

## SECTION : 7A

# HEATING AND VENTILATION SYSTEM

**CAUTION :** *Disconnect the negative battery cable before removing or installing any electrical unit or when a tool or equipment could easily come in contact with exposed electrical terminals. Disconnecting this cable will help prevent personal injury and damage to the vehicle. The ignition must also be in LOCK unless otherwise noted.*

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## SPECIFICATIONS

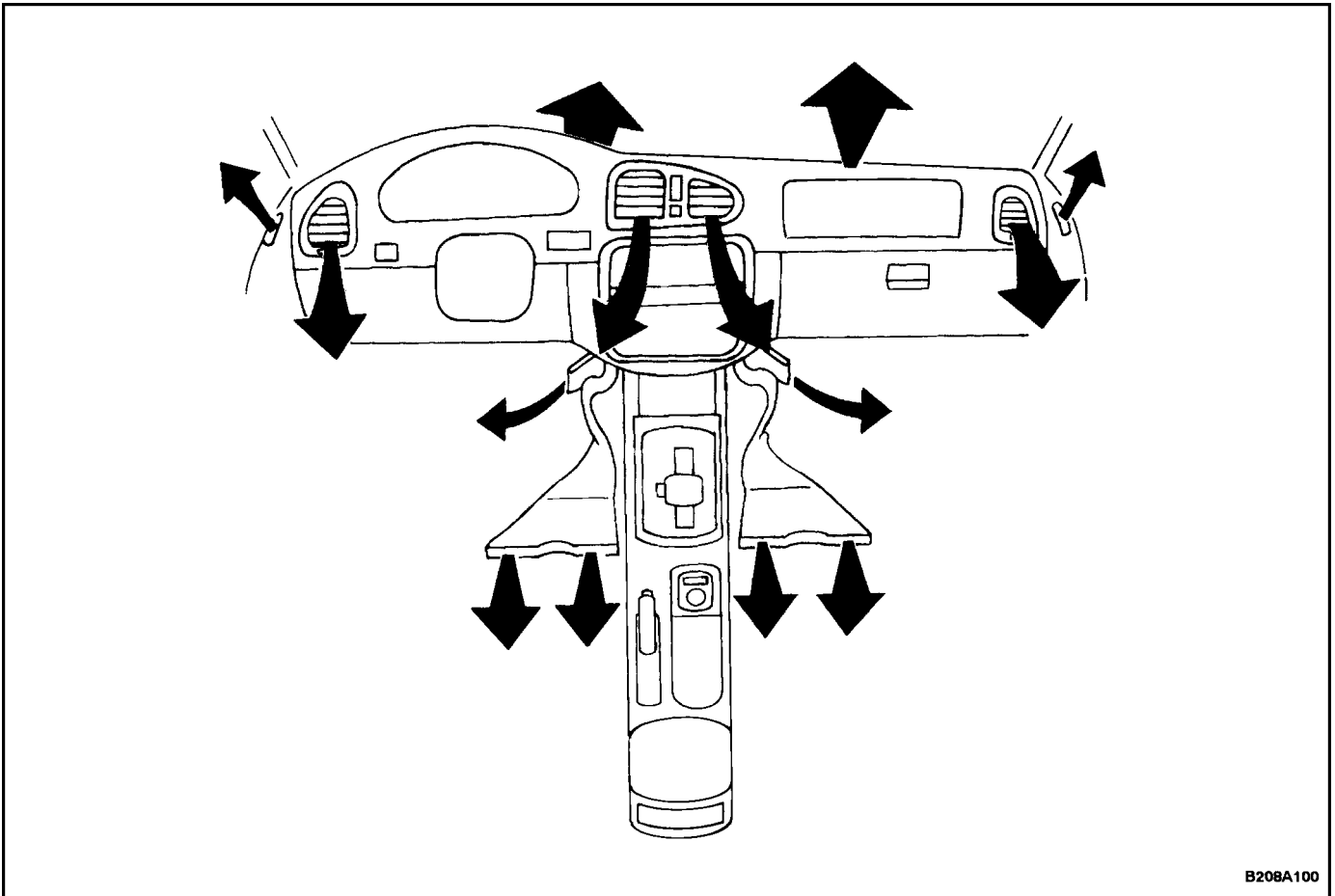
### HEATER TEMPERATURE SPECIFICATIONS

Ambient Air Temperature	Heater Outlet Air Temperature
-18°C (0°F)	54°C (129°F)
- 4°C (25°F)	59°C (138°F)
10°C (50°F)	64°C (147°F)
24°C (75°F)	68°C (154°F)

**FASTENER TIGHTENING SPECIFICATIONS**

<b>Application</b>	<b>N•m</b>	<b>Lb-Ft</b>	<b>Lb-In</b>
Blower Motor Resistor Screws	6	–	53
Blower Resistor Retaining Screws	6	–	53
Heater Core Cover Screw		–	
Heater Core Retaining Bracket Screw		–	
Heater/Air Distributor Case Assembly Screws	8	–	71
HVAC Controller Retaining Screws	2	–	18

## AIRFLOW THROUGH VENTS WITH REAR HEATING DUCT\*



B208A100

\* Rear heating duct available on vehicles in cold climate countries.

# DIAGNOSIS

## HEATER SYSTEM

### INSUFFICIENT HEATING OR DEFROSTING

**CAUTION :** *The cooling system is pressurized when hot. Injury can result from removing the surge tank cap before the engine is sufficiently cool.*

Step	Action	Value(s)	Yes	No
1	Verify the customer's complaint. Are the customer's concerns verified?		Go to <i>Step 2</i>	System OK
2	Check the coolant level. Is the coolant level correct?		Go to <i>Step 4</i>	Go to <i>Step 3</i>
3	Add coolant, as needed. Is the repair complete?		System OK	Go to <i>Step 4</i>
4	Check the drive belts for tension or damage. Are the drive belts OK?		Go to <i>Step 6</i>	Go to <i>Step 5</i>
5	Correct any problem with the drive belts. Is the repair complete?		System OK	Go to <i>Step 6</i>
6	Check the coolant hoses for leaks or kinks. Are the coolant hoses OK?		Go to <i>Step 8</i>	Go to <i>Step 7</i>
7	Repair any problem with the coolant hoses. Is the repair complete?		System OK	Go to <i>Step 8</i>
8	Check the surge tank cap. Refer to <i>Section 1D, Engine Cooling</i> . Is the surge tank cap OK?		Go to <i>Step 10</i>	Go to <i>Step 9</i>
9	Repair or replace the surge tank cap as needed. Is the repair complete?		System OK	Go to <i>Step 10</i>
10	1. Turn the A/C OFF on vehicles equipped with air conditioning. 2. Turn the blower motor switch to 4. 3. Turn the heater control to full hot. 4. Turn the ignition ON. 5. Check for airflow from the vent outlet. Is there heavy airflow from the vent outlet?		Go to <i>Step 11</i>	Go to <i>Step 26</i>
11	Check for a change in the airflow at various blower speeds. Does the blower speed increase as the switch is turned from 1 to 4?		Go to <i>Step 12</i>	Go to "Blower Electrical"
12	1. Turn the A/C OFF. 2. Turn the temperature control knob to full hot. 3. Turn the blower motor switch to 4. 4. With the engine sufficiently cool, remove the surge tank cap. 5. Start the vehicle and idle the engine. 6. Watch for the flow of the coolant. Is the coolant flow visible?		Go to <i>Step 14</i>	Go to <i>Step 13</i>

Step	Action	Value(s)	Yes	No
13	<ol style="list-style-type: none"> <li>Check for the following problems: <ul style="list-style-type: none"> <li>Restriction in the cooling system.</li> <li>Failed water pump impeller.</li> <li>Faulty thermostat.</li> </ul> </li> <li>Make repairs to the cooling system, as needed. Are the repairs complete?</li> </ol>		System OK	Go to <i>Step 14</i>
14	<ol style="list-style-type: none"> <li>Install the surge tank cap.</li> <li>With the ignition ON, allow the engine to warm up for approximately 20 minutes. Drive the vehicle at 48 km/h (30 mph).</li> <li>Use a thermometer to measure the ambient air temperature and the discharge air temperature at the heater outlet.</li> </ol> <p>Does the heater output meet the minimum values specified?</p>	Refer to "Heater Temperature Specifications"	Go to <i>Step 15</i>	Go to <i>Step 16</i>
15	<ol style="list-style-type: none"> <li>Check the vehicle for cold air leaks at the following locations: <ul style="list-style-type: none"> <li>Dash.</li> <li>Heater cases.</li> <li>Vents.</li> </ul> </li> <li>Check under the seat for obstructions.</li> <li>Repair any leaks or obstructions.</li> </ol> <p>Are the repairs complete?</p>		System OK	
16	<ol style="list-style-type: none"> <li>Turn the ignition OFF.</li> <li>Turn the temperature control knob from full cold to full hot.</li> <li>Listen for the sound of the temperature door slam just before reaching the end of the travel range of the control knob.</li> </ol> <p>Does the door slam?</p>		Go to <i>Step 18</i>	Go to <i>Step 17</i>
17	<ol style="list-style-type: none"> <li>Check the following aspects of the temperature door: <ul style="list-style-type: none"> <li>Travel.</li> <li>Cables.</li> <li>Linkage.</li> </ul> </li> <li>Verify the accuracy of the temperature controls at full hot.</li> <li>Verify the accuracy of the temperature controls at full cold.</li> </ol> <p>Is the repair complete?</p>		System OK	
18	<ol style="list-style-type: none"> <li>Turn the temperature control knob to full hot.</li> <li>Start the vehicle.</li> <li>Check the temperature of the heater inlet hose and the heater outlet hose by feel. The air temperature around the hoses should be at least 29°C (84°F).</li> </ol> <p>Is the heater inlet hose hot and the heater outlet hose warm?</p>		Go to <i>Step 19</i>	Go to <i>Step 22</i>
19	Check the thermostat. Refer to <i>1D, Engine Cooling</i> . Is the thermostat installed and seated properly?		Go to <i>Step 20</i>	Go to <i>Step 21</i>

