SECTION 1A

HEATER AND VENTILATION

CAUTION: On vehicles equipped with Supplemental Inflatable Restraint (SIR), refer to CAUTIONS in Section 9J under "ON-VEHICLE SERVICE" and the SIR Component and Wiring Location view in Section 9J before performing service on or around SIR components or wiring. Failure to follow CAUTIONS could result in possible air bag deployment, personal injury, or otherwise unneeded SIR system repairs.

NOTICE: ***Always use the correct fastener in the correct location. When you replace a fastener, use ONLY the exact part number for that application. General Motors will also call out those fasteners that require a replacement after removal. General Motors will also call out the fasteners that require thread lockers or thread sealant. UNLESS OTHERWISE SPECIFIED, do not use supplemental coatings (paints, greases, or other corrosion inhibitors) on threaded fasteners or fastener joint interfaces. Generally, such coatings adversely affect the fastener torque and the joint clamping force, and may damage the fastener. When you install fasteners, use the correct tightening sequence and specifications. Following these instructions can help you avoid damage to parts and systems.***

CONTENTS

CONTENTS (cont'd)

GENERAL DESCRIPTION

HEATER SYSTEM

The heater system provides heating, ram air, power ventilation, and windshield defrosting. Outside air is drawn from the plenum at the base of the windshield into the heater module by the blower fan. Additional outside air, called ram air, is forced into the heater module by the forward movement of the vehicle. Within the heater module, the air is heated as required, and then routes through ducts to the proper outlets for discharge into the passenger compartment. A control assembly in the instrument panel allows the operator to control blower speed, mode of operation and temperature of the air coming from the heater system.

CONTROLS

The control assembly in the instrument panel contains three rotary control knobs: blower speed, mode selection, and temperature adjustment (Figure 1). Brightness of the dial illumination is controlled by the instrument panel dimmer control.

Temperature Rotary Knob

When the temperature rotary knob is in the full "COLD" or counter clockwise position, all of the air delivered by the ventilation system is unheated. When the temperature rotary control is in the full "HOT" or clockwise position, all of the air passing through the heater module is heated before it is discharged. Intermediate positions of the temperature rotary knob result in a mixture of heated and unheated air to provide more moderate air temperatures.

Mode Rotary Knob

The mode rotary knob operates the defrost control cable that goes to the left end of the heater module. This cable operates a crank lever and shaft that controls the position of an air valve in the heater module. There are detents at 0°, 90°, and 180° to indicate VENT, FLOOR, and DEFROST mode positions. Air delivery may be blended by placing the rotary control anywhere in between the two desired modes.

Bower Speed Control

The blower switch provides a choice of four blower speeds and off. It receives power through the HTR-A/C FUSE when the ignition is "ON." In the "LO" position, the circuit continues through the heater wiring harness to two resistors in the resistor assembly near the blower motor.

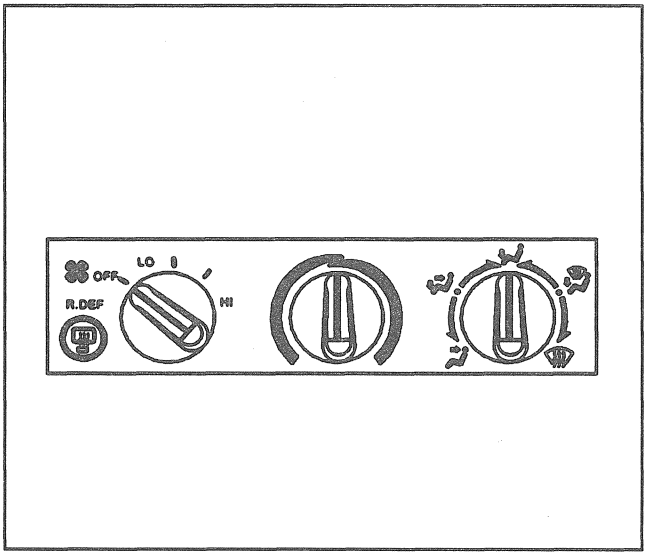


Figure 1—Control Assembly

When the blower switch is in a medium-speed position, the circuit continues through the heater wiring harness to the resistor assembly, but it bypasses one of the two resistors. When the blower switch is in the "HIGH" position, the circuit continues through the heater wiring harness to the resistor assembly, but it bypasses both resistors to provide full power to the blower motor.

From the resistor assembly, the circuit goes to the blower motor terminal to operate the blower motor. The blower motor circuit is completed to ground by a sheet metal ground wire that connects to a ground terminal on the cowl.

AIR DISTRIBUTION SYSTEM

Within the heater module is a series of air valves called the temperature valve, vent valve, and the defroster valve. These air valves are hinged parts that act like doors to direct airflow through various sections of the heater module to provide the proper airflow for the selected operating mode. Each air valve is actuated by a control cable from the heater control assembly.

Temperature Valve and Heater Core

The temperature of the air coming from the air distribution duct is regulated by controlling the relative amounts of warm and cool air in the airflow coming from the heater module. The part of the total airflow through the heater module that is allowed to pass through the heater core is governed by the temperature valve. The temperature valve is operated by the temperature control cable, working through a lever on the temperature valve shaft. The valve defaults to full cold with no cable attached.

When the temperature rotary knob in the control assembly is in the full "COLD" position, the temperature valve is positioned to stop all of the airflow through the heater core so only unheated air is sent to the air distribution duct.

As the temperature rotary knob moves away from the full "COLD" position, the temperature control cable opens the temperature valve to allow an increasing amount of air to pass through the heater core. At the same time, the temperature valve reduces the amount of unheated air that is allowed to enter the mixture. This results in a very responsive control of the air temperature discharged through the heater ducts and defroster.

When the temperature rotary knob reaches the full "HOT" position, the temperature control cable holds the temperature valve in a position that diverts all of the airflow through the heater core for maximum heating.

Hot coolant from the engine is directed through the heater core and returned to the cooling system when the engine is running.

Mode Valves

The heater system provides a choice of three basic operating modes consisting of "VENT," "HEATER," and "DEFROST."

OPERATING MODES

Vent Mode

When the mode rotary knob is in the "VENT" position, the defroster valve and heater valve remain closed. As a result, air coming from the instrument panel vents should be nearly the same temperature as the outside air.

Heater Mode

When the mode rotary knob is in the "HEATER" position, the defroster valve remains closed. As a result, air from the blower fan is heated and directed to the defroster valve which sends most of the airflow to the heater duct, with some going to the defroster nozzle.

Defrost Mode

When the mode rotary knob is in the "DEFROST" position, the defroster control cable moves the defroster valve to fully uncover the opening to the defroster nozzle and restrict the opening to the heater duct. This delivers maximum airflow to the defroster, with only a small amount of airflow coming out of the heater duct.

AUXILIARY HEATER

An auxiliary heater provides additional heating capacity for the rear of the Suburban model.

This unit operates independently of the standard heater and is regulated through its own controls in the instrument panel (Aux. Heater Models) or roof panel (Aux. Heater and A/C Models). This system consists of a separate heater core and blower fan unit mounted in the rear of the vehicle.

Blower Motor Control Switch

The auxiliary heater blower switch is located in the instrument panel to the right of the steering column (Aux. Heater Models) or the roof panel (Aux. Heater and A/C Models).

DIAGNOSIS OF THE HEATER

FUNCTIONAL TEST

Before beginning the functional test of the heater system, the vehicle should be idling with the coolant hot and the thermostat open. Coolant temperature should be close to 90° C (194° F). During the functional test, the operating efforts of the mode rotary knob and the temperature rotary knob should be evaluated. If a problem is found during any intermediate step of the functional test, complete the test before the repair is started.

1. Cycle the temperature rotary knob to the extreme ends of travel on the control assembly dial to ensure that the cable is properly adjusted.
2. Move the mode rotary knob to the "VENT" position.
   - Air should come from the instrument panel outlets at nearly the same temperature as the outside air.
   - Air should not come from the floor outlets, the defroster nozzles, or the side window defogger outlets.

3. Move the mode rotary knob to the "HEATER" position.
   - Most of the air should come from the floor outlets with the remainder coming out of the defroster nozzles and defogger outlets.
   - Air should not come from the instrument panel outlets in the "HEATER" position.
4. Move the mode rotary knob from the "HEATER" position to the "DEFROST" position.
   - Most of the air should be discharged onto the windshield from the defroster nozzles.
   - A small amount of air should also be discharged from the floor outlets.
5. Move the temperature rotary knob back to the full "COLD" position and make sure the air temperature drops back to nearly the temperature of the outside air once again.
6. Slowly turn the blower switch toward off, stopping briefly at each intermediate blower speed position to notice the force of the airflow coming from the instrument panel center outlets and the sound of the blower.
   - Both the airflow and the blower noise should reduce noticeably at each intermediate step.

HEATER OUTPUT TEMPERATURE CHECK

The heat output of the heater system can be checked with the following procedure.

Preparation

With the engine sufficiently cool, the radiator cap should be removed and the engine started and allowed to idle. Heater controls should be set to "HEATER" mode, full "HOT" temperature and "HIGH" blower speed. When coolant flow in the radiator is visible through the filler neck, the radiator cap should be installed.

Temperature Check

When the engine is warmed up (after approximately 20 minutes of operation), the vehicle should be driven. Use an accurate thermometer to determine the temperature of the outside air and the temperature of the air discharged at the floor outlets with the vehicle being driven at 48 km/h (30 mph). Minimum acceptable heater output temperatures at four different outside air temperatures are shown in the table below.

Outside Air Temperature	-18°C (0°F)	-4°C (25°F)	10°C (50°F)	24°C (75°F)
Heater Air Temperature	54°C (130°F)	59°C (139°F)	64°C (147°F)	68°C (155°F)
				T2550

Minimum acceptable heater output temperatures for outside air temperatures other than those shown can be approximated by using the Fahrenheit scale and rounding off the outside air temperature to the nearest 5 degrees. For every additional 5 degrees of outside temperature, an additional 1.8 degrees of heater output temperature should be allowed when the outside temperature is below 50 degrees. An additional 1.6 degrees of heater output temperature should be allowed for every 5 degrees of outside temperature when the outside temperature is above 50 degrees.

INSUFFICIENT HEATING OR DEFROSTING

The most likely causes of insufficient heating outside the heater system include a low coolant level, a faulty thermostat, a partially or fully clogged heater core or hose, an obstruction to air circulation or an air leak past a faulty seal into the passenger compartment. For an organized diagnosis procedure, refer to Figures 2 and 3.

IMPROPER AIR DELIVERY

If the "Functional Test" or other diagnosis indicates improper air delivery or a failure to shift modes when moving the mode rotary knob, check the attachment of the affected control cable at the heater module. Make sure the cable loop is connected to the actuator and the cable sheath is retained. This action can be observed by removing the instrument panel storage compartment for access.

If the cause of the problem is not discovered, disconnect the control cable at the valve and check the air control valve travel and effort. If there is proper valve travel and effort, check the control cable travel at the heater module end while moving the mode rotary knob. If the cable end doesn't move, check for a broken cable or control assembly part and for an unattached cable end at the control assembly. Also, check for a sharp kink in the control cable sheath that could cause severe binding.

HIGH OR LOW TEMPERATURE CONTROL EFFORT

A kinked control cable, a binding valve or a faulty control assembly are possible causes of excessive temperature control rotary knob effort. For an organized diagnosis procedure and an effective fix for too little temperature control effort, refer to Figure 4.

BLOWER NOISE

A constant air rush noise is typical of all heater systems, some may be louder than others. If possible, check a similar vehicle to determine whether the noise is typical or excessive.

For diagnosis of excessive blower noise, refer to Figures 5 and 6.

EXCESSIVE HEAT

The most likely cause of excessive heat from the heater system is an improperly indexed temperature control cable. Other related causes of excessive heat include a slipping self-adjusting clip at the temperature control cable end, a loose control cable sheath retainer or bracket at the bottom of the heater assembly, or a binding or obstructed temperature air valve. A hot air leak from the engine compartment to the blower inlet is also a remote possibility.

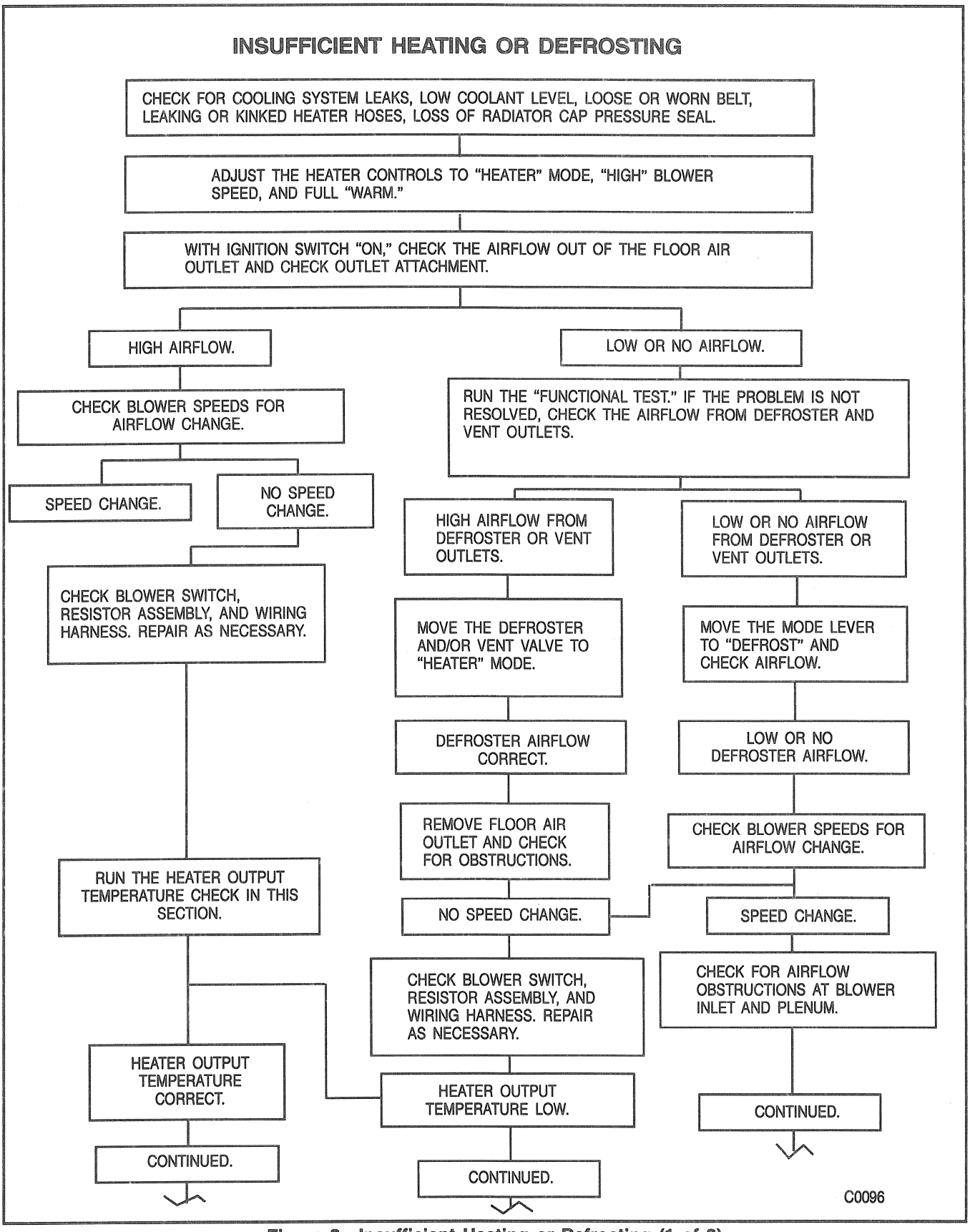


Figure 2—Insufficient Heating or Defrosting (1 of 2)

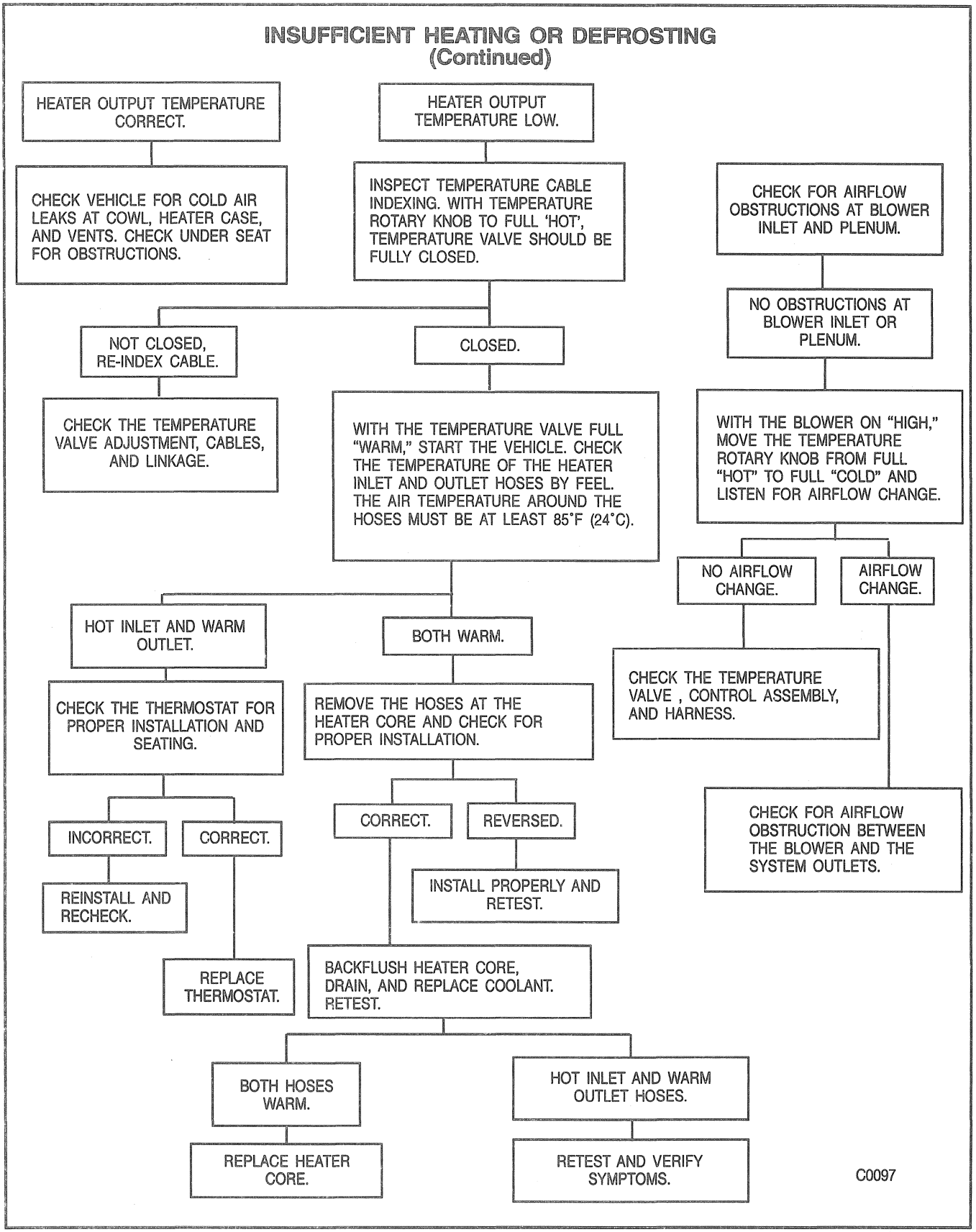


Figure 3—Insufficient Heating or Defrosting (2 of 2)

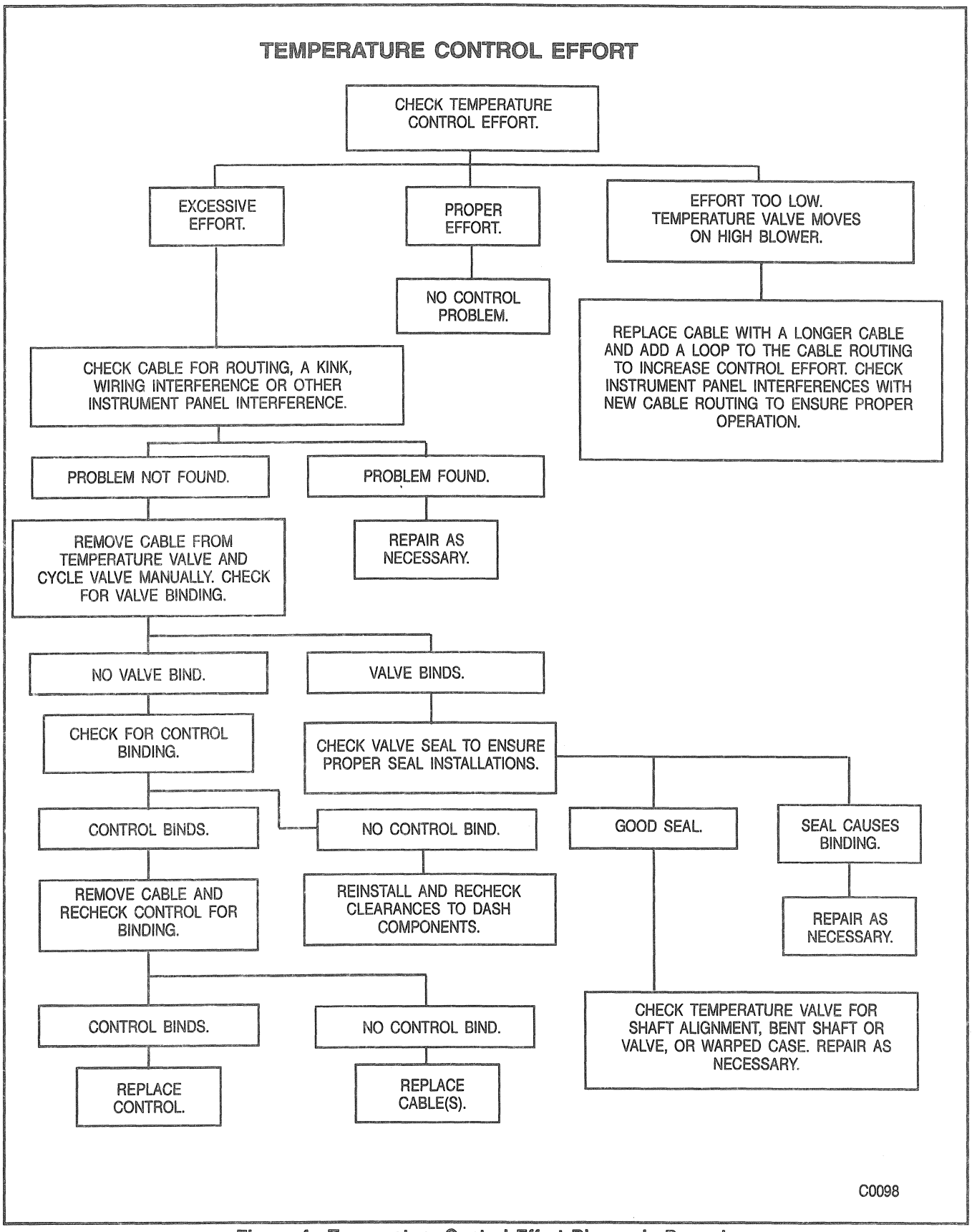


Figure 4—Temperature Control Effort Diagnosis Procedure

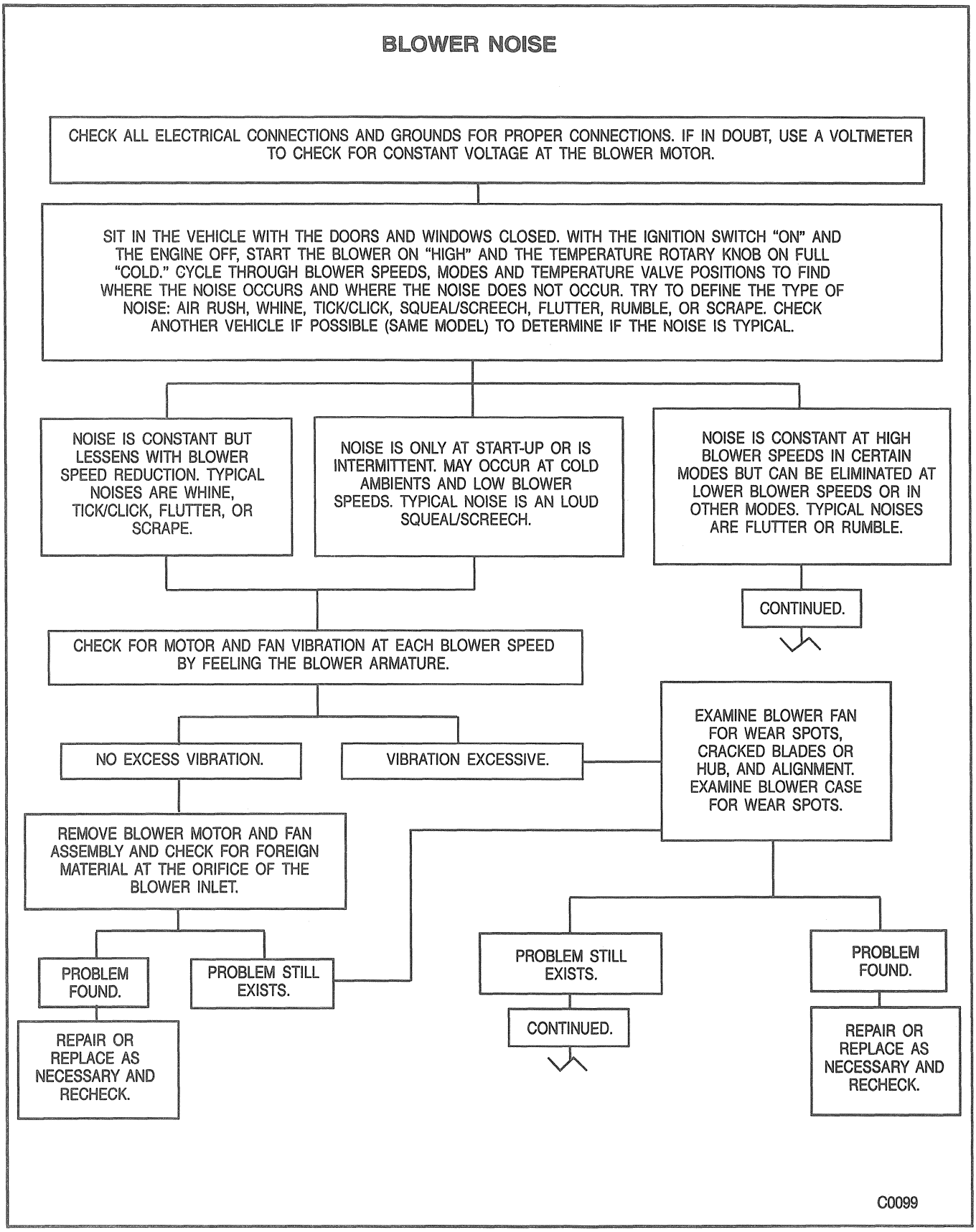


Figure 5—Blower Noise Diagnosis Procedure (1 of 2)

BLOWER NOISE (Continued)

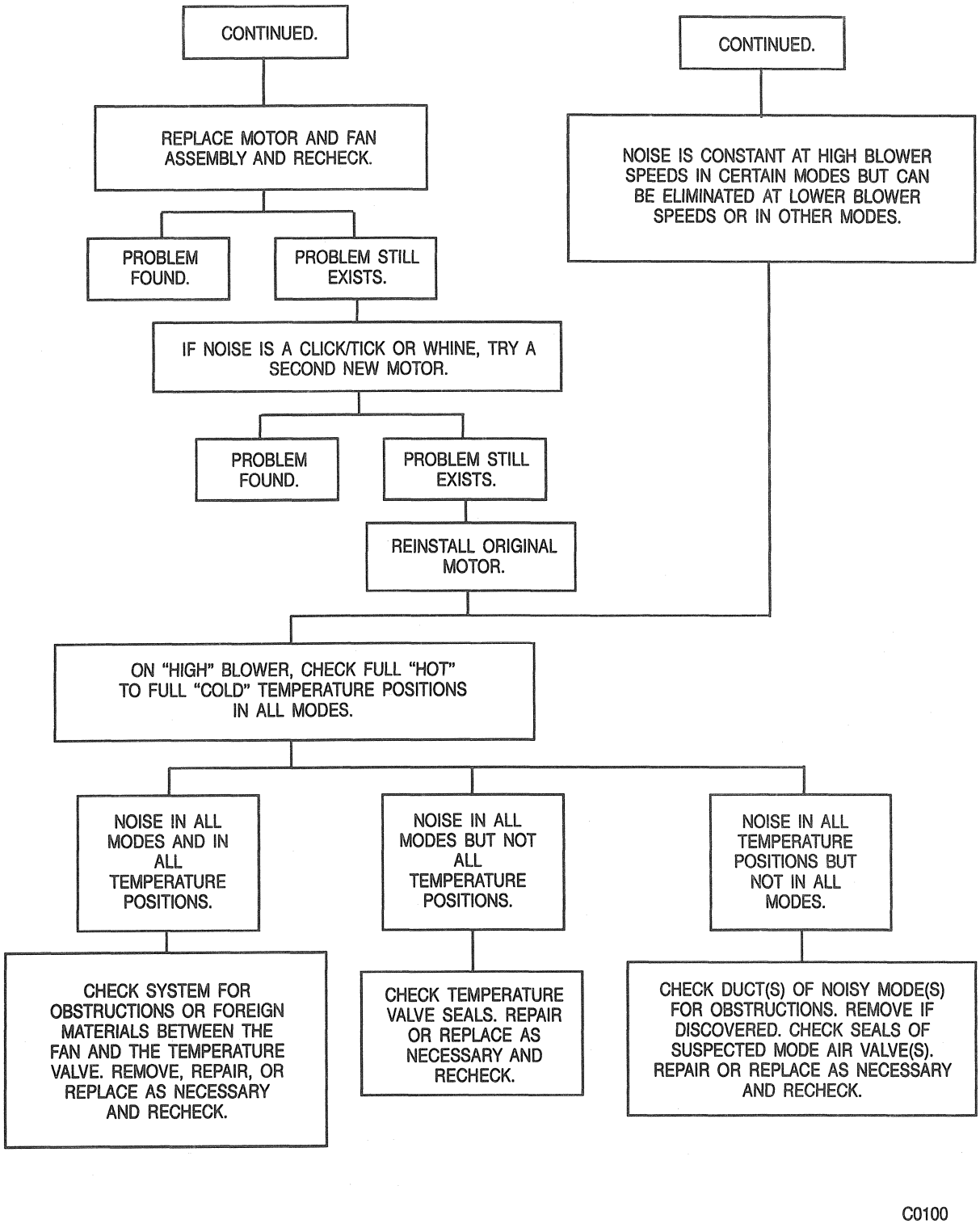


Figure 6—Blower Noise Diagnosis Procedure (2 of 2)

ON-VEHICLE SERVICE

CONTROL ASSEMBLY AND BLOWER SWITCH

Remove or Disconnect (Figure 7)

1. Instrument cluster trim plate. Refer to SECTION 10A4.
2. Control assembly by releasing the snap-fit retainers with a small screwdriver.
3. Electrical connection.
4. Cables from the control assembly by releasing retainers.
5. Blower switch.
   - Remove the blower switch rotary knob and the retaining clip from the shaft of the blower switch.

Install or Connect (Figure 7)

1. Blower switch.
   A. Hold the blower switch in position and install the retaining clip.
   B. Install the blower switch rotary knob.
2. Cables to the control assembly.
3. Electrical connection.
4. Control assembly to the instrument panel by snapping in.
5. Instrument cluster trim plate.
   - Check circuit operation.

CONTROL ASSEMBLY LAMP BULB

Remove or Disconnect

1. Control assembly. Refer to "Control Assembly and Blower Switch" in this section.
   - Pull the heater control assembly out far enough to reach the control assembly lamp socket.
2. Bulb and socket.
3. Bulb from socket.
   - Pull the bulb straight out from the socket.

Inspect

- Control assembly lamp socket for corrosion and damage. Clean or replace as necessary.
- Wires for damage and secure connection to the bulb socket. Repair or replace as necessary.

Install or Connect

1. New bulb.
   - Push the bulb straight into the socket.
2. Bulb and socket.
3. Control assembly.
   - Check circuit operation.

TEMPERATURE CONTROL CABLE

Remove or Disconnect (Figure 8)

1. Instrument cluster trim plate. Refer to SECTION 10A4.
2. Control assembly. Refer to "Control Assembly and Blower Switch" in this section.
3. Electrical connector.
4. Temperature cable from the heater control assembly.
5. Instrument panel storage compartment. Refer to SECTION 10A4.
6. Temperature cable from the temperature valve.
   A. Release cable from the temperature valve by squeezing retainer.
   B. Squeeze post and lift cable end to remove.

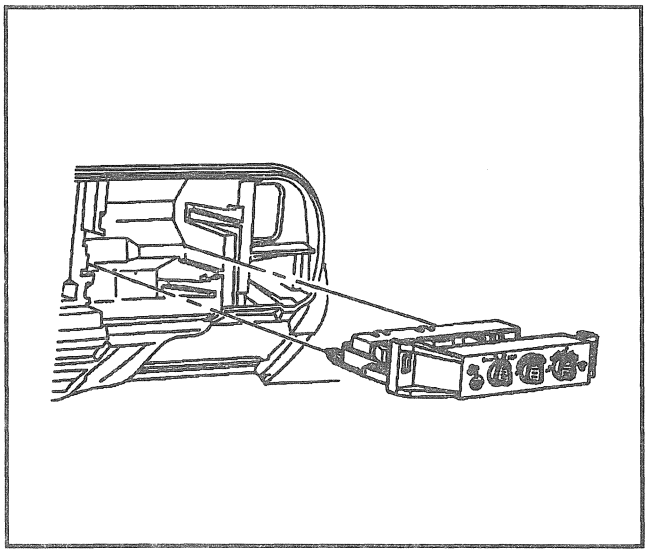


Figure 7—Control Assembly Replacement

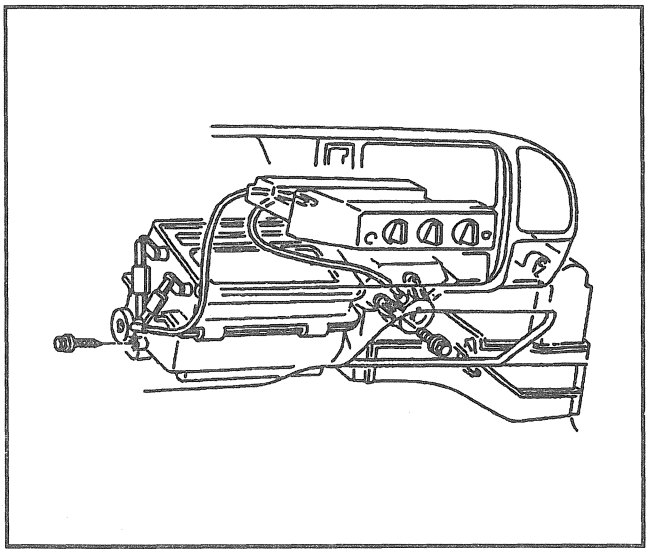


Figure 8—Temperature and Defrost Control Cable

Install or Connect (Figure 8)

1. Index the cable before installing.
   A. Cycle the temperature rotary knob to full "COLD."
   B. Make sure the temperature door is closed.
2. Cable to the temperature valve.
   A. Snap the cable onto the valve.
   B. Secure the cable by snapping it into the heater case.
3. Temperature cable to the control assembly.
   • Route the cable in the same location as removed.
4. Instrument panel storage compartment.
5. Electrical connector.
6. Control assembly.
7. Instrument cluster trim plate.

DEFROST CONTROL CABLE

Remove or Disconnect (Figure 8)

1. Instrument cluster trim plate. Refer to SECTION 10A4.
2. Control assembly. Refer to "Control Assembly and Blower Switch" in this section.
3. Electrical connector.
4. Defrost cable from the control assembly.
5. Defrost cable from the defroster valve.

Install or Connect (Figure 8)

1. Index the cable before installing.
   A. Cycle the mode rotary knob to "HEATER."
   B. Make sure the defrost door is closed.
2. Cable to the defrost valve.
   A. Snap the cable onto the valve.
   B. Secure the cable by snapping the cable into the heater case.
3. Defrost cable to the control assembly.
   • Route the cable in the same location as removed.
4. Electrical connector.
5. Control assembly.
6. Instrument cluster trim plate.

BLOWER MOTOR RESISTOR

Remove or Disconnect (Figure 9)

1. Negative battery cable. Refer to SECTION 6D1.
2. Instrument panel. Refer to SECTION 10A4.
3. Electrical connector.
4. Screws.
5. Resistor.

Install or Connect (Figure 9)

NOTICE: ***When installing resistor to the heater case, do not let the resistor coils contact each other. Improper system operation or vehicle damage could result.***

1. Resistor.
2. Screws.

Tighten

   • Screws to 1.9 N.m (17 lb. in.).

3. Electrical connector.
4. Instrument panel.
5. Negative battery cable.
   • Check circuit operation.

BLOWER MOTOR AND FAN

Remove or Disconnect (Figures 10 and 11)

1. Negative battery cable. Refer to SECTION 6D1.
2. Instrument panel storage compartment. Refer to SECTION 10A4.
3. Front screw from right door sill plate.

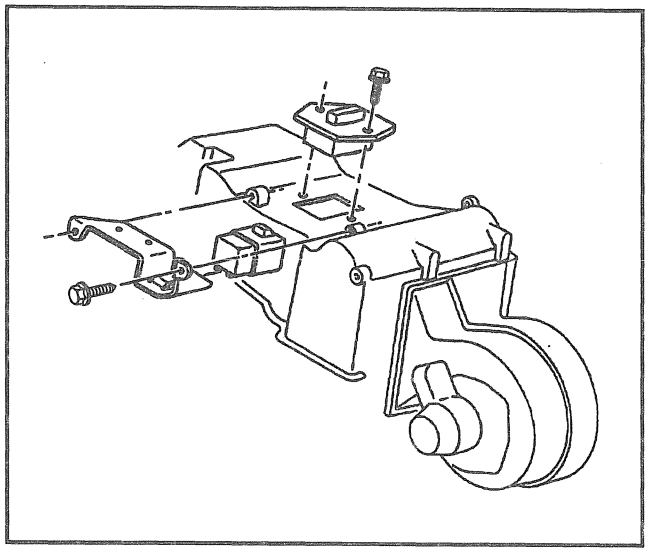


Figure 9—Blower Motor Resistor

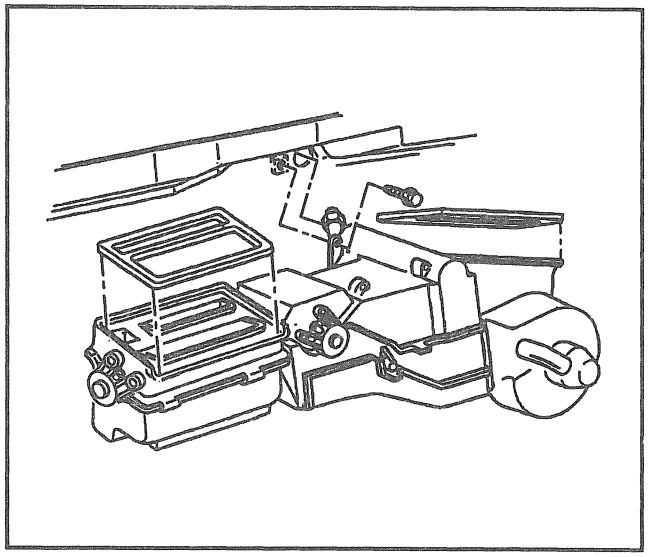


Figure 10—Heater Case (1 of 2)

4. Right hinge pillar trim panel. Refer to SECTION 10A4.
5. Electrical connectors from blower motor, as necessary.
6. Courtesy lamp (if equipped).
7. Bolt from right lower I/P support.
8. Blower motor cover.
9. Blower motor cooling tube.
10. Blower motor flange screws.
11. Blower motor.
    - Pull the blower motor forward carefully to avoid distorting the blower fan.
    - May be necessary to pry back right side of instrument panel.

Inspect

- Blower motor terminals for distortion. Clean corrosion from the terminals or replace the blower motor as necessary.
- Flange of the blower motor for damage or distortion that could cause an air leak. Repair as necessary.
- Blower fan for damage and distortion.

Install or Connect (Figures 10 and 11)

1. Blower motor.
   - Guide the blower motor and blower fan into position, being careful not to catch the blower fan on protruding parts.
2. Blower motor flange screws.

Tighten

- Blower motor flange screws to 1.4 N.m (12 lb. in.).

3. Blower motor cooling tube.
4. Blower motor cover.
5. Bolt to right lower I/P support.
6. Courtesy lamp (if equipped).

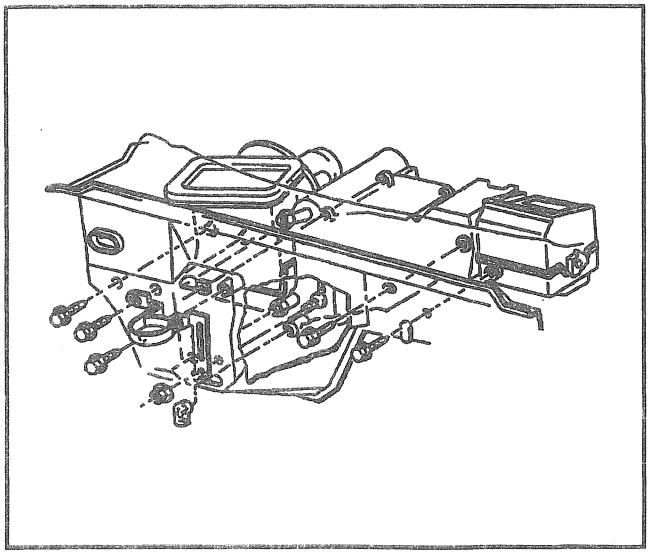


Figure 11—Heater Case (2 of 2)

7. Electrical connectors to blower motor, as necessary.
8. Right hinge pillar trim panel.
9. Front screw into front door sill plate.
10. Instrument panel storage compartment.
11. Negative battery cable.
    - Check circuit operation.

HEATER CORE

Remove or Disconnect (Figures 10 and 11)

1. Engine coolant. Refer to SECTION 6B.
2. Instrument panel storage compartment. Refer to SECTION 10A4.
3. Electrical connectors, as necessary.
4. Center floor air distribution duct.
5. Hinge pillar trim panels. Refer to SECTION 10A4.
6. Blower motor cover.
7. Blower motor. Refer to "Blower Motor and Fan" in this section.
8. Steering column. Refer to SECTION 3F.
9. Tilt back instrument panel. Refer to SECTION 10A4.
10. Coolant recovery reservoir. Refer to SECTION 6B.
11. Heater hoses. Refer to "Heater Hoses" in this section.
12. Screw on interior side of cowl, near the evaporator pipe (if equipped) while holding heater case to the cowl (Figure 10).
13. Four screws on the engine side of the cowl holding the heater case to the cowl (Figure 11).
14. Two nuts on the engine side of the cowl holding the heater case to the cowl (Figure 11).
15. Heater case.
    - It may be necessary to have an assistant when removing heater case.
16. Heater cover.
    - Remove seven screws that hold cover to the heater case.
17. Heater core from retainer.

Install or Connect (Figures 10 and 11)

1. Heater core into retainer.
   - Install seven screws that hold heater cover to heater case.
2. Heater cover.
   - Make sure heater cover is properly sealed.
3. Heater case.
   - May be necessary to have an assistant when installing heater case.
4. Nuts.
5. Screws.

Tighten

- Screws on engine side of the cowl to 1.9 N.m (17 lb. in.).
- Nuts to 2.8 N.m (25 lb. in.).
- Screw on interior side of the cowl to 11 N.m (97 lb. in.).

6. Heater hoses.
7. Coolant recovery reservoir.

8. Instrument panel.
9. Steering column.
10. Blower motor.
11. Blower motor cover.
12. Hinge pillar trim panels.
13. Center floor air distribution duct.
14. Electrical connectors, as necessary.
15. Instrument panel storage compartment.
16. Engine coolant.
    - Check the system for leaks.

AIR DISTRIBUTOR DUCT

Remove or Disconnect (Figure 12)

1. Instrument cluster trim plate. Refer to SECTION 10A4.
2. Defroster grille.
3. Three duct mounting screws.
4. Tilt back instrument panel assembly. Refer to SECTION 10A4.
5. Duct from instrument panel by squeezing to release retainers in three places.
6. Duct from the instrument panel.

