

## VALIANT

### EVAPORATOR HEATER ASSEMBLY

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### GENERAL INFORMATION

The combination heater-air conditioner used on Valiant Models controls and directs airflow by opening and closing a series of doors. The blend air door, which controls the temperature of the heater output, is opened and closed by a bowden cable from the temperature control slide lever in the instrument panel. All the other doors, and the heater water flow valve are operated by vacuum actuators. A single blower serves both heater and air conditioner. In fact, all of the components in the blower motor circuit are common to the heater and air conditioner. Controls and cooling air outlets are integral with the instrument panel.

Three cooling air outlets are contained in one unit secured to the lower edge of the instrument panel. Each outlet can be adjusted independently to direct air up, down, or to either side. Two fixed openings in the distribution duct installed under the instrument panel direct cooling air to the floor.

Controls for the system consists of five push buttons, a temperature control slide lever and a fan blower switch.

**Push Buttons**—Control the source and route of circulating air. "Off" (turns off the entire system); "Max. A/C" (maximum air conditioning); "A/C" (fresh air air conditioning); "Heat" (for heater use only); "Def" (windshield defrosting).

**Temperature Control Slide Lever**—Maintains any desired temperature by sliding the lever right or left when operating either the heater or air conditioner and controls the automatic cycling of the refrigeration system.

**Fan Switch**—Permits selection of "Low," "Medium" or "High" blower speed. "Low" (far left), "Medium" (center) and "High" (far right) used when operating either the heater or air conditioner.

**Air Directional Vanes**—Located on the lower edge of the instrument panel. These are manually adjusted up, down, or to either side to deflect cool air to suit requirements of driver and passengers.

### VACUUM CONTROLS AND CIRCUITS

#### (Figs. 1 thru 4)

When testing or adjusting the doors in the distribution system, it is necessary to know the correct position of each door for each push-button position. In the illustrations which follow; air flow is indicated, also which vacuum actuator hoses are activated for each push-button position.

**Warm Weather Ventilation**—Two "summer" doors are provided, one below each end of the instrument panel. These doors can be opened manually for fresh air ventilation during warm weather. **Before using the air conditioner be sure both ventilation doors are closed and latched.**

#### OFF

When the heater-air conditioner is off, the fresh-air door is closed and the recirculating door is open. The air-conditioning door closes off the heater outlet duct and opens the passage to the evaporator coil, and the heater water flow valve is closed (Fig. 1).

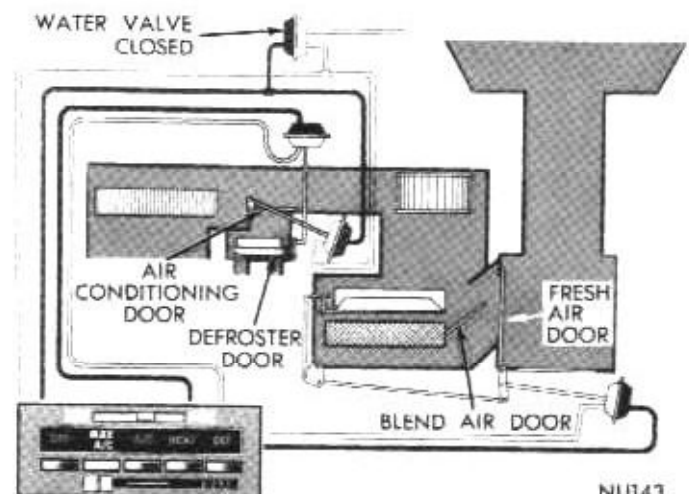


Fig. 1—Off Position Same As Max A/C

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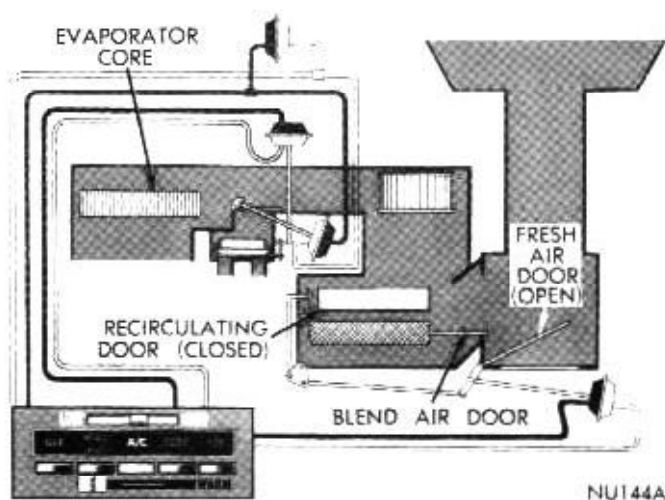


Fig. 2—A/C Position

### MAX A/C

With the "MAX A/C" button pushed in, all of the doors and the water valve are in the same position they are in when the "OFF" button is pushed. The "MAX A/C" push button merely closes the electrical circuits to the blower motor resistor block and the evaporator temperature control switch. The temperature control switch regulates the air-conditioning outlet air temperature, by engaging and disengaging the compressor clutch (Fig. 1).

### A/C

The "A/C" button re-routes fresh-air door vacuum to the rod side of the actuator. This opens the fresh-air door and operates the linkage to close the recirculating door. The recirculating door and the fresh-air door always operate simultaneously. Any time one of them is open, the other is always closed. All the other doors remain in the same position as for MAX A/C operation (Fig. 2).