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Step	Action	Value(s)	Yes	No
20	Replace the thermostat. Refer to <i>Section 1D, Engine Cooling</i> . Is the repair complete?		System OK	
21	Reinstall the thermostat. Is the repair complete?		System OK	
22	Inspect the heater hoses for proper installation. Are the heater hoses reversed?		Go to <i>Step 23</i>	Go to <i>Step 24</i>
23	Reinstall the heater hoses properly. Is the repair complete?		System OK	
24	1. Back flush the heater core. 2. Drain the cooling system. 3. Replace the coolant. 4. Warm the engine to an average operating temperature. 5. Feel the heater inlet hose and the heater outlet hose.  Is the heater inlet hose hot and the heater outlet hose warm?		System OK	Go to <i>Step 25</i>
25	Replace the heater core. Is the repair complete?		System OK	
26	Recheck the system using the "Control Settings/Correct Results" tests. Refer to "Improper Air Delivery or No Mode Shift" in this section. Is the repair complete?		System OK	Go to <i>Step 27</i>
27	Check for airflow from the defroster or the vent outlets. Is there high airflow from the defroster or vent outlets?		Go to <i>Step 28</i>	Go to <i>Step 29</i>
28	Check the heater door at the floor and the vent door to get the proper airflow, verify proper operation, and repair, as required. Is the repair complete?		System OK	
29	Turn the mode knob to defrost. Is the defroster airflow OK?		Go to <i>Step 30</i>	Go to <i>Step 31</i>
30	1. Remove the heater outlet and check for obstructions. 2. Remove any obstructions in the heater outlet. Is the repair complete?		System OK	
31	Check for airflow change at various blower speeds. Does the blower speed increase as the control is turned from 1 to 4?		Go to <i>Step 32</i>	Go to "Blower Electrical"
32	Check for obstructions in the system at the blower inlet and at the air filter, if the vehicle is equipped with one. Are there any obstructions?		Go to <i>Step 33</i>	Go to <i>Step 34</i>
33	Remove the obstructions in the system at the blower inlet or replace a clogged filter. Are the repairs complete?		System OK	

Step	Action	Value(s)	Yes	No
34	<ol style="list-style-type: none"> <li>1. Turn the blower motor switch to 4.</li> <li>2. Turn the temperature control knob from full hot to full cold.</li> <li>3. Listen for an airflow change.</li> </ol> Does the airflow change?		Go to <i>Step 35</i>	Go to <i>Step 36</i>
35	<ol style="list-style-type: none"> <li>1. Check the following aspects of the temperature door:               <ul style="list-style-type: none"> <li>• Travel.</li> <li>• Cables.</li> <li>• Linkage.</li> <li>• Control.</li> </ul> </li> <li>2. Verify the accuracy of the temperature control at full hot.</li> </ol> Is the repair complete?		Go to <i>Step 1</i>	
36	<ol style="list-style-type: none"> <li>1. Check the system for any obstruction between the blower and the system outlets.</li> <li>2. Remove any obstruction.</li> </ol> Is the repair complete?		Go to <i>Step 1</i>	

### BLOWER ELECTRICAL

Step	Action	Value(s)	Yes	No
1	Verify the customer's complaint. Are the customer's concerns verified?		Go to <i>Step 2</i>	System OK
2	Does the blower run at any speed?		Go to <i>Step 14</i>	Go to <i>Step 3</i>
3	<ol style="list-style-type: none"> <li>1. Disconnect the power connector from the blower motor under the dashboard on the passenger's side of the vehicle.</li> <li>2. Turn the ignition ON.</li> <li>3. Turn the blower ON.</li> <li>4. Test the voltage on the connector. The terminal connected to the PPL wire is positive and the terminal connected to the BLK wire is negative.</li> </ol> Is this voltage within the specified range?	11–14 v	Go to <i>Step 4</i>	Go to <i>Step 5</i>
4	Replace the blower motor. Is the repair complete?		System OK	
5	Check fuse EF2 in the engine fuse block. Is the fuse blown?		Go to <i>Step 6</i>	Go to <i>Step 7</i>
6	<ol style="list-style-type: none"> <li>1. Turn the ignition ON.</li> <li>2. Use a short detector to locate the following possible shorts:               <ul style="list-style-type: none"> <li>• From the fuse panel to the blower speed switch.</li> <li>• From the blower speed switch to the heater resistor block.</li> <li>• From the heater resistor block to the blower motor.</li> <li>• From the blower speed switch to the blower HI relay.</li> </ul> </li> <li>3. Repair any short.</li> <li>4. Replace any blown fuse.</li> </ol> Is the repair complete?		System OK	

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Step	Action	Value(s)	Yes	No
7	<ol style="list-style-type: none"> <li>1. Turn the ignition ON.</li> <li>2. Turn the blower motor switch to 4.</li> <li>3. Check the blower motor ground.</li> </ol> Is ground OK?		Go to <i>Step 9</i>	Go to <i>Step 8</i>
8	Repair the blower motor ground. Is the repair complete?		System OK	
9	Check the motor connector with a 12-volt test light. Does the test light come on?		Go to <i>Step 10</i>	Go to <i>Step 11</i>
10	Repair the open in the feed wire from the resistor block to the blower motor. Is the repair complete?		System OK	
11	Use the 12-volt test light to check the power feed terminal on the blower speed switch. Does the light come on?		Go to <i>Step 12</i>	Go to <i>Step 13</i>
12	Replace the blower speed switch. Is the repair complete?		System OK	
13	Repair the open in the power wire from the blower speed switch to the fuse panel. Is the repair complete?		System OK	
14	Does the blower fail to operate at speed 4?		Go to <i>Step 15</i>	Go to <i>Step 21</i>
15	Check fuse EF2 in the engine fuse block. Is the fuse blown?		Go to <i>Step 16</i>	Go to <i>Step 17</i>
16	<ol style="list-style-type: none"> <li>1. Turn the ignition ON.</li> <li>2. Turn the blower motor switch to 4.</li> <li>3. Use a short detector to locate the following possible shorts:                             <ul style="list-style-type: none"> <li>• From the engine fuse panel to the blower HI relay.</li> <li>• From the blower HI relay to the blower motor.</li> </ul> </li> <li>4. Repair any short.</li> <li>5. Replace the EF2.</li> </ol> Is the repair complete?		System OK	
17	<ol style="list-style-type: none"> <li>1. Turn the ignition ON.</li> <li>2. Turn the blower motor switch to 4.</li> <li>3. Check for 12 volts on the blower HI relay coil terminal from the blower speed switch terminal A2.</li> </ol> Is this voltage present?		Go to <i>Step 18</i>	Go to <i>Step 19</i>
18	Replace the blower speed switch. Is the repair complete?		System OK	
19	<ol style="list-style-type: none"> <li>1. Turn the ignition OFF.</li> <li>2. Check for opens in the following locations:                             <ul style="list-style-type: none"> <li>• Fuse EF2 to the blower HI relay.</li> <li>• Blower speed switch to the blower HI relay.</li> <li>• Blower HI relay to ground.</li> <li>• Blower HI relay to the blower motor.</li> </ul> </li> <li>3. Repair any opens.</li> </ol> Is the repair complete?		System OK	Go to <i>Step 20</i>



Step	Action	Value(s)	Yes	No
20	Replace the blower HI relay. Is the repair complete?		System OK	
21	1. Disconnect the resistor block connector. 2. Connect one lead of a self-powered test light to any single lead on the resistor block. Use the other lead to probe each of the other two terminals. Does the test light illuminate on all terminals?		Go to Step 23	Go to Step 22
22	Replace the resistor block. Is the repair complete?		System OK	
23	1. Turn the ignition to LOCK. 2. Disconnect the connector from the resistor block. 3. Connect a jumper lead from the positive terminal on the battery to any wire terminal in the connector. 4. Use a 12-volt test light to check for voltage from the corresponding wire on the blower speed switch. 5. Repeat the same test on the other wires. Does the lamp light on all three wires?		Go to Step 25	Go to Step 24
24	Replace the blower speed switch. Is the repair complete?		System OK	
25	Repair the open in the affected wire. Is the repair complete?		System OK	

### IMPROPER AIR DELIVERY OR NO MODE SHIFT

This procedure provides a test of all functions of the heater/defroster unit.

1. Warm up the vehicle.
2. Keep the engine running.
3. Perform the tests outlined in the table below and look for the results indicated.

CONTROL SETTINGS			CORRECT RESULTS				
MODE KNOB	TEMP. CONTROL	BLOWER MOTOR SWITCH	BLOWER SPEED	POWER VENT OUTLET	FLOOR OUTLET	DEFROST OUTLET	SIDE WINDOW OUTLET
Vent	Cold	Off	Off	No Airflow	No Airflow	No Airflow	No Airflow
Vent	Cold	4	High	Ambient Airflow	No Airflow	No Airflow	No Airflow
Floor	Cold to Hot	4	High	No Airflow	Cold to Hot Airflow	Minimum Cold to Hot Airflow	Minimum Cold to Hot Airflow
Defroster	Cold to Hot	4	High	No Airflow	Minimum Cold to Hot Airflow	Cold to Hot Airflow	Minimum Cold to Hot Airflow

If any of these settings does not produce the correct results, perform the following diagnostic procedure.

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Step	Action	Value(s)	Yes	No
1	Verify the customer's complaint. Are the customer's concerns verified?		Go to <i>Step 2</i>	System OK
2	Examine the affected door in the unit for proper attachment to the vacuum actuator. <ul style="list-style-type: none"> <li>• Check the actuator connection to the door.</li> <li>• Check that the vacuum hose is connected properly.</li> </ul> Is everything connected properly?		Go to <i>Step 4</i>	Go to <i>Step 3</i>
3	Repair, as necessary. Is the repair complete?		System OK	
4	1. Disconnect the actuator at the door. 2. Check the range of the door travel and the effort required to move it.  Does the door move freely through its entire range of travel so that it can close at both ends of the range?		Go to <i>Step 5</i>	Go to <i>Step 3</i>
5	Check the travel of the actuator by turning the control knob with the engine running. Is the actuator travel OK?		Go to <i>Step 6</i>	Go to <i>Step 7</i>
6	1. Reinstall the actuator. 2. Recheck the system using the "Control Settings/Correct Results" tests in this procedure. Does the system perform properly?		System OK	Go to <i>Step 9</i>
7	1. Check the vacuum hose at the control. 2. Check for a broken control. Is there a problem with the vacuum hose or the control?		Go to <i>Step 8</i>	Go to <i>Step 9</i>
8	Repair the vacuum hose or control, as necessary. Is the repair complete?		System OK	Go to <i>Step 9</i>
9	Recheck the system using the "Control Settings/Correct Results" tests in this procedure. Is the repair complete?		System OK	Go to <i>Step 10</i>
10	Check for airflow from the defroster or the vent outlets. Is there high airflow from the defroster or the vent outlets?		Go to <i>Step 11</i>	Go to <i>Step 12</i>
11	Adjust the heater door at the floor and the vent door to get the proper airflow. Is the repair complete?		System OK	
12	Turn the mode knob to defrost. Is the defroster airflow OK?		Go to <i>Step 13</i>	Go to <i>Step 14</i>
13	1. Remove the heater outlet. 2. Check the heater outlet for obstructions. 3. Remove any obstructions in the heater outlet. Is the repair complete?		System OK	
14	Check the blower speeds for a change in the airflow. Does the blower speed increase as the control is turned from 1 to 4?		Go to <i>Step 15</i>	Go to "Blower Electrical"

