

2004 Cadillac SRX

2004 HVAC HVAC Systems - Automatic - SRX

2004 HVAC**HVAC Systems - Automatic - SRX****SPECIFICATIONS****FASTENER TIGHTENING SPECIFICATIONS****Fastener Tightening Specifications**

Application	Specification	
	Metric	English
Blower Motor Control Module Screw	1 N.m	9 lb in
HVAC Control Module Screws	2 N.m	18 lb in
Left Air Temperature Actuator Screws	1 N.m	9 lb in
Mode Actuator Screws	1 N.m	9 lb in
Recirculation Actuator Screws	1 N.m	9 lb in
Right Air Temperature Actuator Screws	1 N.m	9 lb in

SENSOR RESISTANCE TABLE**Sensor Resistance Table**

Temperature	Inside Air Temperature Sensor Resistance	Ambient Air Temperature Sensor Resistance	Evaporator Temperature Sensor Resistance
-17° C (2° F)	13790 ohm	13790 ohm	12235 ohm
-12° C (11° F)	10434 ohm	10434 ohm	9251 ohm
-4° C (25° F)	6806 ohm	6806 ohm	6017 ohm
-1° C (31° F)	5831 ohm	5831 ohm	5147 ohm
1° C (31° F)	5269 ohm	5269 ohm	4647 ohm
5° C (41° F)	4317 ohm	4317 ohm	3804 ohm
10° C (50° F)	3389 ohm	3389 ohm	2983 ohm
12° C (53° F)	3083 ohm	3083 ohm	2712 ohm
15° C (59° F)	2680 ohm	2680 ohm	2357 ohm
17° C (62° F)	2445 ohm	2445 ohm	2148 ohm
21° C (69° F)	2041 ohm	2041 ohm	1789 ohm
23° C (73° F)	1868 ohm	1868 ohm	1636 ohm
25° C (77° F)	1711 ohm	1711 ohm	1497 ohm

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28° C (82° F)	1503 ohm	1503 ohm	1313 ohm
31° C (87° F)	1324 ohm	1324 ohm	1154 ohm
34° C (93° F)	1168 ohm	1168 ohm	1017 ohm
38° C (100° F)	992 ohm	992 ohm	862 ohm
42° C (107° F)	846 ohm	846 ohm	733 ohm
49° C (120° F)	645 ohm	645 ohm	558 ohm

SCHEMATIC AND ROUTING DIAGRAMS

HVAC SCHEMATICS

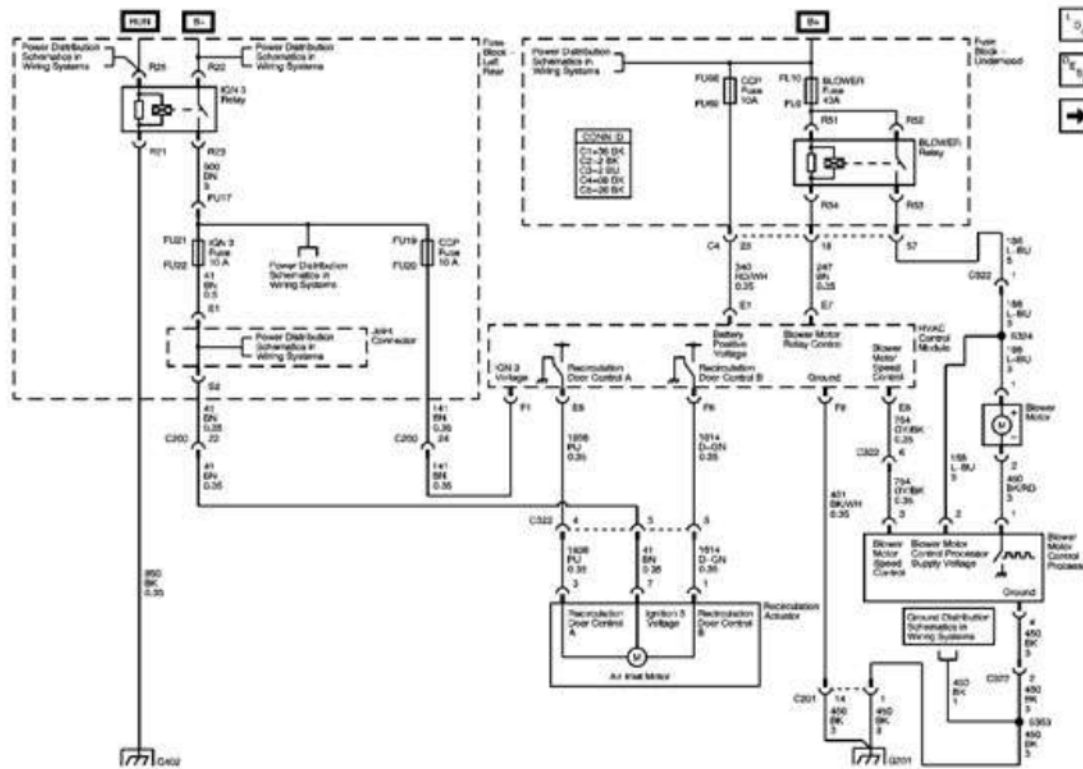


Fig. 1: Power, Ground, Blower Motor & Recirculation Actuator Schematics
Courtesy of GENERAL MOTORS CORP.

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COMPONENT LOCATOR

HVAC COMPONENT VIEWS (04)

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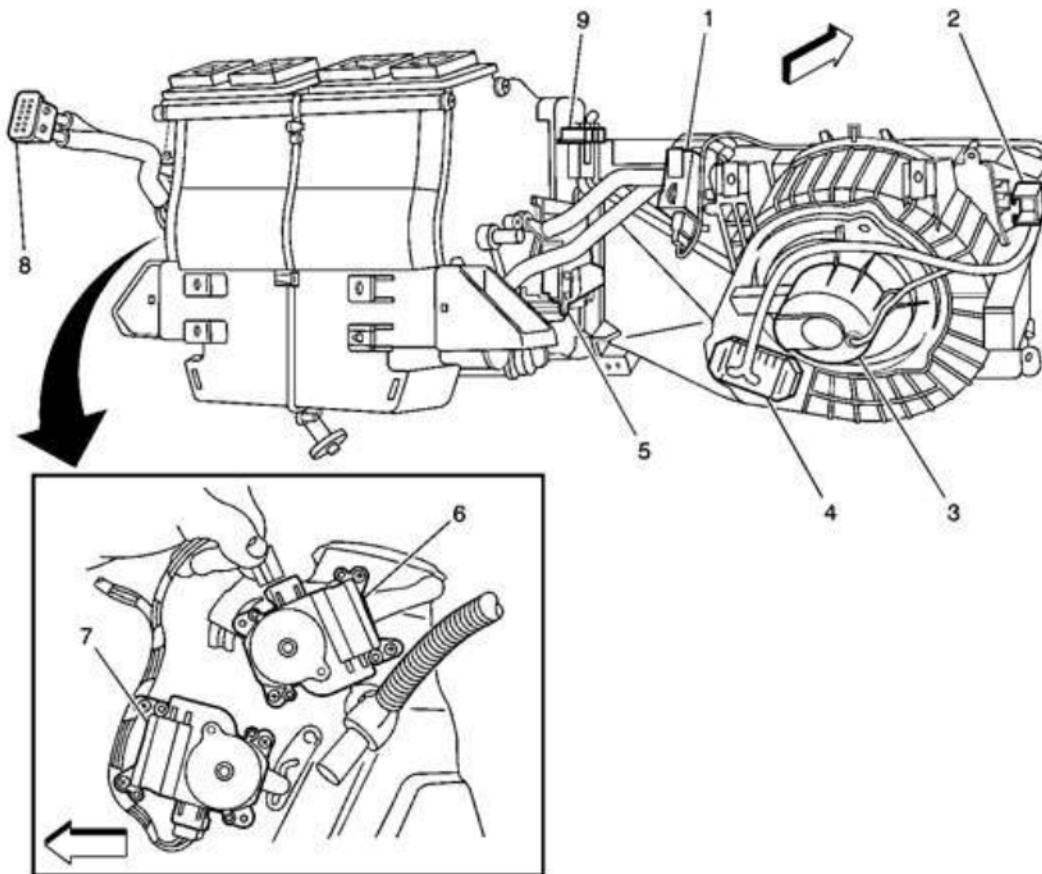