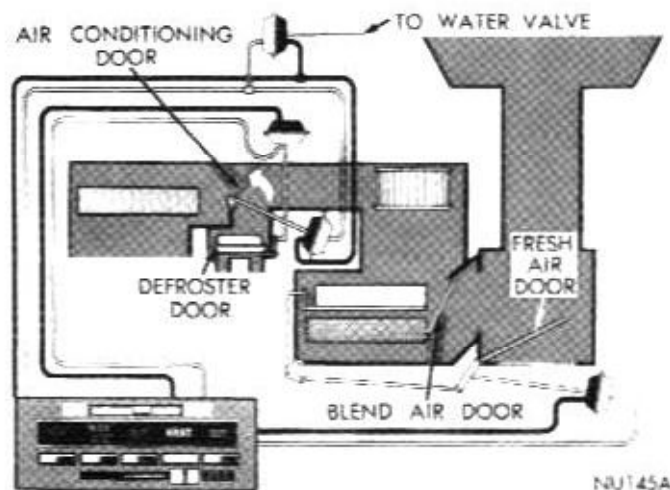


Fig. 3—Heat Position

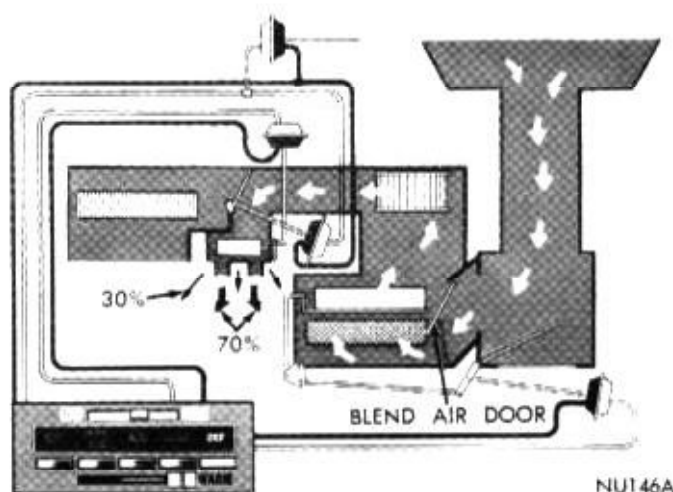


Fig. 4—Defrost Position

### HEAT

With the "HEAT" button in and the temperature control lever all the way to the right, the fresh-air door is opened to the cowl ventilation inlet. At the same time, the fresh-air door actuator closes the recirculating door. The blend air door is held closed by a bowden cable from the temperature control slide lever so all the airflow from the cowl passes through the heater core and into the blower (Fig. 3).

Vacuum is applied to the rod side of the air-conditioning door actuator, closing off the passage to the evaporator core, and opening the passage to the heater-defroster manifold. Since the heater-defroster door is raised, the full flow of heated air goes through the heater outlets, except for a small amount that bleeds off through the defroster outlets.

### DEFROST

When the defroster button is pushed, all conditions are the same as for heater operation, except that vacuum is now applied to the rod side of the defroster door actuator. The door moves away from the defroster outlets and partially closes off the heater outlets. The heater outlets are left open far enough to allow about 30 percent of the blower output to bleed off. The other 70 percent is defroster air (Fig. 4). The full range of temperature control is available during defroster operation, as are all three blower motor speeds.

### ELECTRICAL CONTROLS AND CIRCUITS

The system is controlled by the following switches:

- Push button switch (air conditioner and heater vacuum switch).
- Fan switch (air conditioner and heater blower switch).

(c) Temperature control switch (temperature control slide lever).

The power feed circuit is shown in Figure 5. A 20 ampere fuse in the fuse block protects the circuit.

The compressor clutch circuit is energized when either the "Max A/C," (maximum air conditioning) or the "A/C" (fresh air-air conditioning) push buttons are depressed. The "Off" button turns off the system.

### Blower Motor (Fan Switch)

The power feed line from the push-button switch to the blower switch is energized only when the ignition is on and any push button, other than "Off," is depressed.

The fan switch is controlled by moving the control lever from left "Low" to right "High."

### Temperature Control Switch

The temperature control switch controls the temperature of the evaporator by automatically cycling the compressor clutch. As the clutch is cycled on and off, the temperature of the evaporator is held at the setting of the temperature control lever.

## OPERATION OF ALL CONTROLS

Satisfactory performance of the combined air-

conditioning and heating system is dependent upon proper operation and adjustment of all operating controls, as well as proper functioning of all refrigeration system units. The inspections, tests and adjustments should be used to locate the cause of a malfunction. The tests in this manual have been arranged in a logical sequence that has proved to be the surest and shortest route to accurate diagnosis. It is recommended that they be followed and performed in the order in which they are presented.

- (1) Inspect, test, and adjust compressor drive belt.
- (2) Start engine and adjust engine speed to 1600 rpm for 6 cylinder and 1300 rpm for 8 cylinder engines. Use a reliable tachometer.
- (3) Move temperature control lever to "Off" position and push the "A/C" button.
- (4) The fresh air door should be open to fresh air. Open vehicle windows.
- (5) Test the blower operation at all three speed positions. If the blower does not operate correctly, refer to "Electrical Controls and Circuit." Leave the blower switch in the "High" (Hi) position.
- (6) The compressor should be running and the air conditioning system in operation.