Step	Action	Value(s)	Yes	No
15	<ol style="list-style-type: none"> <li>1. Check for obstructions in the system at the blower inlet and check the air filter, if equipped.</li> <li>2. Remove any obstructions at the blower inlet and replace the filter if it is clogged.</li> </ol> Is the repair complete?		System OK	Go to <i>Step 16</i>
16	<ol style="list-style-type: none"> <li>1. Turn the blower motor switch to 4.</li> <li>2. Turn the temperature control knob from full hot to full cold.</li> <li>3. Listen for an airflow change.</li> </ol> Does the airflow change?		Go to <i>Step 17</i>	Go to <i>Step 18</i>
17	<ol style="list-style-type: none"> <li>1. Check the temperature door, the cable, the linkage, and the control.</li> <li>2. Turn the temperature control knob to full hot.</li> </ol> Is the repair complete?		System OK	
18	<ol style="list-style-type: none"> <li>1. Check the system for any obstruction between the blower and the system outlets.</li> <li>2. Remove any obstruction between the blower and the system outlets.</li> </ol> Is the repair complete?		System OK	

### TOO MUCH HEAT

Step	Action	Value(s)	Yes	No
1	Verify the customer's complaint. Are the customer's concerns verified?		Go to <i>Step 2</i>	System OK
2	Is there too much heat when the mode switch is in the floor position?		Go to <i>Step 3</i>	Go to <i>Step 9</i>
3	Is there objectionable defroster bleed?		Go to <i>Step 4</i>	Go to <i>Step 5</i>
4	<ol style="list-style-type: none"> <li>1. Check the door travel, the cable, the vacuum actuators, and the linkage for the heater and the defroster.</li> <li>2. Adjust or repair, as required.</li> </ol> Is the repair complete?		System OK	
5	<ol style="list-style-type: none"> <li>1. Turn the A/C OFF on vehicles equipped with A/C.</li> <li>2. Turn the blower motor switch to 4.</li> <li>3. Turn the temperature to full hot.</li> <li>4. Turn the ignition ON.</li> <li>5. Start the engine.</li> <li>6. Check for airflow from the floor outlets.</li> <li>7. Check the floor outlet attachment.</li> </ol> Is the airflow high?		Go to <i>Step 6</i>	Go to <i>Step 8</i>
6	Check for a change in the airflow at different blower speeds. Does the airflow change as the setting for the blower motor speed switch is changed?		Go to <i>Step 7</i>	Go to "Blower Electrical"
7	<ol style="list-style-type: none"> <li>1. Check the temperature door travel, the cable, and the linkage.</li> <li>2. Turn the temperature control knob to full cold.</li> <li>3. Check for full hot.</li> </ol> Is the repair complete?		System OK	

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Step	Action	Value(s)	Yes	No
8	Adjust or repair the floor/defroster and/or the vent/floor mode. Is the repair complete?		System OK	
9	Is there objectionable vent bleed?		Go to <i>Step 10</i>	Go to <i>Step 15</i>
10	1. Check the system case for leaks. 2. Check the floor outlet attachment. Are there problems?		Go to <i>Step 11</i>	Go to <i>Step 12</i>
11	Repair the system case or the floor outlet attachment, as required. Is the repair complete?		System OK	Go to <i>Step 12</i>
12	1. Turn the ignition OFF. 2. Turn the temperature control knob from full hot to full cold. 3. Listen for the sound of the temperature door slam just before reaching the end of the travel range at the control knob. Does the door slam?		Go to <i>Step 13</i>	Go to <i>Step 14</i>
13	Adjust the vent door to allow more ventilation. Is the repair complete?		System OK	
14	1. Check the temperature door travel, the cable, and the linkage. 2. Verify that the temperature door goes to full cold. 3. Check the temperature door for full hot. Is the temperature door travel correct?		System OK	
15	1. Turn the fresh air/recirculating air control to fresh air (indicator lamp OFF). 2. Turn the temperature control knob to full cold. 3. Start the vehicle and allow the engine to warm up. 4. Measure the air temperature at the blower inlet, or cowl, and at the vent air outlet inside the vehicle. Is the outlet air more than 5°C (41°F) warmer than the inlet air?		Go to <i>Step 16</i>	System OK
16	1. Check for hot air leaks from the engine compartment to the blower inlet. 2. Repair, as needed. Is the repair complete?		System OK	

**CONTROLS**

<b>Step</b>	<b>Action</b>	<b>Value(s)</b>	<b>Yes</b>	<b>No</b>
1	Verify the customer's complaint. Are the customer's concerns verified?		Go to <i>Step 2</i>	System OK
2	Move the controls other than the temperature adjustment. Is excessive effort required to move the controls?		Go to <i>Step 15</i>	Go to <i>Step 3</i>
3	Move the temperature control knob. Is excessive effort required to move the control knob?		Go to <i>Step 6</i>	Go to <i>Step 4</i>
4	Turn the blower motor control switch to 4. Does the temperature door move too easily?		Go to <i>Step 5</i>	System OK
5	Remove the cable from the controller. Does the control knob turn freely, without the click stops?		Go to <i>Step 15</i>	
6	Check the cables for improper routing, kinks, wiring interference, or other instrument panel interference. Is there a problem?		Go to <i>Step 7</i>	Go to <i>Step 8</i>
7	Repair, as needed. Is the repair complete?		System OK	
8	1. Remove the cable from the temperature door. 2. Cycle the door manually. 3. Check for door binding. Is there any door binding?		Go to <i>Step 9</i>	Go to <i>Step 12</i>
9	Check the door seal for proper installation. Is the door seal OK?		Go to <i>Step 10</i>	Go to <i>Step 11</i>
10	1. Check a binding door for shaft alignment, a bent shaft, a bent door, or a warped case. 2. Repair, as needed. Is the repair complete?		System OK	
11	Repair the door seal, as needed. Is the repair complete?		System OK	
12	Check for control binding. Does the control bind?		Go to <i>Step 14</i>	Go to <i>Step 13</i>
13	1. Reinstall the cable to the door. 2. Check the clearance for the cable-to-dash components. 3. Repair any interference. Is the repair complete?		System OK	
14	1. Remove the cable from the control. 2. Check the control for binding. Does the control bind?		Go to <i>Step 15</i>	Go to <i>Step 16</i>
15	Replace the control. Is the repair complete?		System OK	
16	Replace the cable. Is the repair complete?		System OK	

**BLOWER NOISE**

<b>Step</b>	<b>Action</b>	<b>Value(s)</b>	<b>Yes</b>	<b>No</b>
1	Verify the customer's complaint. Are the customer's concerns verified?		Go to <i>Step 2</i>	System OK
2	1. Sit inside the vehicle. 2. Close the doors and the windows. 3. Turn the ignition ON. 4. Start the engine. 5. Turn the temperature control knob to full cold. 6. Cycle through the blower speeds, the modes, and the temperature settings in order to find the noise.  Is the blower noise constant at high blower speeds or certain modes, but absent at lower speeds or in other modes?		Go to <i>Step 11</i>	Go to <i>Step 3</i>
3	Check for vibrations from the blower motor and fan assembly at each blower speed by feeling the blower motor housing. Is there excessive vibration?		Go to <i>Step 6</i>	Go to <i>Step 4</i>
4	1. Remove the blower motor and the fan assembly. Refer to "Blower Motor" in this section. 2. Check for foreign material at the opening of the blower inlet.  Is there any foreign material at the blower inlet?		Go to <i>Step 5</i>	Go to <i>Step 6</i>
5	Remove all foreign material. Is the repair complete?		System OK	Go to <i>Step 6</i>
6	1. Examine the blower fan for wear spots, cracked blades, a cracked hub, a loose fan retaining nut, or bad alignment. 2. Examine the blower case for wear spots.  Are there any problems?		Go to <i>Step 7</i>	Go to <i>Step 9</i>
7	Repair, as required. Is the repair complete?		System OK	Go to <i>Step 8</i>
8	Replace the motor and the fan assembly. Is the repair complete?		System OK	Go to <i>Step 9</i>
9	If the noise is a click, tick or whine, replace the motor. Is the repair complete?		System OK	Go to <i>Step 10</i>
10	Reinstall the original motor. Is the problem still present?		Go to <i>Step 11</i>	System OK
11	1. Turn the blower motor switch to 4. 2. Check full hot to full cold temperature positions in the defrost, the floor, and the vent modes.  Is the noise present in the defrost mode only?		Go to <i>Step 12</i>	Go to <i>Step 13</i>
12	1. Check the ducts for obstructions or foreign materials. 2. Remove any obstructions or foreign materials. 3. Check the floor/defroster door seals. 4. Repair or replace, as needed.  Is the repair complete?		System OK	
13	Is the noise present in the floor mode only?		Go to <i>Step 12</i>	Go to <i>Step 14</i>
14	Is the noise present in the vent mode only?		Go to <i>Step 15</i>	Go to <i>Step 16</i>

<b>Step</b>	<b>Action</b>	<b>Value(s)</b>	<b>Yes</b>	<b>No</b>
15	1. Check the ducts for obstructions or foreign materials. 2. Remove any obstructions or foreign materials. 3. Check the vent door seals. 4. Repair or replace, as needed. Is the repair complete?		System OK	
16	Is the noise present in all modes, but not all temperature positions?		Go to <i>Step 17</i>	Go to <i>Step 18</i>
17	1. Check the temperature door seals. 2. Repair or replace, as needed. Is the repair complete?		System OK	
18	1. Check the system for obstructions or foreign materials between the fan and the temperature door. 2. Repair or replace, as needed. Is the repair complete?		System OK	Go to <i>Step 2</i>

# MAINTENANCE AND REPAIR

## ON-VEHICLE SERVICE

### TEMPERATURE CABLE ADJUSTMENT

Because the cable and the cable housings have fixed lengths, it is impossible to make a temperature cable adjustment.

