SERVICE MANUAL SECTION

AIR CONDITIONING - HEATER SYSTEM: 5000, 9100, 9200, 9300, 9400, 9600, 9700, 9800, 9900 Models

Model: 5000
Start Date: 11/30/1992 End Date: 03/01/1999

Model: 9100
Start Date: 03/01/1997 End Date: 03/01/1999

Model: 9200
Start Date: 11/30/1992 End Date: 03/01/1999

Model: 9300
Start Date: 11/30/1992 End Date: 10/01/1998

Model: 9400
Start Date: 11/30/1992 End Date: 07/18/1999

Model: 9600
Start Date: 01/01/1993

Model: 9700
Start Date: 01/01/1993

Model: 9800
Start Date: 03/01/1996 End Date: 07/1/1997

Model: 9900
Start Date: 10/01/1998 End Date: 07/18/1999

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1. AIR CONDITIONING SYSTEM SERVICE

This manual covers the air conditioning - heater system for the 5000 Series and 9000 Series Models WITHOUT the Lowered Heater Box (Day Cabs and Add-On Sleeper Boxes). These systems employ two blower motors, and no external access cover for the system filter.

Use s16020, AIR CONDITIONING - HEATER SYSTEM, for 9000 Series Pro-Sleeper Models After 5/1/1997 (WITH the Lowered Heater Box HVAC System)

Use s16023, AIR CONDITIONING - HEATER SYSTEM, for the 5000i Series and 9000i Series Models

NOTE – Effective November 30, 1992 for all 92/93/9400 and 5000 models, and January 1, 1993 for 96/9700 models, (and for all new models introduced after January 1, 1993), the air conditioning systems will be charged with HFC-134A refrigerant. Refer to GROUP 16, AIR CONDITIONING BASIC THEORY, SYSTEM DIAGNOSIS AND SERVICE section in the Master Service Manual for precautions and changes in service procedures and tools to use with HFC-134A refrigerant.

1.1. SERVICE WARNINGS

Refrigerant R-134a is a nonflammable, nonexplosive, and noncorrosive hydrofluorocarbon refrigerant. R-134a is heavier than air and has a slight ether-type odor. Although R-134a is classified as a safe refrigerant, the following precautions must be observed to protect the A/C system components and the person working on the system.

WARNING – Carbon monoxide is a colorless, odorless, and dangerous gas that is present in vehicle exhaust. When it is necessary to operate the engine during vehicle service in a confined area, always use the proper equipment to vent the exhaust gasses outside of the work area.

WARNING – Safety goggles or other adequate eye protection must be worn when working with refrigerant. The temperature of liquid refrigerant is -20 degrees F (-29 degrees C). Serious injury or blindness will result from refrigerant contacting the eyes.

WARNING – If the refrigerant should contact the eyes, DO NOT rub them. Splash the eyes with cold water for at least 15 minutes to gradually get the temperature above the freezing point. See a doctor immediately.

WARNING – Wear nonporous gloves. Should liquid refrigerant come into contact with the skin, remove any contaminated clothing, including shoes; then treat the injury as though the skin had been frostbitten or frozen. See a doctor immediately.

WARNING – Be certain that pressurized refrigerant containers are not exposed to open flame or temperatures above 125 degrees F (51 degrees C). Do not discard empty refrigerant containers where they are likely to be subjected to the heat of trash burners, etc.; they may explode, resulting in personal injury or possible death. Containers must be stored, installed, and disposed of in accordance with all state and local ordinances.

WARNING – Never weld, solder, steam clean or use excessive heat on any of the air conditioning lines or equipment while the system is charged. Heat applied to any part will cause the pressure within the system to become excessive, which may result in an explosion and possible personal injury.

WARNING – Do not smoke or allow any type of fire or flame in the immediate area while servicing the air conditioning system. Refrigerant is not combustible; however, in the presence of heat it changes to a poisonous gas. Inhalation can cause death or serious injury.

WARNING – R-134a must not be mixed with air and then pressurized. When mixed with large quantities of air and pressurized, R-134a becomes combustible.

WARNING – Refrigerant must be recovered from the air conditioning system before any components of the system are removed or replaced. Removing components while pressure is in the system will cause personal injury or death.

WARNING – Do not remove the compressor oil fill plug to check the oil level in the refrigerant compressor while the A/C system is charged with refrigerant. The crankcase side of the compressor is under pressure and personal injury may result. It is not possible to check the oil level in the compressor on an A/C system that is under system pressure.

WARNING – Do not install or remove A/C testing or charging equipment while the engine is running. Serious injury may result from doing so.

WARNING – Always use approved refrigerant recycling equipment when working with R-134a to prevent accidental discharge. If released into the atmosphere, the refrigerant evaporates very quickly and may displace the oxygen surrounding the work area, especially in small or enclosed areas. This situation creates the hazard of suffocation or brain damage for anyone in the work area. If a leak should occur, avoid breathing the refrigerant and lubricant vapor. Thoroughly ventilate the area before continuing with service. Federal and state laws require that refrigerant be recovered and recycled to help protect the environment.

WARNING – When using a manual manifold gauge set connected to both the air conditioning system and refrigerant supply cylinder, never open the high side hand valve of the manifold gauge set while the A/C system is operating. If hot, high pressure refrigerant is forced through the gauge to the refrigerant supply cylinder; it could cause the cylinder to rupture and cause personal injury.

WARNING – When using a recovery station to service the air conditioning system, carefully follow the equipment manufacturer's operating instructions (including all cautions and warnings).

WARNING – Always use correct replacement refrigerant hoses. Do not use hoses other than those specified for the system being serviced. The use of improper hoses may cause a hose rupture, which may result in personal injury.

2. DESCRIPTION

NOTE – Effective November 30, 1992 for all 92/93/9400 and 5000 models, and January 1, 1993 for 96/9700 models, (and for all new models introduced after January 1, 1993), the air conditioning systems will be charged with HFC-134A refrigerant. Refer to GROUP 16, AIR CONDITIONING BASIC THEORY, SYSTEM DIAGNOSIS AND SERVICE section in the Master Service Manual for precautions and changes in service procedures and tools to use with HFC-134A refrigerant.

The Blend-Air heating and air conditioning system is a combination unit (Figure 1). Both the heater and air conditioner are housed in one unit and use common air ducts and blowers. The term "Blend-Air" refers to mixing or blending together of air from the air conditioner, heater and outside air. This provides for heating, cooling, defrosting, dehumidifying and ventilation in whatever combination the driver chooses to select.

The combination unit is a standard high capacity heater-defroster to which optional components are added to provide air conditioning and bulk air distribution. The system is integrated into the cab to provide a built-in appearance (Figure 2, Figure 3 and Figure 4). The heater, evaporator core, two blowers and other parts of the system are located in the enclosure under the passenger seat. For greater detail in servicing the air conditioning system, refer to GROUP 16, AIR CONDITIONING BASIC THEORY, SYSTEM DIAGNOSIS AND SERVICE in the Master Service Manual.

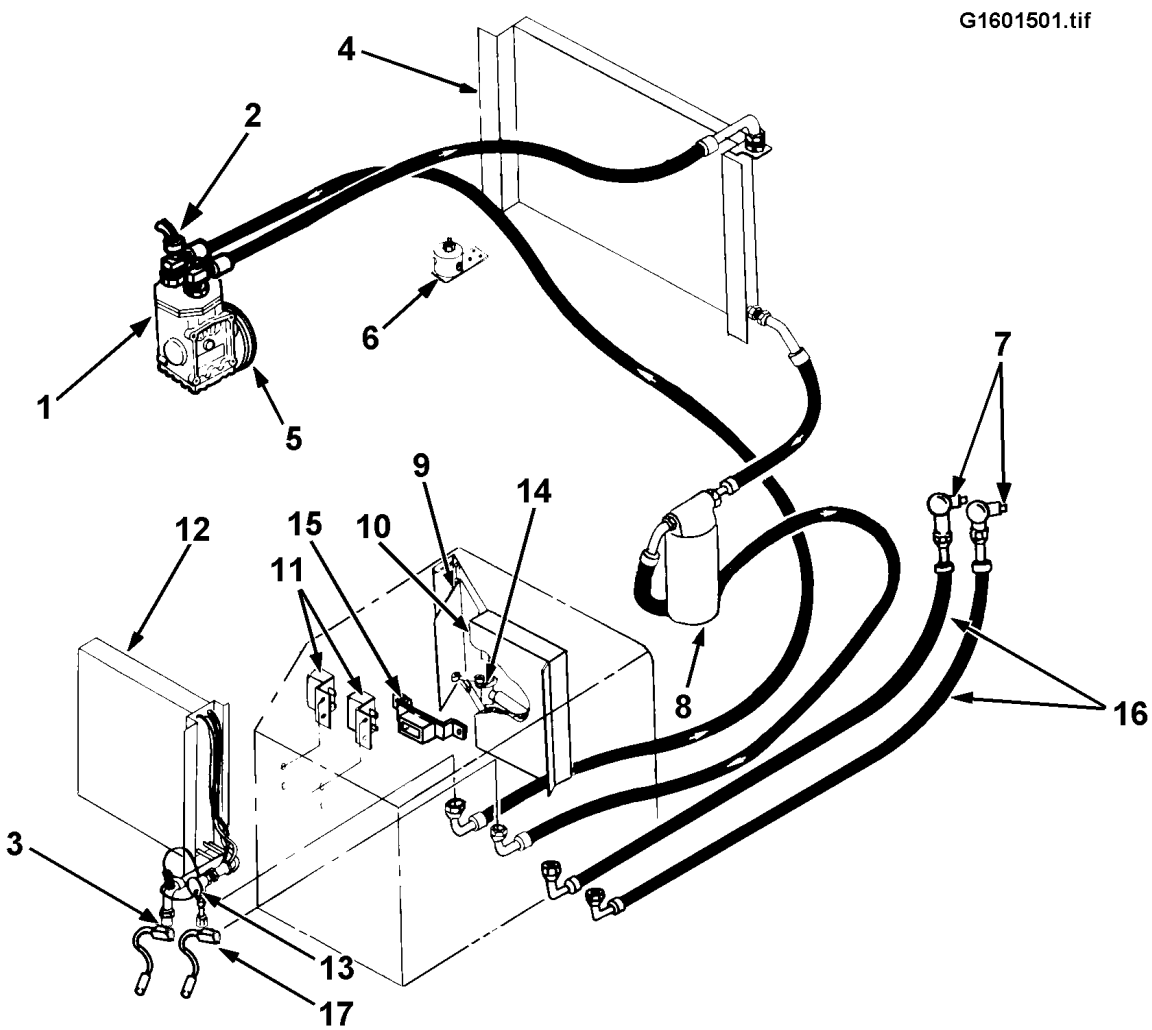

Figure 1 Blend-Air System - Refrigerant and Hot Water Components

1. COMPRESSOR
2. OVERRIDE SWITCH (RADIATOR SHUTTERS OR FAN DRIVE)
3. LOW PRESSURE SWITCH
4. CONDENSER
5. CLUTCH
6. SOLENOID
7. SHUT OFF VALVES
8. RECEIVER-DEHYDRATOR WITH SIGHT GLASS
9. BLEND-AIR DOOR
10. HEATER CORE
11. RELAYS (5000 AND ALL 9000 SERIES VEHICLES HAVE THE RELAYS LOCATED IN THE PASSENGER SIDE DASH)
12. EVAPORATOR
13. EXPANSION VALVE
14. HOT WATER CONTROL VALVE
15. THERMOSTATIC TEMPERATURE CONTROL SWITCH
16. HEATER HOSES
17. HIGH PRESSURE SAFETY SWITCH (HFC-134A)

