SECTION D

AUTOMATIC CLIMATE CONTROL HEATER—AIR CONDITIONER SYSTEM (45-46-48-49000 SERIES)

CONTENTS

DIVISION I SPECIFICATIONS AND ADJUSTMENTS

13-101 SPECIFICATIONS

a. Vacuum Specifications

Vacuum Regulator Output to Cold and Hot Vacuum Valves (Both Valves Closed)	7 to 9 Inches of Vacuum
Cold Vacuum Valve Output at Valve	5 to 8 Inches of Vacuum
Hot Vacuum Valve Output at Valve	5 to 8 Inches of Vacuum
Hot or Cold Vacuum Valve Leakage	Not to Exceed 0.5 Inches of Vacuum with Regulated Vacuum at Input to Valve
Restrictor Output to LVM Hot Port	2.5 to 4.5 Inches of Vacuum
Master Switch	Switch Closes at 5 Inches of Vacuum - Switch Remains Closed Until 2 Inches of Vacuum - Switch Must Open at 0 Inches of Vacuum

b. Liquid Vacuum Motor (LVM) Specifications

Travel of LVM Stem from Extended Position to Retracted Position (Linkage Connected)	13/16 Inch ± 1/64
Time of LVM Stem Travel from Extended to Retracted Position (0.800 Inch), (Linkage Not Connected) @ Ambient of 60° to 80° F with 3-1/2 Inches of Vacuum to Hot Port of LVM	2-1/2 to 4-1/2 Minutes
Time of LVM Stem Travel from Maximum A/C Position (Recirculated Air) to Maximum Heat Position (Hi Blower Just Comes On) (Linkage Connected) with 2-1/2 to 4-1/2 Inches of Vacuum to Hot Port of LVM	3 to 6 Minutes
Time of LVM Stem Travel from Retracted to Extended Position (0.800 Inch) (Linkage Not Connected) @ Ambient of 60° to 80° F with 7 Inches of Vacuum to Cold Port of LVM	1-1/2 to 3-1/2 Minutes
Time of LVM Stem Travel from Maximum Heat Position (High Blower On) to Maximum A/C Position (High Blower On) (Linkage Connected) with 5 to 8 Inches of Vacuum to Cold Port of LVM	1-1/2 to 4 Minutes

c. Thermomechanical Specifications

Thermostatic Vacuum Valve (TVV)--Starts to Open at Engine Coolant Temperature of	100° to 125° F
Ambient Switch (2 States)--Blower Portion of Switch--On	72° F MAX.
Off	52° F MIN.
Compressor Portion of Switch--On	40° F MAX.
Off	25° F MIN.
Range Screw Adjustment (Temperature Lever NORMAL)	75° F NOM.

13-101 SPECIFICATIONS (Cont'd)

d. Electrical Specifications

Blower Motor Voltages (Selector Lever in HIGH and Engine Running at Fast Idle)	
High Speed	13.0V NOM.
Medium-High Speed (M3)	10.7V NOM.
Medium Speed (M2)	9.5V NOM.
Low Speed (M1)	8.0V NOM.
Low-Low Speed	6.5V NOM.
Fixed Low-Speed (Selector Lever in LOW and Engine Running at Fast Idle)	5.5V NOM.

NOTE: Voltages given are nominal only and will vary slightly depending on battery condition and voltage regulator output.

e. Mechanical Specifications

Null Gap Between Hot and Cold Vacuum Valves	0.001 Inch
Distance Bell-crank Spring Must be Stressed to Achieve Correct Tension on Temperature Door Link	
45-46-48000 Series	1/4 Inch
49000 Series	5/16 Inch

13-102 ADJUSTMENT OF LIQUID VACUUM MOTOR (LVM) TO BELL-CRANK, ALIGNING PROGRAM VACUUM DISC SWITCH AND SETTING TEMPERATURE DOOR LINK LENGTH (45-46-48000 SERIES)

1. Apply vacuum (maximum of 10 inches) to hot port of LVM to fully retract stem of LVM (see Figure 13-151).

2. Loosen bell-crank link screw and rotate bell-crank arm in a clockwise direction until it touches support stop, then tighten link screw.

NOTE: Maintain vacuum on LVM during adjustment.

3. Apply vacuum (maximum of 10 inches) to cold port of LVM to fully extend stem of LVM (see Figure 13-152) and rotate bell-crank arm in a counterclockwise direction until bell-crank contacts stop.

4. Check alignment of the two aligning holes of the program vacuum disc switch using pressure relief pin (see Figure 13-161). If holes are not aligned, loosen program vacuum disc switch, maintain holes in alignment with pin and push disc switch toward support casting (see Figure 13-153). Secure disc switch in position.

5. Check setting of the temperature door link to insure that bell-crank leaf spring is stressed 1/4 inch measured from centerline of link pin to centerline of leaf spring loop (see Figure 13-154). Temperature door link should be positioned so that it is extended as far as possible toward the right side of the car.

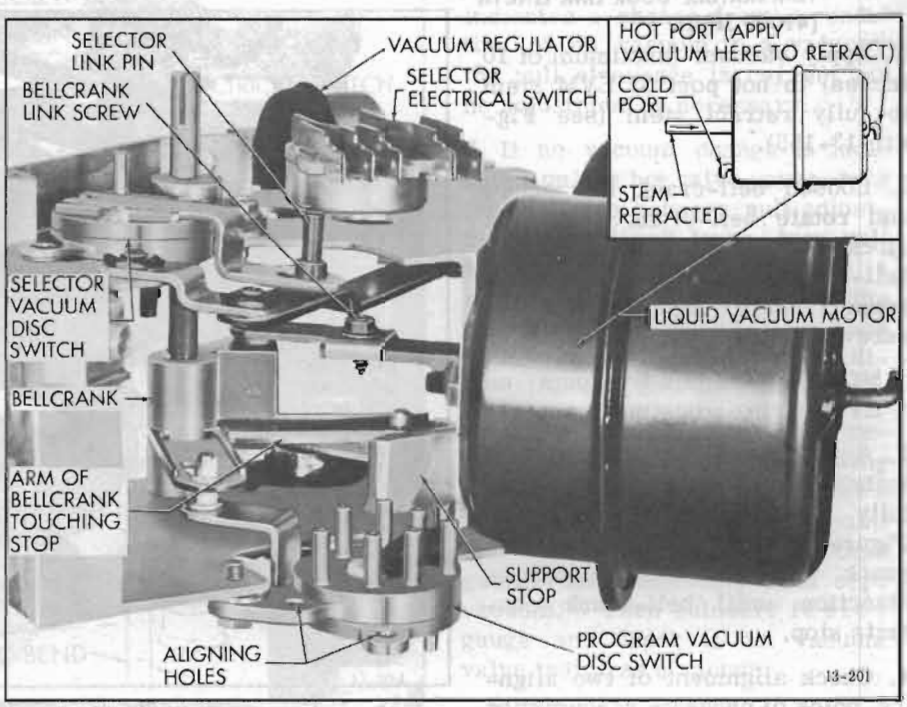


Figure 13-151—Liquid Vacuum Motor with Stem Retraction (45-46-48000 Series)

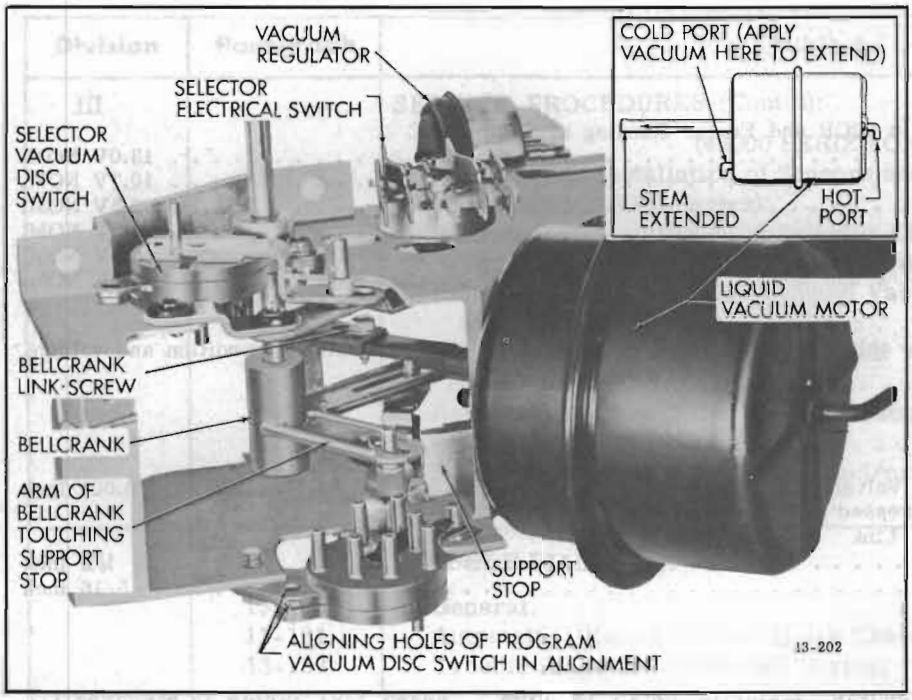


Figure 13-152—Liquid Vacuum Motor with Stem Extended (45-46-48000 Series)

13-103 ADJUSTMENT OF LIQUID VACUUM MOTOR (LVM) TO BELL-CRANK, ALIGNING PROGRAM VACUUM DISC SWITCH AND SETTING TEMPERATURE DOOR LINK LENGTH (49000 SERIES)

1. Apply vacuum (maximum of 10 inches) to hot port of LVM stem to fully retract stem (see Figure 13-155).

2. Loosen bell-crank link screw and rotate bell-crank arm in a clockwise direction until pin of bell-crank arm touches end of support slot, then tighten link screw.

NOTE: Maintain vacuum on LVM during adjustment.

3. Apply vacuum (maximum of 10 inches) to cold port of LVM to fully extend stem of LVM (see Figure 13-156) and rotate bell-crank arm in counterclockwise direction until bell-crank contacts stop.

4. Check alignment of two aligning holes of program vacuum disc switch using pressure relief pin. If holes are not aligned, loosen program vacuum disc switch and adjust (see Figure 13-157).

NOTE: Adjustment screw should be centered in slot before tightening.

5. Check temperature door link to insure that bell-crank leaf spring is stressed approximately 5/16 inch measured front centerline of link pin to centerline of leaf spring loop. Temperature door link should be positioned so that it is extended as far as possible toward the left side of the car (see Figure 13-158).

13-104 NULL CHECK AND ADJUSTMENT OF HOT AND COLD VACUUM VALVES AND POWER ELEMENT LEVER (ALL SERIES)

1. Place temperature and selector levers in mid-position, start engine and operate system for approximately 10 minutes.

2. Connect two vacuum gauges into hot and cold vacuum valves as shown in Figure 13-160.

3. Position the temperature lever so that the gauge attached to the cold valve indicates a vacuum,

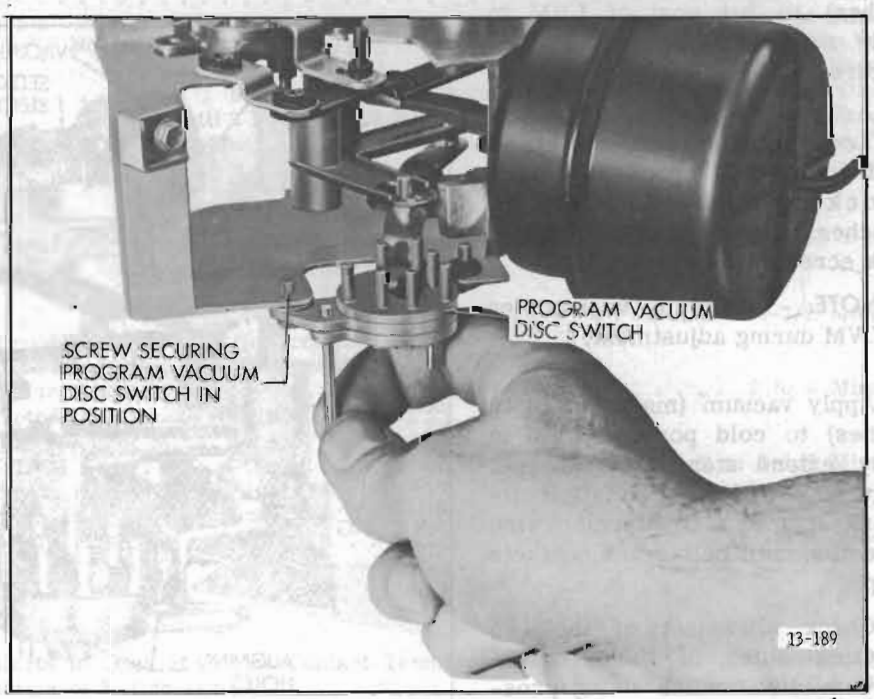


Figure 13-153—Checking Alignment of Program Vacuum Disc Switch Aligning Holes (45-46-48000 Series)

then carefully move lever just far enough in opposite direction until cold valve gauge indicates a zero vacuum.

NOTE: Vacuum gauge attached to hot valve should also be showing a zero vacuum condition.

4. If a point cannot be found with the temperature lever where both gauges simultaneously read zero vacuum and before one gauge drops off the other starts to pick up—then this indicates that the null clearance is inadequate (i.e. not enough clearance between valves and lever). Under these conditions, turn null adjustment screw into stem of hot valve approximately 1/8 turn or until a point can be found where both gauges read zero vacuum when step is performed.

5. Install a 0.001 inch feeler gauge between the null adjustment screw of the hot vacuum valve and the power element lever (see Figure 13-161) and note if hot vacuum valve gauge now indicates hot vacuum valve just beginning to open.

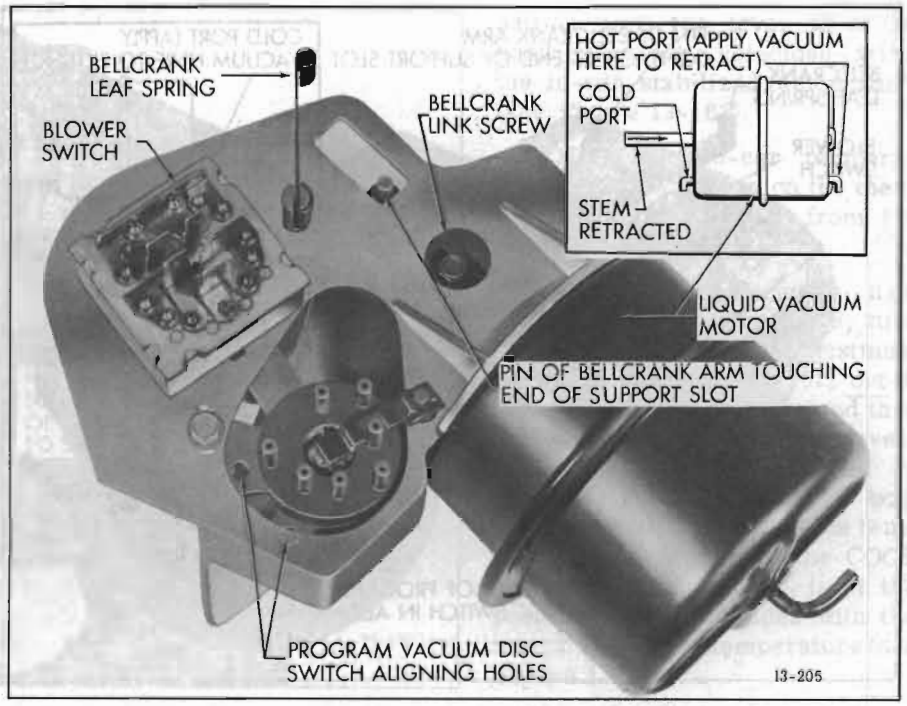


Figure 13-155—Liquid Vacuum Motor with Stem Retracted (49000 Series)

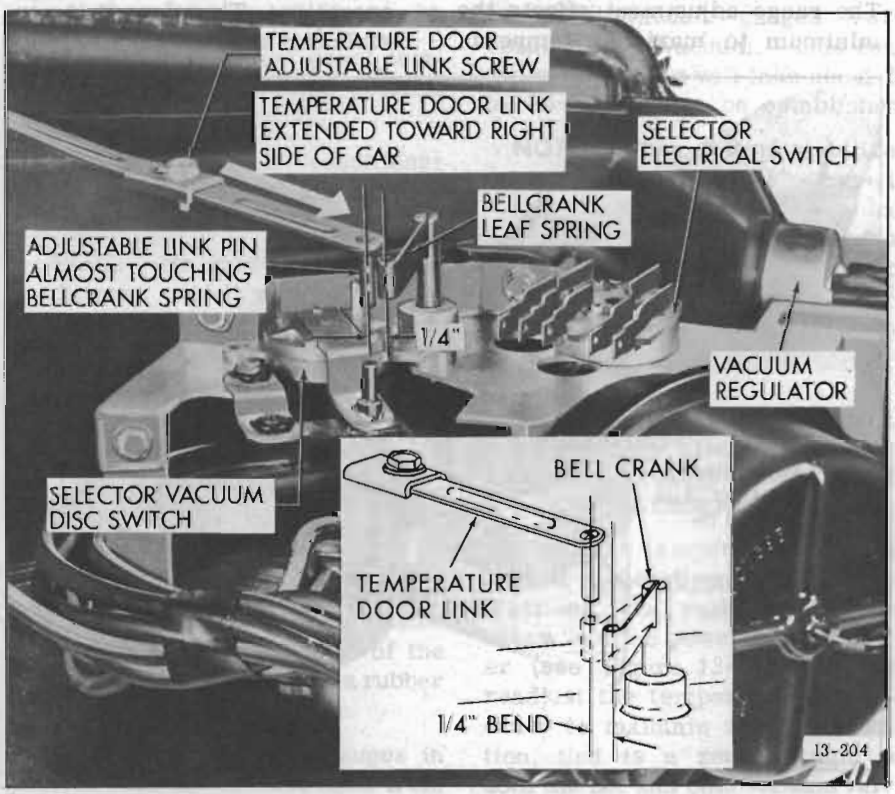


Figure 13-154—Checking Adjustment of Bell-crank Leaf Spring and Temperature Door Link (45-46-48000 Series)

6. If when feeler gauge is installed, hot vacuum valve guage indicates a change from a condition of no vacuum to a vacuum, the null clearance is correct and no adjustment is necessary.

7. If no vacuum change is indicated on the hot valve gauge, with feeler gauge between null adjustment screw and lever, turn null adjustment screw out until a slight vacuum is indicated on the hot valve gauge when feeler gauge is installed. The proper null dimension will now be established.

8. Recheck adjustment by removing feeler gauge and moving temperature lever slowly back and forth and noting if a point can be found where both vacuum gauges simultaneously read zero vacuum. Then reinsert feeler gauge and check if hot vacuum valve indicates a vacuum.

NOTE: As experience is gained with the system a quick check of the null clearance can be

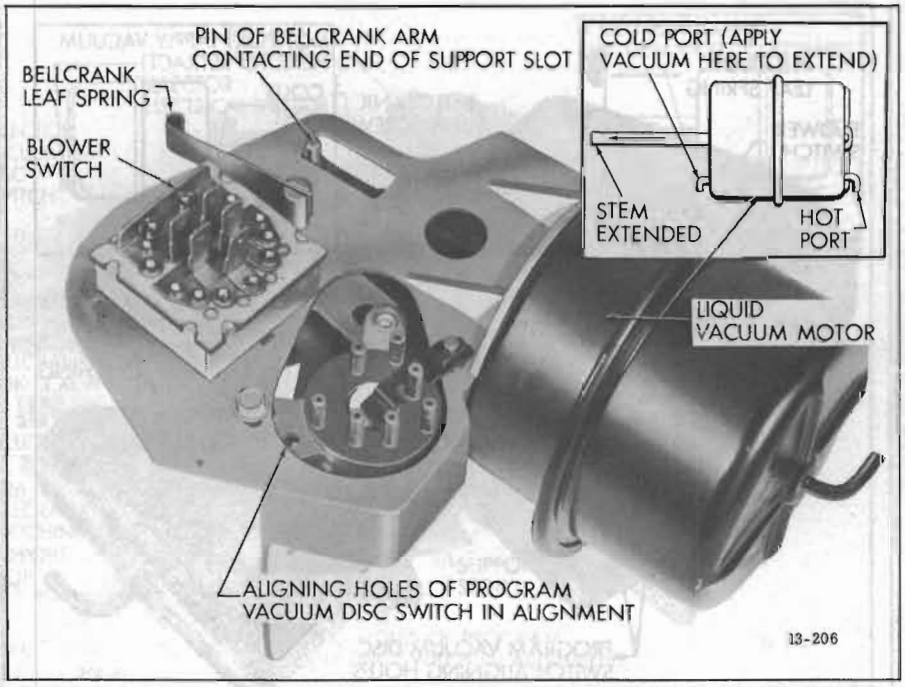


Figure 13-156—Liquid Vacuum Motor with Stem Extended (49000 Series)

made by noting the amount of movement required of the temperature lever to effect a change on the hot and cold vacuum gages. Install vacuum gages as shown in Figure 13-160 and operate system about 10 minutes with controls in NORMAL and HIGH positions. If the null clearance is too little, it will be extremely difficult, or perhaps impossible, to find by moving the temperature lever a point where both the hot and cold gages read zero vacuum. If the null clearance is too great, it will be possible to move the temperature lever distances of more than 3/8 inch before the gage readings are affected. An acceptable lever travel would be approximately 3/16 to 1/4 inch of movement.

13-105 RANGE CHECK AND ADJUSTMENT OF POWER ELEMENT AND POWER ELEMENT LEVER (ALL SERIES)

NOTE: The null clearance and temperature control cable adjustment should always be checked before any range adjustments are made.

The range adjustment affects the minimum to maximum temperature obtained from the system when the temperature lever is moved through its full extent of travel. If the range is correctly set, the in-car temperature will stabilize between 72°F and 78°F when the temperature lever is in the mid-position (NORMAL). The temperature lever will provide a temperature range of approximately between 65°F to 85°F. Adjustment of the range screw may be necessary under the following conditions: temperature lever does not provide acceptable temperature range, sensors and power element assembly are replaced, or hot or cold vacuum valves are replaced.

NOTE: It should be recognized that in the interest of practicality the following procedure is based on the assumption that it is being performed in an enclosed area. This means that the environmental conditions are not the same conditions that will occur when the unit is in operation. Therefore it is possible that the statically adjusted

Figure 13-157—Checking Alignment of Program Vacuum Disc Switch Aligning Holes (49000 Series)

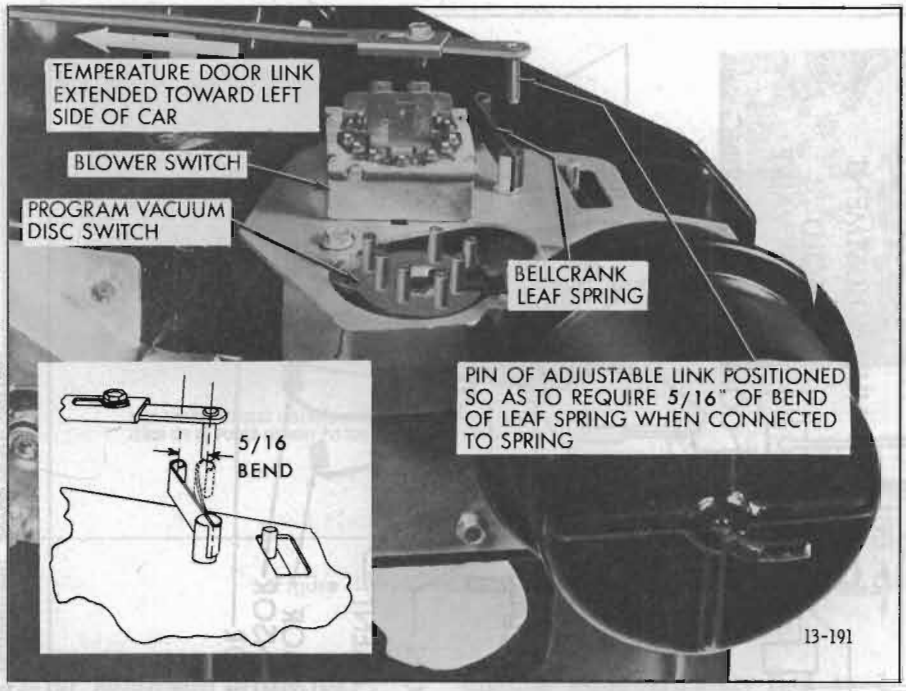


Figure 13-158—Checking Adjustment of Bell-crank Leaf Spring and Temperature Door Link (49000 Series)

range may vary somewhat (2-4 degrees) from the actual range as experienced on the road.

1. Set the instrument panel temperature lever in the mid-position (NORMAL).

2. Position the air conditioner outlets so that the air flow is directed straight out.

NOTE: Be sure side air conditioner outlet vents are fully opened.

3. Suspend a thermometer six inches from the headliner so that it is situated over the back of the front seat and to the right of the driver's seat. This location should situate the thermometer out of the air stream.

NOTE: An alternate location for attaching the thermometer is to secure it to one of the sun visors by means of a rubber band.

4. Install two vacuum gauges in series with the vacuum lines from the hot and cold vacuum valves (see Figure 13-162).

5. Operate system until in-car temperature stabilizes as indicated by vacuum gauges both reading zero vacuum. This condition generally will take about 20 to 25 minutes to be established.

NOTE: When system stabilizes or "nulls out" what occurs is that the in-car temperature has reached the temperature set at the instrument panel, the hot and cold vacuum valves are closed and the LVM stops moving.

6. If the car stabilized temperature is higher than 78°F or lower than 72°F, readjust the range in the following manner.

a. If in-car temperature has stabilized higher than 78°F, turn by fractions the range adjustment screw into the power element lever (see Figure 13-162) and then readjust the temperature lever in order to maintain a nulled condition, that is a zero vacuum on both the hot and cold vacuum valve gauges. Continue inching temperature lever toward the WARM setting until the lever is at the position which coincides with the in-car stabilized temperature (see Figure 13-163).

NOTE: The in-car temperature will be shown on the thermometer suspended from the headliner.

b. If in-car temperature has stabilized lower than 72°F, turn by fractions the range adjustment screw (see Figure 13-162) out of the power element lever and then readjust the temperature lever, thereby maintaining a nulled or zero vacuum condition on both gauges. Continue inching the temperature lever toward the COOL setting until the lever is at the position which coincides with the in-car stabilized temperature (see Figure 13-163).

NOTE: Approximately 1/4 turn of range adjustment screw will generally result in a 3-4 degree temperature variation.

NOTE: The system is capable of producing temperatures higher or lower then the 65 to 85°F normal range limits. Due to physiological variations between individuals, the 65-85°F range may not be suitable to everyone. If a customer complains that he must position the temperature lever to one extreme or the other before he is comfortable - it is recommended that the range be raised or lowered as required (60-80°F or 70-90°F) in order to satisfy customer.

13-106 ADJUSTMENT OF TEMPERATURE CONTROL CABLE AND TEMPERATURE LEVER (ALL SERIES)

To adjust the temperature control cable rotate the cable adjuster nut (color coded red), see Figure 13-168 or 13-170, until a slight springback action is obtained when the instrument panel temperature lever is positioned at either end of its travel.

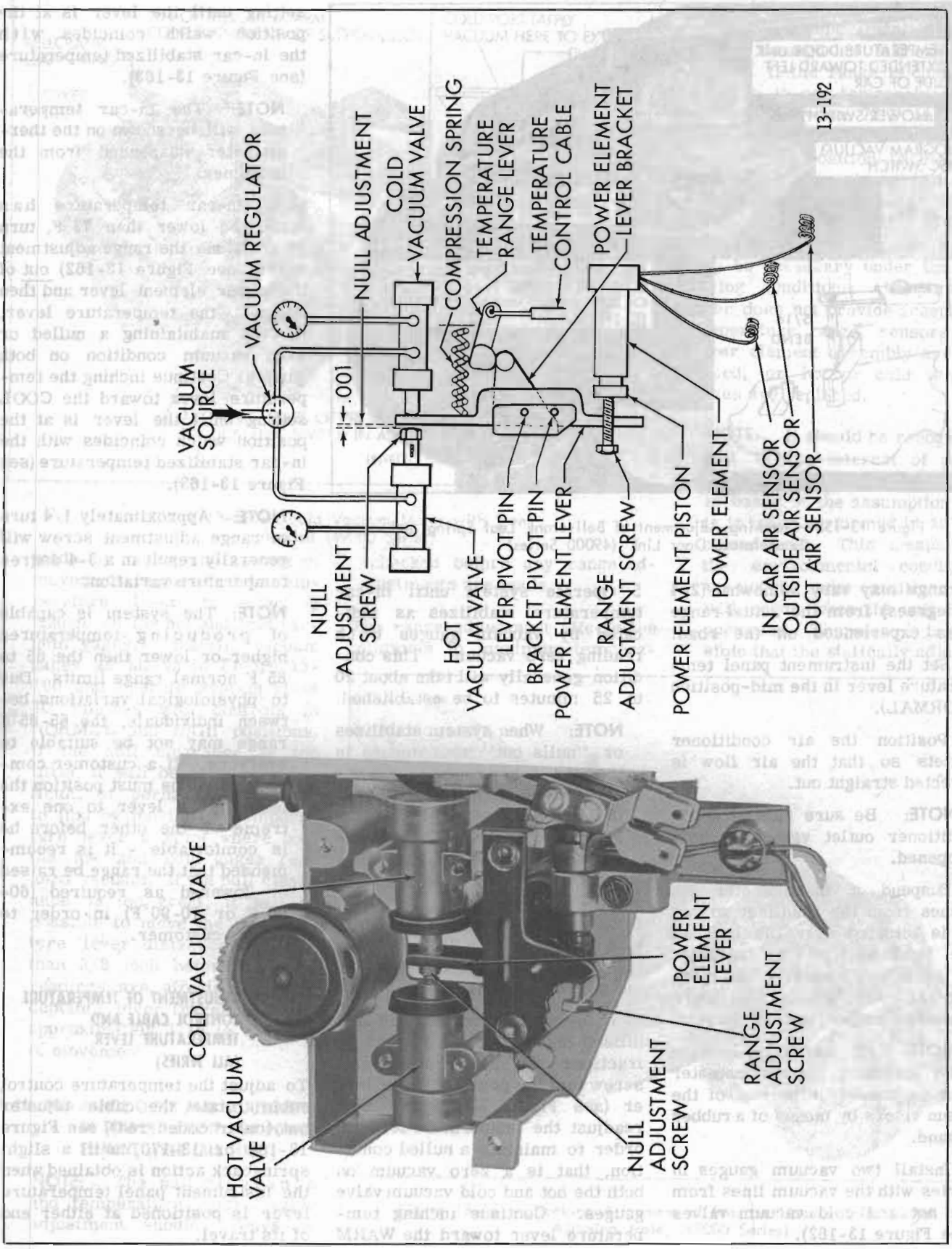


Figure 13-160—Hot and Cold Vacuum Valve Null Check and Adjustment Setup (All Series)

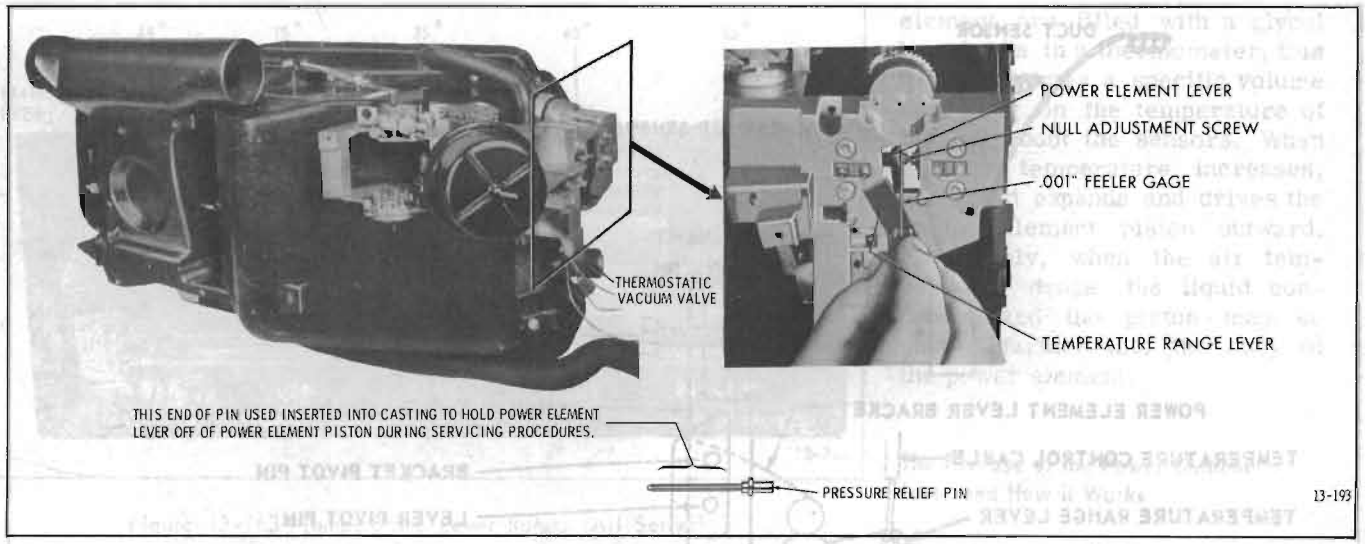


Figure 13-161—Checking Null Clearance with Feeler Gauge (All Series)

13-107 ADJUSTMENT OF SELECTOR CONTROL CABLE AND SELECTOR LEVER (ALL SERIES)

1. Disconnect selector control cable from pin of selector link (see Figures 13-151 and 13-166).

2. Move selector electrical switch arm until a detent action is felt.

3. Move the selector lever at instrument panel to the HIGH position and then rotate selector control cable adjuster nut (see Figures 13-168 and 13-170) until loop on end of control cable is centered over selector link pin.

