AUTOMATIC CLIMATE CONTROL - HEATER - AIR CONDITIONER SYSTEM A-B-C-E SERIES

WARNING: IF EQUIPPED WITH AIR CUSHION RESTRAINT SYSTEM, DO NOT ATTEMPT ANY ADJUSTMENT, REPAIR OR REMOVAL OF ANY PORTION OF THE AIR CONDITIONING SYSTEM WHICH WOULD REQUIRE REMOVAL OR DISCONNECTING OF ANY COMPONENT OF THE AIR CUSHION RESTRAINT SYSTEM UNTIL THE DISCONNECTION PROCEDURE IS COMPLETED. THIS PROCEDURE MUST BE FOLLOWED TO PREVENT ACCIDENTAL DEPLOYMENT OF THE SYSTEM WHICH COULD RESULT IN PERSONAL INJURY AND/OR DAMAGE TO THE SYSTEM'S COMPONENTS.

A.C.R.S. DISCONNECTION PROCEDURE

1. Turn ignition switch to "LOCK" position. Disconnect the negative battery cable from the battery and tape end.

CONTENTS

DESCRIPTION AND OPERATION

GENERAL THEORY OF SYSTEM OPERATION

A.C.C. is designed to automatically control the heating and air conditioning components in the automobile so that a constant interior temperature is maintained, regardless of varying ambient conditions. The Automatic Climate Control system is beneficial in both summer and winter. In hot weather, it will cool the car rapidly to the pre-set comfort level and then modulate cooling to whatever degree is required to maintain contstant comfort. In mild weather, the interior of the vehicle remains comfortable without having to reset the controls. In cold weather, the system will heat the car quickly to the desired temperature, then level out to maintain the pre-set comfort level desired by the passengers.

The existing heater and air conditioning components provide a series system so that the primary control function is to position an air mix door and a mode door in order to release properly-heated or cooled air from the proper duct outlets.

BASIC SYSTEM OPERATION

The numbers on the temperature dial thumbwheel control located on the control head indicate the various temperatures which can be obtained in the passenger compartment of the car. This temperature dial serves the same function as the thermostat in your home. The temperature dial controls the incar temperature when the selector lever is in the "Off", "Lo", "Auto", "Hi", "Bi-Level", or "DEF" position. See Figures 9B-230 and 9B-231.

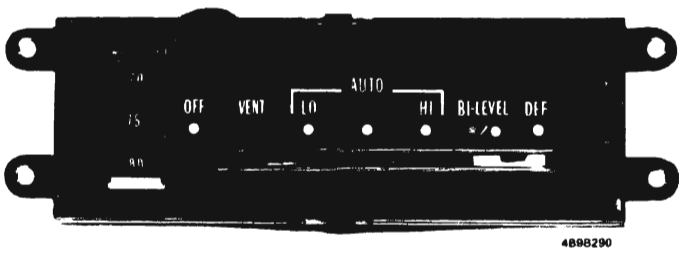


Figure 9B-230 A.C.C. Control Panel - A Series

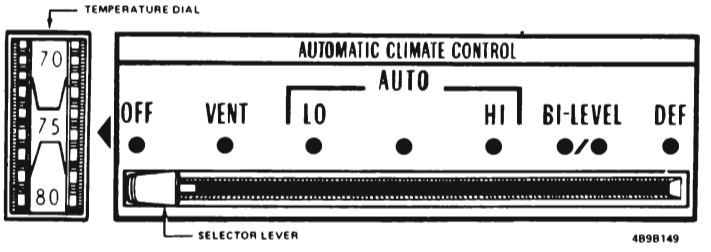


Figure 9B-231 A.C.C. Control Panel B-C-E Series

OFF Position

The Automatic Climate Control system is completely "shut off" when the ignition switch of the car

is in the "Off" position. When the car ignition switch is turned on, the electrical circuit to the A.C.C. system is accomplished. With the control head selector lever in the "Off" position, the system will come on when the engine water temperature reaches about 140 degrees F, or if the inside car temperature reaches about 80 degrees F. The fan will run at "Lo Blower" speed and air will flow from the heater outlets.

VENT Position

When the selector lever is in the "Vent" position, the system comes on immediately whenever the ignition switch is in the "Run" position. The blower runs at "Lo Blower" speed and outside air is distributed into the passenger compartment of the car through the A/C outlets. The compressor is off and the outside air is delivered untempered.

LO Position

With the control head selector lever in the "Lo" position, the system will not come on until either the inside car temperature reaches about 80 degrees F, or the engine water temperature reaches about 140 degrees F. The blower will then operate at "Lo Blower" speed only. Conditioned air will flow from the A/C outlets, the heater outlets, or both when the system is in "Bi- Level" operation.

AUTO Position

The operation of the A.C.C. system when the selector lever is in the "Auto" position is the same as the "Lo" position, except that the blower is no longer locked in "Lo Blower" operation. The programmer will select any of the four blower speeds ("Lo", "Med. 1", "Med. 2", and "Hi") in order to maintain the proper comfort level in the car.

HI Position

When the control head selector lever is placed in the "Hi" position, the blower operates only at "Hi Blower" speed. The temperature selected on the temperature dial will be maintained inside the passenger compartment. If maximum A/C is required, the inside air will be recirculated through the A/C system for maximum cooling. When the system operation has stabilized and the blower is operating at lower speeds, the conditioned air will be distributed from both the A/C and heater outlets. This is "Bi-Level" operation.

BI-LEVEL Position

The blower operates at "Lo", "Med. 1", "Med. 2", or "Hi" speeds when the control head selector lever is in the "BI-LEVEL" position. The desired temperature level inside the car will be maintained. Conditioned air is distributed from the heater, A/C, and defroster outlets, resulting in "tri-level" operation. The system will come on immediately when the engine thermal switch or the incar temperature switch is closed.

DEF Position

With the control head selector lever in the "DEF" position, the system comes on immediately when the ignition switch is turned on. The fan is locked on "Hi Blower" speed and all of the air is distributed from the defroster outlets onto the windshield. Some air is bled to floor on "DEF". The comfort level selected on the temperature dial will be maintained in the car.

ELECTRICAL SYSTEM OPERATION

OFF Position

When the control head selector lever is in the "OFF" position, the system is locked in "Lo Blower" operation when the ignition switch is in the "Run" position and the engine thermal switch is closed and the "Lo Relay" is closed. The engine thermoswitch closes whenever the engine water temperature is above 140 degrees F. If the temperature inside the car is above 80 degrees F, the incar temperature switch is closed, which also causes the "Lo Relay" to close, resulting in "Lo Blower" operation (see Figure 9B-244).

With ignition switch in the "Run" position, power is supplied to the programmer, allowing it to operate. The incar sensor, the ambient sensor, and the temperature dial setting on the control head cause the programmer to move the air-mix door. The proper hot- cold air mixture is then distributed from the heater outlets, maintaining the incar temperature at the comfort level selected on the temperature dial.

VENT Position

With the ignition switch in "Run" and the selector lever in the "Vent" position, the "Lo Relay" will be closed and the system will come on immediately with the fan locked on "Lo Blower" speed. The vacuum motor in the programmer is in the A/C position, since the incar sensor and the ambient sensor are shorted out by the control head switch. The ambient switch is closed when the ambient temperature is above 37 degrees F. However, the compressor will not run, since no voltage is applied to it through the control head switch. The engine thermoswitch is closed when the engine water temperature is above 140 degrees F. The incar temperature switch is closed if the incar temperature is above 80 degrees F. In "Vent" immediate start-up occurs, irrespective of temperature delay settings. The "Auto Relay" is al-

ways open in this mode. The engine thermoswitch is closed when the engine water temperature is above 140 degrees F, which causes the "Lo Relay" to be energized (see Figure 9B-245).

LO Position

With the selector lever in the "Lo" position, the system will come on when the incar temperature is above 80 degrees F, which closes the incar temperature switch, or when the engine water temperature reaches 140 degrees F. The "Lo Relay" is then closed, allowing the blower to be locked on "Lo Blower" speed. The "Auto Relay" remains open.

When the ambient temperature is above 37 degrees F, the ambient switch is closed, supplying voltage to energize the compressor clutch via the control head switch (see Figure 9B-246).

AUTO Position

With the selector lever in the "Auto" position, the system will come on when the incar temperature is above 80 degrees F, which closes the incar temperature switch, or when the engine water temperature reaches 140 degrees F. The "Lo Relay" and the "Auto Relay" are both closed and the position of the blower wiper contacts in the programmer determines the speed at which the blower operates. When the ambient temperature is above 37 degrees F, the compressor clutch is energized via the ambient switch and the control head switch (see Figure 9B-247).

HI Position

When the selector lever is in the "Hi" position, the system turn-on is the same as described in the "Auto" position section. Both the "Lo" and "Auto" relays are closed when the system is operating and a direct circuit path via the control head switch is connected from the battery circuit to the blower motor. This locks the blower on "Hi Blower" operation. When the ambient temperature is above 32 degrees F, the ambient switch is closed and the compressor clutch is energized. If the system is calling for maximum cooling, the system will operate in the recirculation mode; however, there is no change in the electrical function when this mode is achieved (see Figure 9B- 248).

BI-LEVEL Position

With the selector lever in the "BI-LEVEL" position, the system turn-on is the same as described in the "Auto" position section. The "Lo" and "Auto" relays are both closed and the position of the blower wiper contacts in the programmer determines the speed at which the blower operates. When the ambient temperature is above 32 degrees F, the ambient switch is closed and the compressor clutch is energized (see Figure 9B-250).

DEF Position

With the selector lever in the "DEF" position, the system comes on immediately and the blower is locked on "Hi" speed. The "Lo Relay" and the "Auto Relay" always remain energized.

The temperature dial must be used to obtain maximum heat when it is desired to override the automatic control (see Figure 9B-251).

VACUUM SYSTEM OPERATION

OFF Position

With the selector lever in the "Off" position and the engine running, the system is turned on whenever the engine thermal switch or the incar temperature switch is closed. The vacuum motor in the programmer moves to a position that will moderate the incar temperature. Air flows from the heater outlets at "Lo Blower" speed (see Figure 9B-252).

VENT Position

Air is drawn in through the outside air door and is distributed from the A/C and defroster outlets at "Lo Blower" speed. The programmer is in the maximum A/C position (see Figure 9B-253).

LO Position

When maximum cooling is required (see Figure 9B-233), cold air is distributed from the A/C outlets. The blower is locked on "Lo Blower" speed. Recirculation of air is not possible in the "Lo" selector lever position. A small amount of this cold, dry air is also blown onto the windshield.

When the vacuum motor moves from maximum A/C, the porting in the programmer vacuum valve changes.

As the air temperature from the outlets reaches a moderate temperature, the system goes into "Bi-Level" operation and air flows from the A/C and the heater outlets. Some moderate temperature, dry air is also released from the defroster outlets onto the windshield (see Figure 9B-254).

When heating is required, hot air is distributed from the heater outlets. A small amount of hot, dry air is also released from the defroster outlets.

AUTO Position

Even though maximum A/C is required, the system cannot go into recirculation operation. Air is released from the A/C outlets at "Hi Blower" speed (see Figure 9B-258).

As the incar temperature begins to lower, the programmer moves out of the maximum A/C position.

When the outlet air temperature reaches a moderate temperature, the system goes into "Bi-Level" operation. Conditioned air flows from both the heater and A/C outlets. Also, a small amount of moderate, dry air is distributed from the defroster outlets.

When maximum heating is required from the system, air is distributed from the heater outlets at "Hi Blower" speed. Some hot, dry air is also blown onto the windshield (see Figure 9B-270).

HI Position

The passenger compartment air is recirculated through the A/C system when maximum cooling is required. Cold air is distributed from the A/C outlets at "Hi Blower" speed (see Figure 9B-270).

As the programmer moves from the maximum A/C position, air is drawn in from outside the car to be conditioned. This air is distributed from the A/C outlets.

As the outlet air reaches moderate temperature, the system begins to operate in the "Bi-Level" mode. Some cool, dry air is also released from the defroster outlets.

When the system goes into heater operation, the warm air is released from the heater outlets at "Hi Blower" speed. Some warm, dry air is also released from the defroster outlets.

BI-LEVEL Position

If maximum cooling is required, the outside air door is closed for recirculation operation and the blower is operating at "Hi Blower" speed. Cold, dry air is distributed from the heater, A/C, and defroster outlets, resulting in "Tri-Level" operation (see Figure 9B-262).

When maximum cooling is no longer required, the outside air door opens and the blower speed decreases (see Figures 9B-262 and 9B-263). Complete blower programming is used in the "BI-LEVEL" position. When heating is required from the system, the blower speed increases and reaches "Hi Blower" speed at maximum heating.

DEF Position

With the selector lever in the "DEF" position, the outside air door is closed when maximum cooling is required. All of the air is directed onto the windshield from the defroster outlets at "Hi Blower" speed (see Figure 9B-277). When maximum cooling is no longer required, the outside air door opens but the fan remains on "Hi Blower" speed.

Amplifier Theory of Operation

The purpose of the three-stage amplifier used in the Automatic Climate Control system is to amplify the DC signals that are created due to resistance changes in either the temperature dial, the incar sensor, or the ambient sensor.

DIAGNOSIS

GENERAL INFORMATION

The following trouble diagnosis applies only to those components which make up the Automatic Control System. Information on diagnosing and correcting components which are a part of the Heater Air Conditioner System is contained in the "Heater-Air Conditioner System" Section.

TESTING A.C.C. SYSTEM USING TESTER J-23678

This tester has been designed and developed to be used in troubleshooting the Automatic Climate Control System in the car. The tester can be used to isolate the problem to the control head, the sensor string, the A.C.C. vacuum system, or the programmer. If a problem is determined to be in the programmer, the tester can also be used to completely troubleshoot each component in the programmer.

A hard rubber, dummy plug, two sizes of vacuum tees, and a supply of hose unions are located in the tester's storage compartment. The rubber dummy plug is used to plug all of the vacuum ports on the programmer, except the raw vacuum input for isolating a vacuum problem between the programmer and the A.C.C. vacuum system. The tees and unions are used to connect the rubber hose from the tester's vacuum gauge into the system to make various vacuum checks.

The wiring harness from the tester is actually a "patch cable", which can be plugged into the programmer and into the car electrical harness.

The voltmeter on the tester's panel is a 0 to 15 volt meter. The voltage monitored by the meter is controlled by the "voltage" knob just below the meter at

all times, *except when* the "Temperature Dial Calibration" switch is in the calibrate position. The "No. 2 Feed" position allows the tester to directly monitor the input voltage to the programmer. The "No. 6 Blower" position allows the tester to directly monitor the voltage applied to the blower motor. The "No. 7 Lo-Relay" position indicates that the lo-relay has energized and that the relay contacts have closed if battery voltage is read on the meter. The "No. 8 Auto-Relay" position indicates that the auto-relay has energized and that the relay contacts have closed if battery voltage is read on the meter. The "Probe and Clip" position connects the probe and clip in the tester's storage compartment directly to the voltmeter. This makes it possible to use the voltmeter to check various other voltages in the A.C.C. system. The red probe should always be connected to the more negative terminal.

When the "Manual-Automatic" toggle switch is in the automatic position, the tester monitors voltages on the voltmeter according to the "Voltage" knob position when the "Temperature Dial Calibration" switch is in the "Off" position. When the "Manual-Automatic" toggle switch is in the manual position, the temperature dial on the control head, the ambient sensor, and the in-car sensor are *disabled* and the *"Manual Control" knob replaces them.* The numbers around the "Manual Control" knob represent the resistance in ohms that is replacing the resistance of the temperature dial, the ambient sensor, and the in-car sensor. If the knob is rotated to the "Max. Cold" position, the programmer should move to the full A/C position. If the knob is rotated to the "Max. Heat" position, the programmer should move to the maximum heat position. *The "Manual Control" knob is operational ONLY when the "Manual-Automatic" toggle switch is in the "Manual" position.*

When the "Temperature Dial Calibration" switch is in the calibrate position, the voltmeter monitors the voltage directly across the temperature dial on the control head. When the "Compare" button is pressed, the voltmeter reads the voltage across a precision resistor in the tester. By moving the temperature dial on the control head, the two voltage readings can be made the same. After this is accomplished, the temperature dial on the control head should read the correct temperature, as indicated on the tester panel. If it does not, the temperature dial clutch should be held and the dial slipped to read the correct temperature (see Temperature Dial Calibration Procedure).

The "Temperature Dial Calibration" switch should always be in the "Off" position, unless the temperature dial on the control head is being calibrated.

A.C.C. SYSTEM TROUBLESHOOTING OBJECTIVE

The main objective when troubleshooting an A.C.C. system is to isolate the problem to either the control head, the sensor string, the A.C.C. vacuum system, or the programmer. After this preliminary isolation is completed, the actual problem can then be diagnosed quickly.

The programmer *should not* be removed from the car, unless the problem has been isolated positively as being in the programmer. If the programmer has malfunctioned, it should either be repaired at your Buick dealership or sent to a United Delco Service Account which is authorized to make repairs on these units. *Programmers cannot be returned under warranty - they must be repaired.*

PRELIMINARY TROUBLESHOOTING INFORMATION

The most important part of diagnosing a problem is to determine exactly what the complaint is and whether this complaint actually stems from a malfunction in the system. Because of this, before attempting a repair, the serviceman should read through the General Operation section on the A.C.C. system to be sure that he has a thorough understanding of how the system is supposed to operate.

If a customer is complaining of a malfunction in the A.C.C. system that occurs only periodically, the malfunction should be observed before the repair is attempted. This will greatly reduce the diagnosis time and eliminate a possible "comeback" because the wrong part was changed. Do not skip any steps in the Troubleshooting Procedure, unless instructed to do so.

TROUBLESHOOTING PROCEDURE

1. Start the car and place the control head selector lever in the "Auto" position and the temperature dial at 75. Allow enough time for the car engine to warm up and A.C.C. system to come on if the system was acting normally. If the system does not come on, skip to Step 3.

2. After the system has turned on, rotate the temperature dial slowly back and forth looking for abnormal operation of the system. Then move the selector lever to each of the various positions and look for any malfunction in the system's operation. By observing any malfunctions and noting when they occur, often times the serviceman will be able to isolate the problem to a certain area of the system.

3. Remove the cover of the programmer (while it is still mounted in the car) and connect J-23678 A.C.C. Tester electrical harness to the programmer and the car harness.

4. Place the control head selector lever in the "Auto" position and the temperature dial on 75.

5. On the tester, place the "Temperature Dial Calibrator" switch in the "Off" position and the "Manual-Automatic" switch in the "Manual" position.

6. Rotate the "Manual Control" knob to Max. Heat". The programmer should move to the full heat position and the fan should run at high-blower speed. (The vacuum motor mechanism will move into the vacuum motor.) Rotate the knob to "Max. Cold". The programmer should move to the full A/C position and the fan should run at high-blower speed. (The vacuum motor mechanism will move out of the vacuum motor.) If only partial programmer movement occurs, or "Hi Blower" is not obtained at both extremes, make the air mix door link adjustment *before* proceeding to the next step. If the programmer does *not* move at all, skip to Step 9.

7. Rotate the "Manual Control" slowly counterclockwise. The vacuum motor mechanism should first start to move at precisely 180 ohms (plus or minus 1 ohm) on the "Manual Control" knob. If this first movement occurs before or after 180 ohms, make the programmer amplifier calibration (feedback "pot" adjustment).

8. Rotating the "Manual Control" knob to the "Max. Cold" position should cause the system to shift to full A/C operation and the vacuum motor mechanism will move out of the vacuum motor. If the programmer moves normally when rotating the "Manual Control", skip to Step 11.

Programmer Does Not Move

9. On the A.C.C. Tester, place the "Temperature Dial Calibration" switch in the "Off" position and the "Voltmeter" control in the "Programmer 12-V Supply" position. Battery voltage should appear on meter. No voltage indicates the *lack of* a ground on terminal No. 1 of the programmer or the *lack of* battery supply to terminal No. 2 of the programmer.

10. Plug the tester's dummy vacuum plug on the programmer vacuum valve. Connect the dummy hose to the vacuum supply hose (Port No. 2) in the car vacuum harness. Make sure vacuum is present. The programmer now has vacuum supply with no car vacuum system components connected. If the programmer functions using the "Manual Control" on the tester, troubleshoot the A.C.C. vacuum system. If the programmer does not function, the malfunction is in programmer. Remove the dummy plug and reconnect the vacuum harness after making this test.

Sensor String Test

11. Place the control head selector lever in the "Auto" position and the temperature dial on 75.

12. On the J-23678 A.C.C. Tester, place the "Manual- Automatic" switch in the "Auto" position.

13. Observe the position of the vacuum motor mechanism.

14. On the A.C.C. Tester, switch the "Manual- Automatic" switch to the "Manual" position and then adjust the "Manual Control" knob until the vacuum motor mechanism assumes the same position as it had in Step 13. When the "Manual Control" knob is properly adjusted, switching the "Manual-Automatic" switch back and forth will result in no movement of the vacuum motor mechanism.

15. Read the setting of the "Manual Control". This resistance reading is the same as the resistance of the two sensors and the temperature dial combined and should be 120 to 150 ohms at 70 to 75 degrees F. room temperature. If this reading is incorrect, try calibrating the temperature dial. If the calibration can be accomplished, then the temperature dial is "good". Visually check the ambient and in-car sensors for shorts or bad connections.

Lo Relay Test

16. Place the A.C.C. Tester's "Temperature Dial Calibration" switch in the "Off" position and the "Voltmeter" knob in the "Lo Relay" position.

17. Place the control head selector lever in the "Vent" or "Def" position. If the "Lo Relay" is energized, the voltmeter will read battery voltage. The "Lo Relay" is operated by: 1) Hot engine thermal switch; 2) Hot in-car temperature switch; 3) Control head in "Vent" or "De-Ice" position. If the relay does *not* energize in the control head "Vent" or "De-Ice" position, the relay or the control head switch has malfunctioned.

Programmer Blower Switch Test

20. Place the A.C.C. Tester's "Temperature Dial Calibrator" switch in the "Off" position, the "Voltmeter" knob in the "Blower" position, and the "Manual-Automatic" switch in the "Manual" position.

21. Using the "Manual Control" move the programmer from full heat to the full A/C position. The voltage at the blower (coming from programmer terminal No. 5) should be battery voltage in full heat. As the programmer moves from full heat, the voltage should drop in steps, indicating different blower speeds, and then increase in steps to battery voltage

in full A/C. If the voltage steps are not present or battery voltage is not indicated on the tester voltmeter when in full heat and full A/C operation, then the programmer has malfunctioned.

CALIBRATION PROCEDURE USING TESTER J-23678 AND TOOL J-21530

Preliminary Calibration Information

Be sure to allow sufficient time for the car engine to warm up and for the system to turn on before attempting calibration. *Do not skip any steps in the Calibration Procedure.*

Temperature Dial Calibration

1. Connect the A.C.C. Tester J-23678 into the wiring harness and the programmer.

2. Place the control head selector lever in the "Vent" position.

3. Place the "Manual-Automatic" switch on the tester in the "Manual" position.

4. Place the "Temperature Dial Calibrator" switch on the tester in the "Calibrate" position.

5. Note the voltmeter reading.

6. Press the "Calibrate" button and note the voltmeter reading.

7. With the "Calibrate" button pressed in, rotate the temperature dial on the control head until the voltmeter reading is the same as it was in Step 5 (when the button is not pressed in).

8. The temperature dial should be set at the temperature dial setting on the tester panel. If it does not, use Tool No. J-21530 to hold the gear on the left side of the temperature dial and slip the temperature dial to the correct setting. If the temperature dial cannot be calibrated using this procedure, it has malfunctioned.

Programmer Amplifier Calibration (Feedback Pot Adjustment)

1. Remove the plastic cover from the programmer while it is still mounted in the car.

2. Connect the A.C.C. Tester J-23678 into the wiring harness and the programmer.

3. Place the control head selector lever in the "Auto" position.

4. Place the "Manual-Automatic" switch on the tester in the "Manual" position.

5. Place the "Temperature Dial Calibrator" switch of the tester in the "Off" position.

6. Rotate the "Manual Control" knob on the tester to the "Max. Heat" position. The programmer should move to the full heat position.

7. Rotate the "Manual Control" knob to 180 and STOP. DO NOT OVER-TRAVEL.

8. Using a blade-type screwdriver, slip the shaft of the feedback potentiometer fully counterclockwise to its stop (see Figure 9B-232 for location of the feedback potentiometer in the programmer). The vacuum motor mechanism will be "in" the vacuum motor indicating full heat operation.

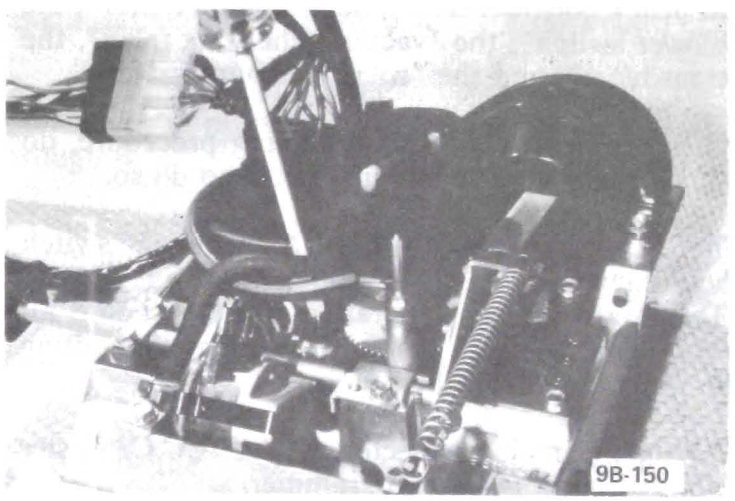


Figure 9B-232 Feedback Potentiometer Adjustment

9. Using the screwdriver, very slowly slip the feedback potentiometer clockwise until the first movement of the vacuum motor mechanism can be seen. Stop the adjustment when the movement first occurs. (Do not watch the programmer output shaft.)

10. To check the adjustment, rotate the "Manual Control" knob to the "Max. Heat" position. Then slowly rotate the "Manual Control" knob counterclockwise and the vacuum motor mechanism should first start to move when the "Manual Control" knob is exactly at 180 plus or minus 1. Touch up the feedback potentiometer adjustment in the programmer so that the mechanism movement occurs exactly at 180. If this adjustment cannot be made, the programmer has malfunctioned.

ON-THE-BENCH TROUBLESHOOTING PROCEDURE FOR PROGRAMMER

Equipment Required

1. A good filtered D.C. Power Supply, rated at 5 amperes at 12 volts.

2. Kent-Moore No. J-23678 Automatic Temperature Control Tester.

3. Vacuum Supply, capable of 20 inches of Hg. or more (Kent-Moore No. J-5428-03 or No. J-23178 or equivalent).

4. 1/4 inch hollow socket spin tight.

5. Medium size blade screwdriver.

6. Long-nose pliers.

7. Electrical test connector (Kent-Moore No. J-23713).

Refer to Figure 9B-313 for identification of all programmer components. Before attempting to repair or adjust a programmer, locate the "output shaft", the "feedback potentiometer", the "vacuum motor", the "blower switch", the "vacuum checking relay", the "transducer", and the "rotary vacuum valve".

When following the troubleshooting procedure, do not skip any steps unless instructed to do so.

The A.C.C. tester "Manual-Automatic" switch should always be in the "Manual" position and the "Temperature Dial Calibration" switch should always be in the "Off" position when troubleshooting the programmer on the bench.

1. Plug the male connector of the A.C.C. Tester electrical harness into programmer.

2. Plug the electrical test connector No. J-23713 into female connector of A.C.C. tester electrical harness.

3. Plug the hard rubber dummy plug from the tester onto the programmer rotary valve and then connect it to the vacuum supply. Turn on the vacuum supply to 20 inches Hg. or more.

4. Connect the positive lead of a 12-volt DC power supply altered to the yellow wire from electrical test connector and connect the negative lead of the supply to the black wire of the test connector. The "Voltage" knob of the tester should read 12 volts when in the "No. 2 Feed" position, the "No. 7 Lo-Relay" position, and the "No. 8 Auto Relay" position. If it doesn't, check the voltage supply and hook-up.

5. On the A.C.C. tester, place the "Manual-Automatic" switch in the "Manual" position and the "Temperature Dial Calibration" switch in the "Off" position.

6. Rotate the A.C.C. tester "Manual Control" knob from "Max. Heat" to Max. Cold". (Make sure the power supply is adjusted for 12 volts DC and vacuum supply is at 20 inches Hg. or more.) The programmer output shaft should rotate 120 degrees (1/3 rotation of shaft) from maximum heat to maximum cold. If it does rotate normally, skip to Step 18.

7. If the programmer output shaft does not operate properly in Step 6, remove the cover of the programmer and reconnect the tester electrical connector and the rotary vacuum valve rubber dummy plug. Recheck programmer operation as described in Step 6. If the programmer output shaft now operates normally, look for pinched vacuum hose, loose electrical connection, pinched or shorted wires, shorted Darlington Amplifier heat sink, or a mechanical bind with the programmer cover. Be sure to tap the programmer components with the handle of a screwdriver to check for intermittent problems.

Amplifier Test

8. If the programmer output shaft still does not operate properly, place the "Voltage" knob of the tester in the "Probe and Clip" position. Connect the alligator clip lead to the transducer terminal with the gray wire. Do not short transducer terminals together or amplifier will be damaged.

Push the probe into the programmer connector body making contact with terminal No. 2 which connects to a yellow wire.

9. Rotating the "Manual Control" knob from "Max. Heat" to "Max. Cold" (or vice-versa), the voltmeter reading should *change 5 volts or more* (after it is stabilized). This change indicates that the amplifier is "good". If the 5 volts or more change is *not* obtained, check the amplifier heat sink insulator for proper positioning. If the heat sink is shorted to the programmer chassis, the programmer will go to the full AC position.

If the voltage change cannot be obtained and the insulator is okay, check the calibration of the amplifier according to the instructions in Step 18. If the programmer still does not function properly, replace the amplifier circuit board and be sure to *install the new heat sink insulator properly.* The new amplifier *must be calibrated* according to Step 18 after installation.

Transducer Test

10. If the 5 volts change was present in the amplifier check in Step 9, but the programmer output shaft does not operate normally, leave the "Probe and Clip" connected, as instructed in Step 8 *throughout Transducer Test Procedure.*

11. Disconnect vacuum hose from the small diameter port of the transducer and connect A.C.C. tester's hose to the vacuum gauge directly to this hose.

About 20 inches Hg. or more vacuum should be present on this transducer vacuum supply hose. If vacuum is proper, restore hose connection. If 20 inches Hg. or more is *not* present, check the vacuum supply vacuum level and then go to Steps 14, 15, 16, and 17 to check for vacuum leaks in the vacuum checking relay and the rotary vacuum valve.

12. To check for properly-regulated vacuum output from the transducer, disconnect the long hose from the transducer to the vacuum checking relay *at the relay.*

This long hose must be at least 15 inches long, or the transducer will make a buzzing noise.

Connect the A.T.C. tester's vacuum gauge directly to the long hose at the vacuum checking relay.

13. Position the programmer in an upright position so that the output shaft points straight up. With the "Manual Control" knob in the "Max. Heat" position, 0 volts should be read on the voltmeter and the vacuum should be 9 to 11 inches Hg. Turning the "Manual Control" knob to the "Max. Cold" position should make the vacuum drop to 0 inches Hg. and the voltage should increase 5 volts or more. If the above indications *do not occur,* the transducer has malfunctioned. After the check is completed, restore hose connection. Disconnect probe and clip from the programmer.

Rotary Vacuum Valve and Vacuum Checking Relay Test

14. Connect the tester's vacuum gauge into the vacuum feed line to the rubber dummy plug on the programmer rotary vacuum valve. Disconnect the center hose from the side port of the rotary vacuum valve and seal off the port by placing your finger over the port. The tester's vacuum gauge should read 20 inches Hg. or more. If it does not, either the vacuum checking relay or the rotary vacuum valve is leaky. If 20 inches Hg. or more vacuum is read, skip to Step 16 and restore the hose connection.

15. Remove all three hoses from the side ports of the rotary vacuum valve. Remove the short hose from the transducer and connect it across the two outer ports on the side of the rotary valve. Place finger over center side port of the rotary vacuum valve. If the tester's vacuum gauge now reads 20 inches Hg. or more, the *vacuum checking relay* has malfunctioned. If it does *not,* the rotary valve is defective and leaking. After repair of programmer, restore all hose connections.

Vacuum Motor and Vacuum Checking Relay Test

16. Disconnect electrical connector from programmer. *Do not disconnect* the vacuum input to programmer. The programmer should go to the full heat position (the vacuum motor mechanism will move into the vacuum motor). If it does not, then either the vacuum checking relay or the vacuum motor has a severe leak. If it does go to full heat, a slight leak may be present and the vacuum motor will move toward "Max. Cold" after removing the rubber dummy plug from the programmer.

17. If the vacuum motor mechanism moves, the vacuum motor or vacuum checking relay is leaking. Disconnect the short hose at vacuum motor. Apply raw vacuum to the vacuum motor input port, then pinch the hose at the vacuum motor with long nose pliers and hold for 30 seconds. If the mechanism moves, the vacuum motor has malfunctioned. If it does *not* move, the vacuum checking relay is defective.

Amplifier Calibration (Feedback Pot Adjustment)

18. a. Remove the programmer cover and make the connections to programmer, as described in Steps 1 through 4.

b. Using a screwdriver, slip the shaft of the feedback potentiometer, turning the shaft fully counterclockwise (gear does not move). See Figure 9B-232. The vacuum motor should now be in the "Full Heat" position. (The vacuum motor mechanism will move into the vacuum motor.)

c. Place the "Manual-Automatic" switch in "Manual" position. Rotate the "Manual Control" to the "Max. Heat" position.

d. Carefully adjust the "Manual Control" to "180" and *do not overshoot.*

e. Slip the shaft of the feedback "pot" very slowly clockwise looking for signs of *vacuum motor, mechanism movement.* (Do not watch the output shaft.) Stop the adjustment when movement first occurs.

f. Check the adjustment with the "Manual Control". Rotate the "Manual Control" to the "Max. Heat" position. Watch for signs of vacuum motor mechanism movement while slowly rotating the "Manual Control" back toward "180". The first sign of movement should occur when the "Manual Control" knob is exactly on "180". Touch up the feedback potentiometer adjustment in the programmer so that the mechanism movement occurs exactly at "180".

Programmer Blower Switch Test

19. Place the "Voltage" knob in the "No. 6 Blower" position. Rotate the "Manual Control" knob to the "Max. Heat" position. The voltmeter reading should be 12 volts DC (supply voltage). As the "Manual Control" knob is slowly rotated toward "Max.

Cold", at about "175", the voltage will drop slightly Then at about "160" the voltage will again drop slightly and at about "155", the voltage will again drop slightly. At about "130", the voltage will increase slightly. At about "120", the voltage will again increase slightly and again at about "110", a slight increase should be noted. If these steps in blower voltage are not present, the blower switch in the programmer has malfunctioned.

20. Tap the components of the programmer while rotating the "Manual Control" knob and watch for any erratic operation due to intermittent problems. Replace programmer cover and rotate "Manual Control" knob, checking for normal rotation of the output shaft.

TROUBLE DIAGNOSIS GUIDE

Blower Inoperative

Possible Causes

Disconnected loose or corroded blower ground wire.

Disconnected feed wire.

Malfunctioned blower.

Malfunctioned fuse.

Malfunctioned blower switch in programmer.

Test programmer with Tester J-23678.

Blower, Programmer, and Compressor Inoperative

Possible Causes

Connection broken at:

Engine Harness Connector Plug (No. 10 red wire and green wire)

Cluster Extension Harness to I/P Harness Connector Plug

Cluster Extension Harness to Body Extension Harness Connector Plug

Hi Blower Only MAX HEAT Position

Possible Cause

Disconnected plug at programmer.

Lo Blower Only

Possible Causes

Disconnected plug at control head to body extension harness.

Disconnected plug at auto relay.

No LO Blower in OFF, VENT, and LO Positions

Possible Causes

Disconnected plug at the lo relay.

Malfunctioned relay.

Immediate Lo Blower - Car Start-Up - In-Car Temperature Below 80 Degrees

Possible Cause

Malfunctioned engine thermoswitch.

Immediate Lo Blower - Car Start-Up - In-Car Temperature Above 80 Degrees

Possible Causes

Check preceding causes.

Low Blower Inoperative All Positions

Possible Cause

Malfunctioned engine thermoswitch.

Compressor Inoperative Above 37 Degrees Ambient

Possible Causes

Disconnected ambient switch.

Malfunctioned ambient switch.

Disconnected plug at compressor.

Malfunctioned compressor coil.

Missed terminal in engine harness connection.

Compressor Operates Below 37 Degrees

Possible Causes

Shorted ambient switch.

Shorted wire in compressor circuit.

Malfunctioned compressor clutch.

Maximum Heat Mode AUTO RANGE Positions - No Temperature Control - No Automatic Blower Changes

Possible Causes

Disconnected ambient sensor.

Disconnected in-car sensor. Buzzing of programmer transducer may occur when selector lever is changed to "VENT" position.

Disconnected vacuum hose in programmer - vacuum valve to checking relay (purple).

Maximum Heat Mode All Positions - No Temperature Control - No Automatic Blower Changes

Possible Cause

Disconnected vacuum plug at:

Control Head (Vacuum)

Programmer (Vacuum)

Main Vacuum Harness Connector

Vacuum Manifold malfunctioned

Maximum Heat Mode and Cold Air From Heater Outlet

Possible Causes

Disconnected vacuum hose in programmer - vacuum valve to checking relay (black).

Disconnected vacuum hose at vacuum source line (black at bulkhead).

Malfunctioned vacuum manifold.

Max. A/C All Positions

Possible Causes

Shorted ambient sensor.

Shorted in-car sensor.

Disconnected vacuum hose in programmer at:

Source to transducer (short black hose).

Vacuum motor to transducer (black and white hose).

Max. A/C Only in AUTO RANGE Positions Cold Air Out of Outlets

Possible Cause

Disconnected vacuum hose in programmer - vacuum motor to checking relay (yellow) - shorted sensor string.

Erratic Temperature Control

Possible Causes

Kinked or disconnected aspirator hose.

Malfunctioned programmer.

Malfunctioned control head. Test programmer with Tester J- 23678.

Temperature of Discharge Air Too Hot or Too Cool at Mode Change

Possible Cause

Misadjusted temperature door linkage.

Insufficient Heat

Possible Causes

Misadjusted temperature door linkage.

Malfunctioned water valve.

Malfunctioned engine thermostat.

Low coolant.

Modes Will Not Change in AUTO RANGE Positions From A/C to Heat

Possible Causes

Black and grey vacuum source lines switched.

Disconnected source vacuum hose to reservoir.

Leaking vacuum reservoir.

Excessive Temperature Difference at Outlets Bi-Level Operation (Left Outlet Warmer Than Center)

Possible Cause

Vacuum lines switched at upper and lower mode door diaphragms.

Partial Air Flow to Windshield in DEF and No Air Flow to Windshield in BI-LEVEL Position

Possible Cause

Vacuum lines to defroster (dual) diaphragm switched.

Normal BI-LEVEL operation has a delay before door opens.

No Air Flow to Windshield in Either BI-LEVEL or DEF Position

Possible Causes

Either vacuum line to defroster diaphragm disconnected.

Leaking dual diaphragm.

MAINTENANCE AND ADJUSTMENTS

ADJUSTMENT OF AUTOMATIC CLIMATE CONTROL PROGRAMMER, LINK ASSEMBLY AND TEMPERATURE DOOR-A-B-C-E SERIES

1. Loosen the hex screw of the door link at the output shaft of the programmer. See Figure 9B-303.

2. Place the control head selector lever in the "DEF" position.

3. Remove the electrical connector from the programmer which results in the proper position of the output shaft of the programmer.

4. Check to make sure that the air mix door is in the full heat position. The blower air flow will now hold the mix door in the proper position.

5. Without disturbing the door link or the output shaft position, tighten the hex screw on the door link.

6. Connect ATC tester J-23678 into the wiring harness and the programmer. With the "Manual-Automatic" switch in the "Manual" position, rotate the "manual control knob" from maximum heat to maximum cold and check for full travel of the air mix door and the programmer.

7. Install vacuum and electrical connections.

TEMPERATURE DIAL CALIBRATION - A-B-C-E SERIES

Be sure to allow sufficient time for car engine to warm up and A.C.C. system to turn-on before attempting calibration.