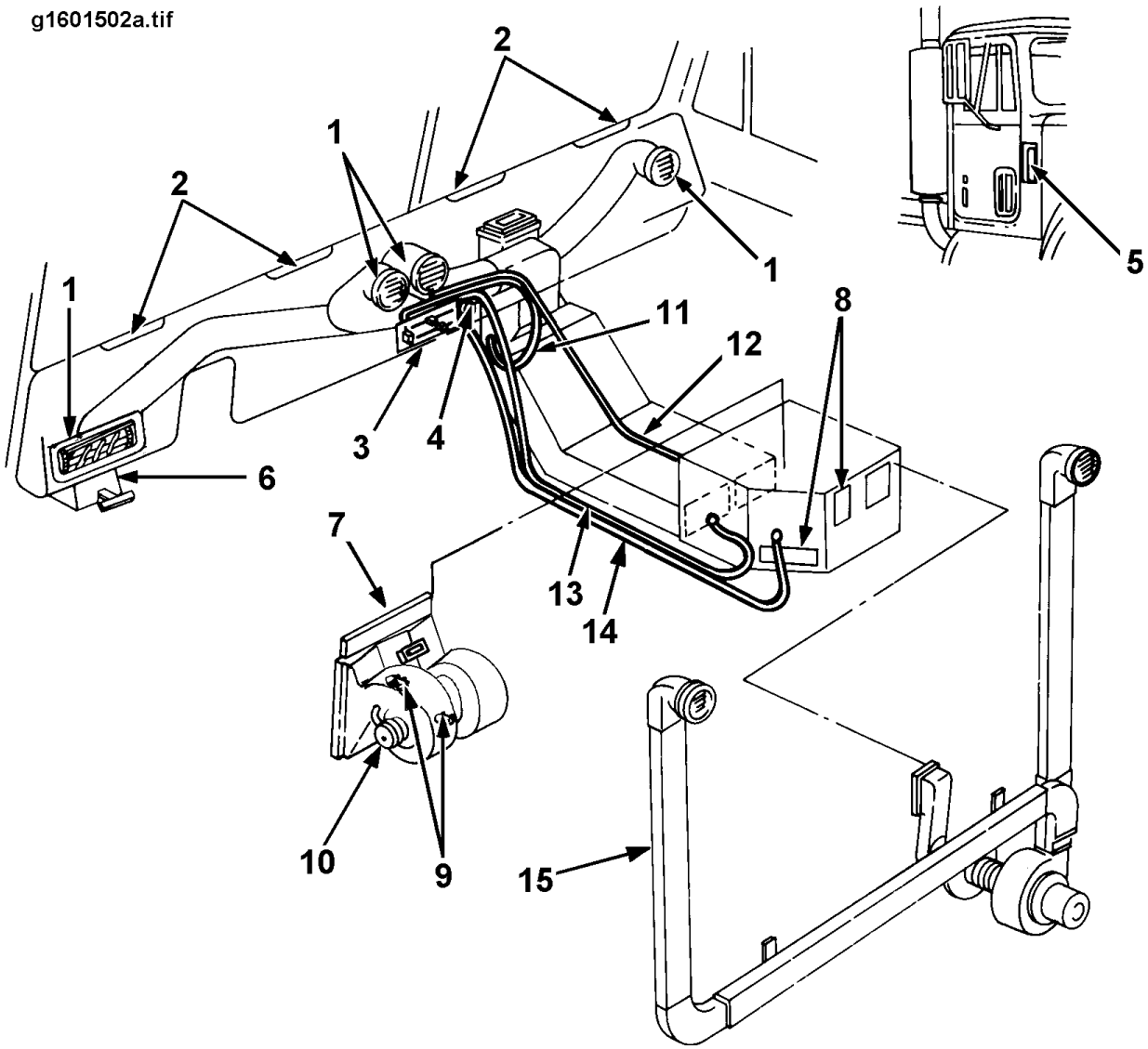

Figure 2 First Generation Sleeper Ventilation System - Cab - 9200, 9300, and 9400

1. LOUVERS
2. DEFROSTERS
3. INSTRUMENT PANEL CONTROLS
4. FRESH AIR VENT CONTROL
5. FRESH AIR INLET
6. FLOOR AIR VENT
7. AIR FILTER
8. RECIRCULATION DOORS
9. BLOWER MOTOR RESISTORS
10. BLOWER MOTOR
11. DEFROST CABLE
12. RECIRCULATION CABLE
13. HEATER CABLE
14. A/C CABLE
15. SLEEPER BOX DUCT AND BLOWER

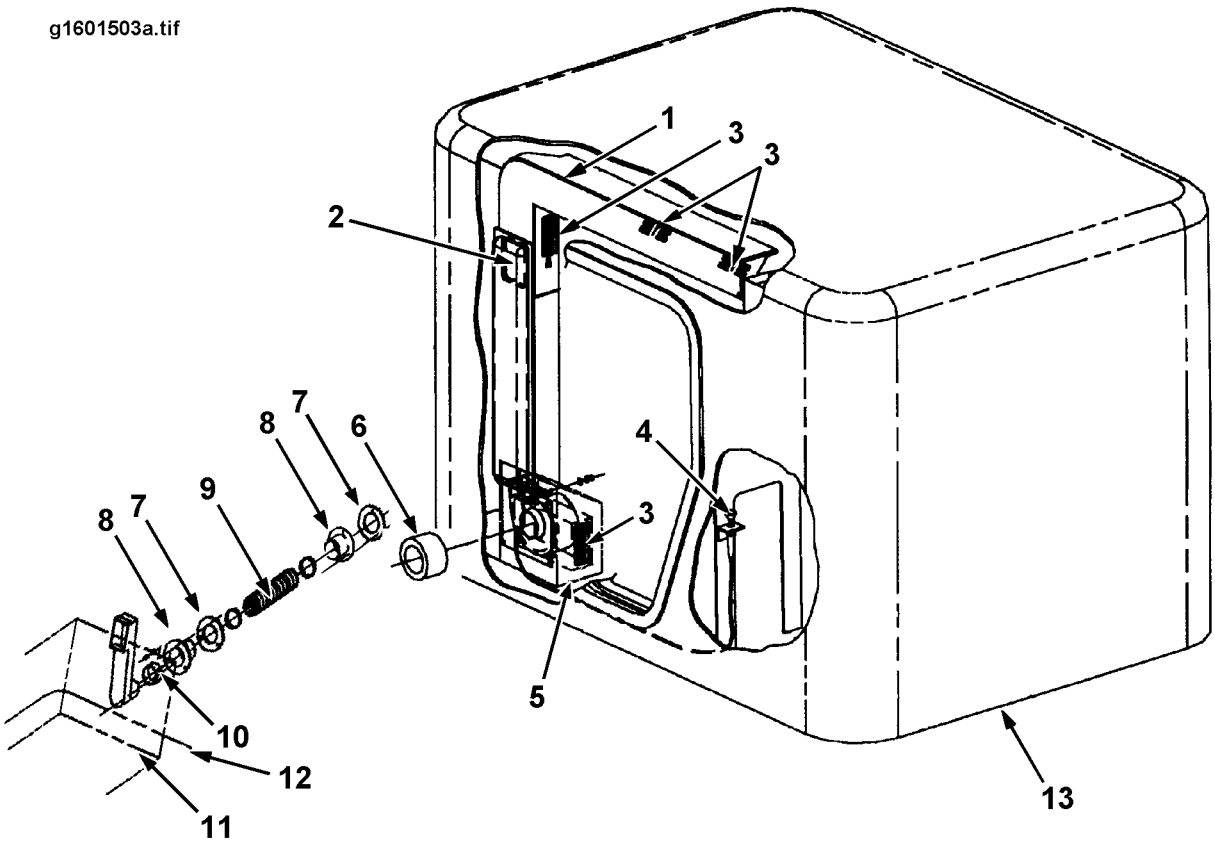

Figure 3 Second Generation Ventilation System - Cab - 9200, 9300, 9400, and 9900

1. AIR CONDITIONING DUCT
2. SEAL
3. GRILLE
4. TEMPERATURE CONTROL (SLEEPER BOX)
5. HEATER BLOWER ASSEMBLY
6. PARTITION SEAL
7. RETAINER TO CAB SEAL
8. AIR INLET RETAINER
9. CAB TO SLEEPER HOSE
10. BUNK HEAT OUTLET DUCT
11. HEATER BOX
12. CAB BACK PANEL
13. SLEEPER BOX

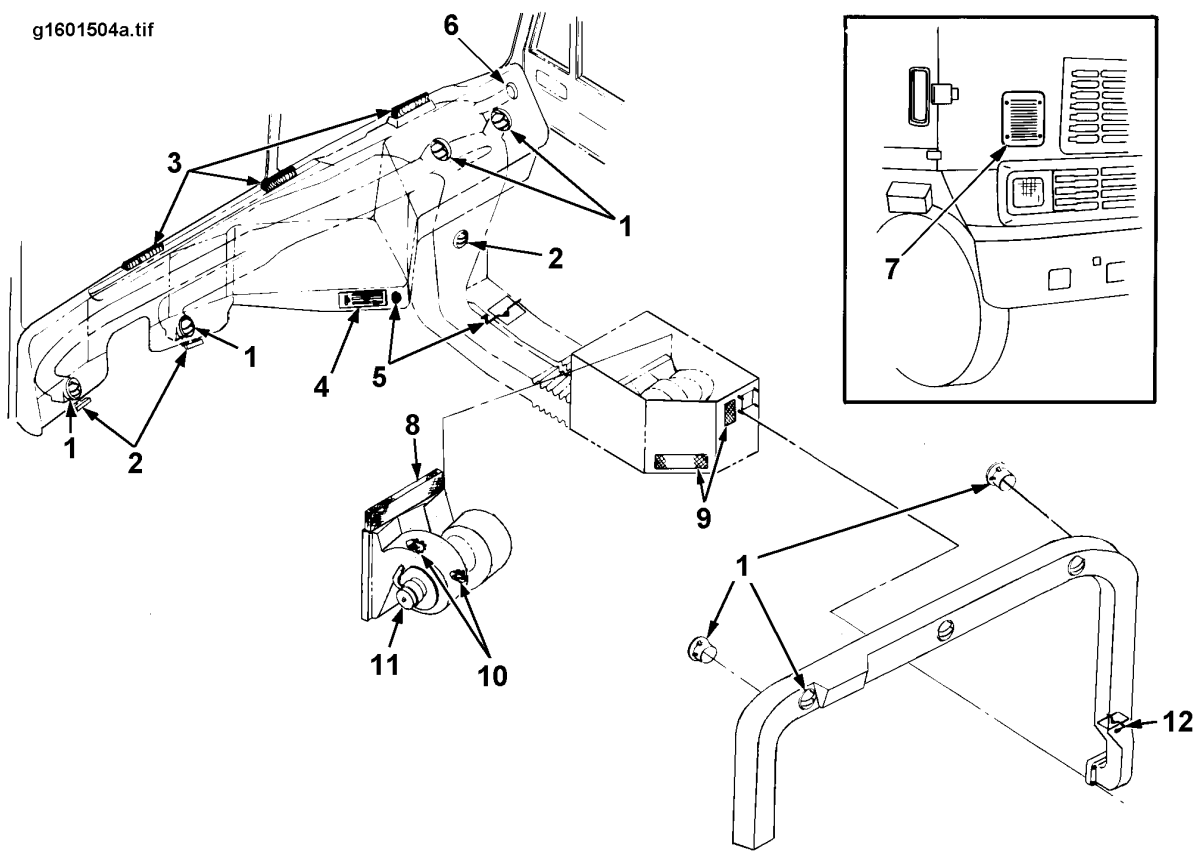

Figure 4 Ventilation System - Cab - 9600, 9700, and 9800

1. LOUVERS
2. FLOOR DUMP
3. DEFROSTERS
4. INSTRUMENT PANEL CONTROLS
5. FRESH AIR VENT CONTROL
6. DEFOGGER
7. FRESH AIR INLET
8. AIR FILTER
9. RECIRCULATION DOORS
10. BLOWER MOTOR RESISTORS
11. BLOWER MOTOR
12. BUNK CONTROL

3. COMPONENTS

3.1. HEATER CORE

The heater core (Figure 5) is mounted vertically in the unit housing. Engine coolant is circulated through the core and heat from the coolant is dissipated by air circulated through the core fins.

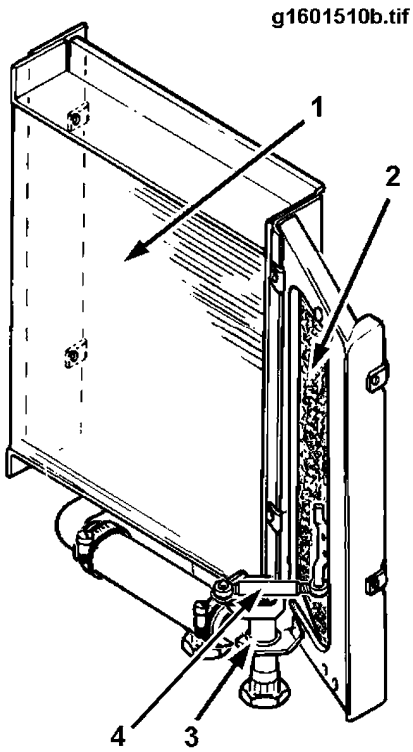

Figure 5 Heater Core and Blend Door Assembly

1. HEATER CORE
2. DOOR ASSEMBLY
3. HEATER WATER VALVE
4. WATER VALVE CONTROL LINK

3.2. HEATER WATER VALVE

The heater water valve (heater shut off) is attached to the frame of the Blend-Air duct door (Figure 5). The inlet hose is connected to it, and the valve meters the flow of hot engine coolant through the core. The valve is operated by an adjustable link connecting the valve to the Blend-Air door, which is controlled by the cable connected to the control panel HTR lever.

3.3. EVAPORATOR CORE AND EXPANSION VALVE

The evaporator core (Figure 6) is mounted in the airflow, before the heater core. Low pressure/low temperature liquid refrigerant from the expansion valve enters the evaporator. Upon entering the evaporator, the pressure is immediately reduced, causing the refrigerant to change its state to a low pressure/low temperature vapor. Cooling and dehumidifying of the cab's interior takes place as the refrigerant vapor passes through the evaporator's finned tubes and absorbs heat from the cab air forced across the evaporator by the blower.