4. Reconnect and secure selector control cable to selector link pin.

13-108 ADJUSTMENT OF DEFROSTER CONTROL CABLE AND DEFROSTER LEVER (45-46-48000 SERIES)

1. Move selector lever to right end of slot.

2. Rotate adjuster nut in a clockwise direction until lever binds when attempt is made to move lever to OFF position.

3. Reverse rotation of adjuster nut until selector lever stops binding (approximately 1/2 to 1 full turn) and moves completely through full range of travel.

NOTE: Do not exceed more than 1/8 inch springback of selector lever from right end of lever slot.

DIVISION II

DESCRIPTION AND OPERATION

13-109 GENERAL DESCRIPTION

The Buick Automatic Climate Control is a thermo-mechanical system which measures by means of three temperature sensors the outdoor, in-car and duct temperatures and converts the sum total of these temperatures into a mechanical action to regulate the blower motor speed, positioning of the temperature door, heater-air conditioner air door and outside-recirculated air door (see Figure 13-164). The systems for both the 45-46-48000 Series cars and the 49000 Series cars are identical insofar as they have the same components (see Figures 13-165 and 13-166). They differ in that, due to variations between the two air conditioning systems, the components for the automatic option must be situated at different locations.

The Purpose of the Sensor and Power Element Assembly and How it Works

The sensors and power element assembly (see Figure 13-167) is the component which measures the air temperature and is the heart of the system. This component physically responds to the air temperature changes and converts the temperature variations into a mechanical action or force. The three sensors are situated about the car so that they sense (1) the temperature the system is delivering (duct sensor located in the heater-air conditioner assembly for 45-46-48000 Series and in the a/c selector and distributor duct assembly for 49000 Series), (2) the temperature of the air in the car (in-car sensor located under the instrument panel grille), and (3) the temperature of the outside air (outside air sensor located on the ambient sensor and switch assembly). See Figures 13-168 and 13-170.

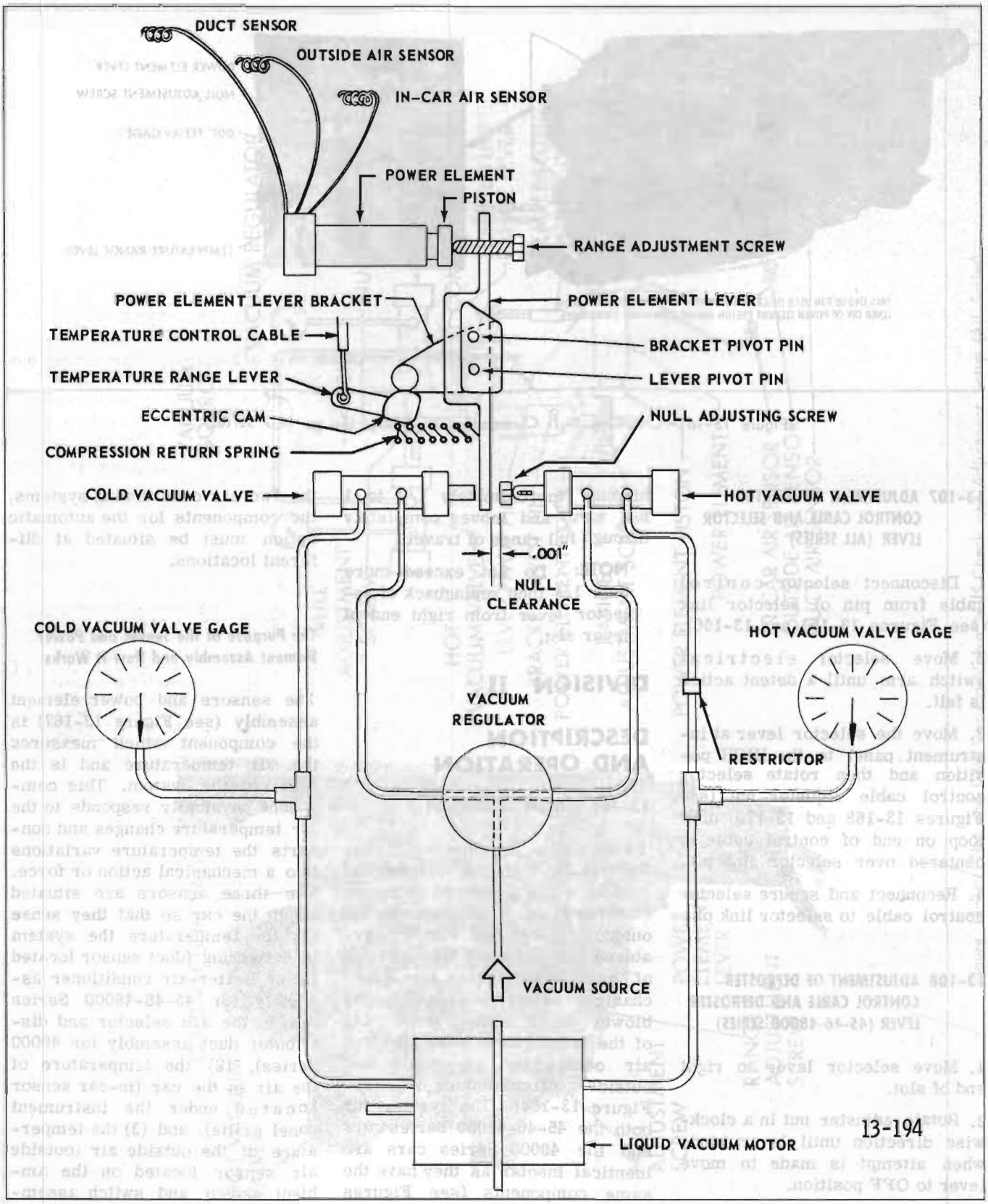


Figure 13-162—Range Check and Adjustment Test Set-up (All Series)

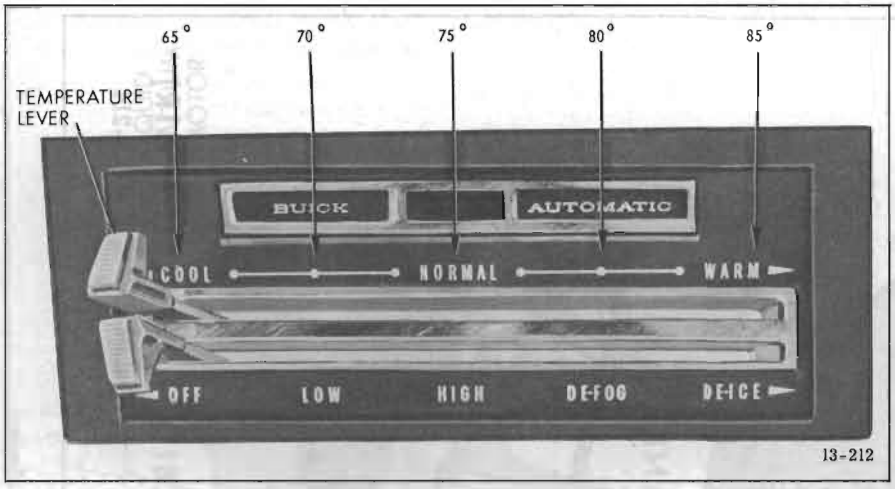


Figure 13-163—Temperature Lever Range (All Series)

The three sensors work in combination to move the power element piston (see Figure 13-167) in or out depending on whether they "feel" hot or cold. The sensors and the body of the power element are filled with a glycol liquid. As in a thermometer, this liquid assumes a specific volume depending on the temperature of the air about the sensors. When the air temperature increases, the liquid expands and drives the power element piston outward. Conversely, when the air temperature drops, the liquid contracts and the piston may be pushed farther into the body of the power element.

The Purpose of the Power Element Lever and How it Works

The second major component of the system is the power element lever. This lever may be mechanically moved in two ways: (1) by

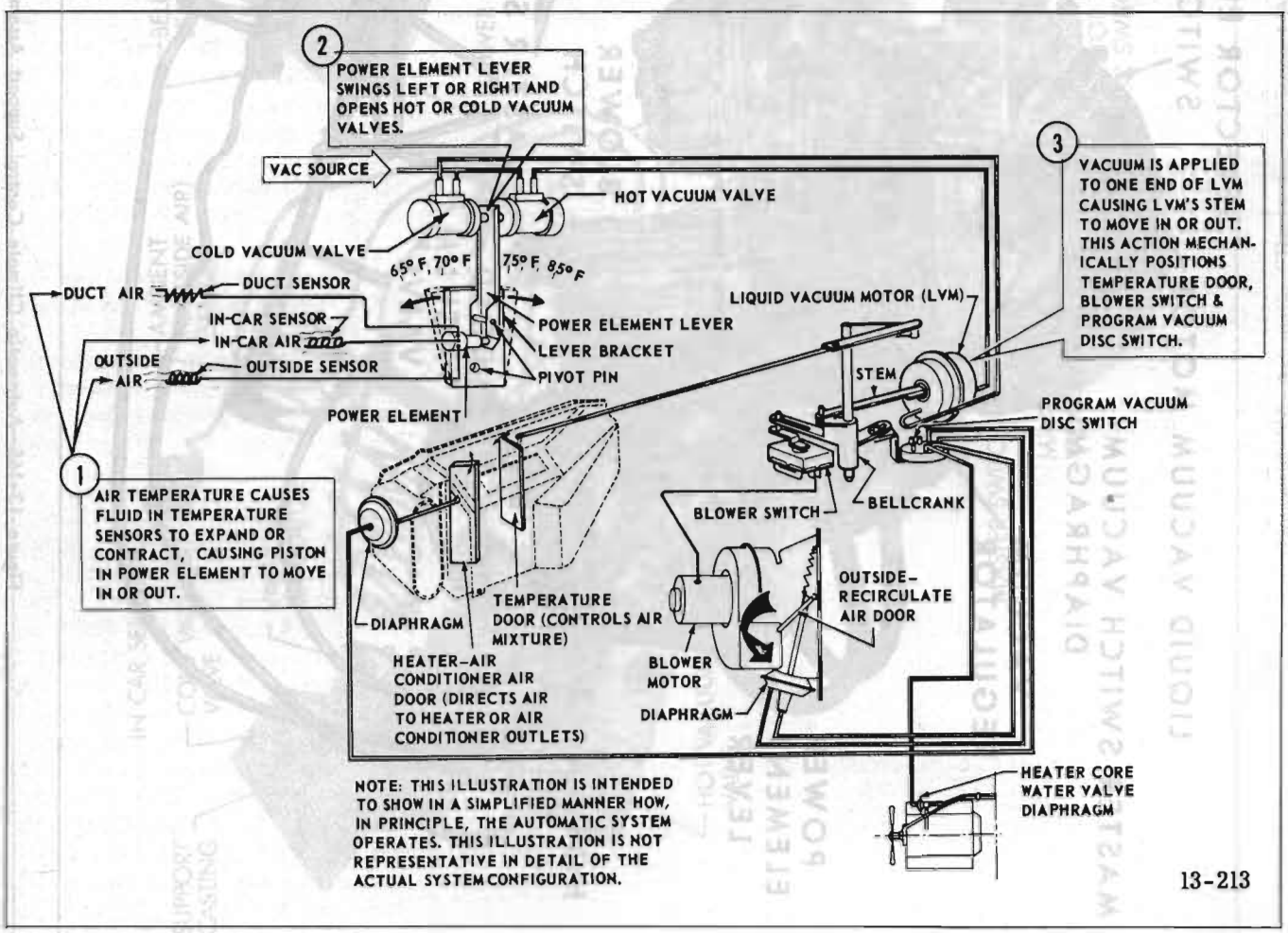


Figure 13-164—Simplified Diagram of Automatic Climate Control System (All Series)

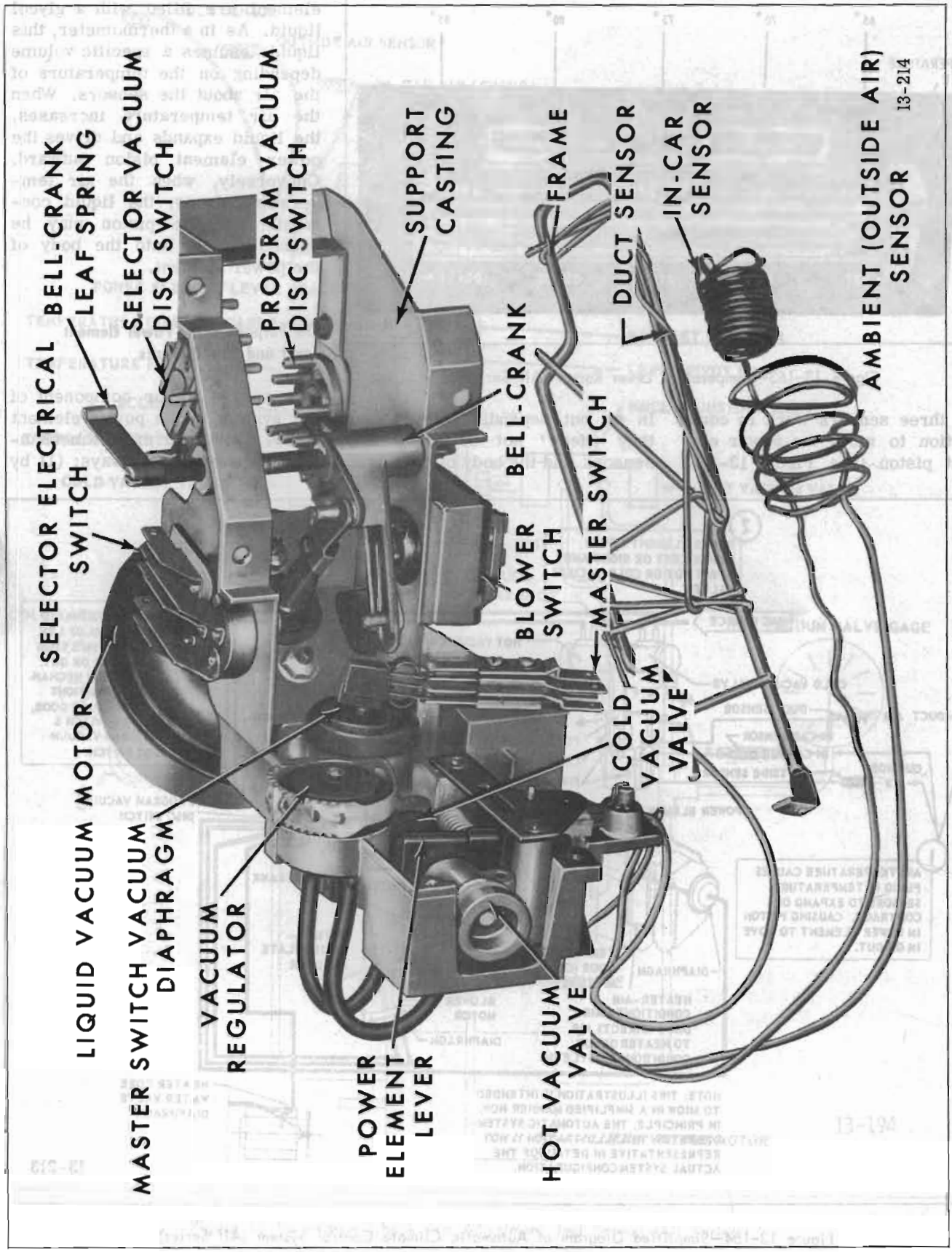


Figure 13-165—Automatic Climate Control Support Assembly (45-46-48000 Series)

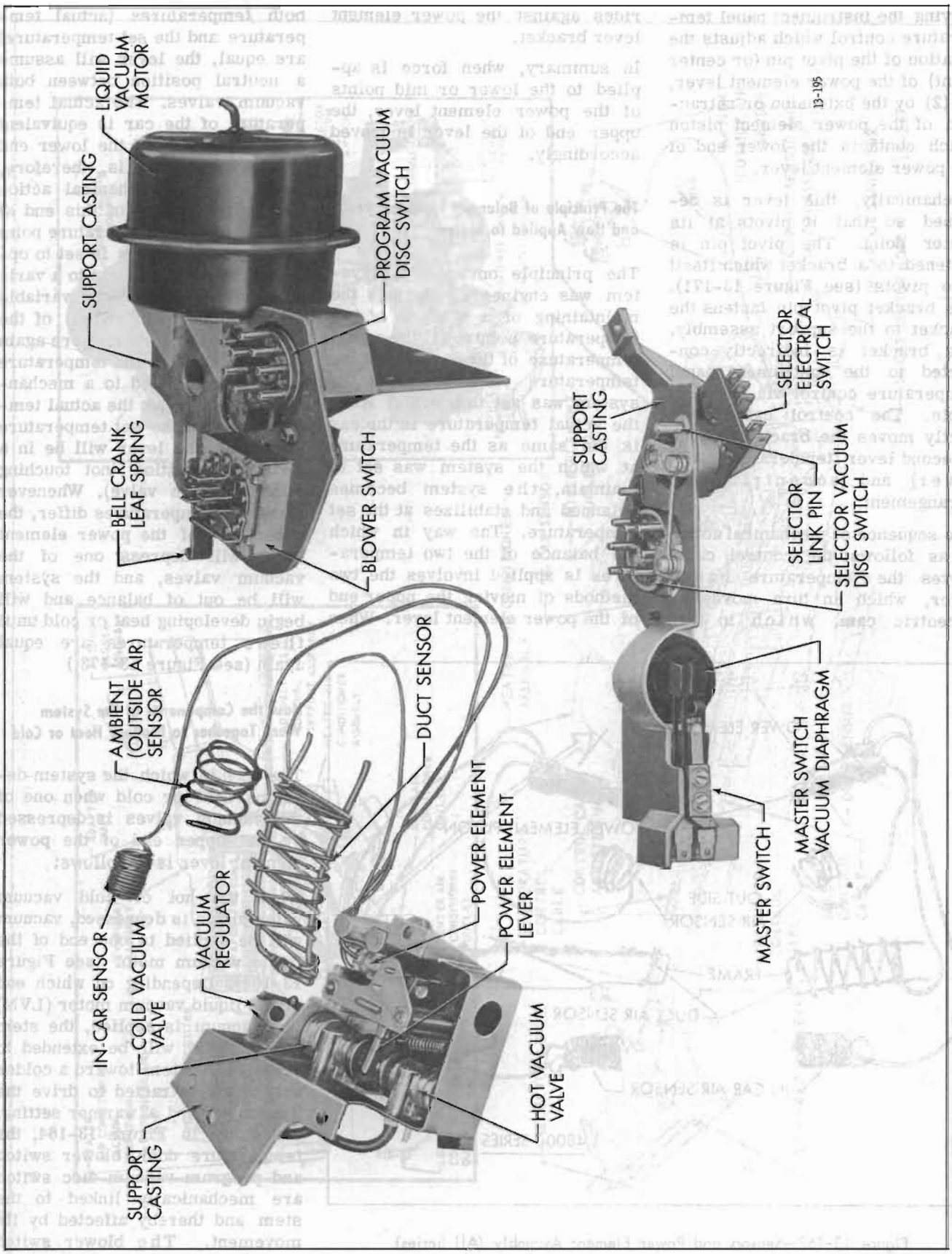


Figure 13-166—Automatic Climate Control Support Assembly (49000 Series)

moving the instrument panel temperature control which adjusts the location of the pivot pin (or center point) of the power element lever, or (2) by the extension or retraction of the power element piston which contacts the lower end of the power element lever.

Mechanically, this lever is designed so that it pivots at its center point. The pivot pin is fastened to a bracket which itself also pivots (see Figure 13-171). The bracket pivot pin fastens the bracket to the support assembly. The bracket is indirectly connected to the instrument panel temperature control via a control cable. The control cable indirectly moves the bracket through a second lever (temperature range lever) and eccentric cam arrangement.

The sequence of mechanical action is as follows: the control cable moves the temperature range lever, which in turn moves an eccentric cam, which in turn rides against the power element lever bracket.

In summary, when force is applied to the lower or mid points of the power element lever, the upper end of the lever is moved accordingly.

The Principle of Balanced Temperatures and How Applied to System

The principle on which the system was engineered involves the maintaining of a balance of two temperature points: (1) the actual temperature of the car and (2) the temperature point at which the system was set to operate. When the actual temperature in the car is the same as the temperature at which the system was set to maintain, the system becomes balanced and stabilizes at the set temperature. The way in which the balance of the two temperatures is applied involves the two methods of moving the upper end of the power element lever. When both temperatures (actual temperature and the set temperature) are equal, the lever will assume a neutral position between both vacuum valves. The actual temperature of the car is equivalent to the position of the lower end of the lever and is, therefore, translated to mechanical action by the positioning of this end of the lever. The temperature point at which the system is set to operate is also equivalent to a variable physical point—the variable center point (pivot point) of the power element lever. Here again the equivalent of the temperature point is translated to a mechanical action. When the actual temperature and the set temperature are equal, the lever will be in a neutral position (not touching either vacuum valve). Whenever these two temperatures differ, the upper end of the power element lever will depress one of the vacuum valves, and the system will be out of balance and will begin developing heat or cold until these temperatures are equal again (see Figure 13-173.)

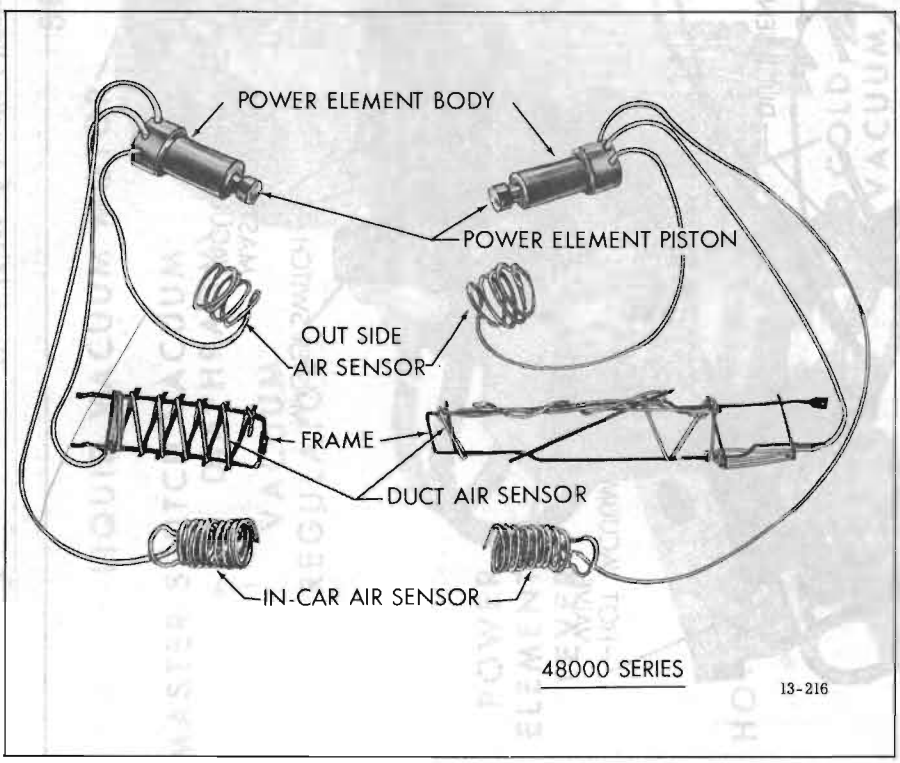


Figure 13-167—Sensors and Power Element Assembly (All Series)

How the Components of the System Work Together to Produce Heat or Cold

The way in which the system develops heat or cold when one of the vacuum valves is depressed by the upper end of the power element lever is as follows:

When the hot or cold vacuum valve piston is depressed, vacuum will be applied to one end of the liquid vacuum motor (see Figure 13-164). Depending on which end of the liquid vacuum motor (LVM) the vacuum is applied, the stem of the LVM will be extended to drive the system toward a colder setting or retracted to drive the system toward a warmer setting. As shown in Figure 13-164, the temperature door, blower switch and program vacuum disc switch are mechanically linked to the stem and thereby affected by its movement. The blower switch

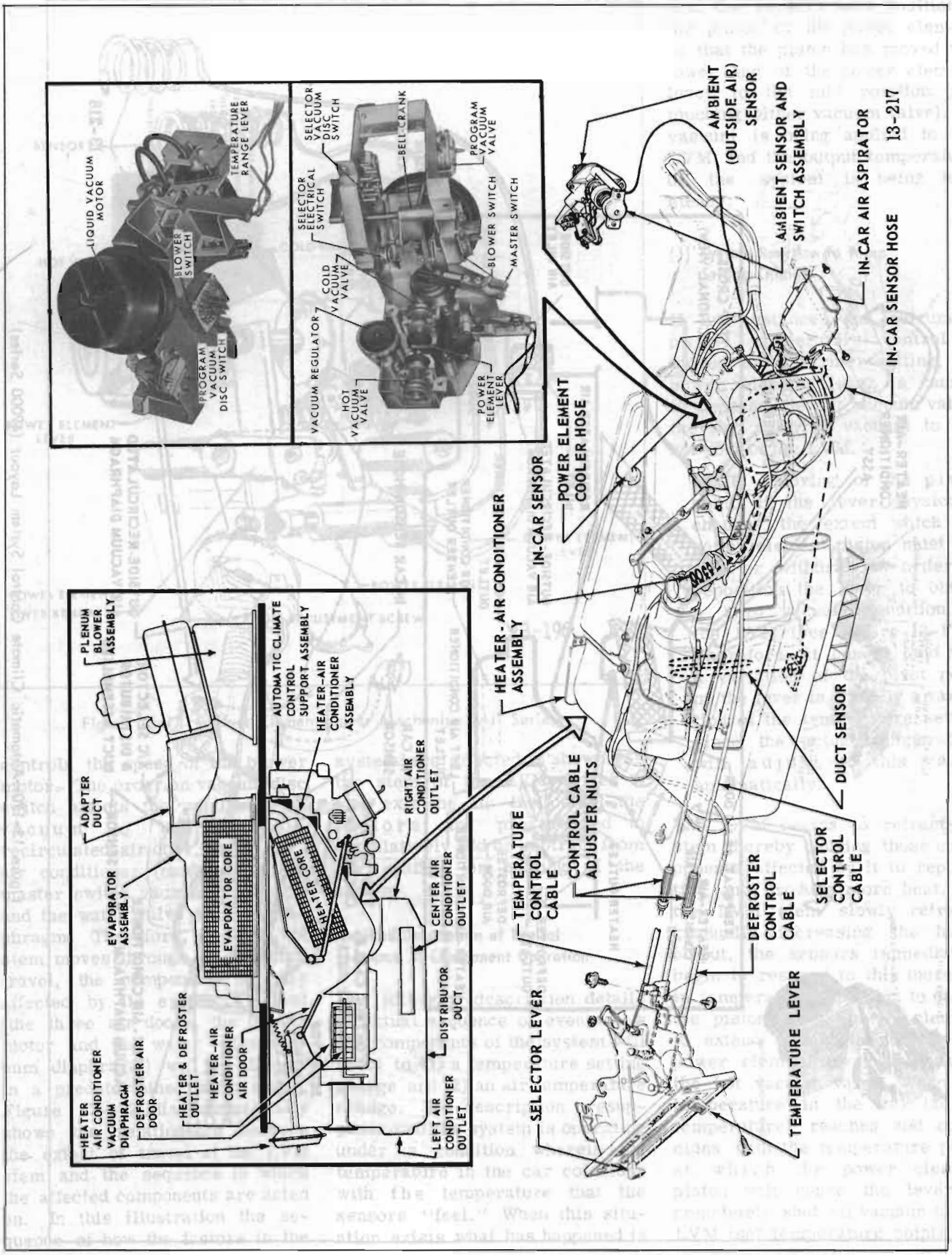


Figure 13-168—Automatic Climate Control System Layout (45-46-48000 Series)

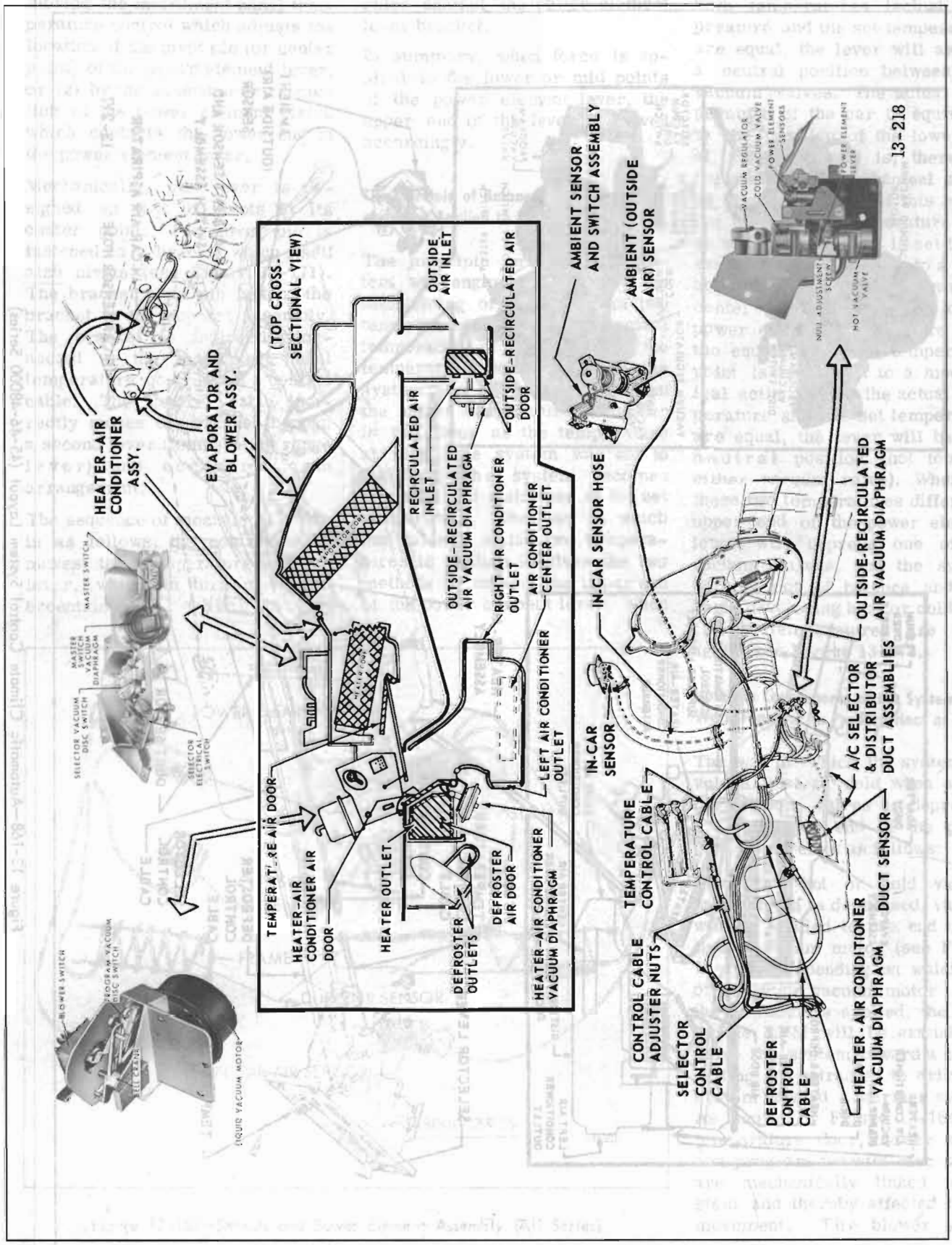


Figure 13-170—Automatic Climate Control System Layout (49000 Series)

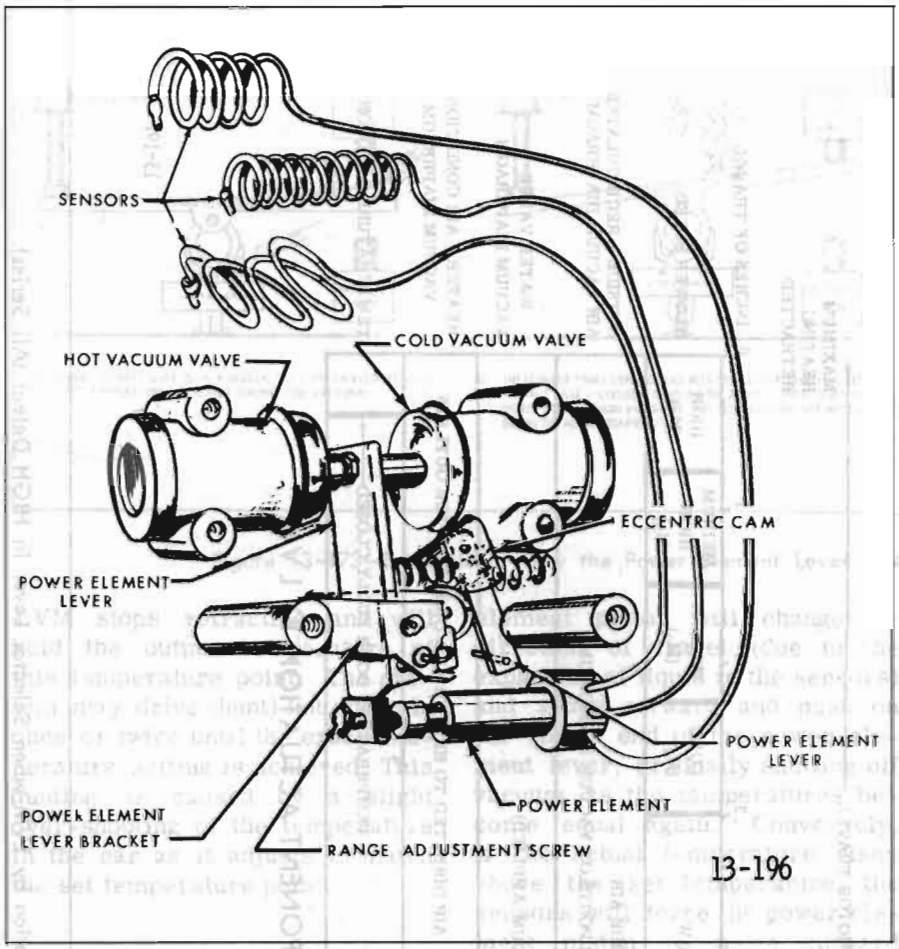


Figure 13-171—Power Element Lever Mechanism (All Series)

controls the speed of the blower motor. The program vacuum disc switch affects the application of vacuum to the outside-recirculated air door, the heater-air conditioner (mode) door, the master switch vacuum diaphragm and the water valve vacuum diaphragm. Therefore, as the LVM stem moves through its length of travel, the components directly affected by its extent of travel (the three air doors, the blower motor and the water valve vacuum diaphragm) will be affected in a predetermined sequence. Figure 13-172 diagrammatically shows the relationship between the extent of travel of the LVM stem and the sequence in which the affected components are acted on. In this illustration the sequence of how the factors in the system are affected is shown. As the stem of the LVM drives to one extreme or the other, the factors are programmed to cumulatively add or subtract from the cooling or heating of the system.