### Push Button Operation

Reduce engine speed to normal idle. With engine

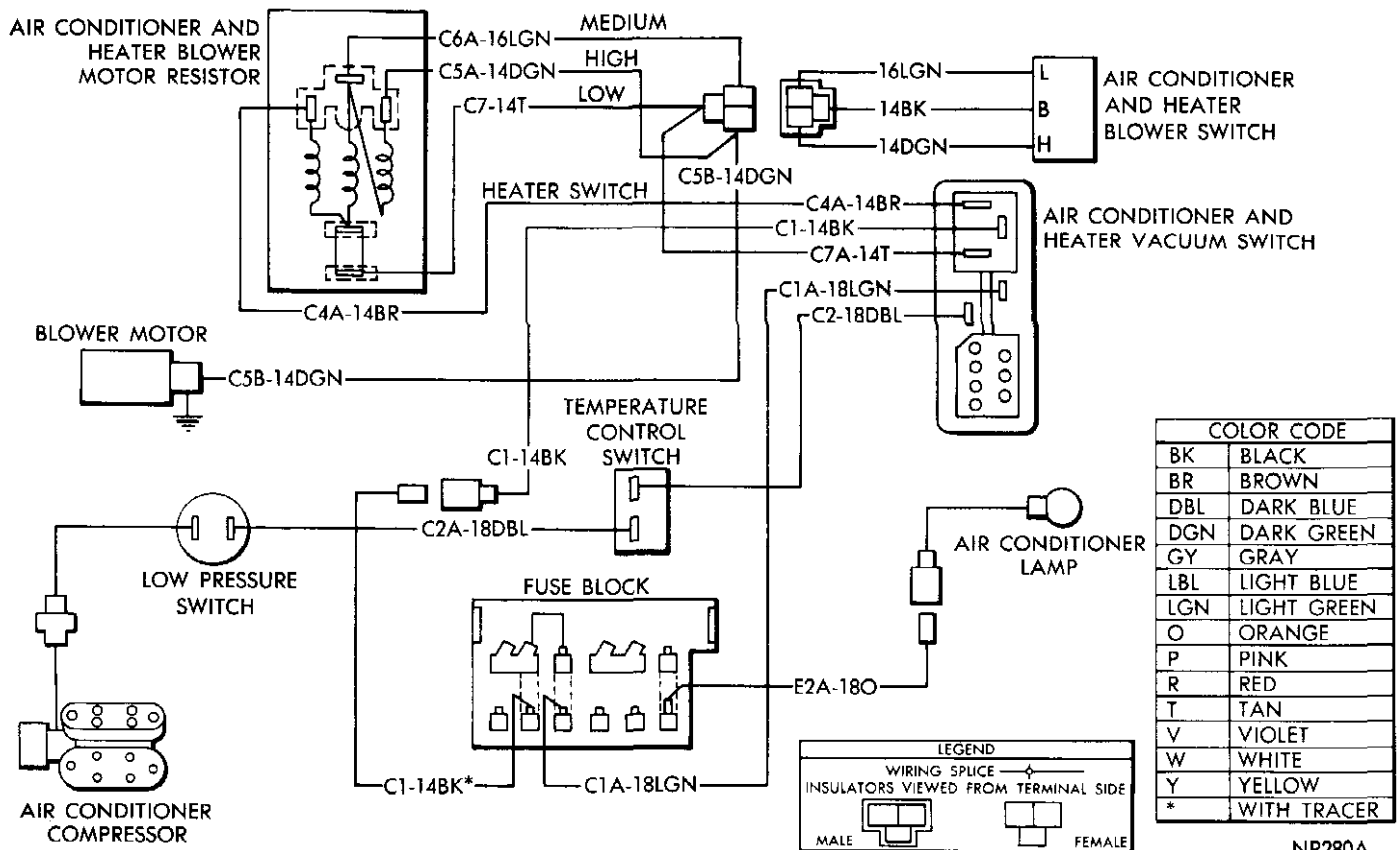


Fig. 5—Electrical Control Circuit (Valiant)

operating at idle speed, vacuum will be high and vacuum actuators should operate quickly.

If actuator operation is slow, check the source hose connection at engine manifold.

Push each button to test over-all operation of the electrical and vacuum controls.

The "Push Button Control Chart" summarizes the actions that should take place when each button is pushed. See "Chart." Also, refer to "Vacuum Controls and Circuits."

If all the controls operate in the proper sequence but the action of the dampers and doors is slow or incomplete, inspect for mechanical misalignment, binding or improper linkage adjustment.

### Water Temperature Control Valve Test (Fig. 6)

The water temperature control valve is mounted from the engine compartment side of the dash panel. The sensing unit is located at the right hand corner of the air conditioning housing.

Remove the radiator cap to minimize pressure in the vehicle's cooling system.

With the "MAX A/C" or "A/C" button pushed in, test water valve by momentarily disconnecting heater outlet hose. A slight spillage of water when the hose is removed is normal. A continuous flow of water indicates that the valve is not closing properly or the vacuum hoses are not properly connected.

If the temperature control valve does not close completely, replace the valve.

## EXPANSION VALVE "Valiant"

### Removal

The system must be completely discharged before

opening any of the refrigerant lines.

(1) Remove equalizer tube from evaporator suction line fitting (Fig. 7).

(2) Disconnect expansion valve from elbow assembly and liquid line. Use two wrenches to loosen each of these connections.

(3) Carefully pull out capillary sensing tube from well located in suction line. Remove rubber seal from capillary sensing tube. Inspect inlet screen.

### Installation

(1) With new "O" rings and clean refrigerant oil on all fittings, install the expansion valve to the liquid line and elbow assembly using two wrenches to prevent rotation and twisting of the lines.

(2) Connect equalizer tube to the fitting on the evaporator suction line.

(3) With a rubber seal on the capillary sensing tube, carefully install the tube in the well located in the suction line as far as it will go (approximately five inch depth).

(4) After expansion valve is installed, it must be completely tested. Then the system must be tested for leaks and recharged.