The expansion valve is located at the inlet of the evaporator, and is the dividing line between the high pressure and low pressure sides of the A/C system. Attached to the top of the expansion valve is a capillary tube with a feeler bulb which is clamped to the outlet (suction) pipe of the evaporator. A second capillary tube (the equalizer line) is attached under the valve diaphragm and is connected to the evaporator outlet (suction) pipe. Together, the capillary tube and equalizer line regulate the amount of refrigerant entering the evaporator through the expansion valve. The valve decreases the amount of refrigerant entering the evaporator core when lower temperatures are sensed and increases the amount at higher temperatures.

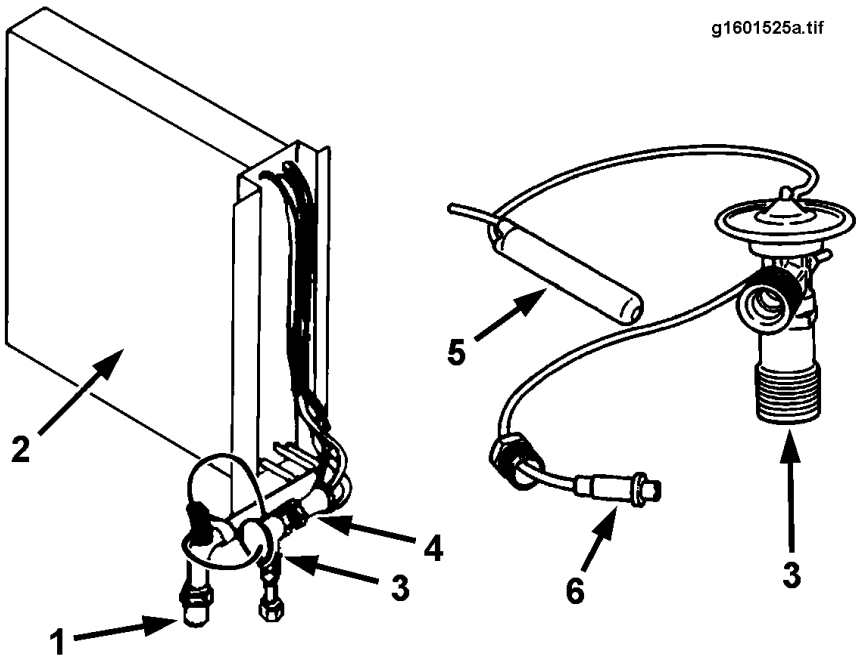

Figure 6 Evaporator Core and Expansion Valve

1. EVAPORATOR CORE OUTLET
2. EVAPORATOR CORE
3. EXPANSION VALVE
4. EVAPORATOR CORE INLET
5. FEELER BULB
6. EQUALIZER LINE

3.4. THERMOSTATIC TEMPERATURE CONTROL SWITCH

Refer to Figure 7.

The thermostatic control switch is a thermal device that controls an electrical switch. A refrigerant-filled capillary tube is inserted into the fins and tubes of the evaporator core. The other end of the capillary tube is attached to

a bellows inside the thermostat portion of the thermostatic switch. When evaporator temperatures drop below the setting selected by the A/C control, the switch de-energizes the clutch that drives the A/C compressor.

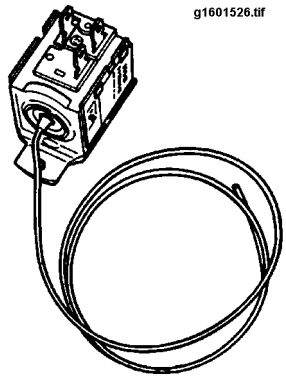

Figure 7 Thermostatic Control Switch

3.5. AIR BLOWERS

There are two blowers (Figure 8) used in the heater or the combination heater-air conditioning systems. Each is a three-speed unit. The blowers provide air circulation through the evaporator and heater cores and delivery of the treated air through the cab.

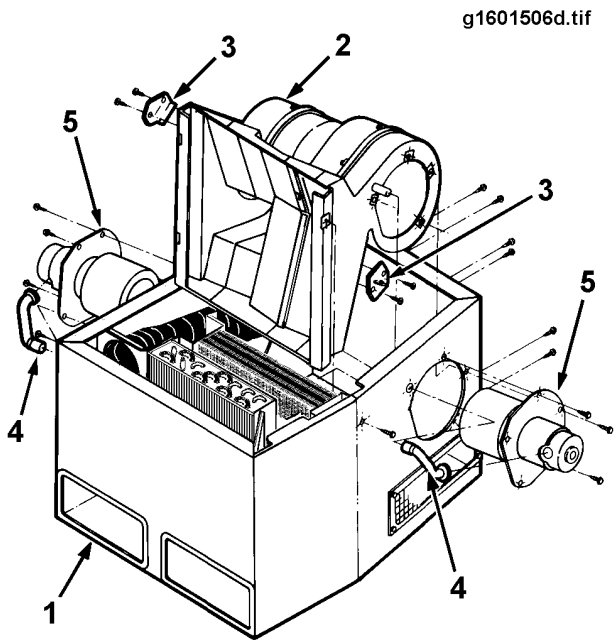

Figure 8 Dual Blower Motor Installation

1. BLEND-AIR UNIT HOUSING
2. BLOWER HOUSING
3. BLOWER RESISTORS
4. VENT HOSES
5. BLOWER MOTOR

3.6. BLOWER SPEED CONTROL RESISTORS AND THERMO-FUSES

Each blower is operated by a three-position switch. Both switches are operated by the same lever in the control assembly. The switches are connected electrically to relays and blower speed control resistors. Prior to 12/91, the relays were located in the Blend-Air unit. In 12/91 the relays were moved to the component support bracket behind the passenger side dash. Blower motor relays in the 9600 and 9700 vehicles were relocated behind the passenger side kick panel in 2/92. The relays also contain thermo-fuses to protect the motor circuits in the event of a locked motor shaft or short circuit. The switches, relays and resistors provide three blower motor speeds, in addition to the OFF position.

The resistors for all the models are located in the Blend-Air unit.

3.7. CONTROL UNIT, SWITCH AND CABLES

The control unit (Figure 9) is mounted in the instrument panel and provides the means of operating the system. The levers and pull knob operate push-pull cables that are connected to the control switches and devices in the system. The HTR lever sets the amount of heat desired from OFF to HOT. The AIR OUTLET lever sets the air distribution from DEF (defrost air to windshield only) to CAB (air to floor ducts only). The A/C lever sets the amount of cooling desired from OFF to COLD. All of these controls are proportional and provide more or less heat, cold, and air mix (windshield to floor outlets) in relation to the position of the lever. Heat and cold can be used together to dehumidify the cab.

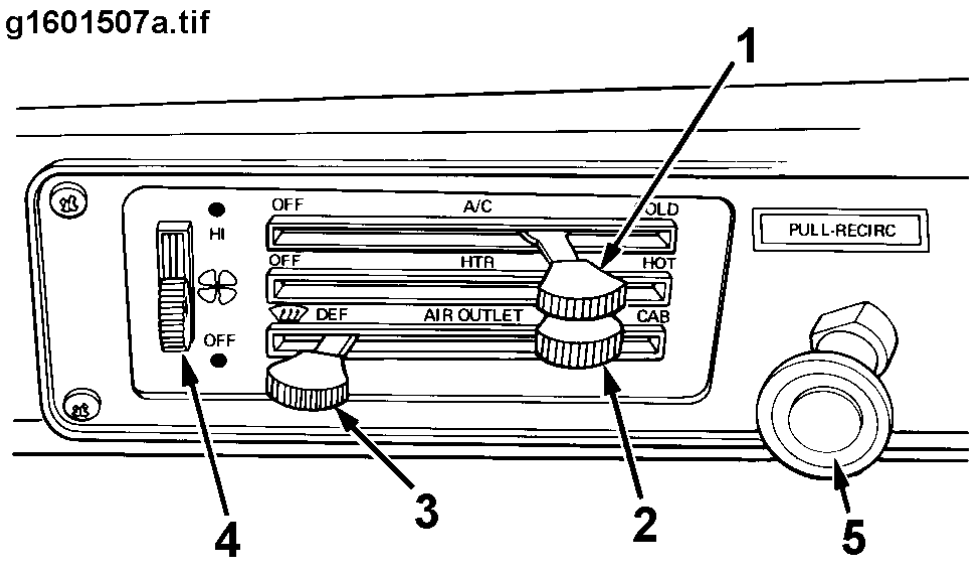

Figure 9 A/C Heater Control Unit

1. A/C LEVER
2. HEATER (HTR) LEVER
3. AIR OUTLET LEVER
4. BLOWER SWITCH
5. RECIRCULATING AIR KNOB

Outside air is controlled by the PULL-RECIRC knob. This is mounted on the instrument panel next to, but separate from, the control assembly. It is used to reduce or shut off outside air when maximum heat or cooling is desired or when outside odors or fumes need to be shut out. Air velocity is controlled by the blower switch. The BLOWER SWITCH is the lever with a fan symbol and has an OFF and three speed positions.

4. OPERATION

Operation of the Blend-Air system is based on standard automotive heating and air conditioning principles and may be operated as a fresh air or air recirculating system.

4.1. FRESH AIR VENTILATION

Fresh outside air is selected by pushing the PULL-RECIRC knob on the instrument panel (Figure 9). With both the heating and cooling controls at OFF, fresh air flows through the instrument panel and floor ventilation outlets. To increase the amount of fresh air entering the cab in the ventilation mode, the blower can be used. The fan speed and air outlets can be adjusted to obtain the desired air flow.

4.2. HEATING

Heating is controlled with the HTR (heat) lever. The full right HOT position provides the maximum heat. Move the AIR OUTLETS control lever to the full cab position or to any of the other three detent positions in order to obtain the desired air flow distribution between cab heat and defrost requirements. For the maximum air flow, set the fan switch to the HI position. The heater will also operate with the fan motor in the OFF position. Air flow is provided by ram air when the truck is being driven.

4.3. DEFROSTING

To obtain maximum defrosting, move the HTR lever to the HOT position and place the AIR OUTLETS lever on DEF. Adjust the fan speed to provide the desired air flow.

To clear the system of humid air, operate blowers for 30 seconds at HI speed before moving the AIR OUTLETS lever to the DEF position. This will minimize rapid fogging of the windshield, which can happen if humid air is blown onto cool glass.

To improve defroster efficiency, remove ice and/or snow from the glass.

4.4. COOLING

To properly cool the cab in warm weather, close both the driver and passenger floor heat outlets and open the instrument panel outlets. Close all windows. Set the HTR lever to OFF and the A/C lever to COLD. For maximum cooling, set the fan switch on the HI position. (The fan must be ON for A/C operation.) Place the AIR OUTLETS lever on CAB position, then adjust the instrument panel outlets to evenly distribute the air around the occupant's head, chest and belt areas. If the foot areas feel warm, partially open heat outlets to obtain the desired comfort level.

4.5. DEHUMIDIFYING

Dehumidifying can be done in mild weather with high humidity by operating the air conditioner and heater simultaneously. To obtain maximum dehumidification, set the A/C lever to COLD, place the fan switch on HI and move the HTR lever towards HOT until a comfortable temperature is maintained. The air conditioner will remove the humidity while the heater keeps the cab comfortable.

5. DIAGNOSIS

Refer to GROUP 16-AIR CONDITIONING BASIC THEORY, SYSTEM DIAGNOSIS AND SERVICE in the Master Service Manual, for the vehicle being serviced.

6. MAINTENANCE

6.1. PRE-SEASON CHECKS AND OFF-SEASON CARE

Experience has shown that many problems incurred with heating and air conditioning systems result from lack of regular maintenance. Complete pre-season checkouts and off-season care of heating and air conditioning systems will aid in obtaining satisfactory performance during the operating seasons. For more detailed information, refer to GROUP 16-AIR CONDITIONING BASIC THEORY, SYSTEM DIAGNOSIS AND SERVICE in the Master Service Manual, for the vehicle being serviced.

6.2. LEAK TEST

NOTE – To use the characteristics of the A/C system to your advantage while leak testing with an electronic leak detector; check the high pressure side of the system with the system running, and check the low pressure side of the system with the system (and engine) off.

1. Start engine and operate A/C system. Determine if there is some cooling. If not, refer to GROUP 16-AIR CONDITIONING THEORY, SYSTEM DIAGNOSIS AND SERVICE in the Master Service Manual, for the vehicle being serviced.

2. Using an electronic leak detector, check the air conditioning system for refrigerant leaks. Follow the leak detector manufacturer's instructions.

3. Shut off the engine.

6.3. SIGHT GLASS CHECK OF THE SYSTEM CHARGE (R-12 SYSTEMS ONLY)

NOTE – The sight glass is not a reliable method of checking system charge on R-134a systems. The following procedures are provided for R-12 systems only.

1. Start engine and operate A/C system.

2. Observe the sight glass in the receiver-dehydrator for bubbles (Figure 10). The sight glass should appear clear. If not, see GROUP 16-AIR CONDITIONING THEORY, SYSTEM DIAGNOSIS AND SERVICE in the Master Service Manual, for the vehicle being serviced.