Install or Connect (Figure 12)

1. Duct to instrument panel.
2. Tilt up instrument panel.
3. Duct mounting screws.

Tighten

- Screws to 1.9 N.m (17 lb. in.).

4. Defroster grille.
5. Instrument cluster trim plate.

REAR SEAT FLOOR HEAT DUCTS (SUBURBAN AND FOUR DOOR UTILITY)

Remove or Disconnect (Figure 13)

1. Seats. Refer to SECTION 10A2.
2. Floor storage compartment. Refer to SECTION 10A4.
3. Front carpet section. Refer to SECTION 10A4.
4. Remove retaining tape.
5. Locating tab from the floor pan.
6. Ducts by lifting the rear section of the ducts and pulling gently backward.
7. Grilles from rear of ducts.

Install or Connect (Figure 13)

1. Grilles to rear of ducts.
2. Ducts by lifting the rear section of the ducts and pushing gently forward.
3. Locating tab from the floor pan.
4. Retaining tape.
5. Front carpet section.
6. Floor storage compartment.
7. Seats.

HEATER HOSES

Heater Inlet Hose (Gasoline Engines)

Tool Required:
J 38723 Heater Line Quick Connect Separator

Remove or Disconnect (Figures 14 and 17)

1. Engine coolant. Refer to SECTION 6B.
2. Inlet hose from generator bracket.
3. Inlet hose at fender clip.
4. Inlet hose clamp at heater core, water shut off valve or tee fitting.
    - Loosen the clamp enough to slide the clamp away from the fitting on the inlet hose.
5. Inlet hose from heater core.
6. Push inlet hose into connector and insert J 38723 or equivalent into connector to release locking tabs.
7. Pull retainer and hose from heater inlet connector.

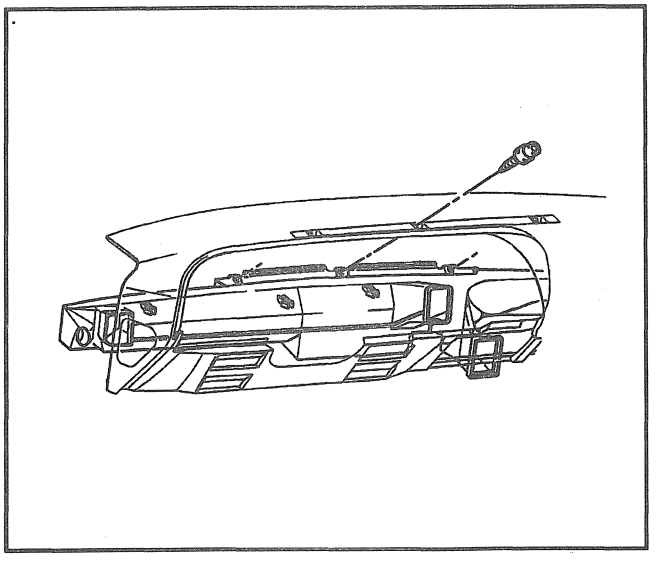


Figure 12—Air Distributor Duct

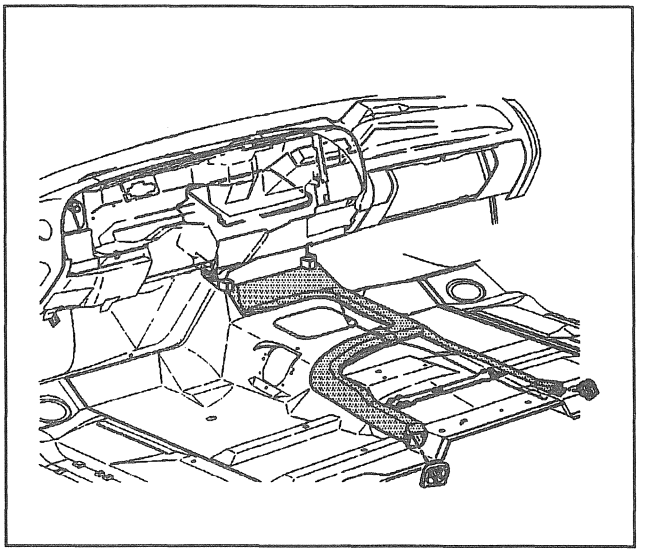


Figure 13—Rear Seat Floor Heat Ducts

Inspect

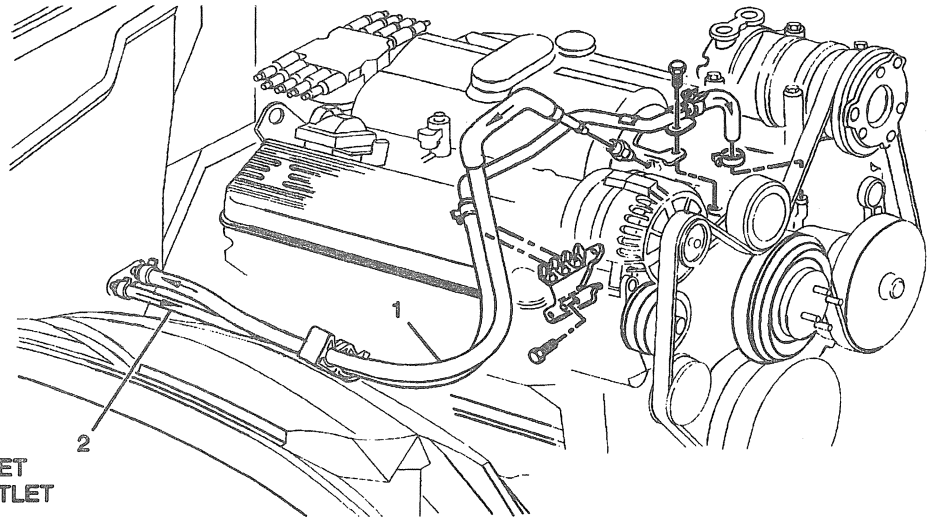
- O-ring sealing surface on hose/pipe.

Adjust

- If replacing heater inlet connector, remove retainer from hose and discard, as new connector is equipped with retainer.
- If replacing hose, remove retainer from hose and reinsert in connector.
- If reusing hose and connector, retainer can remain in place on hose.

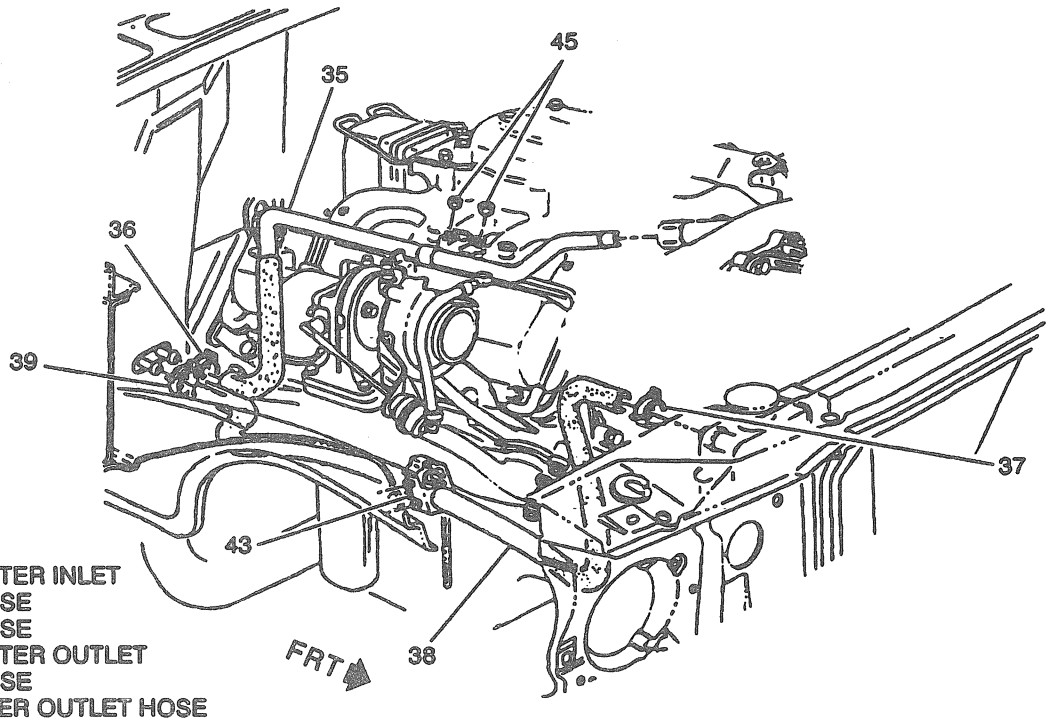
Install or Connect (Figures 14 and 17)

1. Push hose into connector until retainer tabs lock.
   - Pull back on hose to check for proper engagement.



1. HOSE INLET
2. HOSE OUTLET

Figure 14—Heater Hose Routing - (All Gasoline Engines)



35. HOSE, HEATER INLET
36. CLAMP, HOSE
37. CLAMP, HOSE
38. HOSE, HEATER OUTLET
39. CLAMP, HOSE
43. CLIP, HEATER OUTLET HOSE
45. NUT, INLET HOSE MOUNTING

Figure 15—Heater Hose Routing - (Diesel Engines)

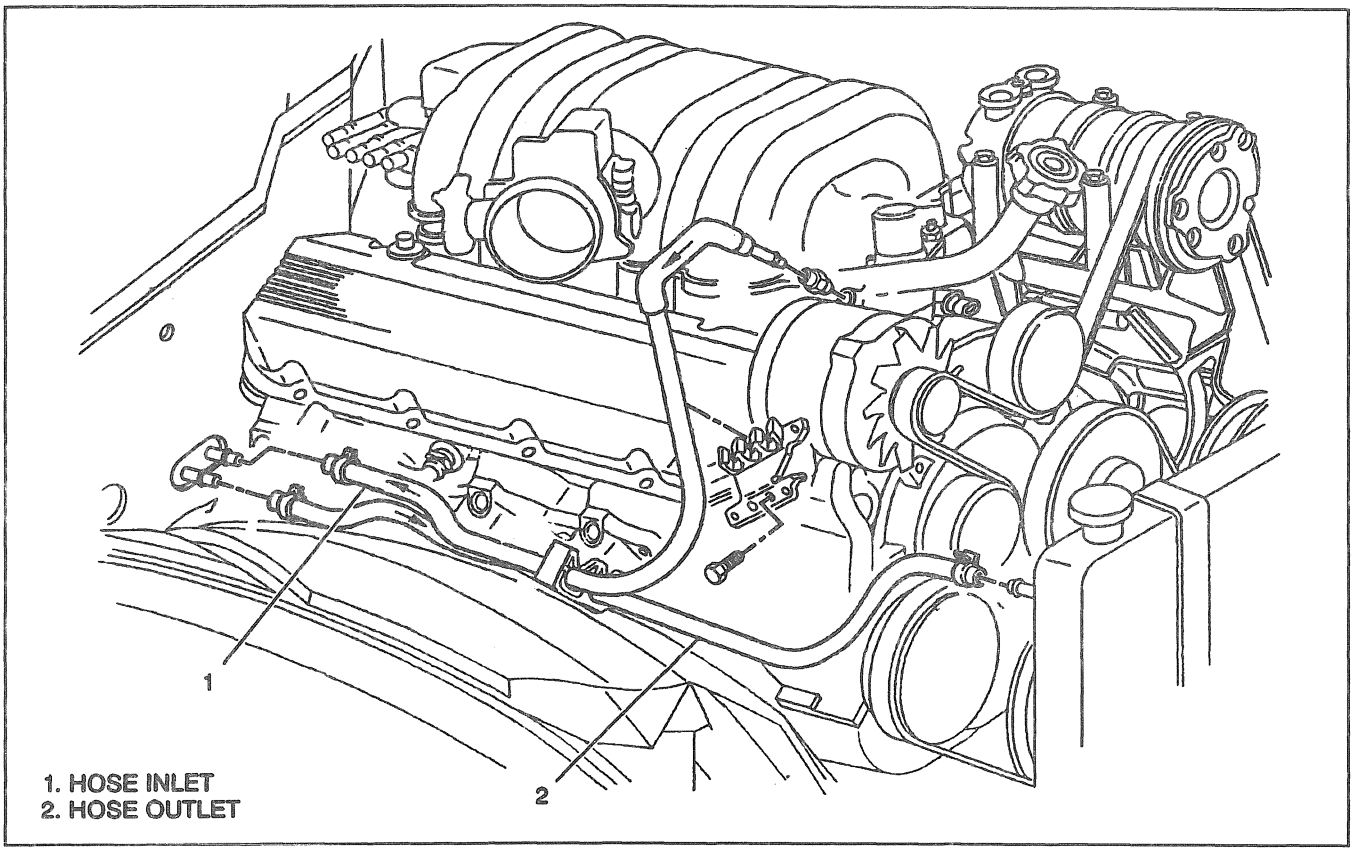


Figure 16—Heater Hose Routing - (7.4L Engines)

2. Inlet hose to heater core, water shut off valve or tee fitting.
3. Inlet hose clamp.
4. Inlet hose mounting screw.

Tighten

- Screw to 30 N·m (22 lb. ft.).

5. Inlet hose to fender clip.
6. Engine coolant.
   - Check the system for leaks.

Diesel Engines

Remove or Disconnect (Figures 15 and 17)

1. Engine coolant. Refer to SECTION 6B.
2. Inlet hose from generator bracket.
3. Inlet hose mounting nuts.
4. Inlet hose clamp at heater core.
   - Loosen the clamp enough to slide the clamp away from the fitting on the inlet hose.
5. Inlet hose from heater core.
6. Push inlet hose into connector and insert J 38723 or equivalent into connector to release locking tabs.
7. Pull retainer and hose from heater inlet connector.

Inspect

- O-ring sealing surface on hose/pipe.

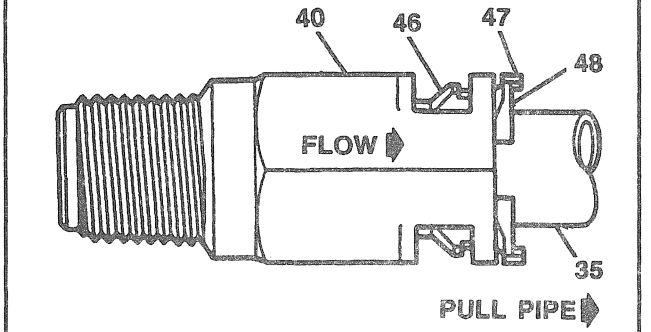


Figure 17—Quick Connect Heater Inlet Connector

Adjust

- If replacing heater inlet connector, remove retainer from hose and discard, as new connector is equipped with retainer.
- If replacing hose, remove retainer from hose and reinsert in connector.
- If reusing hose and connector, retainer can remain in place on hose.

Install or Connect (Figures 15 and 17)

1. Push hose into connector until retainer tabs lock.
   - Pull back on hose to check for proper engagement.
2. Inlet hose to heater core.
3. Inlet hose clamp.
4. Inlet hose mounting screw.

Tighten

   - Screw to 30 N·m (22 lb. ft.).
5. Engine coolant.
   - Check the system for leaks.

Heater Outlet Hose
All Models with 4.3L, 5.0L and 5.7L Engines

Remove or Disconnect (Figures 14 and 17)

1. Engine coolant. Refer to SECTION 6B.
2. Outlet hose from fender clip.
3. Outlet hose clamp from heater core, water shut off valve or tee fitting.
4. Outlet hose from heater core.
5. Outlet hose mounting screw.
6. Outlet hose from generator bracket.
7. Outlet hose clamp from water pump.
8. Outlet hose from water pump.

Install or Connect (Figures 14 and 17)

1. Outlet hose to water pump.
2. Outlet hose clamp to water pump.
3. Outlet hose to generator bracket.
4. Generator bracket mounting screw.

Tighten

   - Screw to 30 N·m (22 lb. ft.).
5. Outlet hose to heater core.
6. Outlet hose clamp to heater core.
7. Outlet hose to fender clip.
8. Engine coolant.
   - Check the system for leaks.

All Models with 7.4L Engines

Remove or Disconnect (Figures 16 and 17)

1. Engine coolant. Refer to SECTION 6B.
2. Hose clamps.
3. Outlet hose from fender clip.
4. Outlet hose from heater core.
5. Outlet hose from radiator.

Install or Connect (Figures 16 and 17)

1. Outlet hose to radiator.
2. Outlet hose to heater core.
3. Outlet hose to fender clip.
4. Hose clamps.
5. Engine coolant. Refer to SECTION 6B1.
   - Check the system for leaks.

6.5L Diesel Engines

Remove or Disconnect (Figure 15 and 17)

1. Engine coolant. Refer to SECTION 6B.
2. Hose clamps.
3. Inlet hose.
4. Outlet hose clip.
5. Outlet hose.

Install or Connect (Figure 15 and 17)

1. Outlet hose.
2. Outlet hose clip.
3. Inlet hose.
4. Hose clamps.
5. Engine coolant.
   - Check the system for leaks.

AUXILIARY HEATER (SUBURBAN)

CONTROL SWITCH

Remove or Disconnect (Figure 18)

1. Instrument cluster trim. Refer to SECTION 10A4.
2. Electrical connectors.
3. Control switch from instrument cluster trim.

Install or Connect (Figure 18)

1. Control switch to instrument cluster trim.
2. Electrical connectors.
3. Instrument cluster trim.
   - Check circuit operation.

Front Overhead (Aux. Heater and A/C)

Remove or Disconnect (Figure 19)

1. Overhead console. Refer to SECTION 10A4.
2. Electrical connectors.
3. Control assembly from overhead console.

Install or Connect (Figure 19)

1. Control assembly to overhead console.
2. Electrical connectors.
3. Overhead console.
   - Check circuit operation.

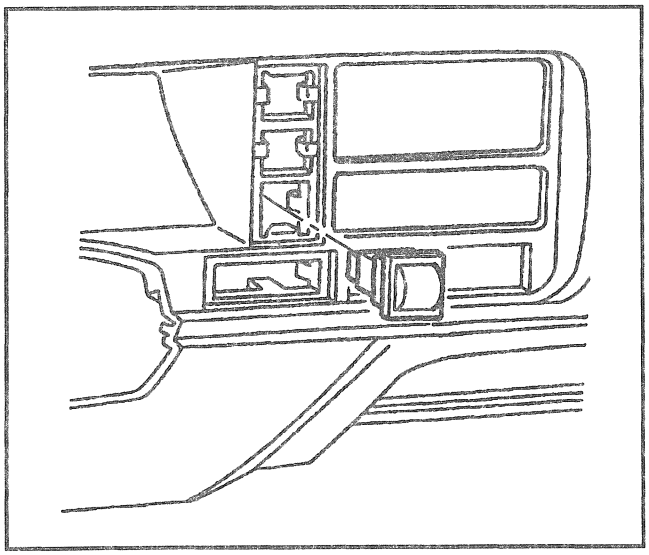


Figure 18—Auxiliary Heater Control Switch

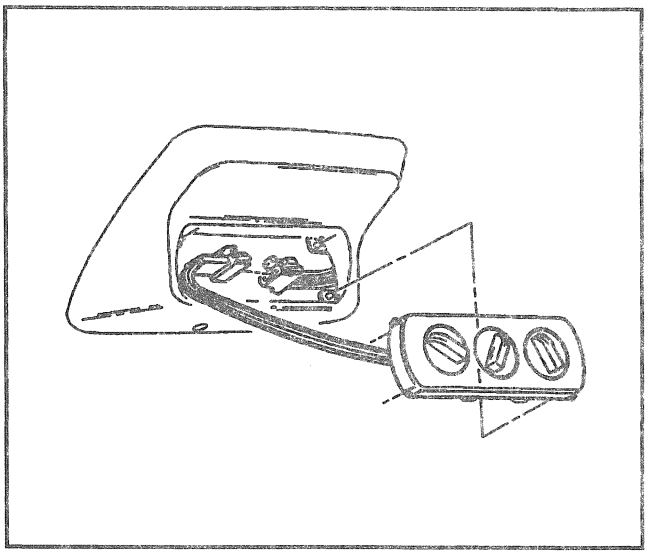


Figure 19—Front Overhead Auxiliary Control Switch

Center Overhead (Aux. Heater and A/C)

Remove or Disconnect (Figure 20)

1. Bezel.
2. Control assembly from roof panel.
3. Electrical connectors.

Install or Connect (Figure 20)

1. Electrical connectors.
2. Control assembly to roof panel.
3. Bezel.
   - Check circuit operation.

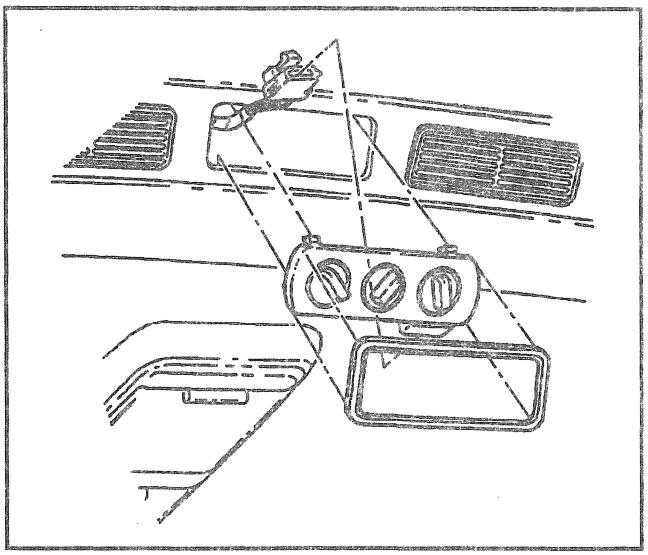


Figure 20—Center Overhead Auxiliary Control Switch

HEATER HOSES

Front Auxiliary Hose Assembly

Remove or Disconnect (Figures 21 through 23)

- Raise the vehicle and support with suitable safety stands.

1. Engine coolant. Refer to SECTION 6B.
2. Right front wheelhouse. Refer to SECTION 2B.
3. Bolts.
4. Hose clamps.
5. Heater inlet hose from tee fittings.
6. Heater outlet hose at tee fitting.

Install or Connect (Figure 23)

1. Heater outlet hose to tee fittings.
2. Heater inlet hose to tee fittings.
3. Hose clamp bolts.

Tighten

- Bolts to 17 N.m (13 lb. ft.).

4. Right front wheelhouse.
5. Engine coolant.
   - Lower the vehicle.
   - Check the system for leaks.

Rear Auxiliary Hose Assembly

Tool Required:
J 38723 Heater Line Quick Connect Separator

Remove or Disconnect (Figures 23 and 24)

- Raise the vehicle and support with suitable safety stands.

1. Engine coolant. Refer to SECTION 6B.
2. Bolts.
3. Rear hose assembly from front hose assembly (Figure 24).
   - Push rear hose assembly into front hose assembly and insert J 38723 or equivalent into hose to release locking tabs.
4. Rear hose assembly from auxiliary heater core.
   - Push rear hose assembly into auxiliary heater core and insert J 38723 or equivalent into hose to release locking tabs.

Install or Connect (Figures 23 and 24)

1. Rear hose assembly to front hose assembly (Figure 24).
   - Push rear hose assembly into front hose assembly until retainer tabs lock.
2. Rear hose assembly to auxiliary heater core.
   - Push rear hose assembly into auxiliary heater core until retainer tabs lock.
3. Bolts.

Tighten

   - Bolts to 17 N.m (13 lb. ft.).
4. Engine coolant.
   - Lower the vehicle.
   - Check the system for leaks.

HEATER CORE

Remove or Disconnect (Figure 25)

1. Engine coolant. Refer to SECTION 6B.
2. Rear quarter interior trim, as necessary. Refer to SECTION 10A4.
3. Right rear quarter trim panel. Refer to SECTION 10A4.
4. Right rear wheelhouse. Refer to SECTION 2B.
5. Auxiliary heater hoses from heater core. Refer to "Heater Hoses" in this section.
6. Electrical connectors, as necessary.
7. Drain valve.
8. Bolts.
9. Nuts.
10. Heater module.
11. Blower motor, if necessary.
12. Heater case cover.
13. Heater core.

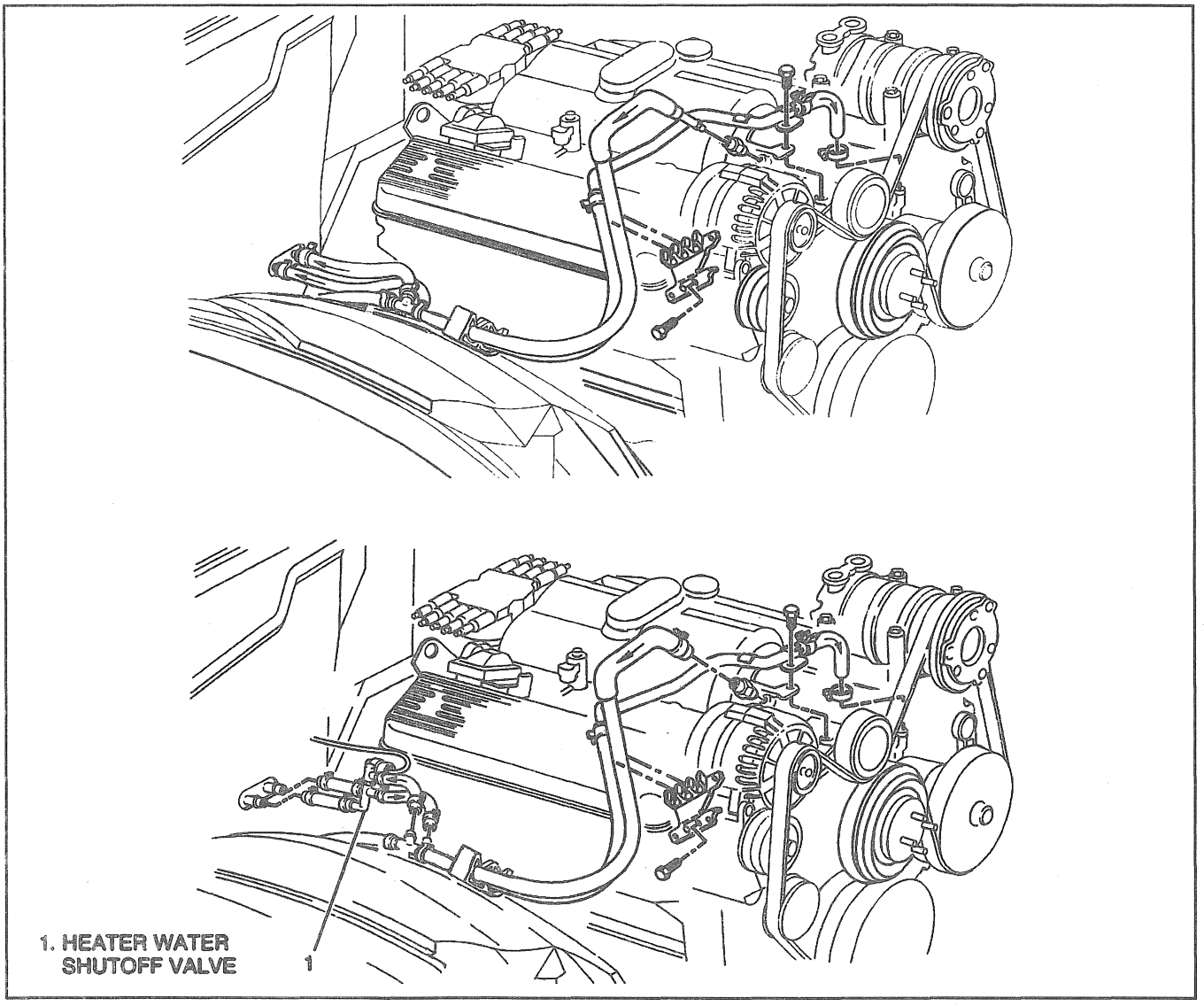


Figure 21—Auxiliary Heater Hose Routing

Install or Connect (Figure 25)

1. Heater core.
2. Heater case cover.
3. Blower motor, if necessary.
4. Heater module.
5. Nuts.
6. Bolts.

Tighten

- Bolts to 1.5 N.m (13 lb. in.).
- Nuts to 10 N.m (89 lb. in.).

7. Drain valve.
8. Electrical connectors, as necessary.
9. Auxiliary heater hoses to heater core.
10. Right rear wheelhouse.
11. Right rear quarter trim panel.
12. Engine coolant.
    - Check the system for leaks.

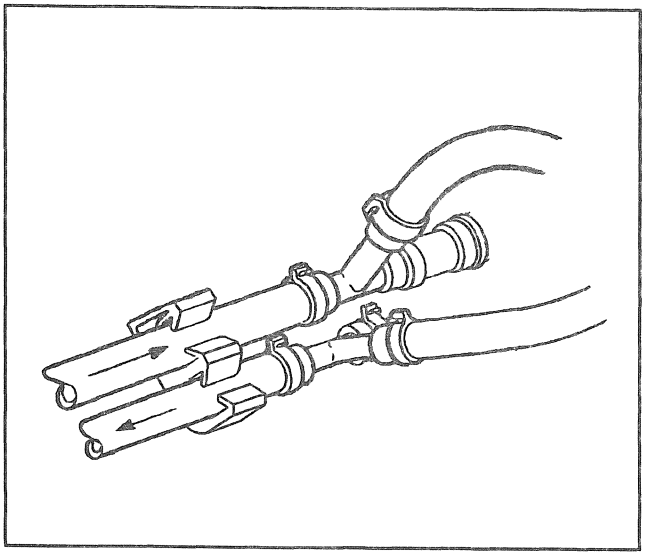


Figure 22—Auxiliary Heater Hose Water Flow

BLOWER MOTOR AND FAN

Remove or Disconnect (Figure 26)

1. Negative battery cable. Refer to SECTION 6D1.
2. Right rear quarter trim panel cover. Refer to SECTION 10A4.
3. Electrical connectors, as necessary.
4. Screws.
    - Position blower motor in order to remove blower motor fan.
5. Blower motor fan retaining nut.
6. Blower motor fan.
7. Blower motor.

Install or Connect (Figure 26)

1. Blower motor.
2. Blower motor fan.
3. Blower motor fan retaining nut.
4. Screws.

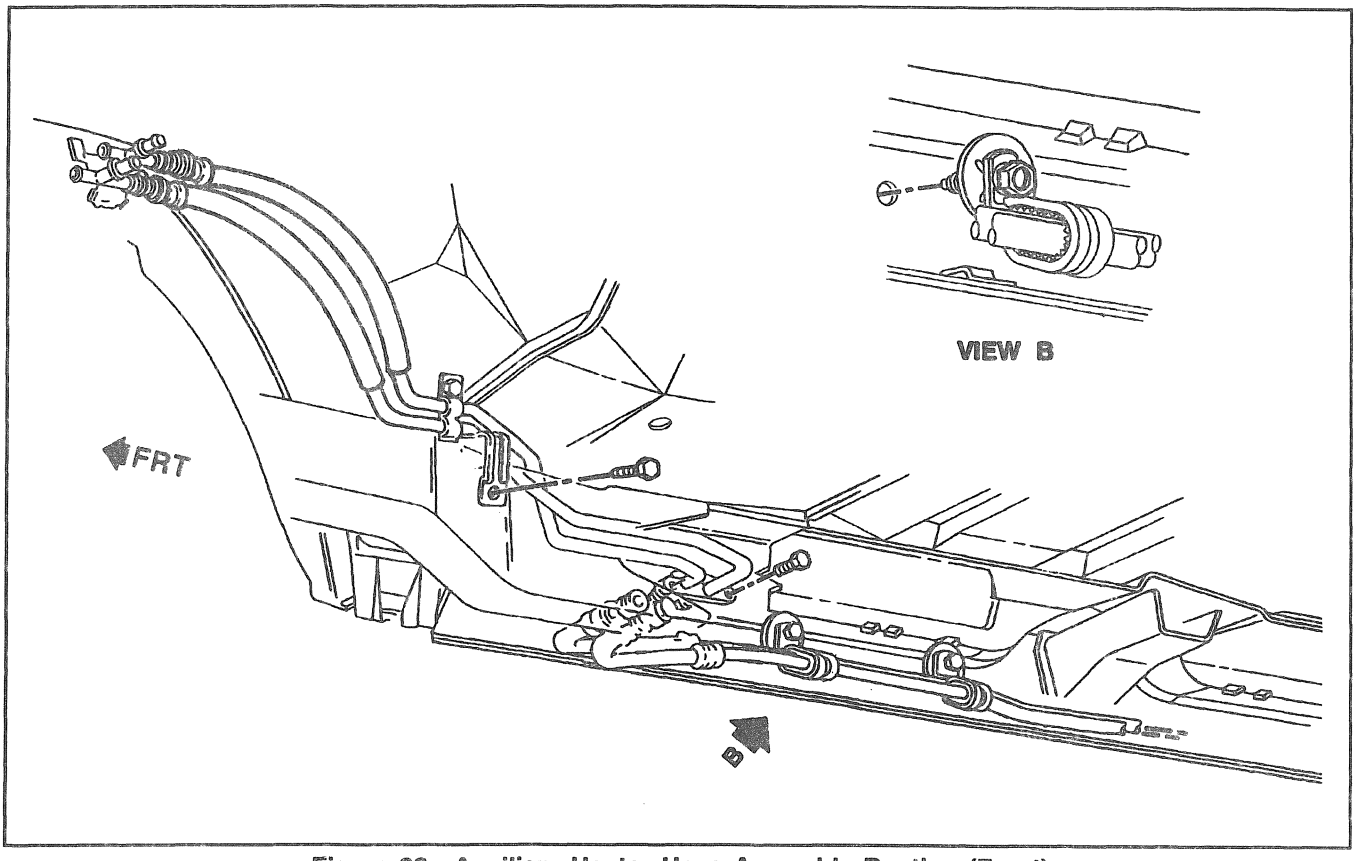
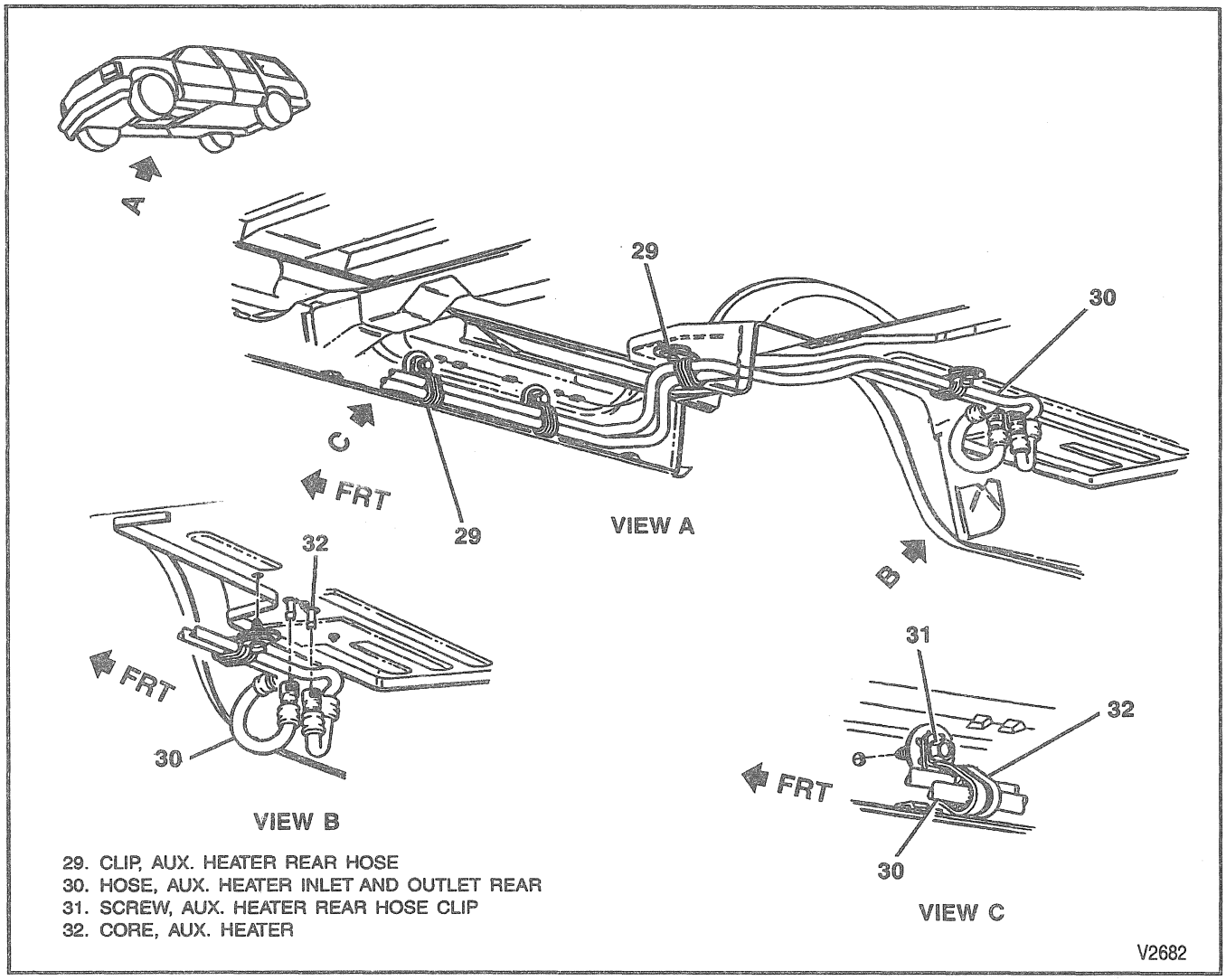


Figure 23—Auxiliary Heater Hose Assembly Routing (Front)



29. CLIP, AUX. HEATER REAR HOSE
30. HOSE, AUX. HEATER INLET AND OUTLET REAR
31. SCREW, AUX. HEATER REAR HOSE CLIP
32. CORE, AUX. HEATER

Figure 24—Auxiliary Heater Hose Assembly Routing (Rear)

Tighten

- Screws to 1.4 N·m (12 lb. in.).

5. Electrical connectors, as necessary.
6. Right rear quarter trim panel cover.
7. Negative battery cable.
8. Check circuit operation.

BLOWER MOTOR RESISTOR

Remove or Disconnect (Figure 27)

1. Negative battery cable. Refer to SECTION 6D1.
2. Right rear quarter trim panel cover. Refer to SECTION 10A4.
3. Electrical connectors, as necessary.
4. Screws.
5. Blower motor resistor.

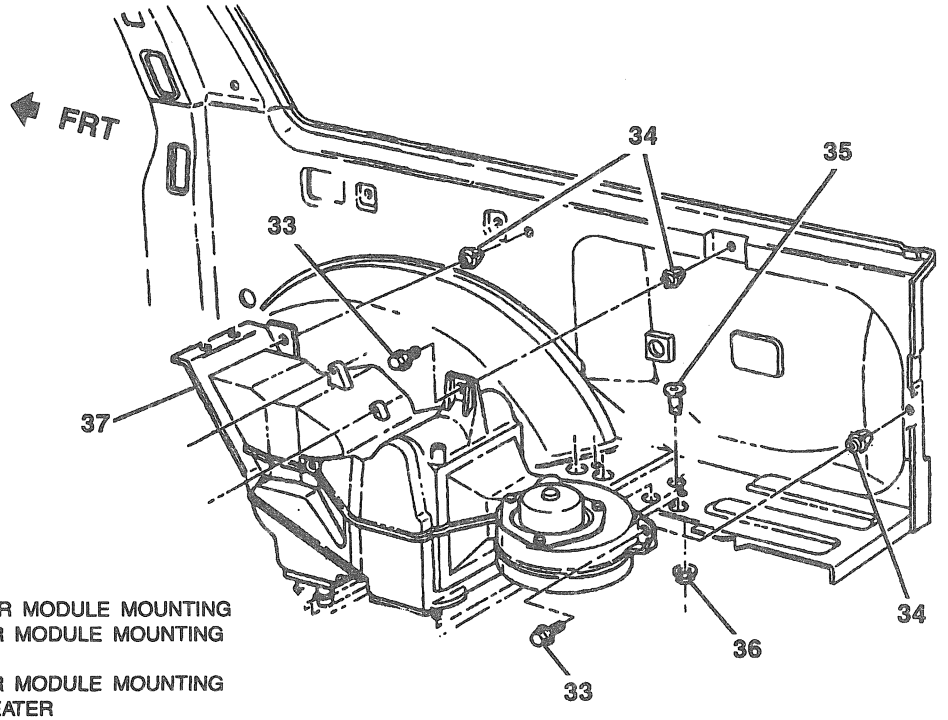
Install or Connect (Figure 27)

1. Blower motor resistor.
2. Screws.

Tighten

- Screws to 1.4 N·m (12 lb. in.).

3. Electrical connectors, as necessary.
4. Right rear quarter trim panel cover.
5. Negative battery cable.
6. Check circuit operation.

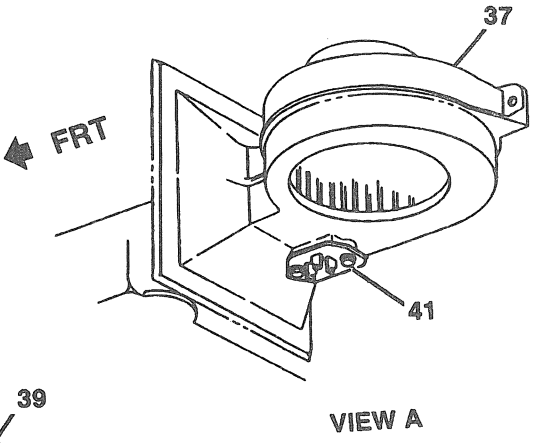


33. BOLT, AUX. HEATER MODULE MOUNTING
34. NUT, AUX. HEATER MODULE MOUNTING
35. VALVE, DRAIN
36. NUT, AUX. HEATER MODULE MOUNTING
37. MODULE, AUX. HEATER

V3371

Figure 25—Auxiliary Heater Module

37. MODULE, AUX. HEATER
38. MOTOR, BLOWER
39. SCREW, BLOWER MOTOR MOUNTING
40. SCREW, BLOWER MOTOR RESISTOR MOUNTING
41. RESISTOR, BLOWER MOTOR
42. CORE, AUX. HEATER



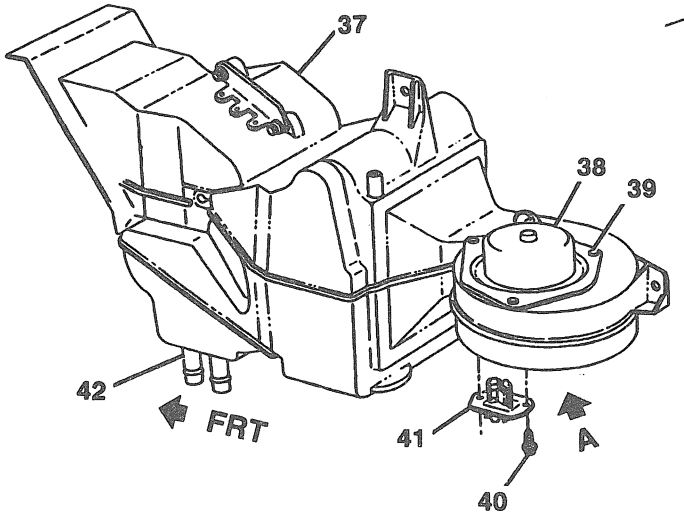


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Figure 26—Auxiliary Blower Motor/Resistor

SPECIFICATIONS

FASTENER TIGHTENING SPECIFICATIONS

ITEM	N·m	Lb. Ft.	Lb. In.
Air Inlet Valve-to-Instrument Panel Screw	1.9	—	17
Alternator Bracket Mounting Screws	30	22	—
Auxiliary Heater Module Mounting Bolts	1.5	—	13
Auxiliary Heater Module Mounting Nuts	10	—	89
Blower Motor Mounting Screw	1.4	—	12
Blower Motor Resistor Mounting Screw	1.4	—	12
Control Assembly Mounting Screw	1.6	—	14
Cowl Panel-to-Heater Case Mounting Screw	1.9	—	17
Defroster Nozzle Mounting Screw	1.9	—	17
Defroster Nozzle-to-Heater Case Mounting Screw	1.4	—	12
Distributor Duct Mounting Screw	1.9	—	17
Front Auxiliary Hose Assembly-to-Frame Mounting Screw	17	13	—
Heater Case-to-Cowl Panel Mounting Nut	2.8	—	25
Heater Case-to-Cowl Panel Mounting Screw	11	—	97
Rear Auxiliary Hose Clip-to-Frame Mounting Bolts	17	13	—
Right Vent Cable-to-Heater Case	1.4	—	12

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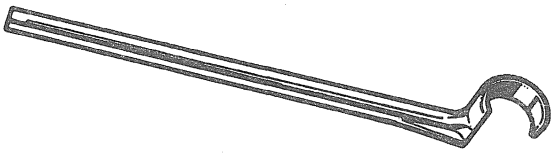
SPECIAL TOOLS

1.  J 38723

1. HEATER LINE QUICK CONNECT SEPARATOR

V3437

SECTION 1B

HEATER, VENTILATION, AND AIR CONDITIONING

CAUTION: On vehicles equipped with Supplemental Inflatable Restraint (SIR), refer to CAUTIONS in Section 9J under "ON-VEHICLE SERVICE" and the SIR Component and Wiring Location view in Section 9J before performing service on or around SIR components or wiring. Failure to follow CAUTIONS could result in possible air bag deployment, personal injury, or otherwise unneeded SIR system repairs.