Fig. 5: HVAC Actuators Component View
Courtesy of GENERAL MOTORS CORP.

Callouts For Fig. 5

Callout	Component Name
1	Recirculation Actuator
2	C322 (Inline to I/P Harness)
3	Blower Motor
4	Blower Motor Control Module
5	Air Temperature Actuator - Right
6	Mode Actuator
7	Air Temperature Actuator - Left
8	Inside Air Temperature Sensor
9	C321 (Inline to I/P Harness)

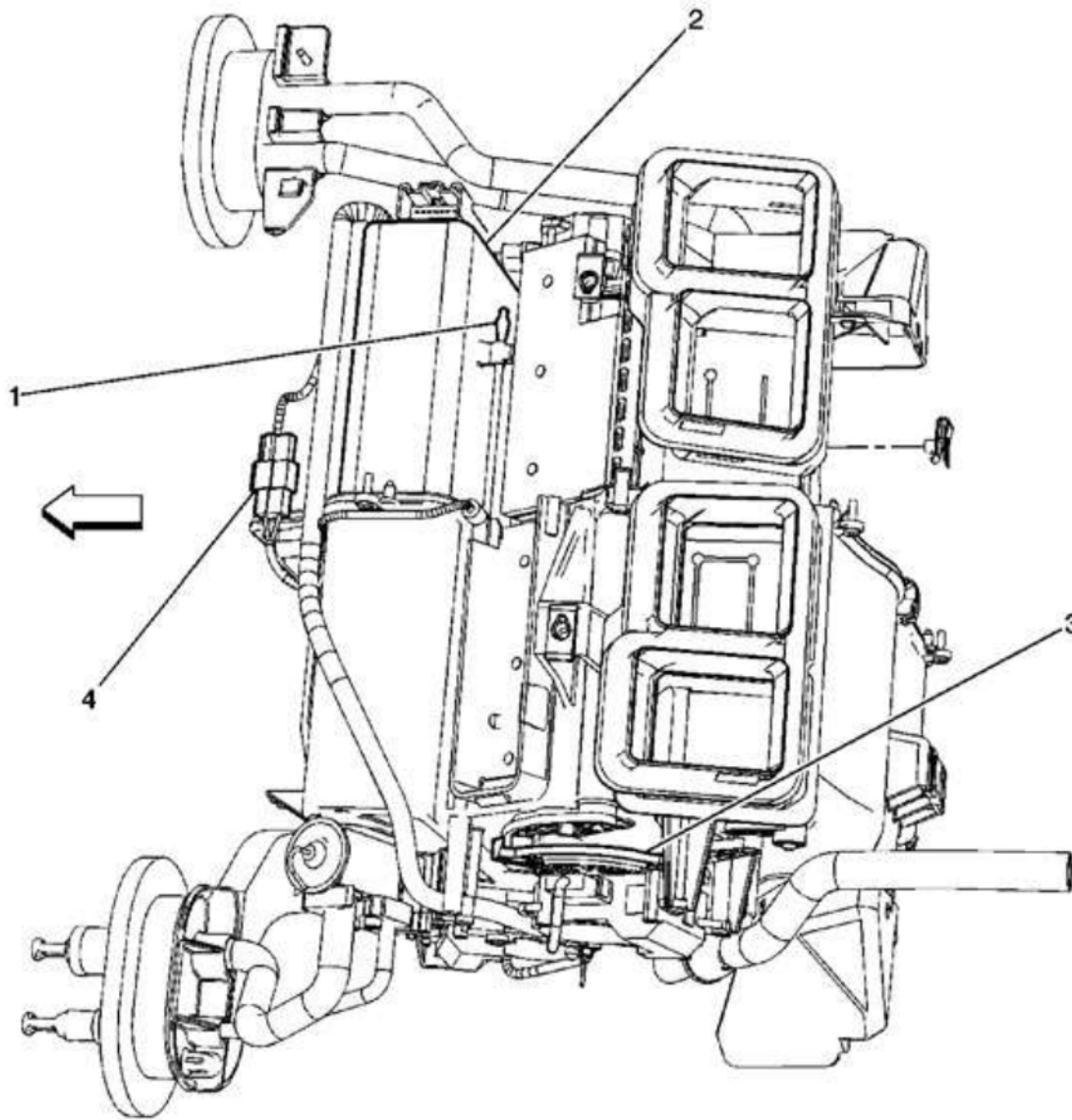


Fig. 6: Evaporator Temperature Sensor Component View
Courtesy of GENERAL MOTORS CORP.

Callouts For Fig. 6

Callout	Component Name
1	Evaporator Temperature Sensor
2	Evaporator Core
3	Mode Actuator
4	Evaporator Temperature Sensor Connector