1. Connect A.C.C. Tester J-23678 into the A.C.C. wiring harness and the programmer.

2. Place control panel selector lever in "VENT".

3. Place manual-automatic switch on the tester in the manual position.

4. Place the temperature dial calibrator switch on the tester in the "CAL" position.

5. Note the voltmeter reading on tester.

6. Press "Compare" button and note voltmeter reading.

7. With the "Compare" button pressed in, rotate the temperature dial on the control panel until the voltmeter reading is the same as it was in Step 5 (button not pressed in).

8. The control panel temperature dial should be set at the temperature dial setting on the tester panel ("75"). If it does not, use Tool J-21530 to hold the gear on the left side of the temperature dial and slip the dial to the correct setting. If the temperature dial cannot be calibrated using this procedure, it has malfunctioned.

MAJOR REPAIR

REMOVAL AND INSTALLATION OF INSTRUMENT PANEL CONTROL ASSEMBLY - A SERIES

1. Disconnect battery.

2. Remove trim plate by pulling rearward and unsnapping from instrument panel.

3. Pull control out from the instrument panel and disconnect vacuum and electrical connectors. See Figure 9B-20.

4. Remove control assembly.

5. Install control assembly reverse of removal procedure.

REMOVAL AND INSTALLATION OF IN-CAR SENSOR - A SERIES

1. Open glove box door.

2. Reach up through opening in glove box and grasp sensor body and twist 1/4 turn clockwise and pull down through opening. See Figure 9B-22.

3. Disconnect wire connector from sensor.

4. Disconnect aspirator hose from sensor.

5. Remove sensor.

6. To replace, reverse removal procedure, making sure sensor body spacer is in between body and sensor grille.

REMOVAL INSTALLATION OF INSTRUMENT PANEL CONTROL ASSEMBLY WITH AIR CUSHION RESTRAINT SYSTEM - B-C-E SERIES

1. Turn ignition switch to "Lock" position. Disconnect the negative battery calbe from the battery and tape end.

2. Remove both lower instrument panel cover trim plates by prying underneath and pulling out. See Figure 9B-233.

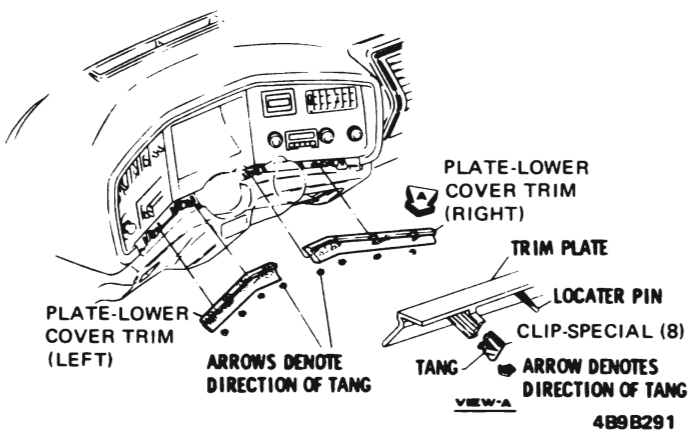


Figure 9B-233 Instrument Panel Lower Cover Trim Plates

3. Disconnect emergency brake release cable and trip set control cable if equipped, and remove lower left instrument panel cover assembly by removing eight retaining screws. See Figure 9B-234.

4. Remove headlight switch control shaft and escutcheon.

5. Pull trim plate off carefully, making sure see-lites pull out of receptacles.

6. Remove screws from control face.

7. Remove 1 screw from under instrument panel housing that connects control to forward support.

8. Disconnect vacuum, electrical connectors and bouder wires.

9. Remove control assembly.

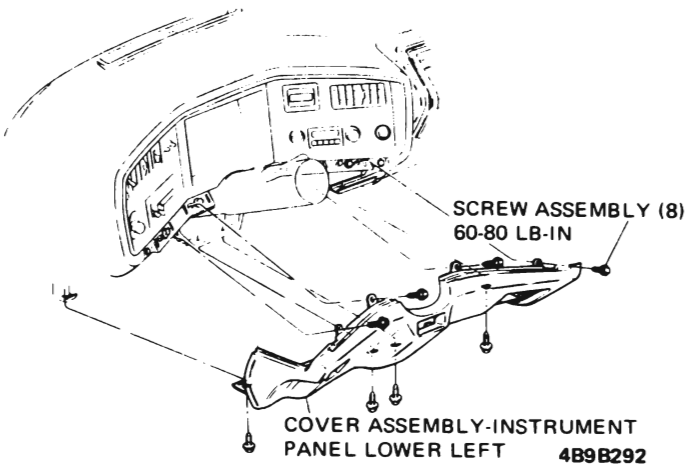


Figure 9B-234 Instrument Panel Lower Left Cover Assembly

10. Install control assembly in reverse of removal.

11. Adjust control cable so that 1/16 to 1/8 inch springback is obtained in the hot position.

12. Connect battery cable.

REMOVAL AND INSTALLATION OF INSTRUMENT PANEL CONTROL ASSEMBLY LESS AIR CUSHION RESTRAINT SYSTEM - B-C-E SERIES

Removal

1. Disconnect battery.

2. Unscrew headlight escutcheon and remove headlight switch.

3. Remove lower dash trim.

4. Remove 2 see-lights from trim plate.

5. Remove 4 screws from control face.

6. Remove 1 screw from under dash which connects heater control to instrument panel forward support.

7. Disconnect vacuum and electrical connectors.

8. Remove control assembly.

Installation

1. Install control assembly reverse of removal procedure.

REMOVAL AND INSTALLATION OF BLOWER MOTOR - A SERIES

1. Disconnect Blower Motor Wire.

2. Remove screws securing blower motor to air inlet assembly.

3. Install in reverse of removal.

REMOVAL AND INSTALLATION OF BLOWER MOTOR B-C-E SERIES

Removal

1. Disconnect blower motor wire.

2. Remove screws securing blower motor to air inlet assembly.

Installation

Install blower motor reverse of removal procedure.

REMOVAL AND INSTALLATION OF HEATER ASSEMBLY OR HEATER CORE B-C-E SERIES

WARNING: IF CAR IS EQUIPPED WITH AIR CUSHION RESTRAINT SYSTEM, REFER TO "AIR CUSHION RESTRAINT SYSTEM" SERVICE MANUAL TO REMOVE THE PASSENGER AIR CUSHION OTHERWISE PERSONAL INJURY MAY RESULT.

Removal

1. Drain radiator and disconnect heater inlet and outlet hoses at dash.

2. Disconnect control wires from defroster door and vacuum hose diverter door actuator diaphragm and control cable from temperature door lever.

3. Remove 4 nuts securing heater assembly to dash.

4. Remove screw securing defroster outlet tab to heater assembly.

5. Work heater assembly rearward until studs clear dash and remove heater assembly.

Installation

Install heater assembly reverse of removal procedures and seal along mating surfaces between dash and heater assembly.

REMOVAL AND INSTALLATION OF IN-CAR SENSOR - B-C-E SERIES

Removal

1. Open glove box door.

2. Reach up through opening in glove box and grasp sensor body and twist 1/4 turn clockwise and pull down through opening.

3. Disconnect wire connector from sensor.

4. Disconnect aspirator hose from sensor.

5. Remove sensor.

Installation

To replace, reverse removal procedure, making sure sensor body spacer is in between body and sensor grille.

REMOVAL AND INSTALLATION OF PROGRAMMER - A-B-C-E SERIES

Removal

1. Remove glove box.

2. Loosen adjustment screw on link assembly.

3. Remove vacuum and electrical connections.

4. Remove 3 screws from programmer and remove programmer.

Installation

1. To replace, install programmer onto the heater defroster assembly.

2. Install the link assembly onto the output shaft leaving the hex screw loose.

3. Place the control head selector lever in the "DE-ICE" position and install the vacuum harness assembly.

4. Check to make sure that the air mix door is in the full heat position. The blower air flow will hold the mix door in the proper position.

5. Without disturbing the door link or the output shaft position, tighten the hex screw on the door link.

6. Connect ATC tester J-23678 into the wiring harness and the programmer. With the "Manual-Automatic" switch in the "Manual" position, rotate the "Manual Control Knob" from maximum heat to maximum cold and check for full travel of the air mix door and the programmer.

7. Install the electrical connector.

REMOVAL AND INSTALLATION OF PROGRAMMER COMPONENTS A-B-C-E SERIES

Vacuum Valve Removal

1. Identify vacuum hoses connected to the two outboard side ports of the vacuum valve and the port to which each is connected. Disconnect the two vacuum hoses.

2. Disconnect vacuum hose to center port on valve at the transducer.

3. Remove two vacuum valve retaining studs and remove valve. Lift valve drive arm off of vacuum motor mechanism boss when removing valve.

Installation

1. Make certain vacuum valve spring is in place. Refer to Figure 9B-235.

2. Place vacuum valve on the spring and valve drive arm on vacuum motor mechanism boss.

3. Replace two vacuum valve retaining studs.

4. Reconnect vacuum hose from the center port on the valve to the transducer.

5. Reconnect the 2 vacuum hoses going from the 2 outboard side ports of the vacuum valve to ports 3 and 5 of vacuum checking relay.

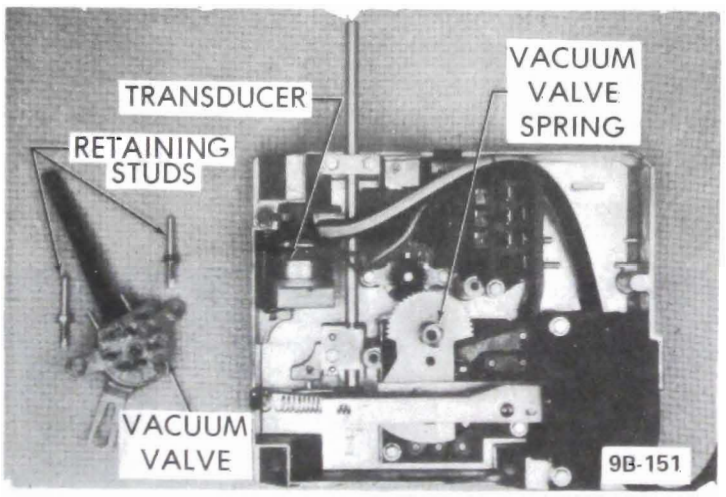


Figure 9B-235 Vacuum Valve - Removed

Checking Relay Removal

1. Disconnect 2 vacuum hoses from vacuum valve at the relay. Identify hoses and relay ports to which they connect for reconnecting.

2. Disconnect long vacuum hose at other side of relay and short vacuum hose at the vacuum motor and remove relay.

Installation

If long vacuum hose (from checking relay to transducer) is replaced, the replacement hose must be at least 15 inches in length. See Figure 9B-236.

1. Reconnect long vacuum hose (white) to port 2 of relay and short vacuum hose (yellow) to the vacuum motor.

2. Reconnect the 2 vacuum hoses going from the 2 outboard side ports of the vacuum valve to ports 3 and 5 of the checking relay.

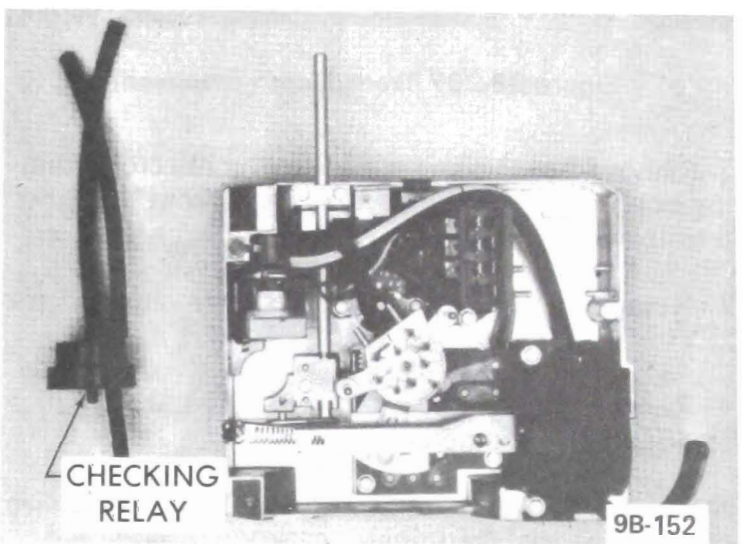


Figure 9B-236 Checking Relay - Removed

Transducer Removal

1. Disconnect two vacuum hoses at transducer; identify hoses and ports for reconnection.

2. Disconnect and identify 2 electrical terminals to transducer.

3. Remove hex screw, retaining clip, and transducer.

Installation

1. Replace transducer, retaining clip, and hex screw. See Figure 9B-237.

2. Reconnect the 2 electrical terminals to the transducer.

3. Reconnect the 2 vacuum hoses to the transducer. The white hose goes to the larger port of the transducer and the black hose from the vacuum valve goes to the smaller port of the transducer.

Amplifier Circuit Board Removal

1. Remove vacuum valve.

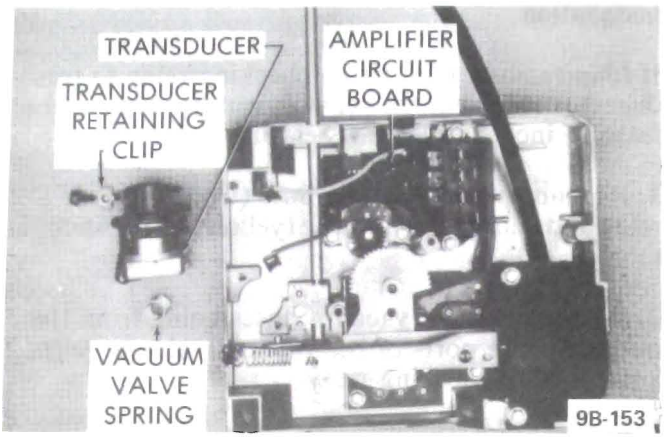


Figure 9B-237 Transducer - Removed

2. Remove 2 programmer electrical connector retaining screws and lift connector body from amplifier terminals.

3. Remove amplifier heatsink retainer clip and insulator.

4. Remove 2 amplifier retaining screws at amplifier feedback potentiometer.

5. Disconnect 2 wires at transducer. Note which wire connects to each terminal.

6. Remove amplifier circuit board.

Installation

1. Replace electrical connector to amplifier terminals on circuit board and place circuit board back into the programmer. See Figure 9B-238.

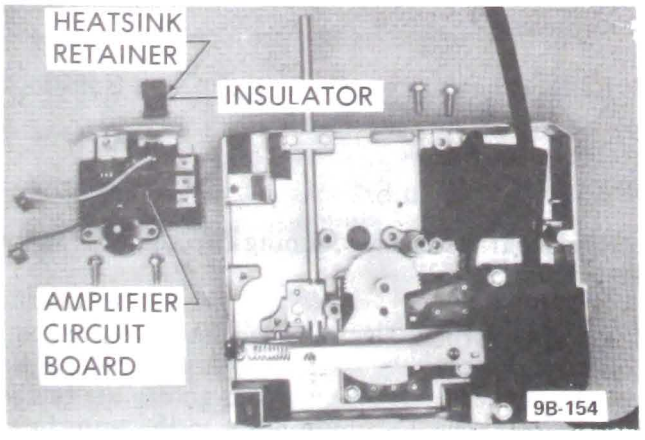


Figure 9B-238 Amplifier Circuit Board - Removed

2. Replace the 2 amplifier retaining screws at amplifier feedback potentiometer.

3. Replace the 2 programmer electrical connector retaining screws.

4. Replace amplifier heatsink retainer clip and insulator.

5. Reconnect grey and yellow wires to transducer.

6. Replace vacuum valve.

Vacuum Motor Removal

1. Remove vacuum valve retaining studs and lift vacuum valve to remove drive arm from boss on vacuum motor mechanism.

2. Remove retaining clip and power spring from motor mechanism.

3. Disconnect vacuum hose from port on motor.

4. Remove 2 motor retaining screws and remove motor, lifting upward.

Installation

1. Replace vacuum motor mechanism into proper place on mix door operating arm and tighten down retaining screw on the mix door operating arm bracket. See Figure 9B-240.

2. Position vacuum motor mechanism and motor into place and replace the motor retaining screws.

3. Reconnect vacuum hose to port on motor.

4. Replace retaining clip and power spring.

5. Replace the drive arm from the vacuum valve onto the boss of the vacuum motor mechanism and tighten the vacuum valve retaining studs.

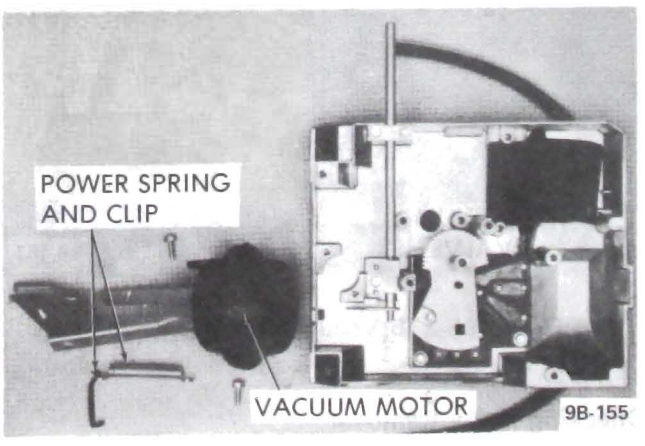


Figure 9B-240 Vacuum Motor and Power Spring - Removed

Blower Resistor Wiper Arm Assembly or Feedback Pot Arm Assembly Removal

1. Remove vacuum valve and spring.

2. Remove vacuum motor and power spring.

3. Lift blower resistor wiper arm and feedback pot arm off of blower resistor circuit board. Take care to locate single ball bearing, making certain it is located in bearing cup on blower resistor circuit board.

4. Separate blower resistor wiper arm from feedback pot arm. Be sure to locate 2 single ball bearings and insure their location in bearing cups on wiper arm.

Installation

1. Put blower resistor wiper arm and feedback pot arm back together, making certain that the 2 ball bearings are located properly in the bearing cups on the wiper arm. See Figure 9B-241.

2. Place blower resistor wiper arm and feedback pot arm onto the blower resistor circuit board, making certain that the single ball bearing is located properly in the bearing cup on the blower resistor circuit board.

3. Replace vacuum motor and power spring.

4. Replace vacuum valve and spring.

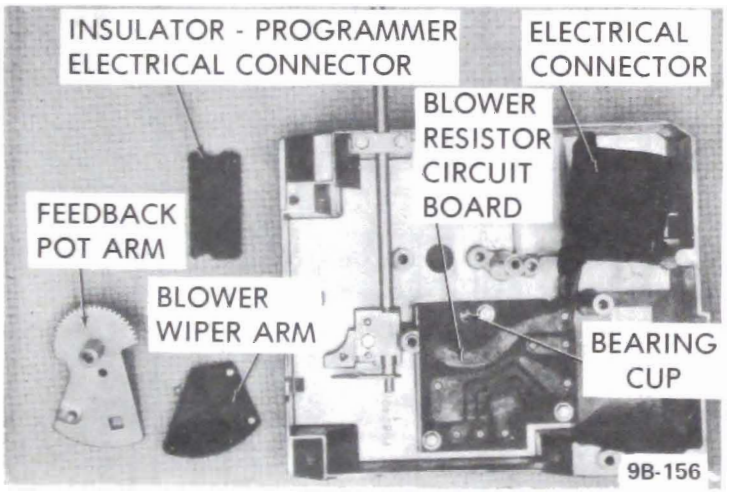


Figure 9B-241 Blower Wiper Arm and Feedback Pot Arm - Removed

Mix Door Operating Arm Removal

1. Remove vacuum valve.

2. Remove vacuum motor retaining screws and power spring. Position motor mechanism to disengage mix door operating arm (programmer output shaft).

3. Disconnect electrical terminals and vacuum hoses at transducer. Identify connections for reassembly.

4. Remove 3 retaining screws and 2 retaining clips and remove mix door arm.

Installation

1. Replace mix door operating arm into holders. See Figure 9B-242.

2. Replace the 3 retaining screws and 2 retaining clips.

3. Reconnect the 2 electrical terminals and vacuum hose at the transducer.

4. Place the vacuum motor and vacuum motor mechanism into their proper position and tighten vacuum motor retaining screws.

5. Replace power spring and retainer.

6. Replace vacuum valve.

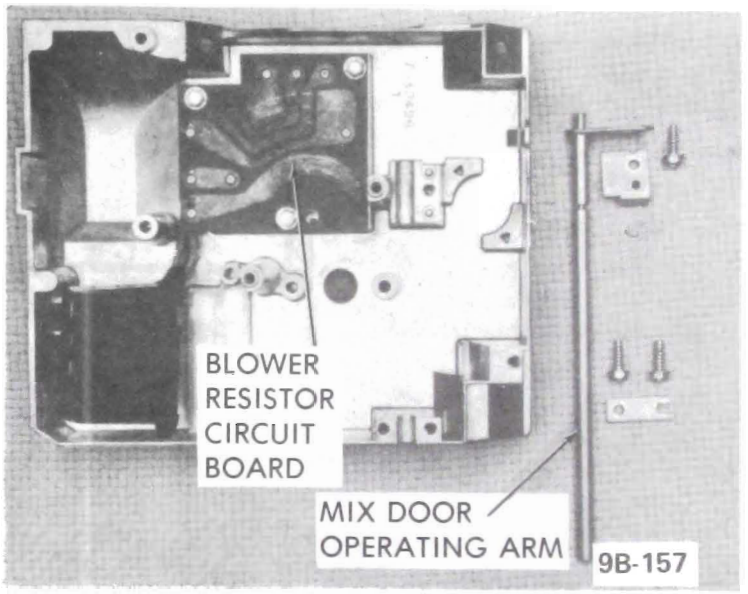


Figure 9B-242 Mix Door Operating Arm - Removed

Blower Resistor Circuit Board Removal

1. Remove blower resistor wiper arm assembly using correct procedure.

2. Remove 3 retaining screws and blower resistor

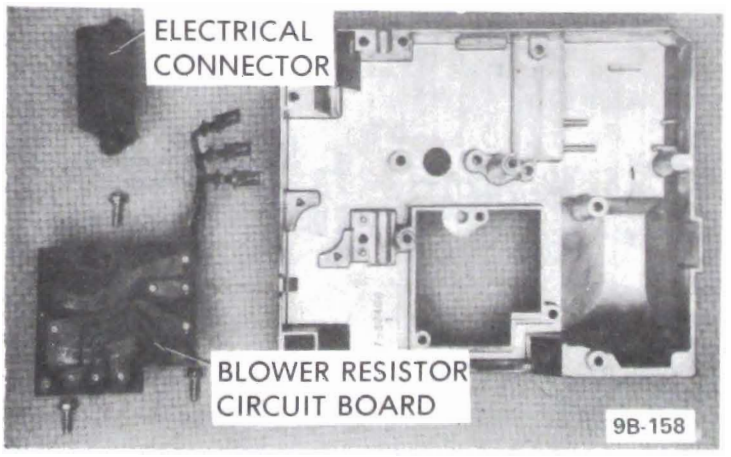


Figure 9B-243 Blower Resistor Circuit Board - Removed

circuit board. Take care that single ball bearing is kept located in bearing cup on circuit board.

3. Remove 3 electrical terminals from programmer electrical connector body.

Installation

1. Replace electrical terminals and electrical body connector and tighten the 2 retaining screws. See Figure 9B-243.

2. Replace the 3 retaining screws on the blower resistor circuit board, making certain that the single ball bearing is kept located in the bearing cup.

3. Replace the blower resistor wiper arm assembly, using the correct procedure.

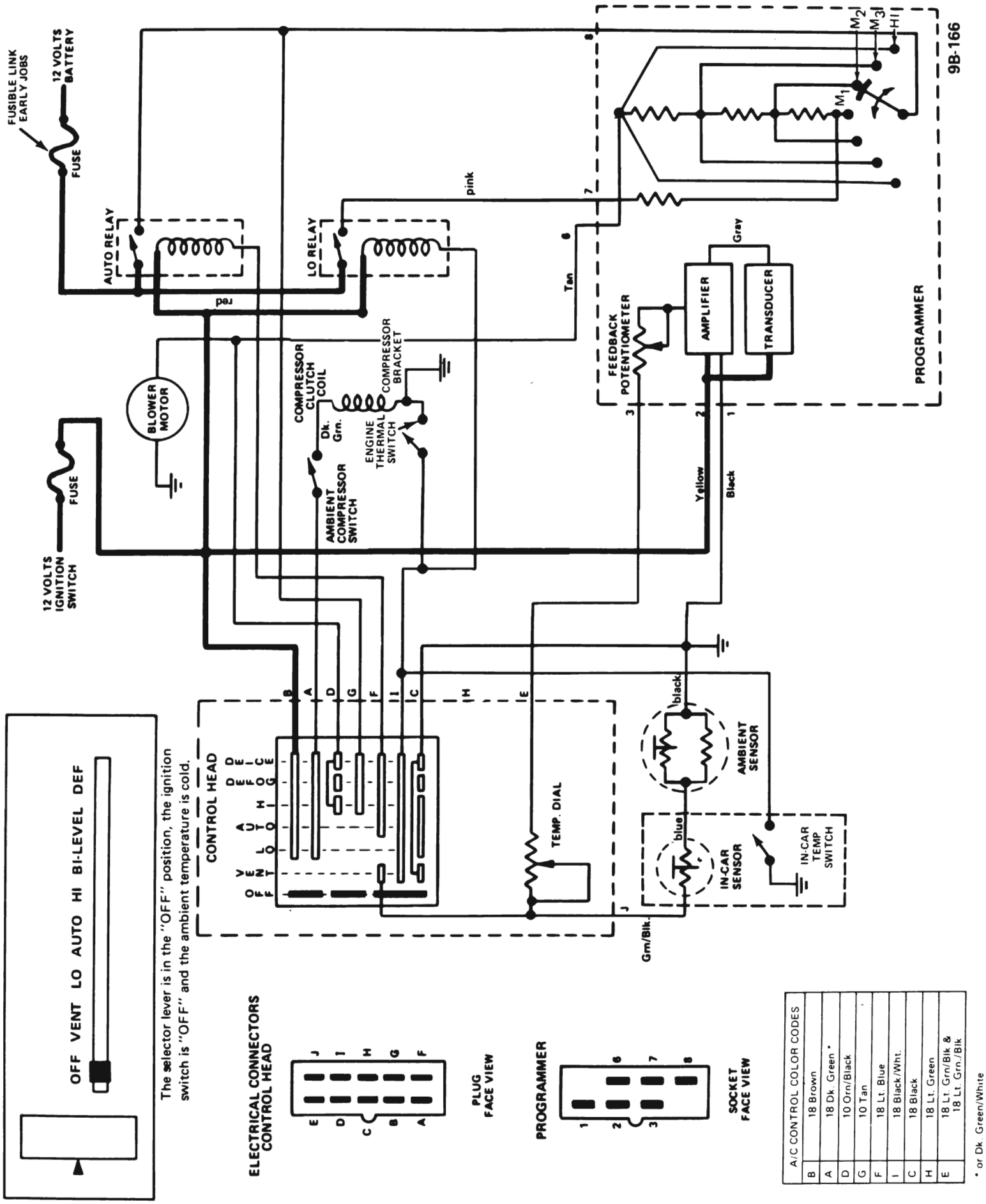


Figure 9B-244 Electrical Operation - Selector Lever in OFF

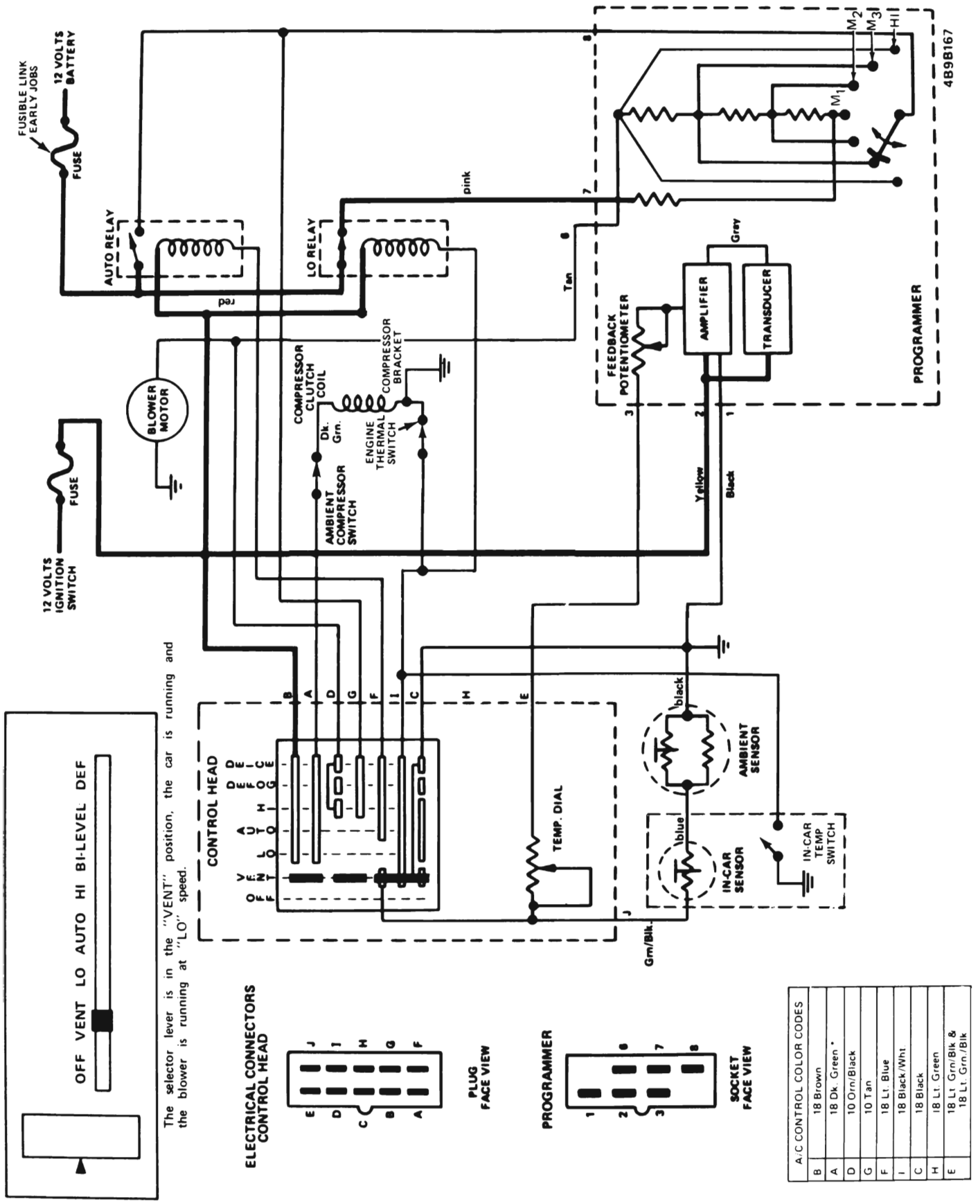


Figure 9B-245 Electrical Operation - Selector Lever in VENT

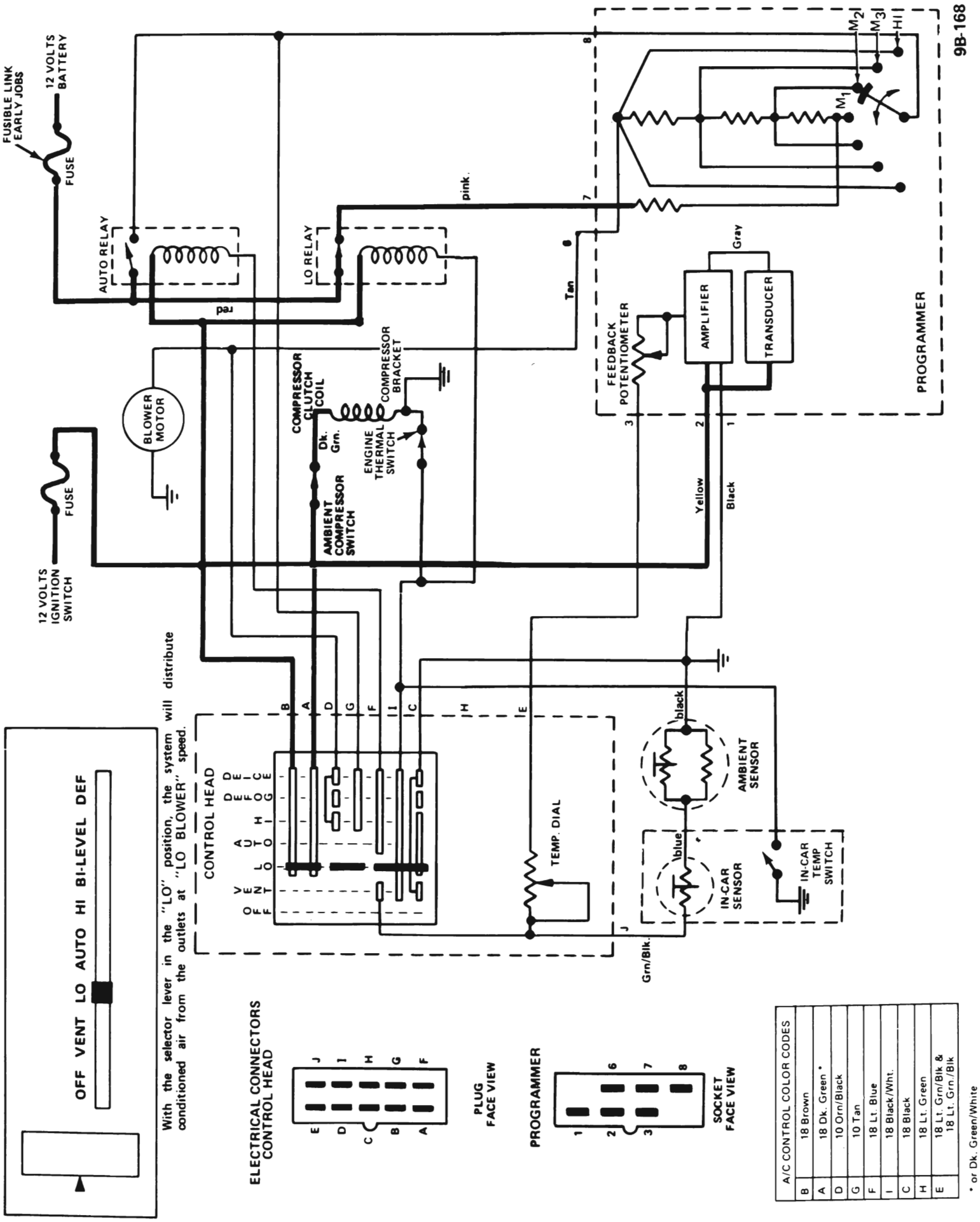


Figure 9B-246 Electrical Operation - Selector Lever in LO

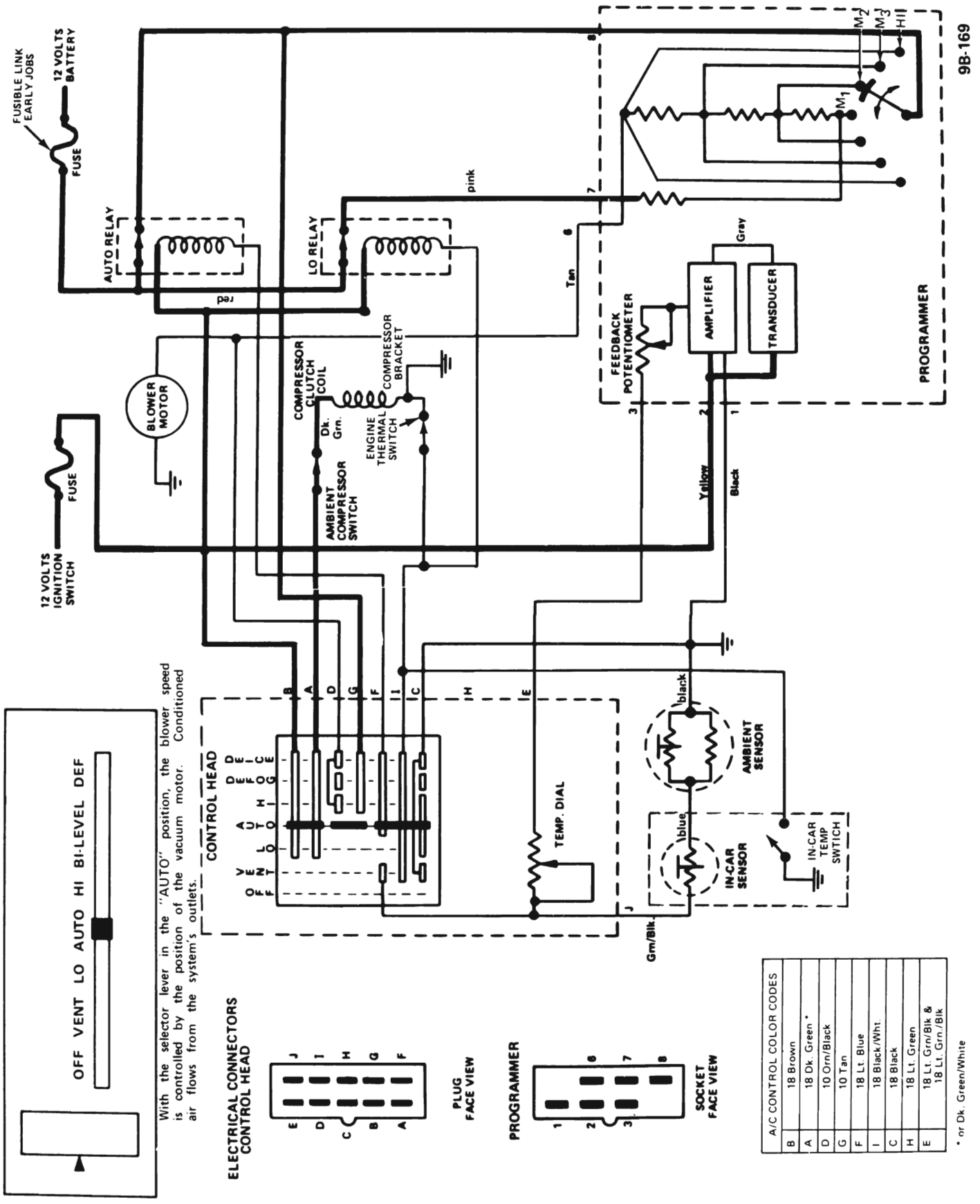
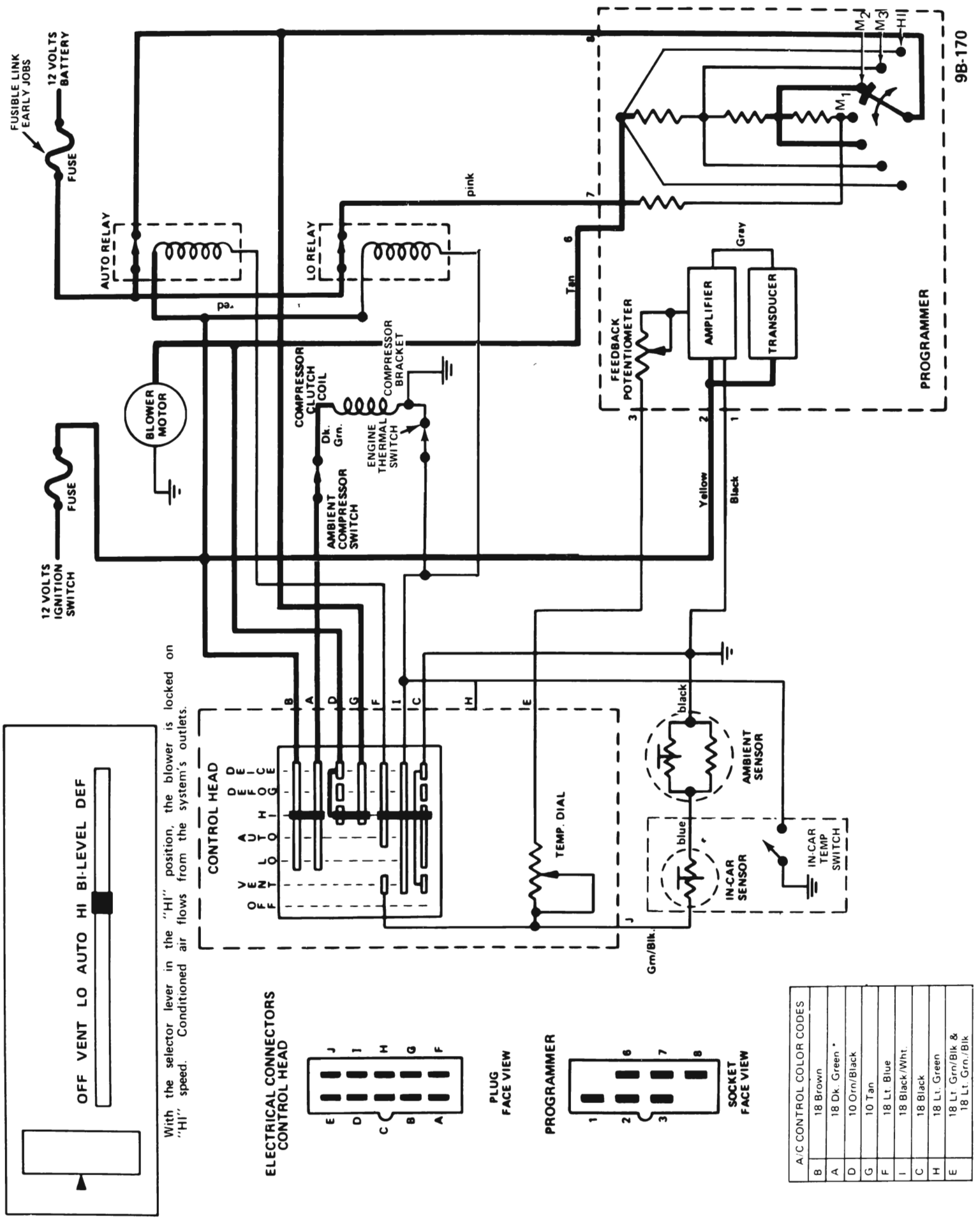