NOTICE: ***Always use the correct fastener in the correct location. When you replace a fastener, use ONLY the exact part number for that application. General Motors will also call out those fasteners that require a replacement after removal. General Motors will also call out the fasteners that require thread lockers or thread sealant. UNLESS OTHERWISE SPECIFIED, do not use supplemental coatings (paints, greases, or other corrosion inhibitors) on threaded fasteners or fastener joint interfaces. Generally, such coatings adversely affect the fastener torque and the joint clamping force, and may damage the fastener. When you install fasteners, use the correct tightening sequence and specifications. Following these instructions can help you avoid damage to parts and systems.***

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CONTENTS (cont'd)

CONTENTS (cont'd)

GENERAL DESCRIPTION

CCOT A/C SYSTEM

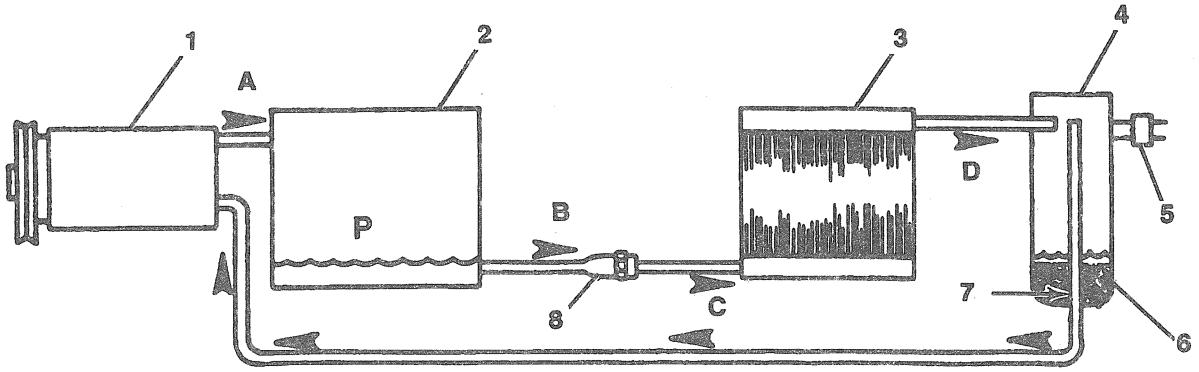
The cycling clutch orifice tube (CCOT) refrigerant system is designed to cycle a compressor on and off to maintain desired cooling and to prevent evaporator freeze-up. Passenger compartment comfort is maintained by the temperature selector on the control assembly.

Control of the refrigeration cycle (on and off operation of the compressor) is done with a switch that senses low side pressure as an indicator of evaporator pressure. The cycling pressure switch is the freeze protection device in the system and senses refrigerant pressure on the suction side of the system. This switch is located on a standard service low-side fitting. During air temperatures of 16-26°C (60-80°F), the equalized pressures within the charged air conditioning system will close the contacts of the pressure switch. Refer to Figure 1 for an overview of system components.

When an air conditioning mode is selected, electrical energy is supplied to the compressor clutch coil. As the compressor reduces the evaporator pressure to approximately 175 kPa (25 psi), the pressure switch opens, de-energizing the compressor clutch. As the system equalizes and the pressure reaches approximately 315 kPa (46 psi), the pressure switch contacts close, re-energizing the clutch coil. This cycling continues and maintains evaporator discharge air temperature at approximately 1°C (33°F).

Because of this cycling, some slight increases and decreases of engine speed/power may be noticed under certain conditions. This is normal. The system is designed to cycle to maintain desired cooling, thus preventing evaporator freeze-up.

Additional compressor protection results from the operating characteristics of the low-side cycling pressure system. If a massive discharge occurs in the low side of the system, or the orifice tube becomes plugged,



A. HIGH PRESSURE VAPOR
B. HIGH PRESSURE LIQUID
C. LOW PRESSURE LIQUID
D. LOW PRESSURE VAPOR

1. COMPRESSOR, A/C
2. CONDENSER, A/C
3. EVAPORATOR, A/C
4. ACCUMULATOR, A/C
5. SWITCH, PRESSURE CYCLING
6. BAG, DESSICANT
7. HOLE, OIL BLEED
8. ORIFICE, A/C CONDENSER

V1392

Figure 1—System Components

low-side pressures could be insufficient to close the contacts of the pressure switch. In the event of a low charge, insufficient cooling accompanied by rapid compressor clutch cycling will be noticed at high air temperatures.

When the engine is turned "OFF" with the air conditioning system operating, the refrigerant in the system will flow from the high-pressure side of the expansion tube (orifice) to the low-pressure side until the pressure is equalized. This may be detected as a hissing sound for 30 to 60 seconds and is a normal condition.

The air conditioning systems that are available for this vehicle are described below:

- C60—Front Manual Controls, HVAC System
- C69—Rear Roof Mounted, HVAC System

Unit Repair Information

For bench repair of the Harrison HT-6 air conditioning compressor, refer to SECTION 1D2.

CONTROLS

The air conditioning system on C/K models is electronically controlled. Three backlit, rotary knobs provide full control of the system. These rotary knobs control blower speed, air temperature, and mode of operation. Two push-to-latch buttons select recirculation mode for maximum cooling and control over the air conditioning compressor.

The blower speed rotary control has four fan speeds and an off position. When the blower fan is turned off, all HVAC operations turn off also. The air inlet door is automatically placed in the recirculation position by the recirculation actuator.

The temperature rotary control has 180° of travel. A detent at the full cold-end of travel engages recirculation. Operating the system with the temperature control placed in this detent will result in maximum cooling. All air inside the passenger compartment will be recirculated through the blower case. No outside air will be present. Recirculation can also be manually selected by pushing the "Recirc" button.

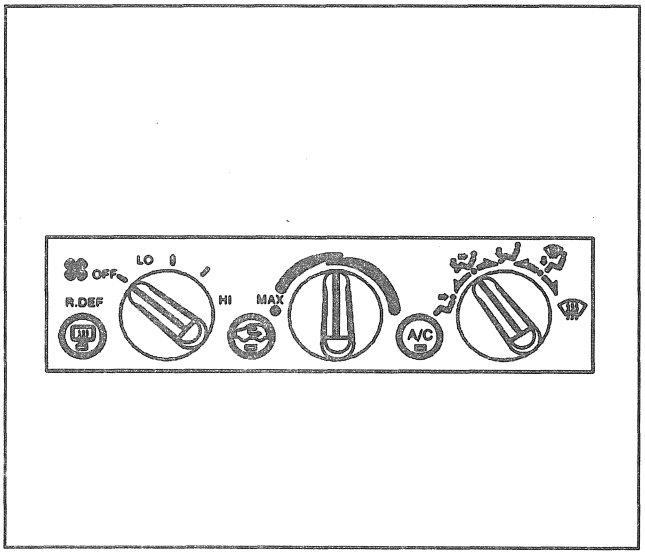


Figure 2—Control Assembly

The mode rotary control has three major detents to indicate Vent, Floor, and Defrost mode positions. Placing the control anywhere in between the major detents results in air output blending between the two modes. The recirculation mode is not available anytime Defrost is selected, or while air is being blended out the defrost outlets.

Automatic recirculation will occur when compressor head pressures exceed 2275 kPa (350 psi) and disable after head pressures reach 1724 kPa (250 psi). When activated, it cannot be manually disabled by the "MAX" button.

AIR DISTRIBUTION SYSTEM

Airflow control through the HVAC module is regulated by electronically-actuated doors. At various positions of the rotary knobs on the control assembly, mode doors mix and direct cooled, heated, and outside air through the air distribution duct.

Ducts and Outlets

A one-piece air distrubtor duct directs air to the passenger compartment. It attaches to the instrument panel with snap-in style retainers and three screws.

In case of poor air output, check the air distributor duct for obstructions such as leaves, dirt, or objects that may have fallen into it from the passenger compartment.

REFRIGERATION SYSTEM

Accumulator

The sealed accumulator assembly connects to the evaporator outlet pipe. It functions as a liquid/vapor separator that receives refrigerant vapor, some liquid refrigerant and refrigerant oil from the evaporator. It only allows refrigerant vapor and oil to flow to the compressor.

At the bottom of the accumulator is desiccant that acts as a drying agent for moisture that may have entered the system. An oil bleed hole is also located near the bottom of the accumulator outlet pipe to provide an oil return path to the compressor.

A low-side pressure service fitting is located on the accumulator. A similar service fitting is provided for mounting the cycling pressure switch. It is not necessary to discharge the system to replace the switch. The accumulator is serviced only as a replacement assembly.

Compressor

The Harrison HT-6 compressor is belt driven by the engine crankshaft through the compressor clutch pulley. The compressor pulley rotates freely, without turning the compressor shaft, until an electromagnetic clutch coil is energized. When voltage is applied to energize the clutch coil, a clutch plate and hub assembly is drawn rearward toward the pulley. The magnetic force locks the clutch plate and pulley together as one unit to drive the compressor shaft.

All replacement compressors from service parts will have 240 ml (8 fl. oz.) of oil in the crankcase. When replacing compressors, drain the oil from the old compressor into an approved container, and note the amount drained. You must also drain the oil from the new compressor, then fill the new compressor with new oil in the same amount that was drained from the old compressor.

Condenser

The condenser assembly in front of the radiator consists of coils that carry the refrigerant, and cooling fins, that provide rapid transfer of heat. Air passing through the condenser cools the high-pressure refrigerant vapor causing it to condense into a liquid.

Expansion (Orifice) Tube

The plastic expansion tube, with its mesh screen and orifice is located in the condenser outlet pipe in all models except Suburbans with rear air conditioning (RPO C69). Suburbans equipped with rear air conditioning use a Y-shaped junction block in the tube between the condenser and the front evaporator. The junction block is located near the right side of the radiator support. The expansion tube is located between the junction block and the front evaporator. Refer to "Evaporator Tube" under "On-Vehicle Service—Rear A/C System (Suburban)" in this section, for more information and component locator views.

The orifice tube provides a restriction to the high-pressure liquid refrigerant in the liquid line, metering the flow of refrigerant to the evaporator as a low-pressure liquid. The expansion tube and orifice are protected from contamination by filter screens on both inlet and outlet sides. The tube is serviced only as a replacement assembly.

When the engine is turned "OFF" with the air conditioning operating, the refrigerant in the system will flow from the high-pressure side of the expansion tube (orifice) to the low-pressure side until the pressure is equalized. This may be detected as a faint sound of liquid flowing (hissing) for 30 to 60 seconds and is a normal condition.

When system diagnostics indicate a restricted expansion tube, it may not be necessary to replace it. Metal chips, flakes, or slivers found on the screen may be removed with compressed air. The expansion tube may be reused if:

- The plastic frame is not broken.
- The expansion tube is not damaged or plugged.
- The screen material is not torn.
- The screen is not plugged with fine gritty material.

Evaporator

The evaporator cools and dehumidifies the air before it enters the vehicle. High pressure liquid refrigerant flows through the orifice tube into the low-pressure area of the evaporator. The heat in the air passing through the evaporator core is lost to the cooler surface of the core, thereby cooling the air. As the process of heat loss from the air to the evaporator core surface is taking place, any moisture (humidity) in the air condenses on the outside surface of the evaporator core and is drained off as water.

Heater Core

In any air conditioning mode, the heater core heats the cool, dehumidified air to achieve the desired temperature. The position of the control assembly temperature rotary knob determines how much heat is added to the incoming air.

High Pressure Relief Valve

The compressor is equipped with a pressure relief valve as a safety factor. Under certain conditions, the refrigerant on the discharge side may exceed the designed operating pressure. Exceeding this pressure limit may cause refrigerant loss. To prevent refrigerant loss or compressor damage, the valve opens automatically at approximately 3036 kPa (440 psi). When the valve opens, current to the compressor clutch is interrupted. Any condition that causes the valve to open will keep the compressor from operating.

Refrigerant-134a

CAUTION: Avoid breathing A/C Refrigerant-134a and lubricant vapor and mist. Exposure may irritate eyes, nose, and throat. To remove R-134a from the A/C system, use service equipment certified to meet the requirements of SAE J2210 (R-134a recycling equipment). If accidental system discharge occurs, ventilate the work area before resuming service. Additional health and safety information may be obtained from the refrigerant and lubricant manufacturers.

Like the coolant in the engine cooling system, the refrigerant is the substance in the air conditioning system that absorbs, carries, and then releases heat. Although various substances are used as refrigerants in other types of refrigeration systems, some automotive air conditioning systems use a type called Refrigerant-12 (R-12).

This vehicle uses Refrigerant-134a (R-134a). It is a non-toxic, non-flammable, clear, colorless liquified gas.

While the R-134a A/C system is very similar to an R-12 A/C system, the differences in the refrigerant, lubricants, and service equipment are important.

NOTICE: ***R-134a refrigerant is not compatible with R-12 refrigerant in an air conditioning system. R-12 in a R-134a system will cause compressor failure, refrigerant oil sludge, or poor air conditioning system performance.***

Refrigerant-134a carries a charge of a special lubricant called polyalkaline glycol (PAG) refrigerant oil. GM (PAG) refrigerant oil has a slight blue tint. The oil is hydroscopic (absorbs water from the atmosphere). Store it in closed containers.

HEATER SYSTEM

The air conditioning system operates on the reheat principle in that all the air passing through the system is chilled almost to a freezing temperature and then reheated to a more comfortable temperature before it is discharged into the passenger compartment.

The dehumidified air is reheated as it passes through the heater core in the air conditioning module. The heater is warmed by engine coolant passing through the tubes of the heater core. This heat is transferred to the heater core fins and given off to the air flowing past the fins. The position of the air temperature valve in the air conditioning module determines how much of the total airflow is allowed to pass through the heater. In turn, this determines the warmth of the total airflow discharged into the passenger compartment.

RELAYS AND SWITCHES

Blower Controls

Battery voltage is supplied at all times to the No. 1 blower relay through the HTR A/C fuse and the RED wire. When the control assembly is OFF, all blower relays are de-energized. In this state there is no voltage path through the relay contacts to the blower motor. The blower motor does not run.

With low blower speed selected, current flows through No. 1 relay, to the top of the resistor board (A) and both resistors.

With medium #1 blower speed selected, current flows through the No. 1 relay, to the No. 2 relay, to the center of the resistor board (A) and one resistor to the motor.

With medium #2 blower speed selected, current flow is the same as in medium #1, PLUS a parallel current path through resistor (B) and No. 3 blower relay to the blower motor. This provides a parallel path with a value less than one alone, but more voltage than for medium #1 blower.

With high blower speed selected, No. 1 and No. 2 blower relays are off. Relay No. 3 is on, and provides a parallel battery feed circuit to the blower motor.

Compressor Pressure Switch

This system is equipped with a compressor pressure switch. This switch is normally open, activates at 2069-2482 kPa (300-360 psi) and releases at 1724 kPa (250 psi).

It's function is to drive the recirculation door to the closed position to reduce the system load and decrease system high-side pressure. It also activates the auxiliary fan on 7.4L applications.

High Pressure Cutoff Switch

The system is also equipped with a high pressure cutoff switch. This switch is normally closed, and opens at 2827-3103 kPa (410-450 psi) to interrupt the voltage to the compressor clutch coil. This will stop the compressor from cycling and prevent the pressure relief valve from discharging refrigerant and oil.

Pressure Cycling Switch

The refrigeration cycle (on and off operation of the compressor) is controlled by a switch that senses the low-side pressure as an indicator of evaporator temperature. The pressure cycling switch is the freeze protection device in the system and senses refrigerant pressure on the suction side of the system. This switch is mounted on a standard service low-side fitting. This switch also provides compressor cutoff during cold weather.

Additional compressor protection results from the operating characteristics of the low-side pressure cycling system. If a massive discharge occurs in the low side of the system, or the orifice tube becomes plugged, low-side pressures could be insufficient to close the contacts of the pressure switch. In the event of a low charge, insufficient cooling accompanied by rapid compressor clutch cycling will be noticed at high outside (ambient) air temperatures.

If replacement of the pressure cycling switch is necessary, it is important to note that this may be done without removing the refrigerant charge. A service fitting is located in the pressure switch fitting. During replacement of the pressure switch, a new O-ring seal must be installed and the switch assembled to 4.5 N·m (40 lb. in.).

REFRIGERANT SYSTEM DIAGNOSIS

FUNCTIONAL TEST

To aid in determining whether or not the air conditioning, electrical, air, and refrigeration systems are operating properly, refer to "Performance Test" in this section. For additional electrical diagrams and diagnostic information, refer to the Driveability, Emissions, and Electrical Diagnosis Manual for these models.

1. Operation of the air conditioning blower at all speeds, in any position except "OFF" and engagement of the compressor clutch indicates that the electrical circuits are functioning properly.
2. The same "hand-felt" temperature of the evaporator inlet pipe and the accumulator surface of an operating system indicates a properly charged system.
3. Operation of the air conditioning control head to distribute air from the designed outlets indicates proper functioning.

PERFORMANCE TEST

Tool Required:
J 21213-A Four Jack-Dual Range Temperature Tester or Equivalent

1. Park the vehicle inside or in a shaded area.
2. Open doors or windows to ventilate the interior.
3. Vent engine exhaust if necessary.
4. Open the hood and install ACR4 high and low side pressure gages. Route lines over the rear hood seal and tape the gages to the windshield for viewing.
5. Record ambient temperature at vehicle.
6. Record relative humidity. Use psychrometer or consult the local weather bureau.

Important

- Make sure to record relative humidity and ambient temperature conditions at time of test.

7. Close doors or windows.
   - For Suburban Models with rear A/C, turn rear A/C "ON."
8. Press "A/C" button, adjust blower speed to "HI," and temperature to full "COLD."
9. Open the air conditioning outlets.
10. Install J 21213-A or equivalent into right center air conditioning outlet.
11. Place transmission in "PARK" or "NEUTRAL."
12. Start engine, stabilize engine speed at 2000 RPM, and start the timer.
13. Run the air conditioning system until outlet air reaches the lowest temperature (about 3 minutes).
14. Record the outlet air temperature and high side and low side pressures.

15. Turn the engine off and compare the readings. Normally operating air conditioning systems should not exceed the levels shown in Figures 3 and 4.

PSIG	TEMP (°F) R-134A	PSIG	TEMP (°F) R-134A	PSIG	TEMP (°F) R-134A	PSIG	TEMP (°F) R-134A
0	-14.7	25	29.3	70	69.6	200	130.1
1	-12.1	26	30.5	75	72.9	210	133.5
2	-9.6	27	31.7	80	76.1	220	136.7
3	-7.2	28	32.9	85	79.2	230	139.8
4	-4.9	29	34.0	90	82.2	240	142.9
5	-2.7	30	35.1	95	85.0	250	145.9
6	-0.6	32	37.4	100	87.8	260	148.8
7	1.4	34	39.5	105	90.5	270	151.6
8	3.4	36	41.6	110	93.1	280	154.3
9	5.3	38	43.6	115	95.6	290	157.0
10	7.1	40	45.6	120	98.0	300	159.6
11	8.9	42	47.4	125	100.4	310	162.2
12	10.6	44	49.2	130	102.7	320	164.7
13	12.3	46	51.0	135	104.9	330	167.2
14	13.9	48	52.8	140	107.1	340	169.6
15	15.4	50	54.5	145	109.3	350	171.9
16	17.0	52	56.4	150	111.4	360	174.2
17	18.5	54	57.8	155	113.3	370	176.5
18	19.9	56	59.3	160	115.4	380	178.7
19	21.4	58	60.8	165	117.4	390	180.7
20	22.8	60	62.4	170	119.3	400	183.1
21	24.1	62	63.9	175	121.2		
22	25.5	64	65.4	180	123.0		
23	26.8	66	66.8	185	124.8		
24	28.0	68	68.2	190	126.6		

Figure 3—Pressure-Temperature Relationship of Refrigerant-134a

T3127

RELATIVE HUMIDITY	AMBIENT AIR TEMP		MAXIMUM LOW SIDE PRESSURE		ENGINE SPEED	MAXIMUM RIGHT CENTER AIR OUTLET TEMP		MAXIMUM HIGH SIDE PRESSURE	
(%)	°F	°C	PSIG	kPaG	(rpm)	°F	°C	PSIG	kPaG
20	70	21	24	165	2000	44	7	285	1965
	80	27	25	172		45	7	290	2000
	90	32	28	193		49	9	314	2165
	100	38	28	193		50	10	320	2206
30	70	21	25	172	2000	43	6	287	1979
	80	27	26	179		45	7	293	2020
	90	32	28	193		50	9	320	2206
	100	38	31	214		53	12	328	2262
40	70	21	25	172	2000	45	7	290	2000
	80	27	28	193		49	9	315	2172
	90	32	28	193		51	11	325	2241
	100	38	37	255		59	15	361	2489
50	70	21	26	179	2000	45	7	290	2000
	80	27	28	193		50	10	320	2206
	90	32	32	221		54	12	330	2275
	100	38	40	276		64	18	370	2551
60	70	21	27	186	2000	46	8	300	2069
	80	27	28	193		50	10	320	2206
	90	32	36	248		58	14	355	2448
	100	38	45	310		68	20	409	2820

RELATIVE HUMIDITY	AMBIENT AIR TEMP		MAXIMUM LOW SIDE PRESSURE		ENGINE SPEED	MAXIMUM RIGHT CENTER AIR OUTLET TEMP		MAXIMUM HIGH SIDE PRESSURE	
(%)	°F	°C	PSIG	kPaG	(rpm)	°F	°C	PSIG	kPaG
70	70	21	28	193	2000	49	9	315	2172
	80	27	28	193		51	11	325	2241
	90	32	38	262		62	17	363	2503
80	70	21	28	193	2000	50	10	320	2206
	80	27	32	221		54	12	330	2275
	90	32	41	283		65	18	377	2600
									T3204

Figure 4—System Performance Test (Cont'd)

If a malfunction in the refrigerant system is suspected due to abnormal system pressures, inspect the following:

1. Outer surfaces of radiator and condenser cores. Make sure airflow is not blocked by dirt, leaves, or other foreign material. Check between the condenser and radiator as well as the outer surfaces.
2. Evaporator core, condenser core, hoses, tubes, etc., for restrictions or kinks.
3. Refrigerant leaks.
4. Air ducts for leaks or restrictions. Low airflow rate may indicate a restricted evaporator core.
5. Compressor clutch for slippage.
6. Drive belt for improper tension.
7. Accumulator for plugging.
8. Expansion (orifice) tube for plugging.

If the problem is not found, continue with diagnostic procedures in Figures 5 through 9.

LEAK TESTING

CAUTION: Avoid breathing A/C Refrigerant-134a and lubricant vapor or mist. Exposure may irritate eyes, nose, and throat. To remove R-134a from the A/C system, use service equipment certified to meet the requirements of SAE J2210 (R-134a recycling equipment). If accidental discharge occurs, ventilate the work area before resuming service. Additional health and safety information may be obtained from the refrigerant and lubricant manufacturers.

A refrigerant leak test should be performed on the system whenever a leak is suspected and after performing a service operation that disturbs the components, lines, or connections. Many methods and special tools are available for this purpose; however, no matter which tool is used, care and diligence are the biggest keys to success.

Electronic Leak Detector

Tool Required:

J 39400 Electronic Leak Detector

This type of leak detector has been found to be the most useful tool in locating refrigerant leaks. The J 39400 is a small unit that operates on 12V DC and provides an audible signal that increases in frequency as R-134a is detected (Figure 10). Make sure the instrument is properly calibrated, according to the included instructions, and that the detector is used in the proper setting for the type of refrigerant being tested. The detector "GAS" switch should be placed in "R-134a" setting prior to use.

The most common leaks are found at the refrigerant fittings or connections. This may be caused by improper torque, damaged O-ring seals, lack of lubricant on O-ring seals, or dirt/debris across the O-ring seals. Even the smallest piece of lint from cotton gloves or shop cloths can create a leak path across an O-ring seal.

The successful use of this and any other electronic leak detector depends greatly upon the scan rate and upon carefully following the manufacturer's instructions regarding calibration, operation, and maintenance. Each joint must be completely circled moving at 25-51 mm (1-2 inches) per second with the tip of the probe as close to the surface as possible but no more than 6 mm (0.25 inches) away and without blocking the air intake (Figure 11). A leak is indicated when the audible tone goes from a steady 1-2 clicks per second to a solid alarm. Adjust the balance knob frequently to maintain the 1-2 clicks per second rate.

Important

- Halogen leak detectors are sensitive to windshield washing solutions, many solvents and cleaners, and some adhesives used in the vehicle. Prevent a false warning by making sure surfaces are clean. Also, surfaces should be dry, since ingestion of liquids will damage the detector.

The evaporator inlet and outlet, accumulator inlet and outlet, condenser inlet and outlet, all brazed and welded areas, areas showing signs of damage, hose couplings, compressor rear head, and housing joints may be tested using this procedure.

Important

- Always follow the refrigerant system around in a continuous path so that no areas of potential leaks are missed. Always test all the above areas to make sure the entire system is leak free, even when one leak is already found.

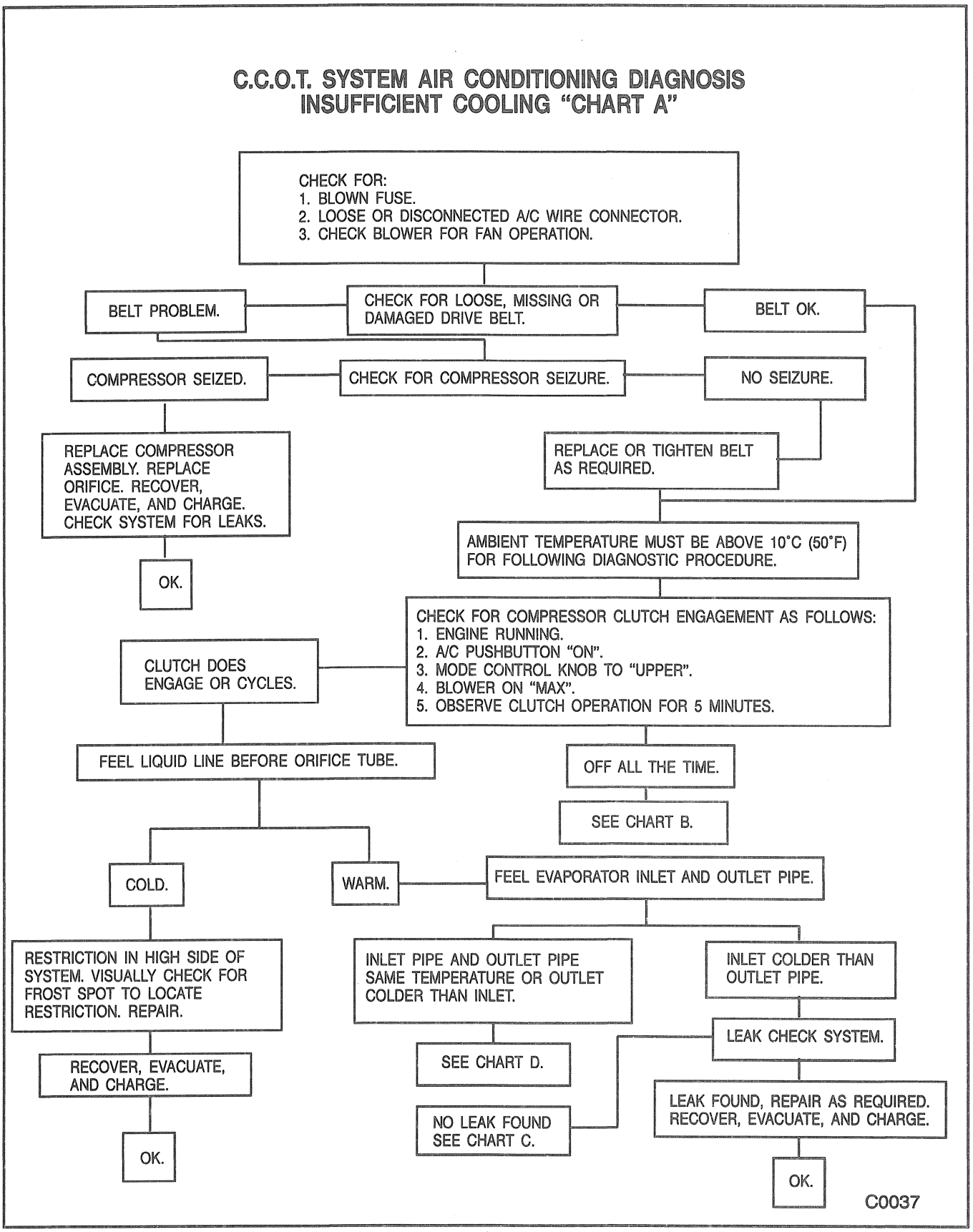


Figure 5—CCOT Air Conditioning System Diagnosis Procedure (1 of 5)

CAUTION: Take care to prevent personal injury that could occur when touching a hot engine while testing. Tests should be done with the engine "OFF" and as cool as possible. Do not operate the detector in a combustible atmosphere since its sensor operates at high temperature.

Service Ports/Access Valves

The primary seal for the service ports is the sealing cap. This cap contains a specially designed O-ring seal or gasket that provides a leak-free seal. Should the cap be loose, missing, or the wrong cap used, it will result in the loss of refrigerant charge.

Evaporator Core

One of the most difficult leaks to find is in the evaporator core. To leak test the core:

1. Turn the blower fan on "HIGH" for 15 or more seconds then turn it off.
2. Wait 10 minutes.
3. Remove the blower motor resistor. Refer to "Blower Motor Resistor" in this section.
4. Insert the leak detector probe as close to the evaporator as possible. If the detector goes to a solid alarm, a leak has been found.
5. If possible, visually inspect the core face with a flashlight for evidence of refrigerant oil.

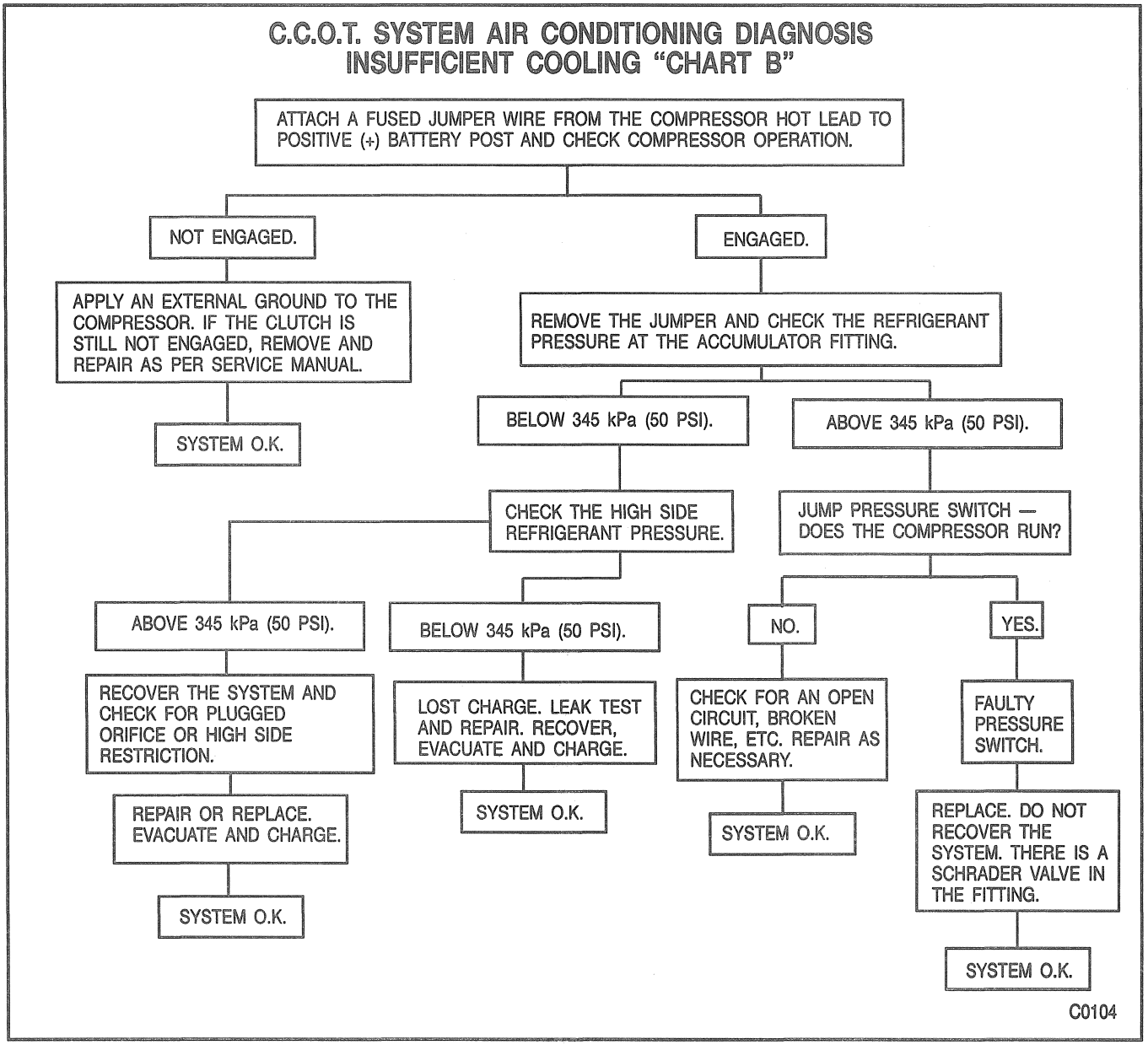


Figure 6—CCOT Air Conditioning System Diagnosis Procedure (2 of 5)

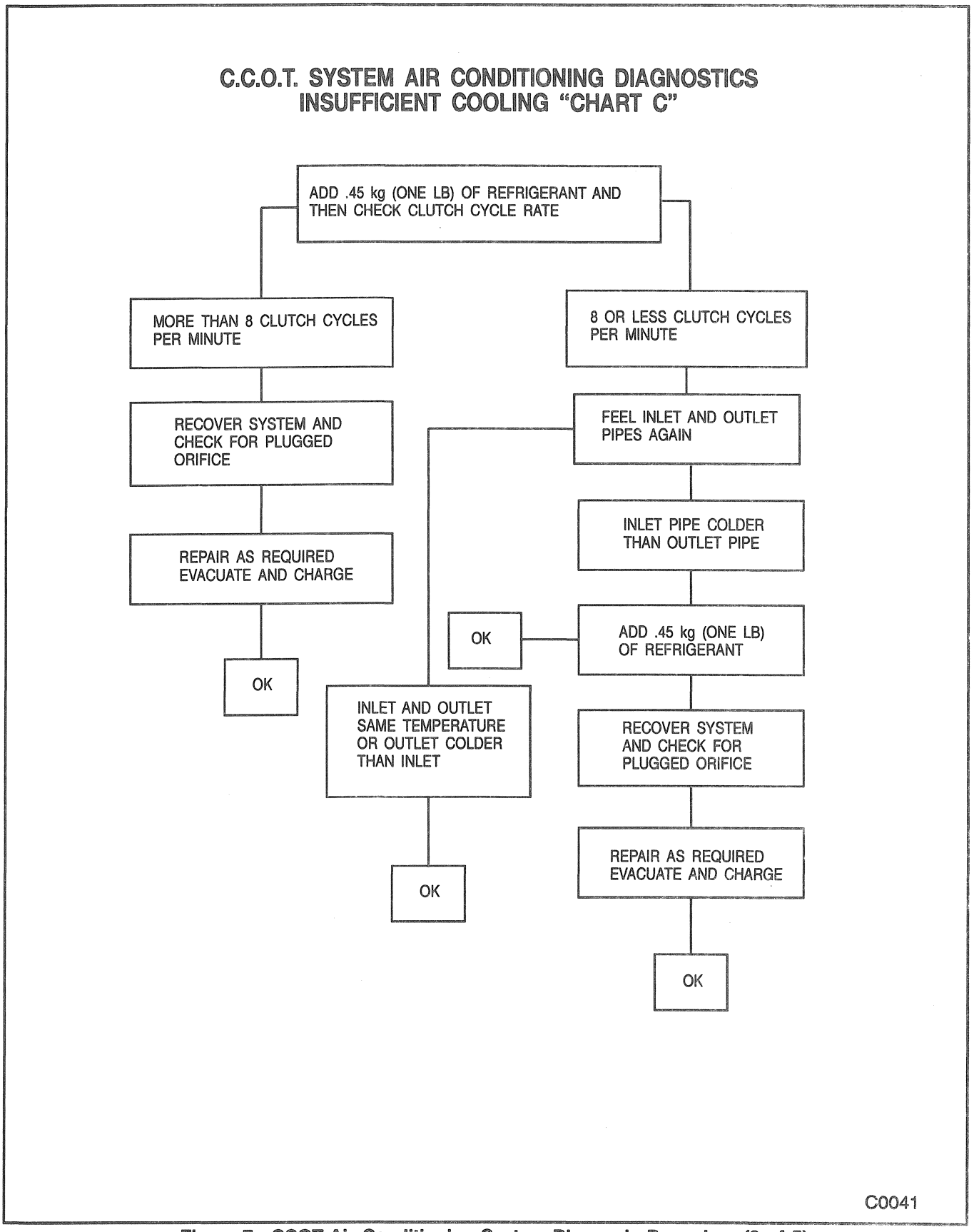


Figure 7—CCOT Air Conditioning System Diagnosis Procedure (3 of 5)

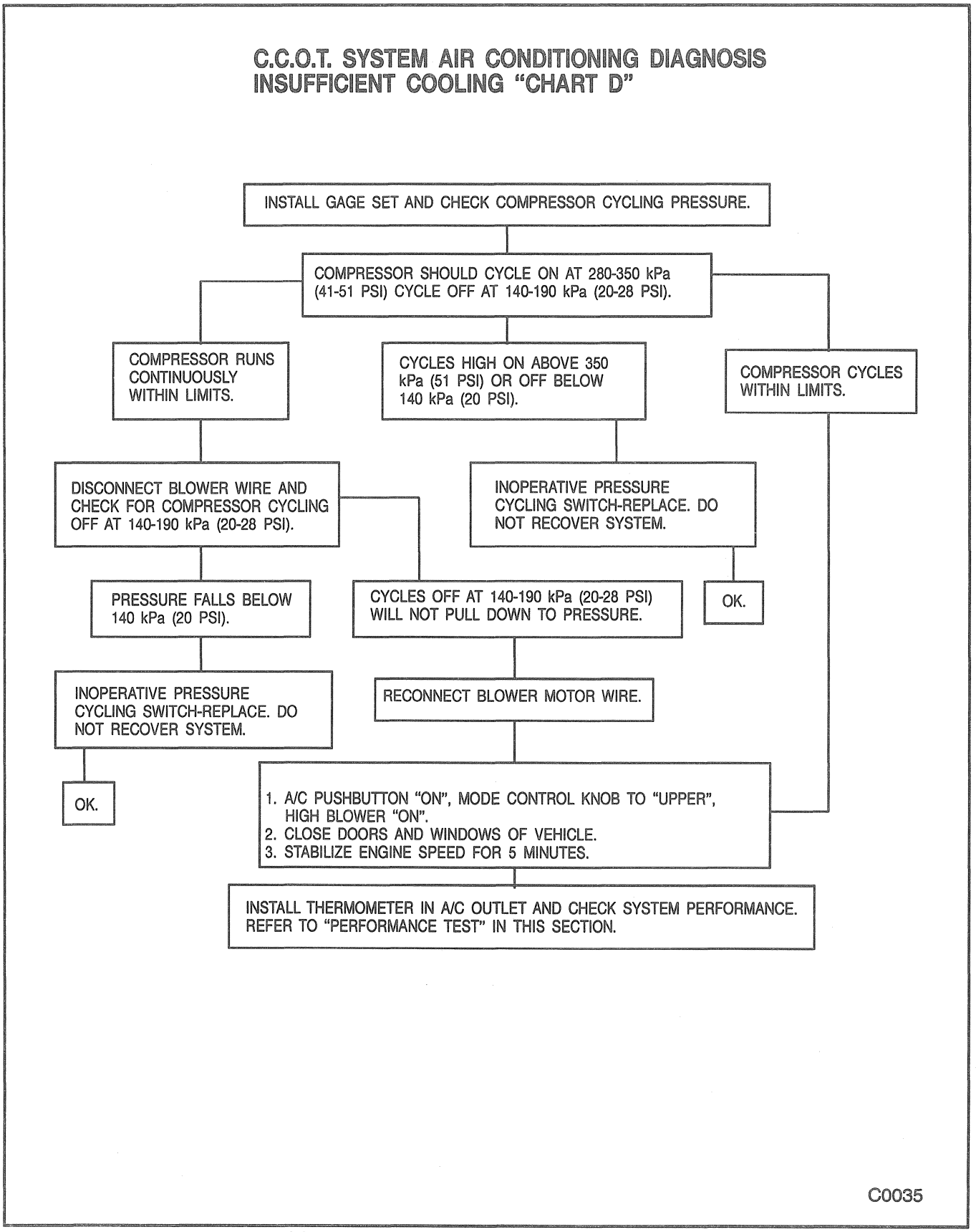


Figure 8—CCOT Air Conditioning System Diagnosis Procedure (4 of 5)

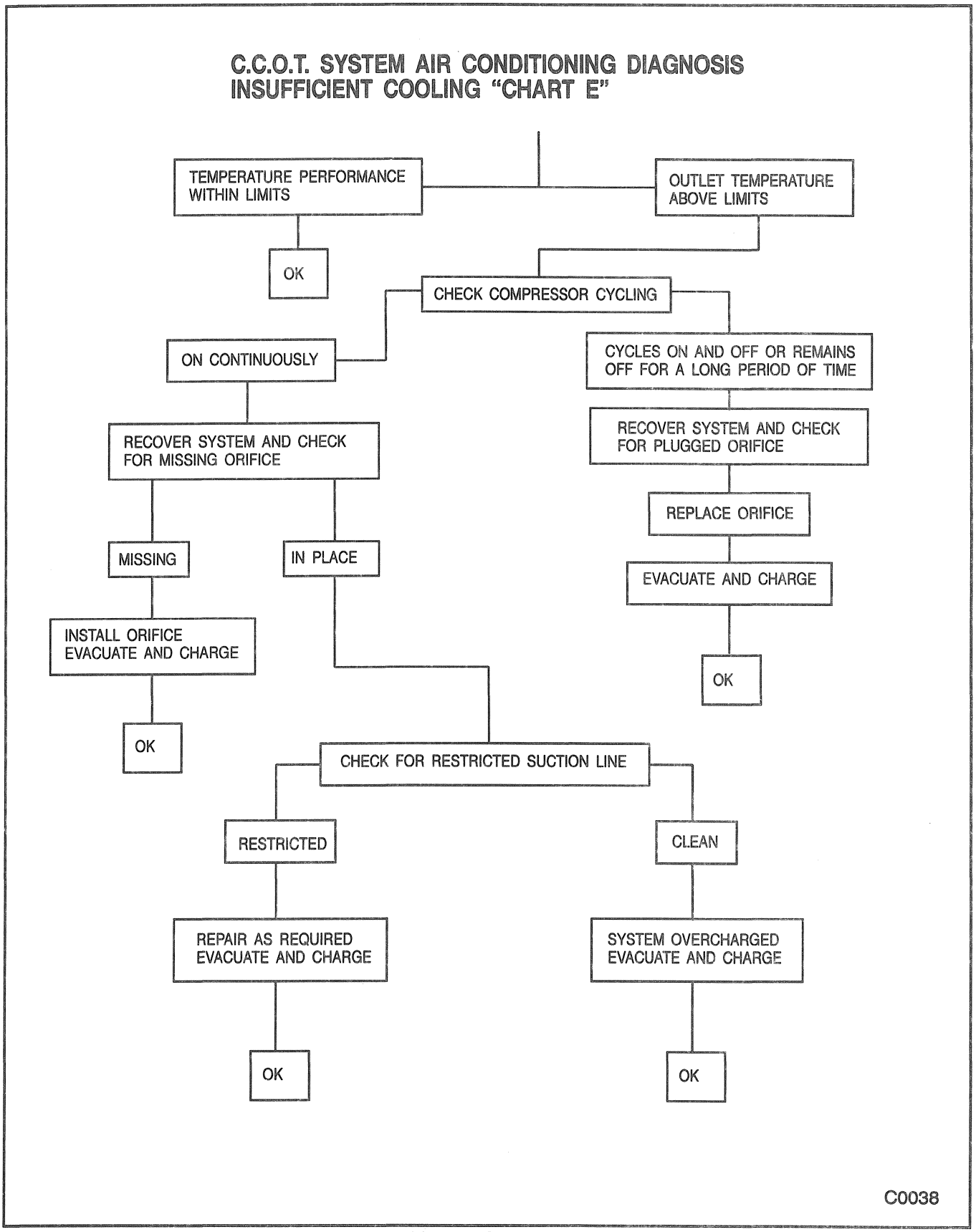


Figure 9—CCOT Air Conditioning System Diagnosis Procedure (5 of 5)

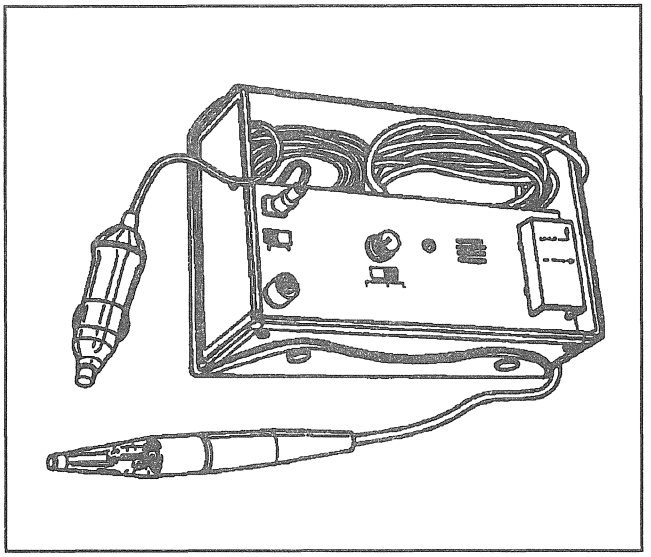


Figure 10—Electronic Leak Detector

Compressor Block Fitting and Shaft Seal

1. Blow shop air behind and in front of the compressor clutch/pulley for at least 15 seconds.
2. Wait 1-2 minutes.
3. Probe the area in front of the pulley. If the detector goes to a solid alarm, a leak has been found.

