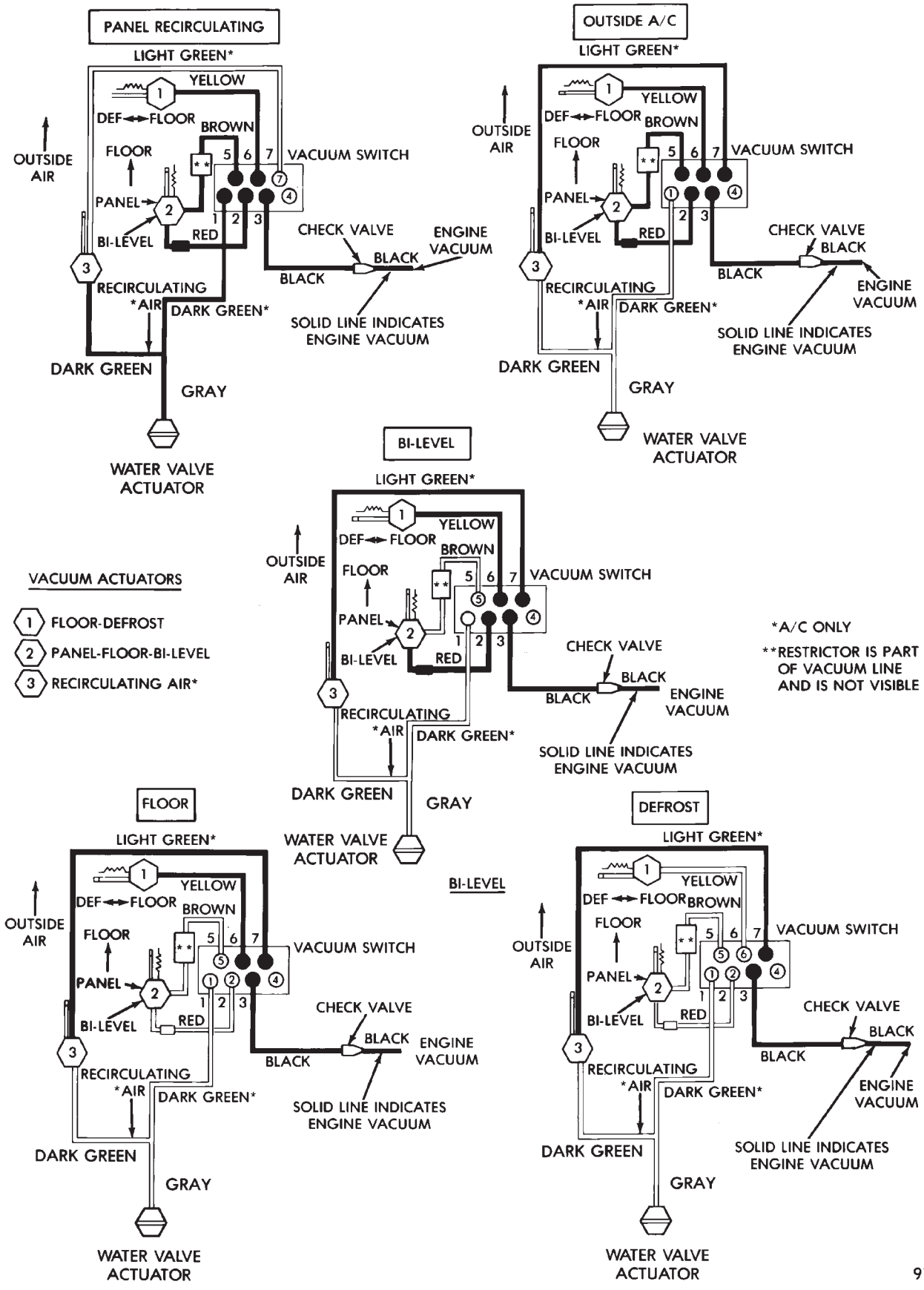


Fig. 2 Vacuum Circuit Test

VACUUM CIRCUITS—HEATER OR HEATER A/C CONTROL



HEATER AND A/C PERFORMANCE TESTS

HEATER OUTPUT TEST

PRE-DIAGNOSTIC PREPARATIONS

Review Safety Precautions and Warnings before performing the following procedures.

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

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

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

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

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

POSSIBLE LOCATIONS OR CAUSE OF OBSTRUCTED COOLANT FLOW

(a) Pinched or kinked heater hoses.
(b) Improper heater hose routing.
(c) Plugged heater hoses or supply and return ports at cooling system connections, refer to Group 7, Cooling System.
(d) Plugged heater core.
(e) Water valve sticking or inoperative.

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

POSSIBLE LOCATION OR CAUSE OF INSUFFICIENT HEAT

(a) Obstructed cowl air intake.
(b) Obstructed heater system outlets.
(c) Blend-air door not functioning properly.

TEMPERATURE CONTROL

If temperature cannot be adjusted with the TEMP lever on the control panel, or TEMP lever is difficult to move, the following could require service:

(a) Blend-air door binding.
(b) Control cables miss-routed, pinched, kinked, or disconnected.
(c) Improper engine coolant temperature.

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 behind the instrument panel, 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 A/C system will be less effective than during periods of high heat and low humidity. With the instrument control 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 before proceeding with this procedure. Air temperature in test room and on vehicle must be 70°F (21°C) minimum for this test.

(1) Connect a tachometer and manifold gauge set.
(2) Set control to A/C, RECIRC, PANEL, or MAX A/C, temperature lever on full cool and blower on high.
(3) Start engine and hold at 1000 rpm with A/C clutch engaged.
(4) Engine should be warmed up with doors and windows closed.

(5) 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.

(6) With the A/C clutch engaged, compare the discharge air temperature to the A/C Performance Temperatures chart.

(7) If the discharge air temperature is low, refer to the Diagnostic Analysis Charts in this Group.

A/C PERFORMANCE TEMPERATURES

Ambient Temperature	21°C (70°F)	26.5°C (80°F)	32°C (90°F)	37.5°C (100°F)	43°C (110°F)
Air Temperature at Center Panel Outlet	2-8°C (35-46°F)	4-10°C (39-50°F)	7-13°C (44-55°F)	10-17°C (50-62°F)	13-21°C (56-70°F)
Compressor Discharge Pressure	965-1448 kPa (140-210 PSI)	1240-1620 kPa (180-235 PSI)	1448-1860 kPa (210-270 PSI)	1655-2137 kPa (240-310 PSI)	1930-2413 kPa (280-350 PSI)
Evaporator Suction Pressure	69-241 kPa (10-35 PSI)	110-262 kPa (16-38 PSI)	138-290 kPa (20-42 PSI)	172-331 kPa (25-48 PSI)	207-379 kPa 30-55 PSI)

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REFRIGERANT SERVICE PROCEDURES

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SIGHT GLASS REFRIGERANT LEVEL INSPECTION

The filter-drier is equipped with a sight glass (Fig. 1) that is used as a refrigerant level indicator only. **This sight glass is not to be used for A/C performance testing.** To check the refrigerant level remove the vehicle jack. Then clean the sight glass, start and warm up engine, and hold rpm slightly above idle (1100 rpm). Place the air-conditioning control on A/C, RECIRC and high blower. The work area should be at least 21°C (70°F). If a Fixed Displacement type compressor does not engage, the refrigerant level is probably too low for the Low Pressure Cut-Off switch to detect. Or, with a Variable Displacement compressor, for the Differential Pressure Cut-off to detect. If compressor clutch does not engage, test the refrigerant system for leaks. If compressor clutch engages, allow approximately one minute for refrigerant to stabilize. View refrigerant through sight glass. The suction line should be cold to the touch and the sight glass should be clear.

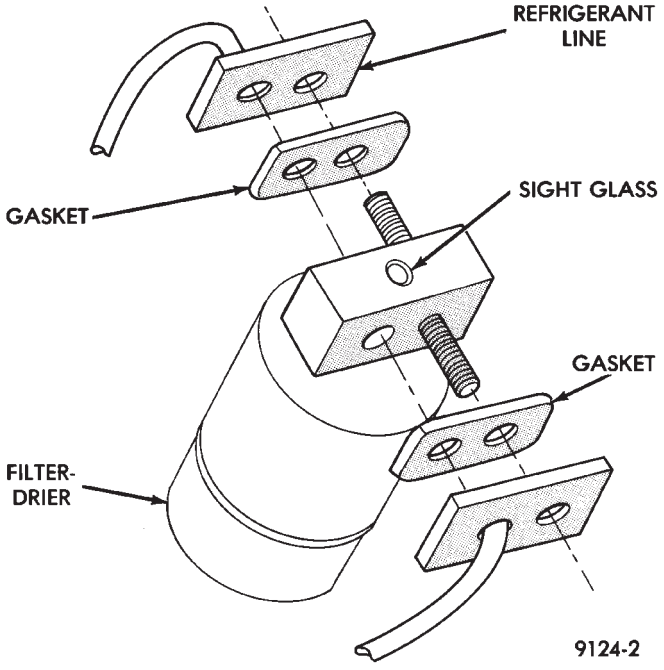

Fig. 1 Filter Drier and Sight Glass

If foam or bubbles are visible in sight glass, the refrigerant level is probably low. Occasional foam or bubbles are normal when the work area temperature is above 43°C (110°F) or below 21°C (70°F). If suction line is cold and occasional bubbles are visible in the sight glass, block the condenser air flow. This will increase the compressor discharge pressure (Do not allow engine to over heat). Bubbles should dissipate. If not, the refrigerant level is low.

WARNING: R-12 REFRIGERANT IS DETRIMENTAL TO THE ENVIRONMENT WHEN RELEASED TO THE ATMOSPHERE. DO NOT RECHARGE AN A/C SYSTEM BY ADDING R-12 REFRIGERANT TO A SYSTEM THAT HAS A KNOWN LEAK.

The refrigerant system will not be low on (R-12) unless there is a leak. Find and repair the leak before charging.

R-12 REFRIGERANT EQUIPMENT

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

When servicing an air-conditioning system, an A/C charging station is recommended (Fig. 2). An (R-12) refrigerant recovery/recycling device (Fig. 3) should also be used. This device should meet SAE standard J1991. Contact an automotive service equipment supplier for refrigerant recycling/recovering equipment. Refer to the operating instructions provided with the equipment for proper operation.

A manifold gauge set (Fig. 4) must also be used in conjunction with the charging and/or recovery/recycling device. The service hoses on the gauge set being used should have manual (turn wheel) or automatic back flow valves at the service port connector ends. This will prevent refrigerant from being release into the atmosphere.

REFRIGERANT RECYCLING

(R-12) refrigerant is a chlorofluorocarbon (CFC) that can contribute to the depletion of the ozone

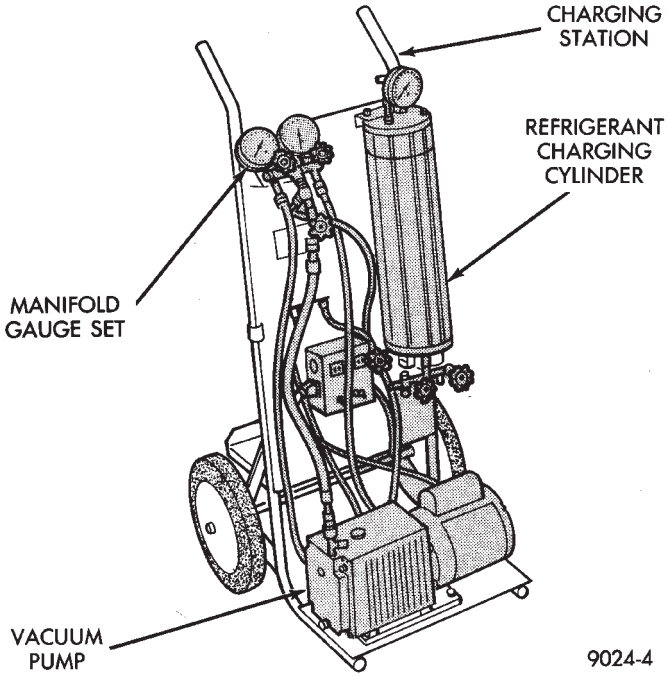

Fig. 2 Refrigerant Charging Station—Typical

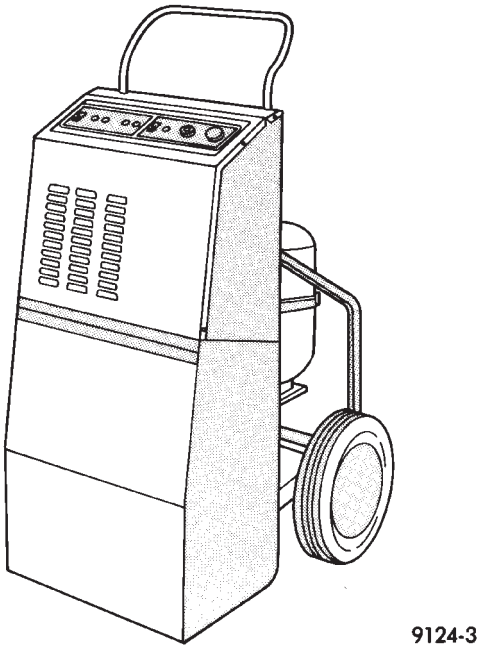

Fig. 3 Refrigerant Recovery/Recycling Station—Typical

layer in the upper atmosphere. To help protect the ozone layer, an R-12 recycling device that meets SAE standard J1991 should be used. Contact an automotive service equipment supplier for refrigerant recycling equipment. Refer to the operating instructions provided with the recycling equipment for proper operation.

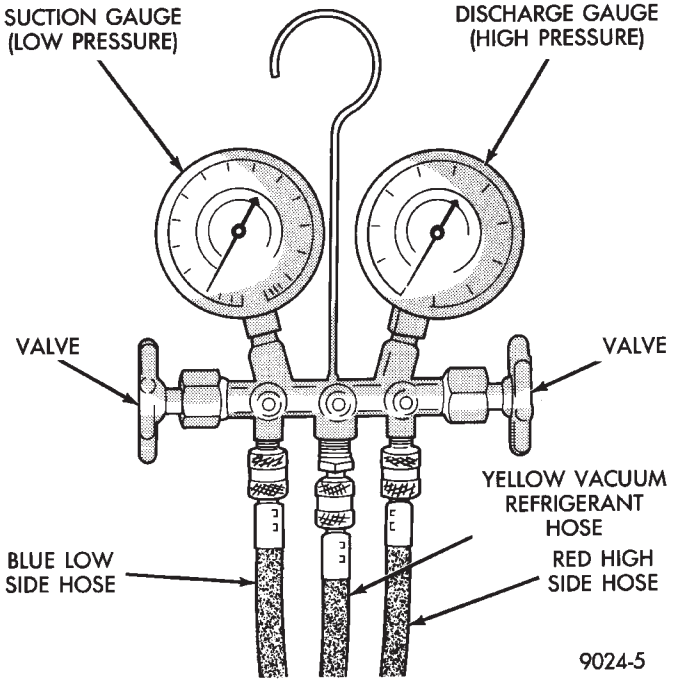

Fig. 4 Manifold Gauge Set—Typical

MANIFOLD GAUGE SET CONNECTIONS

GENERAL INFORMATION

The high pressure (discharge) (RED) hose should be attached to the 1/4 in. discharge service port. This port is located on the discharge line between the A/C compressor and the condenser, or on the high pressure (liquid) line.

The low pressure (suction) (BLUE) hose should be attached to the 3/8 in. suction service port. This port is located on the air conditioning compressor, or the suction line between the expansion valve and the compressor.

SUCTION (LOW PRESSURE) GAUGE CONNECTION

(1) Remove the service port cap from 3/8 in. suction service port.

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

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

(4) Thread the hose connector onto the service port. Quickly secure hose connector to the service port to avoid loosing refrigerant.

To disconnect suction gauge (BLUE) hose:

(a) Wrap the end of hose with a shop towel.

(b) Loosen the hose connector.

(c) Push and hold the end of hose toward the service port to keep the gasket in contact with service port.

(d) Quickly rotate the connector counterclockwise. When the hose connector is completely

backed off, immediately point the end of hose toward floor, as possibly trapped refrigerant in the hose will be released.

(e) Install service port cap.

DISCHARGE (HIGH PRESSURE) GAUGE CONNECTION

(1) Remove the service port cap from the 1/4 in. service port.

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

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

(4) Use a suitable (3/8 in. male to 1/4 in. female) adapter (Fig. 5), threaded securely into the end of the (RED) hose connector.

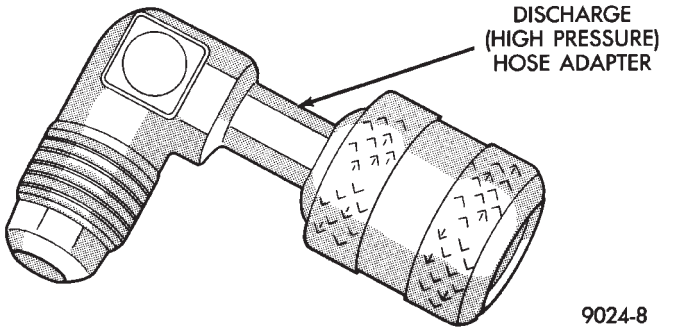

Fig. 5 Discharge Hose Adapter

(5) Thread the 1/4 in. hose adapter connector onto the service port. Quickly secure adapter connector to service port to avoid loosing refrigerant.

To disconnect the discharge gauge (RED) hose:

(a) Wrap the end of hose with a shop towel.

(b) Loosen the hose connector.

(c) Push and hold the end of hose toward the service port to keep the gasket in contact with service port.

(d) Quickly rotate the connector counterclockwise. When the hose connector is completely backed off, immediately point the end of hose toward floor, as possibly trapped refrigerant in the hose will be released.

(e) Install service port cap.

EVACUATION/RECOVERY/RECYCLING/CHARGING LINE CONNECTION

The center manifold (YELLOW) or (WHITE) hose is used to discharge, recycle, recover, evacuate, and charge the refrigerant system. When the discharge or suction valves on the manifold gauge set are opened, the refrigerant in the system will escape through this hose.

This hose should be attached to a R-12 Recovery/Recycling device. Refer to the Recovery/Recycling devices operators manual for procedures.

For disconnection of this hose, refer to Disconnecting the Discharge Gauge (RED) hose in the preceding paragraphs.

TESTING FOR REFRIGERANT LEAKS

If the A/C system is not cooling properly, determine if the refrigerant system is fully charged with R-12. Follow the procedures in the Performance Test Procedures section of this Group. If the refrigerant system is empty or low in refrigerant charge, a leak at any line fitting or component seal is likely. To detect a leak in the refrigerant system, perform one of the following procedures as indicated by the symptoms.

EMPTY REFRIGERANT SYSTEM LEAK TEST

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

(1) Evacuate the refrigerant system to the lowest degree of vacuum possible.

(2) Prepare a 10 oz. refrigerant (R-12) charge to be injected into the system. Refer to Charging Refrigerant System for instructions.

(3) Connect and dispense 10 ozs. of refrigerant into the evacuated refrigerant system.

(4) Proceed to step two of Low Refrigerant Level Leak Test.

LOW REFRIGERANT LEVEL LEAK TEST

Caution: Review Safety Precautions and Warnings in the General Information section of this group.

(1) Using the refrigerant level sight glass, determine if there is any (R-12) refrigerant in the system.

(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.

(4) With the engine not running, use an Electronic Leak Detector (or equivalent) and search for leaks. Fittings, lines, or components that appear to be oily usually will indicate a refrigerant leak. To inspect the evaporator core for leaks, it is possible to insert the leak detector probe into the recirculating air door opening (Fig. 6).

ADDING PARTIAL REFRIGERANT CHARGE

After all leaks have been corrected and it was not necessary to discharge the refrigerant system, a partial refrigerant charge can be added.

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

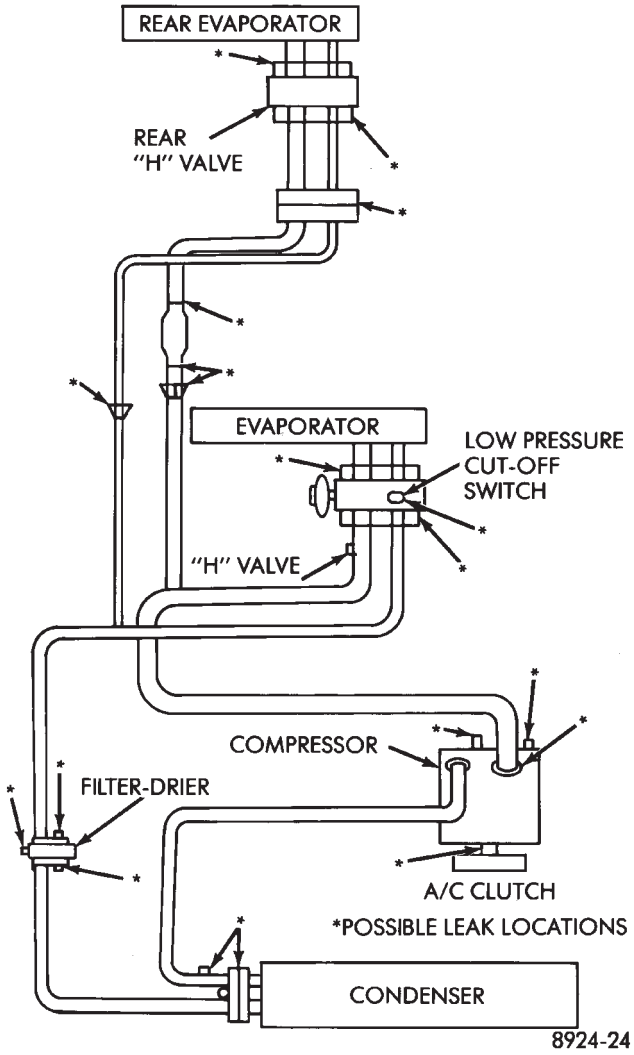

Fig. 6 Testing for A/C Leaks—Typical Front/Rear A/C System

(1) Attach manifold gauge set.

(2) Open the windows of the passenger compartment and set the air-conditioning controls to A/C, RECIRC, and Low blower speed.

(3) Start the engine and allow it to warm up to normal running temperature.

(4) If the air-conditioning compressor does not engage, disconnect the low pressure cut-off switch. Place a jumper wire across the terminals in the connector boot. If the compressor still does not engage, a problem exists in the compressor clutch feed circuit.

(6) Hold the engine speed at 1400 rpm.

(7) Following the instructions provided with the charging equipment being used. Charge through the suction side of the system. Use enough refrigerant to clear the sight glass in the filter drier.

(8) At the point when the sight glass clears, note the weight of the refrigerant supply drum or the level in the charging cylinder. Then add an additional 340 g (12 oz) of refrigerant to the system. Remove the jumper wire from the low pressure cut-off switch connector and connect the cut-off switch.

(9) Test the over all performance of the air-conditioner as described in A/C Overall Performance Test in this Group. Close all valves on the charging equipment and disconnect the hoses from the service ports as described in the Manifold Gauge Set Connections section of this Group. Install the service port caps.

DISCHARGING REFRIGERANT SYSTEM

(R-12) refrigerant is a chlorofluorocarbon (CFC) that can contribute to the depletion of the ozone layer in the upper atmosphere. To help protect the ozone layer, an R-12 refrigerant recycling device that meets SAE standard J1991 be used. Use this device when it is necessary to discharge the refrigerant system. Contact an automotive service equipment supplier for refrigerant recycling equipment. Refer to the operating instructions provided with the recycling equipment for proper operation.

EVACUATING REFRIGERANT SYSTEM

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

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

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

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

The refrigerant system is prepared to be charged with refrigerant.

CHARGING REFRIGERANT SYSTEM—EMPTY SYSTEM

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

WARNING: REVIEW SAFETY PRECAUTIONS AND WARNINGS BEFORE CHARGING THE REFRIGERANT SYSTEM.

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

(1) Connect manifold gauge set.

(2) Measure refrigerant (refer to capacities) and heat to 52°C (125°F) with the charging station. Refer to the instructions provided with the equipment being used.

REFRIGERANT CAPACITIES:

- Without Rear A/C = 907 g (32 oz.)
- With Rear A/C = 1219 g (43 oz.)

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

(4) If all of the refrigerant charge did not transfer from the dispensing device, start engine and hold at idle (1400 rpm). Set the A/C control to A/C, low blower speed, and open windows. If the A/C compressor does not engage, test the compressor clutch control circuit and correct any failure. Refer to Group 8W, Wiring Diagrams.

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

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

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

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

OIL LEVEL

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

The oil used in the compressor is a 500 SUS viscosity, wax-free refrigerant oil. Only refrigerant oil of the same type should be used to service the system. Do not use any other oil. The oil container should be kept tightly capped until it is ready for use, and then tightly capped after use to prevent contamination from dirt and moisture. Refrigerant oil will quickly absorb any moisture it comes in contact with.

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

REFRIGERANT OIL LEVEL CHECK

When an A/C system is assembled at the factory, all components (except the compressor) are refrigerant oil free. After the system has been charged with R-12 and operated, the oil in the compressor is dispersed through the lines and components. The evaporator, condenser, and filter-drier will retain a significant amount of oil. (Refer to the Refrigerant Oil Capacities chart). When a component is replaced, the specified amount of refrigerant oil must be added. When the compressor is replaced, the amount of oil that is retained in the rest of the system must be drained from the replacement compressor. When a refrigerant line or component has ruptured and it has released an unknown amount of oil. The A/C compressor should be removed and drained through the suction port. The filter-drier must be replaced along with the ruptured part. Then the oil capacity of the system (minus the amount of oil still in the remaining components) can be poured into the suction port of the compressor.

Example: The evaporator retains 60 ml (2 oz). The condenser retains 30 ml (1 oz) of oil, and system capacity may be 214 ml (7.25 oz) of oil.

214 ml minus 90 ml = 124 ml (4.25 oz).

REFRIGERANT OIL CAPACITIES

A/C Component Refrigerant Oil Capacities		
Component	**ml**	**oz**
Fixed Displacement Compressor System	214 ml	7.25 oz
Variable Displacement Compressor System	257 ml	8.7 oz
Filter-drier	30 ml	1 oz
Condenser	30 ml	1 oz
Evaporator	60 ml	2 oz
Rear Evaporator	60 ml	2 oz.

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VERIFY REFRIGERANT OIL LEVEL

(1) Slowly discharge refrigerant system.

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

(3) Remove compressor from vehicle.

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

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

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

VARIABLE DISPLACEMENT COMPRESSOR SERVICE PROCEDURES—MODEL 6C17

INDEX

COMPRESSOR REMOVAL AND INSTALLATION

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

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

(1) Disconnect NEGATIVE battery cable.

(2) Loosen and remove drive belts (Refer to Group 7, Cooling System) and disconnect compressor clutch wire lead.

(3) Remove refrigerant lines from compressor (if necessary).

(4) Remove compressor attaching nuts and bolts (Fig. 1, 2 or 3).

(5) Remove compressor. If refrigerant lines were not removed, lift compressor/clutch assembly and tie it to a suitable component.

To install, reverse the preceding operation.

COMPRESSOR CLUTCH/COIL ASSEMBLY

REMOVAL AND INSTALLATION

Compressor assembly must be removed from mounting. Although, refrigerant discharge is not necessary. Refer to Compressor Removal and Installation.

3.0 L ENGINE

Remove the front lower splash shield and front engine mount through-bolt. Allow the engine to swing down to provide access to the front of the compressor.

3.3 L ENGINE

Remove the coolant recovery bottle to provide access the front of the compressor.

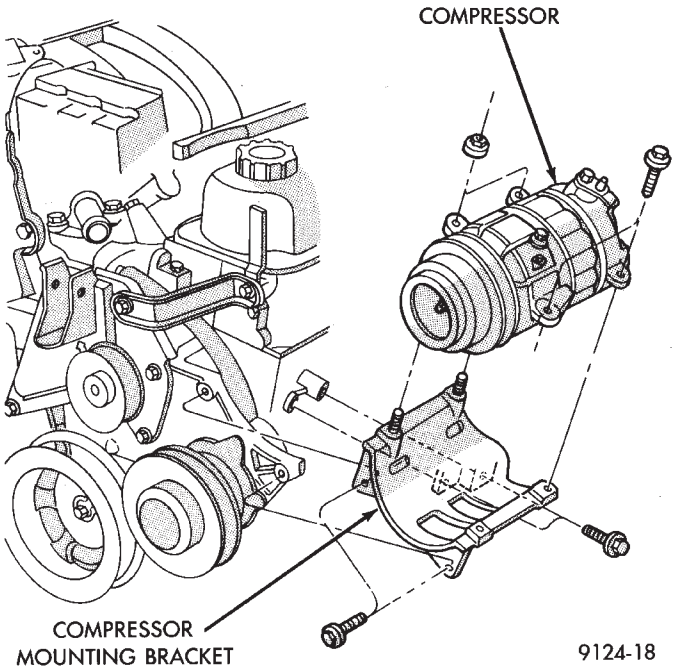


Fig. 1 A/C Compressor Removal and Installation—3.3L Engines

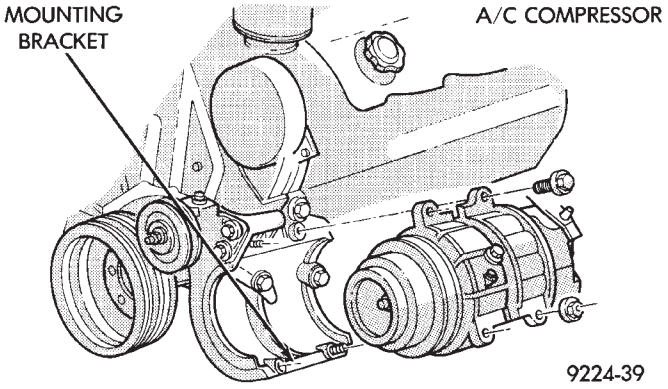


Fig. 2 A/C Compressor Removal and Installation—3.0 L Engine

(1) Remove clutch retaining center nut by using Clutch Plate Holder (6355) (Fig. 3).

(2) Using a Clutch Plate Remover (6354), remove the clutch front plate from the compressor (Fig. 4). When installing the front plate, select the proper shims to achieve .5 to .9 mm (.020 to .035 inch) air

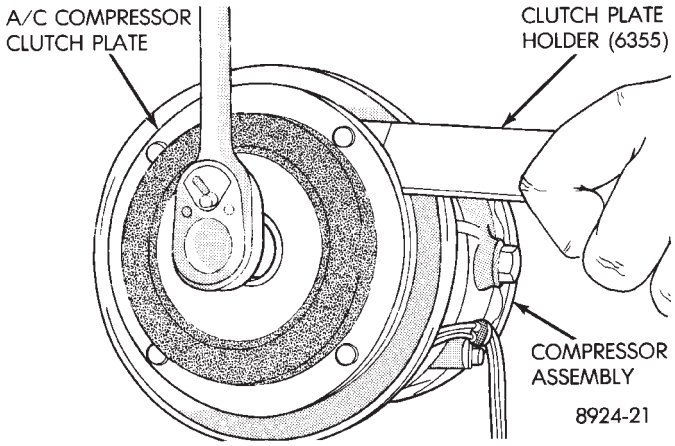


Fig. 3 Remove or Install Front Plate Retaining Nut

gap to the pulley surface (Fig. 5). To install front plate, align shaft key to groove in front plate hub. Push on until it seats, and measure the air gap (Fig. 6).

