SECTION B

HEATER - AIR CONDITIONER SYSTEM
43-44000 SERIES

CONTENTS

DIVISION I

TROUBLE DIAGNOSIS

13-30 TROUBLE DIAGNOSIS GUIDE

Pre-Conditions

FAN switch - "OFF"; TEMPERATURE lever - to extreme left.

SELECTOR switch - "REC"; engine idling.

Move FAN switch to 1st detent.

Changes That Should Take Place in the System

Master vacuum switch will open and apply vacuum to recirculate port of outside-recirculate diaphragm. Outside-recirculate air door will open 1/4 of complete travel.

Possible Cause of Malfunctions

Kinked, plugged, or disconnected hose.

Outside - rec. door diaphragm defective.

Outside - rec. door sticking.

Master vacuum switch defective.

Defective vacuum storage tank.

Vacuum hoses on wrong ports on vacuum diaphragm.

Vacuum hoses incorrectly assembled to plug on vacuum switch.

Changes That Should Take Place in the System

The blower will operate at low blower speed and cold air will flow from air conditioner outlets.

Possible Cause of Malfunctions

Defective compressor clutch switch.

Defective resistor assembly.

Defective blower motor.

Brown wire not seated at blower switch connector.

Loose or broken wire.

Fuse

Defective heater blower switch.

NOTE: *If only one blower speed is available, regardless of switch position, it is likely resistor assembly coils are touching.*

NOTE: *If air flows from the heater outlets, a loss of vacuum will cause air to flow out heater, or flows from both the heater and the A/C outlets, it is possible that the spring which holds the door in position is broken.*

Changes That Should Take Place in the System

The compressor clutch will engage.

Possible Cause of Malfunctions

Defective compressor clutch switch.

Loose or broken wire.

Brown wire not seated at blower switch connector.

Defective compressor clutch coil.

Compressor clutch ground wire broken.

Engine harness connector disc or missed prong.

Connector loose at compressor coil.

NOTE: *If neither the blower motor nor the compressor can be actuated, check the fuse and the blower switch.*

Move the FAN Switch Through 2nd, 3rd, and 4th Detents

Changes That Should Take Place in the System

Blower will increase speed to low, medium, and high.

Possible Cause of Malfunctions

Defective blower resistor assembly.

Missed prong at resistor or switch.

Heater resistor connector under dash disconnected.

Defective blower switch.

NOTE: *If no high blower speed, check A/C relay.*

Move SELECTOR Switch to A/C

Changes That Should Take Place in the System

Vacuum will be applied to outside air port of out side-rec. diaphragm, thereby fully opening door and decreasing air noise level in the car.

Possible Cause of Malfunctions

Kinked hose.

Outside - rec. door diaphragm defective.

Outside - rec. door sticking.

No vacuum to diaphragm.

Move SELECTOR Switch to VENT

Changes That Should Take Place in the System

Compressor clutch will disengage.

Possible Cause of Malfunctions

SELECTOR switch defective.

Move SELECTOR Switch to DEICE

Changes That Should Take Place in the System

Air will be directed to defroster outlets.

Possible Cause of Malfunctions

SELECTOR switch defective. No vacuum to diaphragm.

Defroster door diaphragm defective.

Move SELECTOR Switch to HEAT

Changes That Should Take Place in the System

Vacuum will be applied to heater - A/C diaphragm and door will reposition, directing air out of heater outlets.

Possible Cause of Malfunctions

Defective wiring.

Kinked or pinched hoses.

Heater - A/C Mode door defective.

Sticking heater - A/C Mode door.

Move TEMPERATURE Lever to Extreme Right

Changes That Should Take Place in the System

Vacuum will be applied to diaphragm of water valve and open valve, permitting coolant to circulate through heater core. Warm air will flow from under outlets.

Possible Cause of Malfunctions

Kinked vacuum hoses.

Defective water valve vacuum switch.

Incorrect vacuum hose connection.

Kinked water hoses.

Defective water valve.

Plugged heater core.

Plugged or defective water pump.

DIVISION II

DESCRIPTION AND OPERATION

13-31 GENERAL DESCRIPTION OF SYSTEM

The heater-air conditioner system is a series type in which the cooling unit and heating unit are so arranged that the air flows through both units. With an arrangement of this type it is possible to simultaneously control both the air conditioning and heating of the air in the car. Thus the air may be cooled, heated or both cooled and reheated.

The following description of the heater-air conditioner system is divided into four areas: (1) a description of the route air takes as it flows through the system during various modes of operation, (2) how the doors (which regulate the flow of air) operate and the sequence in which they operate, (3) the theory behind obtaining hot air from the system, (4) the theory of how the system cools the air.

13-32 DESCRIPTION OF AIR FLOW THRU SYSTEM

The following description of the route the air takes as it flows thru the system during various modes of operation is divided into four parts; air flow during air conditioning mode of operation, air flow during heating mode, air flow during defrosting mode and air flow during simultaneous air conditioning and reheating modes of operation.

a. Air Flow During Air Conditioning Mode of Operation

During normal mode of operation of the air conditioner, the FAN switch (see Figure 13-89) is set at any of the four positions away from the "OFF" position. The TEMPERATURE lever will be positioned fully to the left. The SELECTOR switch will be positioned to "A/C".

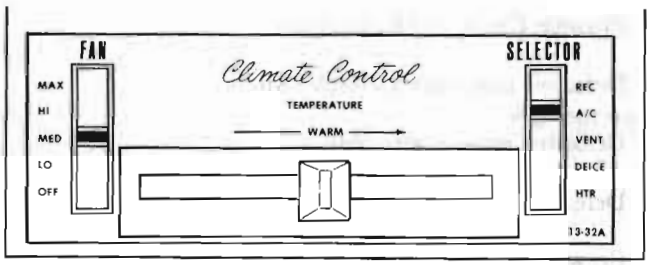

Figure 13-89 Instrument Panel Control Assembly

Under these conditions the air flows into the system thru the opening in front of the windshield into the plenum chamber. Moving of the FAN switch to one of the four positions away from the "OFF" position opens the main vacuum switch and applies vacuum to recirculated air port of the outside recirculated air door diaphragm causing it to partially open. Placing the SELECTOR switch in "A/C" position applies vacuum to outside air port of outside recirculated air door diaphragm. When vacuum is applied to both ports of the diaphragm the air door fully opens.