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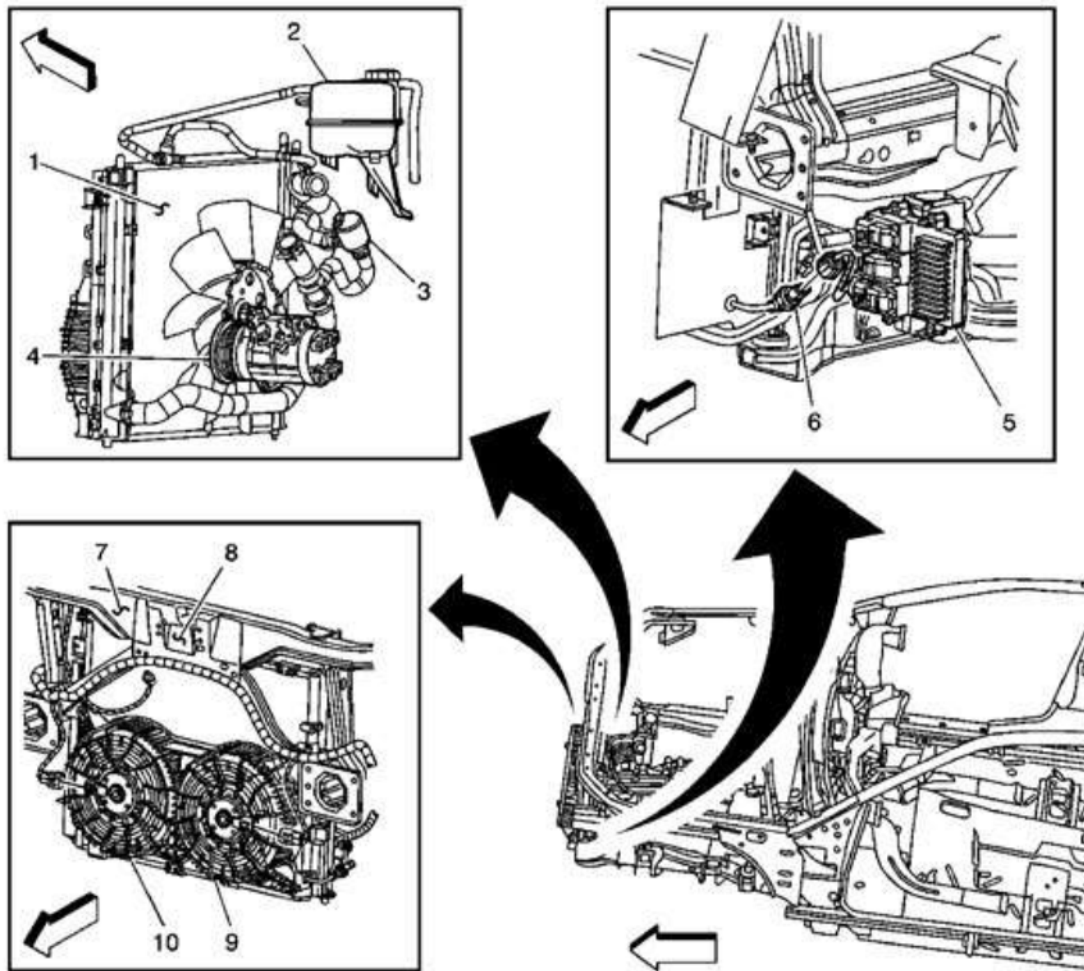


Fig. 7: Front Of Vehicle Component View
Courtesy of GENERAL MOTORS CORP.

Callouts For Fig. 7

Callout	Component Name
1	Radiator
2	Radiator Surge Tank
3	After Boil Coolant Pump (V92)
4	A/C Compressor Clutch
5	Engine Control Module (ECM) (LH2)
6	A/C Refrigerant Pressure Sensor
7	Condenser Assembly
8	Ambient Air Temperature Sensor
9	Cooling Fan - Left
10	Cooling Fan - Right

10

Cooling Fan - Right

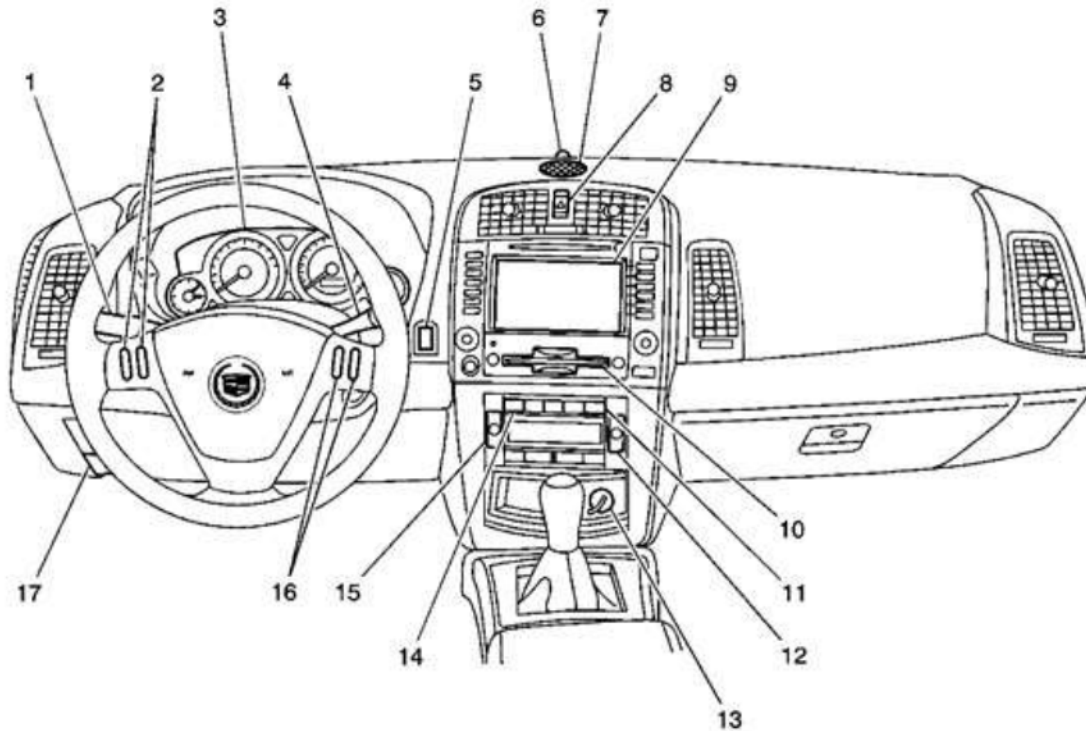


Fig. 8: Instrument Panel Component View
 Courtesy of GENERAL MOTORS CORP.

Callouts For Fig. 8

Callout	Component Name
1	Turn Signal/Multifunction Switch
2	Steering Wheel Controls - Left
3	Instrument Panel Cluster
4	Windshield Wiper/Washer Switch
5	Inside Air Temperature Sensor
6	Sunload/Ambient Light Sensor
7	Speaker - Front Midrange (U57)
8	Hazard Switch
9	Radio
10	CD Player
11	HVAC Control Module - Climate Control - Right
12	Heated Seat Switch - Passenger (KA1)

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13	Cigar Lighter
14	Heated Seat Switch - Driver (KA1)
15	HVAC Control Module - Climate Control - Left
16	Steering Wheel Controls - Left
17	Hood Release Lever