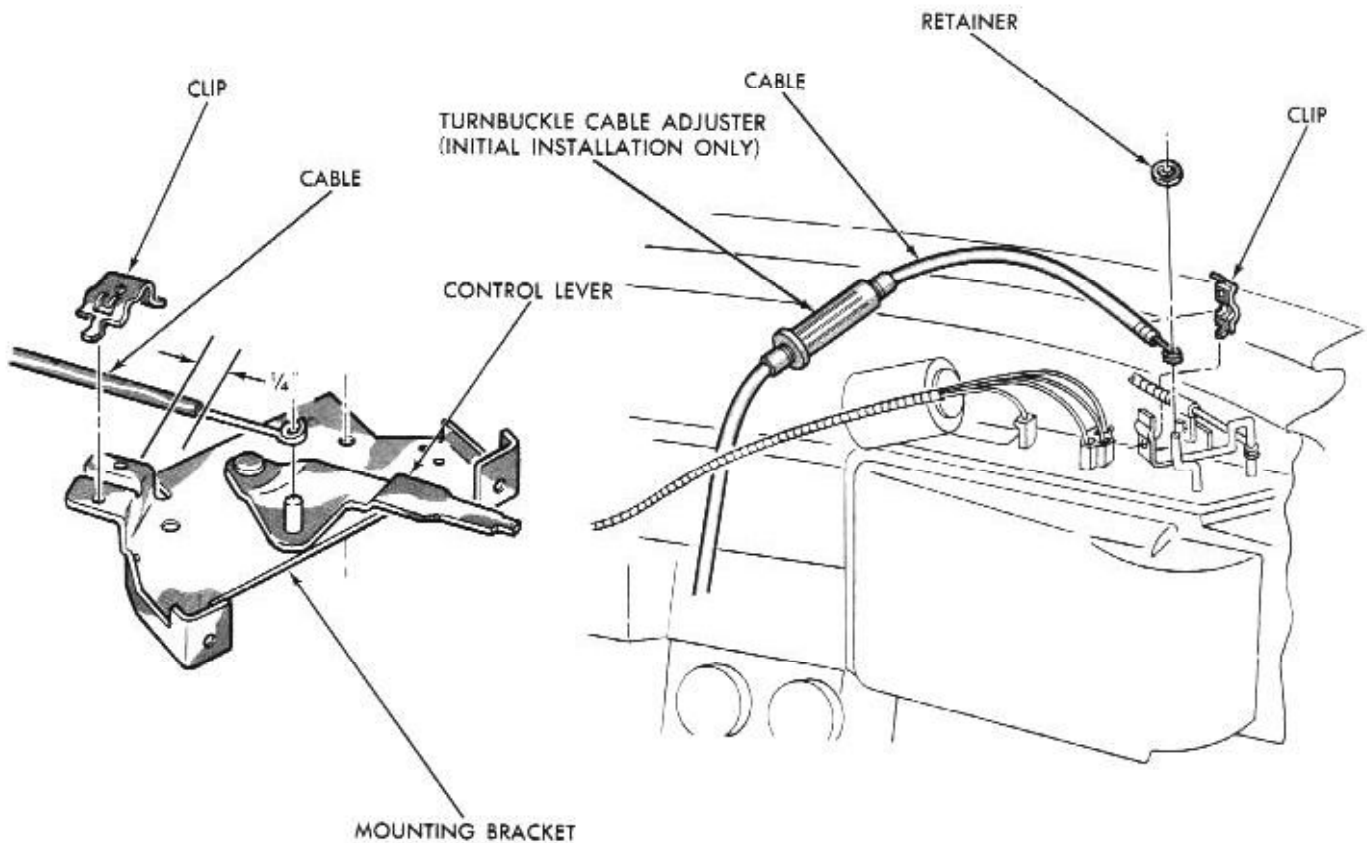
### Recirculating Door Linkage

To adjust the recirculation door, remove the glove box, push the "Max A/C" (Maximum Air Conditioning) button in. Vacuum will then be applied to the top of the fresh air recirculation actuator closing the fresh air door, opening the recirculating door (Fig. 8).

The top connecting rod has a turnbuckle nut and lock nut. The length of the rod can be adjusted by

**PUSH BUTTON CONTROL CHART—VALIANT**

Button	Off	Max. A/C	A/C	Heat	Defrost
Fresh Air Door	Closed	Closed	Open	Open	Open
Recirculating Door	Open	Open	Closed	Closed	Closed
Inlet Door	Open	Open	Open	Closed	Closed
Water Valve	Closed	Closed	Closed	Open	Open
Defroster Doors	Closed	Closed	Closed	Closed with Air Bleed	Open
Heater Door	Open	Open	Open	Open	Closed with Air Bleed
Blower Speed	Off	Hi.-Med. Low	Hi.-Med. Low	Hi.-Med. Low	Hi.-Med. Low
Compressor Clutch	Off	On	On	Off	Off



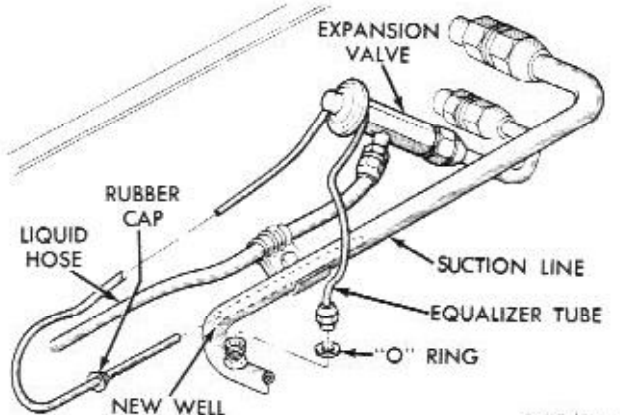
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**Fig. 6—Temperature Control Lever Adjustment (Valiant)**

using two 7/16 inch open-end wrenches. The recirculating door should be adjusted to give the **maximum** possible opening when the fresh air door is completely closed. Push in the "A/C" (Air Conditioning) button and inspect to see that the recirculating door has moved to its fully closed position. Install the glove box.

## HEATER CORE

The heater core is located behind a separate cover



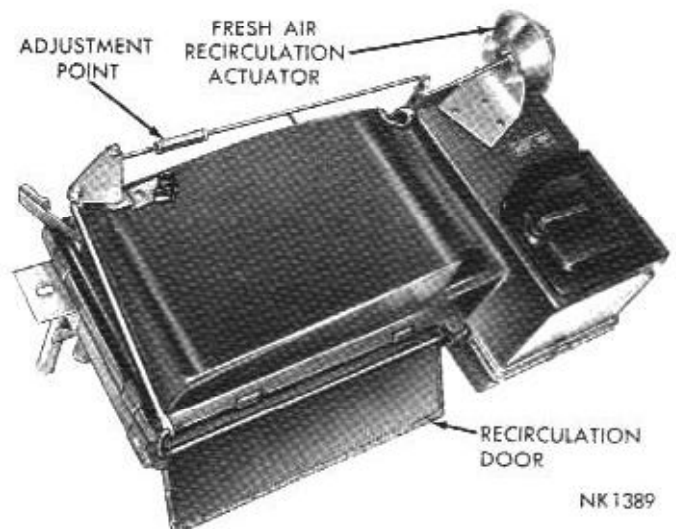
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**Fig. 7—Expansion Valve Details**

forward of the instrument panel. The core is held in position in its cover by four sheet metal attaching screws. The core and cover are removed and installed as an assembly.

## Removal (Figs. 9 and 10)

- (1) Disconnect battery and remove air cleaner.
- (2) Drain cooling system and remove heater hoses from the core.



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**Fig. 8—Recirculating Door Linkage**

(3) Remove air outlet assembly, glove box assembly and right defroster tubing.

(4) Disconnect electrical wires from resistor block, vacuum hoses from the fresh air-recirculating actuator, the temperature control cable, evaporator temperature control switch control cable and heater core ground wire.

(5) Remove the screw securing the heater assembly to the evaporator assembly (View A, Fig. 9).

(6) Disconnect heater housing support rod from the fresh air duct (Fig. 10).

(7) Remove heater assembly.

(8) Remove fresh air-recirculating door actuator.

(9) Remove operating link between bellcrank and recirculating door.

(10) Remove the fresh air inlet seal from either front or rear heater housing half only.

(11) Remove the retainer clips attaching the heater housing halves together and separate the heater housing halves.

(12) Remove the screws attaching the heater core to heater housing and remove the core.

### Installation

(1) Place a small bead of sealer in heater housing flange.

(2) Install heater core in the heater housing and secure the four attaching screws.

(3) Cement the weatherseal on the inner lip of heater core flange (Fig. 11).

(4) Place a small bead of sealer on heater housing cover.

(5) Position both housing halves together and install the eleven retainer spring clips. Remove any excess sealer.

(6) Cement fresh air inlet seal into position.

(7) Install operating link between bellcrank and recirculating door. Adjust if necessary. With recirculating door closed, fresh air door should be fully open.