Detailed Description of Typical Sequence of Component Operation

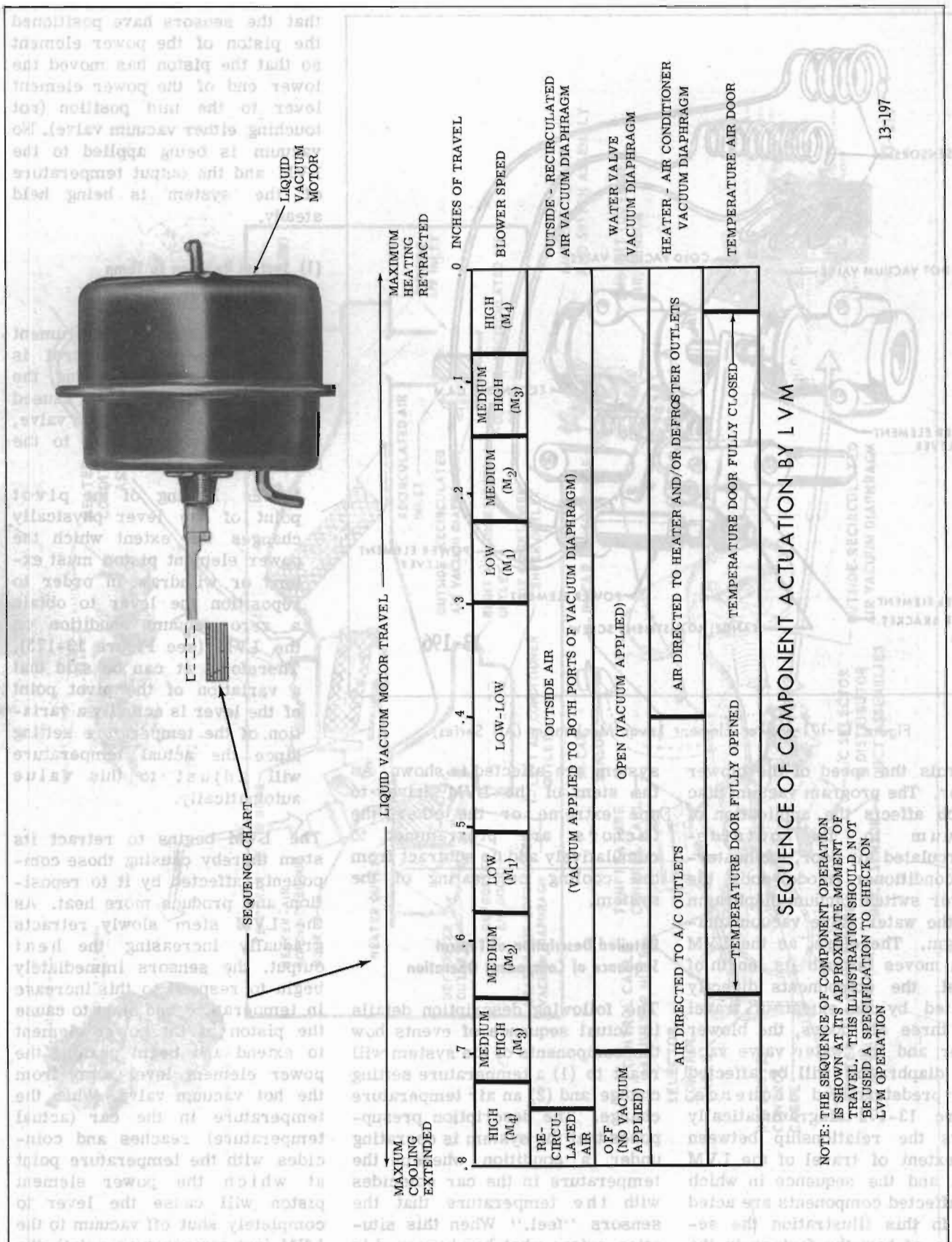
The following description details in actual sequence of events how the components of the system will react to (1) a temperature setting change and (2) an air temperature change. The description presupposes that the system is operating under a condition wherein the temperature in the car coincides with the temperature that the sensors "feel." When this situation exists what has happened is that the sensors have positioned the piston of the power element so that the piston has moved the lower end of the power element lever to the mid position (not touching either vacuum valve). No vacuum is being applied to the LVM and the output temperature of the system is being held steady.

(1) System Reaction to Temp Setting Change

If for instance, the instrument panel temperature control is moved to a warmer setting, the power element lever is caused to depress the hot vacuum valve, thereby applying vacuum to the hot port of the LVM.

NOTE: Moving of the pivot point of the lever physically changes the extent which the power element piston must extend or withdraw in order to reposition the lever to obtain a zero vacuum condition on the LVM (see Figure 13-173). Therefore, it can be said that a variation of the pivot point of the lever is actually a variation of the temperature setting since the actual temperature will adjust to this value automatically.

The LVM begins to retract its stem thereby causing those components affected by it to reposition and produce more heat. As the LVM stem slowly retracts gradually increasing the heat output, the sensors immediately begin to respond to this increase in temperature and start to cause the piston of the power element to extend and begin pushing the power element lever away from the hot vacuum valve. When the temperature in the car (actual temperature) reaches and coincides with the temperature point at which the power element piston will cause the lever to completely shut off vacuum to the LVM (set temperature point), the



NOTE: THE SEQUENCE OF COMPONENT OPERATION IS SHOWN AT ITS APPROXIMATE MOMENT OF TRAVEL. THIS ILLUSTRATION SHOULD NOT BE USED A SPECIFICATION TO CHECK ON LVM OPERATION

Figure 13-172—Sequence of Component Actuation by LVM when Selector Lever in HIGH Detent (All Series)

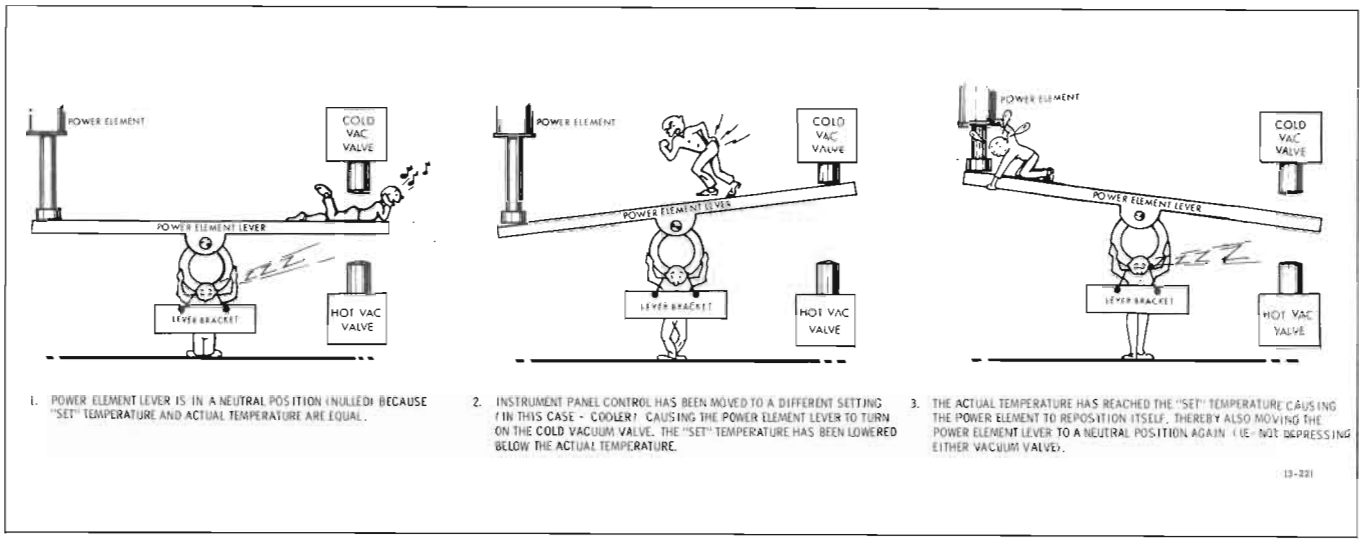


Figure 13-173—Principle of How the Power Element Lever is Automatically Recentered

LVM stops retracting and will hold the output temperature at this temperature point. The system may drive (hunt) hot and cold once or twice until the exact temperature setting is achieved. This hunting is caused by a slight over-shooting of the temperature in the car as it adjusts to match the set temperature point.

(2) System Reaction to Air Temperature Change

When the temperature in the car varies due to normal leakage of air from the car, the door or window being opened momentarily, or perhaps some other external condition, the sensors will react to this temperature change and cause the piston of the power element to move in or out, automatically driving the system hot or cold until it re-establishes the car temperature at the level for which the temperature control was set. If the actual air temperature drops below the "set" temperature, the sensors will allow the power element piston to move into the body of the power element causing the upper end of the lever to depress the hot vacuum valve. As the car temperature increases, the power element piston will change its direction of travel (due to the expansion of liquid in the sensors) and move outward and push on the lower end of the power element lever, gradually shutting off vacuum as the temperatures become equal again. Conversely, if the actual temperature rises above the set temperature, the sensors will force the power element piston to move outward causing the upper end of the lever to depress the cold vacuum valve. As the car temperature decreases, the power element piston will move inward and allow the lever to again move to a neutral (nulled) position.

13-110 DESCRIPTION OF SYSTEM COMPONENTS

Although both the 45-46-48000 Series system and the 49000 Series system have in essence the same components, they are different insofar as the various electrical and vacuum switches are located in different areas due to the variation between the body styles (see Figures 13-168 and 13-170). The following description of each component will apply to all series cars. The description of the components is divided into two groups: the thermomechanical components and the program components.

The thermomechanical components are those which respond to temperature changes and regulate the application of vacuum to the LVM, while the components in the program group are those which are actuated by the LVM and establish the mode of air delivery (heater or a/c ducts), quantity of air delivered (blower speed), type of air delivered (outside or recirculated air), ratio of air mixtures (temperature door position) and water valve and thermostatic vacuum valve function (on or off).

THERMOMECHANICAL COMPONENTS

a. The Sensors and Power Element Assembly

The sensors and power element assembly (see Figure 13-167) works in principle similar to a thermometer. It consists of three hollow copper lines connected to a cylinder to which is fitted a piston at one end. The tubes are filled with a glycol liquid which expands or contracts in accordance with the temperature. Depending on the expansion or

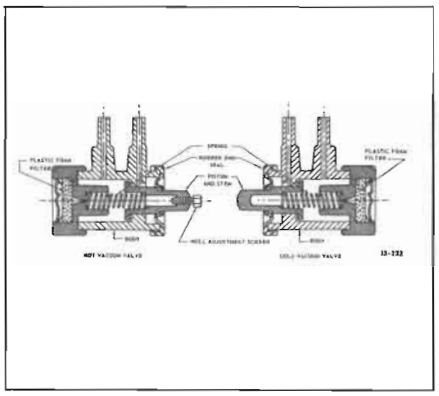


Figure 13-174—Hot and Cold Vacuum Valves (All Series)

contraction of this liquid, the piston in the cylinder or the body of the assembly is pushed outward a specific amount. The ends of the three copper lines (capillaries) are coiled and situated at different points in the system in order to measure the outdoor, in-car and duct air temperatures (see Figures 13-168 and 13-170).

b. Hot and Cold Vacuum Valves

These valves (see Figure 13-174) act similar to water faucets in that they turn the vacuum supply to the LVM on or off. The valve consists of a valve body, valve piston and stem, return spring, rubber seals and plastic foam filter. When the stem is depressed, the valve is opened permitting vacuum to flow through it. On the hot valve only, there is a null adjustment screw. This screw serves to permit a point to be established wherein the power element lever allows both valves to be closed at the same time. With the lever just touching the cold valve stem, the gap between the screw head and the power element lever is adjusted to .001 inch.

c. Vacuum Regulator and Restrictor

The vacuum regulator (see Figure 13-175) is part of the support

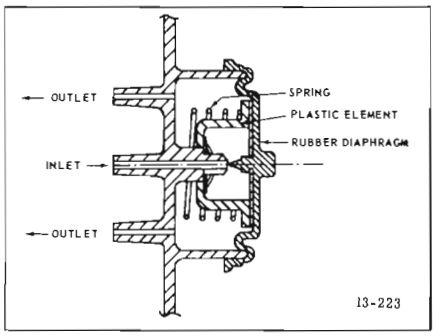


Figure 13-175—Vacuum Regulator (All Series)

casting. It consists of a rubber diaphragm, a spring and a plastic element which function together to maintain a vacuum output of 7 inches to 9 inches of vacuum to the hot and cold vacuum valves. The vacuum is reduced again by a restrictor in the vacuum line between the hot vacuum valve and the LVM to further reduce the vacuum to the hot port of the LVM to approximately 4 inches vacuum. One end of the restrictor hose is marked "LVM" and this hose should be connected to the liquid vacuum motor. The bleed hole size of the cold vacuum valve also acts as a vacuum restriction and lowers the vacuum applied to the LVM cold port to 7 inches vacuum. The amount of vacuum received by these ports determines the speed of the LVM.

d. Power Element Lever and Bracket Assembly

The power element lever mechanism (see Figure 13-171) consists of a lever which pivots on a bracket. The bracket in turn pivots about a limited arc. The fact that the power element lever is hinged to a movable bracket has the effect of permitting the end of the lever situated between the hot and cold valves to be moved against a stem of one of the valves (thereby opening it), while at the same time maintaining the opposite end in contact with the piston of the power element (see Figure 13-173). An eccentric cam is connected to the temperature range lever (see Figure 13-171) and rides against an edge of the lever bracket. Movement of the temperature range lever moves the lever bracket and thereby also the pivoting point of the power element lever. The screw located at the lower end of the power element lever is the range screw.

The total distance the power element piston is capable of traveling represents the total temperature range the sensors are capable of "feeling". As stated previously the pivot point of the power element lever is equivalent to the "set" temperature, and so the distance the pivot point travels is also equivalent to the "set" temperature range. The range screw then moves the "set" temperature range of 20 degrees up or down within the total range that the sensors and power element assembly is capable of responding to. Physically, the range screw adjusts the distance of the lower end of the power element lever to the power element piston.

PROGRAM COMPONENTS

e. Liquid Vacuum Motor (LVM)

The liquid vacuum motor (LVM) shown in Figure 13-176 works similar to a vacuum diaphragm with the exception that it has a double action (i.e., it operates

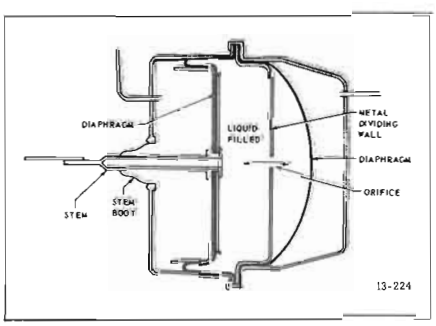


Figure 13-176—Liquid Vacuum Motor (All Series)

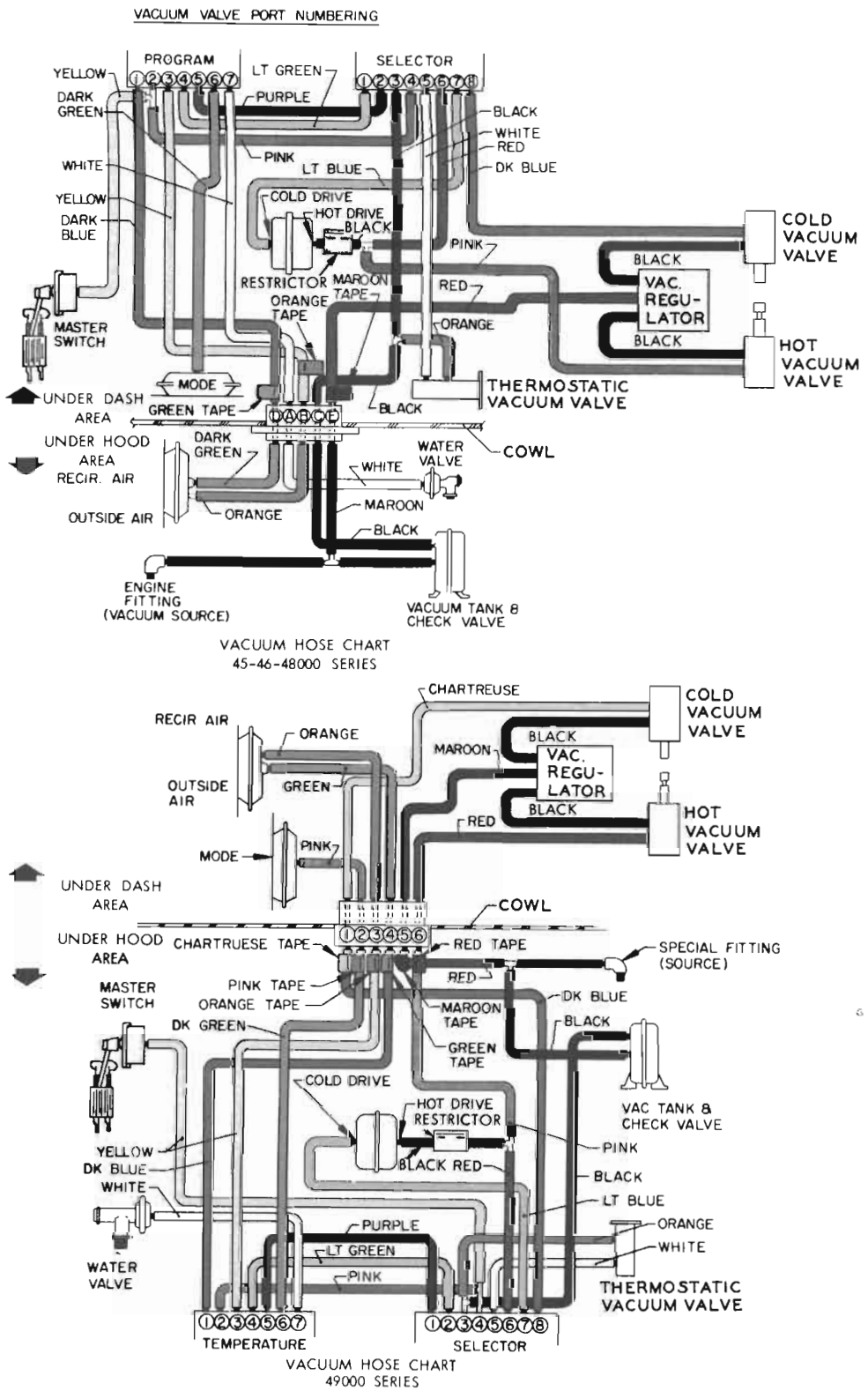


Figure 13-177—Vacuum Circuit Layout (All Series)

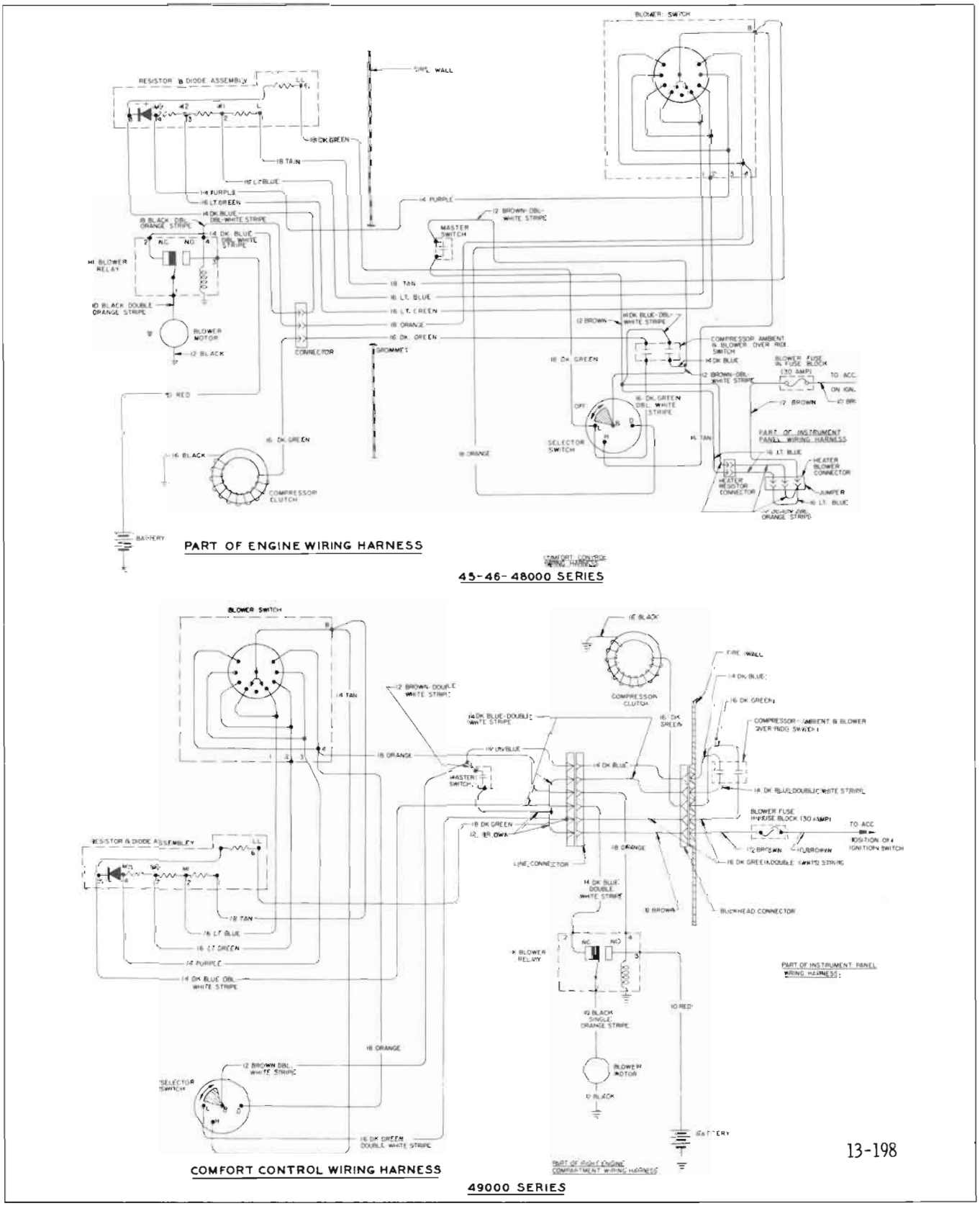


Figure 13-178—Electrical Circuit Layout (49000 Series)

in two directions depending on which side of the diaphragm the vacuum is applied). The LVM is filled with a liquid which functions to dampen out any sudden movement of the stem. The speed at which the stem will travel in or out of the LVM is proportionate to the amount of vacuum applied. A baffle plate inside the LVM divides the liquid chambers of the LVM into two sections. As the stem moves from one direction to the other, the liquid flows through a small orifice in the baffle plate and into the opposite chamber.

f. Temperature Door

The temperature door (see Figure 13-164) functions to regulate the air mixture. The duct air temperature is determined by the position of this door. Movement of the temperature door is in direct relation to movement of the LVM stem. The adjustment of the temperature door adjustable link to the bellcrank leaf spring (see Figures 13-154 and 13-158) determines the maximum temperature of the air out of the a/c outlets before the air flow shifts to the floor outlets. This adjustment is sometimes referred to as the "mode shift point."

g. Selector Lever, Selector Vacuum Disc Switch and Selector Electrical Switch

On the 45-46-48000 Series cars, these switches are located on the support casting attached to the heater air conditioner assembly (see Figure 13-168) situated under the instrument panel. On 49000 Series cars, these switches are still located on the heater-air conditioner assembly, however, the assembly is situated on the engine side of the cowl (see Figure 13-170). The action of both switches is linked together and is in turn controlled via a control cable attached to the instrument panel selector lever. Use of this lever by the operator provides for manual control of the selector vacuum disc and electrical switches. These two switches in turn control the vacuum and electrical circuit pattern that the program vacuum disc switch and the blower switch will be capable of varying within.

The selector vacuum disc switch feeds vacuum to the program vacuum disc switch, the thermostatic vacuum valve (TVV), the liquid vacuum motor (LVM) and the hot and cold vacuum valves (see Figure 13-177). The selector electrical switch is a rotary five position switch and feeds power to the blower switch, ambient switch, resistor block and high blower relay (see Figure 13-178). Placement of the lever in the LOW, HIGH or DEFOG detents provides for three different variations of automatic control (see Figure 13-180). When the instrument panel selector lever is in the LOW position, the selector electrical switch feeds power directly to a resistor (bypassing the blower switch) giving a fixed low blower speed. The temperature of the car under this condition is still under automatic control. When the selector lever is in DE-ICE position, the selector electrical switch again overrides the blower switch and power is fed directly to the blower motor to provide for constant and maximum blower speed. In addition, the LVM is driven to maximum heat position (stem fully retracted) and held there. Both

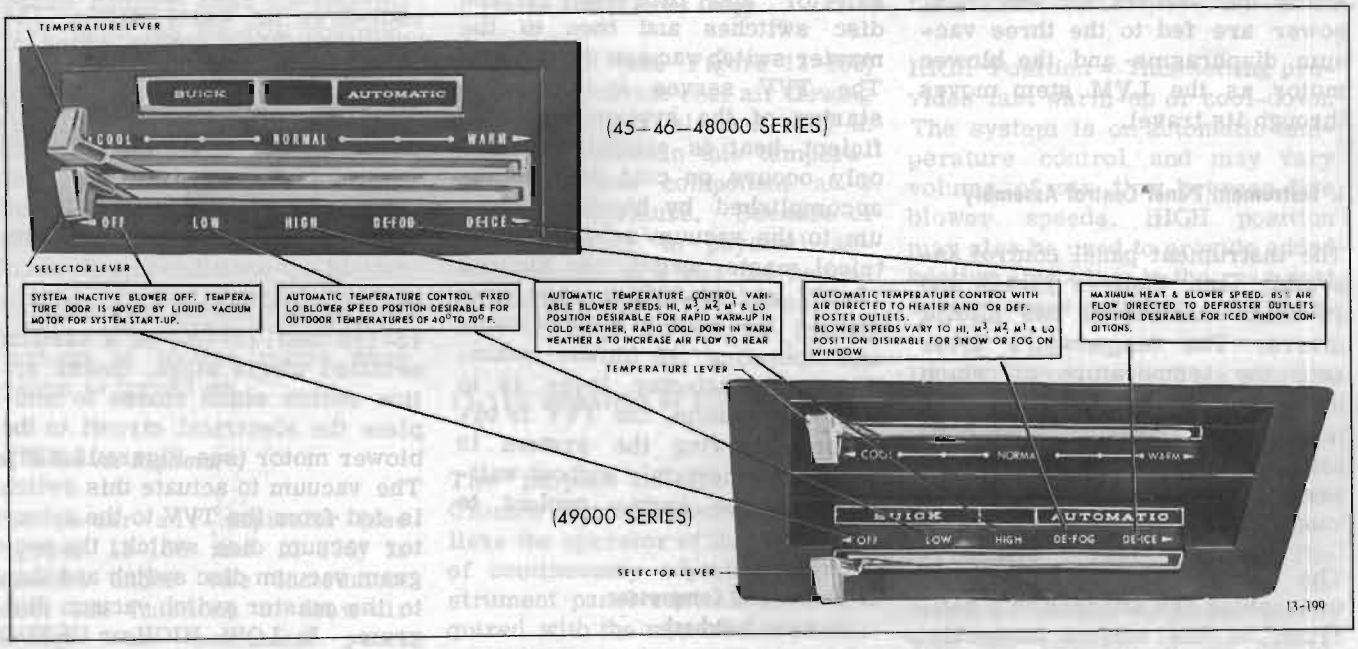


Figure 13-180—Selector Lever Programming Sequence (All Series)

the electrical ambient switch (ref. subpara. "k") and the vacuum controlling thermostatic vacuum valve (TVV) (ref. subpara. "j") are bypassed so that all available heat is immediately utilized without delay for heat buildup. In this setting the system is off automatic control.

h. Program Vacuum Disc Switch and Blower Switch

On the 45-46-48000 Series cars the program vacuum disc and blower switches are located on the casting support situated on the heater-air conditioner assembly (see Figure 13-165). On 49000 Series cars, these two switches are still located on the heater-air conditioner assembly, however, the assembly is situated on the engine side of the cowl (see Figure 13-166). These switches are directly linked via a bell-crank to the LVM and provide for the application of and automatic control of vacuum and electrical power as dictated by the position of the LVM stem (see Figure 13-164). Figure 13-172 diagrammatically shows the sequence in which the vacuum and electrical power are fed to the three vacuum diaphragms and the blower motor as the LVM stem moves through its travel.

i. Instrument Panel Control Assembly

The instrument panel control assembly (see Figures 13-168 and 13-211), consists of two sliding levers. The temperature lever sets the temperature at which the system is to operate. The temperature control cable connects the instrument panel temperature lever to the temperature range lever.