3. Shut off the engine.

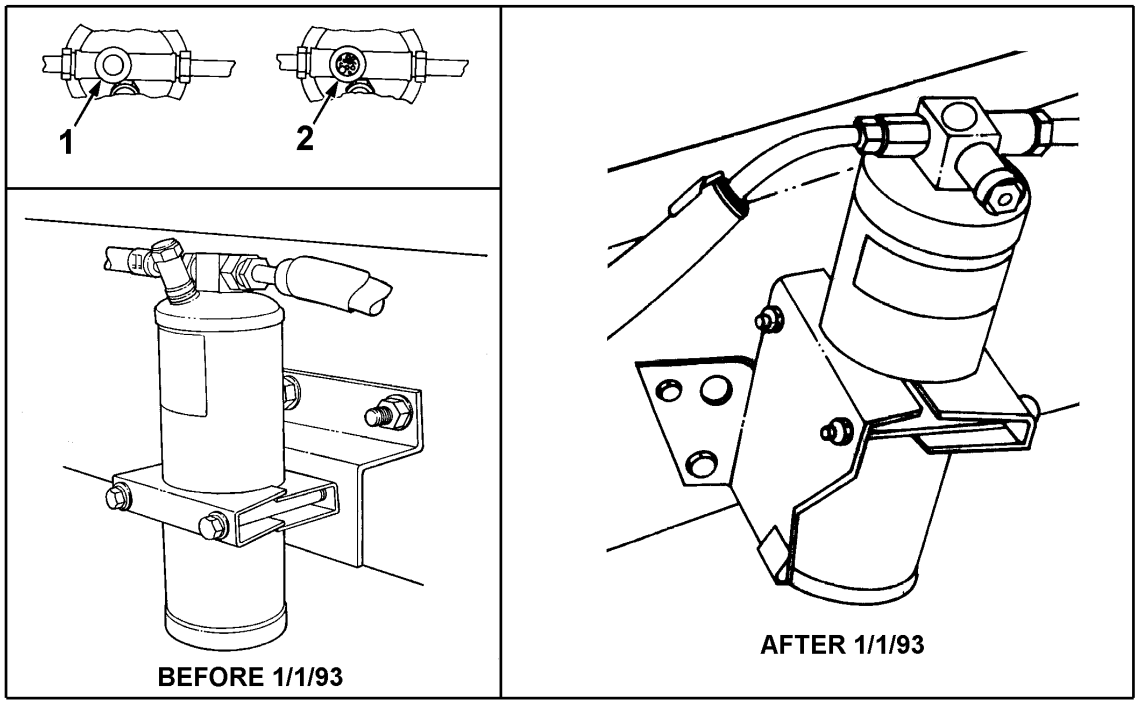

Figure 10 Sight Glass in Receiver-Dehydrator

1. SIGHT GLASS CLEAR - SYSTEM FULL (R-12 SYSTEMS ONLY)
2. SIGHT GLASS BUBBLES - SYSTEM NEEDS CHARGE (R-12 SYSTEMS ONLY)

6.4. AIR FILTER

The air conditioning system air filter element should be replaced every year at the beginning of the cooling season. More frequent replacement may be required for vehicles operating in dusty areas.

Remove and Install

1. Remove the passenger seat and cover from the top of the Blend-Air unit.

2. Lift the old element from the unit, noting the orientation of the filter construction (Figure 11).

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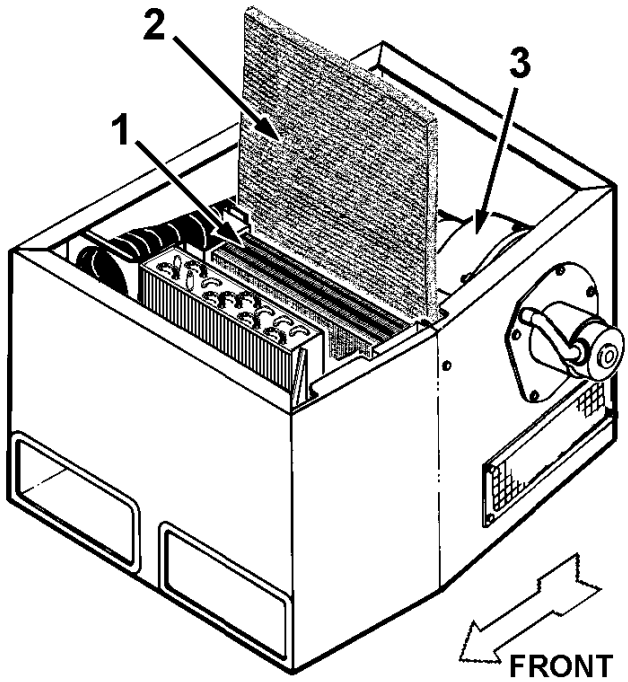

Figure 11 Air Filter

1. EVAPORATOR
2. FILTER ELEMENT
3. BLOWER HOUSING

3. Install the new filter element in the slot between the blower housing and the evaporator. Make sure that the matted or net side of the filter faces the evaporator and the loose bristle ends face the blower.

4. Reinstall the Blend-Air unit cover and passenger seat.

6.5. HEATER WATER VALVE ADJUSTMENT

The water valve should be adjusted so that the valve is full on when the Blend-Air door is closed with about 25% compression of the door seal (Figure 12).

1. Remove the passenger seat and cover from the top of the Blend-Air unit.

2. Lift water valve control link off the water valve control lever (Figure 12).

3. Move the valve control lever against the stop tab in the full ON position.

4. Rotate the control link adjuster until the link can be placed on the valve lever with the door closed and the seal compressed approximately 25%.

5. Adjust the HTR lever control cable (outlined below).

6. Reinstall the Blend-Air unit cover and passenger seat.

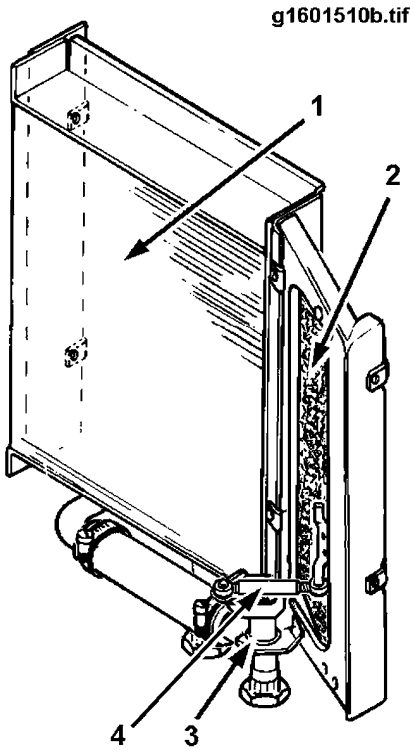

Figure 12 Heater Core and Blend Door Assembly

1. HEATER CORE
2. DOOR ASSEMBLY
3. HEATER WATER VALVE
4. WATER VALVE CONTROL LINK ADJUSTER

6.6. CONTROL CABLE ADJUSTMENT

NOTE – Adjustment to be made with the system and the air outlet assembly to the cab all in place.

1. Remove four mounting screws from the control assembly and pull the assembly out of the instrument panel (Figure 13).

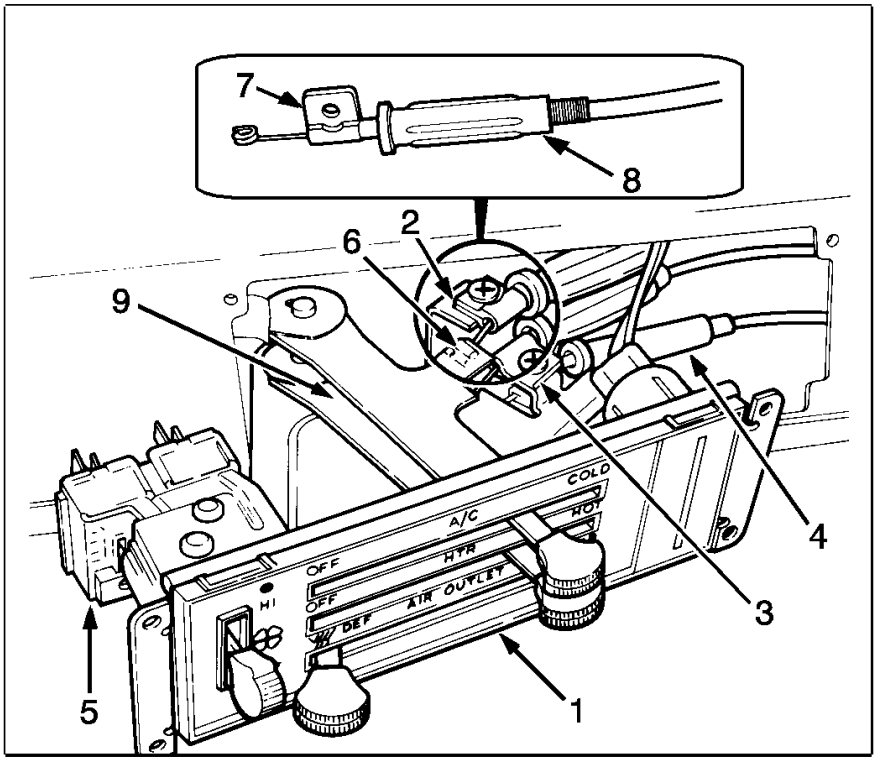

Figure 13 Control Assembly and Cables

1. CONTROL ASSEMBLY
2. A/C CABLE (RED FLAG)
3. HEATER CABLE (WHITE FLAG)
4. AIR OUTLET CABLE (BLACK FLAG)
5. BLOWER SWITCH
6. CABLE EYELET CLIP (TYPICAL)
7. CABLE FLAG (TYPICAL)
8. CABLE LENGTH ADJUSTER (TYPICAL)
9. OPERATING LEVER (TYPICAL)

2. Set HTR to the HOT position, full travel. Set A/C lever to COLD position, full travel. Set AIR OUTLET lever to CAB position, full travel. Push PULL-RECIRC knob in all the way.

3. Adjust each lever by turning its cable adjuster (Figure 13) until the lever is clear of (not touching) the end of its slot. Move each lever to the opposite end of its slot. Adjust again until each lever is the same distance from each end of its slot.

   NOTE – When properly adjusted, levers will have full travel without touching either end of the slot and will stop at the same distance from the end of the slot on each side.

4. Adjust PULL-RECIRC knob (Figure 9) by turning its cable adjuster to set clearance from the bottom of the knob to the bezel nut on the instrument panel at 0.1 inch (2.5 mm).

5. Install the control assembly in the instrument panel and secure with the four mounting screws.

7. SERVICE HINTS

Special attention to the following during component remove and install will aid in avoiding unnecessary and time-consuming problems.

1. Note cable routings during removal. Where necessary, cables should make sweeping curves. Sharp bends tend to increase resistance to bowden wire movement and sometimes cause kinks, which render the cable inoperative.

2. Always use a back-up wrench when loosening or tightening fittings.

3. It is most important that all refrigerant hose, O-rings, and tubing fittings be lubricated with MINERAL-BASED refrigerant oil and tightened as specified in the TORQUE CHART. Use only a torque wrench known to be correct.

IMPORTANT – DO NOT use oil approved for HFC-134A air conditioning systems to lubricate the fittings and O-rings on any system during assembly. The oil absorbs too much moisture which may corrode the fittings and make them difficult to disassemble. Use only mineral-based oil to lubricate fittings and O-rings on all types of systems.

4. Replace the receiver-dehydrator unit on any system which is opened for more than a very short period, when the system is flushed, and/or when the compressor is replaced.

5. Be certain that the evaporator core temperature control sensing capillary tube is properly inserted into the evaporator core.

6. The expansion valve refrigerant temperature sensing tube must be securely attached to the evaporator refrigerant outlet tube. Also, the temperature sensing bulb and expansion valve must be tightly wrapped with insulating tape to prevent the ambient temperature from affecting correct sensing of the temperature of the refrigerant leaving the evaporator.

7. All refrigerant hose and tubing support clamps and strap locks must be reinstalled in their original positions.

8. The air conditioning system must be purged and/or flushed as described in GROUP 16-AIR CONDITIONING BASIC THEORY, SYSTEM DIAGNOSIS AND SERVICE in the Master Service Manual, any time the compressor is replaced for an internal failure resulting in a contaminated system.

9. The compressor oil level must be checked and replaced as specified in GROUP 16-AIR CONDITIONING BASIC THEORY, SYSTEM DIAGNOSIS AND SERVICE in the Master Service Manual, for the vehicle being serviced.

   The type of refrigerant oil used in HFC-134A charged systems has been changed to a non-mineral base oil. The following information must be adhered to when servicing air conditioning systems.

   IMPORTANT – The refrigerant oil used in R-12 charged air conditioning systems CANNOT be used in HFC-134A charged air conditioning systems. The oil used in HFC-134A charged air conditioning systems CANNOT be used in R-12 charged air conditioning systems.

   If you put the wrong oil in the system you are servicing, the system will function poorly and the life of the compressor will be drastically reduced.