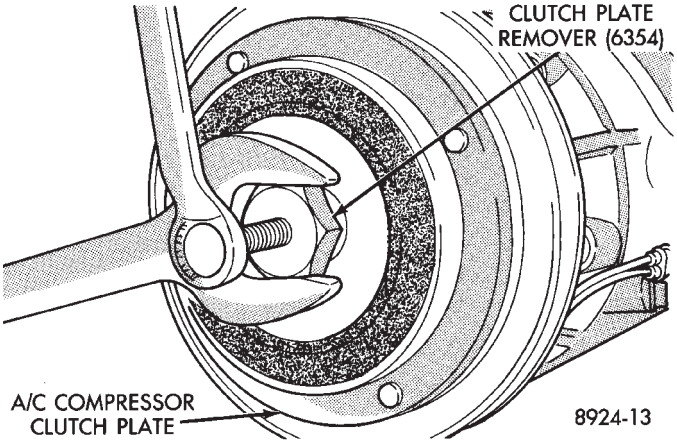


Fig. 4 Remove Front Plate

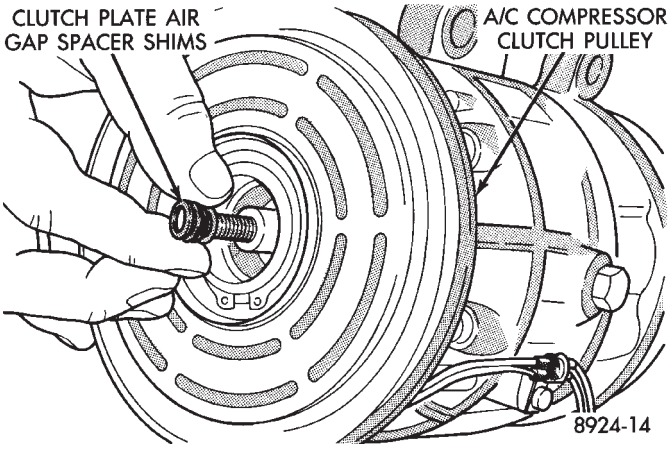


Fig. 5 Install Front Plate and Shims

(3) Remove clutch pulley retaining snap ring (Fig. 7) and pull the pulley from the assembly (Fig. 8).

(4) Remove the clutch coil wire lead strap screw.

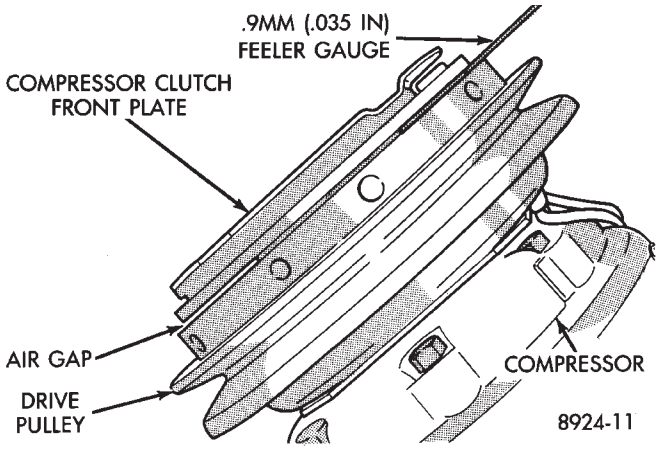


Fig. 6 Measure Front Plate Air Gap

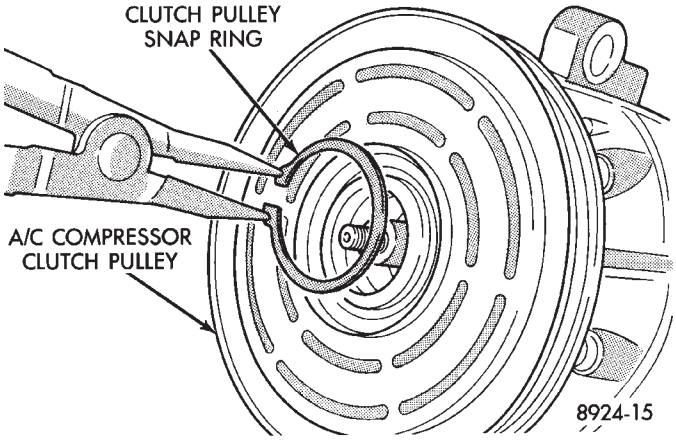


Fig. 7 Remove or Install Pulley Snap Ring

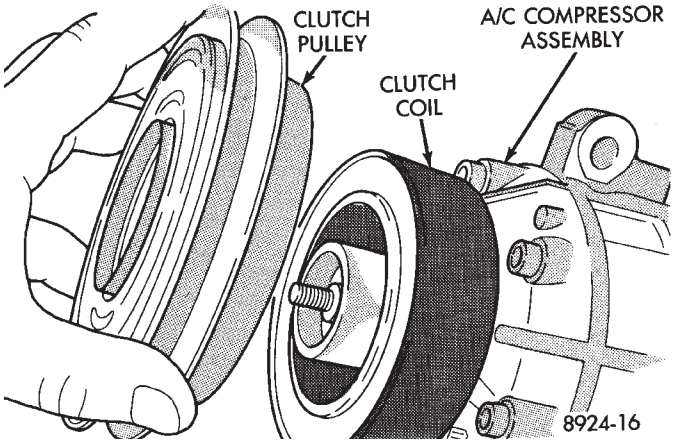


Fig. 8 Remove or Install Pulley

(5) Remove clutch coil retaining snap ring (Fig. 9) and pull the coil from the assembly (Fig. 10). When installing the clutch coil, align the pin on the front of the compressor to the middle hole in the hub of the coil. Position the pin in the snap ring gap.

To install, reverse the preceding operation.

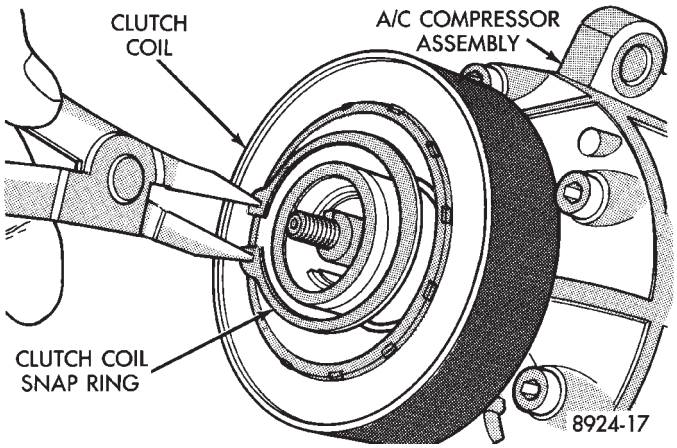


Fig. 9 Remove or Install Clutch Coil Snap Ring

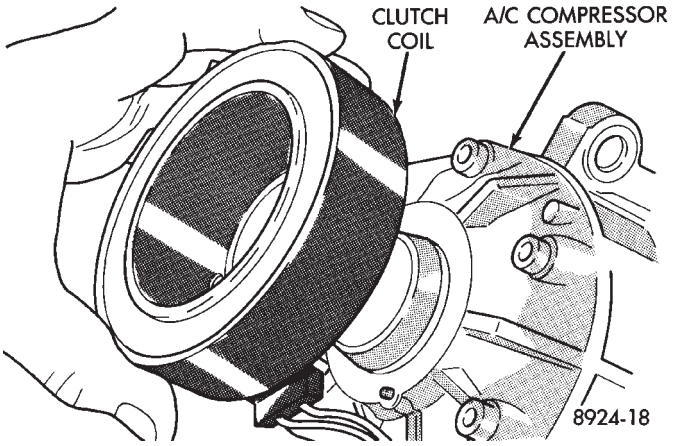


Fig. 10 Remove or Install Clutch Coil

COMPRESSOR FRONT SHAFT SEAL

REMOVAL

(1) Discharge the refrigerant system.

(2) Remove A/C compressor.

(3) Remove the compressor clutch assembly and shaft key.

(4) Remove the felt contaminant absorber and retainer (Fig. 1).

(5) Using a mineral spirits based solvent, thoroughly clean and dry the seal end of the compressor.

(6) Remove the snap ring shaft seal retainer (Fig. 2). Do not use the old snap ring to assemble.

(7) Using Seal Remover/Installer (6429), remove the shaft seal (Fig. 3).

INSTALLATION

(1) Lubricate the new shaft seal with refrigerant oil.

(2) Place Seal Protector (6231) over the end of compressor shaft (Fig. 4). Use the larger flat end of the remover/installer to push the seal in until it seats. The snap ring groove should be visible above the seal (Fig. 5).

(3) Install clutch/coil assembly.

(4) Install compressor.

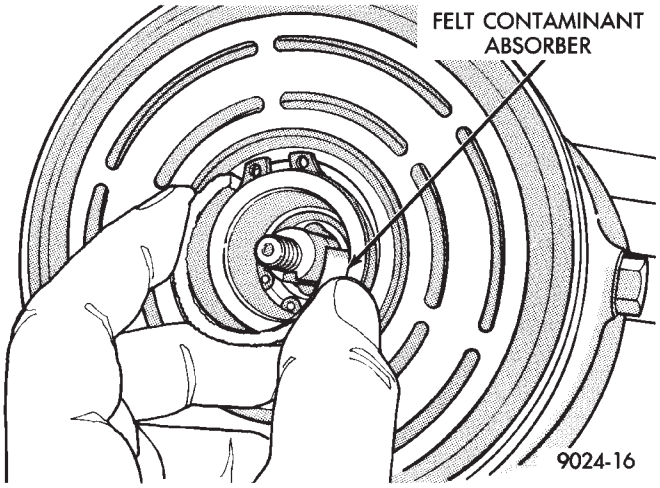


Fig. 1 Felt Contaminant Absorber

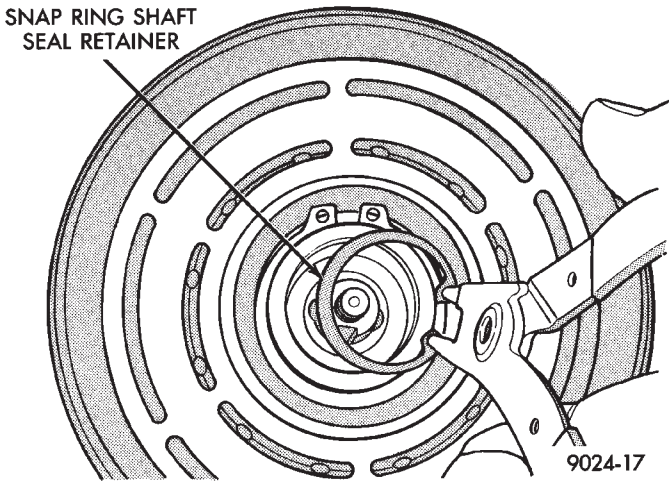


Fig. 2 Shaft Seal Snap Ring

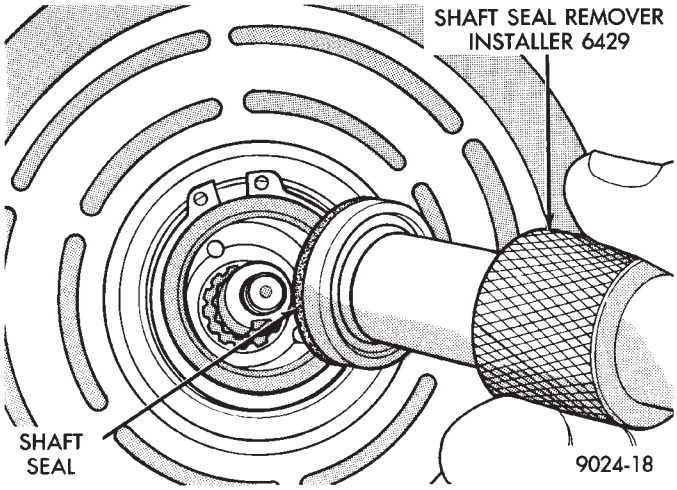


Fig. 3 Remove Shaft Seal

(5) Evacuate and charge the refrigerant system. If oil loss of 3 ml (1 oz) or greater is suspected, refer to Oil Level in the Refrigerant Service Procedures section.

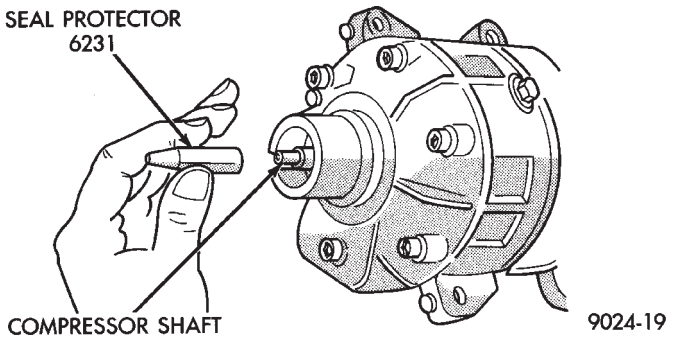


Fig. 4 Shaft Seal Protector

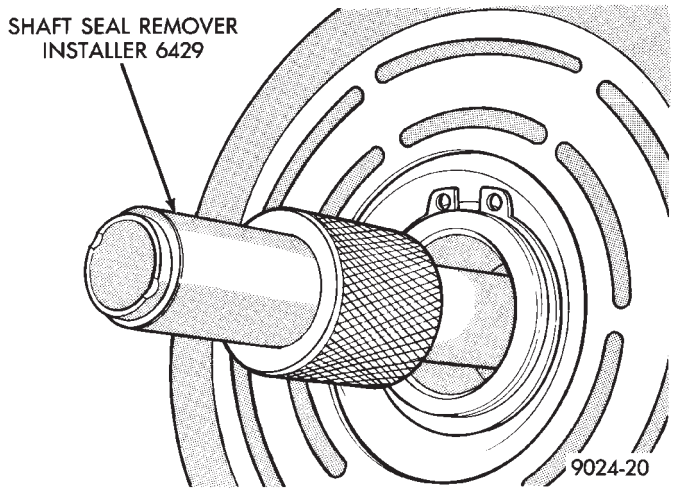


Fig. 5 Install Shaft Seal

COMPRESSOR HIGH PRESSURE CUT-OUT SWITCH

REMOVAL AND INSTALLATION

(1) Discharge the refrigerant system.

(2) Disconnect wire connector from the high pressure cut-out switch (Fig. 6).

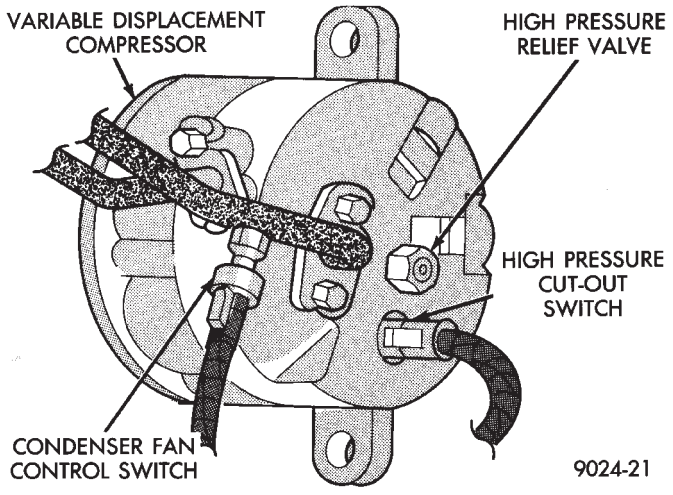


Fig. 6 High Pressure Cut-out Switch

(3) Remove snap ring securing the switch in the compressor end cover (Fig. 7).

CAUTION: The high pressure cut-out switch service kit has two snap rings. One is black and the other is silver. Use the one which has the same color as the original one in the compressor.

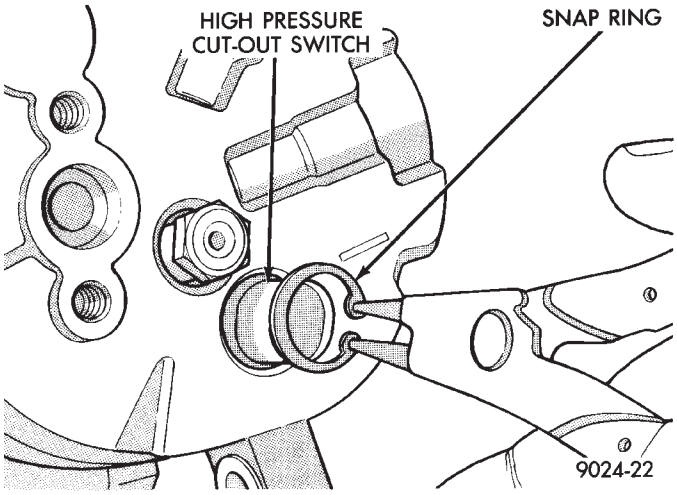


Fig. 7 Remove or Install Snap Ring

(4) Pull switch straight out from end cover. Remove and discard used O-ring seal (Fig. 8).

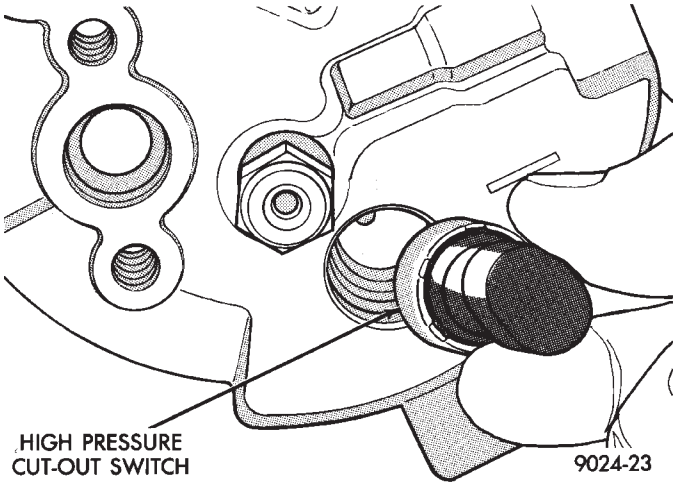


Fig. 8 Remove or Install High Pressure Cut-out Switch

To install, reverse the preceding operation using a new O-ring seal. Evacuate and charge the refrigerant system.

COMPRESSOR HIGH PRESSURE RELIEF VALVE

REMOVAL AND INSTALLATION

(1) Discharge the refrigerant system.

(2) Rotate the high pressure relief valve counterclockwise and separate relief valve from the vehicle (Fig. 9).

To install, reverse the preceding operation using a new O-ring seal. Evacuate and charge the refrigerant system.

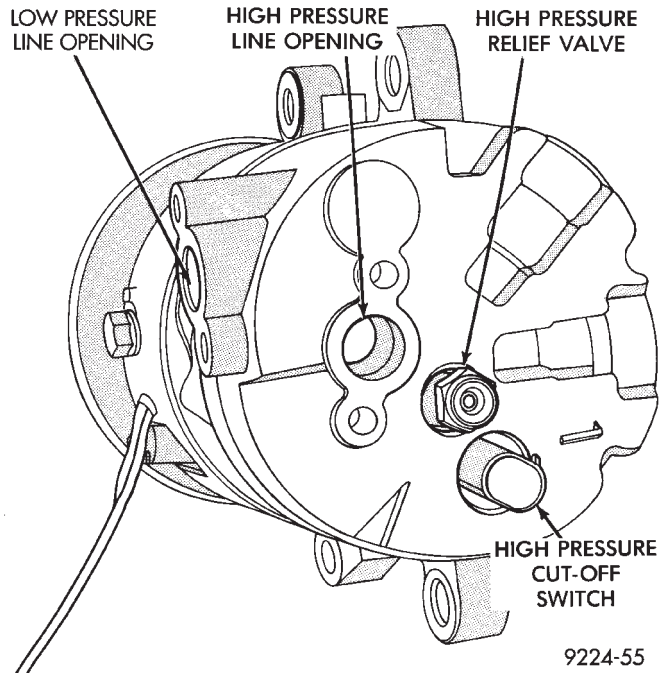


Fig. 9 High Pressure Relief Valve Removal

COMPRESSOR MAIN OR SUB CONTROL VALVES

If the main or sub control valve is leaking refrigerant to the atmosphere, replace the main or sub control valve. If a functional problem is suspected with the main or sub control valve, the compressor should be replaced.

REMOVAL AND INSTALLATION

(1) Discharge the refrigerant system.

(2) Remove the compressor assembly. Position it to gain access to the control valves. It is not necessary to disconnect the suction or discharge lines from the compressor.

(3) Remove the snap ring retaining either the main or sub control valve to the compressor (Fig. 10).

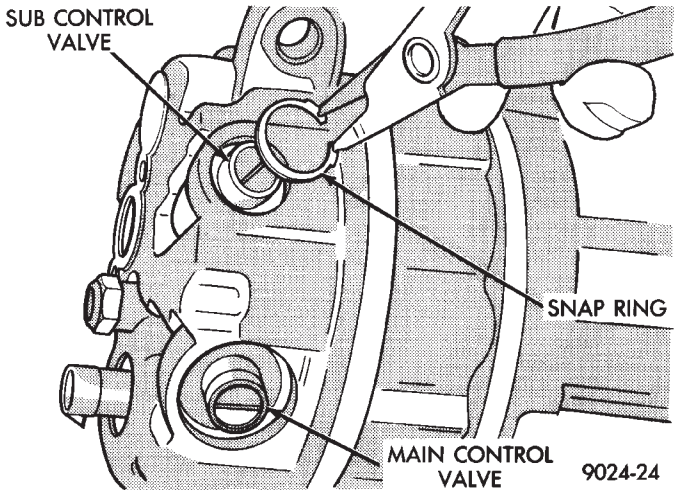


Fig. 10 Main or Sub Control Valve Snap Ring

(4) Pull the main or sub control valve from the compressor end cover (Fig. 11).

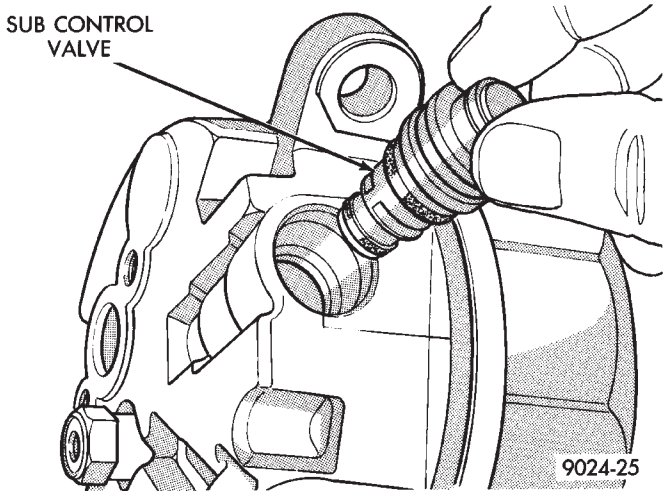


Fig. 11 Remove or Install Main or Sub Control Valve

To install, reverse the preceding operation using new O-ring seals. Evacuate and charge the refrigerant system.

FIXED DISPLACEMENT COMPRESSOR SERVICE PROCEDURES—MODEL 10PA17

INDEX

COMPRESSOR REMOVAL AND INSTALLATION

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

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

(1) Disconnect Negative battery cable.

(2) Loosen and remove drive belts (refer to Group 7, Cooling System) and disconnect compressor clutch wire lead.

(3) Remove refrigerant lines from compressor (if necessary).

(4) Remove compressor attaching nuts and bolts.

(5) Remove compressor. If refrigerant lines were not removed, lift compressor/clutch assembly and tie it to a suitable component.

To install, reverse the preceding operation. If necessary, refer to Charging Refrigerant System in the Refrigerant Service Procedures section.

COMPRESSOR CLUTCH/COIL ASSEMBLY—MODEL 10PA17

REMOVAL

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

(1) Remove the compressor shaft bolt (Fig. 1). A band type oil filter removal tool can be placed around the clutch plate to aid in bolt removal.

(2) Tap the clutch plate with a plastic hammer and remove clutch plate and shim (Fig. 2).

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

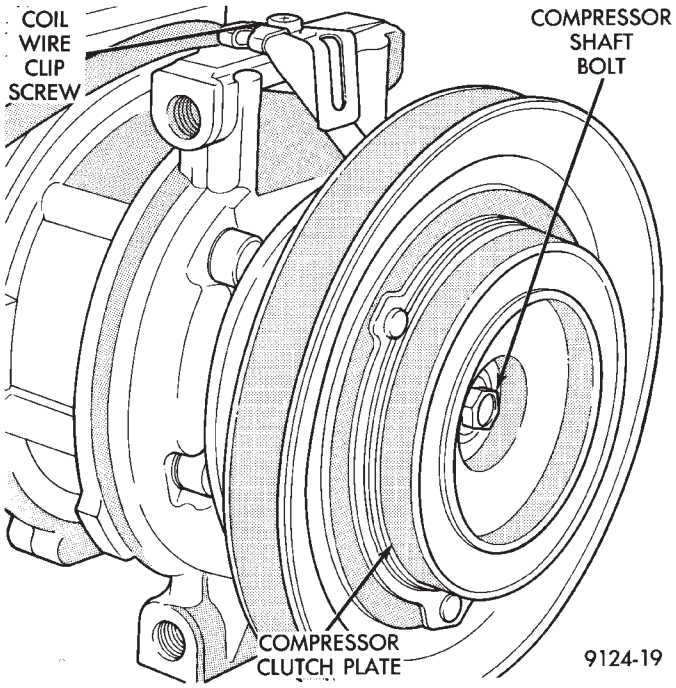


Fig. 1 Compressor Shaft Bolt and Clutch Plate

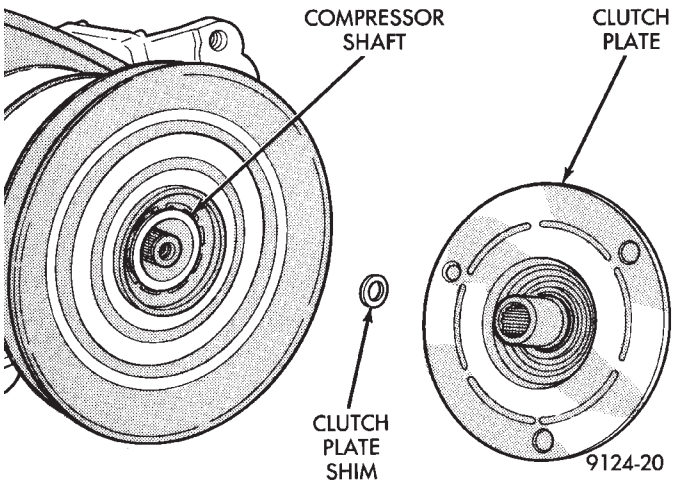


Fig. 2 Clutch Plate and Shim(s)

(3) Remove pulley retaining snap ring with Snap Ring Pliers (C-4574), and slide pulley assembly off of compressor (Fig. 3).

(4) Remove coil wire clip screw and wire harness.

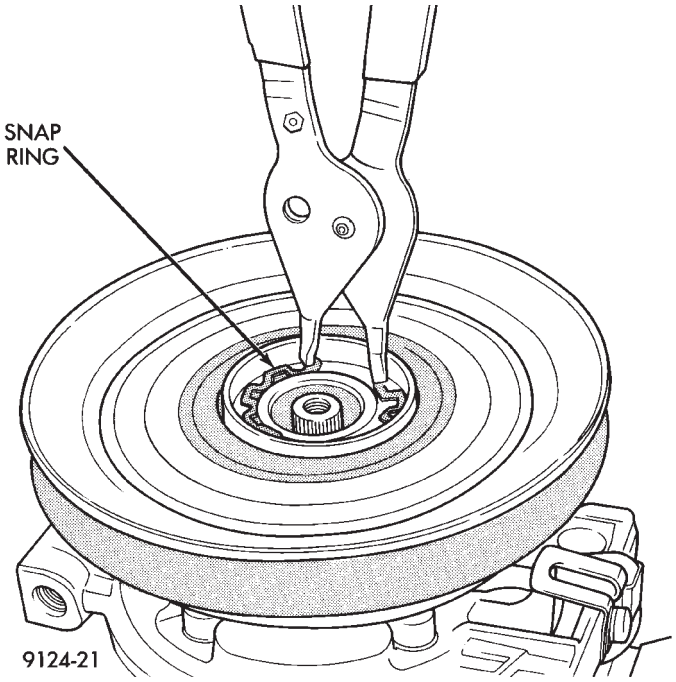


Fig. 3 Removing Pulley Snap Ring

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

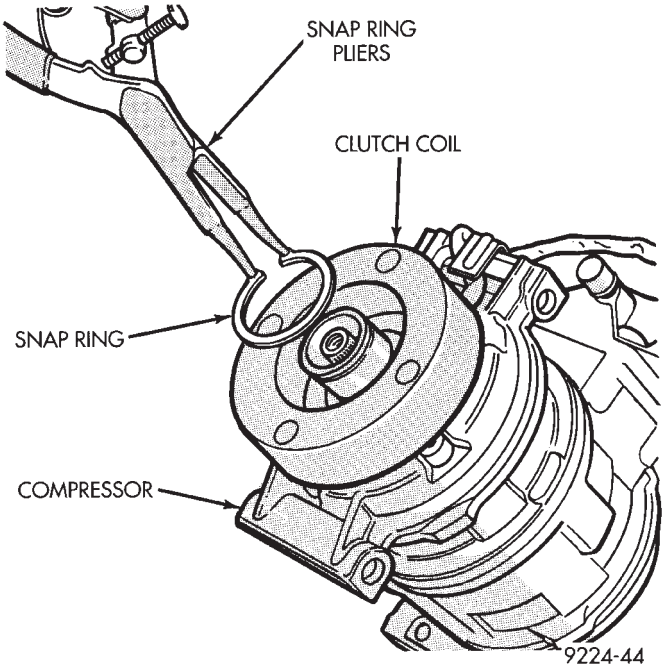


Fig. 4 Clutch Coil Snap Ring

(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 fasten with the wire clip retaining screw (Fig. 1).

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

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

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

CAUTION: Do not mar the pulley frictional surface.

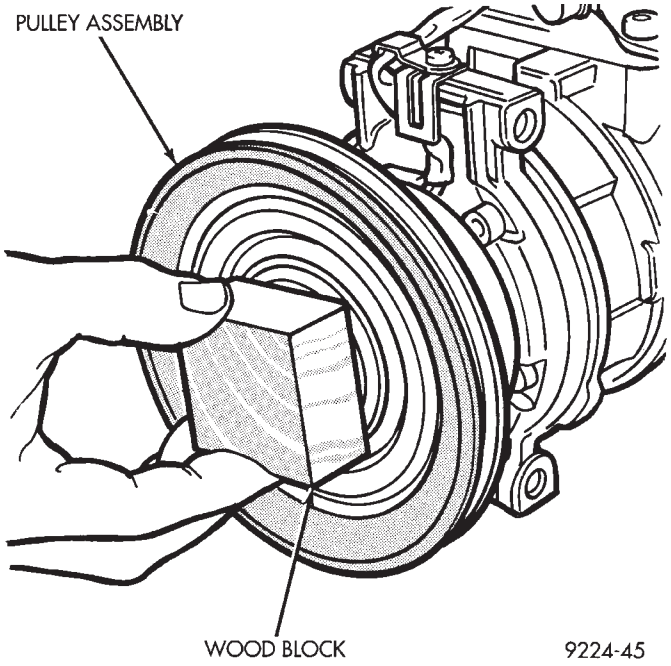


Fig. 5 Installing Pulley Assembly

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

(5) If the original front plate assembly and pulley assembly are to be reused, the old shim(s) can be used. If not, place a 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) With the front plate assembly tight against the shim(s), measure the air gap between front plate and pulley face with feeler gauges. The air gap should be

between 0.5 and 0.9 mm (.020 and .035 inch) If proper air gap is not obtained, add or subtract shims until desired air gap is obtained.