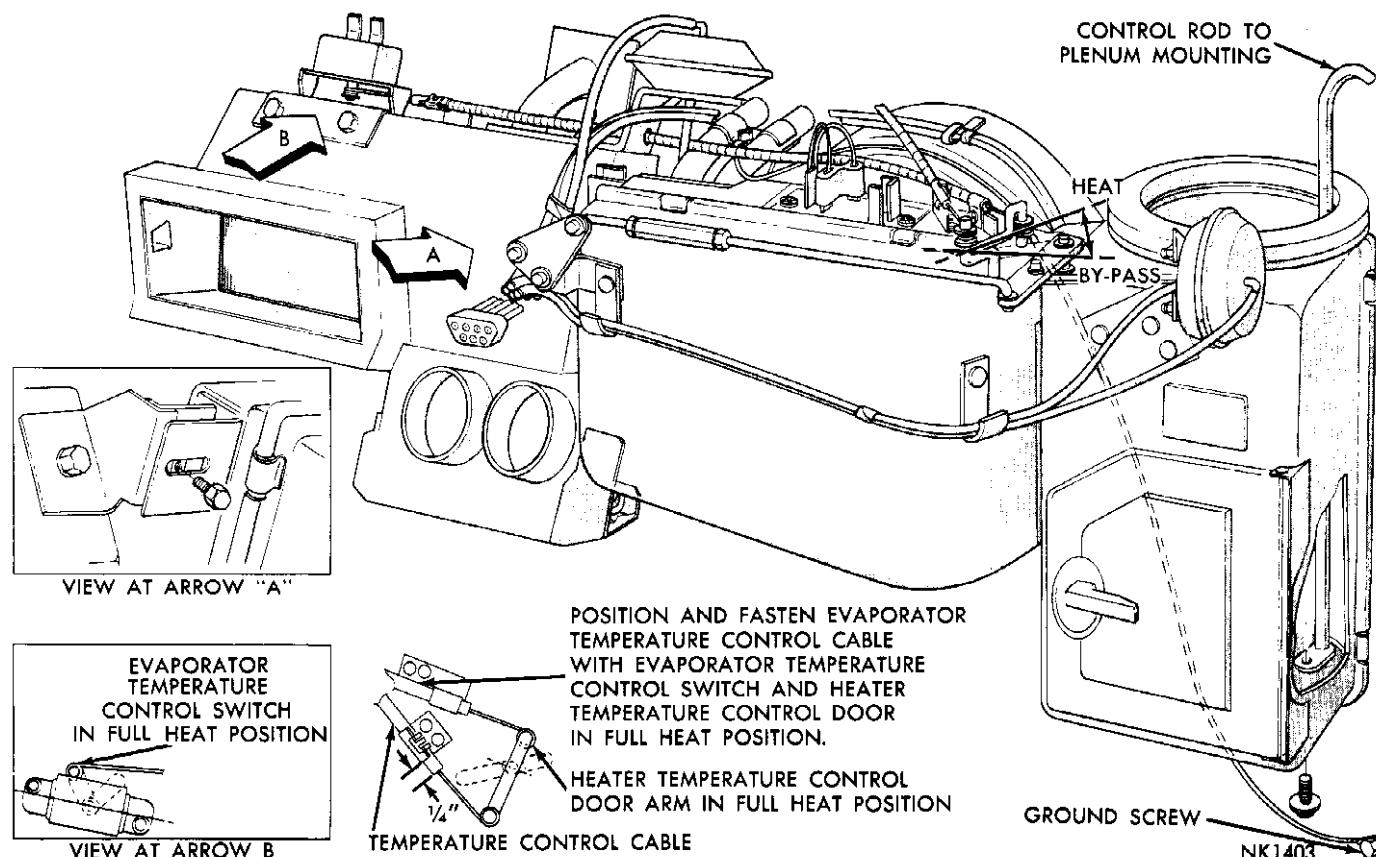
(8) Install fresh air recirculating actuator.

(9) Position heater assembly in the vehicle and proceed as follows:

(a) Install temperature control cable on outer operating arm in full heat position with end of cable housing 1/4 inch beyond edge of retainer clip (Fig. 9).

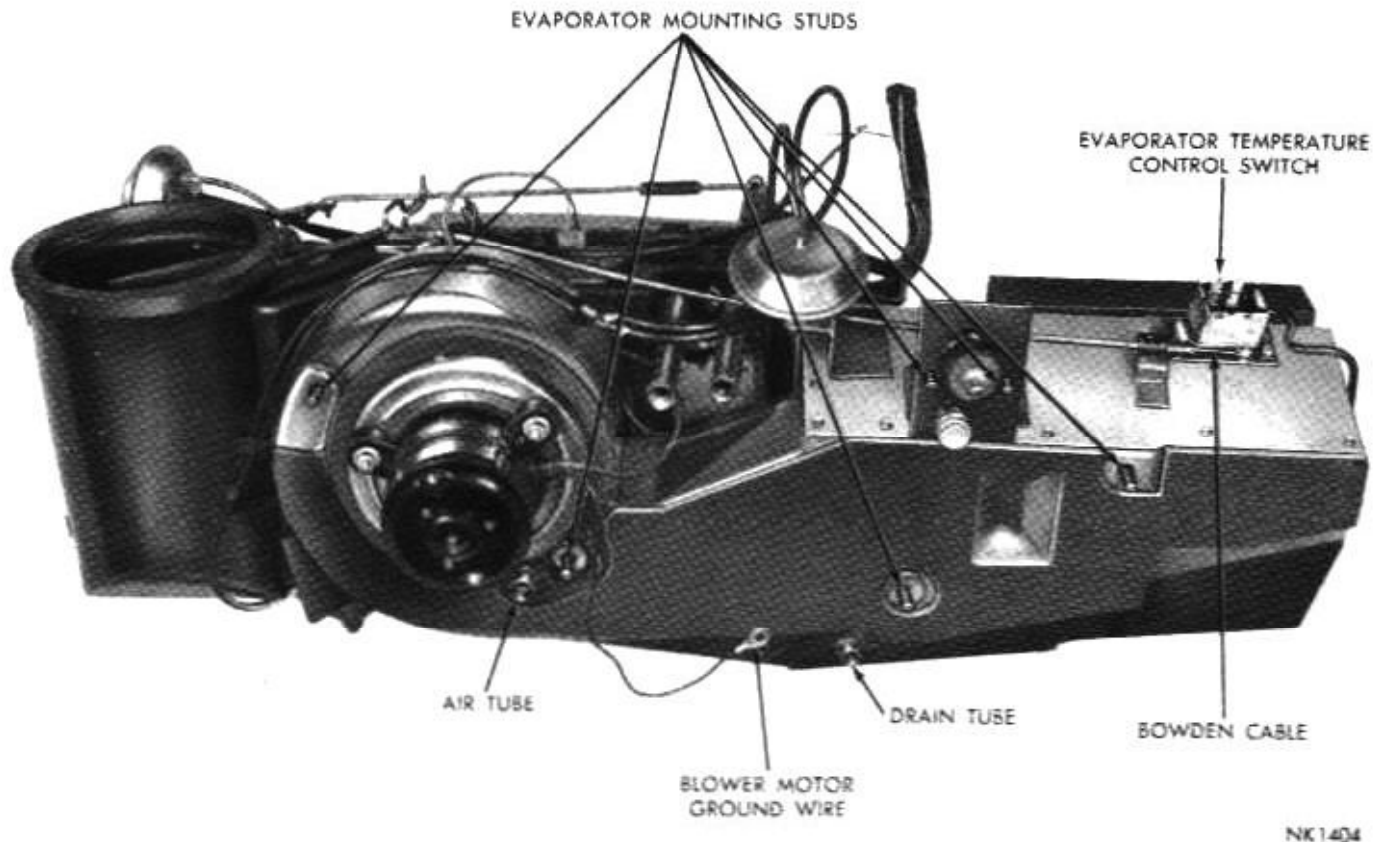
(b) Install the evaporator temperature control switch cable on the inner operating arm in full heat position with the end of the cable housing 1/4 inch beyond the edge of the cable clip.