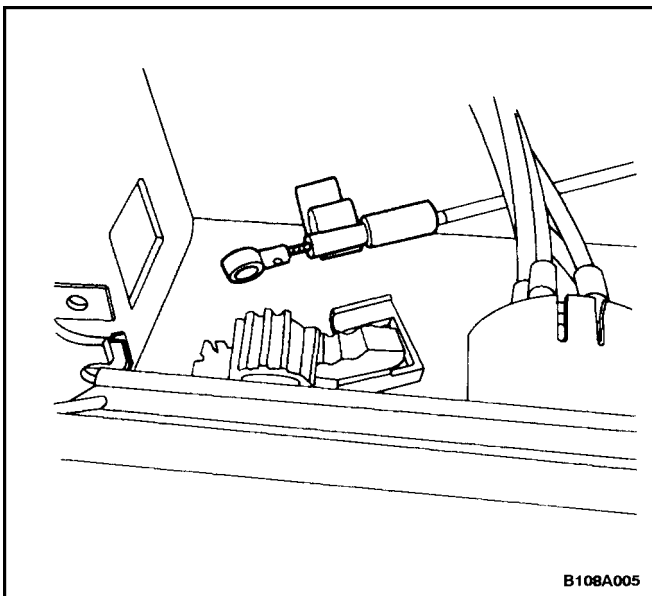
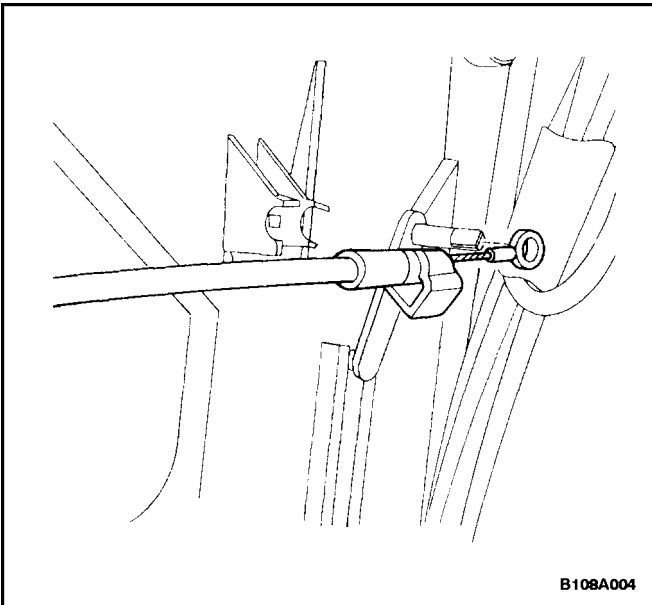
In addition, the heater/air distributor case linkage cannot be adjusted.

If a malfunction is suspected, verify the proper operation of the controller and the mechanical doors for the heater/air distributor case assembly.

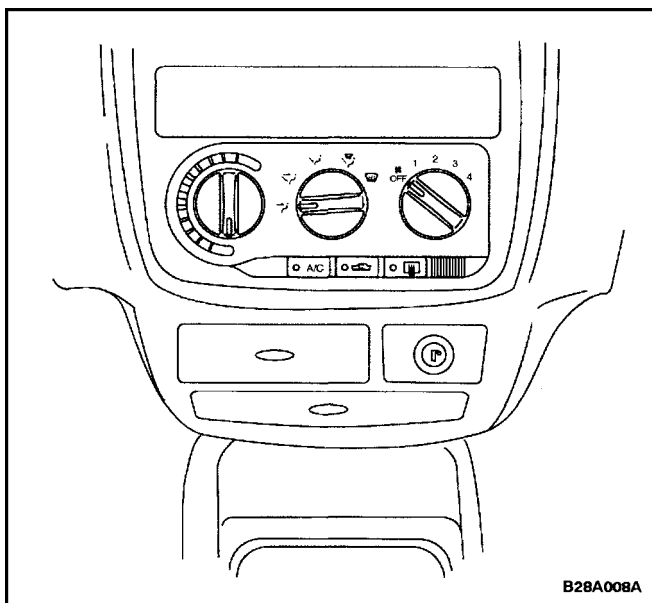
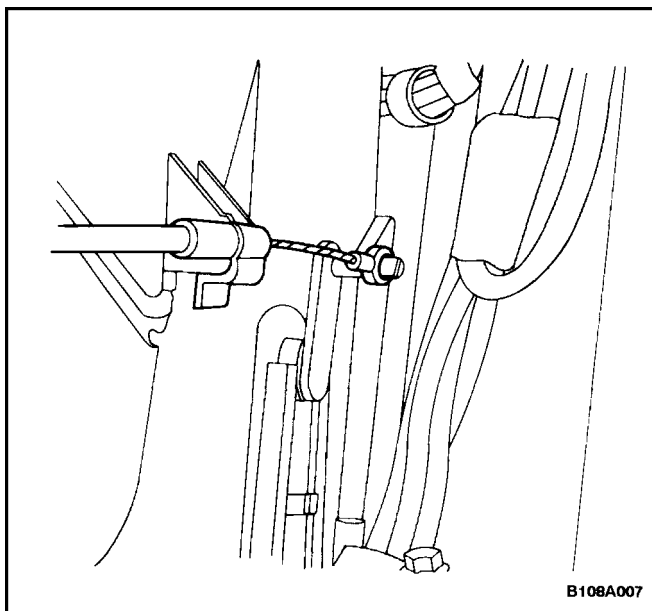
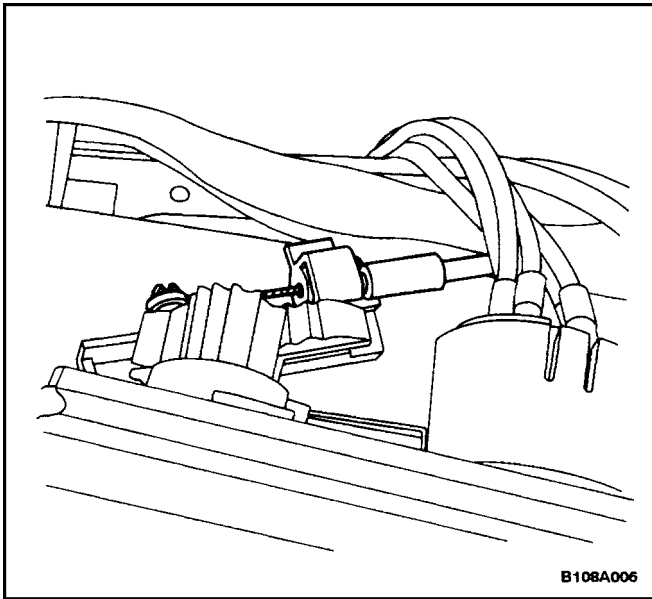
### TEMPERATURE CONTROL CABLE

#### Removal Procedure

1. Disconnect the negative battery cable.
2. Remove the glove box. Refer to *Section 9E, Instrumentation/Driver Information*.
3. Slide the cable eyelet off the post on the temperature door lever.
4. Disconnect the cable retainer from the blower housing.
5. Remove the audio system trim plate. Refer to *Section 9F, Audio Systems*.
6. Remove the four controller retaining screws.
7. Pull out the controller to provide clearance for removal of the temperature control cable.
8. Disconnect the temperature control cable eyelet from the post on the controller.
9. Snap the cable housing connector out of the slide position on the controller.







## Installation Procedure

1. Install the temperature control cable eyelet to the post on the controller.
2. Snap the cable housing connector to the slide position on the controller.

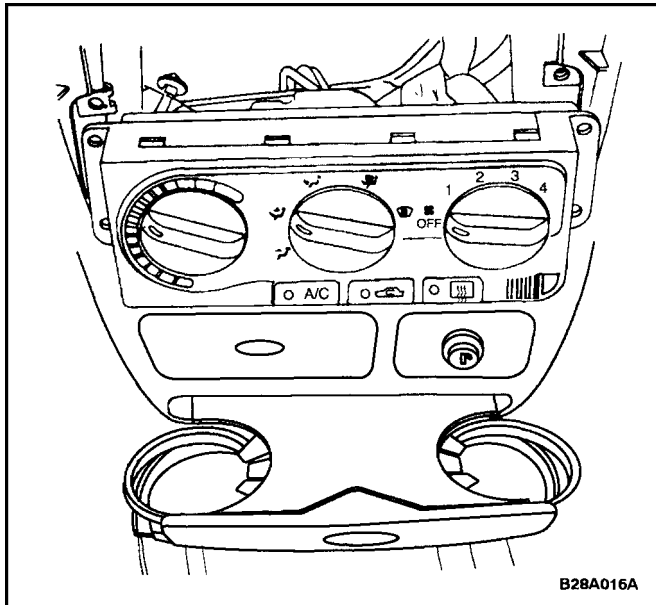
3. Gently insert the controller into position on the center console.
4. Install the four controller retaining screws.

### Tighten

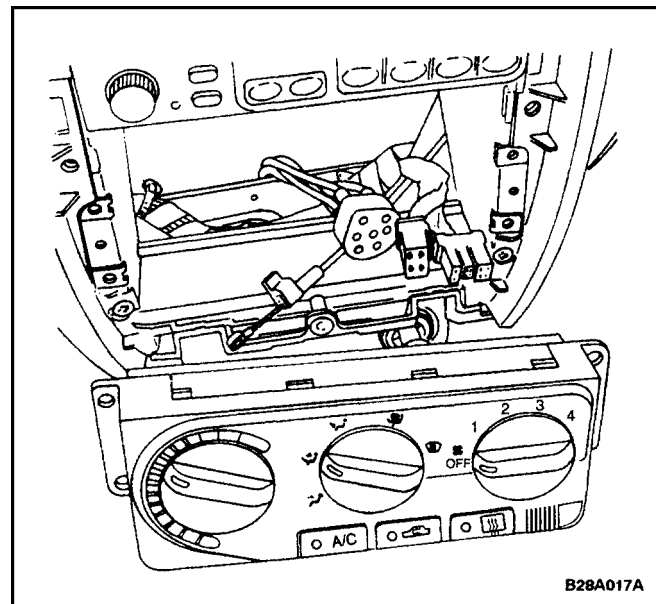
Tighten the HVAC controller retaining screws to 2 N•m (18 lb-in).

5. Install the temperature control cable eyelet to the post on the temperature door lever.
6. Snap the cable retainer to the blower housing.

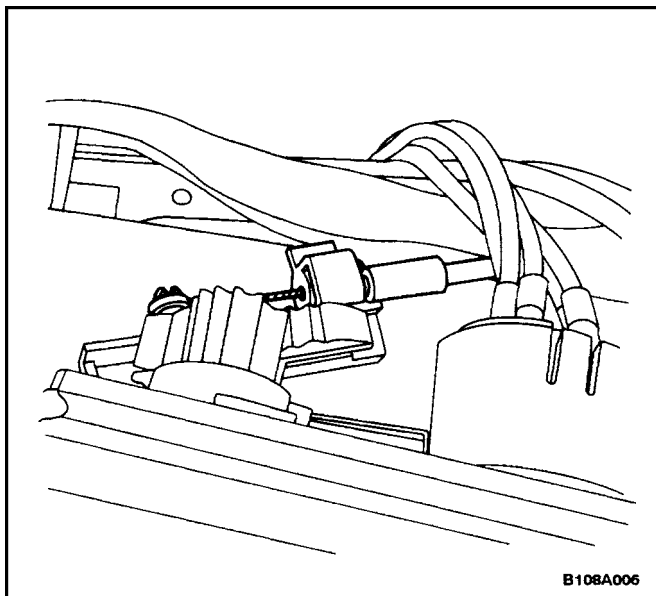
7. Move the temperature control to verify the smooth operation and function of the door and the cable.
8. Install the audio system trim plate. Refer to *Section 9F, Audio Systems*.
9. Connect the negative battery cable.
10. Operate the heating and cooling systems to verify proper function.
11. Install the glove box. Refer to *Section 9E, Instrumentation/Driver Information*.