(8) Install compressor shaft bolt. Tighten to 17.5±2 N•m (155±20 in. lbs.).

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.

CLUTCH BREAK-IN

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

COMPRESSOR FRONT SHAFT SEAL—MODEL 10PA17

REMOVAL

(1) Discharge the refrigerant system.
(2) Remove A/C compressor.
(3) Remove compressor clutch/coil assembly.
(4) Remove compressor through-bolts (Fig. 1).

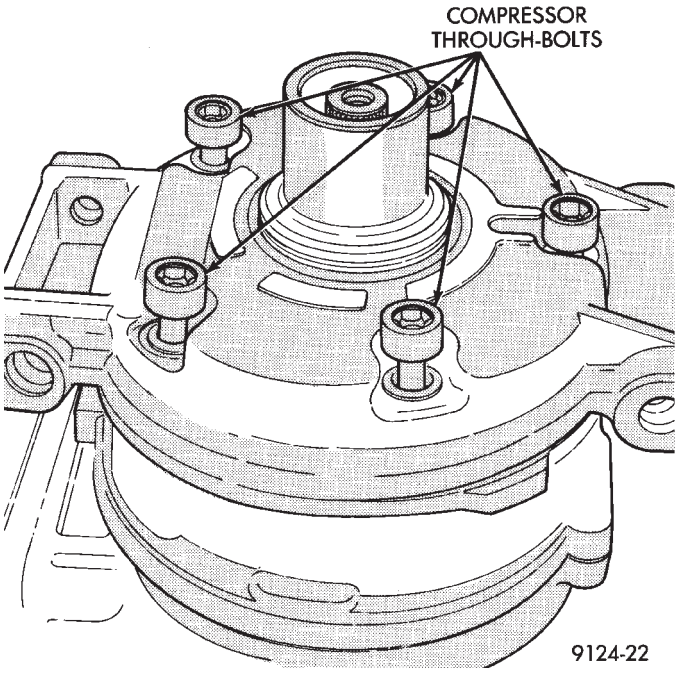


Fig. 1 Compressor Through-Bolts

(5) Remove front cover by tapping on the outside diameter of the cover with a plastic hammer (Fig. 2).

(6) Remove steel valve plate gasket and O-ring seal and discard (Fig. 3 and 4).

Never reuse cover O-rings or the steel valve plate gaskets.

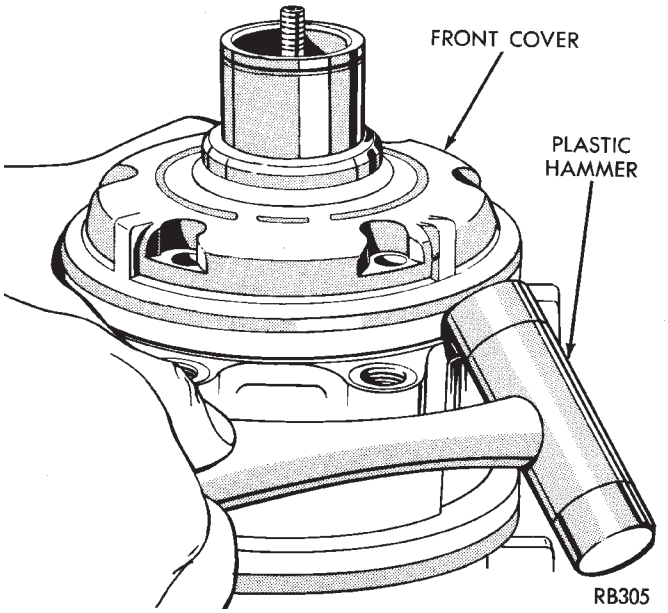


Fig. 2 Removing Front Cover

Fig. 3 Removing Steel Valve Plate Gasket

(7) Pry out the felt retainer and remove felt from front cover (Fig. 5).

(8) Remove seal snap ring (Fig. 6).

(9) Place compressor front cover on a flat surface with neck of cover facing up. Using a brass drift, press out seal assembly (Fig. 7).

(10) Remove dowel pins, valve plates, and steel valve plate gasket. Discard steel gasket (Fig. 8).

INSTALLATION

(1) Install dowel pins in front compressor body.
(2) Install cleaned valve plates.

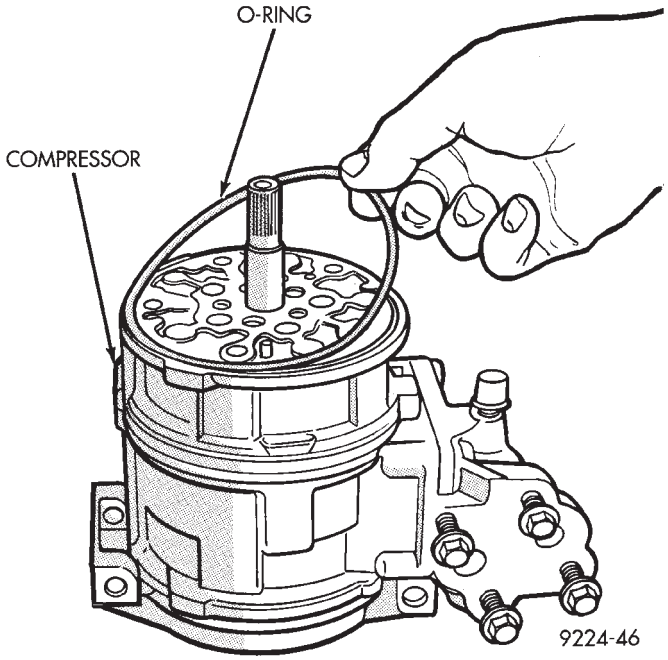


Fig. 4 Removing O-Ring

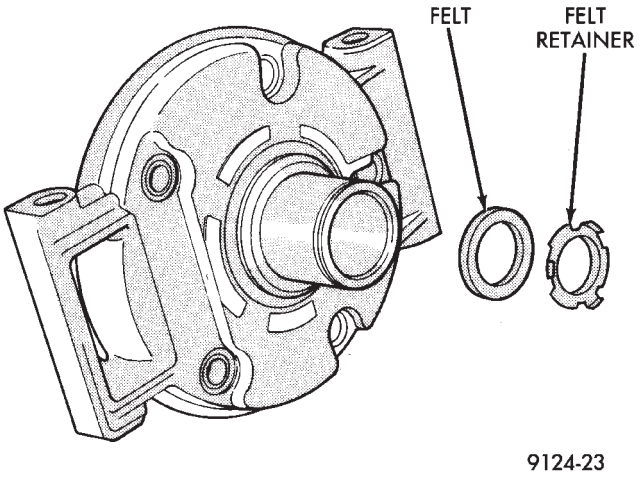


Fig. 5 Removing Felt Retainer and Felt

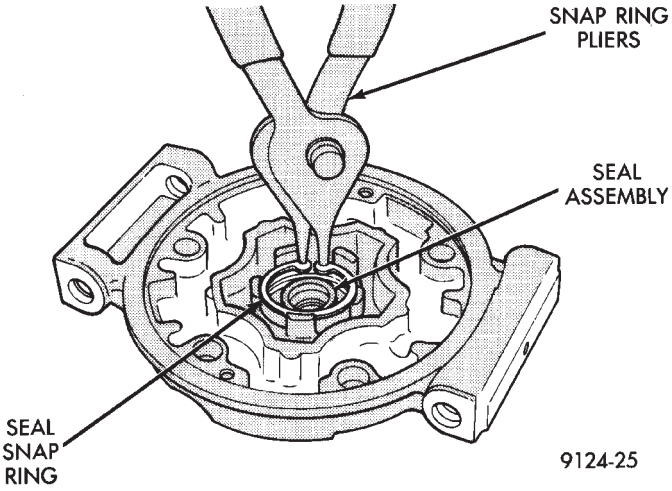


Fig. 6 Seal Snap Ring

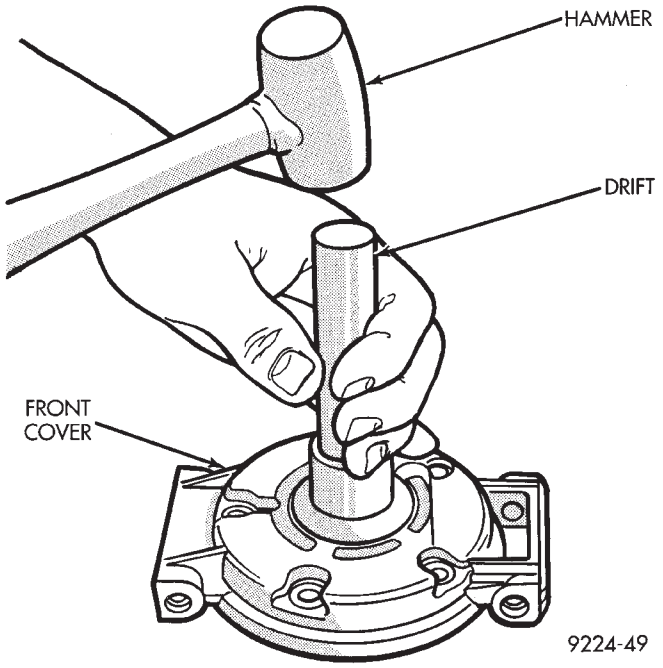


Fig. 7 Removing Seal

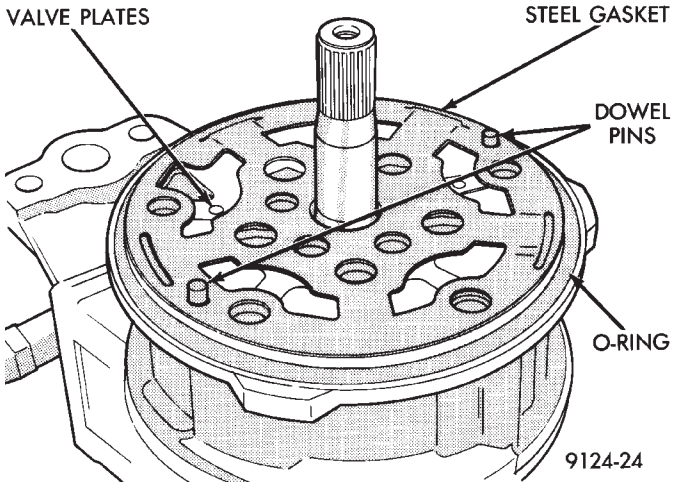


Fig. 8 Disassembling Compressor Front End

(3) Install steel gasket.

(4) Clean crankshaft and coat lightly with refrigerant oil.

(5) Lubricate crankshaft seal seat cavity of front housing with refrigeration oil.

(6) Lubricate crankshaft lip seal and seal O-ring with refrigeration oil. Then install lip seal in front cover using a socket that contacts the outer diameter of the lip seal (Figs. 9 and 10).

(7) Install seal snap ring (Fig. 11).

(8) Lubricate front cover O-ring with refrigeration oil and carefully place it in seal groove.

(9) Install lip seal protector on shaft (Fig. 12).

(10) Install front cover to front compressor body.

(11) Install compressor through-bolts and finger tighten only. After bolts have been finger tightened, torque to 29 N•m (260 in. lbs.).

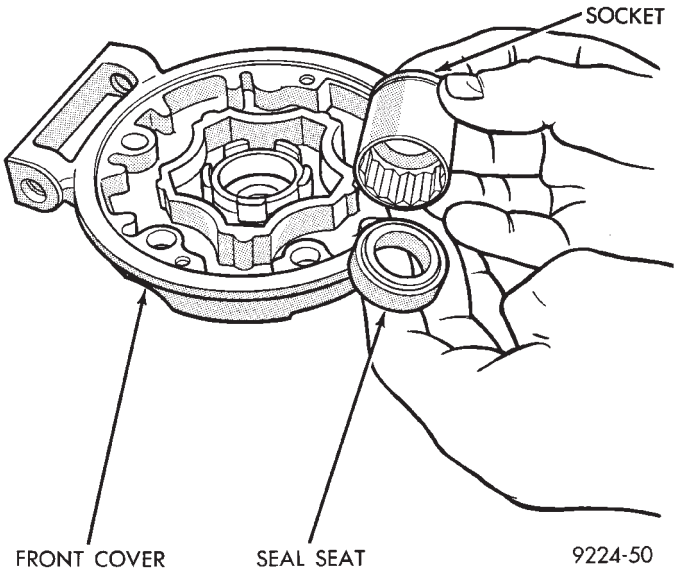


Fig. 9 Match Socket to Outer Seal Diameter

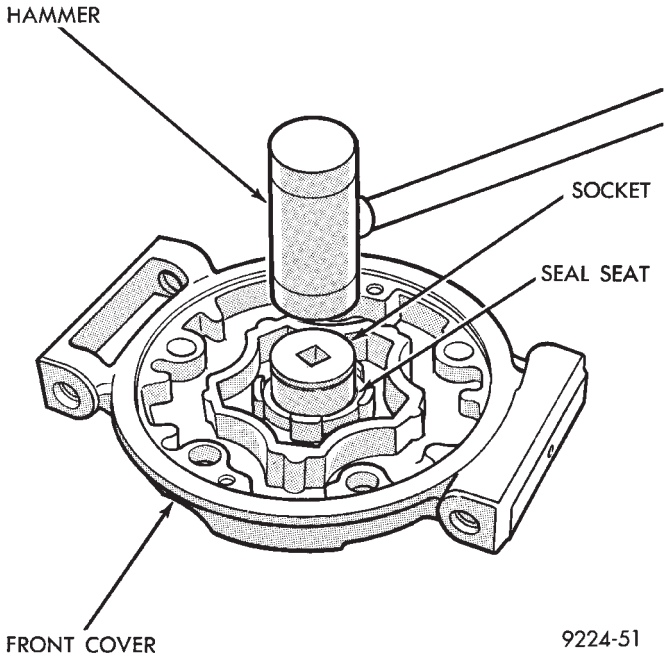


Fig. 10 Installing Seal

(12) Install felt shaft seal and retainer (Fig. 13) into front housing.

Caution: Refer to Oil Level in the Refrigerant Service Procedures section for further details.

(13) Install refrigeration oil (500 SUS) into the compressor through the suction port.

(14) Check compressor operation for smoothness by rotating crankshaft at least five full revolutions.

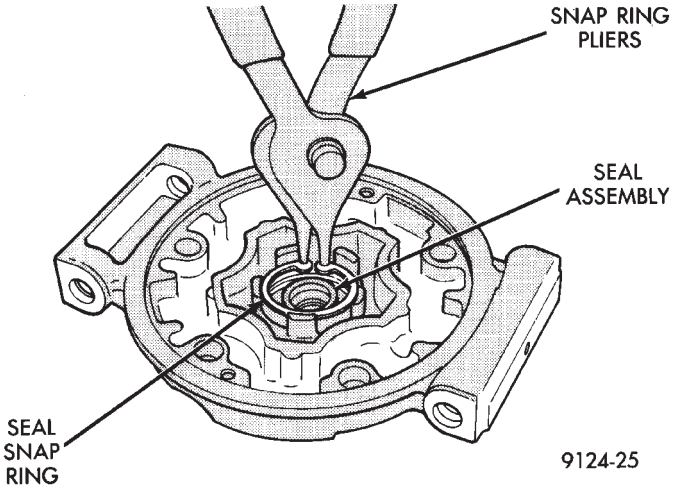


Fig. 11 Seal Snap Ring

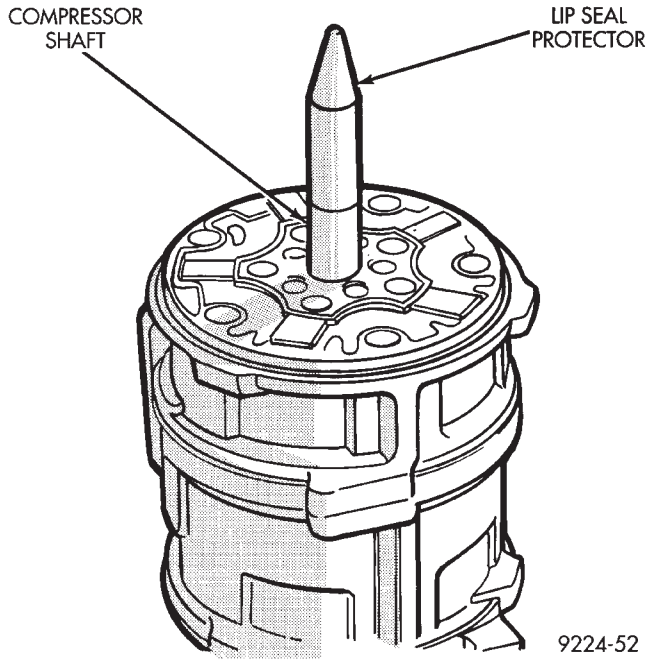


Fig. 12 Installing Lip Seal Protector

(15) Check front housing clutch coil alignment pin for proper installation.

(16) Install clutch assembly.

(17) Install compressor.

(18) Evacuate and charge refrigerant system.

COMPRESSOR HIGH-PRESSURE RELIEF VALVE

REMOVAL AND INSTALLATION

(1) Discharge the refrigerant system.

(2) Rotate the high pressure relief valve counterclockwise and separate relief valve from the vehicle (Fig. 14).

To install, Reverse the preceding operation using a new O-ring seal. Evacuate and charge the refrigerant system.

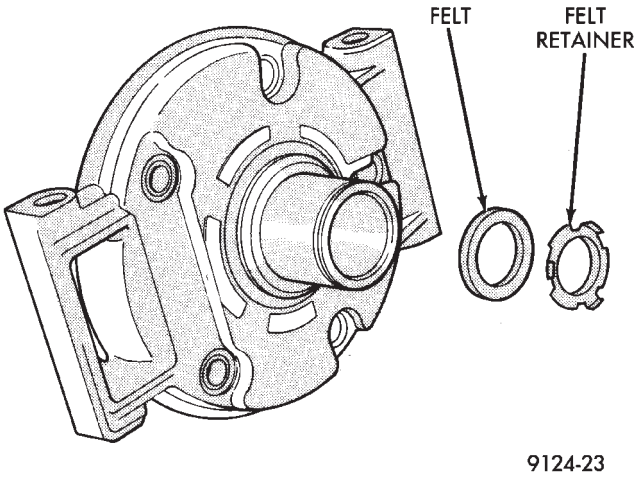


Fig. 13 Felt Retainer and Felt

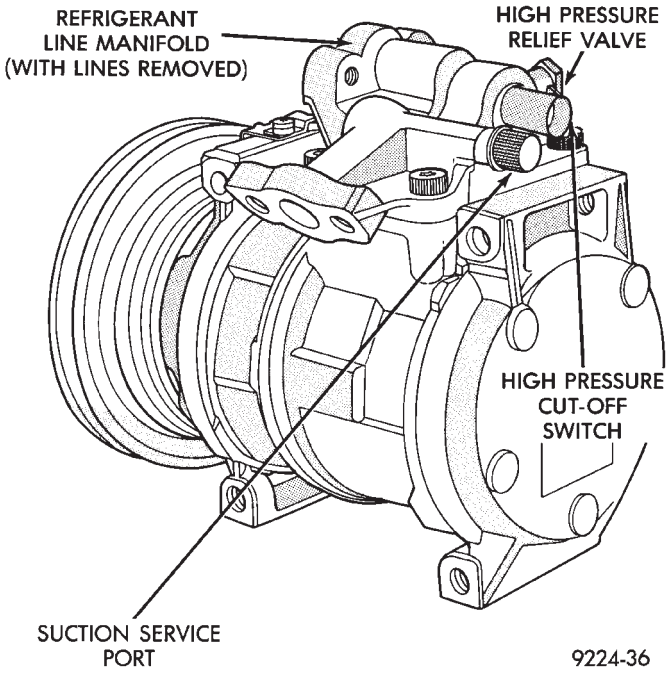


Fig. 14 High Pressure Relief Valve—Typical

FIXED DISPLACEMENT COMPRESSOR SERVICE PROCEDURES—MODEL TR105

INDEX

COMPRESSOR

CAUTION: Cleanliness is extremely important when disassembly of the compressor is necessary. The surfaces around the suction and discharge ports of the compressor should be cleaned thoroughly before opening the system at these points. If compressor is removed from vehicle, apply tape to the opened ports to prevent any contamination.

REMOVAL

(1) Disconnect battery negative cable.
(2) Loosen and remove drive belts (refer to Group 7, Cooling System).
(3) Disconnect compressor clutch wire lead.
(4) Discharge the system.
(5) Remove refrigerant lines from compressor.
(6) Remove compressor attaching bolts.
(7) Remove compressor.

INSTALLATION

(1) Position the compressor on the mount and fit drive belt.
(2) Tighten the compressor attaching bolts to 41 N●m (30 ft. lbs.) torque.
(3) Adjust drive belt (see Group 7, Cooling System).
(4) Install refrigerant hoses.
(5) Connect the clutch wire.
(6) Evacuate and charge the system.
(7) Connect the battery negative cable.

COMPRESSOR FIELD COIL-CORE

REMOVAL

(1) Remove the compressor from the mount.
(2) To prevent compressor shaft rotation, install 2 (6 mm) bolts, along with 2 wrenches, to the threaded holes in the armature plate (Fig. 1). Remove compressor shaft nut.
(3) Tap the armature plate with a plastic and remove plate and shim(s) (Fig. 2).

CAUTION: Do not use screwdrivers between the armature plate assembly and rotor-pulley to remove the armature plate. This may damage the armature plate assembly.

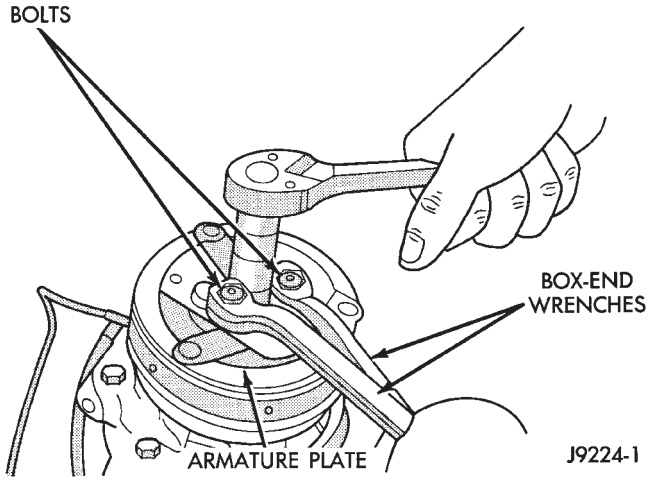


Fig. 1 Compressor Shaft Nut Removal/Installation

(4) Remove rotor-pulley retaining snap ring with Snap Ring Pliers C-4574. Slide rotor-pulley assembly from compressor. Use a plastic hammer, if necessary.

(5) Loosen the lead wire retaining clamps and remove lead wire from the compressor front end plate. Disconnect the lead wire from the thermal limiter switch.

(6) Remove the snap ring which secures the field coil-core assembly to the front boss (Fig. 2). Note the alignment of field coil-core assembly when removing.

WARNING: TAKE CARE THAT THE SNAP RING DOES NOT FLY OUT FROM THE GROOVE.

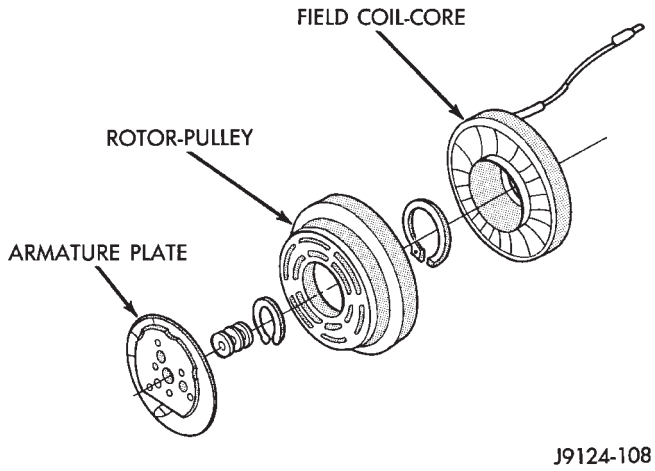


Fig. 2 Armature Plate/Rotor-Pulley/Field Coil-Core

INSPECTION

Examine frictional faces of the rotor-pulley and armature plate for wear. The pulley and 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 excess oil. If excess oil is present, the shaft seal is leaking and will have to be replaced.

Check rotor-pulley bearing for roughness or excessive grease leakage. Check for bearing grease contamination on armature plate faces.

The rotor-pulley and armature plate should be replaced as a matched set.

INSTALLATION

(1) Position the back of the field coil-core over the compressor front boss. This will allow the locating nipple on the back of the coil to line up with the locating indentation on the front boss. This ensures correct angular position of the clutch coil and lead wire.

(2) Fasten lead wire to the compressor front plate with the retaining clip. Connect the lead wire to the thermal limiter switch.

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

CAUTION: If snap rings on field coil-core and rotor-pulley are not fully seated, they will vibrate out. A clutch failure and possible severe damage to the compressor could result.

(4) Slide pulley assembly onto compressor.

CAUTION: Do not mar the pulley frictional surface.

(5) Install rotor-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.

(6) If the original armature plate assembly and rotor-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 compressor shaft against the shoulder of the armature plate.

(7) Install armature plate to the compressor shaft. Note the machined mating splines (Fig. 3).

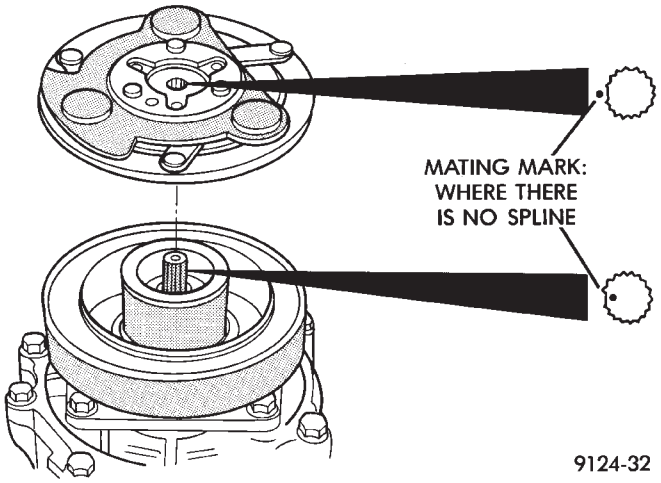


Fig. 3 Aligning Clutch Plate Splines

(8) With the front clutch plate assembly tight against the shims, measure the air gap between armature plate and rotor-pulley face with feeler gauges (Fig. 4). The air gap should be between 0.35 and 0.65 mm (0.013 and 0.025 inch). If proper air gap is not obtained, add or subtract shims until desired air gap is obtained.

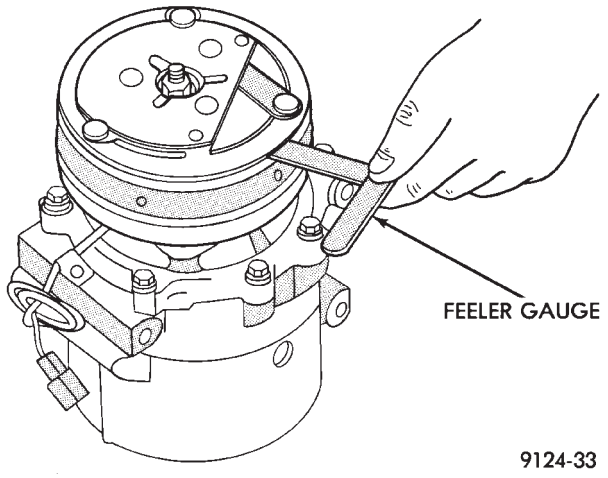


Fig. 4 Measuring Air Gap

(9) Install compressor shaft nut. Tighten nut to 17.5 N●m (155 in. lbs.) torque.

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

(10) Install the compressor onto the mount.

FIELD COIL-CORE BREAK-IN

After a new field coil-core has been installed, cycle the A/C clutch 20 times (5 sec. on and 5 sec. off). During this procedure, run engine at 1500-2000 rpm and set the A/C on the HIGH mode. This procedure (burnishing) will seat the opposing friction surfaces and provide a higher clutch torque capability.

THERMAL LIMITER SWITCH

After removing the thermal limiter switch, always replace with a new unit.

The refrigerant system can remained fully charged for thermal limiter switch replacement.

REMOVAL

(1) Disconnect wiring connectors from switch.

(2) Remove the bolt retaining the switch holding clamp and the switch to the side of the compressor (Fig. 5).

(3) Pry the switch from compressor case with a screwdriver.

CLEANING

Remove silicone filler from the socket and thoroughly clean the socket with thinners.

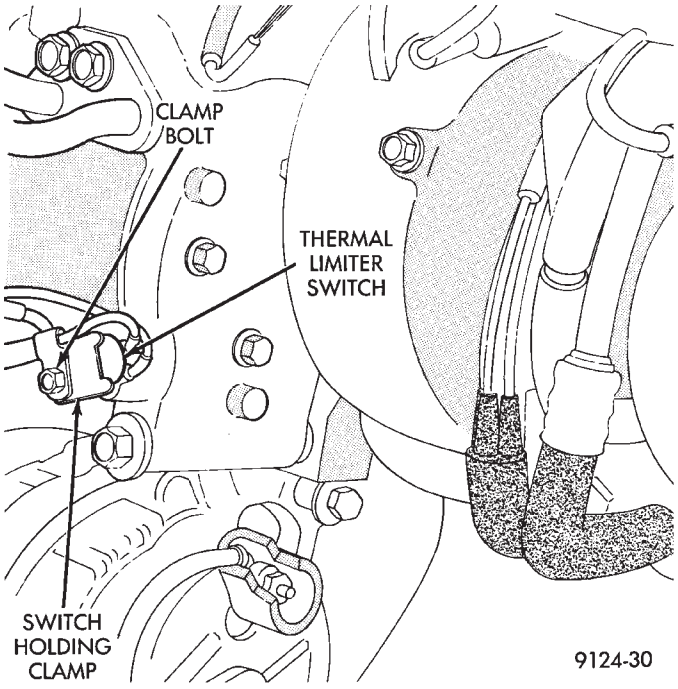


Fig. 5 Thermal Limiter Switch

INSTALLATION

(1) Place the new thermal limiter switch so that the flat copper surface faces upward.

(2) Apply the specified silicone filler (KE 347 RTV) to the flat copper surface until the surface is evenly covered. When silicone is applied, apply only from tube and not by hand.

(3) Install the thermal limiter switch into the socket and secure it with the thermal protector (limiting switch) fixing plate and bolt. Tighten the bolt to 1.8 N●m (17 in. lbs.) torque.

(4) Connect wiring connectors to switch.

COMPRESSOR SHAFT BEARING/SEAL

REMOVAL

(1) Remove the compressor from the mounting.

(2) Remove the compressor nut and armature plate.

(3) Remove the shaft bearing by using Shaft Bearing Removal/Installation Tool 6533 as follows:

(a) With the collet on top of the bearing, insert the 2 jaws into the bearing groove (Fig. 6). Position the jaw retainer over the 2 jaws.

(b) Thread in the screw (Fig. 6). Turn the screw until the bearing is moved up and loosened.