The air now flows from the plenum chamber into the blower air inlet assembly. From here the air flows to the evaporator-blower assembly. Because the TEMPERATURE lever is fully to the left, the temperature door is closed blocking air flow thru the heater core. Consequently the cooled air flows past the normally open heater-air conditioner mode door and out to the air conditioner outlets. The above described air flow also applies to "VENT" mode of operation, the only difference being that the compressor does not operate in "VENT".

During recirculate mode of operation the SELECTOR switch is in "REC" position. The air flow is the same as in "A/C" except that no vacuum is applied to outside air port of the outside recirculated air door diaphragm. The effect of this is to cause the air door to only partially open thereby causing the system to draw some of its air supply from inside the car. This has an added cooling effect because the already cooled air from inside the car can now be recirculated and further cooled.

b. Air Flow During Heater Mode of Operation

For operation of the heater portion of the system the controls are set as follows: FAN switch in one of four positions away from "OFF" position, TEMPERATURE lever positioned to "WARM", and SELECTOR switch positioned to "HTR". The FAN switch, being away from the "OFF" position, permits vacuum to flow to the recirculated air port of the outside-recirculated diaphragm

thereby causing the air door to partially open. The SELECTOR switch being positioned to "HTR" position permits vacuum to flow to the outside air port of the outside-recirculated air door diaphragm thereby causing the air door to open to its full extent. In addition vacuum is also applied to the heater-air conditioner mode door diaphragm, and the vacuum vents. The effect of this is that the diaphragm pulls its related air door closed.

The outside air flows as before into the plenum chamber, down into the blower and air inlet assembly thru the evaporator core, and then into the heater assembly. At this point the air flow divides (according to the opening of the temperature door) and some of it flows thru the heater core and then remixes with the non-heated air. Because the heater- air conditioner mode door is closed, air flow to the air conditioner outlets is blocked and air is thereby forced out the heater outlets.

c. Air Flow For Defroster Mode of Operation

The air flow and position of the controls is very similar to the conditions of the system during heater mode of operation with the exception that the SELECTOR switch is now positioned as required to "DEICE". This has the effect of tilting the defroster door to direct most of the air to the defroster outlets. The position of the defroster door is controlled by a vacuum diaphragm.

d. Air Flow For Both Air Conditioning and Heater Mode of Operation

When both the air conditioner and the heater are operated simultaneously to cool, dry and then reheat the air, the controls are set as follows: FAN switch in one of four positions away from "OFF" position, TEMPERATURE lever positioned as desired toward "WARM", and SELECTOR switch positioned to "A/C". The effect of this setting of the controls will be to position the air doors to allow air flow through both evaporator and heater core.

The air flow is from the plenum chamber, into the blower and air inlet assembly, and then thru the evaporator core. The air at this point divides according to the opening of the temperature door and some of it flows thru the hot heater core. Then the heated air remixes with the cooled air and is channeled to the air conditioner outlets. Vacuum is applied to both ports of the outside-recirculated air door diaphragm to cause the air door to fully open permitting only outside (no recirculated) air into the system.

13-33 OPERATION OF INSTRUMENT PANEL CONTROLS

All the controls for regulation of the heater- air conditioner system are located on the instrument panel control assembly. See Figure 13-89. They operate the system as follows:

a. FAN Switch

FAN This switch operates the heater-air conditioner blower motor. When this switch is moved from one extreme to the other, four positions will be felt. Moving from "OFF", the 1st detent will provide low blower speed. The second, third and fourth detents respectively provide medium, high and maximum blower speeds.
The FAN switch is mechanically linked to the master vacuum switch. Whenever the FAN switch is away from the "OFF" position, vacuum is applied to recirculated port of the outside-recirculated air door diaphragm via this vacuum switch and the door is partially opened.

b. TEMPERATURE Lever

When this lever is positioned fully to left, no vacuum is applied to the diaphragm of the water valve. Movement of the lever to the right applies vacuum to the diaphragm of the water valve and coolant from the engine is circulated thru the heater core. In addition, movement of the lever to the right opens the temperature door via a control cable. Regardless of the position of the SELECTOR switch (REC, A/C, VENT, DEICE, or HTR) the air flow will be warmed in proportion to TEMPERATURE lever position.

c. SELECTOR Switch

This switch operates the outside-recirculated air door, the heater-air conditioner mode door, and the vacuum defroster door. In addition, the switch is mechanically linked to the compressor clutch switch. Movement of the switch actuates these components in the following sequence.

"REC" - In this position the compressor clutch switch is closed completing half the circuit to the compressor clutch (the fan switch must be away from "OFF" before the compressor clutch will be energized).

"A/C" - This position maintains the clutch compressor switch closed and applies vacuum to the outside air port of the outside-recirculated air door diaphragm. With vacuum applied to both ports of this vacuum diaphragm, (vacuum is also being applied by the FAN switch being on) the outside-recirculated air door opens completely thereby drawing on only outside air and blocking off the recirculated air supply.

"VENT" - In this position the compressor clutch control switch is open thereby disrupting half the electrical circuit of the compressor clutch. If the FAN switch was closed and the air conditioning system operating, the compressor would thus be shut off. Vacuum is maintained at both the outside air and recirculated air ports of the outside-recirculated air door diaphragm. The VENT position is provided to afford the driver with uncooled outside air from the air conditioner outlets.

"DEICE" - In this position the compressor clutch control switch is open thereby disrupting half the electrical circuit of the compressor clutch. In addition vacuum is applied to the heater-air conditioner mode door diaphragm and to the defroster door diaphram.

"HTR" - In this position the clutch control switch remains open and vacuum remains applied to both ports of

the outside-recirculated air door diaphragm. The door changes position and blocks off air flow to air conditioner outlets and directs air flow to heater outlets.