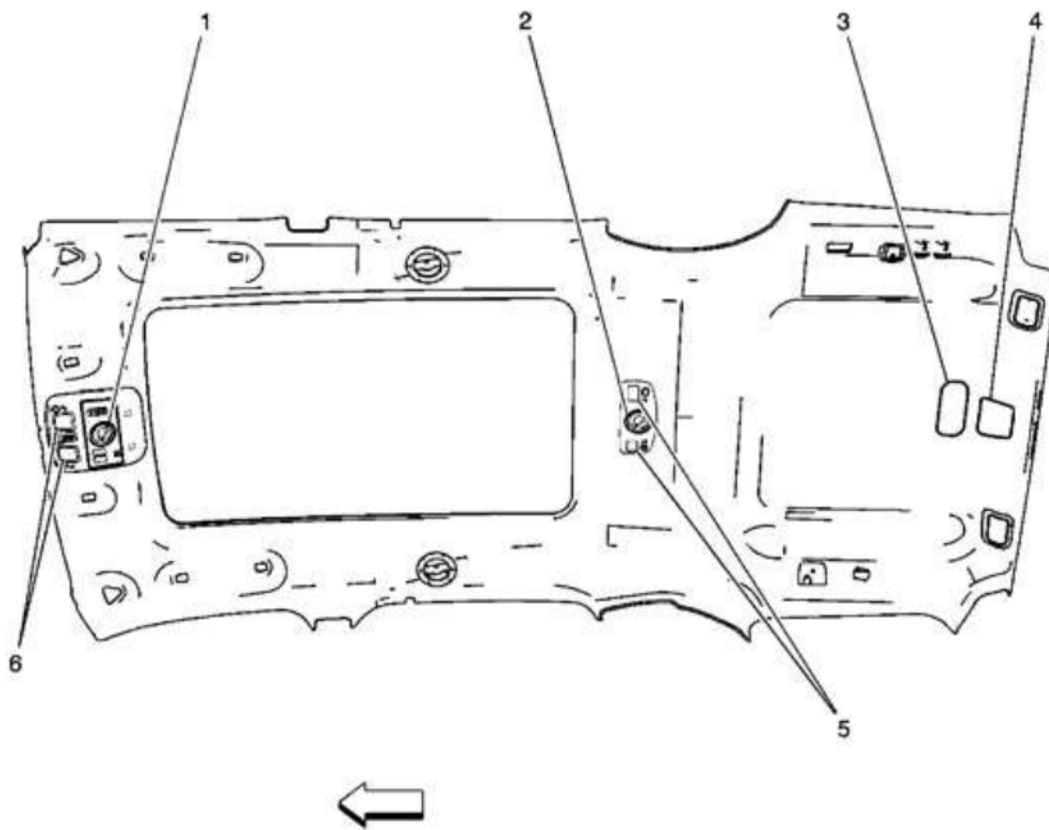


Fig. 9: Headliner Component View
Courtesy of GENERAL MOTORS CORP.

Callouts For Fig. 9

Callout	Component Name
1	Blower Motor Switch - Auxiliary (C57)
2	Blower Motor Switch - Rear Auxiliary (C57)
3	Courtesy/Reading Lamp - Rear
4	Rear Parking Assist (RPA) Display

5	Courtesy/Reading Lamp - Center
6	Courtesy/Reading Lamp - Front

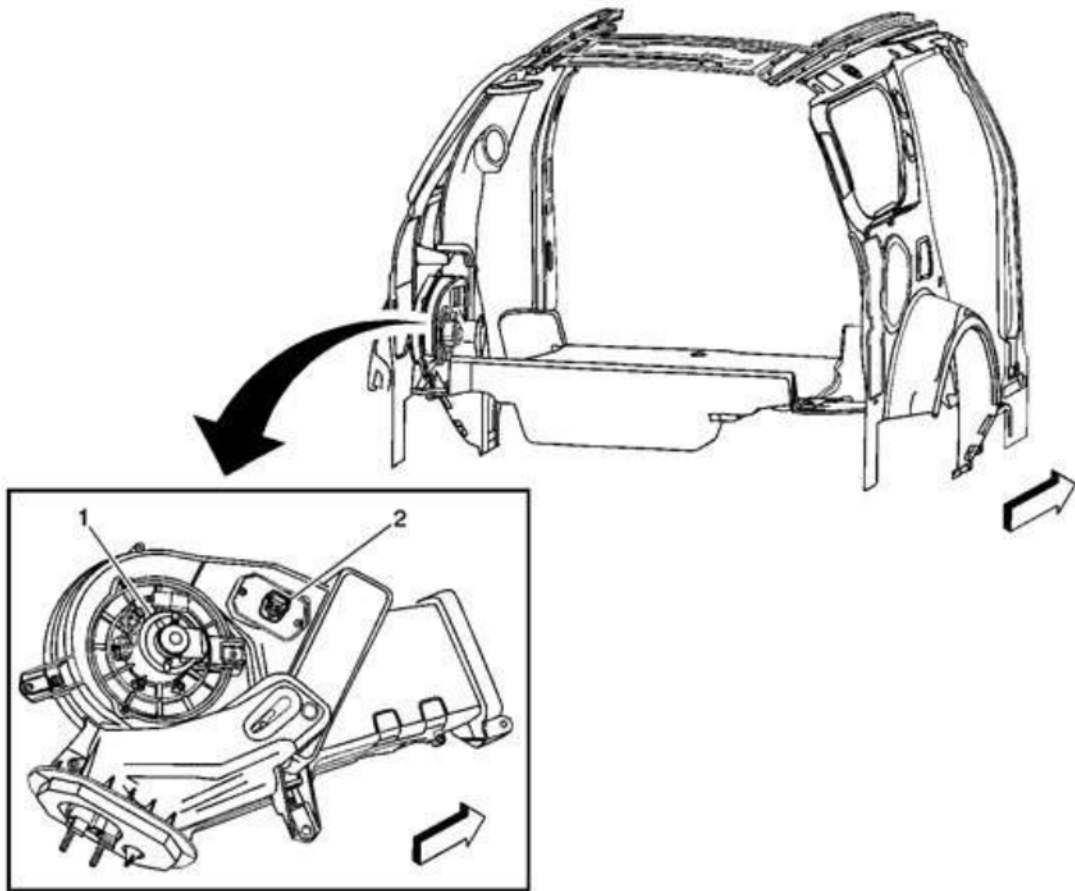


Fig. 10: Rear Of Vehicle Component View
Courtesy of GENERAL MOTORS CORP.

