

SECTION 1

HEATING AND AIR CONDITIONING

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SECTION 1A

HEATER AND VENTILATION

NOTICE: When fasteners are removed, always reinstall them at the same location from which they were removed. If a fastener needs to be replaced, use the correct part number fastener for that application. If the correct part number fastener is not available, a fastener of equal size and strength (or stronger) may be used. Fasteners that are not reused and those requiring thread locking compound will be called out. The correct torque value must be used when installing fasteners that require it. If the above conditions are not followed, parts or system damage could result.

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GENERAL DESCRIPTION

BASE HEATER SYSTEM

Figures 1 through 5

The base heater system provides heating, ventilation, side window defogging and windshield defrosting. Outside air is drawn from the plenum at the base of the windshield assembly into the heater module assembly (1) by the blower motor fan (18).

Within the heater module assembly (1), the air is heated as required and then routed through ducts to the proper outlets for discharge into the passenger compartment. A control assembly (2) in the instrument panel assembly allows the operator to control blower motor assembly speed, mode of operation and the temperature of the air coming from the heater system.

The heater module assembly (1) contains components that heat the air flowing through it and direct the air to the proper ducts and outlets. The heater module assembly (1) is a single unit, including the blower motor assem-

bly (6), that is mounted to the rear surface of the dash front panel in front of the instrument panel assembly.

Hot coolant from the engine's cooling system is directed through the heater core (14) and returned to the cooling system when the engine is running. The heater core (14) transfers heat from the coolant to the air passing through the heater core fins. There is no hot water valve in the heater system to prevent flow of coolant through the heater core (14).

CONTROL ASSEMBLY

Figures 1 through 5

Three knobs in the instrument panel allow a front seat occupant to operate the heating and ventilation. These knobs are in the control assembly, in the center of the instrument panel, just above or below the radio, depending on the vehicle. To the left of the blower motor speed control knob is the control button for the electric rear window defogger (Pontiac only).

The controls are lit when the headlamps are on. Electrical power is provided by the instrument panel lighting circuit. The control assembly lamp is in parallel with the instrument cluster bulbs, the radio dial bulb and certain other interior illumination bulbs. Brightness of the dial illumination is controlled by the dimmer control of the headlamp switch. For electrical circuit diagrams and more information, refer to SECTION 8A.

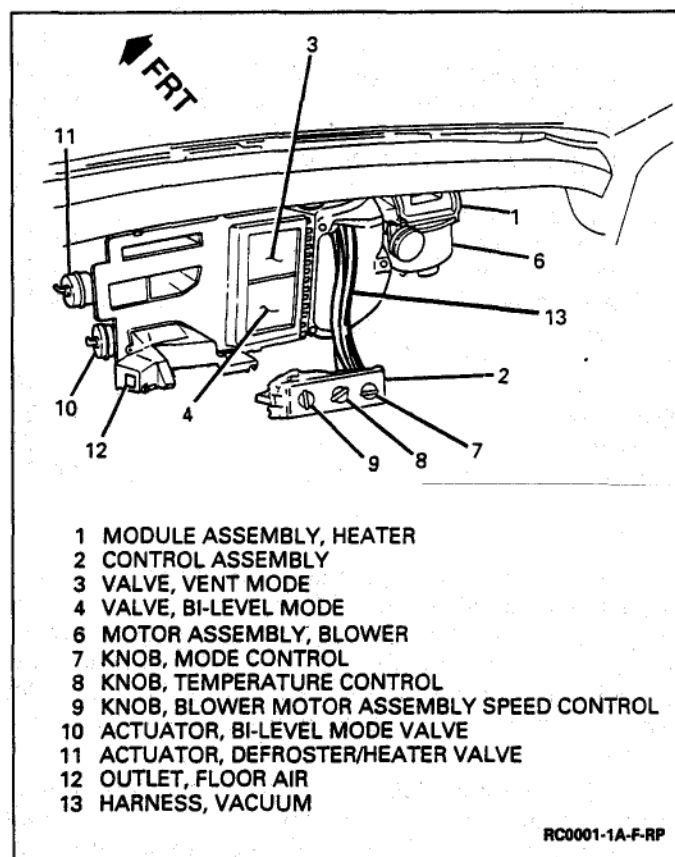


Figure 1 – Heater Module Assembly and Controls

Temperature Control Knob

The temperature control knob is the middle knob in the control assembly. It regulates the temperature of the air being discharged into the passenger compartment from the heater or ventilation system. The temperature control knob controls the position of a "door" called the temperature valve in the heater module assembly. The temperature valve governs the relative amounts of heated and unheated air discharged from the heater system. Full warm, full cool or any intermediate temperature mixture can be selected by moving the knob to the right (red area) for warm air and to the left (blue area) for cool air or anywhere in between.

Mode Control Knob

The right knob, called the mode control knob, is a rotary vacuum switch that regulates airflow from the outlets by routing engine vacuum to vacuum actuators at the heater module assembly. The mode control knob also controls an electrical switch that supplies power to operate the blower motor assembly for specific mode selections.

A choice of six operating modes can be selected by turning the mode control knob in the control assembly. From left to right, the six modes are "OFF," "VENT" (vent), "BI-LEVEL" (bi-level), "HEATER" (heater), "BLEND" (blend) and "DEFROST" (defrost).

"OFF" Mode

When the mode control knob is in the "OFF" position, no electrical power is supplied to the blower motor assembly. A limited flow of air, caused by movement of the vehicle, may come from the defrost outlet and the floor outlets. This is the only mode in which the blower motor assembly will not operate.

"VENT" (Vent) Mode

With the mode control knob in the "VENT" position, outside air is delivered through the instrument panel outlets to ventilate the vehicle. If preferred, the air may be warmed by setting the temperature control knob to the desired temperature.

"BI-LEVEL" (Bi-level) Mode

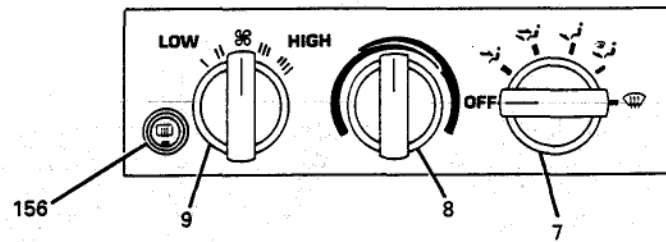
With the mode control knob in the "BI-LEVEL" position, electrical power is supplied to the blower motor assembly. Outside air is drawn in and heated (depending on the position of the temperature control knob). Then the airflow is split between the instrument panel outlets and the floor outlets. Blower motor assembly speed may be varied.

"HEATER" (Heater) Mode

With the mode control knob in the "HEATER" position, outside air is drawn into the vehicle, heated (depending on the position of the temperature control knob) and directed to the floor air outlets. A small amount of air is routed to the windshield assembly through the defrost outlet.

Blower motor assembly speed may be varied as in other operating modes.

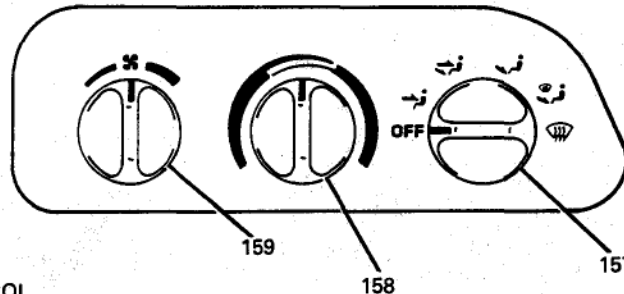
This mode is the normal selection for cold weather operation unless the windshield assembly must be cleared of heavy frost.



- 7 KNOB, MODE CONTROL
- 8 KNOB, TEMPERATURE CONTROL
- 9 KNOB, BLOWER MOTOR ASSEMBLY SPEED CONTROL
- 156 KNOB, REAR WINDOW DEFOGGER

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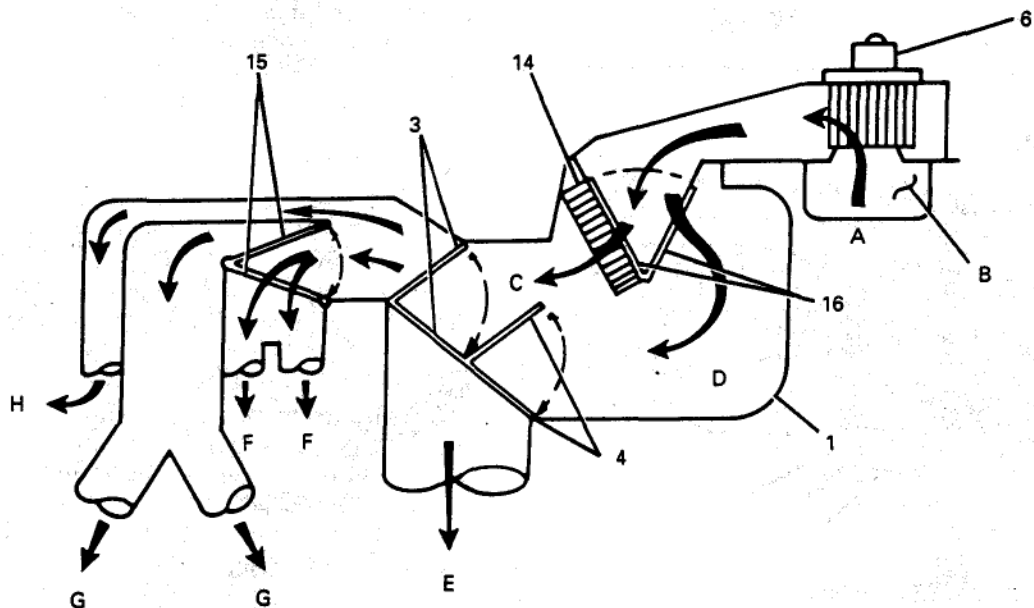
Figure 2 - Control Assembly - (Pontiac)



- 157 KNOB, MODE CONTROL
- 158 KNOB, TEMPERATURE CONTROL
- 159 KNOB, BLOWER MOTOR ASSEMBLY SPEED CONTROL

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Figure 3 - Control Assembly - (Chevrolet)



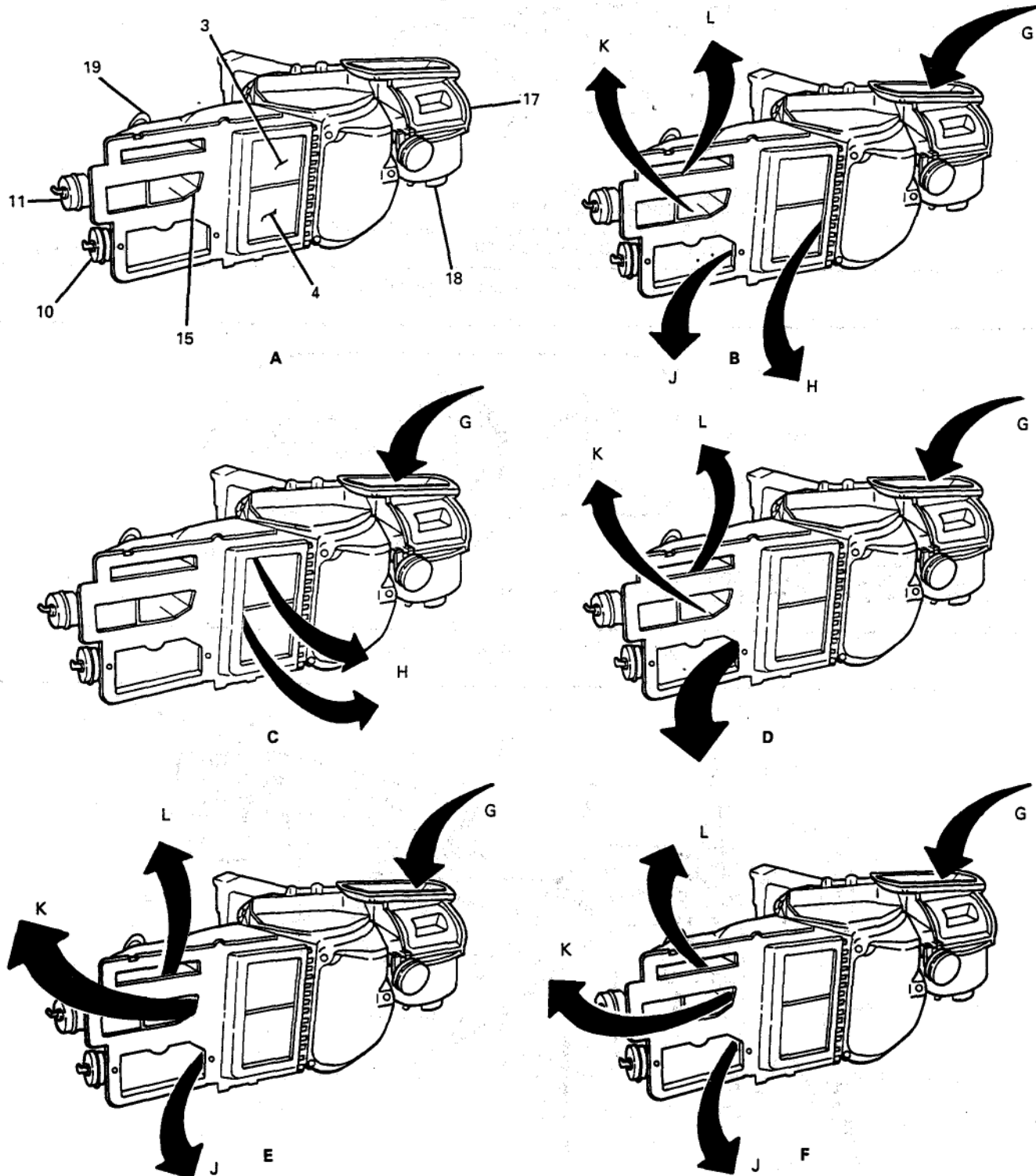
- A OUTSIDE AIR
- B PLENUM
- C HEATED AIR
- D UNHEATED AIR