CCOT AIR CONDITIONING SYSTEM DIAGNOSIS CHARTS

Refer to Figures 5 through 9 for diagnosis of the CCOT air conditioning system.

BLOWER NOISE

A constant air rush noise is typical of high-speed blower operation. Some systems and modes may be noisier than others. If possible, check another similar vehicle to determine whether the noise is typical or excessive.

Sit in the vehicle with the doors and windows closed. With the engine running, run the blower on "HIGH" speed with the temperature set for maximum cooling. Cycle through the blower speeds, modes, and temperature settings to find where the noise does not occur. Try to define the types of noise.

- Noise is constant, but decreases with blower speed reduction. Typical noises are a whine, tick/click, flutter, or scrape.

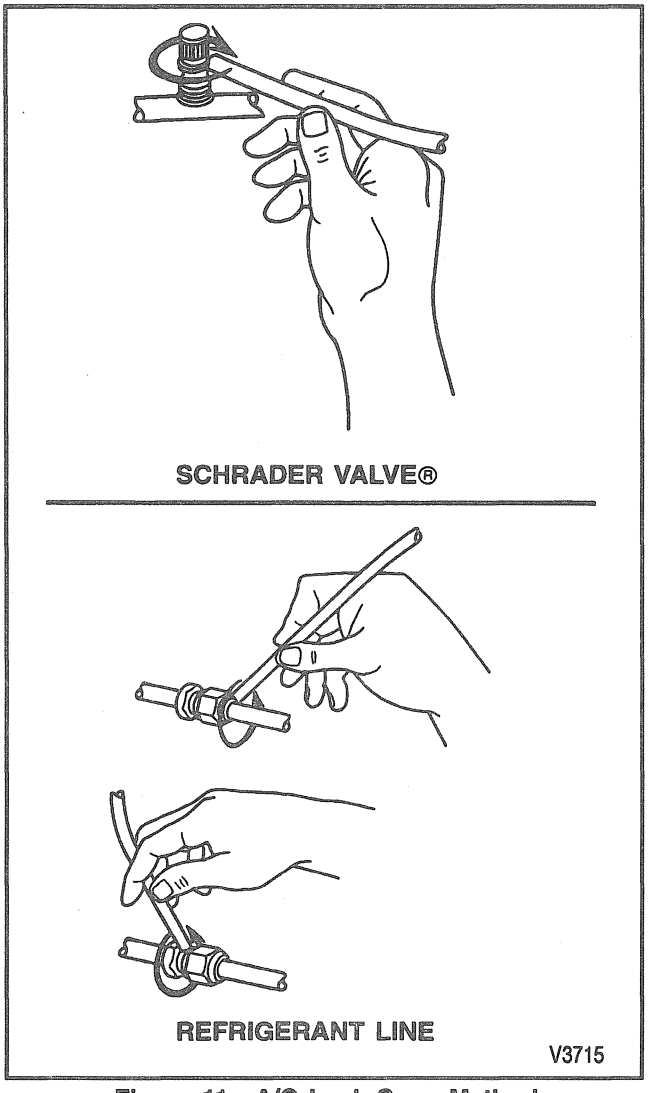


Figure 11—A/C Leak Scan Method

- Noise is only at startup or intermittent. This noise may occur at cold ambients and low blower speeds. Typical noise is a squeal/screech.
- Noise is constant at high blower speeds in certain modes, but can be eliminated at lower blower speeds in other modes. Typical noises are a flutter or rumble.

If the noise persists, remove the blower assembly and check for obstructions or foreign material causing noise and remove. If no obstructions are found and the noise is still heard, replace the blower assembly.

DIAGNOSIS OF AIR CONDITIONING (HEATER)

PROBLEM	POSSIBLE CAUSE	CORRECTION
Inadequate Defrosting	1. Obstruction in defroster nozzle.	1. Both defroster nozzle outlets should be inspected. Any foreign objects should be removed. Any loose instrument panel pad that blocks an outlet should be repaired.
	2. Damaged defroster nozzle outlet.	2. The outlet flange should be carefully reshaped with pliers so the outlet opening is uniform. If the outlet flange cannot be reshaped, the air distributor should be replaced.
	3. Faulty mode actuator.	3. Defroster air valve operation should be checked. A faulty mode actuator should be replaced.
	4. Insufficient heat.	4. Refer to "Insufficient Heating of Passenger Compartment" in this chart.
Inoperative Blower	1. Blown fuse.	1. The fuse should be replaced.
	2. Open circuit.	2. Check the circuit between the ignition switch and the blower motor, and the blower motor ground circuit. Repair as necessary.
	3. Faulty blower switch.	3. A faulty blower switch should be replaced.
Insufficient Heating of Passenger Compartment	1. Incorrect operation of controls.	1. The driver should be advised of proper operation of controls.
	2. Low engine coolant level.	2. Coolant should be added as needed. A check should be made for coolant leaks. The engine should be run to clear any air locks.
	3. Faulty engine thermostat.	3. The thermostat should be checked and replaced if necessary.
	4. Kinked heater hose.	4. Hoses should be checked and kinks should be straightened or hoses replaced as necessary.
	5. Obstructed heater core tubes.	5. An obstruction usually causes a squishing noise in the core. Any foreign material should be removed from the core or the core should be replaced.
	6. Faulty blower motor or blower circuit.	6. Faulty wires or connections must be repaired or replaced. A faulty blower motor must be replaced.
Cold Drafts on Floor	1. Partially open air inlet valve.	1. The air inlet valve should close properly in all modes except recirculation mode. Repairs should be made as necessary.
	2. Side door seals damaged or missing.	2. All door seals should be inspected. Faulty seals should be repaired or replaced as necessary.

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A/C NOISE DIAGNOSIS

NOISE DESCRIPTION	SOURCE	SOLUTION RECOMMENDATION CHECK
1. MOAN (OCCURS AT A SPECIFIC RPM, LESS AT OTHER SPEEDS).	COMPRESSOR.	A. GROUNDOUTS. B. LOOSE BRACKETS BOLTS. C. EXHAUST SYSTEM GROUND. D. LOW BELT TENSION. E. COMP. TORQ. CUSHION (TATC) ON HT6 ONLY. F. SOFTER HOSE MATERIAL.
2. GROWL (IDLE).	COMPRESSOR.	GROUNDOUTS ON ALL A/C LINES AND COMPONENTS.
3. GROWL (ALL SPEEDS).	COMPRESSOR.	ALL LINE CLAMPS AND ANCHOR POINTS (REMOVE TO CHECK).
4. CHATTER (IDLE).	COMPRESSOR.	SYSTEM REFRIG. CHARGE AND OIL (ADD 1/2# R134A AND 3 oz. PAG OIL, CHECK EFFECT.
5. WHINE (ALL SPEEDS) OR GRIND.	1. COMPRESSOR. 2. P/S PUMP. 3. GENERATOR.	A. PULLEY BRG. WITH A/C ON AND OFF. B. INTERFERENCE AT ALL ROTATING POINTS OF PULLEY (CHECK WITH BELT ON AND OFF).
6. SQUEAL (ALL SPEEDS).	1. COMPRESSOR. 2. P/S PUMP. 3. GENERATOR.	A. BELT ALIGNMENT. B. TENSIONER TORQUE. C. BELT CONDITION (EDGE WEAR FOR RUBBING).
7. HISS, GURGLE OR PERCOLATION.	1. ORIFICE TUBE. 2. TXV (THERMAL EXPANSION VALVE).	OCCURS AT A/C SHUT DOWN (ISOLATE LINES OR MOVE O/T OR TXV TO DIFFERENT LOCATION).
8. CHIRP OR THUMP.	COMPRESSOR CLUTCH.	OCCURS WHEN A/C CYCLES ON (COMPRESSOR CLUTCH ENGAGES OR DISENGAGES). APPLY ANTI-SEIZE COMPOUND TO CLUTCH FACE (VERY LIGHT COAT OF MOLY KOTE OR PERMATEXT 2000).
9. KNOCK.	COMPRESSOR.	A. LOOSE BRACKET BOLTS. B. BELT TENSIONER.

A/C ODOR DIAGNOSIS

PROBLEM	POSSIBLE CAUSE	CORRECTION
Musty Smell	1. Water leaks (body). 2. Evaporator drain. 3. Mold/mildew.	1. Seal body. 2. Clean drain. 3. Clean evaporator.
Coolant Smell	1. Anti-freeze.	1. Heater core. 2. Heater pipe/hoses.
Refrigerant Leak	1. Refrigerant oil.	1. Evaporator core.

NOTE: MOLD/MILDEW ODOR PROBLEM — Under certain climate and operating conditions a musty odor develops from mold growth in the evaporator core face. This odor is generally temporary and as climate conditions change will disappear and repair on its own. However, if odor persists, it will become necessary to remove evaporator core and clean the face with appropriate cleaner.

NOTE: If diagnosis indicates a component of the A/C system needs to be cleaned, refer to "Air Conditioning System Odor Procedure".

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REFRIGERATION SYSTEM SERVICES

Before attempting any service that requires opening the refrigerant lines or components to the atmosphere, the technician should be thoroughly familiar with the information under "Handling Refrigerant-134a," "Handling Refrigerant Lines and Fittings," and "Maintaining Chemical Stability" in this section. Very carefully follow the instructions in the "Refrigerant Recovery and Recycling, Adding Oil, Evacuating and Recharging Procedures" in this section, for the unit being serviced.

REPLACING O-RING SEALS

Install new GM-approved service replacement air conditioning O-ring seals whenever a joint or fitting is installed, except when the O-ring seals are provided on new replacement components. Unless service replacement O-ring seals bearing the specified part numbers are used, excessive leakage of Refrigerant-134a may occur. Refer to the part number for identification.

Coat air conditioning O-ring seals with 525 viscosity refrigerant oil just before installation. Slip them onto the flange tube to ensure proper locating and sealing. To prevent the possibility of swelling and a reduction in sealing effectiveness, do not soak O-ring seals in refrigerant oil. Before installation, O-ring seals and fittings should be examined to make sure they have not been nicked or deformed. Replace nicked or deformed parts to prevent refrigerant leakage.

REPLACING DUAL O-RING SEALS

Install new GM-approved service replacement air conditioning O-ring seals whenever a joint or fitting is installed, except when the O-ring seals are provided on new replacement components. Unless service replacement O-ring seals bearing the specified part numbers are used, excessive leakage of Refrigerant-134a may occur. Refer to the part number for identification.

This vehicle uses GM's dual O-ring joint design in the system. This design increases the durability of the joint seal by providing a second O-ring seal. The dual O-ring design consists of:

- An aluminum-alloy, externally threaded fitting which is brazed or welded to an aluminum tube.
- A free-spinning, plated steel internally threaded nut.
- A precision machined, male-piloted aluminum tube end which accomodates two O-rings.

SERVICING DUAL O-RING SEALS

Tool Required:

J 38042 Dual O-Ring Tube Separator

When servicing the dual O-ring joint, the following procedure should be followed:

- Completely recover refrigerant from system. Refer to "Refrigerant Recovery and Recycling, Adding Oil, Evacuating and Recharging" in this section.
- Use J 38042 dual O-ring tube separator to separate the joint while loosing the female nut.
- Whenever a fitting joint is opened, replace the O-rings with new ones.
- Use a nonmetallic tool when removing O-rings to prevent the chance of damaging the seal surface.
- Avoid excessive stretching and twisting of replacement O-rings.
- Align the end forms for pilot-to-bore insertion, then push together completely.
- Application of a small amount of 525 viscosity refrigerant oil will ease insertion.

Important

- Dual O-ring fittings are different in size from standard A/C fitting O-rings.
- Dual O-ring fittings require that the aluminum nut be tightened to a torque of 24 N·m (18 lb. ft.).

Before installation, O-ring seals and fittings should be examined to make sure they have not been nicked or deformed. Replace nicked or deformed parts to prevent refrigerant leakage.

HANDLING REFRIGERANT-134a

CAUTION: Avoid breathing A/C refrigerant and lubricant vapor or mist. Exposure may irritate eyes, nose, and throat. To remove R-134a from the A/C system, use service equipment certified to meet the requirements of SAE J2210 (R-134a recycling equipment). If accidental system discharge occurs, ventilate work area before resuming service. Additional health and safety information may be obtained from refrigerant and lubricant manufacturers.

Important

- R-12 refrigerant and R-134a refrigerant must never be mixed, even in the smallest of amounts. They are incompatible with each other. If the refrigerants are mixed, compressor failure is likely to occur.
- Use only specified lubricant (PAG) for the R-134a A/C system and R-134a components. If lubricants other than those specified are used, compressor failure is likely to occur. All fittings and O-ring seals should be coated with clean 525 viscosity refrigerant oil to provide a leak-proof seal and to aid in assembly and disassembly.
- Do not store or heat refrigerant containers above 52°C (125°F).
- Do not heat a refrigerant container with an open flame. If the container must be warmed, place the bottom of the container in a pail of warm water.
- Do not intentionally drop, puncture, or incinerate refrigerant containers.
- Refrigerant will displace oxygen, so make sure to work in well-ventilated areas to prevent suffocation.
- Do not introduce compressed air to any refrigerant container or refrigerant component, because contamination will occur.

- If it is necessary to carry a container of "Dot CFR" Refrigerant-134a in a vehicle, do not carry it in the passenger compartment.

All Refrigerant-134a disposable (colored "Blue") containers are shipped with a heavy metal screw cap to protect the valve and safety plug of the container from damage. It is good practice to replace the cap after each use of the container to continue protection.

HANDLING REFRIGERANT LINES AND FITTINGS

Important

- Before opening the refrigeration system to the atmosphere, make sure the work area is well ventilated. Welding or steam-cleaning operations should not be done on or near refrigeration system lines or other air conditioning parts on the vehicle.
- All metal tubing lines should be free of dents or kinks to prevent loss of system capacity due to line restriction.
- The flexible hose lines should never be bent to a radius of less than four times the diameter of the hose.
- The flexible hose lines should never be allowed to come within a distance of 6.5 mm (2.5 inches) of the exhaust manifold.
- Flexible hose lines should be inspected regularly for leaks or brittleness and replaced with new lines if deterioration or leaking is found.
- When disconnecting any fitting in the refrigerant system, the system must be discharged of all Refrigerant-134a. However, proceed very cautiously, regardless of the gage readings. Open very slowly, keeping your face and hands away so that no injury can occur. If pressure is noticed when a fitting is loosened, allow it to bleed off very slowly.

NOTICE: ***Alcohol should never be used in the refrigeration system in an attempt to remove moisture. Damage to system components could occur.***

- If any refrigerant line is opened to the atmosphere, it should be immediately capped to prevent the entrance of moisture and dirt. These contaminants can cause internal compressor wear or plugged lines in the condenser and evaporator core and expansion (orifice) tubes or compressor inlet screens.
- Remove sealing caps from subassemblies just before making connections for final assembly. Use a small amount of clean 525 viscosity refrigerant oil on all tube and hose joints. Use new O-ring seals dipped in 525 viscosity refrigerant oil when assembling joints. The oil will aid in assembly and help to provide a leakproof joint. O-ring seals and seats must be in perfect condition because a burr or a piece of dirt can cause a refrigerant leak. Refer to Figures 12 and 13 for additional information.

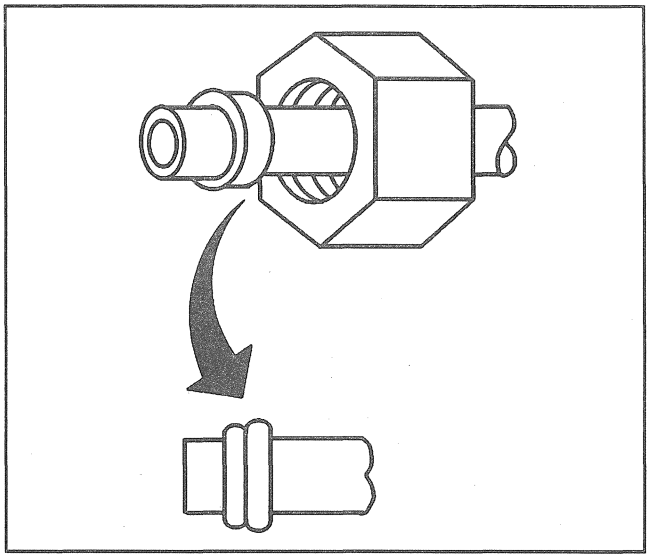


Figure 12—Proper O-Ring Installation

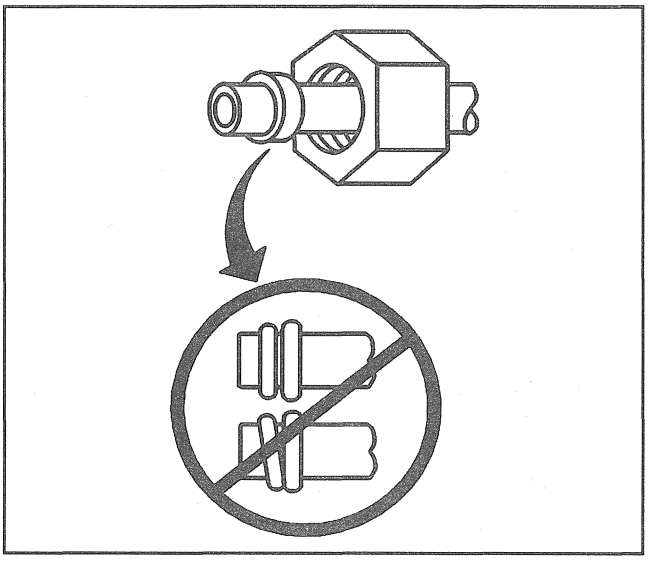


Figure 13—Improper O-Ring Installation

- It is important to use the proper wrenches when making connections on O-ring seal fittings. The use of improper wrenches may damage the connection. The opposing fitting should always be backed up with a wrench to prevent distortion of connecting lines or components (Figures 14 and 15). When connecting the flexible hose connections, it is important that the swaged fitting and the flare nut, as well as the coupling to which it is attached, be held at the same time using three different wrenches to prevent turning the fitting and damaging the seat.

Tighten tubing connections to the specified torque. Refer to "Specifications" in this section.

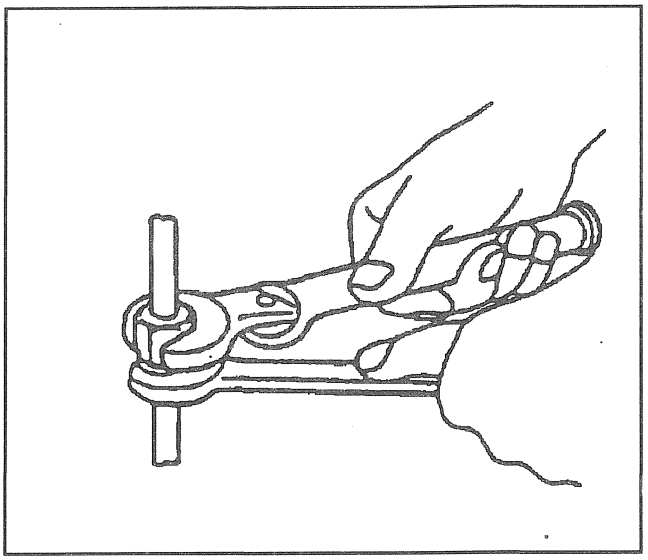


Figure 14—Using the Two-Wrench Method

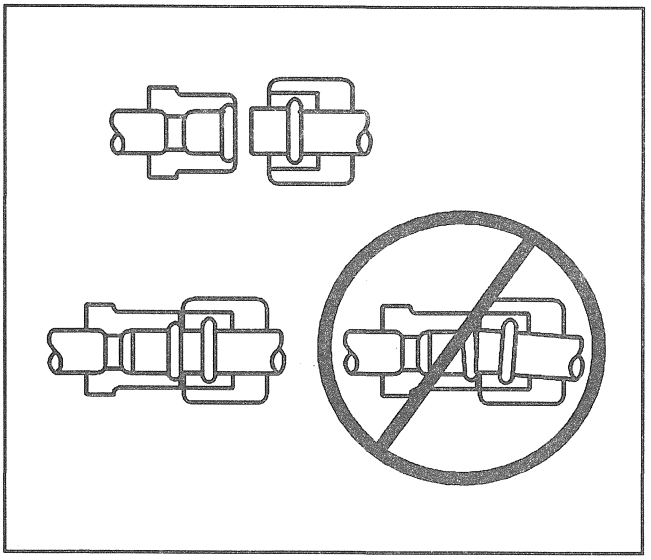


Figure 15—Refrigerant Line Installation

MAINTAINING CHEMICAL STABILITY

The life and efficient operation of the air conditioning system depends upon the chemical stability of the refrigerant system. When foreign materials, such as dirt, air, or moisture, contaminate the refrigeration system, they change the stability of the Refrigerant-134a and polyalkaline glycol (PAG) refrigerant oil. They will also affect the pressure-temperature relationship, reduce efficiency, and could cause internal corrosion and abnormal wear of moving parts.

The following general practices should be followed to ensure chemical stability in the system:

1. Whenever it becomes necessary to disconnect a hose connection, wipe away any dirt or oil at or near the connection to eliminate the possibility of dirt entering the system. Both sides of the connection should be capped, plugged, or taped as soon as possible to prevent the entrance of dirt and moisture. (Remember that all air contains moisture. Air that enters any part of the refrigeration system will carry moisture with it, and the exposed surfaces will collect the moisture quickly.)
2. Keep tools clean and dry. This includes the Manifold Gage Set and all replacement parts.
3. When adding polyalkaline glycol (PAG) refrigerant oil, the container/transfer tube through which the oil will flow should be exceptionally clean and dry. Refrigerant oil must be as moisture-free as possible.
4. When it is necessary to "open" an air conditioning system, have everything needed ready so that as little time as possible will be required to perform the operation. Do not leave the air conditioning system open any longer than necessary.
5. Anytime the air conditioning system has been "opened," it should properly evacuated before recharging.

REFRIGERANT AND OIL CAPACITY

The refrigerant system requires refrigerant and oil in the quantities listed below:

1. Refrigerant-134a
   - Pickup Models - 0.91 kg (2.0 lb.)
   - Crew Cab, Suburban, and Utility Models - 1.02 kg (2.25 lb.)
   - Suburban Models with Aux. A/C - 1.81 kg (4.0 lb.)
2. Polyalkaline Glycol (PAG) Refrigerant Oil
   - Front Air Conditioning System (C60) - 240 ml (8 fl. oz.).
   - Front and Rear Air Conditioning System (C69) - 330 ml (11 fl. oz.).
   - Overcharging a system may allow liquid Refrigerant-134a to get into the compressor, causing compressor noise and damage. Undercharging will cause insufficient cooling.

REFRIGERANT RECOVERY AND RECYCLING, ADDING OIL, EVACUATING AND RECHARGING PROCEDURES

GENERAL DESCRIPTION

The air conditioning refrigerant (R-134a) recovery, recycling and recharging system (J 39500) removes Refrigerant-134a from the vehicle A/C system, recycles and recharges all with one hookup.

Single-pass filtering during recovery cycle, plus automatic multiple-pass filtering during evacuation cycle ensures a constant supply of clean/dry refrigerant for A/C system charging.

Important

- R-12 and R-134a require separate and non-interchangeable sets of recovery, recycle, and recharge equipment, because the refrigerants and lubricants are not compatible and cannot be mixed even in the smallest amounts.
- Do not attempt to use one set of equipment for both R-12 and R-134a, as all equipment contains residual amounts of refrigerant and/or lubricant, which will result in contamination and damage to the recover/recycle equipment.
- Adaptors to convert from one size fitting to the other must never be used; refrigerant/lubricant contamination will occur and system failure may result.

STATION (ACR4) SETUP AND MAINTENANCE

Initial Setup

Refer to the manufacturer's instructions for all initial setup procedures.

Operational Setup

CAUTION: Always wear goggles and gloves when doing work that involves opening the refrigeration system. If liquid refrigerant comes into contact with the skin or eyes, injury may result.

CAUTION: Use only authorized 23-kg (50-lb.) refillable refrigerant tanks (J 39500-50). Use of other tanks could cause personal injury and void the warranty.

1. Connect high side (Red) and low side (Blue) hoses to the ACR4 unit (Figure 16). Make sure to route hoses through hose reel bracket grommets.

NOTICE: ***Refrigerant-134a systems have special fittings (per SAE specifications) to avoid cross-contamination with Refrigerant-12 systems. Do not attempt to adapt this unit to Refrigerant-12 systems as severe system failure will result.***

Control Panel Functions

This section explains the functions of the various components of the unit's control panel (Figure 17).

- **Main Power Switch**--Supplies electrical power to the control panel.
- **Beeper**--Emits an audible tone to alert the operator to unit operating functions.
- **Digital Display**--Shows the time programmed for vacuum and the weight of refrigerant programmed for recharging. Detailed instructions for programming this display are included in "Digital Display Functions" in this section.
- **Low Side Manifold Gage**--When connected to an A/C system, this gage shows the system's low side pressure.

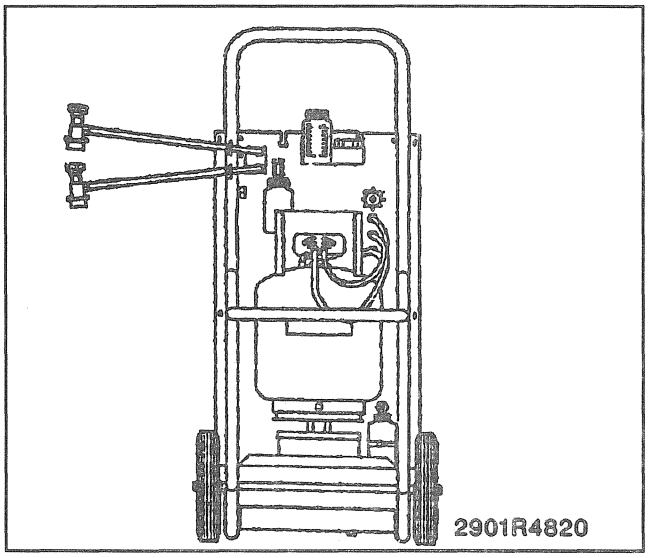


Figure 16—Complete Operational Set-Up

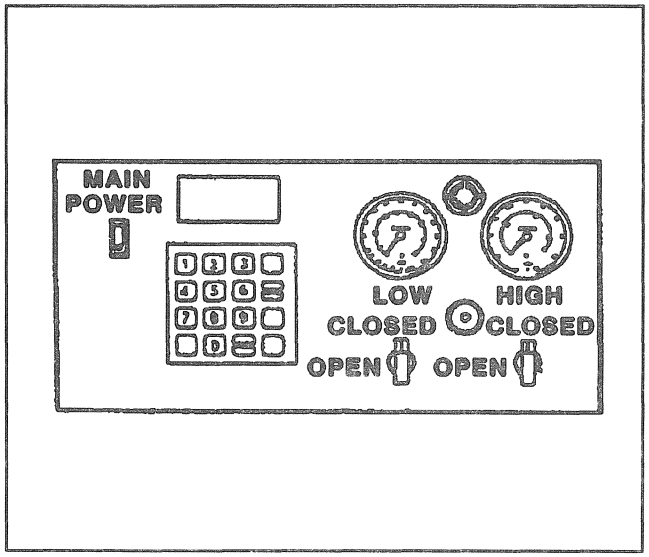


Figure 17—Control Panel

- **High Side Manifold Gage**--When connected to an A/C system, this gage shows the system's high side pressure.
- **Moisture Indicator**--Shows if the refrigerant is wet or dry.
- **Low Side Valve**--Connects the the low side of the A/C system to the unit.
- **High Side Valve**--Connects the high side of the A/C system to the unit.

In addition to the number keys, the control panel contains special keys that accomplish specific operating functions (Figure 18).

- **Recycle**--Activates the recycling sequence.
- **Recover**--Activates the recovery sequence.
- **Shift/Reset**--Activates "shifted" positions of keys on the keypad and resets the program mode.
- **Filter**--Automatically recovers and evacuates to 17 in. Hg. from the filter and low side of the unit.
- **CHG.**--Automatically charges the A/C system with the programmed amount of refrigerant.
- **Hold/Cont.**--Interrupts the automatic cycle in the "HOLD" position, and then resumes functions in the "CONT" position. Press this button once for "HOLD," and again for "CONT."
- **Vacuum**--Activates the vacuum and automatic recycling sequence.
- **Enter**--Enters programmed data into the unit's control memory.

Digital Display Functions

For information regarding the functions of the digital display, refer to the manufacturer's instructions.

Maintenance

Refer to manufacturer's instructions for all maintenance procedures.

Refrigerant Recovery

Important

- Use only the 23-kg (50-lb.) unit refrigerant tank (J 39500-50) designed for the ACR4. The unit's overfill limitation mechanism has been calibrated specifically for use with this tank, and the tank's valving is set up specifically for use with the unit.

1. Attach the high side (Red) hose with the quick disconnect coupler to the high side fitting of the vehicle's A/C system. Open the coupler valve after attachment.
2. Attach the low side (Blue) hose with the quick disconnect coupler to the low side fitting of the vehicle's A/C system. Open the coupler valve after attachment.
3. Check the high side and low side gages on the unit's control panel to make sure the A/C system has pressure. If there is no pressure, there is no refrigerant in the system to recover.

Important

- If there is no refrigerant in the A/C system, do not continue with the recovery operation. Air will be drawn into the recovery tank.

4. Open both the high side and the low side valves on the control panel.
5. Open both the red "Gas" (vapor) and the blue "Liquid" valves on the tank.
6. Slowly open the oil drain valve to see if the oil separator contains oil.
   - If any oil drains into the catch bottle at the bottom of the unit, allow it to drain until there is no more oil in the separator.
7. Close the oil drain valve.
   - Dispose of the oil in the catch bottle in an appropriate manner and return the bottle to it's place on the unit.
8. Plug the unit into the proper voltage outlet and turn on the "Main Power" switch.
9. Press "RECOVER" on the key pad. Before recovery begins, the unit will clear itself of refrigerant "CL-L" will appear on the display. The clearing process takes from 30 seconds to 3 minutes to complete (Figure 19).
10. When clearing is complete, the unit will automatically start recovery, and the control panel display will show the unit is in the "Recover" mode of the

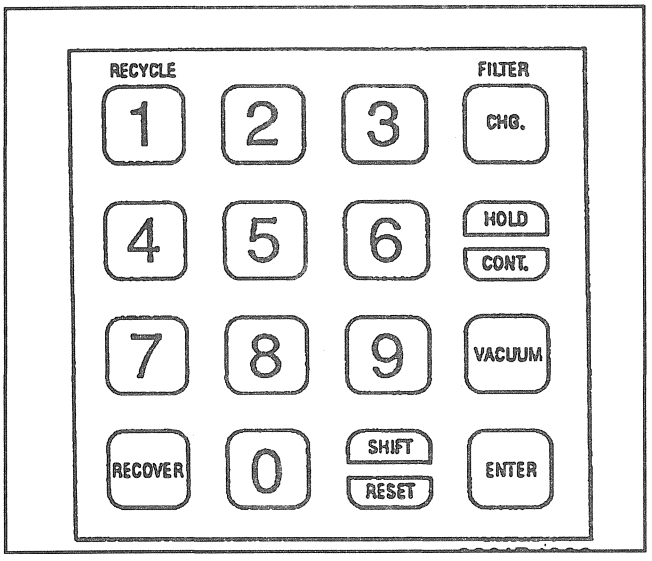


Figure 18—Keypad Functions

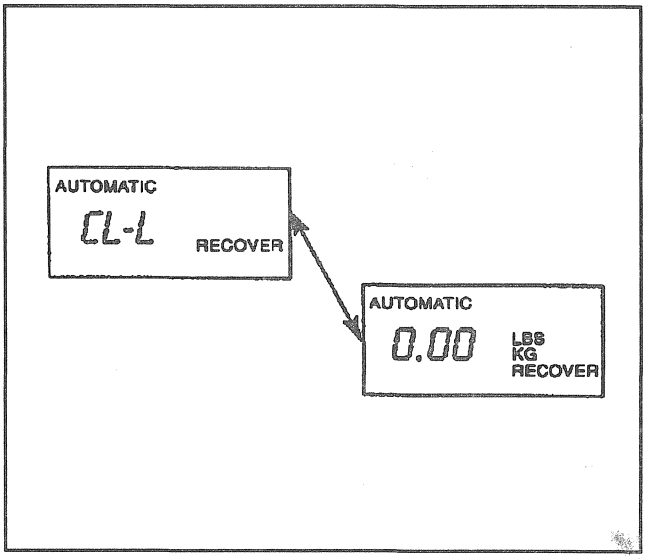


Figure 19—Refrigerant Recovery Display at Start

"Automatic" cycle. Also, the weight of refrigerant being recovered will be displayed.

11. The compressor shuts off automatically when initial recovery has occurred (at approximately 17 in. Hg. vacuum).
12. At the end of the initial recovery process, the display shows "CPL" and then alternately flashes the weight of refrigerant recovered and "OIL/OZ." ("OIL/GMS") (Figure 20).

NOTICE: ***After the initial recovery, more refrigerant might be trapped in the system. About 5 minutes is usually required for it to boil out of the oil. Follow Step 17 to continue the recovery process.***

Important

- Some A/C system lubricating oil (Polyalkaline Glycol-PAG) might be removed with the refrigerant during recovery. The amount of oil removed (often there will be none) will vary greatly depending on a variety of conditions of the vehicle being serviced. The ACR4 separates the oil from the refrigerant.
- The "OIL/OZ" ("OIL/GMS") flashing is a reminder to always drain the recovered oil at this time. The same amount of oil must be replaced in the A/C system later when the system is recharged with refrigerant.

13. Slowly open the oil drain valve and drain the oil into the calibrated oil catch bottle at the bottom of the unit.
14. After the oil is completely drained, close the valve.
15. Read and record the amount of oil removed in the catch bottle.
16. Dispose of the recovered oil in an appropriate manner. Never reuse this oil.
17. Wait 5 minutes, then check the control panel "Low Side Gage."
    - If the A/C system has maintained a vacuum, the recovery is complete.

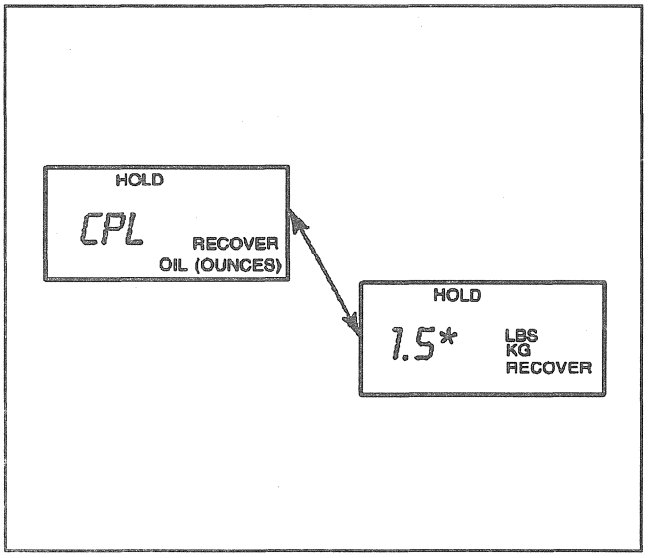


Figure 20—Refrigerant Recovery Display at End

18. If the "Low Side Gage" pressure rises above "0," this indicates the presence of more refrigerant in the system. In this case, press the "HOLD/CONT" key on the keypad to recover the additional refrigerant. Repeat this step as needed until the system maintains vacuum for 2 minutes.

Important

- If the display flashes "Full" during the recovery process, and the unit shuts off, the unit tank is full.
- An empty unit tank (J 39500-50) must be installed to accommodate additional refrigerant proceeding to the next step in the recovery operation. DO NOT USE ANY OTHER KIND OF TANK.
- Charging other vehicles will lower the amount of refrigerant in the unit's tank.

Evacuation

The ACR4 unit tank must contain sufficient R-134a refrigerant for A/C system charging. Check the amount of refrigerant in the tank by simultaneously pressing "RESET" and "ENTER" on the keypad to enter the diagnostic mode. Once in the diagnostic mode, press "7." When "7" is pressed, the ACR4 unit will display the amount of R-134a refrigerant available in the tank. If less than 3.6 kg (8 lbs.) is displayed, add new refrigerant to the tank. Refer to the manufacturer's instructions for adding refrigerant.

1. With the high side and low side hoses connected to the vehicle A/C system, open both the high side (Red) and the low side (Blue) valves on the unit's control panel.
2. Open both the red "Gas" (vapor) and the blue "Liquid" valves on the tank.

Important

- To remove all the air and properly dry the A/C system, the unit automatically goes to a minimum evacuation time of 20 minutes.

It is possible to evacuate longer than 20 minutes. Press keys to enter time desired. New entry will show on the display. Press "ENTER" and the display will blink indicating input of data (Figure 21).

3. Press "VACUUM" to start the vacuum pump. The display counts down the vacuum time from 20 minutes to zero to indicate operation time remaining.

The display reads "RECYCLE" 5 seconds after the vacuum pump starts and continues while the process takes place.

Important

- Automatic refrigerant recycling during each evacuation is a feature of the ACR4 system. No action is required by the technician.
- The control panel "Moisture Indicator" must be "Green" during recycling verifying refrigerant moisture content is within specification. "Yellow" indicates a wet condition requiring a filter/drier cartridge change. Refer to the manufacturer's instructions for this procedure.

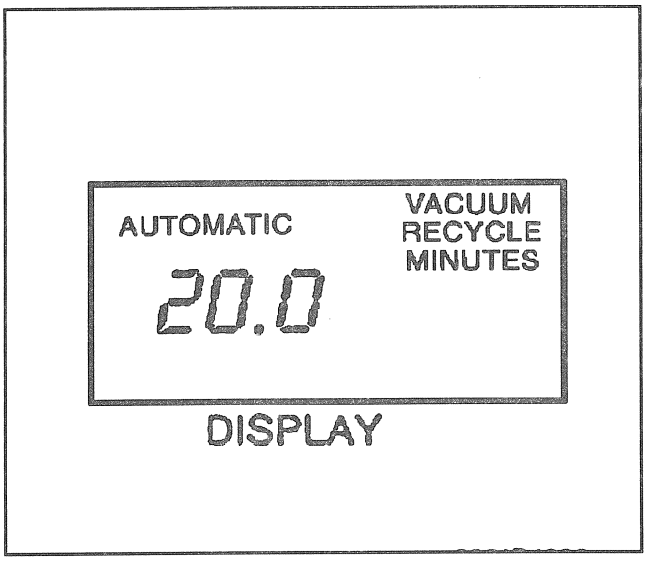


Figure 21—Press Keys to Enter Evacuation Time

- Non-condensable gases (mostly air) are automatically vented from the tank during the recycling process. An audible sound of pressure release may be heard as this happens. This is a normal function.

4. At approximately the 17 minute mark on the display, (pump has run for 3 minutes) press "HOLD/CONT" key to stop vacuum pump (Figure 22).
   A. A "0" vacuum reading indicates a major system leak. Repair leak and restart evacuation procedure.
   B. If a reading of 91-101 kPa (27-30 inch of Hg) is indicated, close the low side and high side valves. Observe the vacuum level for a few minutes as a leak check of the A/C system. If vacuum is not maintained, find and repair the A/C system leak before continuing.
   C. If a reading of 91-101 kPa (27-30 inch of Hg) is maintained, open the high side and low side valves and press the "HOLD/CONT" key to restart the vacuum pump.
5. When the vacuum sequence has run the programmed time, the display shows "CPL" to indicate that evacuation is complete.

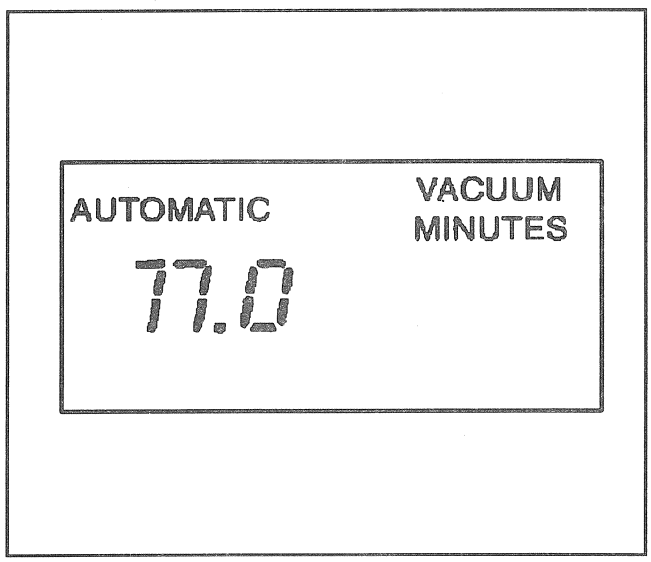


Figure 22—Stopping Evacuation at 17 Minutes

Important

- The vacuum pump oil must be changed frequently.
- When the pump has run for a total time of 10 hours, the message "OIL" will flash on the control panel display as a reminder to change the oil.
- If the "OIL" warning flashes during operation, press "CONT" and change the oil before the next operation. Refer to the manufacturer's instructions for this procedure.

A/C System Oil Charge Replenishing

If oil was removed from the A/C system during the recovery process, it must be replenished at this time.

1. Select the correct graduated bottle of replenishing polyalkaline glycol (PAG) oil for the R-134a A/C system being serviced.
2. Adjust the O-ring seal around the the PAG oil bottle to the required oil charge level.
   Example: If bottle oil level is at 4 oz. and 1/2 oz. of oil is required, adjust O-ring seal to 3 1/2 oz. as final level mark.
3. Install the bottle on the oil injection system on the back of the unit.

Important

- Keep the oil bottles tightly capped at all times to keep out moisture and contamination.
- Never open the oil injection valve while there is positive pressure in the A/C system. This will result in oil blow-back through the bottle vent. A/C system vacuum is required for this operation.
- Never let the oil level drop below the pickup tube while charging or replenishing. This will allow air into the A/C system.