The defroster and selector control cables are attached to a bell-crank on the control assembly. When the selector lever moves from OFF to LOW or HIGH detents, the selector control cable is proportionately moved. The defroster cable starts to move the defroster door when the lever is approximately 1/2 inch from the DE-FOG detent. When lever is at DE-FOG detent, the defroster door opens to one half of its travel. As the lever is moved to the DE-ICE position, the defroster door is proportionately opened the balance of its travel. When the defroster door is fully opened, approximately 85% of the air flow is directed to the windshield.

j. Thermostatic Vacuum Valve (TVV)

The thermostatic vacuum valve (TVV) is a temperature sensitive vacuum switch which is mounted on the side of the heater core (see Figures 13-161 and 13-181). Mechanically the switch consists of a piston and a cylinder filled with a temperature sensitive compound. When the coolant temperature reaches a specific range (100° to 125°F) the compound in the cylinder of the TVV expands and pushes the piston to a point where it opens two vacuum ports permitting flow of vacuum to the selector and program vacuum disc switches and then to the master switch vacuum diaphragm. The TVV serves to delay the startup of the system until sufficient heat is available. This only occurs on cold days and is accomplished by blocking vacuum to the vacuum actuated electrical master switch (see Figures 13-182 and 13-203) thereby preventing the switch from closing and operating the blower motor. When the selector lever is in DE-ICE position, the TVV is bypassed allowing the system to operate immediately without waiting for the engine coolant to warm-up.

k. Blower and Compressor Ambient Switches)

These two micro switches are part of the ambient sensor and switch assembly (see Figures 13-168 and 13-170) which is mounted under the instrument panel against the plenum chamber. The two switches are actuated by a temperature sensitive power element. The power element portion of the assembly extends through a hole in the plenum chamber and senses the temperature of the outside air. Depending on the air temperature, the compound in the power element expands or contracts and pushes on a piston which in turn trips in succession each of the ambient switches. The compressor ambient switch is in series with the compressor clutch and closes (permitting compressor to operate) at 40°F MAX or opens (breaking circuit of compressor) at 25°F MIN. This switch functions to eliminate the unnecessary operation of the compressor on cold days. The blower ambient switch closes at 72°F MAX. On initial warm-day startup, this switch permits the master switch (which is held closed by TVV because engine coolant is not warm) to be bypassed (see Figure 13-197). This arrangement permits system to begin immediate cool-down on warm days. The blower ambient switch opens at 52°F MIN, thereby preventing cold air from being blown on operator during initial cool-day start-up.

l. Master Switch and Vacuum Diaphragm

The master switch (see Figures 13-165 and 13-166) is a vacuum actuated single stage, double action switch which closes to complete the electrical circuit to the blower motor (see Figure 13-178). The vacuum to actuate this switch is fed from the TVV to the selector vacuum disc switch, the program vacuum disc switch and then to the master switch vacuum diagram. In LOW, HIGH or DEFOG modes of operation this arrangement provides that the master

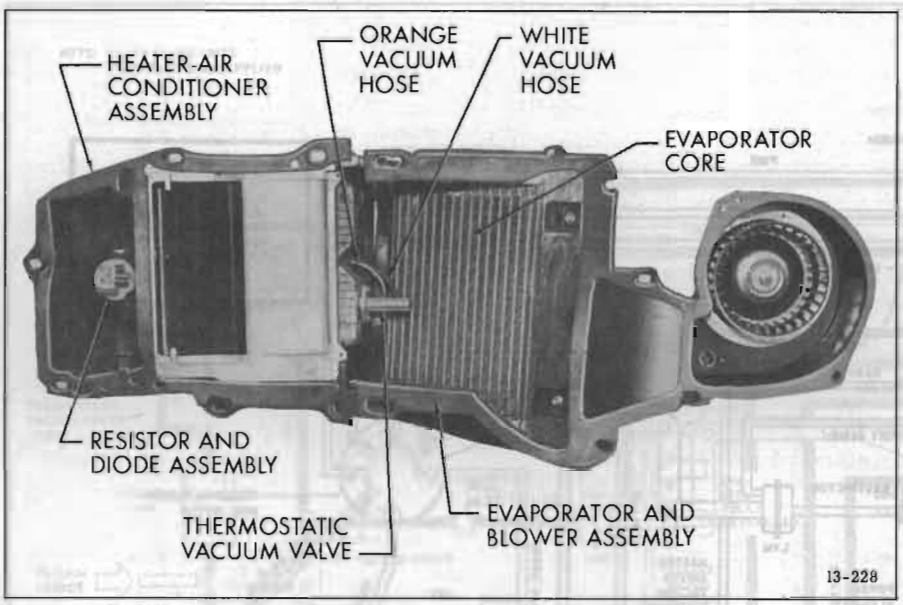


Figure 13-181—Evaporator and Blower Assembly and Air Conditioner - Heater Assembly (Rear View) (49000 Series)

switch will hold the blower motor circuit open until the engine coolant temperature warms and opens the TVV, which in turn applies vacuum to close the master switch (see Figures 13-182 through 13-203).

Two exceptions to this arrangement may occur. The first exception happens when the selector lever is in the DE-ICE position. In DE-ICE position, the master switch is electrically bypassed and power is fed directly to the blower motor via the selector electrical switch. The second exception occurs when the ambient temperature is above 72°F. Under these conditions the blower portion of the ambient switch closes and permits immediate start-up of blower motor when system is turned on.

m. In-Car Air Aspirator

The in-car air aspirator (see Figures 13-168 and 13-170) is mounted under the instrument panel and functions to draw air through the instrument panel grille. As air passes through the aspirator it creates a negative pressure at the lower end of the in-car sensor hose thereby causing air to be drawn into the upper end of the hose. The purpose of this arrangement is to provide the in-car sensor with a constant sample of in-car air.

n. Power Element Cooler Hose (45-46-48000 Series Only)

This hose (see Figure 13-168) serves to provide cool air flowing over the power element body in order to maintain this temperature sensitive component at a stable temperature. Because of the difference in physical arrangements, this was not necessary with 49000 Series cars.

13-111 OPERATION OF SYSTEM CONTROLS

The purpose of the Automatic Climate Control system is to relieve the operator of the necessity of continuously adjusting the instrument panel controls as is required with the manual heater-air conditioner system. The usefulness of the system can be reduced by the operator if, in attempting to speed up system performance, the levers are overly adjusted. Positioning of temperature lever to one extreme or the other does not speed up warm-up or cool-down but can overdrive system to a temperature not desired. In addition, too frequent adjustment of the temperature lever will cause the system to drive too much in one direction with the result that the system overcompensates and the interior temperature may become too hot or too cold. It is suggested that the temperature lever be moved only by small fractions (1/4 inch increments) to readjust the in-car temperature.

The purpose of the selector lever is to provide control over mode of system operation. The following description covers the type of driving conditions that determine at which detent the selector lever should be positioned.

LOW position - This setting should be used during 40° to 70°F outside temperatures. The system will be on automatic temperature control but will have only a fixed low blower speed at all times.

HIGH Position - This setting provides fast warm-up or cool-down. The system is on automatic temperature control and may vary volume of air flow between five blower speeds. HIGH position may also be used to provide added heating or cooling to the rear seat during some weather conditions.

DE-FOG Position - This position directs a portion of the air flow to the defroster outlets and maintains the system on automatic temperature control. The system will vary volume of air flow between five blower speeds. The amount of air deflected to the defroster outlets is proportionate with the position of the selector lever between DE-FOG and DE-ICE.

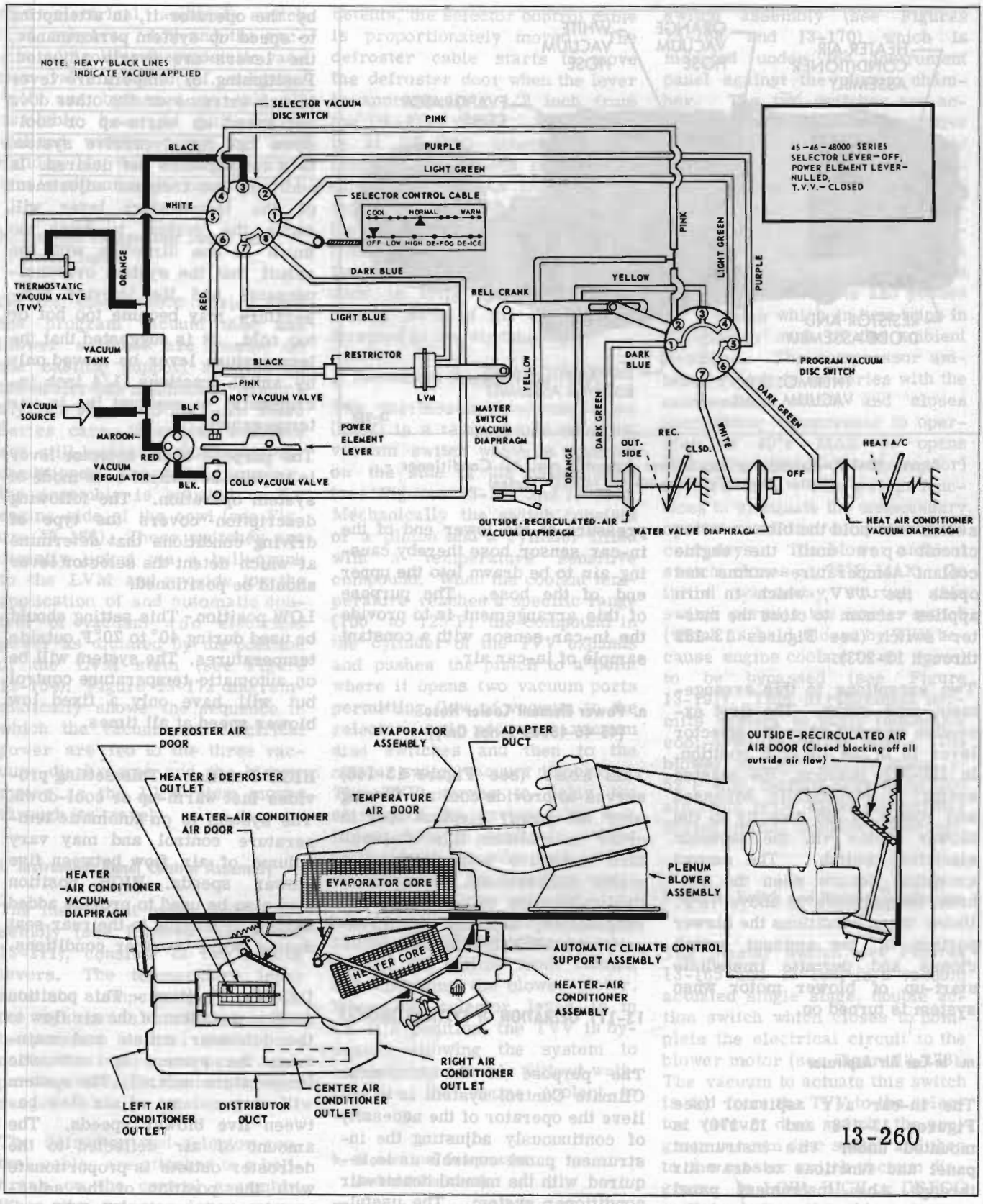


Figure 13-182—Air Flow and Vacuum Circuit, System in Off Position (45-46-48000 Series)

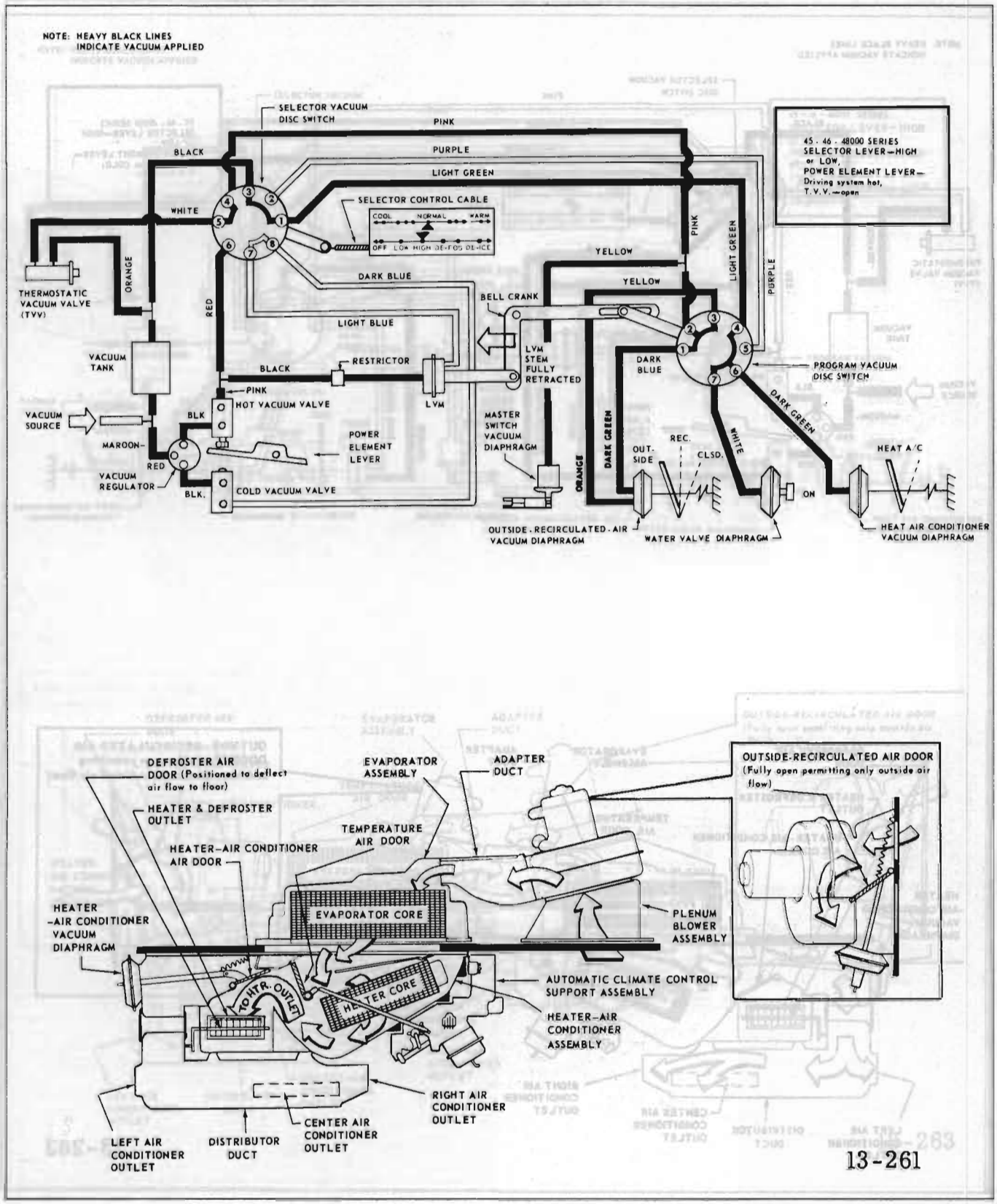


Figure 13-183—Air Flow and Vacuum Circuit, System on LOW or HIGH and LVM Driving to Maximum Heat Position (45-46-48000 Series)

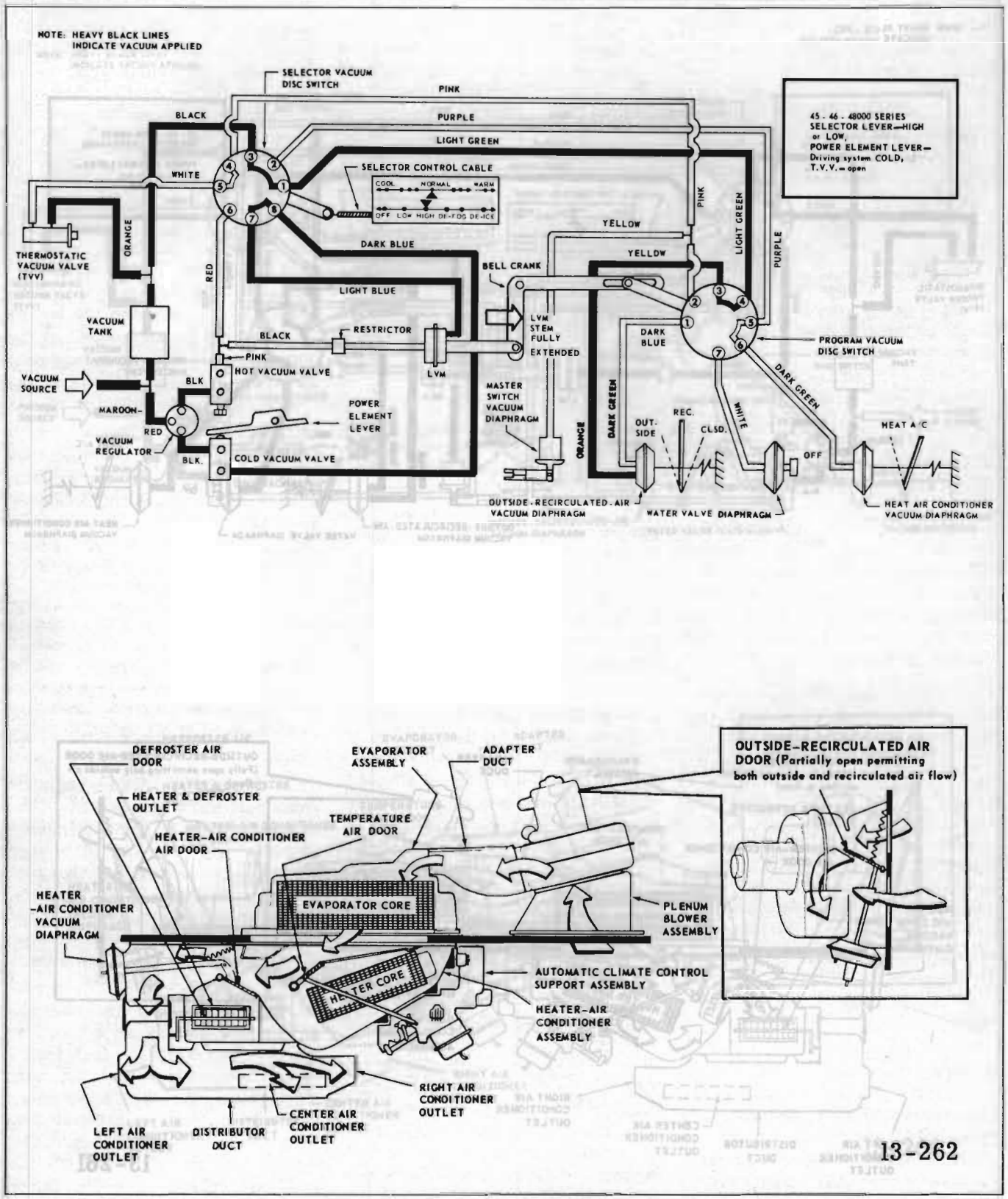


Figure 13-184—Air Flow and Vacuum Circuit System on LOW or HIGH and LVM Driving to Maximum Air Conditioning Position (45-46-48000 Series)

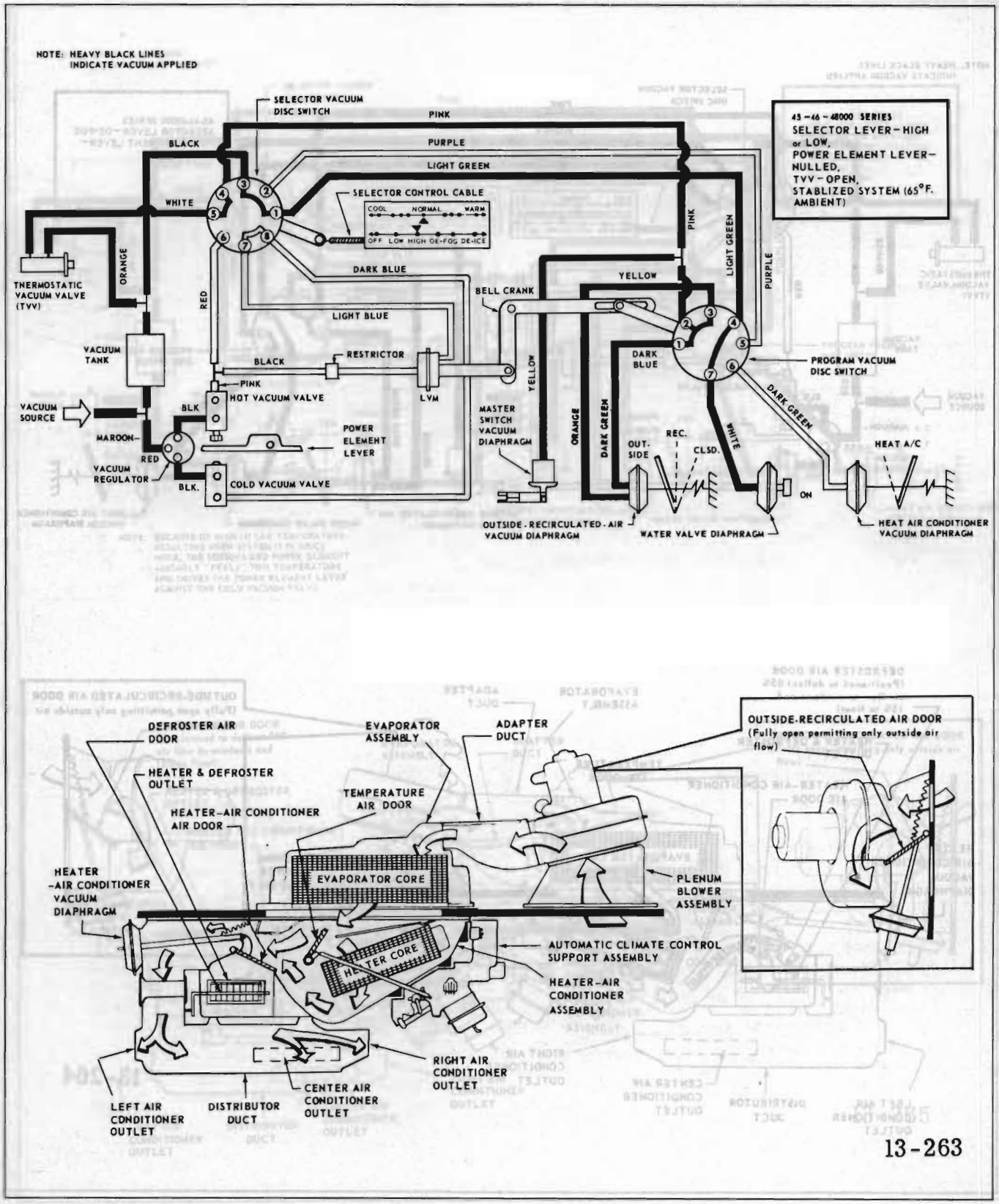


Figure 13-185—Air Flow and Vacuum Circuit, System on LOW or HIGH and LVM Stabilized or "Nulled" (55°F Ambient) (45-46-48000 Series)

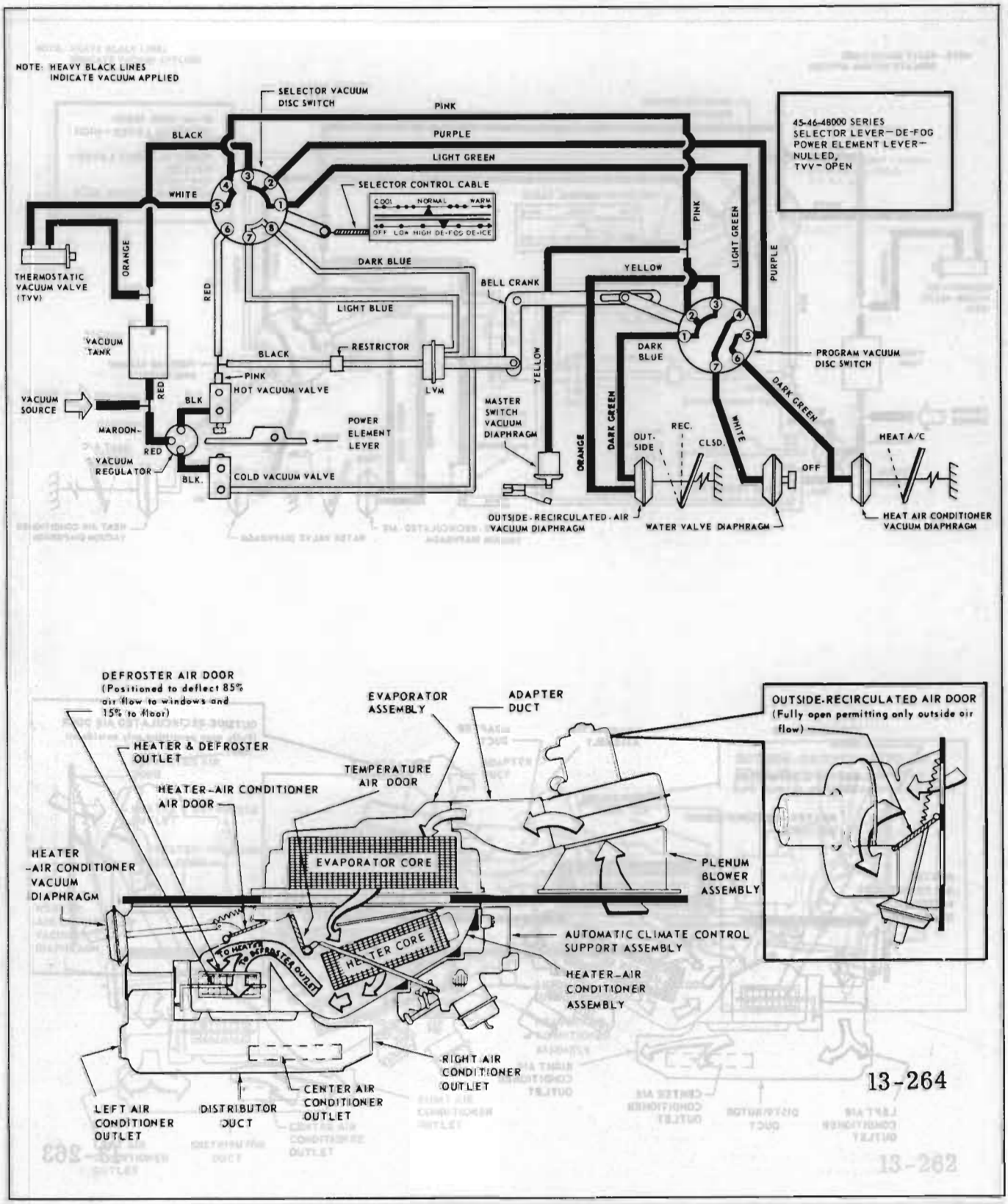


Figure 13-186—Air Flow and Vacuum Circuit, System on DE-FOG. (45-46-48000 Series)

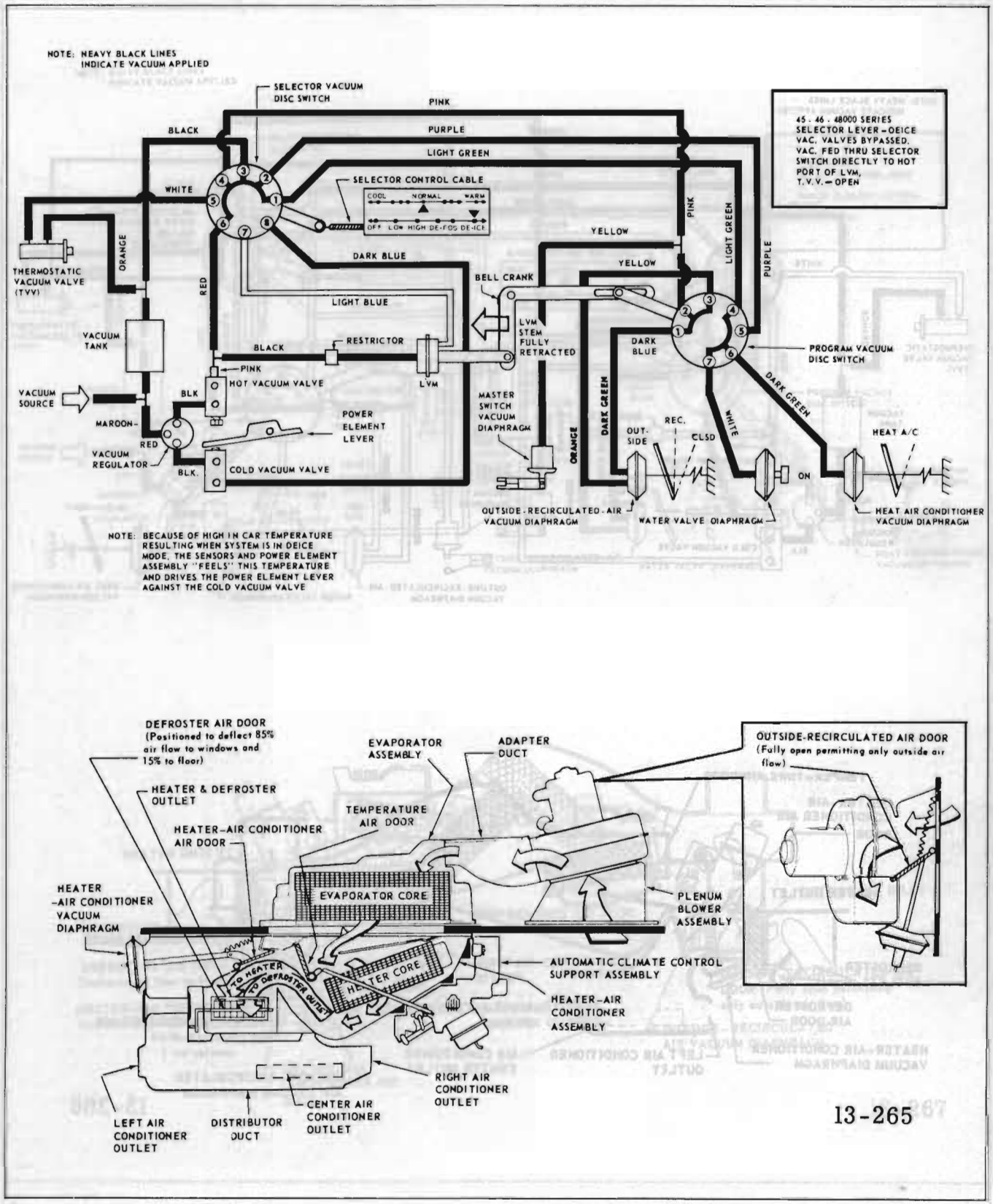


Figure 13-187—Air Flow and Vacuum Circuit, System on DE-ICE and LVM Overridden (45-46-48000 Series)