(4) Remove felt washer (Fig. 7).

(5) Remove snap ring using snap ring pliers (Fig. 8).

CAUTION: Be careful not to scratch the inside bore of front boss.

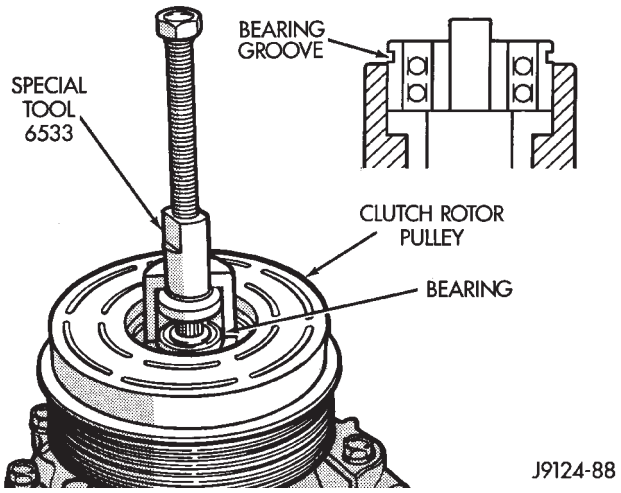


Fig. 6 Bearing Removal using Tool 6533

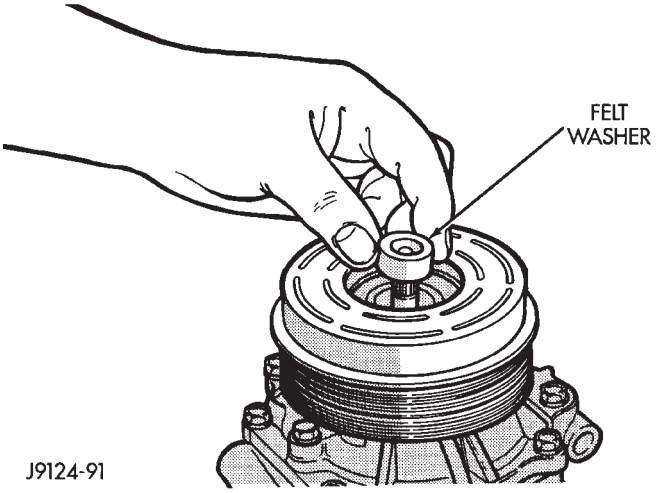


Fig. 7 Felt Washer

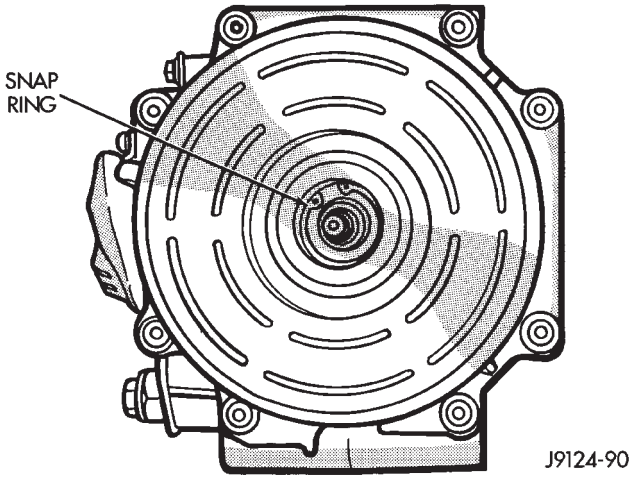


Fig. 8 Compressor Shaft Seal Snap Ring

(6) Insert Lip Seal Removal/Installation Tool 6551 and twist the tool until it is engaged into the slots of the seal case (Fig. 9). Carefully lift out seal assembly.

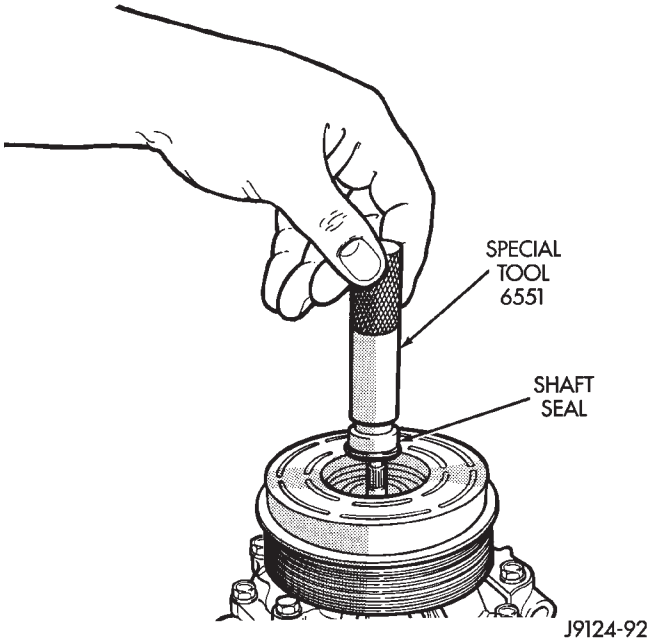


Fig. 9 Compressor Shaft Seal

INSTALLATION

CAUTION: Do not touch seal contact surfaces.

(1) Insert Seal Sleeve Protector Tool 6552 over compressor shaft (Fig. 10).

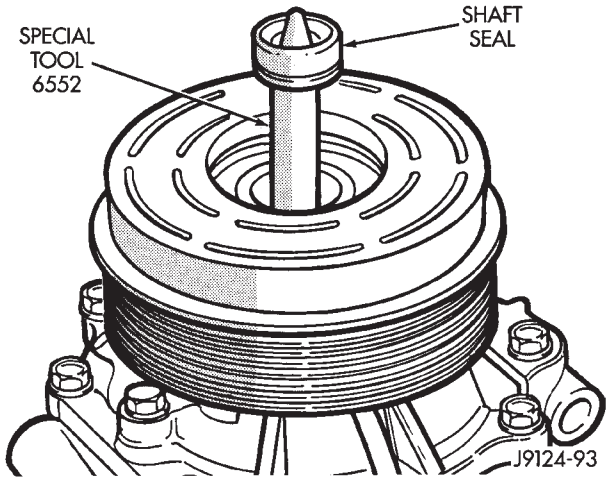


Fig. 10 Compressor Shaft Seal Sleeve Proctor

(2) Apply a little oil on seal sleeve protector.
(3) Apply oil on O-ring portion of the lip seal.

(4) Engage the slots of the Lip Seal Removal/Installation Tool 6551 to the lip seal cage. Install the lip seal into place by pushing gently over the seal protector (Fig. 9).

(5) Twist tool and remove from the seal. Remove seal sleeve protector.

(6) Install snap ring into the snap ring groove (Fig. 8). Push snap ring down to ensure correct positioning by using opposite end of Lip Seal Removal/Installation Tool 6551.

(7) Replace felt washer.

(8) Position the shaft bearing into front boss.

(9) Install bearing with Shaft Bearing Removal/Installation Tool 6533. Use the 2 jaws, the jaw retainer and the collet and gently hammer with a plastic hammer to seat the bearing (Fig. 11). The use of this tool will properly position the bearing.

(10) Install armature plate to the compressor shaft. Note the machined mating splines (Fig. 12).

(11) Install compressor shaft nut. Tighten nut to 17.5 N●m (155 in. lbs.) torque.

(12) Install the compressor onto the mount.

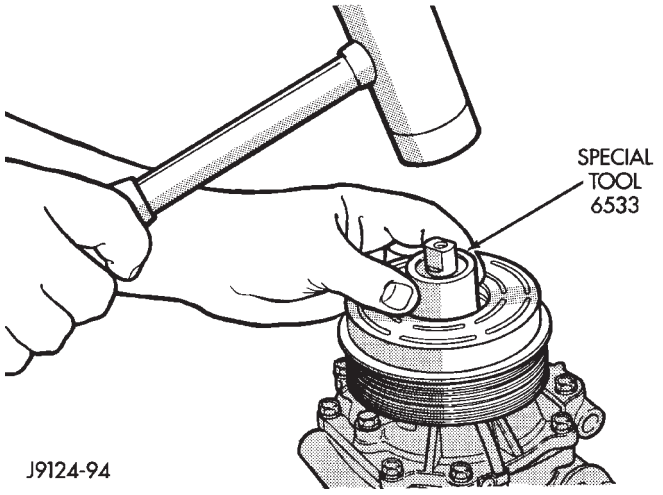


Fig. 11 Shaft Bearing Installation

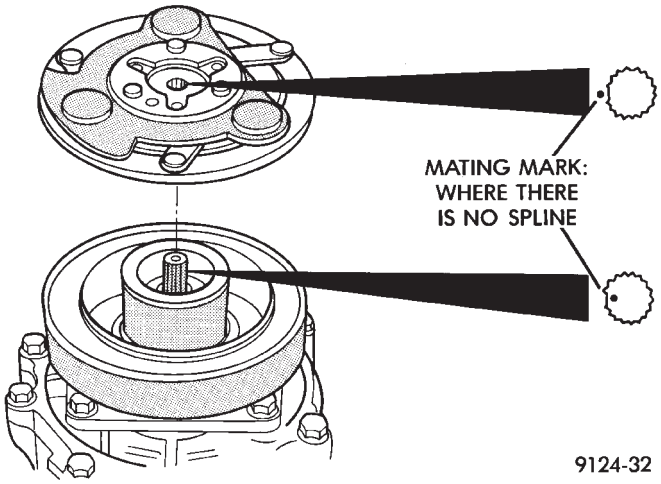


Fig. 12 Aligning Clutch Plate Splines

COMPONENT DIAGNOSIS PROCEDURES

CONDENSATE WATER DRAINAGE

Condensation that accumulates on the bottom of the evaporator housing is drained from a rubber tube through the dash panel and on to the ground. This tube must be kept open to prevent condensate water from collecting in the bottom of the heater A/C unit housing (Fig. 1).

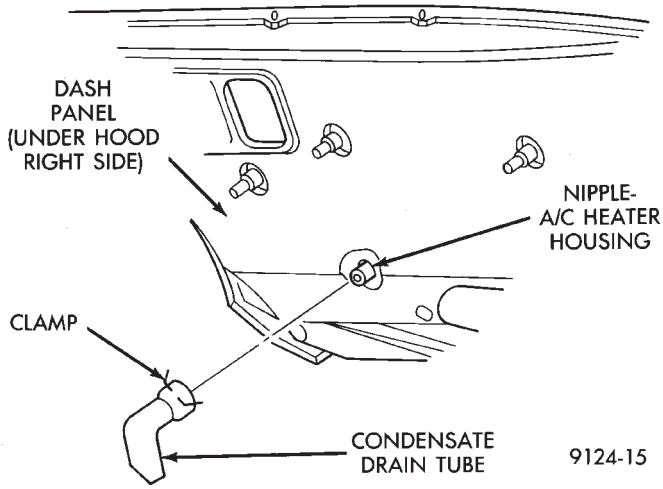


Fig. 1 Condensate Water Drain Tube—Typical

The tapered end of the drain tube is designed to keep contaminants from entering the heater A/C unit housing. If the tube is pinched or blocked, condensate cannot drain, causing water to back up and spill into the passenger compartment. It is normal to see condensate drainage below the vehicle. If the tube is damaged, it should be replaced.

BLOWER MOTOR VIBRATION AND/OR NOISE DIAGNOSIS

The resistor block (Fig. 2), supplies the blower motor with varied voltage (low and middle speeds) or battery voltage (high speed).

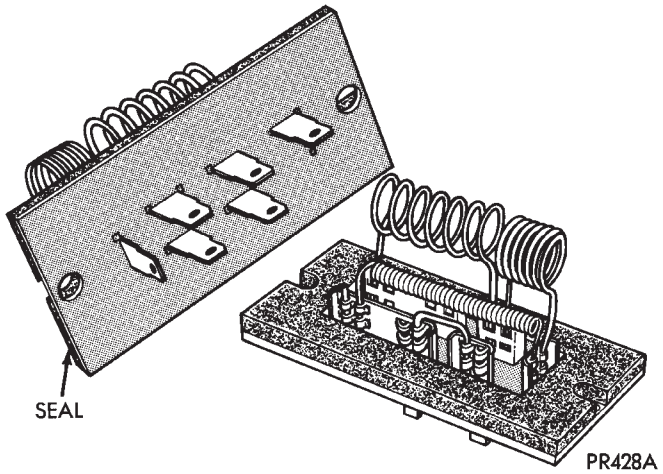


Fig. 2 Blower Motor Resistor Block—Typical

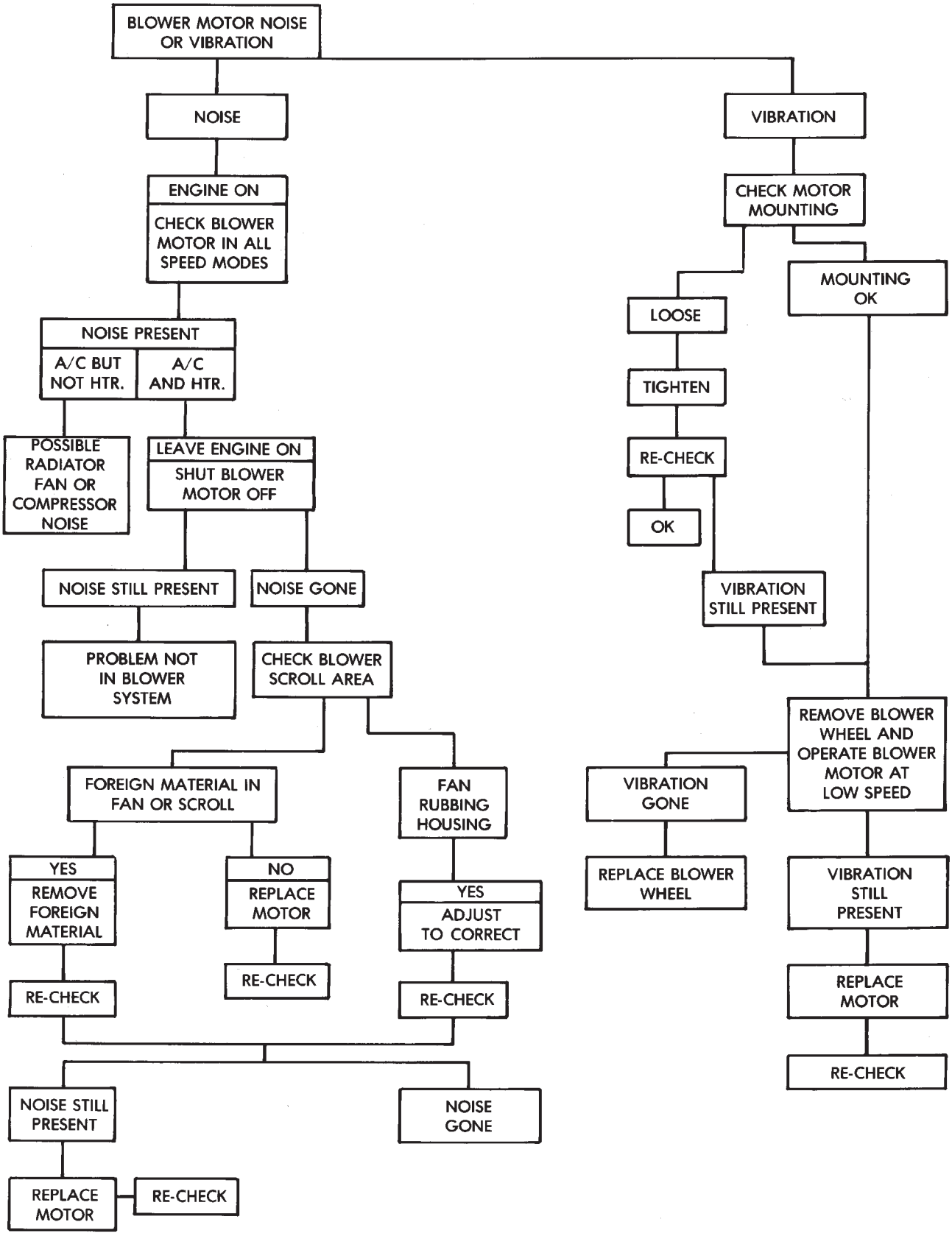
CAUTION: Stay clear of the blower motor and resistor block (Hot). Do not operate the blower motor with the resistor block removed from the heater-A/C housing.

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

BLOWER MOTOR ELECTRICAL DIAGNOSIS

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

BLOWER MOTOR NOISE/VIBRATION DIAGNOSIS



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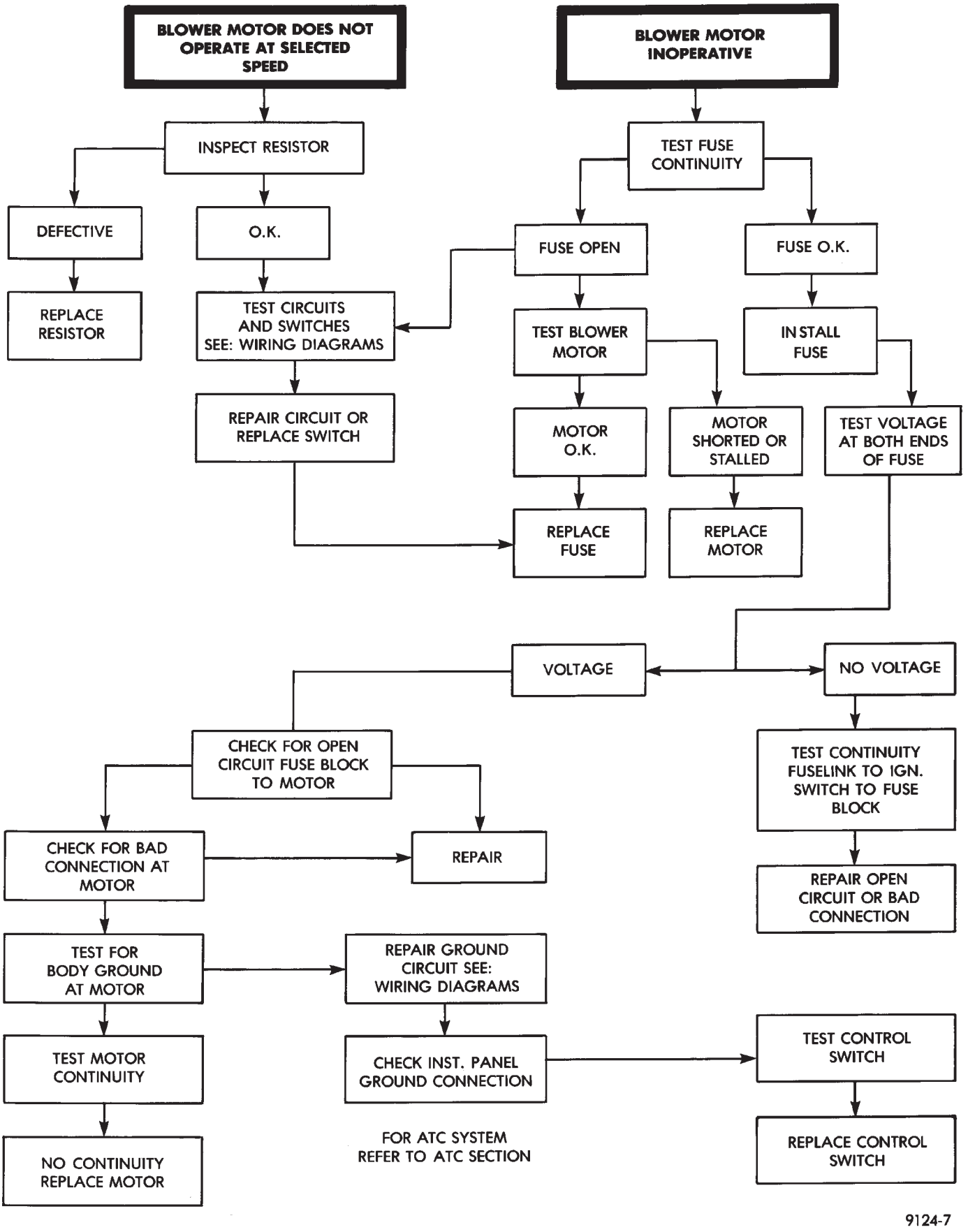
BLOWER MOTOR ELECTRICAL SYSTEM DIAGNOSIS



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COMPONENT SERVICE PROCEDURES

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TEMPERATURE CONTROL CABLE

REMOVAL AND INSTALLATION

A Temperature Control Cable is used on non-ATC heat or heater-A/C systems only. ATC (Automatic Temperature Control) systems use an electrically operated temperature control. Refer to the ATC section of this Group.

(1) Remove the A/C-Heater control panel assembly. Refer to A/C-Heater Control Replacement in Group 8E Instrument Panel. Disconnect the cable attaching flag from the A/C-heater control and remove the cable from control panel.

(2) Locate and disconnect the cable attaching flag on the bottom of the A/C-heater housing behind the floor air duct (Fig. 1).

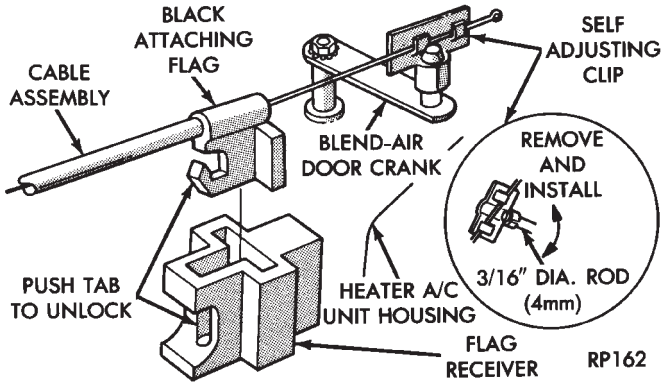


Fig. 1 Temperature Control Cable—Typical

(3) Slip cable self-adjusting clip downward from the blend-air door crank.

(4) Insert a 3/16 diameter tool (drill bit or phillips screwdriver shank) into the crank pin access hole and rotate the clip from the cable.

To install, reverse the preceding operation.

To adjust temperature cable, position the TEMP lever on the control to the cool side of its travel. Allowing the self-adjusting clip to slide on the cable, rotate the blend-air door crank counterclockwise by hand until it stops.

TEMPERATURE CONTROL CABLE

REMOVAL AND INSTALLATION

(1) Remove heater-A/C control panel. Refer to Switch and Panel Component Service in Group 8E, Instrument Panel. Disconnect the attaching flag on the control cable from the heater-A/C control panel.

(2) Remove console assembly. Refer to Group 8E, Instrument Panel.

(3) Remove instrument panel lower steering column cover. Refer to Group 8E, Instrument Panel.

(4) Remove the right lower instrument panel/glove box door assembly. This assembly is clipped to the upper instrument panel at the right upper side.

(5) A/C equipped vehicles: From under the hood, disconnect the A/C suction line mounting bracket from the dash panel (above the expansion valve).

(6) From under the hood, loosen (do not remove) the four heater-A/C assembly to dash panel mounting nuts.

(7) From inside the vehicle: Remove the vertical (heater-A/C housing) support bracket (below the glove box).

(8) Tilt the entire heater-A/C housing assembly downward to gain access to the temperature cable.

(9) Locate and disconnect the attaching flag on the control cable at the heater-A/C housing (Fig. 2).

(10) Slip the cable self-adjusting clip from the blend-air door crank (Fig. 1).

(11) Remove the cable from the vehicle.

(12) To remove the self-adjusting clip from cable (Fig. 1):

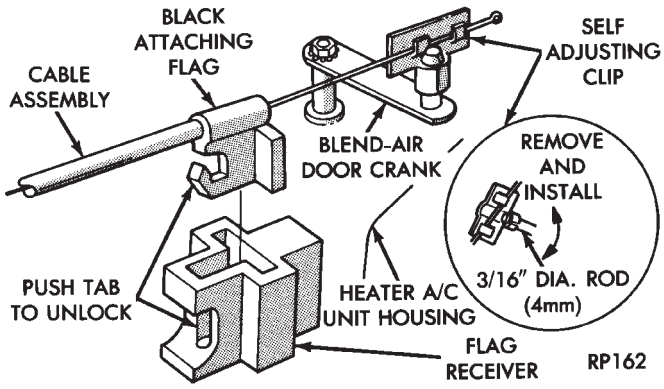


Fig. 2 Temperature Control Cable—Typical

(a) Insert a 4mm (3/16 inch) diameter drill bit (Fig. 1-Inset) into the door crank access hole. Then rotate the clip from the cable.

To install, reverse the preceding operation.

To adjust temperature cable: Position the TEMP lever on the control to the cool side of its travel. Allowing the self-adjusting clip to slide on the cable, rotate the blend-air door crank counterclockwise by hand until it stops.

BLOWER RESISTOR BLOCK—REMOVE AND INSTALL

WARNING: STAY CLEAR OF THE BLOWER MOTOR AND RESISTOR BLOCK (HOT) DURING THE FOLLOWING PROCEDURES.

CAUTION: Do not operate the blower motor with the resistor block removed from the heater-A/C housing. Air must move over the hot coils.

AJ AND AG BODY

(1) Remove the instrument panel glove box and door assembly. Refer to Group 8E Instrument Panel.

(2) Remove security and lamp outage modules.

(3) Locate the blower resistor block (Fig. 3). It is above and to the front of the glove box opening on the dash panel. Remove the wire connector.

(4) Remove the two attaching screws at the resistor block.

(5) Carefully pull the resistor block straight out from the cowl plenum opening and remove the resistor block from the vehicle.

To install, reverse the preceding operation. The coils on the Resistor Block should not be contacting one another. Before installation, gently separate the coils (with fingers only) if one coil is contacting another.

AA, AP, AY, AND AC BODY

(1) Raise the hood and remove the windshield wiper arm assemblies.

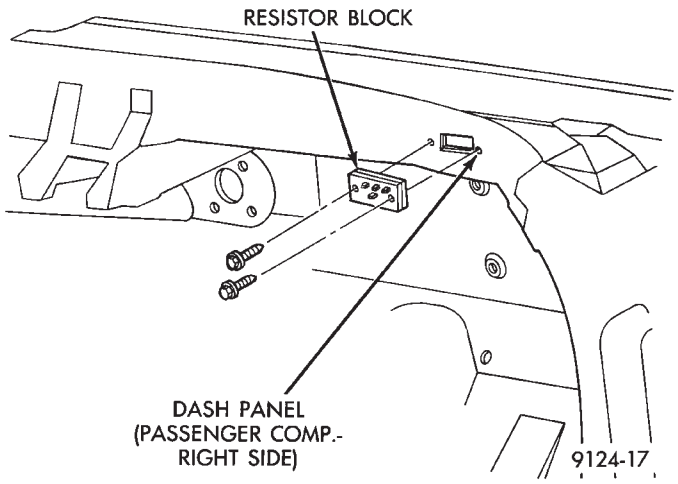


Fig. 3 Blower Resistor Block Location—AJ and AG Body

(2) Remove five cowl-plenum grille attaching screws and carefully lift the grille from the vehicle.

(3) (AA and AP): Locate and remove four air intake shield attaching screws and lift the shield from the vehicle.

(4) (AC and AY): Remove two resistor block terminal cover screws and remove cover.

(5) Disconnect the wire connector from the resistor block located behind the windshield washer reservoir (Fig. 4).

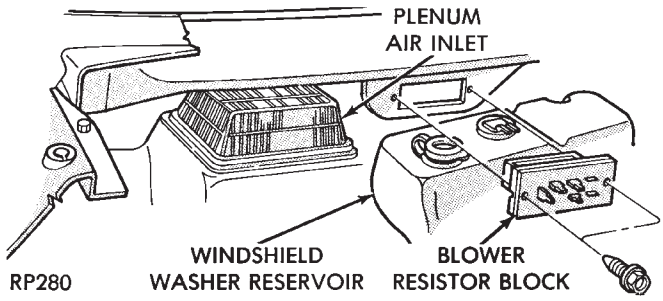


Fig. 4 Blower Resistor Block Location—AA, AP, AY and AC Body

(6) Remove two blower resistor block attaching screws. Then carefully pull the resistor block forward until the coils clear the plenum and lift it from the vehicle.

To install, reverse the preceding operation. The coils on the Resistor Block should not be contacting one another. Before installation, gently separate the coils (with fingers only) if one coil is contacting another.

VACUUM ACTUATOR—FRESH/RECIRC DOOR

This actuator is located on the passenger side of the heater-A/C housing.

REMOVAL AND INSTALLATION

(1) AA, AC or AY Body: Remove silencer cover under the instrument panel (below glove box).

(2) Remove glove box assembly. Refer to Group 8E, Instrument Panel.

(3) Disconnect vacuum lines.

(4) Locate and remove the two vacuum actuator attaching screws.

(5) Disengage the actuator arm linkage from the door pivot and remove the vacuum actuator (Fig. 5) from vehicle.

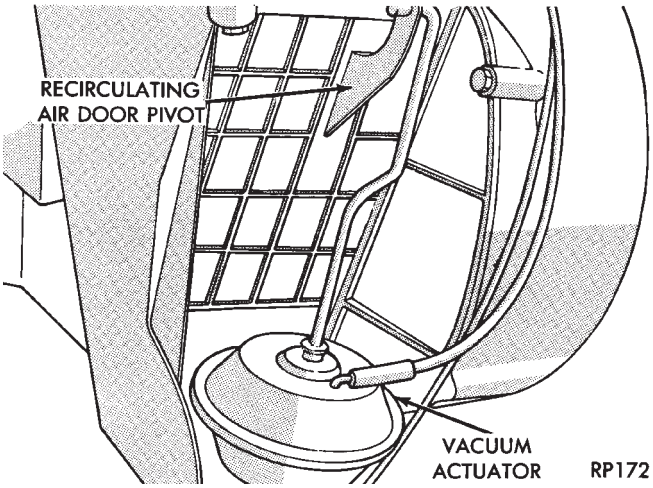


Fig. 5 Recirculating Air Door Vacuum Actuator—Typical

To install, reverse the preceding operation.

AIR DISTRIBUTION DUCT

REMOVAL AND INSTALLATION—AA BODY

On AA Body the instrument panel must be rolled down to service duct. Refer to Group 8E, Instrument Panel.

REMOVAL AND INSTALLATION—AC, AP, AY BODY

(1) Remove lower instrument panel module. Refer to Group 8E, Instrument Panel.

(2) Remove distribution duct attaching screws from under the front edge of the instrument panel (Fig. 6).

(3) Slide duct downward and remove from vehicle.

To install, reverse the preceding operation.

DEFROSTER DUCT ADAPTER

On AA body, the instrument panel must be rolled down to service duct. Refer to Group 8E, Instrument Panel.

REMOVAL AND INSTALLATION—AC, AP, AY BODY

(1) Remove air distribution duct.

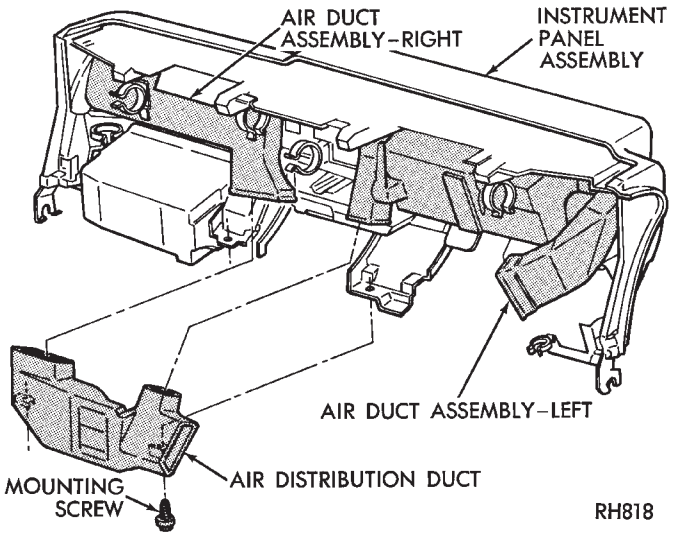


Fig. 6 Air Distribution Ducts—Typical

(2) Separate the defroster adapter from the heater-A/C unit and pull the adapter downward and out from under the instrument panel.