- E TO INSTRUMENT PANEL OUTLETS
- F TO FLOOR OUTLETS
- G TO WINDSHIELD DEFOGGER OUTLETS
- H TO SIDE WINDOW DEFOGGER OUTLETS

- 1 MODULE ASSEMBLY, HEATER
- 3 VALVE, VENT MODE
- 4 VALVE, BI-LEVEL MODE
- 6 MOTOR ASSEMBLY, BLOWER
- 14 CORE, HEATER
- 15 VALVE, DEFROSTER/HEATER
- 16 VALVE, TEMPERATURE

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Figure 4 - Heater Module Assembly Schematics



A COMPONENT LOCATIONS
 B "BI-LEVEL" MODE AIRFLOW
 C "VENT" MODE AIRFLOW
 D "HEATER" MODE AIRFLOW
 E "DEFROST" MODE AIRFLOW
 F "BLEND" MODE AIRFLOW
 G OUTSIDE AIR
 H TO INSTRUMENT PANEL OUTLETS
 J TO FLOOR AIR OUTLET
 K TO WINDSHIELD DEFROSTER NOZZLES

L TO SIDE WINDOW DEFOGGER OUTLETS
 3 VALVE, VENT MODE
 4 VALVE, BI-LEVEL MODE
 10 ACTUATOR, BI-LEVEL MODE VALVE
 11 ACTUATOR, DEFROSTER/HEATER VALVE
 15 VALVE, DEFROSTER/HEATER
 17 HEATER ASSEMBLY
 18 FAN, BLOWER MOTOR
 19 ACTUATOR, VENT MODE VALVE

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Figure 5 - Operating Mode Airflow Distribution

(Blend) Mode

With the mode control knob in this position, outside air is drawn into the vehicle, heated (depending on the position of the temperature control knob) and split between the defrost outlet and the floor air outlets.

(Defrost) Mode

With the mode control knob in the  position, outside air is drawn into the vehicle, heated (depending on the position of the temperature control knob) and directed to the defrost outlet. A small amount of air is routed to the floor air outlets. Blower motor assembly speed may be varied.

Side Window Defogging

In all modes except "OFF" and  (vent), air is supplied to the side window defrost outlets, located at the end of the instrument panel upper trim pad assembly.

Blower Motor Assembly Speed Control Knob

With the ignition switch in the "RUN" position, the blower motor assembly runs in all mode control knob positions except "OFF." Blower motor assembly speed is controlled by a four-position electrical blower switch at the left side of the control assembly. The blower switch provides a choice of low blower motor assembly speed, two medium blower motor assembly speeds and a high blower motor assembly speed.

The circuit to the blower motor assembly is completed to ground at the instrument panel assembly through the instrument panel wiring harness. Refer to SECTION 8A.

AIR DISTRIBUTION SYSTEM

Air enters the heater module assembly where it is heated as necessary before being sent to the proper outlets for discharge into the passenger compartment. Within the heater module, valves ("doors") guide the airflow in response to the positions of the temperature control knob and the mode control knob in the control assembly.

Vacuum System

Figure 6

All valves in the heater module assembly except the temperature valve are controlled by engine vacuum drawn from the vacuum tank in the engine compartment. The vacuum is routed by a vacuum selector valve in the control assembly to spring-loaded vacuum actuators on the heater module assembly. Vacuum stored in the vacuum tank is prevented from bleeding back to its source during conditions of low engine manifold vacuum (acceleration, hard pulling, etc.) by a check valve in the vacuum line.

The vacuum selector valve in the control assembly is controlled by the mode control knob. For each mode control knob position, the vacuum selector valve directs vacuum to specific hoses to overcome the force of the spring within the appropriate vacuum actuators. The vacuum selector valve also vents (to normal air pressure) the hoses to each remaining vacuum actuator, allowing the actuator's external spring to expand. This results in the valves

being properly positioned for the selected operating mode.

The bi-level and vent valves have two-position vacuum actuators. When vacuum is directed to either actuator's vacuum chamber, the vacuum pulls in a flexible diaphragm that forms one wall of the chamber. This draws a movable shaft attached to the diaphragm. The shaft is linked to the corresponding valve, and it operates the valve when vacuum is applied.

When the vacuum chamber is vented to normal air pressure, an external spring moves the shaft back to its original position. The shaft, in turn, returns the valve to its original position.

The defroster/heater valve has a three-position mode valve actuator with two vacuum hoses and two vacuum chambers, one at each end of the actuator. In effect, the three-position mode valve actuator acts like a pair of two-position actuators placed end-to-end. When vacuum is directed to either chamber, that chamber's diaphragm moves the mode valve operating linkage from its centered position to one extreme of travel. Venting that chamber while directing vacuum to the opposite chamber causes the linkage to move to its opposite extreme. Venting both chambers allows external torsion springs to center the linkage. The center position of the defroster/heater valve creates the blend mode.

Temperature Valve and Heater Core

Figure 4

The temperature of the air discharged from the heater system is regulated by controlling the relative amounts of warm and cool air that are mixed together downstream from the heater core area. The part of the total airflow that is allowed to pass through the heater core (14) is governed by the position of the temperature valve (16).

Hot coolant from the engine's cooling system is directed through the heater core (14). The heater core (14) transfers heat from the coolant to the air passing through the heater core fins.

Mode Valve Housing

After the heated and unheated airflows are mixed, the combined airflow comes to the mode valve housing. In vent mode , the vent mode valve actuator is engaged as well as the bi-level mode valve actuator. This directs all the air to the instrument panel outlets.

In bi-level mode , the vent mode valve remains closed (allowing air to the defroster/heater door), while the bi-level mode valve opens, allowing air to the instrument panel outlets. The defroster/heater door directs air to the floor air outlets. A small amount of air goes to the side window defrost outlets.

In heater mode , both the vent and bi-level doors remain closed and the defroster/heater door moves up, directing most of the air to the floor air outlets.

In blend mode , both chambers of the heater/defrost actuator are vented and the heater/defrost valve moves to a mid-position allowing air up to the defroster and down to the heater outlet. Both the vent and bi-level doors remain closed.

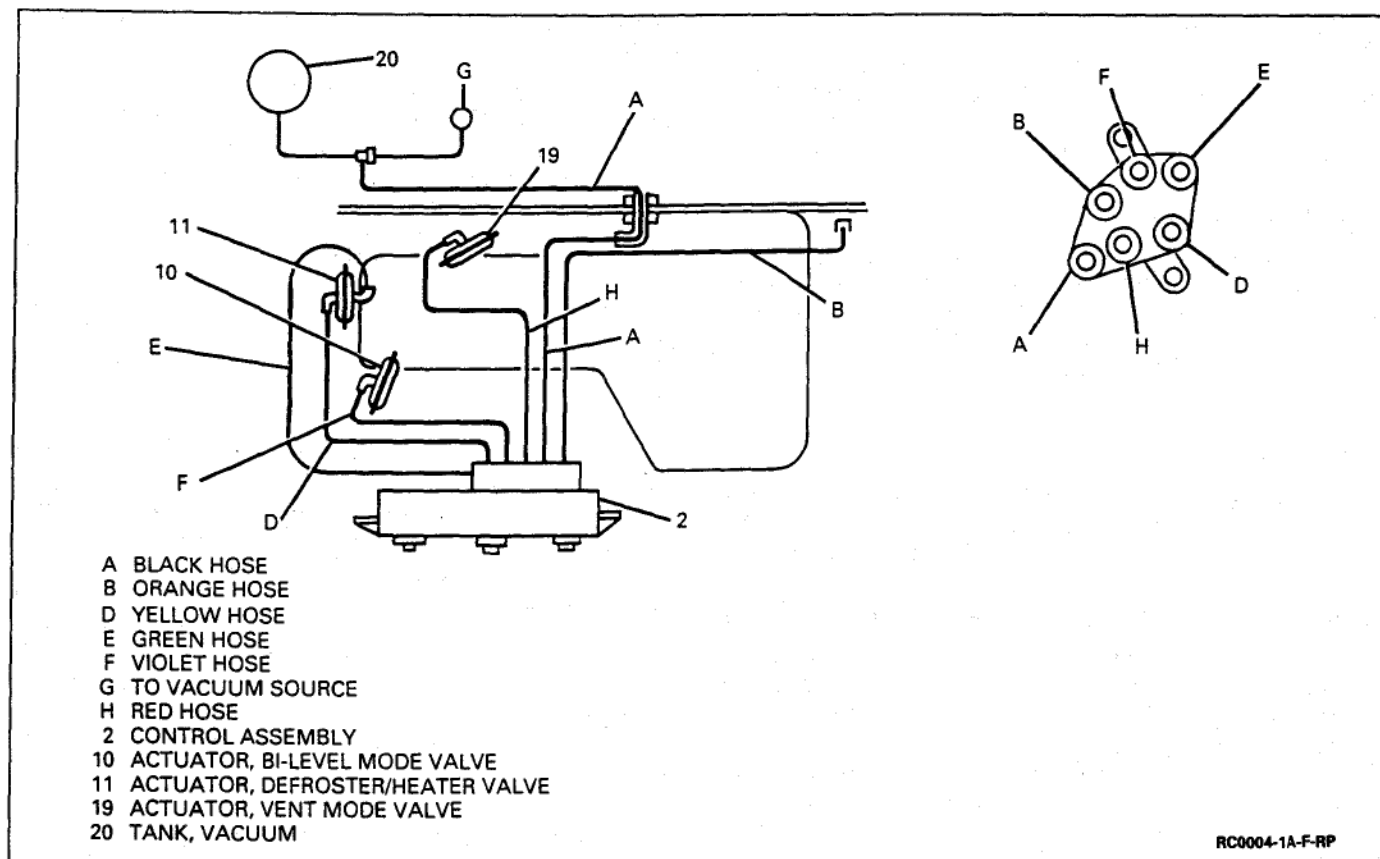


Figure 6 - Vacuum Circuit

In defrost mode “”, the heater/defrost valve moves down and forces the air up to the defroster outlet. A small amount of air still flows to the heater outlet because of a fixed bleed.

Air Outlets

Figures 7 and 8

There are five adjustable high-level air outlets in the instrument panel assembly. Three near the center and one at each extreme end of the panel assembly. In addition, there are two side window defrost outlets, one at each end of the instrument panel upper trim pad assembly (Pontiac) or in the “A” pillar trim (Chevrolet). All seven outlets are fed by the air distributor assembly.

Heated air can be discharged from the floor outlets centered on the transmission tunnel in the front floor pan and from the defrost outlet.

Ventilation

Figure 9

The air distribution system provides fresh air ventilation for the passenger compartment in all operating modes. Even in the “OFF” mode, fresh outside air is forced into the air distribution system by the forward movement of the vehicle.

After being warmed or cooled to the desired temperature, the air is discharged from the outlets appropriate to the selected operating mode. When all windows are closed, the addition of outside air builds a slight positive

pressure within the passenger compartment. The pressure forces stale air to leave the vehicle through a pressure relief valve near the base of the rear compartment after it has circulated through the passenger compartment.

DIAGNOSIS

FUNCTIONAL TEST

The following operational test sequence will aid in determining whether the heater system is working properly. Coolant temperature should be close to 90°C (194°F).

Preparation

- Engine should be started and allowed to idle for about 20 minutes or until thermostat is open.