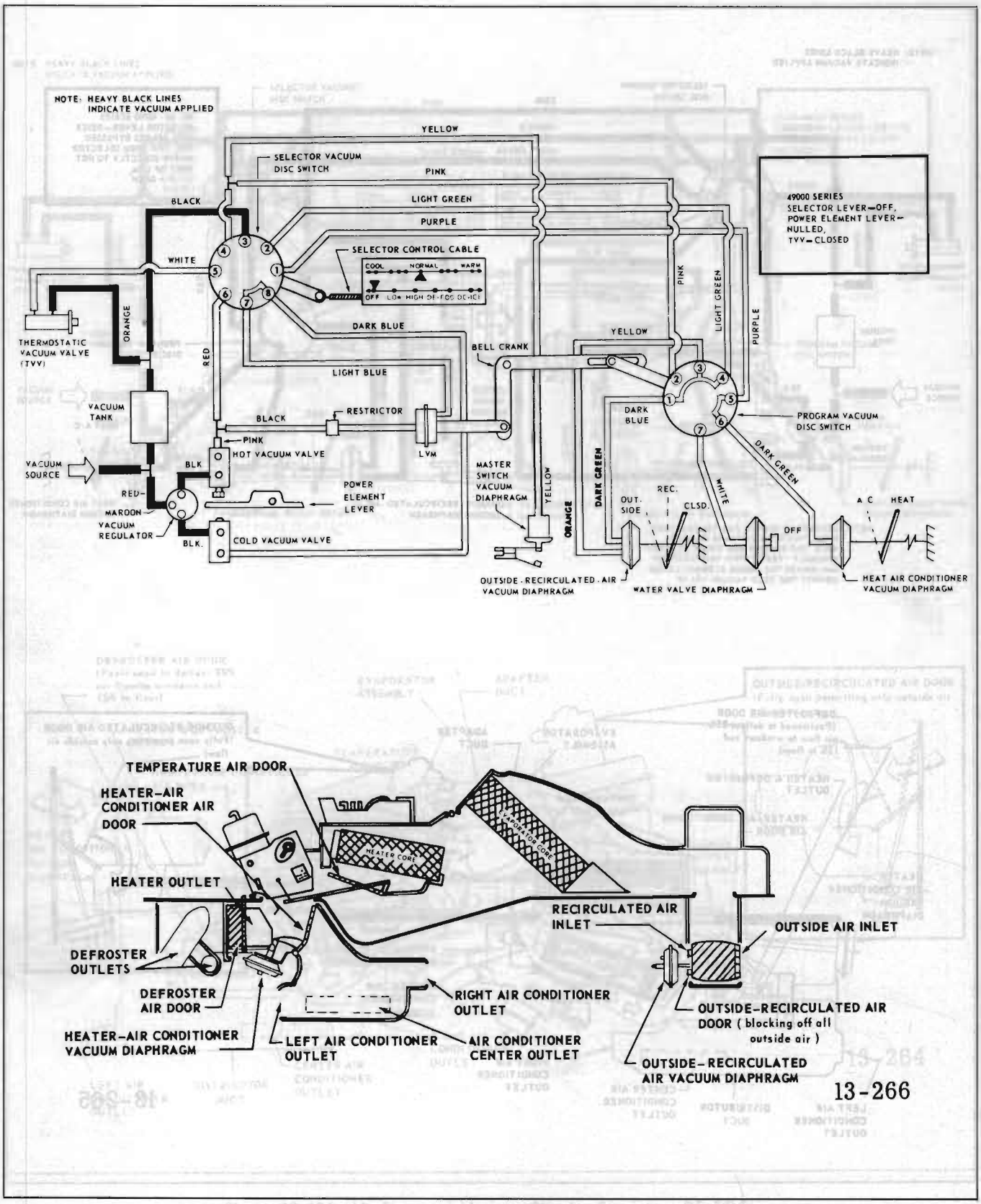


Figure 13-188—Air Flow and Vacuum Circuit, System on OFF Position (49000 Series)

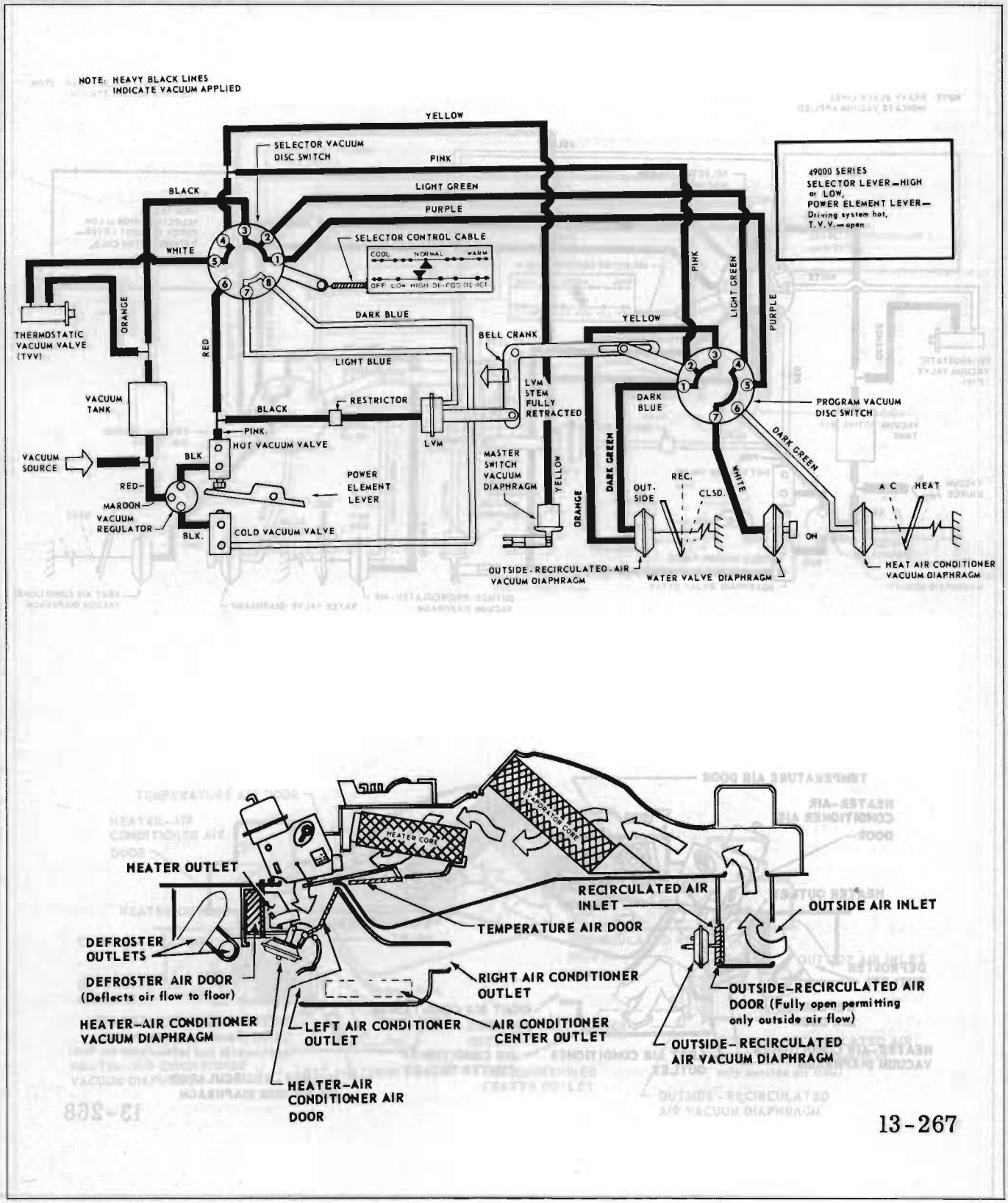


Figure 13-190—Air Flow and Vacuum Circuit, System on LOW or HIGH and LVM Driving to Maximum Heat Position (49000 Series)

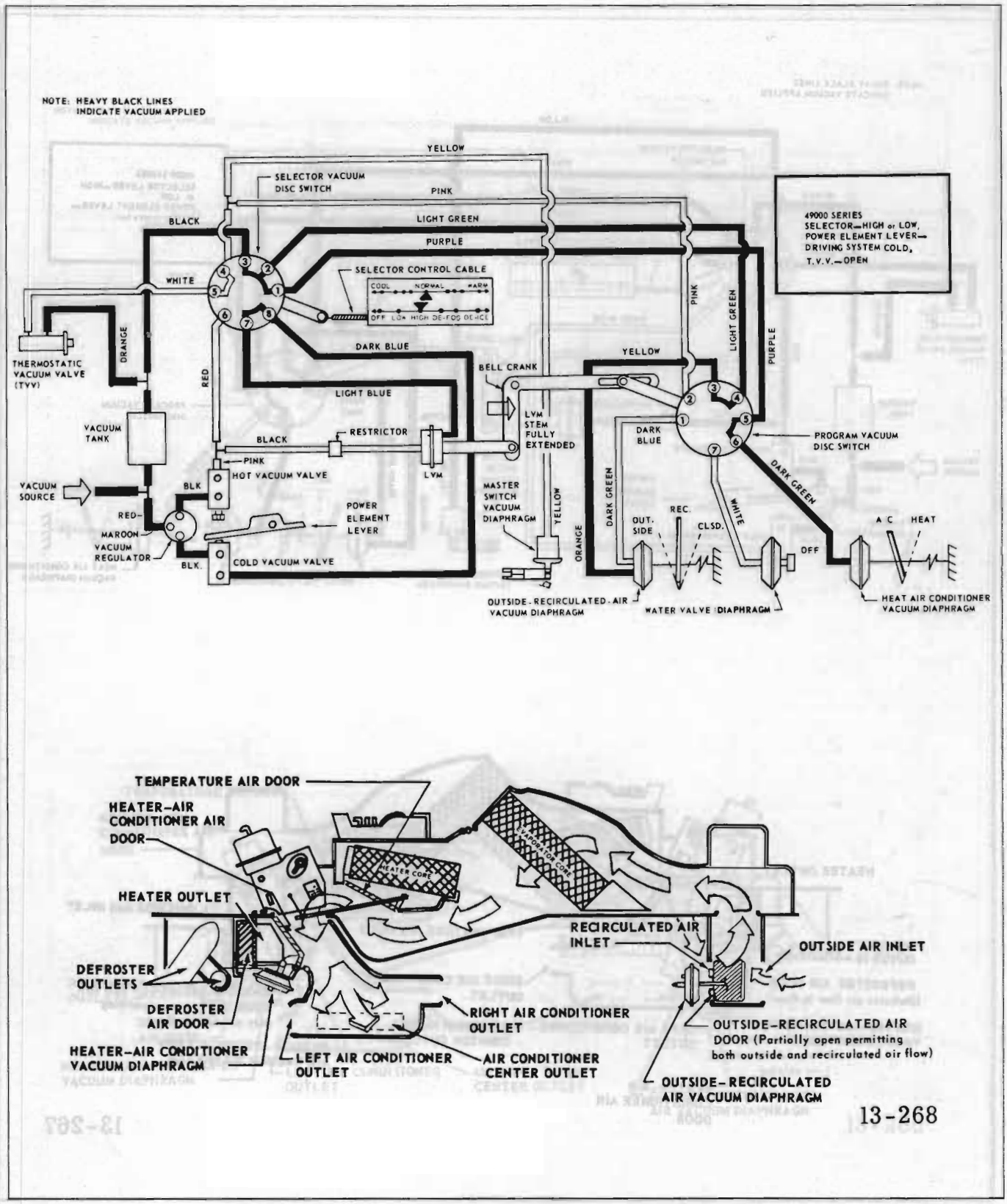


Figure 13-191—Air Flow and Vacuum Circuit, System on LOW or HIGH and LVM Driving to Maximum Air Conditioning Position (49000 Series)

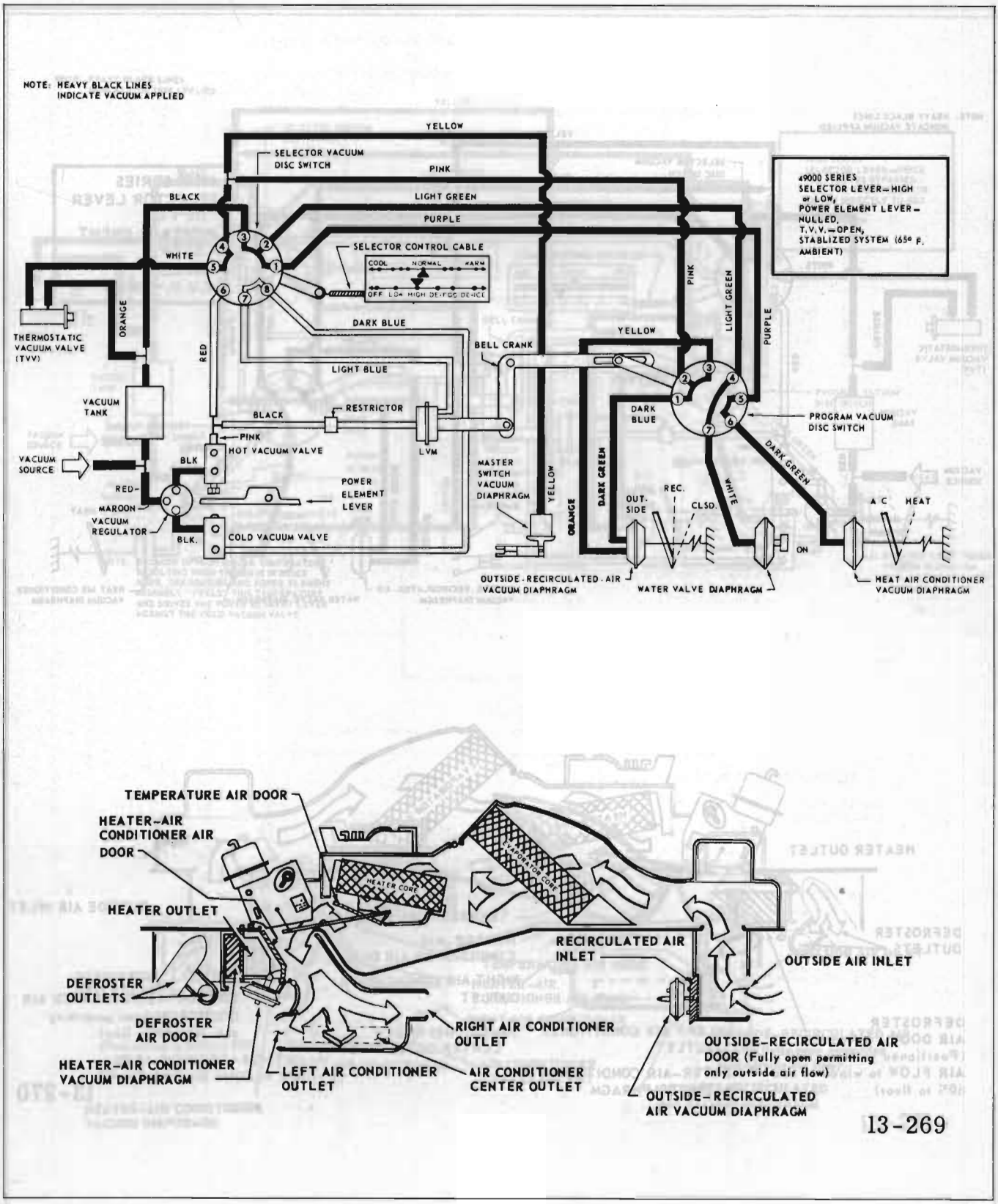


Figure 13-192—Air Flow and Vacuum Circuit, System on LOW or HIGH and LVM Stabilized or "Nulled" (55°F Ambient) (49000 Series)

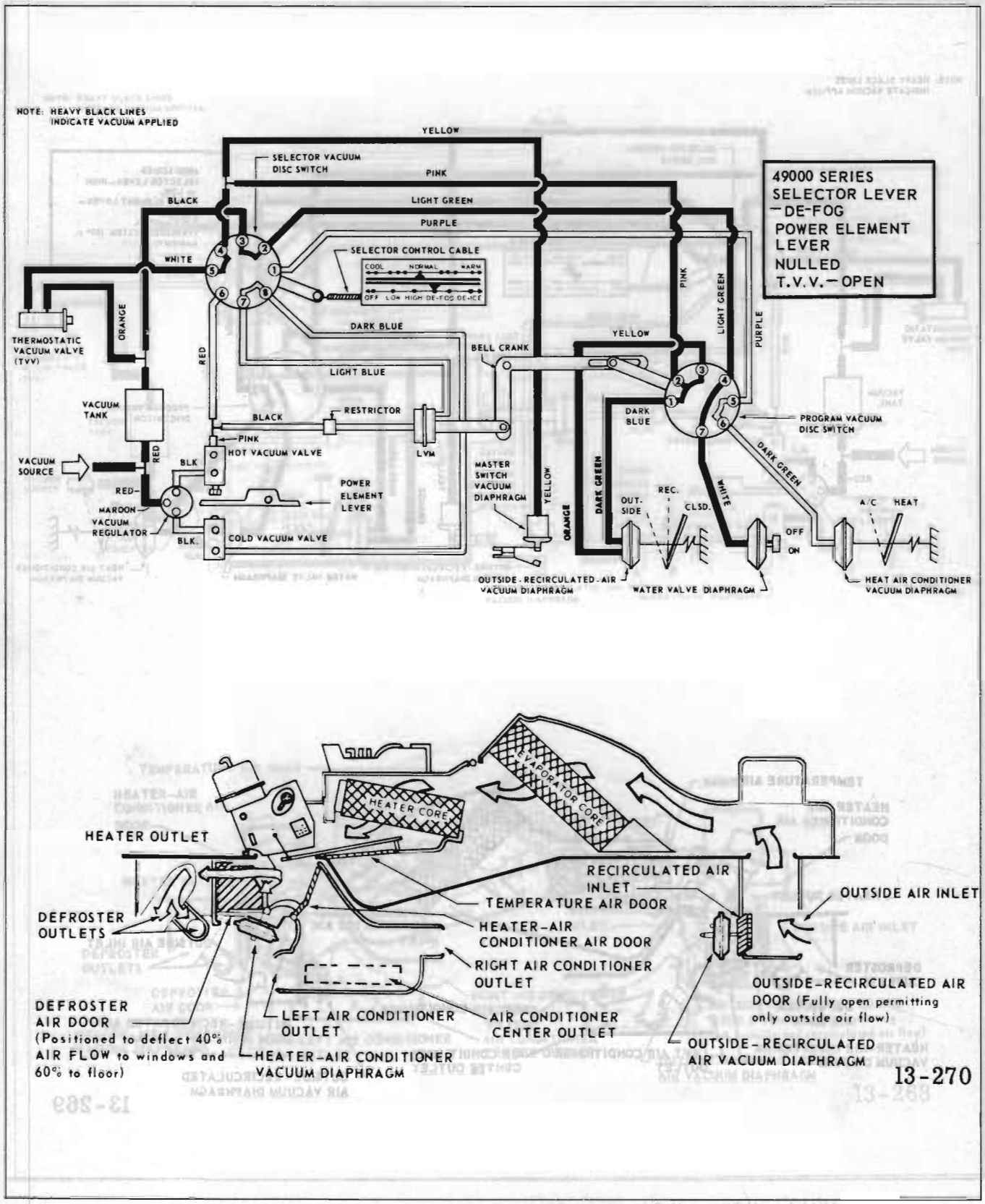


Figure 13-193—Air Flow and Vacuum Circuit, System on DE-FOG. (49000 Series)

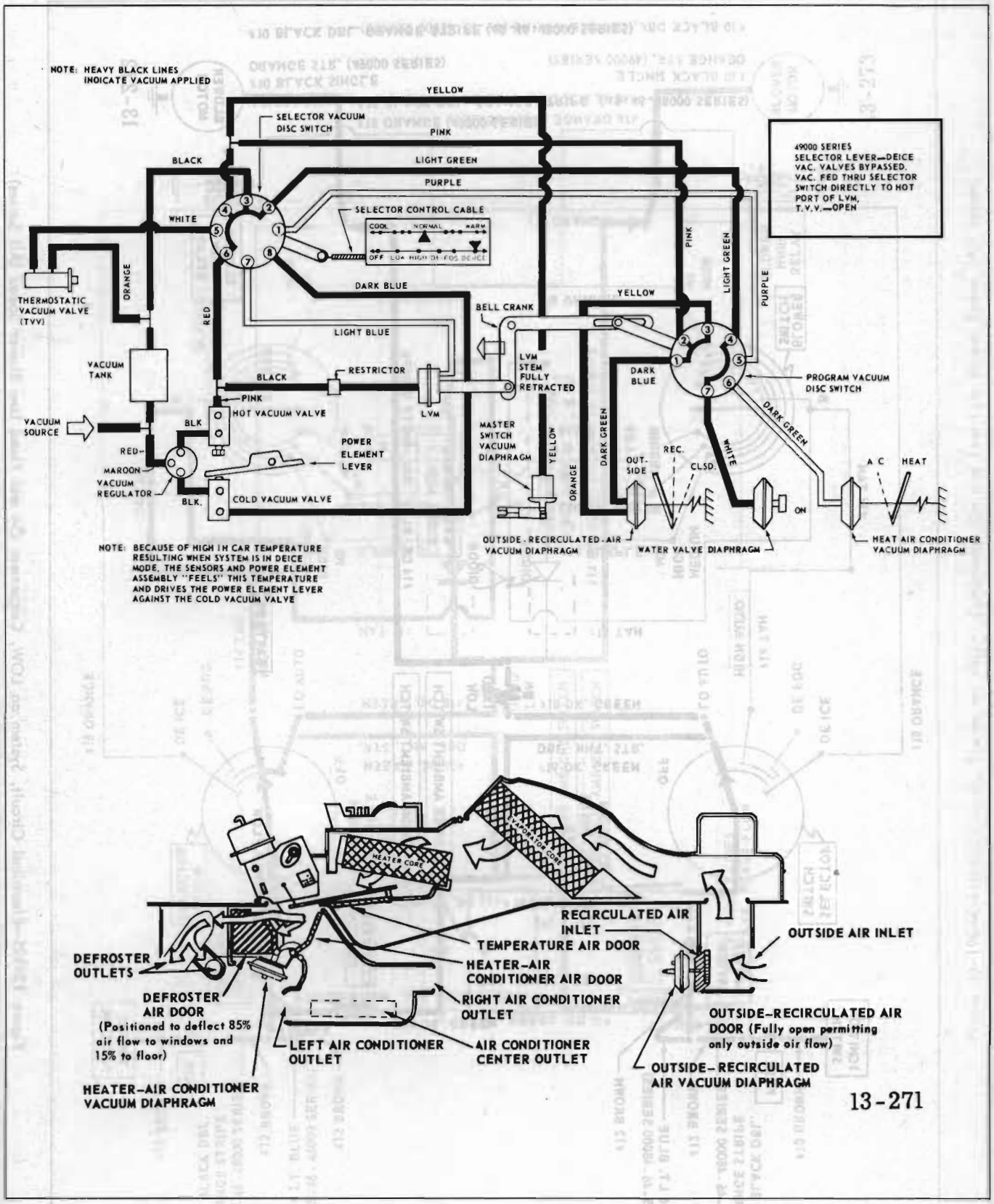


Figure 13-194—Air Flow and Vacuum Circuit, System on DE-ICE and LVM Overridden (49000 Series)

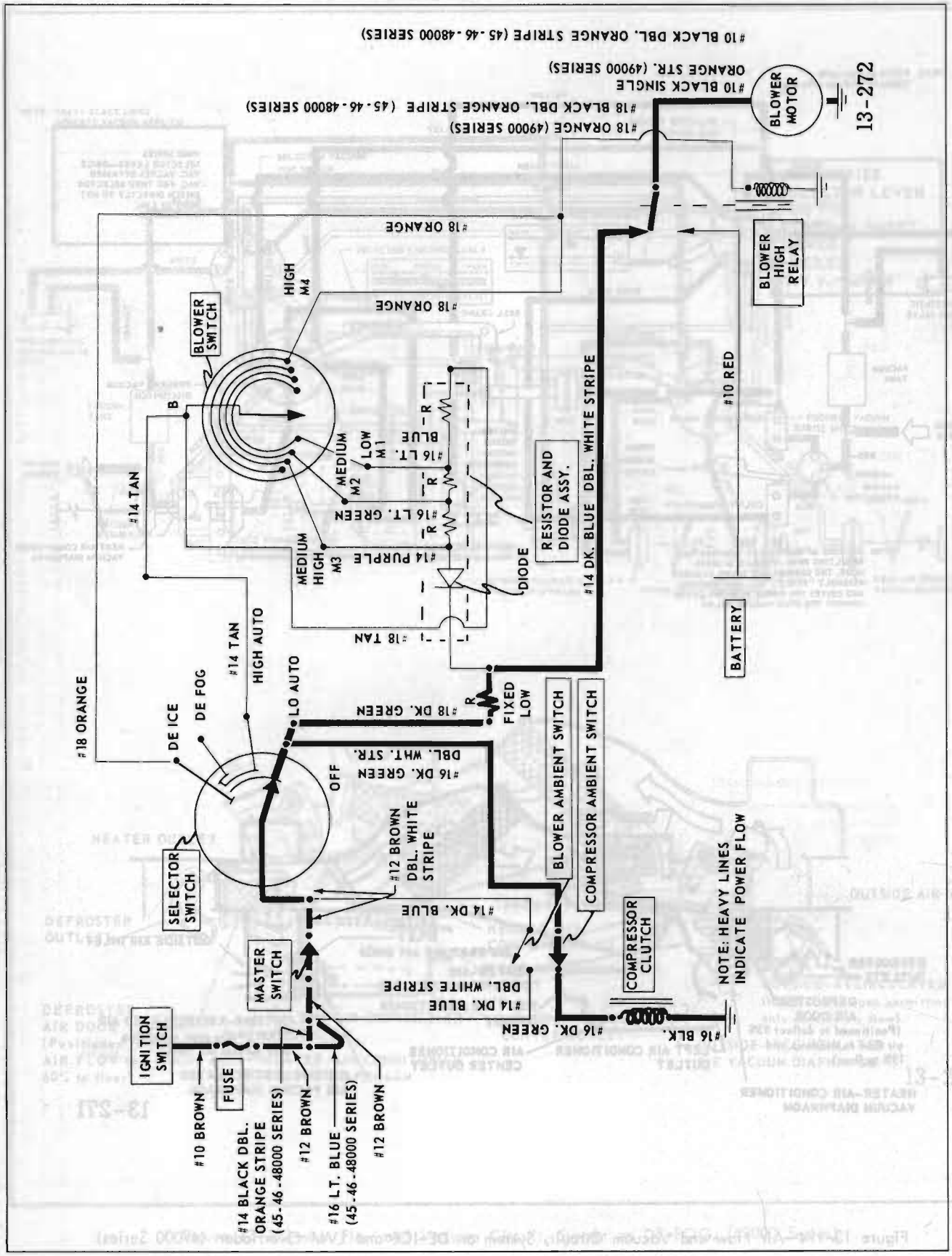


Figure 13-195—Electrical Circuit, System on LOW, Compressor On and Fixed Low Blower Speed (All Series)

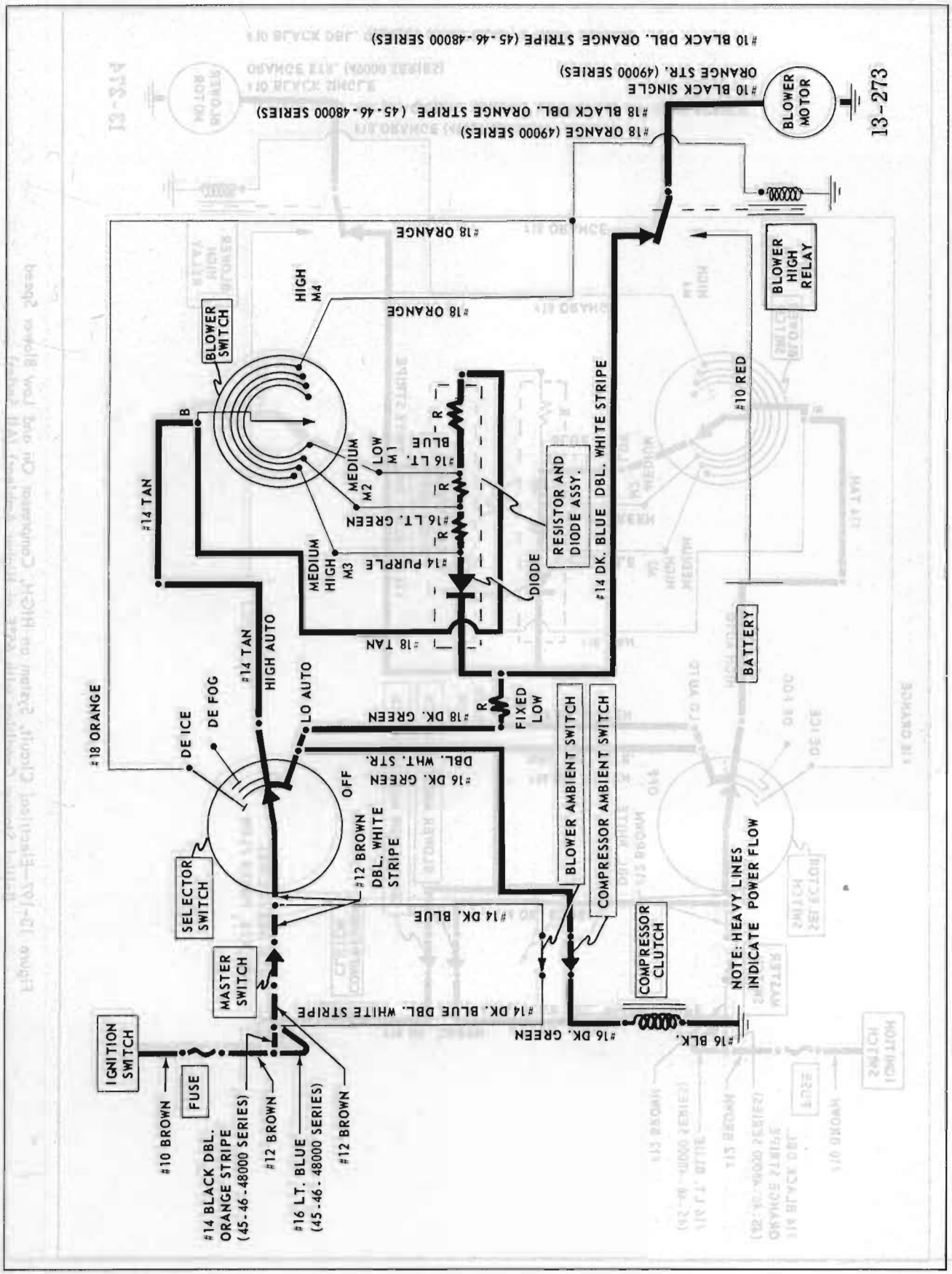


Figure 13-196—Electrical Circuit, System on HIGH, Compressor On and Low-Low Blower Speed (All Series)

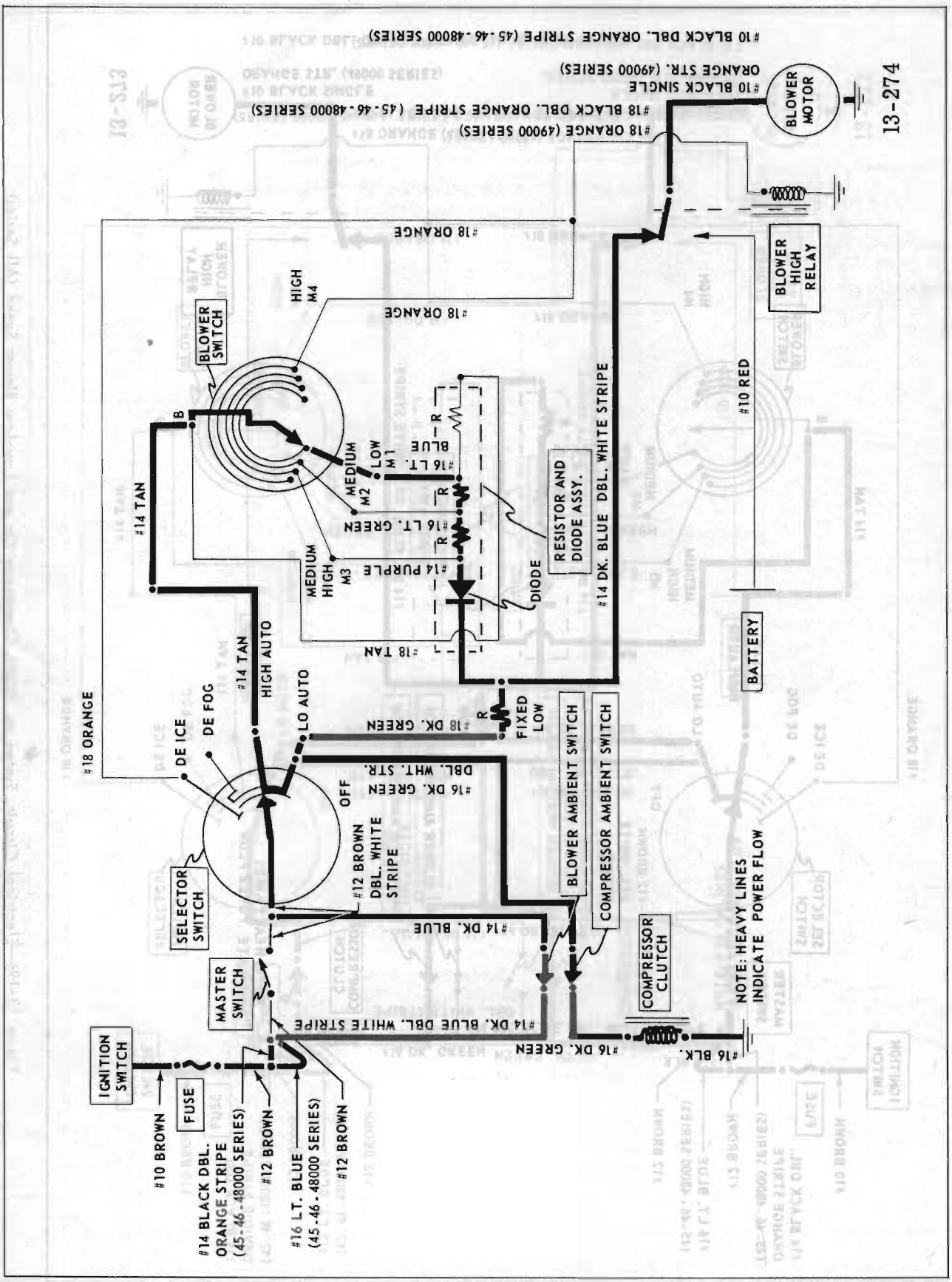


Figure 13-197—Electrical Circuit, System on HIGH, Compressor On and Low Blower Speed (Initial Startup Condition with 65°F or Higher Ambient) (All Series)