13-34 OPERATION OF HEATER PORTION OF SYSTEM

Engine heat is transmitted to the heater core by flow of coolant through the core. Coolant enters the lower port of the heater core and exits from the upper port. A vacuum-operated water valve, which is regulated by the position of the TEMPERATURE lever, controls the flow of coolant to the heater core. When the TEMPERATURE lever is fully to the left the water valve has no vacuum applied to it - hence is closed. When the TEMPERATURE lever is moved approximately 1/3 of the travel from the left, the water valve has vacuum applied to it permitting flow of coolant. The water valve will remain fully open for the remainder of the travel of the TEMPERATURE lever.

13-35 OPERATION OF AIR CONDITIONER PORTION OF SYSTEM

The state of the refrigerant at the inlet port of the compressor is a low pressure gas. The compressor compresses the gas into a high pressure, high temperature gas. Because of the increase in pressure, the heat in the gas has been concentrated and, therefore, is increased above the ambient (outside air) temperature. This heat in excess above the ambient temperature tends to dissipate itself. A condenser is utilized in the refrigeration circuit to provide a means whereby the heat of the refrigerant can be easily dissipated. The high pressure, high temperature (hot) gas flows through the condenser and is cooled and condensed to a high pressure liquid as it gives up its heat. From the condenser the high pressure liquid flows to the receiver-dehydrator and then to the expansion valve where the pressure is reduced and the liquid is allowed to expand in the evaporator. When the pressure is reduced, the refrigerant will successively transform itself from a high pressure liquid to a low pressure liquid and then to a low pressure gas. As the low pressure liquid expands and becomes a low pressure gas, it absorbs heat. To satisfy the refrigerant demand for heat, the air passing over the evaporator gives up heat to the evaporator and, in doing so, is cooled.

The low pressure gas returns to the inlet port of the compressor (the original starting point) where the cycle just described repeats itself. Although the foregoing description holds true in actual system operation, it should be qualified insofar as whenever the compressor is running, a portion of the refrigerant remains in a liquid state and, consequently, there is a certain amount of continuous liquid flow of refrigerant and oil throughout the system at all times during the refrigerating cycle.

DIVISION III

ADJUSTMENTS AND MINOR SERVICE

13-36 ADJUSTMENT OF TEMPERATURE LEVER AND TEMPERATURE DOOR

The control cable should be adjusted when the recommended equal springback is not obtained at both ends of lever travel. This adjustment should also be made when the air conditioner-heater assembly has been removed or when the temperature door does not properly regulate the mixing of, or blocking off of heated air.

To adjust, position the TEMPERATURE lever to extreme left and rotate the control cable adjuster nut until equal springback is obtained at both ends of lever travel. See Figure 13-95.

13-37 ADJUSTMENT OF OUTSIDE AIR INLET DOOR

The linkage between the outside air inlet door and the vacuum diaphragm on the air inlet and valve assembly may be adjusted to insure full closing of the air door.

To adjust, remove glove box or shroud side foundation. Remove vacuum hoses and loosen linkage and allow spring to close door fully, then resecure linkage, install hoses and install shroud side foundation.

DIVISION IV

REMOVAL AND INSTALLATION

13-38 REMOVAL AND INSTALLATION OF BLOWER MOTOR

a. Removal

1. Remove right front fender skirt.

NOTE: *Refer to Group 110.*

2. Remove one screw securing ground wire to motor and disconnect electrical connector from blower motor.

3. Remove five screws securing blower motor to evaporator housing and remove blower motor.

b. Installation

Install reverse of removal procedures.

13-39 REMOVAL AND INSTALLATION OF AIR CONDITIONER-HEATER ASSEMBLY, HEATER CORE, OR AIR DISTRIBUTOR DUCTS

a. Removal

1. Drain radiator and disconnect heater hoses from inlet and outlet pipes of heater core. Insert cork or rubber plugs in heater core inlet and outlet pipes.