CAUTION – Keep spare HFC-134A refrigerant oil in a sealed container. The oil rapidly draws moisture and will become moisture contaminated if exposed to the atmosphere for any period of time.

10. All refrigerant hose and tubing openings should be immediately capped or plugged during removal and remain so until reinstallation to prevent the entry of dirt, moisture and other foreign material. Even the slightest particle can cause problems if carried to a vulnerable place in the system.

8. REMOVE AND INSTALL

WARNING – Before performing any of the following procedures, read the SERVICE WARNINGS. Failure to read the service warnings and to be aware of the dangers involved when working with refrigerant could lead to serious personal injury.

CAUTION – Before disconnecting any A/C components, Always discharge and recover the refrigerant from the system. Refer to GROUP 16-AIR CONDITIONING BASIC THEORY, SYSTEM DIAGNOSIS AND SERVICE in the Master Service Manual, for the vehicle being serviced.

WARNING – Before performing any service operations, set the parking brake and disconnect battery power.

8.1. BLEND-AIR UNIT HOUSING ASSEMBLY

NOTE – Most components can be serviced without removing the blend-air unit. This procedure should not be performed unless there is definite reason for removing the unit.

NOTE – A putty-type sealant is used where components pass through the cab floor. Carefully remove this sealant when removing the components. Reseal the components after installation.

Remove

1. Turn off engine coolant supply to the heater with the heater hose gate valves in the engine compartment, or clamp off the heater inlet and outlet hoses (Figure 14) with C-clamps and wood blocks. Be sure not to damage the hoses.

2. Recover the refrigerant from the Air Conditioning system. Refer to GROUP 16-AIR CONDITIONING THEORY, SYSTEM DIAGNOSIS AND SERVICE in the Master Service Manual.

Remove - Under the Cab

WARNING – To prevent personal injury from hot coolant, do not remove the heater hoses from the heater core inlet and outlet until the cooling system has cooled down.

1. Note how the heater hoses are connected to the heater core, and label the hoses for proper reconnection later. Remove the heater hoses from the heater core inlet and outlet tubes (Figure 14).

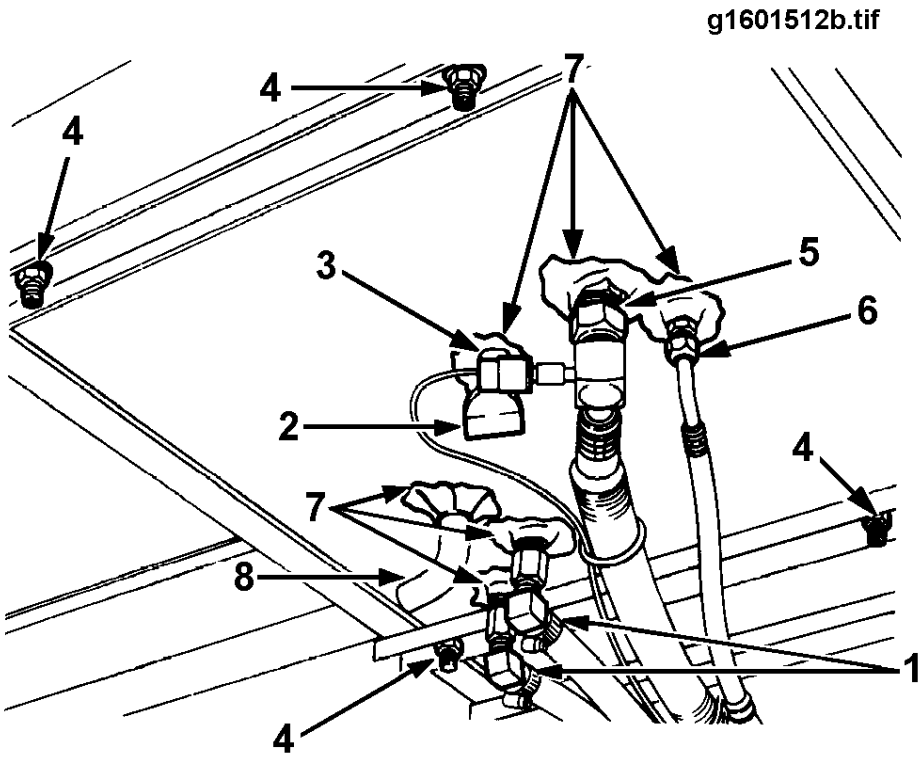

Figure 14 A/C Heater Unit Connections Under Cab Floor

1. HEATER HOSE FITTINGS
2. MOISTURE DRAIN NIPPLE
3. REFRIGERANT LOW PRESSURE SWITCH (R-12 ONLY) BEFORE 1/1/93
4. MOUNTING NUT AND WASHER
5. EVAPORATOR OUTLET HOSE
6. EVAPORATOR INLET HOSE
7. SEALANT
8. CONDENSATE DRAIN

NOTE – Plug the heater hose inlet and outlet tubes to prevent coolant from being released inside the cab during removal of the Blend-Air unit.

2. Disconnect the evaporator hoses and fittings (Figure 14). Cap or plug all hoses and fittings.

3. Remove the moisture drain nipple and evaporator drain tube, if so equipped, under the cab (Figure 14).

4. Remove the sealant from the components that pass through the cab floor.

5. Remove the unit mounting stud nuts and washers (Figure 14).

Remove - Inside the Cab

1. Remove the screws securing the passenger seat and the Blend-Air housing cover plate. Remove the seat and cover from the cab.

2. Remove the passenger side floor panel, as follows:
   a. Remove the scuff plate from door sill.
   b. Remove the floor mat.
   c. Remove the screws securing the floor panel.
   d. Take out the floor panel, exposing the air ducts.

3. Remove the sheet metal screws securing the air ducts at the Blend-Air unit.

4. Disconnect the control cables from inside the Blend-Air unit (at Blend-Air door and thermostatic switch).

5. Disconnect the electrical wiring. If necessary, remove the passenger side kick panel to gain access.

6. Carefully lift the Blend-Air unit and remove it from the vehicle.

Install

Position the Blend-Air unit housing assembly in the cab with mounting studs, tubes and pipes protruding through the floor.

Install - Under the Cab

1. Install washers and nuts on the mounting studs (Figure 14). Tighten mounting nuts to 22 to 28 lbf-ft (30 to 38 Nm).

2. Install the heater hoses on the heater core tubes making certain that the supply hose is on the inlet tube and the return hose on the outlet tube. The heater core inlet tube is the one nearest the center of the cab. Install the hose clamps.

3. Install new O-rings, lubricate threads of the evaporator core fittings with **MINERAL-BASED** refrigerant oil and connect the inlet and outlet hoses to evaporator fittings.

4. If applicable, connect electrical connector(s) to any pressure switches located below the cab floor.

5. Apply sealant around the Blend-Air unit housing connections where they exit the cab floor (Figure 14).

6. Open the heater water valves at the engine; or remove clamps used to close hoses, if used.

Install - Inside the Cab

1. Connect electrical wiring. Install the passenger side kick panel if it was removed earlier.

2. Verify that the control cables are routed into the heater assembly. Connect the control cables to the appropriate points in the Blend-Air unit.

3. Secure the air ducts in place with sheet metal screws. Be certain the two rubber seals are in place on the duct openings.

4. Install the floor panel and the floor mat.

5. Adjust the control cables. Refer to CONTROL CABLE ADJUSTMENT.

6. Replace coolant lost during heater hose removal. Refer to the Operator's Manual for the correct type of coolant.

7. Evacuate and charge the air conditioning system as described in GROUP 16-AIR CONDITIONING BASIC THEORY, SYSTEM DIAGNOSIS AND SERVICE in the Master Service Manual.

NOTE – In the following step, to verify correct heater and A/C operation at the air duct outlets, the cover must be in place on the Blend-Air unit.

8. Run the engine and check the system for leaks (coolant and refrigerant) and proper operation.

9. Install the Blend-Air unit cover and passenger seat assembly. Tighten the six thumb screws.

8.2. HEATER CORE, HEATER WATER VALVE AND BLEND-AIR DOOR ASSEMBLY

The three components covered here are closely related and are serviced as an assembly (Figure 15). While each unit can be removed from the Blend-Air box individually, much time can be saved by removing them as one assembly.

NOTE – A putty-type sealant is used where components pass through the cab floor. Carefully remove this sealant when removing the components. Reseal the components after installation.

Remove

WARNING – To prevent personal injury from hot coolant, do not remove the heater hoses from the heater core inlet and outlet until the cooling system has cooled down.

1. Turn off engine coolant supply to the heater with the heater hose gate valves in the engine compartment, or clamp off the heater inlet and outlet hoses (Figure 14) with C-clamps and wood blocks. Be sure not to damage the hoses.

2. Note how the heater hoses are connected to the heater core (Figure 14), and label the hoses for proper reconnection later. Disconnect the heater hoses from the inlet and outlet fittings under the cab.

3. Remove the two elbow fittings and sealant (or insulating tape) from the heater core tubes.

NOTE – Plug the heater hose inlet and outlet tubes to prevent coolant from being released inside the cab during removal of the heater core.

4. Remove the screws securing the passenger seat and the Blend-Air housing cover plate. Remove the seat and cover plate from the cab.

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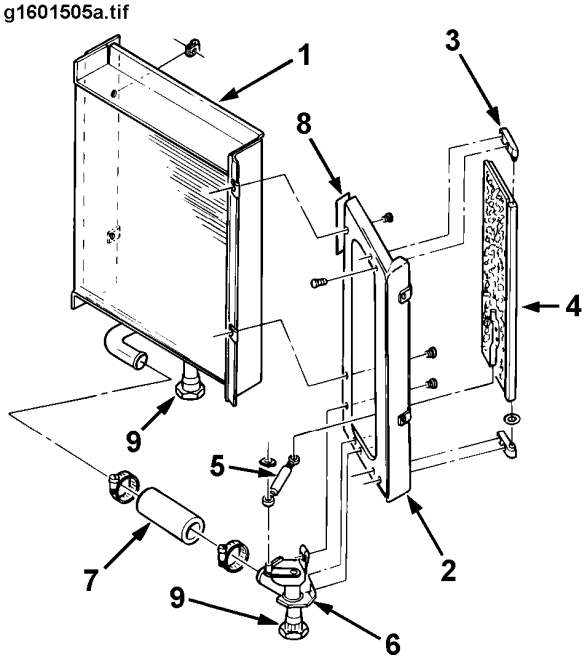

Figure 15 Heater Core and Blend-Air Door Exploded View

1. HEATER CORE
2. BLEND-AIR DOOR FRAME
3. HINGE
4. BLEND-AIR DOOR ASSEMBLY
5. WATER VALVE OPERATING LINK
6. HEATER WATER VALVE
7. HEATER HOSE
8. SEALING TAPE
9. HEATER HOSE CONNECTIONS

5. Release the clip on the control cable and detach the cable from the blend door (Figure 15).

6. Locate and remove two mounting screws which secure the outboard side of the heater core to the housing.

7. Locate and remove two mounting screws which secure the blend door frame to the housing.

8. Lift the heater core, heater water valve and blend door from the housing as an assembly.

9. Loosen the clamps on the hose that connects the heater water valve to the heater core (Figure 15).

10. Remove the two screws securing the blend door frame to the heater core to separate the heater core from the door frame (Figure 15).

11. Remove the clip from the water valve operating lever to detach the adjustable link that connects the valve to the blend door (Figure 15).

12. Remove the four mounting screws and detach the heater water valve from the blend door frame.

13. Service, replace or adjust individual components as required.

Install

1. Align the heater water valve to the blend door frame and secure with four mounting screws (Figure 15).
2. Connect the valve operating lever to the blend door with the adjustable link and secure with the clip.
3. Connect the heater core to the water valve with the short length of heater hose. Leave the hose clamps loose (Figure 15).
4. Align the heater core to the blend door frame and secure it with two mounting screws.
5. Tighten the hose clamps.
6. Insert the assembly into the blend-air unit housing, noting that the coolant inlet and outlet tubes pass through the bottom of the housing and the cab floor.
7. Secure the assembly to the housing with four mounting screws, two screws into the side of the heater core and two screws into the blend door frame.
8. Connect the control cable to the blend door and install clip.
9. Check the operation of the blend door and the heater water valve. Adjust the link as required (see HEATER WATER VALVE ADJUSTMENT).
10. At the underside of the cab, install the elbow fittings to the heater core inlet and outlet tubes and connect the heater hoses. Secure with hose clamps. Make certain that the supply hose is on the inlet tube and the return hose on the outlet tube. The heater core inlet tube is the one nearest the center of the cab.
11. Wrap the fittings with insulating tape (or use sealant) to seal the floor openings (Figure 14).
12. Open the heater water valves at the engine; or remove clamps used to close hoses, if used.
13. Replace coolant lost during heater core removal. Refer to the Operator's Manual for the correct type of coolant.
14. Set the heater (HTR) control lever to HOT. Operate the engine. Check for coolant leaks and check for proper operation of blend door and heater water valve at both HOT and OFF positions.
15. Install the Blend-Air unit cover and passenger seat assembly. Tighten the six thumb screws.