Test

1. Set mode control knob to “” (bi-level), temperature control knob all the way to the left and blower switch to “HIGH.”
 - Air at nearly the same temperature as outside air should come from all outlets.
2. Set mode control knob to “” (vent).
 - Air at nearly the same temperature as outside air should come from instrument panel outlets.
 - Air should not come from floor outlets, defroster nozzle or side window defogger outlets.

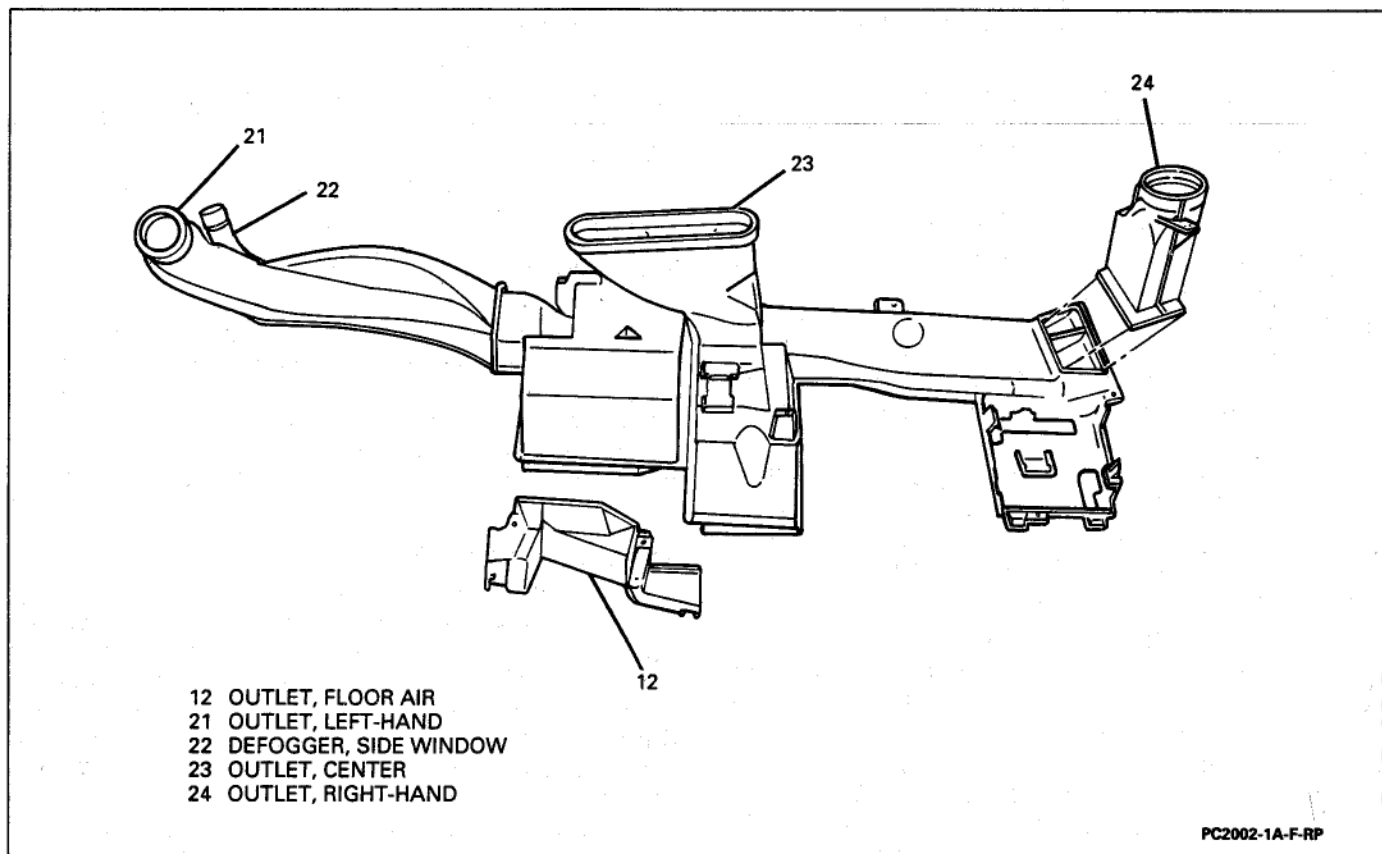


Figure 7 – Air Outlets – (Pontiac)

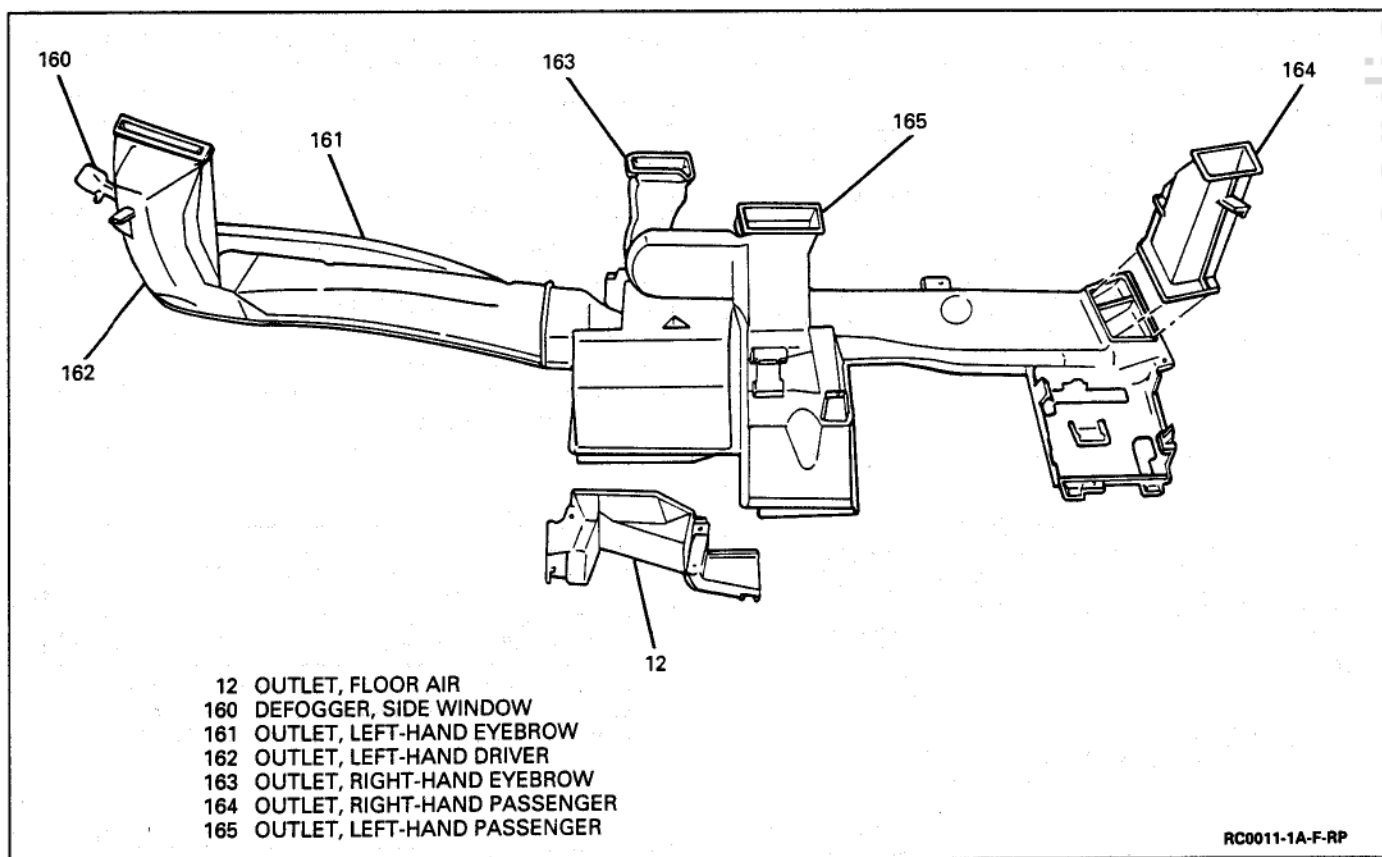


Figure 8 – Air Outlets – (Chevrolet)

3. Move mode control knob to the "☞" (heater) position.
 - Most of the air should come from floor outlets with remainder coming out of defroster nozzles and defogger outlets.
 - Air should not come from instrument panel outlets in "☞" (heater) position.
 - All air from heater system should be at nearly the same temperature as outside air.
4. Move the mode control knob from "☞" (heater) position to the "☞☞" (blend) position. Air should come equally from the defroster nozzle and the heater outlet with some air coming from the side window defogger.
5. Move mode control knob from "☞☞" (blend) position to "☞☞☞" (defrost) position.
 - Most of the air should be discharged onto windshield from defroster nozzles.
 - A small amount of air should also be discharged from floor outlets.
6. Move mode control knob back to "☞☞☞" (bi-level) position and move temperature control knob all the way to the right.
 - Air should come from instrument panel outlets, and its temperature should climb rapidly to approximately 55°C (131°F) or higher, depending upon outside air temperature. For a more precise heater output temperature check, refer to "Heater Output Temperature Check" in the following procedure.
 - Defroster nozzle airflow should diminish and airflow from floor outlets may increase slightly.
7. Move temperature control knob all the way to the left and check to be sure air temperature drops back to nearly the temperature of the outside air once again.
8. Slowly turn blower motor assembly speed control knob toward "OFF," stopping briefly at each intermediate position to notice force of airflow coming from instrument panel center outlets and sound of blower.

- Both airflow and blower noise should reduce noticeably at each intermediate step.

HEATER OUTPUT TEMPERATURE CHECK

Figure 10

The heat output of the heater system can be checked with the following procedure.

Preparation

With the engine sufficiently cool, the radiator cap should be removed and the engine started and allowed to idle (3.4L V6 engine only). Heater controls should be set to "☞" (heater) mode, temperature control knob turned all the way to the right and "HIGH" blower speed. When coolant flow in the radiator is visible through the filler neck, the radiator cap should be installed (3.4L V6 engine only).

Temperature Check

When the engine is warmed up (after approximately 20 minutes of operation), the vehicle should be driven. An accurate thermometer should be used to determine the temperature of the outside air and the temperature of the air discharged at the floor outlets with the vehicle being driven at 48 km/h (30 mph). Minimum acceptable heater output temperatures at four different outside air temperatures are shown in Figure 10.

Minimum acceptable heater output temperatures for outside air temperatures other than those shown in Figure 10 can be approximated by using the Fahrenheit scale and rounding off the outside air temperature to the nearest 5°. For every additional 5° of outside temperature, an additional 1.8° of heater output temperature should be allowed when the outside temperature is below 50°F. An additional 1.6° of heater output temperature should be allowed for every 5° of outside temperature when the outside temperature is above 50°.

INSUFFICIENT HEATING OR DEFROSTING

The most likely causes of insufficient heating outside the heater system include a low coolant level, a faulty thermostat, a partially or fully clogged heater core or heater hose, an obstruction to air circulation (often under the front seat) or an air leak past a faulty seal into the passenger compartment. For an organized diagnosis procedure, refer to Figures 11 and 12.

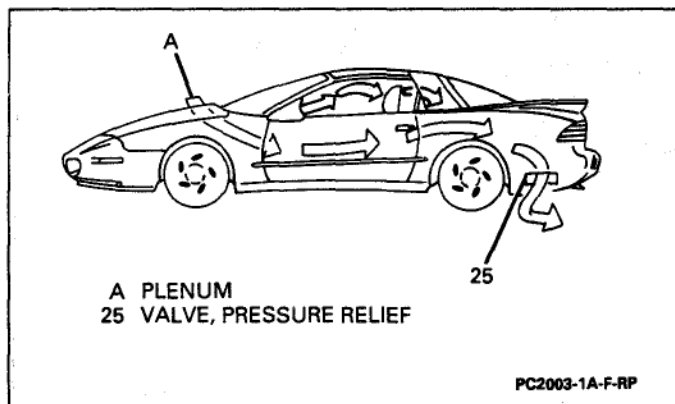


Figure 9 – Flow-Through Ventilation (Typical)

OUTSIDE AIR TEMPERATURE	-18°C (0°F)	-4°C (25°F)	10°C (50°F)	24°C (75°F)
HEATER AIR TEMPERATURE*	43°C (110°F)	50°C (125°F)	60°C (140°F)	66°C (150°F)

* Temperature at floor air outlet assembly controls at "HI" blower, "HEATER" mode and full warm, engine at operating temperature and vehicle speed of 48 km/h (30 mph).

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Figure 10 – Heater Output Temperature Chart

HIGH OR LOW HEATER CONTROL EFFORT

A kinked control cable, a binding valve or a faulty control assembly are possible causes of excessive temperature control knob effort. For an organized diagnosis procedure, refer to Figure 13.

