

2001 Cadillac Catera

2000-01 AUTOMATIC A/C-HEATER SYSTEMS Catera

2000-01 AUTOMATIC A/C-HEATER SYSTEMS

Catera

SPECIFICATIONS

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Application	Specification
Compressor Type	Harrison V5 5-Cyl.
Compressor Belt Tension	(1)
System Oil Capacity	9 ozs.
Refrigerant (R-134a) Capacity	(2) 46.4 ozs.
System Operating Pressures (3)	
High-Side	145-261 psi (10.2-18.4 kg/cm ²)
Low-Side	28-30 psi (1.9-2.1 kg/cm ²)
(1) Belt tension is adjusted by automatic belt tensioner.	
(2) Use PAG Oil (Part No. 12345923).	
(3) Measured at 2000 RPM with ambient temperature at 68°F (20°C).	

DESCRIPTION & OPERATION

WARNING: To avoid injury from accidental air bag deployment, read and carefully follow all SERVICE PRECAUTIONS and DISABLING & ACTIVATING AIR BAG SYSTEM procedures in AIR BAG SYSTEM SAFETY article in GENERAL SERVICING.

Electronic Climate Control (ECC) system automatically regulates and maintains selected in-vehicle temperature between 65°F (18°C) and 85°F (29°C) regardless of changes in outside air temperature. Settings of 60°F (16°C) and 90°F (32°C) provide unregulated cooling and heating, respectively. Climate Control Panel (CCP) is the main control for selecting in-vehicle comfort levels. Fresh or recirculated air is pulled through HVAC module by the blower motor. Air is then routed through heater core or evaporator, depending on mode selected. CCP provides individual (dual zone) driver and passenger temperature control knobs. If a fault occurs, a trouble code is stored in memory inside the heater and A/C control module. System also defrosts windshield and side windows.

Automatic A/C heater system is a Variable Displacement Orifice Tube (VDOT) system that can match A/C demands under all conditions without cycling. Compressor is cut-off under conditions such as: wide open throttle, low idle speed, low ambient temperature, high power steering loads and high engine oil or engine coolant temperatures. Compressor has a mechanical destroyer that will destroke compressor, by changing wobble plate angle, during engine speeds of 3000-3800 RPM.

HEATER & A/C CONTROL

AUTO Mode

Press driver's side TEMP knob to set system in AUTO mode. Once system is set, sensors will provide input to A/C-heater system to obtain last setting or maintain desired interior temperature. Air delivery goes to automatic and system illuminates AUTO and air delivery mode icons. Blower speed adjusts automatically as interior temperature nears temperature setting. Display will show SET TEMP information for 5 seconds, then revert to OUTSIDE

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TEMP. If driver's temperature control is set at 60°F (16°C) or 90°F (32°C), system will not operate automatically until a different temperature is selected.

Off

A/C off mode deactivates the A/C compressor. Off mode deactivates entire automatic A/C-heater system. System will attempt to maintain previously set temperature without the use of blower motor or A/C. Display will show SET TEMP for 5 seconds, then will display outside air temperature. With system off and vehicle moving, air is forced through HVAC module and out heater and defrost vents. Air temperature can be warmed, but not cooled.

Temperature Control

The driver and passenger temperature control knobs provide a dual zone heating and cooling feature. The dual zone feature may be changed to a single zone mode by depressing passenger knob. Driver's knob changes temperature on both sides of vehicle. Passenger's knob is independent of driver's side. Passenger's temperature can be set anywhere between 60°F (16°C) and 90°F (23°C).

Mode Button

Pressing mode button will manually lock system in current air distribution setting and stop automatic mode control. Display will turn off AUTO and illuminated MODE icons will be displayed. Pressing mode button repeatedly will cycle manual delivery modes in the following sequence:

- UPPER
- LOWER
- DEFOG
- BI-LEVEL

Defog Mode

This mode divides air between windshield and lower outlets and a small amount toward side window vents. Digital display will show front defog mode and lower vent icon. Recirculated air mode will operate.

Front Defog Mode

In this mode, most of airflow will be directed to windshield, for quick removal of fog or frost, and a small amount of air toward lower and side window outlets. Indicator light on button will illuminate and digital display will show defog mode icon. Depressing front defog mode button again will return system to last mode.

Fan Speed

Blower motor speed is controlled by A/C-heater system using a blower controller. A manual fan speed change will override the AUTO mode setting. A bar graph is displayed (1-5 bars).

Recirculated Air Mode

The recirculated air mode closes off most of the entrance of outside air and recirculates passenger compartment air. Recirculated air mode does not operate in front defog mode.

Upper Mode

This mode directs most airflow through instrument panel vents and a very small amount of air to lower outlets. Display will show upper airflow (face) icon.

Bi-Level Mode

This mode provides outside airflow to the instrument panel and to floor outlet. Cooler air is directed to instrument

panel vents, while warmer air is directed through lower outlets. Display will show floor/panel airflow icon.

Floor Mode

In this mode, all airflow is directed to the floor outlet ducts. Display will show floor airflow icon.

Display Panel

The vacuum fluorescent display panel provides system operating information for the driver. The set temperature can be displayed in °F or °C. To switch between °F and °C, depress driver's TEMP button for at least 3 seconds.

Outside temperature reading is displayed in the same temperature value as the requested interior temperature setting. If OUTSIDE temperature displays "--", this indicates outside temperature sensor failure. A freeze warning feature causes outside temperature display to flash. This feature indicates outside temperature is cold enough to encounter icy road surfaces.

When AUTO is displayed, it indicates system is in automatic operating mode. When system is manually turned off, AC OFF will be displayed. Defrost and rear heated window functions are displayed with an appropriate icon and can be initiated by depressing appropriate buttons.

Adjustment of fan speed is accomplished by depressing rocker button either up or down. Fan speed icon is not displayed in AUTO mode. In manual mode, fan speed is designated by graduated bars.

MODE rocker button will adjust direction of the airflow as designated by icon displayed on panel. Arrows show direction of airflow. Defog icon will appear in grouping when set.

Recirculated air icon will be displayed when system is manually set to recirculate passenger compartment air. Recirculated air button controls function in either the AUTO or manual mode.

A/C COMPRESSOR CONTROLS

When A/C button on heater and A/C control is pressed, an A/C compressor request signal is sent through refrigerant pressure switch and Engine Control Module (ECM) to coil of A/C compressor relay. This enables A/C compressor relay to energize, allowing ignition voltage to energize A/C compressor clutch coil and fan control relay. When fan control relay energizes, battery voltage is supplied to auxiliary cooling fan No. 1 and through normally open contacts of fan control relay, to auxiliary cooling fan No. 2. If coolant temperature reaches 248°F (120°C), temperature switch No. 2 contacts will open and compressor clutch coil is disengaged causing the A/C system to turn off. Temperature switch No. 2 will not allow A/C system to turn back on until coolant temperature has dropped to 239°F (115°C) or less.

The A/C compressor clutch coil can also be turned off by refrigerant pressure switches (low-pressure switch or high-pressure switch). Low-pressure switch will turn A/C compressor clutch off as soon as refrigerant pressure falls to about 26 psi (1.8 kg/cm²). This is done by opening low-pressure switch contacts and not allowing battery voltage to pass through A/C compressor relay to compressor clutch coil. Low-pressure switch activates A/C compressor clutch when refrigerant pressure increases to about 36.3 psi (2.6 kg/cm²).

High-pressure switch will turn A/C compressor clutch off as soon as refrigerant pressure exceeds approximately 435 psi (30.6 kg/cm²). This is done by opening high-pressure switch contacts in refrigerant pressure switch and not allowing battery voltage to pass through A/C compressor relay to A/C compressor clutch. High-pressure switch activates A/C compressor clutch when refrigerant pressure drops to less than about 290 psi (19.3 kg/cm²).

When refrigerant pressure exceeds approximately 159.4 psi (11.2 kg/cm²), the A/C control switch contacts will close and engine idle speed will increase to compensate for the RPM drop that occurs when A/C system is switched on. A/C control switch is installed in high-pressure line, between A/C compressor and condenser. When refrigerant

pressure drops to less than approximately 130.5 psi (9.2 kg/cm²), A/C control switch contacts will close and allow engine idle speed to return to normal.

ACTUATORS

Automatic A/C-heater system uses 5 electrically operated actuators (stepper motors) and 2 vacuum actuators. Electrically operated actuators control driver's and passenger's temperature doors, inside air (panel) valve door, and mode valve (floor) door. Vacuum actuators control interior air recirculation valve and heater cut-off valve.

AIR DELIVERY & TEMPERATURE CONTROLS

Outside (ambient) air temperature sensor is a thermistor, located in front grille area under front bumper, that controls signal voltage to heater and A/C control. The heater and A/C control supplies a reference voltage of about 5-volt to the sensor's circuit. When the sensor is cold, its resistance is high, and heater and A/C control will see a high voltage signal. When sensor warms up, its resistance is reduced and signal voltage is pulled low through ground circuit. Signal voltage varies from 5-volt (open circuit) to zero volts (short circuit).

Headlight automatic control ambient light sensor is a photo diode that controls signal voltage to heater and A/C control. Heater and A/C control monitors voltage on the circuit to this sensor. When sensor is exposed to direct light, heater and A/C control reads a low voltage signal. As sensor becomes shaded, signal voltage increases. Signal voltage varies from 5-volt (open circuit) to zero volts (short circuit). Light sensor influences the A/C-heater system by changing blower speed, air distribution, and temperature depending on the sun's intensity (sunload sensor input).

Left and right outlet temperature sensors are thermistors that control signal voltages to the heater and A/C control. When sensors are cold, their resistance is high. When sensors warm up, their resistance is reduced and signal voltage is pulled low through ground circuit. Signal voltage varies from 5-volt (open circuit) to zero volts (short circuit).

BLOWER CONTROLS

Airflow is controlled through blower motor control module by increasing or decreasing a 12 volt pulse width signal (4-12 volts), which varies blower motor speed. Adjustments to blower motor speed are made based on vehicle speed, coolant temperature, and solar load (sunload sensor input). There are some instances which may override the normal operation of the blower motor in order to limit snow ingestion, purge air ducts, cooling of the instrument cluster, or to enhance heater warm-up performance.

COLD AIR PURGE

During a start in cool weather with a warm engine, humid air which collects around the heater core could cause windshield fogging. To prevent this, a cold air purge routine is programmed into the heater and A/C control. With coolant temperature at least 60°F (16°C) and blower motor and air distribution in AUTO mode, air valves will move to guide airflow away from windshield. During first 5 seconds, while air valves are moving into position, blower motor will not run. Then for the next 30 seconds, a low blower motor speed purges moist air from the system. System then reverts to its normal operating mode.

ELECTRIC COOLING FANS

The electric cooling fan circuits consist of one engine cooling fan, 2 auxiliary cooling fans, 2 temperature switches, the A/C compressor refrigerant pressure switch, the Engine Control Module (ECM), cooling blower, the timing control pump, the auxiliary water pump, 7 fan control relays, and one engine cooling fan resistor. The auxiliary water pump is provided with battery voltage at all times, enabling it to operate anytime the ignition switch is on.

At 212°F (100°C), temperature switch No. 1 stage one contacts will close, enabling ECM relay and cooling fan control relay to energize. When ECM relay energizes, ignition voltage will be applied to the ECM cooling blower, allowing it to operate.

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When cooling fan control relay energizes, battery voltage is applied to auxiliary cooling fan No. 1 and to auxiliary cooling fan No. 2 through the normally open contacts of fan control relay. This will cause the auxiliary cooling fans to operate in series at half speed.

Fan control relay will also supply battery voltage to the engine cooling fan after it goes through the engine cooling fan resistor. The engine cooling fan resistor will cause the engine cooling fan to operate at half speed. Fan control relay will also supply battery voltage to the timing control pump through normally closed contacts of the auxiliary water pump relay. This will allow the timing control pump to operate.

Temperature switch No. 1 stage one contacts will open when coolant temperature reaches 203°F (95°C). This will turn on all 3 fans, the ECM cooling blower, and turn the timing control pump off, unless the A/C system is on.

If ignition is off and coolant temperature is greater than 212°F (100°C), both auxiliary cooling fans, the engine cooling fans, and the timing control pump will remain on until the coolant temperature drops to less than 203°F (95°C).

If temperature reaches 221°F (105°C), temperature switch contacts will close enabling fan control relays to energize. When fan control relay energizes, auxiliary cooling fan No. 1 will go to full speed as it is no longer in series with auxiliary cooling fan No. 2. When fan control relay energizes, battery voltage is applied to auxiliary cooling fan No. 2 which operates at full speed.

With temperature switch No. 1 stage one contacts closed, the ECM cooling blower, the timing control pump, and the engine cooling fan (half speed) will continue to operate. Temperature switch No. 2 contacts will open when coolant temperature reaches 212°F (100°C) and cause the operation of the auxiliary cooling fans to operate differently as designated by temperature switch No. 1.

If coolant temperature reaches 230°F (110°C), temperature switch No. 2 stage two contacts will close, enabling fan control relay to energize. When fan control relay energizes, battery voltage will be applied directly to engine cooling fan, causing it to operate at full speed. All other operations that were taking place before the coolant temperature reached 230°F (110°C) will remain in effect. Temperature switch No. 1 stage two contacts will open when coolant temperature reaches 221°F (105°C) and the engine cooling fan will return to half speed.

At coolant temperatures greater than approximately 230°F (110°C), all 3 cooling fans operate at full speed. The ECM cooling blower, the timing control pump, and the auxiliary water pump are also operating. Only 6 of the 7 relays operate at this time, unless the A/C system is turned on. In this case, fan control relay and the A/C compressor relay will also operate.

To prevent excessively high refrigerant pressure, auxiliary cooling fans are switched from first speed to second speed at refrigerant pressures greater than approximately 276 psi (19.4 kg/cm²). When pressure drops less than approximately 218 psi (15.3 kg/cm²), auxiliary cooling fans are switched back to first speed.

HOT AIR PURGE

During a start in warm weather, warm moist air can accumulate around evaporator. To divert this undesirable air, heater and A/C control will disable blower motor for 5 seconds while mode valves move to divert air to floor outlets away from driver's face. After positioning mode valves, heater and A/C control will set blower motor on low for 30 seconds to purge air from A/C-heater module before returning to AUTO mode.

INSIDE AIR TEMPERATURE SENSOR

The inside air temperature sensor is located in A/C-heater control module, behind a small grille. Inside air temperature sensor input takes place only during initial start-up. In the case of an inside air temperature sensor failure, the A/C-heater system will default to a value of 75°F (24°C).

OUTSIDE AIR TEMPERATURE SENSOR

Outside (ambient) temperature sensor is located on bottom of front bumper. Sensor is exposed to the airflow across the front of the vehicle and provides a sample of outside air (ambient) temperature. In the case of an outside air temperature sensor failure, heater and A/C control will default to a value of 50°F (10°C).

SOLAR/TWILIGHT SENTINEL SENSOR

Solar/Twilight sentinel sensor is a photo-electric cell that provides 2 inputs to heater and A/C control system. One input is used by heater and A/C control for temperature control compensation. The other input is used to determine the need for the twilight sentinel. This signal is sent from heater and A/C control to the Body Control Module (BCM).

Solar/twilight sentinel sensor input to heater and A/C system provides a means of determining intensity of solar heat passenger compartment is subjected to. In the case of a sunload sensor failure, heater and A/C control will default to a value of zero (darkness).

ADJUSTMENTS

CALIBRATING ACTUATORS

Turn ignition on. On heater and A/C control, simultaneously press and hold AUTO and OFF buttons for at least 5 seconds. Stepper motors will cycle from one stop to the other. Operation of stepper motors may be heard.

PROGRAMMING

PROGRAMMING ECM

All Engine Control Module (ECM) functions must be programmed using Tech 2 scan tool. Follow instructions provided with scan tool.

TROUBLE SHOOTING

WARNING: To avoid injury from accidental air bag deployment, read and carefully follow all SERVICE PRECAUTIONS and DISABLING & ACTIVATING AIR BAG SYSTEM procedures in AIR BAG SYSTEM SAFETY article in GENERAL SERVICING.

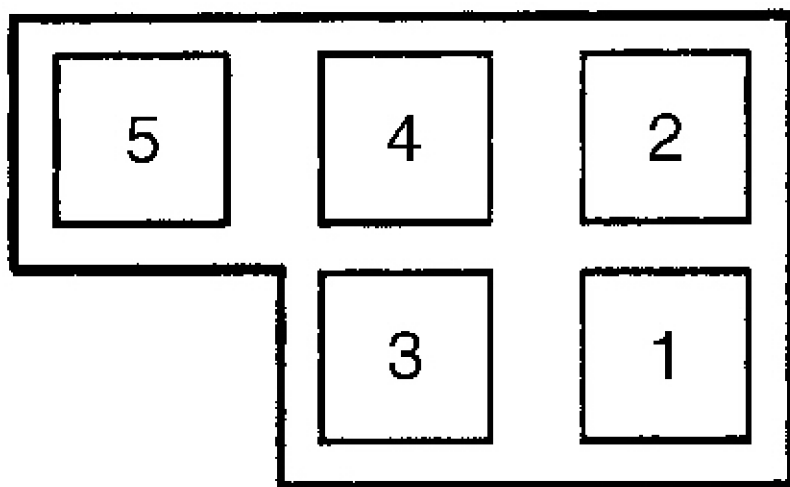
Verify customer complaints by operating system in all available modes. Carefully check the following for possible cause of problems and repair as necessary: damaged vacuum hoses, system components, damaged compressor drive belt, open fuses, damaged/misrouted wiring circuits, and damaged/disconnected connectors. If inspection reveals a problem, service as necessary and repeat preliminary inspection. If problem remains after initial inspection, perform **DIAGNOSTIC SYSTEM CHECK** under DIAGNOSTIC TESTS and repair any DTC related problem first. If no DTCs exist, diagnose fault by symptom. See **SYMPTOM TESTS**.

SYMPTOM TESTS

BLOWER MOTOR INOPERATIVE AT ANY SPEED

1. Check HEATER BLOWER fuse (30-amp). If fuse is blown, go to next step. If fuse is not blown, go to step 3.
2. Check battery feed circuit to blower control module (Red wire) for short to ground. If battery feed circuit is shorted to ground, go to step 4. If battery feed circuit is not shorted to ground, go to step 5.
3. Remove HEATER BLOWER fuse. Check for voltage at battery feed terminal in fuse block. If 11-13 volts

- exists, go to step 6 . If 11-13 volts does not exist, go to step 7 .
4. Repair short to ground in Red wire between fuse block and blower control module. See **WIRING DIAGRAMS** . Repair HEATER BLOWER fuse. After repair is complete, go to step 17 .
 5. Short to ground may be intermittent at this time. Replace HEATER BLOWER fuse. If fuse does not blow, go to step 17 . If fuse blows, go to step 12 .
 6. Install HEATER BLOWER fuse. Disconnect blower motor control module main Black 5-pin harness connector. Measure voltage between blower motor harness connector terminals No. 1 (Red wire) and No. 3 (Black wire). See **Fig. 1** . If 11-13 volts exists, go to step 8 . If 11-13 volts does not exist, go to step 9 .



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Fig. 1: Identifying Blower Control Module 5-Pin Harness Connector Terminals
Courtesy of GENERAL MOTORS CORP.

7. Repair open in battery feed circuit (Red wire) between fuse block and blower control module. See **WIRING DIAGRAMS** . After repair, go to step 17 .
8. Connect blower motor harness connector. Measure voltage between ground and blower motor Red wire terminal (blower motor positive). If 11-13 volts exists, go to step 10 . If 11-13 volts does not exist, go to step 13 .
9. Move DVOM negative lead to another ground location. Remeasure voltage at No. 1 (Red wire). If 11-13 volts exists, go to step 11 . If 11-13 volts does not exist, go to step 15 .
10. Disconnect blower motor ground (Brown wire) from blower motor control module harness connector. Connect a fused jumper wire between ground and Brown wire terminal. Turn ignition on. If blower motor operates, go to step 13 . If blower motor does not operate, go to step 16 .
11. Check for open or short to ground in Black/Blue wire between blower motor control and heater and A/C control. See **WIRING DIAGRAMS** . If open or short to ground exists, go to next step. If open or short to ground does not exist, go to step 13 .
12. Repair open or short to ground in Black/Blue wire. See **WIRING DIAGRAMS** . After repair, go to step 17 .
13. Replace blower control unit. After repair, go to step 17 .
14. Repair open in Black wire between blower control unit and ground. See **WIRING DIAGRAMS** . After repair, go to step 17 .
15. Repair open in Red wire between blower control unit and splice S249. See **WIRING DIAGRAMS** . After

repair, go to step 17 .

16. Replace blower motor. After repair, go to step 17 .
17. Recheck system operation. If problem still exists, go to step 1 . If problem no longer exists, system is okay at this time.

BLOWER MOTOR ALWAYS ON

1. Remove heater and A/C control. See **HEATER & A/C CONTROL ASSEMBLY** under REMOVAL & INSTALLATION. Disconnect heater and A/C control Black 22-pin harness connector C1. Disconnect blower control module Black 5-pin harness connector. Turn ignition on. Check for short to power in Black/Blue wire between blower control module and heater and A/C control. If short to power exists, go to next step. If short to power does not exist, go to step 3 .
2. Repair short to power in Black/Blue wire. See **WIRING DIAGRAMS** . After repair, go to step 4 .
3. Disconnect blower motor ground (Brown wire) from blower control module. If blower motor stops operating, go to step 5 . If blower motor does not stop operating, go to step 7 .
4. Reassemble or reconnect components removed and disconnected in previous steps. Turn ignition on. Press AUTO on heater and A/C control. Cycle through all blower speeds. If all blower speeds operate properly, system is okay at this time. If all blower speeds do not operate properly, go to step 6 .
5. Replace blower control module. Go to step 4 .
6. Replace heater and A/C control. See **HEATER & A/C CONTROL ASSEMBLY** under REMOVAL & INSTALLATION. After repair go to step 8 .
7. Replace blower motor. See **BLOWER MOTOR** under REMOVAL & INSTALLATION. After repair go to step 8 .
8. Recheck system operation. If problem still exists, go to step 1 . If problem no longer exists, system is okay at this time.