8.3. CONTROL ASSEMBLY

Remove

1. Remove the four screws securing the Air Conditioning Heater Control to the instrument panel. Pull the control assembly away from the instrument panel.
2. Remove the clips securing the cable eyelets to the control lever pins (Figure 16).
3. Remove the screws attaching the cable sleeve flags to the control assembly.
4. Disconnect the cables from the levers.

5. Disconnect the electrical connectors from the blower switches.
6. Remove the light bulbs from the control assembly housing.
7. Remove the four screws securing the control assembly to the support housing.
8. Remove the control assembly from the support housing.

Install

1. Place the control assembly in the support housing and install the four securing screws.
2. Reinstall the light bulbs in the control assembly housing.

NOTE – The cables to be connected in the following step are identified by the color of their sleeve flag. The PULL-RECIRC control is mounted on the instrument panel separate from the A/C-Heater control.

- **AIR OUTLETS cable - Black Flag**
- **HTR cable - White Flag**
- **A/C cable - Red Flag**
- **PULL-RECIRC cable - Green Flag**

3. Connect the control cables, as follows, starting with the bottom cable.
   a. Connect the cable eyelet to the control lever pin.
   b. Install the clip securing the cable eyelet to the control lever pin.
   c. Attach the cable sleeve (flag) to the control assembly.
   d. Repeat steps for remaining cables.
4. Connect the electrical connectors to the blower switches.
5. Place the control assembly in the instrument panel and replace the four securing screws (Figure 16).

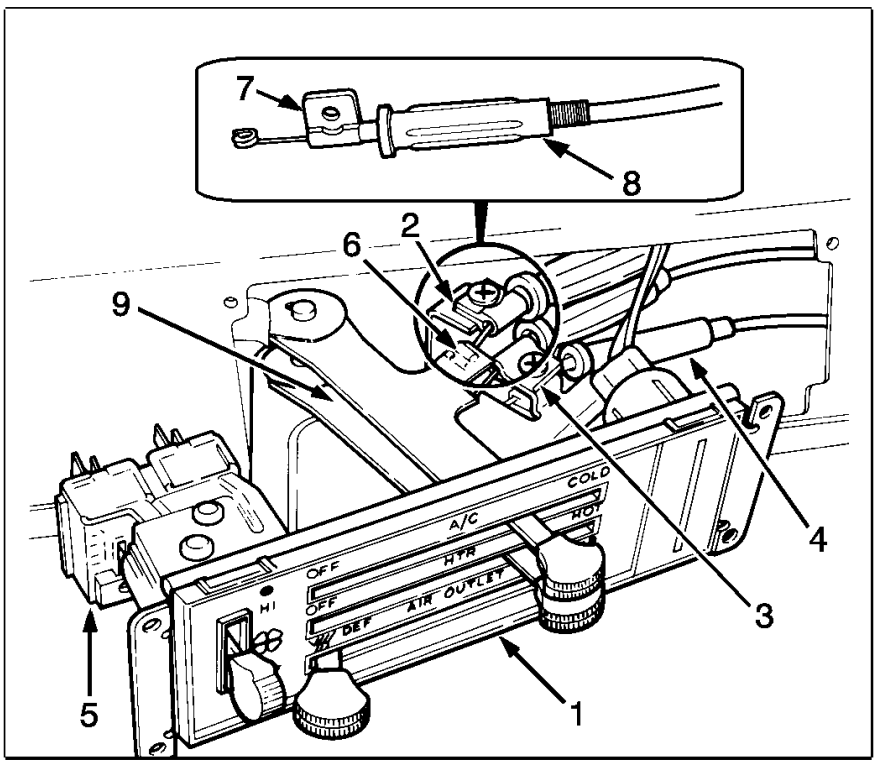

Figure 16 Control Assembly and Cables

1. CONTROL ASSEMBLY
2. A/C CABLE (RED FLAG)
3. HEATER CABLE (WHITE FLAG)
4. AIR OUTLET CABLE (BLACK FLAG)
5. BLOWER SWITCH
6. CABLE EYELET CLIP (TYPICAL)
7. CABLE FLAG (TYPICAL)
8. CABLE LENGTH ADJUSTER (TYPICAL)
9. OPERATING LEVER (TYPICAL)

8.4. CONTROL CABLE REPLACEMENT

Remove

1. Disconnect the battery ground cable.

2. Remove the screws from the control panel assembly bezel on the instrument panel (Figure 16). Pull control assembly away from the instrument panel.

3. Locate the cable to be removed and remove the clip securing the cable eyelet to the control lever pin (Figure 16). Cables can be identified by the color-coded mounting flags.

   a. A/C Cable - Red Flag

   b. HTR Cable - White Flag

   c. AIR OUTLET Cable - Black Flag

   d. PULL-RECIRC Cable - Green Flag

NOTE – PULL-RECIRC Cable is mounted on the instrument panel separate from the A/C-Heater control.

4. Remove control cable mounting screw and disconnect the cable from the control lever.
5. Disconnect the opposite end of the cable as follows:
   a. Air Control Cable
      1. Remove the control cable mounting screw from the mounting bracket.
      2. Remove the retainer clip and disconnect the cable from the defrost door crank.
   b. Air Conditioning (A/C) Cable
      1. Remove the passenger seat and the Blend-Air unit cover.
      2. Remove the cable mounting screw from the thermostatic control switch bracket.
      3. Remove the thermostatic control switch from the mounting bracket.
      4. Remove the retainer clip and disconnect the cable from the switch lever.
   c. Heater (HTR) Cable
      1. Remove the passenger seat and the Blend-Air unit cover.
      2. Remove the control cable mounting screw from the cable mounting bracket.
      3. Disconnect the cable from the Blend-Air door.
      4. Withdraw the end of the cable through the hole at the front of the Blend-Air unit housing.
6. Note cable routing and withdraw cable as required.

Install

NOTE – When installing new control cables, follow the color code outlined in the Remove procedure above.

1. Position the cable as it was originally routed.
2. At the instrument panel end of the cable, hold the cable sleeve, then push and pull the inner cable to verify that it moves freely. If not, look for kinks and bends, and correct the condition.
3. At the control assembly, connect the cable eyelet to the control lever pin and install the retainer clip.
4. Attach the cable sleeve (flag) to the control assembly.
5. Connect the opposite end of the cable as outlined below.
   a. Air Conditioning Cable
      1. Inside the Blend-Air housing unit, connect the cable to the thermostatic switch lever and install the retainer clip.
      2. Install the switch on its mounting bracket.
      3. Fasten the cable mounting flag (red) to the switch bracket.
   b. Heater (HTR) Cable
      1. Inside the Blend-Air housing unit, connect the cable to the Blend-Air door.

2. Fasten the cable mounting flag (white) to the cable mounting bracket.

c. Air Control Cable (Defrost)

1. Connect the cable to the defrost door crank mounting bracket.
2. Fasten the cable mounting flag (black) to the mounting bracket.

6. Adjust the control cable(s) as outlined in CONTROL CABLE ADJUSTMENT.
7. Position the control assembly in the instrument panel and install the mounting screws (Figure 16).
8. If necessary, install the Blend-Air unit cover and the passenger seat.
9. Connect the battery ground cable.

8.5. BLOWER SWITCH

Remove

1. Make sure the key switch is OFF.
2. Pull the knob from the blower switch lever on the A/C-Heater control on the instrument panel.
3. Remove the control assembly mounting screws and pull the control assembly outward (Figure 16).
4. Disconnect the wiring harness connector from the blower switches.
5. Remove the switch from the control assembly.

Install

1. Assemble the blower switch to the control assembly.
2. Connect the wiring harness connector to the blower switches.
3. Position the control assembly in the instrument panel and install the mounting screws (Figure 16).
4. Install the knob onto the blower switch lever.
5. Check the operation of the blower switch.

8.6. THERMOSTATIC TEMPERATURE CONTROL SWITCH

Remove

1. Make sure the key switch and A/C lever are off.
2. Remove the screws securing the passenger seat and the Blend-Air housing cover plate. Remove the seat and cover from the cab.
3. Disconnect wiring connectors from the thermostatic control switch (Figure 17).

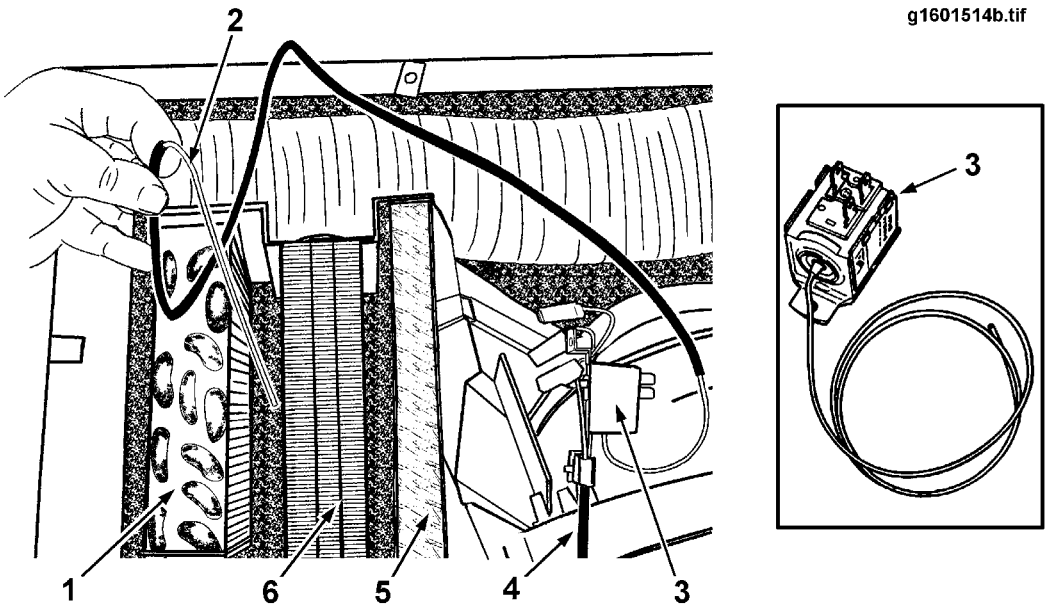

Figure 17 Thermostatic Control Switch

1. HEATER CORE
2. CAPILLARY TUBE
3. THERMOSTATIC CONTROL SWITCH
4. A/C CONTROL CABLE
5. FILTER
6. EVAPORATOR CORE

NOTE – Before disconnecting wires, take note of the circuit locations to insure correct reassembly.

4. Remove thermostatic control switch mounting screws and the switch.

5. Remove the retainer clip and disconnect the control cable from the switch lever.

6. Withdraw the thermostatic control switch capillary tube from the evaporator core.

Install

1. Carefully insert the end of the capillary tube into the evaporator core (Figure 17). Do not insert in the same hole as removed. Insert nearby to provide good contact with the fins.

2. Connect the control cable to the thermostatic control switch lever and install the retainer clip.

3. Position the switch on the bracket and install the switch mounting screws.

4. Connect the wiring connectors to the thermostatic control switch. Make sure the connectors are located properly.

5. Check the operation of the thermostatic control switch.

6. Install the Blend-Air unit cover and the passenger seat.

8.7. BLOWER MOTOR ASSEMBLIES

Remove

1. Make sure the key and blower motor switch is OFF, or the battery ground strap has been disconnected.
2. Remove the screws securing the passenger seat and the Blend-Air housing cover plate. Remove the seat and cover from the cab.
3. Remove the passenger side scuff plate and the blower motor access panel.
4. Disconnect the blower motor wiring connector and ground wire.
5. Disconnect the motor cooling air hose (vent) from the blower housing (Figure 18).