4. Open the valve at the top of the plastic container and watch the level of oil being drawn into the system.
5. Close the valve when the required oil charge has been pulled into the system.

Refrigerant Oil Distribution

The Harrison HT-6 compressor system used on all C/K models requires polyalkaline glycol (PAG) refrigerant oil in the quantities listed below:

- Without Aux. A/C - 240 ml (8 fl. oz.)
- With Aux. A/C - 330 ml (11 fl. oz.)

New oil quantities must be added to the system during component replacement and conditions stated as follows:

- With no signs of excessive oil leakage, add:

A. All Compressors (drain and measure the oil)
   - If less than 30 ml (1 fl. oz.) is drained—add 60 ml (2 fl. oz.) to the new compressor.
   - If more than 30 ml (1 fl. oz.) is drained—add same amount that was drained to the new compressor.

B. Accumulator—Add 105 ml (3.5 fl. oz.) of new oil to the replacement accumulator to compensate for oil retained by original accumulator desiccant and bag assemblies. The accumulator should only be replaced if leaking due to a perforation, damaged O-ring seal seat, or damaged threads.
C. Evaporator—Add 90 ml (3 fl. oz.) of new refrigerant oil.
D. Condenser—Add 30 ml (1 fl. oz.) of new refrigerant oil.

Refrigerant Oil Loss Due to a Large Leak

If the refrigerant charge is abruptly lost due to a large refrigerant leak, approximately 90 ml (3 fl. oz.) of refrigerant oil will be carried out of the system suspended in the refrigerant. Any failure that caused a abrupt refrigerant discharge will experience this oil loss. Failures that allow the refrigerant to seep or bleed off over time do not experience this oil loss.

Upon replacement of a component that caused a large refrigerant leak, add 90 ml (3 fl. oz.) of new polyalkaline glycol (PAG) refrigerant oil plus the desired amount of oil for the particular component. Refer to "Refrigerant Oil Distribution" in this section.

Charging

Important

- The A/C system must be evacuated prior to charging.
- Check that the "Lbs/Kg" switch on the back of the unit to make sure it is set for the desired units of weight system (operate switch with main power "Off").

1. Close the low side valve on the control panel (Figure 23).
2. Open the high side valve on the control panel.
3. Press "CHG" on the keypad to make sure the unit is in the program mode.

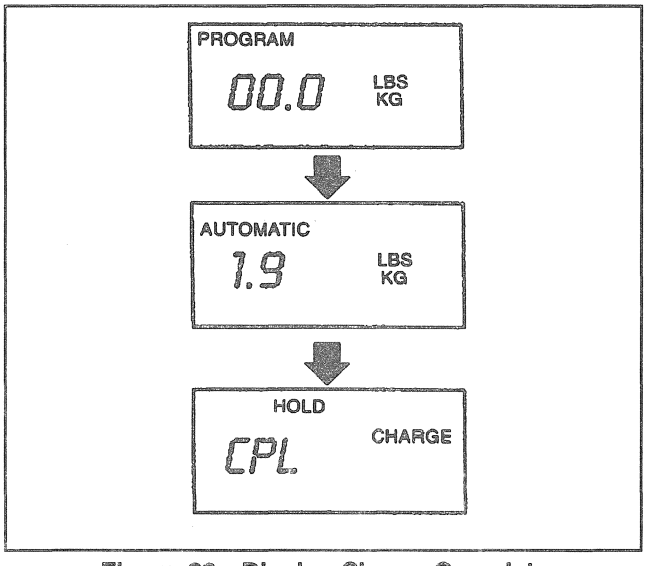


Figure 23—Display Shows Complete

4. Enter the amount of refrigerant charge to charge the A/C system by pressing the appropriate number keys. Make sure to use correct unit of weight (Lbs. or Kg.).
5. Press "ENTER."
   - A blink of the display indicates the charge amount is in the unit's memory.
6. Press "CHG" on the keyboard to begin the charging process.
7. The display shows "AUTOMATIC" and the amount of refrigerant programmed for charging.
   - The display counts down to zero as the charging process proceeds.
   - At the end of the process, the display shows "CPL."

Important

- If the transfer of refrigerant stops before complete, refer to "Unsuccessful Transfer" in this section.

Successful Transfer Complete

1. Close the high side valve on the unit's control panel. (Both valves should be closed.)
2. Start the vehicle and the A/C system and let run until the readings on the high side and low side gages stabilize. Compare readings to system specifications.
3. Check the evaporator outlet temperature to make sure the A/C system is operating to system specifications.
4. With the A/C system running, close the high side coupler valve and disconnect the high side (Red) hose from the vehicle.
5. Open both the high side and low side valves on the control panel.
6. Refrigerant from both hoses will be drawn quickly in to the A/C system through the low side (Blue) hose.
7. Close the low side coupler valve and disconnect from the vehicle.

Unsuccessful Transfer

On rare occasions, the total charge does not transfer to the vehicle A/C system. There are two reasons why this can occur.

1. If the transfer is too slow because the pressure in the unit's tank and the vehicle A/C system are about the same, the unit will emit an audible signal and the display shows the weight remaining for transfer (Figure 24).
   In this case:
   A. Close the high side valve.
   B. Open the low side valve.
   C. Start the vehicle A/C system, and press "HOLD/CONT" on the keyboard.
   This will put the remainder of the charge into the A/C system, and continue with Step 1 under "Successful Transfer Complete" in this section.

2. If the transfer will not complete and the display shows "CHECK REFRIGERANT," there is not enough refrigerant in the tank to complete the process. This condition requires the recovery of the partial charge of refrigerant in the vehicle A/C system and another complete evacuation and charge procedure.
   A. Press "HOLD/CONT" on the keypad to interrupt the cycle.
   B. Press "RESET" to reset the unit.
   C. Recover the refrigerant that has been charged into the system, refer to "Refrigerant Recovery" in this section.
3. Add refrigerant to the tank following the manufacturer's instructions, and refer to Step 1 under "Evacuation" in this section.

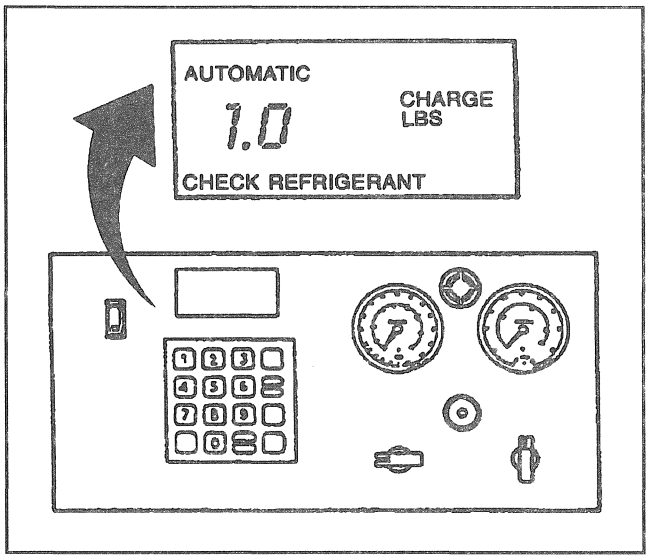


Figure 24—Unsuccessful Charging

DIAGNOSIS OF THE REFRIGERANT RECOVERY, RECYCLING AND RECHARGING SYSTEM

PROBLEM	POSSIBLE CAUSE	CORRECTION
RECOVERY OPERATION		
Recovery Compressor Does Not Start	• "Main Power" switch off. • Power cord not plugged in or no power at plug. • "Full" on digital display. • "Hi-P" on digital display. • Faulty components.	• Turn on "Main Power" switch. • Check circuit for power. • Change the tank according to the manufacturer's instructions. • Check the valves on the unit tank to be sure they are open. • Operate recycling only to activate automatic air purge. Excessive air raises the tank presure. Refer to manufacturer's instructions.
Runs A Short Time, But Does Not Complete Recovery	• Tank valves not open. • Manifold valves not open. • Faulty components.	• Open both valves on the tank. • Open both valves on the manifold.
Runs But Won't Shut Off	• Oil drain valve not closed. • Leak in vahicle system. • Return oil solenoid valve open. • Faulty components.	• Close the oil drain valve. • Locate and repair system leak. • Replace solenoid valve.
RECYCLING OPERATION		
Moisture Indicator Will Not Turn Green During Automatic Recycling (Occurs During A/C System Evacuation)	• Saturated filter-drier. • Faulty moisture indicator.	• Remove and replace filter-drier following manufacturer's instructions. • Remove and replace the moisture indicator.
Refrigerant Does Not Flow During Recycling	• Refrigerant supply empty or low. • Faulty moisture indicator.	• Check display for "CHECK REFRIGERANT". If shown, add more refrigerant before recycling. Refer to manufacturer's instructions. • Open the valves.

DIAGNOSIS OF THE REFRIGERANT RECOVERY, RECYCLING AND RECHARGING SYSTEM (cont'd)

PROBLEM	POSSIBLE CAUSE	CORRECTION
No Power When POWER Switch Is On—No Display Showing	• Unit unplugged. • No power at wall outlet.	• Plug unit into power source outlet. • Locate problem with outlet or change outlets.
Vacuum Pump Does Not Start	• Vacuum pump unplugged. • Check extension cord (if used). • Faulty components.	• Plug pump into power source. • Try without extension cord.
Audible Tone Sounds During Refrigerant Transfer	• Transfer stopped or too slow. • Refrigerant supply low.	• Start vehicle A/C system and pull rest of refrigerant into system. • Add refrigerant to the tank. Refer to manufacturer's instructions.
Vacuum Pump Runs, But Low Side Gauge Does Not Register An Appropriate Vacuum	• Low side valve closed. • Pump oil contaminated. • Charging line loose. • Manifold leaking.	• Open low side valve. • Change oil. Refer to manufacturer's instructions. • Check connections. • Check connections.
		D0289

AIR CONDITIONING SYSTEM ODOR PROCEDURE

Odors emitted from the air conditioning system occur primarily at startup in hot, humid climates. This odor may be the result of debris in the heater/evaporator case or growth of mold on the evaporator core. To address this condition, use the following equipment and procedure.

Tools Required:
- J 36645 Air Conditioning Cleaning Gun
- GM Goodwrench Air Conditioning System Disinfectant Kit

CAUTION: Procedure should only be performed on a cold vehicle to prevent the disinfectant from coming in contact with hot engine components. Disinfectant can cause substantial but temporary eye injury. Do not get in eyes or clothing. Wash thoroughly with soap and water after handling.

Important

- If disinfectant gets into eyes, hold eyelids open and flush with a steady, gentle stream of water for 15 minutes. Obtain medical attention if irritation persists.

1. Put on rubber gloves and safety goggles.
2. Pour the small bottle of the two-part GM Goodwrench Air Conditioning System Disinfectant Kit into the large bottle. Seal and invert the large container once or twice to mix contents.
3. Check underneath the vehicle to verify that drain outlet is not plugged.
4. Connect battery charger to avoid draining the battery during cleaning procedure.
5. Remove blower resistor, leaving wiring connectors attached. Refer to "Blower Motor Resistor" in this section.

NOTICE: ***Do not allow the metal coils of the blower resistor to become grounded to any metal surface as this may result in internal circuitry damage.***

6. Check heater/evaporator case for debris. Remove any debris present through blower resistor opening. If debris is imbedded into the evaporator core face and cannot be removed, the core will have to be removed from the vehicle and cleaned. If a large amount of debris is present in the heater/evaporator case the air inlet screen will require sealing around the air intake in the cowl area.
7. Turn the ignition to the "ON" position but do not start vehicle.
8. Set mode selector to "Vent," blower speed to "LOW," and temperature to full "COLD."
9. Open all windows and doors. Exit vehicle.
10. Place a drain pan with at least a 2-quart capacity below heater/evaporator drain hole to collect disinfectant and rinse water runoff. If necessary, install additional hose onto drain so that all fluid goes into the drain pan.
11. Turn pedestal fan on "High" to provide cross ventilation during cleaning procedure.
12. Using J 36645, or equivalent spray gun, insert the nozzle of the spray gun through the blower resistor opening and insert siphon hose into container of disinfectant. Spray directly toward evaporator face taking extra care to ensure adequate coverage of the corner and edges, completely saturating the entire core. Use the entire container of solution.

Important

- Do not allow disinfectant to come into contact with hot engine components such as the exhaust manifold.

13. Reach into vehicle and turn the ignition to the "OFF" position, and allow the core to soak for 5 minutes.
14. Double check underneath the vehicle to verify proper drain operation. If necessary, unclog and increase drain plug slits with a razor blade or sharp knife.
15. Reach into the vehicle and turn the ignition to the "ON" position, but do not start vehicle.
16. Thoroughly rinse the evaporator core with clean water using the spray gun to remove all disinfectant residue. At least a 2-quart rinse is recommended.
17. Reach into the vehicle and turn the ignition to the "OFF" position and then reinstall the blower resistor. Refer to "Blower Motor Resistor" in this section.
18. Dispose of disinfectant and rinse water runoff collected in the drain pan in an approved manner.

ON-VEHICLE SERVICE

COMPRESSOR

4.3L, 5.0L and 5.7L Engines

Remove or Disconnect (Figure 25)

1. Negative battery cable. Refer to SECTION 6D1.
2. Recover refrigerant. Refer to "Refrigerant Recovery" in this section.
3. Drive belt. Refer to SECTION 6B.
4. Refrigerant hose assembly from compressor. Refer to "Compressor and Condenser Hose Assembly" in this section.
   - Cap or plug all open connections.
5. Electrical connectors, as necessary.
6. Bolts.
7. Compressor from bracket.
8. Drain and measure compressor oil. Refer to "Refrigerant Oil Distribution" in this section.

Install or Connect (Figure 25)

1. Fill compressor with oil.
2. Compressor to bracket.
3. Compressor mounting bolts.

Tighten

   - Bolts to 50 N·m (37 lb. ft.).
4. Electrical connectors, as necessary.
5. Refrigerant hose assembly to compressor.
6. Drive belt.
7. Negative battery cable.
8. Charge system. Refer to "Charging" in this section.
9. Check system for leaks. Refer to "Leak Testing" in this section.

7.4L Engines

Remove or Disconnect (Figure 26)

1. Negative battery cable. Refer to SECTION 6D1.
2. Recover refrigerant. Refer to "Refrigerant Recovery" in this section.
3. Drive belt. Refer to SECTION 6B.
4. Refrigerant hose assembly from compressor. Refer to "Compressor and Condenser Hose Assembly" in this section.
   - Cap or plug all open connections.
5. Electrical connectors, as necessary.
6. Bolt.
7. Compressor from bracket.
8. Drain and measure compressor oil. Refer to "Refrigerant Oil Distribution" in this section.

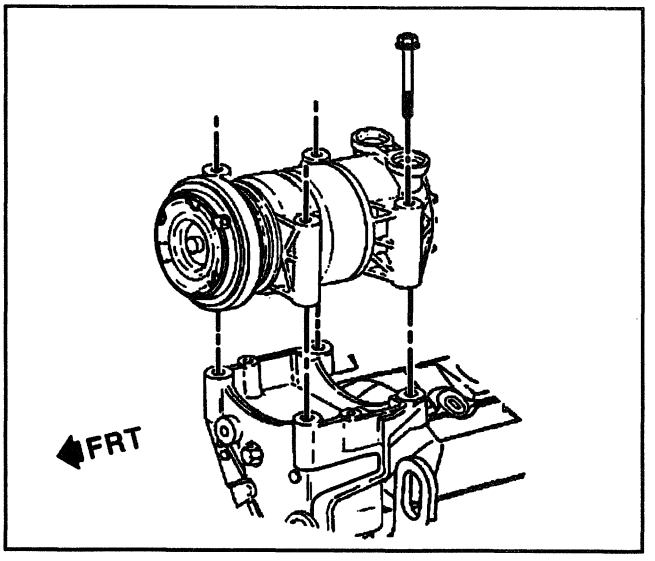


Figure 25—Compressor Mounting (4.3L, 5.0L, and 5.7L Engines)

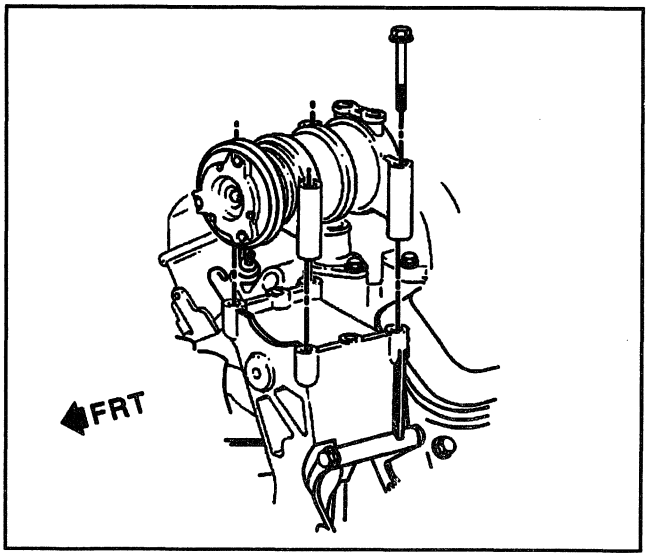


Figure 26—Compressor Mounting (7.4L Engines)

Install or Connect (Figure 26)

1. Fill compressor with oil.
2. Compressor to bracket.
3. Compressor mounting bolts.

Tighten

- Bolts to 50 N·m (37 lb. ft.).

4. Electrical connectors, as necessary.
5. Refrigerant hose assembly to compressor.
6. Drive belt.
7. Negative battery cable.
8. Charge system. Refer to "Charging" in this system.
9. Check system for leaks. Refer to "Leak Testing" in this section.

6.5L Diesel Engines

Remove or Disconnect (Figure 27)

1. Negative battery cable. Refer to SECTION 6D1.
2. Recover refrigerant. Refer to "Refrigerant Recovery" in this section.
3. Drive belt. Refer to SECTION 6B.
4. Refrigerant hose assembly from compressor. Refer to "Compressor and Condenser Hose Assembly" in this section.
   - Cap or plug all open connections.
5. Electrical connectors, as necessary.
6. Bolts.
7. Compressor from bracket.
8. Drain and measure compressor oil. Refer to "Refrigerant Oil Distribution" in this section.

Install or Connect (Figure 27)

1. Fill compressor with oil.
2. Compressor to bracket.
3. Compressor mounting bolts.

Tighten

- Bolts to 50 N·m (37 lb. ft.).

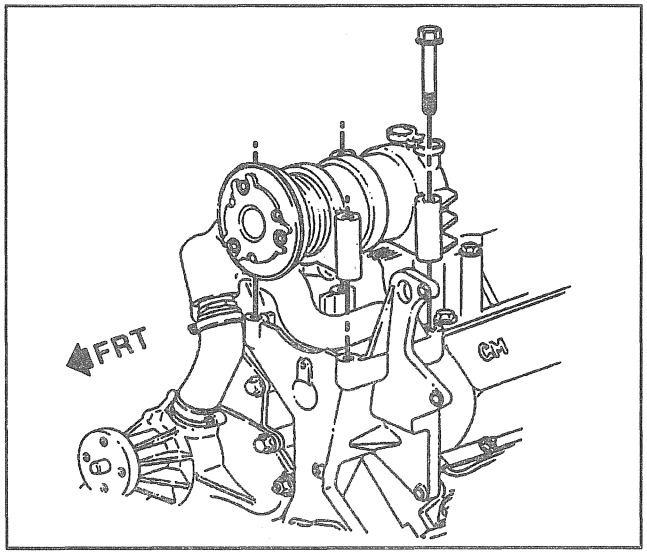


Figure 27—Compressor Mounting (6.5L Diesel Engines)

4. Electrical connectors, as necessary.
5. Refrigerant hose assembly to compressor.
6. Drive belt.
7. Negative battery cable.
8. Charge system. Refer to "Charging" in this section.
9. Check system for leaks. Refer to "Leak Testing" in this section.

COMPRESSOR SEALING WASHERS

- When installing sealing washers, keep dirt and foreign material from getting on the sealing surfaces of the washers, hose block, or compressor ports. Clean all sealing surfaces with a lint-free rag.
- Do not reuse sealing washers.
- Sealing washers do not have to be oiled prior to assembly.

1. Install sealing washer onto pilots of suction/discharge block fitting. Washers must "bottom" against surface of block fitting (Figure 28).
2. Install hose block to the compressor. Make sure the sealing washers are seated within the compressor machined surfaces (Figure 29).
3. Hold block in place, hand tighten bolt.

Tighten

- Bolt to 34 N·m (25 lb. ft.).

COMPRESSOR AND CONDENSER HOSE ASSEMBLY

Refer to the following Figures for the models listed below:

- Pickup/Extended Cab Models (4.3L, 5.0L, 5.7L, and 7.4L Engines) Figure 30.
- Suburban/Crew Cab Models (7.4L Engines w/o Aux. Heater or A/C) Figure 30.
- Suburban/Utility and Crew Cab Models (5.7L Engines w/o Aux. A/C) Figure 31.

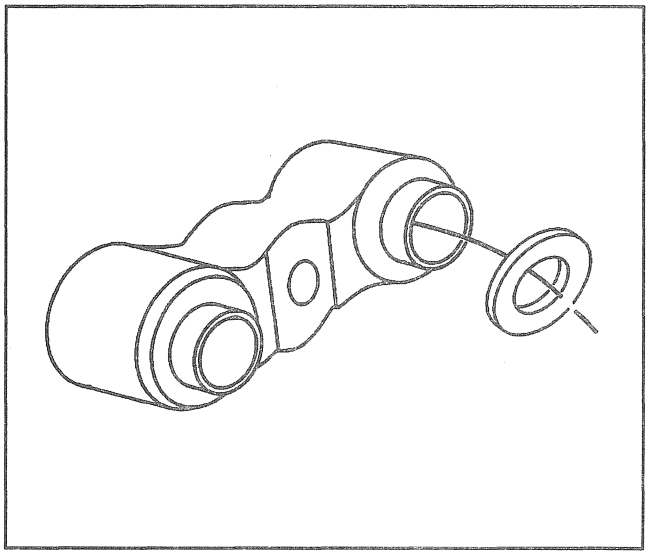


Figure 28—Sealing Washer Installation (1 of 2)

- All Models (6.5L Diesel Engines w/o Aux. A/C) Figure 32.
  Tool Required:
  J 38042 Dual O-Ring Tube Separator

Remove or Disconnect (Figures 30 through 32)

1. Negative battery cable. Refer to SECTION 6D1.
2. Recover refrigerant. Refer to "Refrigerant Recovery" in this section.
3. Grille. Refer to SECTION 2B.
4. Bolt.
5. Hose assembly from top of compressor.
6. Sealing washers. Refer to "Compressor Sealing Washers" in this section.
7. Hose assembly from accumulator using J 38042. Refer to "Servicing Dual O-Ring Seals" in this section.
8. O-ring seals from accumulator hose.
9. Hose assembly from condenser.
10. O-ring seal from condenser hose.
    - Cap or plug all open connections.

Install or Connect (Figures 30 through 32)

1. New O-ring seal to condensor hose.
   - Coat O-ring seal with 525 viscosity refrigerant oil.
2. Hose assembly to condenser.

Tighten

- Hose assembly to 45 N·m (33 lb. ft.).

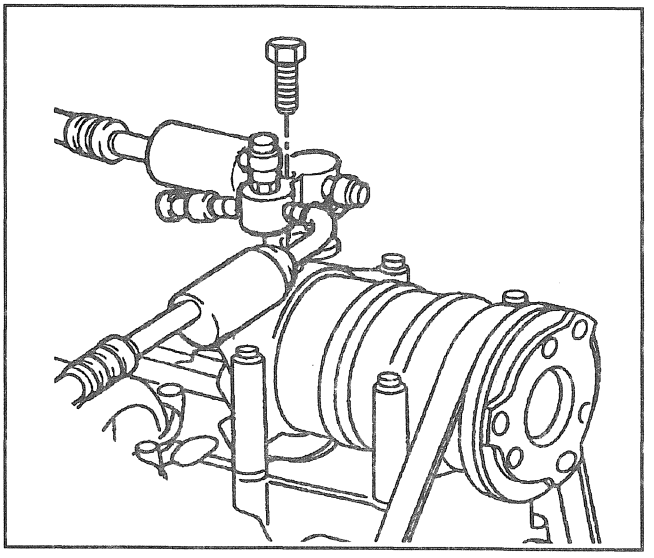


Figure 29—Sealing Washer Installation (2 of 2)

3. New dual O-ring seals to accumulator hose.
   - Coat O-ring seals with 525 viscosity refrigerant oil.
4. Hose assembly to accumulator.

Tighten

- Hose assembly to 24 N·m (18 lb. ft.).

5. Sealing washers.

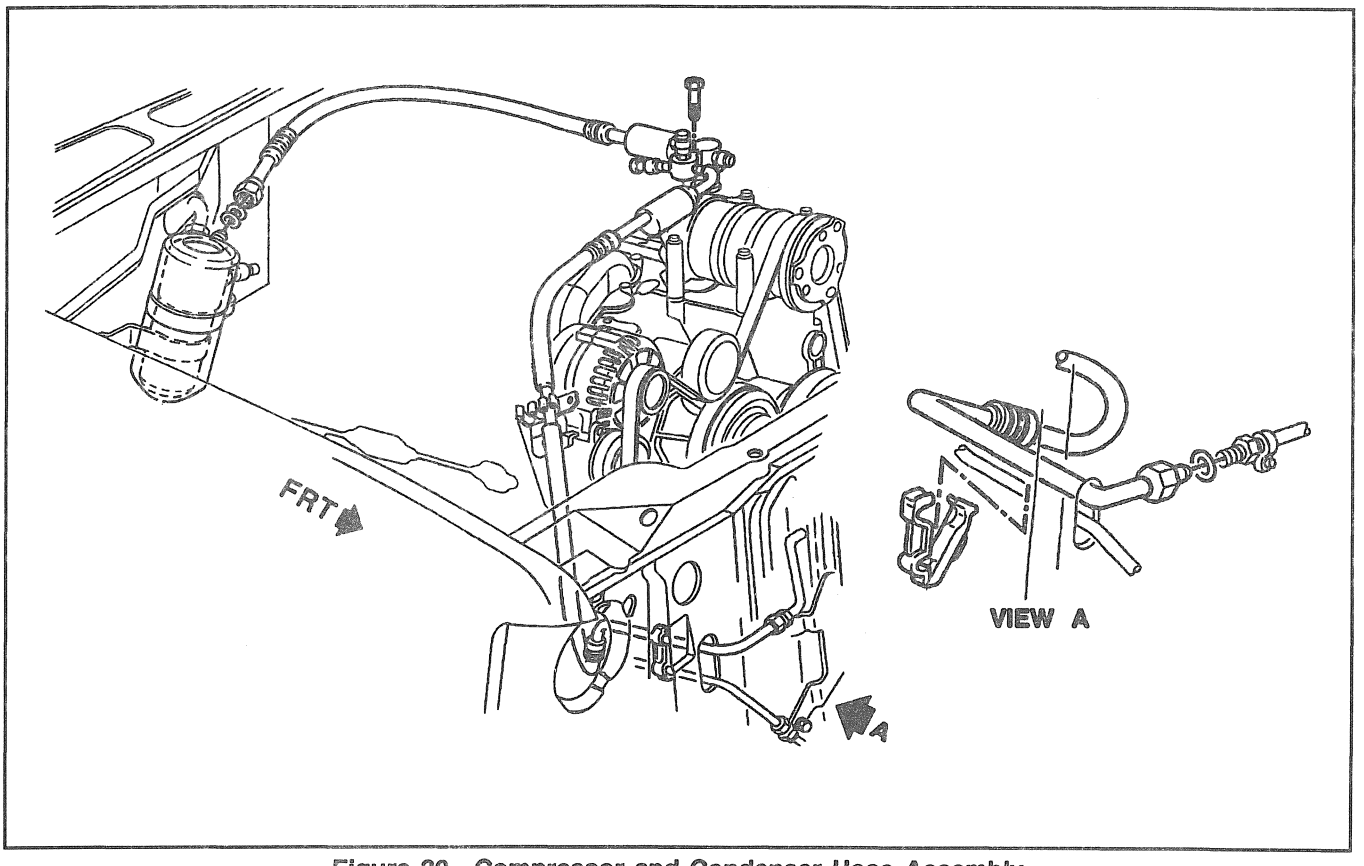


Figure 30—Compressor and Condenser Hose Assembly

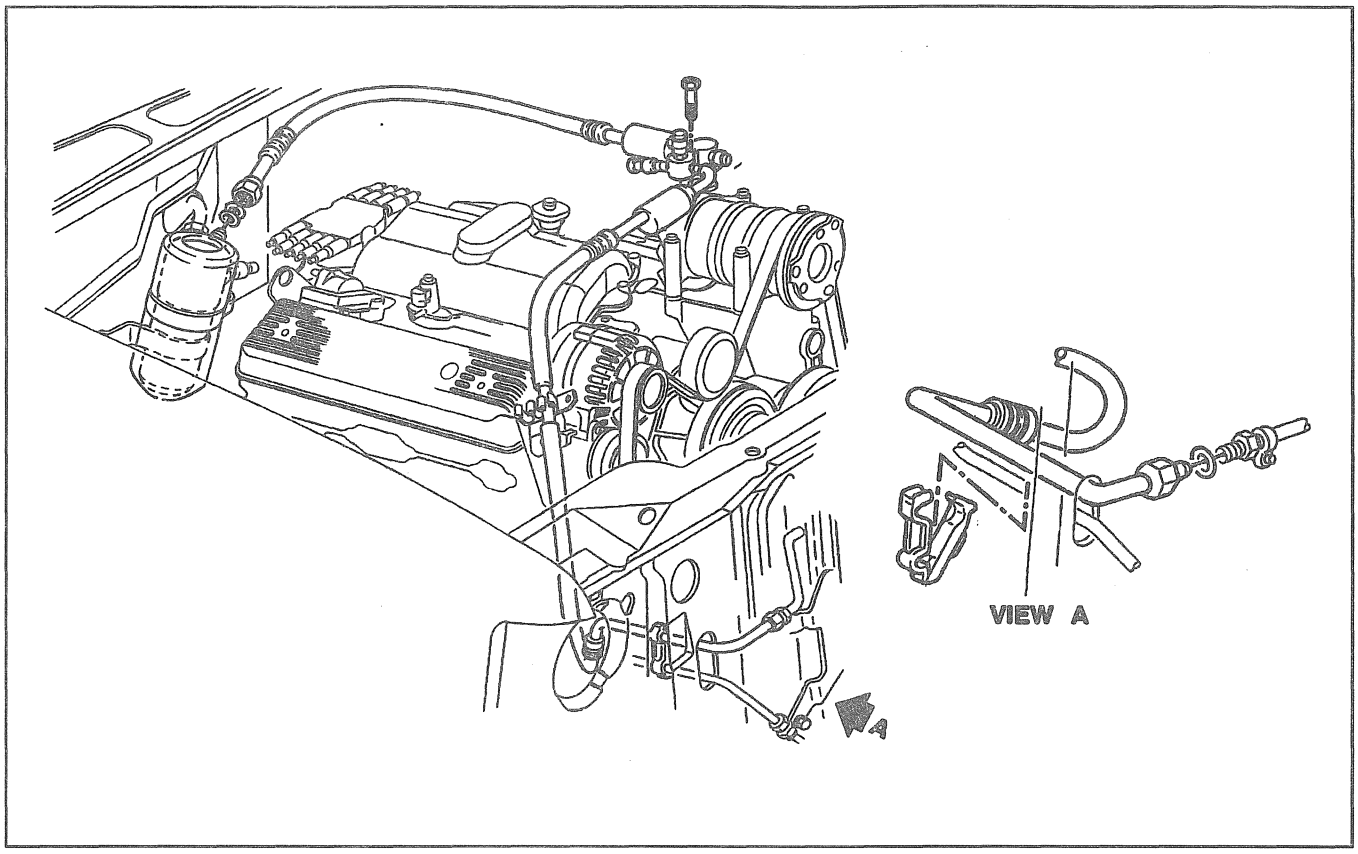


Figure 31—Compressor and Condenser Hose Assembly

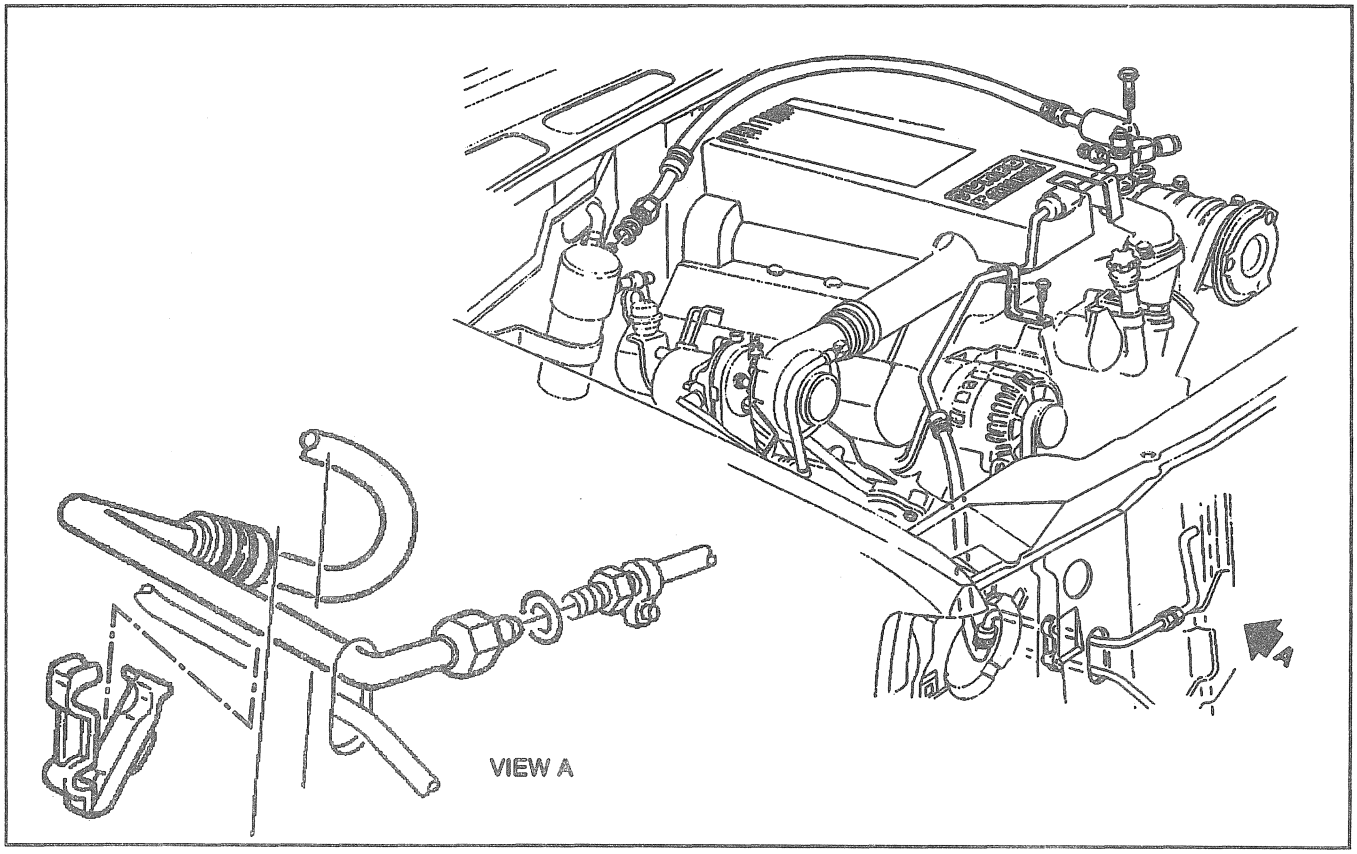


Figure 32—Compressor and Condenser Hose Assembly

6. Hose assembly to the top of the compressor.
7. Bolt.

Tighten

- Bolt to 34 N.m (25 lb. ft.).

8. Grille.
9. Negative battery cable.
10. Charge system. Refer to "Charging" in this section.
11. Check system for leaks. Refer to "Leak Testing" in this section.

COMPRESSOR PRESSURE SWITCH

Remove or Disconnect (Figure 33)

1. Negative battery cable. Refer to SECTION 6D1.
2. Electrical connectors, as necessary.
3. Compressor pressure switch.
4. O-ring seal.

Install or Connect (Figure 33)

1. New O-ring seal.
   - Coat O-ring seal with 525 viscosity refrigerant oil.
2. Compressor pressure switch.

Tighten

- Compressor pressure switch to 6 N.m (53 lb. in.).

3. Electrical connectors, as necessary.
4. Negative battery cable.

EVAPORATOR TUBE

Remove or Disconnect (Figure 34)

1. Negative battery cable. Refer top SECTION 6D1.
2. Recover refrigerant. Refer to "Refrigerant Recovery" in this section.
3. Auxiliary heater pipe, if equipped. Refer to SECTION 1A.
4. Coolant recovery reservoir. Refer to SECTION 6B.
5. Evaporator tube from evaporator.
6. O-ring seal.
7. Evaporator tube from condenser.
8. O-ring seal.
9. Evaporator tube from clip.

Install or Connect (Figure 34)

1. Evaporator tube into clip.
2. New O-ring seal.
   - Coat O-ring seal with 525 viscosity refrigerant oil.
3. Evaporator tube to condenser.

Tighten

- Evaporator tube to 24 N.m (18 lb. ft.).

4. New O-ring seal.
   - Coat O-ring seal with 525 viscosity refrigerant oil.
5. Evaporator tube to evaporator.

Tighten

- Evaporator tube to 24 N.m (18 lb. ft.).

6. Coolant recovery reservoir.
7. Auxiliary heater pipe, if equipped.
8. Negative battery cable.
9. Charge system. Refer to "Charging" in this section.
10. Check system for leaks. Refer to "Leak Testing" in this section.

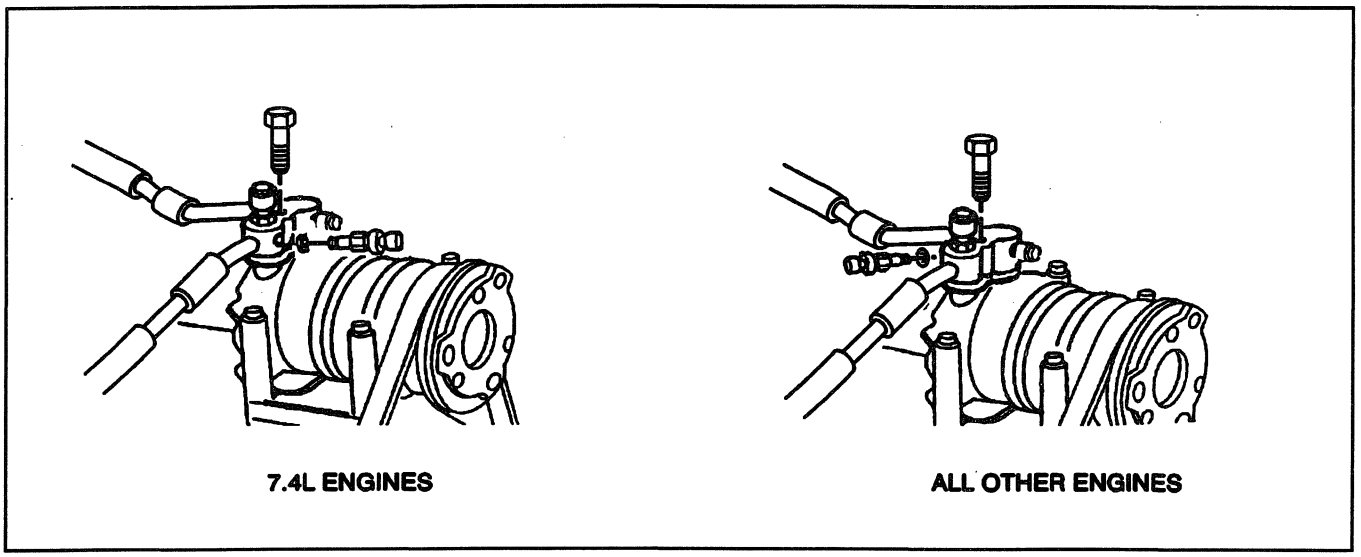


Figure 33—Compressor Pressure Switch

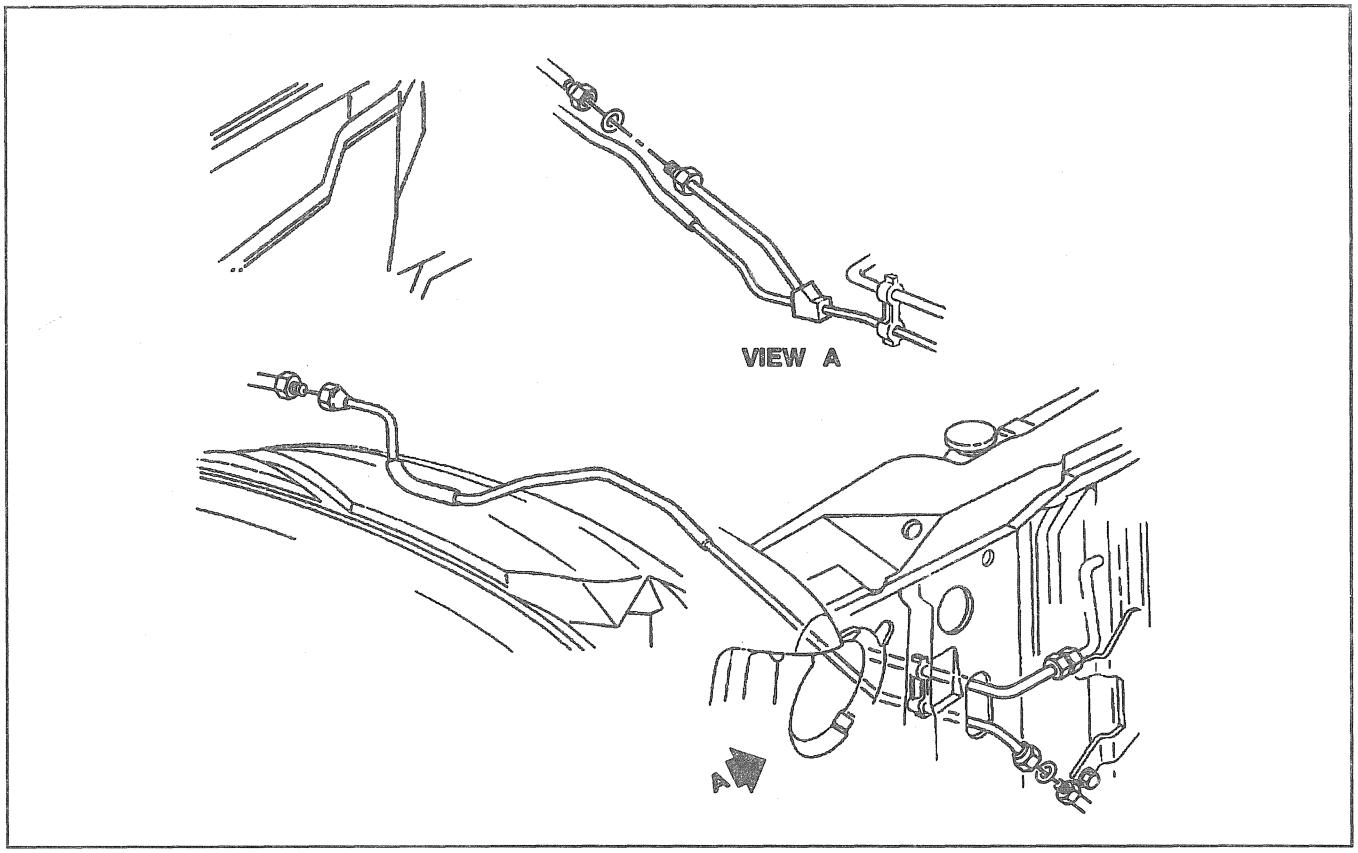


Figure 34—Evaporator Tube

BLOWER MOTOR RELAY

Remove or Disconnect (Figure 35)

1. Negative battery cable. Refer to SECTION 6D1.
2. Instrument panel compartment. Refer to SECTION 10A4.
3. Electrical connectors, as necessary.
4. Relay from relay bracket.