Callouts For Fig. 10

Callout	Component Name
1	Auxiliary Blower Motor
2	Auxiliary Blower Motor Resistor Assembly

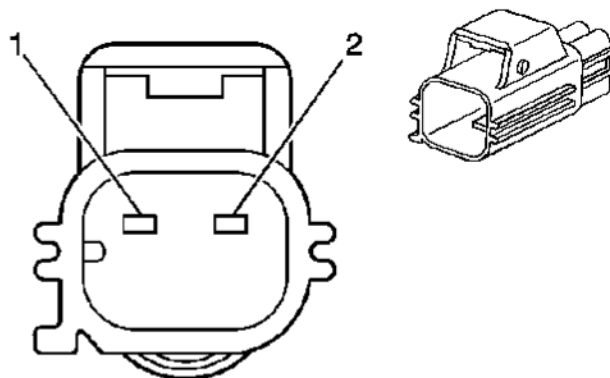
HVAC CONNECTOR END VIEWS

A/C Compressor Clutch Terminal Identification

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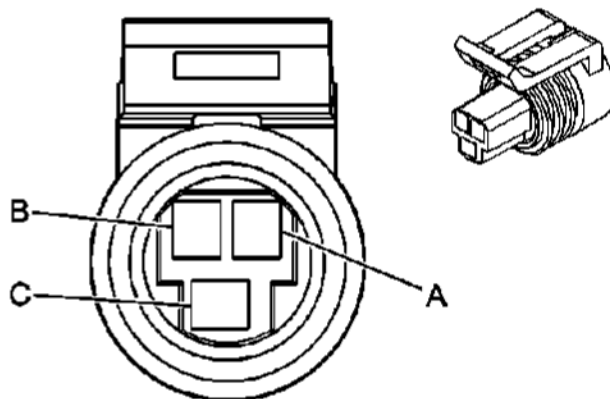


Connector Part Information

- 7282-5548-30
- 2-Way M Yazaki Weather Pack (BK)

Pin	Wire Color	Circuit No.	Function
1	D-GN	59	A/C Compressor Clutch Supply Voltage
2	BK	750	Ground (LY7)
	BK	1550	Ground (LH2)

A/C Refrigerant Pressure Sensor Terminal Identification



Connector Part Information

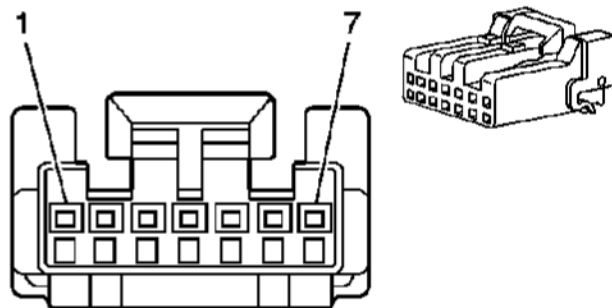
- 12186689
- 3-Way F Metri-Pack 150 Series, Sealed, P2S (BK)

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Pin	Wire Color	Circuit No.	Function
A	TN	452	Low Reference (LY7)
	TN	470	Low Reference (LH2)
B	GY	596	5-Volt Reference (LY7)
	GY	2700	5-Volt Reference (LH2)
C	OG/BK	380	A/C Refrigerant Pressure Sensor Signal

Air Temperature Actuator Terminal Identification - Left

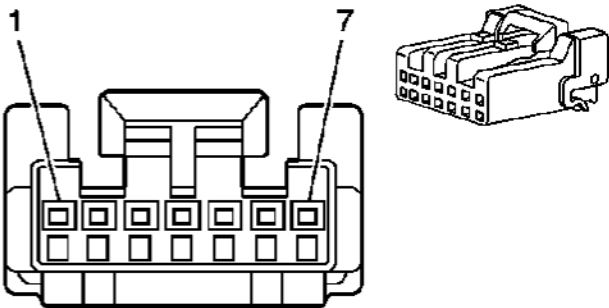


Connector Part Information

- IL-AG5-7S-S3C1
- 7-Way F Molex (L-GN)

Pin	Wire Color	Circuit No.	Function
1	GY	705	5-Volt Reference
2	-	-	Not Used
3	YE	61	Low Reference
4	-	-	Not Used
5	L-BU	733	Driver Air Temperature Door Position Signal
6	D-BU	1199	Driver Air Temperature Door Control B
7	YE	1791	Driver Air Temperature Door Control A

Air Temperature Actuator Terminal Identification - Right

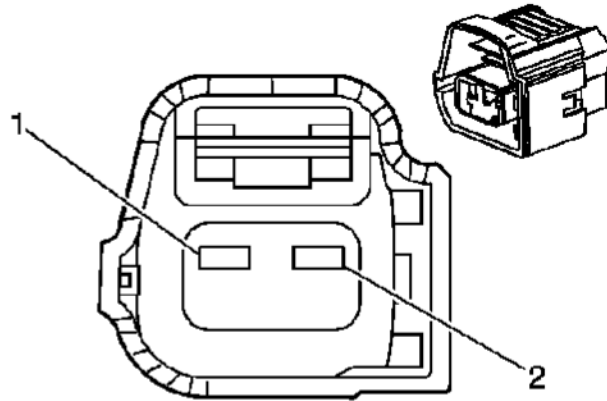


Connector Part Information		- IL-AG5-7S-S3C1 7-Way F Molex (L-GN)	
Pin	Wire Color	Circuit No.	Function
1	YE	61	Low Reference
2	-	-	Not Used
3	GY	705	5-Volt Reference
4	-	-	Not Used
5	D-BU	1646	Passenger Air Temperature Door Position
6	GY/BK	2778	Passenger Air Temperature Door Control A
7	WH/BK	1236	Passenger Air Temperature Door Control B

Ambient Air Temperature Sensor Terminal Identification

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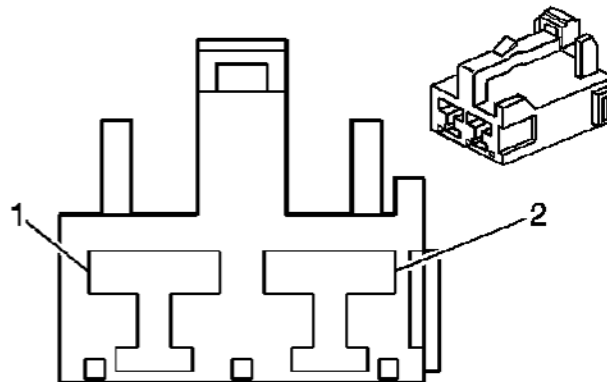


Connector Part Information

- 7283-7028-30
- 2-Way F Yazaki 2.3 Series, Sealed (BK)

Pin	Wire Color	Circuit No.	Function
1	L-GN/BK	735	Ambient Air Temperature Sensor Signal
2	YE	61	Low Reference

Blower Motor Terminal Identification - Auxiliary



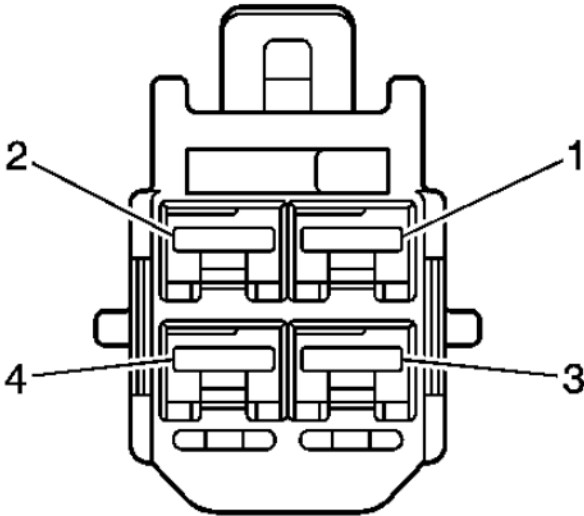
Connector Part Information

- 6098-0325
- 2-Way F Sumitomo (WH)