2. Remove instrument panel cover with right side A/C outlet and hose attached. See Figure 13-97.

3. Remove center A/C duct, left A/C outlet duct, A/C distributor duct, and defroster assembly. See Figure 13-96.

4. Disconnect defroster and temperature control wires. See Figure 13-95.

5. Remove four nuts and two screws securing air condition heater assembly to dash and remove assembly.

13-40 REMOVAL AND INSTALLATION OF AIR CONDITIONER CONTROL ASSEMBLY

a. Removal

1. Remove left A/C outlet duct.

2. Disconnect light sockets, electrical and vacuum connections.

3. Loosen self-contained nuts on back of control assembly.

4. Move control assembly back out of instrument panel and remove Bowden cable. Remove control assembly.

b. Installation

1. Install control assembly reverse of removal procedure.

2. Adjust as necessary.

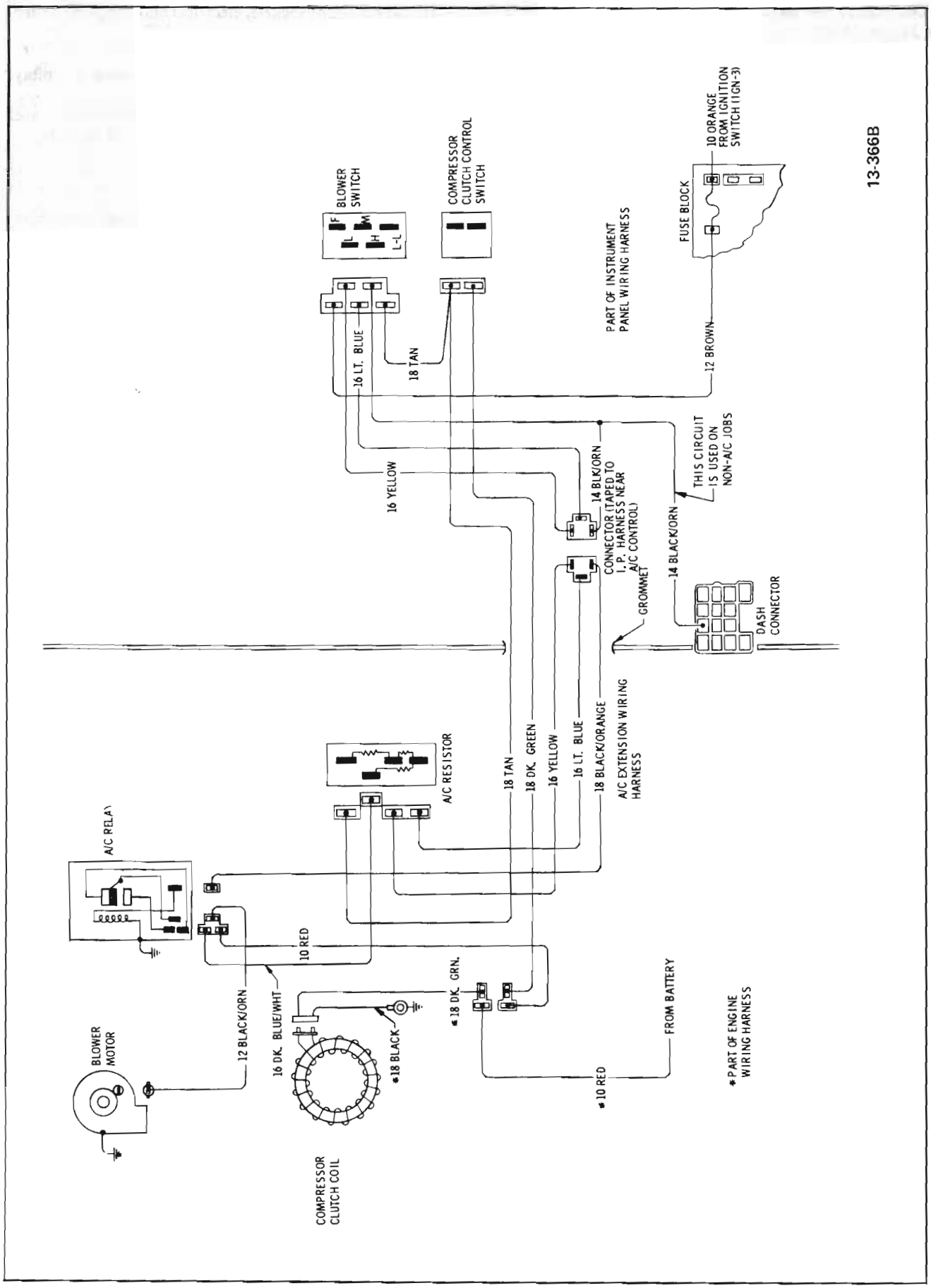

Figure 13-90 43-44000 Series Heater-Air Conditioner Wiring Diagrams

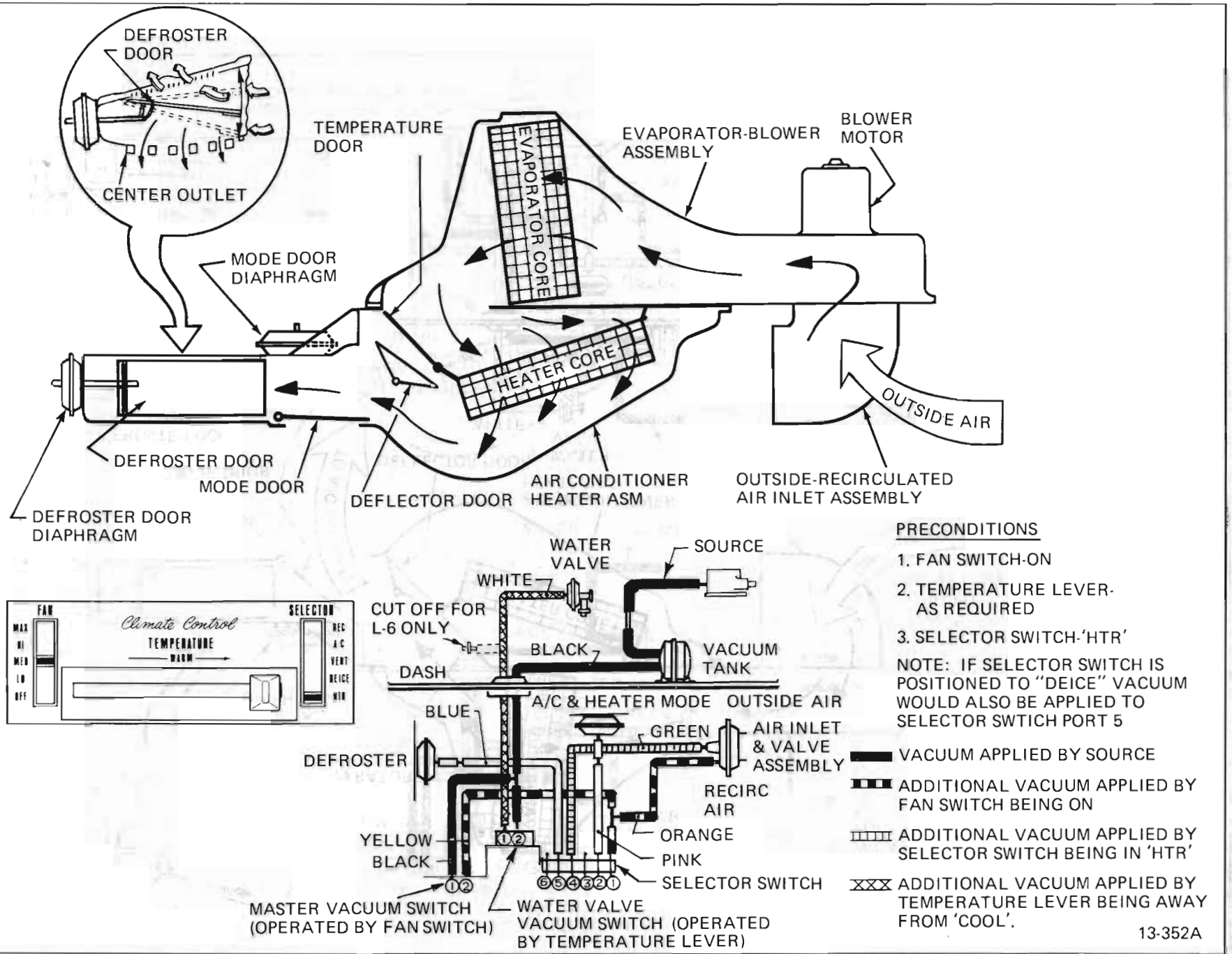

Figure 13-91 43-44000 Series Control Position, Vacuum Circuits, and Air Flow During HTR Mode