Figure 9B-247 Electrical Operation - Selector Lever in AUTO



A/C CONTROL COLOR CODES	
B	18 Brown
A	18 Dk. Green *
D	10 Orn/Black
G	10 Tan
F	18 Lt. Blue
I	18 Black/Wht.
C	18 Black
H	18 Lt. Green
E	18 Lt. Grn/Blk & 18 Lt. Grn./Blk

* or Dk. Green/White

Figure 9B-248 Electrical Operation - Selector Lever in HI

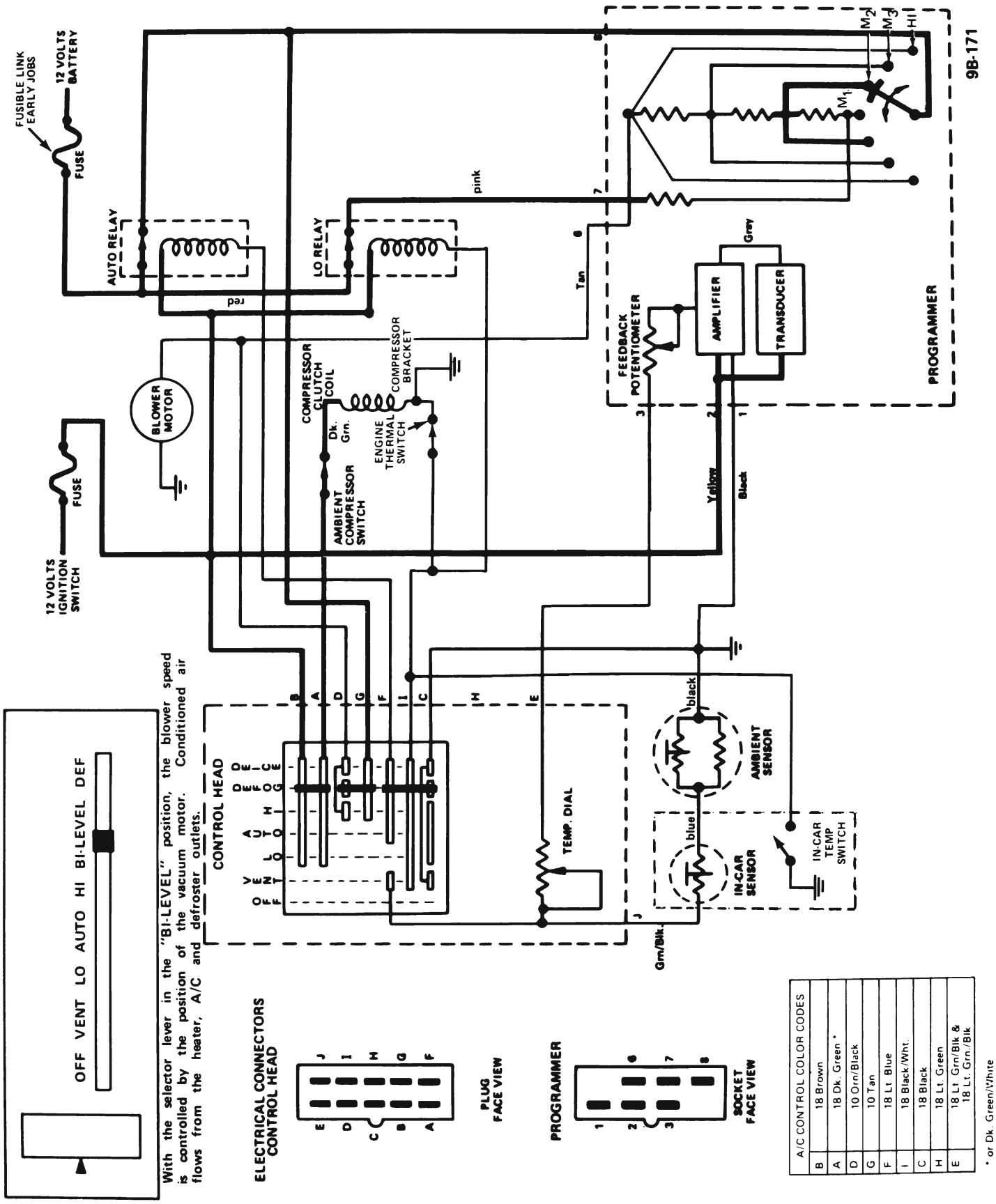


Figure 9B-250 Electrical Operation - Selector Lever in BI-LEVEL

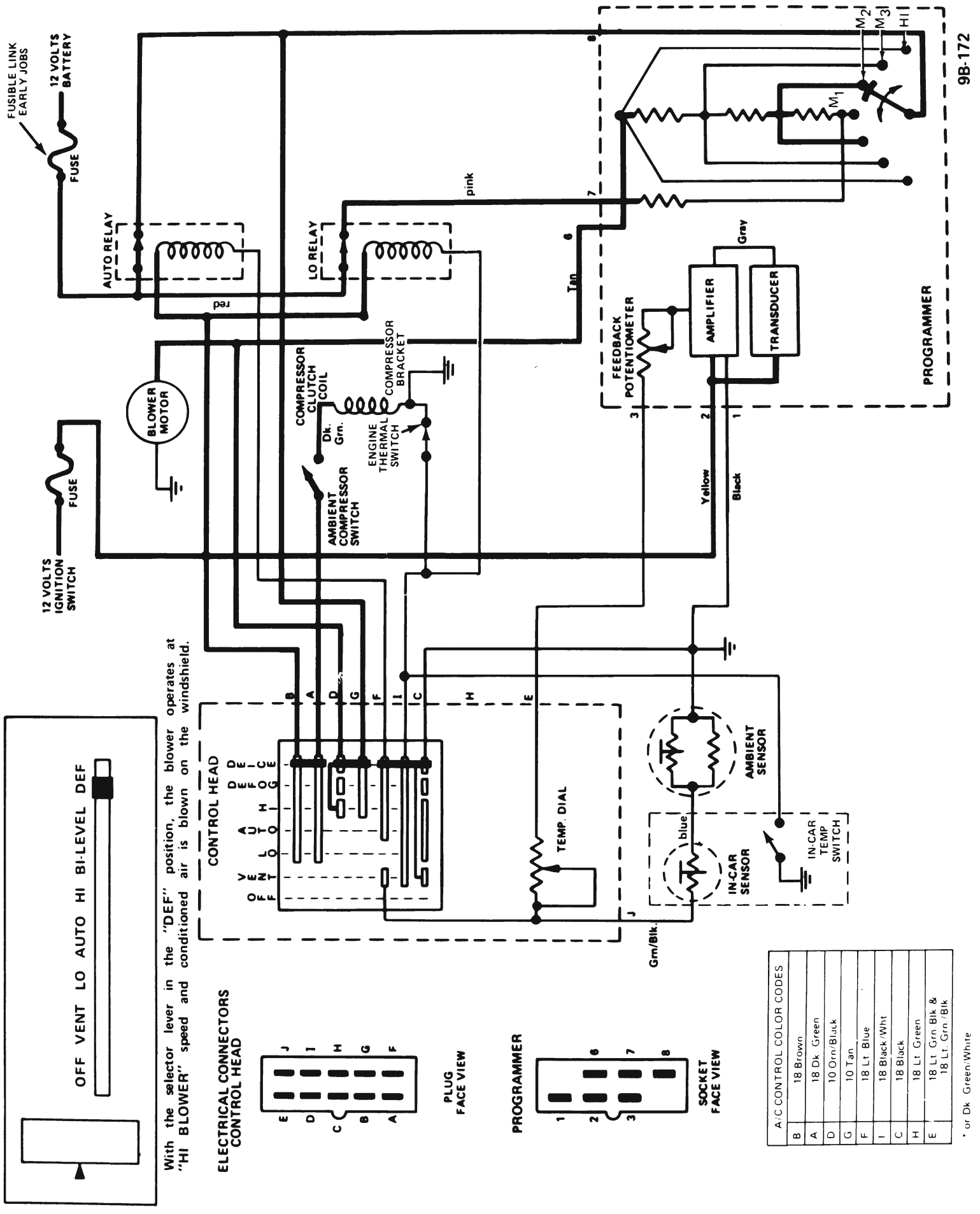


Figure 9B-251 Electrical Operation - Selector Lever in DEF

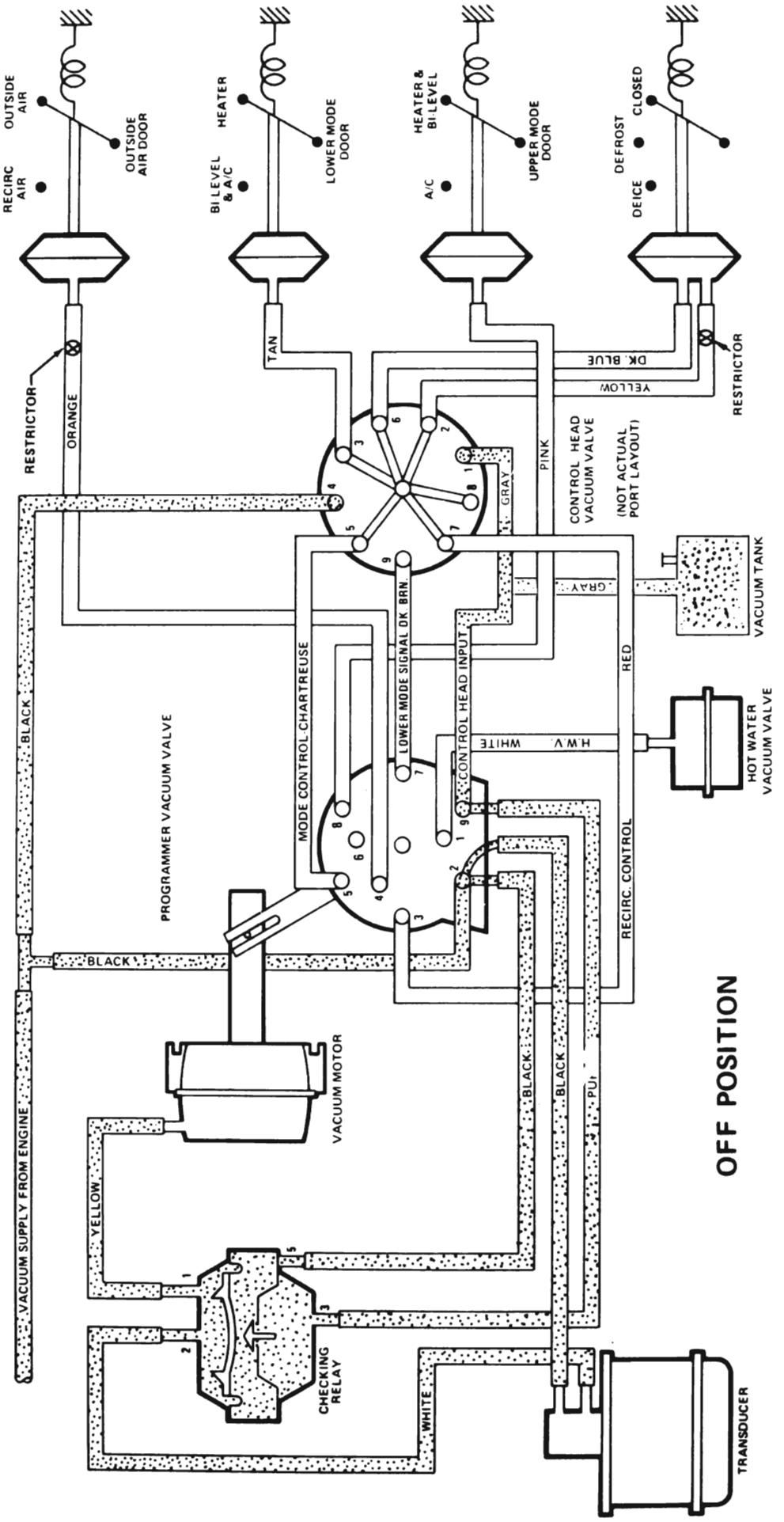


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Figure 9B-252 Vacuum Circuits - OFF Position

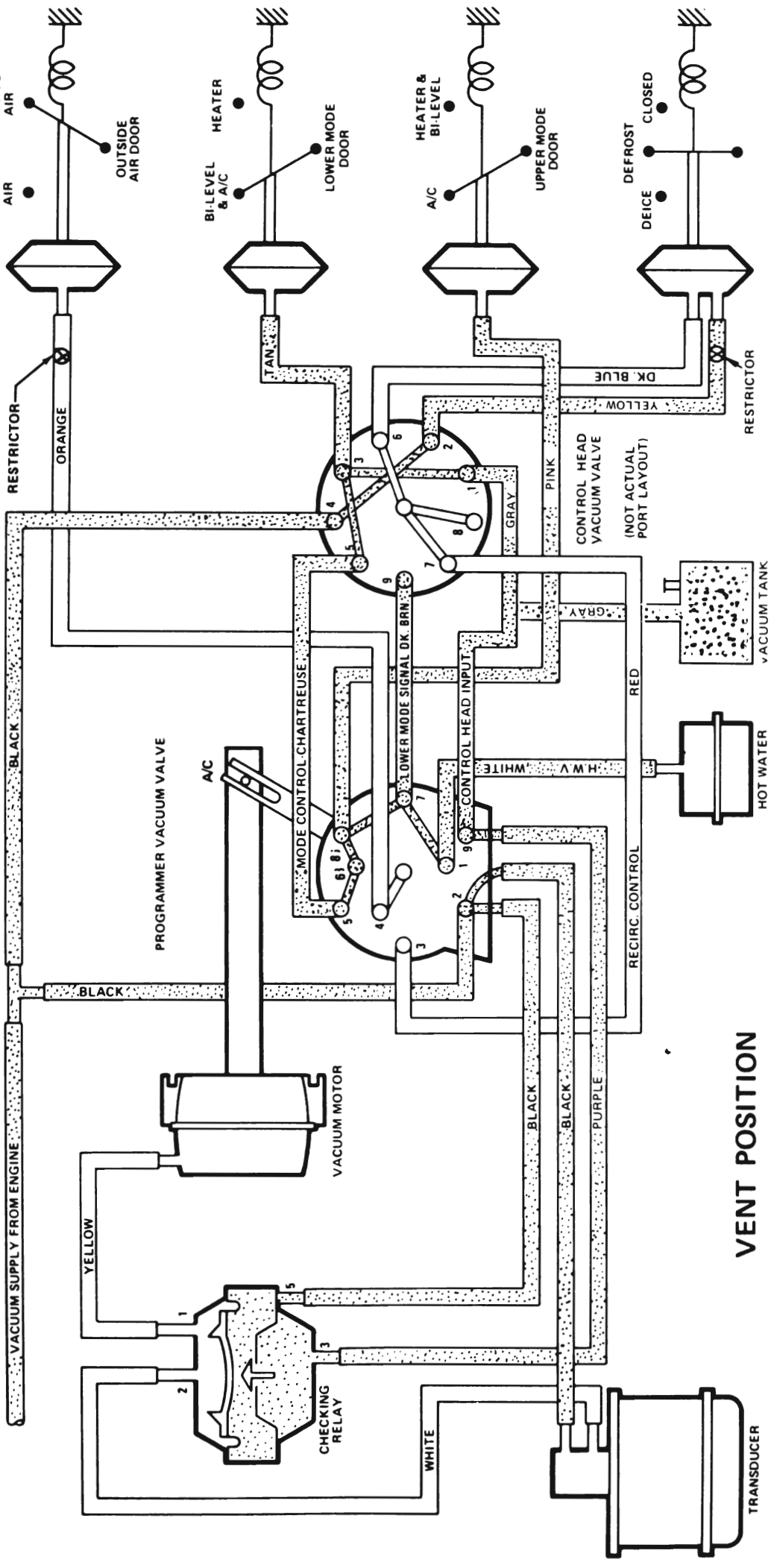

Figure 9B-253 Vacuum Circuits - System in VENT Position

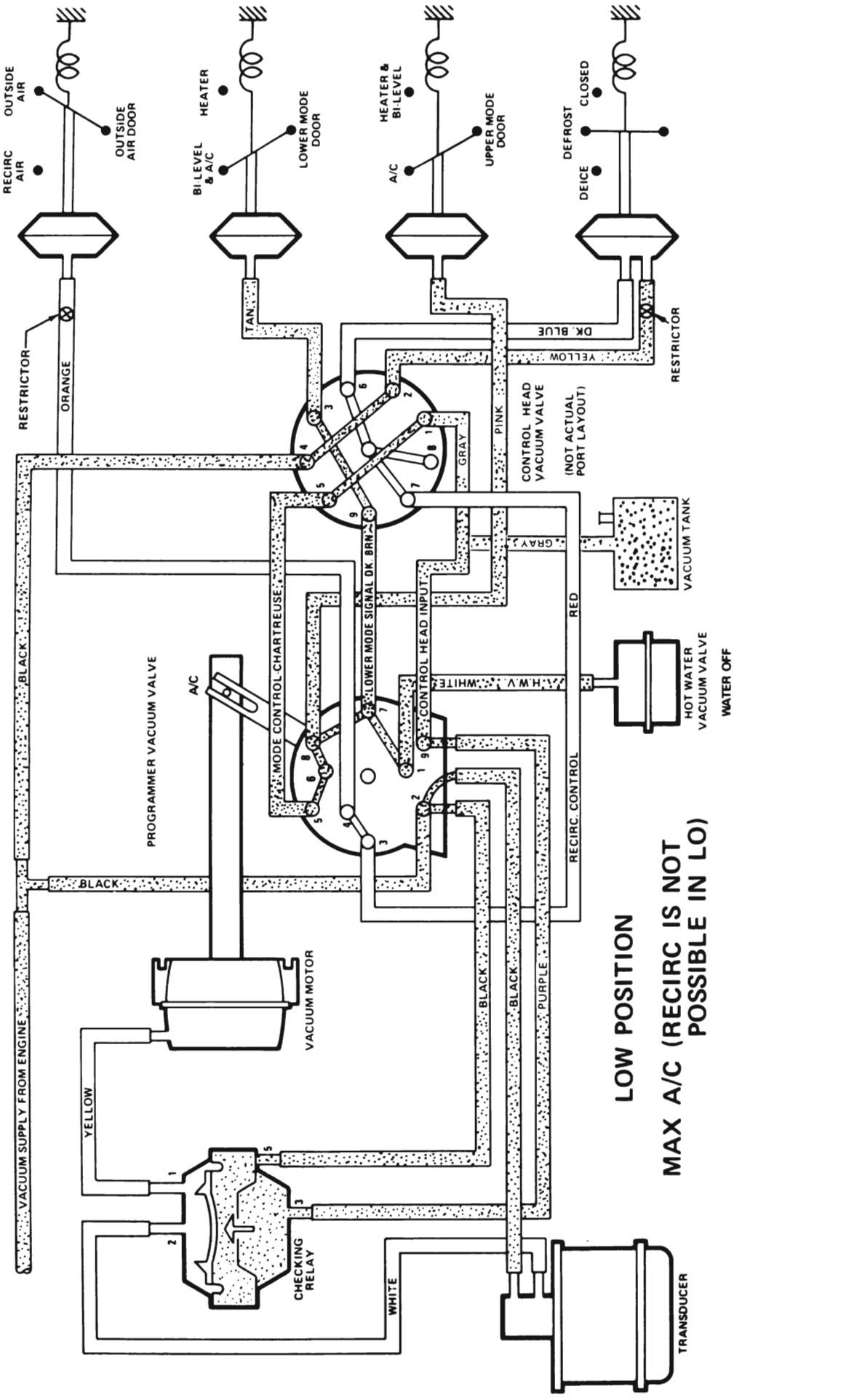

Figure 9B-254 Vacuum Circuits - System in MAX A/C LO Position (Recirc Impossible in LO)

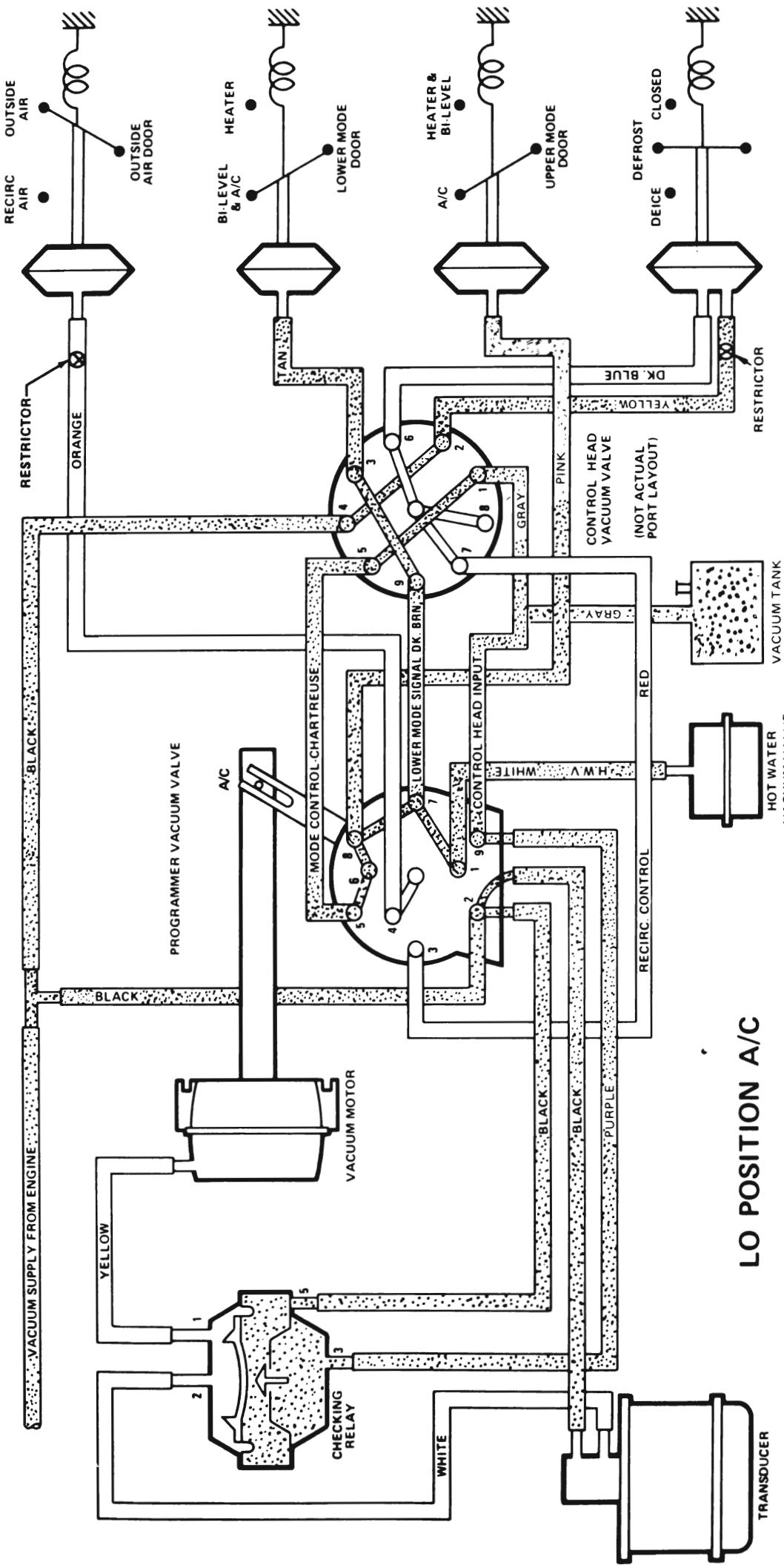

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Figure 9B-255 Vacuum Circuits - System in LO Position A/C

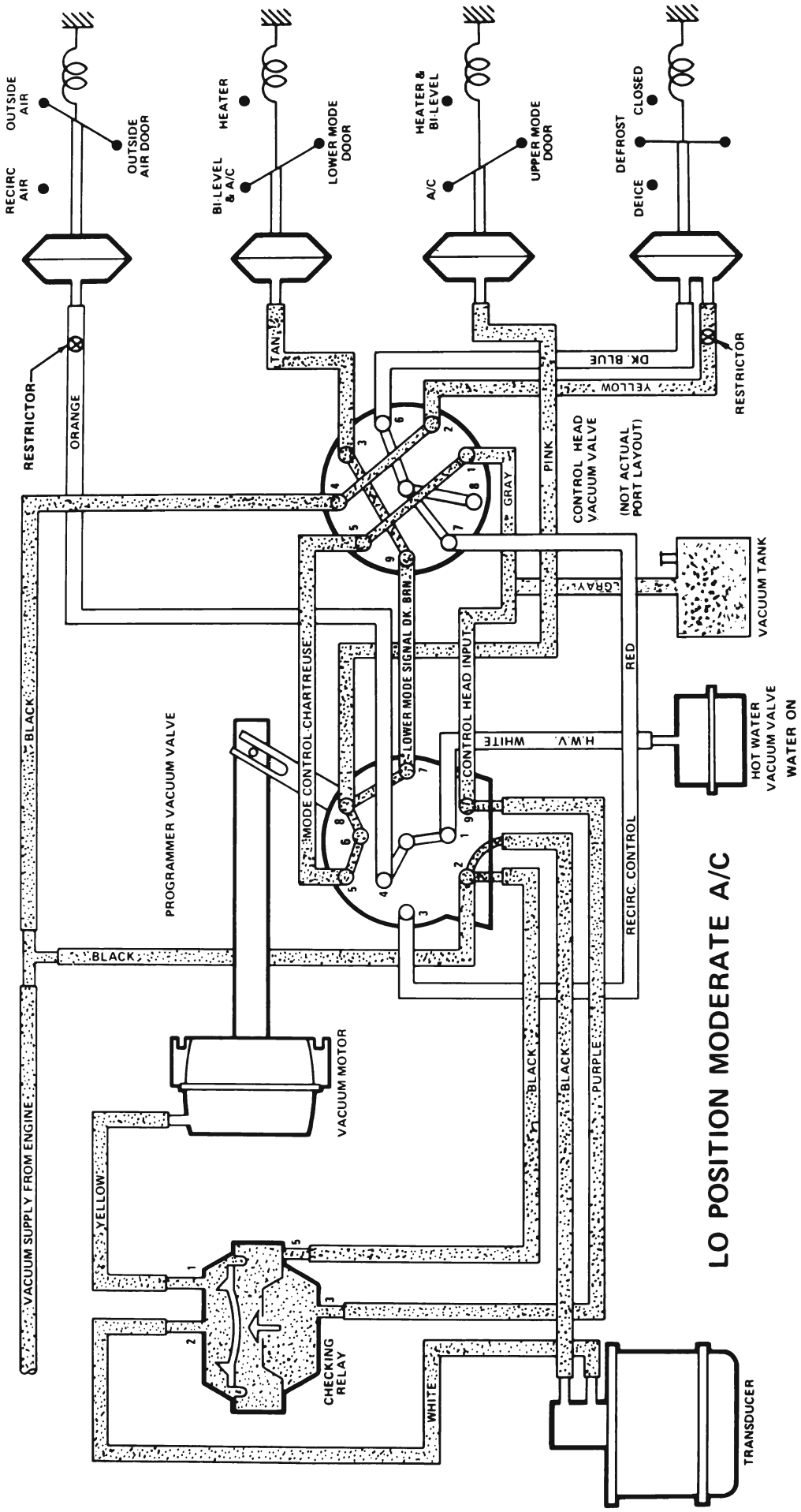

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Figure 9B-256 Vacuum Circuits - System in LO Position Moderate A/C

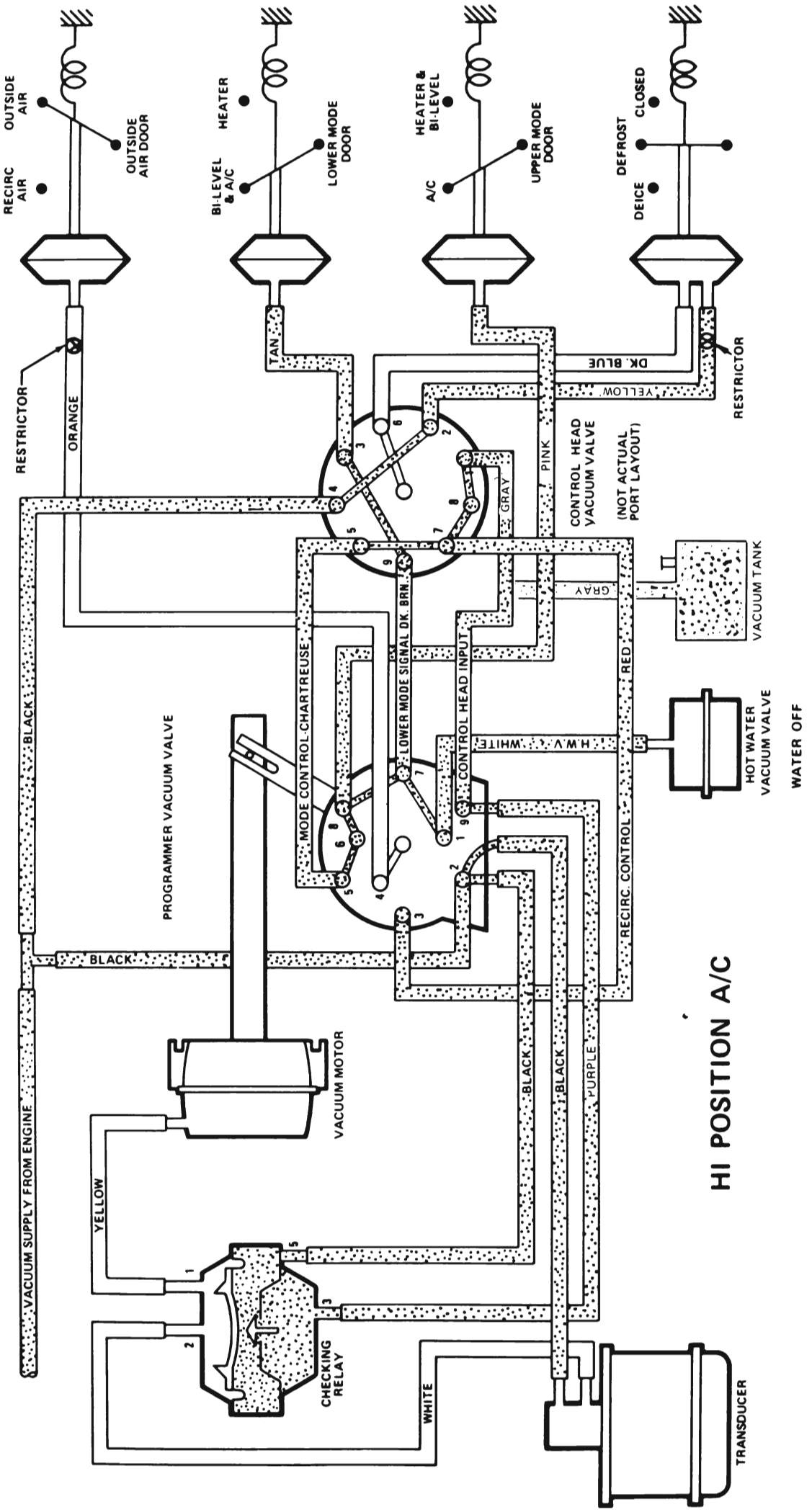


Figure 9B-257 Vacuum Circuits - System in HI Position A/C

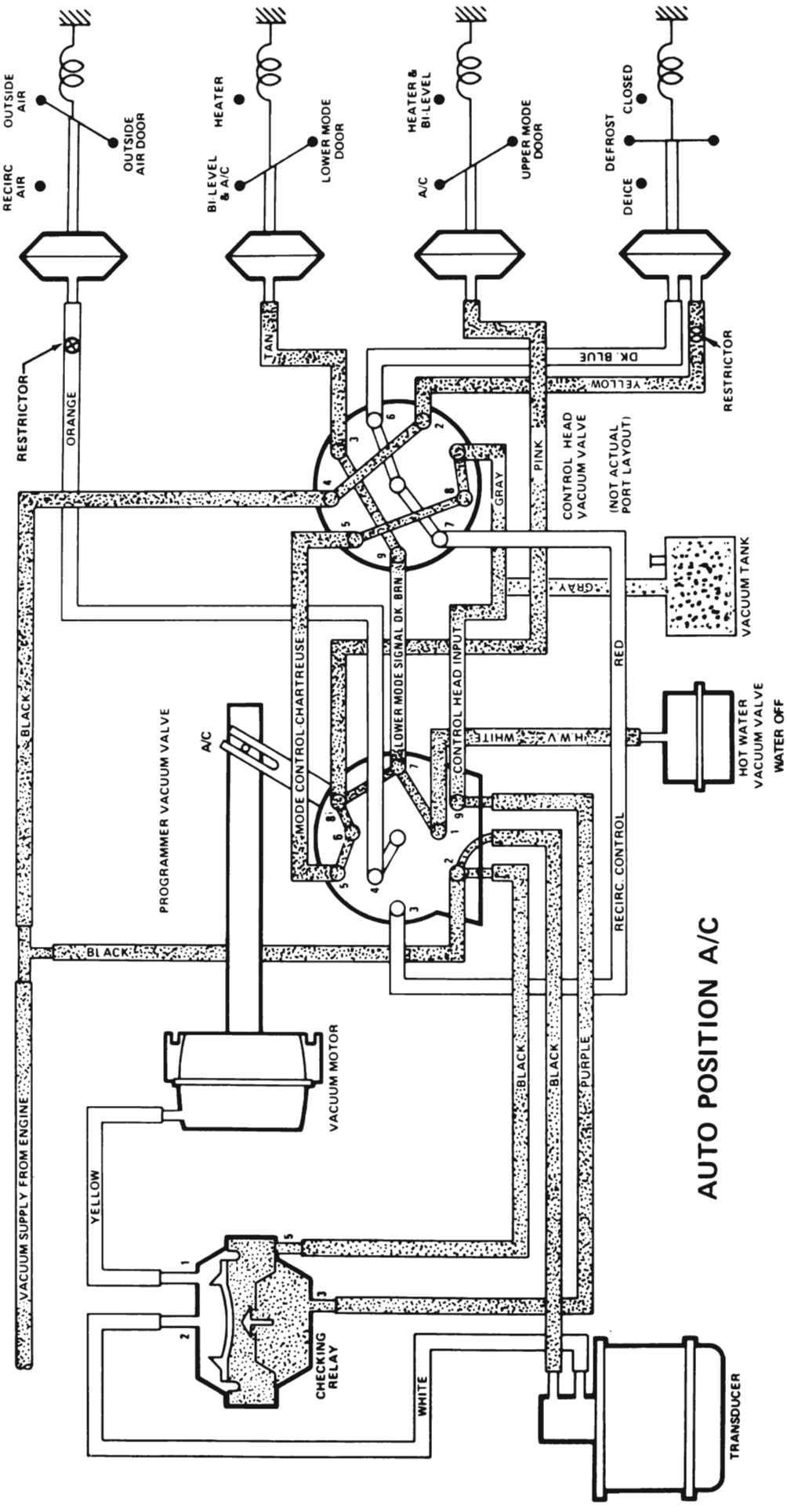


Figure 9B-258 Vacuum Circuits - AUTO Position A/C

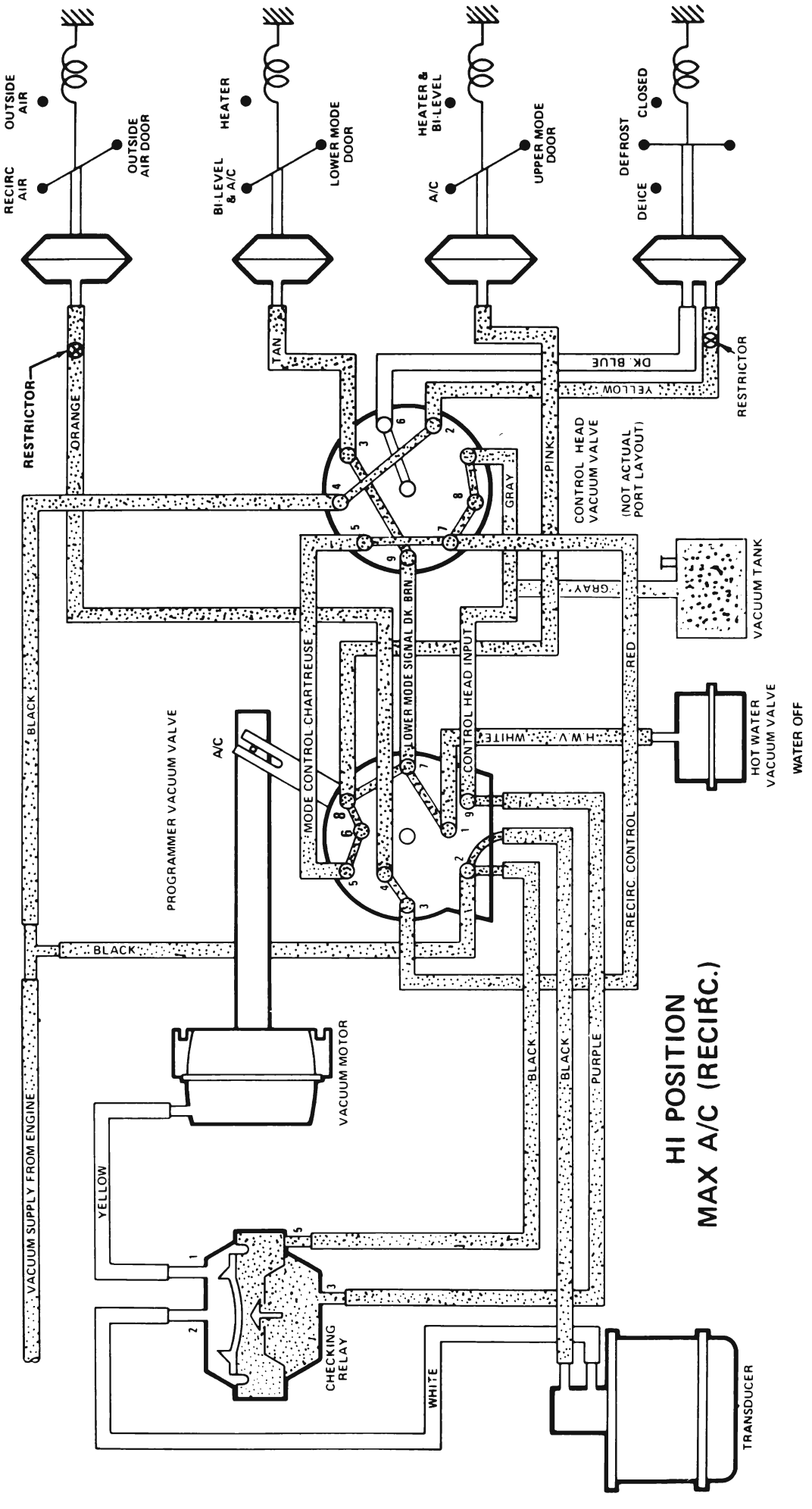


Figure 9B-260 Vacuum Circuits - System in HI Position MAX A/C (Recirc)