Pin	Wire Color	Circuit No.	Function

1	OG	1052	Auxiliary Blower Motor Supply Voltage
2	PU	65	Blower Motor Supply Voltage

Blower Motor Resistor Assembly Terminal Identification - Auxiliary



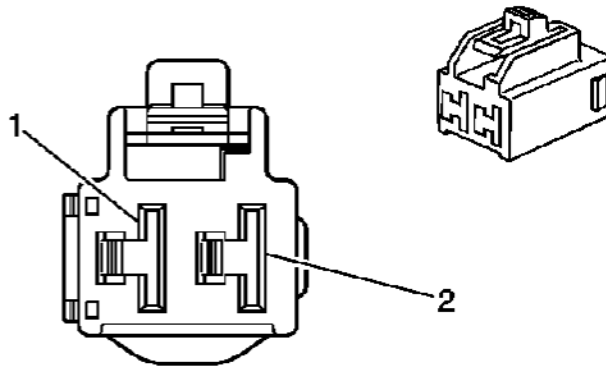
The diagram shows a top-down view of a 4-pin automotive connector. The pins are arranged in a 2x2 grid. Pin 1 is at the top right, Pin 2 is at the top left, Pin 3 is at the bottom right, and Pin 4 is at the bottom left. Each pin has a corresponding terminal block with a locking tab.

Connector Part Information		• 6098-0514 • 4-Way F Sumitomo (WH)	
Pin	Wire Color	Circuit No.	Function
1	OG	1052	Auxiliary Blower Motor Supply Voltage
2	TN	63	Blower Motor Medium 1 Control
3	L-BU	72	Medium 2 Blower Motor Control
4	YE	60	Blower Motor Low Control

Blower Motor Terminal Identification

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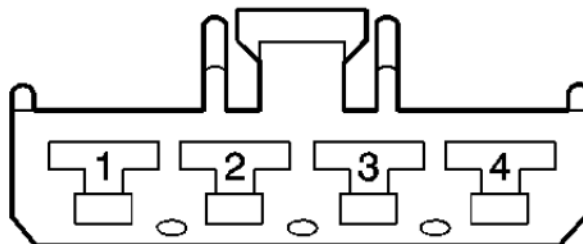


Connector Part Information

- 7283-3020-30
- 2-Way F Yazaki (BK)

Pin	Wire Color	Circuit No.	Function
1	L-BU	188	Blower Motor Control Processor Supply Voltage
2	BK/RD	450	Ground

Blower Motor Control Module Terminal Identification



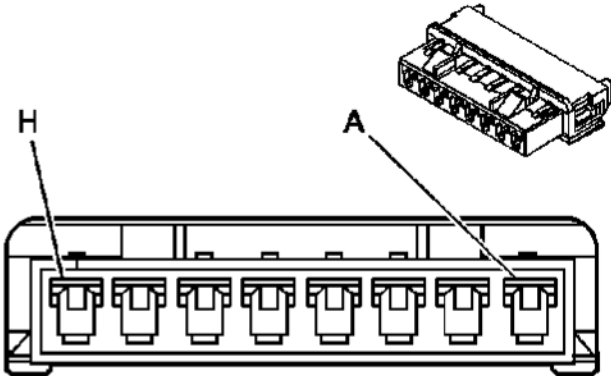
Connector Part Information

- 6098-1449
- 4-Way F Sumitomo (BK)

Pin	Wire Color	Circuit No.	Function
1	BK/RD	450	Ground
2	L-BU	188	Blower Motor Control Processor Supply Voltage

3	GY/BK	754	Blower Motor Speed Control
4	BK	450	Ground

Blower Motor Switch Terminal Identification - Auxiliary



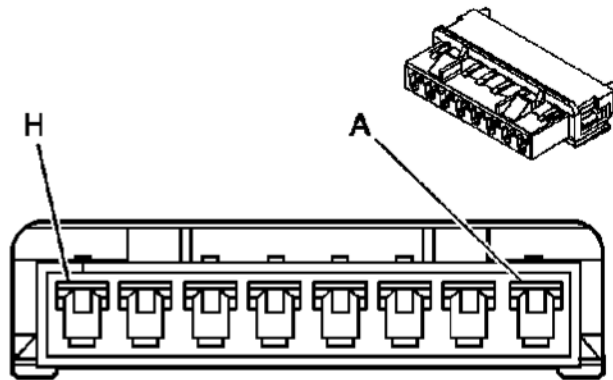
Connector Part Information		12015416 8-Way F Metri-Pack 280 Series (WH)	
Pin	Wire Color	Circuit No.	Function
A	BK	1050	Ground
B	PU/WH	5264	Rear Auxiliary Mode Door Control
C	BK	1050	Ground
D	YE	60	Blower Motor Low Control
E	TN	63	Blower Motor Medium 1 Control
F	L-BU	72	Medium 2 Blower Motor Control
G	OG	1052	Auxiliary Blower Motor Supply Voltage
H	YE	1491	Backlight Lamps Control

Blower Motor Switch Terminal Identification - Rear Auxiliary

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Connector Part Information

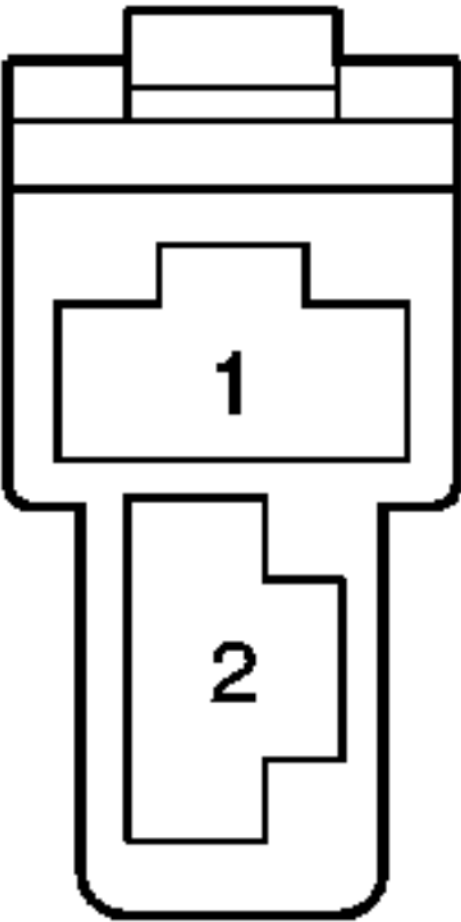
- 12015416
- 8-Way F Metri-Pack 280 Series (WH)

Pin	Wire Color	Circuit No.	Function
A	BK	1050	Ground
B	-	-	Not Used
C	PU/WH	5264	Rear Auxiliary Mode Door Control
D	YE	60	Blower Motor Low Control
E	TN	63	Blower Motor Medium Control
F	L-BU	72	Medium 2 Blower Motor Control
G	OG	1052	Auxiliary Blower Motor Supply Voltage
H	YE	1491	Backlight Lamps Control