SELF-DIAGNOSTICS

NOTE: Diagnostic Trouble Codes (DTCs) should be diagnosed and repaired before proceeding with any other tests. If no DTCs are set, diagnose problem by symptom, see appropriate symptom test under **SYMPTOM TESTS** .

DIAGNOSTIC SYSTEM CHECK

1. Connect Tech 2 Scan Tool (7000081) with appropriate cartridge to data link connector. If scan tool powers up, go to next step. If scan tool does not power up, go to SCAN TOOL DOES NOT POWER UP in BODY CONTROL MODULES - CATERA article in ACCESSORIES & EQUIPMENT.
2. Turn ignition on. Attempt to establish communication with ECM and heater and A/C control. If scan tool communicates with heater and A/C control, go to next step. If scan tool does not communicate with heater and A/C control, go to BODY CONTROL MODULES - CATERA article in ACCESSORIES & EQUIPMENT.
3. Select HEATING AND A/C display DTCs function on scan tool. If scan tool displays any DTCs, go to **DTC IDENTIFICATION** table. After a repair is completed, DTCs must be cleared from memory to ensure proper system operation. See **CLEARING DIAGNOSTIC TROUBLE CODES** . If no DTCs are displayed, diagnose problem by symptom. Go to appropriate symptom test under **SYMPTOM TESTS** .
4. Exit all scan tool tests before cycling ignition switch OFF to ON, unless scan tool instructions direct otherwise.

DTC IDENTIFICATION

DTC	Description

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<u>10</u>	Inside Air Temperature Sensor Voltage Low
<u>11</u>	Inside Air Temperature Sensor Circuit Open
<u>12</u>	Left Air Outlet Temperature Sensor Voltage Low
<u>13</u>	Left Air Outlet Temperature Sensor Circuit Open
<u>14</u>	Right Air Outlet Temperature Sensor Voltage Low
<u>15</u>	Right Air Outlet Temperature Sensor Circuit Open
<u>16</u>	Interior Air Mix Door Motor Voltage Low Or Circuit Open
<u>17</u>	Interior Air Mix Door Motor Voltage High
<u>18</u>	Left Air Mix Door Motor Voltage Low Or Circuit Open
<u>19</u>	Left Air Mix Door Motor Voltage High
<u>20</u>	Right Air Mix Door Motor Voltage Low Or Circuit Open
<u>21</u>	Right Air Mix Door Motor Voltage High
<u>22</u>	Floor Air Mix Door Motor Voltage Low Or Open Circuit
<u>23</u>	Floor Air Mix Door Motor Voltage High
<u>24</u>	Defrost Air Mix Door Motor Voltage Low Or Circuit Open
<u>25</u>	Defrost Air Mix Door Motor Voltage High
<u>27</u>	Blower Motor Voltage Low Or Circuit Open
<u>28</u>	Air Circulation Valve Voltage Low Or Circuit Open
<u>29</u>	Air Circulation Valve Voltage High
<u>30</u>	Heating Cut-Off Valve Voltage Low Or Circuit Open
<u>31</u>	Heating Cut-Off Valve Voltage High
<u>35</u>	A/C Request Signal Voltage Circuit Open
<u>36</u>	A/C Request Signal Voltage Low
<u>37</u>	A/C-Heater Control Panel Switch Stuck
<u>38</u>	Solar/Twilight Sensor Supply Voltage Low
<u>39</u>	Solar/Twilight Sensor Supply Voltage High
<u>40</u>	Solar/twilight Sensor Ground Shorted To Power
<u>51</u>	Replace A/C-Heater Control Panel
<u>52</u>	A/C-Heater Control Panel Not Programmed
<u>55</u>	Replace A/C-Heater Control Panel
<u>169</u>	Outside Air Temperature Sensor Voltage Low
<u>171</u>	Outside Air Temperature Sensor Circuit Open

CLEARING DIAGNOSTIC TROUBLE CODES

Diagnostic Trouble Codes (DTCs) are cleared using scan tool. After repairs are made, clear DTCs following scan tool manufacturer's instructions. If a scan tool is not available, DTCs are automatically cleared from memory after 20 ignition cycles if no faults exist.

DTC 10: INSIDE AIR TEMPERATURE SENSOR VOLTAGE LOW**Circuit Description**

Inside air temperature sensor is located in heater and A/C control behind a small grill which provides an inside air temperature signal to heater and A/C control. Inside air temperature sensor is a thermistor used to control signal voltage at heater and A/C control. Heater and A/C control supplies a 5-volt reference to sensor and measures voltage drop in the circuit to obtain a temperature signal. This signal is used by heater and A/C control to determine how much cooling or heating is require to obtain temperature setting for automatic temperature control. Eventually temperature input from both outlet air temperature sensors override inside air temperature and becomes

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primary temperature sensor input to heater and A/C control.

When inside air temperature is cold, thermistor resistance is high. Heater and A/C control will receive a high signal voltage input. If inside air temperature is hot, thermistor resistance is low. Heater and A/C control will receive a low voltage input.

Conditions For Setting DTC

Sensor circuit is checked continuously every 200 ms with ignition switch in ON position. Circuit stays at or near zero voltage. When DTC 10 sets, it will store in heater and A/C control memory and system will use 75°F (24°C) as a default value. DTC will clear when conditions for fault no longer exist or by clearing with a scan tool. A history DTC will clear after 20 consecutive ignition cycles if conditions for fault no longer exist.

Diagnostic Test

1. If diagnostic system check has not been performed, perform **DIAGNOSTIC SYSTEM CHECK** . If diagnostic system check has been performed, go to next step.
2. Install scan tool. Turn ignition on. Select INSIDE AIR TEMP SENSOR and display voltage. If less than .2 volt exists, go to step 4 . If .2 volt or more exists, go to next step.
3. Check for poor terminal contact at heater and A/C control connector. Repair as necessary. After repair, go to step 5
4. Replace and program heater and A/C control. After repair, go to next step.
5. Clear DTCs using scan tool. See **CLEARING DIAGNOSTIC TROUBLE CODES** . Retrieve any DTCs. If DTC 10 resets, go to step 2 .

DTC 11: INSIDE AIR TEMPERATURE SENSOR CIRCUIT OPEN

Circuit Description

Inside air temperature sensor is located in heater and A/C control behind a small grill which provides an inside air temperature signal to heater and A/C control. Inside air temperature sensor is a thermistor used to control signal voltage at heater and A/C control. Heater and A/C control supplies a 5-volt reference to sensor and measures voltage drop in the circuit to obtain a temperature signal. This signal is used by heater and A/C control to determine how much cooling or heating is require to obtain temperature setting for automatic temperature control. Eventually temperature input from both outlet air temperature sensors override inside air temperature and becomes primary temperature sensor input to heater and A/C control.

When inside air temperature is cold, thermistor resistance is high. Heater and A/C control will receive a high signal voltage input. If inside air temperature is hot, thermistor resistance is low. Heater and A/C control will receive a low voltage input

Conditions For Setting DTC

Sensor circuit is checked continuously every 200 ms with ignition switch in ON position. Circuit stays at 4.5 volts or more. When DTC 11 sets, it will store in heater and A/C control memory and system will use 75°F (24°C) as a default value. DTC will clear when conditions for fault no longer exist or by clearing with a scan tool. A history DTC will clear after 20 consecutive ignition cycles if conditions for fault no longer exist.

Diagnostic Test

1. If diagnostic system check has not been performed, perform **DIAGNOSTIC SYSTEM CHECK** . If diagnostic system check has been performed, go to next step.
2. Install scan tool. Select INSIDE AIR TEMP SENSOR and display voltage. If more than 4.5 volts exists, go to step 4 . If 4.5 volts or less exists, go to next step.
3. Check for poor terminal contact at heater and A/C control connector. Repair as necessary. After repair, go to

step 5 .

4. Replace and program heater and A/C control. After repair, go to next step.
5. Clear DTCs using scan tool. See **CLEARING DIAGNOSTIC TROUBLE CODES** . Retrieve any DTCs. If DTC 11 resets, go to step 2 .

DTC 12: LEFT AIR OUTLET TEMPERATURE SENSOR VOLTAGE LOW

Circuit Description

Left air outlet temperature sensor is located in left air outlet attached to air distribution module. Sensor is exposed to airflow through the module before air enters passenger compartment, providing a sample of outlet air temperature. Air outlet temperature sensor is a thermistor used to control the signal voltage at heater and A/C control. Heater and A/C control supplies a 5-volt reference on circuit No. 923 (Green/Red wire) and measures the voltage drop in the circuit to obtain a temperature signal. This signal is used by heater and A/C control to determine how much cooling or heating is require to obtain temperature setting for automatic temperature control. Eventually temperature input from both outlet air temperature sensors override inside air temperature and becomes primary temperature sensor input to heater and A/C control.

When inside air temperature is cold, thermistor resistance is high. Heater and A/C control will receive a high signal voltage input. If inside air temperature is hot, thermistor resistance is low. Heater and A/C control will receive a low voltage input.

Conditions For Setting DTC

Sensor circuit is checked continuously every 200 ms with ignition switch in ON position. Circuit stays at or near zero volts. When DTC 12 sets, it will store in heater and A/C control memory and system will use 106°F (41°C) as a default value. DTC will clear when conditions for fault no longer exist or by clearing with a scan tool. A history DTC will clear after 20 consecutive ignition cycles if conditions for fault no longer exist.

Diagnostic Aids

If DTC is a history or intermittent, try performing tests shown while moving wiring harness and connectors. Visually inspect sensor connector for damage, corrosion, terminal contact or water intrusion. Check wiring for misrouting, rubbed through insulation or broken wire inside insulation.

Diagnostic Test

1. If diagnostic system check has not been performed, perform **DIAGNOSTIC SYSTEM CHECK** . If diagnostic system check has been performed, go to next step.
2. Connect scan tool. Turn ignition on. Select LEFT AIR OUT TEMP SENSOR and display voltage parameter. If less than .2 volt exists, go to next step. If .2 volt or more exists, go to step 4 .
3. Turn ignition off. Disconnect left air outlet sensor harness connector. If more than 4.5 volts exist, go to step 5 . If 4.5 volts or less exist, go to step 6 .
4. Move related harnesses and harness connectors at left air outlet temperature sensor and heater and A/C control. If voltage changes, go to step 7 . If voltage does not change, go to **DIAGNOSTIC AIDS** .
5. Replace left air outlet temperature sensor. After repair, go to step 10 .
6. Turn ignition on. Measure voltage between ground and left air temperature sensor harness connector terminal "B" (Green/Red wire). If 4.5-5.0 volts exist, go to step 8 . If 4.5-5.0 volts does not exist, go to step 9 .
7. Repair wiring or connector as necessary. After repair, go to step 10 .
8. While monitoring DVOM, move harness and harness connectors at air outlet sensor and heater and A/C control. If voltage changes while harness or connector(s) are moved, go to step [11](#) . If voltage does not change while harness or connector(s) are being moved, go to step 12 .
9. Turn ignition off. Disconnect heater and A/C control Black 22-pin harness connector C1. Check for short to

ground in Green/Red wire between left air outlet temperature sensor and heater and A/C control. If short to ground exists, go to step 11 . If short to ground does not exist, go to step 12 .

10. Reassemble any connector or components remove. Clear DTCs using scan tool. See **CLEARING DIAGNOSTIC TROUBLE CODES** . Retrieve any DTCs. If DTC 12 resets, go to step 2 . If no DTCs exist, system is okay at this time.
11. Repair short to ground in Green/Red wire. See **WIRING DIAGRAMS** . After repair, go to step 10 .
12. Replace and program heater and A/C control. See **HEATER & A/C CONTROL ASSEMBLY** under REMOVAL & INSTALLATION. After repair, go to step 10 .

DTC 13: LEFT AIR OUTLET TEMPERATURE SENSOR CIRCUIT OPEN

Circuit Description

Left air outlet temperature sensor is located in left air outlet attached to air distribution module. Sensor is exposed to airflow through the module before air enters passenger compartment, providing a sample of outlet air temperature. Air outlet temperature sensor is a thermistor used to control the signal voltage at heater and A/C control. Heater and A/C control supplies a 5-volt reference on circuit No. 923 (Green/Red wire) and measures the voltage drop in the circuit to obtain a temperature signal. This signal is used by heater and A/C control to determine how much cooling or heating is required to obtain temperature setting for automatic temperature control. Eventually, temperature input from both outlet air temperature sensors override inside air temperature and becomes primary temperature sensor input to heater and A/C control.

When inside air temperature is cold, thermistor resistance is high. Heater and A/C control will receive a high signal voltage input. If inside air temperature is hot, thermistor resistance is low. Heater and A/C control will receive a low voltage input.

Conditions For Setting DTC

Sensor circuit is checked continuously every 200 ms with ignition switch in ON position. Circuit stays at 4.5 volts or more. When DTC 13 sets, it will store in heater and A/C control memory and system will use 106°F (41°C) as a default value. DTC will clear when conditions for fault no longer exist or by clearing with a scan tool. A history DTC will clear after 20 consecutive ignition cycles if conditions for fault no longer exists.

Diagnostic Aids

If DTC is a history or intermittent, try performing tests shown while moving wiring harness and connectors. Visually inspect sensor connector for damage, corrosion, terminal contact or water intrusion. Check wiring for misrouting, rubbed through insulation or broken wire inside insulation.

Diagnostic Test

1. If diagnostic system check has not been performed, perform **DIAGNOSTIC SYSTEM CHECK** . If diagnostic system check has been performed, go to next step.
2. Connect scan tool. Select LH AIR OUT TEMP SENSOR and display voltage parameter. If less than .2 volt exists, go to next step. If .2 volt or more exists, go to step 4 .
3. Turn off ignition. Disconnect left air outlet sensor harness connector. Connect a fused (3-amp) jumper wire between left air outlet sensor harness connector terminals. If less than .2 volt exists, go to step 5 . If .2 volt or more exists, go to step 6 .
4. Move related harnesses and harness connectors at left air outlet temperature sensor and heater and A/C control. If voltage changes, go to step 7 . If voltage does not change, go to **DIAGNOSTIC AIDS** .
5. Replace left air outlet temperature sensor. After repair, go to step 10 .
6. Jumper sensor circuit No. 923 (Green/Red wire) to a known good ground. If air outlet temperature sensor voltage is less than .2 volt, go to step 8 . If air outlet temperature sensor voltage is .2 volt or more, go to step 9 .

7. Repair damaged wiring harness or connector as necessary. After repair, go to step 10 .
8. Turn ignition off. Disconnect heater and A/C control Yellow 26-pin harness connector C2. Check for open in left air outlet temperature sensor ground circuit (Brown/Black wire). If ground circuit is open, go to step 11 . If ground circuit is not open, go to step 12 .
9. Turn ignition off. Disconnect heater and A/C control Yellow 26-pin harness connector C2. Check for open in left air outlet temperature sensor signal circuit (Green/Red wire). If signal circuit is open, go to step 13 . If signal circuit is not open, go to step 12 .
10. Reassemble any connectors or components removed. Clear DTCs using scan tool. See **CLEARING DIAGNOSTIC TROUBLE CODES** . Recheck for DTCs. If DTC 13 resets, go to step 2 . If DTC 13 does not exist, system is okay at this time.
11. Repair open in ground circuit (Brown/Black wire). See **WIRING DIAGRAMS** . After repair, go to step 10 .
12. Replace and program heater and A/C control. See **HEATER & A/C CONTROL ASSEMBLY** under REMOVAL & INSTALLATION. After repair, go to step 10 .
13. Repair open in sensor circuit (Green/Red wire). See **WIRING DIAGRAMS** . After repair, go to step 10 .

DTC 14: RIGHT AIR OUTLET TEMPERATURE SENSOR VOLTAGE LOW

Circuit Description

Right air outlet temperature sensor is located in right air outlet attached to air distribution module. Sensor is exposed to airflow through the module before air enters passenger compartment, providing a sample of outlet air temperature. Air outlet temperature sensor is a thermistor used to control signal voltage at heater and A/C control. Heater and A/C control supplies a 5-volt reference on circuit No. 924 (Green/Brown wire) and measures voltage drop in the circuit to obtain a temperature signal. This signal is used by heater and A/C control to determine how much cooling or heating is require to obtain temperature setting for automatic temperature control. Eventually temperature input from both outlet air temperature sensors override inside air temperature and becomes primary temperature sensor input to heater and A/C control.

When inside air temperature is cold, thermistor resistance is high. Heater and A/C control will receive a high signal voltage input. If inside air temperature is hot, thermistor resistance is low. Heater and A/C control will receive a low voltage input.

Conditions For Setting DTC

Sensor circuit is checked continuously every 200 ms with ignition in ON position. Circuit stays at or near zero volts. When DTC 12 sets, it will store in heater and A/C control memory and system will use 106°F (41°C) as a default value. DTC will clear when conditions for fault no longer exist or by clearing with a scan tool. A history DTC will clear after 20 consecutive ignition cycles if conditions for fault no longer exists.

Diagnostic Aids

If DTC is a history or intermittent, try performing tests shown while moving wiring harness and connectors. Visually inspect sensor connector for damage, corrosion, terminal contact or water intrusion. Check wiring for misrouting, rubbed through insulation or broken wire inside insulation.

Diagnostic Test

1. If diagnostic system check has not been performed, perform **DIAGNOSTIC SYSTEM CHECK** . If diagnostic system check has been performed, go to next step.
2. Connect scan tool. Select RH AIR OUT TEMP SENSOR from heating and A/C data list and display voltage parameter. If less than .2 volt exists, go to next step. If .2 volt or more exists, go to step 4 .
3. Turn ignition off. Disconnect right air outlet temperature sensor harness connector. Turn ignition on. If more than 4.5 volts exist, go to step 5 . If 4.5 volts or less exist, go to step 6 .

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4. Move related harnesses and harness connectors at right air outlet temperature sensor and heater and A/C control. If voltage changes, go to step 7 . If voltage does not change, go to **DIAGNOSTIC AIDS**
5. Replace right air outlet temperature sensor. After repair, go to step 10 .
6. Turn ignition on. Measure voltage between ground and right air outlet temperature sensor harness connector terminal "B" (Green/Brown wire). If 4.5-5.0 volts exist, go to step [8](#) . If 4.5-5.0 volts do not exist, go to step 9 .
7. Repair damaged connector or wiring harness as necessary. After repair, go to step 10 .
8. While monitoring DVOM, move harness and harness connectors at air outlet sensor and heater and A/C control. If voltage changes while harness or connectors are moved, go to step [11](#) . If voltage does not change while harness or connectors are moved, go to step 12 .
9. Turn ignition off. Disconnect heater and A/C control Black 22-pin harness connector C1. Check for short to ground in Green/Brown wire between right air outlet temperature sensor and heater and A/C control. If short to ground exists, go to step 11 . If short to ground does not exist, go to step 12 .
10. Reassemble any connector or components removed. Clear DTCs using scan tool. See **CLEARING DIAGNOSTIC TROUBLE CODES** . Retrieve any DTCs. If DTC 14 resets, go to step 2 . If DTC 14 does not exist, system is okay at this time.
11. Repair short to ground in Green/Brown wire. See **WIRING DIAGRAMS** . After repair, go to step 10 .
12. Replace and program heater and A/C control. See **HEATER & A/C CONTROL ASSEMBLY** under REMOVAL & INSTALLATION. After repair, go to step 10 .

DTC 15: RIGHT AIR OUTLET TEMPERATURE SENSOR CIRCUIT OPEN

Circuit Description

Right air outlet temperature sensor is located in right air outlet attached to air distribution module. Sensor is exposed to airflow through module before air enters passenger compartment, providing a sample of outlet air temperature. Air outlet temperature sensor is a thermistor used to control signal voltage at heater and A/C control. Heater and A/C control supplies a 5-volt reference on circuit No. 924 (Green/Brown wire) and measures voltage drop in the circuit to obtain a temperature signal. This signal is used by heater and A/C control to determine how much cooling or heating is require to obtain temperature setting for automatic temperature control. Eventually temperature input from both outlet air temperature sensors override inside air temperature and becomes primary temperature sensor input to heater and A/C control.

When inside air temperature is cold, thermistor resistance is high. Heater and A/C control will receive a high signal voltage input. If inside air temperature is hot, thermistor resistance is low. Heater and A/C control will receive a low voltage input.

Conditions For Setting DTC

Sensor circuit is checked continuously every 200 ms with ignition in ON position. DTC 15 will set if circuit stays at or near zero volts. When DTC 15 sets, it will store in heater and A/C control memory and system will use 106°F (41°C) as a default value. DTC will clear when conditions for fault no longer exist or by clearing with a scan tool. A history DTC will clear after 20 consecutive ignition cycles if conditions for fault no longer exists.

Diagnostic Aids

If DTC is a history or intermittent, try performing tests shown while moving wiring harness and connectors. Visually inspect sensor connector for damage, corrosion, terminal contact or water intrusion. Check wiring for misrouting, rubbed through insulation or broken wire inside insulation.

Diagnostic Test

1. If diagnostic system check has not been performed, perform **DIAGNOSTIC SYSTEM CHECK** . If

diagnostic system check has been performed, go to next step.

2. Connect scan tool. Select RH AIR OUT TEMP SENSOR and display voltage parameters. If more than 4.5 volts exist, go to next step. If 4.5 volts or less exists, go to step 4 .
3. Turn ignition off. Disconnect right air outlet temperature sensor harness connector. Connect a fused (3-amp) jumper wire between right air outlet temperature sensor harness connector terminals. Turn ignition on. If less than .2 volt exists, replace right air outlet temperature sensor and go to step 5 . If .2 volt or more exists, go to step 6 .
4. Move related harnesses and harness connectors at right air outlet temperature sensor and heater and A/C control. If voltage changes, repair damaged connector or wiring harness and go to step 7 . If voltage does not change, go to **DIAGNOSTIC AIDS** .
5. Replace right air outlet temperature sensor. After repair, go to step 10 .
6. Jumper sensor signal circuit 924 (Green/Brown wire). If air outlet temperature sensor voltage is less than .2 volt, go to step 8 . If air outlet temperature sensor voltage is .2 volt or more, go to step 9 .
7. Repair damaged connector or wiring harness. After repair, go to step 10 .
8. Turn ignition off. Disconnect heater and A/C control Yellow 26-pin harness connector C2. Check right air outlet temperature sensor ground circuit (Brown/Black wire). If ground circuit is open, go to step 11 . If ground circuit is not open, go to step 12 .
9. Turn ignition off. Disconnect heater and A/C control Yellow 26-pin harness connector C2. Check for open in left air outlet temperature sensor signal circuit (Green/Red wire). If signal circuit is open, go to step 11 . If signal circuit is not open, go to step 12 .
10. Repair open in ground circuit (Brown/Black wire). See **WIRING DIAGRAMS** . After repair, go to step 10 .
11. Replace and program heater and A/C control. After repair, go to step 10 .
12. Repair open in sensor circuit (Green/Red wire). See **WIRING DIAGRAMS** . After repair, go to step 10 .