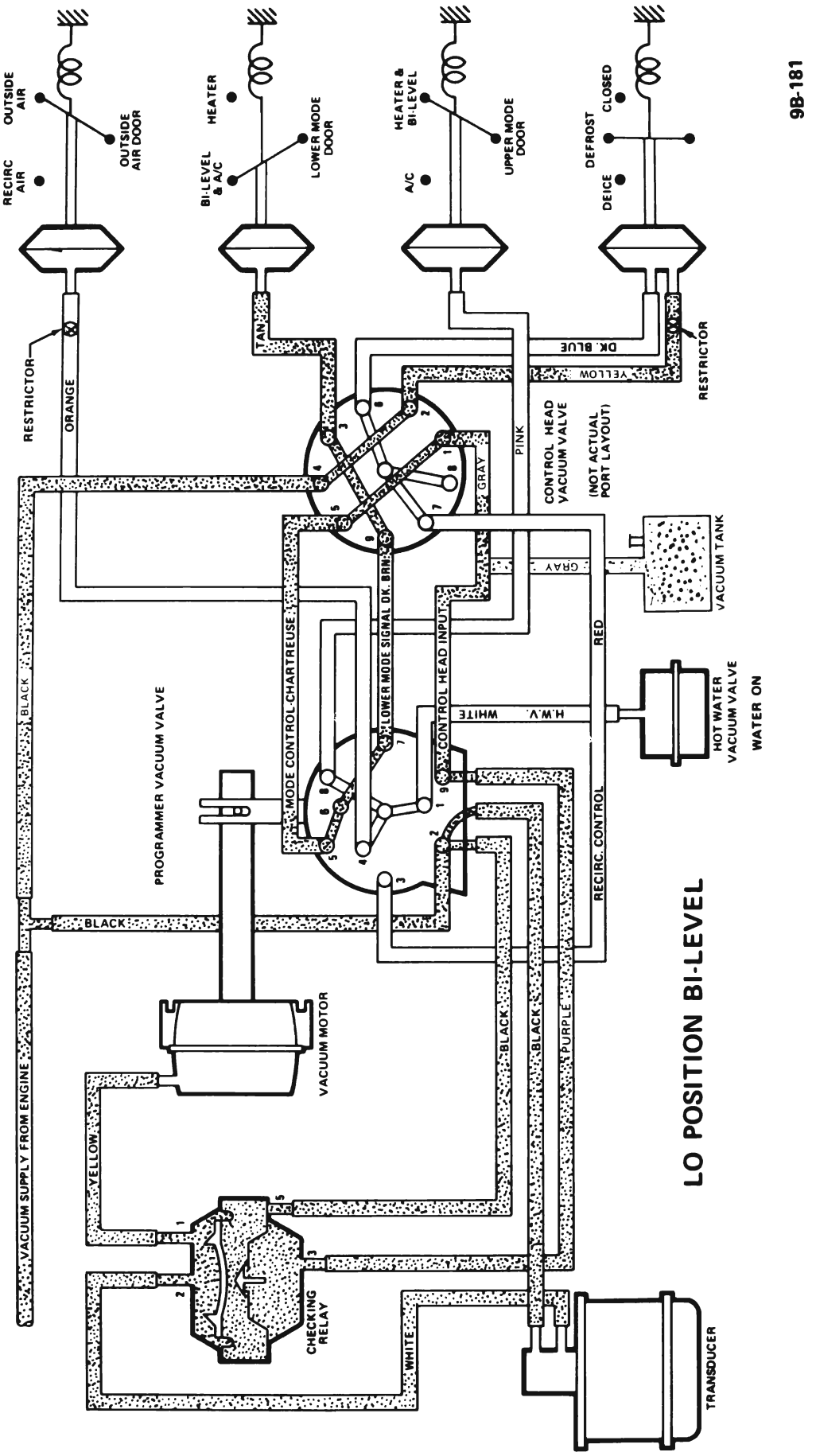


Figure 9B-261 Vacuum Circuits - System in LO Position Bi-Level

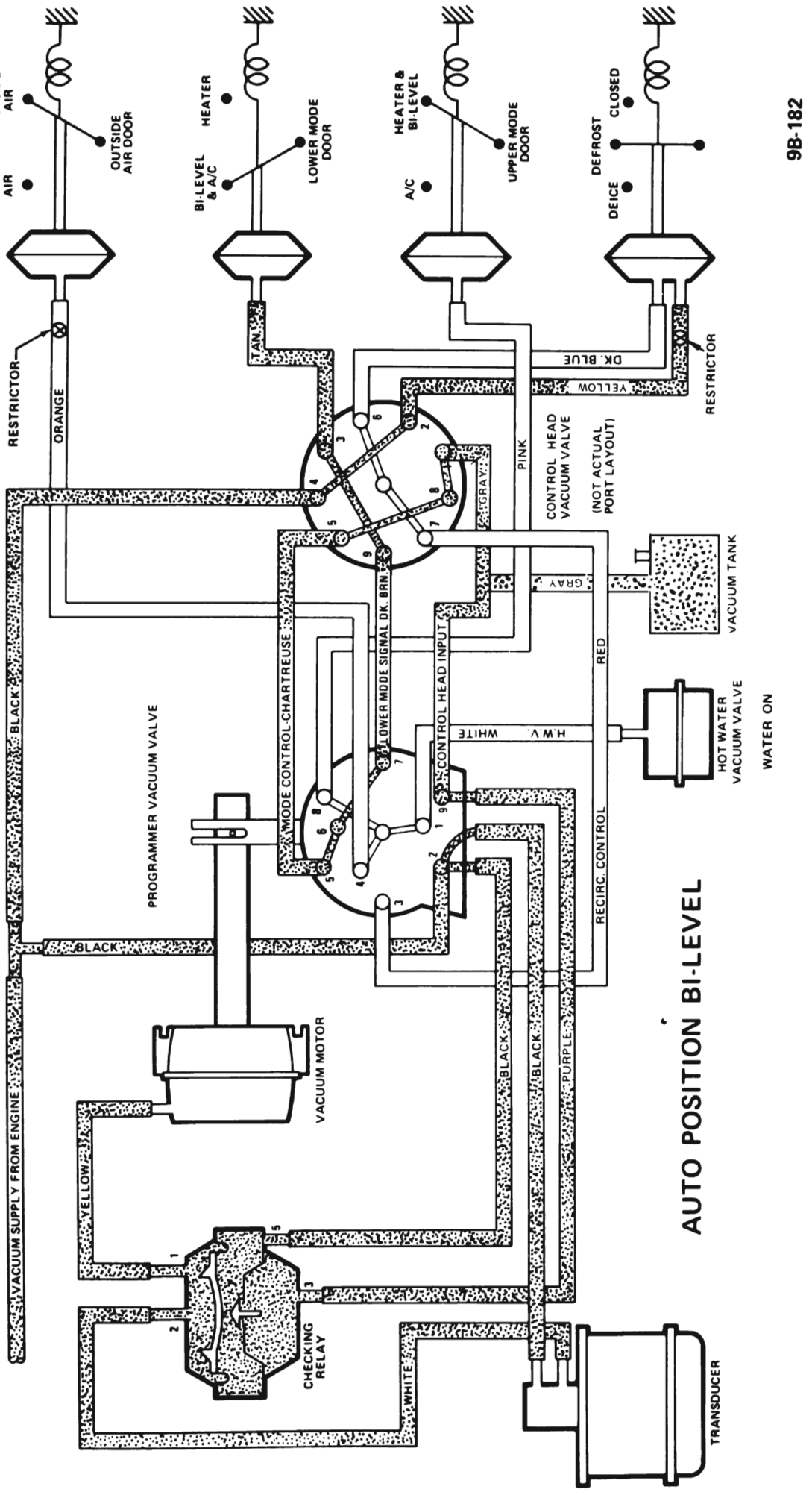


Figure 9B-262 Vacuum Circuits - System in AUTO Position Bi-Level

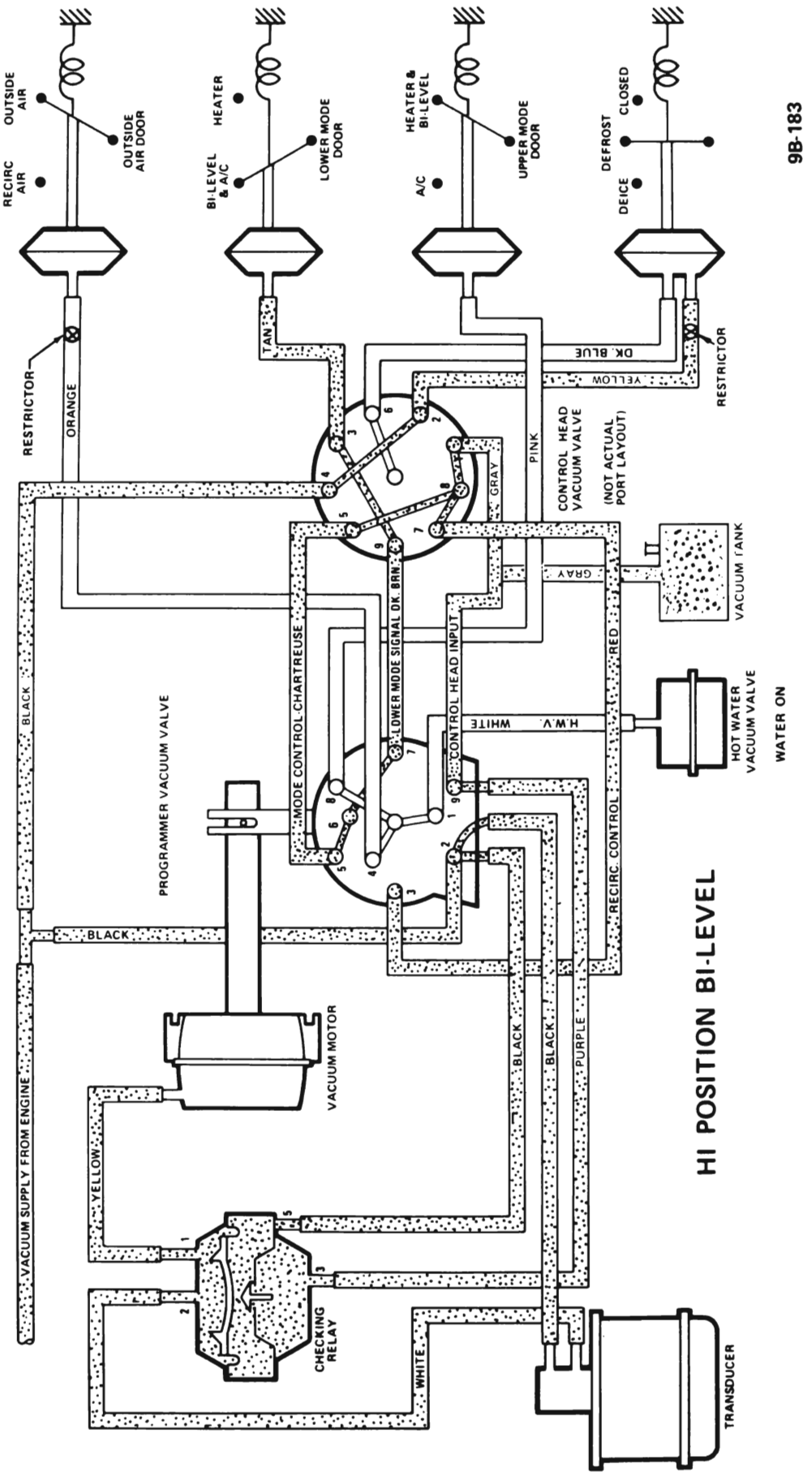


Figure 9B-263 Vacuum Circuits - System in HI Position Bi-Level

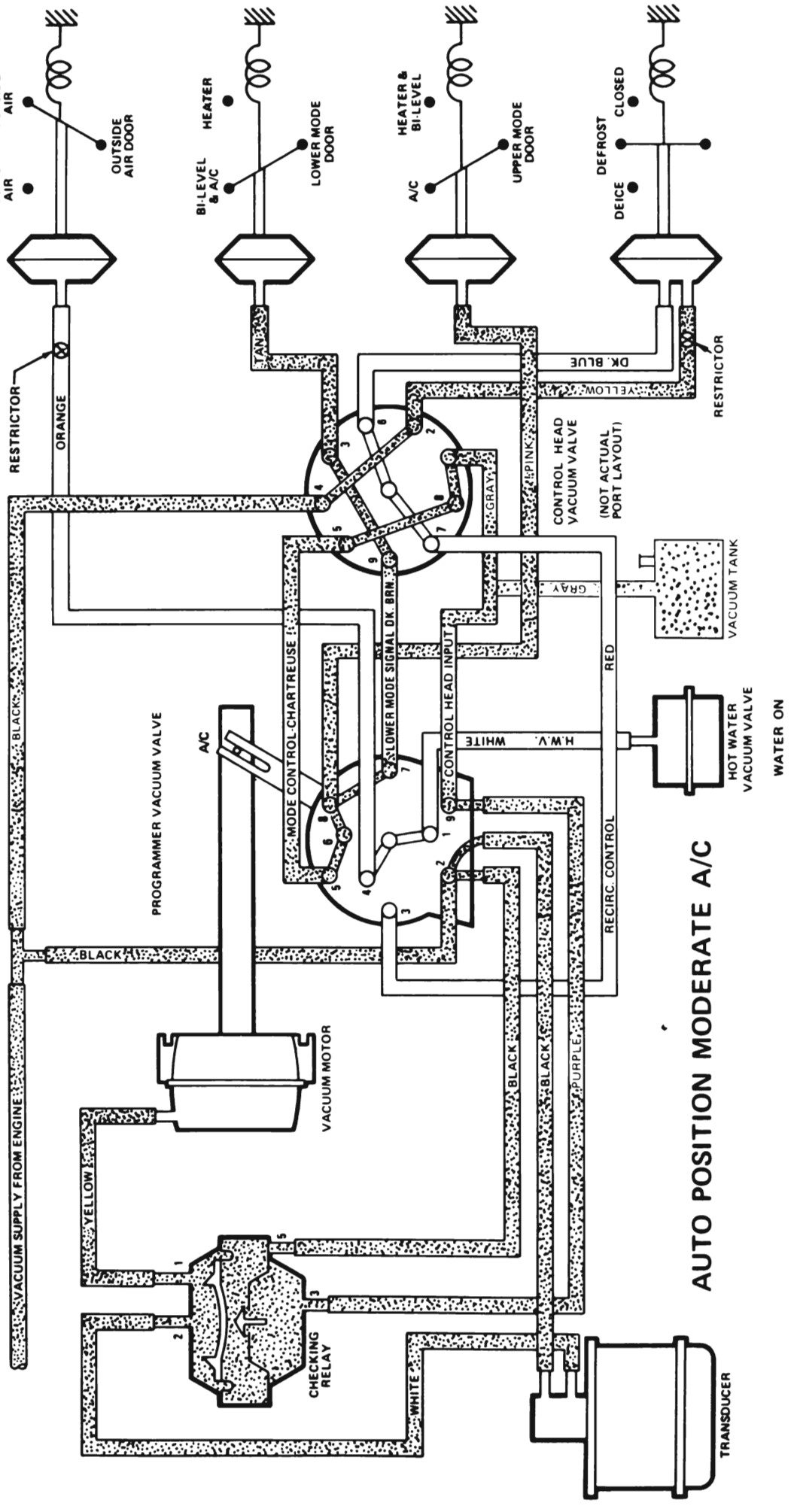


Figure 9B-264 Vacuum Circuits - System in AUTO Position Moderate A/C

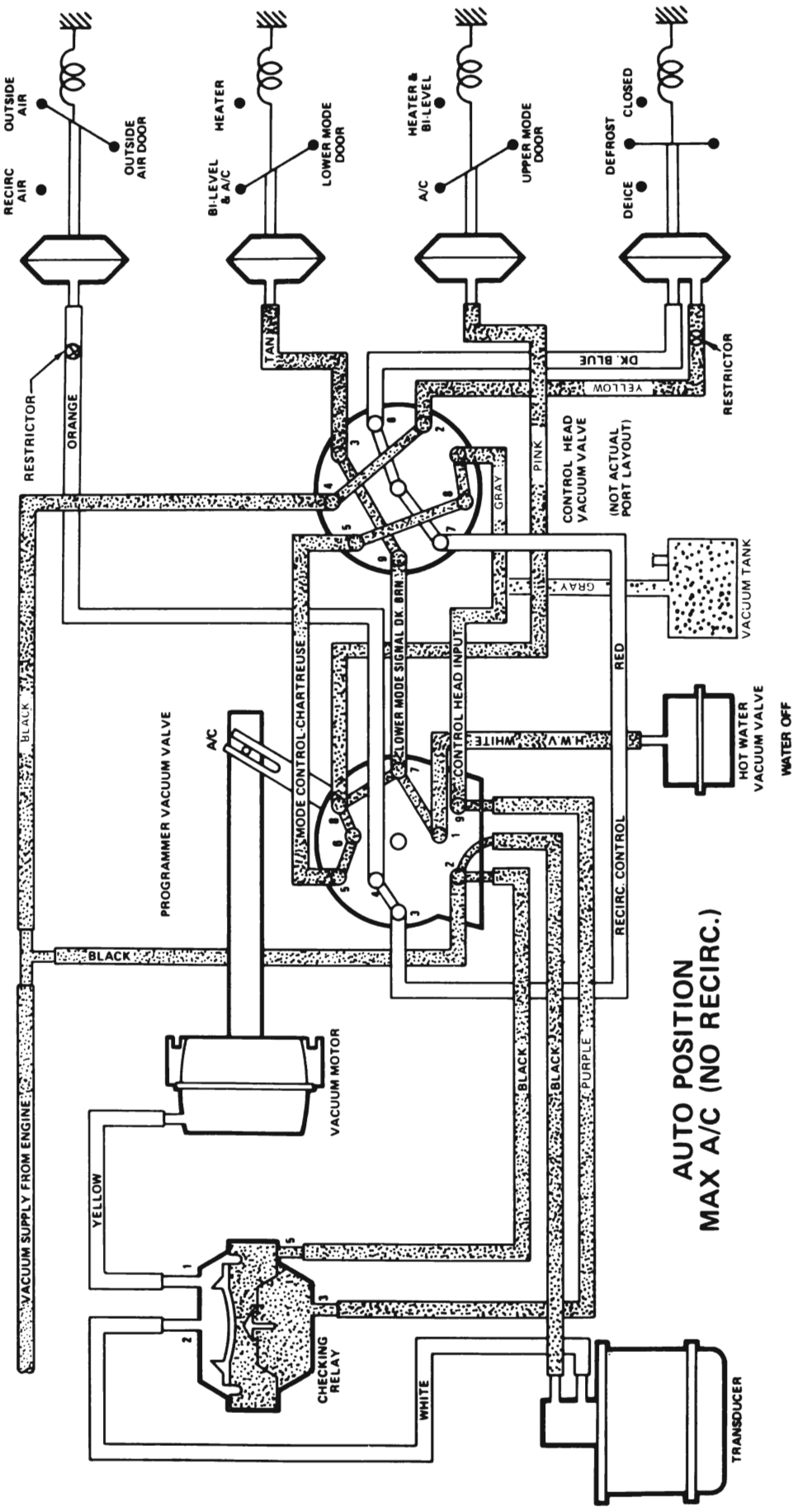


Figure 9B-265 Vacuum Circuits - AUTO Position MAX A/C (No Recirc)