Evaporator Temperature Sensor Terminal Identification

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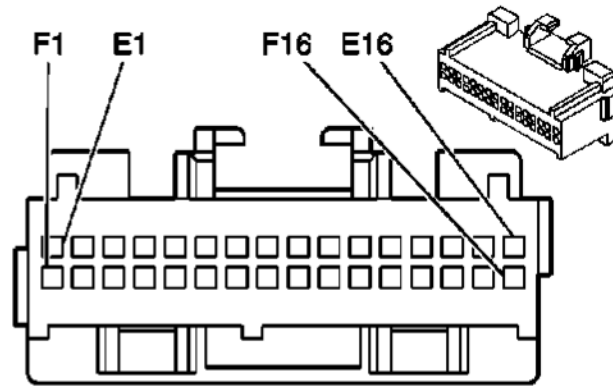


Connector Part Information		• 7123-2820 • 2-Way F Yazaki (CL)	
Pin	Wire Color	Circuit No.	Function
1	GY	731	Evaporator Temperature Sensor Signal
2	YE	61	Low Reference

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HVAC Control Module Terminal Identification



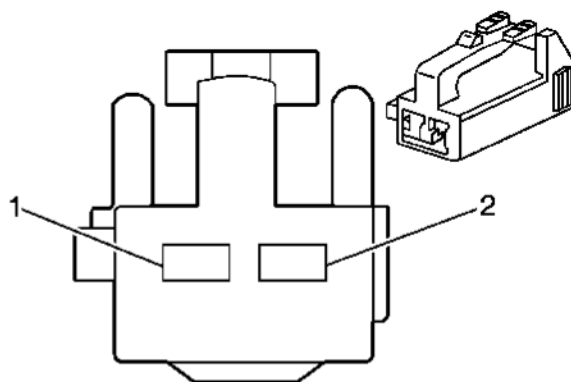
Connector Part Information		• 12110115 • 32-Way F Micro-Pack 100 Series (BU)	
Pin	Wire Color	Circuit No.	Function
E1	RD/WH	340	Battery Positive Voltage
E2	-	-	Not Used
E3	D-BU	1199	Driver Air Temperature Door Control B
E4	WH/BK	1236	Passenger Air Temperature Door Control B
E5	YE	1318	Mode Door Control B
E6	PU	1838	Recirculation Door Control A
E7	BN	247	Blower Motor Relay Control
E8	GY/BK	754	Blower Motor Speed Control
E9	PU	1807	Class 2 Serial Data
E10	PU	1807	Class 2 Serial Data
E11	L-GN	1478	Coolant Level Switch Signal
E12	YE/BK	1814	Mode Door Position Signal
E13	L-GN/BK	735	Ambient Air Temperature Sensor Signal
E14	D-GN	734	Inside Air Temperature Sensor Signal
E15	GY	705	5-Volt Reference
E16	-	-	Not Used
F1	BN	141	Ignition 3 Voltage

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F2	-	-	Not Used
F3	YE	1791	Driver Air Temperature Door Control A
F4	GY/BK	2778	Passenger Air Temperature Door Control A
F5	TN	2273	Mode Door Control A
F6	D-GN	1614	Recirculation Door Control B
F7	GY	5127	Afterboil Coolant Pump Supply Voltage (V92)
F8	BK/WH	451	Ground
F9	D-BU	1646	Passenger Air Temperature Door Position Signal
F10	L-BU	733	Driver Air Temperature Door Position Signal
F11	GY	1548	Passenger Sunload Sensor Signal
F12	L-BU/BK	590	Driver Sunload Sensor Signal
F13	WH	278	Ambient Light Sensor Signal
F14	GY	731	Evaporator Temperature Sensor Signal
F15	YE	61	Low Reference
F16	-	-	Not Used

Inside Air Temperature Sensor Terminal Identification



Connector Part Information

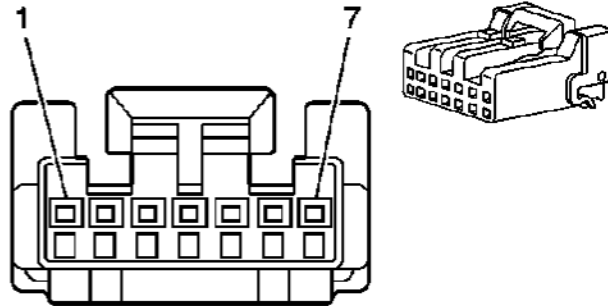
- 7283-1020
- 2-Way F Yazaki 2.3 Series (WH)

Pin	Wire Color	Circuit No.	Function
1	D-GN	734	Inside Air Temperature Sensor Signal
2	YE	61	Low Reference

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Mode Actuator Terminal Identification

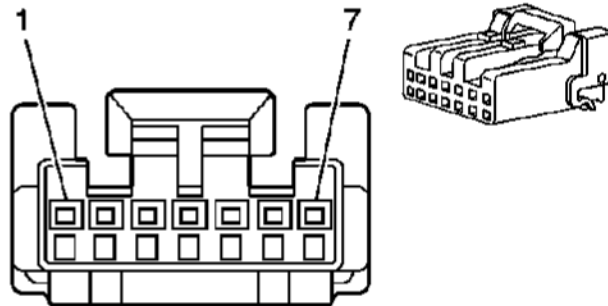


Connector Part Information

- IL-AG5-7S-S3C1
- 7-Way F Molex (L-GN)

Pin	Wire Color	Circuit No.	Function
1	YE	61	Low Reference
2	-	-	Not Used
3	GY	705	5-Volt Reference
4	-	-	Not Used
5	GY	1814	Mode Door Position Signal
6	PK	1318	Mode Door Control B
7	L-BU	2273	Mode Door Control A

Recirculation Actuator Terminal Identification



Connector Part Information

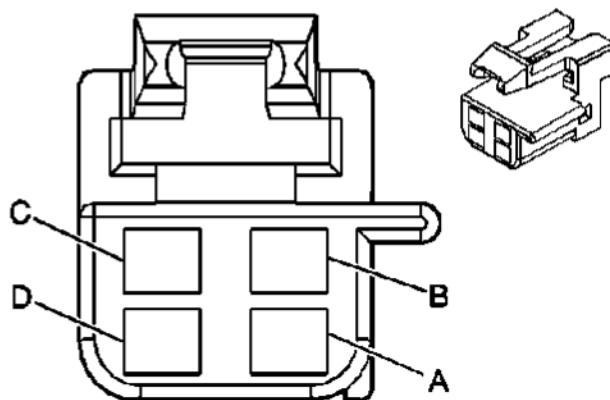
- IL-AG5-7S-S3C1
- 7-Way F (GN)

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Pin	Wire Color	Circuit No.	Function
1	D-GN	1614	Recirculation Door Control B
2	-	-	Not Used
3	PU	1838	Recirculation Door Control A
4-6	-	-	Not Used
7	BN	41	Ignition 3 Voltage

Sunload/Ambient Light Sensor Terminal Identification



Connector Part Information

- 12064760
- 4-Way F (BK)

Pin	Wire Color	Circuit No.	Function
A	L-BU/BK	590	Driver Sunload Sensor Signal
B	GY	1548	Passenger Sunload Sensor Signal
C	YE	61	Low Reference
D	WH	278	Ambient Light Sensor Signal

DIAGNOSTIC INFORMATION AND PROCEDURES

DIAGNOSTIC SYSTEM CHECK - HVAC SYSTEMS - AUTOMATIC

Test Description

The numbers below refer to the step numbers on the diagnostic table.