DTC 16: INTERIOR AIR MIX DOOR MOTOR VOLTAGE LOW OR CIRCUIT OPEN

Circuit Description

Inside air valve actuator is a DC stepper motor by design. Stepper motor has 4 field windings that are controlled by heater and A/C control. Heater and A/C control moves stepper motor by energizing the proper field windings which rotates the armature in a fixed amount (a step) in the appropriate direction. Battery voltage for stepper motor is supplied through heater and A/C control when ignition switch is in ON position. Attached to stepper motor is a small gear that meshes with a larger gear which is part of an assembly that drives linkage of air mix door.

Conditions For Setting DTC

When ignition is in ON position, heater and A/C control measures the current on all 4 coil wires on stepper motor. Measured current is averaged by heater and A/C control and a fail threshold is calculated. After output current is measured, it is compared with threshold value. If current is too low, then output from heater and A/C control to stepper motor is presumed to be open or shorted to ground. This step is repeated 3 times within a 10 second time frame.

DTC 16 stores in heater and A/C control memory. Fault detection process is repeated 3 times at a fixed interval of 70 ms to allow for debouncing. When DTC is set, stepper motor can no longer be controlled. DTC will clear when conditions for fault no longer exist or by clearing with a scan tool. A history DTC will clear after 20 consecutive ignition cycles if conditions for fault no longer exist.

Diagnostic Aids

If DTC is history or an intermittent, try performing tests shown while moving wiring harness and connectors. This can cause malfunction to appear. Visually inspect stepper motor connector and harness for damage, corrosion or

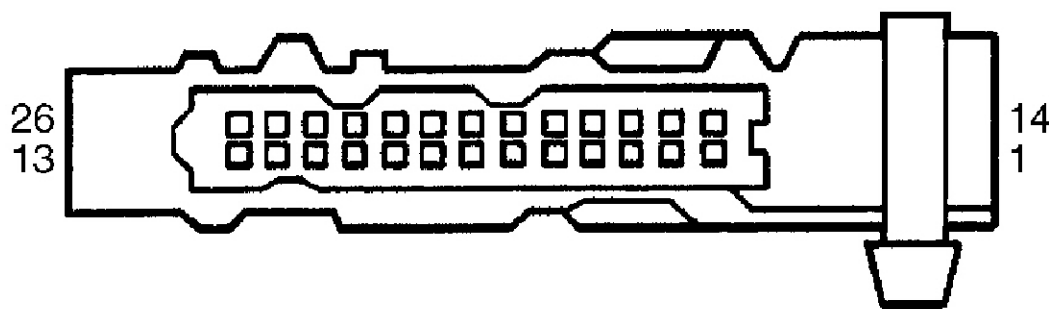
water intrusion. Check for proper terminal contact, misrouted harness, rubbed through wire insulation and broken wire inside insulation.

Diagnostic Test

1. If diagnostic system check has not been performed, perform **DIAGNOSTIC SYSTEM CHECK** . If diagnostic system check has been performed, go to next step.
2. Connect scan tool. Turn ignition on. Select INT. AIR MIX DOOR MOT. and POS. from data list. Press AUTO button on heater and A/C control panel. Set MODE to middle vents. If scan tool displays interior air mix door motor ACTIVE and position is at 70-100 percent, go to next step. If scan tool does not display interior air mix door motor ACTIVE and position is at 70-100 percent, go to step 4 .
3. Press defrost button. If scan tool displays interior air mix door motor ACTIVE and position is at zero percent, go to **DIAGNOSTIC AIDS** . If scan tool does not display interior air mix door motor ACTIVE and position is at zero percent, go to next step.
4. Turn ignition off. Disconnect heater and A/C control Yellow 26-pin harness connector C2. Disconnect interior air mix door motor Blue 6-pin harness connector. Check for continuity of circuits between interior air mix door motor harness connector and heater and A/C control harness connector C2. See **VALVE ACTUATOR CIRCUIT IDENTIFICATION** table. See **Fig. 2** and **Fig. 3** . If continuity exists in all circuits, go to next step. If continuity does not exist in any circuit, go to step 6 .

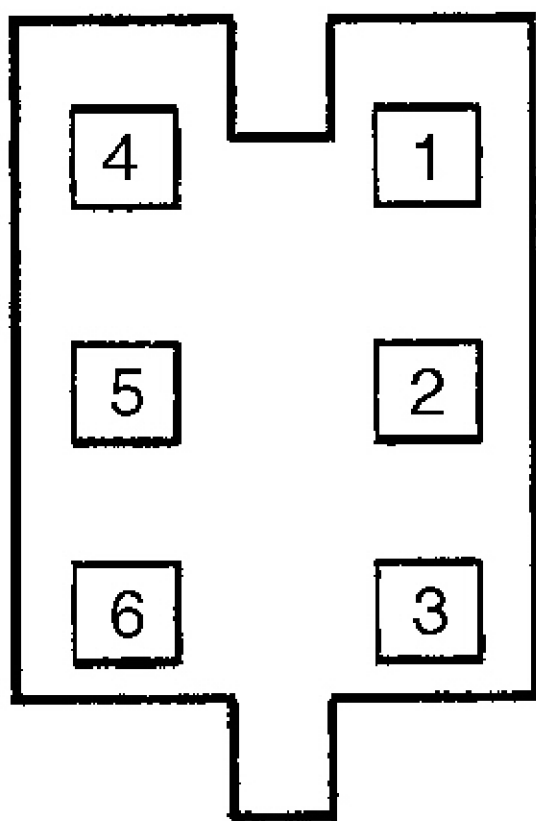
VALVE ACTUATOR CIRCUIT IDENTIFICATION

Heater & A/C Terminal No.	Wire Color	Inside Air Valve Actuator Terminal No.
9	White	1
10	Blue	3
11	Black	4
12	Gray	6



G00033507

Fig. 2: Identifying Heater & A/C Control 26-Pin Harness Connector C2
 Courtesy of GENERAL MOTORS CORP.



G00033508

Fig. 3: Identifying Actuator 6-Pin Harness Connector

Courtesy of GENERAL MOTORS CORP.

5. Check for a short to ground in circuits between interior air mix door motor harness connector and heater and A/C control harness connector C2. See **VALVE ACTUATOR CIRCUIT IDENTIFICATION** table. If wires are okay, go to step 7 . If short to ground exists, go to step 8 .
6. Repair open in appropriate wire(s). See **WIRING DIAGRAMS** . After repair, go to step 9 .
7. Replace inside air valve actuator. After repair, go to step 9 .
8. Repair short to ground in appropriate wire(s). After repair, go to step 9 .
9. Connect all connectors. Clear DTCs using scan tool. See **CLEARING DIAGNOSTIC TROUBLE CODES** . Ensure DTC 16 does not reset. If DTC 16 exists, go to next step. If no DTCs exists, system is okay at this time.
10. Replace and program heater and A/C control. See **HEATER & A/C CONTROL ASSEMBLY** under REMOVAL & INSTALLATION. Recheck system operation.

DTC 17: INSIDE AIR MIX DOOR MOTOR VOLTAGE HIGH**Circuit Description**

Inside air valve actuator is a DC stepper motor by design. Stepper motor has 4 field windings that are controlled by heater and A/C control. Heater and A/C control moves stepper motor by energizing the proper field windings which rotates the armature in a fixed amount (a step) in the appropriate direction. Battery voltage for stepper motor is supplied through heater and A/C control when ignition switch is in ON position. Attached to stepper motor is a small gear that meshes with a larger gear which is part of an assembly that drives linkage of air mix door.

Conditions For Setting DTC

When ignition is in ON position, heater and A/C control measures the current on all 4 coil wires on stepper motor. Measured current is averaged by heater and A/C control and a fail threshold is calculated. After output current is measured, it is compared with threshold value. If short to power is detected on any of the low side drivers, heater and A/C control automatically protect low-side drivers by disabling all low-side outputs. This step is repeated 3 times within a 10 second time frame.

DTC 17 stores in heater and A/C control memory. Fault detection process is repeated 3 times at a fixed interval of 70 ms to allow for debouncing. When DTC is set, stepper motor can no longer be controlled. DTC will clear when conditions for fault no longer exist or by clearing with a scan tool. A history DTC will clear after 20 consecutive ignition cycles if conditions for fault no longer exist.

Diagnostic Aids

If DTC is history or an intermittent, try performing tests shown while moving wiring harness and connectors. This can cause malfunction to appear. Visually inspect stepper motor connector and harness for damage, corrosion or water intrusion. Check for proper terminal contact, misrouted harness, rubbed through wire insulation and broken wire inside insulation.

Diagnostic Test

1. If diagnostic system check has not been performed, perform **DIAGNOSTIC SYSTEM CHECK** . If diagnostic system check has been performed, go to next step.
2. Connect scan tool. Turn ignition on. Select INT. AIR MIX DOOR MOT. and POS. from data list. Press AUTO button on heater and A/C control panel. Set MODE to upper and lower vents. If scan tool displays interior air mix door motor ACTIVE and position is at 70-100 percent, go to next step. If scan tool does not display interior air mix door motor ACTIVE and position is at 70-100 percent, go to step 4 .
3. Press defrost button. If scan tool displays interior air mix door motor ACTIVE and position is at zero percent, go to **DIAGNOSTIC AIDS** . If scan tool does not display interior air mix door motor ACTIVE and position is at zero percent, go to next step.
4. Turn ignition off. Disconnect heater and A/C control Yellow 26-pin harness connector C2. Disconnect inside air mix door motor Blue 6-pin harness connector. Measure voltage in circuits between interior air mix door motor harness connector and heater and A/C control harness connector C2. See **VALVE ACTUATOR CIRCUIT IDENTIFICATION** table. See **Fig. 2** and **Fig. 3** . If less than .1 volt exists in all cases, go to next step. If .1 volt or more exists, go to step 6 .
5. Connect all connectors. Clear DTCs using scan tool. See **CLEARING DIAGNOSTIC TROUBLE CODES** . Ensure DTC 17 does not reset. If DTC 17 exists, go to step 7 .
6. Repair short to power in appropriate wire(s). After repair, go to next step.
7. Replace and program heater and A/C control. See **HEATER & A/C CONTROL ASSEMBLY** under REMOVAL & INSTALLATION. Recheck system operation.

DTC 18: LEFT AIR MIX DOOR MOTOR VOLTAGE LOW OR CIRCUIT OPEN**Circuit Description**

Left air valve actuator is a DC stepper motor by design. Stepper motor has 4 field windings that are controlled by heater and A/C control. Heater and A/C control moves stepper motor by energizing the proper field windings which rotates the armature in a fixed amount (a step) in the appropriate direction. Battery voltage for stepper motor is supplied through heater and A/C control when ignition is in ON position. Attached to stepper motor is a small gear that meshes with a larger gear which is part of an assembly that drives linkage of air mix door.

Conditions For Setting DTC

When ignition switch is in ON position, heater and A/C control measures the current on all 4 coil wires on stepper motor. Measured current is averaged by heater and A/C control and a fail threshold is calculated. After output current is measured, it is compared with threshold value. If current is too low, then output from heater and A/C control to stepper motor is presumed to be open or shorted to ground. This step is repeated 3 times within a 10 second time frame.

DTC 18 stores in heater and A/C control memory. Fault detection process is repeated 3 times at a fixed interval of 70 ms to allow for debouncing. When DTC is set, stepper motor can no longer be controlled. DTC will clear when conditions for fault no longer exist or by clearing with a scan tool. A history DTC will clear after 20 consecutive ignition cycles if conditions for fault no longer exists.

Diagnostic Aids

If DTC is history or an intermittent, try performing tests shown while moving wiring harness and connectors. This can cause malfunction to appear. Visually inspect stepper motor connector and harness for damage, corrosion or water intrusion. Check for proper terminal contact, misrouted harness, rubbed through wire insulation and broken wire inside insulation.

Diagnostic Test

1. If diagnostic system check has not been performed, perform **DIAGNOSTIC SYSTEM CHECK** . If diagnostic system check has been performed, go to next step.
2. Connect scan tool. Turn ignition on. Select LEFT AIR MIX DOOR MOT. and POS from data list. Press A/C, then AUTO button on heater and A/C control panel. Turn left temperature knob to maximum heat. If scan tool displays left air mix door motor ACTIVE and position is at 100 percent, go to next step. If scan tool does not display left air mix door motor ACTIVE and position is not at 100 percent, go to step 4 .
3. Turn left temperature knob to maximum cool. If scan tool displays left air mix door motor ACTIVE and position is at zero percent, fault may be intermittent. Go to **DIAGNOSTIC AIDS** . If scan tool does not display left air mix door motor ACTIVE and position is not at zero percent, go to next step.
4. Turn ignition off. Disconnect heater and A/C control Yellow 26-pin harness connector C2. Disconnect left air mix door motor Black 6-pin harness connector. Check for continuity of circuits between interior air mix door motor harness connector and heater and A/C control harness connector C2. See **VALVE ACTUATOR CIRCUIT IDENTIFICATION** table. See **Fig. 2** and **Fig. 3** . If continuity exists in all circuits, go to next step. If continuity does not exist in any circuit, go to step 6 .
5. Check for a short to ground in the same circuits between interior air mix door motor harness connector and heater and A/C control harness connector C2. See **VALVE ACTUATOR CIRCUIT IDENTIFICATION** table. If all circuits are okay, go to step 7 . If short to ground exists in any circuit(s), go to step 8 .
6. Repair open in appropriate wire(s). See **WIRING DIAGRAMS** . After repair, go to step 9 .
7. Replace left temperature valve actuator. After repair, go to step 9 .
8. Repair short to ground in appropriate wire(s). See **WIRING DIAGRAMS** . After repair, go to step 9 .
9. Install scan tool and clear DTCs. See **CLEARING DIAGNOSTIC TROUBLE CODES** . Ensure DTC 18 does not reset. If DTC 18 resets, replace and program heater and A/C control. See **HEATER & A/C CONTROL ASSEMBLY** under REMOVAL & INSTALLATION.
10. Replace and program heater and A/C control. See **HEATER & A/C CONTROL ASSEMBLY** under REMOVAL & INSTALLATION. Recheck system operation.

DTC 19: LEFT AIR MIX DOOR MOTOR VOLTAGE HIGH

Circuit Description

Left air valve actuator is a DC stepper motor by design. Stepper motor has 4 field windings that are controlled by heater and A/C control. Heater and A/C control moves stepper motor by energizing the proper field windings which rotates the armature in a fixed amount (a step) in appropriate direction. Battery voltage for stepper motor is

supplied through heater and A/C control when ignition is in ON position. Attached to stepper motor is a small gear that meshes with a larger gear which is part of an assembly that drives linkage of air mix door.

Conditions For Setting DTC

When ignition switch is in ON position, heater and A/C control measures the current on all 4 coil wires on stepper motor. Measured current is averaged by heater and A/C control and a fail threshold is calculated. After output current is measured, it is compared with threshold value. If short to power is detected on any of the low side drivers, heater and A/C control automatically protect low-side drivers by disabling all low-side outputs. This step is repeated 3 times within a 10 second time frame.

DTC 19 stores in heater and A/C control memory. Fault detection process is repeated 3 times at a fixed interval of 70 ms to allow for debouncing. When DTC is set, stepper motor can no longer be controlled. DTC will clear when conditions for fault no longer exist or by clearing with a scan tool. A history DTC will clear after 20 consecutive ignition cycles if conditions for fault no longer exist.

Diagnostic Aids

If DTC is history or an intermittent, try performing tests shown while moving wiring harness and connectors. This can cause malfunction to appear. Visually inspect stepper motor connector and harness for damage, corrosion or water intrusion. Check for proper terminal contact, misrouted harness, rubbed through wire insulation and broken wire inside insulation.

Diagnostic Test

1. If diagnostic system check has not been performed, perform **DIAGNOSTIC SYSTEM CHECK** . If diagnostic system check has been performed, go to next step.
2. Install scan tool. Turn ignition switch to ON position. Select LEFT AIR MIX DOOR MOT. and POS from data list. Press A/C, then AUTO button on heater and A/C control panel. Turn left temperature knob to maximum heat. If scan tool displays left air mix door motor ACTIVE and position is at 100 percent, go to next step. If scan tool does not display interior air mix door motor ACTIVE and position is not at 100 percent, go to step 4 .
3. Turn temperature knob to maximum cool. If scan tool displays left air mix door motor ACTIVE and position is at zero percent, fault may be intermittent. Go to **DIAGNOSTIC AIDS** . If scan tool does not display left air mix door motor ACTIVE and position is not at zero percent, go to next step.
4. Turn ignition off. Disconnect heater and A/C control Yellow 26-pin harness connector. Disconnect left air mix door motor 6-pin harness connector. Measure voltage in circuits between left air mix door motor harness connector and heater and A/C control harness connector C2. See **VALVE ACTUATOR CIRCUIT IDENTIFICATION** table. See **Fig. 2** and **Fig. 3** . If less than .1 volt exists in all cases, go to next step. If .1 volt or more exists, go to step 6
5. Connect all connectors. Clear DTCs using scan tool. See **CLEARING DIAGNOSTIC TROUBLE CODES** . Ensure DTC 19 does not reset. If DTC 19 exists, go to step 7 .
6. Repair short to power in appropriate wire(s). See **WIRING DIAGRAMS** . After repair, go to next step.
7. Replace and program heater and A/C control. See **HEATER & A/C CONTROL ASSEMBLY** under REMOVAL & INSTALLATION. Recheck system operation.

DTC 20: RIGHT AIR MIX DOOR MOTOR VOLTAGE LOW OR CIRCUIT OPEN

Circuit Description

Right temperature valve actuator is a DC stepper motor by design. Stepper motor has 4 field windings that are controlled by heater and A/C control. Heater and A/C control moves stepper motor by energizing the proper field windings which rotates the armature in a fixed amount (a step) in the appropriate direction. Battery voltage for stepper motor is supplied through heater and A/C control when ignition is in ON position. Attached to stepper

motor is a small gear that meshes with a larger gear which is part of an assembly that drives linkage of air mix door.

Conditions For Setting DTC

When ignition switch is in ON position, heater and A/C control measures the current on all 4 coil wires on stepper motor. Measured current averaged by heater and A/C control and a fail threshold is calculated. After output current is measured, it is compared with threshold value. If current is too low, then output from heater and A/C control to stepper motor is presumed to be open or shorted to ground. This step is repeated 3 times within a 10 second time frame.

DTC 20 stores in heater and A/C control memory. Fault detection process is repeated 3 times at a fixed interval of 70 ms to allow for debouncing. When DTC 20 sets, stepper motor can no longer be controlled. DTC will clear when conditions for fault no longer exist or by clearing with a scan tool. A history DTC will clear after 20 consecutive ignition cycles if conditions for fault no longer exist.

Diagnostic Aids

If DTC is history or an intermittent, try performing tests shown while moving wiring harness and connectors. This can cause malfunction to appear. Visually inspect stepper motor connector and harness for damage, corrosion or water intrusion. Check for proper terminal contact, misrouted harness, rubbed through wire insulation and broken wire inside insulation.

Diagnostic Test

1. If diagnostic system check has not been performed, perform **DIAGNOSTIC SYSTEM CHECK** . If diagnostic system check has been performed, go to next step.
2. Connect scan tool. Turn ignition on. Select RT. AIR MIX DOOR MOT. and POS from data list. Press A/C, then AUTO button on heater and A/C control panel. Turn right temperature knob to maximum heat. If scan tool displays right air mix door motor ACTIVE and position is at 100 percent, go to next step. If scan tool does not display right air mix door motor ACTIVE and position is not at 100 percent, go to step 4 .
3. Turn right temperature knob to maximum cool. If scan tool displays right air mix door motor ACTIVE and position is at zero percent, fault may be intermittent. Go to **DIAGNOSTIC AIDS** . If scan tool does not display right air mix door motor ACTIVE and position is not at zero percent, go to next step.
4. Turn ignition off. Disconnect heater and A/C control Yellow 26-pin harness connector C2. Disconnect right air mix door motor Black 6-pin harness connector. Check for continuity of circuits between right temperature door motor harness connector and heater and A/C control harness connector C2. See **VALVE ACTUATOR CIRCUIT IDENTIFICATION** table. See **Fig. 2** and **Fig. 3** . If continuity exists in all circuits, go to next step. If continuity does not exist in any circuit, go to step 6 .
5. Check for a short to ground in the same circuits between right air mix door motor harness connector and heater and A/C control harness connector C2. See **VALVE ACTUATOR CIRCUIT IDENTIFICATION** table. If all circuits are okay, go to step 7 . If short to ground exists in any circuit(s), go to step 8 .
6. Repair open in appropriate wire. See **WIRING DIAGRAMS** . After repair, go to step 9 .
7. Replace right temperature valve actuator. After repair, go to step 9 .
8. Repair short to ground in appropriate wire(s). See **WIRING DIAGRAMS** . After repair, go to step 9 .
9. Clear DTCs using scan tool. See **CLEARING DIAGNOSTIC TROUBLE CODES** . Ensure DTC 20 does not reset. If DTC 20 resets, go to next step.
10. Replace and program heater and A/C control. See **HEATER & A/C CONTROL ASSEMBLY** under REMOVAL & INSTALLATION. Recheck system operation.

DTC 21: RIGHT AIR MIX DOOR MOTOR VOLTAGE HIGH

Circuit Description

2001 Cadillac Catera

2000-01 AUTOMATIC A/C-HEATER SYSTEMS Catera

Right air valve actuator is a DC stepper motor by design. Stepper motor has 4 field windings that are controlled by heater and A/C control. Heater and A/C control moves stepper motor by energizing the proper field windings which rotates the armature in a fixed amount (a step) in the appropriate direction. Battery voltage for stepper motor is supplied through heater and A/C control when ignition is in ON position. Attached to stepper motor is a small gear that meshes with a larger gear which is part of an assembly that drives linkage of air mix door.