(10) Position heater assembly on dash panel and secure heater support rod to the fresh air duct and the screw to the evaporator assembly.



**Fig. 9—Heater and Evaporator Assembly—Passenger Side—Typical**





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**Fig. 10—Heater and Evaporator Assembly—Engine Side—Typical**

(11) Install electrical wires to resistor block, vacuum hoses to fresh air-recirculating actuator (red stripe to rod side) and heater core ground wire.

(12) Install right defroster tubing, glove box assembly and air outlet assembly.

(13) Install heater hoses, (Figs. 12 and 13), fill cooling system, connect battery terminal and install air cleaner.

(14) Start engine, operate until normal engine operating temperature is obtained and test operation of heater assembly.

prevent entrance of dirt and moisture.

(2) Disconnect blower motor wires and air tube.

(3) Disconnect actuator hoses.

(4) Remove mounting stud nuts and remove evaporator assembly with blower motor as a single unit (Fig. 14).

(5) Remove defroster actuator, evaporator temperature control switch, and carefully withdraw the capillary sensing tube.

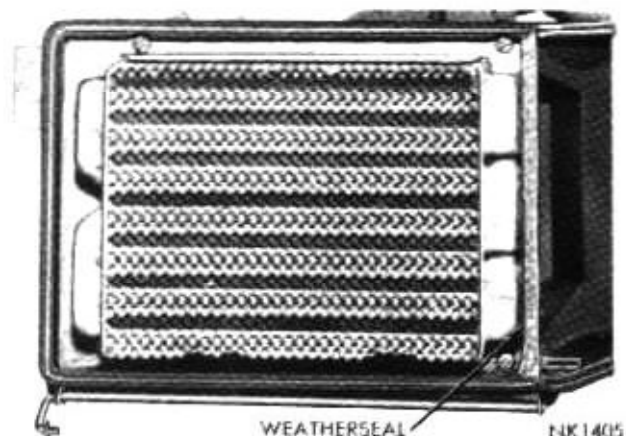
(6) Remove the weatherseal around the air outlet opening, and remove cover screws and cover.

## EVAPORATOR

The evaporator assembly includes the evaporator core, the evaporator housing with the evaporator inlet and defroster doors. To remove the evaporator assembly, it is necessary to remove the heater assembly. See "Heater Removal." The system must be completely discharged before opening any of the refrigerant lines.