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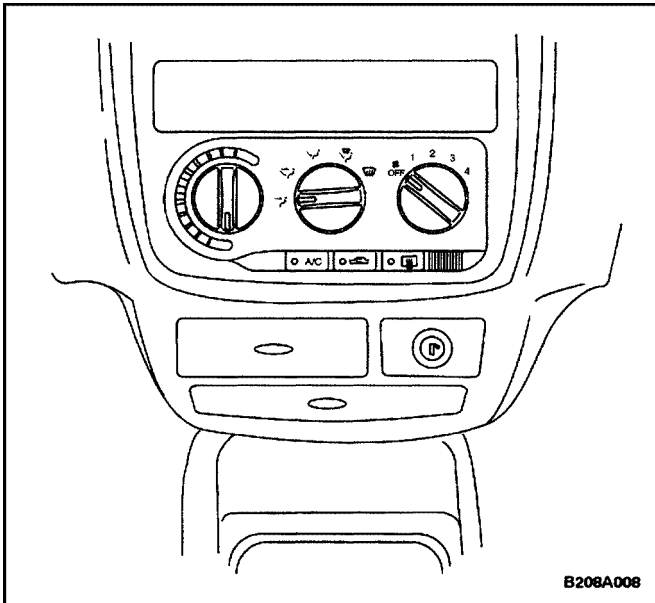
## CONTROL ASSEMBLY

### Removal Procedure

1. Disconnect the negative battery cable.
2. Remove the audio system trim plate. Refer to *Section 9F, Audio Systems*.
3. Remove the four controller retaining screws.
4. Pull out the controller to provide clearance for the removal of the temperature control cable.
5. Disconnect the temperature control cable by gently prying the cable eyelet from the post on the controller. Unsnap the cable housing from the mechanical slide. Note the location of the cable and the housing for ease of installation.
6. Disconnect the electrical connectors.
7. Remove the vacuum hose connection block from the mode control switch.

### Installation Procedure

1. Connect the vacuum hose connection block to the mode control switch.
2. Press the cable end eyelet onto the post on the controller.
3. Attach the mechanical cable housing to its original control position.
4. Connect the electrical connectors to the sockets on the back of the controller.



5. Gently insert the controller into position on the center console.
6. Install the retaining screws.

### Tighten

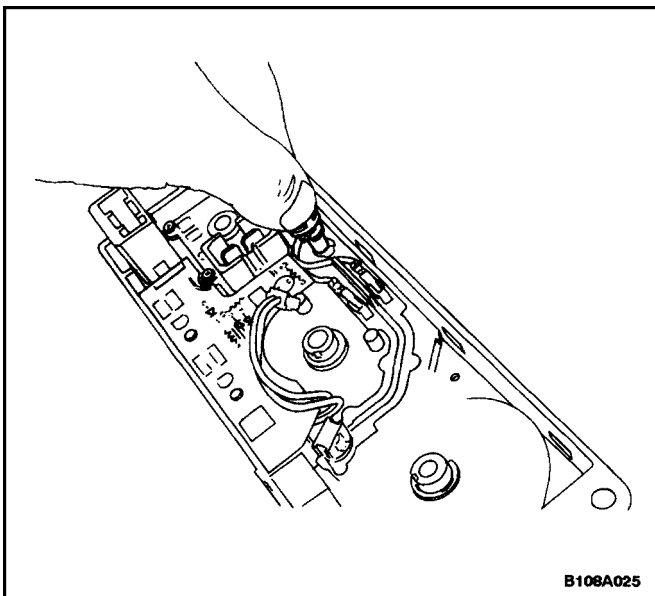
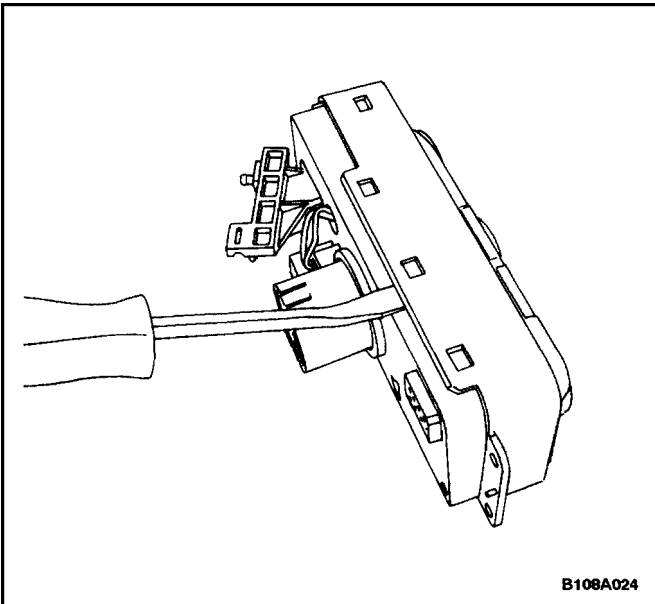
Tighten the HVAC controller retaining screws to 2 N•m (18 lb-in).

7. Connect the negative battery cable.
8. Confirm the proper operation of the controller by moving it through all of the controller's possible functioning positions.
9. Install the audio system trim plate. Refer to *Section 9F, Audio Systems*.

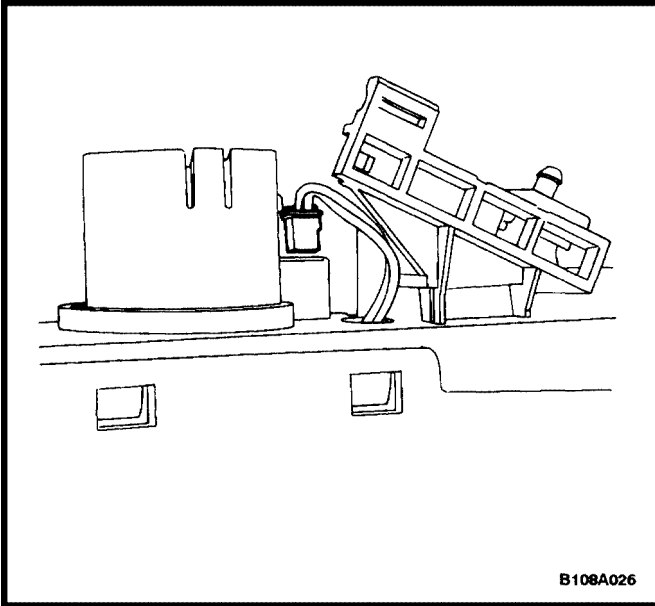
## CONTROL ASSEMBLY KNOB LIGHTING

### Removal Procedure

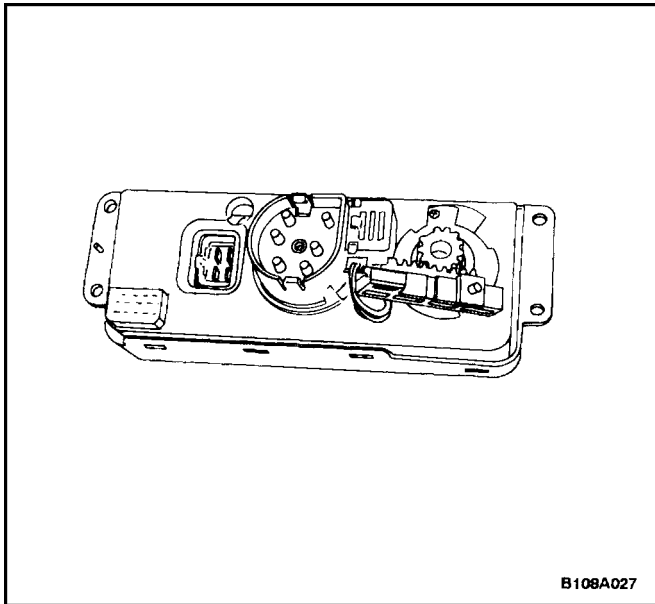
1. Disconnect the negative battery cable.
2. Remove the heating and ventilation system control assembly. Refer to "Control Assembly" in this section.
3. Disconnect the small connector to the vacuum control switch on the rear of the assembly case.
4. Separate the control assembly case halves.



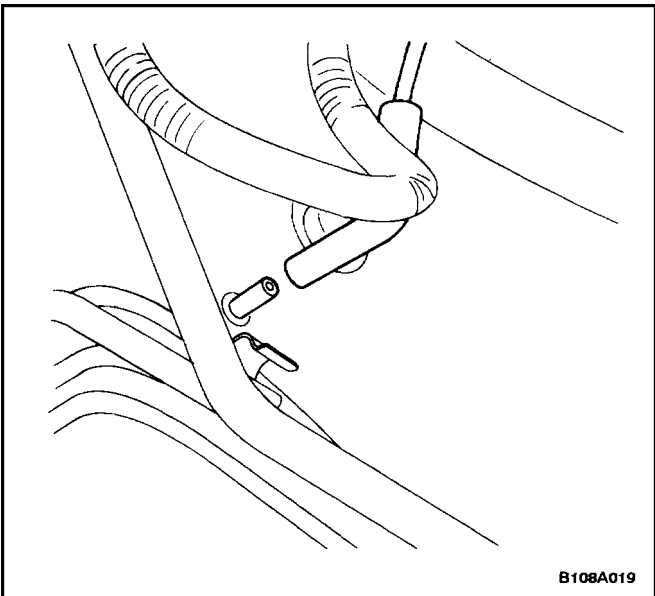
5. Turn the bulb holder to the left and pull out the bulb.



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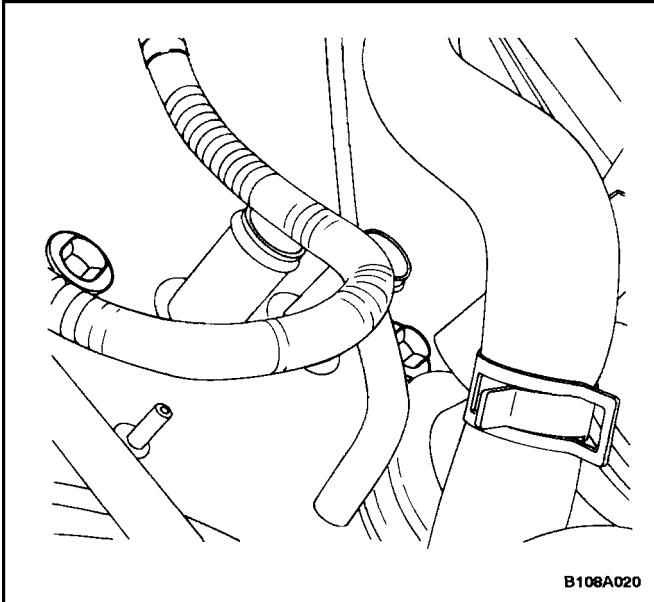
## Installation Procedure

1. Install the bulb into the holder and turn the bulb to the right.
2. Install the control assembly case halves.
  - Pass the connector for the vacuum switch through the hole in the rear assembly case part.
  - Be sure to align the flats on mating control shafts of the two case halves.
3. Install the connector into the vacuum control switch.
4. Install the control assembly. Refer to "Control Assembly" in this section.
5. Connect the negative battery cable.
6. Check the knob light for proper operation.