BLOWER MOTOR ASSEMBLY NOISE

A constant air rush noise is typical of all heater systems when operating on "HIGH" blower speed. Some systems and modes may be worse than others. If possible, check a similar vehicle to determine whether the noise is typical or excessive. For diagnosis of excessive blower motor assembly noise, refer to Figures 14 and 15.

EXCESSIVE HEAT

The most likely cause of excessive heat from the heater system is a disconnected or nonfunctional temperature control cable assembly. Refer to "Temperature Control Cable Assembly" in this section. A hot air leak from the engine compartment to the blower inlet is also a remote possibility.

ON-VEHICLE SERVICE

REPLACEMENT PROCEDURES

Control Assembly and Vacuum Selector Valve and/or Blower Motor Assembly Switch

Figures 2, 3, 16 and 17

Remove or Disconnect

1. Control assembly trim plate (Pontiac only).
 - Pull control assembly trim plate rearward and off instrument panel lower trim pad.
2. Upper instrument panel cover panel (Chevrolet only).
3. Cluster trim plate (Chevrolet only). Refer to SECTION 8C.
4. Heater and air conditioning control bolts/screws (26).
5. Control assembly (2 or 162).
 - Pull control assembly (2 or 162) out far enough to reach the vacuum, electrical and temperature control cable connections.
6. Blower motor assembly switch connector.
7. Vacuum harness connector from vacuum selector valve.
8. Temperature control cable assembly from control assembly (2 or 162).
 - A. Release temperature control cable clips from control assembly.
 - B. Pry temperature control cable with small screwdriver from control assembly (2 or 162).
9. Vacuum selector valve, if necessary.

- Remove two retaining screws and remove vacuum selector valve.

10. Blower motor assembly switch, if necessary.
 - A. Remove blower motor assembly speed control knob (9 or 159) and retaining bolt/screw.
 - B. Remove blower motor assembly switch.

Inspect

- Electrical terminals for corrosion. Remove corrosion or replace component as necessary
- Temperature and mode knobs for freedom of movement. Lubricate, repair or replace as necessary.
- Temperature control cable assembly for kinks, binding and other damage. Adjust, repair or replace as necessary.

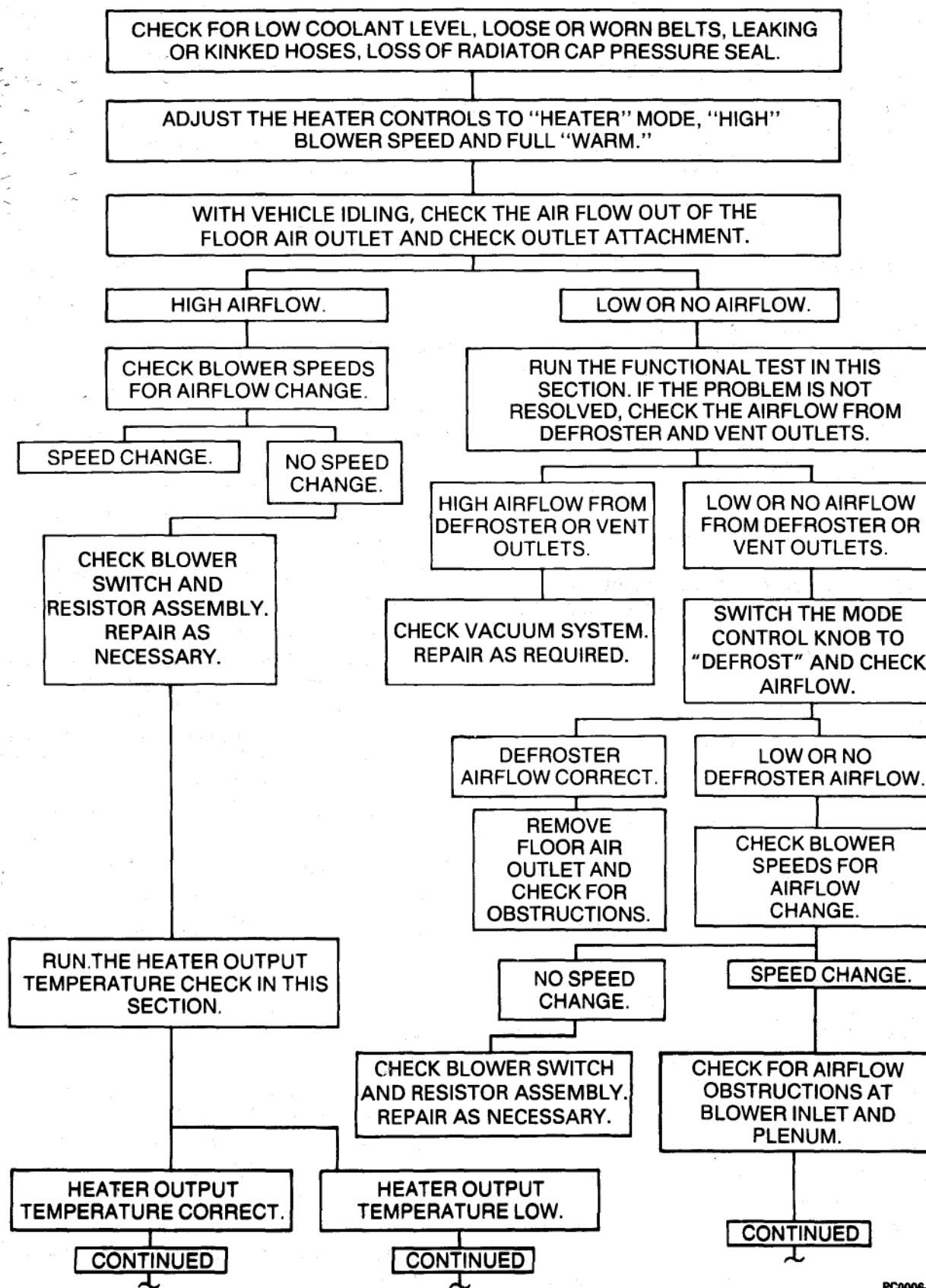
Install or Connect

NOTICE: See "Notice" on page 1A-1 of this section.

1. Blower motor assembly switch, if removed.
 - A. Hold blower motor assembly switch in position and install bolt/screw.
 - B. Install blower motor assembly speed control knob (9 or 159).
2. Vacuum selector valve and retaining screws, if removed.
3. Temperature control cable assembly.
 - A. Slip temperature control cable assembly into position on lever arm. Align shaft with temperature control cable slot.
 - B. Press temperature control cable clip into slot in control assembly (2 or 162). Make sure all three clips are in place.
4. Vacuum harness connector to vacuum selector valve.
5. Blower motor assembly switch connector.
6. Control assembly (2 or 162).
7. Heater and air conditioning control bolts/screws (26).
 - Install lower right bolt/screw (26) first to align control assembly (2 or 162) properly.

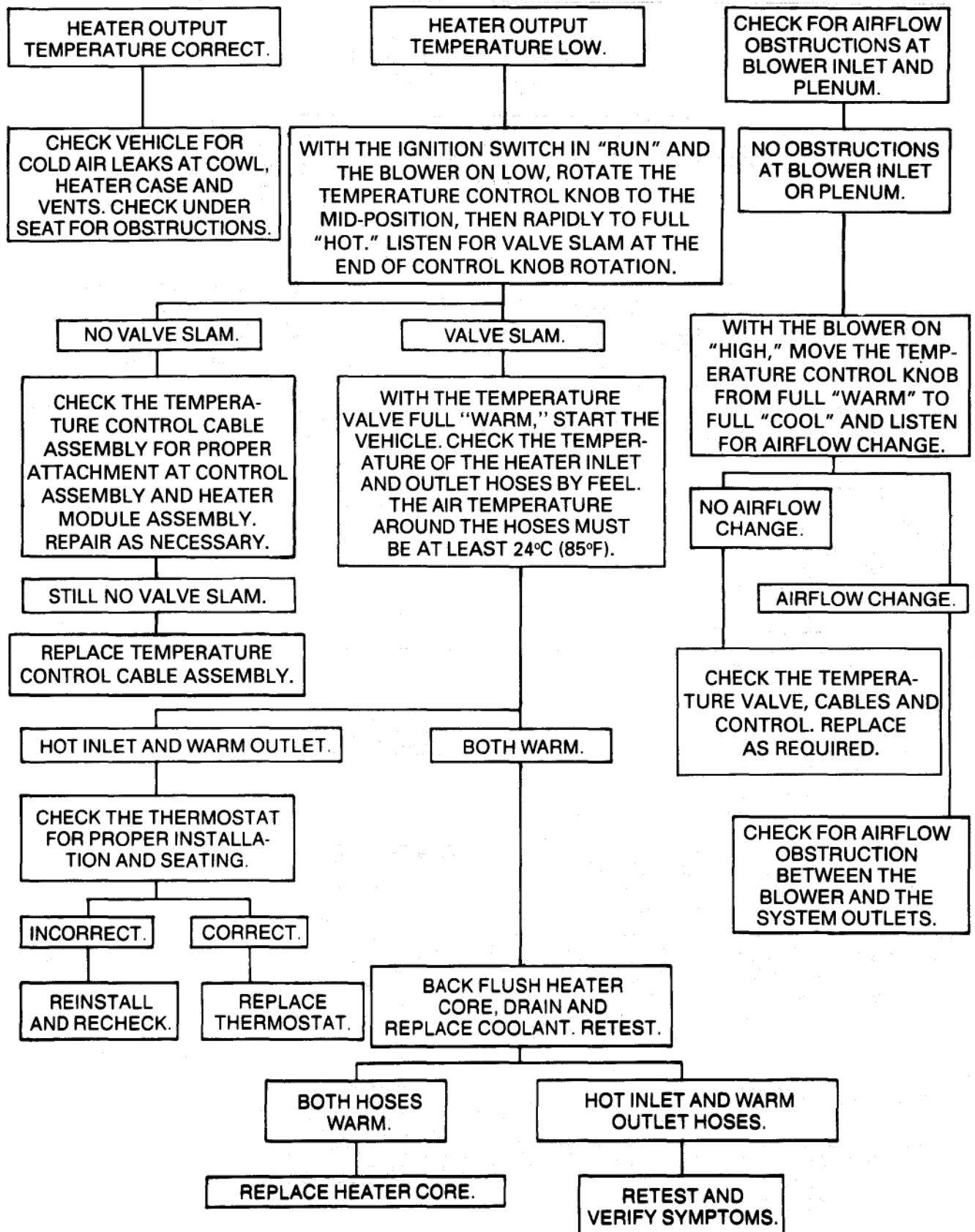
Tighten

- Heater and air conditioning control bolts/screws (26) to 1.9 N•m (17 lb. in.).
8. Control assembly trim plate (Pontiac only).
 - Hold control assembly trim plate in position and press it forward to engage four retaining clips.
 9. Cluster trim plate (Chevrolet only). Refer to SECTION 8C.
 10. Upper instrument panel cover panel (Chevrolet only).