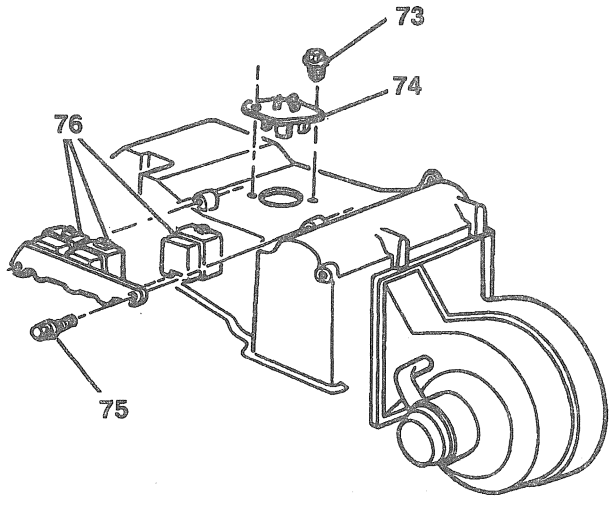
Install or Connect (Figure 35)

1. Relay to relay bracket.
2. Electrical connectors, as necessary.
3. Instrument panel compartment.
4. Negative battery cable.
   - Check circuit operation.

CONDENSER

Remove or Disconnect (Figure 36)

1. Recover refrigerant. Refer to "Refrigerant Recovery" in this section.
2. Grille. Refer to SECTION 2B.
3. Hood primary latch support.
4. Auxiliary cooling fan, if equipped. Refer to SECTION 6B.
5. Refrigerant hose from condenser. Refer to "Compressor and Condenser Hose Assembly" in this section.



73. SCREW, BLOWER MOTOR RESISTOR MOUNTING
74. RESISTOR, BLOWER MOTOR
75. SCREW, RELAY BRACKET MOUNTING
76. RELAY, A/C COMPRESSOR

F9691

Figure 35—Blower Motor Relay/Resistor

6. Evaporator tube from condenser. Refer to "Evaporator Tube" in this section.
   • Cap or plug all open connections.
7. Bolts.
8. Brackets.
9. Upper insulators.
10. Condenser.
    • Bend the left grille support outboard to gain clearance for the condenser removal.
11. Lower insulators.

Install or Connect (Figure 36)

1. Lower insulators.
2. Condenser. Refer to "Refrigerant Oil Distribution" in this section, if replacing condenser.
3. Upper insulators.
4. Brackets.
5. Bolts.

Tighten

• Bolts to 4.5 N.m (40 lb. in.).

6. Evaporator tube to condenser.
7. Refrigerant hose to condenser.
8. Auxiliary cooling fan, if equipped.
9. Hood primary latch support.
10. Grille.
11. Charge system. Refer to "Charging" in this section.
12. Check system for leaks. Refer to "Leak Testing" in this section.

ACCUMULATOR

Tool Required:
J 38042 Dual O-Ring Tube Separator

Remove or Disconnect (Figure 37)

1. Negative battery cable. Refer to SECTION 6D1.
2. Recover refrigerant. Refer to "Refrigerant Recovery" in this section.
3. Electrical connectors, as necessary.
4. Pressure cycling switch.
5. Refrigerant hose from accumulator using J 38042. Refer to "Compressor and Condenser Hose Assembly" in this section.
6. Accumulator from the evaporator using J 38042.
7. O-ring seals from accumulator.

Important

• Cap or plug all open connections.

8. Accumulator bracket screw.
9. Accumulator.
10. Upper and lower accumulator insulators.

Install or Connect (Figure 37)

1. Upper and lower accumulator insulators.
2. Accumulator. Refer to "Refrigerant Oil Distribution" in this section, if replacing accumulator.
3. Accumulator bracket screw.

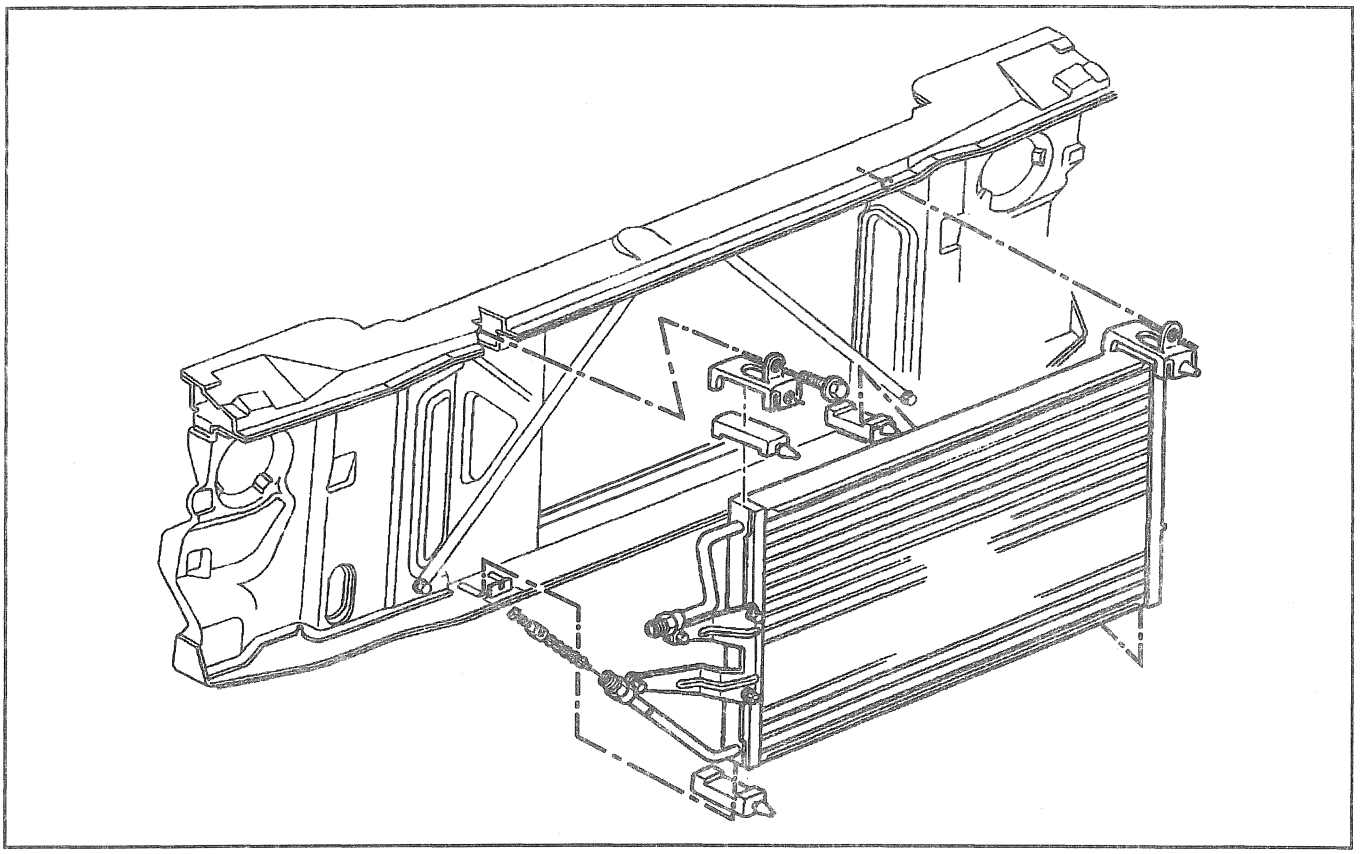


Figure 36—Condenser Assembly

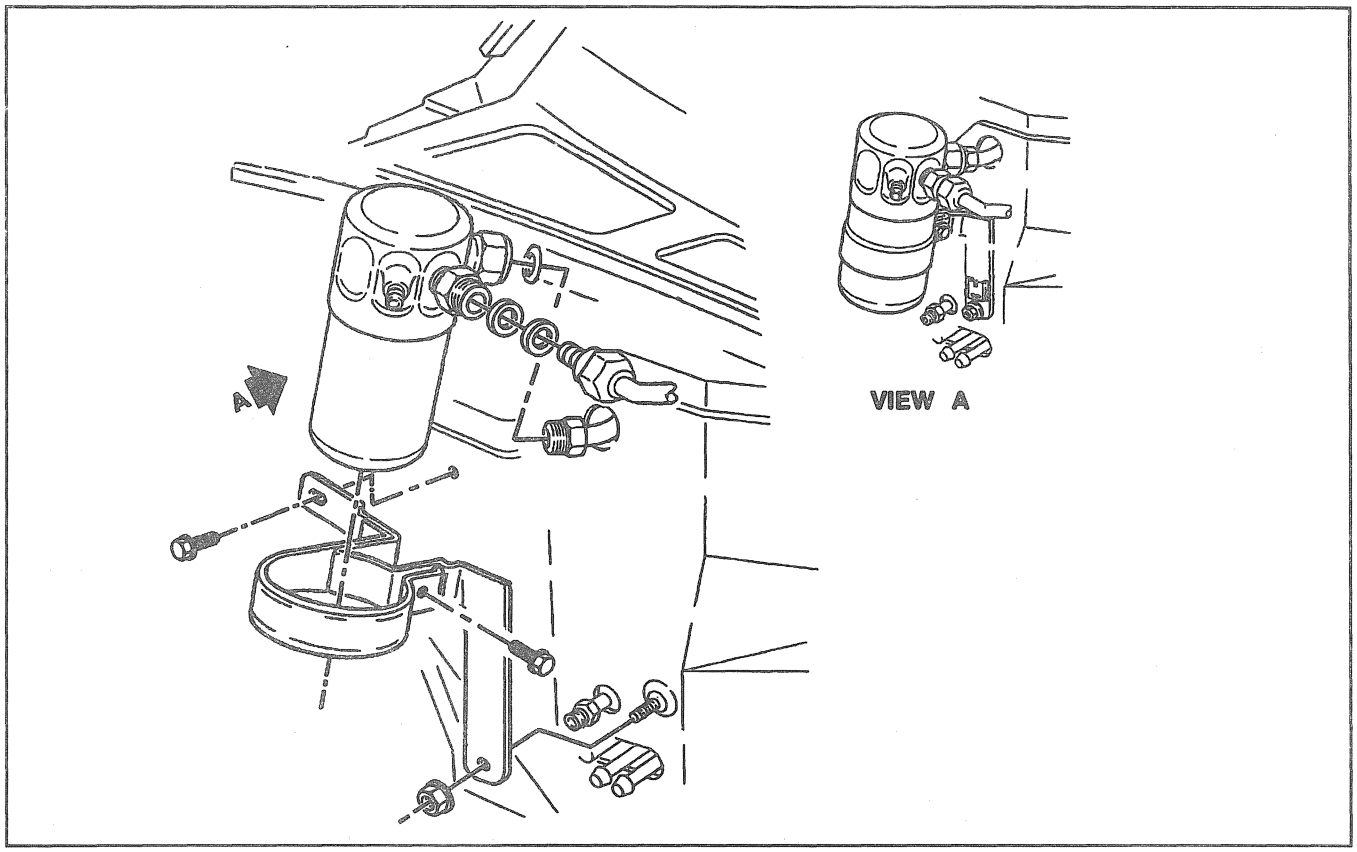


Figure 37—Accumulator

Tighten

- Screw to 6 N·m (53 lb. in.).

4. New O-ring seals.
   - Coat O-ring seals with 525 viscosity refrigerant oil.
5. Accumulator to the evaporator.

Tighten

- Accumulator to 41 N·m (30 lb. ft.).

6. Refrigerant hose to accumulator.

Tighten

- Hose to 24 N·m (18 lb. ft.).

7. Pressure cycling switch.
8. Electrical connectors, as necessary.
9. Negative battery cable.
10. Charge system. Refer to "Charging" in this section.
11. Check system for leaks. Refer to "Leak Testing" in this section.

EXPANSION (ORIFICE) TUBE

Front A/C System (C60)

Tool Required:
J 26549-E Orifice Tube Remover and Installer or Equivalent

Remove or Disconnect (Figure 34)

1. Recover refrigerant. Refer to "Refrigerant Recovery" in this section.
2. Grille. Refer to SECTION 2B.
3. Evaporator tube from condenser. Refer to "Evaporator Tube" in this section.
4. O-ring seal.
   - Cap or plug the open line.
5. Expansion (orifice) tube from the condenser outlet pipe, using J 26549-E or equivalent.

In the event that difficulty is encountered during the removal of a restricted or plugged expansion (orifice) tube, the following procedure is recommended:

A. Remove as much of any impacted residue as possible.
B. Carefully apply heat with heat gun (hair drier, epoxy drier or equivalent) approximately 7 mm (1/4 inch) from dimples on inlet pipe. Do not overheat pipe.
C. While applying heat, use expansion tube removal tools J 26549-E or equivalent to grip the expansion (orifice) tube. Use a turning motion along with a push-pull motion to loosen the impacted expansion (orifice) tube and remove it.

Install or Connect (Figure 34)

1. Expansion tube into condenser outlet pipe, using J 26549-E or equivalent.
2. New O-ring seal.
   A. Coat O-ring seal with 525 viscosity refrigerant oil.
   B. Insert the short screen end of the new orifice into the evaporator tube.
3. Evaporator tube to condenser.
4. Grille.

5. Charge system. Refer to "Charging" in this section.
6. Check system for leaks. Refer to "Leak Testing" in this section.

EVAPORATOR CORE

Remove or Disconnect (Figure 38)

1. Negative battery cable. Refer to SECTION 6D1.
2. Engine coolant. Refer to SECTION 6B.
3. Recover refrigerant. Refer to "Refrigerant Recovery" in this section.
4. Instrument panel. Refer to SECTION 10A4.
5. Electrical connectors, as necessary.
6. Center floor air distribution duct.
7. ECM and mounting tray (diesel engines only).
8. Hinge pillar trim panels. Refer to SECTION 10A4.
9. Blower motor cover.
10. Blower motor (60). Refer to "Blower Motor and Fan" in this section.
11. Steering column. Refer to SECTION 3F.
12. Tilt back instrument panel assembly. Refer to SECTION 10A4.
13. Coolant recovery reservoir. Refer to SECTION 6B1.
14. Heater hoses. Refer to SECTION 1A.
15. Evaporator tube. Refer to "Evaporator Tube" in this section.
16. Accumulator. Refer to "Accumulator" in this section.
17. Screws (52 and 64).
18. Nut (50).
19. Screw (56).
20. Module assembly (57).
    - May be necessary to have an assistant when removing module assembly.
21. Evaporator case bottom cover plate (63).
    - Remove the seven screws that hold the cover plate to the module assembly.
22. Heater core and seal from module assembly.
23. Evaporator case cover (61).
    - Remove the four screws that hold the case cover to the module assembly.
24. Evaporator core.

Install or Connect (Figure 38)

1. Evaporator core. Refer to "Refrigerant Oil Distribution" in this section, if replacing evaporator core.
2. Evaporator case cover (61).
    - Install the four screws that hold the case cover to the module assembly.
3. Heater core and seal into module assembly.
4. Evaporator case bottom cover plate (63).
    - Install the seven screws that hold the cover plate to the module assembly.
5. Module assembly (57).
    - May be necessary to have an assistant when installing module assembly.
6. Screw (56).
7. Nut (50).
8. Screws (52 and 64).

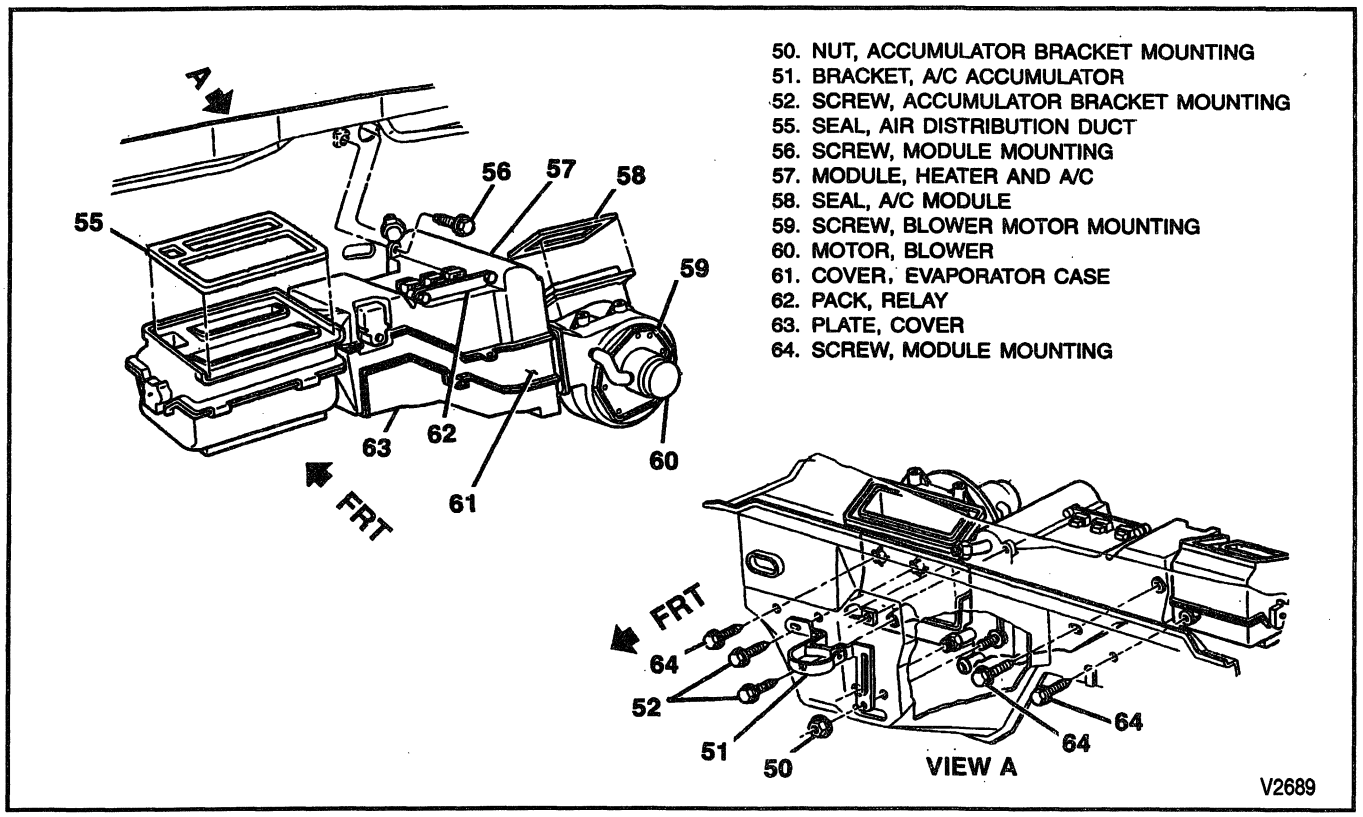


Figure 38—Evaporator/Heater Core Case

Tighten

- Screw (56) to 11 N·m (97 lb. in.).
- Nut (50) to 2.8 N·m (25 lb. in.).
- Screws (52 and 64) to 1.9 N·m (17 lb. in.).

9. Accumulator.
10. Evaporator tube.
11. Heater hoses.
12. Coolant recovery reservoir.
13. Instrument panel.
14. Steering column.
15. Blower motor (60).
16. Blower motor cover.
17. Hinge pillar trim panels.
18. ECM and mounting tray.
19. Center floor air distribution duct.
20. Electrical connectors, as necessary.
21. Engine coolant.
22. Negative battery cable.
23. Charge system. Refer to "Charging" in this section.
24. Check system for leaks. Refer to "Leak Testing" in this section.

BLOWER MOTOR AND FAN

Remove or Disconnect (Figure 38)

1. Negative battery cable. Refer to SECTION 6D1.
2. Instrument panel compartment. Refer to SECTION 10A4.
3. Front screw from right door sill plate.
4. Right hinge pillar trim panel. Refer to SECTION 10A4.
5. Electrical connectors from ECM, as necessary.
6. ECM and mounting bracket (diesel engines only).
7. Electrical connectors from blower motor (60), as necessary.
8. Courtesy lamp (if equipped).
9. Bolt from right lower I/P support.
10. Blower motor cover.
11. Blower motor cooling tube.
12. Blower motor flange screws (59).
13. Blower motor (60).
    - Pull the blower motor forward carefully to avoid distorting the blower fan.
    - May be necessary to pry back right side of instrument panel.

Inspect

- Blower motor terminals for distortion. Clean corrosion from the terminals or replace the blower motor (60) as necessary.
- Flange of the blower motor (60) for damage or distortion that could cause an air leak. Repair as necessary.
- Blower fan for damage and distortion.

Install or Connect (Figure 38)

1. Blower motor (60).
    - Guide the blower motor and blower fan into position, being careful not to catch the blower fan on protruding parts.
2. Blower motor flange screws (59).
3. Blower motor cooling tube.
4. Blower motor cover.
5. Bolt to right lower I/P support.
6. Courtesy lamp (if equipped).
7. Electrical connectors to blower motor (16), as necessary.
8. Mounting bracket and ECM.
9. Electrical connectors to ECM, as necessary.
10. Right hinge pillar trim panel.
11. Front screw into front door sill plate.
12. Instrument panel compartment.
13. Negative battery cable.
    - Check circuit operation.

BLOWER MOTOR RESISTOR

Remove or Disconnect (Figure 35)

1. Negative battery cable. Refer to SECTION 6D1.
2. Instrument panel. Refer to SECTION 10A4.
3. Electrical connectors, as necessary.
4. Screws (73).
5. Blower motor resistor (74).

Install or Connect (Figure 35)

1. Blower motor resistor (74).

NOTICE: ***Make sure the resistor coils do not contact each other. Improper operation or system damage may result.***

2. Screws (73).

Tighten

- Screws (73) to 1.4 N·m (12 lb. in.).

3. Electrical connectors, as necessary.
4. Instrument panel.
5. Negative battery cable.
    - Check circuit operation.

CONTROL ASSEMBLY AND BLOWER SWITCH

Remove or Disconnect (Figure 39)

1. Instrument cluster trim. Refer to SECTION 8C.
2. Control assembly.
    - Release the retainers using a small screwdriver, then pull the control assembly out from the instrument panel.
3. Electrical connectors, as necessary.

Install or Connect (Figure 39)

1. Electrical connectors, as necessary.
2. Control assembly.
    - The control assembly snap-fits to the instrument panel.
3. Instrument cluster trim.
    - Check circuit operation.

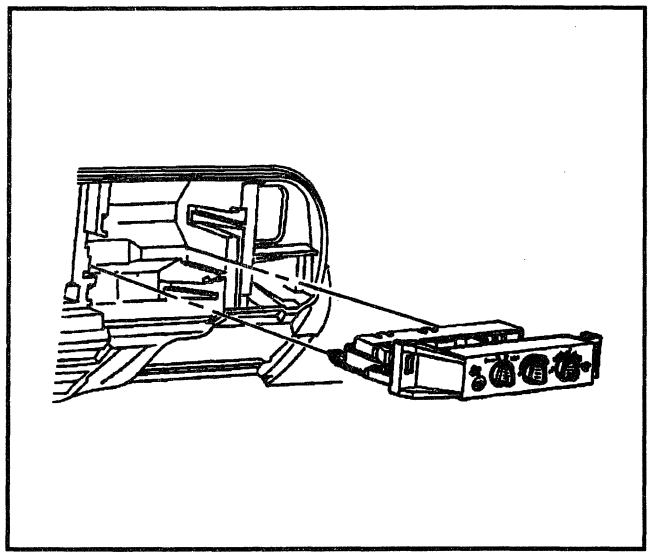


Figure 39—Control Assembly Replacement

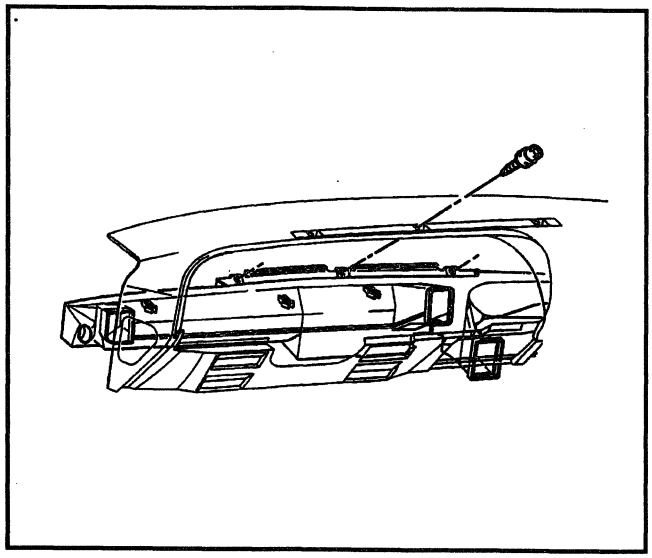


Figure 40—Air Distributor Duct

HEATER HOSES

For complete replacement procedure, refer to SECTION 1A.

HEATER CORE

For complete replacement procedure, refer to SECTION 1A.

AIR DISTRIBUTOR DUCT

Remove or Disconnect (Figure 40)

1. Negative battery cable. Refer to SECTION 6D1.
2. Tilt back instrument panel. Refer to SECTION 10A4.
3. Three duct mounting screws.
   - Squeeze to release the duct retainers in five places.
4. Duct from instrument panel.

Install or Connect (Figure 40)

1. Duct to instrument panel.
2. Duct mounting screws.

Tighten

   - Screws to 1.9 N·m (17 lb. in.).
3. Instrument panel.
4. Negative battery cable.

MODE ACTUATOR

The mode actuator is located on the left side of the air distribution case (Figure 41).

Remove or Disconnect (Figure 42)

1. Negative battery cable. Refer to SECTION 6D1.
2. DERM for access. Refer to SECTION 9J.
3. Electrical connector.
4. Screws.
5. Adjuster links from control lever.
6. Mode actuator.

Adjust

   A. Electrical connector to the actuator.
   B. Turn the ignition key to the run position and let the actuator position itself.
   C. Turn off the ignition key.
   D. Remove the actuator from the electrical connection.

Install or Connect (Figure 42)

1. Mode actuator.
2. Screws.
3. Adjuster links to control lever.
4. Electrical connector.
5. DERM.
6. Negative battery cable.
   - Check circuit operation.

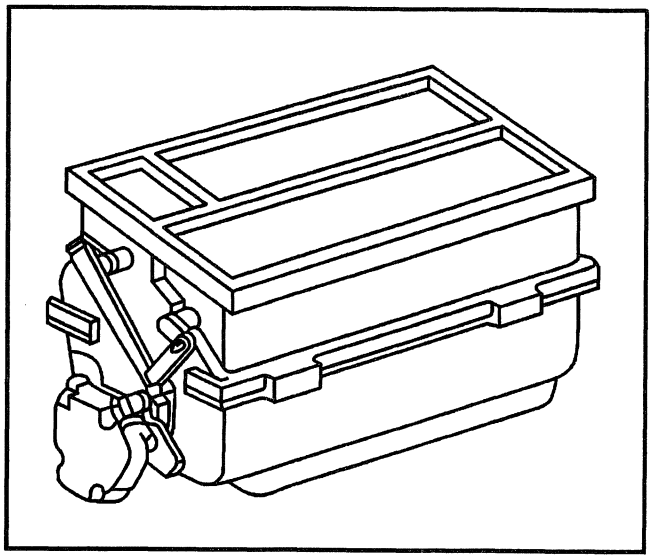


Figure 41—Mode Actuator Location

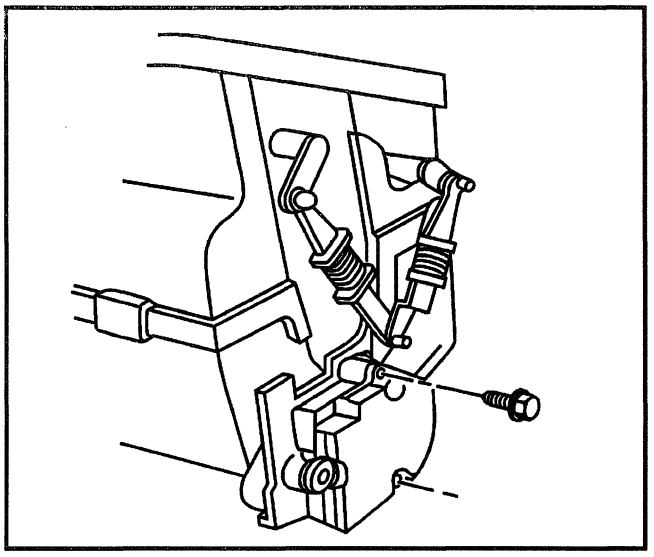


Figure 42—Mode Actuator Replacement

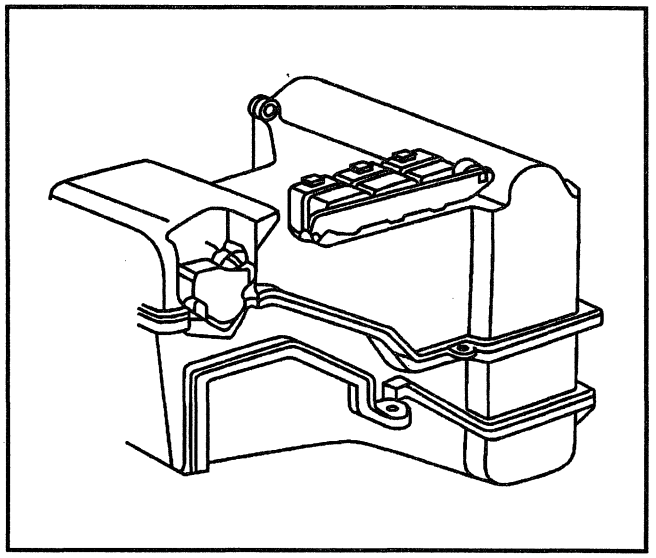


Figure 43—Temperature Actuator Location

TEMPERATURE ACTUATOR

The temperature actuator is located in the passenger compartment of the vehicle, on the front of the (heater) case (Figure 43).

Remove or Disconnect (Figure 44)

1. Negative battery cable. Refer to SECTION 6D1.
2. Instrument panel compartment. Refer to SECTION 10A4.
3. Electrical connector.
4. Screws.
5. Actuator.

Adjust

A. Electrical connector to the actuator.
B. Turn the ignition key to the run position and let the actuator position itself.
C. Turn off the ignition key.
D. Remove the actuator from the electrical connector.

Install or Connect (Figure 44)

1. Actuator.
2. Screws.
3. Electrical connectors.
4. Instrument panel compartment.
5. Negative battery cable.
   - Check circuit operation.

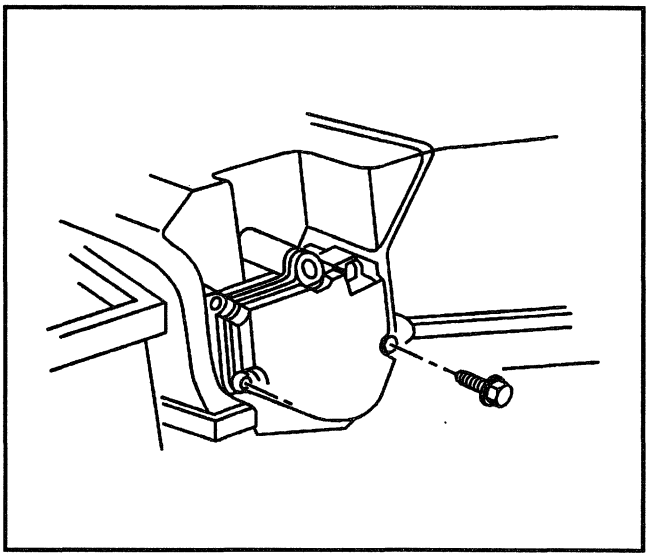


Figure 44—Temperature Actuator Replacement

ON-VEHICLE SERVICE—REAR A/C SYSTEM (SUBURBAN)

CONTROL ASSEMBLY

Front Overhead (Auxiliary Heater and A/C)

Remove or Disconnect (Figure 45)

1. Negative battery cable. Refer to SECTION 6D1.
2. Overhead console. Refer to SECTION 10A4.
3. Electrical harness from control assembly.
4. Control assembly from overhead console.

Install or Connect (Figure 45)

1. Control assembly to overhead console.
2. Electrical harness to control assembly.
3. Overhead console.
4. Negative battery cable.

- Check circuit operation.

Center Overhead (Auiliary Heater and A/C)

Remove or Disconnect (Figure 46)

1. Bezel.
2. Control assembly from roof panel.
3. Electrical harness from control assembly.

Install or Connect (Figure 46)

1. Electrical harness to control assembly.
2. Control assembly to roof panel.
3. Bezel.

- Check circuit operation.

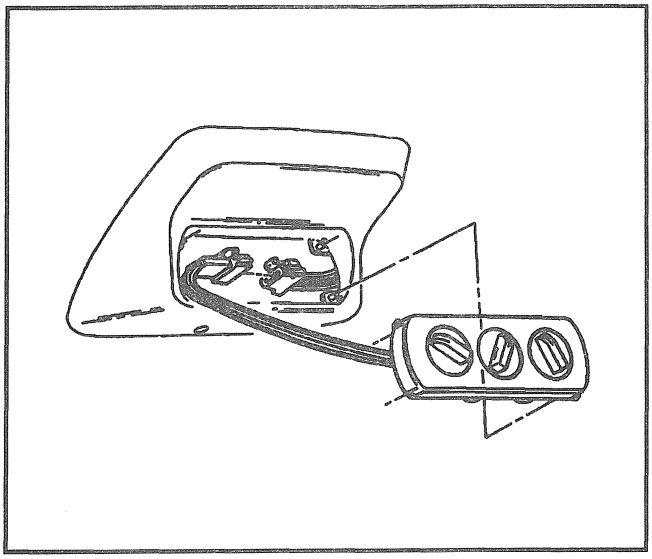


Figure 45—Front Overhead Auxiliary Control Switch

EVAPORATOR TUBE

Remove or Disconnect (Figure 47)

1. Recover refrigerant. Refer to "Refrigerant Recovery" in this section.
2. Evaporator tube from evaporator.
3. O-ring seal.
4. Evaporator tube from condenser.
5. O-ring seal.
6. Evaporator tube from auxiliary evaporator hose.
7. O-ring seal.

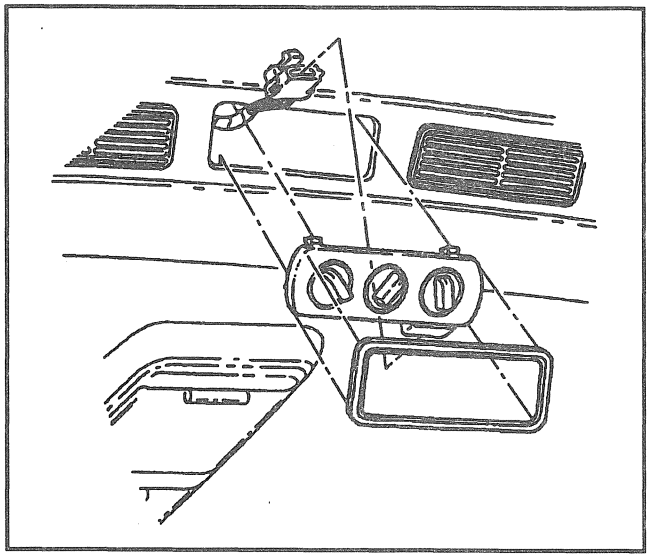


Figure 46—Center Overhead Auxiliary Control Switch

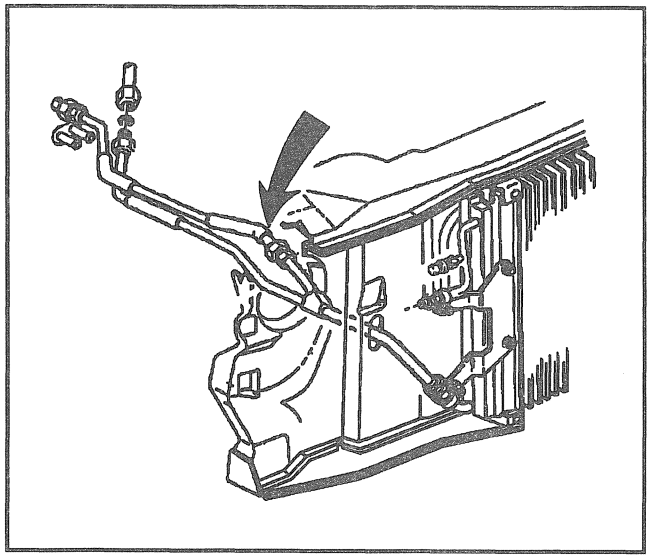


Figure 47—Auxiliary Evaporator Tube Location (Suburbans with Aux. A/C)

8. Evaporator tube.

Install or Connect (Figure 47)

1. Evaporator tube.
2. New O-ring seal.
   - Coat O-ring seal with 525 viscosity refrigerant oil.
3. Evaporator tube to auxiliary evaporator hose.

Tighten

   - Evaporator tube to 24 N·m (18 lb. ft.).
4. New O-ring seal.
   - Coat O-ring seal with 525 viscosity refrigerant oil.
5. Evaporator tube to condenser.

Tighten

   - Evaporator tube to 24 N·m (18 lb. ft.).
6. New O-ring seal.
   - Coat O-ring seal with 525 viscosity refrigerant oil.
7. Evaporator tube to evaporator.

Tighten

   - Evaporator tube to 24 N·m (18 lb. ft.).
8. Charge system. Refer to "Charging" in this section.
9. Check system for leaks. Refer to "Leak Testing" in this section.

COMPRESSOR AND CONDENSER HOSE ASSEMBLY

Remove or Disconnect (Figures 48 through 50)

1. Recover refrigerant. Refer to "Refrigerant Recovery" in this section.
2. Bolt.
3. Hose assembly from the top of the compressor.
4. Sealing washers. Refer to "Compressor Sealing Washers" in this section.
5. Hose from accumulator using J 38042. Refer to "Servicing Dual O-Ring Seals" in this section.
6. O-ring seals from accumulator hose.
7. Hose from aux. A/C line using J 38042. Refer to "Servicing Dual O-Ring Seals" in this section.
8. O-ring seals from hose.
9. Hose from clip.
10. Hose from bracket, if equipped with diesel engine.
11. Hose assembly from condenser.
12. O-ring seal.
    - Cap or plug all open connections.

Install or Connect (Figures 48 through 50)

1. New O-ring seals to Aux. A/C hose.
   - Coat O-ring seal with 525 viscosity refrigerant oil.
2. Hose assembly to Aux. A/C line.

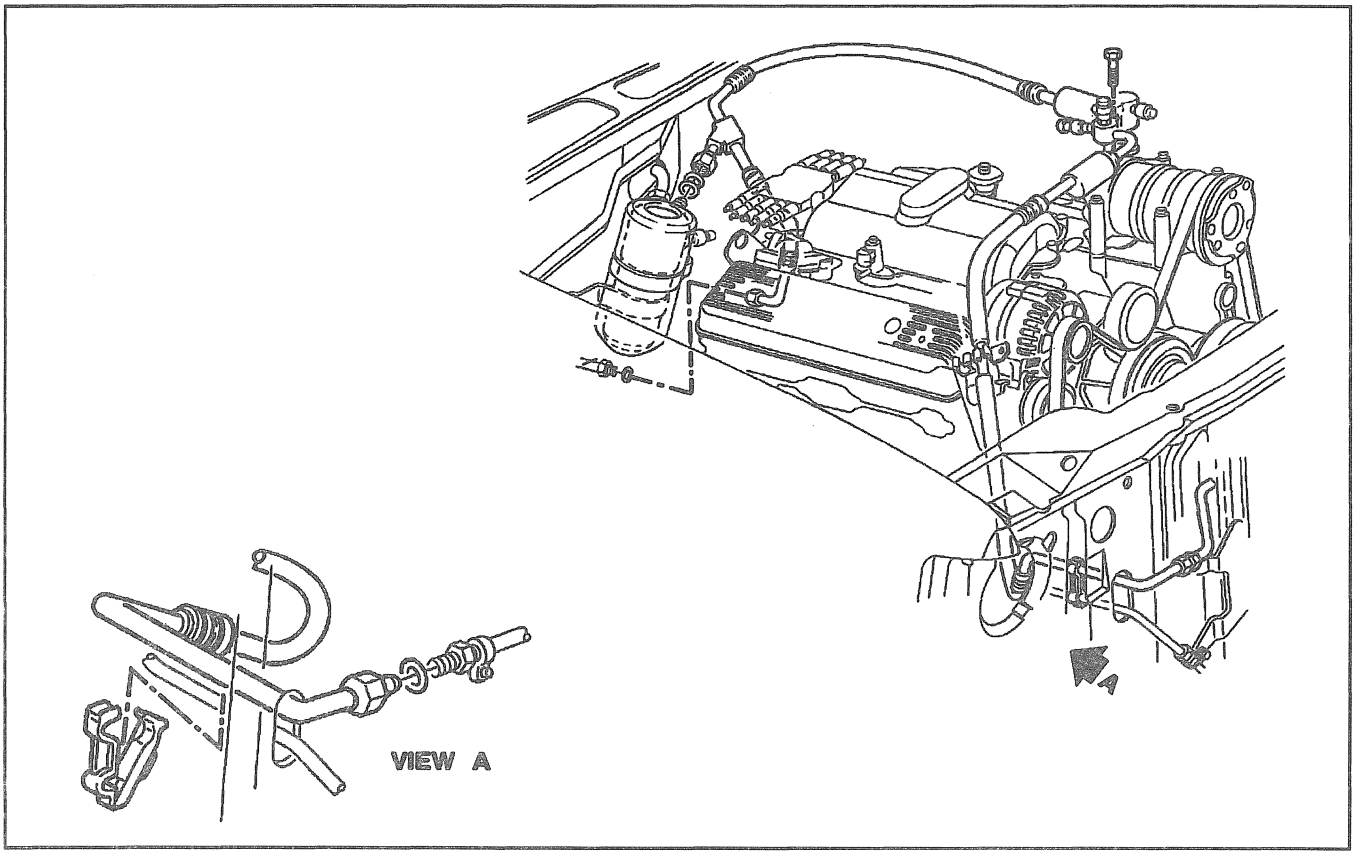


Figure 48—Compressor and Condenser Hose Assembly (5.7L Engines w/Aux. A/C)

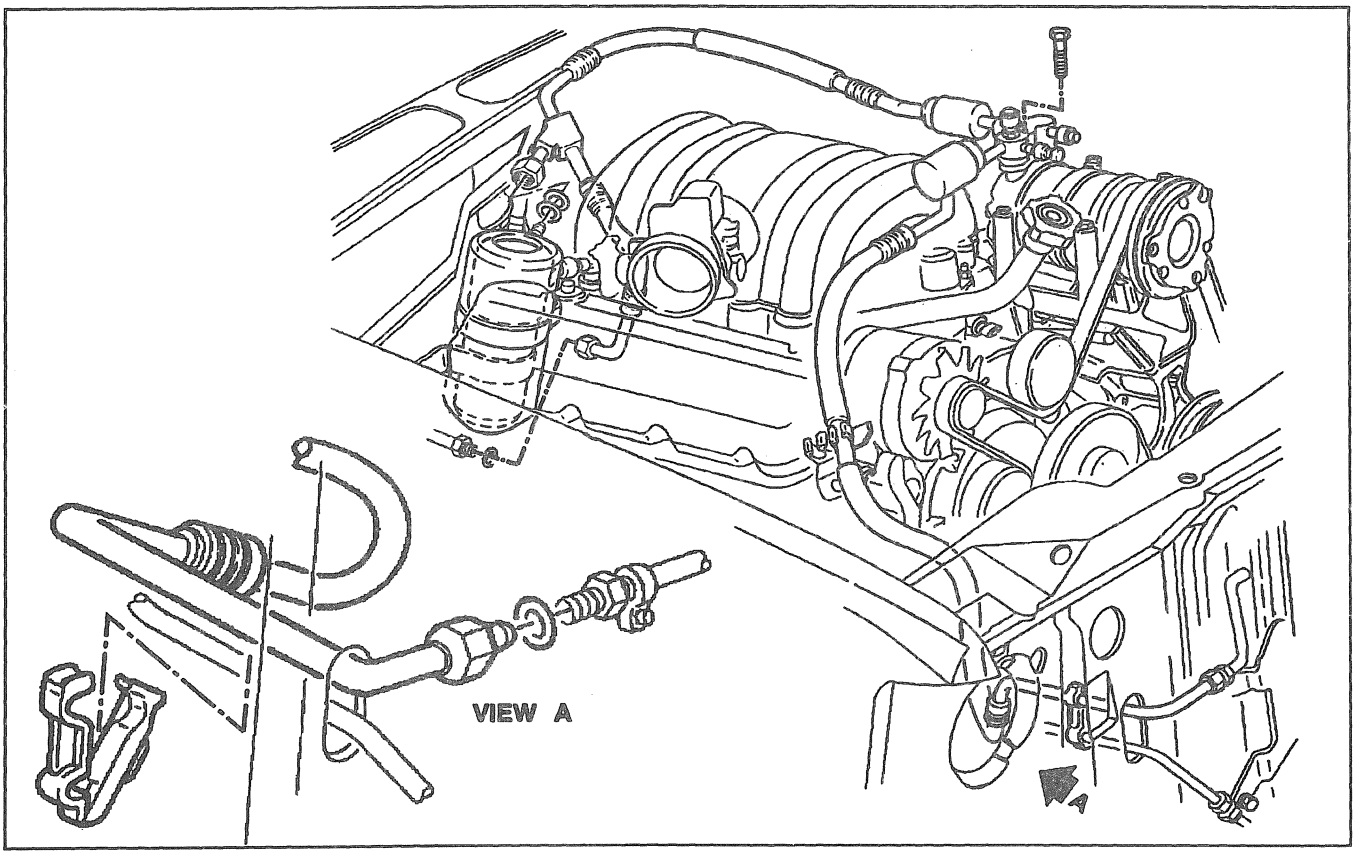


Figure 49—Compressor and Condenser Hose Assembly (7.4L Engines w/Aux. A/C)

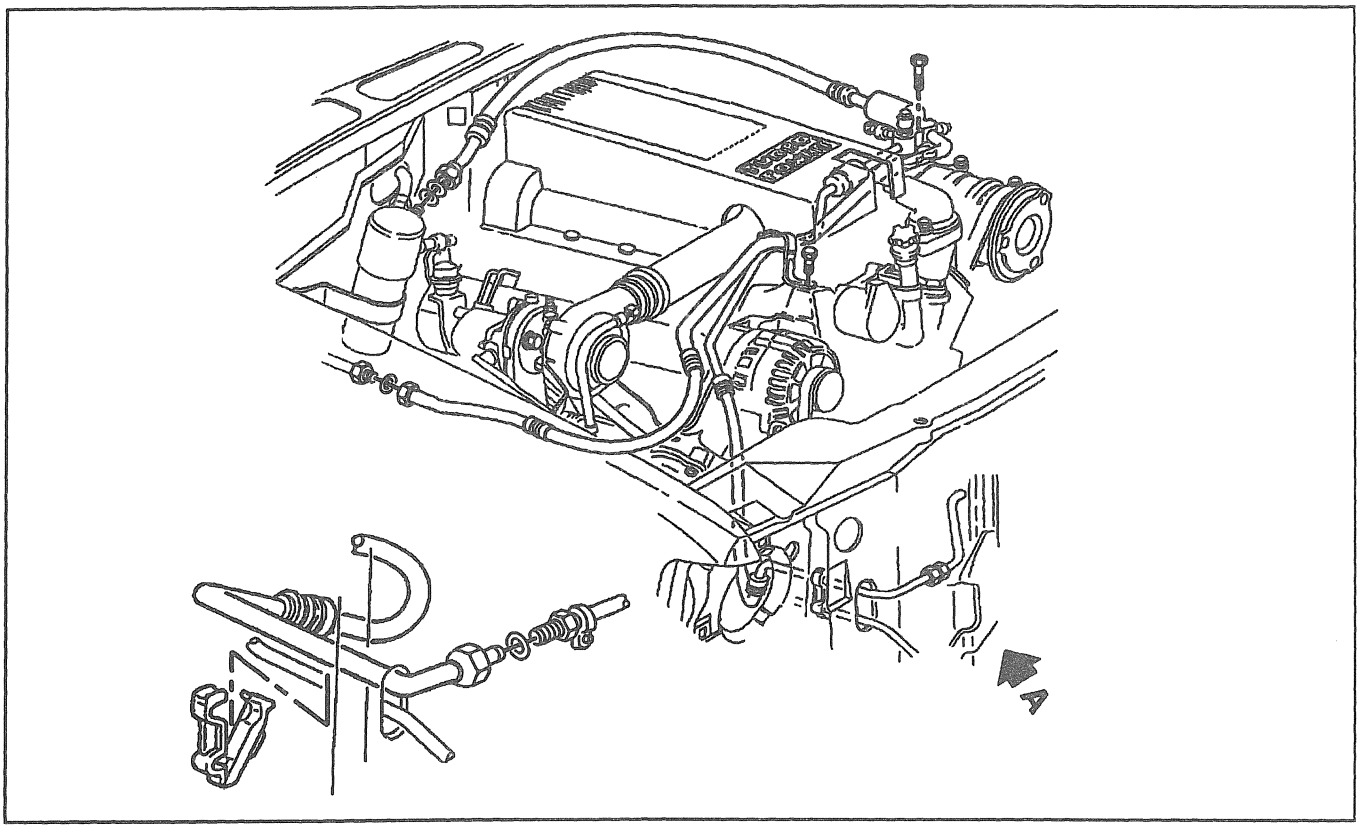


Figure 50—Compressor and Condenser Hose Assembly (6.5L Diesel Engines w/Aux. A/C)

Tighten

- Hose assembly to 24 N·m (18 lb. ft.).