To install, reverse the preceding operation.

DEFROSTER DUCT

On AA, AG, and AJ Body, the instrument panel must be rolled down to service duct. Refer to Group 8E, Instrument Panel.

REMOVAL AND INSTALLATION—AC, AP, AY BODY

(1) Remove the air distribution duct.

(2) Remove the defroster duct adapter.

(3) Remove the instrument panel top cover. Refer to Group 8E, Instrument Panel.

(4) Locate and remove defroster duct attaching screws at the ends of each outlet (Fig. 7).

(5) Allow the defroster duct to drop downward and remove it from the vehicle.

To install, reverse the preceding operation.

HEATER HOSES

REMOVAL AND INSTALLATION

Review Cooling System Precautions before proceeding with this operation.

(1) Drain engine cooling system. Refer to Group 7, Cooling System.

(2) Loosen clamps at each end of hose to be removed (Figs. 8 or 9).

(3) Carefully rotate hose back and forth while tugging slightly away from connector nipple.

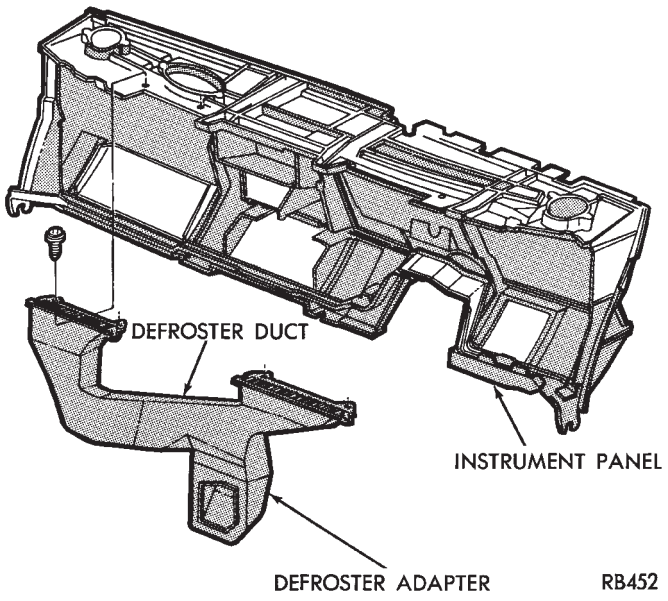


Fig. 7 Removing or Installing Defroster Duct—Typical

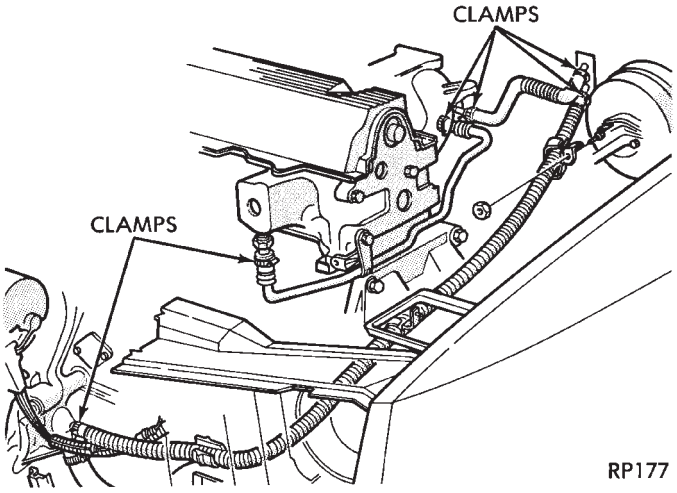


Fig. 8 Heater Hose Routing—2.2 L, 2.5 L Engines—Typical

CAUTION: When removing hoses from heater core inlet or outlet nipples DO NOT exert excess pressure. The heater core may become damaged and leak engine coolant into heater-A/C unit.

To install, reverse the preceding operation.

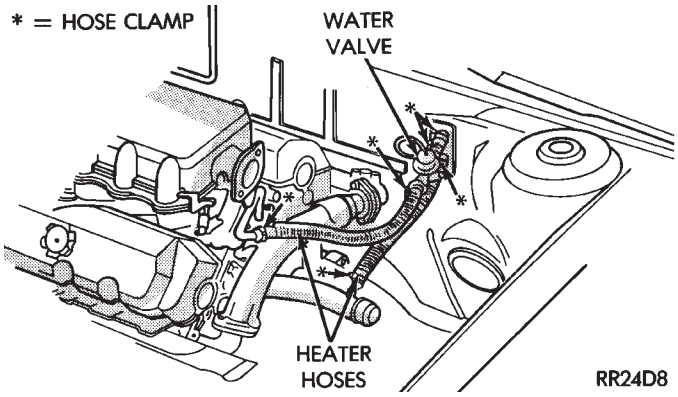


Fig. 9 Heater Hose Routing—3.0 L Engine—Typical

AMBIENT TEMPERATURE SENSOR SWITCH—VARIABLE DISPLACEMENT COMPRESSOR

REMOVAL AND INSTALLATION

The Ambient Temperature Sensor Switch is located in front of the A/C condenser and behind the vehicle grill (Fig. 10). Grill removal is not necessary for Sensor replacement.

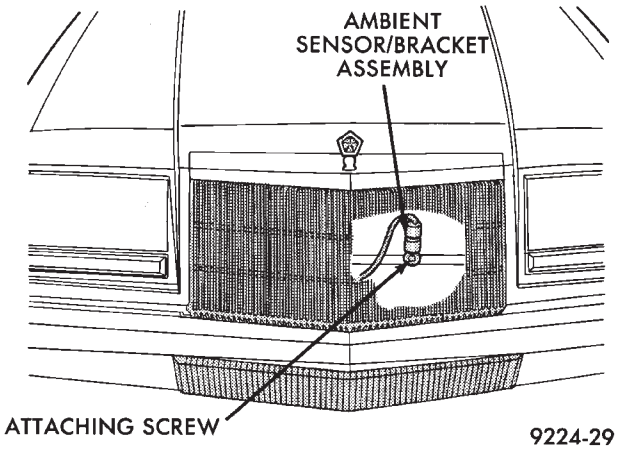


Fig. 10 Ambient Temperature Sensor Switch—Typical Mounting

(1) Remove the one attaching screw.
(2) Remove the sensor/bracket assembly from the vehicle.

To install, reverse the preceding operation.

VACUUM ACTUATORS—MODE DOORS

The Vacuum Actuators for the Mode Doors are located on the drivers side of heater/AC housing above the accelerator pedal.

REMOVAL

(1) Remove the instrument panel cover under the steering column. Refer to Group 8E, Instrument Panel.

Heat/Defrost Actuator:

Remove two screws from bracket. Lift actuator upward and pull out (Fig. 11).

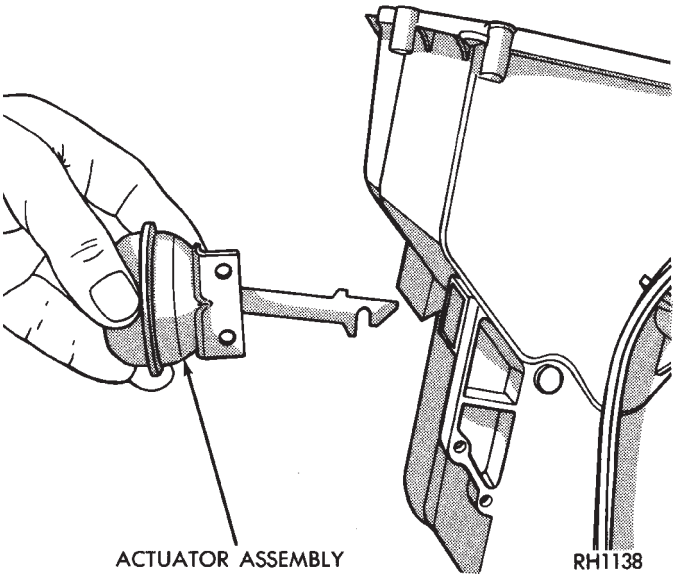


Fig. 11 Removing or Installing Heat/Defrost Vacuum Actuator Assembly

Mode Door Actuator:

Remove two screws from bracket (Fig. 12). Rotate actuator counter-clockwise to unhook from door and pull to remove.

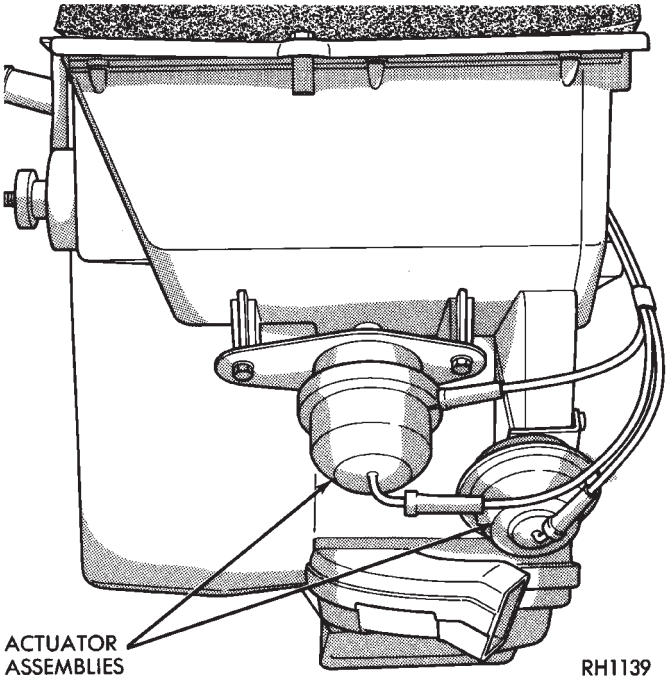


Fig. 12 Mode Door Vacuum Actuators

INSTALLATION

Heat/Defrost Actuator:

Install actuator link through housing and insert in heat defrost door slot. Push down to hook link to door. Locate the bracket to the housing and install two screws.

Mode Door Actuator:

Insert the actuator shaft through the hole in the housing and heat/defrost door. Attach through mounting hole in the mode door. Install two screws in bracket.

Install the instrument panel cover under the steering column.

AIR DISTRIBUTION DUCT

REMOVAL AND INSTALLATION

(1) Instrument panel assembly must be removed. Refer to Group 8E, Instrument Panel.

(2) After instrument panel has been removed, separate the defroster/demister ducts from the air distribution duct.

(3) Remove the air distribution duct-to-instrument panel mounting screws (Fig. 13).

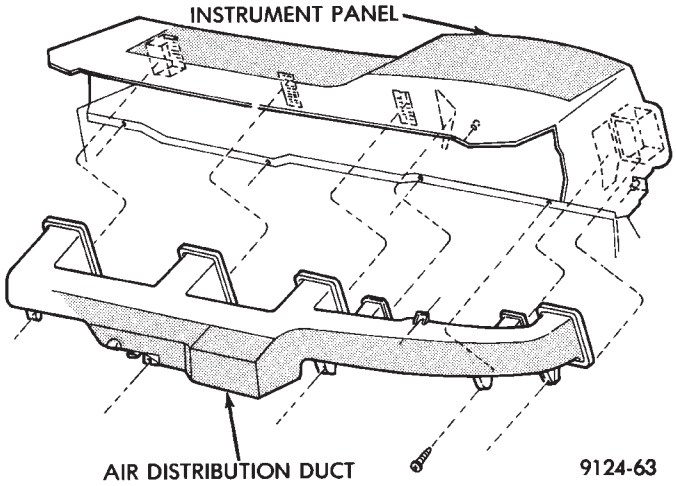


Fig. 13 Air Distribution Duct

DEFROSTER DUCTS/DEMISTER DUCTS AND HOSES

REMOVAL AND INSTALLATION

(1) Instrument panel assembly must be removed. Refer to Group 8E, Instrument Panel.

(2) After instrument panel has been removed, separate the defroster/demister ducts from the air distribution duct.

(3) Remove the demister tubes and hoses (Fig. 14).

CONDENSER FAN CONTROL SWITCH—VARIABLE DISPLACEMENT COMPRESSOR SYSTEM

The Fan Control Switch is located on the plumbing discharge line at the A/C compressor (Fig. 15).

CAUTION: Refrigerant discharge is not necessary when removing the Condenser Fan Control Switch. However, a small amount of refrigerant will vent from the switch port. Review the refrigerant handling section of Safety Precautions and Warnings in the General Information section of this Group.

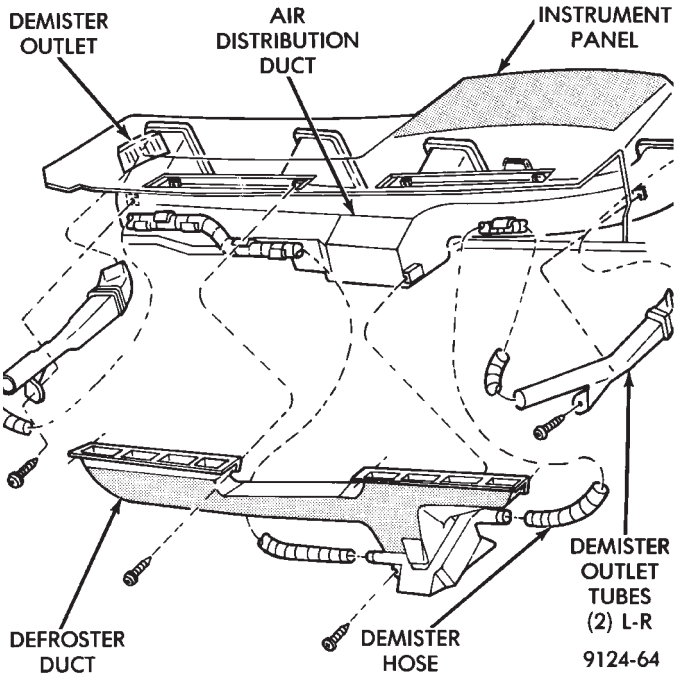


Fig. 14 Defroster Ducts/Demister Ducts and Hoses

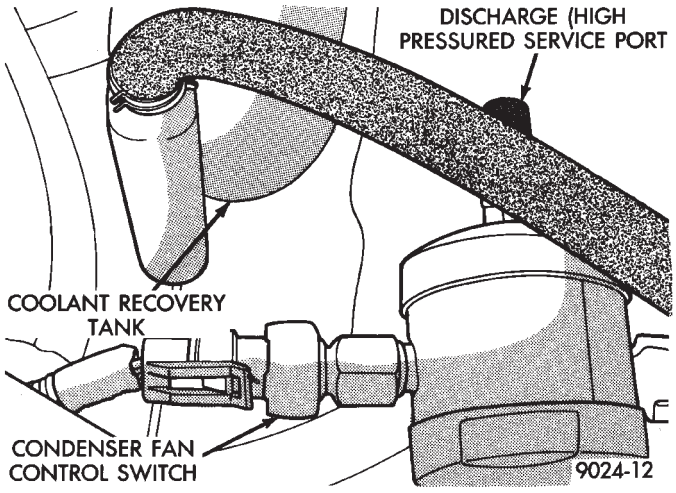


Fig. 15 Condenser Fan Control Switch

REMOVAL AND INSTALLATION

(1) Disconnect wire connector from condenser fan control switch.

(2) Loosen and quickly rotate the switch counterclockwise and separate from the high pressure line switch port.

To install, reverse the preceding operation.

FIN-SENSING CYCLING CLUTCH SWITCH

REMOVAL AND INSTALLATION

(1) Remove the cover/housing from the heater-A/C blower motor. Refer to Blower Motor removal and installation. Remove the cover only. Blower motor or blower motor wheel removal is not necessary.

(2) Disconnect the (three pin) wiring pigtail connector from the clutch switch sensor harness (located on the outside of the A/C-heater housing). Push the wire harness grommet (attached to the A/C-heater housing) through the hole in the housing. Feed the wire harness and connector through the opening and into the housing (Fig. 16).

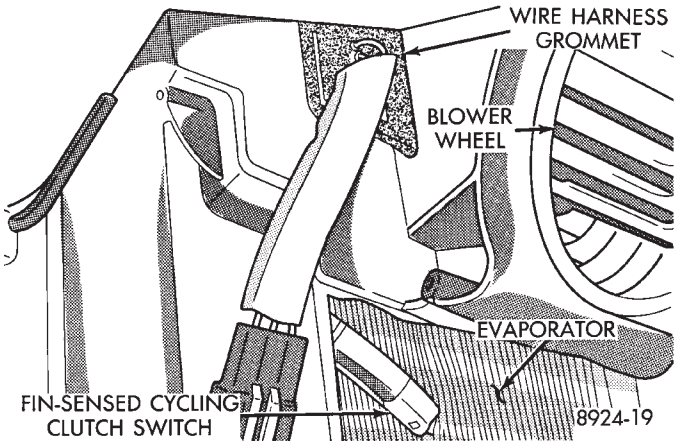


Fig. 16 Remove or Install Wire Harness Grommet

(3) Work through the air inlet opening (to the left of the blower motor wheel). Pull the fin-sensing cycling switch from the A/C evaporator (Fig. 17). **The metal probe on the switch is pushed into the evaporator approximately three inches.**

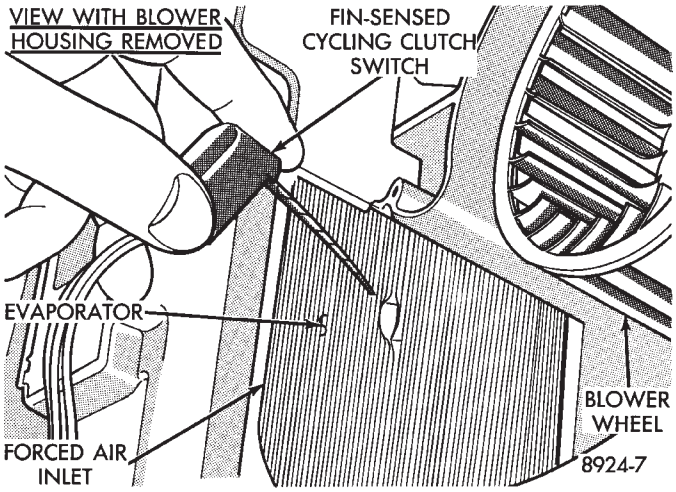


Fig. 17 Remove or Install Fin-sensing Cycling Clutch Switch

To install, reverse the preceding operation. The switch probe should not be installed in the original location (hole). Insert the probe in the evaporator coil approximately 5 mm (3 to 4 fins) to the right or left of the position it was removed. This will insure correct temperature sensing and system performance. Excessive force should not be required for probe insertion. Care should be taken not to damage the A/C evaporator coil or the switch probe.

LOW OR DIFFERENTIAL PRESSURE CUT-OFF SWITCH

REMOVAL AND INSTALLATION

WARNING: THE REFRIGERATION SYSTEM MUST BE COMPLETELY DISCHARGED BEFORE PROCEEDING WITH THIS OPERATION. REFER TO DISCHARGING REFRIGERATION SYSTEM IN THE REFRIGERANT SERVICE PROCEDURES SECTION.

(1) Disconnect the boot like wire connector at the cut-off switch.

(2) Using a sender unit type socket, remove the switch from the expansion valve (Fig. 18 or 19).

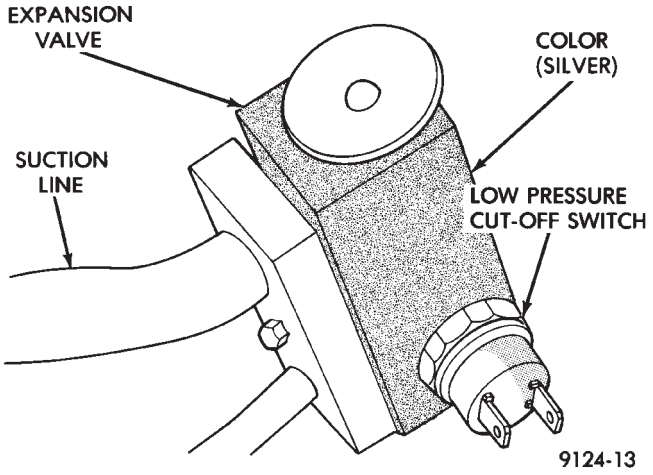


Fig. 18 Low Pressure Cut-Off Switch and Expansion Valve—Typical

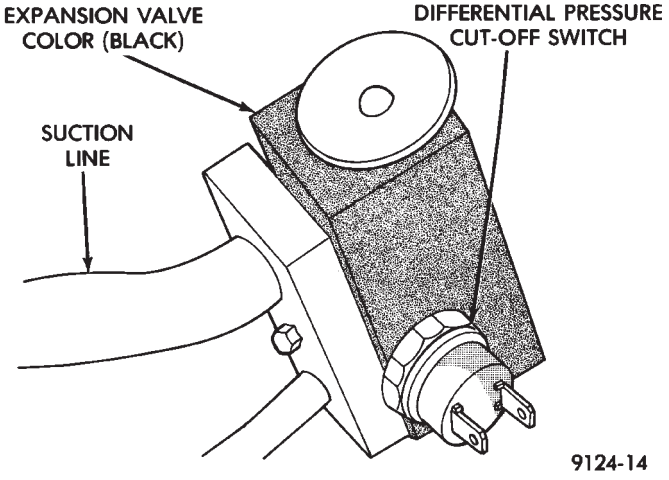


Fig. 19 Differential Pressure Cut-Off Switch and Expansion Valve—Typical

To install, assure an adequate seal by using a small amount of thread sealing tape on the replacement switch and reverse the preceding steps.

Evacuate and charge the system.

EXPANSION VALVE

REMOVAL

WARNING: THE REFRIGERATION SYSTEM MUST BE COMPLETELY DISCHARGED BEFORE PROCEEDING WITH THIS OPERATION. REFER TO DISCHARGING REFRIGERATION SYSTEM IN THE REFRIGERANT SERVICE PROCEDURES SECTION.

(1) Remove the boot-type wire connector from the pressure cut-off switch.

(2) Remove the attaching bolt in center of refrigerant line-plumbing sealing plate (Fig. 20).

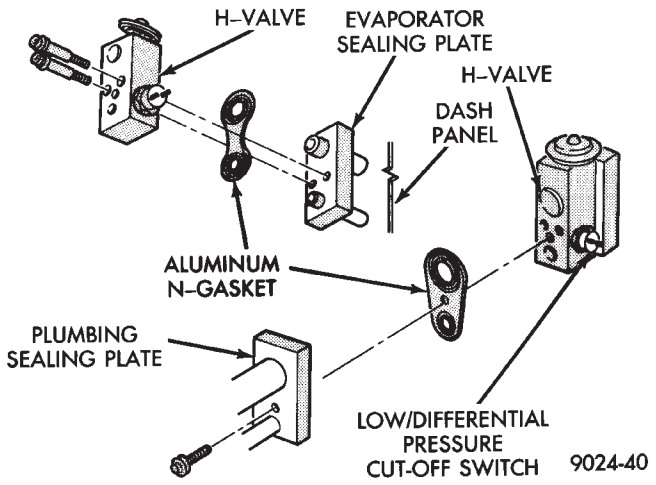


Fig. 20 Expansion Valve

(3) Carefully pull the refrigerant line-sealing plate assembly from the expansion valve towards front of vehicle. Do Not scratch the expansion valve sealing surfaces with pilot tubes.

(4) Cover the openings on A/C line-sealing plate assembly to prevent contamination.

(5) Remove two screws securing the expansion valve to the evaporator sealing plate.

(6) Carefully remove valve.

INSTALLATION

(1) Remove and replace the aluminum gasket on the evaporator sealing plate.

(2) Carefully hold the expansion valve to the evaporator sealing plate (do not scratch sealing surface). Install two attaching screws and tighten to 11 ± 3 N●m (100 ± 30 inch lbs.).

(3) Remove and replace the aluminum gasket (Fig. 15) on the refrigerant line-sealing plate assembly.

(4) Carefully hold the refrigerant line-sealing plate assembly to the expansion valve, install bolt and tighten to 23 ± 3 N●m (200 ± 30 inch lbs.).

(5) Connect wires to low pressure cut-off switch.

(6) Evacuate and recharge system.

(7) After expansion valve is installed, system is charged, and leaks have been checked, repeat A/C performance check.

FILTER-DRIER ASSEMBLY

REMOVAL AND INSTALLATION

WARNING: THE REFRIGERATION SYSTEM MUST BE COMPLETELY DISCHARGED BEFORE PROCEEDING WITH THIS OPERATION. REFER TO DISCHARGING REFRIGERATION SYSTEM IN THIS GROUP.

(1) Remove the two high pressure lines from the sides of the filter-drier assembly (Fig. 1). Then carefully separate the lines from filter-drier. Discard old gaskets.

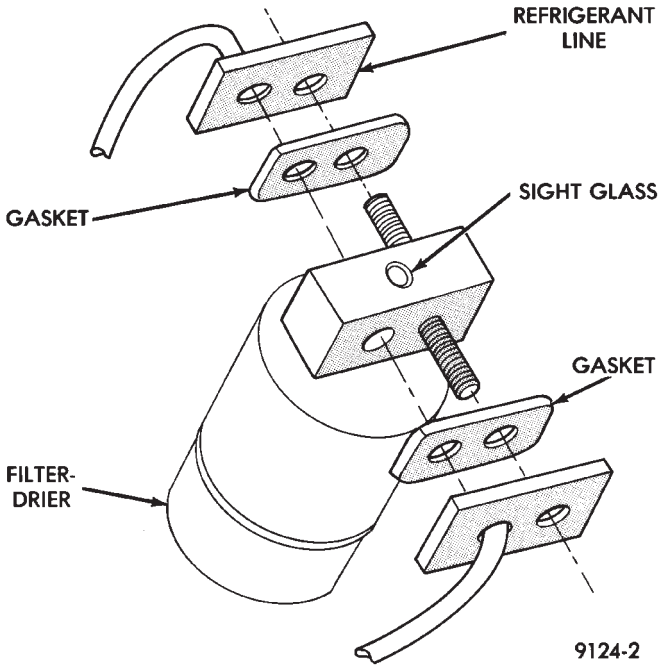


Fig. 1 Filter-Drier—Typical

(2) Cover the open ends of the A/C lines to minimize system contamination.

(3) Remove two mounting strap bolts and lift the filter-drier from vehicle. If replacing the filter-drier assembly, transfer the mounting strap to replacement part.

To install, replace both refrigerant line to filter-drier gaskets, and reverse the preceding operation.

Evacuate and recharge system.

CONDENSER ASSEMBLY

The A/C condenser is mounted to the radiator with bolts (upper) and mounting pads (lower).

WARNING: THE REFRIGERATION SYSTEM MUST BE COMPLETELY DISCHARGED BEFORE PROCEEDING WITH THIS OPERATION. REFER TO DISCHARGING REFRIGERATION SYSTEM IN THIS GROUP.

REMOVAL AND INSTALLATION

(1) Discharge A/C system.

(2) Remove the refrigerant line mounting nut (Fig. 2) and separate the refrigerant lines from condenser sealing plate.

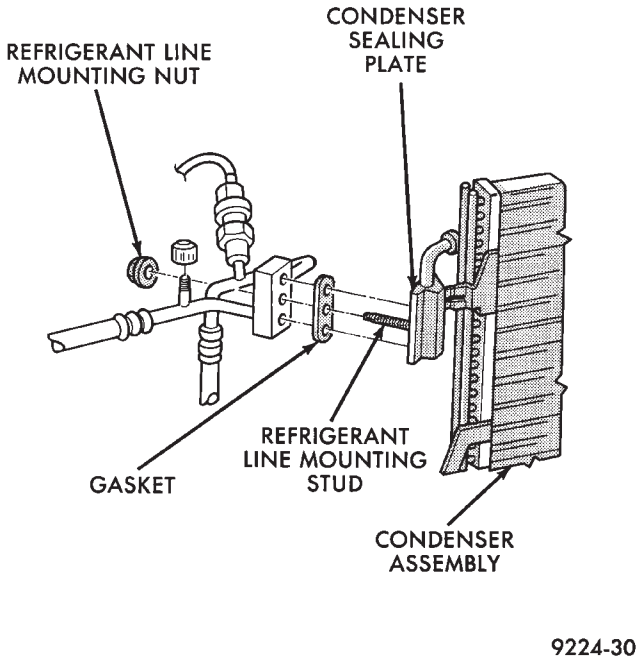


Fig. 2 A/C Condenser Refrigerant Lines—Typical

(3) Cover the open ends of the A/C lines and condenser to minimize system contamination.

(4) Remove the coolant overflow bottle, electric cooling fans and radiator assembly. Also remove the turbocharger inter-cooler if equipped. Refer to Group 7, Cooling System.

On some models, complete removal of the radiator, or coolant drainage is not necessary. The radiator may be moved slightly rearward to remove the condenser.

(5) Remove the two bolts securing the condenser assembly to the radiator.

(6) Slip the condenser from the lower radiator mounting brackets.

(7) Remove condenser.

To install, replace all O-rings and gaskets and coat sealing surfaces with approved refrigerant oil. Then reverse the preceding operation. When installing a new condenser, refer to Oil Level in the Refrigerant section. Tighten the refrigerant line mounting nut to 23 N•m (200 inch pounds).

Evacuate and recharge system.

BLOWER MOTOR

REMOVAL AND INSTALLATION

(1) Disconnect the negative battery cable.

(2) Remove the glove box. Refer to Group 8E, Instrument Panel.

(3) On vehicles equipped with A/C, disconnect the two vacuum

lines from the recirculating air door actuator. Disconnect blower lead wire connector.

(4) Remove two screws at the top of the blower housing, securing it to the unit cover.

(5) Remove five screws from around the blower housing and separate the blower housing from the unit (Fig. 3).

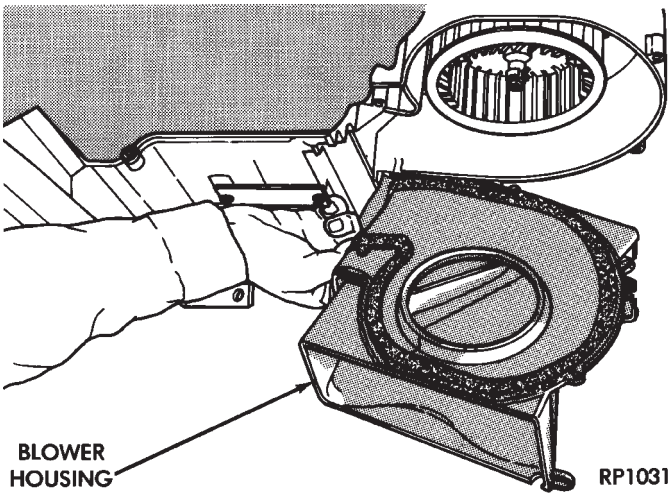


Fig. 3 Blower Housing—Typical

(6) Remove three screws securing the blower and wheel assembly to the heater or A/C unit housing. Then separate the assembly from the unit (Fig. 4).