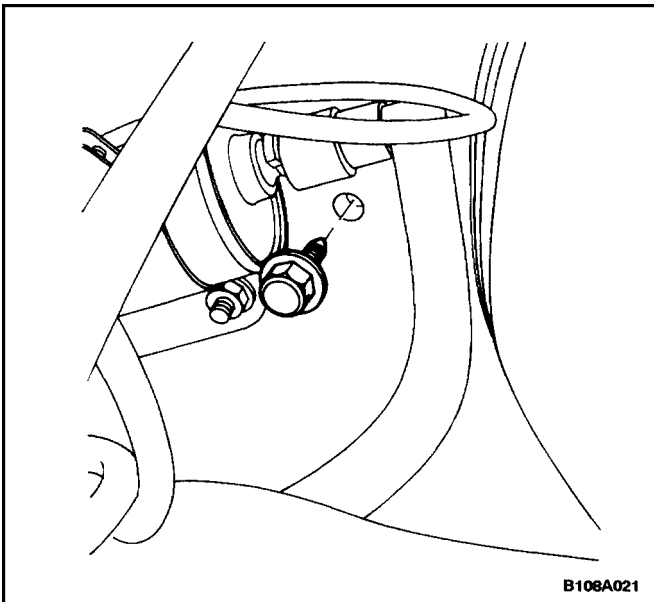
## HEATER/AIR DISTRIBUTOR CASE ASSEMBLY

### Removal Procedure

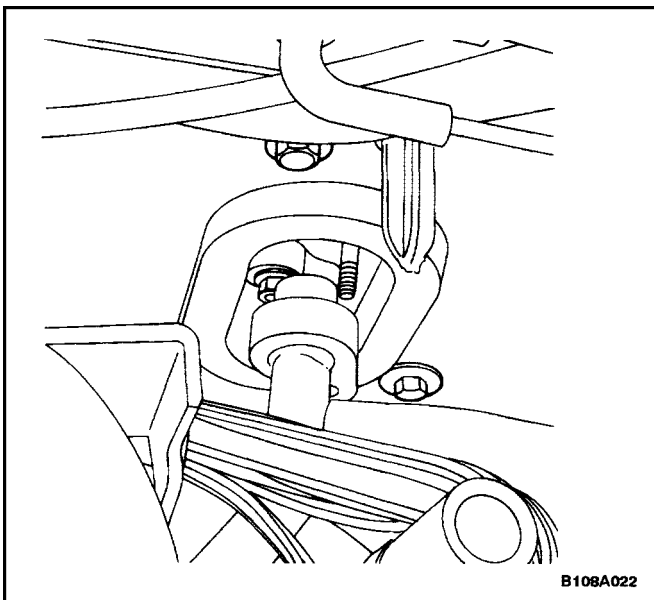
1. Disconnect the negative battery cable.
2. Remove the instrument panel carrier assembly. Refer to *Section 9E, Instrumentation/Driver Information*.
3. Drain the cooling system. Refer to *Section 1D, Engine Cooling*.
4. Turn the vacuum hose and pull the hose off.



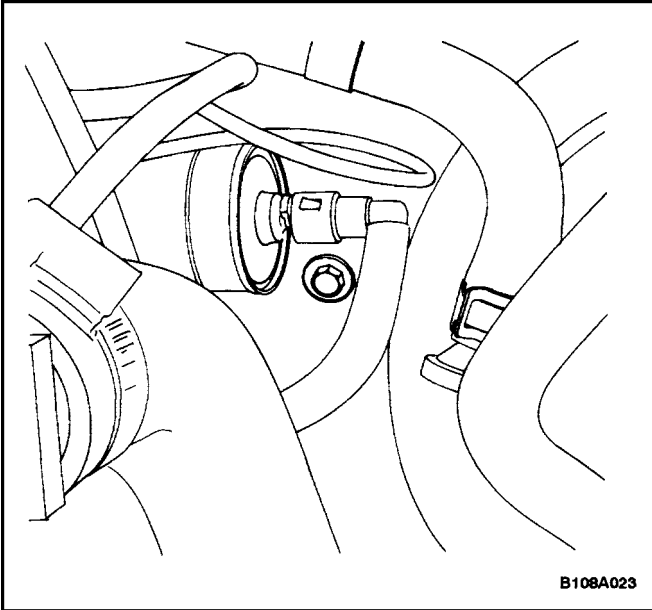
5. Compress the heater hose clamps at the bulkhead and slide the clamps toward the engine.
6. Remove the two heater hoses from the core lines at the bulkhead.
7. Remove the screws that secure the heater/air distributor case assembly to the bulkhead on either side of the heater core pipes.



8. Remove the heater/air distributor case screw located above the fuel filter on the engine compartment side of the bulkhead.



9. Have an assistant support the heater/air distributor case from inside the vehicle.
- Notice :** Handle the case carefully to avoid damage to the mechanical door operating linkage.
10. Remove the screws from the connecting block opening mount on the engine compartment side of the bulkhead on the right-hand side of the vehicle. The case assembly will start to drop.
  11. Pull the heater/air distributor case straight away from the bulkhead to free the alignment pegs from their openings in the bulkhead.
  12. Remove the heater/air distributor case assembly from the vehicle.



### Installation Procedure

1. Position the heater/air distributor case in the vehicle.

**Notice :** Avoid damaging the heater core tubes by making sure they do not contact the bulkhead opening.

2. Slowly raise the heater/air distributor case into position.
  - Insert the guide pegs through their holes in the bulkhead.
  - Hold the case in position against the bulkhead while installing and tightening the screws on the engine side of the bulkhead.
3. Install the screws through the bulkhead from the engine compartment side.
  - Install the two screws at the connecting block mount.
  - Install the screw above the fuel filter.

### Tighten

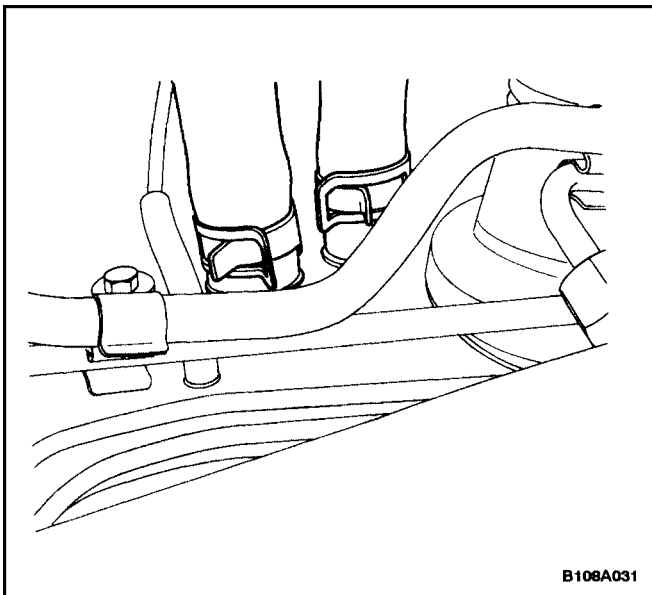
Tighten the heater/air distributor case assembly screws to 4 N•m (35 lb-in).

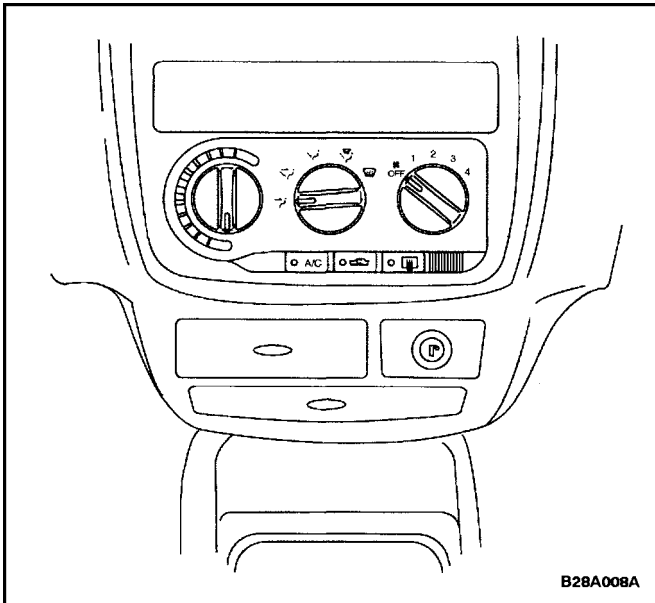
4. Install the two heater/air distributor case screws that flank the heater core pipes.

### Tighten

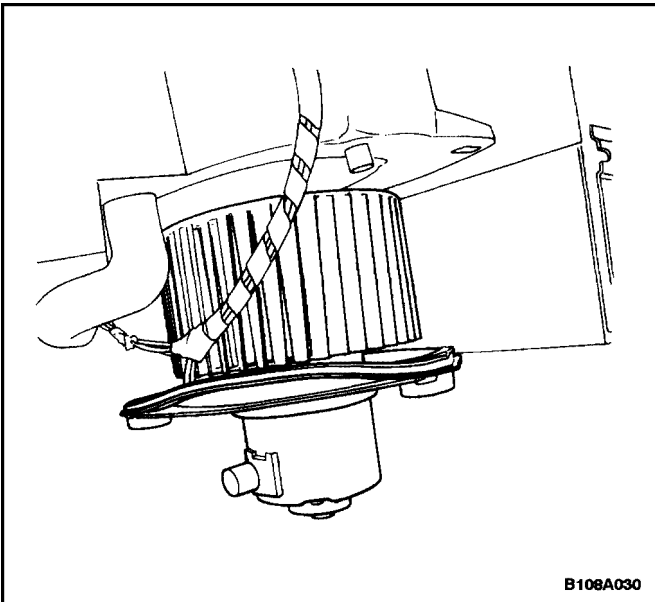
Tighten the heater/air distributor case assembly screws to 4 N•m (35 lb-in).