Conditions For Setting DTC

When ignition switch is in ON position, heater and A/C control measures the current on all 4 coil wires on stepper motor. Measured current averaged by heater and A/C control and a fail threshold is calculated. After output current is measured, it is compared with threshold value. If short to power is detected on any of the low side drivers, heater and A/C control automatically protect low-side drivers by disabling all low-side outputs. This step is repeated 3 times within a 10 second time frame.

DTC 21 stores in heater and A/C control memory. Fault detection process is repeated 3 times at a fixed interval of 70 ms to allow for debouncing. When DTC is set, stepper motor can no longer be controlled. DTC will clear when conditions for fault no longer exist or by clearing with a scan tool. A history DTC will clear after 20 consecutive ignition cycles if conditions for fault no longer exist.

Diagnostic Aids

If DTC is history or an intermittent, try performing tests shown while moving wiring harness and connectors. This can cause malfunction to appear. Visually inspect stepper motor connector and harness for damage, corrosion or water intrusion. Check for proper terminal contact, misrouted harness, rubbed through wire insulation and broken wire inside insulation.

Diagnostic Test

1. If diagnostic system check has not been performed, perform **DIAGNOSTIC SYSTEM CHECK** . If diagnostic system check has been performed, go to next step.
2. Connect scan tool. Turn ignition on. Select RT. AIR MIX DOOR MOT. and POS from data list. Press A/C, then AUTO button on heater and A/C control panel. Turn right temperature knob to maximum heat. If scan tool displays right air mix door motor ACTIVE and position is at zero percent, go to next step. If scan tool does not display interior air mix door motor ACTIVE and position is not at zero percent, go to step 4 .
3. Turn temperature knob to maximum cool. If scan tool displays right air mix door motor ACTIVE and position is at zero percent, fault may be intermittent. Go to **DIAGNOSTIC AIDS** . If scan tool does not display right air mix door motor ACTIVE and position is not at zero percent, go to next step.
4. Turn ignition off. Disconnect heater and A/C control Yellow 26-pin harness connector. Disconnect right air mix door motor 6-pin harness connector. Measure voltage in circuits between right air mix door motor harness connector and heater and A/C control harness connector C2. See **VALVE ACTUATOR CIRCUIT IDENTIFICATION** table. See **Fig. 2** and **Fig. 3** . If less than .1 volt exists in all cases, go to next step. If .1 volt or more exists, go to step 6 .
5. Connect all connectors. Clear DTCs using scan tool. See **CLEARING DIAGNOSTIC TROUBLE CODES** . Ensure DTC 21 does not reset. If DTC 21 exists, go to step 7 .
6. Repair short to power in appropriate wire(s). See **WIRING DIAGRAMS** . After repair, go to next step.
7. Replace and program heater and A/C control. See **HEATER & A/C CONTROL ASSEMBLY** under REMOVAL & INSTALLATION. Recheck system operation.

DTC 22: FLOOR AIR MIX DOOR MOTOR VOLTAGE LOW OR OPEN CIRCUIT

Circuit Description

Floor air valve actuator is a DC stepper motor by design. Stepper motor has 4 field windings that are controlled by heater and A/C control. Heater and A/C control moves stepper motor by energizing the proper field windings

which rotates the armature in a fixed amount (a step) in the appropriate direction. Battery voltage for stepper motor is supplied through heater and A/C control when ignition is in ON position. Attached to stepper motor is a small gear that meshes with a larger gear which is part of an assembly that drives linkage of air mix door.

Conditions For Setting DTC

When ignition switch is in ON position, heater and A/C control measures the current on all 4 coil wires on stepper motor. Measured current averaged by heater and A/C control and a fail threshold is calculated. After output current is measured, it is compared with threshold value. If current is too low, then output from heater and A/C control to stepper motor is presumed to be open or shorted to ground. This step is repeated 3 times within a 10 second time frame.

DTC 22 stores in heater and A/C control memory. Fault detection process is repeated 3 times at a fixed interval of 70 ms to allow for debouncing. When DTC is set, stepper motor can no longer be controlled. DTC will clear when conditions for fault no longer exist or by clearing with a scan tool. A history DTC will clear after 20 consecutive ignition cycles if conditions for fault no longer exist.

Diagnostic Aids

If DTC is history or an intermittent, try performing tests shown while moving wiring harness and connectors. This can cause malfunction to appear. Visually inspect stepper motor connector and harness for damage, corrosion or water intrusion. Check for proper terminal contact, misrouted harness, rubbed through wire insulation and broken wire inside insulation.

Diagnostic Test

1. If diagnostic system check has not been performed, perform **DIAGNOSTIC SYSTEM CHECK** . If diagnostic system check has been performed, go to next step.
2. Connect scan tool. Turn ignition on. Select FLR. AIR MIX DOOR MOT. and POS from data list. Press AUTO button on heater and A/C control panel. Set MODE to floor vents. If scan tool displays floor air mix door motor ACTIVE and position is at 100 percent, go to next step. If scan tool does not display floor air mix door motor ACTIVE and position is not at 100 percent, go to step 4 .
3. Press defrost button. If scan tool displays floor air mix door motor ACTIVE and position is at zero percent, fault may be intermittent. Go to **DIAGNOSTIC AIDS** . If scan tool does not display floor air mix door motor ACTIVE and position is not at zero percent, go to next step.
4. Turn ignition off. Disconnect heater and A/C control Yellow 26-pin harness connector C2. Disconnect floor air mix door motor Black 6-pin harness connector. Check for continuity of circuits between floor air mix door motor harness connector and heater and A/C control harness connector C2. See **VALVE ACTUATOR CIRCUIT IDENTIFICATION** table. See **Fig. 2** and **Fig. 3** . If continuity exists in all circuits, go to next step. If continuity does not exist in any circuit, go to step 6 .
5. Check for a short to ground in circuits between floor air mix door motor harness connector and heater and A/C control harness connector C2. See **VALVE ACTUATOR CIRCUIT IDENTIFICATION** table. If all circuits are okay, go to step 7 . If short to ground exists in any wire(s), go to step 8 .
6. Repair open in appropriate wire. See **WIRING DIAGRAMS** . After repair, go to step 9 .
7. Replace floor air valve actuator. After repair, go to step 9 .
8. Repair short to ground in appropriate wire(s). See **WIRING DIAGRAMS** . After repair, go to step 9 .
9. Clear DTCs using scan tool. See **CLEARING DIAGNOSTIC TROUBLE CODES** . Ensure DTC 22 does not reset. If DTC 22 resets, go to next step.
10. Replace and program heater and A/C control. See **HEATER & A/C CONTROL ASSEMBLY** under REMOVAL & INSTALLATION. Recheck system operation.

DTC 23: FLOOR AIR MIX DOOR MOTOR VOLTAGE HIGH

Circuit Description

Floor air valve actuator is a DC stepper motor by design. Stepper motor has 4 field windings that are controlled by heater and A/C control. Heater and A/C control moves stepper motor by energizing the proper field windings which rotates the armature in a fixed amount (a step) in the appropriate direction. Battery voltage for stepper motor is supplied through heater and A/C control when ignition is in ON position. Attached to stepper motor is a small gear that meshes with a larger gear which is part of an assembly that drives linkage of air mix door.

Conditions For Setting DTC

When ignition switch is in ON position, heater and A/C control measures the current on all 4 coil wires on stepper motor. Measured current averaged by heater and A/C control and a fail threshold is calculated. After output current is measured, it is compared with threshold value. If short to power is detected on any of the low side drivers, heater and A/C control automatically protect low-side drivers by disabling all low-side outputs. This step is repeated 3 times within a 10 second time frame.

DTC 23 stores in heater and A/C control memory. Fault detection process is repeated 3 times at a fixed interval of 70 ms to allow for debouncing. When DTC is set, stepper motor can no longer be controlled. DTC will clear when conditions for fault no longer exist or by clearing with a scan tool. A history DTC will clear after 20 consecutive ignition cycles if conditions for fault no longer exist.

Diagnostic Aids

If DTC is history or an intermittent, try performing tests shown while moving wiring harness and connectors. This can cause malfunction to appear. Visually inspect stepper motor connector and harness for damage, corrosion or water intrusion. Check for proper terminal contact, misrouted harness, rubbed through wire insulation and broken wire inside insulation.

Diagnostic Test

1. If diagnostic system check has not been performed, perform **DIAGNOSTIC SYSTEM CHECK** . If diagnostic system check has been performed, go to next step.
2. Connect scan tool. Turn ignition on. Select FLR. AIR MIX DOOR MOT. and POS from data list. Press AUTO button on heater and A/C control panel. Set MODE to floor vents. If scan tool displays right air mix door motor ACTIVE and position is at zero percent, go to next step. If scan tool does not display interior air mix door motor ACTIVE and position is not at zero percent, go to step 4 .
3. Turn temperature knob to maximum cool. If scan tool displays right air mix door motor ACTIVE and position is at zero percent, fault may be intermittent. Go to **DIAGNOSTIC AIDS** . If scan tool does not display right air mix door motor ACTIVE and position is not at zero percent, go to next step.
4. Turn ignition off. Disconnect heater and A/C control Yellow 26-pin harness connector. Disconnect right air mix door motor 6-pin harness connector. Measure voltage in circuits between right air mix door motor harness connector and heater and A/C control harness connector C2. See **VALVE ACTUATOR CIRCUIT IDENTIFICATION** table. See **Fig. 2** and **Fig. 3** . If less than .1 volt exists in all cases, go to next step. If .1 volt or more exists, go to step 6 .
5. Connect all connectors. Clear DTCs using scan tool. See **CLEARING DIAGNOSTIC TROUBLE CODES** . Ensure DTC 21 does not reset. If DTC 21 exists, go to step 7 .
6. Repair short to power in appropriate wire(s). See **WIRING DIAGRAMS** . After repair, go to next step.
7. Replace and program heater and A/C control. See **HEATER & A/C CONTROL ASSEMBLY** under REMOVAL & INSTALLATION. Recheck system operation.

DTC 24: DEFROST AIR MIX DOOR MOTOR VOLTAGE LOW OR CIRCUIT OPEN**Circuit Description**

Defrost air valve actuator is a DC stepper motor by design. Stepper motor has 4 field windings that are controlled by heater and A/C control. Heater and A/C control moves stepper motor by energizing the proper field windings which rotates the armature in a fixed amount (a step) in the appropriate direction. Battery voltage for stepper motor is supplied through heater and A/C control when ignition is in ON position. Attached to stepper motor is a small gear that meshes with a larger gear which is part of an assembly that drives linkage of air mix door.

Conditions For Setting DTC

When ignition switch is in ON position, heater and A/C control measures the current on all 4 coil wires on stepper motor. Measured current averaged by heater and A/C control and a fail threshold is calculated. After output current is measured, it is compared with threshold value. If current is too low, then output from heater and A/C control to stepper motor is presumed to be open or shorted to ground. This step is repeated 3 times within a 10 second time frame.

DTC 24 stores in heater and A/C control memory. Fault detection process is repeated 3 times at a fixed interval of 70 ms to allow for debouncing. When DTC is set, stepper motor can no longer be controlled. DTC will clear when conditions for fault no longer exist or by clearing with a scan tool. A history DTC will clear after 20 consecutive ignition cycles if conditions for fault no longer exist.

Diagnostic Aids

If DTC is history or an intermittent, try performing tests shown while moving wiring harness and connectors. This can cause malfunction to appear. Visually inspect stepper motor connector and harness for damage, corrosion or water intrusion. Check for proper terminal contact, misrouted harness, rubbed through wire insulation and broken wire inside insulation.

Diagnostic Test

1. If diagnostic system check has not been performed, perform **DIAGNOSTIC SYSTEM CHECK** . If diagnostic system check has been performed, go to next step.
2. Connect scan tool. Turn ignition on. Select DEF AIR MIX DOOR MOT. and POS from data list. Press AUTO button on heater and A/C control panel. Set MODE to defogger vents. If scan tool displays defrost air mix door motor ACTIVE and position is at 30 percent, go to next step. If scan tool does not display defrost air mix door motor ACTIVE and position is not at 30 percent, go to step 4 .
3. Press defrost button. If scan tool displays defrost air mix door motor ACTIVE and position is at 100 percent, fault may be intermittent. Go to **DIAGNOSTIC AIDS** . If scan tool does not display defrost air mix door motor ACTIVE and position is not at 100 percent, go to next step.
4. Turn ignition off. Disconnect heater and A/C control Yellow 26-pin harness connector C2. Disconnect defrost air mix door motor White 6-pin harness connector. Check for continuity of circuits between defrost air mix door motor harness connector and heater and A/C control harness connector C2. See **VALVE ACTUATOR CIRCUIT IDENTIFICATION** table. See **Fig. 2** and **Fig. 3** . If continuity exists in all circuits, go to next step. If continuity does not exist in any circuit, go to step 6 .
5. Check for a short to ground in circuits between defrost air mix door motor harness connector and heater and A/C control harness connector C2. See **VALVE ACTUATOR CIRCUIT IDENTIFICATION** table. If all circuits are okay, go to step 7 . If short to ground exists in any wire(s), go to step 8 .
6. Repair open in appropriate wire. See **WIRING DIAGRAMS** . After repair, go to step 9 .
7. Replace floor air valve actuator. After repair, go to step 9 .
8. Repair short to ground in appropriate wire(s). See **WIRING DIAGRAMS** . After repair, go to step 9 .
9. Clear DTCs using scan tool. See **CLEARING DIAGNOSTIC TROUBLE CODES** . Ensure DTC 24 does not reset. If DTC 24 resets, go to next step.
10. Replace and program heater and A/C control. See **HEATER & A/C CONTROL ASSEMBLY** under REMOVAL & INSTALLATION. Recheck system operation.

DTC 25: DEFROST AIR MIX DOOR MOTOR VOLTAGE HIGH**Circuit Description**

Defrost air valve actuator is a DC stepper motor by design. Stepper motor has 4 field windings that are controlled by heater and A/C control. Heater and A/C control moves stepper motor by energizing the proper field windings which rotates the armature in a fixed amount (a step) in the appropriate direction. Battery voltage for stepper motor is supplied through heater and A/C control when ignition is in ON position. Attached to stepper motor is a small gear that meshes with a larger gear which is part of an assembly that drives linkage of air mix door.

Conditions For Setting DTC

When ignition switch is in ON position, heater and A/C control measures the current on all 4 coil wires on stepper motor. Measured current averaged by heater and A/C control and a fail threshold is calculated. After output current is measured, it is compared with threshold value. If short to power is detected on any of the low side drivers, heater and A/C control automatically protect low-side drivers by disabling all low-side outputs. This step is repeated 3 times within a 10 second time frame.

DTC 25 stores in heater and A/C control memory. Fault detection process is repeated 3 times at a fixed interval of 70 ms to allow for debouncing. When DTC is set, stepper motor can no longer be controlled. DTC will clear when conditions for fault no longer exist or by clearing with a scan tool. A history DTC will clear after 20 consecutive ignition cycles if conditions for fault no longer exist.

Diagnostic Aids

If DTC is history or an intermittent, try performing tests shown while moving wiring harness and connectors. This can cause malfunction to appear. Visually inspect stepper motor connector and harness for damage, corrosion or water intrusion. Check for proper terminal contact, misrouted harness, rubbed through wire insulation and broken wire inside insulation.

Diagnostic Test

1. If diagnostic system check has not been performed, perform **DIAGNOSTIC SYSTEM CHECK** . If diagnostic system check has been performed, go to next step.
2. Connect scan tool. Turn ignition on. Select DEF AIR MIX DOOR MOT. and POS from data list. Press AUTO button on heater and A/C control panel. Set MODE to defogger vents. If scan tool displays defrost air mix door motor ACTIVE and position is at 30 percent, go to next step. If scan tool does not display defrost air mix door motor ACTIVE and position is not at 30 percent, go to step 4 .
3. Press defrost button. If scan tool displays defrost air mix door motor ACTIVE and position is at zero percent, fault may be intermittent. Go to **DIAGNOSTIC AIDS** . If scan tool does not display right air mix door motor ACTIVE and position is not at zero percent, go to next step.
4. Turn ignition off. Disconnect heater and A/C control Yellow 26-pin harness connector. Disconnect defrost air mix door motor 6-pin harness connector. Measure voltage in circuits between right air mix door motor harness connector and heater and A/C control harness connector C2. See **VALVE ACTUATOR CIRCUIT IDENTIFICATION** table. See **Fig. 2** and **Fig. 3** . If less than .1 volt exists in all cases, go to next step. If .1 volt or more exists, go to step 6 .
5. Connect all connectors. Clear DTCs using scan tool. See **CLEARING DIAGNOSTIC TROUBLE CODES** . Ensure DTC 25 does not reset. If DTC 25 exists, go to step 7 .
6. Repair short to power in appropriate wire(s). See **WIRING DIAGRAMS** . After repair, go to next step.
7. Replace and program heater and A/C control. See **HEATER & A/C CONTROL ASSEMBLY** under REMOVAL & INSTALLATION. Recheck system operation.

DTC 27: BLOWER MOTOR VOLTAGE LOW OR CIRCUIT OPEN

2001 Cadillac Catera

2000-01 AUTOMATIC A/C-HEATER SYSTEMS Catera

Circuit Description

Operation of blower motor is determined by mode selection. Up to 5 speeds can be achieved. When a blower speed or mode is selected, heater and A/C control provides a variable output voltage of 0-5 volt from connector C1 terminal No. 11 (Black/Blue wire) to blower control module connector terminal No. 2. Blower motor receives power from blower control module connector terminal No. 6.

Actual fan speed is achieved by controlling ground side of blower motor at blower motor control module terminal No. 7. Voltage on ground side varies from 10 volts for a low blower speed request to 0.5 volt for a high blower speed request. Blower control module provides a feedback circuit, on circuit XM112 (Brown/White wire), to heater and A/C control, in order to ensure the following:

- Blower motor speed stability.
- Indication of any failure in input circuitry to blower control module.
- Indication of any failure in output circuitry to heater and A/C control.

Conditions For Setting DTC

Heater and A/C control detects an open or short to ground in CKT XM112 (Brown/White wire), CKT FP812 (Black/Blue wire), CKT A75 (Red wire) or CKT A465 (Red wire). All of above conditions must be met for less than one second.

When Black/Blue wire is open or shorted to ground, heater and A/C control internally disables blower speed voltage output at terminal No. 11, ending all blower motor operation. When Brown/White wire is open or shorted to ground, blower motor operation is still functional. When either Red wire is open or shorted to ground, blower control module disables the blower supply voltage ending all blower motor operation. Heater and A/C control stores DTC 27 in memory. DTC will clear when conditions for fault no longer exist or by clearing with a scan tool. A history DTC will clear after 20 consecutive ignition cycles if conditions for fault no longer exist.

Diagnostic Aids

If DTC is an intermittent, perform the tests shown while moving the wiring harnesses and connectors. This may cause the malfunction to appear. When moving related harnesses and harness connectors, inspect wiring and connectors for broken wiring inside the insulation, poor terminal contact or damaged terminals. All connector terminals in related circuits should be carefully reformed or replaced in order to ensure proper contact tension.

Typical voltage readings at blower control module terminal No. 2 with the ignition switch ON and engine OFF and no existing DTCs. Position 1 is low speed and position 5 is high speed:

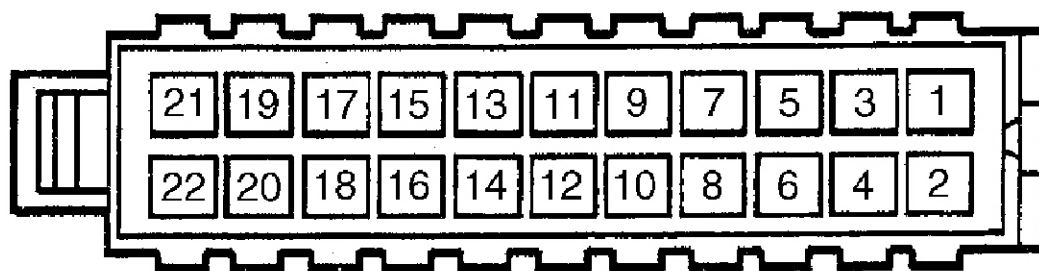
- Position 1: 1.5 volts.
- Position 2: 2.1 volts
- Position 3: 2.8 volts
- Position 4: 3.4 volts
- Position 5: 5.0 volts

Monitor this voltage at blower control module with a scan tool. Select blower controller VOLTAGE from the Heating and A/C data list. Always inspect power and ground circuits before replacing heater and A/C control.

Diagnostic Test

1. If diagnostic system check has not been performed, perform **DIAGNOSTIC SYSTEM CHECK**. If diagnostic system check has been performed, go to next step.
2. If blower motor operates at any speed, go to next step. If blower motor does not operate at any speed, go to **BLOWER MOTOR INOPERATIVE AT ANY SPEED** under TROUBLESHOOTING.

3. Disconnect heater and A/C control Black 22-pin harness connector C1. Disconnect blower control module Black 5-pin harness connector. Measure resistance of Brown/White wire between heater and A/C control harness connector C1 terminal No. 13 and blower control module harness connector terminal No. 4. See **Fig. 1** and **Fig. 4**. If resistance is less than 5 ohms, go to next step. If resistance is 5 ohms or more, go to step 5.



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Fig. 4: Identifying Heater & A/C Harness Connector C1 Terminals
 Courtesy of GENERAL MOTORS CORP.