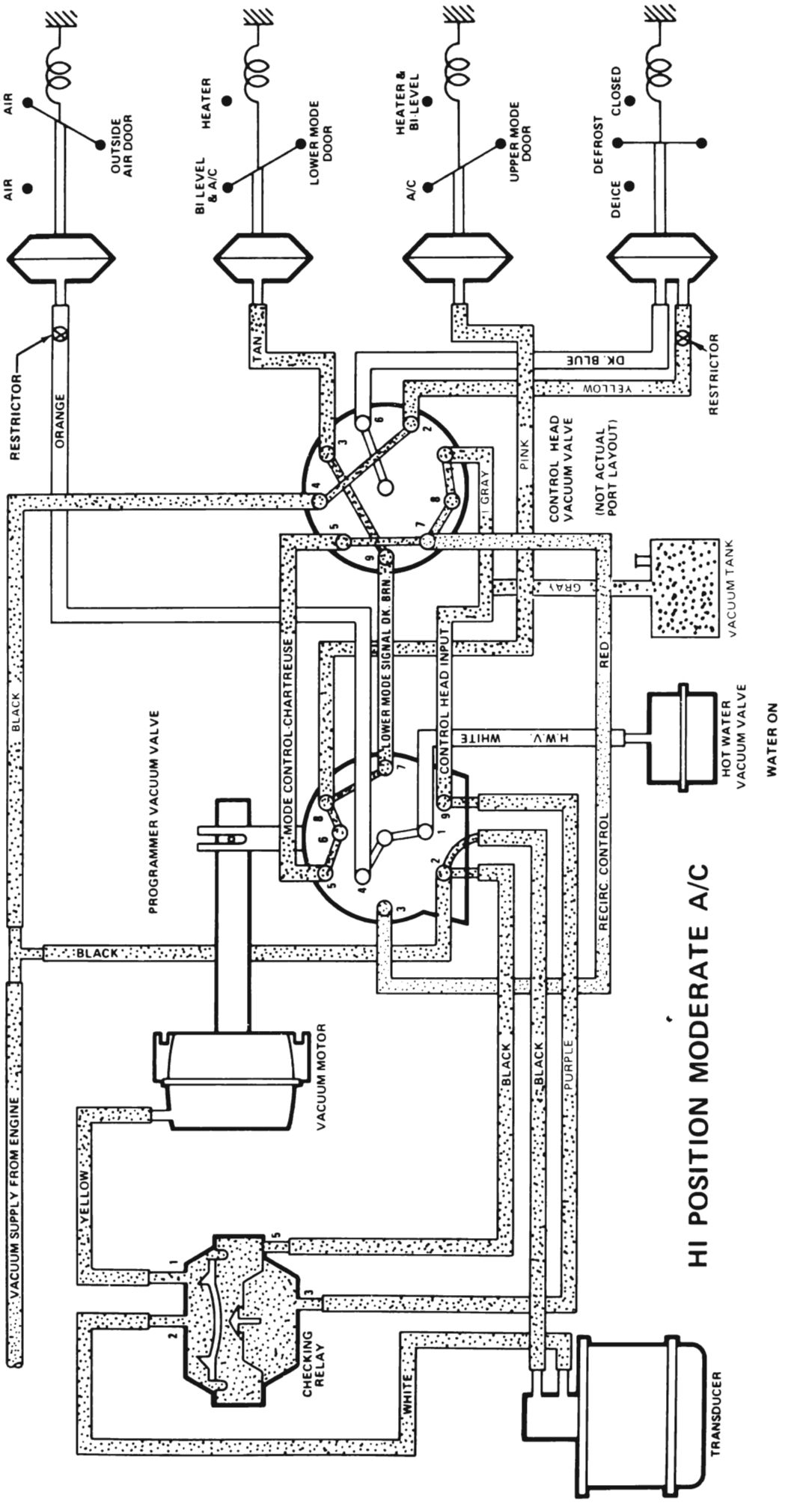


Figure 9B-266 Vacuum Circuits - System in HI Position Moderate A/C

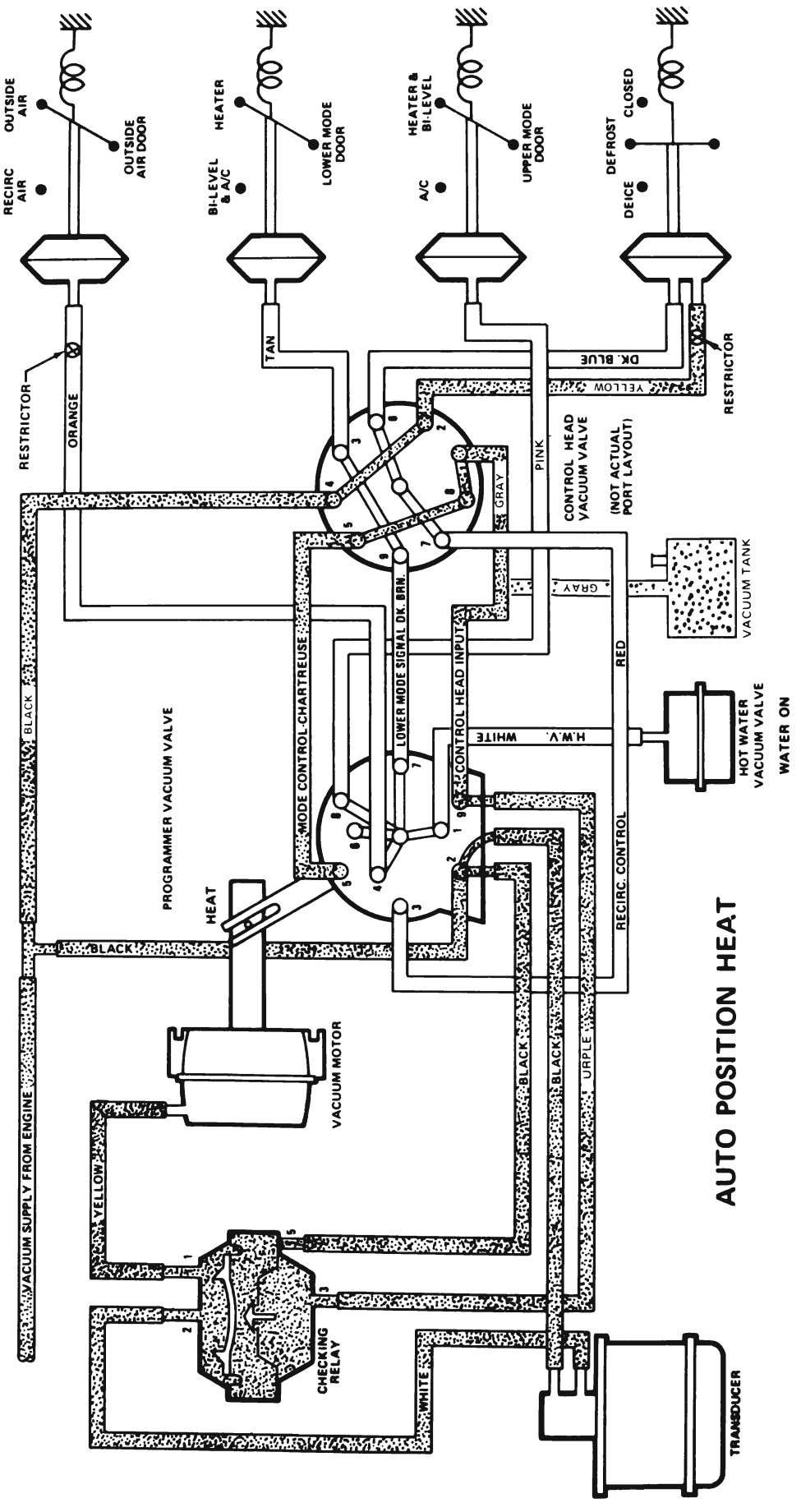


Figure 9B-267 VACUUM Circuits - AUTO Position Heat

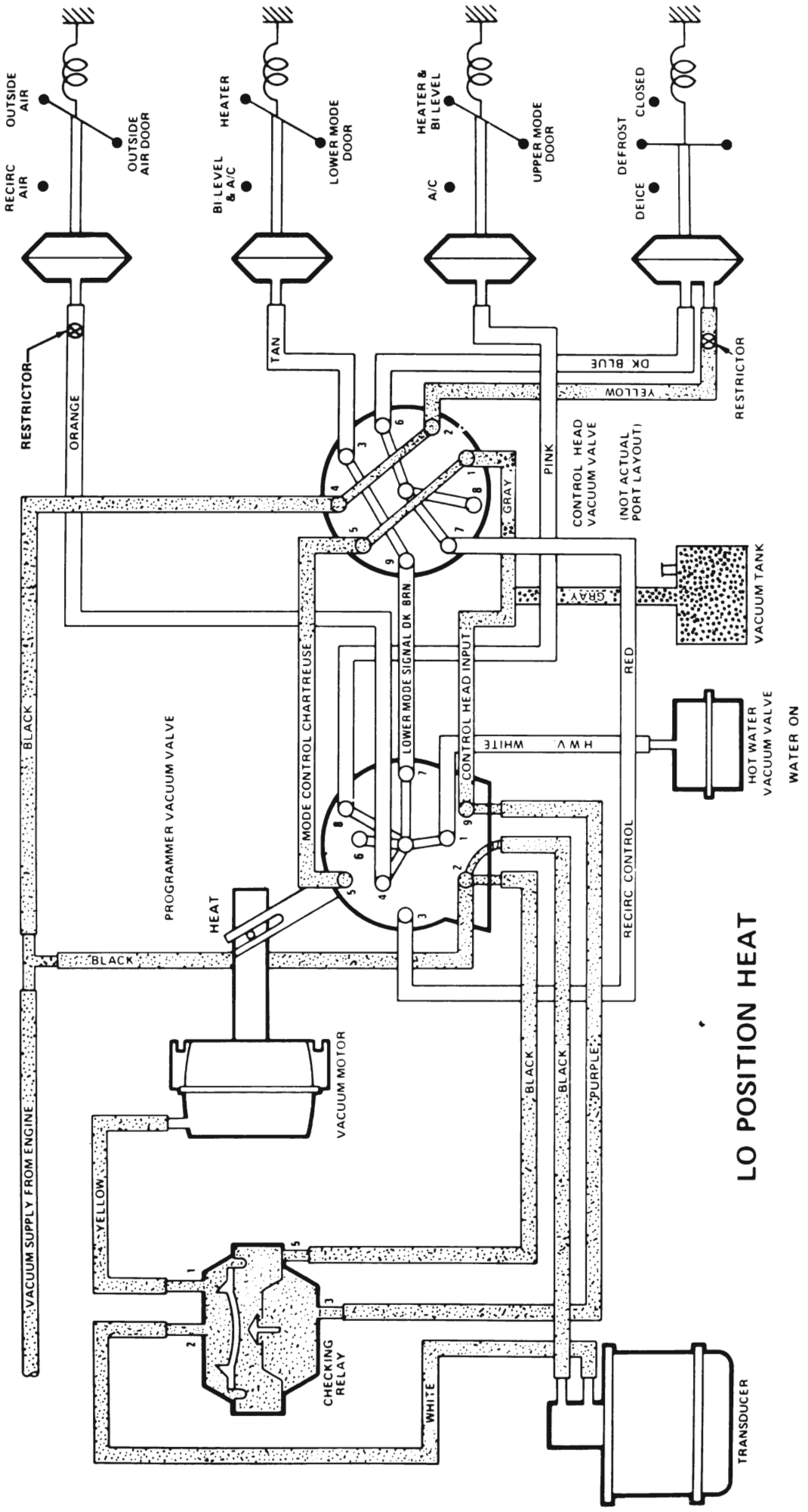


Figure 9B-268 Vacuum Circuits - System in LO Position Heat

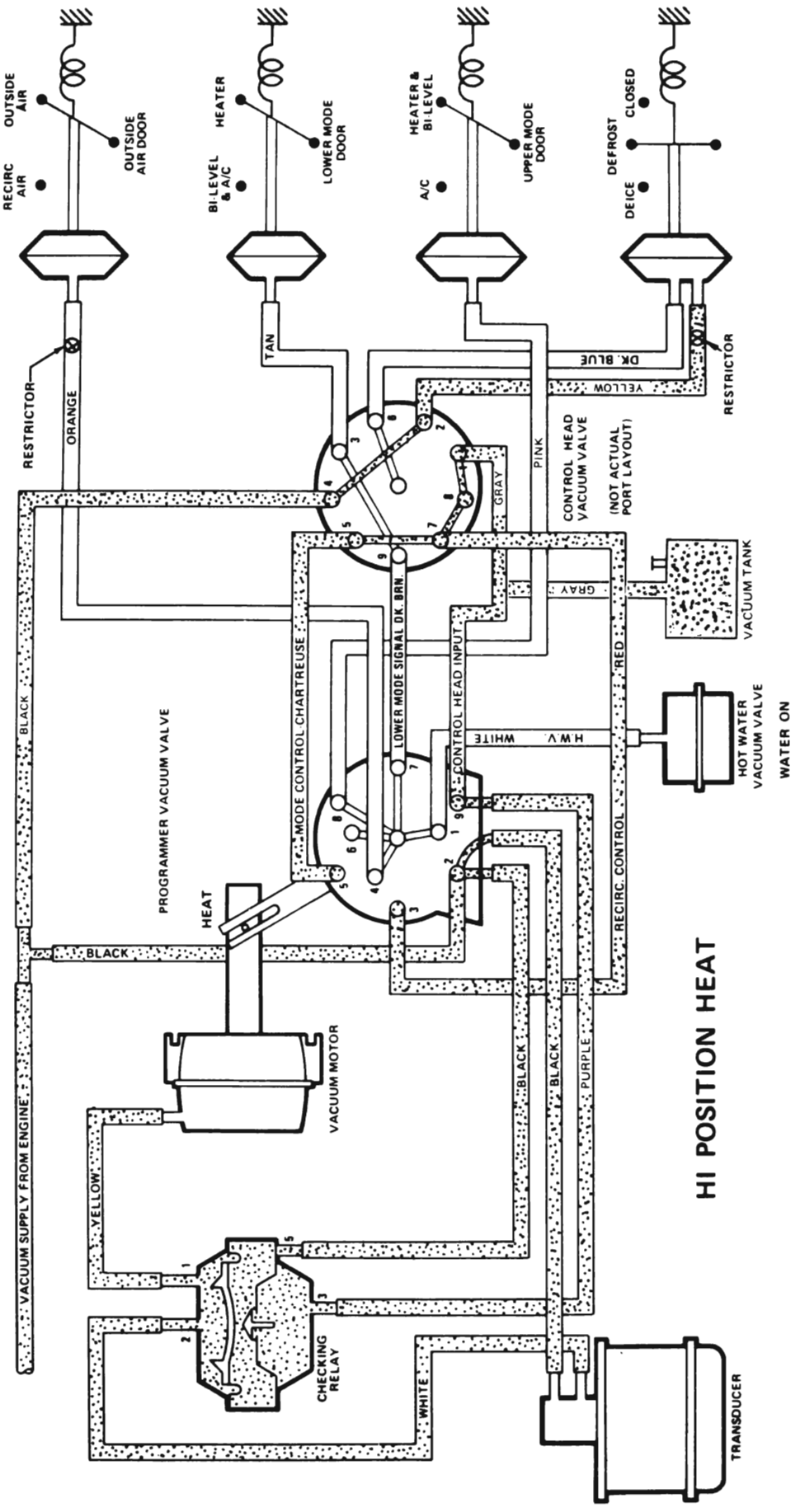


Figure 9B-270 Vacuum Circuits - System in HI Position Heat

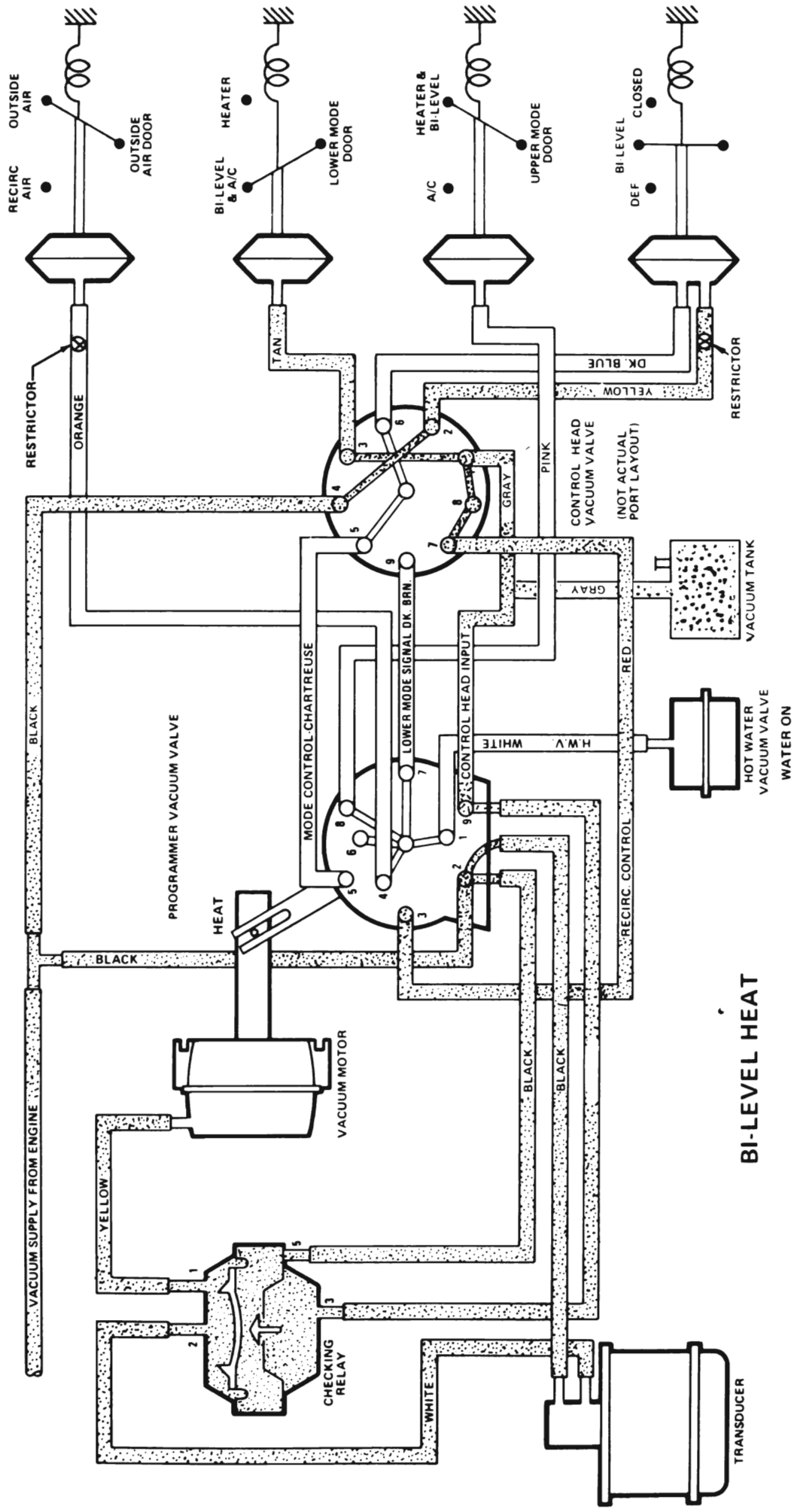


Figure 9B-271 Vacuum Circuits - System in BI-LEVEL Heat

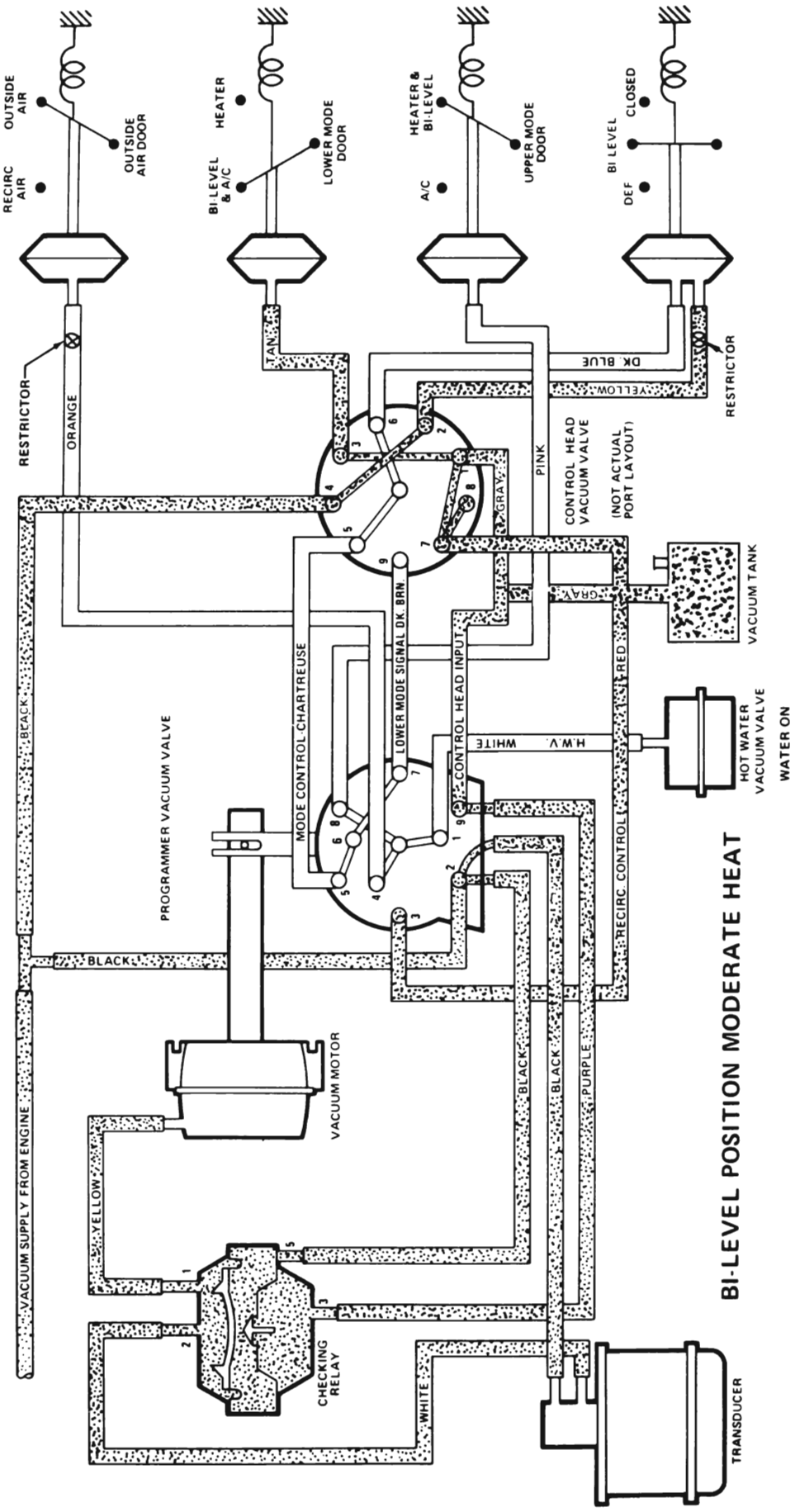


Figure 9B-272 Vacuum Circuits - BI-LEVEL Position Moderate Heat

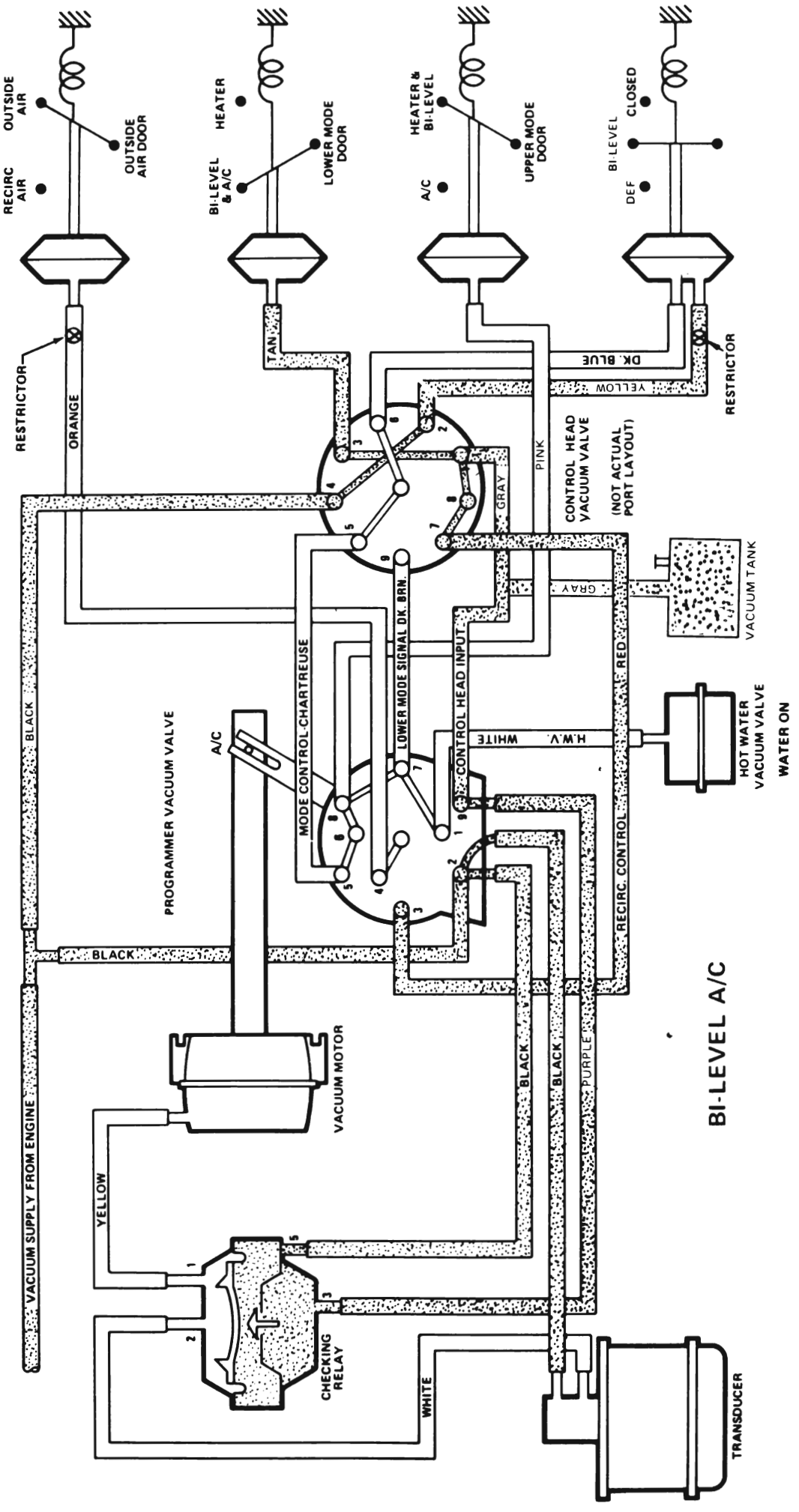


Figure 9B-273 Vacuum Circuits - System in BI-LEVEL A/C

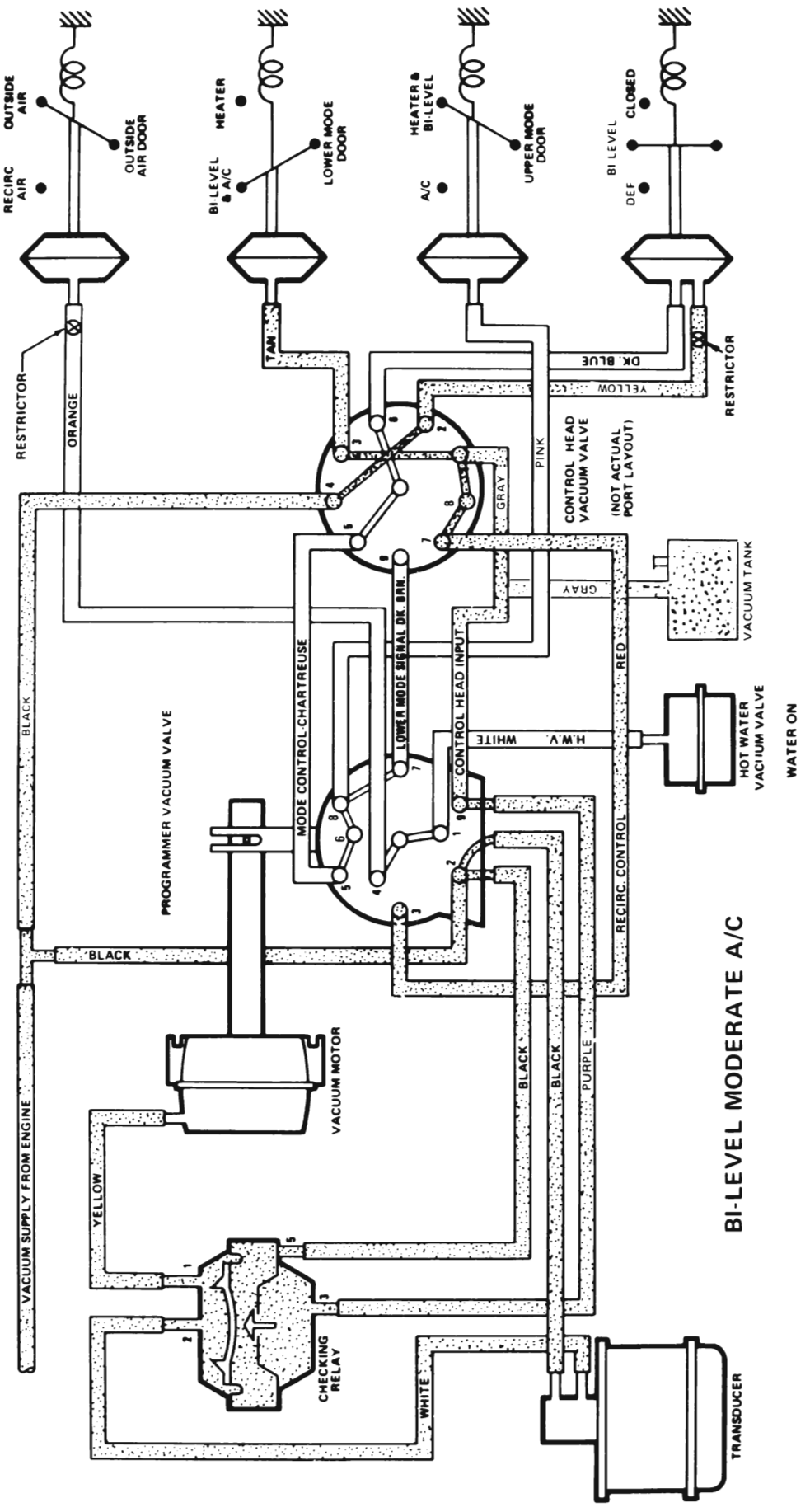


Figure 9B-274 Vacuum Circuits - System in BI-LEVEL Moderate A/C

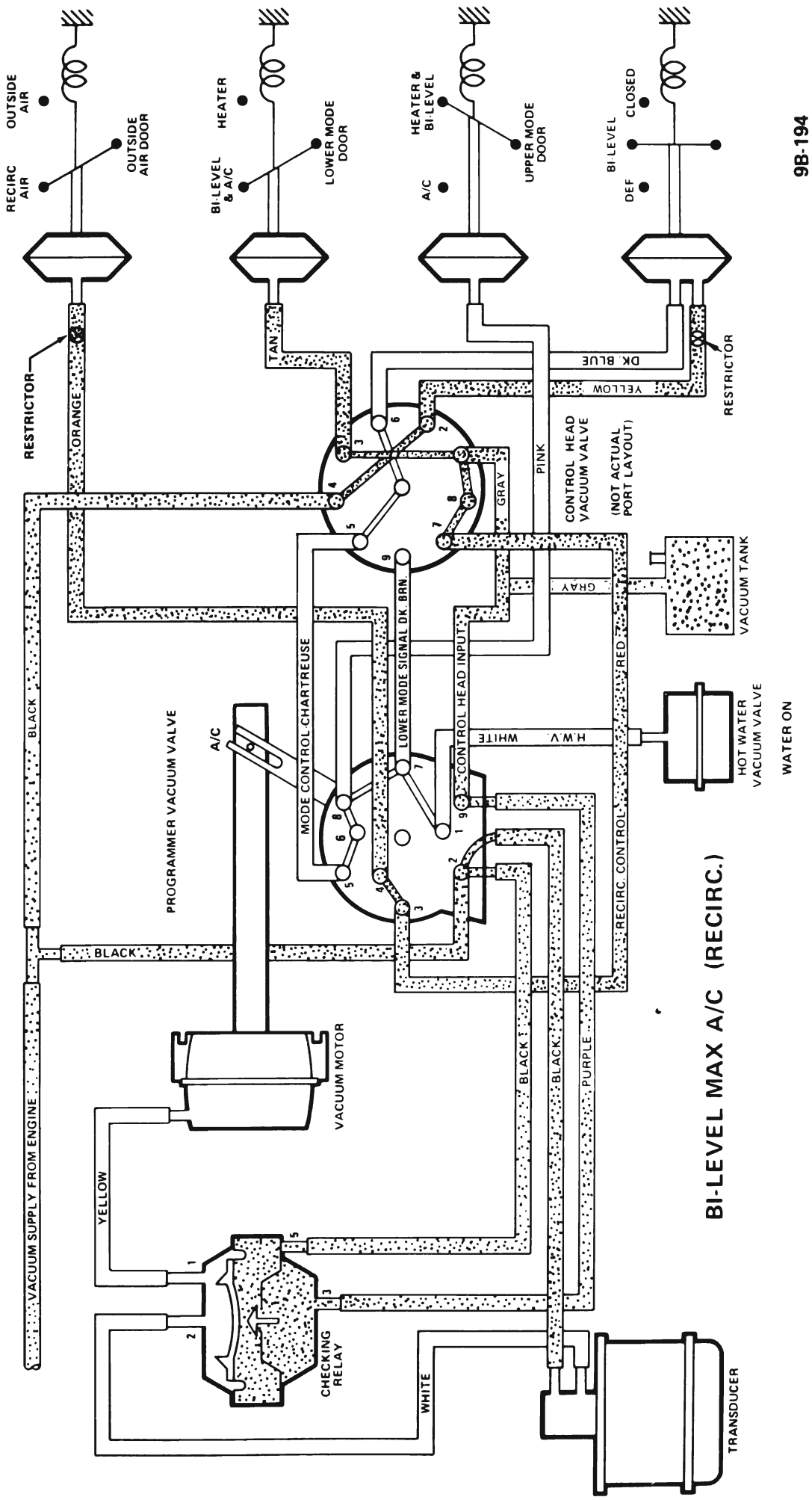


Figure 9B-275 Vacuum Circuits - System in BI-LEVEL MAX A/C (Recirc)

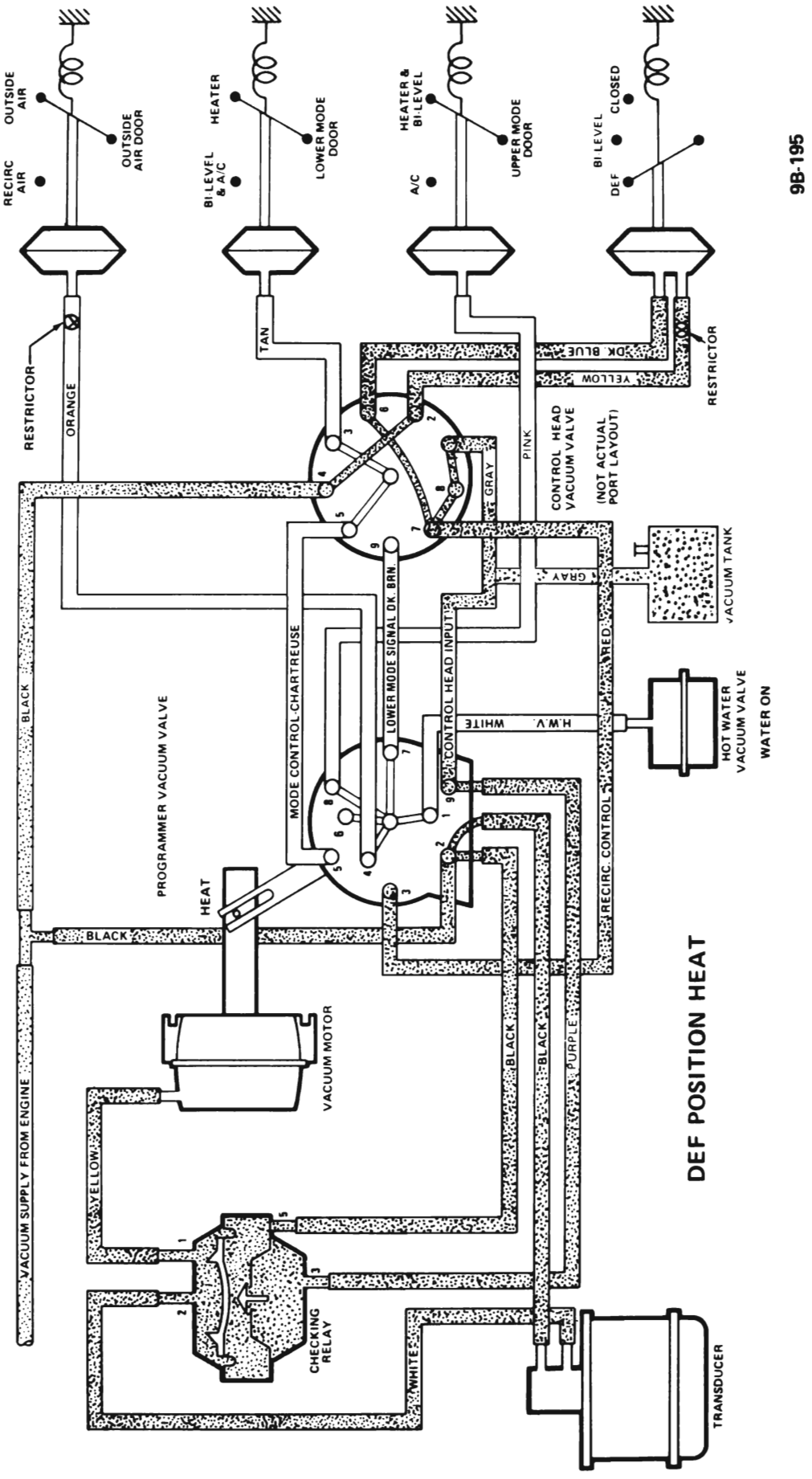


Figure 9B-276 Vacuum Circuits - System in DEF Position Heat

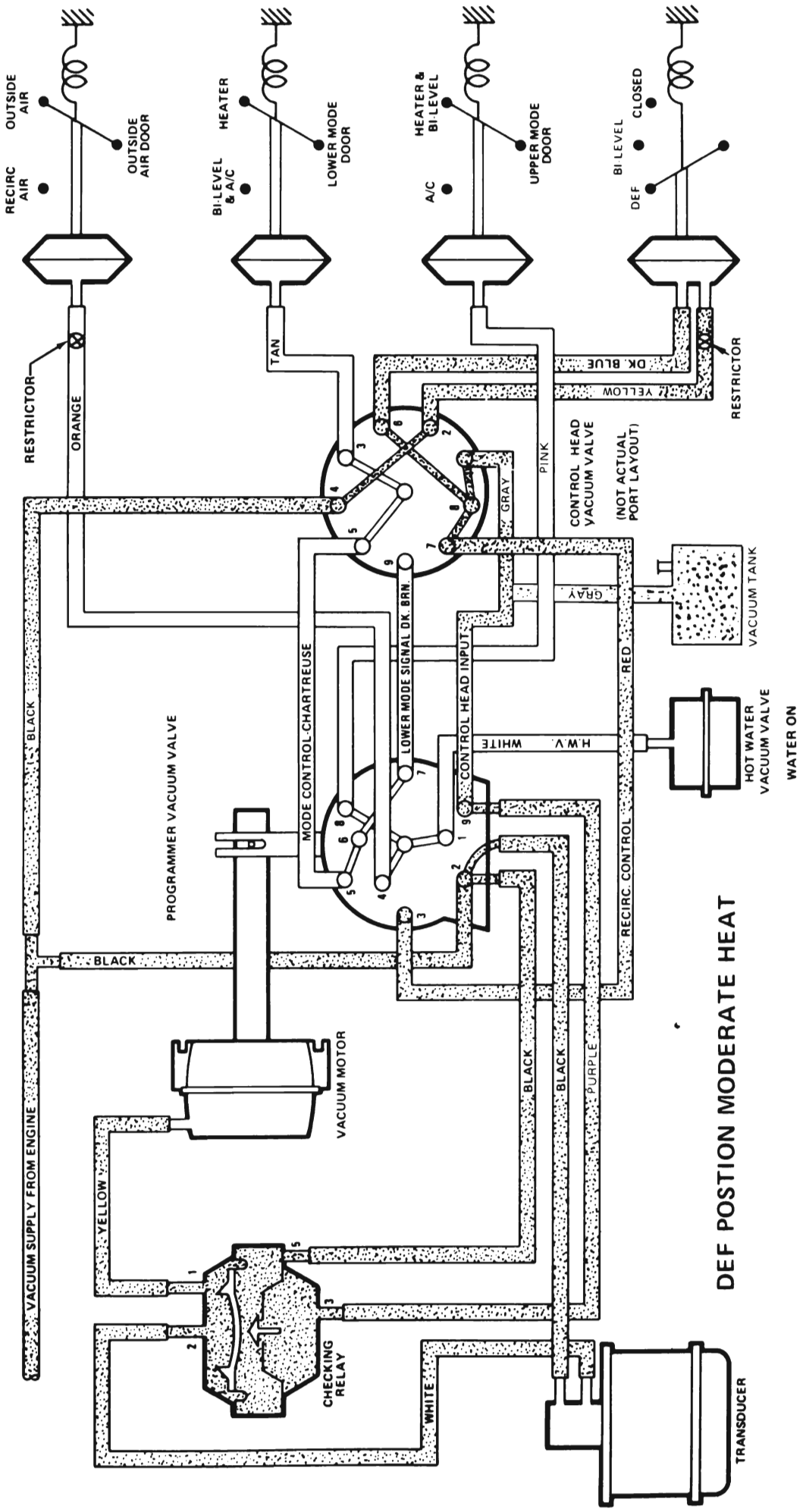


Figure 9B-277 Vacuum Circuits - DEF Position Moderate Heat

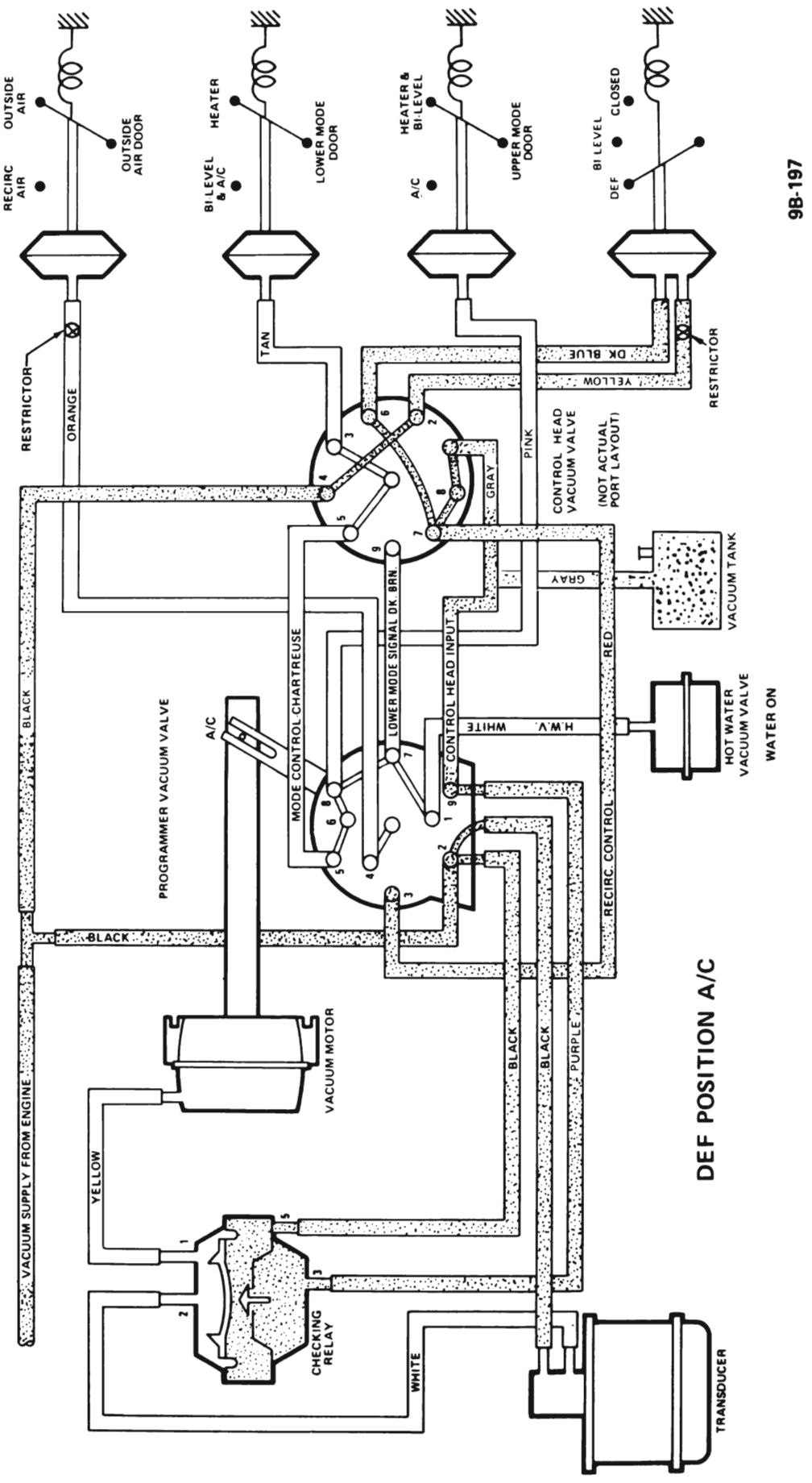


Figure 9B-278 Vacuum Circuits - System in DEF Position A/C

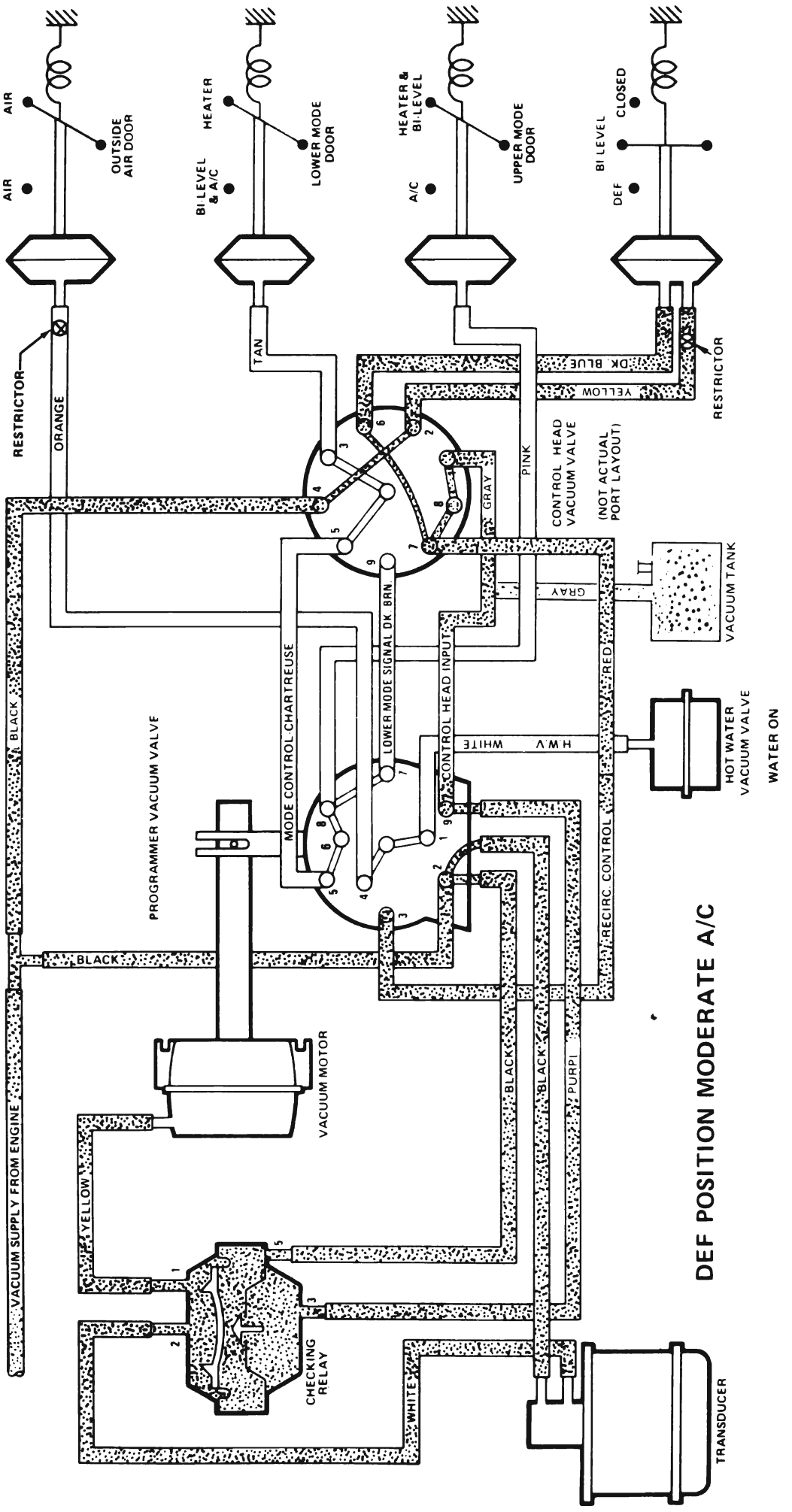


Figure 9B-280 Vacuum Circuits - System in DEF Position Moderate A/C

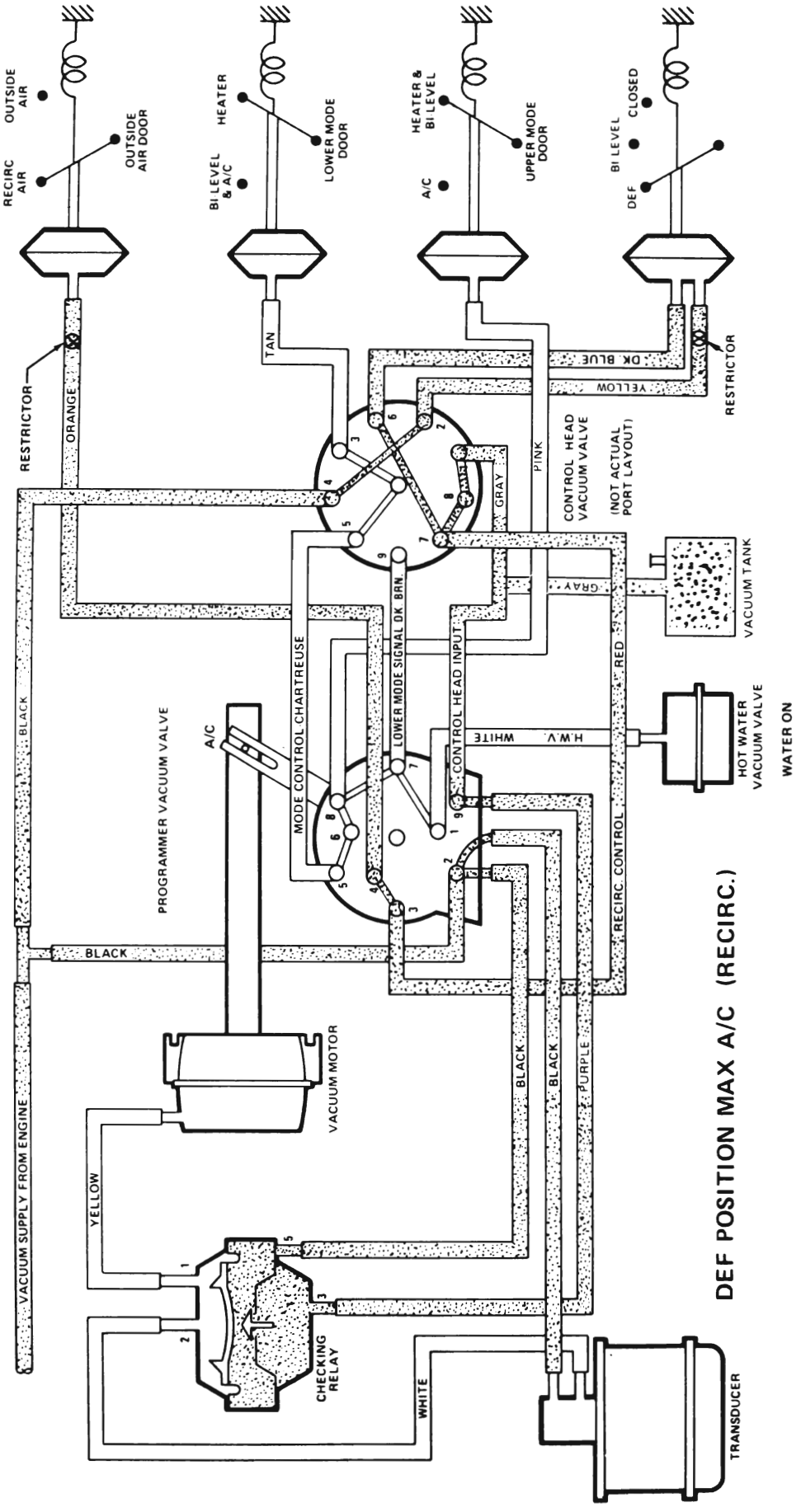
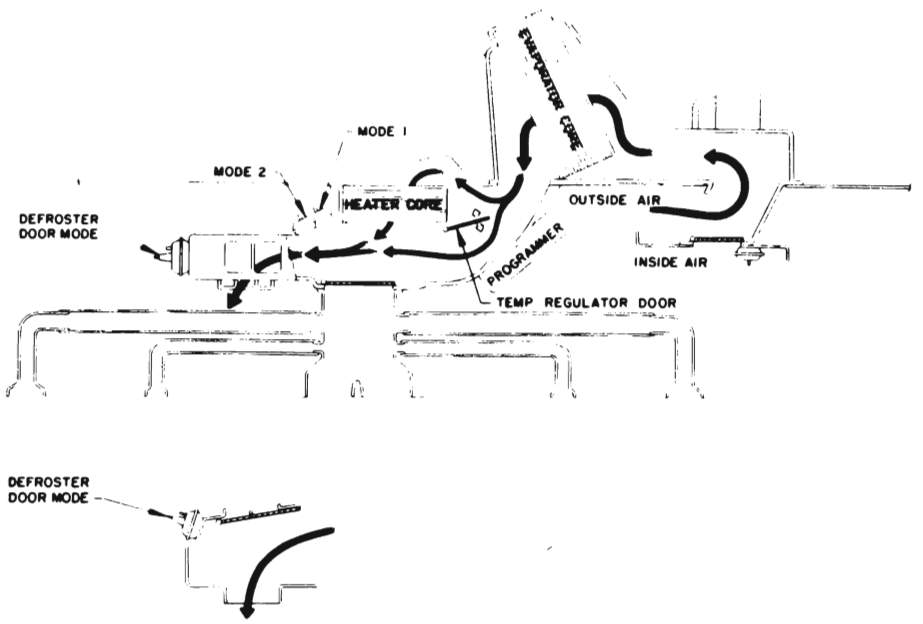


Figure 9B-281 Vacuum Circuit - System in DEF Position MAX A/C (Recirc)



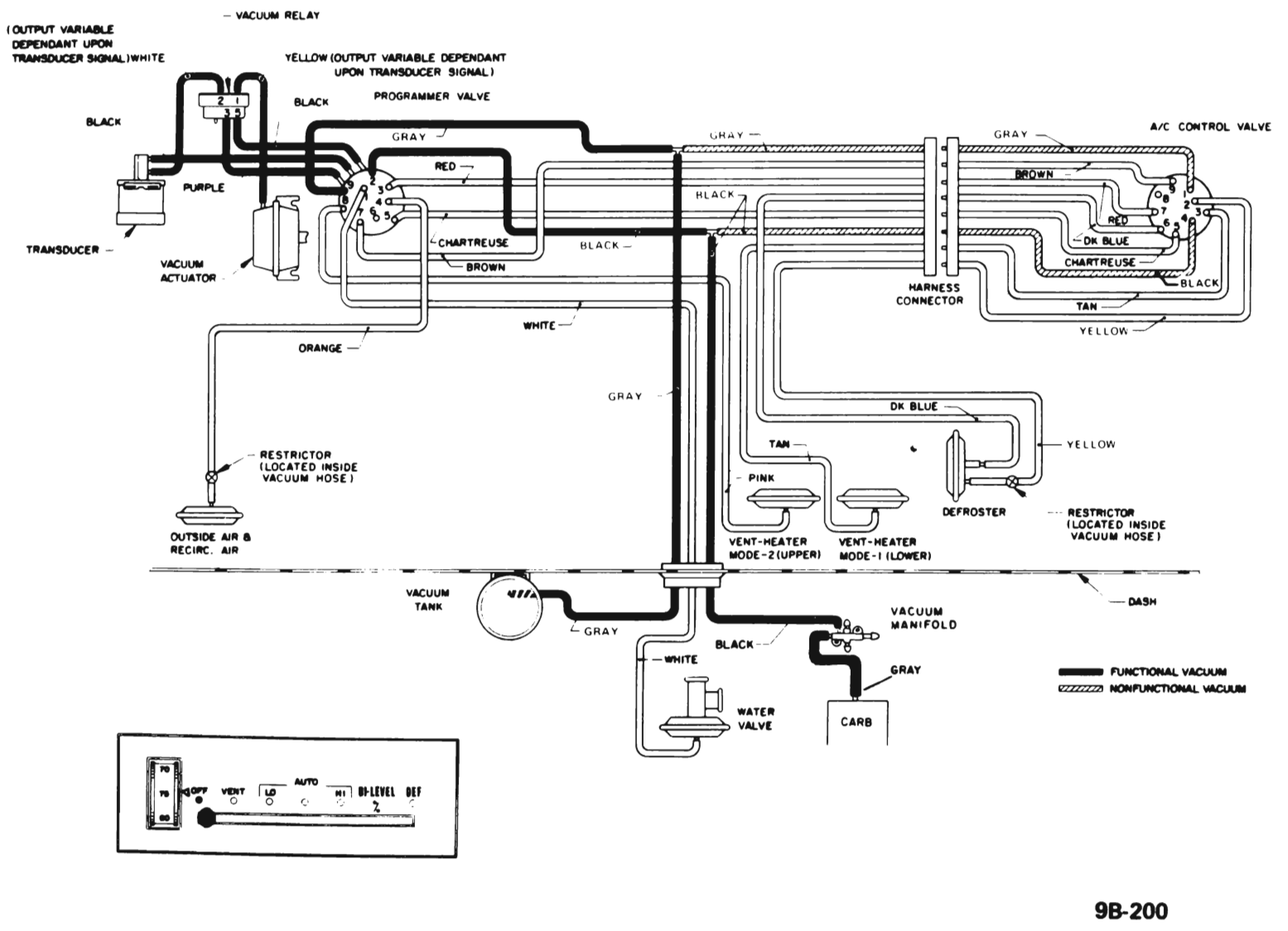


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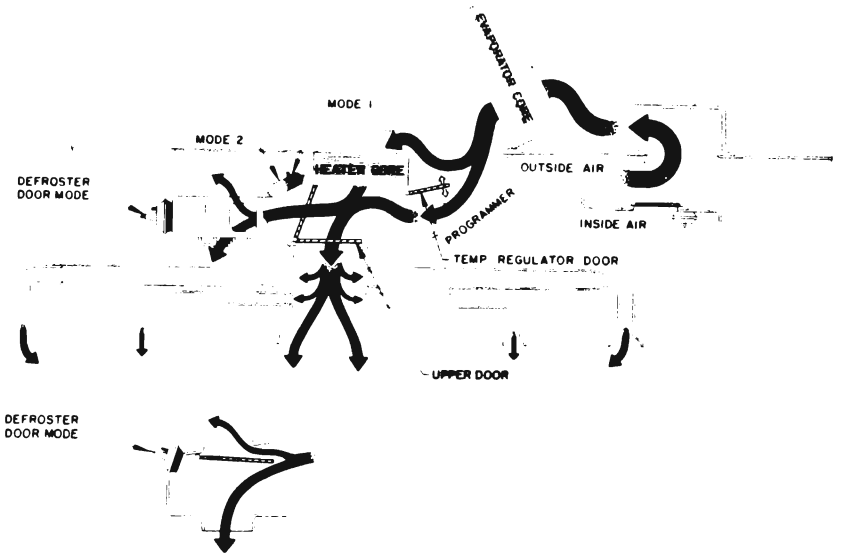
Figure 9B-282 Air Flow and Vacuum Circuits - System in OFF Position



AIRFLOW RATE IS DICTATED BY SENSORS — MEDIUM TO MAXIMUM AIRFLOW.