3. New O-ring seal to condenser hose.
   - Coat O-ring seal with 525 viscosity refrigerant oil.
4. Hose assembly to condenser.

Tighten

- Hose assembly to 24 N·m (18 lb. ft.).

5. New O-ring seals to accumulator hose.
   - Coat O-ring seal with 525 viscosity refrigerant oil.
6. Hose assembly to accumulator.

Tighten

- Hose assembly to 24 N·m (18 lb. ft.).

7. Sealing washers.
8. Hose assembly to top of the compressor.
9. Bolt.

Tighten

- Bolt to 34 N·m (25 lb. ft.).

10. Charge system. Refer to "Charging" in this section.
11. Check system for leaks. Refer to "Leak Testing" in this section.

Rear Auxiliary Hose Assembly

Remove or Disconnect (Figures 51 through 53)

1. Recover refrigerant. Refer to Refrigerant Recovery" in this section.
2. Air cleaner assembly.
3. Evaporator tube from auxiliary evaporator hose.
4. O-ring seal.
5. Refrigerant hose assembly from auxiliary compressor hose.
6. O-ring seal.
7. Right front wheelhouse. Refer to SECTION 2B.
8. Auxiliary evaporator hose from auxiliary evaporator.
9. O-ring seal.
10. Auxiliary compressor hose from auxiliary evaporator.
11. O-ring seal.
12. Screws.
13. Hose clips.
14. Auxiliary evaporator hose.
15. Auxiliary compressor hose.

Install or Connect (Figures 51 through 53)

1. Auxiliary compressor hose.
2. Auxiliary evaporator hose.
3. Hose clips.
4. Screws.

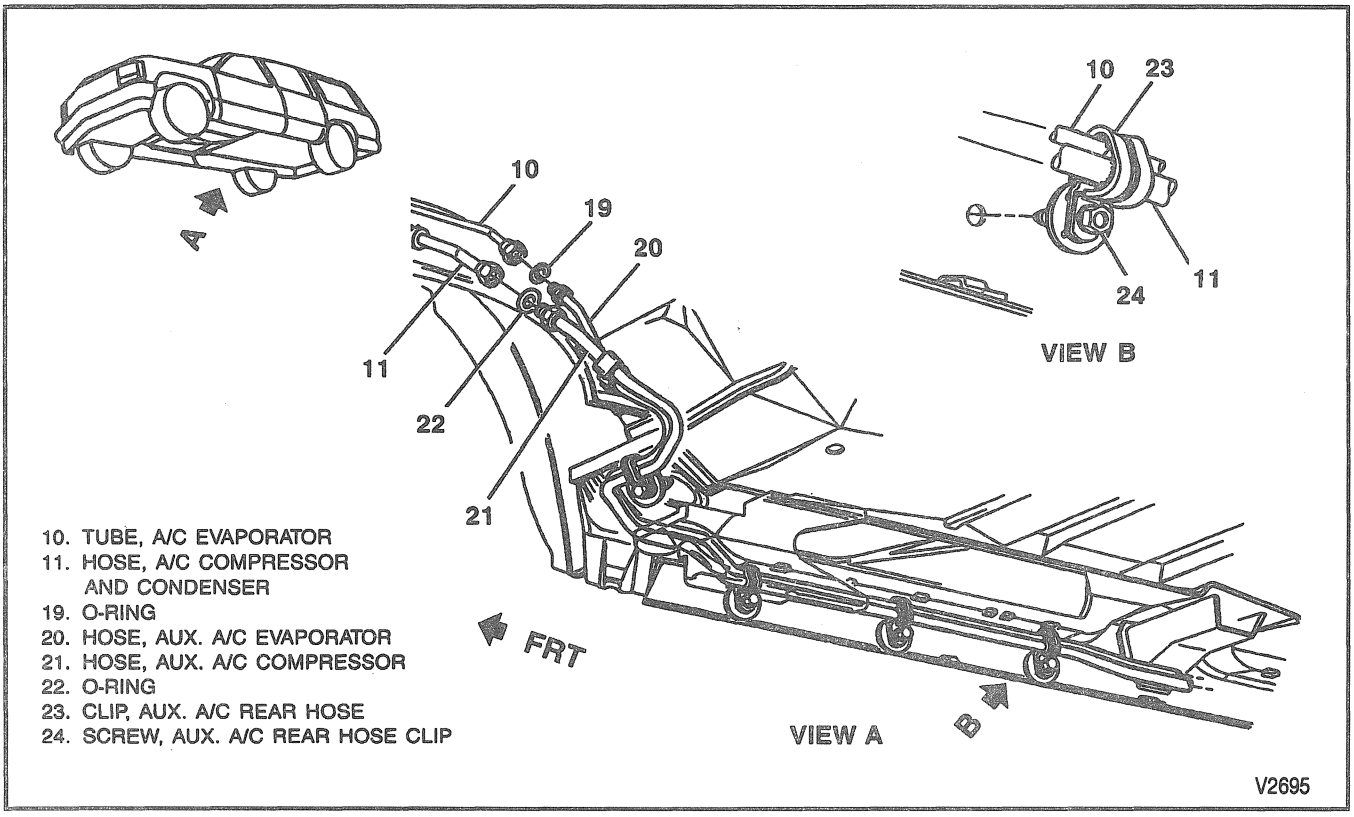


Figure 51—Auxiliary Condenser Hose Routing

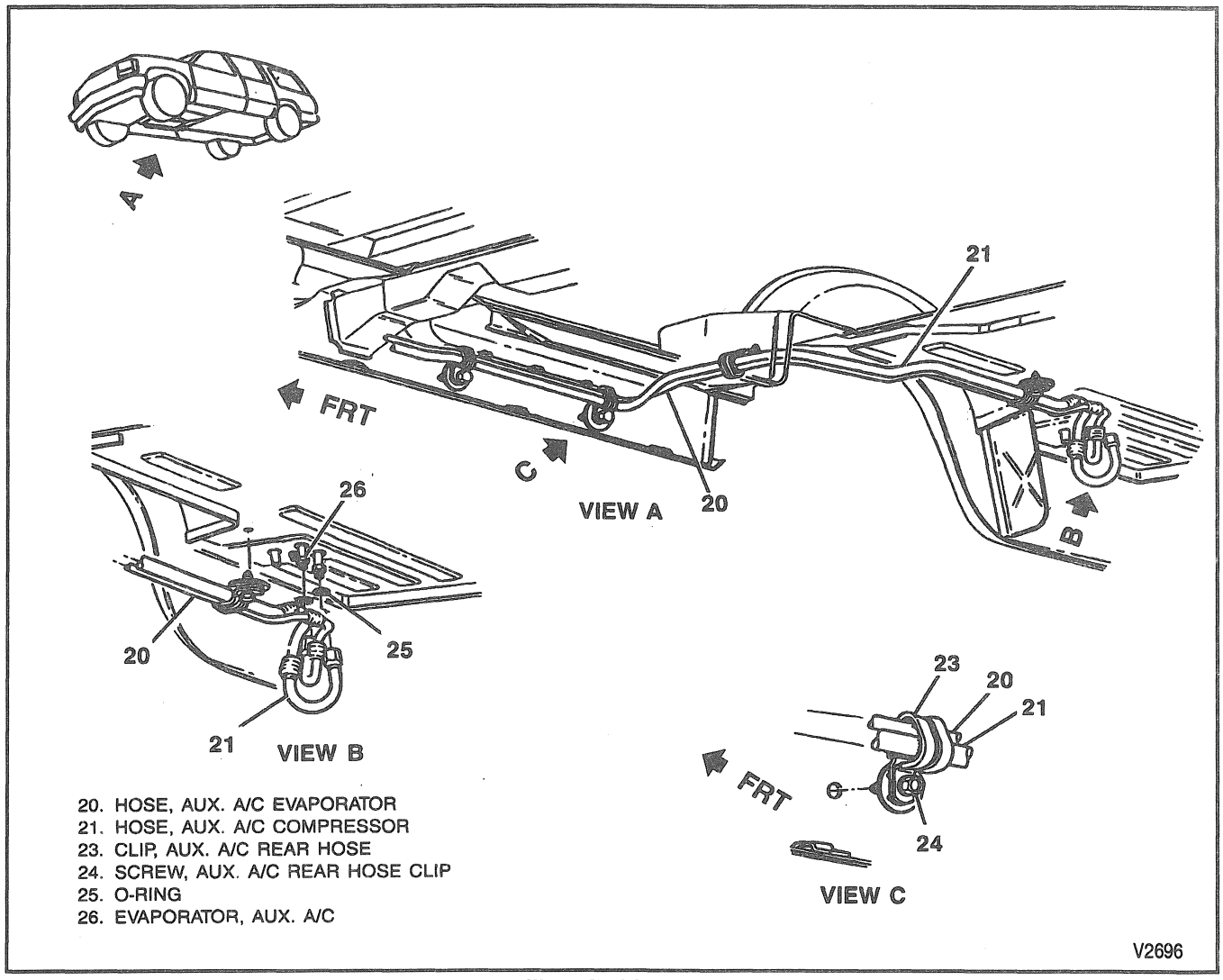


Figure 52—Auxiliary Refrigerant Hose Routing

Tighten

- Screws to 6 N·m (53 lb. in.).

5. New O-ring seal.
   - Coat O-ring seal with 525 viscosity refrigerant oil.
6. Auxiliary compressor hose to auxiliary evaporator.

Tighten

- Auxiliary compressor hose to 32 N·m (24 lb. ft.)

7. New O-ring seal.
   - Coat O-ring seal with 525 viscosity refrigerant oil.
8. Auxiliary evaporator hose to auxiliary evaporator.

Tighten

- Auxiliary evaporator hose to 17 N·m (13 lb. ft.).

9. Right front wheelhouse.
10. New O-ring seal.
    - Coat O-ring seal with 525 viscosity refrigerant oil.
11. Refrigerant hose assembly to auxiliary compressor hose.

Tighten

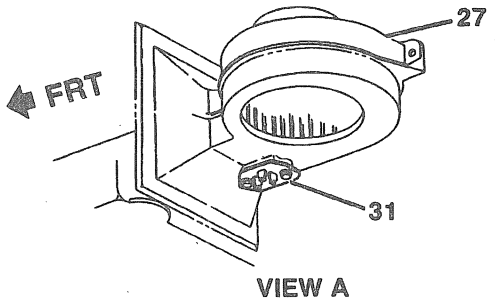
- Refrigerant hose assembly to 24 N·m (18 lb. ft.).
- Lower the vehicle.

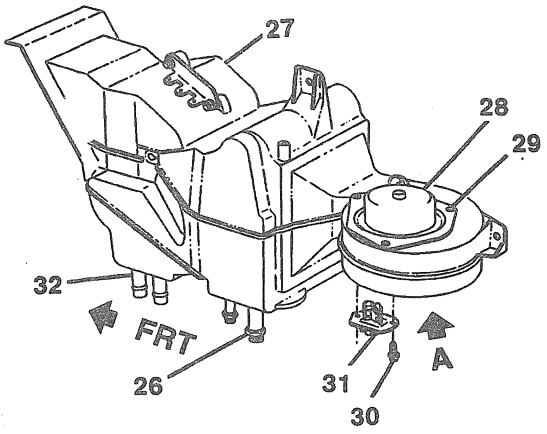
12. New O-ring seal.
    - Coat O-ring seal with 525 viscosity refrigerant oil.
13. Evaporator tube to auxiliary evaporator hose (Figure 47).

Tighten

- Evaporator tube to 24 N·m (18 lb. ft.).

14. Air cleaner assembly.
15. Charge system. Refer to "Charging" in this section.
16. Check system for leaks. Refer to "Leak Testing" in this section.





26. EVAPORATOR, AUX. A/C
27. MODULE, AUX. HEATER AND A/C
28. MOTOR, BLOWER
29. SCREW, BLOWER MOTOR MOUNTING
30. SCREW, BLOWER MOTOR RESISTOR MOUNTING
31. RESISTOR, BLOWER MOTOR
32. CORE, AUX. HEATER

Figure 53—Auxiliary Heater Module

EVAPORATOR CORE

Remove or Disconnect (Figures 53 and 54)

1. Negative battery cable. Refer to SECTION 6D1.
2. Recover refrigerant. Refer to "Charging" in this section.
3. Rear quarter interior trim, as necessary. Refer to SECTION 10A4.
4. Right rear quarter trim panel. Refer to SECTION 10A4.
5. Right rear wheelhouse. Refer to SECTION 2B.
6. Rear heater hoses from auxiliary heater core (32), if equipped. Refer to SECTION 1A.
7. Auxiliary refrigerant hoses (20 and 21) from auxiliary evaporator (26). Refer to "Compressor and Condenser Hose Assembly" in this section.
8. Electrical connectors, as necessary.
9. Heater/evaporator case cover.
   A. Remove case clip (Figure 54).
   B. Remove eleven case screws.
   C. Separate case halves.
10. Pipe insulator
11. Evaporator core (26).

Install or Connect (Figures 53 and 54)

1. Evaporator core (26). Refer to "Refrigerant Oil Distribution" in this section, if replacing evaporator.
2. Pipe insulator.
3. Heater/evaporator case cover and screws.
   • Case clip (Figure 54).
4. Auxiliary heater case to the vehicle.
5. Auxiliary refrigerant hoses (20 and 21) to auxiliary evaporator (26).
6. Rear heater hoses to auxiliary heater core (32), if equipped.
7. Electrical connectors, as necessary.
8. Right rear wheelhouse.
9. Right rear quarter trim panel.
10. Rear quarter interior trim, as necessary.
11. Negative battery cable.
12. Charge system. Refer to "Charging" in this section.
13. Check system for leaks. Refer to "Leak Testing" in this section.

BLOWER MOTOR RESISTOR

Remove or Disconnect (Figure 53)

1. Negative battery cable. Refer to SECTION 6D1.
2. Right rear quarter trim panel cover. Refer to SECTION 10A4.
3. Electrical connectors, as necessary.
4. Screws (30).
5. Blower motor resistor (31).

Install or Connect (Figure 53)

1. Blower motor resistor (31).
2. Screws (30).

Tighten

• Screws (30) to 1.4 N·m (12 lb. in.).

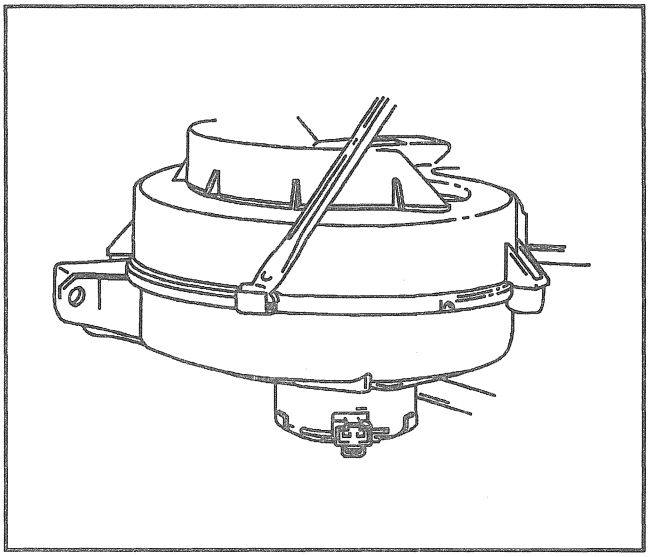


Figure 54—Removing Case Clip

3. Electrical connectors, as necessary.
4. Right rear quarter trim panel cover.
5. Negative battery cable.
   • Check circuit operation.

BLOWER MOTOR AND FAN

Remove or Disconnect (Figures 53 through 55)

1. Negative battery cable. Refer to SECTION 6D1.
2. Right rear quarter trim panel cover. Refer to SECTION 10A4.
3. Electrical connectors.
4. Screws (29).
5. Cooling tube.
6. Blower motor (28).
7. Fan cage from the motor (Figure 54)

Install or Connect (Figures 53 through 55)

1. Fan cage to the motor.
2. Blower motor (28) to the heater case.
3. Screws (29).

Tighten

   • Screws (29) to 1.7 N·m (15 lb. in.).

4. Cooling tube.
5. Electrical connectors, as necessary.
6. Right rear quarter trim panel cover.
7. Negative battery cable.
   • Check circuit operation.

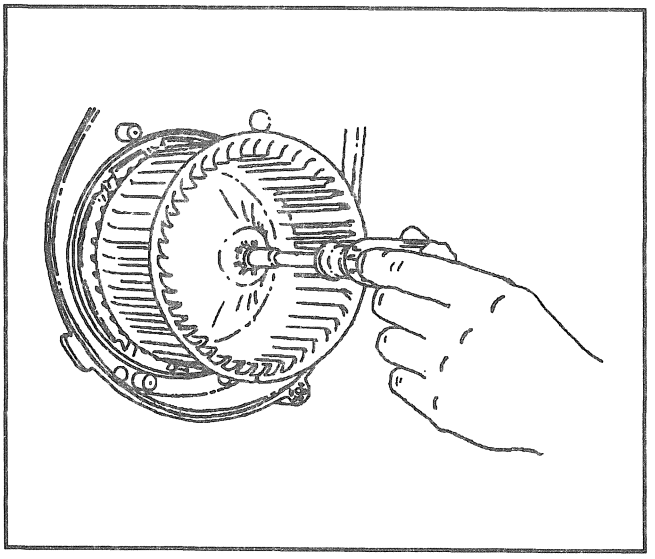


Figure 55—Removing Blower Fan Cage

SPECIFICATIONS

GENERAL SPECIFICATIONS

Compressor ..... DELPHI Thermal HT-6
Type ..... 6 Cylinder Axial
Displacement ..... 10.0 Cu. In.

SYSTEM CAPACITIES

Refrigerant-134a
- Pickup Models ..... 0.91 kg (2.0 lbs.)
- Crew Cab, Suburban, and Utility Models ..... 1.02 kg (2.25 lbs.)
- Suburban with Aux. A/C ..... 1.81 kg (4.0 lbs.)

Polyalkaline Glycol (PAG) Refrigerant Oil
- Without Aux. A/C ..... 240 ml (8 fl. oz.)
- With Aux. A/C ..... 330 ml (11 fl. oz.)

FASTENER TIGHTENING SPECIFICATIONS

ITEM	N·m	Lb. Ft.	Lb. In.
Accumulator Bracket Mounting Screw	6	—	53
Accumulator-to-Evaporator	41	30	—
Auxiliary Blower Motor Resistor Mounting Screw (C69)	1.4	—	12
Auxiliary Compressor Hose Mounting Clip Screws (C69)	6	—	53
Auxiliary Compressor Hose-to-Auxiliary Evaporator (C69)	32	24	—
Auxiliary Evaporator Hose-to-Auxiliary Evaporator (C69)	17	13	—
Blower Motor Mounting Screw	1.7	—	15
Blower Motor Resistor Mounting Screw	1.4	—	12
Compressor Mounting Bolts	50	37	—
Condenser Mounting Screw	4.5	—	40
Control Assembly Mounting Screw	1.9	—	17
Cowl Panel-to-Module Assembly Screw	1.9	—	17
Defroster Nozzle Mounting Screw	1.9	—	17
Defroster Nozzle-to-Heater Case Mounting Screw	1.4	—	12
Distributor Duct Mounting Screw	1.9	—	17
Evaporator Tube-to-Auxiliary Evaporator Hose (C69)	24	18	—
Evaporator Tube-to-Condenser	24	18	—
Evaporator Tube-to-Evaporator	24	18	—
Module Assembly-to-Cowl Panel Nut	2.8	—	25
Module Assembly-to-Cowl Panel Screw	11	—	97
Pressure Cycling Switch-to-Accumulator	4.5	—	40
Refrigerant Hose-to-Accumulator	41	30	—
Refrigerant Hose-to-Auxiliary Compressor Hose	24	18	—
Refrigerant Hose-to-Compressor Bolt	34	25	—
Refrigerant Hose-to-Condenser	24	18	—

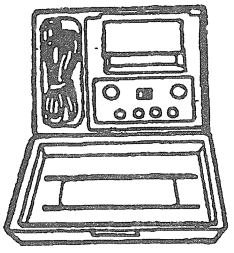
T2964

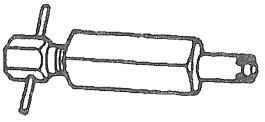
R134A METRIC FITTING SIZES

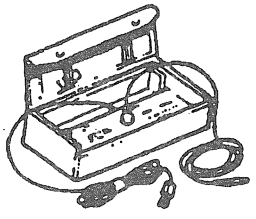
RPO	HEX FITTING SIZE (mm)	CONNECTION	B/U HEX FITTING SIZE (mm)
C60/C69	24	A/C Cond. Hose to Cond. Inlet	
C60/C69	24	Evap. Tube to Cond. Outlet	
C60/C69	22	Evap. Tube to Module	20
C60/C69	32	A/C Accum. to Module	27
C60/C69	32	A/C Comp. Hose to A/C Accum.	N/A
C69	24	Aux. Evap. Hose to Evap. Tube	20
C69	22	Aux. Evap. to Aux. Module	16
C69	26	Aux. Comp. Hose to Aux. Module	22

T3122

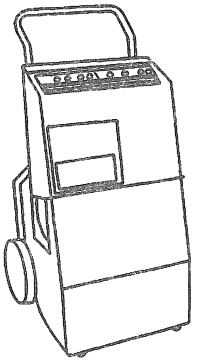
SPECIAL TOOLS

1.  J 21213 – A

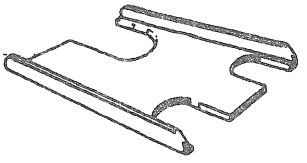
2.  J 26549 – D

3.  J 39400

4.  J 36645

5.  J 39500

6.  J 39037

7.  J 38042

1. FOUR JACK – DUAL RANGE TEMPERATURE TESTER
2. ORIFICE RUBE REMOVER AND EXTRACTOR
3. H – 10 LEAK DETECTOR
4. EVAPORATOR CLEANING GUN
5. REFRIGERANT RECOVERY, RECYCLING, AND RECHARGING STATION
6. CHARGE VALVE OCTAGON SOCKET
7. DUAL O – RING SEPARATOR

BLANK

SECTION 1D2

HD6/HT6 AIR CONDITIONING COMPRESSOR SERVICE OR UNIT REPAIR R-134a

CAUTION: This vehicle is equipped with Supplemental Inflatable Restraint (SIR). Refer to CAUTIONS in Section 9J under ON-VEHICLE SERVICE and the SIR Component and Wiring Location view in Section 9J before performing service on or around SIR components or wiring. Failure to follow CAUTIONS could result in possible air bag deployment, personal injury, or otherwise unneeded SIR system repairs.

NOTICE: When fasteners are removed, always reinstall them at the same location from which they were removed. If a fastener needs to be replaced, use the correct part number fastener for that application. If the correct part number fastener is not available, a fastener of equal size and strength (or stronger) may be used. Fasteners that are not reused, and those requiring thread locking compound will be called out. The correct torque value must be used when installing fasteners that require it. If the above conditions are not followed, parts or system damage could result.

CONTENTS

GENERAL DESCRIPTION

The HD6/HT6 Automotive Conditioning Compressor and Clutch Assembly is a lightweight, six cylinder axial design consisting of three double ended pistons and weighs 5.8 kg (12.7 lbs.)

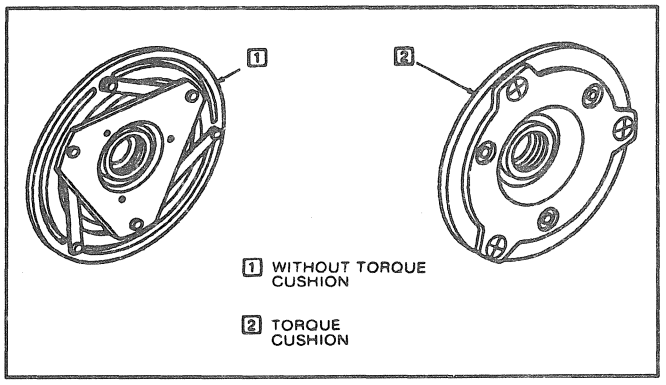


Fig. 1 Clutch Driver Designs

Although this compressor is the same for all vehicle applications, there are differences in installations, mounting brackets, pulleys, torque cushions and switches, none of which will affect the following overhaul procedures.

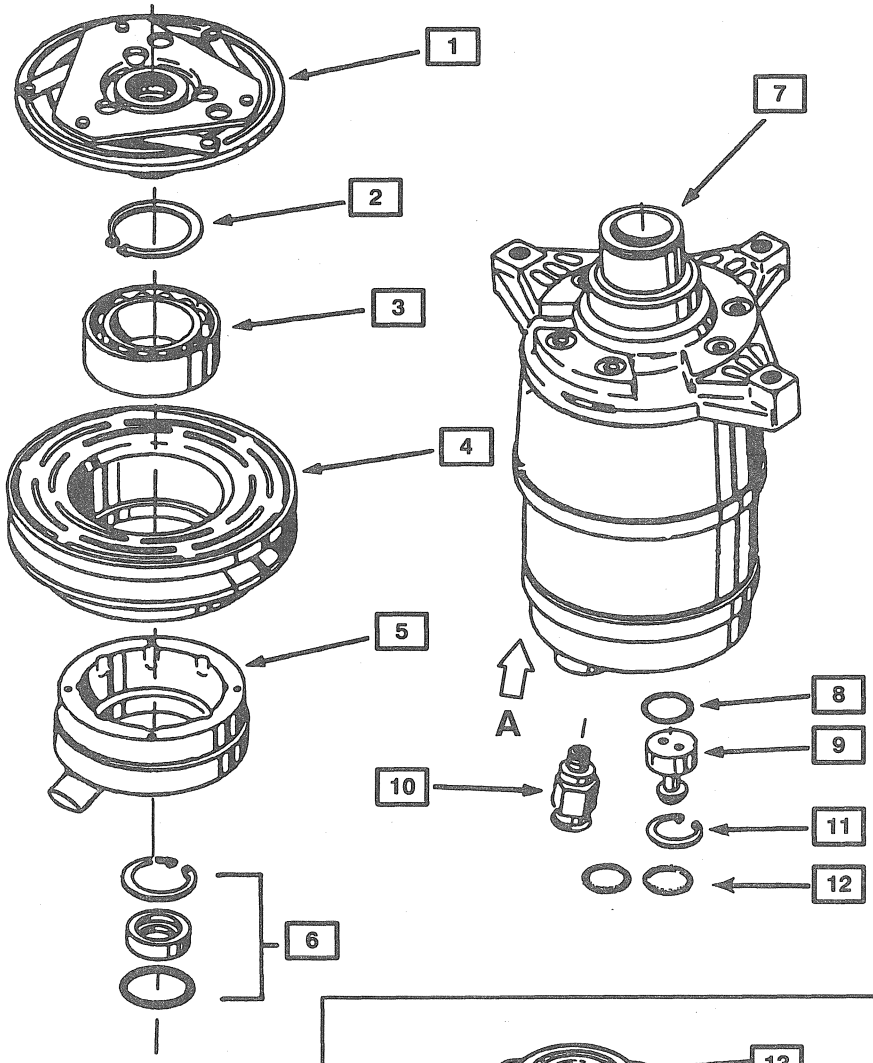
There are two clutch driver designs for these compressors. The clutch driver without a torque cushion and the clutch driver having a thin torque cushion (Fig. 1).

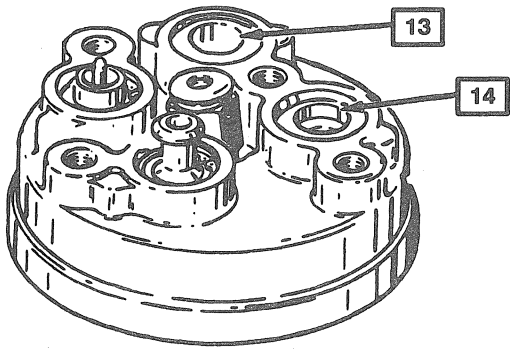
Service compressors are supplied with either the control switches assembled in the rear head or a plug may be found where a control switch is required. If the service compressor requires control switches, the plug may be removed from the appropriate rear head switch cavity of the replaced compressor and assembled as prescribed in this manual.

When servicing the compressor, keep dirt or foreign material from getting on or into the compressor parts and system. Clean tools and a clean work area are important for proper service. The compressor connections and the outside of the compressor should be cleaned before any "on vehicle" repairs, or before removal of the compressor. The parts must be kept clean at all times and any parts to be reassembled should be cleaned with trichloroethane, naphtha, stoddard solvent, kerosene or equivalent and dried with dry air. When necessary to use a cloth on any part, it should be of a non-lint producing type.

The operations described below are based on bench overhaul with the compressor removed from the vehicle, except as noted. They have been prepared in order of accessibility of the components. When a compressor is removed from the vehicle for servicing, the amount of PAG lubricant remaining in the compressor should be drained,

1 — CLUTCH DRIVER
2 — ROTOR BEARING RETAINER
3 — PULLEY BEARING
4 — PULLEY
5 — CLUTCH COIL ASSEMBLY
6 — SHAFT SEAL PARTS
7 — PUMP ASSEMBLY
8 — SWITCH O-RING
9 — SYSTEM CONTROL SWITCH
10 — HIGH PRESSURE RELIEF VALVE
11 — RETAINER RING SWITCH
12 — SUCTION/DISCHARGE PORT SEALING WASHERS
13 — SPECIAL 134a SUCTION PORT
14 — SPECIAL 134a DISCHARGE PORT





Compressor — Rear Head
As Viewed In Direction of Arrow "A"

Fig. 2 Compressor Components — Disassembly

measured and recorded. This PAG lubricant should then be discarded and an equal amount of new PAG lubricant added to the compressor.

The service compressor is shipped with 240 ml (8 oz.) of PAG lubricant. This lubricant should be drained and retained for use as replacement lubricant when service procedures require addition of new lubricant to compressor. NOTE: Replace only with GM approved PAG oil P/N 12345923.

Most minor repair procedures may be done on the vehicle without discharging the system. Major repair procedures require that the system be discharged of refrigerant.

METRIC THREAD SIZE INFORMATION

1. Compressor to mounting bracket bolts.
   Front M10 x 1.5 – 6H
   Rear M8 x 1.25 – 6H
2. Suction-discharge port screw.
   M10 x 1.5 – 6H
3. Compressor shaft.
   M9 x 1.25 – 6H
4. Internal hub-clutch drive assembly.
   M22 x 1.5 – 6H

UNIT REPAIR

MINOR COMPRESSOR REPAIR PROCEDURES

THE FOLLOWING OPERATIONS TO THE COMPRESSOR CLUTCH PLATE AND HUB, ROTOR AND BEARING, AND COIL ARE COVERED AS "MINOR" BECAUSE THEY MAY BE PERFORMED WITHOUT FIRST RECOVERING REFRIGERANT FROM THE SYSTEM OR REMOVING THE COMPRESSOR FROM THE VEHICLE.

The Compressor Shaft Seal assembly, control switches, and Pressure Relief Valve may also be serviced WITHOUT REMOVING THE compressor from the vehicle but these operations are covered later in this section as MAJOR REPAIR PROCEDURES because the system must be reclaimed, evacuated and recharged to complete service.

Illustrations used in describing these operations show the compressor removed from the vehicle only to more clearly illustrate the various operations.

When servicing the compressor, remove only the parts that preliminary diagnosis shows are in need of service. Refer to Figures 2 and 5 for information relative to part names and location.

Removal and installation of external compressor parts, and disassembly and assembly of internal parts, must be performed on a clean workbench. The work area, tools and parts must be kept clean at all times.

COMPRESSOR CLUTCH PLATE AND HUB ASSEMBLY

Remove or Disconnect

1. Clamp the holding fixture J 33026 in a vise and attach compressor to holding fixture with thumb screws J 33026–1 (Fig. 3).
2. With center screw forcing tip in place to thrust against the end of the shaft, thread the Clutch Plate and Hub Assembly Installer-Remover J 33013–B into the hub. Hold the body of the remover with a wrench and turn the center screw into the remover body to remove the clutch plate and hub assembly (Fig. 3).

   NOTICE: Do not drive or pound on the clutch hub or shaft. Internal damage to compressor may result. The forcing tip on J 33013–B remover-installer center screw must be flat or the end of the shaft/axial plate assembly will be damaged.
3. Remove the shaft key and retain for reassembly.

Install or Connect

1. Install the shaft key into the hub key groove (Fig. 4). Allow the key to project approximately 3.2mm (1/8") out of the keyway. The shaft key is curved slightly to provide an interference fit in the hub key groove.
2. Be sure the frictional surface of the clutch plate and the clutch rotor are clean before installing the clutch plate and hub assembly.
3. Align the shaft key with the shaft keyway and place the clutch plate and the hub assembly onto the compressor shaft.

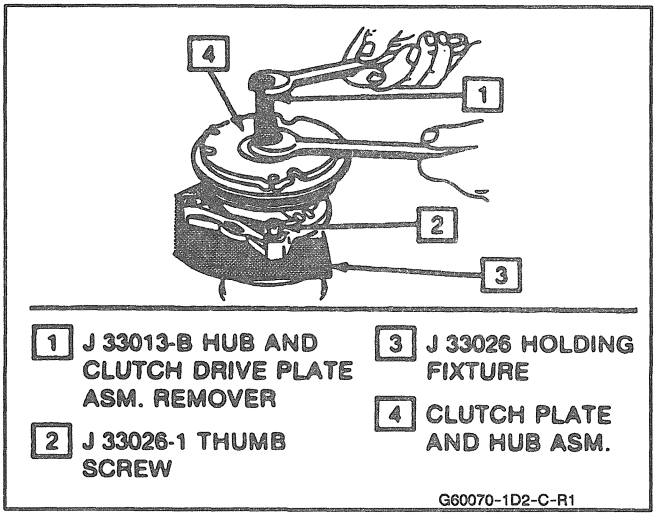


Fig. 3 Clutch Plate and Hub Assembly Removal

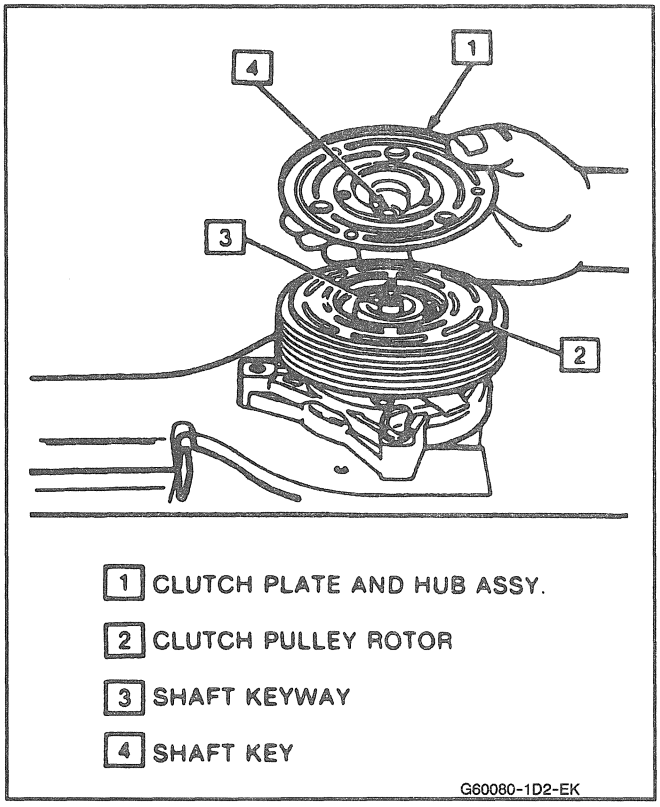


Fig. 4 Shaft Key, Clutch Plate/Hub Installation

4. Remove the forcing tip on J 33013–B clutch plate and hub assembly installer–remover center screw and reverse the body direction on the center screw, as shown in Figure 5.
5. Install the clutch plate and hub installer–remover J 33013–B with bearing as shown in Figure 8.

   The body of the J 33013–B installer–remover should be backed off sufficiently to allow the center screw to be threaded onto the end of the compressor shaft.
6. Hold the center screw with a wrench. Tighten the hex portion of the installer–remover J 33013–B body to press the hub onto the shaft. Tighten the body several turns, remove the installer and **check to see that the shaft key is still in place in the keyway before installing the clutch plate and hub assembly to its final position.** The air gap between frictional surfaces of the clutch plate and clutch rotor should be 0.50–0.76mm (.020–.030″).

NOTICE: If the center screw is threaded **fully** onto the end of the compressor shaft. or if the body of the installer is held and the center screw is rotated, the key will wedge and will break the clutch hub.

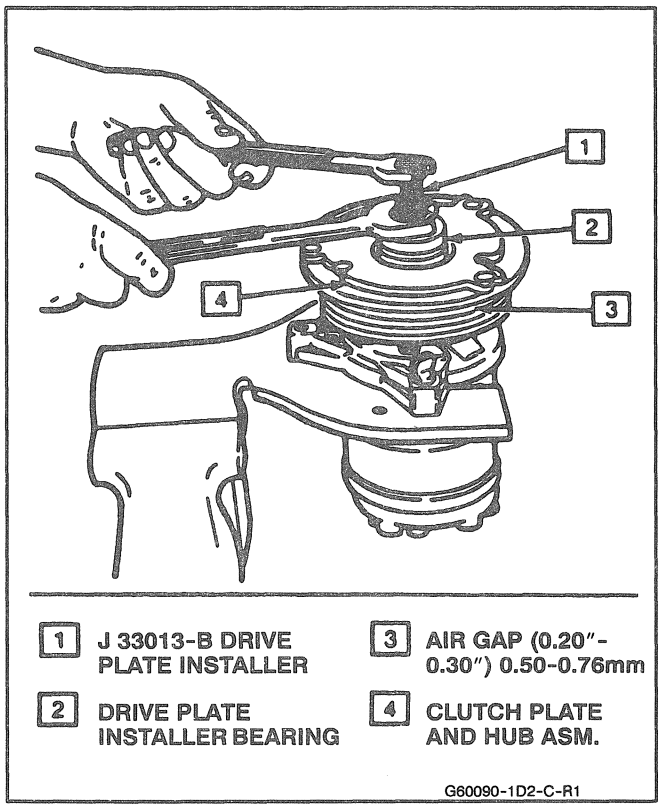


Fig. 5 Installing Clutch Plate & Hub Assembly

7. Remove installer J 33013–B, check for proper positioning of the shaft key (even or slightly above the clutch hub).
8. Spin the pulley rotor by hand to see that the rotor is not rubbing the clutch drive plate.

COMPRESSOR CLUTCH ROTOR AND/OR BEARING

Remove or Disconnect

1. Remove the clutch plate and hub assembly as described previously.
2. Remove rotor and bearing assembly retaining ring, using snap ring pliers J 6083 (Fig. 6).