4. Measure resistance between ground and blower control module harness connector terminal No. 4. If resistance is infinite, go to step 6. If resistance is not infinite, go to step 7.
5. Repair open in Brown/White wire. See **WIRING DIAGRAMS**. After repair, go to step 8.
6. Measure resistance of Black/Blue wire between blower control module harness connector terminal No. 2 and heater and A/C control harness connector C1 terminal No. 11. If resistance is less than 5 ohms, go to step 9. If resistance is 5 ohms or more, go to step 10.
7. Repair short to ground in Brown/White wire. See **WIRING DIAGRAMS**. After repair, go to next step.
8. Connect all connectors. Connect scan tool. Clear DTCs using scan tool. See **CLEARING DIAGNOSTIC TROUBLE CODES**. Cycle through all blower speeds. Check for heating and A/C DTCs. If DTC resets as current, go to step 11. If DTC 27 does not reset, system is okay at this time.
9. Measure resistance between ground and heater and A/C control harness connector C1 terminal No. 11 (Black/Blue wire). If resistance is infinite, go to step 12. If resistance is not infinite, go to step 13.
10. Repair open in Black/Blue wire. See **WIRING DIAGRAMS**. After repair, go to step 8.
11. Replace blower control module. After repair, go to step 14.
12. Fault may be intermittent in either circuit at this time. Check circuits again while moving related harnesses and connectors. If open or short is found, repair as necessary. After repair, go to step 14. If open or short is not found, go to **DIAGNOSTIC AIDS**.
13. Repair short to ground in blower speed output circuit (Black/Blue wire). See **WIRING DIAGRAMS**. After repair, go to step 8.
14. Clear DTCs using scan tool. See **CLEARING DIAGNOSTIC TROUBLE CODES**. Cycle through all blower speeds. Check for heating and A/C DTCs. If DTC 27 resets as current, go to next step. If DTC 27 does not reset, system is okay at this time.
15. Replace and program heater and A/C control. See **HEATER & A/C CONTROL ASSEMBLY** under REMOVAL & INSTALLATION. Recheck system operation.
16. Clear DTCs using scan tool. See **CLEARING DIAGNOSTIC TROUBLE CODES**. Cycle through all blower speeds. Check for Heating and A/C DTCs. If DTC 27 does not reset, system is okay at this time.

DTC 28: AIR CIRCULATION VALVE VOLTAGE LOW OR CIRCUIT OPEN

Circuit Description

2001 Cadillac Catera

2000-01 AUTOMATIC A/C-HEATER SYSTEMS Catera

Recirculation switch on control panel is a momentary switch that returns to the rest position after it is pressed to ON or OFF positions. When in ON position, heater and A/C control grounds coil of recirculation vacuum solenoid valve. Battery voltage is supplied from heater and A/C control to solenoid when ignition is in ON position. With voltage supplied and ground and provided, solenoid energizes, and allows vacuum to flow to recirculation actuator valve. Heater and A/C control also controls solenoid valve in AUTO mode.

Conditions For Setting DTC

Every 200 ms heater and A/C control continuously monitors circuit No. 921 (Blue/Black wire) for an open or short to ground. If circuit No. 921 stays at or near zero volts, DTC 28 will set in heater and A/C control memory and will disable the output. This DTC can only set with system off. DTC will clear when conditions for fault no longer exist or by clearing with a scan tool. A history DTC will clear after 20 consecutive ignition cycles if conditions for fault no longer exists.

Diagnostic Aids

If DTC is history or an intermittent, try performing tests shown while moving wiring harness and connectors. This can cause malfunction to appear. Visually inspect related connectors and harness for damage, corrosion or water intrusion. Check for proper terminal contact, misrouted harness, rubbed through wire insulation and broken wire inside insulation. Check power and ground circuits before replacing heater and A/C control.

Diagnostic Test

1. If diagnostic system check has not been performed, perform **DIAGNOSTIC SYSTEM CHECK** . If diagnostic system check has been performed, go to next step.
2. Disconnect air circulation valve harness connector. Turn ignition on. Measure voltage between ground and air circulation valve harness connector terminal No. 2 (Yellow wire). If battery voltage exists, go to next step. If battery voltage does not exist, go to step 4 .
3. Turn ignition switch to OFF position. Disconnect heater and A/C control 26-pin harness connector C2. Measure resistance of Blue/Black wire between heater and A/C control harness connector C2 terminal No. 22 and air recirculation valve harness connector terminal No. 1. See **Fig. 2** . If resistance is less than 5 ohms, go to step 5 . If resistance is 5 ohms or more, go to step 6 .
4. Check for open in Yellow wire between heater and A/C control harness connector C2 terminal No. 26 and recirculation vacuum solenoid harness connector. Repair as necessary. After repair, go to step 10 . If Yellow wire is okay, go to step 11 .
5. Measure resistance of recirculation vacuum solenoid valve. If resistance is 36.4 ohms, go to step 7 . If resistance is not 36.4 ohms, go to step 8 .
6. Check for open in Blue/Black wire between heater and A/C control and air circulation valve. Repair as necessary. After repair, go to step 10 .
7. Measure resistance between ground and heater and A/C control harness connector C2 terminal No. 22 (Blue/Black wire). If resistance is infinite, go to step 10 . If resistance is not infinite, go to step 9 .
8. Replace recirculation vacuum solenoid valve. After repair, go to step 10 .
9. Check for short to ground in Blue/Black wire between air recirculation solenoid valve harness connector terminal No. 2 and heater and A/C control harness connector C2 terminal No. 26. Repair as necessary. After repair, go to next step.
10. Connect all connectors. Clear DTCs using scan tool. See **CLEARING DIAGNOSTIC TROUBLE CODES** . Ensure DTC 28 does not reset. If DTC 28 exists, go to next step.
11. Replace and program heater and A/C control. See **HEATER & A/C CONTROL ASSEMBLY** under REMOVAL & INSTALLATION. Recheck system operation.

DTC 29: AIR CIRCULATION VALVE VOLTAGE HIGH

Circuit Description

Recirculation switch on control panel is a momentary switch that returns to the rest position after it is pressed to ON or OFF positions. When in ON position, heater and A/C control grounds coil of recirculation vacuum solenoid valve. Battery voltage is supplied from heater and A/C control to solenoid when ignition is in ON position. With voltage supplied and ground and provided, solenoid energizes, and allows vacuum to flow to recirculation actuator valve. Heater and A/C control also controls solenoid valve in AUTO mode.

Conditions For Setting DTC

DTC 29 will set if a short to power is detected on circuit No. 921 (Blue/Black wire) or on a low side driver, heater and A/C control automatically protects low side driver by disabling all low side outputs. DTC will clear when conditions for fault no longer exists or by clearing with a scan tool. A history DTC will clear after 20 consecutive ignition cycles if conditions for fault no longer exist.

Diagnostic Aids

If DTC is history or an intermittent, try performing tests shown while moving wiring harness and connectors. This can cause malfunction to appear. Visually inspect related connectors and harness for damage, corrosion or water intrusion. Check for proper terminal contact, misrouted harness, rubbed through wire insulation and broken wire inside insulation. Check power and ground circuits before replacing heater and A/C control.

Diagnostic Test

1. If diagnostic system check has not been performed, perform **DIAGNOSTIC SYSTEM CHECK** . If diagnostic system check has been performed, go to next step.
2. Disconnect recirculation vacuum solenoid valve harness connector. Turn ignition on. Connect test light between ground and coil side feed circuit of solenoid valve harness connector terminal No. 2 (Yellow wire). If test light illuminates, go to next step. If test light does not illuminate, go to step 4 .
3. Turn ignition off. Remove heater and A/C control. Disconnect heater and A/C control Black 26-pin harness connector C2. Check for short to power in recirculation vacuum solenoid valve control circuit (Blue/Black wire). See [Fig. 2](#) . Repair as necessary. If short to power was found and corrected, go to step 5 . If short to power was not found, go to step 6 .
4. Repair open in coil side feed circuit (Yellow wire). See **WIRING DIAGRAMS** . After repair, go to next step.
5. Install scan tool and clear DTCs. See **CLEARING DIAGNOSTIC TROUBLE CODES** . Recheck system operation. Ensure DTC 29 does not reset. If DTC 29 resets, go to step 2 .
6. Measure resistance of recirculation vacuum solenoid valve. If resistance is less than 36.4 ohms, go to next step. If resistance is 36.4 ohms or more, go to step 8 .
7. Replace recirculation vacuum solenoid valve. After repair, go to step 5 .
8. Check for poor connections at heater and A/C control harness connector. Repair as necessary. If poor connections were found and repaired, go to step 5 . If poor connections were not found, go to next step.
9. Repair and program heater and A/C control. See **HEATER & A/C CONTROL ASSEMBLY** under REMOVAL & INSTALLATION. After repair, go to step 5 .

DTC 30: HEATING CUT-OFF VALVE VOLTAGE LOW OR CIRCUIT OPEN

Circuit Description

When water cut-off vacuum solenoid valve is activated it allows vacuum to be applied to hot water control valve. Control valve prevents heated coolant from entering heater core when vacuum is applied. In A/C mode or when cooler air is requested, heater and A/C control grounds coil of water cut-off vacuum solenoid valve. When ignition switch is in ON position, battery voltage is supplied from heater and A/C control to the solenoid. With voltage applied and ground provided, solenoid energizes and allows vacuum to flow to hot water control valve.

Conditions For Setting DTC

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Every 200 ms heater and A/C control continuously monitors circuit No. 920 (Blue/White wire) for an open or short to ground. If circuit 920 stays at or near zero volts, DTC 30 will set in heater and A/C control memory and does not disable output. DTC will clear when conditions for fault no longer exist or by clearing with a scan tool. A history DTC will clear after 20 consecutive ignition cycles if conditions for fault no longer exist.

Diagnostic Aids

If DTC is history or an intermittent, try performing tests shown while moving wiring harness and connectors. This can cause malfunction to appear. Visually inspect related connectors and harness for damage, corrosion or water intrusion. Check for proper terminal contact, misrouted harness, rubbed through wire insulation and broken wire inside insulation. Check power and ground circuits before replacing heater and A/C control.

Diagnostic Test

1. If diagnostic system check has not been performed, perform **DIAGNOSTIC SYSTEM CHECK** . If diagnostic system check has been performed, go to next step.
2. Disconnect water cut-off vacuum solenoid valve harness connector. Turn ignition on. Measure voltage between ground and water cut-off vacuum solenoid valve harness connector terminal No. 2 (Yellow wire). If battery voltage exists, go to next step. If battery voltage does not exist, go to step 4 .
3. Turn ignition off. Disconnect heater and A/C control Black 26-pin harness connector C2. Measure resistance of Blue/White wire between heater and A/C control harness connector C2 terminal No. 21 and water cut-off vacuum solenoid valve harness connector terminal No. 1. See **Fig. 2** . If resistance is less than 5 ohms, go to step 5 . If resistance is 5 ohms or more, go to step 6 .
4. Locate and repair open in Yellow wire between heater and A/C control harness connector C2 terminal No. 26 and water cut-off vacuum solenoid valve. If open is found and repaired, go to step 10 . If open was not found, go to step 11 .
5. Measure resistance of water cut-off vacuum solenoid valve. If resistance is about 36.4 ohms, go to step 7 . If resistance is not about 36.4 ohms, go to step 8 .
6. Repair open in Blue/White wire between water cut-off vacuum solenoid valve connector terminal No. 1 and heater and A/C control harness connector terminal No. 21. After repair, go to step 10 .
7. Measure resistance between ground and heater and A/C control harness connector C2 terminal No. 21 (Blue/White wire). If resistance is infinite, go to step 10 . If resistance is not infinite, go to step 9 .
8. Replace water cut-off vacuum solenoid valve. After repair, go to step 10 .
9. Repair short to ground in Blue/White wire. See **WIRING DIAGRAMS** . After repair, go to next step.
10. Connect all connectors. Clear DTCs using scan tool. See **CLEARING DIAGNOSTIC TROUBLE CODES** . Ensure DTC 30 does not reset. If DTC 30 exists, go to next step.
11. Repair and program heater and A/C control. See **HEATER & A/C CONTROL ASSEMBLY** under REMOVAL & INSTALLATION. Recheck system operation.

DTC 31: HEATING CUT-OFF VALVE VOLTAGE HIGH

Circuit Description

When water cut-off vacuum solenoid valve is activated it allows vacuum to be applied to hot water control valve. Control valve prevents heated coolant from entering heater core when vacuum is applied. In A/C mode or when cooler air is requested, heater and A/C control grounds coil of water cut-off vacuum solenoid valve. When ignition switch is in ON position, battery voltage is supplied from heater and A/C control to the solenoid. With voltage applied and ground provided, solenoid energizes and allows vacuum to flow to hot water control valve.

Conditions For Setting DTC

DTC 31 will set if a short to power is detected on circuit No. 920 (Blue/White wire) or on a low side driver. Heater and A/C control automatically protects low side driver by disabling all low side outputs. DTC will clear

when conditions for fault no longer exist or by clearing with a scan tool. A history DTC will clear after 20 consecutive ignition cycles if conditions for fault no longer exist.

Diagnostic Aids

If DTC is history or an intermittent, try performing tests shown while moving wiring harness and connectors. This can cause malfunction to appear. Visually inspect related connectors and harness for damage, corrosion or water intrusion. Check for proper terminal contact, misrouted harness, rubbed through wire insulation and broken wire inside insulation. Check power and ground circuits before replacing heater and A/C control.

Diagnostic Test

1. If diagnostic system check has not been performed, perform **DIAGNOSTIC SYSTEM CHECK** . If diagnostic system check has been performed, go to next step.
2. Disconnect water cut-off solenoid valve harness connector. Turn ignition on. Connect test light between ground and coil side feed circuit of solenoid valve harness connector terminal No. 2 (Yellow wire). If test light illuminates, go to next step. If test light does not illuminate, go to step 4 .
3. Turn ignition off. Remove heater and A/C control. Disconnect heater and A/C control Black 26-pin harness connector C2. Check for short to power in water cut-off solenoid valve control circuit (Blue/White wire). See **Fig. 2** . Repair as necessary. If short to power was found and repaired, go to step 5 . If short to power was not found, go to step 6 .
4. Repair open in coil side feed circuit (Yellow wire). See **WIRING DIAGRAMS** . After repair, go to next step.
5. Connect scan tool and clear DTCs. See **CLEARING DIAGNOSTIC TROUBLE CODES** . Recheck system operation. Ensure DTC 31 does not reset. If DTC 31 resets, go to step 2 .
6. Measure resistance of water cut-off solenoid valve. If resistance is less than 36.4 ohms, go to next step. If resistance is 36.4 ohms or more, go to step 8 .
7. Replace water cut-off solenoid valve. After repair, go to step 5 .
8. Check for poor connections at heater and A/C control harness connector. Repair as necessary. If poor connections were found and repaired, go to step 5 . If poor connections were not found, go to next step.
9. Repair and program heater and A/C control. See **HEATER & A/C CONTROL ASSEMBLY** under REMOVAL & INSTALLATION. After repair, go to step 5 .

DTC 35: A/C REQUEST SIGNAL VOLTAGE CIRCUIT OPEN

Circuit Description

When A/C button is pressed on, battery voltage is supplied to A/C compressor refrigerant pressure switch terminal No. 2 (Black/White wire). A/C compressor refrigerant pressure switch is closed when pressure is about 36 psi (2.53 kg/cm²). With pressure switch closed, battery voltage is supplied to ECM harness connector C2 terminal No. 58 (Black/White wire). See **Fig. 5** . After receiving A/C request input, ECM grounds A/C compressor relay coil which energizes A/C compressor relay closing relay contacts. With relay contacts closed, circuit is completed allowing battery voltage to be applied to A/C compressor clutch coil, engaging compressor clutch. Heater and A/C control monitors the state of compressor clutch relay through A/C cut-out input circuit.

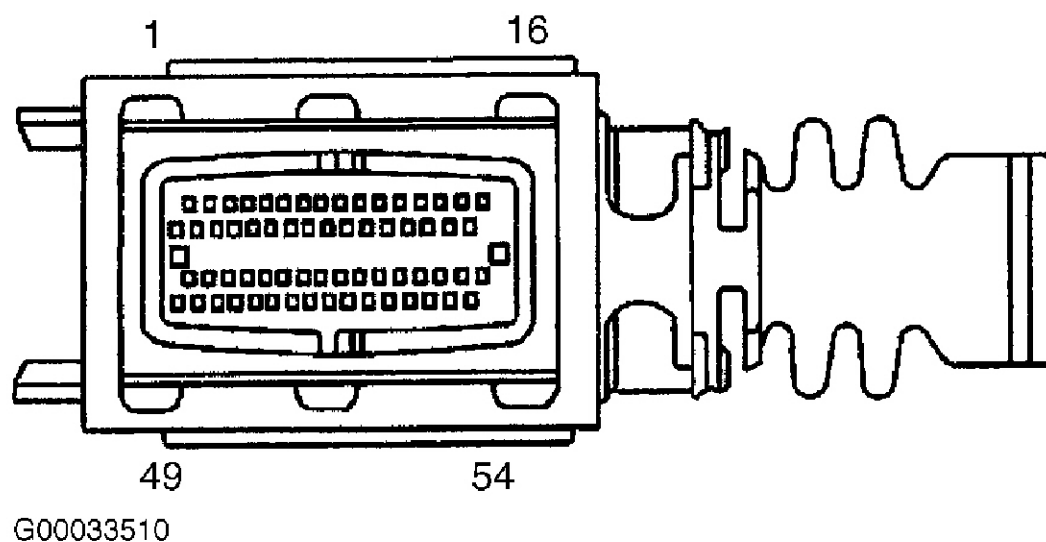


Fig. 5: Identifying ECM Harness Connector C2 Terminals
 Courtesy of GENERAL MOTORS CORP.

Conditions For Setting DTC

DTC 35 will set if ignition is on, A/C request is inactive and heater and A/C control detects an open or short to power in A/C request circuit. DTC 35 will set in heater and A/C control memory. Heater and A/C control will not disable the output. DTC will clear when conditions for fault no longer exist or by clearing with a scan tool. A history DTC will clear after 20 consecutive ignition cycles if conditions for fault no longer exist.

Diagnostic Aids

If DTC is history or an intermittent, try performing tests shown while moving wiring harness and connectors. This can cause malfunction to appear. Visually inspect related connectors and harness for damage, corrosion or water intrusion. Check for proper terminal contact, misrouted harness, rubbed through wire insulation and broken wire inside insulation. Check power and ground circuits before replacing heater and A/C control.

Diagnostic Test

1. If diagnostic system check has not been performed, perform **DIAGNOSTIC SYSTEM CHECK** . If diagnostic system check has been performed, go to next step.
2. Connect scan tool. Start engine. Turn A/C system on. Monitor A/C-CUTOFF parameter in heater and A/C data list. Press A/C on control panel. If A/C-CUTOFF parameter changes state, go to **DIAGNOSTIC AIDS** . If A/C-CUTOFF parameter does not change, go to next step.
3. Turn ignition off. Disconnect ECM 64-pin harness connector. Turn ignition on. Using scan tool, command A/C request output on. Measure voltage between ground and A/C request input circuit, ECM harness connector C2 terminal No. 6 (Black/Blue wire). See **Fig. 5** . If battery voltage exists, go to step 6 . If battery voltage does not exist, go to next step.
4. Turn ignition off. Disconnect A/C compressor refrigerant pressure switch Black 4-pin harness connector. Connect a fused (3-amp) jumper wire between A/C compressor refrigerant pressure switch harness connector terminals No. 1 (Black/White wire) and No. 2 (Black/White wire). Turn ignition on. Using scan tool, command A/C request on. Measure voltage between ground and ECM harness connector C2 terminal No. 6 (Black/Blue wire). If about 12 volts exist, go to step 9 . If about 12 volts does not exist, go to next step.
5. Check for open or high resistance in A/C request output circuit (Black/White wire) and A/C request input circuit (Black/Blue wire). Repair as necessary. See **WIRING DIAGRAMS** . If open or high resistance is found and repaired in either circuit, go to step 15 . If open or high resistance is not found in either circuit, go to step 10 .

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6. Using scan tool, command A/C request output off. Measure voltage between ground and ECM harness connector C2 terminal No. 6 (Black/Blue wire). If 6.5 volts exist, go to step [11](#) . If 6.5 volts does not exist, go to next step.
7. Turn ignition off. Disconnect A/C compressor refrigerant pressure switch Black 4-pin harness connector. Connect a fused (3-amp) jumper wire between A/C compressor refrigerant pressure switch harness connector terminals No. 1 (Black/White wire) and No. 2 (Black/White wire). Turn ignition on. Using scan tool, command A/C request off. Measure voltage between ground and ECM harness connector C2 terminal No. 6 (Black/Blue wire). If about 6.5 volts exist, go to step 9 . If about 6.5 volts does not exist, go to next step.
8. Check for short to power in A/C request output circuit (Black/White wire) and A/C request input circuit (Black/Blue wire). Repair as necessary. If short to power is found and repaired in either circuit, go to step 15 . If short to power is not found in either circuit, go to step 10 .
9. Check for poor terminal contact in A/C compressor refrigerant pressure switch harness connector. Repair as necessary. If poor terminal contact is found and repaired, go to step [15](#) . If poor terminal contact is not found, go to step 12 .
10. Check for poor terminal contact in heater and A/C control harness connector. If poor terminal contact is found and repaired, go to step 15 . If poor terminal contact is not found, go to step 13 .
11. Check for poor terminal contact in ECM harness connector. If poor terminal contact is found and repaired, go to step 15 . If poor terminal contact is not found, go to step 14 .
12. Replace A/C compressor refrigerant pressure switch. After repair, go to step 15 .
13. Repair and program heater and A/C control. See **HEATER & A/C CONTROL ASSEMBLY** under REMOVAL & INSTALLATION. After repair, go to step 15 .
14. Replace ECM. See **ENGINE CONTROL MODULE (ECM)** under REMOVAL & INSTALLATION. After repair, go to next step.
15. Using scan tool, clear DTCs. See **CLEARING DIAGNOSTIC TROUBLE CODES** . Recheck system operation. Ensure DTC 35 does not reset. If DTC 35 resets, go to step 2 .

DTC 36: A/C REQUEST SIGNAL VOLTAGE LOW

Circuit Description

When A/C button is pressed on, battery voltage is supplied to A/C compressor refrigerant pressure switch terminal No. 2 (Black/White wire). A/C compressor refrigerant pressure switch is closed when pressure is about 36 psi (2.53 kg/cm²), with pressure switch closed, battery voltage is supplied to ECM harness connector C2 terminal No. 58 (Black/White wire). After receiving A/C request input, ECM grounds A/C compressor relay coil which energizes A/C compressor relay closing relay contacts. With relay contacts closed, circuit is completed allowing battery voltage to be applied to A/C compressor clutch coil, engaging compressor clutch. Heater and A/C control monitors ECM when it energizes or de-energizes A/C compressor relay coil. Heater and A/C control monitors the circuit at connector C1 terminal No. 9 (Yellow/Blue wire). This circuit is in parallel with control side of relay coil.