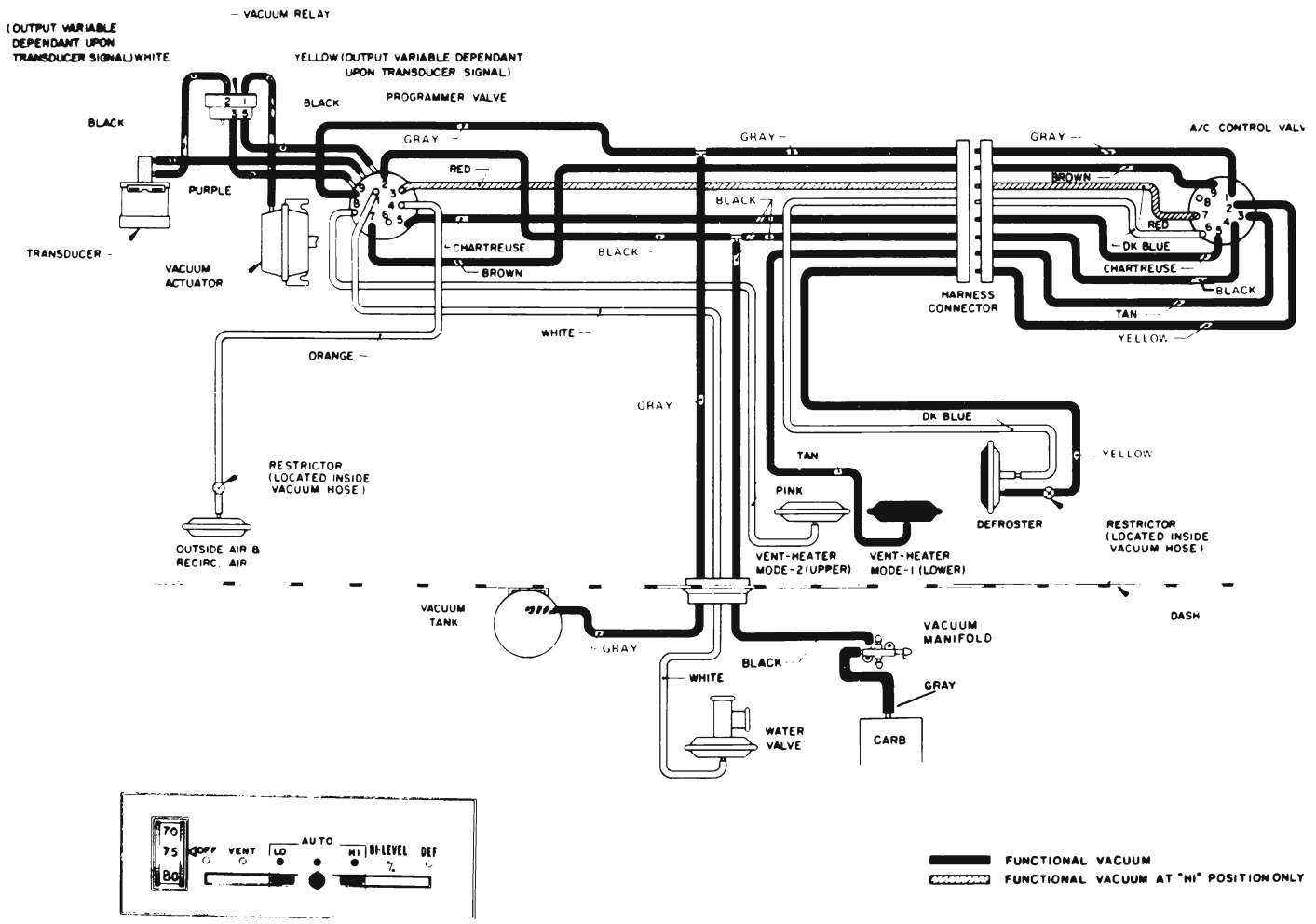


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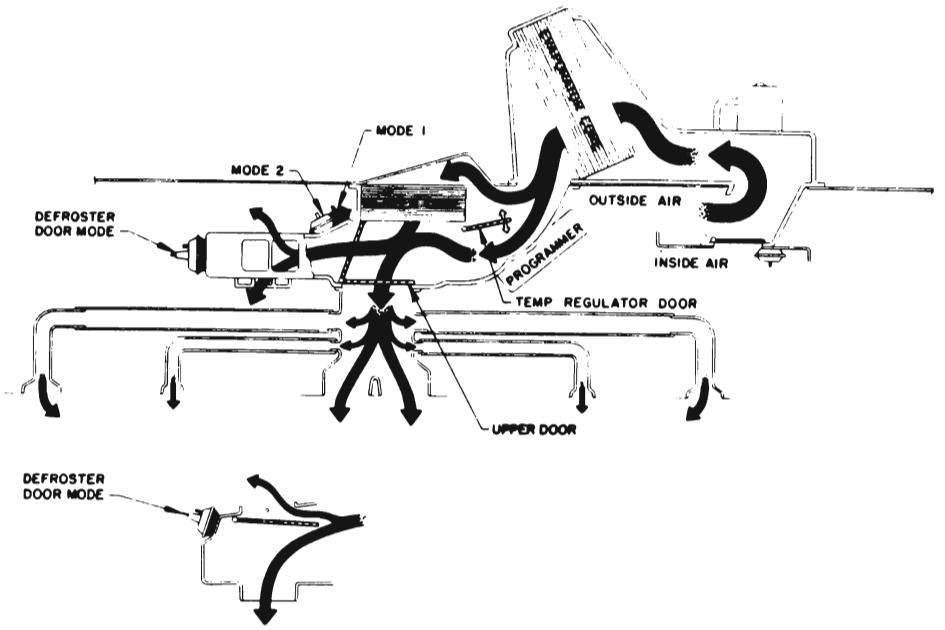
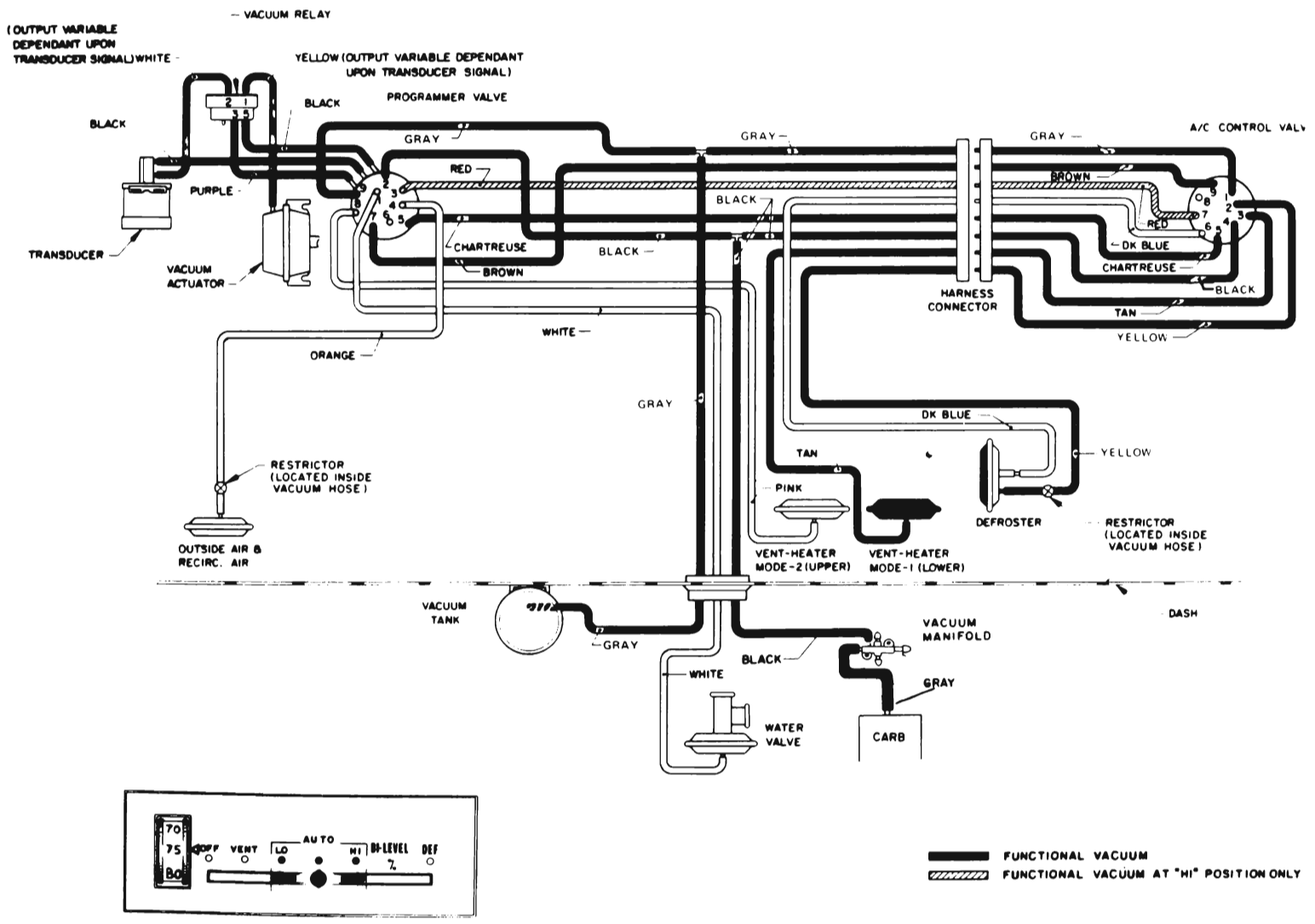
Figure 9B-283 Air Flow and Vacuum Circuits - System in VENT Position



AIRFLOW RATE IS DICTATED BY SENSORS—MEDIUM TO MAXIMUM AIRFLOW.



9B-202

Figure 9B-284 Air Flow and Vacuum Circuits - System in AUTO Position

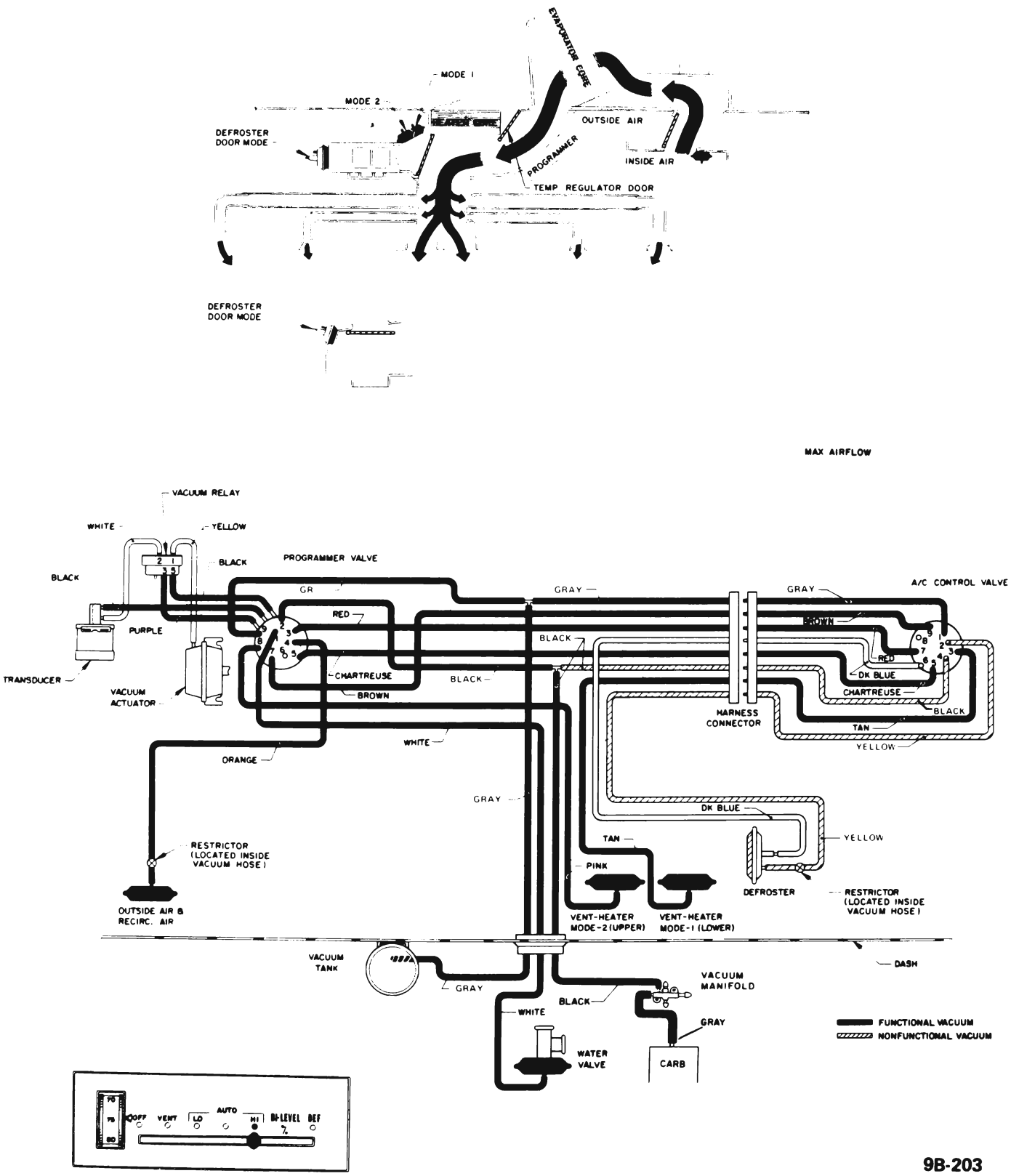
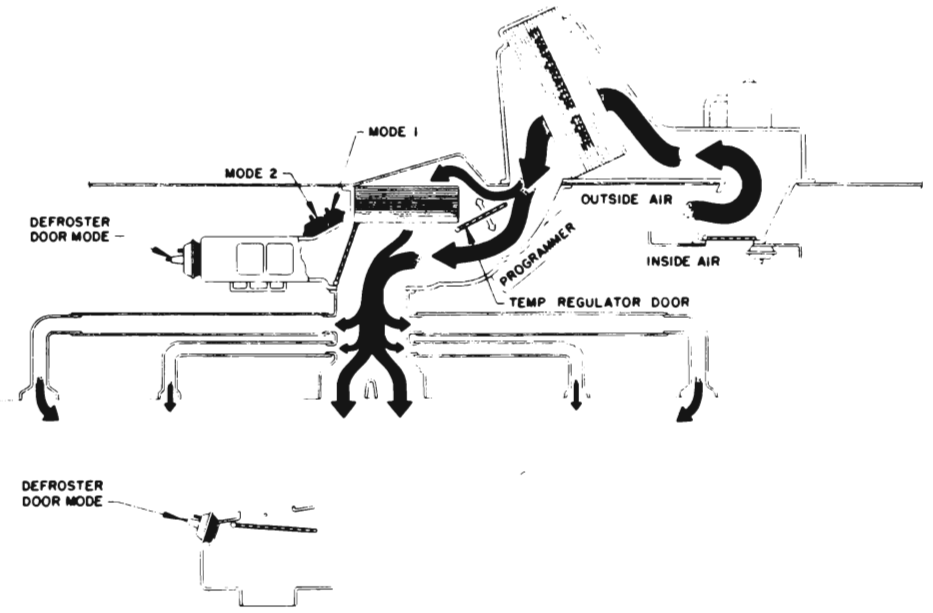


Figure 9B-285 Air Flow and Vacuum Circuits - System in AUTO HI Position



AIRFLOW RATE IS DICTATED BY SENSORS — MEDIUM TO MAXIMUM AIRFLOW.

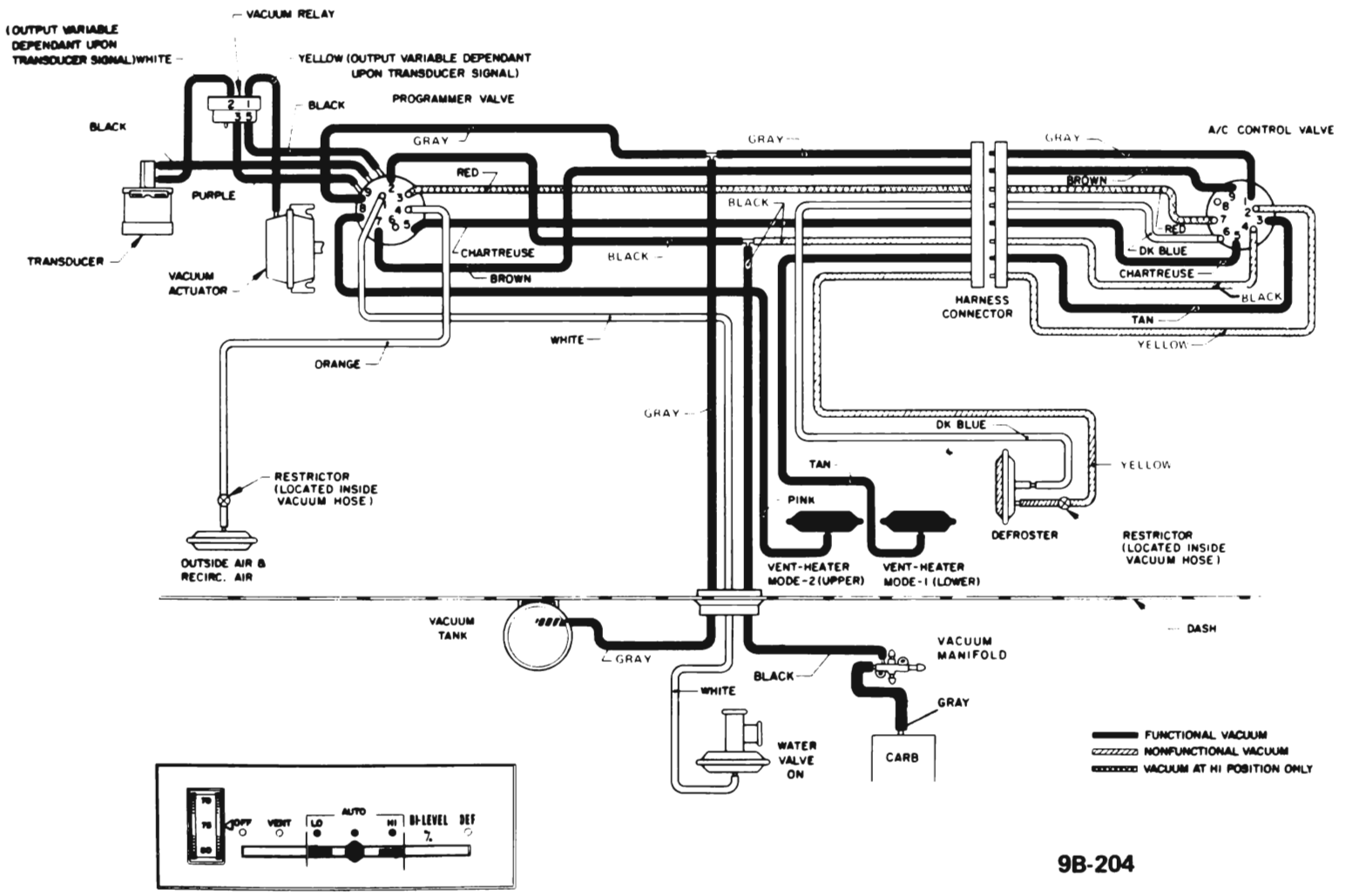


Figure 9B-286 Air Flow and Vacuum Circuits - System in AUTO Position

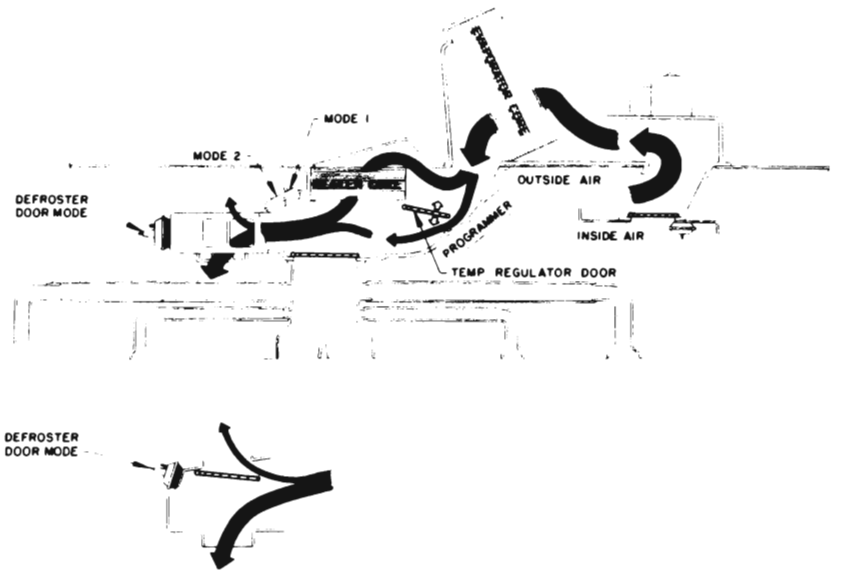
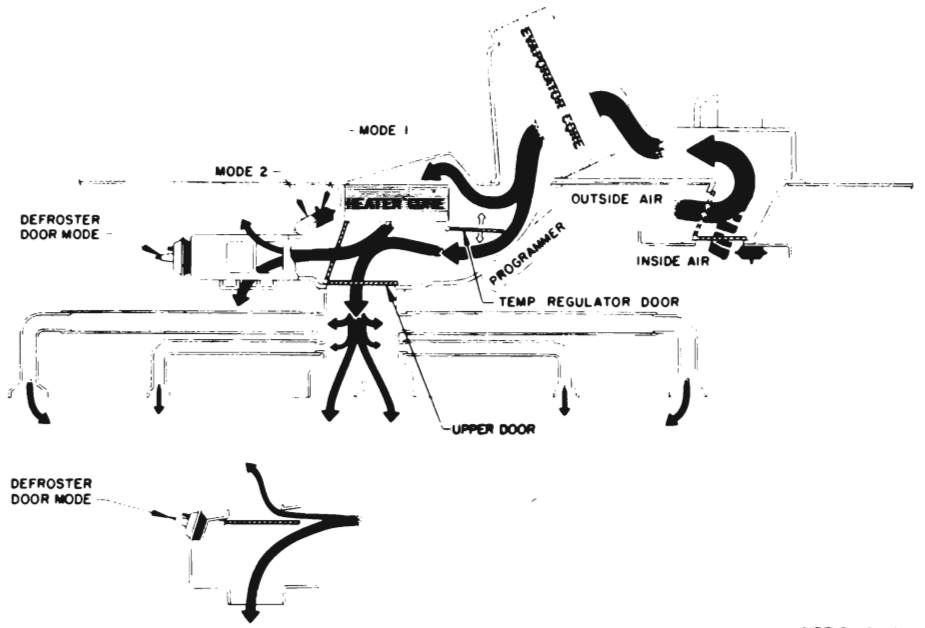


Figure 9B-287 Air Flow and Vacuum Circuits - System in AUTO Position



AIRFLOW RATE IS DICTATED BY SENSORS - MEDIUM TO MAXIMUM AIRFLOW.

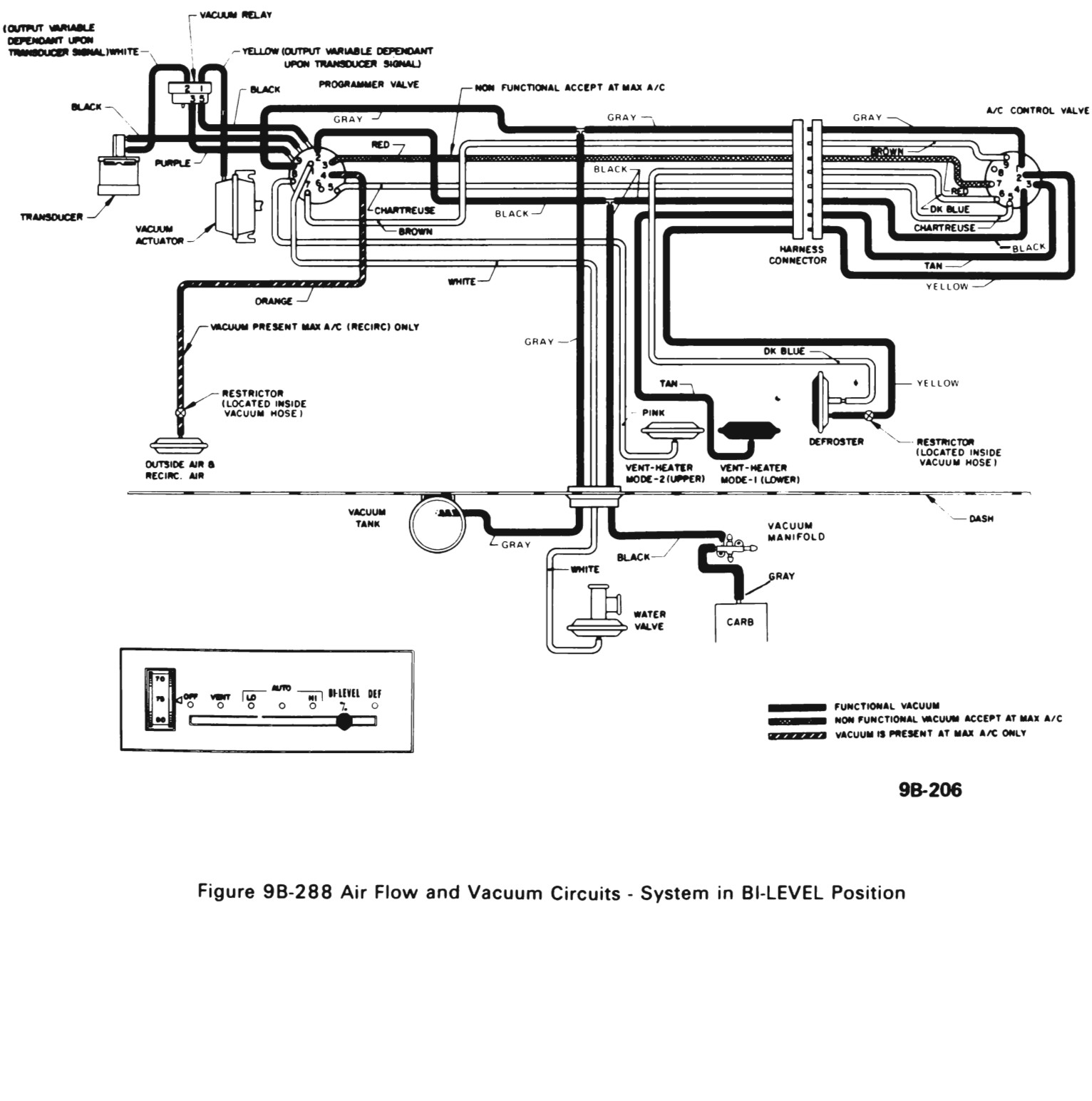


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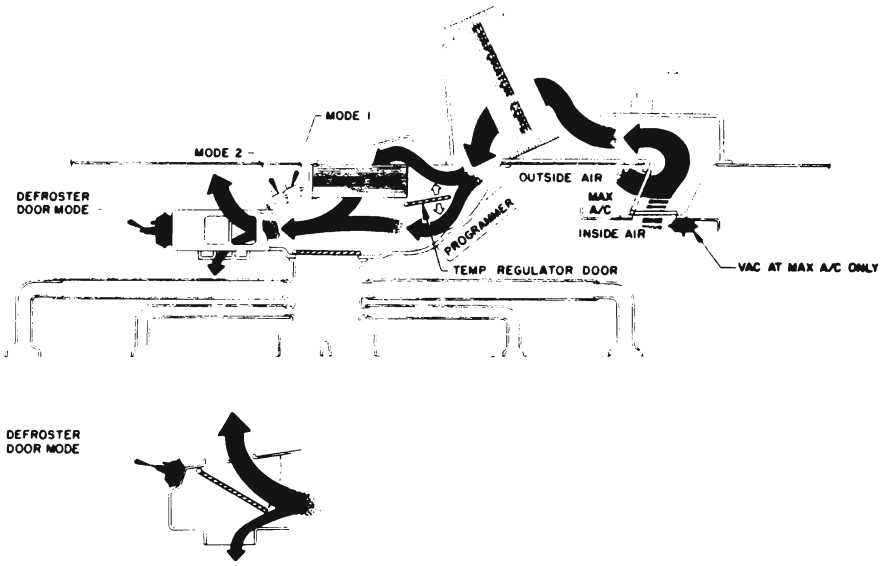
Figure 9B-288 Air Flow and Vacuum Circuits - System in BI-LEVEL Position