INSUFFICIENT HEATING OR DEFROSTING

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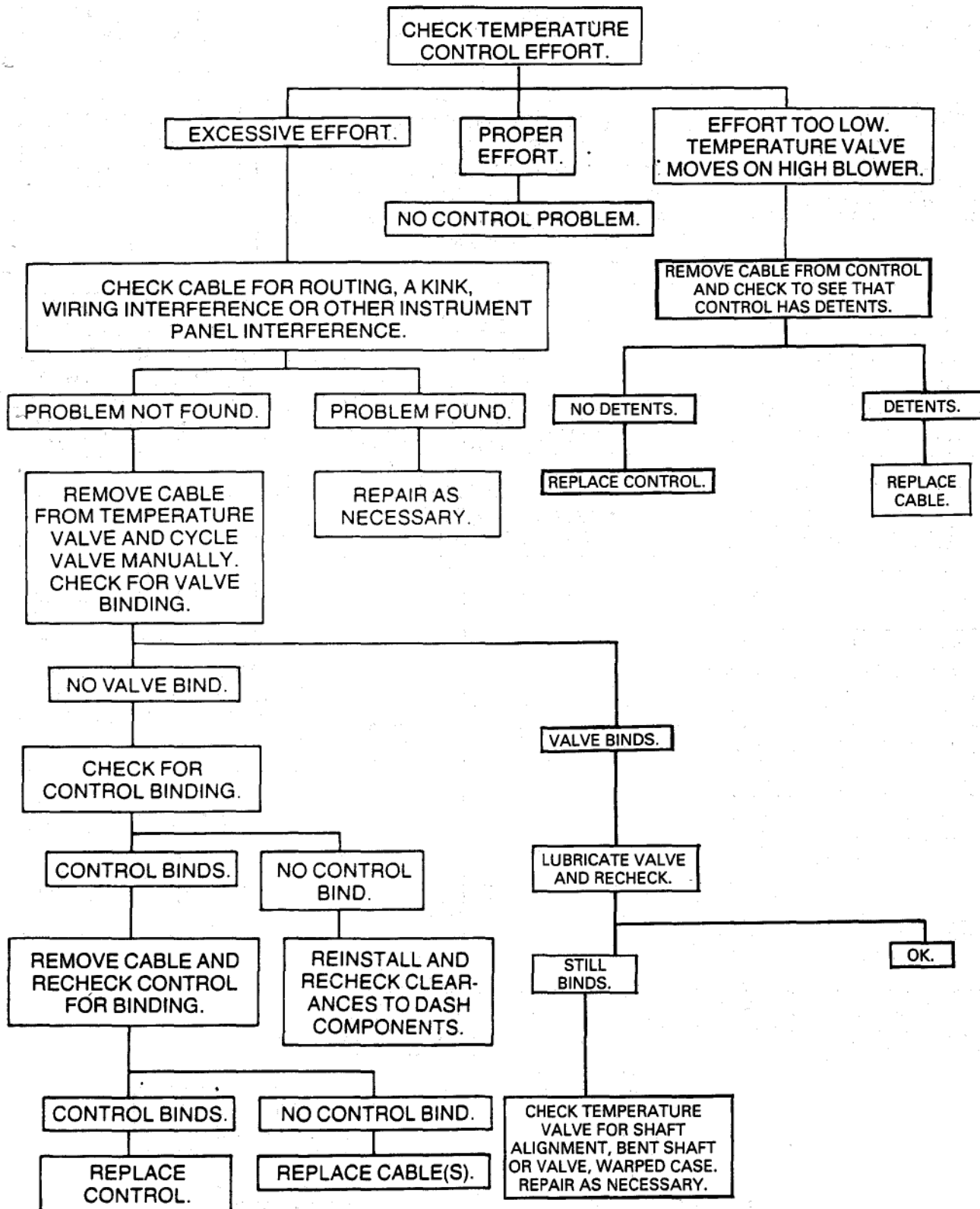
Figure 11 – Insufficient Heating or Defrosting Diagnostic Procedure (1 of 2)

INSUFFICIENT HEATING OR DEFROSTING (Continued)

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Figure 12 – Insufficient Heating or Defrosting Diagnostic Procedure (2 of 2)

TEMPERATURE CONTROL EFFORT



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Figure 13 – Temperature Control Effort Diagnostic Procedure

BLOWER MOTOR ASSEMBLY NOISE

CHECK ALL ELECTRICAL CONNECTIONS AND GROUNDS FOR PROPER CONNECTIONS. IF IN DOUBT, USE VOLTMETER TO CHECK FOR CONSTANT VOLTAGE AT BLOWER MOTOR ASSEMBLY.

SIT IN VEHICLE WITH DOORS AND WINDOWS CLOSED, WITH IGNITION SWITCH ASSEMBLY IN "RUN" AND ENGINE "OFF." RUN BLOWER MOTOR ASSEMBLY ON HIGH SPEED WITH TEMPERATURE SET FOR MAXIMUM COOLING. CYCLE THROUGH BLOWER MOTOR ASSEMBLY SPEEDS, MODES AND TEMPERATURE SETTINGS TO FIND WHERE NOISE OCCURS AND WHERE NOISE DOES NOT OCCUR. TRY TO DEFINE TYPE OF NOISE: AIR RUSH, WHINE, TICK/CLICK, SQUEAL/SCREECH, FLUTTER, RUMBLE OR SCRAPE. CHECK ANOTHER VEHICLE IF POSSIBLE (SAME MODEL) TO DETERMINE IF NOISE IS TYPICAL.

NOISE IS CONSTANT BUT LESSENS WITH BLOWER MOTOR ASSEMBLY SPEED REDUCTION. TYPICAL NOISES ARE WHINE, TICK/CLICK, FLUTTER OR SCRAPE.

NOISE IS ONLY AT START-UP OR IS INTERMITTENT. MAY OCCUR AT COLD AMBIENTS AND LOW BLOWER MOTOR ASSEMBLY SPEEDS. TYPICAL NOISE IS AN OBJECTIONABLE SQUEAL/SCREECH.

NOISE IS CONSTANT AT HIGH BLOWER MOTOR ASSEMBLY SPEEDS IN CERTAIN MODES BUT CAN BE ELIMINATED AT LOWER BLOWER MOTOR ASSEMBLY SPEEDS OR IN OTHER MODES. TYPICAL NOISES ARE FLUTTER OR RUMBLE. REFER TO FIGURE 6.

CHECK FOR MOTOR ASSEMBLY AND BLOWER IMPELLER VIBRATION AT EACH BLOWER MOTOR ASSEMBLY SPEED BY FEELING THE BLOWER MOTOR COVER.

NO EXCESS VIBRATION.

VIBRATION EXCESSIVE.

REMOVE BLOWER MOTOR ASSEMBLY AND BLOWER IMPELLER AND CHECK FOR FOREIGN MATERIAL AT THE ORIFICE OF THE BLOWER INLET.

PROBLEM FOUND.

PROBLEM STILL EXISTS.

REPAIR OR REPLACE AS NECESSARY AND RECHECK.

EXAMINE BLOWER IMPELLER FOR WEAR SPOTS, CRACKED BLADES OR HUB, AND ALIGNMENT. EXAMINE BLOWER CASE FOR WEAR SPOTS.

PROBLEM STILL EXISTS.

PROBLEM FOUND.

CONTINUED

REPLACE BLOWER IMPELLER AND RECHECK.

Figure 14 – Blower Motor Assembly Noise Diagnostic Procedure (1 of 2)

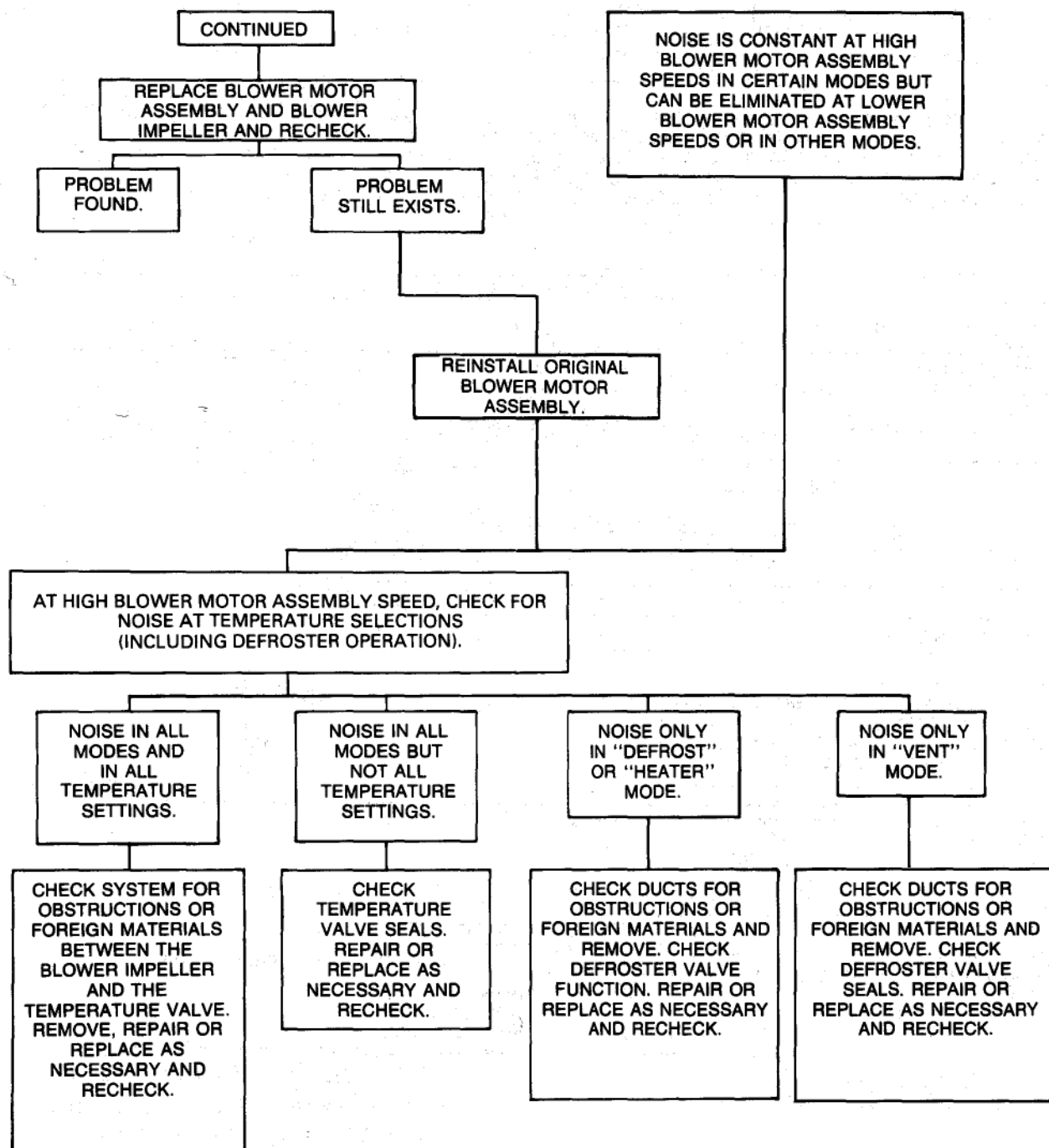
BLOWER MOTOR ASSEMBLY NOISE (Continued)

Figure 15 – Blower Motor Assembly Noise Diagnostic Procedure (2 of 2)

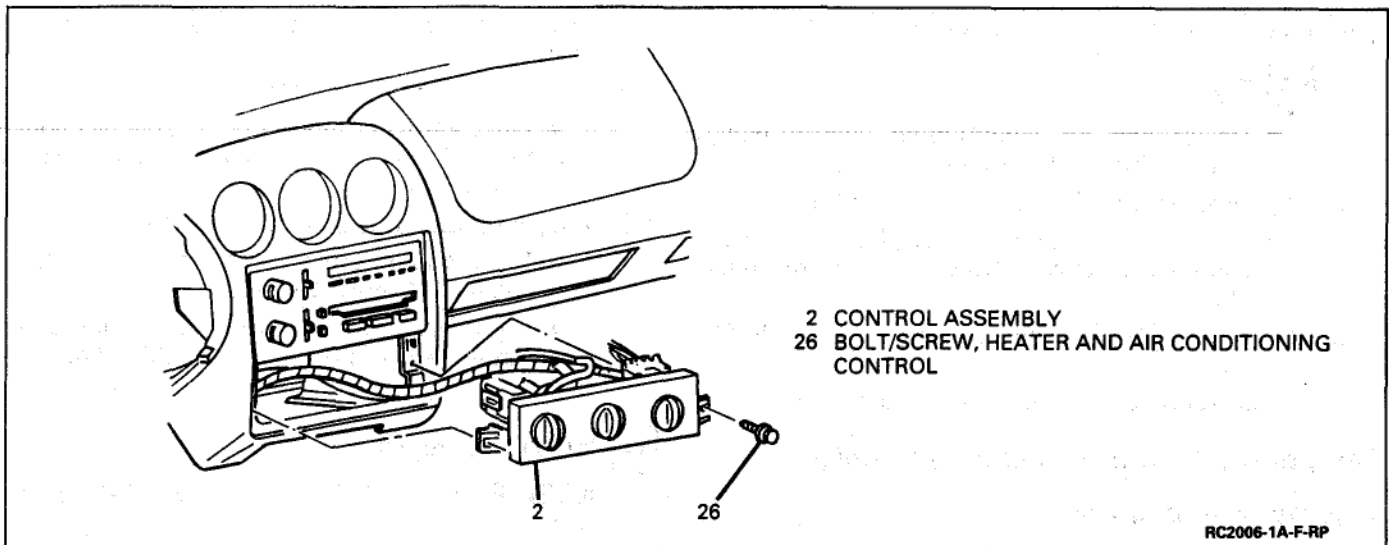


Figure 16 – Control Assembly Removed – (Pontiac)