Conditions For Setting DTC

Heater and A/C control monitors request circuit for a short to ground every 40 ms on a continuous basis. DTC 36 will set if circuit stays at or near zero volts. DTC 35 will set in heater and A/C control memory. Heater and A/C control will internally disable the output. DTC will clear when conditions for fault no longer exist or by clearing with a scan tool. A history DTC will clear after 20 consecutive ignition cycles if conditions for fault no longer exist.

Diagnostic Aids

If DTC is history or an intermittent, try performing tests shown while moving wiring harness and connectors. This can cause malfunction to appear. Visually inspect related connectors and harness for damage, corrosion or water

intrusion. Check for proper terminal contact, misrouted harness, rubbed through wire insulation and broken wire inside insulation. Check power and ground circuits before replacing heater and A/C control.

Diagnostic Test

1. If diagnostic system check has not been performed, perform **DIAGNOSTIC SYSTEM CHECK** . If diagnostic system check has been performed, go to next step.
2. Disconnect ECM 64-pin harness connector C2. Turn ignition on. Measure voltage between ground and ECM harness connector C2 terminal No. 58 (Black/White wire). If about 12 volts exists, go to **DIAGNOSTIC AIDS** . If about 12 volts does not exist, go to next step.
3. Check A/C request circuit for short to ground. Repair as necessary. See **WIRING DIAGRAMS** . If short to ground is found and repaired, go to next step. If short to ground does not exist, go to step 5 .
4. Using scan tool and clear DTCs. See **CLEARING DIAGNOSTIC TROUBLE CODES** . Recheck system operation. Ensure DTC 36 does not reset. If DTC 36 resets, go to next step.
5. Check for poor terminal contact at heater and A/C control connector. Repair as necessary. If poor terminal contact is found and repaired, go to step 4 . If poor terminal contact is not found, go to next step.
6. Replace and program heater and A/C control. See **HEATER & A/C CONTROL ASSEMBLY** under REMOVAL & INSTALLATION. Recheck system operation.

DTC 37: HEATER & A/C CONTROL SWITCH STUCK

1. If diagnostic system check has not been performed, perform **DIAGNOSTIC SYSTEM CHECK** . If diagnostic system check has been performed, go to next step.
2. Connect scan tool. Turn ignition on. Observe A/C SWITCH parameter in heater and A/C control data list. If display shows INACTIVE, go to next step. If display does not show INACTIVE, go to step 4 .
3. Press A/C button on control panel. If A/C SWITCH parameter changes state, fault may be intermittent. If A/C SWITCH parameter does not change state, go to step 5 .
4. If scan tool displays ACTIVE at all times, go to next step.
5. Replace and program heater and A/C control. See **HEATER & A/C CONTROL ASSEMBLY** under REMOVAL & INSTALLATION. After repair, go to next step.
6. Using scan tool, clear DTCs. See **CLEARING DIAGNOSTIC TROUBLE CODES** . Recheck system operation. Ensure DTC 37 does not reset. If DTC 37 resets, go to step 2 .

Install scan tool. Select DATA LIST from heater and A/C control menu. Select A/C SWITCH from data list. Press A/C button (on heater and A/C control) on and off several times. If scan tool displayed ACTIVE and INACTIVE while A/C button is being pressed, system is okay. If scan tool does not display ACTIVE and INACTIVE while A/C button is being pressed, replace and program heater and A/C control. See **HEATER & A/C CONTROL ASSEMBLY** under REMOVAL & INSTALLATION.

DTC 38: SOLAR/TWILIGHT SENSOR SUPPLY VOLTAGE LOW

NOTE: Solar/twilight sensor may also be referred to as headlight automatic control ambient light sensor.

Circuit Description

Solar/twilight sensor is a photo-electric cell that provides 2 inputs to heater and A/C control system. Input for sunload is at heater and A/C control terminal No. 3 (Black wire). This is used by heater and A/C control for temperature control compensation based on additional heat from the sun (sunload). Input for twilight is at heater and A/C control terminal No. 2 (Black/White wire). Twilight sentinel input is processed by heater and A/C control and sent to Body Control Module (BCM).

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Conditions For Setting DTC

Heater and A/C control continuously monitors circuit X812 (Brown wire). DTC 38 will set into memory if circuit needs to stay at or near zero volts for 200 ms. System will default to a assumed value of no solar heat (darkness). DTC 38 will clear if conditions for fault no longer exist or can be cleared using a scan tool. A history DTC will clear after 20 consecutive ignition cycles if conditions for fault no longer exist.

Diagnostic Aids

If DTC is history or an intermittent, try performing tests shown while moving wiring harness and connectors. This can cause malfunction to appear. Visually inspect related connectors and harness for damage, corrosion or water intrusion. Check for proper terminal contact, misrouted harness, rubbed through wire insulation and broken wire inside insulation. Check power and ground circuits before replacing heater and A/C control.

Diagnostic Test

1. If diagnostic system check has not been performed, perform **DIAGNOSTIC SYSTEM CHECK** . If diagnostic system check has been performed, go to next step.
2. Remove solar/twilight sensor and disconnect solar/twilight sensor 4-pin harness connector. Turn ignition on. Measure voltage between ground and solar/twilight sensor harness connector terminal No. 1 (Brown wire). If about 5 volts exist, go to **DIAGNOSTIC AIDS** . If about 5 volts does not exist, go to next step.
3. Disconnect heater and A/C control Black 22-pin harness connector C1. Check circuit X812 (Brown wire) between heater and A/C control harness connector C1 terminal No. 7 and solar/twilight sentinel harness connector terminal No. 1 for open or short to ground. Repair as necessary. If open or short is found and repaired, go to next step. If open or short to ground is not found, go to step 5 .
4. Connect scan tool and clear DTCs. See **CLEARING DIAGNOSTIC TROUBLE CODES** . Ensure DTC 38 does not reset. If DTC 38 resets, go to step 6 .
5. Check for poor terminal contact at solar/twilight sensor connector. Repair as necessary. If poor terminal contact is found and repaired, go to step 4 . If terminal contact is okay,
6. Check for poor terminal contact at heater and A/C control connector. Repair as necessary. If poor terminal contact is found and repaired, go to step 4 . If terminal contact is okay, go to step 8 .
7. Replace solar/twilight sensor. After repair, go to step 4 .
8. Replace and program heater and A/C control. See **HEATER & A/C CONTROL ASSEMBLY** under REMOVAL & INSTALLATION.

DTC 39: SOLAR/TWILIGHT SENSOR SUPPLY VOLTAGE HIGH

NOTE: Solar/twilight sensor may also be referred to as headlight automatic control ambient light sensor.

Circuit Description

Solar/twilight sensor is a photo-electric cell that provides 2 inputs to heater and A/C control system. Input for sunload is at heater and A/C control terminal No. 3 (Black wire). This is used by heater and A/C control for temperature control compensation based on additional heat from the sun (sunload). Input for twilight is at heater and A/C control terminal No. 2 (Black/White wire). Twilight sentinel input is processed by heater and A/C control and sent to Body Control Module (BCM).

Conditions For Setting DTC

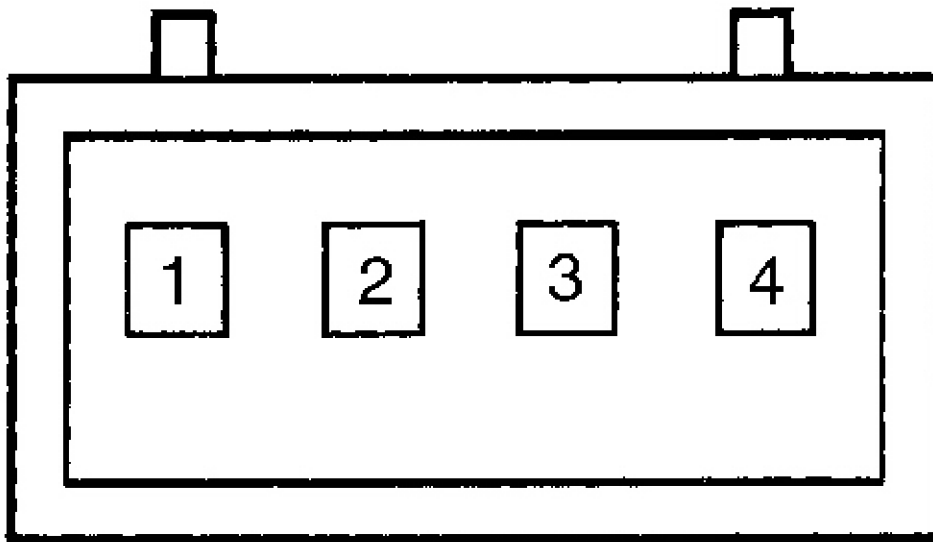
Heater and A/C control continuously monitors circuit X812 (Brown wire). DTC 39 will set into memory if circuit stays above 5.5 volts for 200 ms. System will default to an assumed value of no solar heat (darkness). DTC 39 will clear if conditions for fault no longer exist or can be cleared using a scan tool. A history DTC will clear after 20 consecutive ignition cycles if conditions for fault no longer exists.

Diagnostic Aids

If DTC is history or an intermittent, try performing tests shown while moving wiring harness and connectors. This can cause malfunction to appear. Visually inspect related connectors and harness for damage, corrosion or water intrusion. Check for proper terminal contact, misrouted harness, rubbed through wire insulation and broken wire inside insulation. Check power and ground circuits before replacing heater and A/C control.

Diagnostic Test

1. If diagnostic system check has not been performed, perform **DIAGNOSTIC SYSTEM CHECK** . If diagnostic system check has been performed, go to next step.
2. Remove solar/twilight sensor and disconnect solar/twilight sentinel sensor 4-pin harness connector. Measure voltage between ground and solar/twilight sentinel sensor harness connector terminal No. 1 (Brown wire). See **Fig. 6** . If about 5 volts exist, go to next step. If about 5 volts does not exist, go to **DIAGNOSTIC AIDS** .



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Fig. 6: Identifying Solar/Twilight Sentinel Connector Terminals
Courtesy of GENERAL MOTORS CORP.

3. Disconnect heater and A/C control Black 22-pin harness connector C1. Check 5-volt reference circuit (Brown wire) for short to power. Repair as necessary. If short to power was found and repaired, go to next step. If short to power does not exist, go to step 5 .
4. Connect scan tool and clear DTCs. See **CLEARING DIAGNOSTIC TROUBLE CODES** . Ensure DTC 39 does not reset. If DTC 39 resets, go to step 6 .
5. Check for poor terminal contact at heater and A/C control connector. Repair as necessary. If poor terminal contact was found and repaired, go to step 4 .
6. Replace and program heater and A/C control. See **HEATER & A/C CONTROL ASSEMBLY** under REMOVAL & INSTALLATION.

DTC 40: SOLAR/TWILIGHT SENSOR GROUND SHORTED TO POWER

NOTE: Solar/twilight sentinel sensor may also be referred to as headlight automatic control ambient light sensor.

Circuit Description

Solar/twilight sensor is a photo-electric cell that provides 2 inputs to heater and A/C control system. Input for sunload is at heater and A/C control terminal No. 3 (Black wire). This is used by heater and A/C control for temperature control compensation based on additional heat from the sun (sunload). Input for twilight is at heater and A/C control terminal No. 2 (Black/White wire). Twilight sentinel input is processed by heater and A/C control and sent to Body Control Module (BCM).

Conditions For Setting DTC

Heater and A/C control continuously monitors circuit X812 (Brown wire). DTC 40 will set into memory if voltage on circuit significantly increases to more than .4 volts for 200 ms. System will default to a assumed value of no solar heat (darkness). DTCs 10, 12, 14, 26, 39, 55 and 169 may also appear when DTC 40 sets. DTC 40 will clear if conditions for fault no longer exist or can be cleared using a scan tool. A history DTC will clear after 20 consecutive ignition cycles if conditions for fault no longer exist.

Diagnostic Aids

If DTC is history or an intermittent, try performing tests shown while moving wiring harness and connectors. This can cause malfunction to appear. Visually inspect related connectors and harness for damage, corrosion or water intrusion. Check for proper terminal contact, misrouted harness, rubbed through wire insulation and broken wire inside insulation. Check power and ground circuits before replacing heater and A/C control.

Diagnostic Test

1. If diagnostic system check has not been performed, perform **DIAGNOSTIC SYSTEM CHECK** . If diagnostic system check has been performed, go to next step.
2. Remove solar/twilight sensor and disconnect solar/twilight sentinel sensor 4-pin harness connector. Measure voltage between ground and solar/twilight sentinel sensor harness connector terminal No. 4 (Blue wire). See **Fig. 6** . If more than .4 volt exists, go to next step. If .4 volt or less exists, go to **DIAGNOSTIC AIDS** .
3. Disconnect heater and A/C control Black 22-pin harness connector C1. Measure voltage between ground and heater and A/C control connector C1 terminal No. 5 (Blue wire). If less than .1 volt exists, go to step 5 . If more than .1 volt exists, repair short to power in Blue wire between heater and A/C control and solar/twilight sentinel sensor terminal No. 4. Also check for short to power in Blue wire between heater and A/C control connector C1 terminal No. 5 and outside temperature sensor harness connector terminal "B".
4. Install scan tool and clear DTCs. See **CLEARING DIAGNOSTIC TROUBLE CODES** . Ensure DTC 40 does not reset. If DTC 40 resets, go to step 6 .
5. Check for poor terminal contact at heater and A/C control connector. Repair as necessary. If poor terminal contact is found and repaired, go to step 4 . If poor terminal contact does not exist, go to next step.
6. Replace and program heater and A/C control. See **HEATER & A/C CONTROL ASSEMBLY** under REMOVAL & INSTALLATION.

DTC 51: REPLACE HEATER & A/C CONTROL

Circuit Description

Calibrations for heater and A/C control are stored on EEPROM. When ignition is first turned on, heater and A/C control performs internal tests on EEPROM and can determine the integrity of EEPROM's non-volatile memory. Heater and A/C control compares its previously stored checksum with checksum calculated when ignition was first turned on. If 2 checksums do not match, heater and A/C control indicates that a calibration error (checksum error) has occurred.

Conditions For Setting DTC

DTC 51 will set and store in memory if stored checksum does not match calculated checksum or heater and A/C detects an internal memory malfunction (checksum error). Condition must exist while ignition is first turned on. When DTC 51 sets, all heater and A/C control functions are disabled. DTC 51 will clear if condition for fault no longer exists, cleared using scan tool. A history will clear after 20 seconds after 20 consecutive ignition cycles if condition for fault no longer exist.

Diagnostic Test

1. If diagnostic system check has not been performed, perform **DIAGNOSTIC SYSTEM CHECK** . If diagnostic system check has been performed, go to next step.
2. Replace and program heater and A/C control. See **HEATER & A/C CONTROL ASSEMBLY** under REMOVAL & INSTALLATION.
3. Install scan tool and clear DTCs. See **CLEARING DIAGNOSTIC TROUBLE CODES** . Ensure fault DTC does not reset.

DTC 52: HEATER & A/C CONTROL NOT PROGRAMMED**Circuit Description**

Calibrations for heater and A/C control are stored in EEPROM. When ignition is first turned on, heater and A/C control performs internal tests on EEPROM to determine if EEPROM is programmed.

Conditions For Setting DTC

DTC 52 will set and store in memory if test byte in EEPROM has an incorrect value (EEPROM not programmed). This fault is immediately recognized when ignition is first turned on. Heater and A/C control will use default values. DTC 52 will clear when heater and A/C control is programmed and cleared by scan tool. A history will clear after 20 seconds after 20 consecutive ignition cycles if conditions for fault no longer exist.

Diagnostic Test

1. If diagnostic system check has not been performed, perform **DIAGNOSTIC SYSTEM CHECK** . If diagnostic system check has been performed, go to next step.
2. Connect scan tool. Select PROGRAMMING from heater and A/C control main menu. Follow instructions on display screen. After completion of programming, go to next step.
3. Turn ignition off, then on. Perform **DIAGNOSTIC SYSTEM CHECK** . If DTC 52 is current, go to next step. If DTC 52 does not exist, go to step 5 .
4. Replace and program heater and A/C control. See **HEATER & A/C CONTROL ASSEMBLY** under REMOVAL & INSTALLATION.
5. Using scan tool, clear DTCs. See **CLEARING DIAGNOSTIC TROUBLE CODES** . Ensure fault DTC does not reset.

DTC 55: REPLACE HEATER & A/C CONTROL**Circuit Description**

DTC 55 is an internal control unit hardware failure (RAM, ROM defective) in heater and A/C control.

Conditions For Setting DTC

Heater and A/C control detects an internal hardware malfunction. Heater and A/C control checks hardware on a continuous basis every 200 ms. DTC 55 stores in memory and will disable all heater and A/C control functions. DTC 55 will clear if fault no longer exists or can be cleared using scan tool. A history will clear after 20 seconds

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after 20 consecutive ignition cycles if condition for fault no longer exists.

Diagnostic Test

1. If diagnostic system check has not been performed, perform **DIAGNOSTIC SYSTEM CHECK** . If diagnostic system check has been performed, go to next step.
2. Replace and program heater and A/C control. See **HEATER & A/C CONTROL ASSEMBLY** under REMOVAL & INSTALLATION.
3. Install scan tool and clear DTCs. See **CLEARING DIAGNOSTIC TROUBLE CODES** . Ensure fault DTC does not reset.

DTC 169: OUTSIDE AIR TEMPERATURE SENSOR VOLTAGE LOW

Circuit Description

Outside air temperature sensor is located behind lower grill of front fascia on left side of vehicle and provides a sample of outside (ambient) air temperature. Ambient air sensor is a thermistor used to control signal voltage to heater and A/C control. Heater and A/C control supplies a reference voltage (about 5 volts) on circuit PM4 (Blue/White wire) to sensor and measures voltage drop in circuit to obtain a temperature signal. Signal is an input that tells heater and A/C control how much cooling or heating will be required to deliver to passenger compartment. Blower motor speed is also affected by ambient temperature sensor.

Resistor of sensor varies from 169,400 ohms at -40°F (-40°C) to 1,245 ohms at 140°F (60°C). When outside air temperature is cold, thermistor resistance is high, therefore, heater and A/C will receive a high signal voltage input. If air temperature is hot, thermistor resistance is low and heater and A/C control will receive a low voltage signal voltage input.

Outside air temperature is displayed on display panel of heater and A/C control. Displayed temperature value is derived from a series of calculations performed by a processor in heater and A/C control. When measured outside temperature is less than displayed value, processor filters less of input signal, stores it in EEPROM, and rapidly updates the display. If measured outside temperature is more than displayed value and vehicle is moving, processor filters more of input signal, stores it in EEPROM and updates the display at a much slower rate.

Conditions For Setting DTC

When ignition is on, circuit PM4 (Blue/White wire) is checked continuously every 200 ms. DTC 169 will set if circuit PM4 stays at or near zero volts. Heater and A/C control displays outside temperature as "F" and system uses 50°F (10°C) as a default value. DTC 169 will clear if fault no longer exists or can be cleared using scan tool. A history will clear after 20 seconds after 20 consecutive ignition cycles if condition for fault no longer exists.

Diagnostic Aids

If DTC is history or an intermittent, try performing tests shown while moving wiring harness and connectors. This can cause malfunction to appear. Visually inspect related connectors and harness for damage, corrosion or water intrusion. Check for proper terminal contact, misrouted harness, rubbed through wire insulation and broken wire inside insulation. Check power and ground circuits before replacing heater and A/C control. Resistance value must be close to ohmic value specified. See **OUTSIDE TEMPERATURE SENSOR RESISTANCE VALUES** table. If values do not match, replace sensor.

OUTSIDE TEMPERATURE SENSOR RESISTANCE VALUES

Temp. - °F	Temp. - °C	Ohms
-40	-40	169,400
-22	-30	88,740
-4	-20	48,580

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14	-10	27,670
32	0	16,330
50	10	9,951
68	20	6,246
86	30	4,028
104	40	2,663
122	50	1,801
140	60	1,245

Diagnostic Test

1. If diagnostic system check has not been performed, perform **DIAGNOSTIC SYSTEM CHECK** . If diagnostic system check has been performed, go to next step.
2. Disconnect outside air temperature sensor harness connector. Turn ignition on. Measure voltage between ground and outside air temperature harness connector terminal "A" (Blue/White wire). If about 5 volts exist, go to next step. If about 5 volts does not exist, go to step 4 .
3. Check for poor terminal contact at outside air temperature sensor connector. Repair as necessary. If poor terminal contact is found and repaired, go to step 5 . If poor terminal contact does not exist, go to step 6 .
4. Check for short to ground in outside temperature sensor 5-volt reference circuit (Blue/White wire). Repair as necessary. After repair, go to next step. If short to ground does not exist, go to step 7 .
5. Connect scan tool and clear DTCs. See **CLEARING DIAGNOSTIC TROUBLE CODES** . If DTC 169 does not reset, system is okay at this time. If DTC 169 resets, go to step 8 .
6. Replace outside air temperature sensor. After repair, go to step 5 .
7. Check for poor terminal contact at heater and A/C control connector. Repair as necessary. If poor terminal contact is found and repaired, go to step 5 . If poor terminal contact does not exist, go to next step.
8. Replace and program heater and A/C control. See **HEATER & A/C CONTROL ASSEMBLY** under REMOVAL & INSTALLATION.

DTC 171: OUTSIDE AIR TEMPERATURE SENSOR CIRCUIT OPEN**Circuit Description**

Outside air temperature sensor is located behind lower grill of front fascia on left side of vehicle and provides a sample of outside (ambient) air temperature. Ambient air sensor is a thermistor used to control signal voltage to heater and A/C control. Heater and A/C control supplies a reference voltage (about 5 volts) on circuit PM4 (Blue/White wire) to sensor and measures voltage drop in circuit to obtain a temperature signal. Signal is an input that tells heater and A/C control how much cooling or heating will be required to deliver to passenger compartment. Blower motor speed is also affected by ambient temperature sensor.