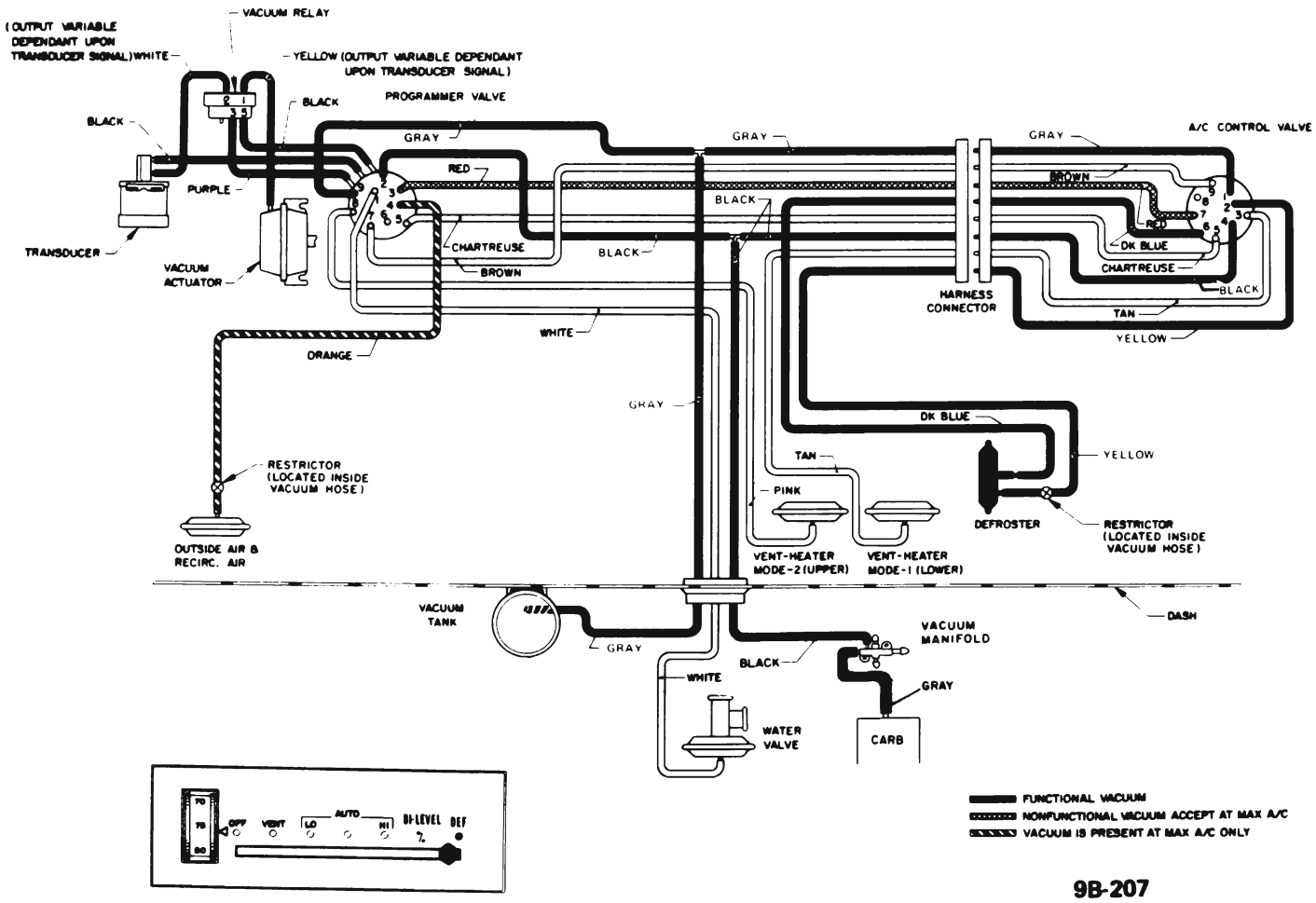


Figure 9B-290 Air Flow and Vacuum Circuits - System in DEF Position

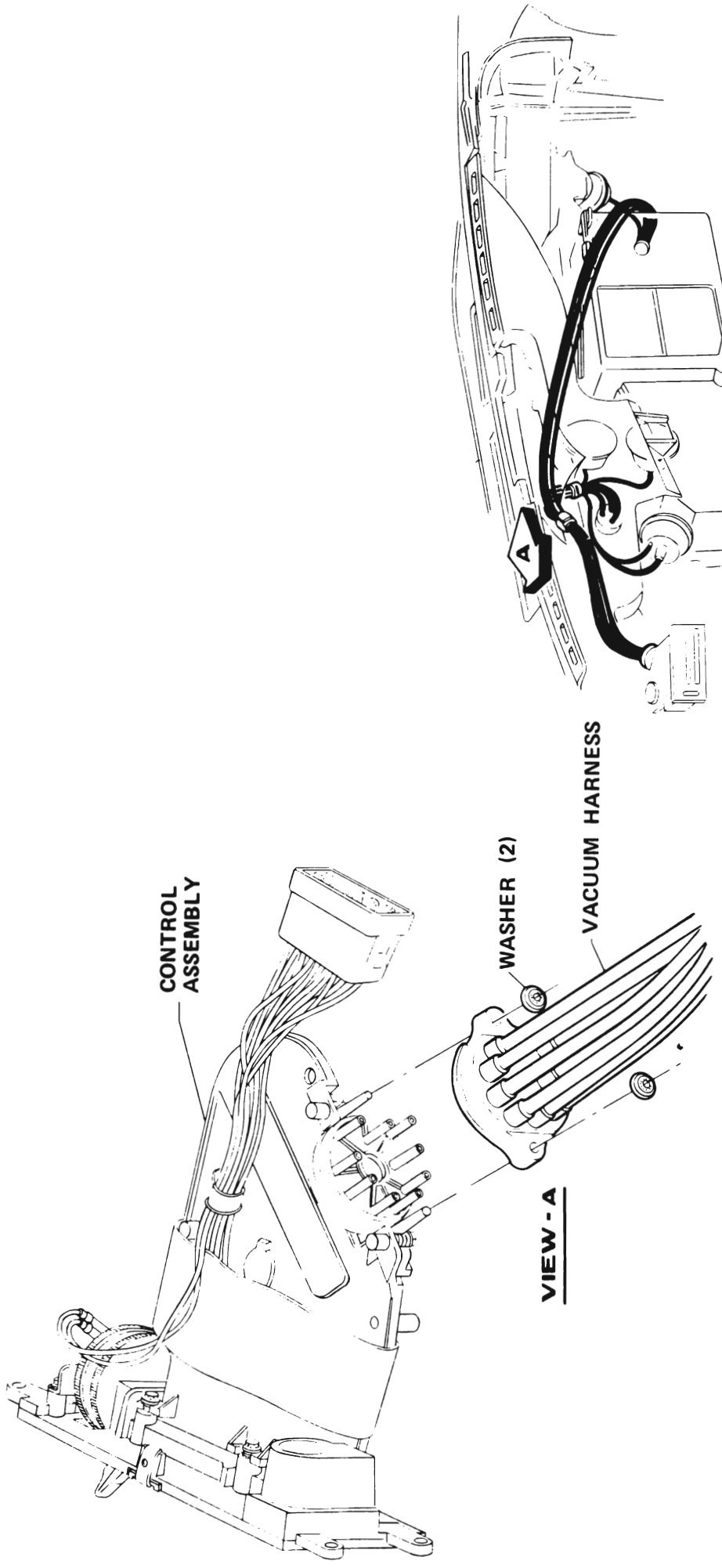


Figure 9B-291 Vacuum Harness to Control - Automatic A/C - A Series

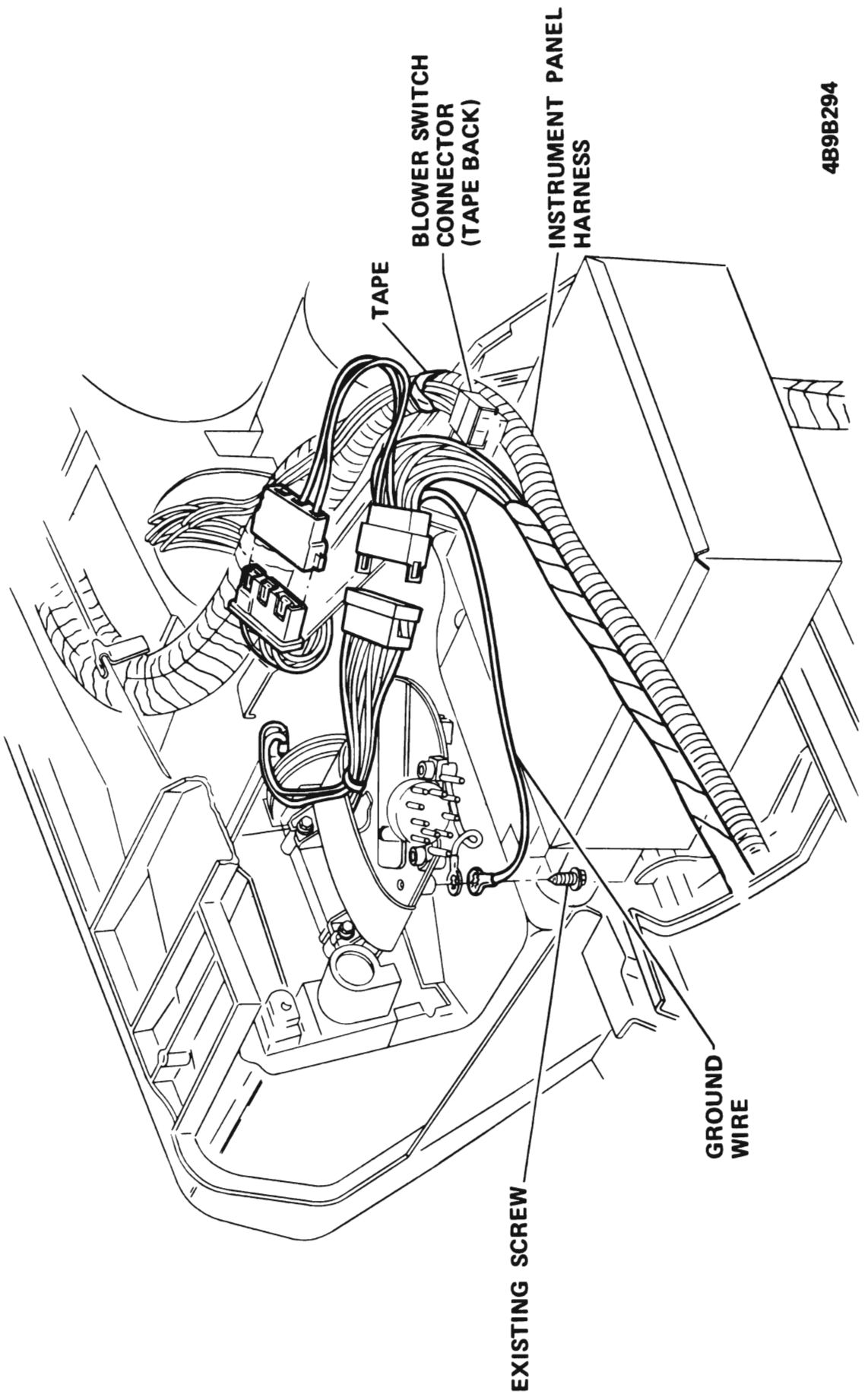


Figure 9B-292 Wiring - Automatic A/C - A Series

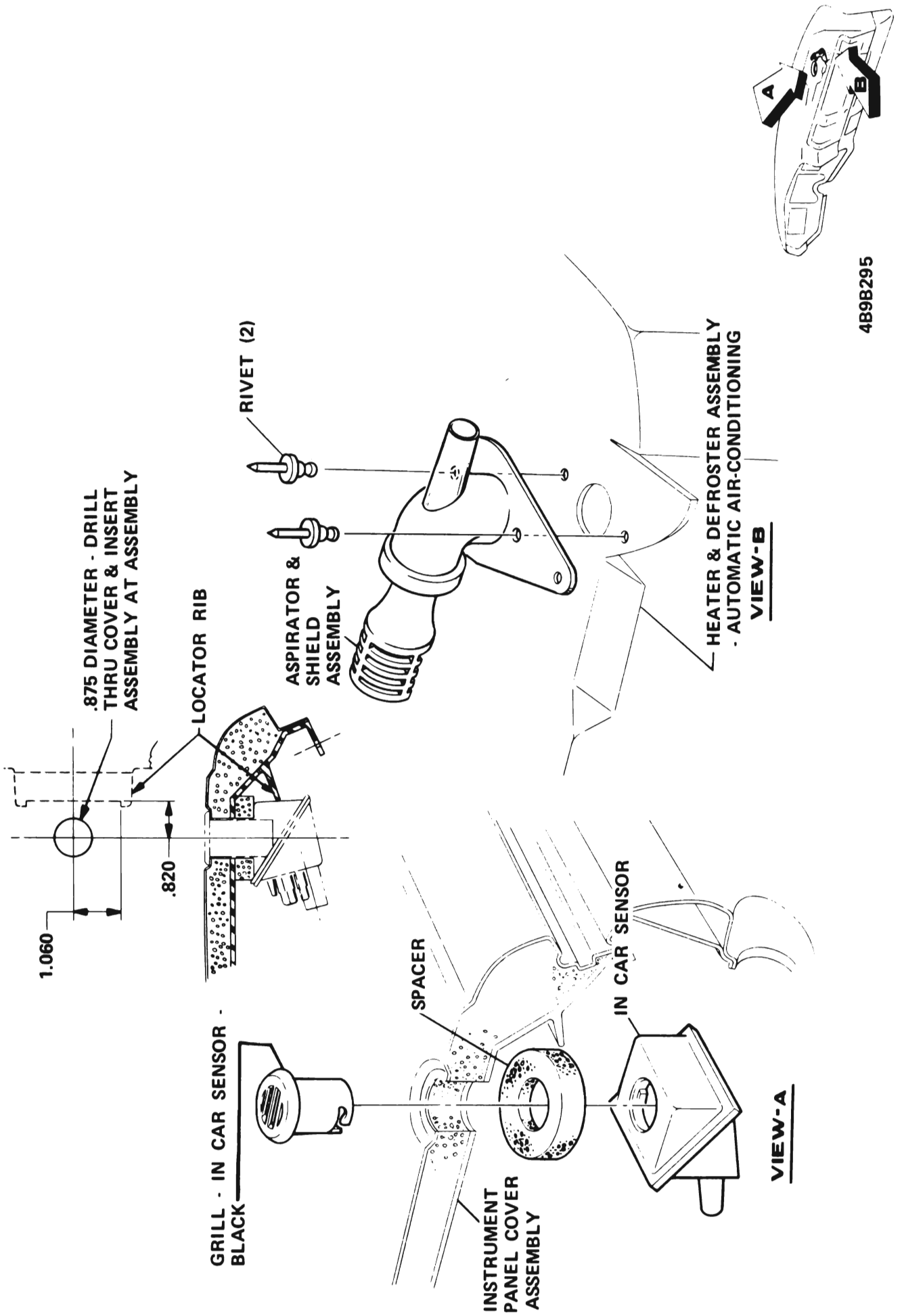


Figure 9B-293 In Car Sensor and Aspirator - Automatic A/C - A Series

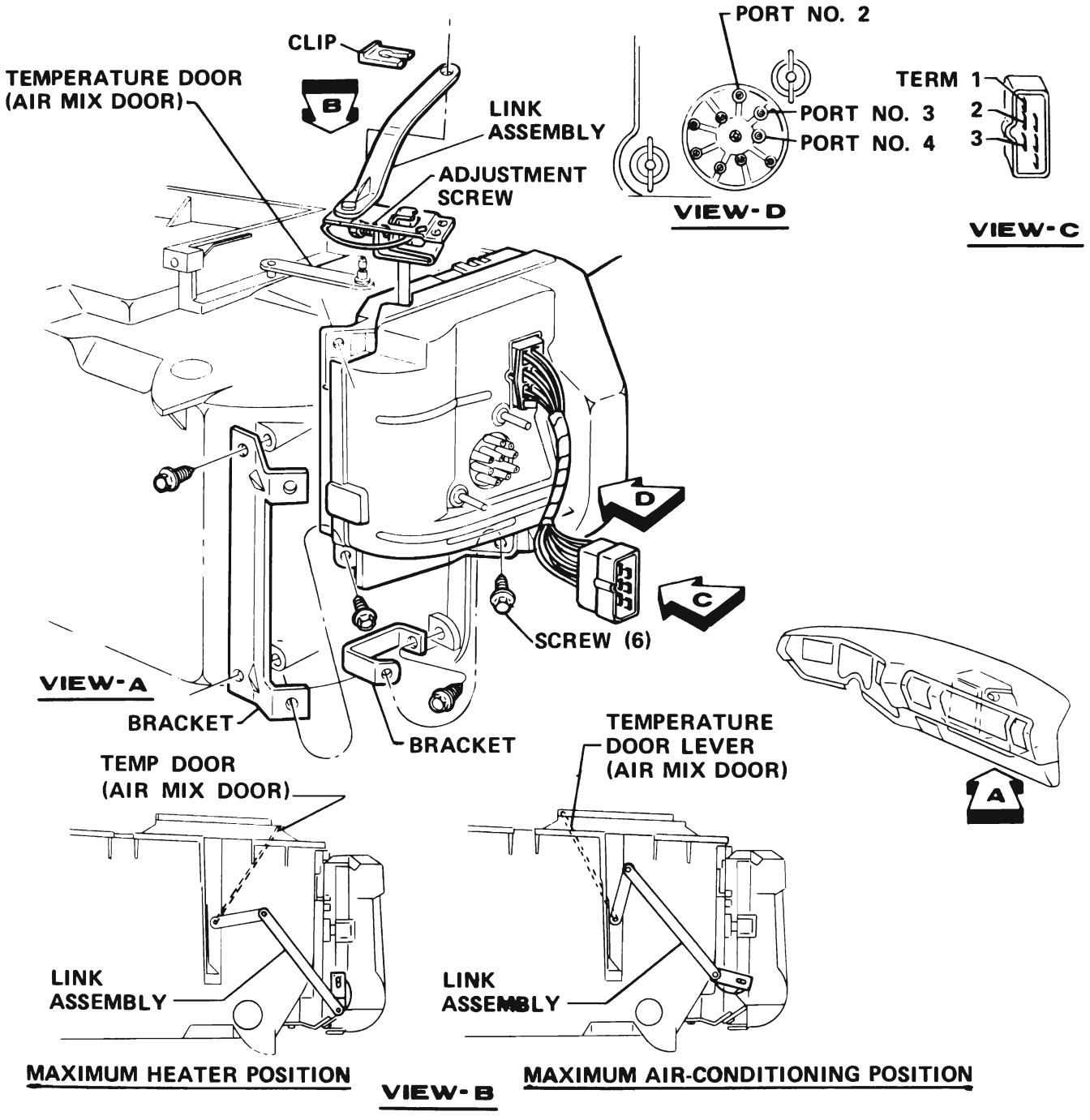


Figure 9B-294 A/C Programmer - Automatic - A Series

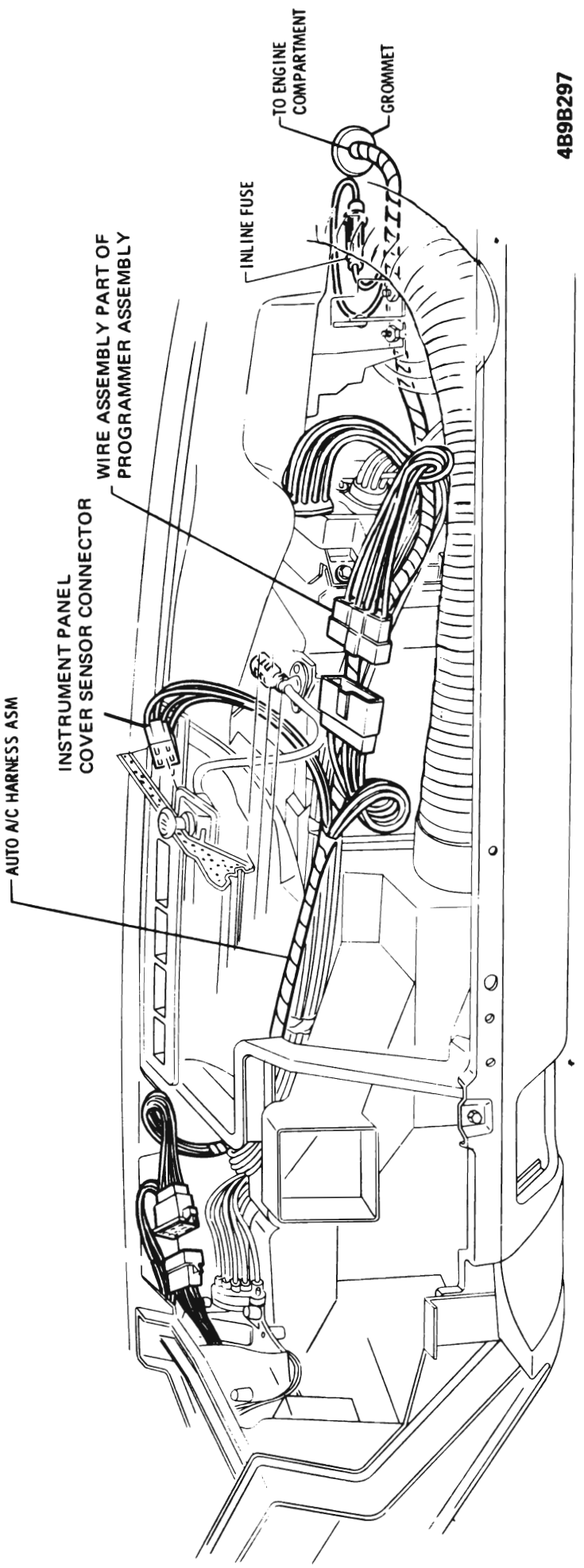


Figure 9B-295 Wiring - Automatic A/C Programmer and Thermo Sensor - A Series

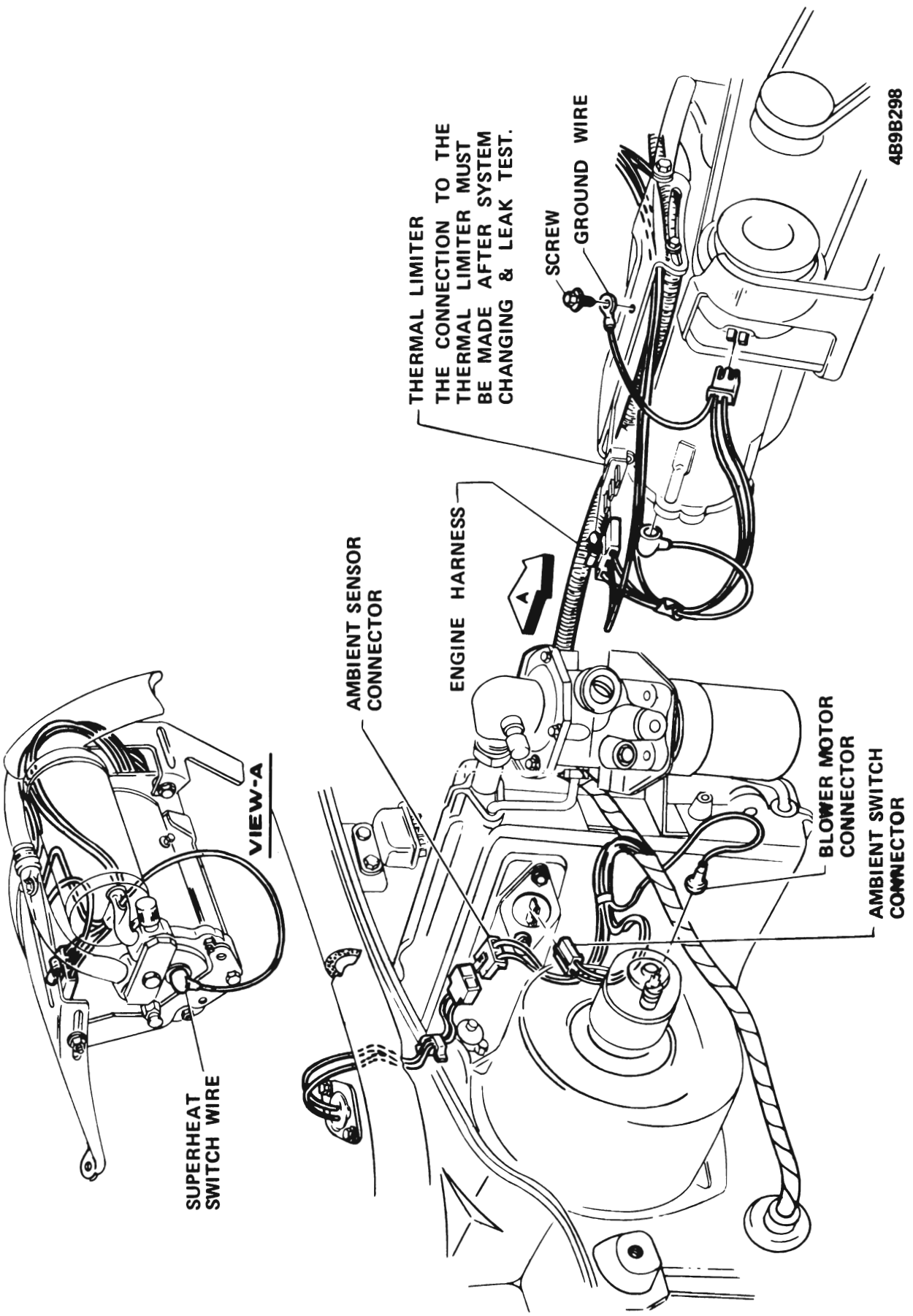


Figure 9B-296 Wiring - Automatic A/C Blower Motor and Ambient Switch - A Series

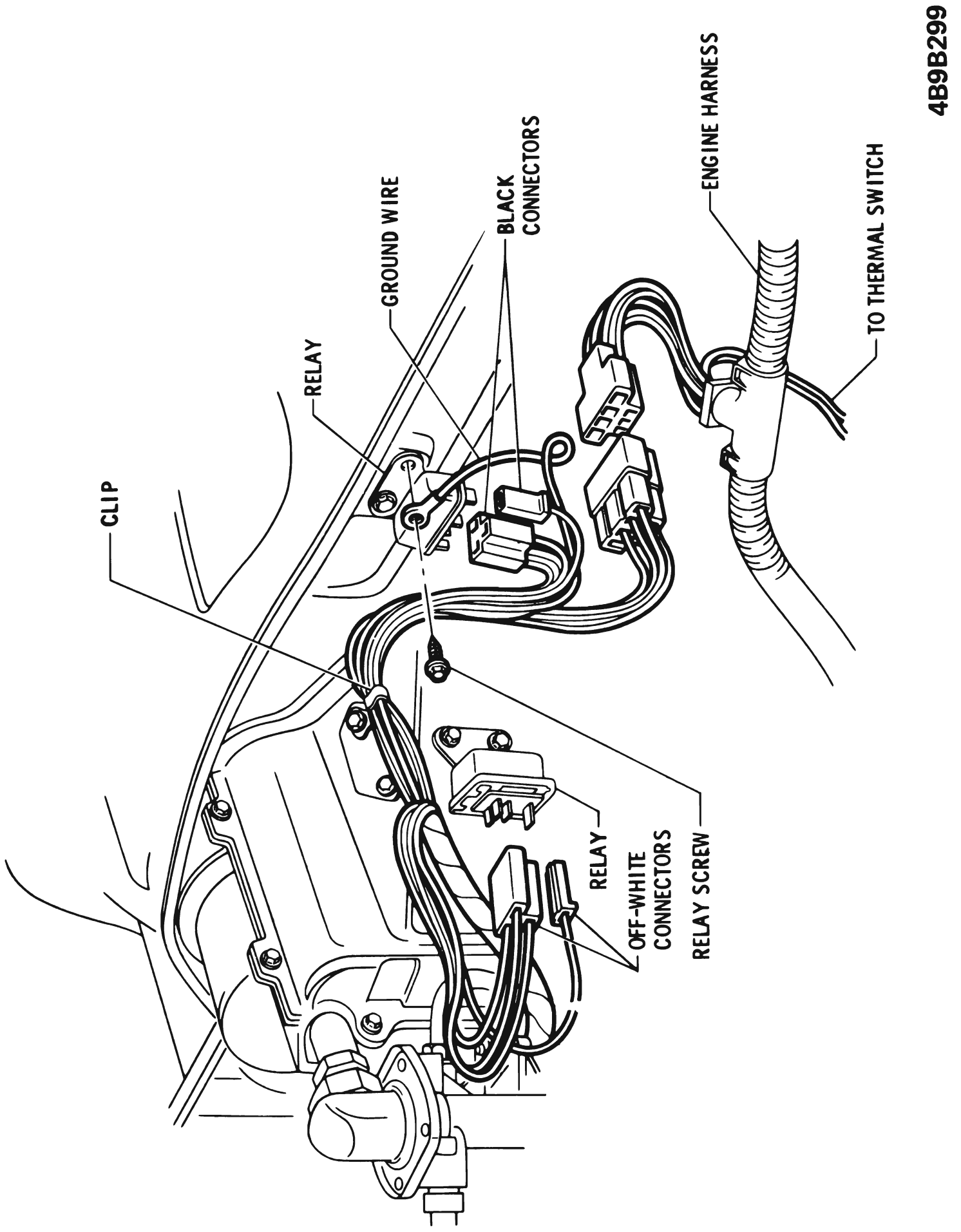


Figure 9B-297 Wiring - Automatic A/C Relays - A Series

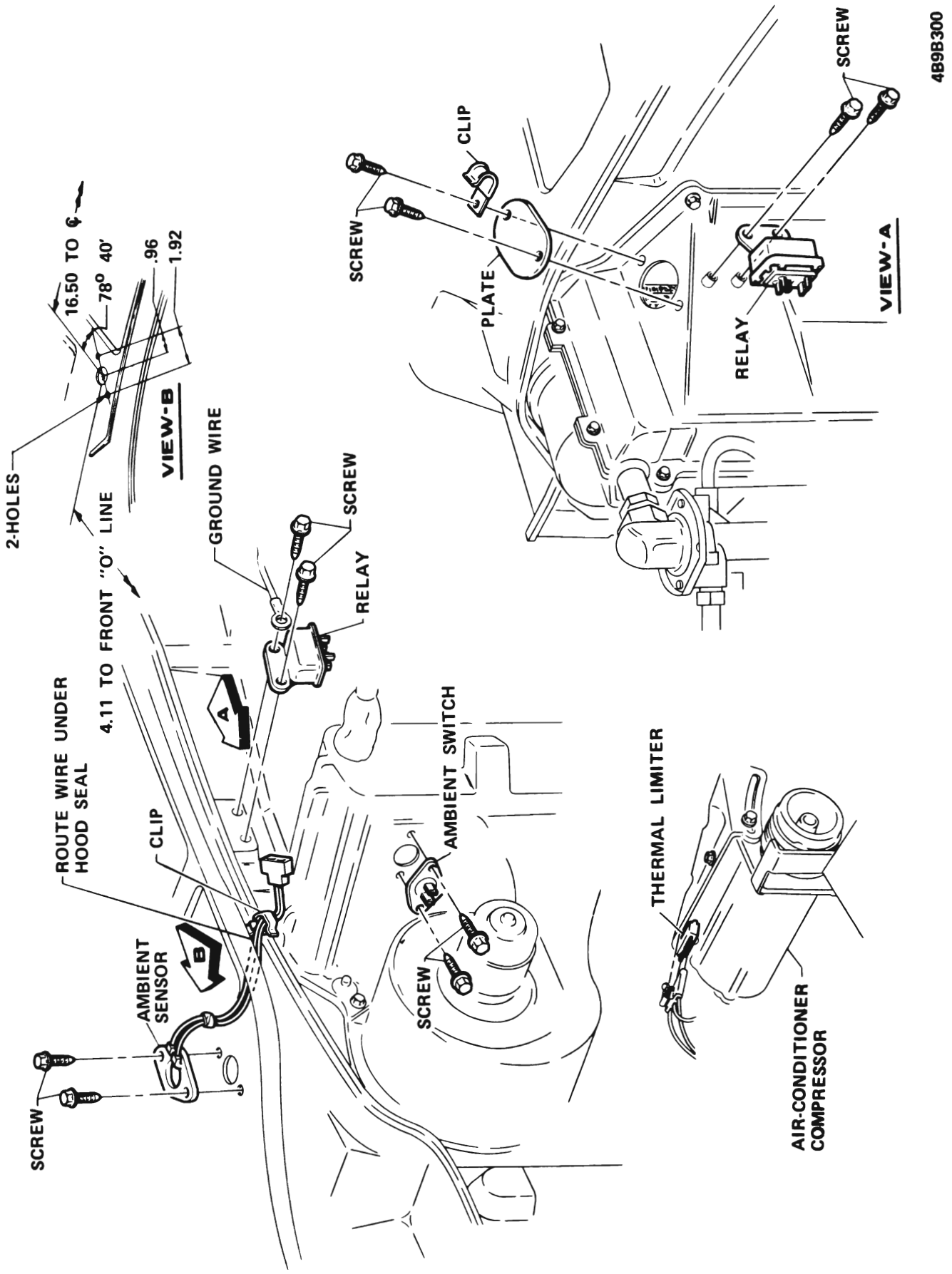


Figure 9B-298 Ambient Switch - Sensor Relays - Thermal Limiter - Automatic A/C - A Series

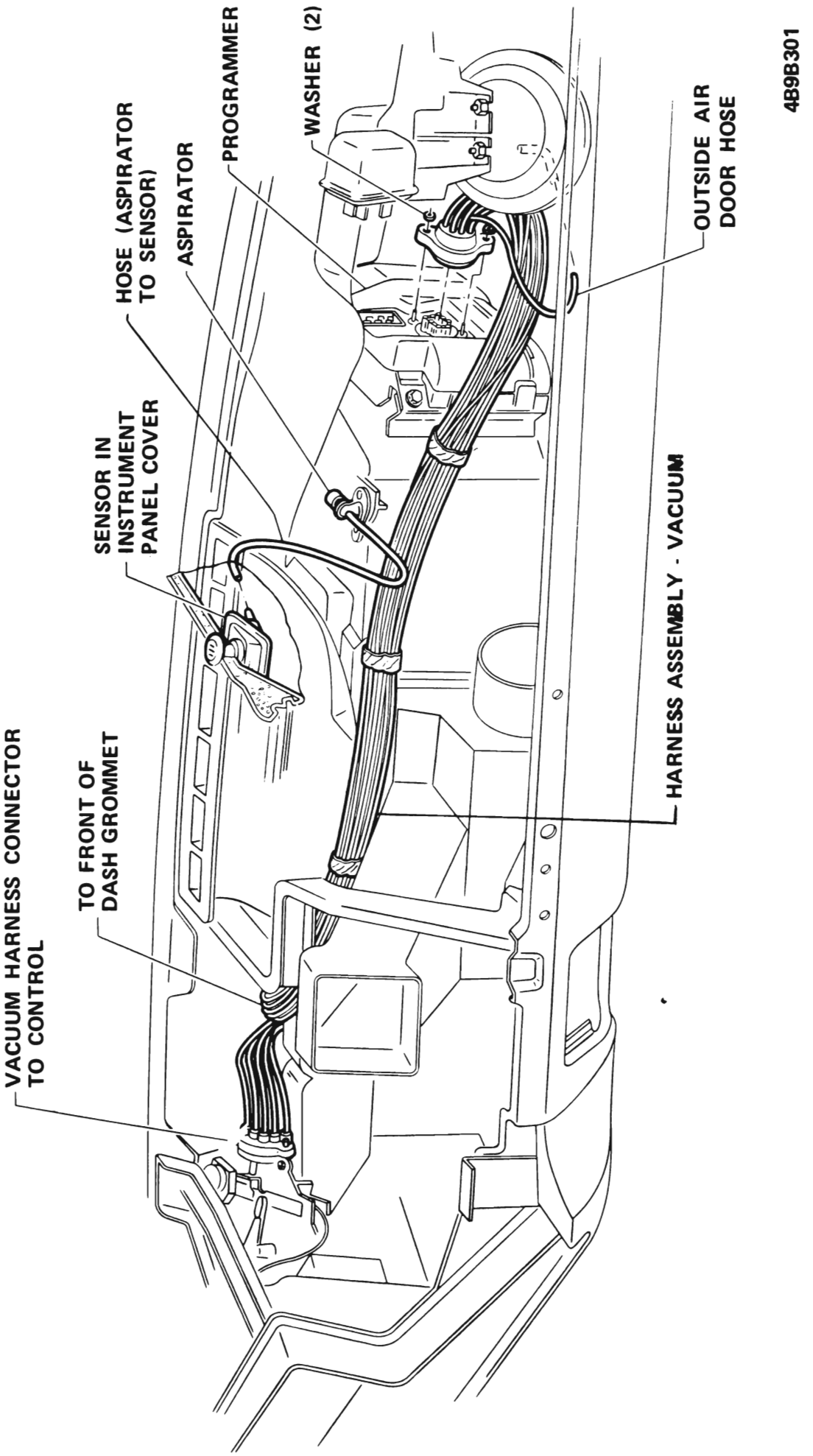


Figure 9B-300 Vacuum Harness Passenger Compartment - Automatic A/C - A Series

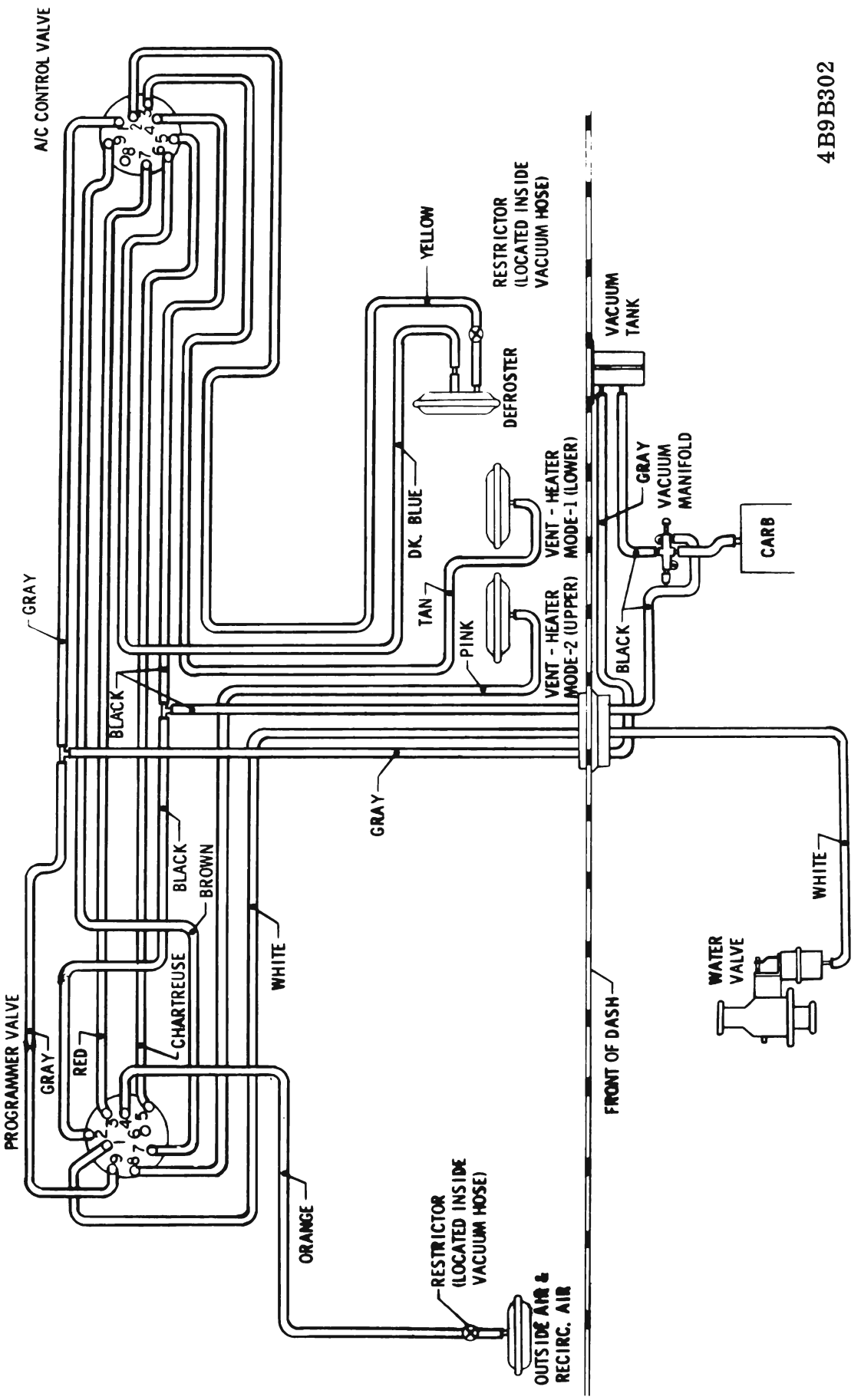


Figure 9B-301 Automatic A/C - Vacuum Hose Schematic - A Series

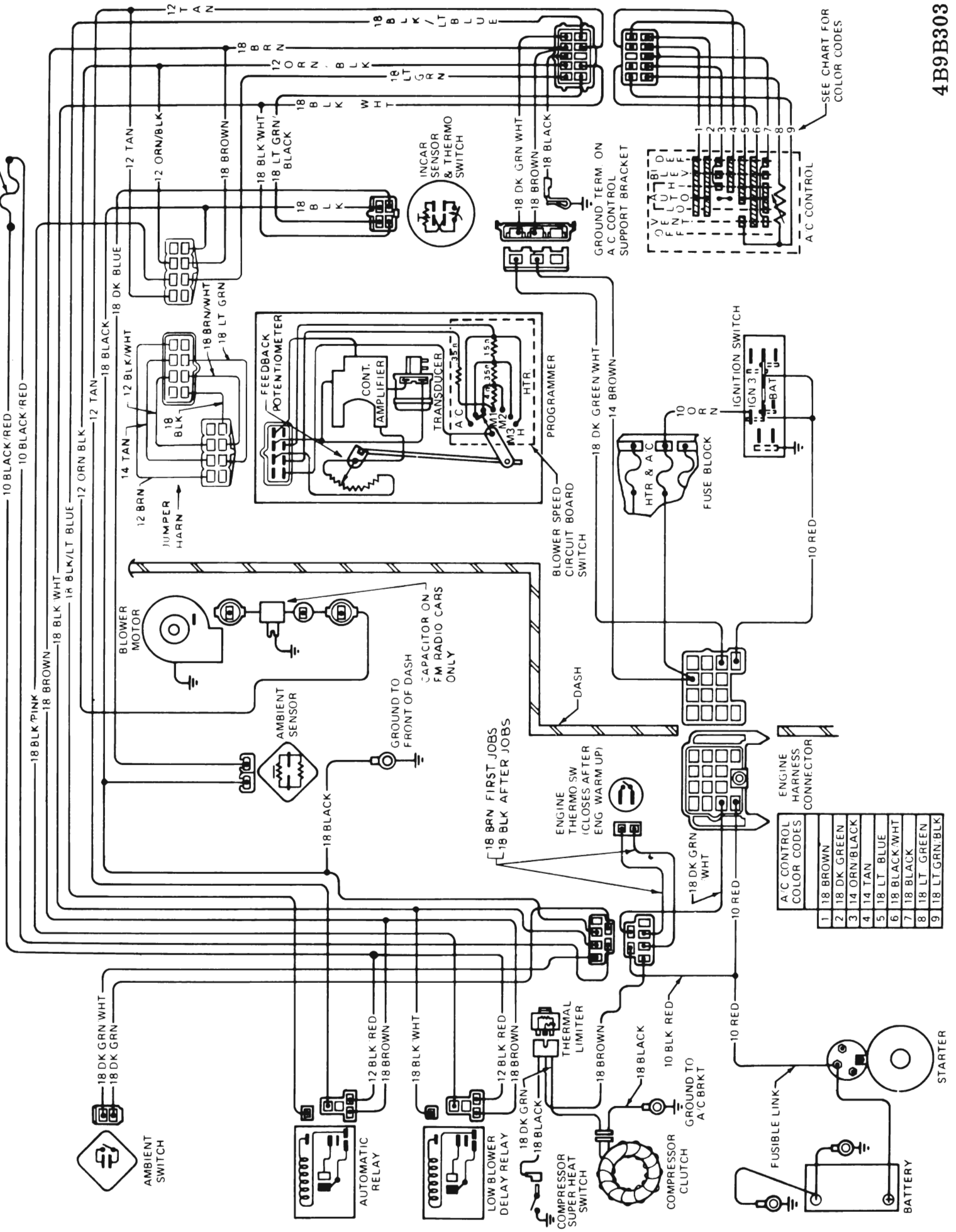


Figure 9B-302 Wiring Circuit Diagram - Automatic A/C - A Series

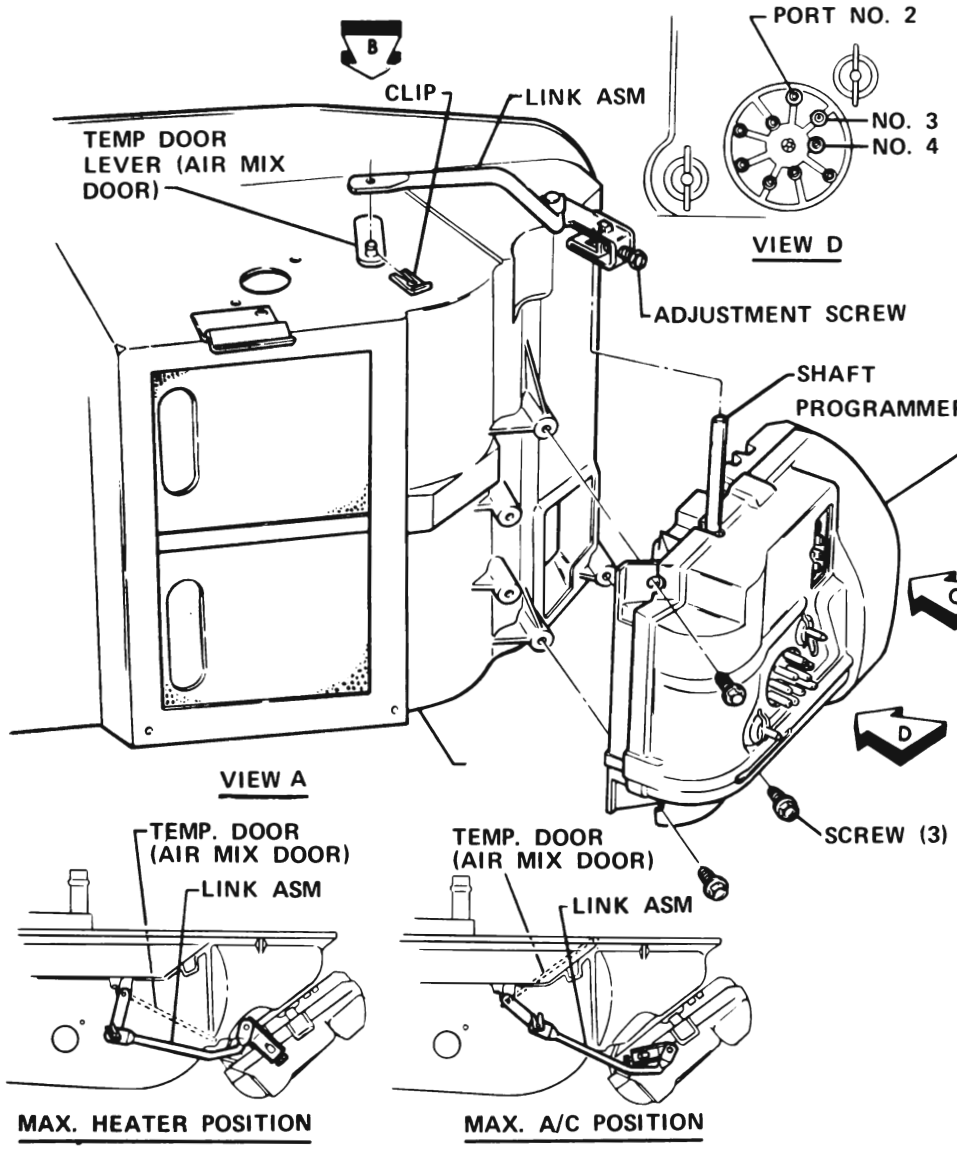
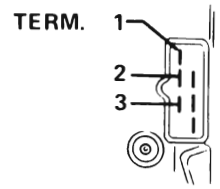


Figure 9B-303 Automatic A/C Programmer Control and In Car Sensor - B-C-E Series



ADJUSTMENT OF AUTO A/C

PROGRAMMER, LINK ASM & TEMP DOOR

1. INSTALL PROGRAMMER TO CASE. PLACE THE LINK OVER THE PROGRAMMER SHAFT & SECURE IT TO THE MIX DOOR ARM WITH RETAINER (CLIP).

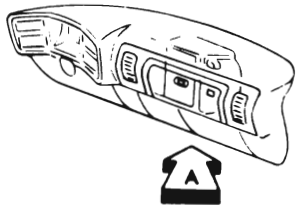
2. PRELOAD THE AIR MIX DOOR IN THE MAX. HEAT POSITION WITH A FORCE ON THE DOOR EQUAL TO 3.0 LB-IN TORQUE AT THE MIX DOOR ARM SEE VIEW-B.

3. APPLY VACUUM TO PROGRAMMER PORT 2 & 3. CONNECT A VACUUM GAGE TO PORT 4 SEE VIEW-D. SEAL ALL OTHER PORTS. THE PROGRAMMER WILL INDEX TO MAX. HEAT.

4. TIGHTEN THE LINK SCREW 15-20 LB.IN. TO SECURE THE ADJUSTMENT. DO THIS CAREFULLY TO AVOID INFLUENCING THE PROGRAMMER, LINK, OR DOOR POSITIONS. THIS COMPLETES THE ADJUSTMENT PROCEDURE.

5. RELEASE THE PRELOAD ON THE AIR MIX DOOR. CONNECT +12V TO TERMINAL 2. CONNECT TERMINAL 1 TO GROUND & TERMINAL 3 TO GROUND THRU A 68 OHM RESISTOR. THE PROGRAMMER WILL INDEX TO MAX A/C. CHECK FOR VACUUM OUTPUT ON PORT 4 & SEAL OF THE MIX DOOR AGAINST THE FRAME. SEE VIEW-B.