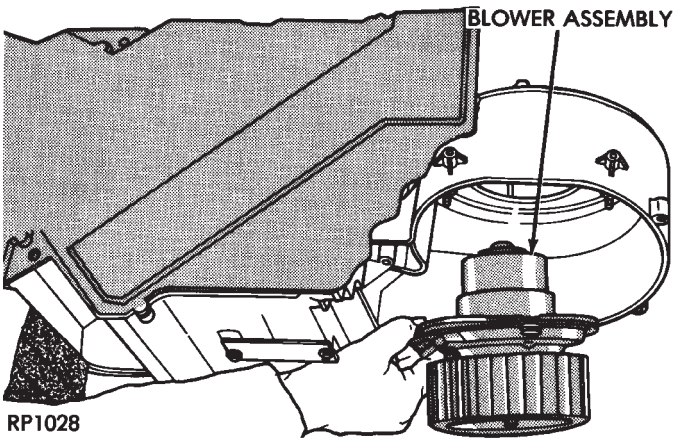


Fig. 4 Blower Motor and Wheel Assembly

To install, reverse the preceding operation.

BLOWER MOTOR WHEEL ASSEMBLY

REMOVAL AND INSTALLATION

Blower motor must be removed from vehicle before performing this operation. Refer to Blower Motor Removal and Installation.

(1) Remove the spring type retaining ring from the center of the blower wheel (Fig. 5). Note the location of the blower wheel on the blower motor shaft.

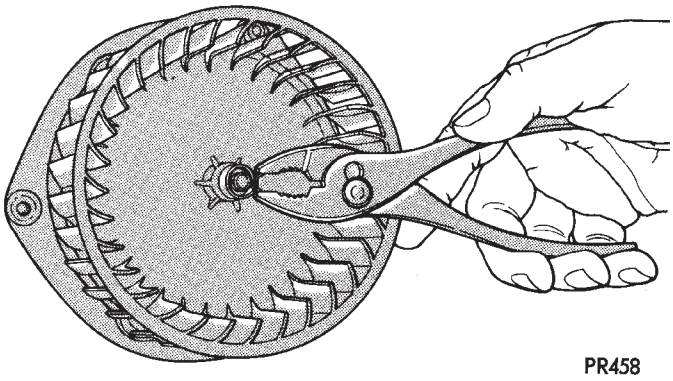


Fig. 5 Blower Wheel Retaining Ring Removal and Installation

(2) Remove blower wheel from blower motor shaft.

To install, reverse the preceding operation. To prevent noise or vibration, rotate the blower wheel by hand to check for rubbing.

HEATER-A/C UNIT ASSEMBLY—REMOVAL AND INSTALLATION

AP, AC, AY BODY PROCEDURE

WARNING: IF EQUIPPED WITH A/C, THE REFRIGERATION SYSTEM MUST BE COMPLETELY DISCHARGED BEFORE PROCEEDING WITH THIS OPERATION. REFER TO DISCHARGING REFRIGERATION SYSTEM IN THIS GROUP.

(1) Disconnect battery NEGATIVE cable.

(2) Drain radiator and disconnect heater hoses at unit. Tape heater tubes to keep from leaking during removal. Refer to Group 7, Cooling System.

(3) Remove A/C condensate drain and disconnect vacuum lines.

(4) Inside passenger compartment, perform as follows, according to body designation.

(a) AC-body, remove right upper and lower under-panel silencers.

(b) AP & AC-bodies, remove steering column cover.

(c) AC-body, remove left under-panel silencer.

(5) Position front seat or right front seat full rear.

(a) AP-body, remove right A-pillar trim.

(b) Remove right cowl side trim.

(6) Remove glove box.

(a) AC-body, remove right instrument panel reinforcement.

(7) AP-body only:

(a) Remove right instrument panel lower mounting screw.

(b) Remove center bezel.

(c) Remove lower center module cover.

(d) Remove floor console.

(e) Remove instrument panel support brace (from steering column opening to right cowl side at bottom of instrument panel).

(f) Remove instrument panel to support bracket (below glove box opening).

(g) Remove ash receiver.

(h) Remove radio.

(i) Remove panel top cover.

(j) Remove three right side panel to fence (below windshield) attaching screws.

(8) AC-body, remove ash receiver.

(9) AP body, pull right lower side of instrument panel rearward.

(10) Remove center distribution and defroster adapter ducts.

(11) AP and AC-bodies, disconnect relay module.

(12) AP-body, remove instrument panel to unit bracket.

(13) AP-body, remove lower air distribution duct.

(14) Disconnect blower motor wire connector.

(15) Disconnect demister hoses from top of unit.

(16) For Non-ATC equipped vehicles, disconnect the temperature control cable flag from the bottom of the heater-A/C unit. Then un-clip the cable from the left side of the heat distribution duct. Swing the cable out of the way to the left. Disconnect the vacuum lines at the unit.

(17) For ATC equipped vehicles, disconnect the instrument panel wiring from the rear face of the ATC control unit.

(18) AC body, disconnect right 25-way connector bracket and fuse block from panel.

(19) Fold floor right side carpet back (except AC body).

(20) From engine compartment, remove four unit attaching nuts.

(21) Remove unit hanger strap lower screw, and rotate strap.

(22) Move heater-A/C unit rearward to clear mounting studs, and lower unit.

(23) AP-body, remove demister adapter from top of unit.

(24) While pulling the lower right of instrument panel rearward:

(a) Slide unit upright from under instrument panel for AP-body.

(b) Except for AP-body, rotate unit while pulling from under instrument panel.

To install, reverse the preceding operation.

AA BODY PROCEDURE

WARNING: IF EQUIPPED WITH A/C, THE REFRIGERATION SYSTEM MUST BE COMPLETELY DISCHARGED BEFORE PROCEEDING WITH THIS OPERATION. REFER TO DISCHARGING REFRIGERATION SYSTEM IN THIS GROUP.

Refer to Group 8E and Group 23 for component removal and installation when performing this operation.

(1) Perform steps 1 through 7 of Blower Motor removal and installation.

(2) Remove relay panel above glove compartment opening.

(3) Disconnect the A/C vacuum line connector and radio noise capacitor connectors.

(4) Remove left windshield pillar trim cover.

(5) Remove left lower side cowl trim cover.

(6) Remove hood release handle mechanism attaching screws.

(7) Remove steering column trim covers.

(8) Disconnect parking brake release mechanism connecting rod. Gain access through fuse panel opening.

(9) Remove lower left instrument panel silencer.

(10) Remove lower left instrument panel reinforcement.

(11) Remove instrument panel center (radio) bezel.

(12) Remove forward floor console.

(13) Remove the radio.

(14) Remove the heater-A/C control.

(15) Remove cigar lighter.

(16) Remove message center/trip computer, if equipped.

(17) Disconnect side window demister tubes from top of heat A/C unit.

(18) Remove steering column upper attaching bolts and allow the steering wheel to rest on the driver seat cushion.

(19) Remove upper instrument panel (defroster outlet) cover.

(20) Remove upper instrument panel attaching screws from below the windshield opening.

(21) Loosen (do not remove) the left lower cowl instrument panel attaching screw.

(22) Remove the right lower cowl instrument panel attaching screw.

CAUTION: Protect the passenger seat cover from soiling or damage using a suitable cover.

(23) Carefully pull the right side of the instrument panel away from the vehicle. Allow the instrument panel to rest on the passenger seat cushion.

CAUTION: Before proceeding with the next operation, review the Safety Precautions and Warnings at the front of this Group.

(24) From the engine compartment, drain the cooling system and disconnect the heater hoses from the heater core nipples. Plug the nipples to avoid spilling coolant inside the vehicle.

(25) Disconnect the refrigerant lines from the expansion-valve at the dash panel on the right side of the vehicle. Seal the refrigerant lines to prevent contamination.

(26) Remove the expansion valve from the evaporator plate. Seal the valve to avoid contamination.

(27) Remove the condensate drain tube.

(28) Remove heater-A/C unit to dash panel attaching nuts.

(29) From inside the vehicle, pull rearward on the heater-A/C unit to clear the dash panel silencer and remove the unit from the vehicle.

To install, reverse the preceding operation. Refill cooling system and test for leaks. Evacuate and charge the refrigerant system and test overall performance.

AG, AJ BODY PROCEDURE

WARNING: IF EQUIPPED WITH A/C, THE REFRIGERATION SYSTEM MUST BE COMPLETELY DISCHARGED BEFORE PROCEEDING WITH THIS OPERATION. REFER TO DISCHARGING REFRIGERATION SYSTEM IN THIS GROUP.

(1) Disconnect the battery negative cable.

(2) Drain the coolant from cooling system. Refer to Group 7, Cooling System.

(3) Remove the air-conditioner expansion valve (if equipped).

(4) Disconnect the heater hoses from heater core. Then plug or cap the tubes on heater core. This will prevent spilling coolant into the interior of vehicle during unit removal.

(5) Remove the condensate drain tube.

(6) Disconnect the A/C-heater vacuum supply line from vacuum supply nipple (in the engine compartment).

(7) Remove the four A/C-heater assembly-to-dash panel attaching nuts.

(8) Remove the passenger side front seat. Refer to Group 23, Body.

(9) Remove the kick panel/sill cover at right door opening.

(10) Remove the body computer (Fig. 6) located at the lower right section of the right front door pillar.

(11) Remove the glove box assembly. Refer to Group 8E, Instrument Panel.

(12) Remove the carpeted panels from both sides of the console.

(13) Un-clip the radio antenna cable from the metal support (Fig. 6) located behind and below the glove box opening.

(14) Instrument panel removal is not necessary to remove the A/C-heater assembly from the vehicle. Although, part of the lower instrument panel must be cut. The cut line is marked: **CUT HERE FOR A/C HTR REMOVAL**.

This cut line is stamped (indented) into the right-outer side of the instrument panel padding (outboard of the glove box opening). Using a hacksaw blade, cut the instrument panel padding along the indented line from point A to point B (Fig. 6). **CUT THE PLASTIC ONLY**. Do not cut the metal support behind the instrument panel padding.

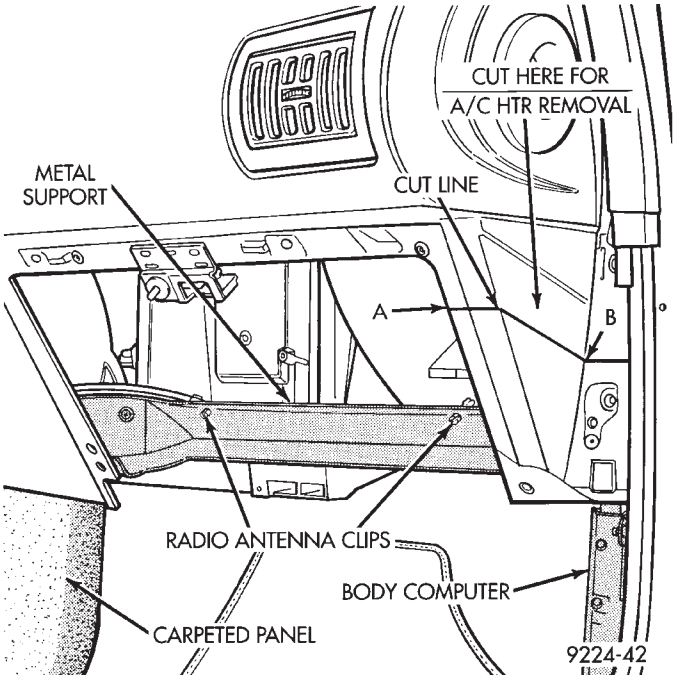


Fig. 6 Cut Line For A/C-heater Removal—AG/AJ Body

(15) Remove the metal support behind and below the glove box opening, and the previously cut piece of the instrument panel that is riveted to it.

(16) Remove the radio choke, security alarm module and the lamp outage module from above the glove box opening (if equipped).

(17) Remove the plastic cover under the steering column.

(18) Remove the metal support under the steering column.

(19) AJ Body only: Remove the under-panel silencer pad from under the glove box opening.

(20) Remove the lower heat distribution duct (3 screws).

(21) Remove the air distribution duct through the opening at the left side of instrument panel.

(22) Reach through glove box opening and disconnect the demister hoses from the top of the A/C-heater assembly.

(23) Disconnect the temperature control cable from the bottom of the A/C-heater assembly and position out of the way.

(24) Disconnect wiring at the blower motor and fin-sensing cycling clutch switch electrical connectors.

(25) Un-plug the antenna cable from the radio.

(26) Remove the metal (A/C-heater-to-instrument panel) hanger strap from the upper part of the A/C-heater assembly.

(27) Roll back the floor carpeting from under the A/C-heater assembly far enough to avoid restricting unit removal.

(28) Remove the A/C-heater assembly through the opening on the right side of the console, and remove unit from vehicle.

The instrument panel (to the left side of the glove box opening) must be slightly folded back to remove the unit from the vehicle. If wrinkles appear in the instrument panel after the unit has been installed, they may be removed using a heat gun. Refer to Installation AG, AJ Body for instructions.

To install, reverse steps (28) through (13). If wrinkles have appeared in the instrument panel, apply low heat from a heat gun over the wrinkled area. **Do not overheat the instrument panel padding or the surrounding area.**

Reverse steps (12) through (1). If equipped with A/C, evacuate and charge the refrigerant system.

HEATER-A/C UNIT RECONDITION

The following operation requires the removal of the heater-A/C unit assembly from the vehicle. Refer to Heater-A/C Unit Assembly removal and installation in this Group.

DISASSEMBLE

(1) Place the heater-A/C unit on a suitable work surface. (Fig. 7).

(2) Locate and remove one retaining nut from the blend-air door pivot shaft.

(3) To remove the top cover from the A/C-heater case, the crank arm must be removed (Fig. 8).

(4) Disconnect the vacuum lines from the defroster and panel mode vacuum actuators and position them out of the way.

(5) Remove three heater-A/C unit cover attaching screws going upward at the defroster outlet chamber.

(6) Remove two heater-A/C unit cover attaching screws going upward at the air inlet plenum.

(7) Remove eleven heater-A/C unit cover attaching screws going downward into the housing. Then lift the cover from the heater-A/C unit. (Fig. 9).

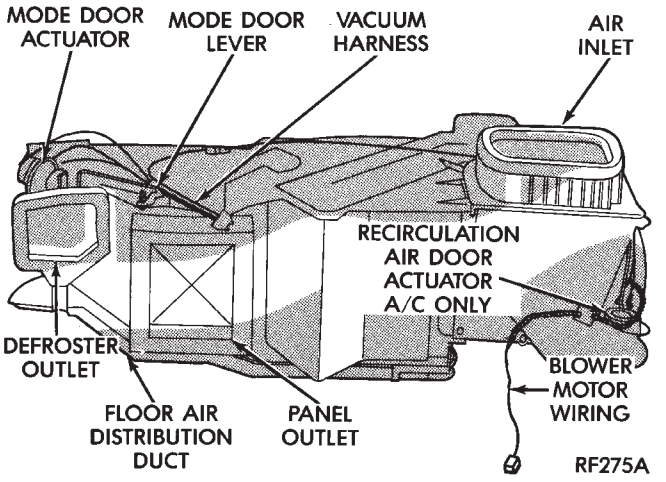


Fig. 7 Position Heater-A/C Unit for Disassembly and Reassembly

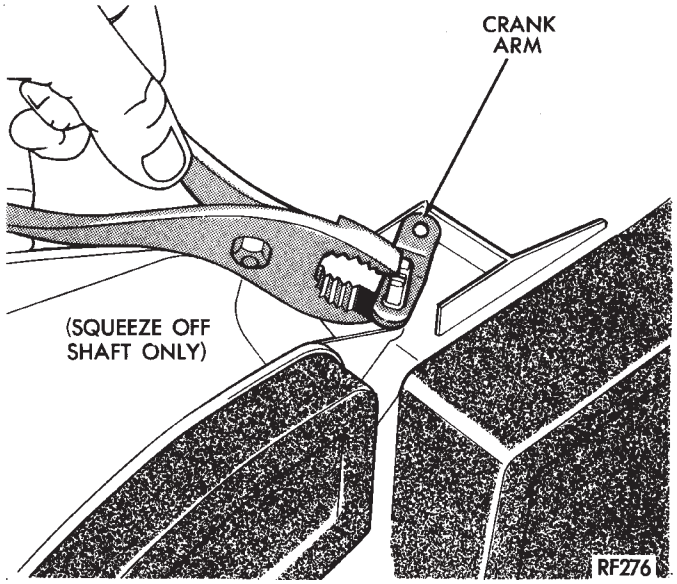


Fig. 8 Blend-Air Door Crank Linkage Removal

To reassemble, lower the heater-A/C unit cover into place. Then guide the panel air mode door pivot shaft into its socket and reverse the preceding operation.

BLEND-AIR DOOR

REMOVAL AND INSTALLATION

The following operation requires the removal of the heater-A/C unit assembly from the vehicle. Refer to Heater-A/C Unit Assembly removal and installation in this Group.

(1) Remove Heater-A/C unit top cover.

(2) Remove the nut from bottom of the blend-air door pivot shaft and lift the blend-air door from the heater-A/C unit housing. (Fig. 10).

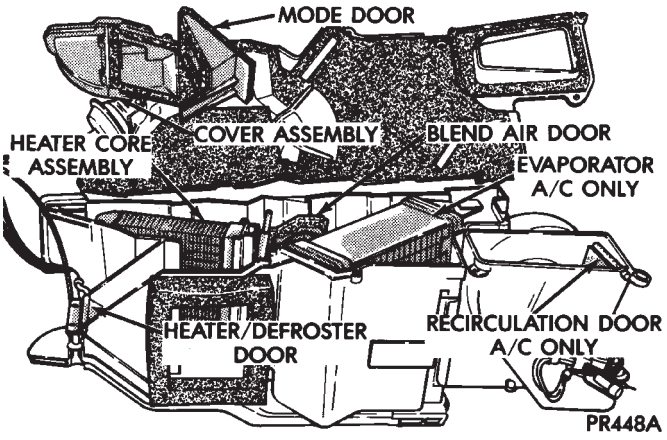


Fig. 9 Heater-A/C Unit Cover Removal and Installation

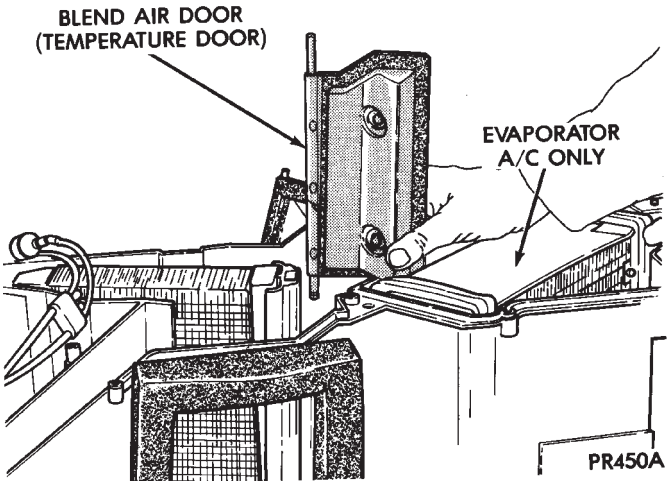


Fig. 10 Blend-Air Door Removal and Installation

To install, reverse the preceding operation.

HEATER CORE

REMOVAL AND INSTALLATION

Refer to Heater A/C Unit Recondition in this Group.

EVAPORATOR COIL

REMOVAL AND INSTALLATION

Refer to Heater A/C Unit Recondition in this Group.

CONDENSATE DRAIN TUBE

REMOVAL AND INSTALLATION

(1) Raise vehicle.

(2) Locate rubber Drain Tube on right side of dash panel (Fig. 11).

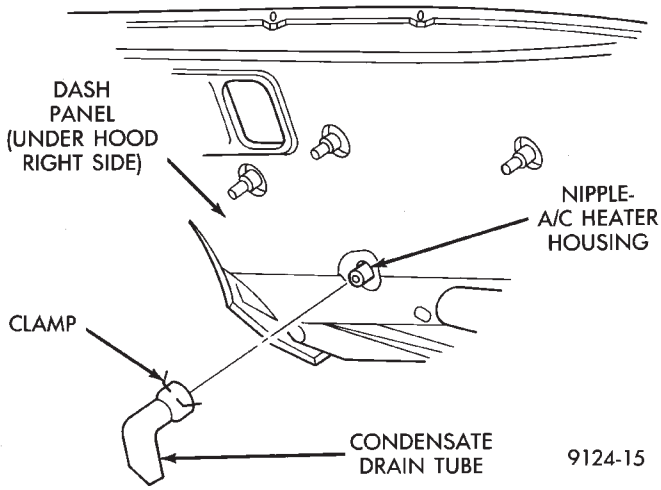


Fig. 11 Condensate Water Drain Tube—Typical

(3) Squeeze clamp and remove drain tube.

To install, reverse the preceding operation. Check the drain tube nipple on the heater-A/C housing for any obstructions.

AUTOMATIC TEMPERATURE CONTROL (ATC)

INDEX

GENERAL INFORMATION—COMPONENT OPERATION

The Automatic Temperature Control (ATC) system lets the operator change the passenger compartment environment. A computer, built into the control panel (Fig. 1), regulates the desired temperature, air flow direction and blower speed. The operator may also select an AUTO mode feature in which the computer would select the blower speed and air flow direction. Refer to the Owner's Manual for proper operation.

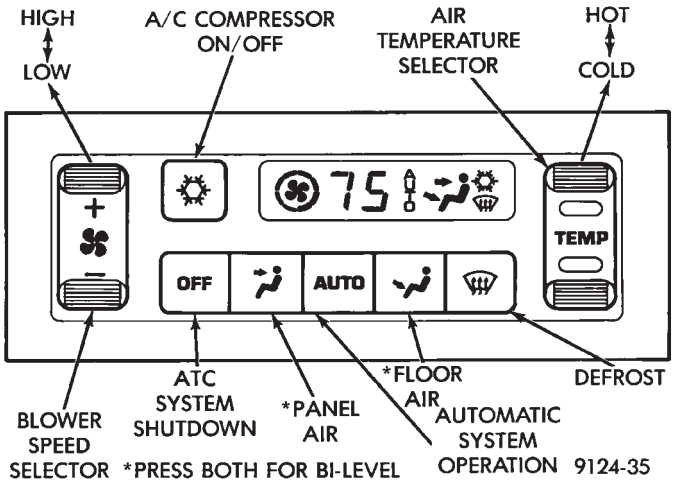


Fig. 1 Automatic Temperature Control Computer Panel

The system goes into a maximum cool recirculated air lock-in mode:

- After selecting a comfort temperature setting of 18°C or 65°F.
- With the A/C compressor turned on (snowflake illuminated) (Fig. 2).
- With the system not in the defrost mode.
- When the temperature button is held in for ten seconds.

This will not regulate the temperature until the system is turned off or the comfort setting is raised.

Vacuum is not used to control any of the ATC system or components. It is a totally electronic unit.

COMPUTER CONTROLLER

The ATC computer controller (Fig. 3) manages all of the systems electronic functions. It provides logic and/or power to operate the power module, blend-air door actuator, the mode door and fresh/recirc actuators. It remembers the operators control panel selected settings when the vehicle is not running. Then it measures return inputs from the sun sensor and various temperature sensors. After measuring all input information, the computer will ground the output circuits. This provides logic signals for automatic system control. The computer control panel is not serviceable except for the illumination bulbs.

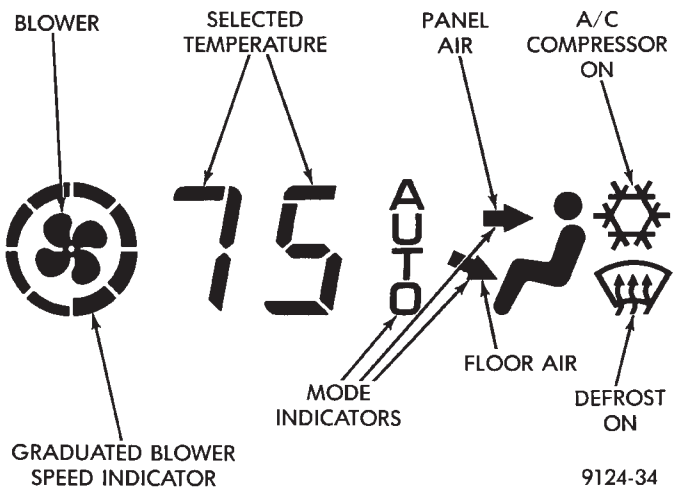


Fig. 2 Automatic Temperature Control Panel Display Symbols

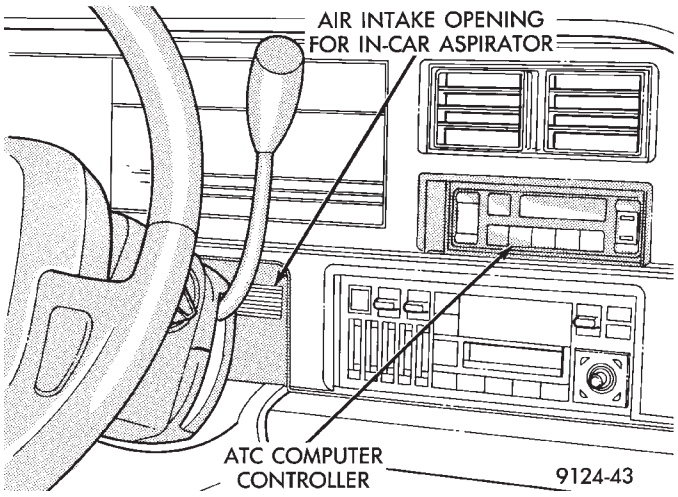


Fig. 3 ATC Computer Controller—Aspirator Air Intake

For bulb replacement, refer to A/C-Heater Control Lamp Replacement in Group 8E Instrument Panel.

POWER MODULE

The power module (PM) (Fig. 4) receives pulse width modulated logic signals from the computer control. The PM then supplies varied voltage to the blower motor ground circuit for different blower speeds based on the logic signal. The power module is not serviceable and must be replaced if found to be defective.

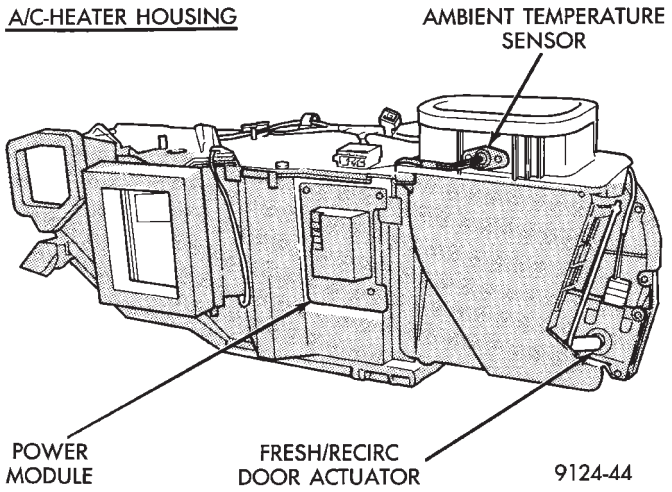


Fig. 4 Power Module—Ambient Temperature Sensor—Fresh/Recirc Door Actuator

AMBIENT TEMPERATURE SENSOR

The ambient air temperature sensor is located in the A/C housing above the glove box. This is also a thermistor and will pick up on the environmental ambient temperature. The computer control uses the information provided by the ambient sensor to:

- Regulate the low blower speed
- Temperature offsets
- Mode control

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

FRESH/RECIRC DOOR ACTUATOR

The fresh/recirc door actuator (Fig. 4) is an electric servo motor. It (with the use of linkage) mechanically positions the A/C unit door in the open or closed position. Actuation of the servo motor will occur when drive signals are supplied to the actuator from the computer control. This actuator does not contain a feedback strip therefore can not communicate the fresh/recirc door position back to the computer control. The fresh/recirc door actuator is not serviceable and must be replaced if found to be defective.

BLEND-AIR DOOR ACTUATOR

The blend-air door actuator (Fig. 5) is an electric servo motor which mechanically positions the A/C unit temperature door. Actuation of the servo motor will occur when drive signals are supplied to the actuator from the computer control. 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.

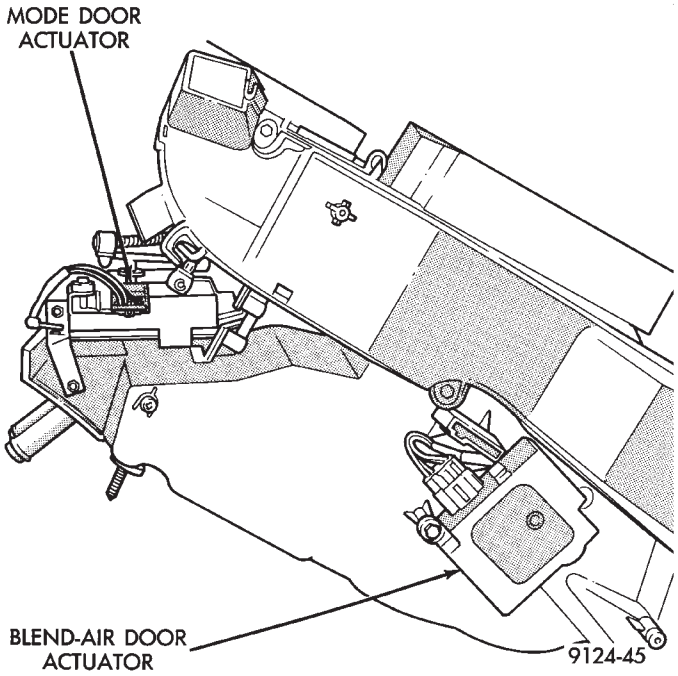


Fig. 5 Blend-Air Door Actuator—Mode Door Actuator—View from bottom of A/C Housing

MODE DOOR ACTUATOR

The mode door actuator (Fig. 5) is an electric servo motor. It (with the use of linkages) mechanically positions the A/C unit panel/bi-level door and the floor/defrost door. Actuation of the servo motor will occur when drive signals are supplied to the actuator from the computer control. This actuator also 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.

IN-CAR TEMPERATURE SENSOR/ASPIRATOR ASSEMBLY

The ATC system uses various sensors which return electrical signals to the computer control. The in-car temperature sensor (Fig. 6) is part of a motorized aspirator assembly (Fig. 6) that is mounted in the instrument panel. A small fan (in the aspirator) draws air through an intake on the instrument panel. This air flows over a thermistor which picks up temperature variations. The computer control then makes system adjustments to maintain a constant passenger compartment temperature. The in-car temperature sensor/aspirator assembly is not serviceable and must be replaced if found to be defective.