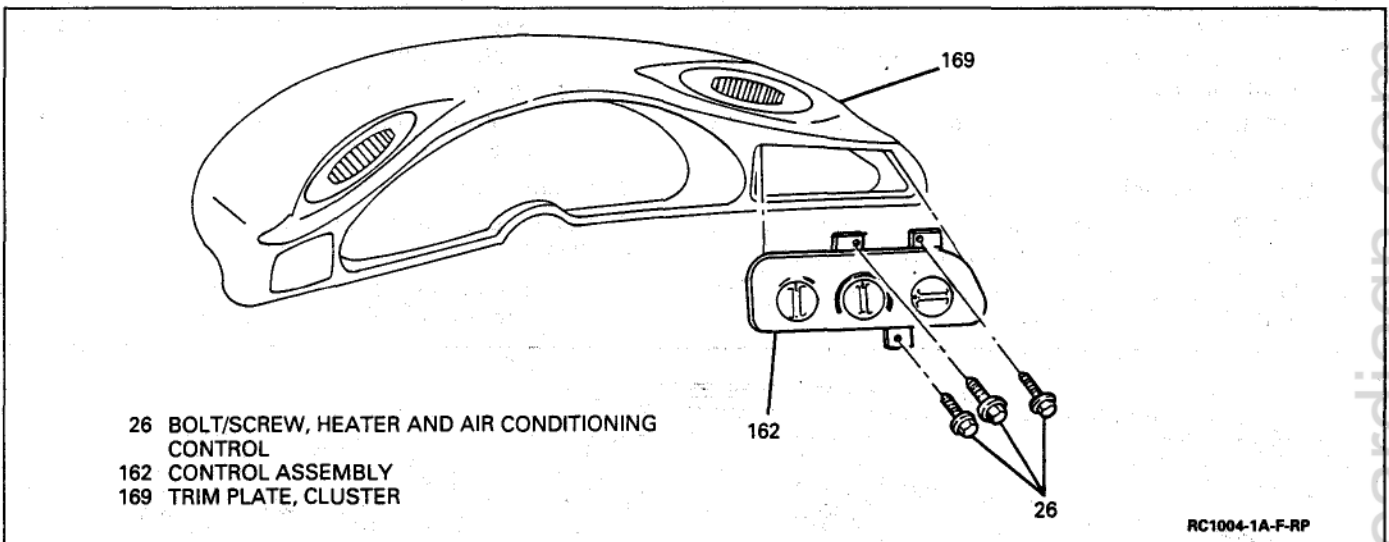


Figure 17 – Control Assembly Removed – (Chevrolet)

11. Test operation of temperature control knob, mode control knob and blower motor assembly switch.

Control Assembly Lamp Bulb

Figures 16 and 17

Remove or Disconnect

1. Control assembly trim plate (Pontiac only).
 - Pull control assembly trim plate forward and off instrument panel lower trim pad.
2. Cluster trim plate (Chevrolet only). Refer to SECTION 8C.
3. Heater and air conditioning control bolts/screws (26).
4. Control assembly (2 or 162).
 - Pull control assembly (2 or 162) out far enough to reach control assembly lamp bulb socket.

5. Bulb and socket by twisting socket.

6. Bulb from socket.

- Pull bulb straight out from socket.

Inspect

- Control assembly lamp bulb socket for corrosion and damage. Clean or replace as necessary.
- Wires for damage and secure connection to bulb socket. Repair or replace as necessary.

Install or Connect

NOTICE: See "Notice" on page 1A-1 of this section.

1. New bulb.
 - Push bulb straight into socket.
2. Bulb and socket by twisting socket into place.
3. Control assembly (2 or 162).

4. Heater and air conditioning bolts/screws (26).



Tighten

- Heater and air conditioning control bolts/screws (26) to 1.9 N•m (17 lb. in.).
5. Control assembly trim plate (Pontiac only).
 - Hold control assembly trim plate in position and press it rearward to engage four retaining clips.
 6. Cluster trim plate (Chevrolet only). Refer to SECTION 8C.
 7. Test operation of control assembly lamp bulb.

Temperature Control Cable Assembly

Figures 16 through 18



Remove or Disconnect

1. Right instrument panel sound insulator assembly. Refer to SECTION 8C.
2. Temperature control cable assembly (5) at heater module assembly (1).
 - Remove temperature control cable bolt/screw (29).
3. Control assembly trim plate (Pontiac only).
 - Pull control cable assembly trim plate rearward and off instrument panel lower trim pad.
4. Cluster trim plate (Chevrolet only). Refer to SECTION 8C.



Install or Connect

NOTICE: See "Notice" on page 1A-1 of this section.

1. Temperature control cable assembly (5) to control assembly (2 or 162).
 - A. Slip temperature control cable into position over lever arm. Align shaft with temperature control cable slot.
 - B. Press temperature control cable clip into slot in control assembly (2 or 162). Make sure all three clips are in place.
2. Control assembly (2 or 162).
3. Heater and air conditioning control bolts/screws (26).
 - Install lower right bolt/screw (26) first to align control assembly (2 or 162) properly.

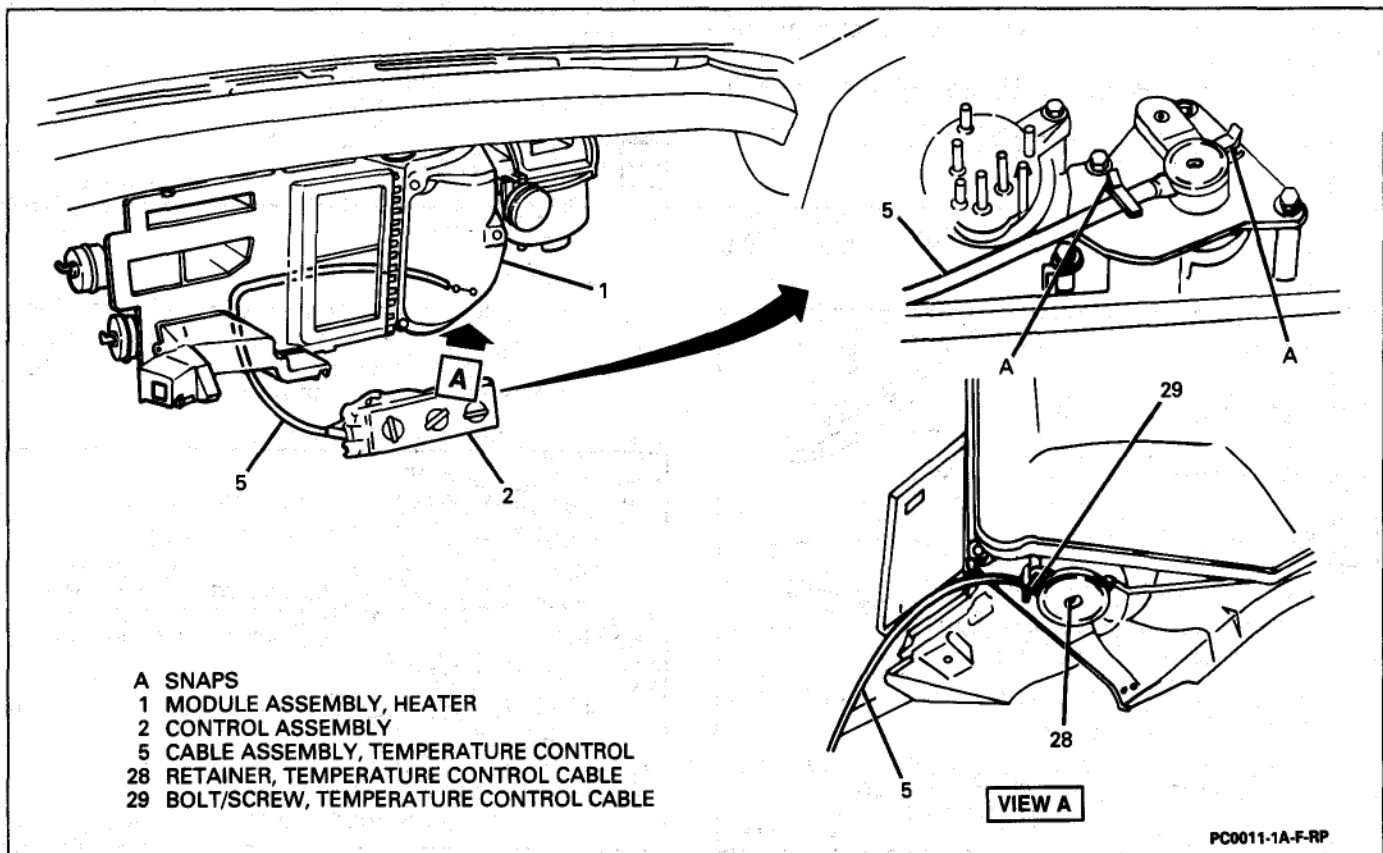


Figure 18 – Temperature Control Cable Assembly

Tighten

- Heater and air conditioning control bolts/screws (26) to 1.9 N•m (17 lb. in.).
4. Control assembly trim plate (Pontiac only).
 - Hold control assembly trim plate in position and press it forward to engage four retaining clips.
 5. Cluster trim plate (Chevrolet only). Refer to SECTION 8C.
 6. Temperature control cable assembly (5) at heater module assembly (1) with temperature control cable bolt/screw (29).

Tighten

- Temperature control cable bolt/screw (29) to 1.9 N•m (17 lb. in.).
7. Right instrument panel sound insulator assembly. Refer to SECTION 8C.

Blower Motor Resistor Assembly

Figure 19

Remove or Disconnect

1. Key from ignition to assure that switch will remain "OFF."
2. Right instrument panel sound insulator assembly. Refer to SECTION 8C.
3. Pull carpet assembly away from heater module assembly.
4. Blower motor resistor bolt/screw (31).
5. Blower motor resistor assembly (30).

Install or Connect

NOTICE: See "Notice" on page 1A-1 of this section.

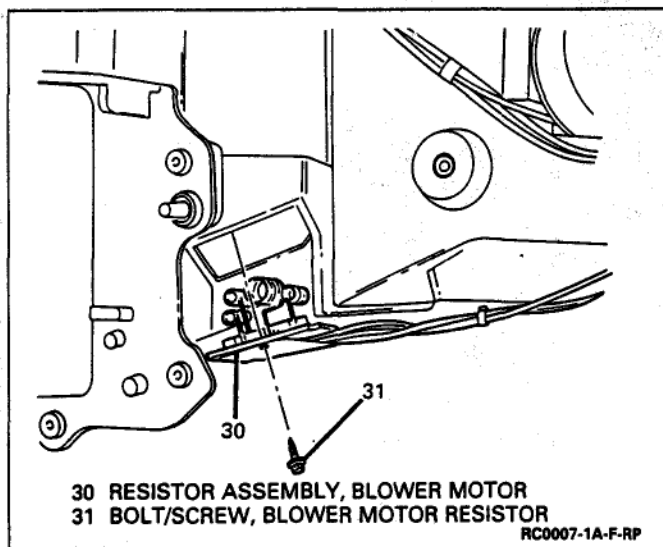


Figure 19 – Blower Motor Resistor Assembly Removed

1. Blower motor resistor assembly (30) and blower motor resistor bolt/screw (31).

Tighten

- Blower motor resistor bolt/screw (31) to 2 N•m (18 lb. in.).
2. Carpet assembly.
 3. Right instrument panel sound insulator assembly. Refer to SECTION 8C.
 4. Test blower motor operation at all four speeds.

Blower Motor Assembly and Blower Motor Fan

Figure 20

Remove or Disconnect

1. Key from ignition switch to assure that switch will remain "OFF."
2. Right instrument panel sound insulator assembly and side trim panel. Refer to SECTION 8C.
3. Blower motor bolts/screws (32).
 - Blower motor assembly (6) and blower motor fan (18) will drop down.

Inspect

- Blower motor terminals for corrosion. Clean corrosion from terminals or replace blower motor assembly (6) as necessary.
- Flange of blower motor assembly (6) for damage or distortion that could cause an air leak. Repair as necessary.
- Blower motor fan (18) for damage and distortion. Repair or replace as necessary.

Install or Connect

NOTICE: See "Notice" on page 1A-1 of this section.

1. Blower motor assembly (6).
 - Guide blower motor assembly (6) and blower motor fan (18) into position, being careful not to catch blower motor fan (18) on protruding parts.
2. Blower motor bolts/screws (32).

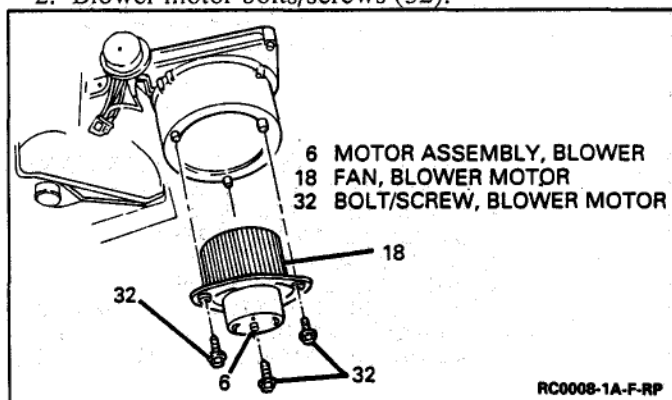


Figure 20 – Blower Motor Assembly and Blower Motor Fan Removed

**Tighten**

- Blower motor bolts/screws (32) to 2.3 N•m (20 lb. in.).
3. Right instrument panel sound insulator assembly and side trim panel. Refer to SECTION 8C.
 4. Check blower operation.