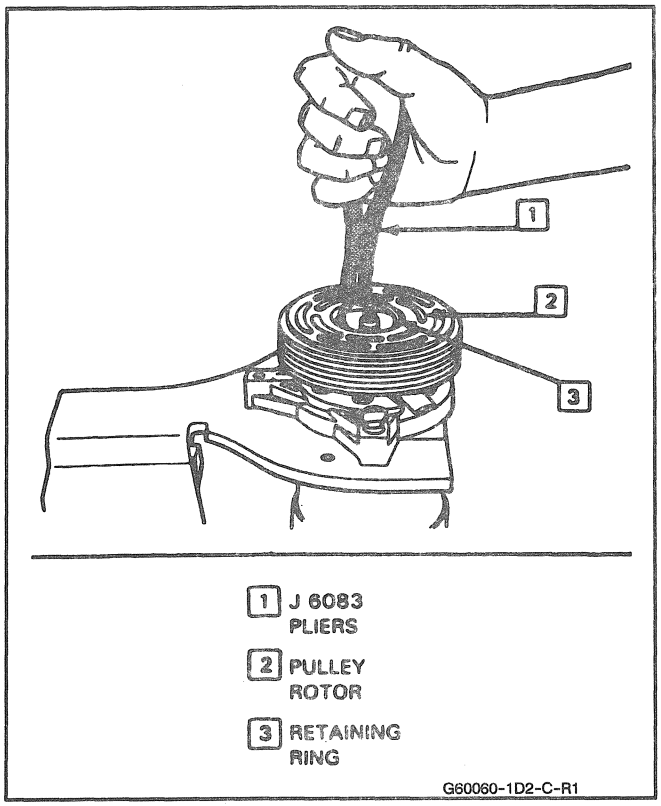


Fig. 6 Installing-Removing Pulley Rotor & Bearing Assembly Retaining Ring

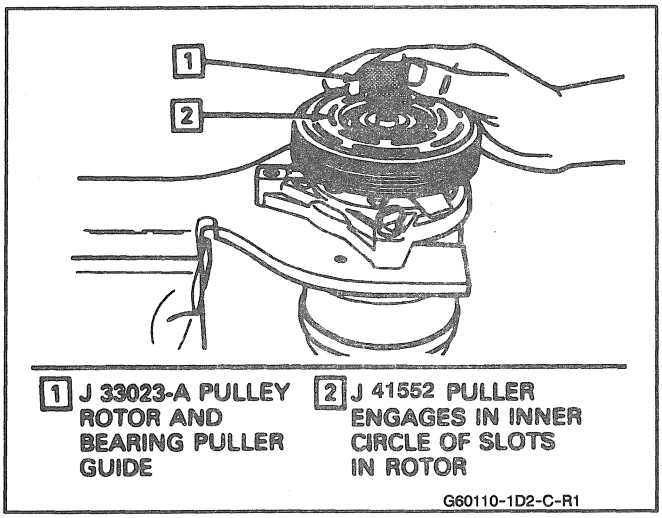


Fig. 7 Installing Pulley Rotor/Bearing Puller Guide

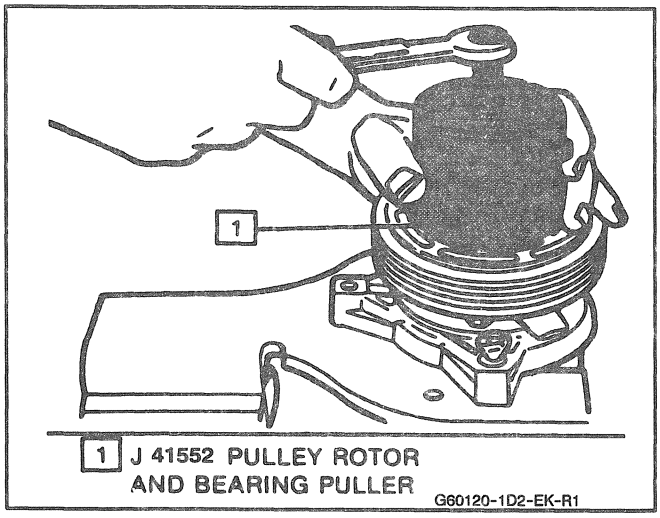


Fig. 8 Removing Pulley Rotor and Bearing Assembly

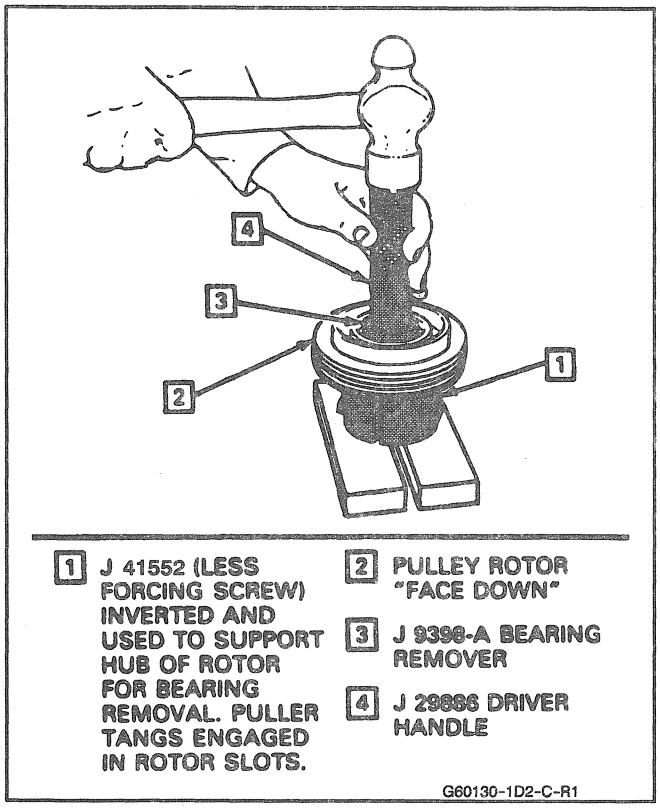


Fig. 9 Pulley Rotor Bearing Removal

3. Install pulley rotor and bearing puller guide J 33023–A to the front head (Fig. 7) and install J 41552 pulley rotor and bearing puller down into the inner circle of slots in the rotor. Turn the J 41552 puller clockwise in the slots in the rotor (Fig. 8).
4. Hold the J 41552 puller in place and tighten the puller screw against the puller guide to remove the pulley rotor and bearing assembly.
5. To prevent damage to the pulley rotor during bearing removal the rotor hub must be properly supported. Remove the forcing screw from J 41552 puller and, with the puller tangs still engaged in the rotor slots, invert the assembly onto a solid flat surface or blocks as shown in Figure 9.
6. Drive the bearing out of the rotor hub with rotor bearing remover J 9398–A and J 29886 universal handle (Fig. 9).

NOTICE: It is not necessary to remove the staking in front of the bearing to remove the bearing, however, it will be necessary to file away the old stake metal for proper clearance for the new bearing to be installed into the rotor bore or the bearing may be damaged.

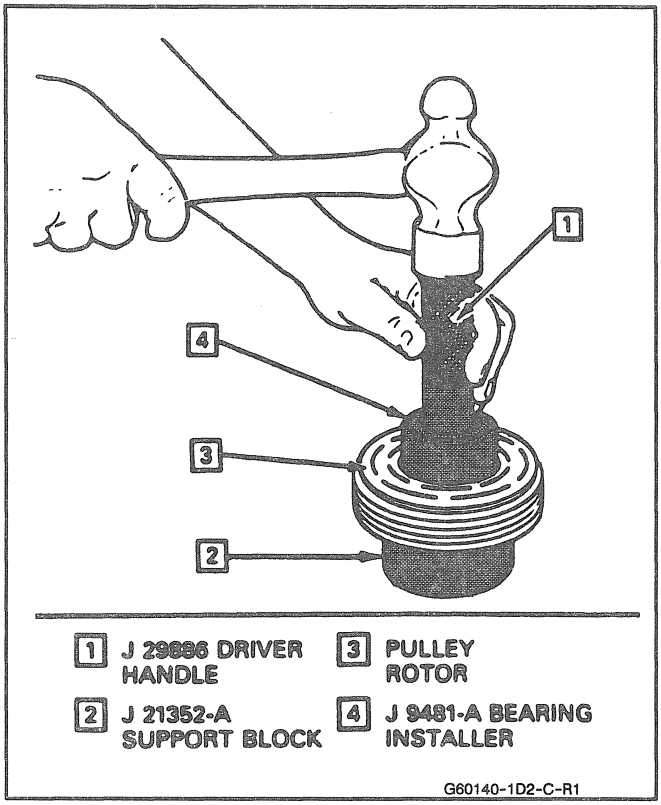


Fig. 10 Installing Pulley Rotor Bearing

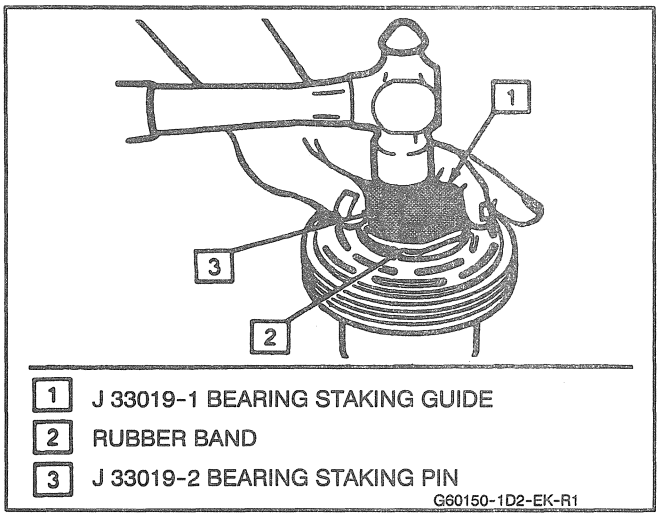


Fig. 11 Staking Bearing In Rotor Hub Bore

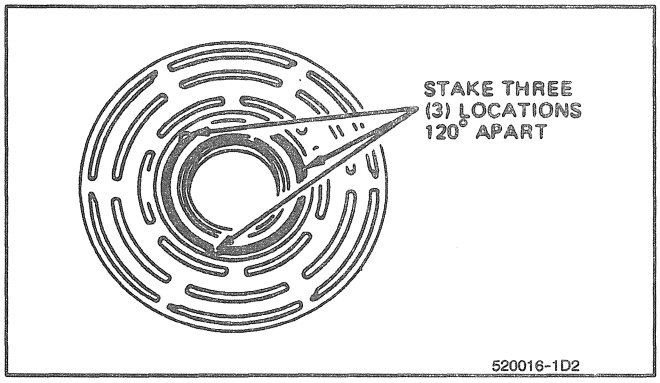


Fig. 12 Bearing Staked in Place

Install or Connect

1. Place the pulley rotor on the J 21352–A support block to fully support the rotor hub during bearing installation (Fig. 10).

   NOTICE: DO NOT support the rotor by resting the pulley rim on a flat surface during the bearing installation or the rotor face will be bent.

2. Align the new bearing squarely with the hub bore and using puller and bearing installer J 9481–A with universal handle J 29886, drive the bearing fully into the hub (Fig. 10). The installer will apply force to the outer race of the bearing, if used as shown.

3. Place bearing staking guide J 33019–1 and bearing staking pin J 33019–2 in the hub bore as shown in Figure 11. Shift the rotor and bearing assembly on the J 21352–A support block to give full support of the hub under the staking pin location. A heavy–duty rubber band may be used to hold the stake pin in the guide (Fig. 11), and the stake pin should be properly positioned in the guide after each impact on the pin.

4. Using care to prevent personal injury, strike the staking pin with a hammer until a metal stake, similar to the original, is formed **down to** but **not touching** the **bearing**.

   Noisy bearing operation and reduced bearing life may result if outer bearing race is deformed while staking, The stake metal should not contact the outer race of the bearing. Stake three places 120 degrees apart as shown in Figure 12.

5. With the compressor mounted to the J 33026 holding fixture, position the rotor and bearing assembly on the front head (Fig. 13).

6. Position the J 33017 pulley, rotor and bearing installer and J 33023–A puller pilot directly over the inner race of the bearing (Fig. 13).

7. Position puller crossbar J 8433–1 on the puller pilot J 33023–A and assemble the two J 33026–2 through bolts and washers through the puller bar slots and thread them into the J 33026 holding fixture (Fig. 13). The thread of the through bolts should engage the full thickness of the holding fixture.

8. Tighten the center screw in the J 8433–1 puller crossbar to force the pulley rotor and bearing assembly onto the compressor front head (Fig. 13). Should the J 33017 pulley rotor and bearing installer slip off direct in-line contact with the inner race of the bearing, loosen the J 8433–1 center forcing screw and realign the installer and pilot so that the J 33017 installer will properly clear the front head.

9. Install rotor and bearing assembly retainer ring, using snap ring pliers J 6083 (Fig. 6).

10. Reinstall clutch plate and hub assembly as described previously.

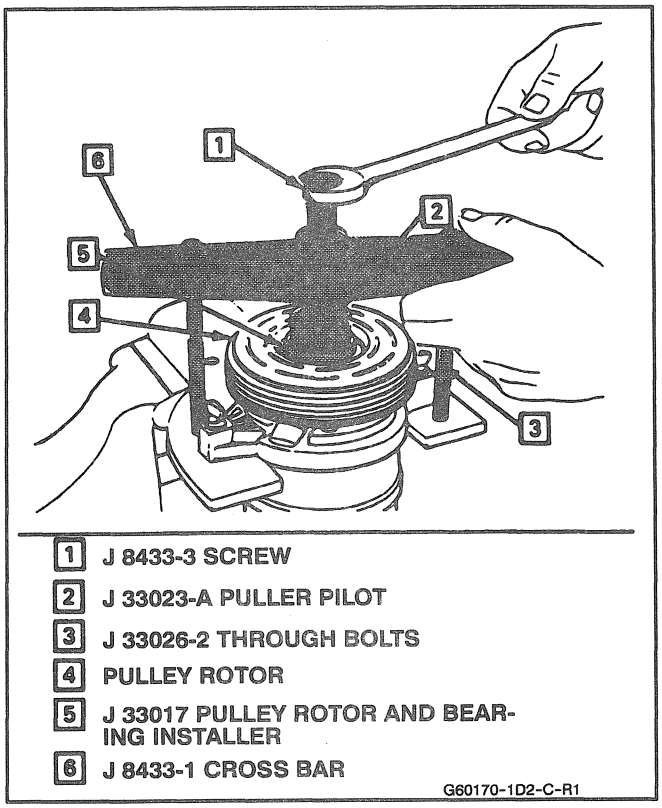


Fig. 13 Installing Pulley Rotor and Bearing Assembly

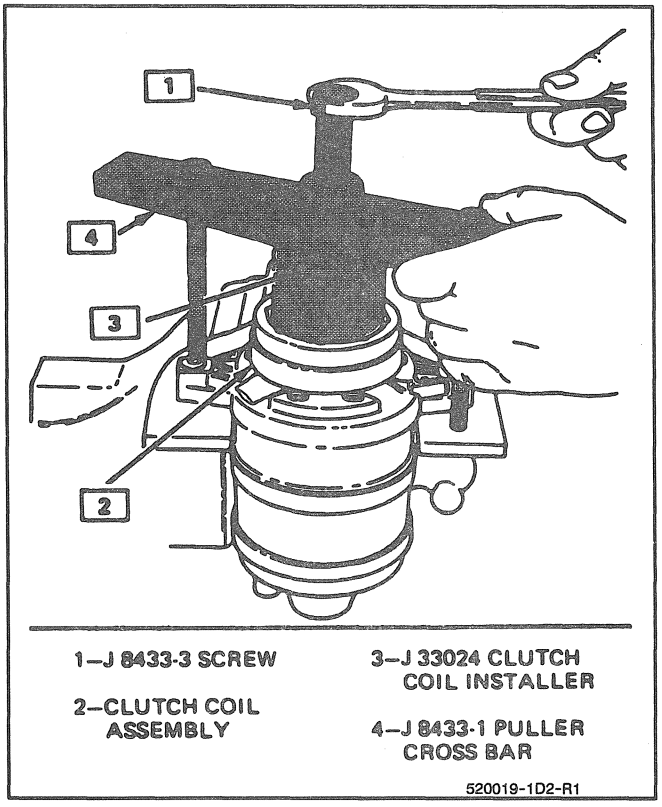


Fig. 15 Installing Clutch Coil Assembly

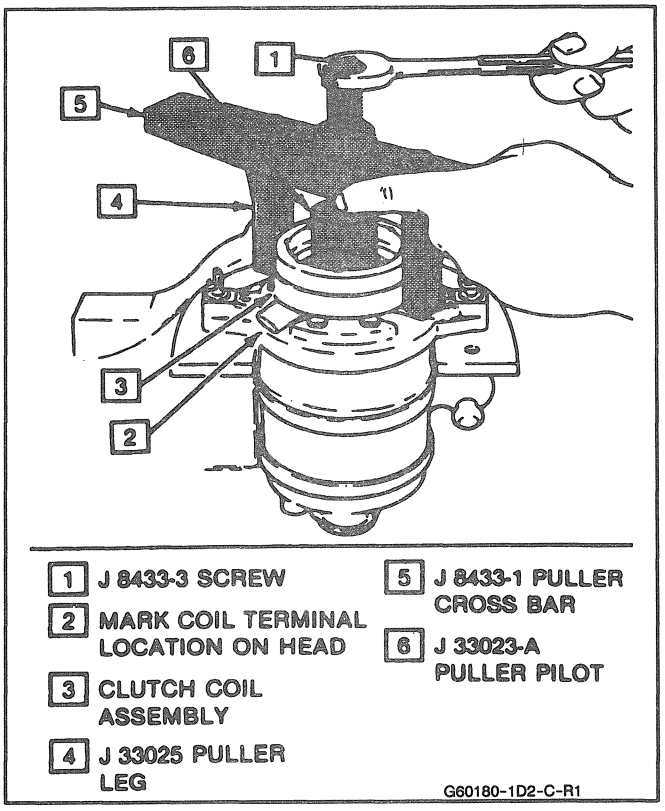


Fig. 14 Clutch Coil Assembly Removal

COMPRESSOR CLUTCH COIL

Remove or Disconnect

1. Perform Steps 1 through 4 of "Clutch Rotor and/or Bearings" removal procedure. **Mark clutch coil terminal location on compressor front head.**
2. Install J 33023–A puller pilot on front head of compressor (Fig. 14). Also install J 8433–1 puller crossbar with J 33025 puller legs as shown in Figure 14.
3. Tighten J 8433–3 forcing screw against the puller pilot to remove the clutch coil.

Install or Connect

1. Place the clutch coil assembly on the front head with the terminals positioned at the "marked" location.
2. Place the J 33024 clutch coil installer over the internal opening of the clutch coil housing and align installer with the compressor front head.
3. Center the J 8433–1 puller crossbar in the counter- sunk center hole of the J 33024 clutch coil installer. Install the J 33026–2 through bolts and washers through the crossbar slots and thread them into the holding fixture J 33026 to full fixture thickness (Fig. 15).
4. Turn the center forcing screw of the J 8433–1 puller crossbar to force the clutch coil onto the front head. Be sure clutch coil and J 33024 installer stay "in-line" during installation.

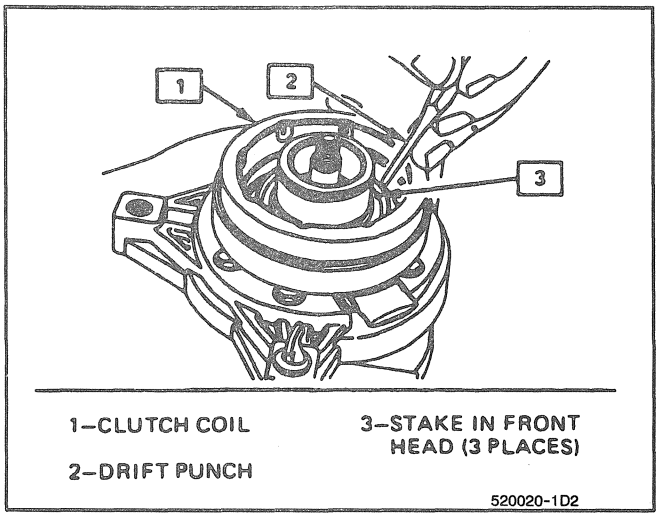


Fig. 16 Staking Clutch Coil to Front Head

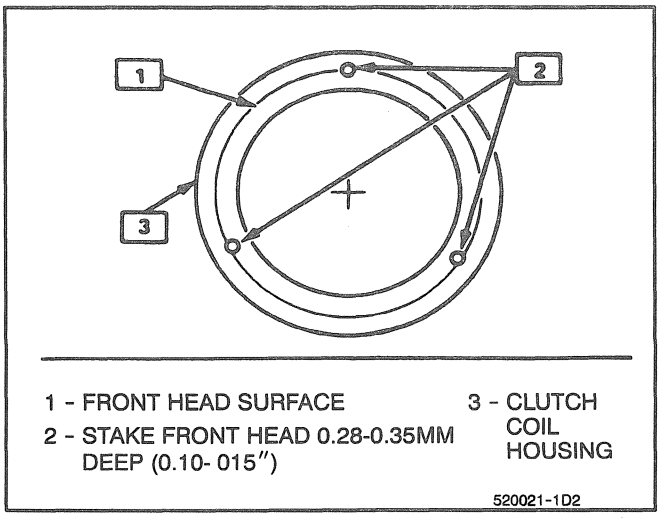


Fig. 17 Details of Stakes in Front Head for Clutch Coil

5. When coil is fully seated on the front head, use a 1/8″ diameter drift punch and stake the front head at three places 120 degrees apart (Fig. 16), to ensure clutch coil remains in position.
   - Stake size should be only one–half the area of the punch tip and be only approximately 0.28–0.35mm (.010–.015″) deep (Fig. 17).
6. Install rotor and bearing assembly and the clutch plate and hub assembly as described previously.

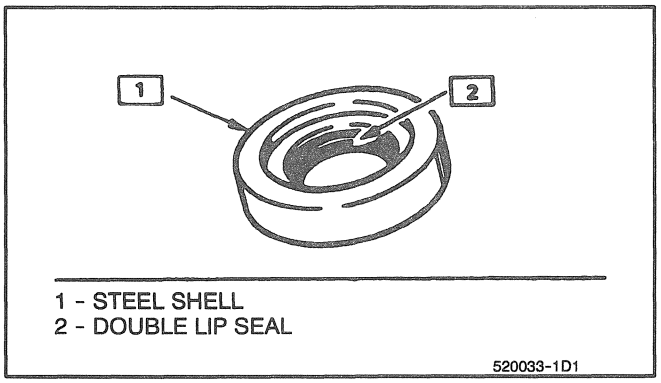


Fig. 18 Compressor Shaft Seal

MAJOR COMPRESSOR REPAIR PROCEDURES

When replacing the shaft seal assembly (Fig. 18), pressure relief valve or control switches (Fig. 19), it will be necessary to recover the refrigerant. Other than clutch repair procedures, the same holds true for any disassembly of the compressor.

A clean workbench covered with a sheet of clean paper, and a place (clean trays, etc.) for all parts being removed and replaced is important, as is the use of proper clean service tools.

NOTICE: Any attempt to use makeshift or inadequate service tools or equipment may result in damage and/or improper compressor operation.

All parts required for servicing the internal compressor are protected by a preservative process and packaged in a manner which will eliminate the necessity of cleaning, washing or flushing of the parts. The parts can be used in the internal assembly just as they are removed from the service package. **Seals and protective packaging should be left intact until just prior to installation.**

If the compressor rear head, front head or cylinder and shaft assembly is to be serviced or replaced, the oil in the compressor must be drained, measured, recorded and replaced.

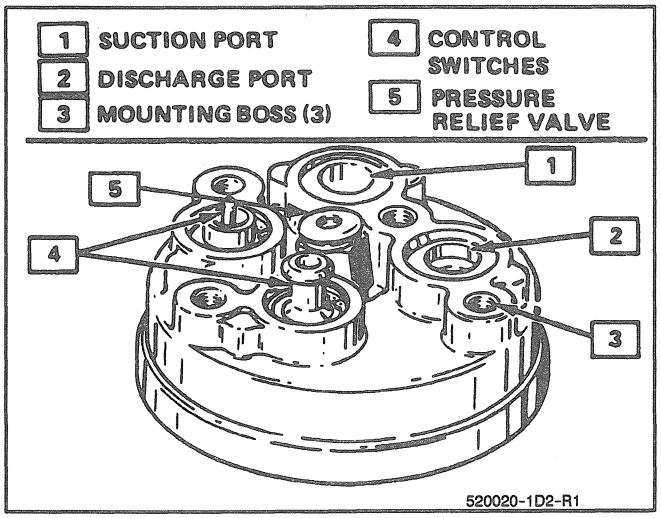


Fig. 19 Compressor — Rear Head

COMPRESSOR SHAFT SEAL REPLACEMENT

Seal Leak Detection

A shaft seal should not be changed because of small amounts of oil found on an adjacent surface but only after actual refrigerant leakage is found using an approved leak detector, J 39400 or equivalent.

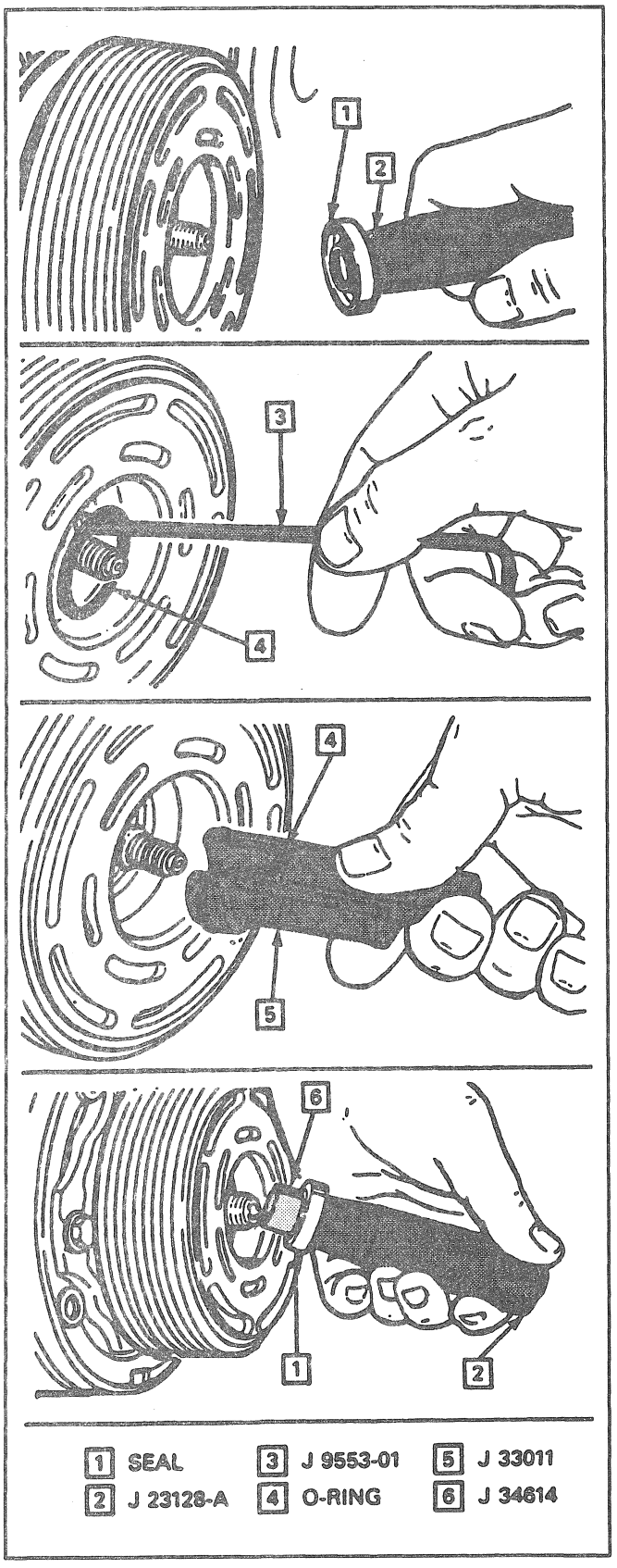


Fig. 20 Removing and Installing Shaft Seal and O-Ring

Remove or Disconnect

1. Recover the refrigerant using J 39500-GM.
2. Loosen and reposition compressor in mounting brackets, if necessary.
3. Remove clutch plate and hub assembly from compressor as described in minor repairs.
4. Remove the shaft seal retainer ring, using snap ring pliers J 5403 (Fig. 21).
5. Thoroughly clean inside of compressor neck area surrounding the shaft, the exposed portion of the seal, the retainer ring groove and the shaft itself. Any dirt or foreign material getting into compressor may cause damage.
6. Fully engage the knurled tangs of Seal Remover-Installer J 23128–A into the recessed portion of the Seal by turning the handle clockwise. Remove the Seal from the compressor with a rotary–pulling motion (Fig. 22). Discard the seal. The handle must be hand- tightened securely. Do not use a wrench or pliers.
7. Remove and discard the seal seat O-ring from the compressor neck using O-ring remover J 9553–01, Figure 20.
8. Recheck the shaft and inside of the compressor neck for dirt or foreign material and be sure these areas are perfectly clean before installing new parts.

Clean

- Thoroughly clean O-ring seal groove in front head.

NOTICE: Seals should not be re-used. Always use a new specification service seal on rebuild (Fig. 18). Be sure that the seal to be installed is not scratched or damaged in anyway. Make sure that the seal seat and seal are free of lint and dirt that could damage the seal surface or prevent sealing.

Install or Connect

1. Dip the new seal seat O-ring in clean 525 viscosity refrigerant oil and assemble onto O-ring installer J 33011, Figure 20.
2. Insert the O-ring installer J 33011 into the compressor neck until the installer "bottoms". Lower the moveable slide of the O-ring installer to release the O-ring into the seal O-ring lower groove. (The compressor neck top groove is for the shaft seal retainer ring.) Rotate the installer to seat the O-ring and remove the installer.
3. Dip the new seal in clean 525 viscosity refrigerant oil and assemble seal to Seal Installer J 23128–A, by turning handle clockwise. The stamped steel case side of the lip seal must be engaged with knurled tangs of installer so that flared-out side of lip seal is facing and installed towards the compressor. Install seal protector J 34614, in the seal lip and place over the compressor shaft, Figure 22, and push the seal in place with a rotary motion or place the seal protector J 34014 over end of compressor shaft, Figure 22, and slide the new

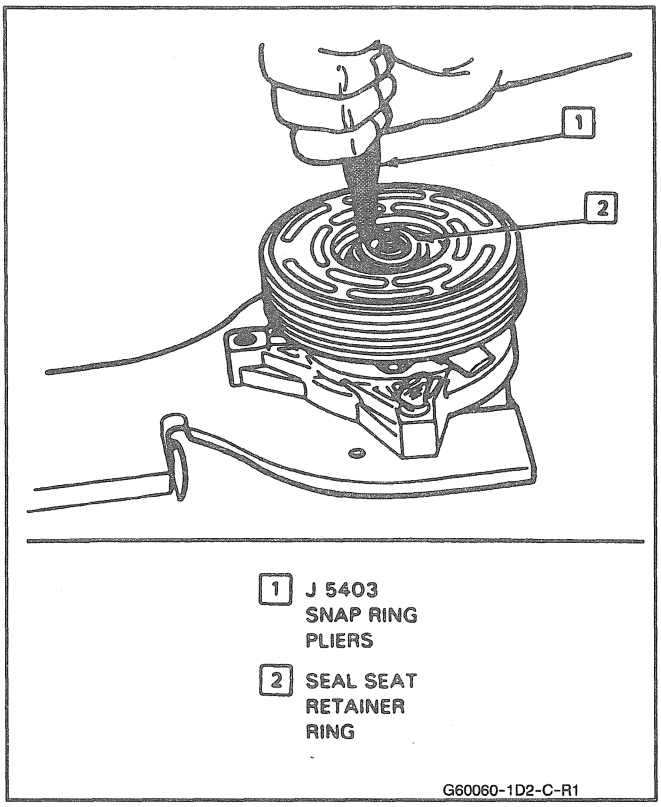


Fig. 21 Removing or Installing Shaft Seal Retaining Ring

seal onto the shaft with a rotary motion until it stops. Take care not to dislodge the O-ring. Be sure the seal makes good contact with the O-ring. Disengage the installer from the seal and remove the installer J 23128–A and the seal protector J 34614.

NOTICE: Handling and care of seal protector is important. If seal protector is nicked or the bottom flared, the new seal may be damaged during installation.

4. Install the new seal retainer ring with its flat side against the Seal, using Snap-Ring Pliers J 5403. See Figure 21. Use the sleeve from O-ring installer J 33011 to press in on the seal retainer ring so that it snaps into its groove.
5. To leak test, install compressor leak test fixture J 39893 on rear head of compressor and connect gage charging lines and J 39500-GM Refrigerant Recovery System. Pressurize suction and high-side of compressor with R-134a Refrigerant. Temporarily install (M9 x 1.25 thread on shaft) nut and, with the compressor in horizontal position, rotate the compressor shaft in normal direction of rotation several turns by hand. Leak test the seal area and correct and leak found. Recover the refrigerant. Remove shaft nut.
6. Remove any excess oil resulting from installing the new seal parts from the shaft and inside the compressor neck.
7. Install the clutch plate and hub assembly as described in minor repair procedures.
8. Reinstall compressor belt and tighten bracket.
9. Evacuate and charge the refrigerant system.

COMPRESSOR PRESSURE RELIEF VALVE

Remove or Disconnect

1. Recover the refrigerant using J 39500-GM.
2. Remove old pressure relief valve (Fig. 19).

Install or Connect

1. Clean valve seat area on rear head.
2. Lubricate O-ring of new pressure relief valve and O-ring assembly with new 525 viscosity refrigerant oil. Install new valve and torque in place, 9.0 N•m (6.1 lbs.–ft.)
3. Evacuate and recharge the system.
4. Leak test system.

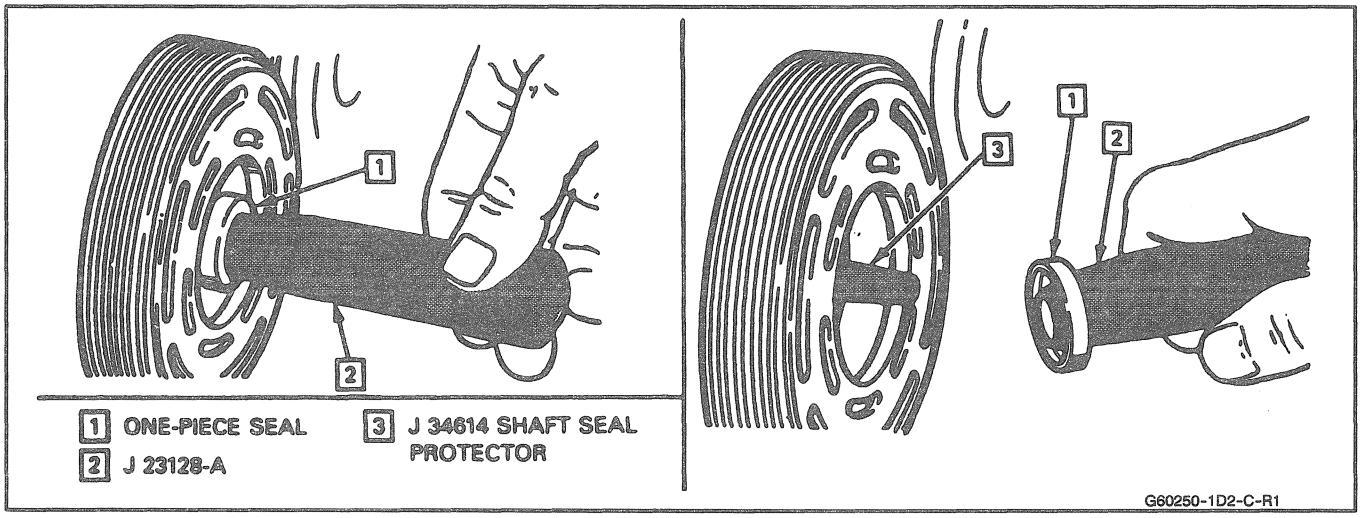


Fig. 22 Removing or Installing Shaft Seal

CONTROL SWITCHES

Figure 20

Remove or Disconnect

1. Recover the refrigerant.
2. Disconnect the electrical connector from the switch in the rear head of compressor.
3. Remove the switch retaining ring using J 5403 internal snap ring pliers.
4. Remove the switch from the compressor.
5. Remove old O-ring seal from the switch cavity using J 9553–01 O-ring removal tool.

If existing control switch is reinstalled in the compressor, a new O-ring seal must be used and preferably a new retainer ring should also be used. A new switch kit has the O-ring and retainer ring included.

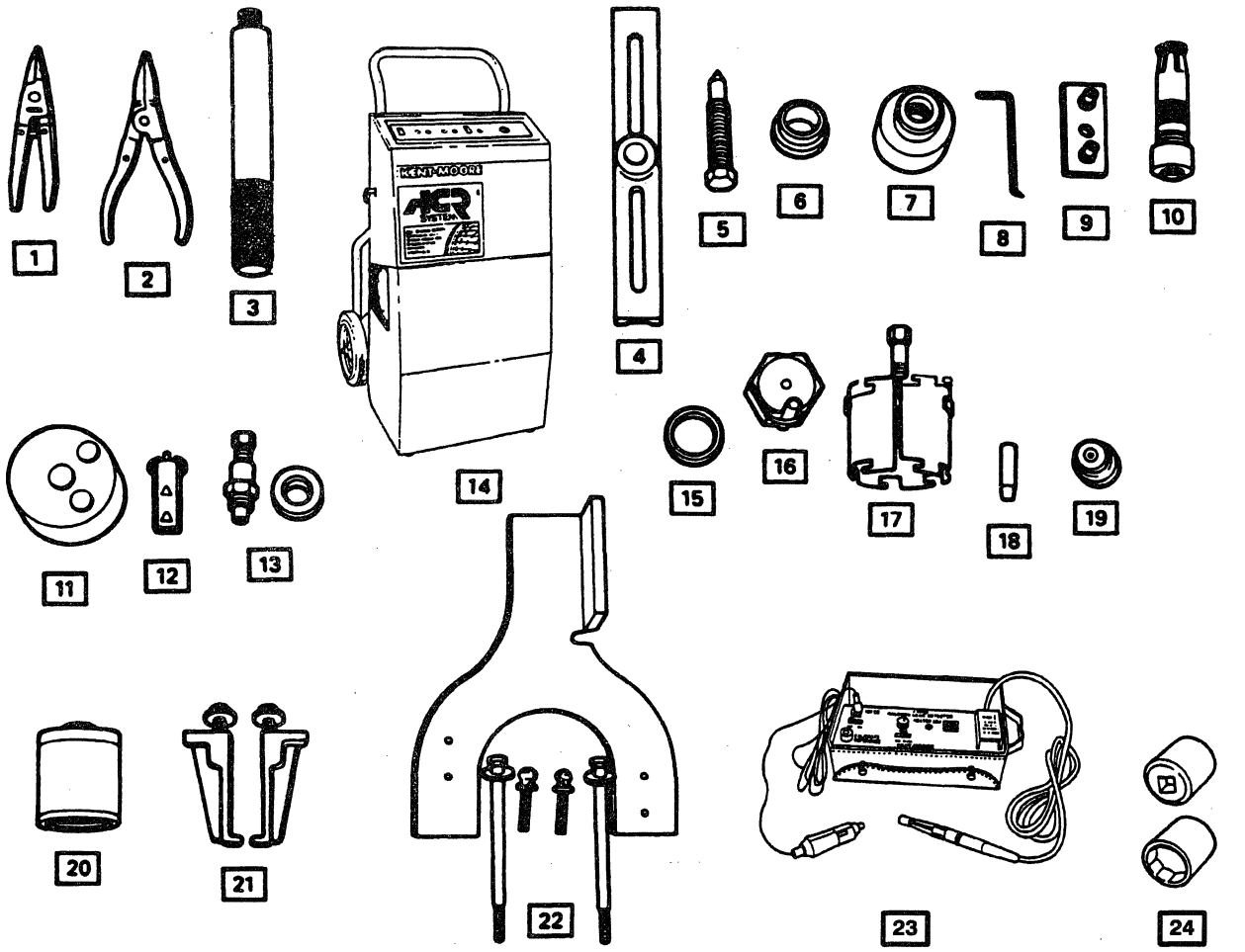
Install or Connect

1. Check switch cavity and O-ring groove in the rear head for dirt or foreign material and clean as necessary. Install a new O-ring coated with clean refrigerant oil into groove in switch cavity.
2. Lubricate the control switch housing with clean refrigerant oil and carefully insert switch into switch cavity until switch bottoms in cavity.
3. Using J 9533–1 snap ring pliers install switch retaining ring with high point of curved sides adjacent to switch housing. Be sure retaining ring is properly seated in switch cavity retaining groove. Leak test according to bench test procedure.

COMPRESSOR LEAK TESTING (EXTERNAL AND INTERNAL)

Bench-Check Procedure

1. Install test plate J 39893 on rear head of compressor.
2. Using J 39500-GM Refrigerant Recovery System, attach center hose of manifold gage set on charging station to a refrigerant drum standing in an upright drum.
3. Connect charging station high and low pressure lines to corresponding fittings on test plate J 39893. Suction port (low-side) of compressor has large internal opening. Discharge port (high-side) has smaller internal opening into compressor and deeper recess.
4. Open low pressure control, high pressure control and refrigerant control on charging station to allow refrigerant vapor to flow into compressor.
5. Using a leak detector, check for leaks at pressure relief valve, rear head switch location, compressor front and rear head seals, center cylinder seal, through bolt head gaskets and compressor shaft seal. After checking, shut off low pressure control and high-pressure control on charging station.
6. If an external leak is present, perform the necessary corrective measures and recheck for leaks to make certain the leak has been corrected.
7. Recover the refrigerant.
8. Disconnect both hoses from the test plate J 39893.
9. Add 90 ml (3 oz.) new PAG lubricant to the compressor assembly. Rotate the complete compressor assembly (not the crankshaft or drive plate hub) slowly several turns to distribute oil to all cylinder and piston areas.
10. Install a M9 x 1.25 threaded nut on the compressor crankshaft if the drive plate and clutch assembly are not installed.
11. Using a box-end wrench or socket and handle, rotate the compressor crankshaft or clutch drive plate on the crankshaft several turns to insure piston assembly to cylinder wall lubrication.
12. Using J 39500-GM Refrigerant Recovery System, connect J 9893 the charging station high-pressure line to the test plate high-side connector.
13. Using J 39500-GM Refrigerant Recovery System, connect the charging station low-pressure line to the low pressure port of the test plate J 39893. Oil will drain out of the compressor suction port if the compressor is positioned with the suction port downward.
14. Attach the compressor to the J 33026 holding fixture and mount the compressor in a vise so that the compressor will be in a horizontal position and the shaft can be turned with a wrench.
15. Using a wrench, rotate the compressor crankshaft or drive plate hub ten complete revolutions at a speed of approximately one-revolution per second. Turning the compressor at less than one-revolution per second can result in a lower pump-up pressure and disqualify a good pumping compressor.
16. Observe the reading on high-pressure gage at the completion of the tenth revolution of the compressor. The pressure reading for a good pumping compressor should be 690 kPa (100 psi) or above. A pressure reading of less than 620 kPa (90 psi) would indicate one or more suction and/or discharge valves leaking an internal leak, or an inoperative valve, and the refrigerant must be recovered and the compressor disassembled and checked for cause of leak. Repair as needed, reassemble and repeat the pump-up test. Externally leak test.
17. When the pressure pump-up test is completed, recover the refrigerant from the high-side and remove the test plate J 39893.
18. Tilt the compressor so that the compressor suction and discharge ports are down. Drain the PAG lubricant from the compressor.
19. Allow the compressor to drain for 10 minutes, then refill with the proper amount of PAG lubricant, per oil balance procedure in section 1B of the service manual. The PAG lubricant may be poured into the suction port. If further assembly or processing is required, a shipping plate or test plate J 39893 should be installed to keep out air, dirt and moisture until the compressor is installed.



1 — J 5403	SNAP RING PLIERS	13 — J 33013	HUB & DRIVE PLATE REMOVER & INSTALLER
2 — J 6083	SNAP RING PLIERS	14 — J 39500-GM	R134a A/C REFRIGERANT RECOVERY, RECYCLING AND RECHARGING SYSTEM (ACR[4])
3 — J 29886	DRIVER HANDLE	15 — J 33017	PULLEY & BEARING ASSEMBLY INSTALLER
4 — J 8433-1	PULLER BAR	16 — J 33019	BEARING STAKING TOOL
5 — J 8433-3	FORCING SCREW	17 — J 41552	PULLEY PULLER
6 — J 9398-A	BEARING REMOVER	18 — J 34614	SHAFT SEAL PROTECTOR
7 — J 9481-A	BEARING INSTALLER	19 — J 33023	PULLER PILOT
8 — J 9553-01	"O" RING REMOVER	20 — J 33024	CLUTCH COIL INSTALLER ADAPTER
9 — J 39893	PRESSURE TESTING CONNECTOR	21 — J 33025	CLUTCH COIL PULLER LEGS
10 — J 23128-A	SEAL SEAT REMOVER & INSTALLER	22 — J 34992	COMPRESSOR HOLDING FIXTURE
11 — J 21352-A	SUPPORT BLOCK	23 — J 39400	LEAK DETECTOR
12 — J 33011	"O" RING INSTALLER	24 — J 39037	HIGH-SIDE CHARGE VALVE SOCKET

Fig. 23 Compressor Overhaul — Special Tools