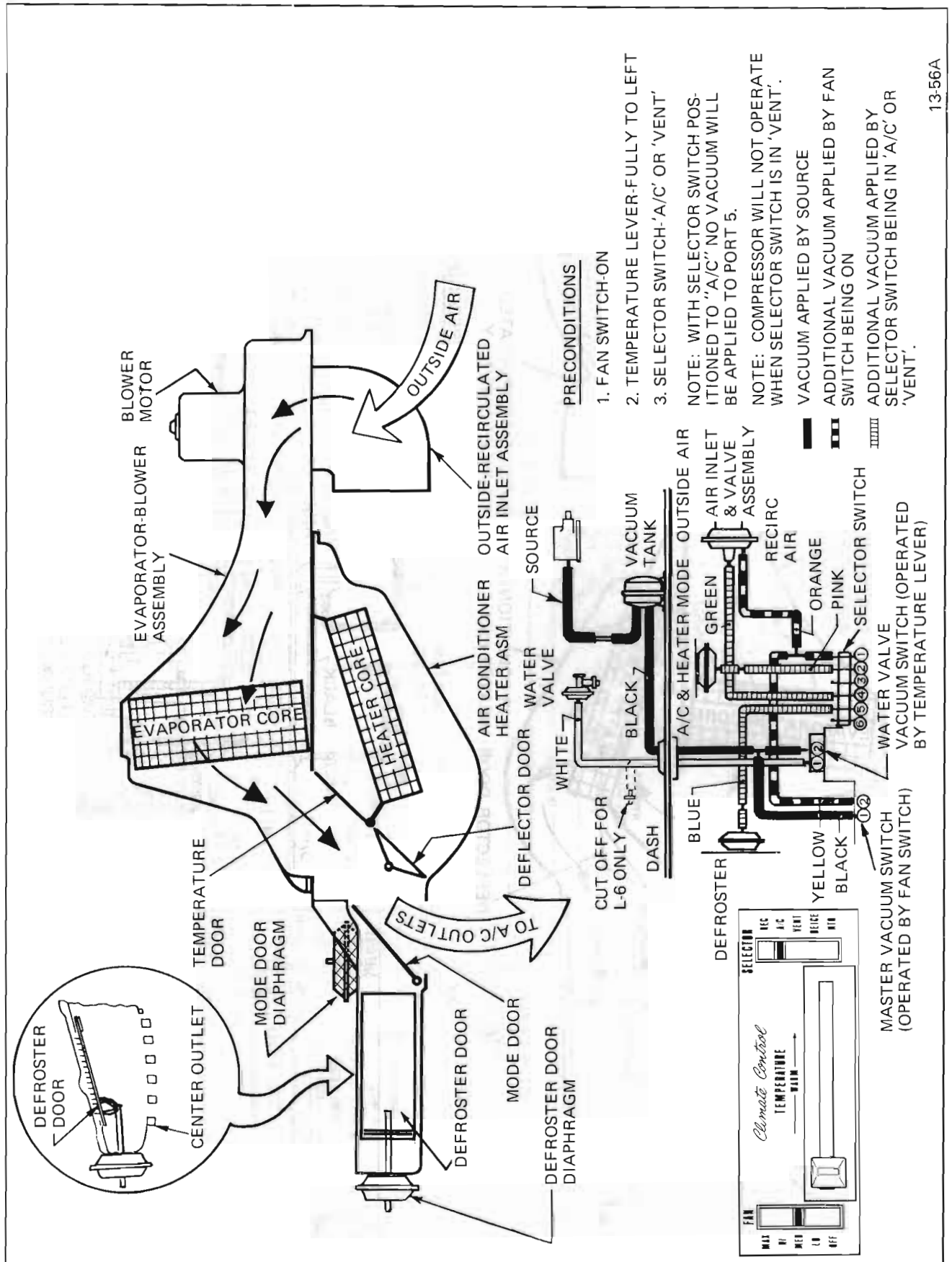

Figure 13-92 43-44000 Series Control Position, Vacuum Circuits, and Air Flow During VENT or A/C Mode