Resistor of sensor varies from 169,400 ohms at -40°F (-40°C) to 1,245 ohms at 140°F (60°C). When outside air temperature is cold, thermistor resistance is high, therefore, heater and A/C will receive a high signal voltage input. If air temperature is hot, thermistor resistance is low and heater and A/C control will receive a low voltage signal voltage input.

Outside air temperature is displayed on display panel of heater and A/C control. Displayed temperature value is derived from a series of calculations performed by a processor in heater and A/C control. When measured outside temperature is less than displayed value, processor filters less of input signal, stores it in EEPROM, and rapidly updates the display. If measured outside temperature is more than displayed value and vehicle is moving, processor filters more of input signal, stores it in EEPROM and updates the display at a much slower rate.

Conditions For Setting DTC

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When ignition is on, circuit PM4 (Blue/White wire) is checked continuously every 200 ms. DTC 171 will set if circuit PM4 stays at 4.5 volts or more. Heater and A/C control displays outside temperature as "F" and system uses 50°F (10°C) as a default value. DTC 171 will clear if fault no longer exists or can be cleared using scan tool. A history will clear after 20 seconds after 20 consecutive ignition cycles if condition for fault no longer exists.

Diagnostic Aids

If DTC is history or an intermittent, try performing tests shown while moving wiring harness and connectors. This can cause malfunction to appear. Visually inspect related connectors and harness for damage, corrosion or water intrusion. Check for proper terminal contact, misrouted harness, rubbed through wire insulation and broken wire inside insulation. Check power and ground circuits before replacing heater and A/C control. Resistance value must be close to ohm value specified. See **OUTSIDE TEMPERATURE SENSOR RESISTANCE VALUES** table. If values do not match, replace sensor.

Diagnostic Test

1. If diagnostic system check has not been performed, perform **DIAGNOSTIC SYSTEM CHECK** . If diagnostic system check has been performed, go to next step.
2. Disconnect outside air temperature sensor harness connector. Turn ignition on. Measure voltage between ground and outside air temperature sensor harness connector terminal "A" (Blue/White wire). If about 5 volts exist, go to next step. If about 5 volts does not exist, go to step 4 .
3. Disconnect heater and A/C control Black 22-pin harness connector C1. Check for open in outside temperature sensor ground circuit (Blue wire). Repair as necessary. After repair, go to step 5 . If open does not exist, go to step 6 .
4. Check for open in outside temperature sensor 5-volt reference circuit (Blue/White wire). Repair as necessary. After repair, go to next step. If short to ground does not exist, go to step 7 .
5. Connect scan tool and clear DTCs. See **CLEARING DIAGNOSTIC TROUBLE CODES** . If DTC 171 does not reset, system is okay at this time. If DTC 171 resets, go to step 8 .
6. Check for poor terminal contact at outside air temperature sensor connector. Repair as necessary. If poor terminal contact is found and repaired, go to step 5 . If poor terminal contact does not exist, go to step 9 .
7. Check for poor terminal contact at heater and A/C control connector. Repair as necessary. If poor terminal contact is found and repaired, go to step 5 . If poor terminal contact does not exist, go to next step.
8. Replace and program heater and A/C control. See **HEATER & A/C CONTROL ASSEMBLY** under REMOVAL & INSTALLATION.
9. Replace outside air temperature sensor. After repair, go to step 5 .

SYSTEM TESTS

A/C SYSTEM PERFORMANCE

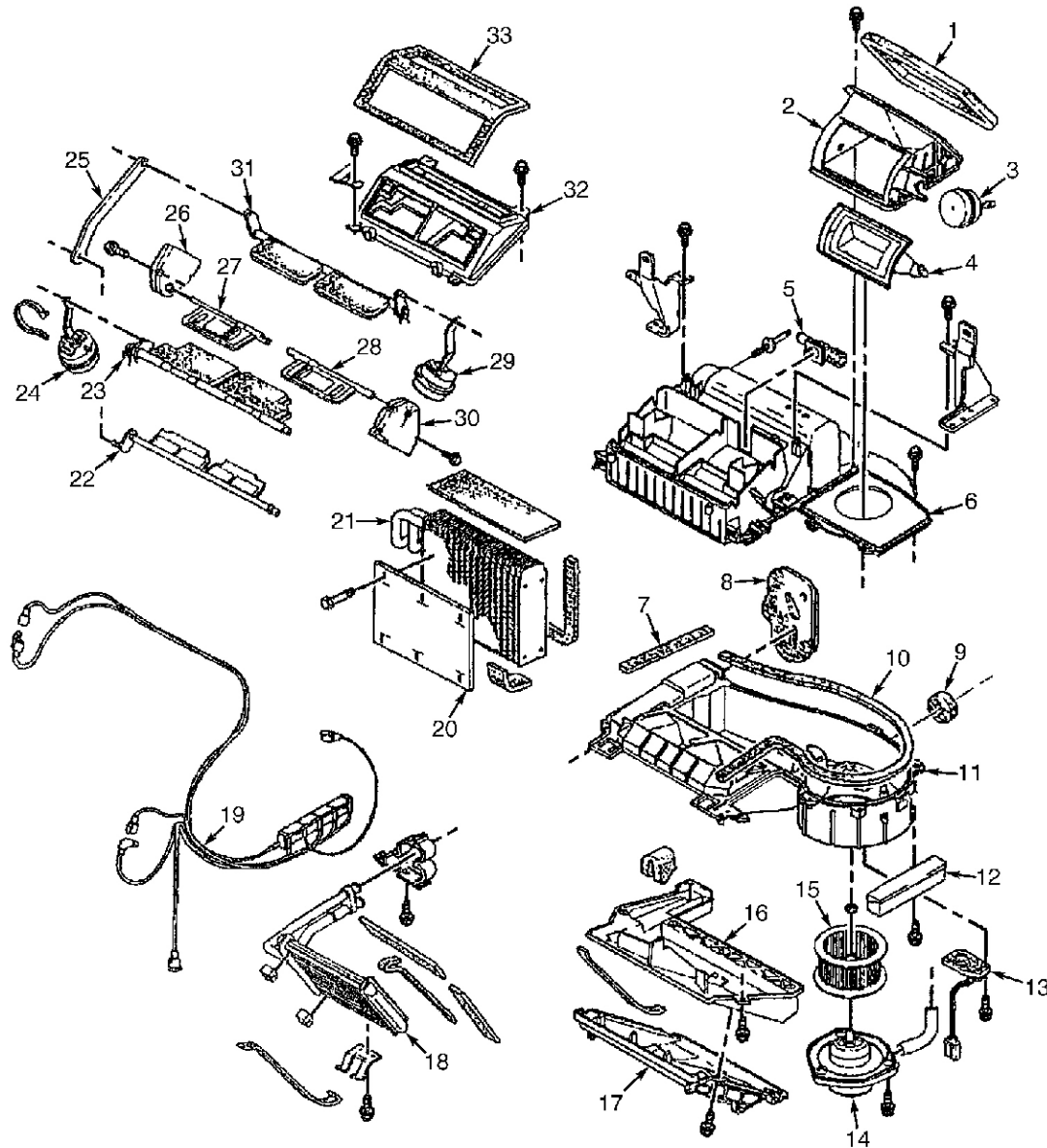
1. Connect manifold gauge set. High-pressure service valve is located on A/C compressor-to-condenser hose. Low-pressure service valve is located on accumulator. Place a high-volume fan in front of radiator grille.
2. Open hood and close all doors and windows. Set heater and A/C control to 60°F (16°C), AUTO mode and high blower motor speed. Start engine and allow it to idle for 5 minutes.
3. Increase engine speed to 2000 RPM and perform test. Measure ambient air temperature and the temperature of the air being discharged from center vent on instrument panel. Measure and record system pressures.
4. If discharged air temperature is at least 20°F (11°C) less than ambient temperature and pressures fall within normal range, system is operating properly.

REMOVAL & INSTALLATION

WARNING: To avoid injury from accidental air bag deployment, read and carefully

follow all SERVICE PRECAUTIONS and DISABLING & ACTIVATING AIR BAG SYSTEM procedures in AIR BAG SYSTEM SAFETY article in GENERAL SERVICING.

NOTE: Use Fig. 7 as a reference for removal and installation procedures.



- | | |
|--|---|
| 1. Air Inlet Seal | 18. Heater Core |
| 2. Air Inlet Case | 19. HVAC Module Vacuum Harness |
| 3. Air Inlet Valve Vacuum Actuator | 20. A/C Evaporator Core Water Filter |
| 4. Air Inlet Valve | 21. A/C Evaporator Core |
| 5. Inside Air Temperature Sensor Aspirator | 22. Heater Valve |
| 6. Upper HVAC Module Case | 23. Mode Valve |
| 7. HVAC Module Case Seal | 24. Mode Valve Vacuum Actuator |
| 8. A/C Evaporator Tube & Heater Core Pipe Seal | 25. Heater & Defroster Valve Link |
| 9. A/C Evaporator Drain Seal | 26. Temperature Valve Electric Actuator |
| 10. Primary HVAC Module Case Seal | 27. Left Temperature Valve |
| 11. Lower HVAC Module Case | 28. Right Temperature Valve |
| 12. Vacuum Control Solenoid Valve | 29. Temperature Valve Electric Actuator |
| 13. Blower Motor Control Module | 30. Defroster Valve Vacuum Actuator |
| 14. Blower Motor | 31. Defroster Valve |
| 15. Blower Motor Impeller | 32. Air Distribution Case |
| 16. Heater Core Cover | 33. Air Distribution Case Seal |
| 17. Heater Core Outlet Cover | |

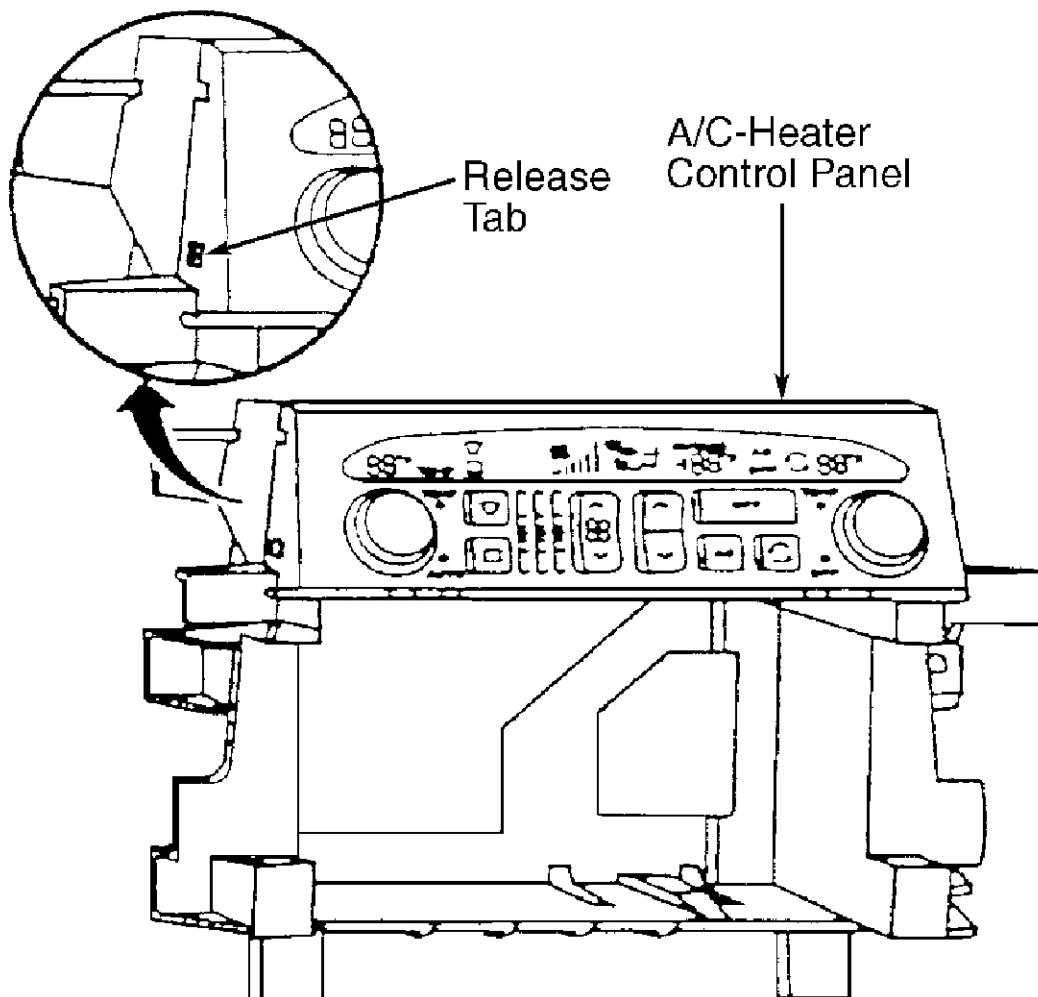
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Fig. 7: Identifying HVAC Module Components
 Courtesy of GENERAL MOTORS CORP.

HEATER & A/C CONTROL ASSEMBLY

Removal & Installation

1. Disconnect negative battery cable. Set parking brake. Place shift lever in 1st gear (rear position). Remove instrument panel center bezel. Remove radio mounting screws. Remove radio from heater and A/C control mounting bracket. Disconnect antenna and wiring harness from radio.
2. Remove 6 heater and A/C control screws. Disconnect wiring harness to heater and A/C control. Remove heater and A/C control from vehicle.
3. If necessary, press release tabs on side of heater and A/C control to gain access to bulbs and printed circuit. See **Fig. 8** . To install, reverse removal procedure.



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Fig. 8: Removing Heater & A/C Control Assembly
 Courtesy of GENERAL MOTORS CORP.

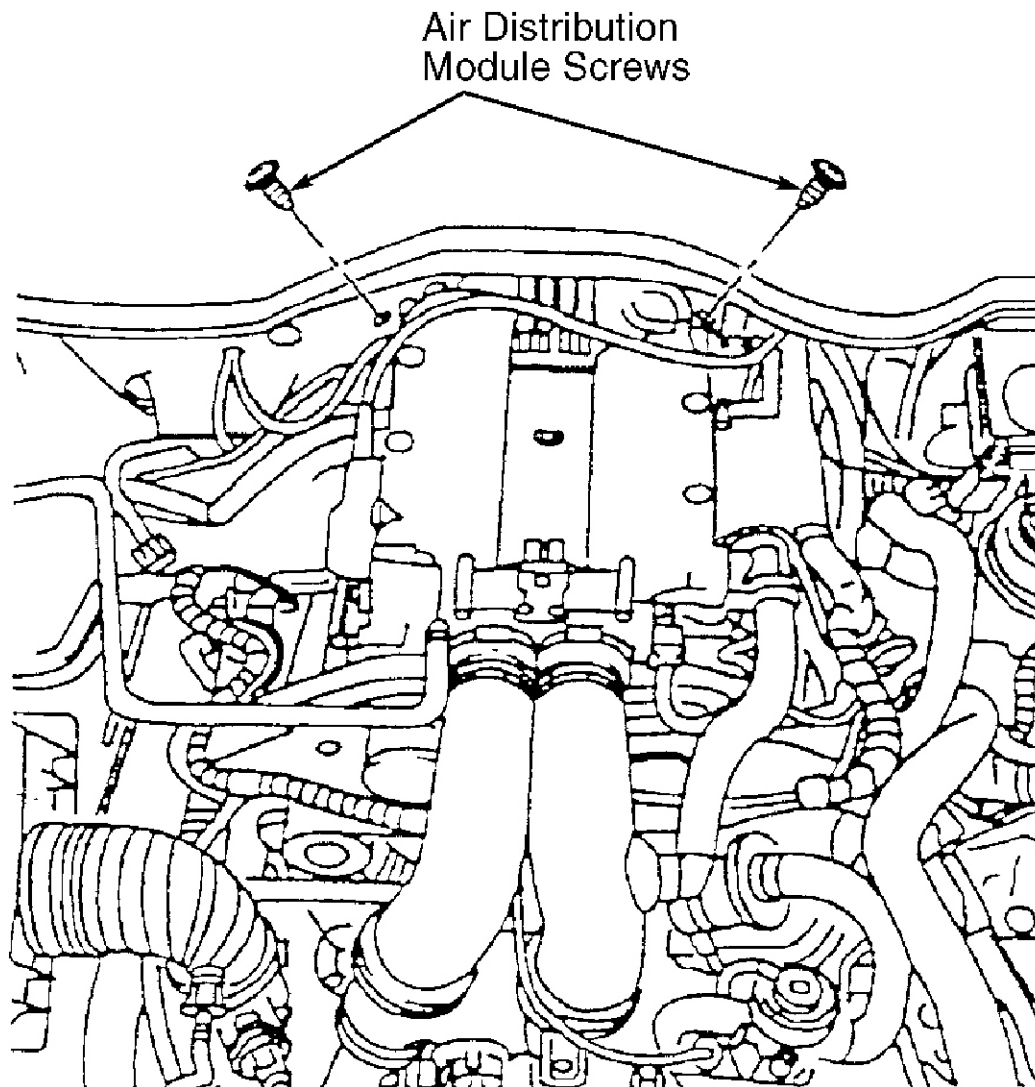
HEATER & A/C CONTROL ASSEMBLY(HVAC MODULE)

Removal & Installation

1. Disconnect negative battery cable. Drain cooling system. Discharge A/C system, using approved refrigerant recovery/recycling equipment.
2. Disconnect heater hose at quick-connect fittings. Use caution as tabs on quick-connect fittings break easily. Remove evaporator line extension bolt from cowl. Remove steering column and instrument panel carrier. See **INSTRUMENT PANEL** under REMOVAL & INSTALLATION.
3. Disconnect vacuum hose connection at cowl. Disconnect wiring harness from electrically operated actuators. Remove heater core pipe bracket screws and bracket. Remove heater core pipe bracket screws and pipes. Remove instrument panel support brace.
4. Disconnect wiring harness and vacuum hoses from vacuum actuators. Remove 2 screws, at cowl, from engine

compartment side of air distribution module. See **Fig. 9** . From inside passenger compartment, remove air distribution module nut.

5. Remove right/left side floor supply duct screws and remove ducts from air distribution module. Set wiring harness aside to allow for air distribution module removal.
6. Carefully pry upper vents from under rubber seal, and angle air distribution module out. Remove air distribution module from vehicle. To install, reverse removal procedure. Ensure wiring harness and vacuum hoses are not pinched during installation.



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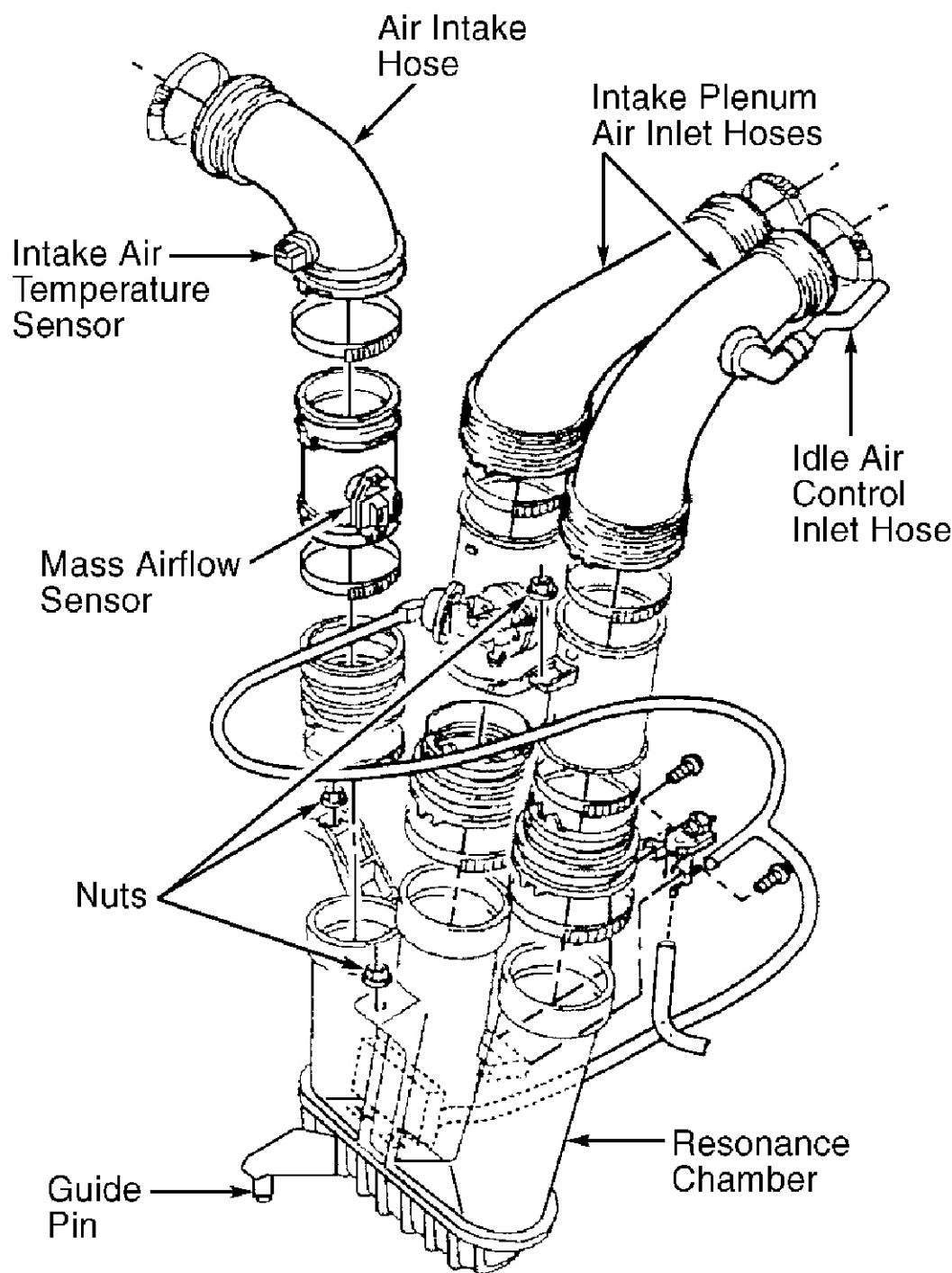
Fig. 9: Removing Air Distribution Module
 Courtesy of GENERAL MOTORS CORP.