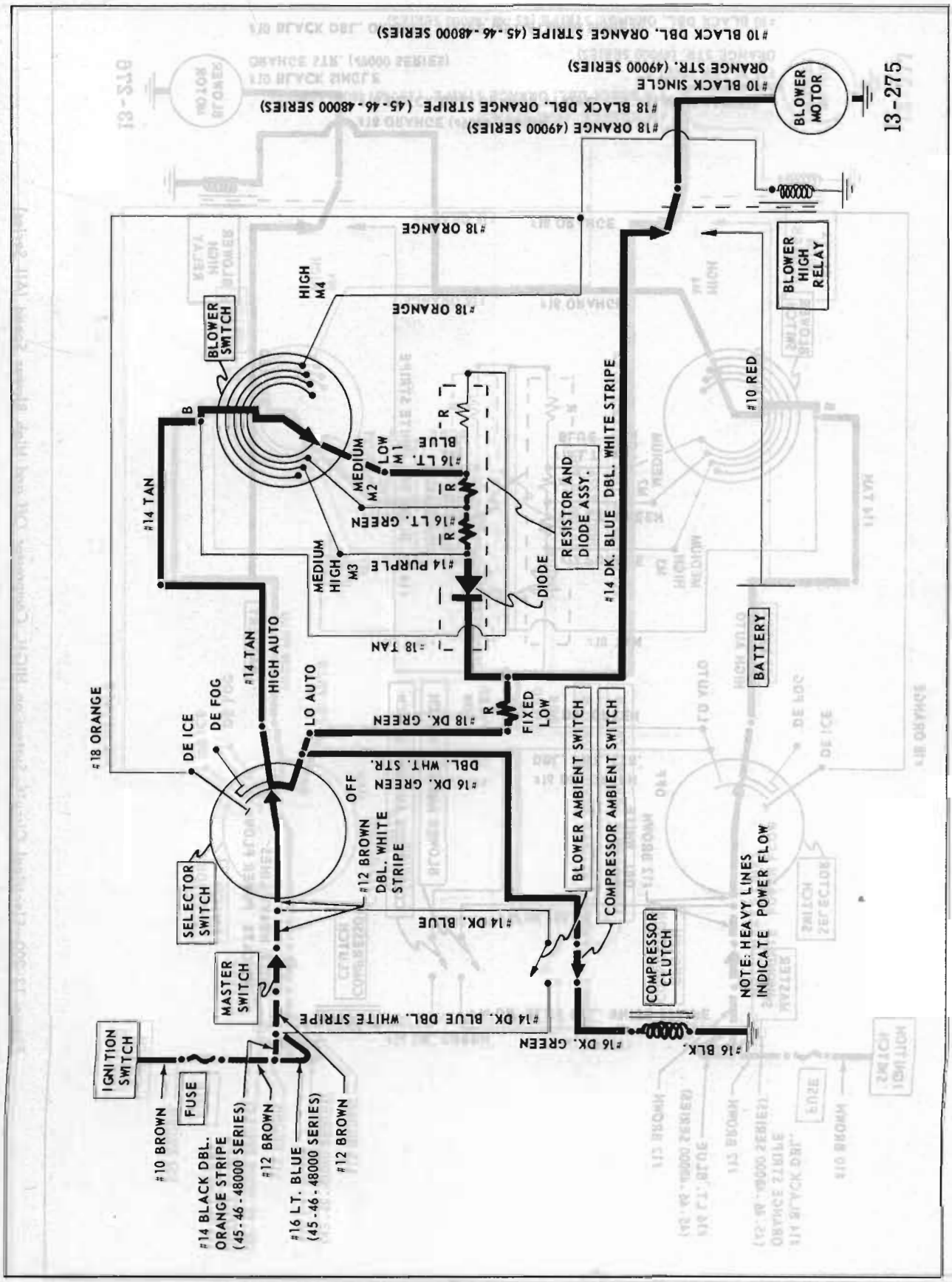


Figure 13-198—Electrical Circuit, System on HIGH, Compressor On and Low Blower Speed (All Series)

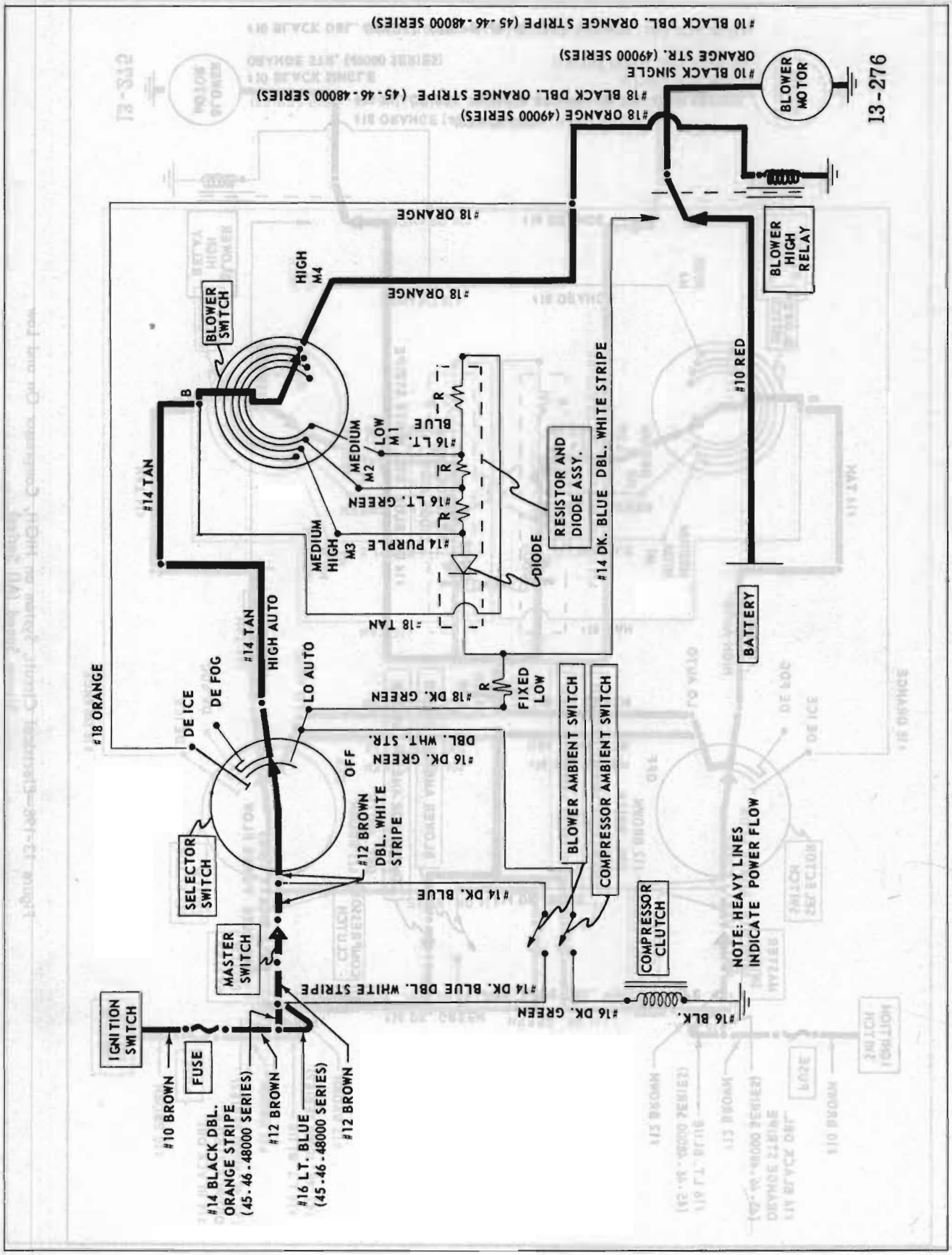


Figure 13-200—Electrical Circuit, System on HIGH, Compressor Off and High Blower Speed (All Series)

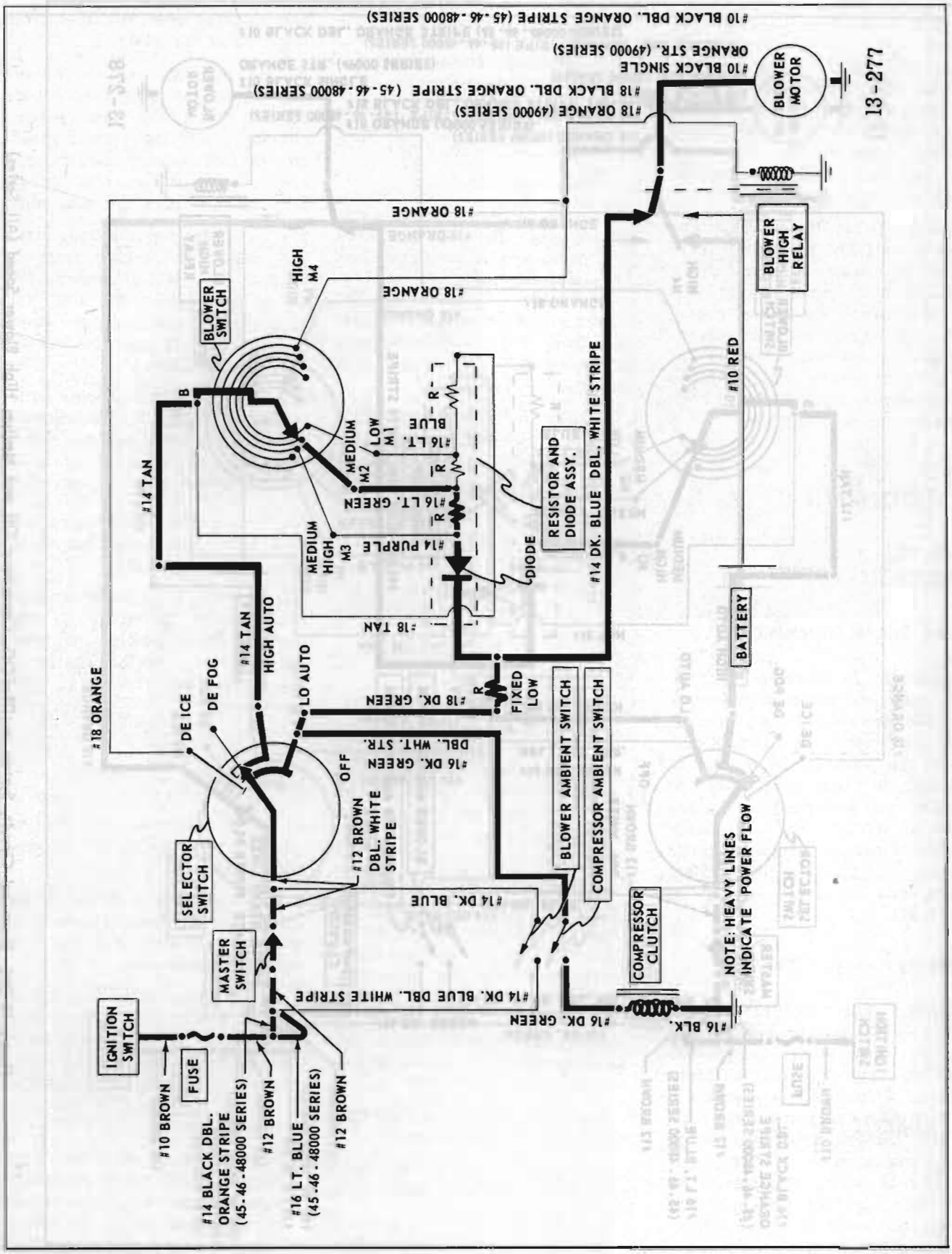


Figure 13-201—Electrical Circuit, System on DE-FOG, Compressor On and Medium Blower Speed (All Series)

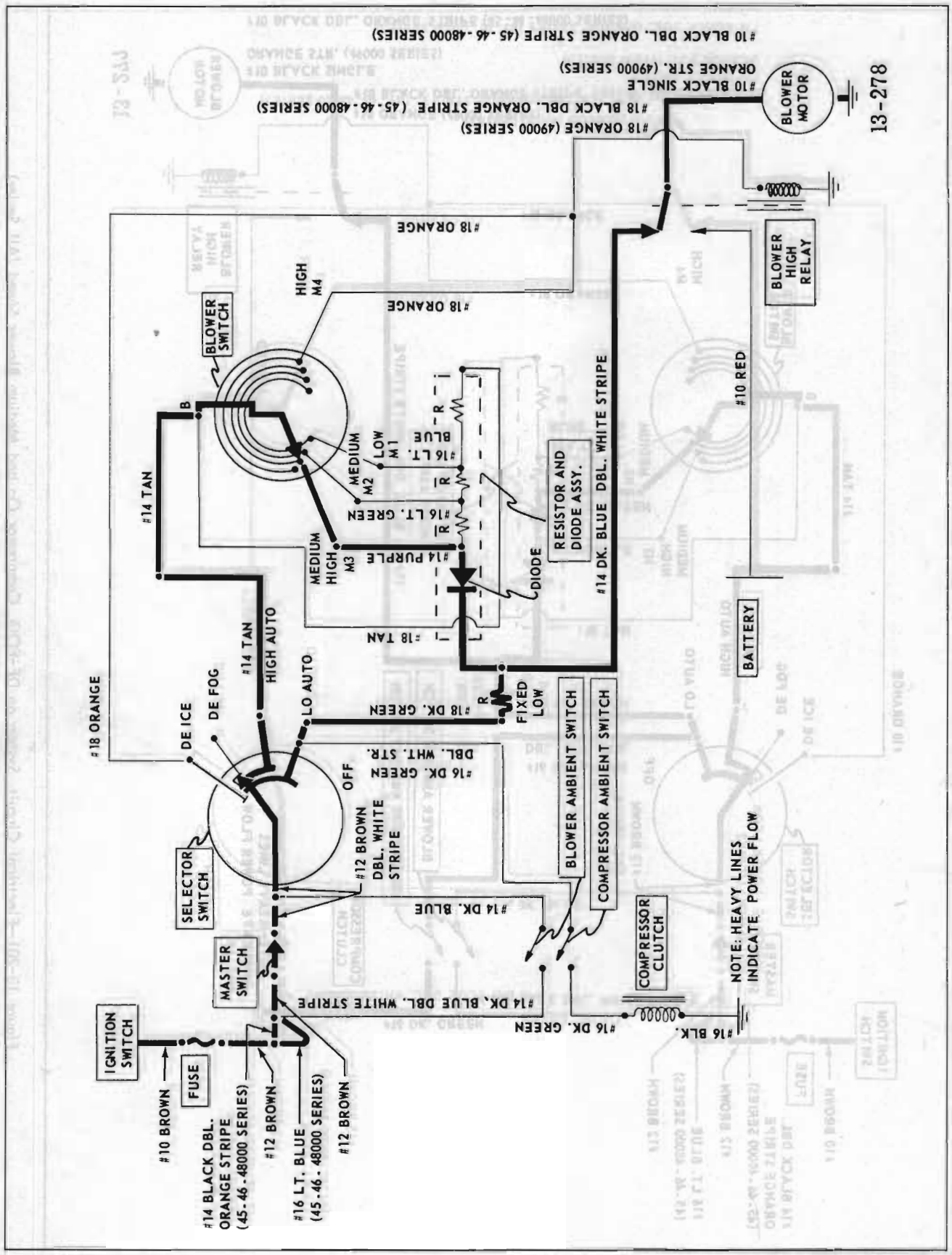


Figure 13-202—Electrical Circuit, System on DE-FOG, Compressor Off and Medium High Blower Speed (All Series)

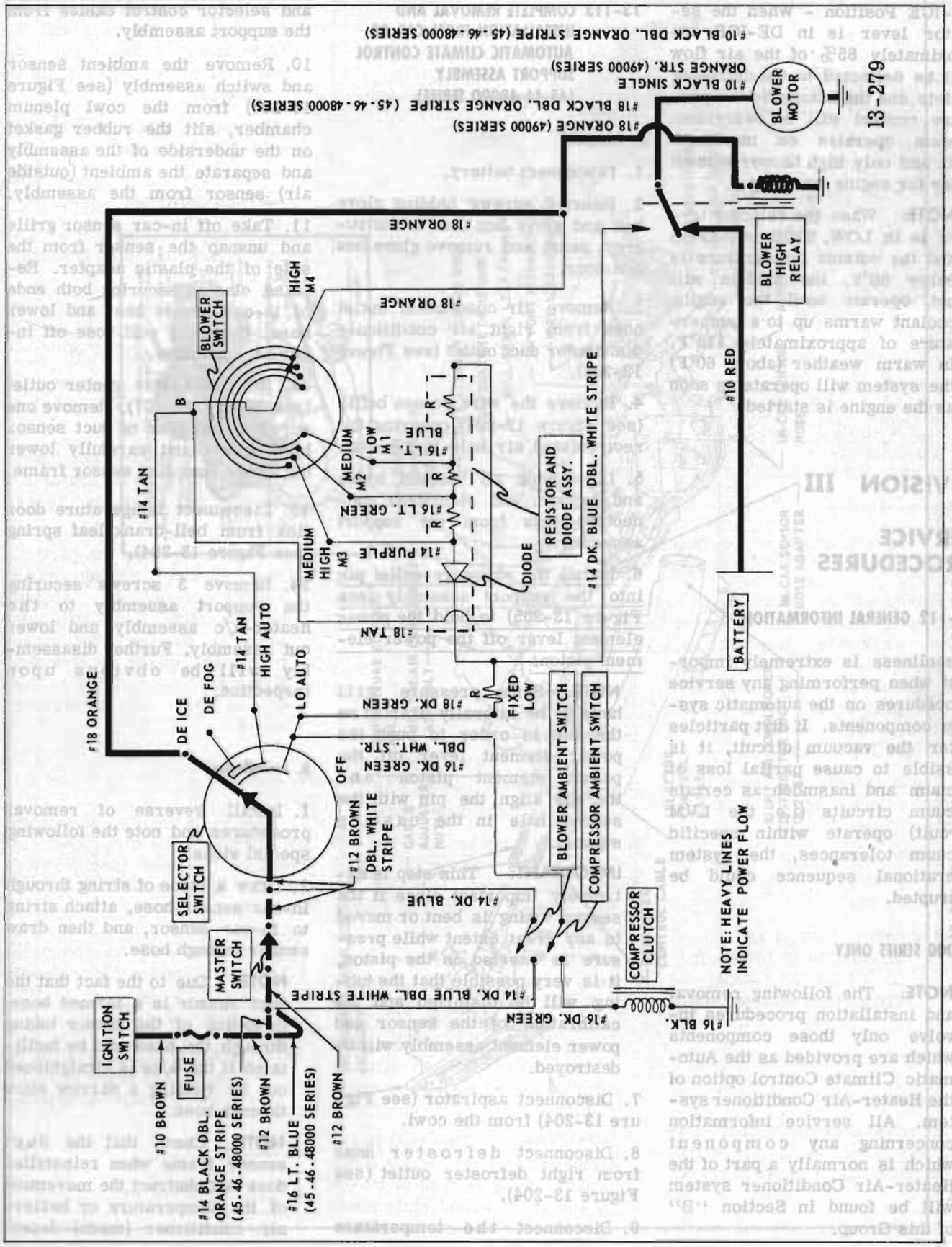


Figure 13-203—Electrical Circuit, System on DE-ICE, Compressor Off and High Blower Speed (All Series)

DE-ICE Position - When the selector lever is in DE-ICE approximately 85% of the air flow will be deflected to the defroster outlets and the automatic temperature control will be overriden. System operates on maximum heat and only high blower without delay for engine warm-up.

NOTE: When the selector lever is in LOW, HIGH or DEFOG and the outside temperature is below 60°F, the system will not operate until the engine coolant warms up to a temperature of approximately 115°F. In warm weather (above 60°F) the system will operate as soon as the engine is started.

DIVISION III

SERVICE PROCEDURES

13-112 GENERAL INFORMATION

Cleanliness is extremely important when performing any service procedures on the automatic system components. If dirt particles enter the vacuum circuit, it is possible to cause partial loss of vacuum and inasmuch as certain vacuum circuits (i.e. the LVM circuit) operate within specific vacuum tolerances, the system operational sequence could be disrupted.

48000 SERIES ONLY

NOTE: The following removal and installation procedures involve only those components which are provided as the Automatic Climate Control option of the Heater-Air Conditioner system. All service information concerning any component which is normally a part of the Heater-Air Conditioner system will be found in Section "B" of this Group.

13-113 COMPLETE REMOVAL AND INSTALLATION FROM CAR OF AUTOMATIC CLIMATE CONTROL SUPPORT ASSEMBLY (45-46-48000 SERIES)

a. Removal

1. Disconnect battery.

2. Remove screws holding glove box and glove box door to instrument panel and remove glove box and door.

3. Remove air conditioner outlet hose from right air conditioner distributor duct outlet (see Figure 13-204).

4. Remove the wire screen baffle (see Figure 13-204) covering the recirculated air hole in the cowl.

5. Disconnect all vacuum hoses and vacuum and electrical connector plugs from the support assembly.

6. Install the pressure relief pin into the support assembly (see Figure 13-205) to hold the power element lever off the power element piston.

NOTE: Some pressure will have to be laterally exerted on the pin in order to push the power element lever off the power element piston and thereby align the pin with the second hole in the casting support.

IMPORTANT: This step is extremely important since if the sensor tubing is bent or moved to any great extent while pressure is exerted on the piston, it is very possible that the tubing will be distorted and the calibration of the sensor and power element assembly will be destroyed.

7. Disconnect aspirator (see Figure 13-204) from the cowl.

8. Disconnect defroster hose from right defroster outlet (see Figure 13-204).

9. Disconnect the temperature and selector control cables from the support assembly.

10. Remove the ambient sensor and switch assembly (see Figure 13-206) from the cowl plenum chamber, slit the rubber gasket on the underside of the assembly and separate the ambient (outside air) sensor from the assembly.

11. Take off in-car sensor grille and unsnap the sensor from the side of the plastic adapter. Release clamps securing both ends of in-car sensor hose and lower hose. Carefully pull hose off in-car sensor tubing.

12. Remove heater center outlet (see Figure 13-207). Remove one screw from rear of duct sensor hose elbow and carefully lower out elbow and duct sensor frame.

13. Disconnect temperature door link from bell-crank leaf spring (see Figure 13-204).

14. Remove 3 screws securing the support assembly to the heater-a/c assembly and lower out assembly. Further disassembly will be obvious upon inspection.

b. Installation

1. Install reverse of removal procedures and note the following special steps.

2. Draw a piece of string through in-car sensor hose, attach string to in-car sensor, and then draw sensor through hose.

NOTE: Due to the fact that the duct sensor is a formed hose, threading of the sensor tubing through the hose will be facilitated if the hose is straightened out by running a narrow stick through hose.

NOTE: Check that the duct sensor frame when reinstalled does not obstruct the movement of the temperature or heater-air conditioner (mode) doors.

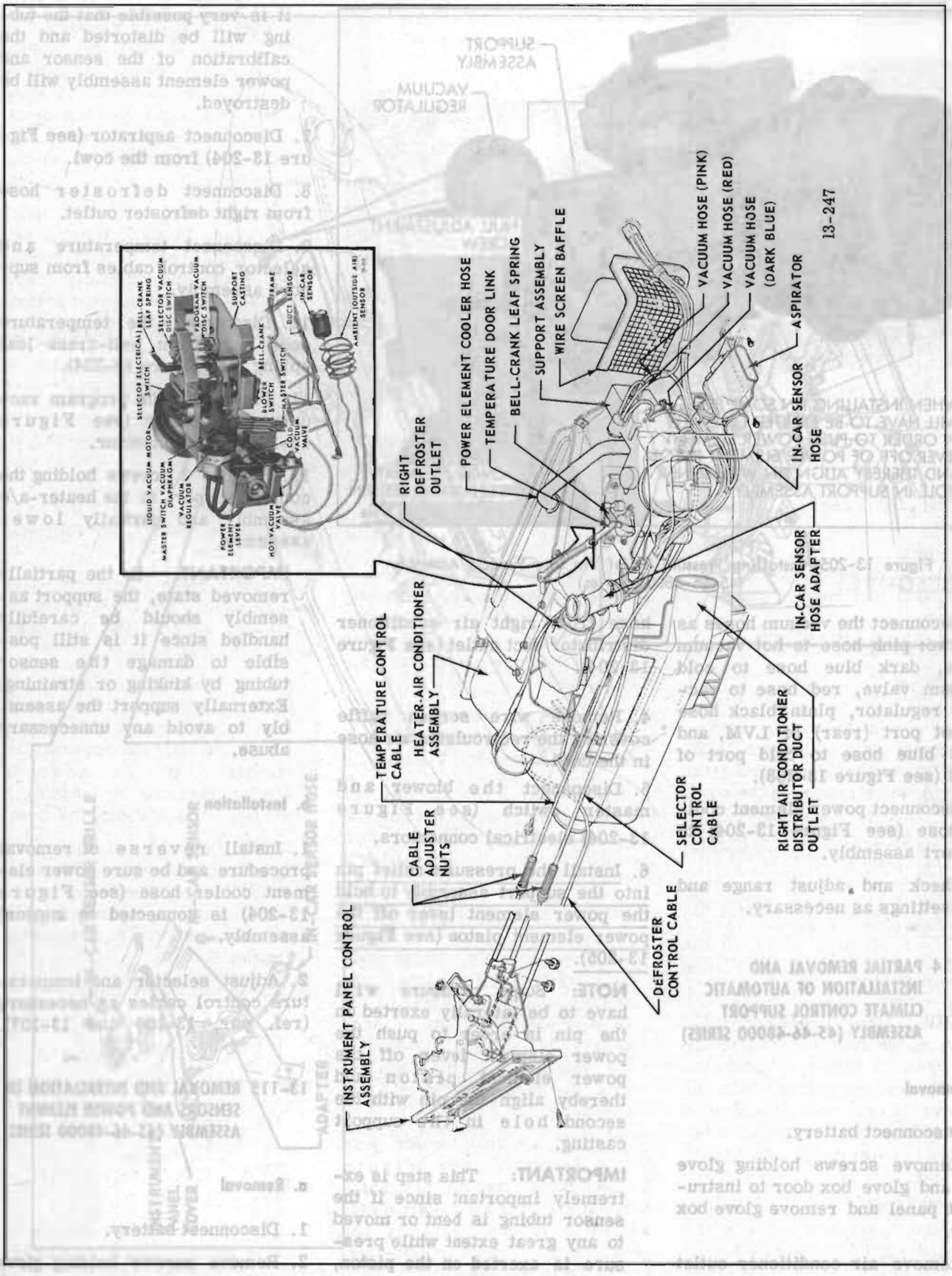


Figure 13-204—Support Assembly, Instrument Panel Control Assembly, and Heater-Air Conditioner Assembly Installation (45-46-48000 Series)

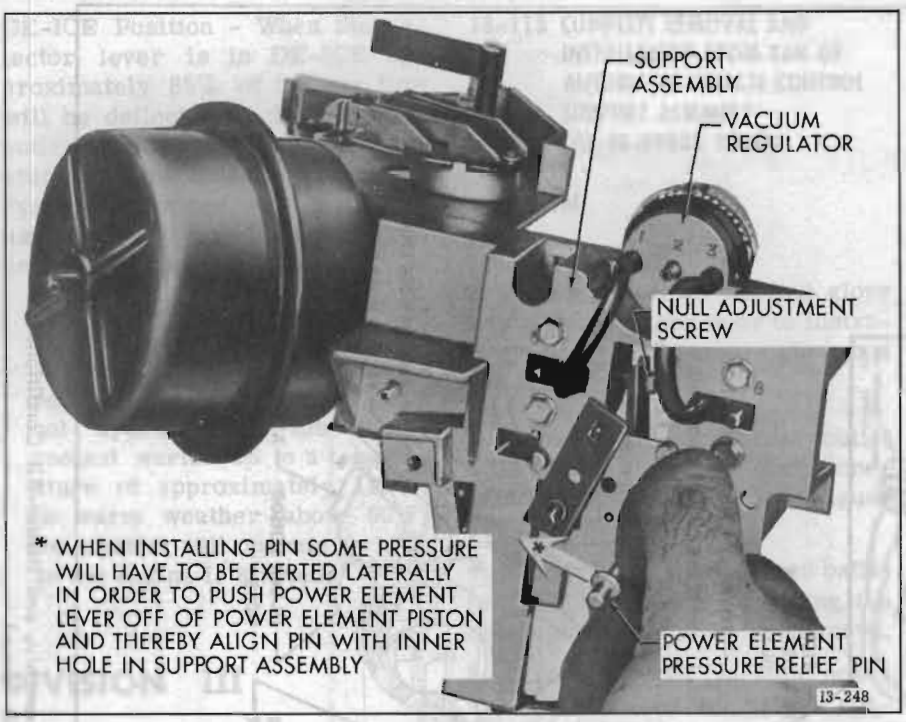


Figure 13-205—Installing Pressure Relief Pin into Support Assembly (45-46-48000 Series)

3. Reconnect the vacuum hoses as follows: pink hose to hot vacuum valve, dark blue hose to cold vacuum valve, red hose to vacuum regulator, plain black hose to hot port (rear) of LVM, and light blue hose to cold port of LVM (see Figure 13-208).

4. Reconnect power element cooler hose (see Figure 13-204) to support assembly.

5. Check and adjust range and null settings as necessary.

13-114 PARTIAL REMOVAL AND INSTALLATION OF AUTOMATIC CLIMATE CONTROL SUPPORT ASSEMBLY (45-46-48000 SERIES)

a. Removal

1. Disconnect battery.

2. Remove screws holding glove box and glove box door to instrument panel and remove glove box door.

3. Remove air conditioner outlet hose from right air conditioner distributor duct outlet (see Figure 13-204).

4. Remove wire screen baffle covering the recirculated air hose in the cowl.

5. Disconnect the blower and master switch (see Figure 13-204) electrical connectors.

6. Install the pressure relief pin into the support assembly to hold the power element lever off the power element piston (see Figure 13-205).

NOTE: Some pressure will have to be laterally exerted on the pin in order to push the power element lever off the power element piston and thereby align the pin with the second hole in the support casting.

IMPORTANT: This step is extremely important since if the sensor tubing is bent or moved to any great extent while pressure is exerted on the piston, it is very possible that the tubing will be distorted and the calibration of the sensor and power element assembly will be destroyed.

7. Disconnect aspirator (see Figure 13-204) from the cowl.

8. Disconnect defroster hose from right defroster outlet.

9. Disconnect temperature and selector control cables from support assembly.

10. Disconnect the temperature door link from bell-crank leaf spring (see Figure 13-204).

11. Disconnect the program vacuum disc switch (see Figure 13-204) plug connector.

12. Remove 3 screws holding the control support to the heater-a/c assembly and partially lower assembly.

IMPORTANT: In the partially removed state, the support assembly should be carefully handled since it is still possible to damage the sensor tubing by kinking or straining. Externally support the assembly to avoid any unnecessary abuse.

b. Installation

1. Install reverse of removal procedure and be sure power element cooler hose (see Figure 13-204) is connected to support assembly.