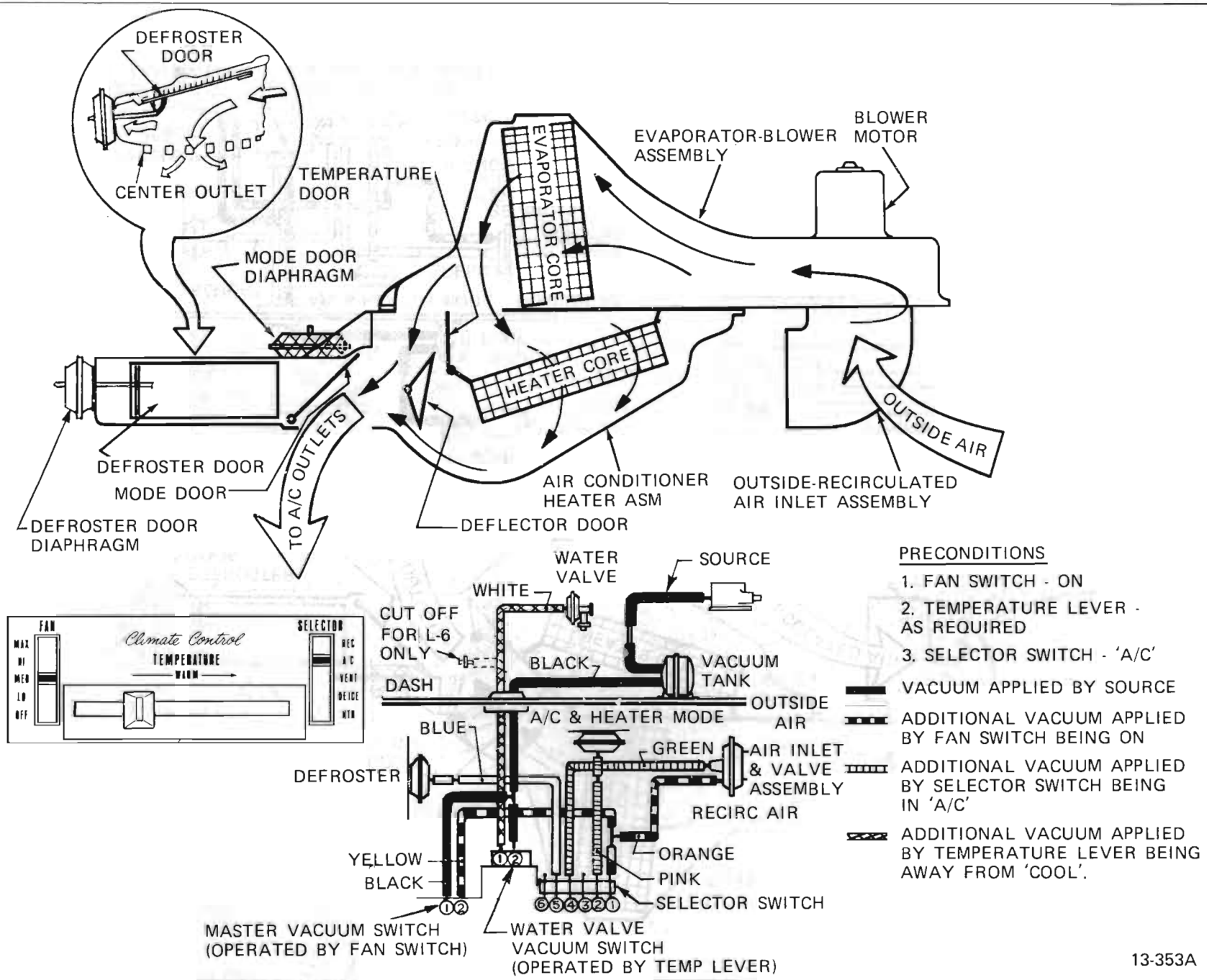

Figure 13-93 43-44000 Series Control Position, Vacuum Circuits, and Air Flow With Heater and Air Conditioner On

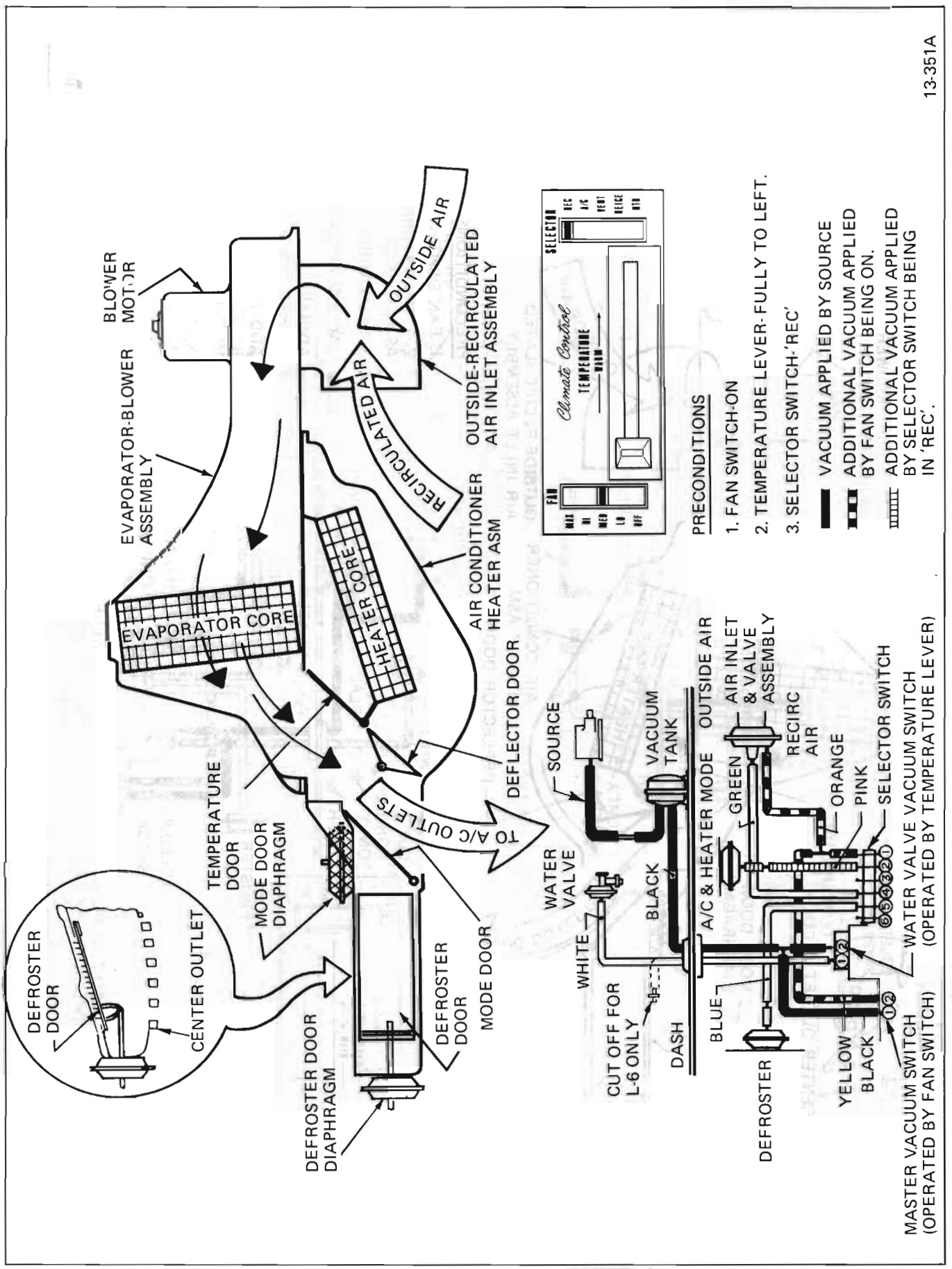

Figure 13-94 43-44000 Series Control Position, Vacuum Circuits, and Air Flow During REC Mode