A/C COMPRESSOR

Removal & Installation

1. Disconnect negative battery cable. Discharge A/C system, using approved refrigerant recovery/recycling equipment. Disconnect refrigerant hoses from top of compressor, through top of engine compartment.
2. Remove air intake resonance chamber. See **Fig. 10** . Raise and support vehicle. Remove compressor-to-hose "O" rings. Remove compressor hose clamp-to-air pipe bracket bolt. Remove compressor hose bracket to oil pan bolt.
3. Remove accessory drive belt. Remove front compressor bolts. Remove 2 rear compressor bolts. Disconnect compressor harness connector. Lower vehicle. Remove compressor through top of engine compartment.

4. To install, reverse removal procedure. Use NEW "O" rings lubricated with mineral oil. Evacuate and charge A/C system.



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Fig. 10: Removing Resonance Chamber
 Courtesy of GENERAL MOTORS CORP.

A/C-HEATER VACUUM SOLENOIDS

Removal & Installation

Detach sound insulator locking tabs and remove sound insulator from driver's side. Detach clip for driver's side front floor air outlet. Remove front floor air outlet. Disconnect wiring harness and vacuum hoses from solenoids. Remove screws and vacuum solenoids. To install, reverse removal procedure.

AIR MIX ACTUATORS

Removal & Installation (Driver's Side)

1. Disconnect negative battery cable. Detach sound insulator locking tabs and remove sound insulator from driver's side.
2. Detach clip for driver's side front floor air outlet. Remove front floor air outlet. Remove actuator cover. Disconnect wiring harness from actuator. Remove screw and detach actuator from linkage. Remove actuator from vehicle.
3. To install, reverse removal procedure. Recalibrate actuator. See **CALIBRATING ACTUATORS** under ADJUSTMENTS.

Removal & Installation (Passenger's Side)

1. Disconnect negative battery cable. Detach sound insulator locking tabs and remove sound insulator from passenger's side.
2. Detach clip for passenger's side front floor air outlet. Remove front floor air outlet. Disconnect wiring harness from actuator. Remove screw and detach actuator from linkage. Remove actuator from vehicle.
3. To install, reverse removal procedure. Recalibrate actuator. See **CALIBRATING ACTUATORS** under ADJUSTMENTS.

BLOWER MOTOR**Removal & Installation**

1. Disconnect negative battery cable. Detach sound insulator locking tabs and remove sound insulator from passenger's side. Detach clip for passenger's side front floor air outlet. Remove front floor air outlet.
2. Remove glove box. Bend down accordion section of side air vent supply duct and remove. Remove blower motor housing. Remove blower motor from housing. To install, reverse removal procedure.

CONDENSER**Removal & Installation**

1. Disconnect negative battery cable. Discharge A/C system, using approved refrigerant recovery/recycling equipment. Remove resonance chamber. See **Fig. 10**. Drain cooling system.
2. Remove radiator. Remove bolt from condenser line connection (at condenser). Disconnect refrigerant line from condenser. Remove condenser from vehicle.
3. To install, reverse removal procedure. Transfer receiver-drier and brackets to replacement condenser. Use NEW "O" rings lubricated with mineral oil. Evacuate and charge A/C system. Fill cooling system.

DEFROSTER VALVE ACTUATOR & MODE VALVE (FLOOR) ACTUATOR**Removal & Installation**

1. Disconnect negative battery cable. Remove right floor air outlet. Disable airbag system. See AIR BAG SYSTEM SAFETY article in GENERAL SERVICING. Open glove box. Remove right end panel from instrument panel. Remove right outlet vent.
2. Remove air bag cover screws and cover. Remove screws from front of glove box and right side of instrument panel. Disconnect glove box light switch and light connector. Remove cool air hose from rear of glove box and remove glove box.
3. Disconnect defroster valve actuator connector. If necessary, rotate defroster valve actuator linkage to access screws. Remove screw and detach defroster valve actuator from linkage.
4. Disconnect mode valve actuator connector. If necessary, rotate mode valve actuator linkage to access screws. Remove screw and detach mode valve actuator from linkage.
5. To install, reverse removal procedure. Recalibrate actuators. See **CALIBRATING ACTUATORS** under

ADJUSTMENTS

ENGINE CONTROL MODULE (ECM)

Removal & Installation

Turn ignition off. Slide ECM straight up and out of relay center. Flip release lever and disconnect ECM connector. Ensure not to touch connector pins or soldered components. Transfer broadcast code and production ECM number to new ECM label. DO NOT record this information on ECM cover. To install, reverse removal procedure. Program new ECM with frequency code of theft deterrent module currently on vehicle.

EVAPORATOR CORE

Removal & Installation

1. Disconnect negative battery cable. Discharge A/C system, using approved refrigerant recovery/recycling equipment. Remove thermostatic expansion valve. See **THERMOSTATIC EXPANSION VALVE** .
2. Remove steering column. See **STEERING COLUMN** . Remove brake pedal bracket with brake pedal attached.
3. Remove evaporator access panel screws and panel. Remove evaporator line screw. Plug evaporator openings to prevent oil from dripping on interior. Carefully pull evaporator out.
4. To install, reverse removal procedure. Use NEW "O" rings lubricated with mineral oil. Evacuate and charge A/C system.

HEATER CORE

Removal & Installation

1. Disconnect negative battery cable. Drain cooling system. Disconnect heater hose at quick-connect fittings. Use caution as tabs on quick-connect fittings break easily.
2. Remove steering column and instrument panel carrier. See **STEERING COLUMN** . Remove blower motor housing and blower motor. Remove heater core pipe bracket screws and bracket.
3. Remove heater core pipe bracket screws and pipes. Remove instrument panel support brace and bracket. Remove heater core retaining screw. Remove heater core and rubber seal. To install, reverse removal procedure.

HEATER CONTROL VALVE

Removal & Installation

1. Drain cooling system. Remove windshield wiper motor. Remove access panel nut, located near pollen filter, and remove access panel.
2. Disconnect vacuum hose from heater control valve. Clamp shut heater hoses and detach hoses from heater control valve. Remove heater control valve. To install, reverse removal procedure.

INSTRUMENT CLUSTER

Removal & Installation

1. Remove center air deflectors. Remove 2 screws from center air deflector housing. Remove center air deflector housing. Rotate steering wheel to expose screw location on upper steering column cover. Remove screw cover and screw from left side of upper steering column cover.
2. Rotate steering wheel to expose right side of cover. Remove screw cover and screw from right side of upper steering column cover. Remove upper steering column cover. Remove screw from upper column cover collar. Remove collar from upper column.

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3. Remove screw from right side of instrument cluster. Dislodge right side of instrument cluster. Disconnect wiring harness connector from right side of cluster. Slide cluster to right side enough to clear left vent housing. Disconnect harness connector from left side of cluster. Gently remove cluster from mounting location.
4. To install, reverse removal procedure. Connect scan tool. Select PROGRAMMING from SPECIAL FUNCTIONS menu. Follow programming instructions on display screen. Reprogram instrument cluster.

INSTRUMENT PANEL

Removal & Installation

1. Disable air bag system. See AIR BAG SYSTEM SAFETY article in GENERAL SERVICING. Remove steering column. See **STEERING COLUMN** . Remove left and right front assist handles.
2. Remove windshield pillar moldings. Remove passenger's side air deflector outlet screw. Remove passenger's side air deflector outlet. Remove passenger's side air outlet duct. Remove passenger's side air bag module trim cover. Remove glove box. Disconnect air bag module 2-pin wiring harness connector. Remove passenger's side air bag module.
3. Remove console. Remove center console air duct. Remove radio trim plate. Remove radio. Remove heater and A/C control assembly. See **HEATER & A/C CONTROL ASSEMBLY(HVAC MODULE)** .
4. Remove center air outlet deflector and air deflector outlet housing. Remove driver's side access panel. Remove driver's side air outlet air deflector and air deflector housing. Remove driver's side lower outlet duct. Carefully remove instrument cluster. See **INSTRUMENT CLUSTER** .
5. Remove fuse and relay panels from instrument panel. Remove steering column support bracket bolts. Remove left side instrument panel carrier bolts. Remove right side instrument panel carrier bolts. Remove solar/twilight sentinel sensor. See **SOLAR/TWILIGHT SENTINEL SENSOR** .
6. Remove wiring harness connectors and clips from instrument panel carrier. Remove instrument panel carrier. To install, reverse removal procedure. Ensure wiring harnesses are not pinched during installation.

INSTRUMENT PANEL AIR VALVE ACTUATOR

Removal & Installation

1. Disconnect negative battery cable. Detach sound insulator locking tabs and remove sound insulator from passenger's side. Detach clip for passenger's side front floor air outlet. Remove front floor air outlet. Remove glove box.
2. Bend down accordion section of side air vent supply duct and remove. Disconnect wiring harness from actuator. Remove 3 screws, and detach actuator from linkage. It may be necessary to rotate actuator linkage to access screws. Remove actuator from vehicle.
3. To install, reverse removal procedure. Recalibrate actuator. See **CALIBRATING ACTUATORS** under ADJUSTMENTS.

OUTLET TEMPERATURE SENSORS

Removal & Installation (Driver's Side)

1. Disconnect negative battery cable. Detach sound insulator locking tabs and remove sound insulator from driver's side.
2. Detach clip for driver's side front floor air outlet. Remove front floor air outlet. Remove outlet temperature sensor from air distribution module by rotating sensor 180 degrees. Disconnect wiring harness from sensor. To install, reverse removal procedure.

Removal & Installation (Passenger's Side)

1. Disconnect negative battery cable. Detach sound insulator locking tabs and remove sound insulator from passenger's side.
2. Detach clip for passenger's side front floor air outlet. Remove front floor air outlet. Remove mode valve (floor) actuator. See **DEFROSTER VALVE ACTUATOR & MODE VALVE (FLOOR) ACTUATOR**.
3. Remove outlet temperature sensor from air distribution module by rotating sensor 180 degrees. See **Fig. 11**. Disconnect wiring harness from sensor.
4. To install, reverse removal procedure. Turn ignition on. Simultaneously press and hold AUTO and OFF buttons on the heater and A/C control for at least 5 seconds to synchronize actuators.

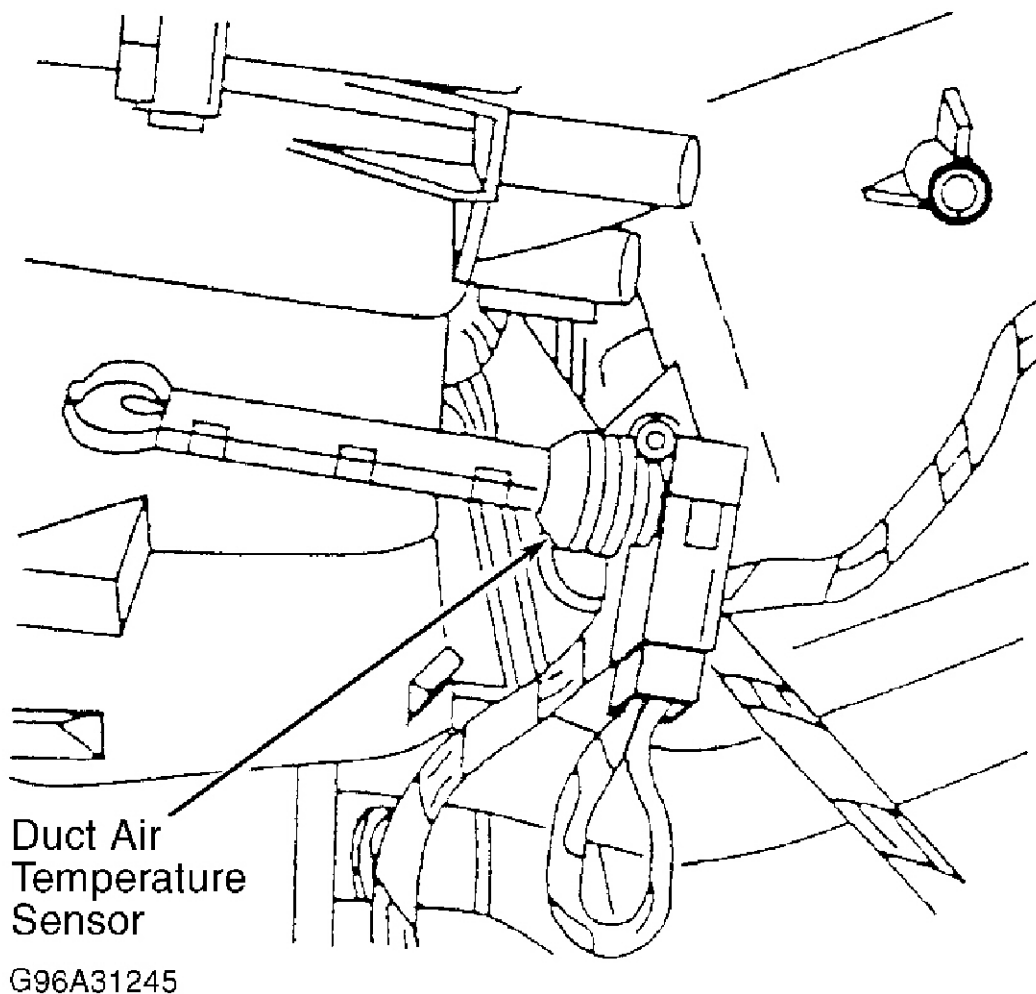


Fig. 11: Removing Outlet Air Temperature Sensor
 Courtesy of GENERAL MOTORS CORP.

OUTSIDE AIR TEMPERATURE SENSOR

Removal & Installation

Raise and support vehicle. Locate ambient air temperature sensor on left side of front fascia. Remove sensor and disconnect wiring harness. To install, reverse removal procedure.

POLLEN FILTER

Removal & Installation

Open hood. Pull back sealing strip on passenger's side of air inlet grille. Open air inlet grille flap. Release clips and pull pollen filter straight up. To install, reverse removal procedure.

RECEIVER-DRIER

Removal & Installation

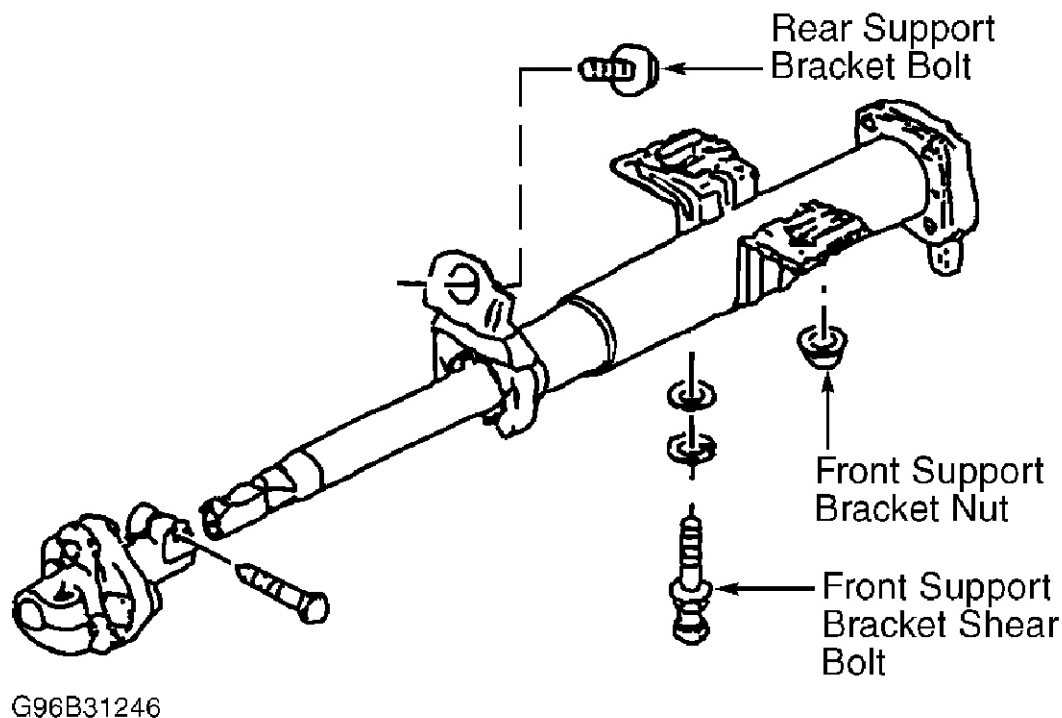
1. Disconnect negative battery cable. Discharge A/C system, using approved refrigerant recovery/recycling equipment. Remove front grille.
2. Pull windshield washer reservoir fill tube straight up to remove. Remove receiver-drier connection bolt through front grille opening. Remove upper radiator covers. Remove left and right condenser-to-radiator screws. Slightly tilt condenser to left side of vehicle to allow clearance, and remove receiver-drier bracket bolts and receiver-drier.
3. To install, reverse removal procedure. Use NEW "O" rings lubricated with mineral oil. Evacuate and charge A/C system.

STEERING COLUMN

CAUTION: Ensure front wheels are in straight-ahead position and steering column is in LOCK position before disconnecting steering column or intermediate shaft from steering gear, or SIR coil will become uncentered. If weight of column is supported by only lower or upper support bracket, lower bearing adapter may be damaged. When steering column is removed from vehicle, it is extremely susceptible to damage. Do not drop or lean on column. Do not hammer on ends of shaft, or plastic injections which maintain column rigidity could be loosened.

Removal

1. Disconnect negative battery cable. Remove steering wheel. See **STEERING WHEEL** . Remove screws and upper column cover. Carefully thread out tilt lever. Remove rubber protective cover for lock cylinder. Remove screws and lower steering column cover.
2. Remove SIR coil. See appropriate AIR BAG RESTRAINT SYSTEMS article. Insert a small pointed tool into lock cylinder release pin hole, and pull lock cylinder out. Disconnect theft deterrent immobilizer connector. Remove set screw and ignition switch. Remove turn signal/headlight dimmer lever switch and connector. Remove wiper/washer switch and connector.
3. Remove driver-side knee bolster. Remove sound insulator. Remove coupler-to-steering column shaft bolt. Slightly separate coupler to allow removal. Rotating bolt with a chisel, remove forward support strap nut and shear-bolt. Remove rear support bracket bolt. See **Fig. 12** . Carefully remove steering column straight back through dash assembly.



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Fig. 12: Removing Steering Column
 Courtesy of GENERAL MOTORS CORP.

Installation

1. Install steering column in vehicle, carefully aligning column shaft into lower steering coupler. Loosely install rear support bracket bolt. Install forward support strap nut and a NEW shear-bolt. Tighten rear support bracket bolts, forward support strap nut and shear-bolt to specification. See **TORQUE SPECIFICATIONS**.
2. Install and tighten coupler/steering column shaft connection bolt to specification. See **TORQUE SPECIFICATIONS**. To complete installation, reverse removal procedure. Coat tilt lever with medium strength locking compound. Tighten steering wheel nut to specification.

STEERING WHEEL

Removal & Installation

Turn ignition switch to LOCK position. Remove air bag module. See appropriate AIR BAG RESTRAINT SYSTEMS article. Mark steering wheel hub in relation to slash mark on steering shaft for installation reference. Remove steering wheel nut. Using Steering Wheel Puller (J-1859-A) and Steering Wheel Puller Legs (J-36541), remove steering wheel. To install, reverse removal procedure. Tighten steering wheel nut to specification. See **TORQUE SPECIFICATIONS**.

SOLAR/TWILIGHT SENTINEL SENSOR

Removal & Installation

Locate solar/twilight sensor on top of instrument panel. Carefully pry solar/twilight sensor out of instrument panel. Disconnect wiring harness from sensor. To install, reverse removal procedure.

THERMOSTATIC EXPANSION VALVE

Removal & Installation

1. Disconnect negative battery cable. Discharge A/C system, using approved refrigerant recovery/recycling

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- equipment. Remove evaporator line extension bolt from cowl.
2. Remove evaporator tube extension block fitting bolt. Detach sound insulator locking tabs and remove sound insulator. Detach driver's side front floor air outlet clip. Remove air outlet duct. Disconnect wiring harness from vacuum solenoid/cut-off valve actuator. Remove screws and position vacuum solenoid/cut-off valve actuator out of way.
 3. Remove evaporator access panel screws and panel. Remove evaporator line screw. Remove thermostatic expansion valve screws and valve. To install, reverse removal procedure. Use NEW "O" rings lubricated with mineral oil. Evacuate and charge A/C system.

VACUUM TANK

Removal & Installation

Open hood. Remove air inlet grille. Remove vacuum tank nuts. Disconnect vacuum hoses from tank. Remove vacuum tank from vehicle. To install, reverse removal procedure.

TORQUE SPECIFICATIONS

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Application	Ft. Lbs. (N.m)
A/C Compressor Hose Bolt	24 (33)
A/C Compressor Mounting Bolts	30 (41)
Air Injection Crossover Support Bracket Nut (Generator Bolt)	30 (41)
Condenser Line Bolt	20 (27)
Evaporator Line Extension Bolt	15 (20)
Instrument Panel Carrier Bolts	16 (22)
Receiver-Drier Connection Bolt	11 (15)
Steering Column Support Bracket Bolts/Nut	⁽¹⁾ 16 (22)
Steering Wheel Nut	21 (28)
	INCH Lbs. (N.m)
A/C Compressor Hose-To-Oil Pan Bolt	71 (8)
Air Distribution Module Nut/Screws	35 (4)
Driver's Side Air Bag Module Bolts	25 (2.8)
Passenger's Side Air Bag Module Bolts	71 (8)
Receiver-Drier Bracket Bolts	35 (4)
Resonance Chamber Nuts	27 (3)
Thermostatic Expansion Valve Screws	71 (8)
(1) Tighten support bracket shear bolt until head breaks off.	

WIRING DIAGRAMS

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Fig. 13: Automatic A/C-Heater System Wiring Diagram (2000 Catera - 1 Of 2)

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Fig. 14: Automatic A/C-Heater System Wiring Diagram (2000 Catera - 2 Of 2)

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Fig. 15: Automatic A/C-Heater System Wiring Diagram (2001 Catera - 1 Of 2)

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Fig. 16: Automatic A/C-Heater System Wiring Diagram (2001 Catera - 2 Of 2)

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