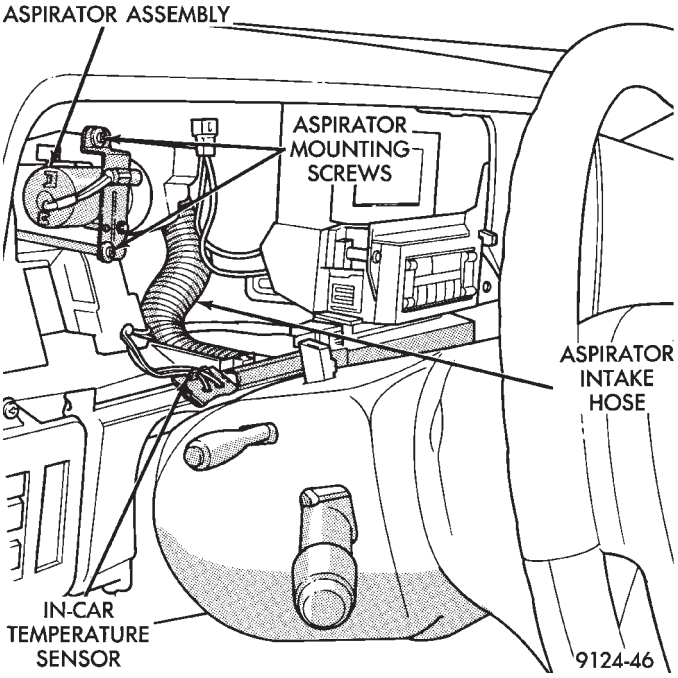


Fig. 6 In-car Temperature Sensor/Aspirator Assembly

WATER TEMPERATURE SENSOR

The water temperature sensor is located on the heater core mounting plate (Fig. 7). This is a thermistor which will pick up on the engines coolant temperature. The computer control uses this information to control the cold engine lockout time. The water temperature sensor is not serviceable and must be replaced if found to be defective.

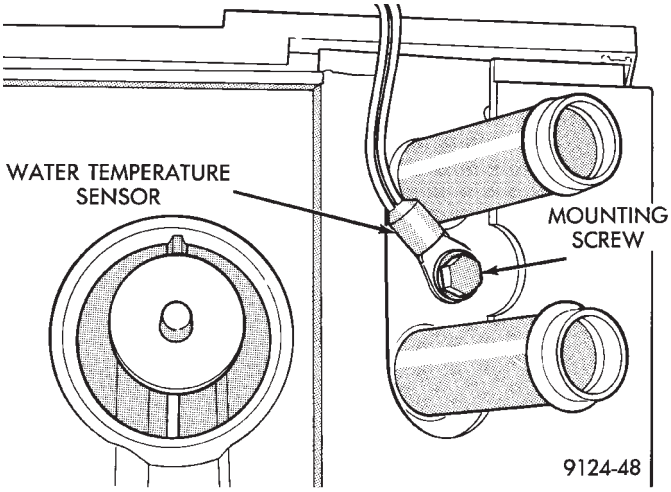


Fig. 7 Water Temperature Sensor

SUN SENSOR

The sun sensor (Fig. 8) is mounted on the driver side of the vehicle on top of the instrument panel. 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. The sun sensor is not serviceable and must be replaced if found to be defective.

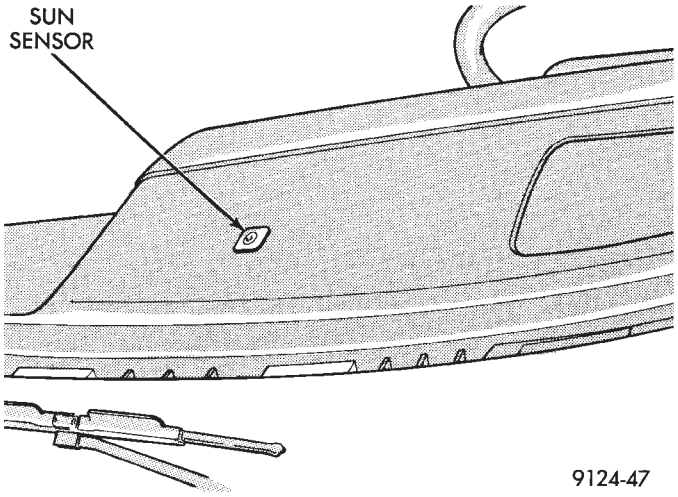


Fig. 8 Sun Sensor

NON—COMPUTER AIDED DIAGNOSTIC TESTS

Determine whether the operator complaint is due to a system failure or improper operation of the ATC system. The system will to go into a maximum heat or cooling mode if the operator changes the temperature setting four or more degrees.

Check the following:

- Coolant level
- Refrigerant charge
- Drive belt tension
- Radiator air flow
- Radiator fan operation
- Air suction of In-car Temperature Sensor/Aspirator

To check air suction of the Aspirator, place a small piece of tissue paper over the Aspirator opening on the instrument panel. This opening is located to the right of the steering column. The tissue paper should cling to the opening if system is functioning properly.

Bring the engine to normal operating temperature and proceed with Computer Aided Diagnostic Procedures. Always test the entire system after each repair has been performed.

COMPUTER AIDED DIAGNOSTIC TESTS

The ATC control has a computer capable of troubleshooting the entire ATC system in approximately 60 seconds. The engine must be running and at normal operating temperature during the test to provide hot coolant for the heater.

During the ATC Diagnostic Test, the computer will calibrate the Mode and Blend Door actuators.

CAUTION: Do not remove the actuators from the heater-A/C unit assembly with power applied. Removal should only be done with the Ignition OFF. The actuators have no mechanical stops to limit the travel. If the actuator rotates and is not connected to the unit assembly, it will become un-calibrated.

The Diagnostic Test is capable of checking all electrical signals between the ATC Control Module, actuators, sensors and blower control.

The Diagnostic Test will display two types of FAILURE CODES (Fig. 9). The Failure Codes numbered 01 through 22, have been detected during the Diagnostic Test. Failure Codes numbered 23 through 28, have been detected during normal ATC operation. Failure Codes 23 through 28 would then be stored in the ATC control computer and are only being retrieved during the Diagnostic Test.

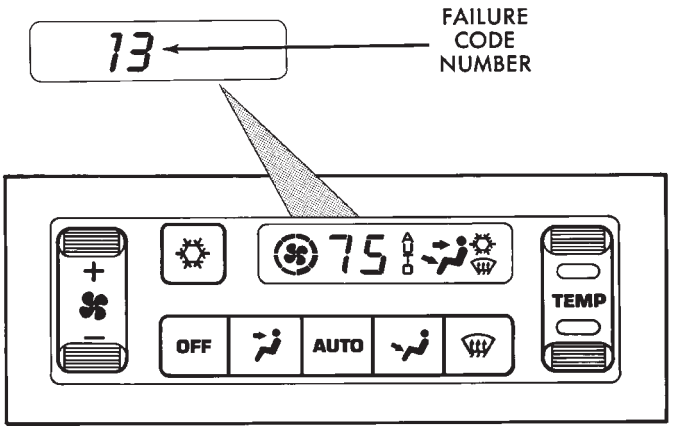


Fig. 9 Automatic Temperature Control Failure Codes

For electrical pin numbers, refer to the wiring Pin out charts on the following pages in this section.

(1) Start vehicle and allow engine to warm up.

(2) For two seconds, depress the DEFROST, FLOOR and AUTO buttons at the same time. The ATC control should begin to flash on and off.

(3) During the Diagnostic Test perform the following symptom tests:

(a) Do all display symbols and indicators illuminate ?

(b) Does the blower motor operate at its highest speed ?

(c) Feel the outlet temperature. Does it get hot and then cycle cold ?

(d) Does the air flow switch from DEFROST outlets and then cycle to PANEL outlets?

If you can answer NO to any of these questions, proceed to step 4, otherwise proceed to step 5.

(4) If you answered NO to:

SYMPTOM A

The display symbols and indicators do not illuminate. Failure Codes are not displayed.

TEST

After self-diagnostic test is complete, select a mode that will display the malfunction.

ACTION

If the ATC system operates properly, and the display does not, replace ATC control panel computer.

SYMPTOM B

The blower motor does not operate.

CAUTION: Stay clear of blower motor and power module (PM) heat sink. Do not run system for more than 10 minutes with PM removed from A/C unit.

TEST

- Check all power module and blower motor connections. Use a voltmeter to test for 12 volts (ignition) at both ends of the fuse with ignition ON. If fuse is good, test the green wire at the blower motor connector for 12 volts (ignition) to body ground.
- Turn ignition to the ON position.
- With the blower motor still connected, check for 12 volts to body ground on the black/tan wire of the blower motor two way connector.
- Check for 12 volts at the Power Module pin #4 (BK/TN).
- Check for continuity from the Power Module pin #3 (BK) to chassis ground.
- Replace the Power Module.

ACTION

- If 12 volts is not detected, repair feed circuit. Refer to the Front Wheel Drive Car-Wiring Diagrams Service Manual.
- If 12 volts is not detected, repair wires of the blower motor or replace the blower motor.
- If 12 volts is not present, repair wire from the blower motor connector to the Power Module.
- If circuit is open, repair ground circuit of the Power Module.
- Replace the Power Module (power transistor open).

SYMPTOM C

The outlet air temperature does not become hot and then cycle to cold during self-test operation. Failure Codes are not displayed.

TEST/ACTION

- Make sure the blend-air door is properly attached to the actuator.
- If cold air is not discharged from the outlets, check the base A/C refrigerant system.
- Make sure heating operation works correctly, (water level, thermostat, heater hoses, heater core, etc.).

SYMPTOM D

Air does not flow from DEFROST outlets and then cycle to PANEL outlets during self-test operation.

TEST/ACTION

- Check linkages from the mode door actuator for binding.
- Check for proper door travel in the unit.

(5) The computer will do one of two things:

- Will return to the control settings that were selected before the Diagnostic Test was started. This means the test is over. If Failure Codes did not occur, and answers to questions (a), (b), (c), and (d) were YES, the entire system is operating correctly.
- The blower motor will stop and the computer will flash a FAILURE CODE number from 01 through 28. Record the number and then depress the PANEL button to advance to the next test. If the ATC control flashes one or more codes 23 to 28, the digits on the display will flash alternating Zeros. If you do nothing, these codes will remain stored within the ATC control computer. After all repairs have been made erase fault codes. Refer to Erasing Failure Codes 23 through 28 from ATC Control in this section.

Repair all Failure Codes in the order that they have been indicated, and then retest the system. If any blend door test fails, all remaining blend door tests will be skipped. IF any mode door tests fail, all remaining mode door tests will be skipped.

Diagnostic Test can be stopped at any time by depressing any button other than PANEL.

FAILURE CODE DEFINITIONS

Non-computer aided diagnostics should be performed first. Hood of vehicle should be closed during the diagnostic test to keep engine heat from effecting the ambient temperature sensor.

Also refer to the wiring Pin out charts (Figs. 10, 11, 12, 13, 14, or 15).

FAILURE CODE 1

- Involves the wiring or the ATC control head.

FAILURE CODES 2, 13, 14, 15, 20, and 23

- Involves the wiring, blend-air door actuator, or the ATC control head.

FAILURE CODES 3, 16, 17, 18, 19, and 24

- Involves the wiring, mode door actuator, or the ATC control head.

FAILURE CODE 4

- Involves the wiring, blend-air door actuator, mode door actuator, fresh/recirc. door actuator, or the ATC control head.

FAILURE CODE 5

- Involves the wiring, fresh/recirc. door actuator, or the ATC control head.

FAILURE CODE 6

- Involves the compressor circuit signal wiring, or the ATC control head.

FAILURE CODE 7

- Involves the blower wiring, power module, or the ATC control head.

FAILURE CODES 8, 21, 22

- Requires replacing the ATC control head.

FAILURE CODES 9, and 27

- Involves the wiring, sun sensor, or the ATC control head.

FAILURE CODES 10, and 28

- Involves the wiring, water temperature sensor, or the ATC control head.

FAILURE CODES 11, and 25

- Involves the wiring, ambient temperature sensor, or the ATC control head.

FAILURE CODES 12, and 26

- Involves the wiring, in-car temperature sensor/aspirator, or the ATC control head.

FAILURE CODE SERVICE PROCEDURES

The control keyboard will not function if pins 7, 9, 17, 19, or 20 of the 21-way wiring connector are shorted to battery voltage.

For electrical pin numbers, refer to the wiring Pin out charts (Figs. 10, 11, 12, 13, 14, or 15).

FAILURE CODE 1—OUTPUT FAILURE WITH ALL OUTPUTS LOW

(1) Remove pin #2 from 21-way connector on control and retest system. If code 01 does not appear, the control is good.

Disconnect 21-way connector from control. With an ohmmeter, measure the resistance between pin #2 and pin #12 of 21-way. This should be between 2,600 and 2,800 ohms. If yes, the power module is good.

Source of voltage on pin #2 is in the wiring. Repair and retest system.

(2) Remove pin #13 from 21-way connector on control and retest system. If code 01 does not appear, the control is good. Locate source of voltage on pin #13. Repair and retest system.

(3) Remove pin #5 from 21-way connector on control and retest system. If code 01 does not appear, the control is good. Locate source of voltage on pin #5. Repair and retest system.

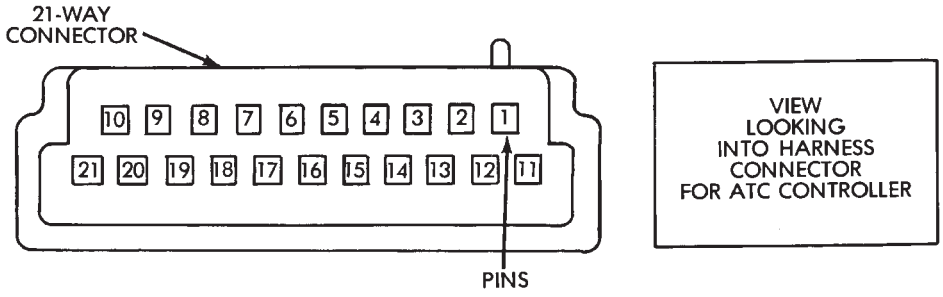
(4) Remove pin #6 from 21-way connector on control and retest system. If code 01 does not appear, the control is good. Locate source of voltage on pin #6. Repair and retest system.

(5) Remove pin #15 from 21-way connector on control and retest system. If code 01 does not appear, the control is good. Locate source of voltage on pin #15. Repair and retest system.

FAILURE CODE 2—BLEND ACTUATOR DRIVE SIGNAL NOT HIGH

If both Failure Codes 2 and 3 occur simultaneously, do both procedures. There is typically only 1 failure.

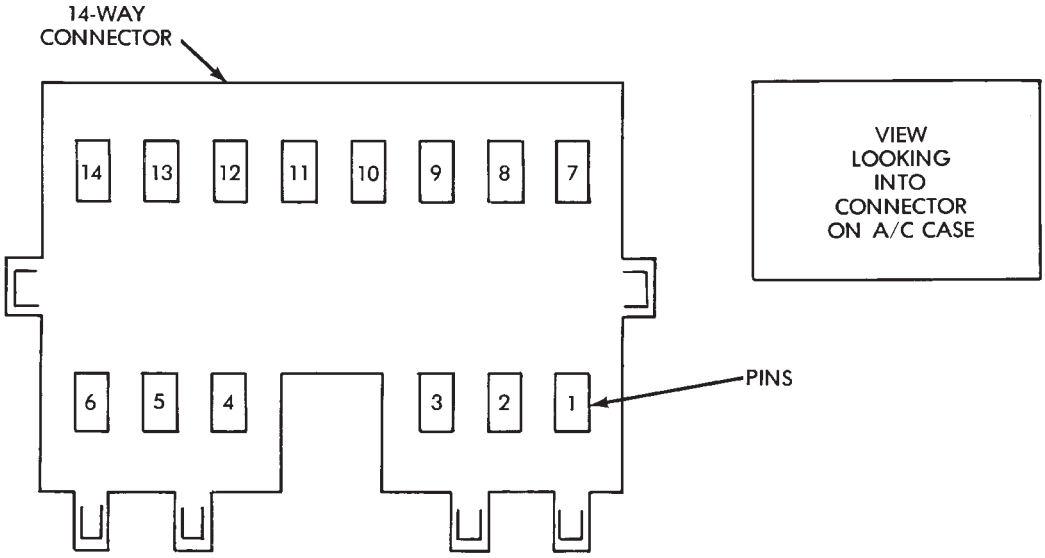
(1) Disconnect terminal #6 on the ATC control 21-way connector and retest the system. Note that removing this terminal may generate additional Failure Codes. Disregard these at this time.



PIN / CAVITY NUMBER	CIRCUIT DESIGNATION / WIRE COLOR		DESCRIPTION
1	F20	18WT	IGNITION FEED
2	C31	20LB	BLOWER SIGNAL FROM CONTROLLER
3	OPEN		OPEN
4	C34	20RD/LG	+/– TO BLEND, MODE, RECIRC
5	C35	20OR/DG	+/– TO MODE
6	C33	20LB/RD	+/– TO BLEND AIR
7	C57	20DB/GY	SENSOR/ACT GRND. TO CONTROLLER
8	C36	20GY/OR	BLEND AIR FEEDBACK
9	C08	20DG/RD	AMBIENT SENSOR SIGNAL TO CONTROLLER
10	E17	18BK/YL	DIMMER SIGNAL
11	Z02	18BK/LG	ELEC. GROUND
12	C30	18VT	BLOWER-IGNITION FROM CONTROLLER
13	C02	18DB/YL	CLUTCH CYCLE SIGNAL
14	Z03	20BK/OR	PANEL LAMP GROUND
15	C32	20YL/PK	+/– TO RECIRC
16	C37	20DG/WT	MODE FEEDBACK SIGNAL
17	C39	20LB/VT	WATER TEMP SIGNAL
18	OPEN		OPEN
19	C38	20BK/DG	SUN SENSOR SIGNAL
20	C10	20RD/TN	IN-CAR SENSOR SIGNAL
21	E02	18OR	PANEL LAMPS

9124-37

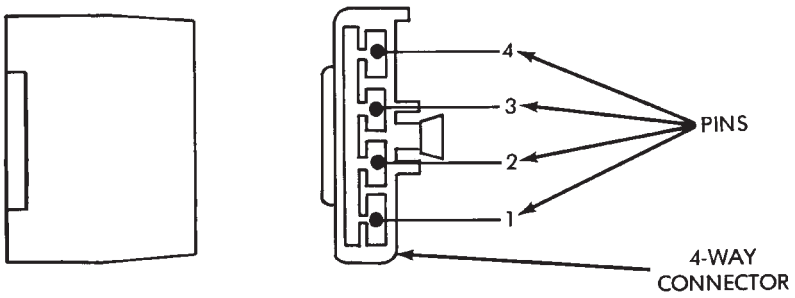
Fig. 10 Pin outs for 21-way Connector at ATC Computer Connector



PIN / CAVITY NUMBER	CIRCUIT DESIGNATION / WIRE COLOR		DESCRIPTION
1	OPEN		OPEN
2	C34	20RD/LG	+/– TO BLEND AIR, MODE RECIRC ACT.
3	C35	20OR/DG	+/– MODE ACT.
4	C33	20LB/RD	+/– BLEND AIR ACT.
5	C37	20DG/WT	MODE ACT. FEEDBACK TO CONTROL
6	C32	20YL/PK	+/– RECIRC ACT.
7	OPEN		OPEN
8	OPEN		OPEN
9	C08	20DG/RD	AMBIENT SENSOR, I/P TO CONTROLLER
10	C39	20LB/VT	WATER SENSOR CONTROL
11	C57	20DG/GY	SENSOR/ACT COMM. GROUND TO CONTROLLER
12	C36	20GY/OR	BLEND AIR ACT. FEEDBACK TO CONTROLLER
13	OPEN		OPEN
14	OPEN		OPEN

9124-38

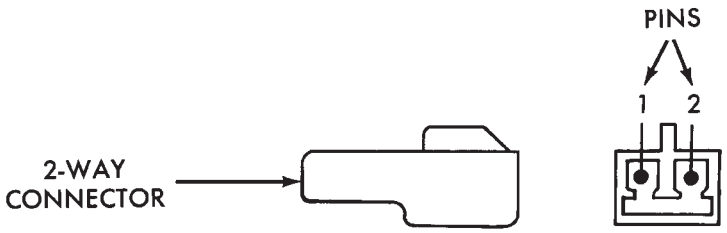
Fig. 11 Pin outs for 14-way Connector at ATC Harness on A/C Housing



PIN/ CAVITY NUMBER	CIRCUIT DESIGNATION/ WIRE COLOR	DESCRIPTION
1	C30 18VT	IGNITION FROM CONTROLLER
2	C31 20LB	BLOWER SIGNAL FROM CONTROLLER
3	Z01 10BK	GROUND
4	C07 12BK/TN	BLOWER MOTOR GROUND SIGNAL

9124-39

Fig. 12 Pin outs for 4-Way Connector



PIN/ CAVITY NUMBER	CIRCUIT DESIGNATION/ WIRE COLOR	DESCRIPTION
1	C57 20DB/GY	SENSOR ACT. GND. TO CONT.
2	C38 20 TAN	SUN SENSOR SIGNAL

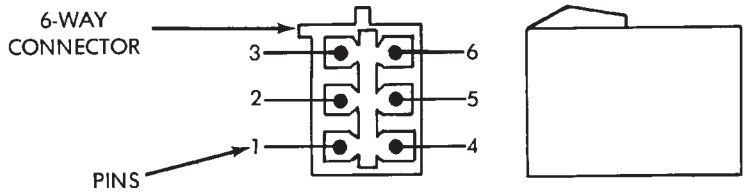
9224-33

Fig. 13 Pin outs for Sun Sensor 2-Way Connector

(2) If Failure Code 2 reappears, replace control.

(3) If code 2 does not reappear, the problem is a shorted blend door actuator motor or a short to ground in circuit 33 (pin #6).

(4) Remove 21-way connector and check for continuity from pin #6 to chassis ground. There should not be any continuity. If continuity is there, repair wiring and retest.



PIN/ CAVITY NUMBER	CIRCUIT DESIGNATION/ WIRE COLOR		DESCRIPTION
1	C10	22RD/TN	IN CAR SENSOR TO CONTROLLER
2	F20	18WT	IGNITION
3	Z01	20BK	GROUND
4	C57	20DB/GY	SENSOR/ACT COMMON GROUND TO CONTROLLER
5	OPEN		OPEN
6	C38	20TN	SUN SENSOR SIGNAL +

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Fig. 14 Pin outs for 6-Way Connector In-Car Sensor and Sun Sensor

(5) Check resistance across pins #6 and #4 of the 21-way for a shorted actuator motor. Resistance should be between 20 and 50 ohms. If not correct, replace actuator.

FAILURE CODE 3—MODE ACTUATOR DRIVE SIGNAL NOT HIGH

If both failure codes 2 and 3 occur simultaneously, do both procedures. There is typically only 1 failure.

(1) Disconnect terminal #5 on the ATC control 21-way connector and retest the system. Removing this terminal may generate additional Failure Codes. Disregard these at this time.

(2) If Failure Code 3 reappears, replace control.

(3) If code 3 does not reappear, the problem is a shorted mode door actuator motor, or a short to ground in circuit #35 (pin #5).

(4) Remove 21-way and check for continuity from pin #5 to chassis ground. There should not be any continuity. If continuity is there, repair wiring and retest.

(5) Check resistance across pins #4 and #5 of the 21-way connector for a shorted actuator motor. Resistance should be between 20 and 50 ohms. If not correct, replace actuator.

FAILURE CODE 4—ACTUATOR DRIVE COMMON SIGNAL NOT HIGH

If both Failure Codes 4 and 5 occur simultaneously, do both procedures. There is typically only 1 failure.

(1) Disconnect terminal #4 on the ATC control 21-way connector and retest the system. Removing this terminal may generate additional Failure Codes. Disregard these at this time.

(2) If Failure Code 4 reappears, replace control.

(3) If code 4 does not reappear, the problem is a shorted actuator motor or a short to ground in circuit #34 (pin #4).

(4) Remove 21-way connector and check for continuity from pin #4 to chassis ground. There should not be any continuity. If continuity is there, repair wiring and retest.

(5) Check resistance across pins #4 and #5, #4 and #6, and #4 and #15 of the 21-way connector for a shorted actuator motor. Resistance should be between 20 and 50 ohms. If not correct, replace actuator involved.

FAILURE CODE 5—FRESH/RECIRC ACTUATOR DRIVE SIGNAL NOT HIGH

If both Failure Codes 4 and 5 occur simultaneously, do both procedures. There is typically only 1 failure.

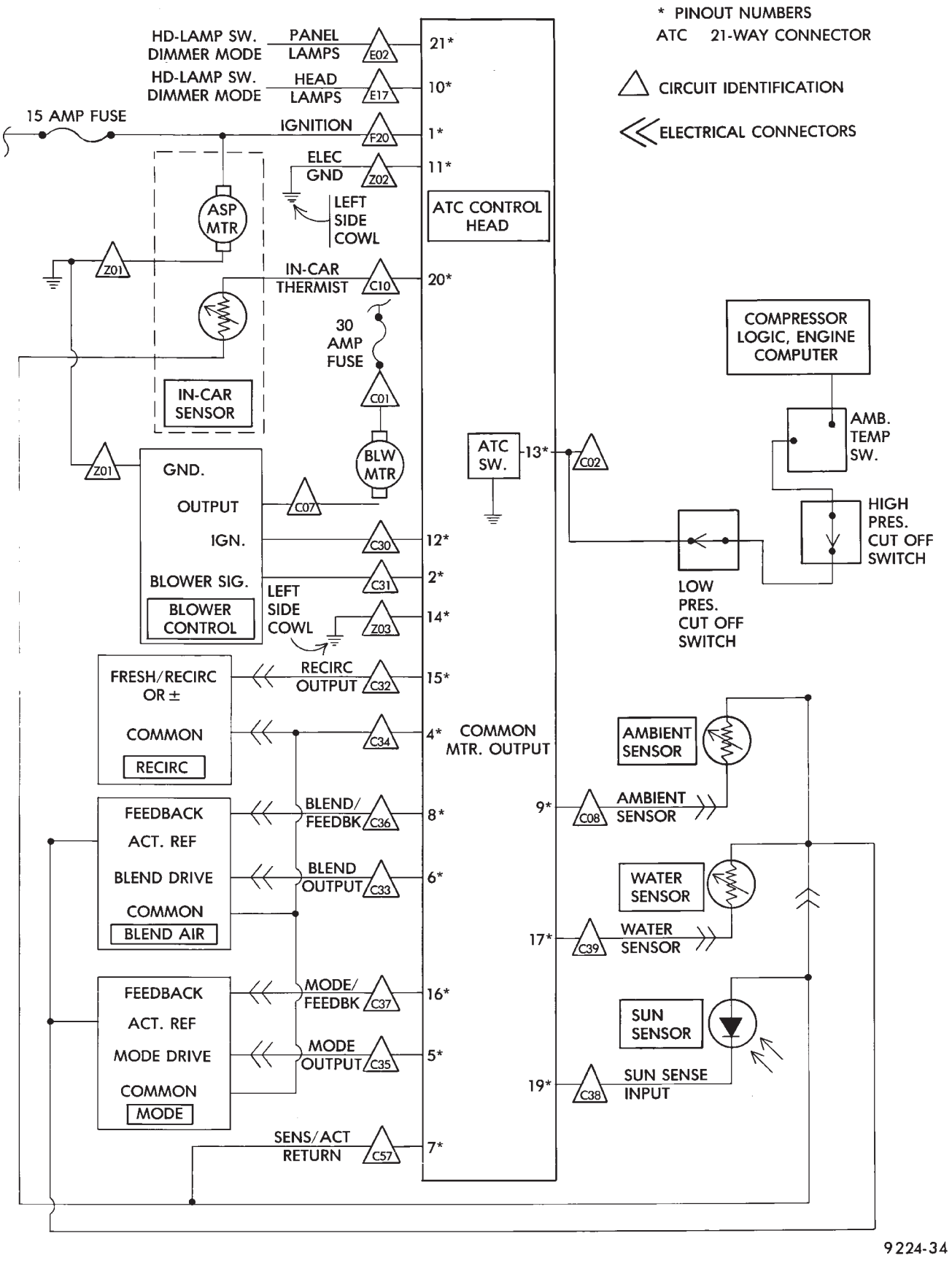

Fig. 15 ATC Circuits

(1) Disconnect terminal #15 on the ATC control 21-way connector and retest the system. Removing this terminal may generate additional Failure Codes. Disregard these at this time.

(2) If Failure Code 5 reappears, replace control.

(3) If code 5 does not reappear, the problem is a shorted fresh/recirc door actuator motor. It could also be a short to ground in circuit #32 (pin #15).

(4) Remove 21-way connector and check for continuity from pin #15 to chassis ground. There should not be any continuity. If continuity is there, repair wiring and retest.

(5) Check resistance across pins #15 and #4 of the 21-way connector for a shorted actuator motor. Resistance should be between 20 and 50 ohms. If not correct, replace actuator.

FAILURE CODE 6—COMPRESSOR DRIVE SIGNAL NOT HIGH

(1) Disconnect the low pressure cut out switch and retest diagnostics.

(2) If code 6 does not reappear, then the problem is in the A/C signal circuit C02. Check for wiring problem between the low pressure cut out switch and the engine controller, or a bad engine controller.

(3) If code 6 does reappear, remove the 21-way connector from the control and check for a short between pin #13 and chassis ground. This test will check the wire from the control to the low pressure cut out switch for a short to ground.

(4) If pin #13 shows continuity, repair circuit C02 and retest.

(5) If no continuity is shown, replace the ATC control and retest.

FAILURE CODE 7—BLOWER DRIVE SIGNAL NOT HIGH

First check the 4-way connector to the power module for correct installation

(1) With the ignition ON, check for ignition voltage to the power module pin #1 from the ATC control. If ignition is present at the power module, proceed to step 3. If not proceed to step 2.

(2) With the 21-way connector still connected and the ignition ON, check for power module ignition feed at the control pin #12. If ignition is not present, replace the control. If ignition voltage is present, repair the open in the wire between the control pin #12 and power module pin #1. Retest system.

(3) Turn ignition OFF and disconnect the 21-way connector. Measure the resistance between pins #2 and #12. The resistance should read between 2,600 and 2,800 ohms. If correct, replace the ATC control. If not correct, proceed to step 4.

(4) Remove the 4-way connector from the power module. Check for continuity between the ATC control pin #2 and power module pin #2. If no continuity is shown, repair the wire for an open. If continuity is shown, replace the power module and retest.

FAILURE CODE 8—A/D CONVERTOR INTERNAL FAILURE

Diagnostics will indicate a Failure Code 8 if the internal reference voltage of the A/D Convertor is not correct. This Failure Code is not serviceable. If a Failure Code 8 occurs, the computer control head must be replaced.

FAILURE CODE 9—SUN LOAD SENSOR FAILURE

(1) Unplug the 21-way connector from the control and check pin #19 for continuity to chassis ground. If continuity is present, repair the wire shorted to ground. If no continuity is present, proceed to step 2.

(2) Plug the 21-way connector back in. Remove pin #19 from the 21 way connector and run diagnostics again. If Failure Code 9 is still present, replace the control. If code 9 is not present, replace the sun sensor.

FAILURE CODE 10—WATER TEMPERATURE SENSOR FAILURE

(1) Disconnect 21-way connector at control. Measure resistance between pin #17 and pin #7. This value will change with temperature. Refer to Temperature Reference—Failure Code 10 chart.

TEMPERATURE REFERENCE—FAILURE CODE 10

WATER TEMPERATURE (DEGREES FAHRENHEIT)	RESISTANCE (OHMS)
–20°	479358
0°	249910
20°	136049
40°	77260
50°	59173
60°	45703
70°	35583
80°	27915
90°	22057
100°	17548
110°	14052
120°	11322
130°	9178
140°	7487
150°	6145
160°	5073
170°	4211
180°	3514
190°	2947
200°	2483

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(2) Check for continuity between pin #17 and chassis ground. If continuity is present, repair and retest.

FAILURE CODE 11—AMBIENT TEMPERATURE SENSOR FAILURE

(1) Disconnect 21-way connector at control. With an ohmmeter, measure the resistance between pin #9 and pin #7. Refer to the Temperature Reference—Failure Code 11 chart.