Vacuum Harness**Figure 21**

It is not necessary to replace an entire vacuum harness in case of a localized leakage or hose collapse. A repair can be made by cutting the hose and inserting a plastic retainer.

If an entire hose must be replaced in the harness that connects to the round vacuum selector valve on the control assembly, cut off all hoses at the connector and then attach all the hoses (including the replacement hose) directly to the vacuum selector valve.

**Remove or Disconnect**

1. Open instrument panel compartment and push in on both sides of compartment. This will cause compartment to "drop" open completely for access to vacuum harness.
2. Vacuum hose connectors at vacuum actuators.
 - Trace each vacuum hose to its actuator on heater module assembly (1), noting its routing for reference during installation.

**Inspect**

- Vacuum hoses for leaks by attempting to blow through hose while covering opposite end with a fingertip. Replace any hose that leaks.
- Vacuum switches and connecting hose at control assembly for leaks and proper function. Replace faulty components.

**Install or Connect**

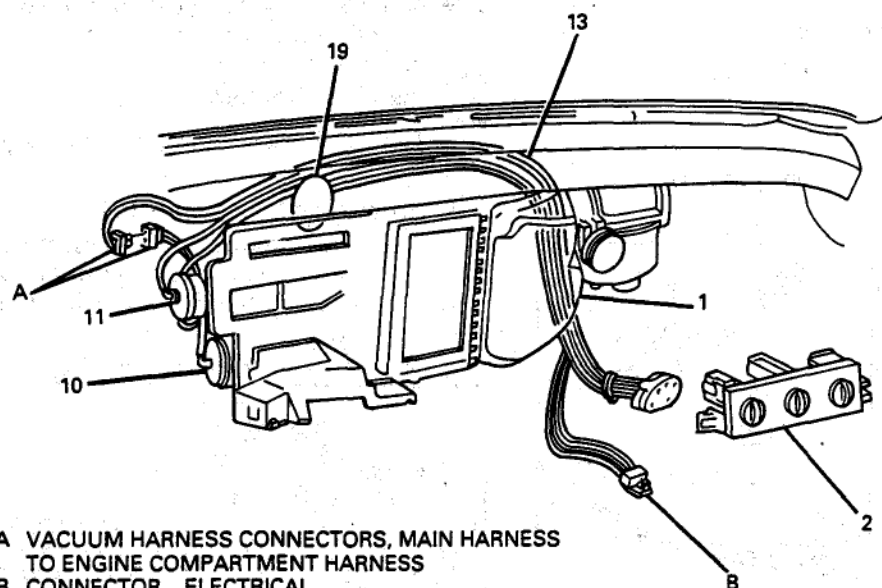
1. Vacuum harness.
2. Vacuum hose connectors to vacuum actuators.
 - Be sure connectors are snapped securely in place.
3. Push in on sides of instrument panel compartment and return it to its normal position.

Vacuum Tank

The vacuum tank that supplies the heater vacuum system is an oblong-shaped tank mounted on the front outer engine rail.

**Remove or Disconnect**

1. Raise and suitably support vehicle. Refer to SECTION 0A.
2. Right lower side air baffle.
3. Vacuum line from lower connection.



- A VACUUM HARNESS CONNECTORS, MAIN HARNESS TO ENGINE COMPARTMENT HARNESS
 B CONNECTOR, ELECTRICAL
 1 MODULE ASSEMBLY, HEATER
 2 CONTROL ASSEMBLY
 10 ACTUATOR, BI-LEVEL MODE
 11 ACTUATOR, DEFROSTER/HEATER VALVE
 13 HARNESS, VACUUM
 19 ACTUATOR, VENT MODE VALVE

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Figure 21 – Vacuum Harness

- Two vacuum tank mounting bolts/screws from top of vacuum tank.
- Vacuum tank.

Install or Connect

NOTICE: See "Notice" on page 1A-1 of this section.

- Vacuum tank and vacuum tank mounting bolts/screws.

Tighten

- Vacuum tank mounting bolts/screws to 2.5 N•m (22 lb. in.).
- Vacuum line to lower connection.
 - Right lower side air baffle.
 - Lower vehicle.

Vacuum Actuators

Figure 21

Defroster/Heater Valve

Remove or Disconnect

- Instrument panel. Refer to SECTION 8C.
- Defroster/heater valve actuator (11) from linkage.

Install or Connect

- Defroster/heater valve actuator (11) to linkage.
- Instrument panel. Refer to SECTION 8C.

Bi-Level Mode Valve

Remove or Disconnect

- Front floor console assembly. Refer to SECTION 8C.
- Floor air outlet.
- Bi-level mode valve linkage bolt/screw from linkage.
- Bi-level mode valve actuator (10).
 - Unsnap bi-level mode valve actuator (10).

Install or Connect

NOTICE: See "Notice" on page 1A-1 of this section.

- Bi-level mode valve actuator (10).
 - Snap bi-level mode valve actuator (10) into place.
- Bi-level mode valve linkage bolt/screw to linkage.

Tighten

- Bi-level mode valve linkage bolt/screw to 2.3 N•m (20 lb. in.).
- Floor air outlet.

- Front floor console assembly. Refer to SECTION 8C.

Vent Mode Valve

Remove or Disconnect

- Instrument panel. Refer to SECTION 8C.
- Vent mode valve linkage bolt/screw.
- Vent mode valve actuator (19).
 - Disconnect linkage from vent mode valve actuator (19).

Install or Connect

NOTICE: See "Notice" on page 1A-1 of this section.

- Vent mode valve actuator (19).
 - Connect linkage to vent mode valve actuator (19).
- Vent mode valve linkage bolt/screw.

Tighten

- Vent mode valve linkage bolt/screw to 2.3 N•m (20 lb. in.).
- Instrument panel. Refer to SECTION 8C.

Air Deflectors

The right (passenger's side) and three center air deflectors of the heater system can be removed by closing the deflector and then pulling it out. The left (driver's side) deflector can be removed by inserting a screwdriver or similar object into the locking tabs. Gently pry up to remove the deflector. The deflectors can be installed by pressing them into place.

Heater Hose Assembly and Heater Hose Pipes

Figures 22 and 23

The heater hose inlet pipe (37) and heater hose outlet pipe (36) extend forward from the dash front panel next to the heater module assembly. The heater hose inlet pipe (37) is toward the left side of the vehicle from the heater hose outlet pipe (36).

On the 3.4L L32 engine, the heated coolant supply for the heater comes from a fitting at the front of the lower inlet manifold, just below the throttle body air inlet. A pipe from the fitting extends across the front of the engine and connects to a heater inlet hose assembly (33) that leads to a pipe mounted on the right side rail in the engine compartment. The rear end of the pipe is connected to a short inlet hose that leads to the heater hose inlet pipe (37). The fitting on the pipe across the front of the engine has two hose nipples that connect to short inlet and outlet hoses which heat the fuel injection system throttle body air inlet.

On the 5.7L LT1 engine, the heated coolant supply for the heater comes from a fitting at the water pump assembly.

On both engines, the heater hose outlet pipe (36) discharges coolant to a short heater outlet hose that is con-

nected to a pipe mounted on the right side rail in the engine compartment. The forward end of the pipe is connected to an outlet hose that crosses in front of the engine and feeds the coolant into the water pump assembly.

The hoses are attached at each end with a spring tension clamp (34 and 35 or 151 and 152).

Remove or Disconnect

1. Engine coolant.
 - Drain enough coolant into a clean container for reuse.

NOTICE: The heater core can be damaged if excessive force is applied on the core pipes during hose removal.

2. Heater hose assembly (33).
 - A. Squeeze clamps with pliers and slide clamps (34 and 35 or 151 and 152) away from fittings.
 - B. Remove heater hose assembly (33) by twisting and pulling. If hose will not come off heater hose inlet pipe (37) or outlet pipe (36) easily with this method, cut off hose forward of heater hose pipes. Then cut hose remaining on pipes lengthwise to remove it.
 - C. Remove and discard hose clamps (34 and 35 or 151 and 152) if hose assembly (33) is to be reused.

Install or Connect

1. Heater hose assembly (33). If old hoses are being reused, replace original hose clamps with worm-gear clamps.
 - A. Cut replacement hose(s) to same length as original hose(s), if necessary.
 - B. If replacing rubber hoses, remove aluminum crimp and replace it with worm-gear clamps.
 - C. Apply rubber lubricant to inside diameter of hose(s), if desired.
 - D. Squeeze clamp ends and slip new hose clamp (34, 35, 151 or 152) over one end of heater hose. Push hose onto fitting with twisting motion. Hose end should be 1.0 mm (0.04 inch) away from touching nearest surface (dash front panel, fitting hex head, etc.).
 - E. Install clamp (34, 35, 151 or 152) beyond any bead around fitting, but not closer than 3.0 mm (0.12 inch) to nearest surface (dash front panel, fitting hex head, etc.).
 - F. Repeat hose and clamp installation procedure at other end of hose.
2. Engine coolant.
 - Use coolant drained earlier only if it is uncontaminated. Discard contaminated coolant and add fresh 50/50 coolant and water mixture.

Inspect

- Be sure installed hose does not sag or rub against other components. Adjust or support hose as necessary to correct hose position.

- Operate engine and check hose installation for leaks.
- Check coolant level after engine has been warmed up. Add coolant as necessary.

Heater Core

Figure 24

Remove or Disconnect

1. Open instrument panel compartment. Push in on sides of compartment to release it to reach heater core.

NOTICE: Heater core can be damaged if too much force is applied to heater core pipes during hose removal.

2. Heater module bolts/screws (41).
3. Heater module assembly cover.
 - For vehicles equipped with A/C, remove air conditioning evaporator temperature sensor assembly from heater and air conditioning cover.
4. Heater core bolt/screw (42) and heater core clamp (43).
5. Hose pipe clamp bolt/screw (45) and hose pipe clamp (44).
 - Clamp off heater hoses.
6. Heater hose assembly from heater hose pipes.
7. Heater core (14).
 - Carefully pull heater core toward you.

Install or Connect

NOTICE: See "Notice" on page 1A-1 of this section.

1. Heater core (14).
2. Heater hose assembly to heater hose pipes.

Important

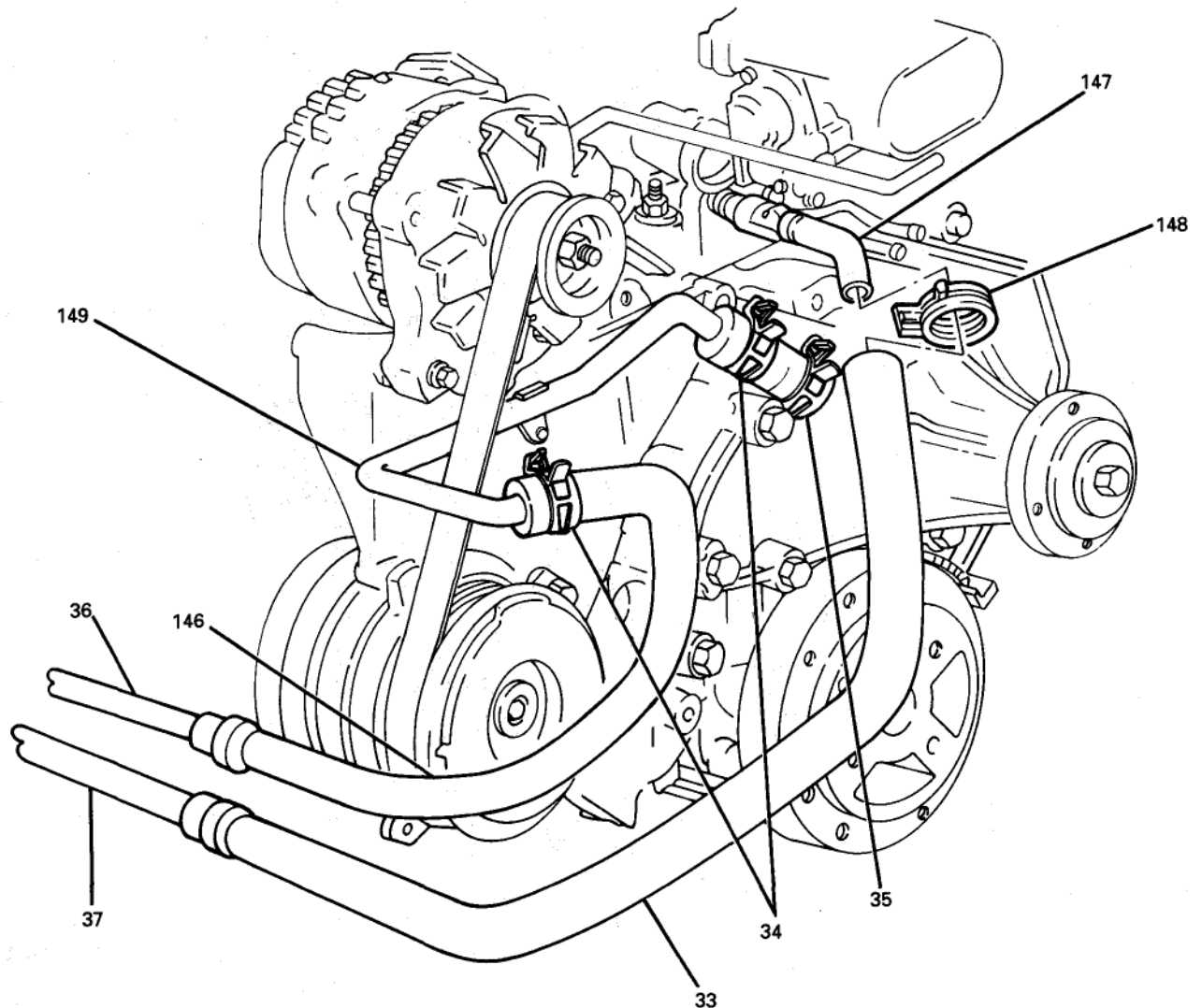
- Lubricate heater pipes for good seal.
 - Be sure seals around heater pipes remain in place when installing.
 - To verify that seal is installed correctly, observe seal from inside engine compartment. If seal leaks, apply sealer GM P/N 3012078 between heater core pipes and evaporator housing.
3. Hose pipe clamp bolt/screw (45) and hose pipe clamp (44).
 - Unclamp heater hoses.