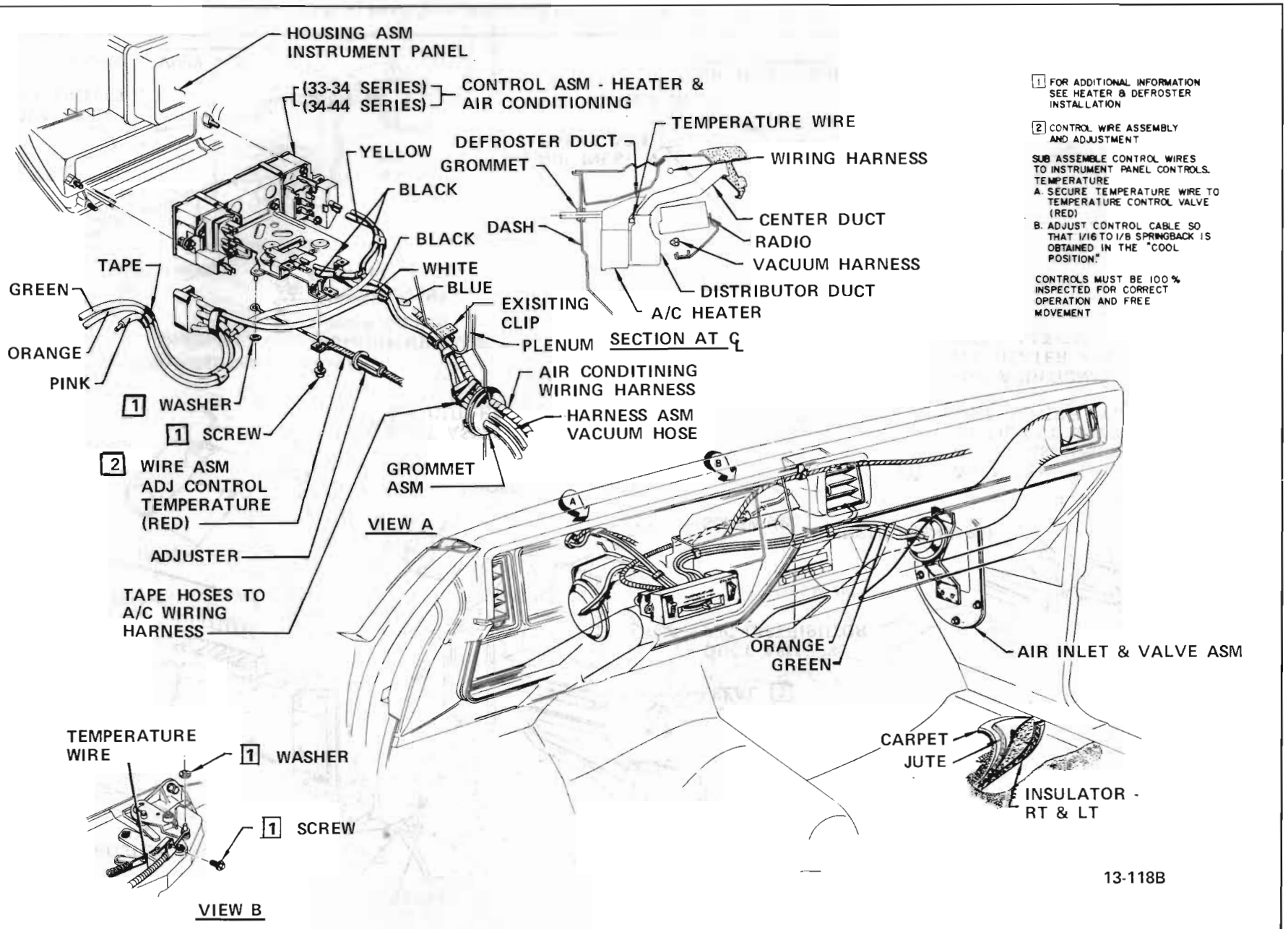

Figure 13-95 43-44000 Series Control Wire and Vacuum Hose Installation

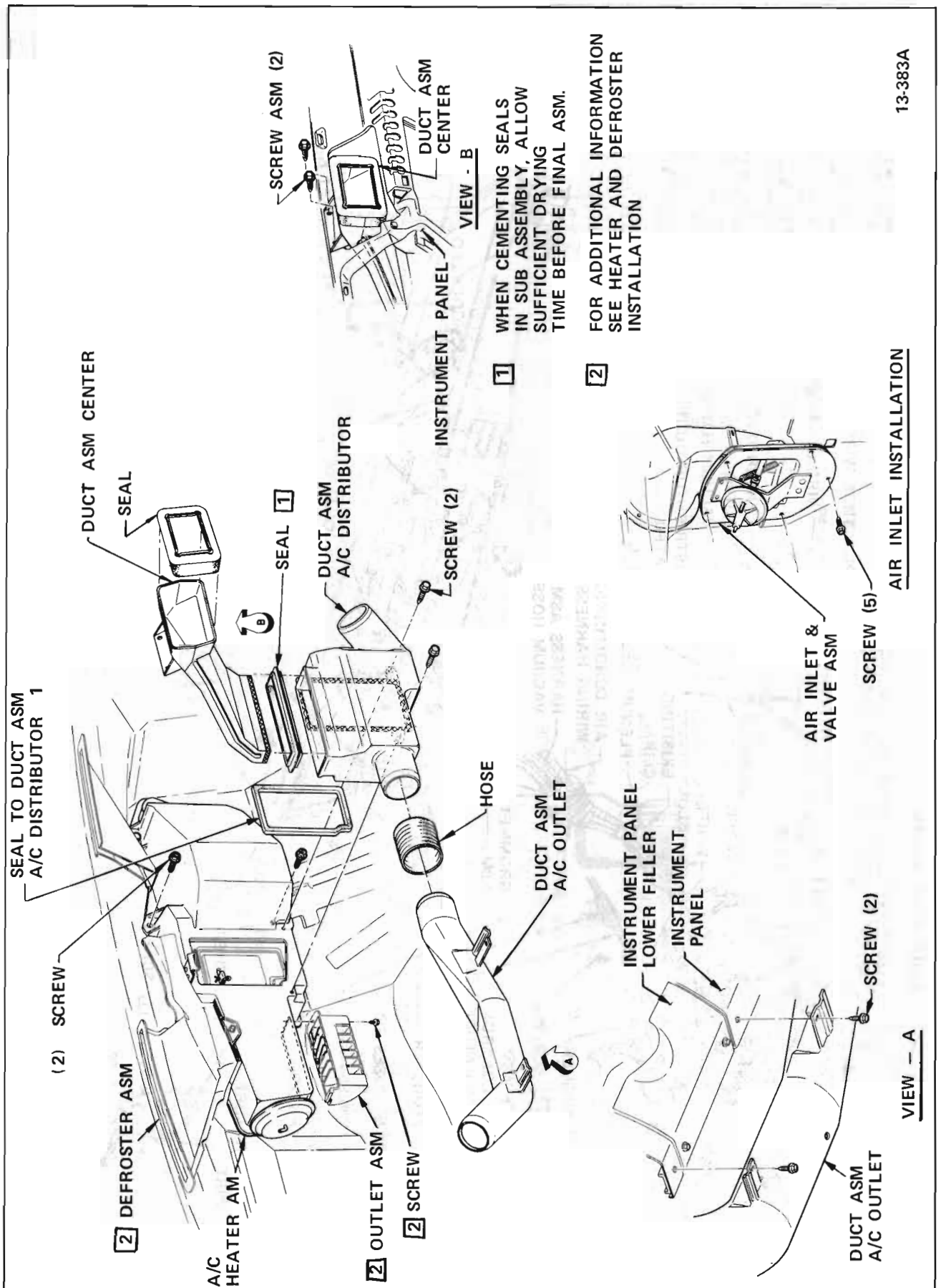