TEMPERATURE REFERENCE—FAILURE CODE 11

WATER TEMPERATURE (DEGREES FAHRENHEIT)	RESISTANCE (OHMS)
–20°	195000
–10°	142000
0°	99200
20°	52500
40°	38000
60°	12670
80°	9310
90°	7310
100°	5730
110°	4520
120°	3550

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(2) Check for continuity between pin #9 and chassis ground. If continuity is present, repair and retest.

FAILURE CODE 12—IN-CAR TEMPERATURE SENSOR/ASPIRATOR FAILURE

(1) Disconnect 21-way connector at control. With an ohmmeter, measure the resistance between pin #20 and pin #7. Refer to Temperature Reference—Failure Code 11 chart for electrical values.

(2) Check for continuity between pin #20 and chassis ground. If continuity is present, repair and retest.

FAILURE CODE 13—BLEND DOOR FAILED TO DRIVE TO HEAT POSITION

(1) Check door and linkage for binding.

(2) Disconnect 21-way connector from control head and the 5-way connector from the blend air door actuator. Check continuity between pin #6 of the 21-way connector and pin #5 of the 5-way connector. If continuity is shown, go to step 3. If continuity is not shown, repair circuit for an open circuit and retest system.

(3) Plug in the 5-way connector and check for resistance between pins #4 and #6 of the 21-way connector. A resistance of 20-50 ohms should be present. If not, replace actuator. If correct, proceed to step 4.

(4) If steps 1 and 2 indicate no failures, replace the ATC control head.

FAILURE CODE 14—BLEND DOOR FAILED TO DRIVE TO COLD POSITION

First check the 5-way connector to the blend air door actuator for proper connection

(1) Check door and linkage for binding.

(2) Remove the 21-way connector from the control. With ignition ON, check for ignition voltage between pin #8 of the 21-way connector and chassis ground. If voltage is present, repair circuit for short to ignition voltage. If voltage is not present, proceed to step 3.

(3) Turn ignition OFF. With the 21-way still removed, disconnect the 5-way connector from the blend air door actuator. Check for continuity between pin #8 of the 21-way connector and pin #1 of the 5-way connector. If continuity is not present, repair open circuit. If present, continue to step 4.

(4) Install the 5-way connector back into the blend air door actuator and check for continuity between the pins #7 and #8 of the 21-way connector. If continuity is present, replace the ATC control. If continuity is not present, replace the blend air door actuator.

FAILURE CODE 15—BLEND DOOR FEEDBACK SHORTED TO GROUND

(1) Remove the 21-way connector from the control and the 5-way connector from the blend air door actuator.

(2) Check for continuity between pin #8 of the 21-way connector and chassis ground. If present, repair circuit for short to ground. If not present, continue to step 3.

(3) Plug in the 5-way connector and measure resistance between pins #7 and #8 of the 21-way connector. If the resistance is less than 10 ohms, replace the actuator. If not, replace the control head.

FAILURE CODE 16—MODE DOOR MOVED DURING BLEND DOOR TEST

(1) Remove the 21-way connector from the control and the 5-way connector from the three actuators.

(2) Check for continuity between pin #4 of the 21-way connector and pin #4 of each actuator. If continuity is not present for a particular actuator circuit, repair that circuit and retest system. If continuity is present for all circuits, continue to step 3.

(3) Plug in the 5-way connectors and check for resistance between pins #4 and #6 of the 21-way connector for the blend air actuator. Then check pins #4 and #5 of the 21-way for the mode actuator. The resistance should be between 20-50 ohms. If either of the actuators do not pass the resistance tests, replace that particular actuator and retest the system. If both pass the resistance test, replace the ATC control.

FAILURE CODE 17—MODE DOOR FAILED TO DRIVE TO DEFROST

(1) Disconnect 21-way connector from control head and the 5-way connector from the blend air door actuator. Check continuity between pin #5 of the 21-way connector and pin #5 of the 5-way connector. If continuity is present, proceed to step 2. If continuity is not present, repair open circuit and retest system.

(2) Plug in the 5-way connector and check for resistance between pins #4 and #5 of the 21-way connector. A resistance of 20-50 ohms should be present. If not, replace actuator. If correct, proceed to step 3.

(3) If steps 1 and 2 do not indicate any failures, replace the ATC control head.

FAILURE CODE 18—MODE DOOR FAILED TO DRIVE TO PANEL

Check the 5-way connector to the mode door actuator for proper installation.

(1) Check the door and linkage for binding.

(2) Remove the 21-way connector from the control. With ignition ON, check for ignition voltage between pin #16 of the 21-way connector and chassis ground. If voltage is present, repair circuit for short to ignition voltage. If voltage is not present, proceed to step 3.

(3) Turn ignition OFF. With the 21-way connector still removed, disconnect the 5-way connector from the mode door actuator. Check for continuity between pin #16 of the 21-way connector, and pin #1 of the 5-way connector. If continuity is not present, repair circuit for an open. If present, continue to step 4.

(4) Install 5-way connector back into the mode door actuator. Then check for continuity between pins #7 and #16 of the 21-way connector. If continuity is present, replace the ATC control. If continuity is not present, replace the mode door actuator.

FAILURE CODE 19—MODE DOOR FEEDBACK SHORTED TO GROUND

(1) Remove the 21-way connector from the control, and the 5 way connector from the mode door actuator.

(2) Check for continuity between pin #16 of the 21-way connector and chassis ground. If present, repair circuit for short to ground. If not present, continue to step 3.

(3) Plug in the 5-way connector and measure resistance between pins #7 and #16 of the 21-way connector. If the resistance is less than 10 ohms, replace the actuator. If not, replace the control head.

FAILURE CODE 20—BLEND DOOR MOVED DURING MODE DOOR TEST

(1) Remove the 21-way connector from the control and the 5-way connector from the three actuators.

(2) Check for continuity between pin #4 of the 21-way connector and pin #4 of each actuator. If continuity is not present for a particular actuator circuit, repair that circuit and retest system. If continuity is present for all circuits, continue to step 3.

(3) Plug in the 5-way connectors and check for resistance between pins #4 and #6 of the 21-way connector for the blend air actuator. Then check pins #4 and #5 of the 21-way connector for the mode actuator. The resistance should be between 20-50 ohms. If either of the actuators do not pass the resistance tests, replace that particular actuator and retest the system. If both pass the resistance test, replace the ATC control.

FAILURE CODE 21—ROM CHECK SUM ERROR

During the Diagnostics test, the computer will verify it's own internal program. If it finds any part to be bad, a Failure Code 21 will be set. This Failure Code is not serviceable. If a Fail Code 21 occurs, the ATC Control Module must be replaced.

FAILURE CODE 22—COMPUTER ERROR

If incorrect data is found in the ATC Control computer module, a Failure Code 22 will be set. This Fail Code is not serviceable. If a Failure Code 22 occurs, the ATC Control Module must be replaced.

FAILURE CODE 23—BLEND DOOR FEEDBACK FAILED

This Failure Code is set during normal ATC operation. The Failure Code will be set only after the ATC control has been operating for 15 minutes. The control will compensate for the feedback failure immediately upon power up, but the Failure Code will not be set until the time limit has been met.

Failure Code 23 will be stored within the ATC Control, and must be cleared after the failure has been repaired. To clear this Failure Code, refer to Erasing Failure Codes 23 through 28 from ATC Control.

Follow service procedures for Failure Codes 14 and 15 when repairing.

FAILURE CODE 24—MODE DOOR FEEDBACK FAILED

This Failure Code is set during normal ATC operation. The Failure Code will be set only after the ATC control has been operating for 15 minutes. The control will compensate for the feedback failure immediately upon power up, but the Failure Code will not be set until the time limit has been met.

Failure Code 24 will be stored within the ATC Control, and must be cleared after the failure has been repaired. To clear this Failure Code, refer to Erasing Failure Codes 23 through 28 From ATC Control.

Follow service procedures for Failure Codes 18 and 19 when repairing.

FAILURE CODE 25—AMBIENT TEMPERATURE SENSOR FAILURE

This Failure Code is set during normal ATC operation. The Failure Code will be set only after the ATC control has been operating for 15 minutes. The control will compensate for the feedback failure immediately upon power up, but the Failure Code will not be set until the time limit has been met.

Failure Code 25 will be stored within the ATC Control, and must be cleared after the failure has been repaired. To clear this Failure Code, refer to Erasing Failure Codes 23 through 28 from ATC Control.

Follow service procedures for Failure Code 11 when repairing.

FAILURE CODE 26—IN-CAR TEMPERATURE SENSOR/ASPIRATOR FAILED

This Failure Code is set during normal ATC operation. The Failure Code will be set only after the ATC control has been operating for 15 minutes. The control will compensate for the feedback failure immediately upon power up, but the Failure Code will not be set until the time limit has been met.

Failure Code 26 will be stored within the ATC Control, and must be cleared after the failure has been repaired. To clear this Failure Code, refer to Erasing Failure Codes 23 through 28 from ATC Control.

Follow service procedures for Failure Code 12 when repairing.

FAILURE CODE 27—SUN LOAD SENSOR FAILED

This Failure Code is set during normal ATC operation. The Failure Code will be set only after the ATC control has been operating for 15 minutes. The control will compensate for the feedback failure immediately upon power up, but the Failure Code will not be set until the time limit has been met.

Failure Code 27 will be stored within the ATC Control, and must be cleared after the failure has been repaired. To clear this Failure Code, refer to Erasing Failure Codes 23 through 28 from ATC Control.

Follow service procedures for Failure Code 12 when repairing.

FAILURE CODE 28—WATER TEMPERATURE SENSOR FAILED

This Failure Code is set during normal ATC operation. The Failure Code will be set only after the ATC control has been operating for 15 minutes. The control will compensate for the feedback failure immediately upon power up, but the Failure Code will not be set until the time limit has been met.

Failure Code 28 will be stored within the ATC Control and must be cleared after the failure has been repaired. To clear this Failure Code, refer to Erasing Failure Codes 23 through 28 from ATC Control.

Follow service procedures for Failure Code 10 when repairing.

ERASING FAILURE CODES

Failure Codes 23 through 28 are stored within the ATC in the computer memory. These codes may be erased from the memory after the correct repairs have been made. Intermittent Failure Codes 23 through 28 will be stored until they are erased.

(1) Run the DIAGNOSTIC TEST.

(2) Depress the PANEL button to access all Failure Codes. When the Display begins flashing alternating zeros, you can do three things:

- Do nothing, and in five seconds control will return to normal ATC operation. All codes will remain stored in the control.
- Depress any button within five seconds, other than A/C, and stop the test immediately. Control will return to normal ATC operation.
- Depress the A/C button within five seconds, and proceed to the erasing procedure. By depressing the A/C button, you will not erase any Failure Codes. You will only access the next part of the procedure. Proceed to step 3.

(3) After you depress the A/C button the display will alternate E's. This is for ERASE. You can now do two things:

- Do nothing, and in five seconds, all Failure Codes from 23 through 28 will be erased from the ATC control.
- Depress any button within five seconds, and Failure Codes will not be erased.

Control will return to normal ATC operation.

AUTOMATIC TEMPERATURE CONTROL COMPONENT SERVICE PROCEDURES

INDEX

SUN SENSOR

REMOVAL AND INSTALLATION

(1) Carefully pry up the sensor from the instrument panel with a screwdriver (Fig. 1). Place a rag under the screwdriver to prevent scratching of the instrument panel.

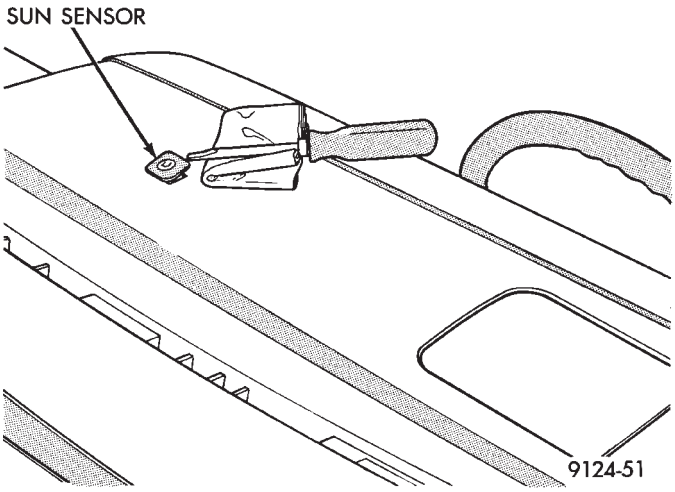


Fig. 1 Sun Sensor Removal

(2) Disconnect the sensor at the wiring harness.

To install, reverse the preceding operation. Snap the sensor securely to the instrument panel.

POWER MODULE (PM)

REMOVAL AND INSTALLATION

(1) Disconnect the negative battery cable.

(2) Remove glove box/ash tray assembly. Refer to Switch and Panel Component Service section of Group 8E.

(3) Remove the four PM attaching screws (Fig. 2).

(4) Disconnect electrical connector.

(4) Gently extract PM (to prevent damage to A/C evaporator) from A/C-heater housing and remove from under instrument panel.

To install, reverse the preceding operation. Perform systems check.

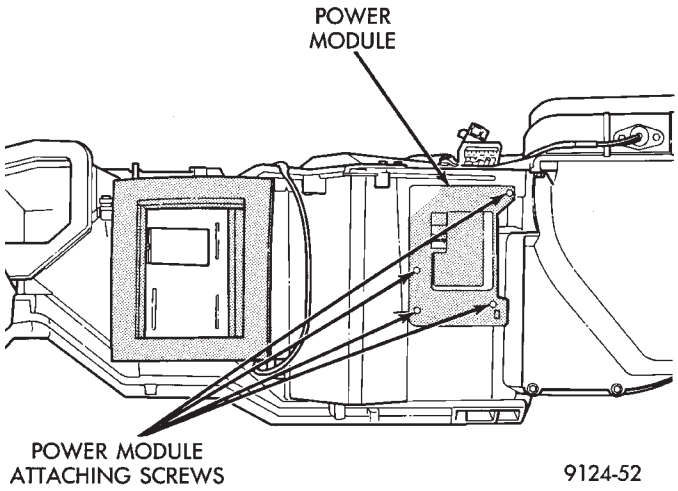


Fig. 2 Power Module Removal and Installation

BLEND-AIR DOOR ACTUATOR

CAUTION: Do not remove any of the motor actuators from the heater-A/C unit assembly with any electrical power applied. Removal should only be done with the Ignition OFF. The actuators have no mechanical stops to limit their travel. If the actuator rotates and is not connected to the unit assembly, it will become un-calibrated.

REMOVAL AND INSTALLATION

The blend-air door actuator is located on the A/C-heater housing above the floor hump.

(1) Remove under panel silencers.

(2) Remove the carpeted cover over the air bag control module.

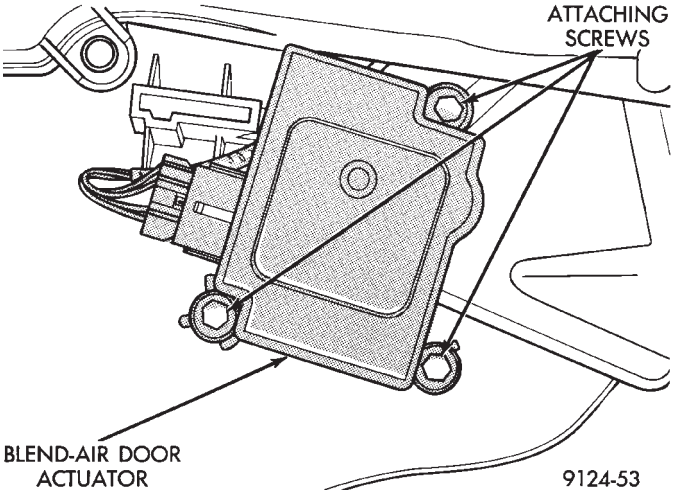
(3) Remove floor air distribution duct.

(4) Locate and remove three actuator attaching screws (Fig. 2).

(5) Lower the blend-air door actuator from A/C-heater housing while removing actuator from blend-air door shaft (Fig. 3).

(6) Disengage wire connector lock and unplug connector.

To install, reverse the preceding operation.



Figs. 3 Blend-Air Door Actuator Removal and Installation—View from bottom of A/C Housing

CAUTION: Align the blend-air door shaft to the slot in the actuator. Be sure the shaft on blend-air door actuator is properly engaged (when installing) to prevent damage.

Perform system check.

MODE DOOR ACTUATOR

The Mode Door Actuator is located on the side of the A/C-heater case near the accelerator pedal.

CAUTION: Do not remove any of the motor actuators from the heater-A/C unit assembly with any electrical power applied. Removal should only be done with the Ignition OFF. The actuators have no mechanical stops to limit their travel. If the actuator rotates and is not connected to the unit assembly, it will become un-calibrated.

REMOVAL AND INSTALLATION

(1) Remove under panel silencer.

(2) Disconnect electrical connector from actuator.

(3) Pinch and remove the lower plastic clip from the actuator arm (Fig. 4).

(4) Remove the three actuator bracket mounting screws (Fig. 5).

(5) Rotate actuator to gain access to upper plastic clip. Pinch and remove the upper plastic clip (Fig. 5) from the actuator arm.

(6) Remove actuator-to-actuator mounting bracket screws.

(7) Remove actuator from mounting bracket. Remove from vehicle.

To install, reverse the preceding operation.

FRESH/RECIRC DOOR ACTUATOR

The Fresh/Recirc Door Actuator is located on the passenger side of the A/C-heater case.

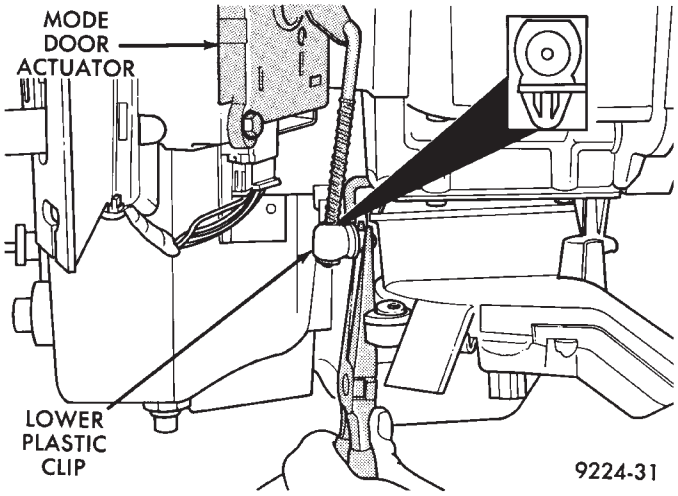


Fig. 4 Plastic Clip on Mode Door Actuator

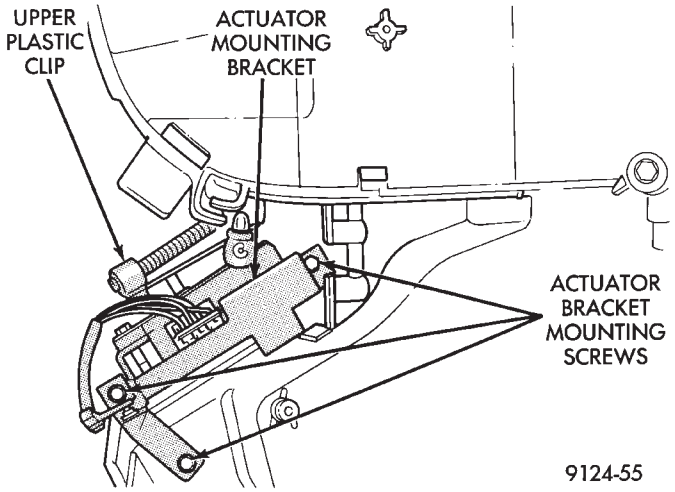


Fig. 5 Actuator Bracket Mounting Screws

CAUTION: Do not remove any of the motor actuators from the heater-A/C unit assembly with any electrical power applied. Removal should only be done with the Ignition OFF. The actuators have no mechanical stops to limit their travel. If the actuator rotates and is not connected to the unit assembly, it will become un-calibrated.

REMOVAL AND INSTALLATION

(1) Remove the glove box/ash tray assembly. Refer to the Switch and Panel Component Service section of Group 8E.

(2) Remove under panel silencer pad.

(3) Remove the carpeted cover over the air bag module.

(4) Remove the right front kick panel.

(5) Remove metal instrument panel brace (Fig. 6).

(6) Remove two screws mounting the actuator mounting bracket to the A/C-heater case (Fig. 7).

(7) Remove three screws holding the actuator to the mounting bracket (Fig. 8).

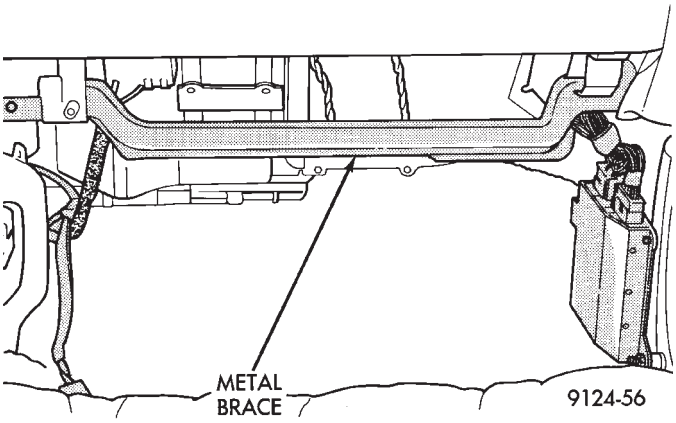


Fig. 6 Brace Removal and Installation

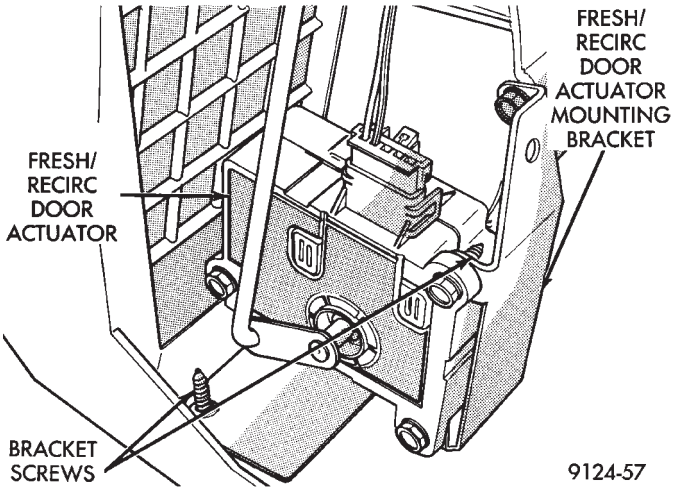


Fig. 7 Actuator Mounting Bracket Removal and Installation

CAUTION: Do not allow screw A (Fig. 8) to drop into A/C-heater housing assembly.

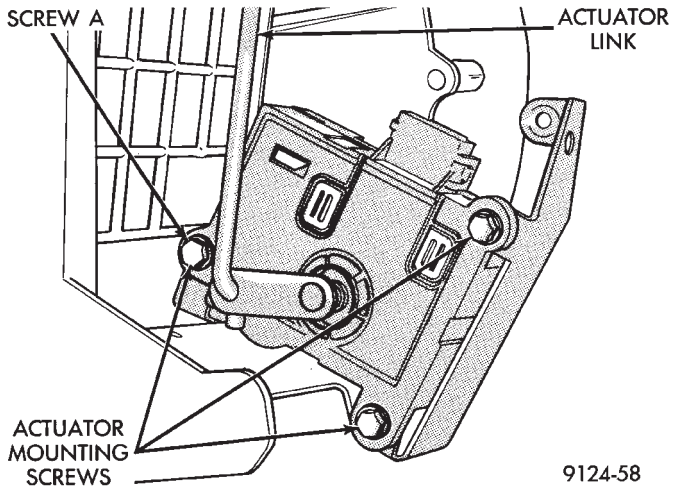


Fig. 8 Actuator Removal and Installation

(8) Tilt actuator to release from actuator link. Remove actuator from vehicle.

To install, reverse the preceding operation.

IN-CAR TEMPERATURE SENSOR/ASPIRATOR ASSEMBLY

The In-Car Temperature Sensor/Aspirator Assembly is located behind the instrument panel and to the right of the steering column. The air intake opening for the aspirator is located to the right of the steering column (Fig. 9). The Sensor and Aspirator are wired together and must be replaced as an assembly.

REMOVAL AND INSTALLATION

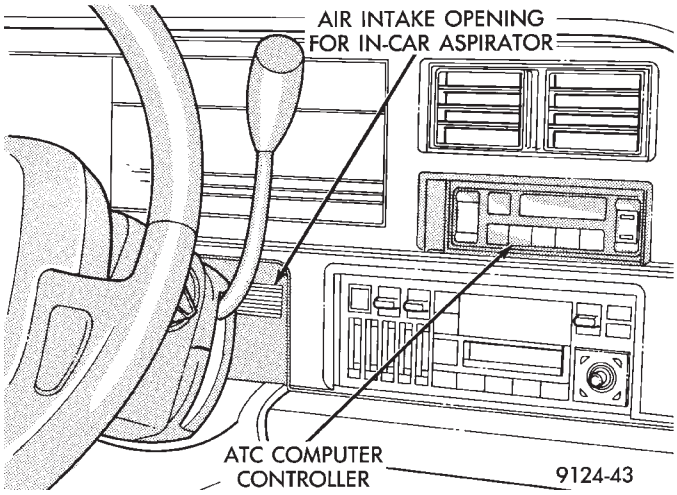


Fig. 9 Aspirator Air Intake

(1) Remove the instrument cluster assembly. Refer to Cluster and Gauge Service section in Group 8E.

(2) Un-snap the sensor from the instrument panel (Fig. 10).

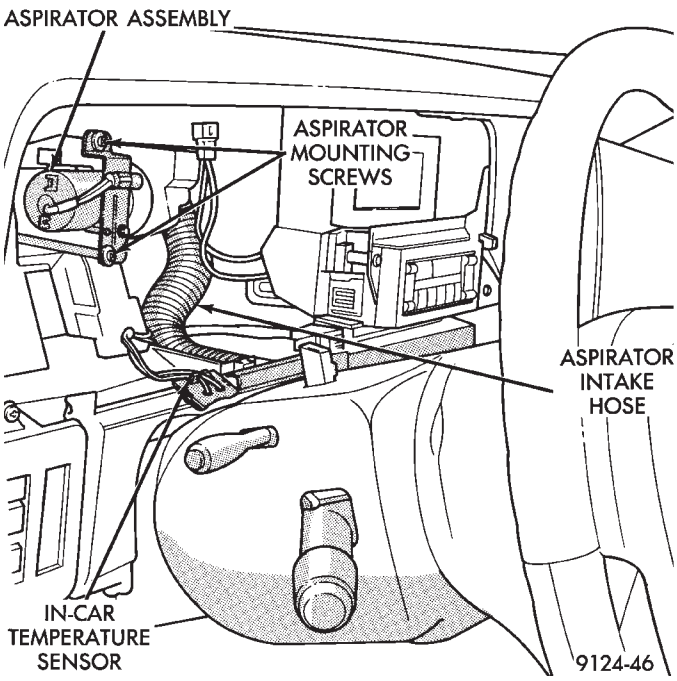


Fig. 10 In-Car Temperature Sensor/Aspirator Assembly Removal and Installation

(3) Remove the two aspirator mounting screws (Fig. 10).

(4) Disconnect the aspirator intake hose from the instrument panel (Fig. 10).

(5) Remove sensor/aspirator and it's wiring harness from vehicle.

To install, reverse the preceding operation.

AMBIENT TEMPERATURE SENSOR

The ambient temperature sensor is plugged into a two wire receptacle in the A/C-heater housing behind and above the glove box.

REMOVAL AND INSTALLATION

(1) Remove glove box/ash tray assembly.

(2) Locate and remove two attaching screws on sensor receptacle (Fig. 11).

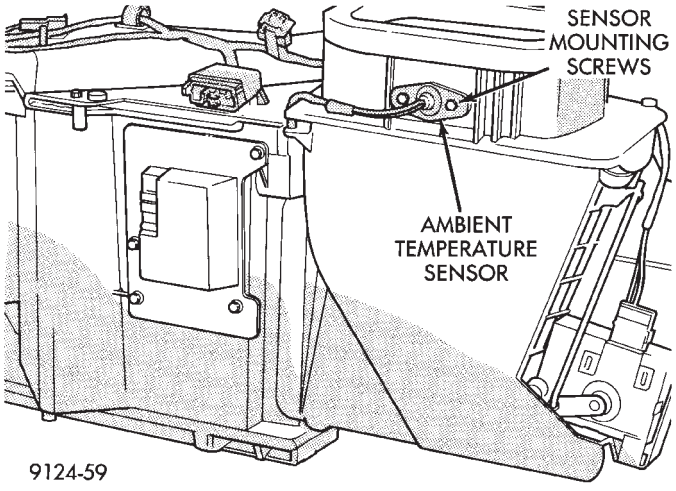


Fig. 11 Ambient Sensor Removal and Installation

(3) Carefully pull receptacle and sensor from housing.

CAUTION: It is possible for the sensor to hang up on the edge of the hole in the A/C-heater housing assembly during removal. This may cause the sensor to disengage from the receptacle and fall into the housing.

(4) Unplug sensor from receptacle.

To install, reverse the preceding operation and retest system.

WATER TEMPERATURE SENSOR

The Water Temperature Sensor is located on the heater hose mounting plate between the heater hose nipples.

REMOVAL AND INSTALLATION

(1) The A/C-heater housing assembly must be removed for Water Temperature Sensor replacement. Refer to Heater-A/C Unit Housing Removal and Installation—AC/AY Body for procedures.

(2) Remove sensor mounting screw (Fig. 12).

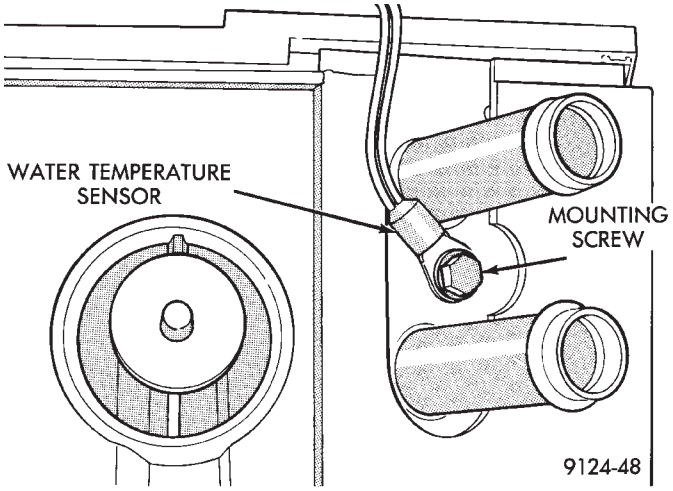


Fig. 12 Water Temperature Sensor Removal and Installation

(3) Disconnect the sensor pigtail wiring harness from the main wiring harness and remove sensor from vehicle.

To install, reverse the preceding operation. When tightening the sensor mounting screw, allow the sensor to rotate and contact the upper heater hose nipple (Fig. 12). This will aid in sensor efficiency.

ATC COMPUTER/CONTROL PANEL

The ATC Computer/Control Panel is located in the center of the instrument panel above the radio.

REMOVAL AND INSTALLATION

Refer to A/C-Heater control replacement in the Switch and Panel Component section of Group 8E, Instrument Panel and Gauges.