2. Adjust selector and temperature control cables as necessary (ref. par. 13-106 and 13-107).

13-115 REMOVAL AND INSTALLATION OF SENSORS AND POWER ELEMENT ASSEMBLY (45-46-48000 SERIES)

a. Removal

1. Disconnect battery.

2. Remove screws holding glove

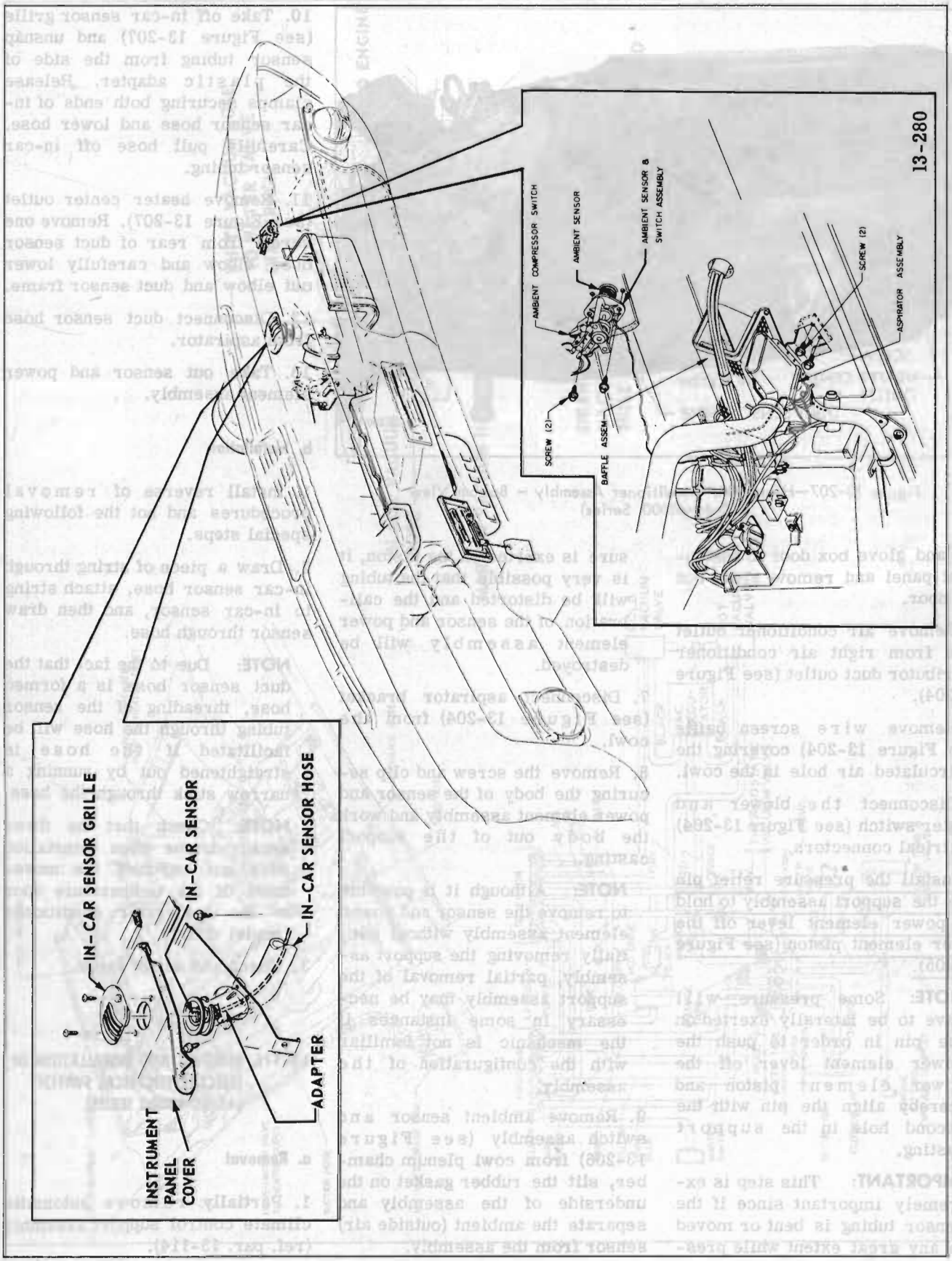


Figure 13-206—In-Car Sensor and Ambient (Outside Air) Sensor Installation (45-46-48000 Series)

Figure 13-207—Heater-Air Conditioner Assembly - Bottom View (45-46-48000 Series)

box and glove box door to instrument panel and remove glove box and door.

3. Remove air conditioner outlet hose from right air conditioner distributor duct outlet (see Figure 13-204).

4. Remove wire screen baffle (see Figure 13-204) covering the recirculated air hole in the cowl.

5. Disconnect the blower and master switch (see Figure 13-204) electrical connectors.

6. Install the pressure relief pin onto the support assembly to hold the power element lever off the power element piston (see Figure 13-205).

NOTE: Some pressure will have to be laterally exerted on the pin in order to push the power element lever off the power element piston and thereby align the pin with the second hole in the support casting.

IMPORTANT: This step is extremely important since if the sensor tubing is bent or moved to any great extent while pressure is exerted on the piston, it is very possible that the tubing will be distorted and the calibration of the sensor and power element assembly will be destroyed.

7. Disconnect aspirator bracket (see Figure 13-204) from the cowl.

8. Remove the screw and clip securing the body of the sensor and power element assembly and work the body out of the support casting.

NOTE: Although it is possible to remove the sensor and power element assembly without partially removing the support assembly, partial removal of the support assembly may be necessary in some instances if the mechanic is not familiar with the configuration of the assembly.

9. Remove ambient sensor and switch assembly (see Figure 13-206) from cowl plenum chamber, slit the rubber gasket on the underside of the assembly and separate the ambient (outside air) sensor from the assembly.

10. Take off in-car sensor grille (see Figure 13-207) and unsnap sensor tubing from the side of the plastic adapter. Release clamps securing both ends of in-car sensor hose and lower hose. Carefully pull hose off in-car sensor tubing.

11. Remove heater center outlet (see Figure 13-207). Remove one screw from rear of duct sensor hose elbow and carefully lower out elbow and duct sensor frame.

12. Disconnect duct sensor hose from aspirator.

13. Take out sensor and power element assembly.

b. Installation

1. Install reverse of removal procedures and not the following special steps.

2. Draw a piece of string through in-car sensor hose, attach string to in-car sensor, and then draw sensor through hose.

NOTE: Due to the fact that the duct sensor hose is a formed hose, threading of the sensor tubing through the hose will be facilitated if the hose is straightened out by running a narrow stick through the hose.

NOTE: Check that the duct sensor frame when reinstalled does not obstruct the movement of the temperature door or the heater-air conditioner (mode) door.

3. Check and adjust range.

13-116 REMOVAL AND INSTALLATION OF SELECTOR ELECTRICAL SWITCH (45-46-48000 SERIES)

a. Removal

1. Partially remove automatic climate control support assembly (ref. par. 13-114).

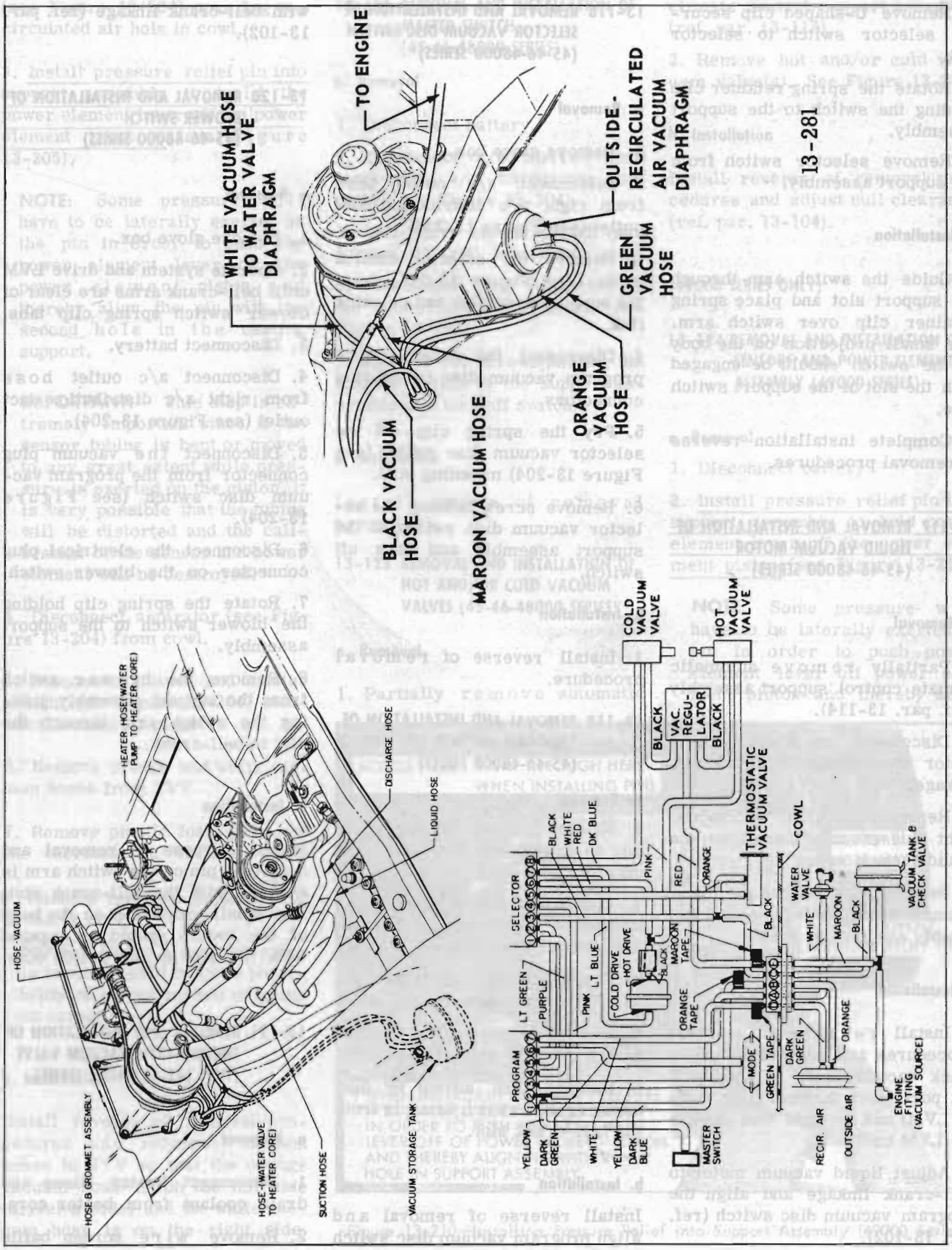


Figure 13-208—Vacuum Hose Installation (45-46-48000 Series)

2. Remove U-shaped clip securing selector switch to selector link.

3. Rotate the spring retainer clip holding the switch to the support assembly.

4. Remove selector switch from the support assembly.

b. Installation

1. Guide the switch arm through the support slot and place spring retainer clip over switch arm. The small projection on the body of the switch should be engaged with the slot of the support switch hole.

2. Complete installation reverse of removal procedures.

13-117 REMOVAL AND INSTALLATION OF LIQUID VACUUM MOTOR (45-46-48000 SERIES)

a. Removal

1. Partially remove automatic climate control support assembly (ref. par. 13-114).

2. Disconnect the liquid vacuum motor stem from the bell-crank linkage.

3. Remove the plain black and light blue vacuum hoses from the liquid vacuum motor.

4. Remove nuts holding the liquid vacuum motor to the support assembly and remove LVM.

b. Installation

1. Install reverse of removal procedures and connect the plain black vacuum hose to the LVM hot port (port farthest from stem of LVM) and the light blue hose to the LVM cold port.

2. Adjust liquid vacuum motor to bell-crank linkage and align the program vacuum disc switch (ref. par. 13-102).

13-118 REMOVAL AND INSTALLATION OF SELECTOR VACUUM DISC SWITCH (45-46-48000 SERIES)

a. Removal

1. Remove glove box.

2. Disconnect a/c outlet hose from right a/c distribution duct outlet (see Figure 13-204).

3. Remove the selector control cable (see Figure 13-204) from the support assembly and selector link.

4. Disconnect the selector and program vacuum disc switch plug connectors.

5. Pry the spring clip off the selector vacuum disc switch (see Figure 13-204) mounting stud.

6. Remove screw holding the selector vacuum disc switch to the support assembly and take off switch.

b. Installation

1. Install reverse of removal procedure.

13-119 REMOVAL AND INSTALLATION OF PROGRAM VACUUM DISC SWITCH (45-46-48000 SERIES)

a. Removal

1. Remove screws holding glove box tc instrument panel and take off glove box.

2. Disconnect the vacuum plug connector from program vacuum disc switch (see Figure 13-204).

3. Pry the spring clip off the vacuum disc switch mounting stud.

4. Remove screw holding the disc switch to the support assembly.

5. Remove disc switch by disengaging the switch arm pin from the bell-crank slot.

b. Installation

Install reverse of removal and align program vacuum disc switch with bell-crank linkage (ref. par. 13-102).

13-120 REMOVAL AND INSTALLATION OF BLOWER SWITCH (45-46-48000 SERIES)

a. Removal

1. Remove glove box.

2. Operate system and drive LVM until bell-crank arms are clear of blower switch spring clip tabs.

3. Disconnect battery.

4. Disconnect a/c outlet hose from right a/c distribution duct outlet (see Figure 13-204).

5. Disconnect the vacuum plug connector from the program vacuum disc switch (see Figure 13-204).

6. Disconnect the electrical plug connector on the blower switch.

7. Rotate the spring clip holding the blower switch to the support assembly.

8. Remove the blower switch from the support assembly guiding the switch arm through the slot in bell-crank.

b. Installation

Install reverse of removal and note that pin on the switch arm is engaged with the bell-crank slot. The small projection on the body of the switch should be engaged with the slot in the switch hole.

13-121 REMOVAL AND INSTALLATION OF THERMOSTATIC VACUUM VALVE (TVV) (45-46-48000 SERIES)

a. Removal

1. Disconnect heater hoses and drain coolant from heater core.

2. Remove wire screen baffle

(see Figure 13-204) covering recirculated air hole in cowl.

3. Install pressure relief pin into support assembly to hold the power element lever off the power element piston (see Figure 13-205).

NOTE: Some pressure will have to be laterally exerted on the pin in order to push the power element lever off the power element piston and thereby align the pin with the second hole in the casting support.

IMPORTANT: This step is extremely important since if the sensor tubing is bent or moved to any great extent while pressure is exerted on the piston, it is very possible that the tubing will be distorted and the calibration of the sensor and power element will be destroyed.

4. Disconnect aspirator (see Figure 13-204) from cowl.

5. Disconnect blower and master switch (see Figure 13-204) electrical connector plugs.

6. Remove orange and white vacuum hoses from TVV.

7. Remove plastic foam pad from the thermostatic vacuum valve.

8. Remove two nuts holding TVV to heater core.

NOTE: Use of a floor covering is recommended to avoid possibility of engine coolant dripping on carpet.

b. Installation

Install reverse of removal procedures and reconnect vacuum hoses to TVV so that the orange vacuum hose is on the left side (driver's side) and the white vacuum hose is on the right side.

13-122 REMOVAL AND INSTALLATION OF MASTER SWITCH (45-46-48000 SERIES)

a. Removal

1. Disconnect battery.

2. Disconnect a/c outlet hose from right a/c distribution duct outlet (see Figure 13-204).

3. Disconnect blower switch (see Figure 13-204) connector plug.

4. Disconnect plug connector at the master switch terminals (see Figure 13-204).

5. Remove two screws holding the master switch to the support assembly and take off switch.

b. Installation

Install reverse of removal procedures.

13-123 REMOVAL AND INSTALLATION OF HOT AND/OR COLD VACUUM VALVES (45-46-48000 SERIES)

a. Removal

1. Partially remove automatic climate control support assembly (ref. par. 13-114).

2. Remove hot and/or cold vacuum valve(s). See Figure 13-204.

b. Installation

Install reverse of removal procedures and adjust null clearance (ref. par. 13-104).

(49000 SERIES ONLY)

13-124 REMOVAL AND INSTALLATION OF SENSORS AND POWER ELEMENT ASSEMBLY (49000 SERIES)

a. Removal

1. Disconnect battery.

2. Install pressure relief pin into support assembly to hold power element lever off the power element piston (see Figure 13-210).

NOTE: Some pressure will have to be laterally exerted on pin in order to push power element lever off power element piston and thereby align

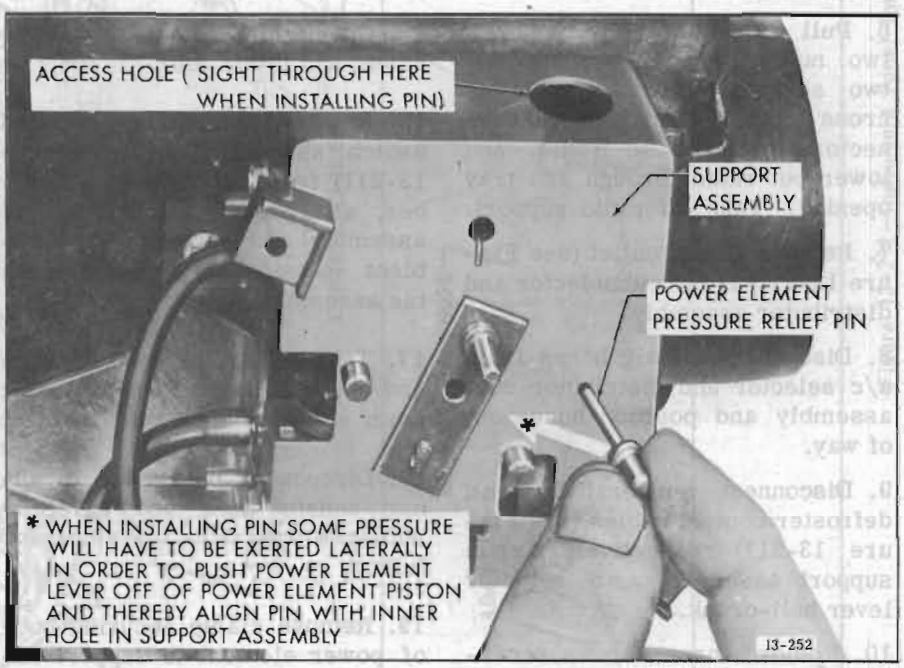


Figure 13-210—Installing Pressure Relief into Support Assembly (49000 Series)

the pin with the second hole in the casting support.

NOTE: Installation of pin will be facilitated if relationship of pin to inside hole is observed through access hole in rear of support (see Figure 13-210).

IMPORTANT: This step is extremely important since if the sensor tubing is bent or moved to any great extent while pressure is exerted on the piston, it is very possible that the tubing will be distorted and the calibration of the sensor and power element assembly will be destroyed.

3. Take out six screws securing ash tray assembly and remove assembly.

4. Remove two screws securing a/c center outlet to instrument panel, take off outlet and pull out plastic center outlet duct.

5. Pry off thin chrome strip on instrument panel just under a/c center outlet, remove four screws securing instrument panel control assembly to instrument panel and pull control assembly rearward as far as possible.

6. Pull off radio knobs, unscrew two nuts under knobs, unscrew two screws securing radio to cross support, separate all connectors attached to radio, and lower out radio through ash tray opening. Take off radio support.

7. Remove heater outlet (see Figure 13-211) from a/c selector and distributor assembly.

8. Disconnect all air hoses from a/c selector and distributor duct assembly and position hoses out of way.

9. Disconnect temperature and defroster control cables (see Figure 13-211) respectively from support assembly and selector lever bell-crank.

10. Remove three screws securing support assembly to a/c selector and distributor duct assembly, lower assembly and disconnect the red, maroon and chartreuse vacuum hoses from assembly (see Figure 13-211).

11. Disconnect pink vacuum hose from heater-air conditioner (mode) vacuum diaphragm on a/c selector and distributor duct assembly.

12. Take off aspirator air hose adapter (see Figure 12-211) on topside of a/c selector and distributor duct assembly and position adapter and hose out of way.

13. Take off three screws securing a/c selector and distributor duct assembly to cowl and work assembly out from under instrument panel.

IMPORTANT: Due to tightness of fit of a/c selector and distributor duct assembly under instrument panel, extra care should be taken to avoid unnecessary stressing of sensor tubing.

14. Disconnect duct sensor and frame (see Figure 13-211) from a/c selector and distributor duct assembly.

15. Open glove box door release catch, and lower door.

16. Remove ambient sensor and switch assembly (see Figure 13-211) from cowl plenum chamber, slit gasket on underside of assembly and separate the ambient (outside air) sensor from the assembly.

17. Take off in-car sensor grille and unsnap in-car sensor tubing from side of the plastic adapter.

18. Disconnect both ends of in-car sensor hose and carefully withdraw hose from in-car sensor tubing.

19. Remove clamp securing body of power element to support assembly and take off sensors and power element assembly.

b. Installation

1. Install reverse of removal procedures and note the following special steps.

2. Draw a piece of string through in-car sensor hose, attach string to sensor and draw sensor up through hose.

NOTE: Due to the fact that the in-car sensor hose is a formed hose, drawing a sensor through hose will be facilitated if the hose is straightened out by running a narrow stick through hose.

3. Install ambient (outside air) sensor onto ambient sensor and switch assembly and repair slit in gasket.

4. Reconnect pink vacuum hose to heater-air conditioner (mode) diaphragm, chartreuse hose to cold vacuum valve, red hose to hot vacuum valve (hot valve has null adjustment screw) and maroon hose to center of vacuum regulator (see Figure 13-211).

5. Pull out pressure relief pin.

6. Check and adjust range and temperature control cable (ref. par. 13-105 and 13-106).

13-125 REMOVAL AND INSTALLATION OF SELECTOR ELECTRICAL SWITCH, SELECTOR VACUUM DISC SWITCH AND MASTER SWITCH (49000 SERIES)

a. Removal

1. Disconnect battery.

2. Remove plastic cover from support assembly.

3. Disconnect selector switch and master switch electrical plug connectors.

4. Disconnect from selector vacuum disc switch the vacuum plug connector and also yellow vacuum hose from master switch diaphragm.

5. Disconnect selector control cable from the support assembly and selector switch arm.

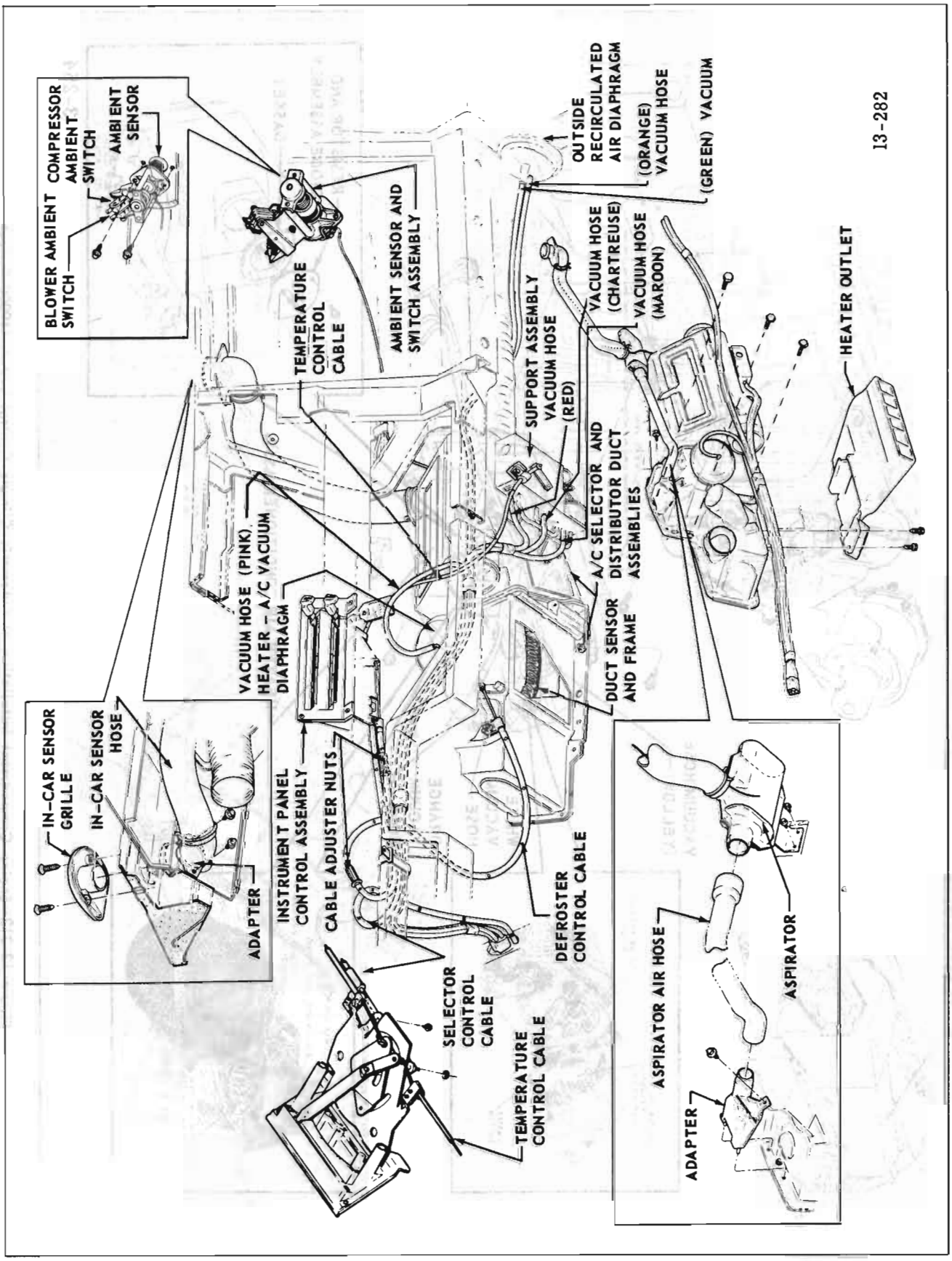


Figure 13-211—Instrument Panel Installation of Automatic Climate Control System (49000 Series)

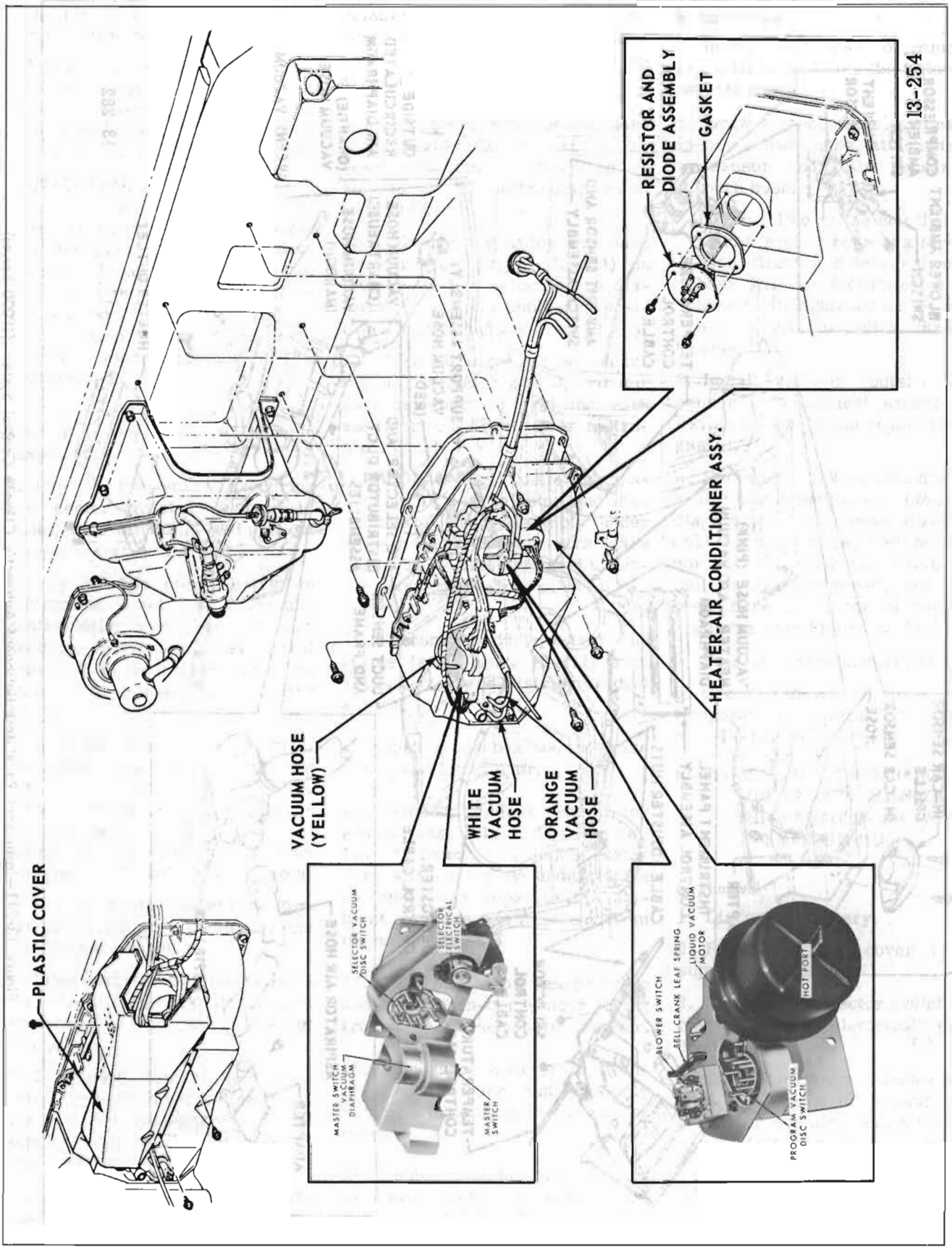


Figure 13-212—Engine Compartment Installation of Automatic Climate Control System (49000 Series)

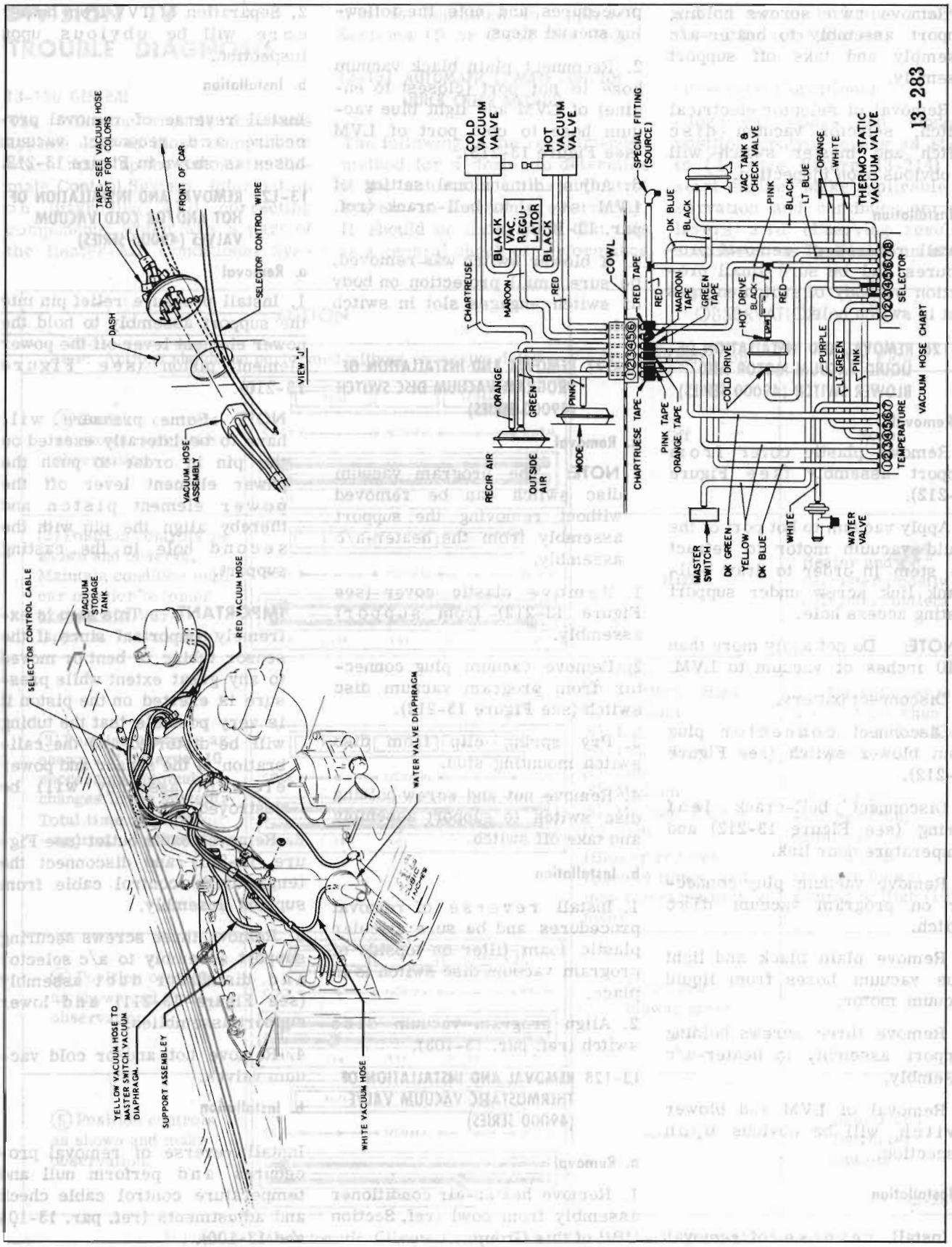


Figure 13-213—Vacuum Hose Installation (49000 Series)

6. Remove two screws holding support assembly to heater-a/c assembly and take off support assembly.

7. Removal of selector electrical switch, selector vacuum disc switch and master switch will be obvious upon inspection.

b. Installation

Install reverse of removal procedures and be sure small projection on body of switch engages slot in switch hole.