Figure 13-96 43-44000 Series Heater and Distribution Duct Assembly - Air Conditioning Installation

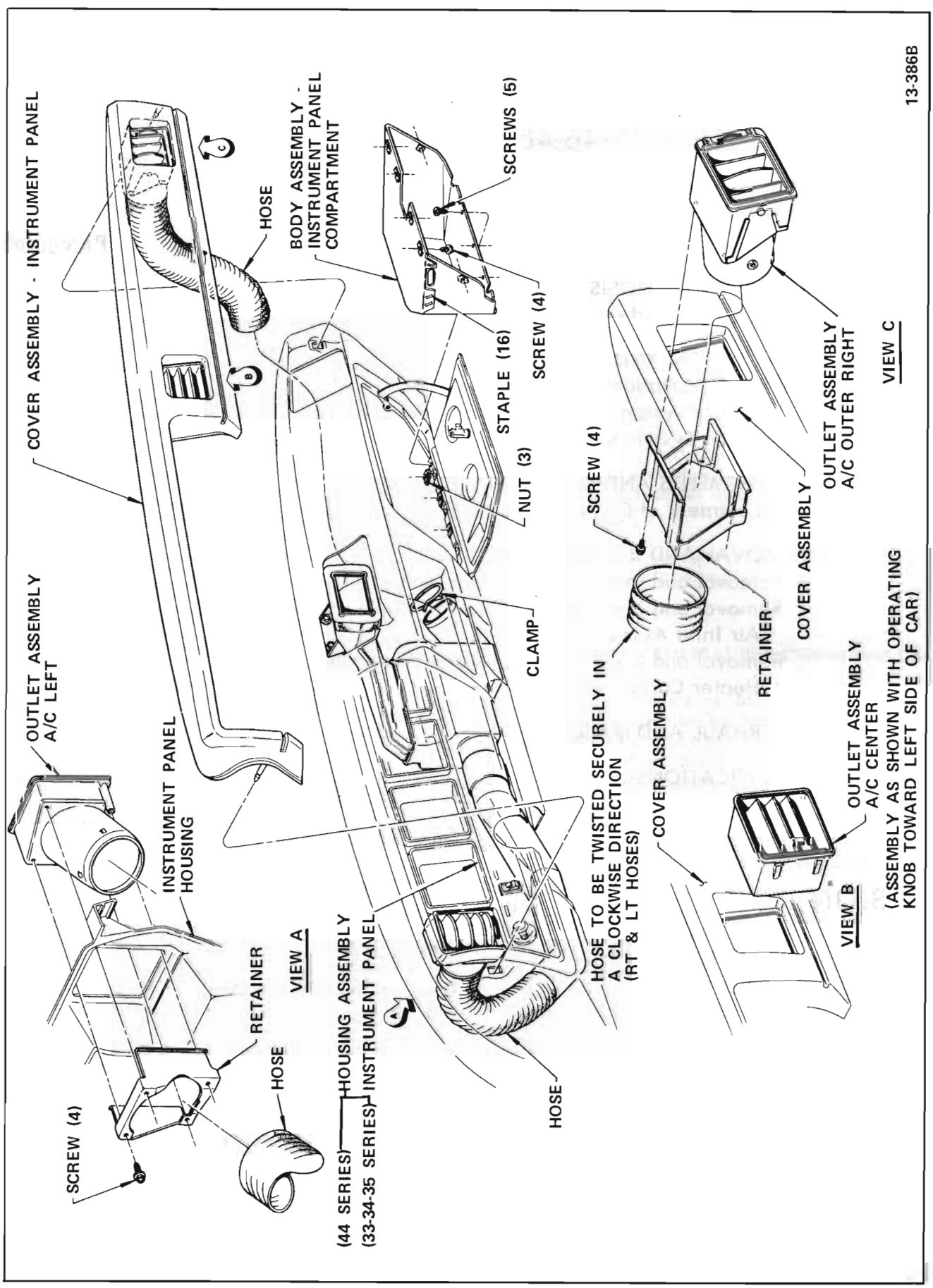

Figure 13-97 43-44000 Series Instrument Panel Outlet Assembly