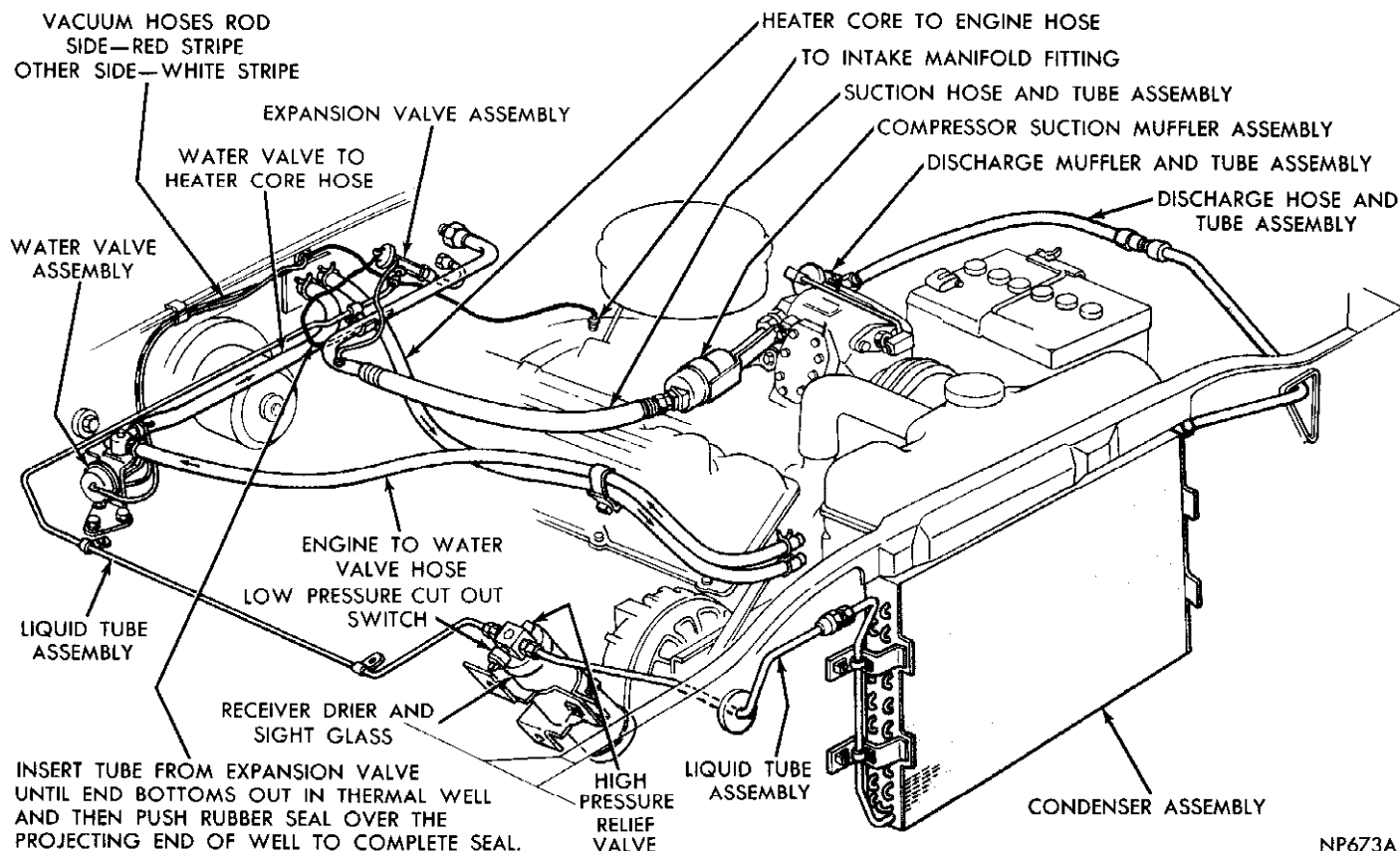
### Removal

(1) Disconnect elbow assembly and suction lines from evaporator. Use two wrenches to loosen each of these connections. Cap all the refrigerant openings to



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**Fig. 11—Weatherseal Positioned**



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**Fig. 12—Air Conditioning and Heater Plumbing (Valiant) 198 and 225 Cu. In. Engine**

(7) Remove the attaching stud nuts and remove evaporator from case (Fig. 15).

### Installation

(1) Position evaporator in the case and secure with attaching stud nuts.

(2) Place a small bead of sealer on case flange, install case cover and secure the attaching screws. Remove any excess sealer.

(3) Carefully install capillary sensing tube through the case into the evaporator **to the full depth**. Position evaporator temperature control switch and secure with attaching screws (Fig. 16).

(4) Install defroster actuator and cement the weatherseal around air outlet opening.

(5) Position evaporator assembly on the dash panel and install the stud nuts that attach the assembly to dash panel.

(6) Install blower motor wires and air tube. suction line. Use two wrenches to prevent rotation

(7) Use new "O" rings with clean refrigerant oil on all connections, install the inlet elbow assembly and twisting of the lines.

(8) Install actuator hoses (hose with red stripe to rod side).

(9) Install heater as described in "Heater Installation."

(10) After the evaporator and heater assemblies are installed in the vehicle, it will be necessary to sweep the system, test for leaks and charge the system with the proper amount of refrigerant. It is recommended that the operation of all controls be tested and an overall performance test be made after the repair or replacement of the evaporator assembly.

### BLOWER MOTOR

#### "Valiant"

All service to the blower motor is made from the engine compartment side.

#### Removal

(1) Disconnect feed wire at connector and ground wire. Remove air tube.

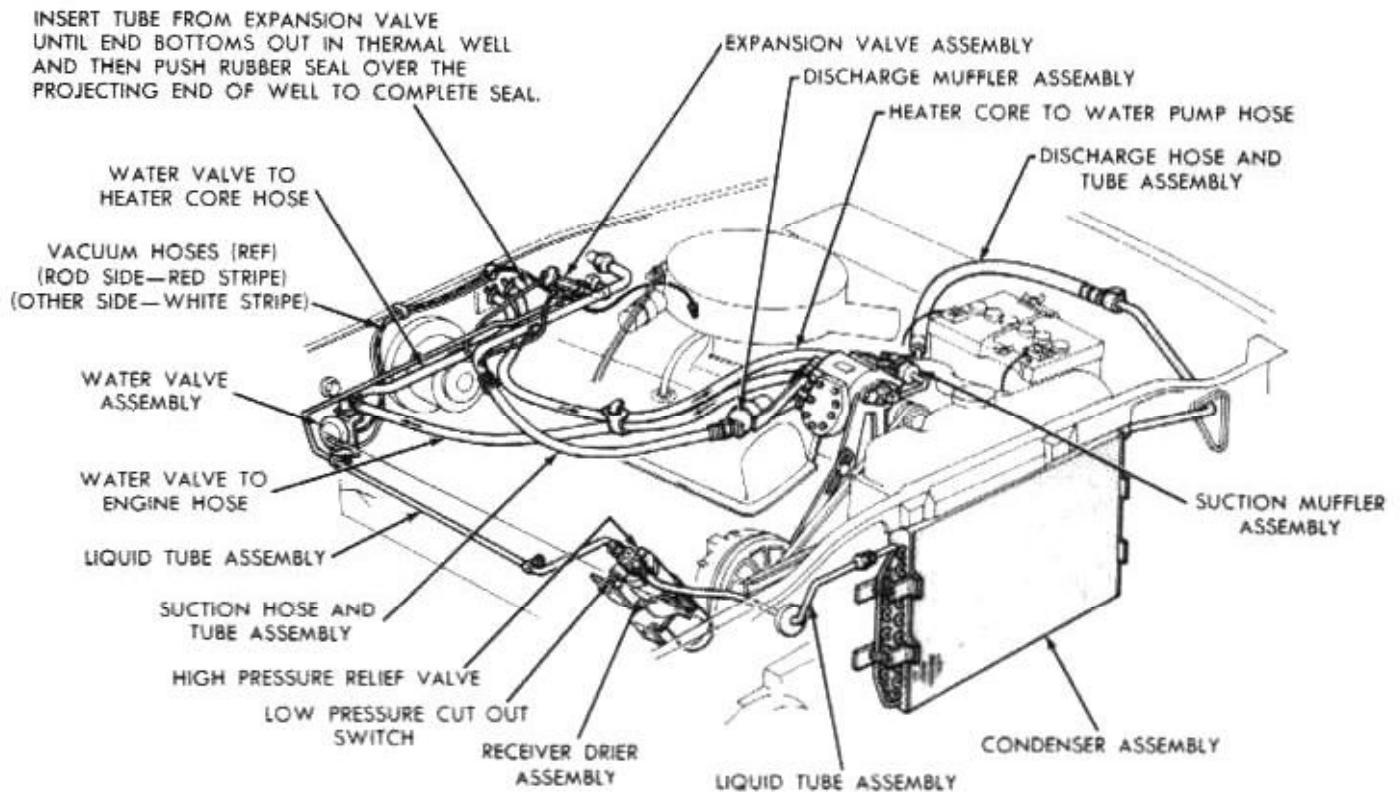
(2) Remove the three sheet metal screws located on the outer surface of mounting plate.