13-126 REMOVAL AND INSTALLATION OF LIQUID VACUUM MOTOR AND BLOWER SWITCH (49000 SERIES)

a. Removal

1. Remove plastic cover from support assembly (see Figure 13-212).

2. Apply vacuum to hot port of the liquid vacuum motor to retract the stem in order to draw bell-crank link screw under support casting access hole.

NOTE: Do not apply more than 10 inches of vacuum to LVM.

3. Disconnect battery.

4. Disconnect connector plug from blower switch (see Figure 13-212).

5. Disconnect bell-crank leaf spring (see Figure 13-212) and temperature door link.

6. Remove vacuum plug connector on program vacuum disc switch.

7. Remove plain black and light blue vacuum hoses from liquid vacuum motor.

8. Remove three screws holding support assembly to heater-a/c assembly.

9. Removal of LVM and blower switch will be obvious upon inspection.

b. Installation

1. Install reverse of removal procedures and note the following special steps.

2. Reconnect plain black vacuum hose to hot port (closest to engine) of LVM and light blue vacuum hose to cold port of LVM (see Figure 13-213).

3. Adjust dimensional setting of LVM stem to bell-crank (ref. par. 13-103).

4. If blower switch was removed, be sure small projection on body of switch engages slot in switch hole.

13-127 REMOVAL AND INSTALLATION OF PROGRAM VACUUM DISC SWITCH (49000 SERIES)

a. Removal

NOTE: The program vacuum disc switch can be removed without removing the support assembly from the heater-a/c assembly.

1. Remove plastic cover (see Figure 13-212) from support assembly.

2. Remove vacuum plug connector from program vacuum disc switch (see Figure 13-212).

3. Pry spring clip from disc switch mounting stud.

4. Remove nut and screw holding disc switch to support assembly and take off switch.

b. Installation

1. Install reverse of removal procedures and be sure circular plastic foam filter on topside of program vacuum disc switch is in place.

2. Align program vacuum disc switch (ref. par. 13-103).

13-128 REMOVAL AND INSTALLATION OF THERMOSTATIC VACUUM VALVE (49000 SERIES)

a. Removal

1. Remove heater-air conditioner assembly from cowl (ref. Section "B" of this Group.

2. Separation of TVV from heater core will be obvious upon inspection.

b. Installation

Install reverse of removal procedure and reconnect vacuum hoses as shown in Figure 13-212.

13-129 REMOVAL AND INSTALLATION OF HOT AND/OR COLD VACUUM VALVES (49000 SERIES)

a. Removal

1. Install pressure relief pin into the support assembly to hold the power element lever off the power element piston (see Figure 13-210).

NOTE: Some pressure will have to be laterally exerted on the pin in order to push the power element lever off the power element piston and thereby align the pin with the second hole in the casting support.

IMPORTANT: This step is extremely important since if the sensor tubing is bent or moved to any great extent while pressure is exerted on the piston it is very possible that the tubing will be distorted and the calibration of the sensor and power element assembly will be destroyed.

2. Remove heater outlet (see Figure 13-211) and disconnect the temperature control cable from support assembly.

3. Remove three screws securing support assembly to a/c selector and distributor duct assembly (see Figure 13-211) and lower support assemblies.

4. Remove hot and/or cold vacuum valves.

b. Installation

Install reverse of removal procedures and perform null and temperature control cable check and adjustments (ref. par. 13-104 and 13-106).

DIVISION IV
TROUBLE DIAGNOSIS

13-130 GENERAL

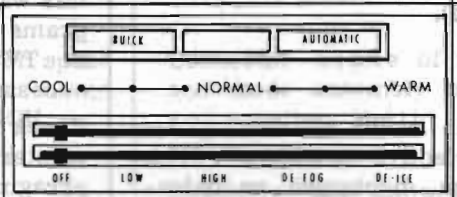
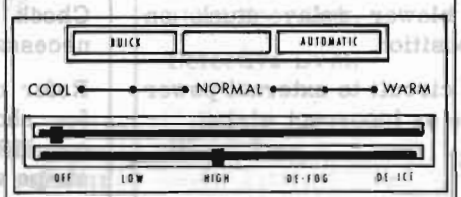
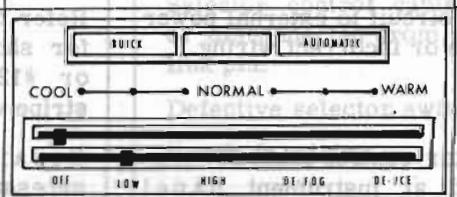
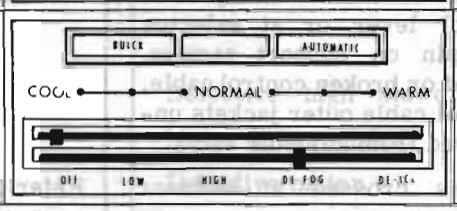
The following trouble diagnosis applies only to those components which make up the Automatic Climate Control Ssytem. Information on diagnosing and correcting components which are a part of the Heater-Air Conditioner System is contained in applicable Sections (B or C) of this Group.

13-131 AUTOMATIC CLIMATE CONTROL QUICK CHECK METHOD

The following is the recommended method for a dealer to determine if the Automatic Climate Control system is functioning correctly. It should be understood that this is a general check of performance and is not an inclusive analyzation of the total system.

(Precheck Conditions)

Close car doors and windows, position control levers as shown in (1) (see Figure 13-214) and start engine. Make applicable observation and continue operating levers and observing resulting conditions as indicated in chart.

ACTION		OBSERVATION	
Note: Actions should be performed without excessive delay		Blower Operation	Air Flow
(1) Position controls as shown and make observation		Off	None
(2) Position controls as shown and observe. Maintain condition until car interior becomes excessively warm (approx. 7-8 minutes)		High	Heater and defroster (mostly defroster) outlets
(3) Position controls as shown and observe 10 successive automatic changes in the system. Total time required - approx. 4 minutes		(1) High (2) Medium - High (3) Medium (4) Low (5) Low - Low (7) Low (8) Medium (9) Medium -High (10) High (Blower reduces speed 4 times, and then increases back to high)	(6) Air switches to A/C outlets when blower is at low-low (5) speed. (11) Air flow switches from outside to recirculated air when blower returns to High (10)
(4) Position controls as shown and make observation.		Fixed low blower speed	—
(5) Position controls as shown and make observation.		—	Heater and Defroster Outlets

13-284

Figure 13-214—Automatic Climate Control System Quick Check Chart (All Series)

NOTE: It may be necessary to position the lower lever (selector lever) slightly past the instrument panel control markings in order to achieve a particular setting. Do not wait for engine to warm-up, but start check as soon as engine is started.

13-132 TROUBLE DIAGNOSIS TABLE (ALL SERIES)

It is recommended that a serviceman when diagnosing a complaint can begin by riding the car with the customer and having the customer point out his complaints. This procedure is recommended insofar as many times an owner explanation of a difficulty is somewhat misleading.

SYMPTOM	POSSIBLE CAUSES	CHECKS AND CORRECTIONS
BLOWER SYMPTOMS		
Blower operates on DE-ICE setting only (Cold weather - ambient below 72°F).	Not sufficient time allowed (approx. 3 minutes) for TVV to open.	Wait sufficient time for engine coolant to warm up and TVV to open. Instruct owner that system is designed to operate this way. Refer to vacuum diagrams and check for vacuum at TVV. Replace TVV if necessary.
	Defective TVV (TVV stuck closed).	
	Master switch not closing due to defective master switch vacuum diaphragm or defective master switch.	Check that there is vacuum to master switch vacuum diaphragm. Check that rubber diaphragm portion of vacuum diaphragm is not partially off and leaking vacuum. Check for voltage across master switch when vacuum applied indicating switch closing.
Blower operates when selector lever OFF and ignition on.	Selector control cable misadjusted, kinked or disconnected.	Repair or replace as necessary.
	High blower relay stuck on high position.	Check relay and replace if necessary.
	Short circuit to external power source or incorrect wiring.	Refer circuit diagrams, check for short to #18 orange wire or #12 black, single orange stripe wire.
Blower operates when selector lever OFF and ignition off.	High blower relay stuck on high position.	Check relay and replace if necessary.
	Short circuit to external power source or incorrect wiring.	Refer circuit diagrams, check for short to #18 orange wire or #12 black, single orange stripe wire.
Blower operates at same speed in any selector lever position.	Selector control cable not connected at instrument panel control lever or at selector link pin on support casting. Kinked or broken control cable. Control cable outer jackets unscrewed from adjuster nut.	Repair or replace as necessary.
	Wires crossed at ambient switches.	Refer circuit diagrams and reconnect wires as required.

SYMPTOM	POSSIBLE CAUSES	CHECKS AND CORRECTIONS
No blower in DE-ICE only. Blower operates on LOW, HIGH or DE-FOG.	Orange high blower relay wire not connected.	Check and correct.
	Selector control cable misadjusted.	Check and adjust.
No high (M4) blower speed in DE-ICE, but other blower speeds available.	Insufficient defroster door travel restricting selector lever travel.	Bend defroster door to allow more travel.
Blower speeds erratic and do not operate in proper sequence or give full range of speeds	Defective resistor and diode assembly due to resistor coils touching each other.	Check and repair.
or		
No Change in blower speed when selector lever moved between LOW and HIGH.	Connector blade of resistor and diode assembly bent and not mating with harness connector.	Check and repair.
	Defective high blower relay.	Replace relay.
	Defective wiring.	Check for break in wires and open circuits and correct as required.
Blower does not reach high speed in maximum heating or cooling condition but does reach all other speeds.	Insufficient LVM travel.	Readjust bell-crank to LVM linkage.
	Binding bell-crank or temperature door link.	Check and repair.
	Defective LVM.	Replace LVM.
Blower completely inoperative regardless of selector lever position.	Blown fuse.	Refer circuit diagrams and check for short circuits.
	Loose terminal connections or incorrect wiring.	Check all terminal connectors and wiring.
	Selector control cable broken or disconnected from selector link pin.	Repair or replace as required.
	Defective selector switch.	Replace switch.
	Break in wiring.	Refer circuit diagrams and check #12 brown wire from ignition and #12 black single orange stripe wire to motor.
	Defective high blower relay.	Replace relay.
	Motor not grounded.	Check motor ground.
	Defective motor.	Replace motor.

SYMPTOM	POSSIBLE CAUSES	CHECKS AND CORRECTIONS
Blower will not operate as soon as car is started during 60°F or higher ambient.	Defective blower ambient switch.	Repair or replace as necessary.
	Open circuit from ambient switch to master switch.	Check wires and repair as necessary.
Blower operates as soon as car is started (selector lever is LOW, HIGH or DE-FOG) during 60°F or lower ambient.	TVV sticking in open position due to plugged TVV vent hole or defective TVV.	Repair or replace as required.
	Master switch sticking in closed position.	Replace master switch.
	Defective blower ambient switch.	Replace blower ambient switch.
Blower operates on high blower when selector lever in LOW, or Blower operates only on high regardless of selector lever position.	Wires crossed at blower and compressor ambient switches.	Refer to circuit diagram and reconnect wires as required.
AIR FLOW SYMPTOMS		
Air flows only from heater outlets and does not alternate between heater and air conditioner outlets.	No vacuum to heater - a/c air door diaphragm (49000 Series only).	Check vacuum circuits for pinched hose or restriction.
	Defective heater - a/c vacuum diaphragm (49000 Series only).	Replace diaphragm.
	Vacuum bleed or vent to diaphragm plugged (48000 Series only).	Check and correct.
	Vacuum hoses crossed at vacuum disc switch rubber connector (plug).	Check vacuum circuits.
Air flows only from heater outlets and does not alternate between heater and air conditioner outlets or System will not shift air flow to a/c outlets when selector lever in HIGH but will shift when lever moved to LOW.	Selector lever due to lag in linkage appears to be HIGH, however, is actually still in DE-FOG. (This is true on only early production models).	Readjust selector control cable. **NOTE:** On some early production cars even with correct cable adjustment it will not be possible to eliminate all the lag or hystersis in the selector lever. In these cases it will be necessary to move the lever slightly beyond the HIGH setting in order to obtain HIGH mode.

SYMPTOM	POSSIBLE CAUSES	CHECKS AND CORRECTIONS
System remains fully on 100% recirculated air (outside-recirculated air door does not open) or switches only to recirculated air and not to outside air (air door fully opened).	Pinched vacuum hose(s) to outside-recirculated air vacuum diaphragm.	Check vacuum circuit for loose or pinched hoses.
	Defective vacuum diaphragm.	Replace diaphragm.
Inside of car develops a stale odor. Windows tend to fog. **NOTE:** The movement of the outside recirculated air door may be observed on 49000 Series cars by removing the side kick panel, and on 48000 Series cars by removing the glove box and the wire screen baffle.	Rubber diaphragm portion on master switch vacuum diaphragm partially off.	Repair as required.
	Master switch vacuum hose disconnected.	Repair as required.
	Program vacuum disc switch defective.	Replace disc switch.
System will switch to outside air (outside-recirculated air door fully open) but will not switch to recirculated air (air door partially open).	Misadjusted program vacuum disc switch.	Adjust disc switch as required.
	LVM and bellcrank link misadjusted.	Adjust linkage as required.
	LVM defective and not driving to fully extend position.	Replace LVM.
	Broken air door return spring. **NOTE:** On 48000 Series the spring is secured to the topside of the plenum blower assembly. To test if spring is broken merely try to wiggle end of spring that is hooked through hole on topside of plenum blower assembly. If spring feels loose - it is broken.	Replace spring.
	Outside-recirculate air door binding.	Correct condition as required.
Insufficient air flow from air conditioner outlets.	Air hoses leading to air conditioner outlets partially off.	Correct as required.
	Air leaks in ducting.	Correct as required.
	Frozen evaporator core.	Refer to trouble diagnosis in previous Section.
	Air conditioner side outlets partially closed.	Instruct owner to open side outlets by pushing in on knob near each side outlet.

SYMPTOM	POSSIBLE CAUSES	CHECKS AND CORRECTIONS
Air flows from air conditioner outlets even though selector lever is in DE-FOG or DE-ICE.	45-46-48000 Series only - Pinched vacuum hose to heater - air conditioner vacuum diaphragm.	Correct as required.
AIR TEMPERATURE SYMPTOMS (EXCESSIVE HEAT)		
Hot air only with air from only heater outlets or System drives to maximum heat and high blower speed and remains in this condition.	No vacuum passing to LVM cold port even though power element lever is depressing cold vacuum valve.	Check for vacuum leaks, blocked or pinched hoses, defective vacuum disc switches or defective hot or cold vacuum valves.
	Broken or disconnected temperature lever control cable.	Repair or replace as required.
	Defective sensor and power element assembly.	Replace.
	Range adjustment incorrect.	Adjust range cooler. **NOTE:** If this correction not successful reset range screw to original setting.
Hot air from air conditioner outlets.	Compressor inoperative.	Check compressor ambient microswitch and selector switch for voltage. Check for wires from compressor to ambient switch and ambient switch to selector switch for open circuit. Check clutch coil for continuity and for good ground condition.
		Check for loose compressor belts.
	Insufficient refrigerant.	Check for adequate freon charge and correct as required.
		Check POA valve for operation.
	Heater-air conditioner air door not shifting position.	48000 Series only - Check for vacuum leak or pinched vacuum hose, defective vacuum diaphragm or binding condition at air door.
		49000 Series only - Check for bleed or vent plugged on heater-air conditioner diaphragm. Also check for binding condition at air door.

SYMPTOM	POSSIBLE CAUSES	CHECKS AND CORRECTIONS
(INSUFFICIENT HEAT)		
Air from heater outlets cool or cold.	No vacuum being applied to water valve.	Check for pinched hose, restriction in hose, vacuum leak, or defective selector or program vacuum disc switches. **NOTE:** Due to fact that yellow water valve vacuum hose is routed along the side of heater hose - there have been some cases found where as the heater hose expands due to heat, the vacuum hose is pinched against the securing clamps.
	Defective water valve.	Replace valve.
	Insufficient coolant.	Correct as required.
	Blockage in coolant circuit (i.e. - blocked heater core or kinked heater hoses).	Correct as required.
	Misadjusted or binding bellcrank or temperature door link.	Check for free movement of linkage.
	Range adjustment incorrect.	Check and adjust as required. **NOTE:** If this does not correct situation - reset range to original setting.
	LVM not receiving vacuum at hot port.	Check for plugged vacuum lines or vacuum leak.
		Malfunctioning hot or cold vacuum valves due to dirt under valve seat, or rubber boot around valve stem leaking.
	Defective LVM.	Replace LVM.
	TVV not open.	Check, repair or replace.
Heat buildup in car extremely slow.	Insufficient inches of vacuum (1 to 2.5) to LVM when lever in DE-ICE (Vacuum to LVM should be 5 - 8 inches).	Check for defective LVM restrictor.
		Check for partially blocked or leaking vacuum hose.
	Excessive body air leaks.	Check for vacuum leakdown due to defective vacuum component.

SYMPTOM	POSSIBLE CAUSES	CHECKS AND CORRECTIONS
(EXCESSIVE COOLING)		
Cold air only with air from only air conditioner outlets or System drives to maximum cooling and high blower speed and remains in this condition.	Range adjustment incorrect.	Adjust range cooler. **NOTE:** If this correction not successful - reset range screw to original position.
	Cold vacuum valve stuck in open position.	Move temperature lever back and forth several times to try to free sticking valve. If not successful - manually depress valve stem. If still not successful, replace valve.
	Temperature control cable disconnected.	Correct as required.
	No vacuum to hot port of LVM.	Check for vacuum leaks, blocked or pinched hoses, defective program or selector vacuum disc switches.
	Defective LVM.	Replace LVM.
(INSUFFICIENT COOLING)		
Car does not cool-down fast enough.	Loss of refrigerant.	Correct as required.
	Loss of refrigerant.	Check and correct.
	Insufficient inches of vacuum (1 to 2.5) to LVM when system driving cold (vacuum to LVM should be 5 - 8 inches) resulting in extremely slow LVM drive.	Check for partially pinched or blocked vacuum hose or vacuum leak down due to loose or defective vacuum hose or vacuum component. Check for defective hot or cold vacuum valves.
	Temperature door linkage binding, obstructed or misadjusted.	Correct as required.
	Outside-recirculated air door not in recirculated (partially closed) position.	Check for broken air door return spring and replace if necessary. Check for correct adjustment of program vacuum disc switch and bell-crank linkage.
	Flexible air hoses disconnected or air leakage in ducting.	Correct as required.

SYMPTOM	POSSIBLE CAUSES	CHECKS AND CORRECTIONS
(INSUFFICIENT COOLING) Cont'd.	Air conditioner side outlets closed or partially closed.	Instruct owner how to open outlets.
	Range adjustment incorrect.	Check and adjust range. **NOTE:** If this does not correct situation - reset range to original setting.
	Defective POA valve.	Replace valve.
MISCELLANEOUS SYMPTOMS		
Low cold drive vacuum (1 to 2.5 inches) and LVM stem remains fully extended.	LVM vacuum hoses switched at vacuum harness cowl connector.	Correct as required.
Compressor does not operate (ambient temperature above 40°F).	Compressor ambient switch disconnected.	Check and correct as required.

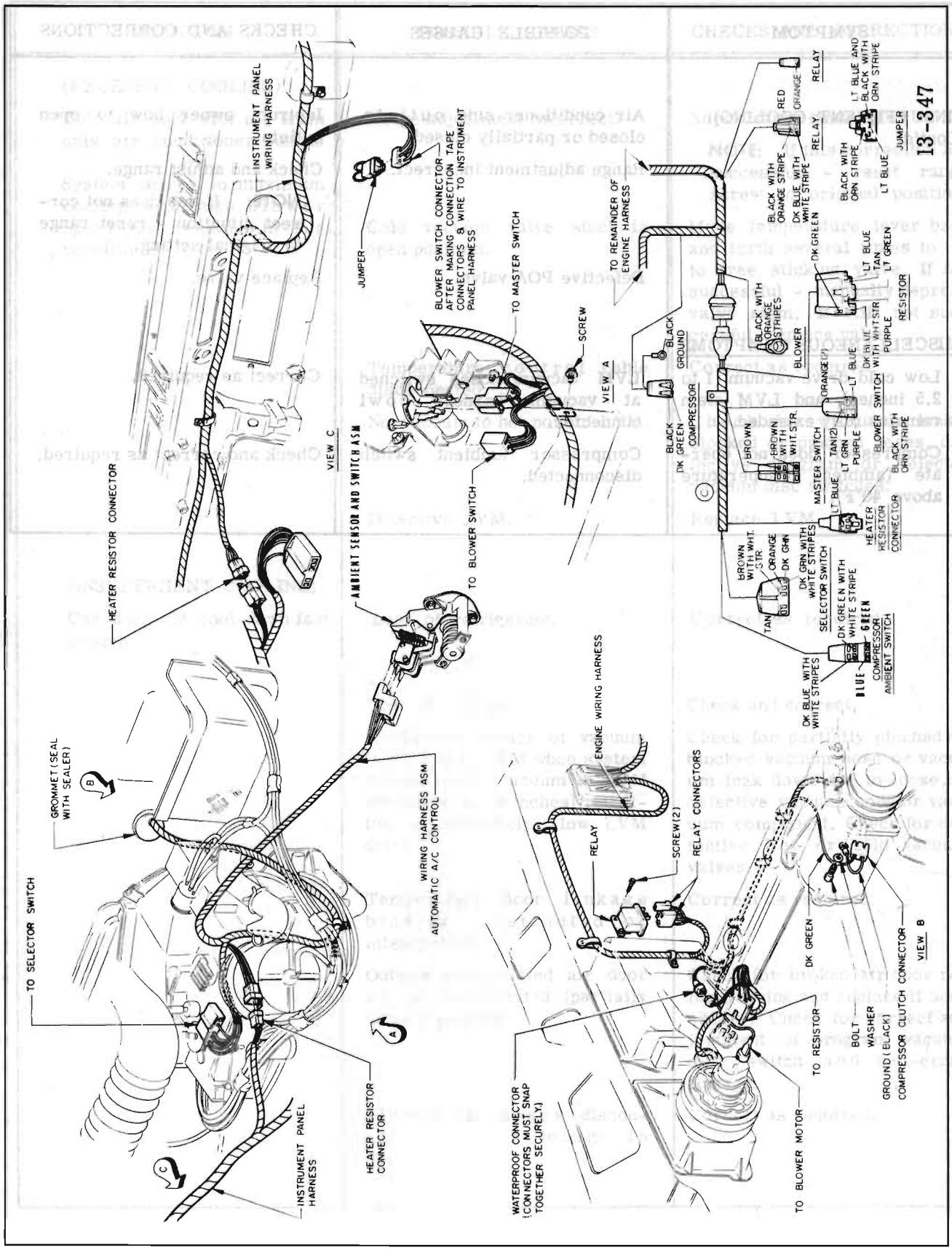


Figure 13-215—Wiring Harness Installation (45-46-48000 Series)

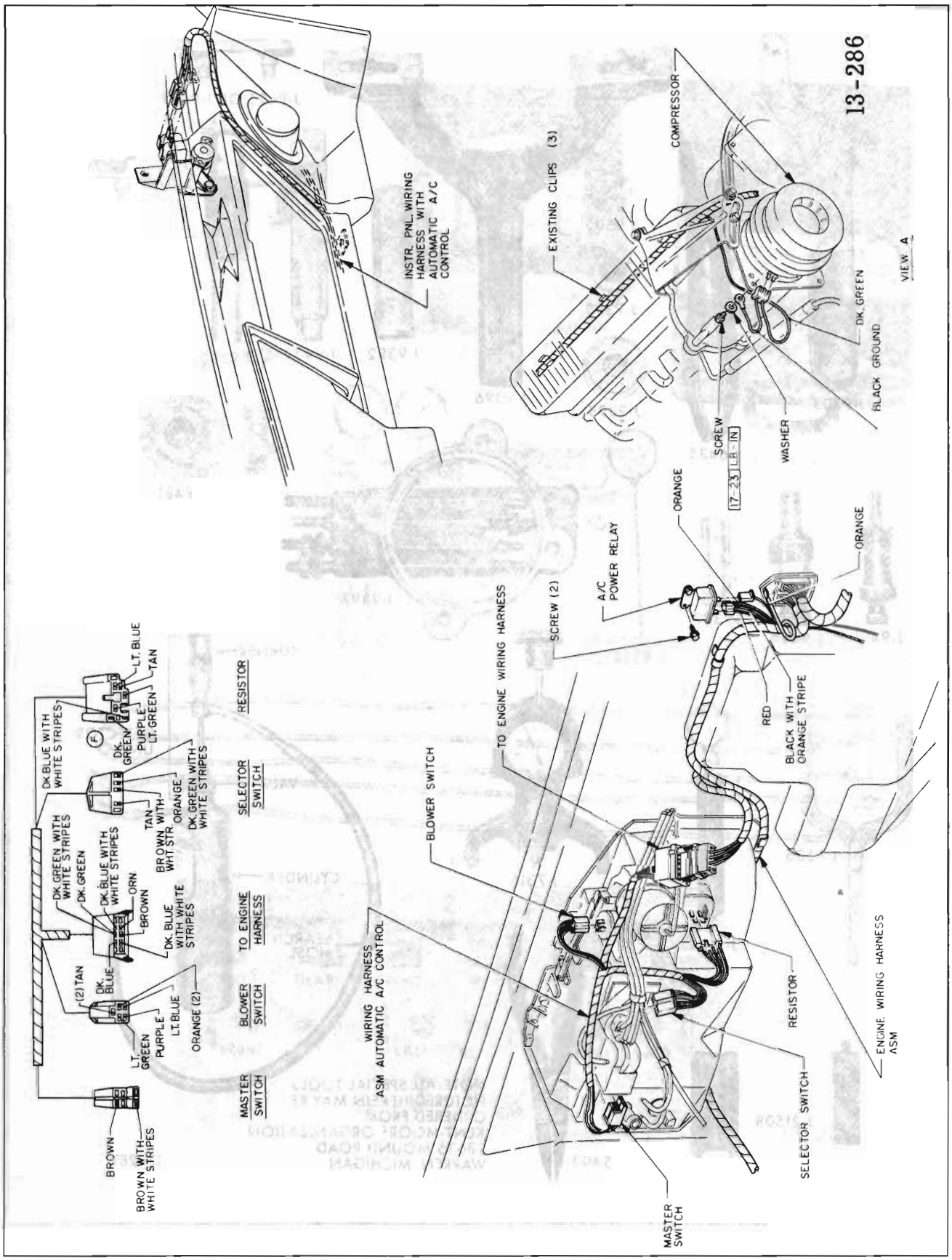


Figure 13-216—Wiring Harness Installation (49000 Series)

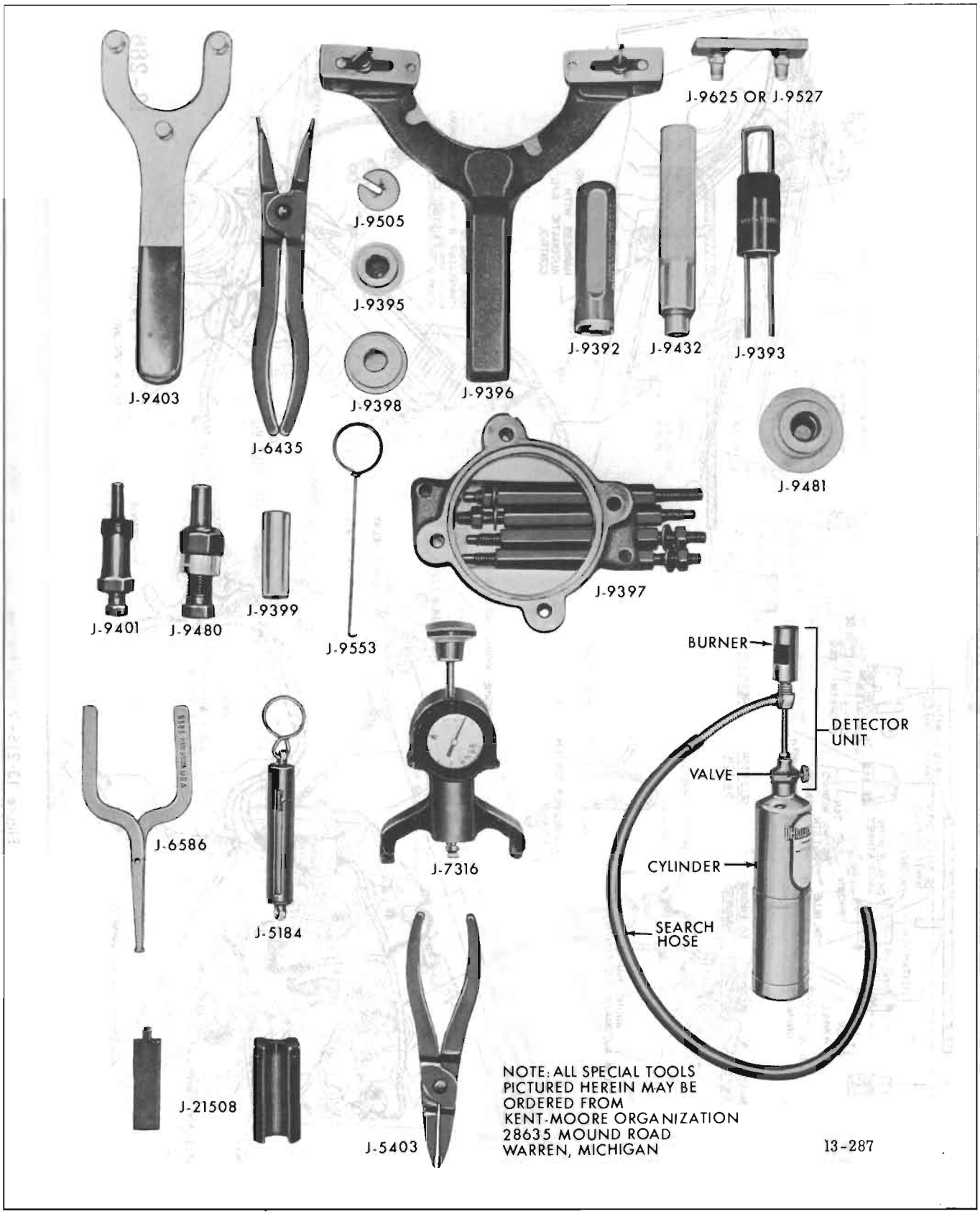
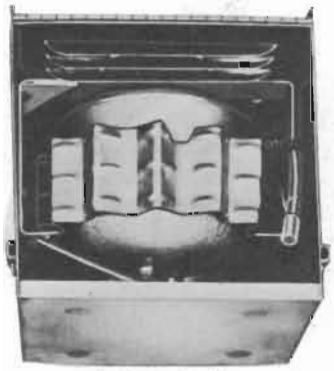


Figure 13-217—Air Conditioner Special Tools


J-8433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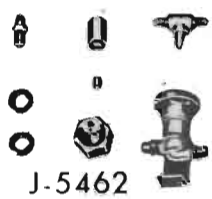
J-22511-01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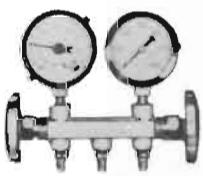
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J-5453


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J-5420


J-5418

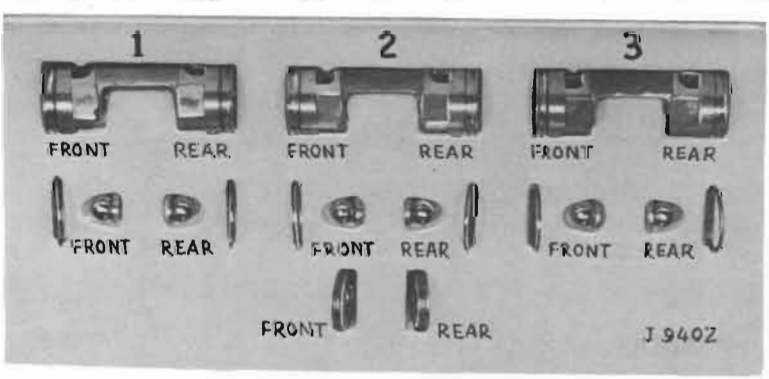

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Figure 13-218—Air Conditioner Special Tools