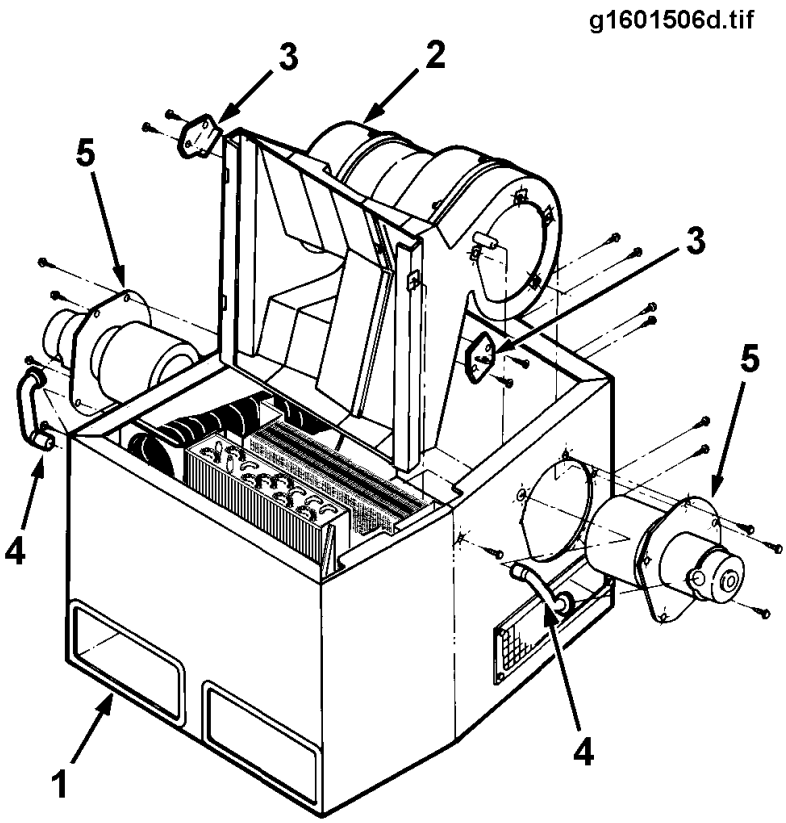

Figure 18 Blower Assembly Exploded View

1. BLEND-AIR UNIT HOUSING
2. BLOWER HOUSING
3. BLOWER RESISTORS
4. VENT HOSES
5. BLOWER MOTOR

6. Remove the mounting screws and the blower motor assembly from the blower housing.

7. To separate the fan from the motor, remove the fan lock nuts and lift the fan and spacer from the motor shaft.

Install

1. Install the fan on the motor shaft as follows:
   a. Position the metal spacer on the shaft.
   b. Position the fan on the motor shaft.
   c. Install the fan lock nut and tighten to 1 to 1.25 lbf-ft (1 to 1.7 Nm).
2. Install the blower motor assembly in the blower housing and install the mounting screws (Figure 18).
3. Connect the motor cooling air hose (vent) to the outlet on the blower housing.
4. Connect the blower wiring connector and ground wire.
5. Reconnect battery if disconnected.
6. Check the blower motor operation.
7. Install the passenger side scuff plate and the blower motor access panel.
8. Install the Blend-Air unit cover and the passenger seat.

8.8. BLOWER RESISTORS

Remove

1. Make sure the key and blower motor switch is OFF, or the battery ground strap has been disconnected.
2. Remove the screws securing the passenger seat and the Blend-Air housing cover plate. Remove the seat and cover from the cab.
3. Disconnect the wiring harness connectors from the blower resistors (Figure 18).
4. Remove the resistor mounting screws and remove the resistor from the blower housing.

Install

1. Position the resistor in the housing. Make sure the resistor terminal locations correspond with the wiring harness terminals. Install the mounting screws (Figure 18).
2. Connect the wiring harness connector to the resistor.
3. Connect the battery, if necessary; then turn the key switch ON.
4. Operate the blower switch and check the resistor operation (all blower speeds are available). Turn the key switch OFF after the operation check.
5. Install the Blend-Air unit cover and the passenger seat.

8.9. BLOWER HOUSING

Remove

1. Remove both blower motor assemblies (see BLOWER MOTOR ASSEMBLIES).
2. Remove the thermostatic control switch (see THERMOSTATIC TEMPERATURE CONTROL SWITCH).
3. Disconnect the harness and remove the two blower resistors (Figure 18).
4. Remove the air filter.
5. Loosen or remove the evaporator mounting screws, as necessary, but **DO NOT** remove the evaporator (see EVAPORATOR CORE).
6. Remove the blower housing mounting bolts (Figure 18).
7. Open the harness mounting clip and move the harness aside.
8. Lift the blower housing up and out of the Blend-Air unit housing. Some prying will be required to remove the motor cooling tube outlet from the inboard side of the unit housing. Be careful to avoid breakage.

Install

1. Position the wiring harness inside the unit housing.
2. Start the blower housing into the unit housing carefully so as to avoid damage.
3. Work the housing into position while making sure the wiring harness stays clear of the housing.
4. To fully seat the housing, use a small pry bar to work the blower motor cooling outlet under the unit housing flange and into the inboard outlet.
5. Check alignment of the housing and secure it to the Blend-Air unit housing with the mounting screws.
6. Position the wiring harness to clips on the blower housing.
7. Install the evaporator mounting screws removed earlier.
8. Install the thermostatic control switch (see THERMOSTATIC TEMPERATURE CONTROL SWITCH).
9. Install the blower motors and connect the wiring harness (see BLOWER MOTOR ASSEMBLIES).

8.10. BLOWER MOTOR SWITCH RELAYS

Two blower switch relays are located inside the cab. Refer to Figure 19 for specific locations.

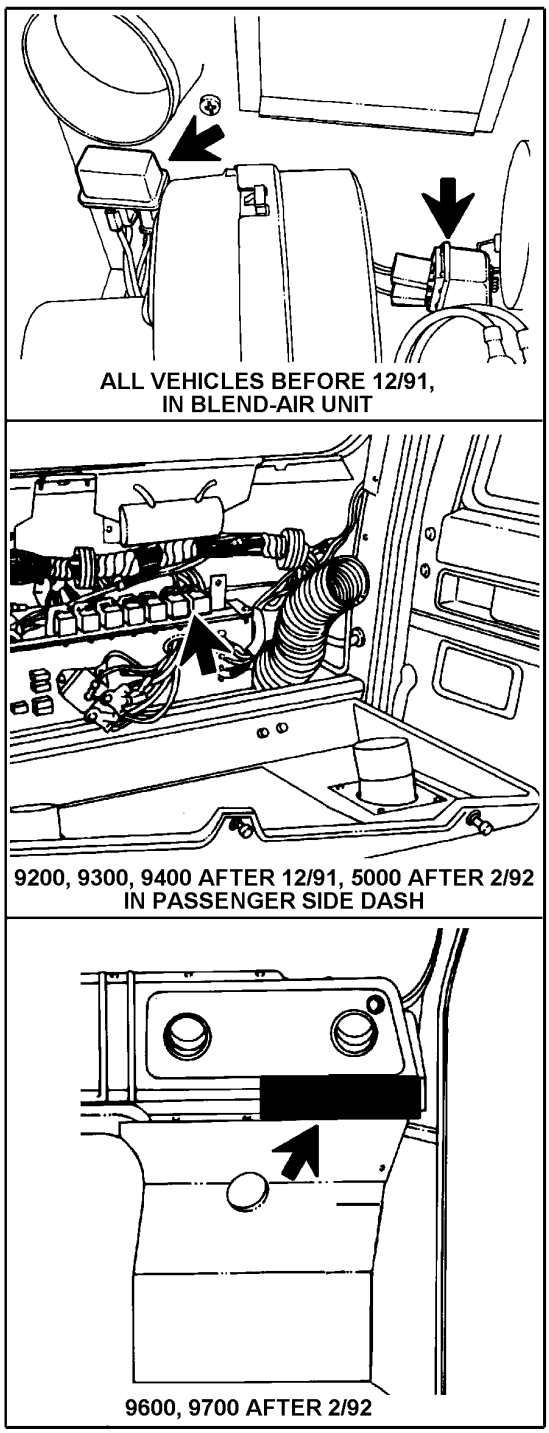

Figure 19 Blower Motor Switch Relay Locations

Remove

1. Disconnect the battery ground cable.
2. Disconnect the wiring harness from the relay being removed.
3. Remove the relay.

Install

1. Install the relay in its proper location.
2. Reconnect the relay connector.
3. Reconnect the battery ground cable and turn the key switch on.
4. Check the operation of the blower motor switch through all the speeds.

8.11. EXPANSION VALVE

Remove

1. Make sure the key switch is off.
2. Recover the air conditioning system refrigerant as described in GROUP 16-AIR CONDITIONING BASIC THEORY, SYSTEM DIAGNOSIS AND SERVICE in the Master Service Manual.
3. Remove the floor mat kick plate and the outboard Blend-Air unit access cover.
4. Working through the access hole, remove the insulating tape from the expansion valve and capillary tubes (Figure 20).
5. Using two wrenches, disconnect the expansion valve equalizer line from the fitting on the evaporator outlet tube. Cap or plug the evaporator outlet opening.
6. Remove the screw and clamp securing the expansion valve feeler bulb to the evaporator outlet tube.
7. At the underside of the cab, remove the insulating tape (or sealer) and disconnect the refrigerant inlet hose (small diameter hose) from the inlet fitting (Figure 14). Cap or plug the inlet fitting and the hose.
8. Using two wrenches, disconnect the expansion valve from the evaporator core inlet tube. Remove the expansion valve (Figure 20) and cap or plug the evaporator inlet.

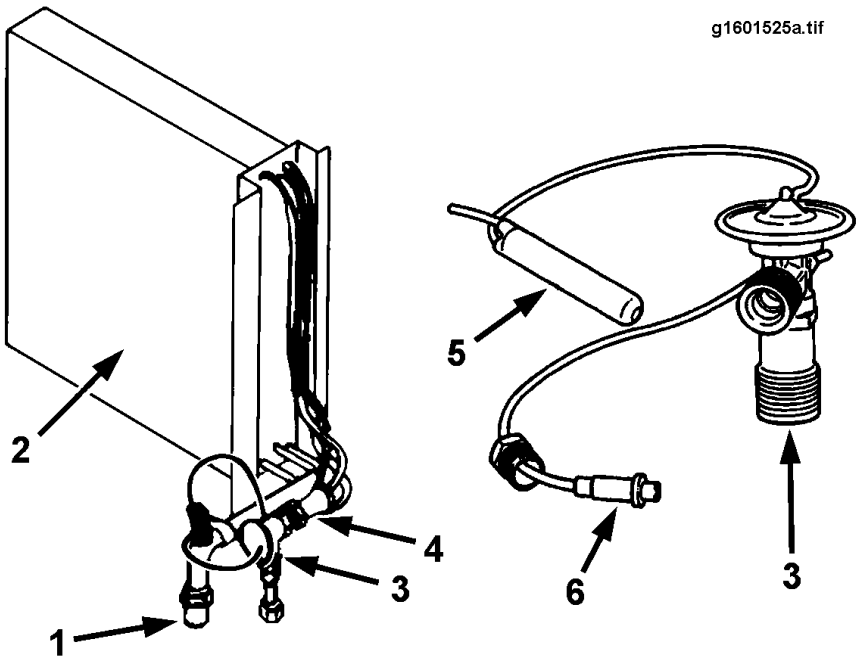

Figure 20 Evaporator Core and Expansion Valve

1. EVAPORATOR CORE OUTLET
2. EVAPORATOR CORE
3. EXPANSION VALVE
4. EVAPORATOR CORE INLET
5. FEELER BULB
6. EQUALIZER LINE

Install

1. Install a new O-ring, lubricate the threads with **MINERAL-BASED** refrigerant oil and connect the expansion valve to the evaporator core inlet tube. Tighten to 33 to 35 lbf-ft (45 to 48 Nm).

2. Lubricate the threads with **MINERAL-BASED** refrigerant oil and connect the expansion valve inlet tube (under cab) to the expansion valve. Tighten to 13 to 20 lbf-ft (18 to 27 Nm).

3. Position expansion valve feeler bulb on evaporator core outlet tube and secure with the clamp and screw.

4. Install a new O-ring, lubricate the threads with **MINERAL-BASED** refrigerant oil and connect the expansion valve equalizer to the fitting on the evaporator outlet tube (Figure 20). Using two wrenches, tighten to 33 to 35 lbf-ft (45 to 48 Nm).

5. Wrap the expansion valve and evaporator inlet and outlet tubes with insulating tape.

6. Evacuate and charge the air conditioning system as described in GROUP 16-AIR CONDITIONING BASIC THEORY, SYSTEM DIAGNOSIS AND SERVICE in the Master Service Manual.

7. Run the engine and check the system for proper operation and leaks. Repair as necessary.

8. Install the Blend-Air unit access cover and floor mat kick plate.

8.12. EVAPORATOR CORE

Remove

1. Recover the air conditioning system refrigerant as described in GROUP 16-AIR CONDITIONING BASIC THEORY, SERVICE DIAGNOSIS AND SERVICE in the Master Service Manual.

2. Remove the screws securing the passenger seat and the Blend-Air unit cover plate. Remove the seat and cover from the cab.

3. At the underside of the cab, remove the insulating tape or sealant surrounding the evaporator unit inlet and outlet fittings (Figure 14).

4. Disconnect the refrigerant inlet and outlet hoses. Cap or plug the refrigerant hose fittings.

5. Remove the air filter from the blower housing.

6. Carefully remove the capillary tube of the thermostatic temperature control switch from the evaporator core, taking care not to kink the tube (Figure 17).