(3) Remove mounting plate, blower motor and fan as an assembly.

#### Installation

If the blower was removed from the mounting plate, be sure the mounting grommets are installed at the attaching bolts. Be sure the blower wheel is free and does not rub.

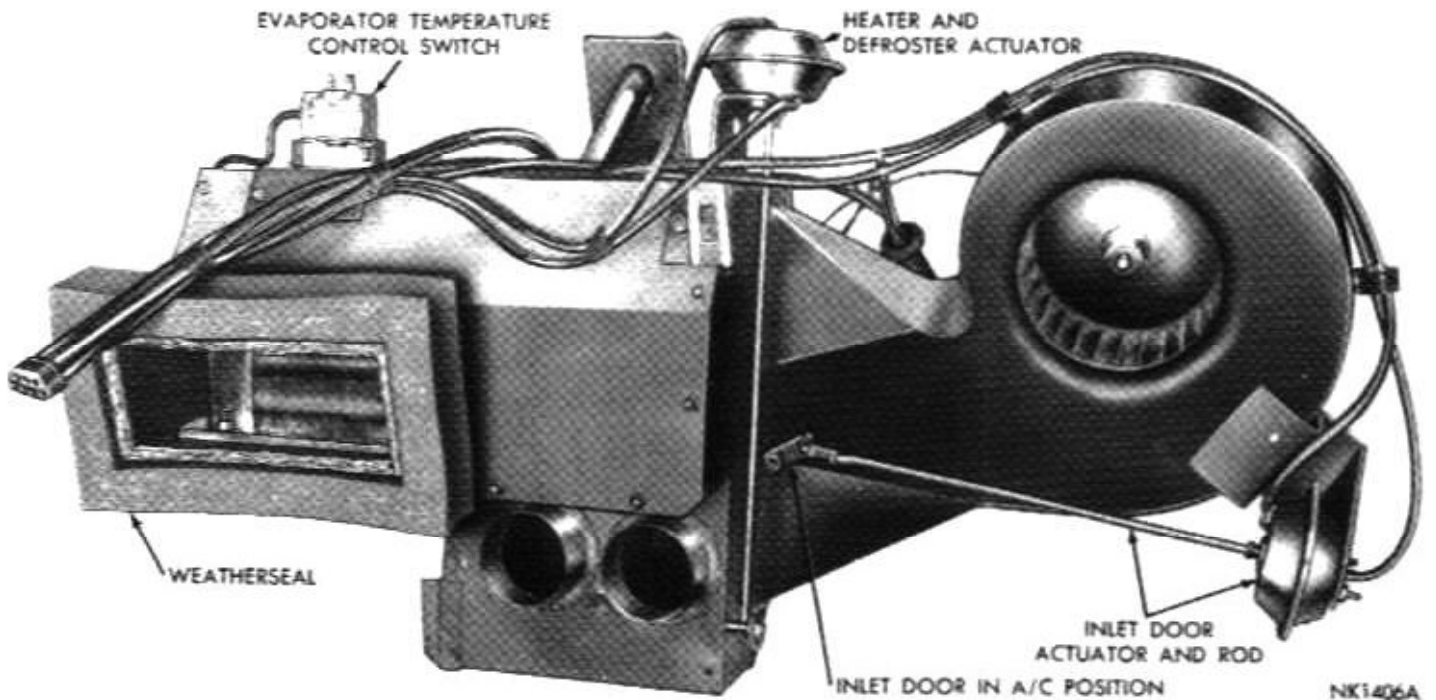




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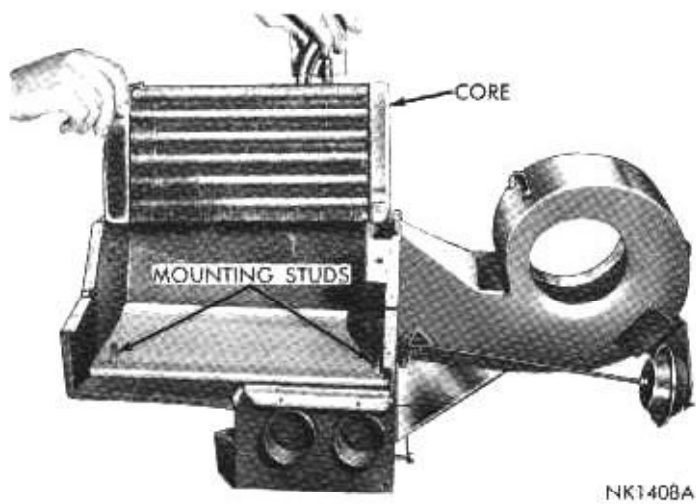
**Fig. 13—Air Conditioning and Heater Plumbing (Valiant) 318 Cu. In. Engine**

- (1) Install blower motor assembly to the evaporator case with air tube opening to the bottom. Secure with the three sheet metal screws.
- (2) Install air tube, motor ground wire and connect the feed wire.
- (3) Test operation of blower motor.

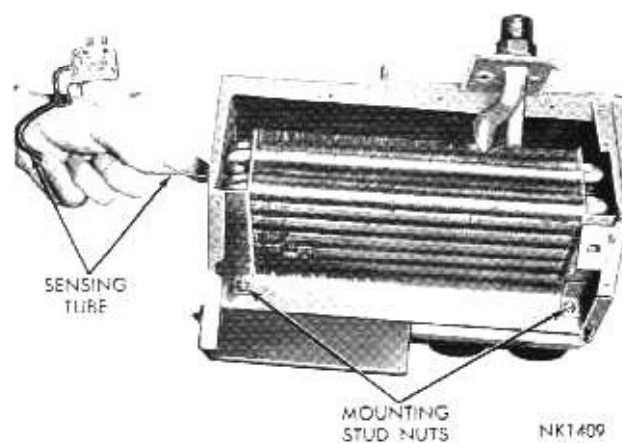


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**Fig. 14—Evaporator Assembly Removed—Typical**



**Fig. 15—Removing Evaporator Core—Typical**



**Fig. 16—Installing Capillary Sensing Tube**