5. Install the vacuum hose.
6. Install the two heater hoses.
7. Slide the heater hose clamps into position.

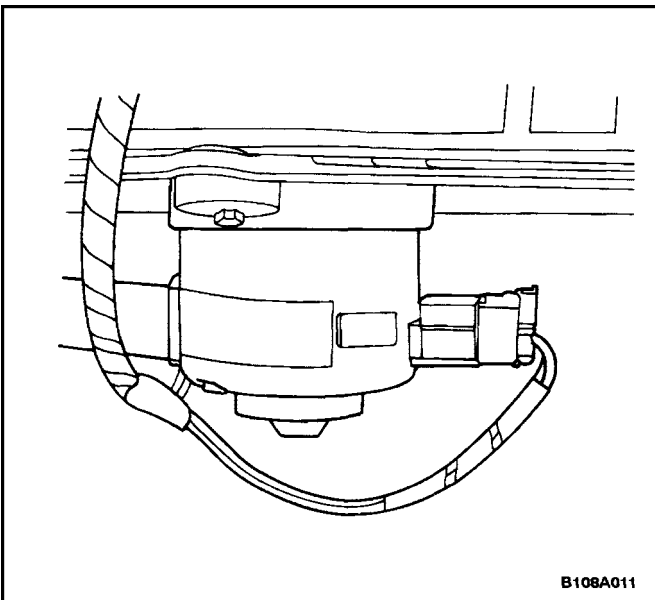




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8. Install the instrument panel carrier assembly. Refer to *Section 9E, Instrumentation/Driver Information*.
9. Fill the cooling system. Refer to *Section 1D, Engine Cooling*.
10. Connect the negative battery cable.

**Notice :** If the vehicle is equipped with air conditioning, refer to *Section 7B, Heater/Air Distributor Case Assembly*.

11. Operate the controls to verify the proper function of the heating and ventilating systems.

## BLOWER MOTOR

### Removal Procedure

1. Disconnect the negative battery cable.
2. Remove the glove box. Refer to *9E, Instrumentation/Driver Information*.
3. Remove the footwell upper cover. Refer to *Section 9E, Instrumentation/Driver Information*.
4. Disconnect the blower motor electrical connector.
5. Remove the blower motor cooling hose.
6. Remove the screws that secure the motor to the heater/air distributor case.
7. Remove the motor, the seal, and the shock mount pads from the heater/air distributor case by gently pulling the motor straight down and out.

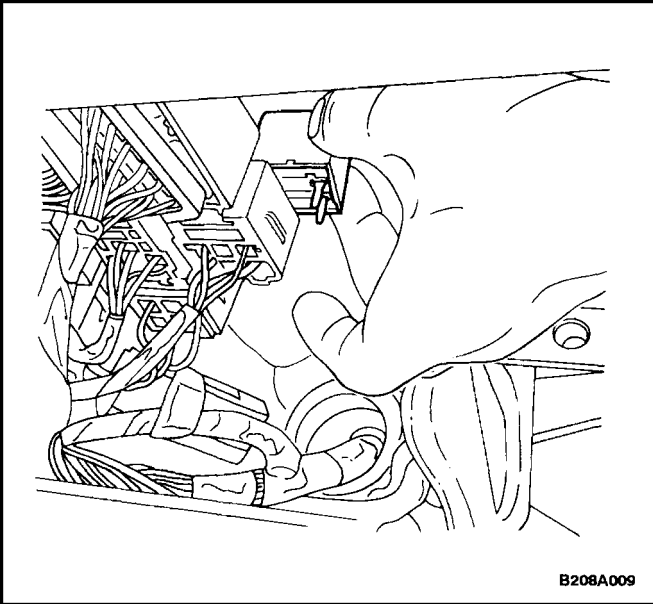
### Installation Procedure

1. Install the blower motor and the seal with the shock mount pads in the heater/air distributor case. Hold the blower motor in position.
2. Install the screws to secure the blower motor to the heater/air distributor case.

### Tighten

Tighten the blower motor retaining screws to 6 N•m (53 lb-in).

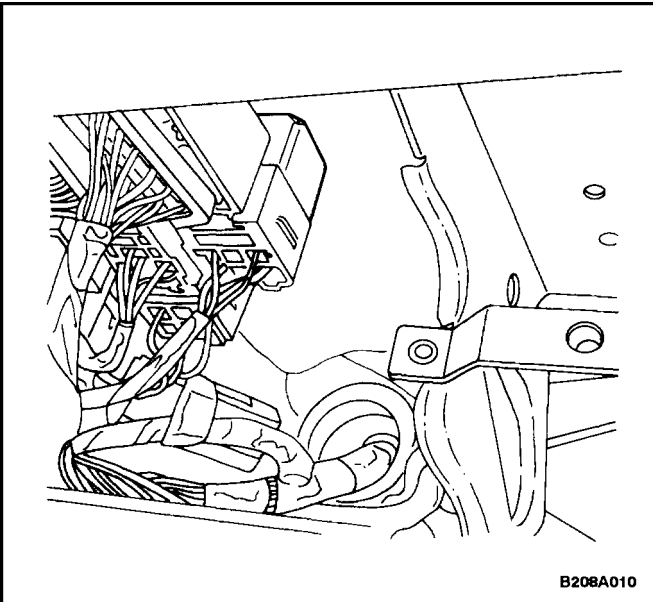
3. Install the blower motor cooling hose.
4. Connect the blower motor electrical connector.
5. Connect the negative battery cable.
6. Confirm that the blower motor operates properly.
7. Replace the footwell upper cover. Refer to *Section 9E, Instrumentation/Driver Information*.
8. Replace the glove box. Refer to *Section 9E, Instrumentation/Driver Information*.



## HIGH-BLOWER RELAY

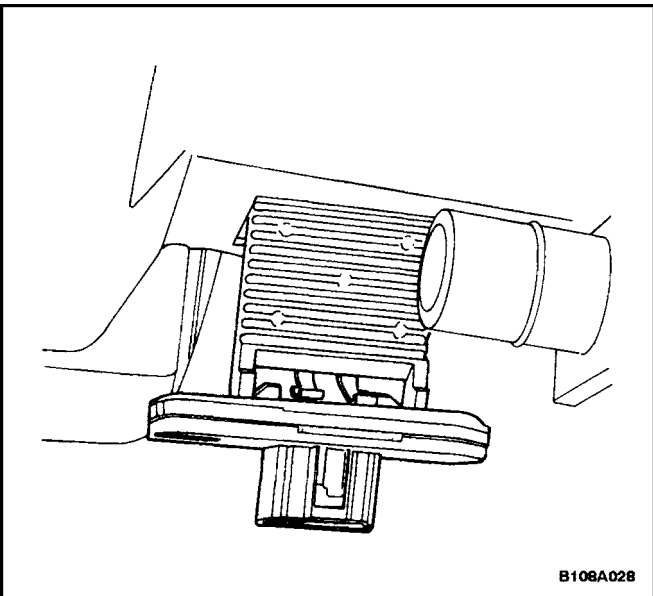
### Removal Procedure

1. Disconnect the negative battery cable.
2. Locate the high-blower relay in the connector box under the driver's side of the instrument panel. Note the colors of the wires entering the connector from underneath: RED, BLK, PPL, ORN.
3. Pull out the relay.



### Installation Procedure

1. Align the relay contacts with the relay terminal slots.
2. Push the relay firmly into the base. The relay must be seated and flush with the base edge.
3. Connect the negative battery cable.

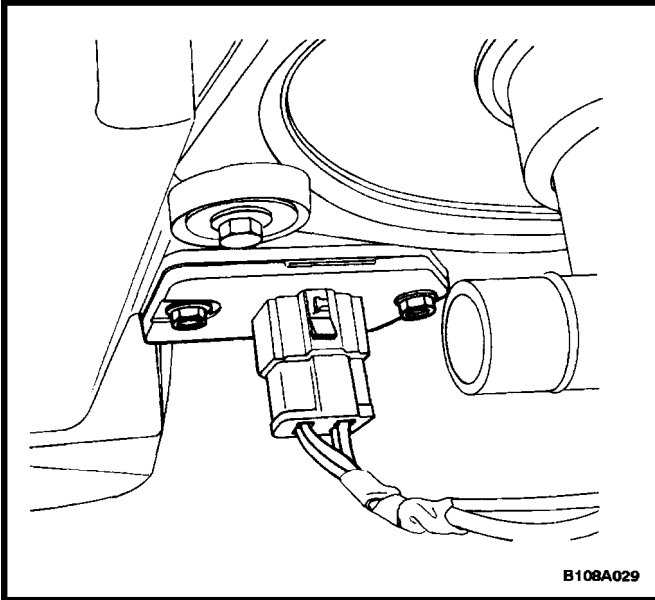


## BLOWER RESISTOR

### Removal Procedure

1. Disconnect the negative battery cable.
2. Remove the glove box. Refer to *Section 9E, Instrumentation/Driver Information*.
3. Remove the footwell upper cover. Refer to *Section 9E, Instrumentation/Driver Information*.
4. Disconnect the electrical connector at the resistor.
5. Remove the mount screws from the resistor.
6. Remove the resistor from the heater/air distributor case by gently pulling the resistor downward.





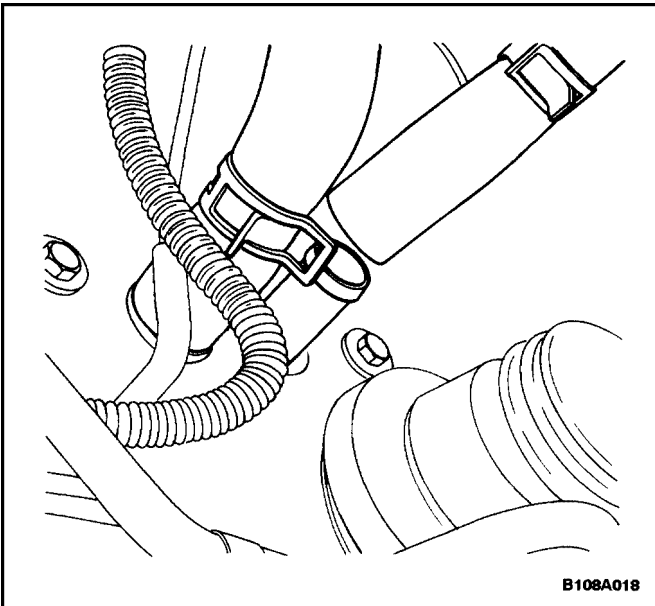
### Installation Procedure

1. Install the new resistor into the heater/air distributor case with the screws.

#### Tighten

Tighten the blower resistor retaining screws to 6 N•m (53 lb-in).

2. Connect the electrical connector at the resistor.
3. Connect the negative battery cable.
4. Confirm the proper performance of the blower.
5. Replace the footwell upper cover. Refer to *Section 9E, Instrumentation/Driver Information*.
6. Replace the glove box. Refer to *Section 9E, Instrumentation/Driver Information*.