7. Locate and remove the seven evaporator core mounting screws (Figure 21).

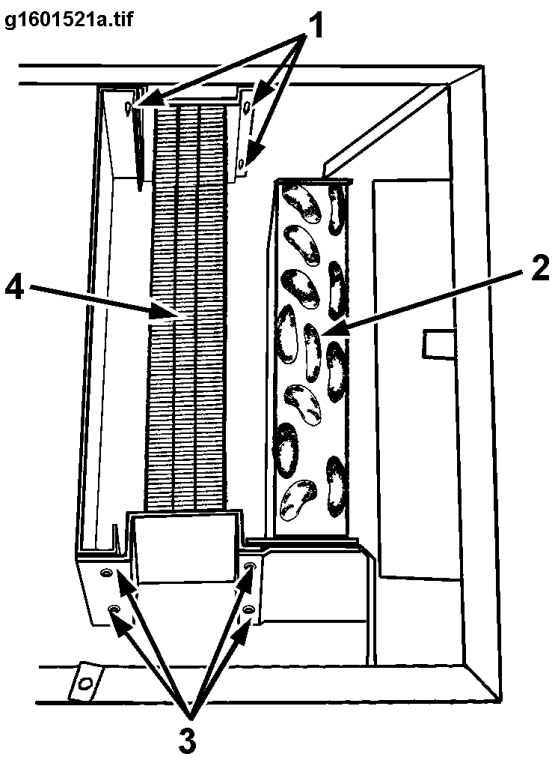

Figure 21 Evaporator Core Mounting Screws

1. INBOARD MOUNTING SCREWS
2. HEATER CORE
3. OUTBOARD MOUNTING SCREWS
4. EVAPORATOR CORE

8. Lift the core (with expansion valve still attached) straight up and out of the unit housing.

9. Peel away the insulating tape and remove the expansion valve from the evaporator core (see EXPANSION VALVE).

Install

1. Install the expansion valve onto the evaporator core, and replace the insulating tape (see EXPANSION VALVE).

2. Install the evaporator core in the Blend-Air unit, and install and tighten the seven mounting screws (Figure 21).

3. Install the thermostatic temperature control switch capillary tube in the evaporator core (see THERMOSTATIC TEMPERATURE CONTROL SWITCH).

4. Install the air filter.

5. At the underside of the cab install new O-rings, lubricate the threads of the evaporator core fittings with **MINERAL-BASED** refrigerant oil and connect the inlet and outlet hoses to the evaporator core fittings. Tighten to 33 to 35 lbf-ft. (45 to 48 Nm).

6. Evacuate and charge the air conditioning system. Refer to GROUP 16-AIR CONDITIONING BASIC THEORY, SYSTEM DIAGNOSIS AND SERVICE in the Master Service Manual.

7. Run the engine and check for proper air conditioning system operation. Check for leaks and repair as necessary.

8. Install the Blend-Air unit cover and the passenger seat.

9. SYSTEM OPERATING TEST

This test is used to determine if the air conditioning system is properly charged with refrigerant and the refrigerant cycle is functioning correctly. The test is performed using a recovery/recycling/charging station (recovery station), or a manifold gauge set, and two thermometers.

WARNING – During system pressure tests the recovery station, or manifold gauge set, is only being used to read high and low pressures. DO NOT open either hand valve on the equipment for any reason. Equipment can be damaged, and personal injury can result.

CAUTION – To prevent damage to the test equipment, make sure test equipment and all connections are clear of all moving parts in the engine compartment.

Run this test under the following conditions:

- Park the vehicle so there is no solar loading and no wind.

- Position a thermometer approximately 12 to 24 inches in front of the vehicle grille to measure ambient temperature of air entering the condenser.
- Connect the recovery station, or manifold gauge set, to the air conditioning system.
- If the vehicle is equipped with a solenoid-controlled fan drive, engage it. The fan can be operated with a jumper wire or by disconnecting the solenoid valve, depending on the system.
- Slowly close the hood, being careful not to damage test equipment connections.
- Insert a thermometer into the center air conditioning duct. Do not allow the thermometer to touch the sides of the duct.
- Run the engine at 1800 RPM.
- Open both cab doors.
- Set the A/C control for maximum cooling, blower switch on HIGH and heater OFF.
- Operate the system for at least five minutes, or until the gauge readings settle. Check the gauge readings on the recovery station, or manifold gauge set. If the system is operating properly, the high and low pressure readings will be within the listed pressure range in the SYSTEM PRESSURE TEST CHART that follows. If the gauge readings are not within SYSTEM PRESSURE TEST CHART ranges, refer to GROUP 16 - AIR CONDITIONING BASIC THEORY, SYSTEM DIAGNOSIS AND SERVICE in the Master Service Manual.

9.1. SYSTEM PRESSURE TEST CHART

Table 1 System Pressure Test Chart (R-134a System)

Relative Humidity	Ambient Temperature		Refrigerant Pressure (PSI)		Register Temperature	
(Percent)	(°F)	(°C)	High	Low	(°F)	(°C)
Below 30%	70*	21.1*	125 - 155	7 - 11	36 - 42	2.2 - 5.6
	80	26.7	150 - 180	9 - 13	39 - 45	3.9 - 7.2
	90	32.2	165 - 200	10 - 16	40 - 48	4.4 - 8.9
	100	37.8	190 - 230	12 - 18	42 - 55	5.6 - 12.8
	110	43.3	230 - 275	13 - 21	43 - 58	6.1 - 14.4
Above 30%	70*	21.1*	135 - 165	8 - 14	36 - 44	2.2 - 6.7
	80	26.7	155 - 185	10 - 15	41 - 47	5.0 - 8.3
	90	32.2	170 - 205	11 - 17	42 - 52	5.6 - 11.1
	100	37.8	215 - 255	15 - 22	45 - 60	7.2 - 15.6
	110	43.3	250 - 295	18 - 27	50 - 65	10.0 - 18.3

* System may cycle at these ambient temperatures. Above readings will occur prior to compressor cycling.

10. SPECIFICATIONS

Table 2 Air Conditioning System Specifications

Refrigerant Type	R-12	HFC-134A
Refrigerant Quantity (Full Charge)	4.5 lbs. (2 kg.)	3.5 lbs. (1.5 kg.)
Compressor Oil Type (Refrigerant Oil)	500 to 525 Viscosity (Mineral-Based) Refrigerant Oil	Synthetic Ester Oil - P/N ZGGR725007 Non-Synthetic Ester Oil - P/N ZGG19356
System Refrigerant Oil Capacity	16.0 fl.oz. (473 cc) NOTE: This is a reference value only. Refer to GROUP 16 - AIR CONDITIONING BASIC THEORY, SYSTEM DIAGNOSIS AND SERVICE Manual in the Master Service Manual, to determine oil quantities during service.	16.0 fl.oz. (473 cc) NOTE: This is a reference value only. Refer to GROUP 16 - AIR CONDITIONING BASIC THEORY, SYSTEM DIAGNOSIS AND SERVICE Manual in the Master Service Manual, to determine oil quantities during service.
Compressor Oil Level* (Vertical Mounting)	1 to 1-3/8 inch** (25.4 to 34.9 mm)	1 to 1-3/8 inch** (25.4 to 34.9 mm)
Compressor Oil Level* (Horizontal Mounting)	1 to 1-7/16 inch** (25.4 to 36.5 mm)	1 to 1-7/16 inch** (25.4 to 36.5 mm)
Compressor Oil Level* (45 Degree Mounting)	1-13/16 to 2-7/32 inch** (46.0 to 56.3 mm)	1-13/16 to 2-7/32 inch** (46.0 to 56.3 mm)
Compressor Belt Drive Tension (Except Vehicles Equipped with Auto-Tensioner) – Initial Tension (New Belt)	130 lbs. (578 N)	130 lbs. (578 N)
Compressor Belt Drive Tension (Except Vehicles Equipped with Auto-Tensioner) – Normal Tension (Used Belt)	100 lbs. (450 N)	100 lbs. (450 N)
Low Pressure Switch (Normally Closed)*** - Opens At	30 psi (205 kPa)	19 to 29 psi (131 to 201 kPa)
Low Pressure Switch (Normally Closed)*** - Closes At	0 to 7 psi (0 to 50 kPa)	0 to 8 psi (0 to 57 kPa)
High Pressure Safety Switch (Normally Open)*** - Closes At	NA	355 to 395 psi (2448 to 2723 kPa)
High Pressure Safety Switch (Normally Open)*** - Opens At	NA	200 to 300 psi (1380 to 2070 kPa)
Shutter Switch (Normally Closed)*** - Opens at	240 to 260 psi (1660 to 1800 kPa)	240 to 260 psi (1660 to 1800 kPa)

Table 2 Air Conditioning System Specifications (cont.)

Refrigerant Type	R-12	HFC-134A
Shutter Switch (Normally Closed)*** - Closes at	90 to 110 psi (620 to 760 kPa)	90 to 110 psi (620 to 760 kPa)
Fan Drive Switch (Normally Closed)*** - Opens at	290 to 310 psi	290 to 310 psi
Fan Drive Switch (Normally Closed)*** - Closes at	200 to 220 psi	200 to 220 psi
* Measuring the compressor oil level with a dipstick, provides a rough measure of the quantity of oil in the compressor only. NOTE: Compressor oil level is a reference value only, used to determine the total system oil level. Refer to GROUP 16 - AIR CONDITIONING BASIC THEORY, SYSTEM DIAGNOSIS AND SERVICE Manual in the Master Service Manual to determine the correct oil quantities required when servicing the system.		
** This level equals approximately 12 oz. (355 cc) of oil: the amount present in the compressor during normal operation. Another 4 oz. (118 cc) of additional oil is distributed throughout the system when the system is operating with the full 16 oz. (473 cc) system capacity.		
*** Normally open or closed means the state of the device not being installed. The operating condition may or may not be the same. Normally open in a switch is opposite that in a valve. In a switch, the contacts are open and no current is conducted. In a valve, the poppet is open and air flows from the inlet port to the outlet port.		

11. TORQUE CHART

Table 3 Torque Chart

Joint No. - Refer to Figure 22	Thread Size	Torque	
		Lbf-ft	Nm
1	1-14	40-44	54-60
2	3/4-16	22-26	30-35
3	5/8-18	15-19	20-26
4	11/16-16	15-19	20-26
5	5/8-18	15-19	20-26
6	7/16-20	7-11	9-15
7	5/8-18	15-19	20-26
8	1 1/16-14	46-50	63-68
9	1-14	40-44	54-60
10	3/8-24	4-11	5-15

Lubricate all O-rings and fitting threads with MINERAL-BASED oil on both HFC-134A and R-12 systems.

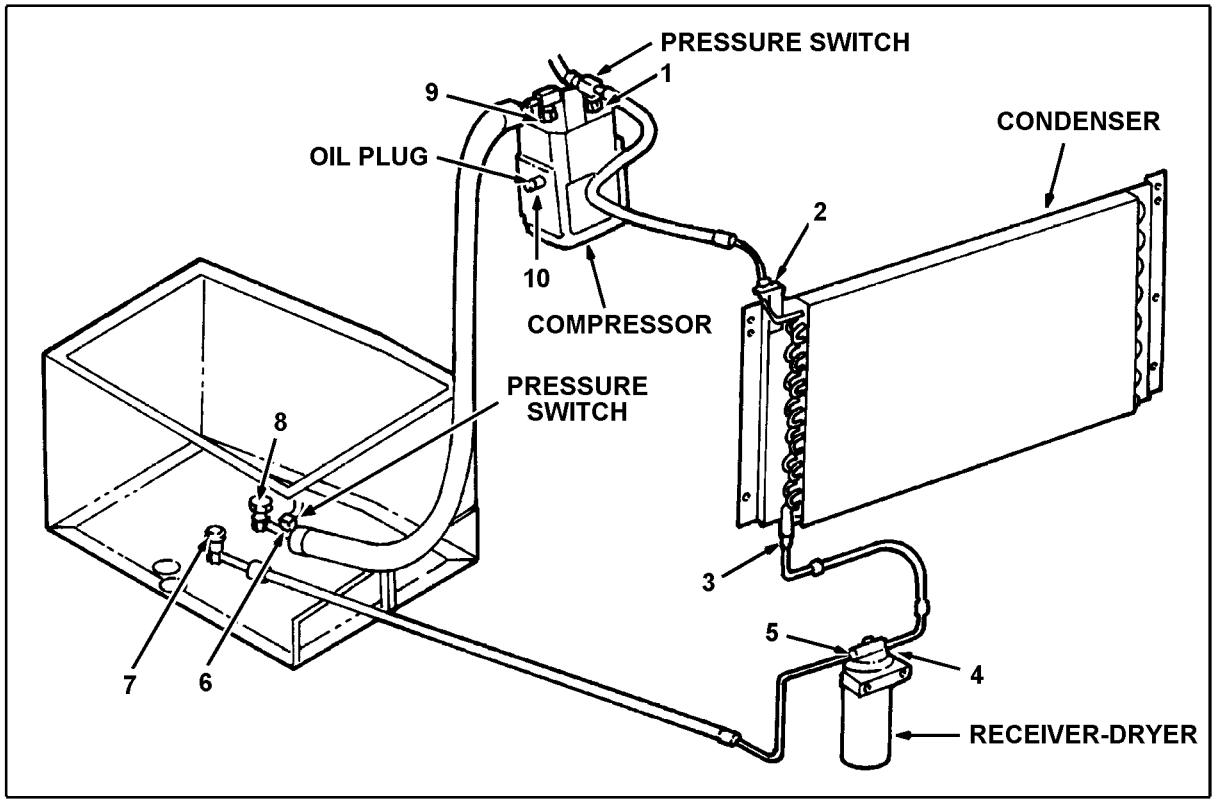

Figure 22 Torque Locations