6. REMOVE VACUUM & ELECTRICAL CONNECTIONS.



4B9B210

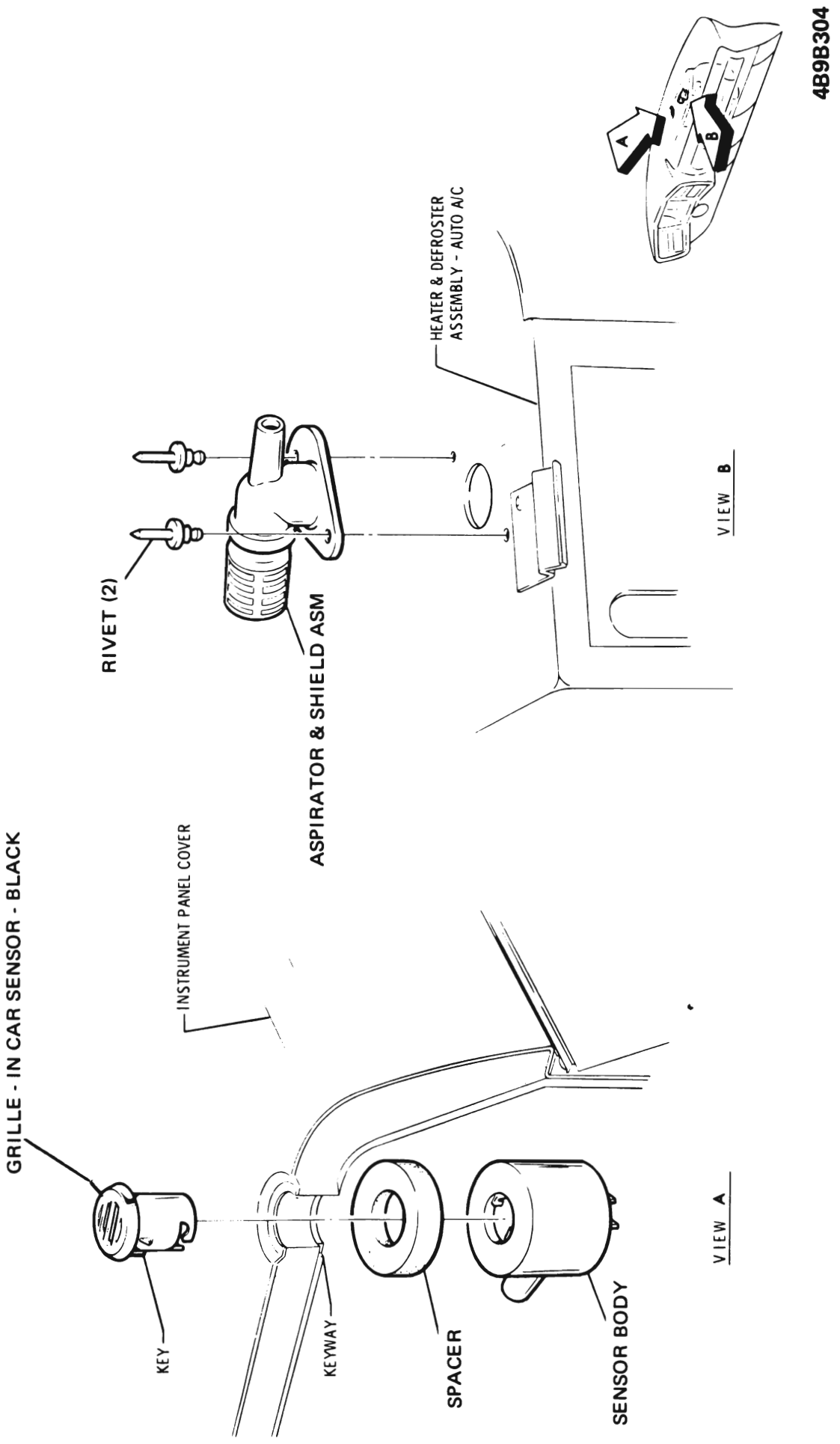


Figure 9B-304 Automatic A/C in Car Sensor and Aspirator - B-C-E Series

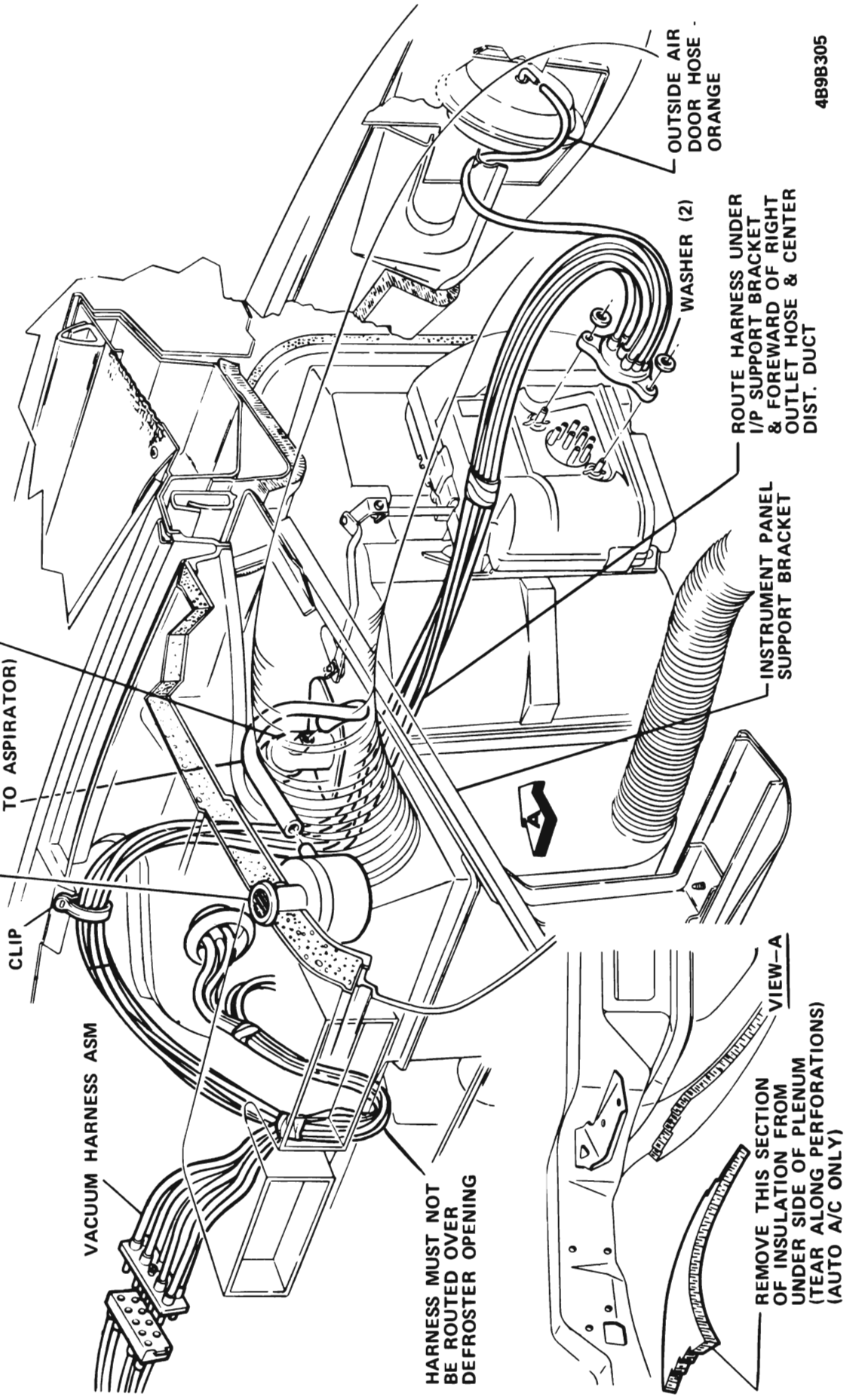


Figure 9B-305 Automatic A/C Passenger Compartment Vacuum Harness - B-C-E Series

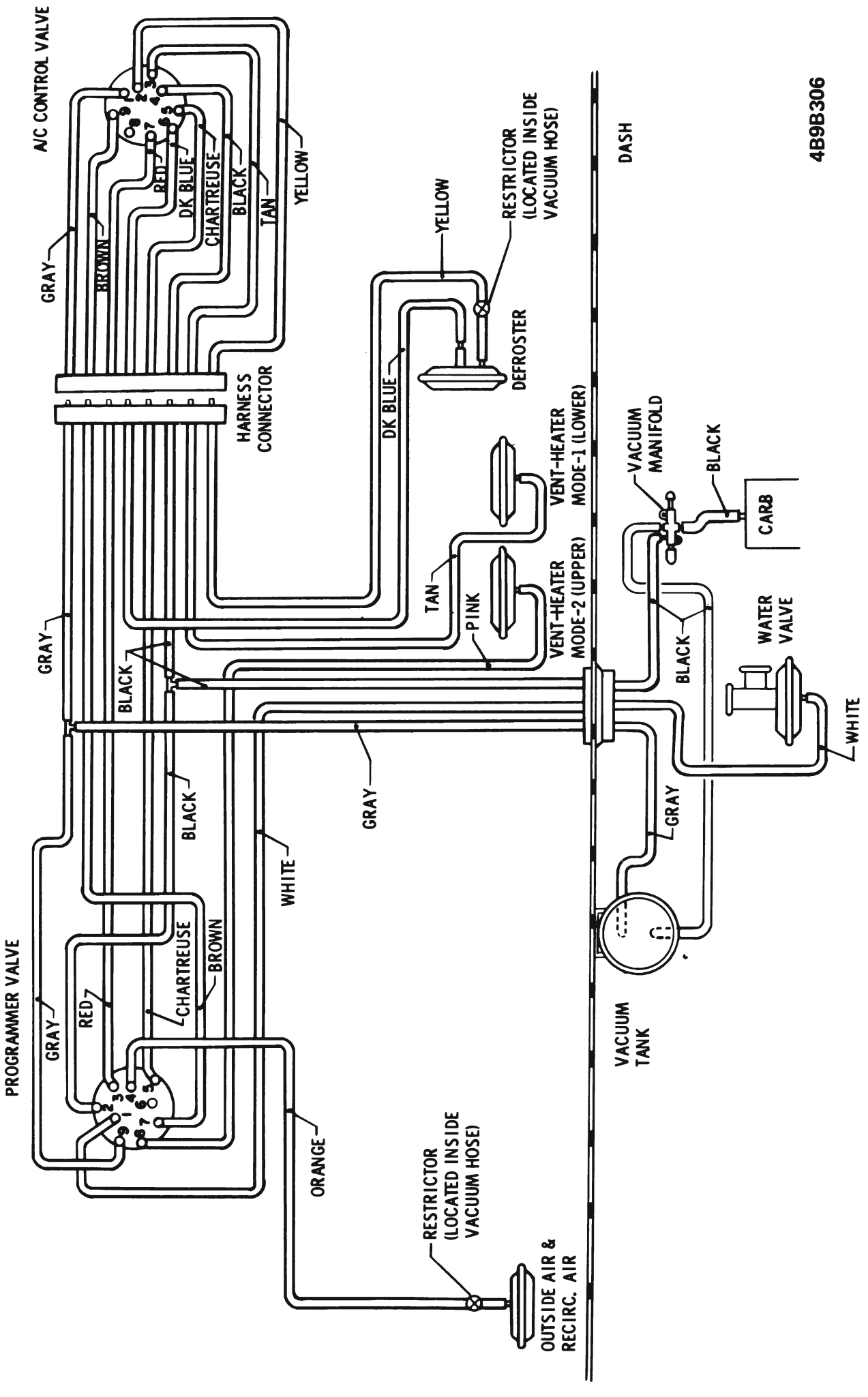


Figure 9B-306 Automatic A/C Vacuum Hose Schematic - B-C-E Series

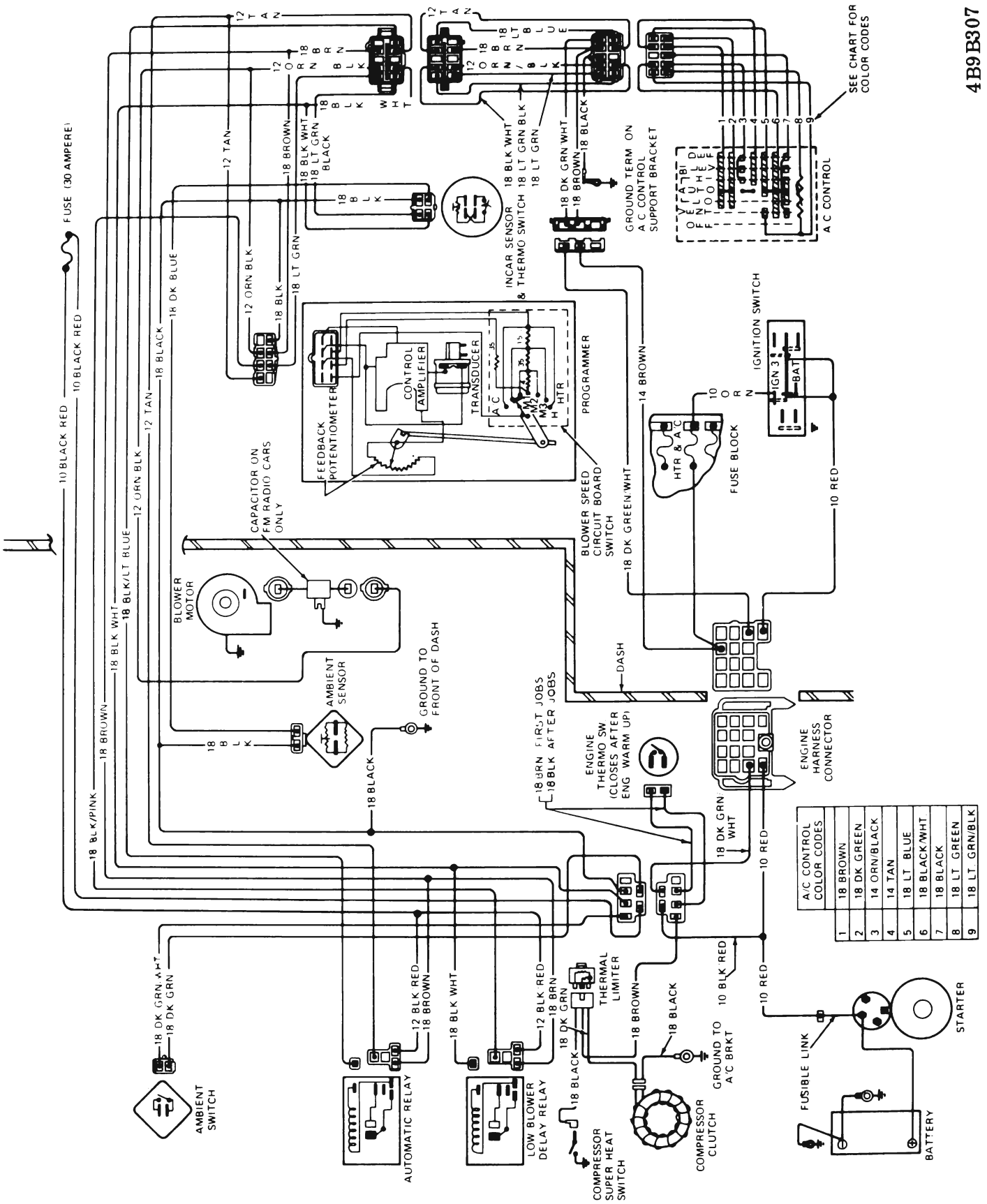


Figure 9B-307 Automatic A/C Wiring Circuit Diagram - B-C-E Series

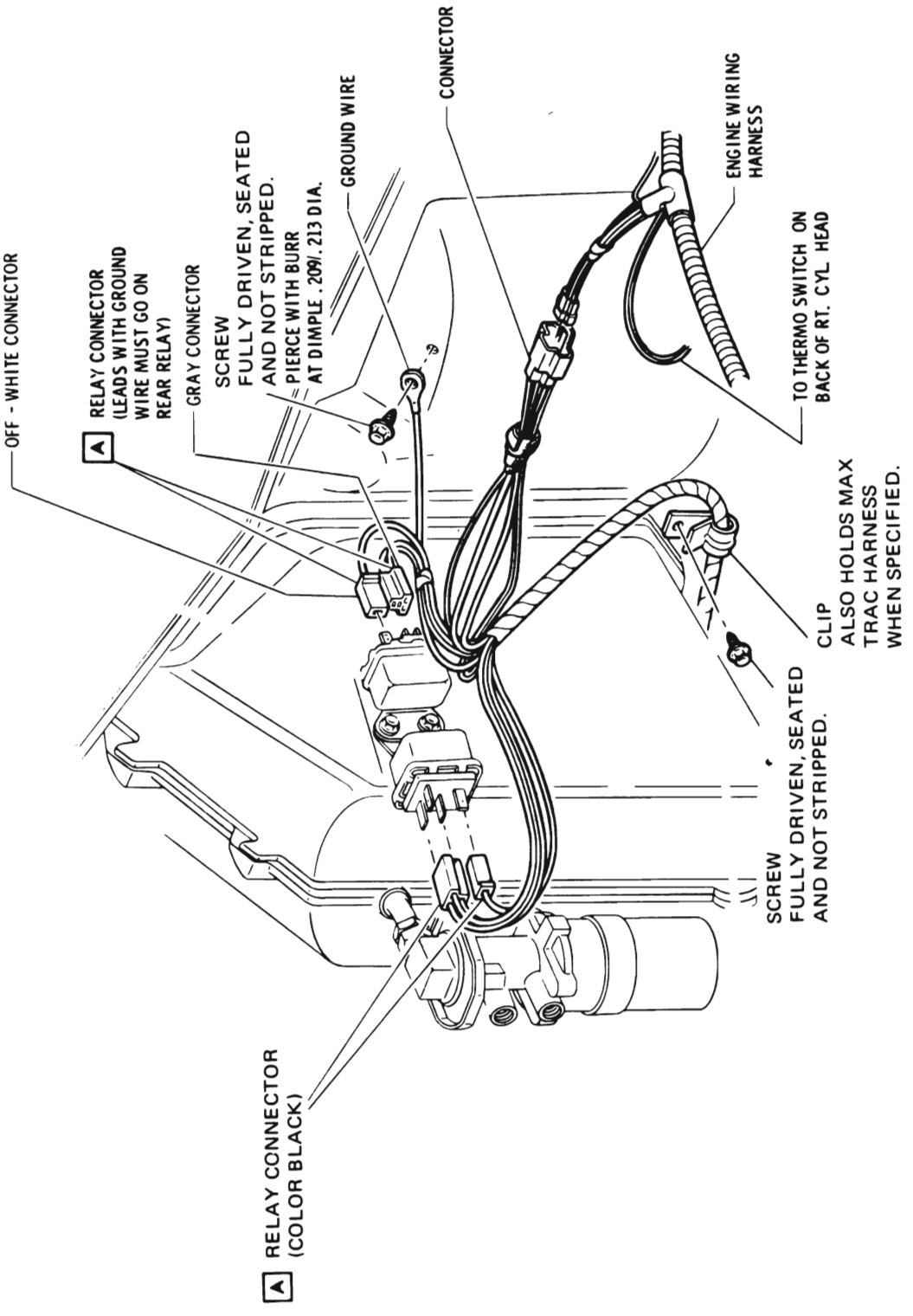


Figure 9B-308 Automatic A/C Relays Wiring - B-C-E Series

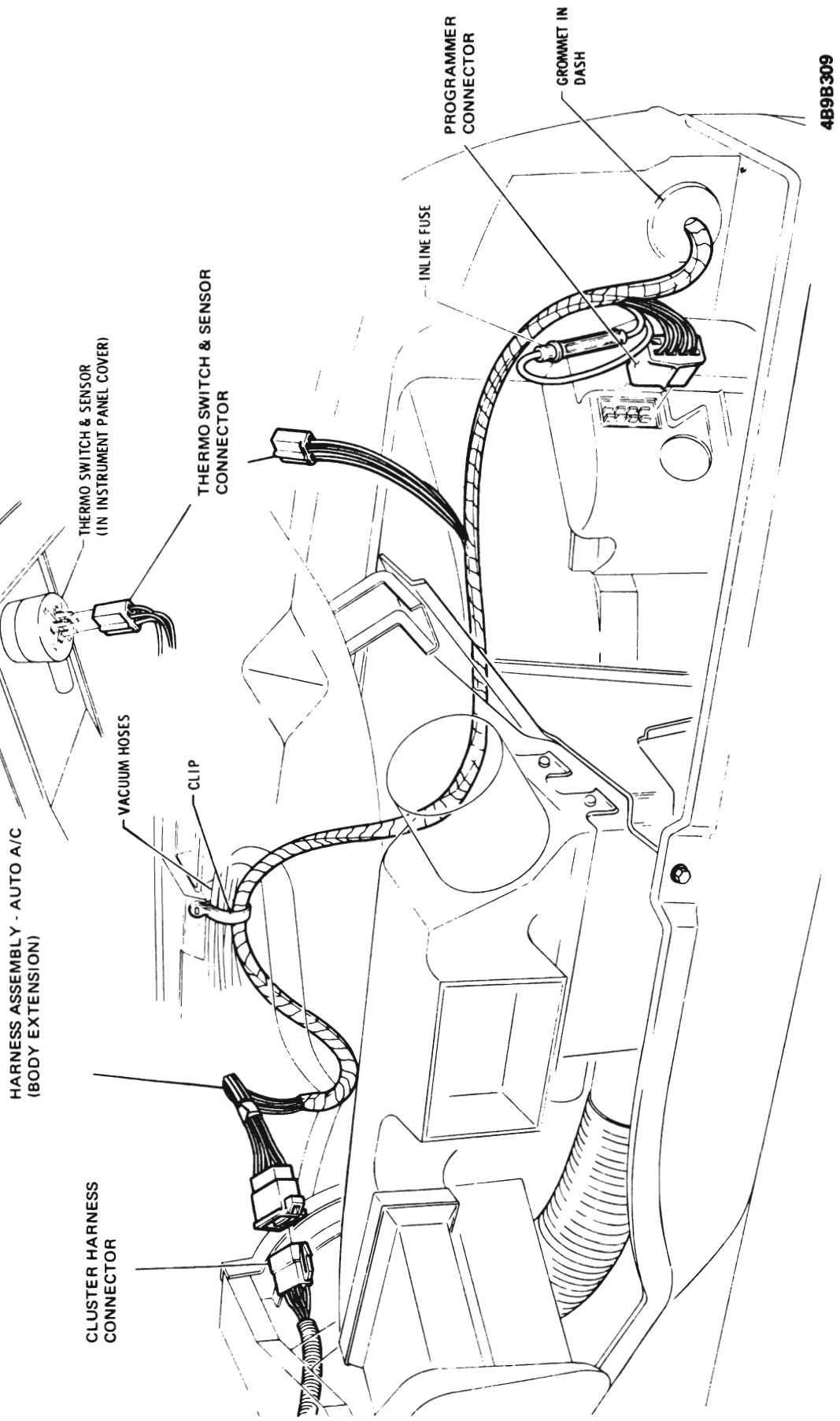


Figure 9B-310 Automatic A/C Programmer and Thermo Sensor Wiring - B-C-E Series

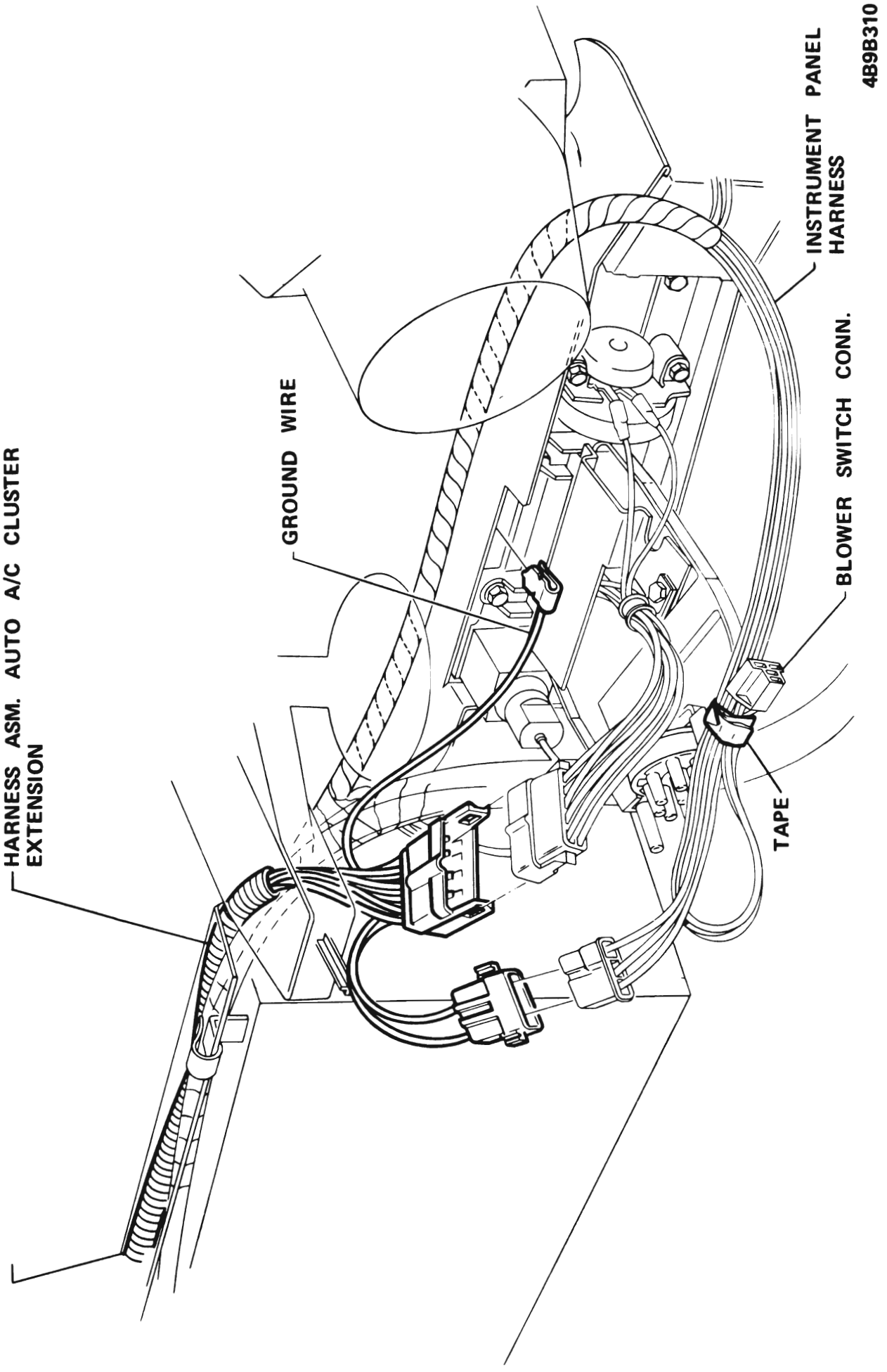


Figure 9B-311 Automatic A/C Control Wiring- B-C-E Series

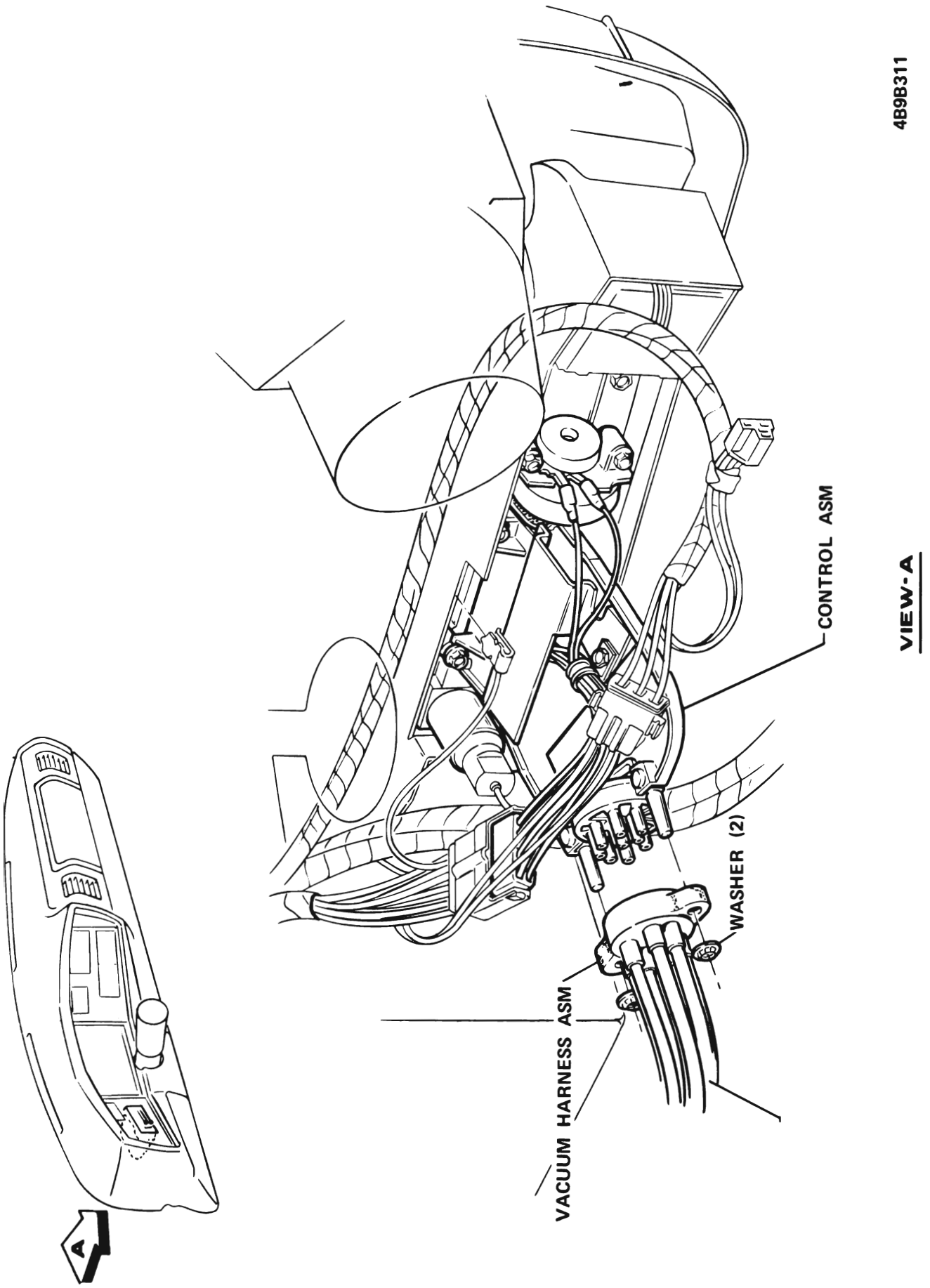


Figure 9B-312 Vacuum Harness (at control) Automatic A/C - B-C-E Series

DELCO RADIO PROGRAMMER

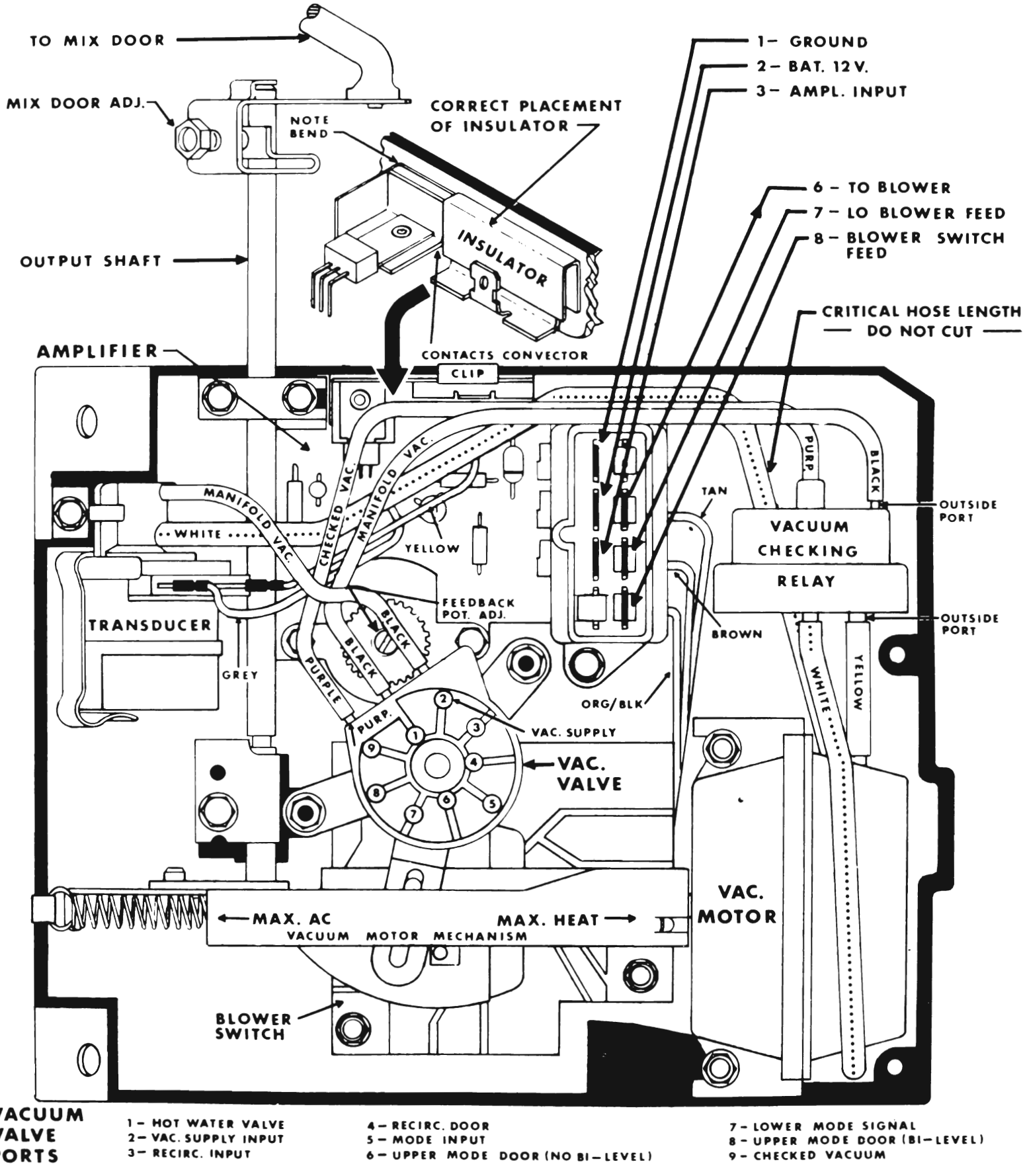


Figure 9B-313 Delco Radio Programmer - A-B-C-E Series

AUTOMATIC CLIMATE CONTROL

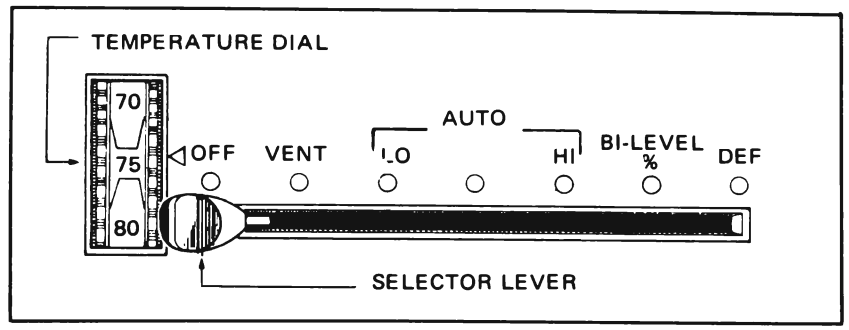


Figure 9B-314 Function Chart

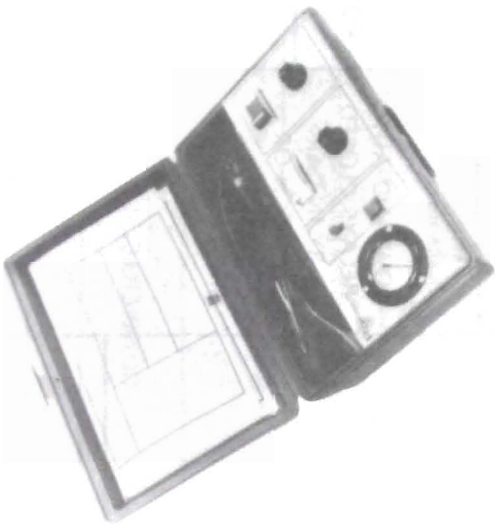
COMFORT PREFERENCE	SELECTOR SWITCH POSITION	TEMPERATURE DIAL POSITION	COMMENTS
VENTILATION	VENT	No effect	A/C Compressor off Fixed LO blower speed Untreated outside air enters thru Air Conditioner outlets
	OFF	Set between "70" & "80" to approximate temperature preference. If adjustment is necessary after temperature stabilizes, move dial only slightly to avoid discomfort of extreme temperatures.	A/C Compressor off Fixed LO blower speed (after engine warm-up). Outside air enters thru heater outlet
AUTOMATIC CLIMATE CONTROL OPERATION FOR WARMING OR COOLING DEPENDING ON WEATHER	AUTO (Center Position)		ALL WEATHER OPERATION Blower speeds alternate automatically from HI to Lo as necessary to maintain temperature setting. Treated air may come from heater and/or Air Conditioning outlets depending on system demands. A/C compressor on above 35° F to dehumidify and cool.
	AUTO ("LO")		OPTIONAL FOR MODERATE WEATHER Same as above except blower speed on fixed LO to maintain temperature setting.
	AUTO ("HI")		OPTIONAL FOR EXTREME WEATHER Blower speed on fixed HI to maintain temperature setting. In hot weather incoming air is initially recirculated for maximum air conditioning and then outside air is cooled to maintain temperature setting.
WINDSHIELD DEFOGGING OR DEFROSTING	BI-LEVEL		A/C Compressor on to dehumidify (above 35° F) Air enters thru Air Conditioning, heater, & defroster outlets to defog windshield & side windows.
	DEF		A/C Compressor on to dehumidify (above 35° F) Fixed high blower speed. Majority of air out defroster outlets - some out heater outlet.

NOTE: To insure passenger comfort in cool weather, the Full Flow Ventilation blower fan will not start until engine warm-up with Selector lever at "OFF or "AUTO".

LEVER	AIR INLET DOOR LOCATION	PROGRAMMER AND TEMP. DOOR	MODE DOORS POSITION	DEFROSTER DOOR POSITION	COMPRESSOR CLUTCH	WATER VALVE (NORMALLY OPEN)	BLOWER RELAYS	BLOWER SPEEDS
OFF	OUTSIDE AIR	VARIES	HEATER	CLOSED	DE-ENERGIZED	EITHER	LOW RELAY CLOSED BY IN-CAR SWITCH OR BY ENGINE SWITCH CLOSING	FIXED LOW
VENT		FORCED TO MAX. A/C	A/C	BLEED POSITION AND WILL DELIVER SMALL AMOUNT OF AIR TO W/S IF IN HEATER OR BI-LEVEL MODE		SHUT-OFF	LOW RELAY IS CLOSED BY CONTROL HEAD SWITCH	
LO		VARIES FROM MAX. HTR. TO MAX. A/C DEPENDING ON SENSOR STRING RESISTANCE	EITHER HEATER BI-LEVEL OR A/C DEPENDING ON PROGRAMMER POSITION		ENERGIZED IF ABOVE FREEZING	USUALLY OPEN HOWEVER SHUT-OFF IF PROGRAMMER IS IN MAX. A/C POSITION	SAME AS CONTROL HEAD IN "OFF"	
AUTO							LOW AND AUTO RELAYS CLOSED BY IN-CAR SWITCH OR BY ENGINE SWITCH CLOSING	VARIABLE BLOWER PROGRAM
HI	RECIRCULATE AIR WHEN PROGRAMMER IS IN MAX. A/C OTHERWISE OUTSIDE AIR							FIXED HIGH
BI-LEVEL			BI-LEVEL			OPEN		VARIABLE BLOWER PROGRAM
DEF			HEATER	FULL OPEN TO W/S			LOW AND AUTO RELAYS CLOSED BY CONTROL HEAD SWITCH	FIXED HIGH

9B-222

Figure 9B-315 Function Chart



J 23678 AUTOMATIC TEMP.
CONTROL TESTER

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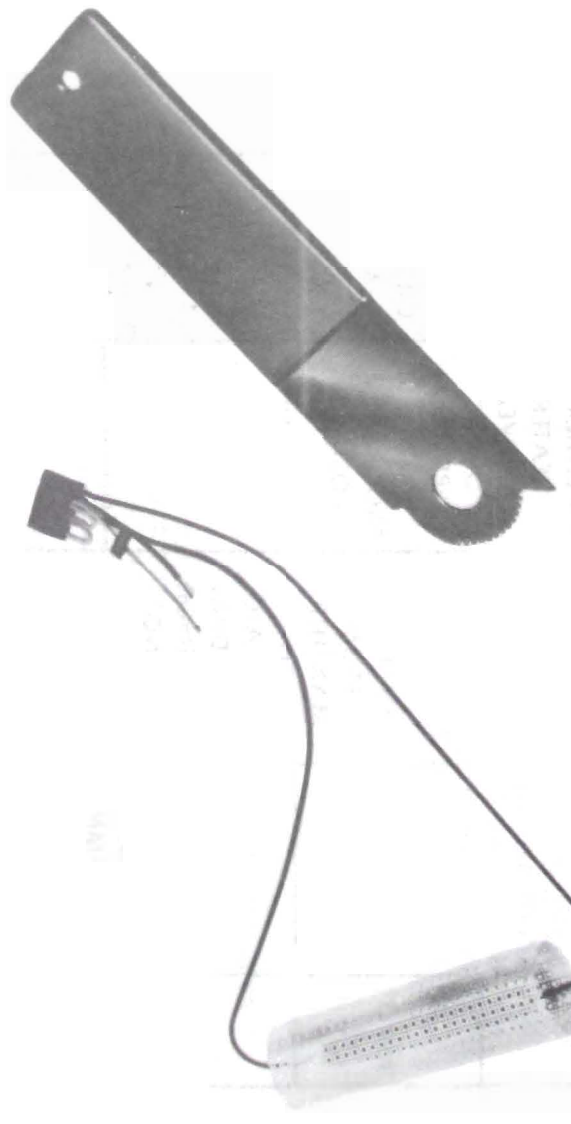

J 21530 AUTOMATIC TEMP.
CONTROL KNOB ADJUSTER

J 23713 PROGRAMMER
ADAPTER HARNESS

Special Tools