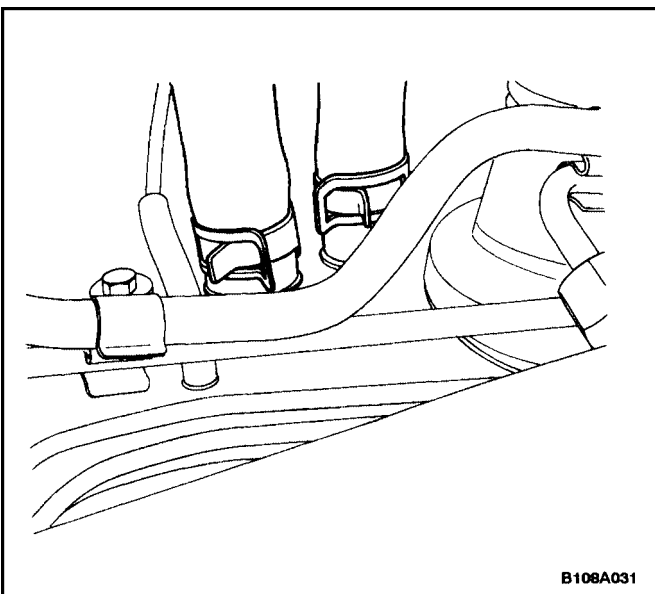
## HEATER HOSES

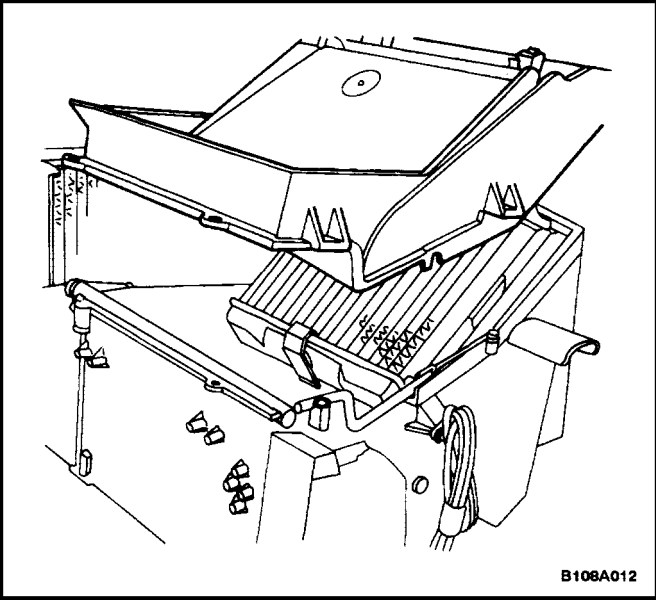
### Removal Procedure

1. Partially drain the cooling system. Refer to *Section 1D, Engine Cooling*.
2. Compress and slide the two heater hose spring clamps at the bulkhead rearward.
3. Gently twist the hose from the left to the right and back again to loosen the bond between the hose and the tube.
4. Remove the end of the hose from the tube.
5. Repeat Steps 3 and 4 with the other hose.
6. Compress the heater hose spring clamp on the inlet coolant line and slide the clamp rearward.
7. Remove the heater hose from the vehicle.
8. Compress the heater hose spring clamp at the connection below the intake manifold and slide the clamp rearward.
9. Remove the heater hose from the vehicle.

### Installation Procedure

1. Install the left heater hose to the coolant inlet line fitting. Slide the end of the heater hose over the coolant fitting until the hose is seated.
2. Install the right heater hose to the fitting below the intake manifold. Slide the end of the heater hose over the fitting until it is seated.
3. Install and seat the other end of each heater hose.
4. Compress and slide the spring clamps into position on the heater hoses and release the tension.
5. Fill the cooling system. Refer to *Section 1D, Engine Cooling*.
6. Check the hoses for leaks.

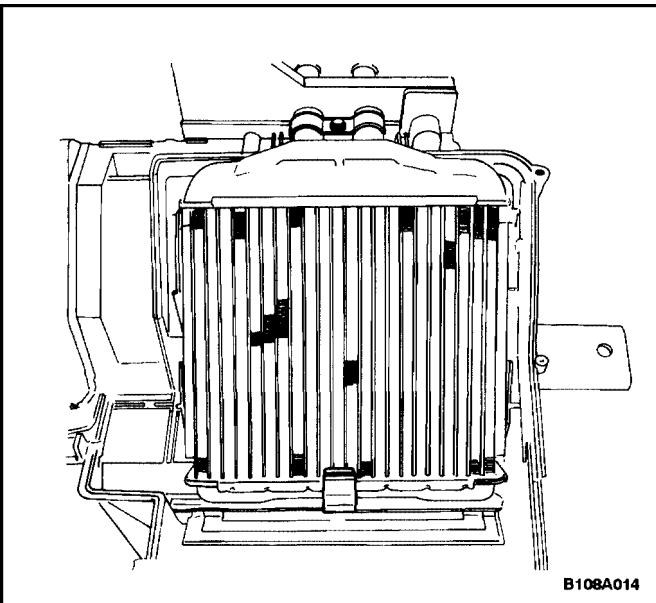
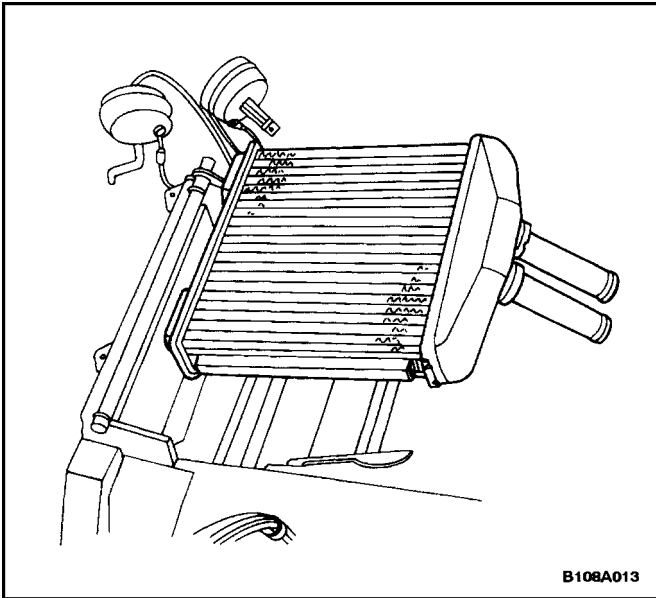




## HEATER CORE

### Removal Procedure

1. Disconnect the negative battery cable.
2. Remove the instrument panel from the vehicle. Refer to *Section 9E, Instrumentation/Driver Information*.
3. Remove the heater/air distributor case from the vehicle. Refer to "Heater/Air Distributor Case Assembly" in this section.
4. Disconnect the vacuum actuators from the vent/floor door and the defroster door.
5. Remove the vacuum actuators from the heater/air distributor case.
6. Remove the screws that secure the heater core cover to the heater/air distributor case assembly.
7. Slowly separate the lower heater core cover from the rest of the assembly.
8. Remove the screw and the bracket clamp that secure the heater core lines to the case.
9. Remove the spring clamp that secures the heater core body to the case.
10. Remove the heater core from the case.



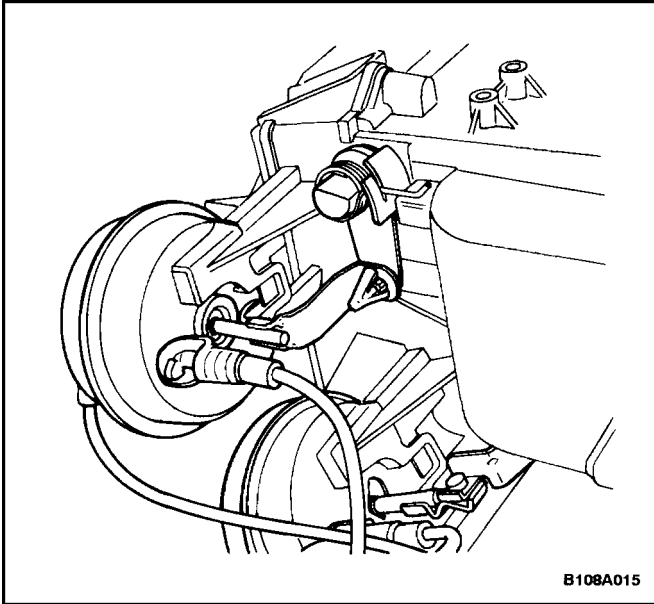
### Installation Procedure

1. Install the heater core into the case.
2. Secure the heater core lines to the case with the retaining bracket clamp and the screw.

#### **Tighten**

Tighten the heater core retaining bracket screw to N•m (lb-in).

3. Install the heater core body with the retaining spring clamp.



4. Install the heater core cover.
5. Install and tighten the screws that secure the heater core cover to the heater/air distributor case assembly.

### **Tighten**

Tighten the heater core cover screws to N•m (lb-in).

6. Install the actuators for the vent/floor and the defroster doors.
7. Install the heater/air distributor case. Refer to "Heater/Air Distributor Case Assembly" in this section.
8. Install the instrument panel. Refer to *Section 9E, Instrumentation/Driver Information*.
9. Fill the cooling system.
10. Connect the negative battery cable.

## **REAR HEATING DUCT**

Some vehicles are equipped with rear seat heating ducts. Should there be no airflow to the rear, look for any obstructions, such as items on the floor under the front seats. Also, check for air leaks between the heater/air distributor assembly and the rear ducts.

# GENERAL DESCRIPTION AND SYSTEM OPERATION

## HEATING AND VENTILATION SYSTEMS

The base heater system is designed to provide heating, ventilation, windshield defrosting, and side window defogging. On some vehicles, it also provides heat directly to the rear seat area.

The heater and fan assembly blower regulates the airflow from the air inlet for further processing and distribution.

The heater core transfers the heat from the engine coolant to the inlet air.

The temperature door regulates the amount of air that passes through the heater core. The temperature door also controls the temperature of air by controlling the mix of heated air with ambient air.

The mode door regulates the flow and the distribution of processed air to the heater ducts and to the defroster ducts.

The console-mounted heating and ventilation control panel contains three rotary control knobs and two push control knobs which operate as follows:

### Rotary Temperature Control Knob

- Actuates by cable.

- Raises the temperature of air entering the vehicle by rotation toward the right, or the red portion of the knob.

### Rotary Mode Control Knob

- Actuates by vacuum.
- Regulates the air distribution between the windshield, the instrument panel, and the floor vents.

### Rotary Blower Control Knob

- Turns ON to operate the blower motor at four speeds.
- Turns OFF to stop the blower.
- Operates completely independently from both the mode control knob and the temperature control knob.
- Changes the fan speed in any mode and at any temperature setting.

### Rear Window Defogger Push Knob

- Controls the rear window defogger.
- Turns On the rear window defogger when the push knob is pressed and illuminates the indicator lamp.

### Fresh Air Control Push Knob

- Operates by vacuum.
- Switches between recirculating the passenger compartment air and bringing outside air into the passenger compartment.
- Is normally in the fresh air mode.
- Illuminates the indicator lamp when in the recirculating mode.