Tighten

- Hose pipe clamp bolt/screw (45) to 1.8 N•m (16 lb. in.).
4. Heater core bolt/screw (42) and heater core clamp (43).

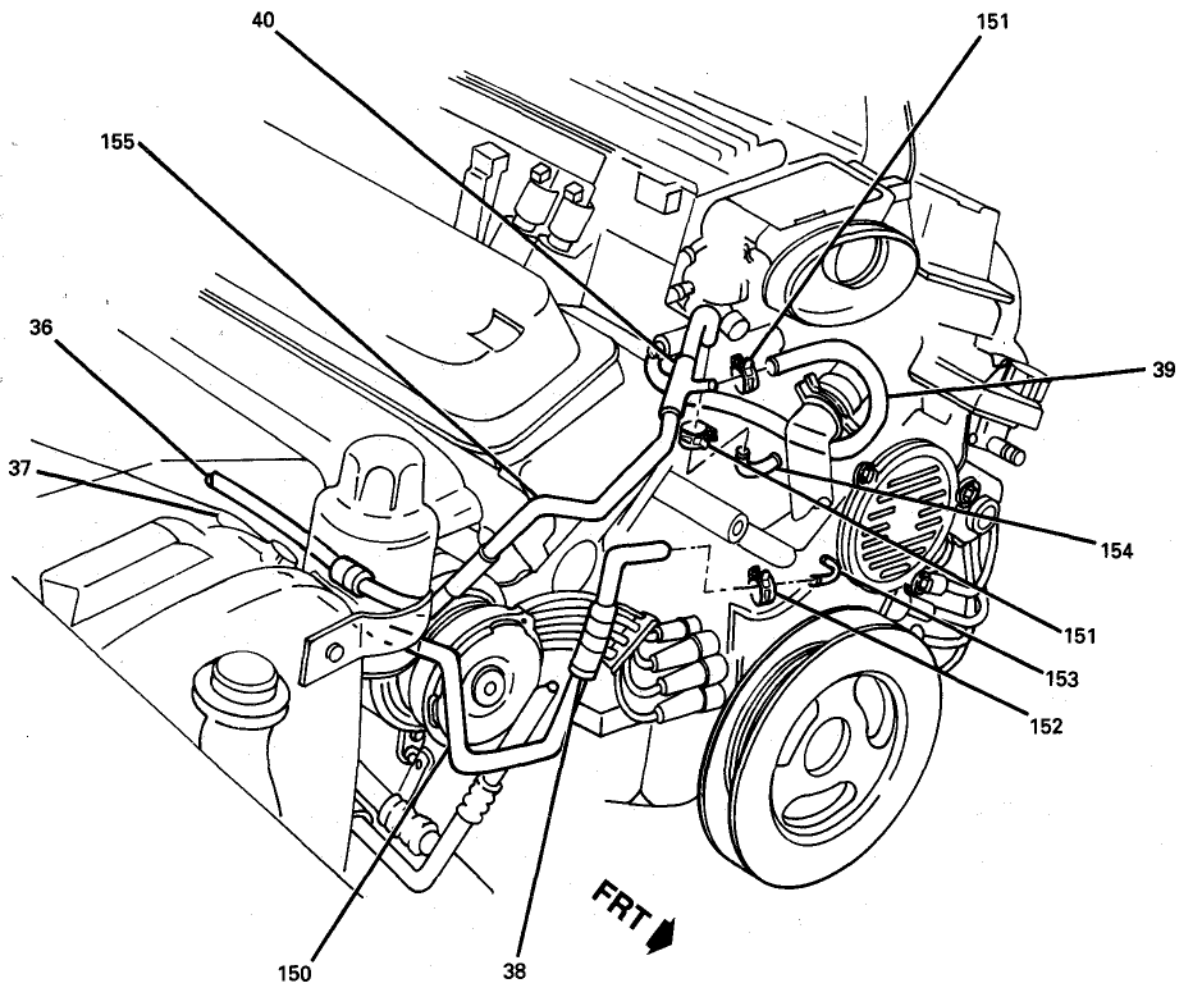
Tighten

- Heater core bolt/screw to 1.8 N•m (16 lb. in.).
5. Heater module assembly cover.



- 33 HOSE ASSEMBLY, HEATER INLET
- 34 CLAMP, HEATER OUTLET FRONT HOSE
- 35 CLAMP, HEATER INLET FRONT HOSE
- 36 PIPE, HEATER HOSE OUTLET
- 37 PIPE, HEATER HOSE INLET
- 146 HOSE ASSEMBLY, HEATER OUTLET
- 147 HOSE, THROTTLE BODY HEATER RETURN
- 148 CLAMP, THROTTLE BODY HEATER RETURN HOSE
- 149 PIPE, HEATER OUTLET

Figure 22 – Heater Hose Assembly and Heater Hose Pipes (3.4L L32 Engine)



- 36 PIPE, HEATER HOSE OUTLET
- 37 PIPE, HEATER HOSE INLET
- 38 VALVE, FLOW CONTROL
- 39 HOSE, THROTTLE BODY HEATER RETURN
- 40 VALVE, BLEED
- 150 HOSE ASSEMBLY, HEATER INLET
- 151 CLAMP, HEATER OUTLET FRONT HOSE
- 152 CLAMP, HEATER INLET FRONT HOSE
- 153 PIPE, HEATER INLET
- 154 PIPE, HEATER OUTLET
- 155 HOSE ASSEMBLY, HEATER OUTLET

Figure 23 – Heater Hose Assembly and Heater Hose Pipes (5.7L LT1 Engine)

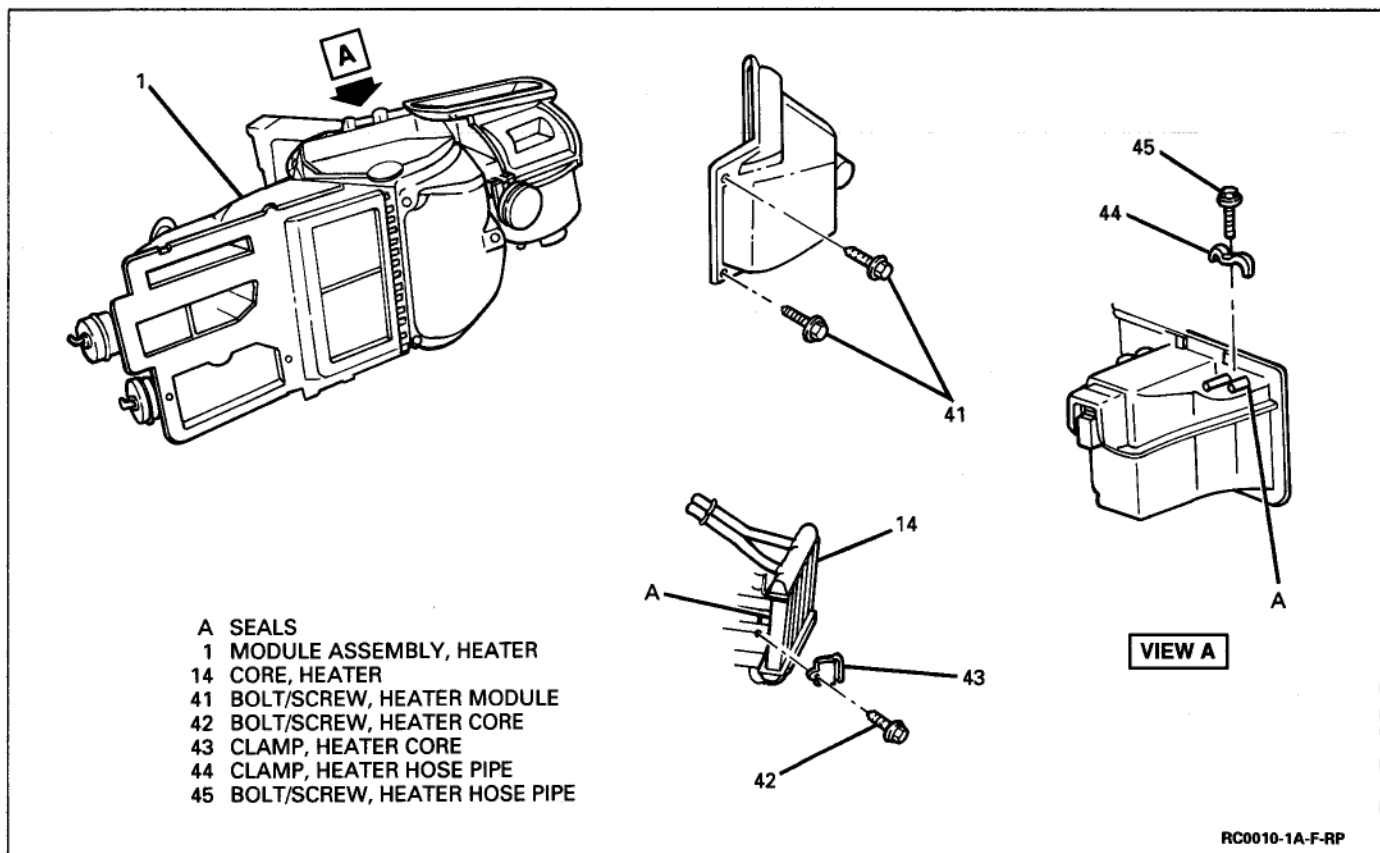


Figure 24 – Heater Core Removed

6. Heater module bolts/screws (41).



Tighten

- Heater module bolts/screws (41) to 2 N•m (18 lb. in.).

7. Coolant.

- A. Fill cooling system.

- B. Operate engine and check for leaks at heater core pipes.

- C. Check coolant level after engine has been warmed up. Add coolant as necessary.

8. Instrument panel compartment.

SPECIFICATIONS

FASTENER TIGHTENING SPECIFICATIONS

Bi-Level Mode Valve Linkage Bolt/Screw	2.3 N•m (20 lb. in.)
Blower Motor Bolt/Screw	2.3 N•m (20 lb. in.)
Blower Motor Resistor Bolt/Screw	2 N•m (18 lb. in.)
Heater and A/C Control Bolt/Screw	1.9 N•m (17 lb. in.)
Heater Core Bolt/Screw	1.8 N•m (16 lb. in.)
Heater Hose Pipe Bolt/Screw	1.8 N•m (16 lb. in.)
Heater Module Bolt/Screw	2 N•m (18 lb. in.)
Hose Pipe Clamp Bolt/Screw	1.8 N•m (16 lb. in.)
Temperature Control Cable Bolt/Screw	1.9 N•m (17 lb. in.)
Vacuum Tank Mounting Bolt/Screw	2.5 N•m (22 lb. in.)
Vent Mode Valve Linkage Bolt/Screw	2.3 N•m (20 lb. in.)

ELECTRICAL SPECIFICATIONS

Blower Motor Fuse (Labeled "HVAC")	25 Amp. (White)
Control Assembly Dial Fuse (Labeled "IP DIMMER")	5 Amp. (Tan)
Control Assembly Dial Lamp Bulb Number	37