3: Lack of communication may be due to a partial malfunction of the class 2 serial data

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circuit or due to a total malfunction of the class 2 serial data circuit. The specified procedure will determine the particular condition.

4: Determine if the HVAC control module or the engine control module (ECM) have set DTCs which may affect HVAC operation are present.

5: The presence of DTCs which begin with "U" indicate some other module is not communicating. The specified procedure will compile all the available information before tests are performed.

6: Answer Yes if the first 3 characters of the DTC name begins with B10; regardless of the last 2 characters.

Diagnostic System Check - HVAC Systems - Automatic

Step	Action	Yes	No
1	Did you review A Diagnostic Starting Point - Heating, Ventilation and Air Conditioning?	Go to Step 2	Go to <u>Diagnostic Starting Point - Heating, Ventilation and Air Conditioning</u> in Heating, Ventilation and Air Conditioning
2	Install a scan tool. Does the scan tool power up?	Go to Step 3	Go to <u>Scan Tool Does Not Power Up</u> in Data Link Communications
3	1. Turn ON the ignition, with the engine OFF. 2. Attempt to establish communication with the following control modules: • HVAC control module • Engine control module Does the scan tool communicate with the control modules?	Go to Step 4	Go to <u>Data Link References</u> in Data Link Communications
	Select the display DTCs function on the scan tool for the following modules: • HVAC control module		

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4	Engine control module		Go to Symptoms - HVAC Systems - Automatic
	Does the scan tool display any DTCs?	Go to Step 5	
5	Does the scan tool display any DTCs which begin with a "U"?	Go to Scan Tool Does Not Communicate with Class 2 Device in Data Link Communications	Go to Step 6
6	Does the scan tool display DTC B10XX?	Go to Diagnostic Trouble Code (DTC) List in Body Control System	Go to Step 7
7	Does the scan tool display any DTCs that are associated with the charging system?	Go to Diagnostic Trouble Code (DTC) List in Engine Electrical	Go to Step 8
8	Does the scan tool display any DTCs that are associated with the HVAC system?	Go to Diagnostic Trouble Code (DTC) List	Go to Diagnostic Trouble Code (DTC) List in Engine Controls- 2.6L and 3.2L

SCAN TOOL OUTPUT CONTROLS

HVAC Control Module Scan Tool Output Controls

Scan Tool Output Control	Additional Menu Selection(s)	Description
Air Inlet Door Position	HVAC Motors	When you select Outside, the HVAC control module commands the recirculation actuator toward the outside air position. When you select Recirc, the HVAC control module commands the recirculation actuator toward the recirculation position.
		When you select ON, the HVAC control module commands the blower motor relay ON. When you

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Blower Motor	Miscellaneous Test	select OFF, the HVAC control module commands the blower motor relay OFF.
Driver Temp Door Position	HVAC Motors	When you select Cold, the HVAC control module commands the driver air temperature actuator to the full cold position. When you select Hot, the HVAC control module commands the actuator to the full hot position.
Htr./Def./A/C Door Position	HVAC Motors	When you select A/C, the HVAC control module commands the mode actuator to the panel position. When you select Defrost, the HVAC control module commands the actuator to the defrost position.
Passenger Temp Door Position	HVAC Motors	When you select Cold, the HVAC control module commands the passenger air temperature actuator to the full cold position. When you select Hot, the HVAC control module commands the actuator to the full hot position.

ECM Scan Tool Output Controls

Scan Tool Output Control	Additional Menu Selection(s)	Description
A/C Relay	Engine Output Controls	The engine must be running and the ECM must receive an A/C request from the HVAC control module in order to enable the output control. The ECM de-energizes the A/C compressor clutch relay when you select OFF. The relay remains de-energized until you select ON.

SCAN TOOL DATA LIST

HVAC Control Module Scan Tool Data List

Scan Tool Parameter	Data List	Units Displayed	Typical Data Value
Operating Conditions: Engine idling, A/C ON, ambient air temperature between 22-27° C (70-80° F)			
A/C Clutch-Actual	A/C Compressor Data	On/Off	On
A/C Clutch-Desired	A/C Compressor Data	Engage/Disengage	Yes

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AC Pressure	A/C Compressor Data	kPa/psi	Varies
Air Inlet Door Actual	HVAC Door Positions	Recirc/Fresh Air	Varies
Commanded Blower	HVAC System Data	%	Varies
Coolant Temperature	HVAC System Data	° C/° F	Varies
Driver Temp. Dr. Actual	HVAC Door Positions	Counts/Volts	Varies
Driver Temp. Dr. Commanded	HVAC Door Positions	Counts/Volts	Varies
Driver Solar Sensor	Open/Short Data	Counts/Volts	Varies
Driver Sunload	HVAC System Data	w/m2	Varies
Evaporator Temp	HVAC System Data	° C/° F	Varies
Evaporator Temp	A/C Compressor Data	° C/° F	Varies
Evaporator Temp	Open/Short Data	Counts/Volts	Varies
Htr./Def./A/C Dr. Actual	HVAC Door Positions	Counts/Volts	Varies
Htr./Def./A/C Dr. Commanded	HVAC Door Positions	Counts/Volts	Varies
Inside Air Temp	HVAC System Data	° C/° F	Varies
Inside Air Temp	Open/Short Data	Counts/Volts	Varies
Low Coolant Status	HVAC System Data	OK/Low	OK
Low Coolant Switch	HVAC System Data	Open/Closed	Closed
Outside Air Temp	HVAC System Data	° C/° F	Varies
Outside Air Temp	Open/Short Data	Counts/Volts	Varies
Passenger Solar Sensor	Open/Short Data	Counts/Volts	Varies
Passenger Sunload	HVAC System Data	w/m2	Varies

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Passenger Temp Dr. Actual	HVAC Door Positions	Counts/Volts	Varies
Passenger Temp Dr. Commanded	HVAC Door Positions	Counts/Volts	Varies
Pressure Sensor	A/C Compressor Data	OK/Failed	OK
Vehicle Speed	HVAC System Data	Km/h/mph	Varies

ECM Scan Tool Data List

Scan Tool Parameter	Data List	Units Displayed	Typical Data Value
Operating Conditions: Engine idling, A/C ON, ambient air temperature between 22-27° C (70-80° F)			
A/C High Side Pressure	Cooling HVAC Data	kPa/Psi	629-845 kPa (85-120 psi)
A/C High Side Pressure	Cooling HVAC Data	Volts	Varies
A/C Relay Command	Engine Data 1, Cooling HVAC Data	On/Off	Varies
A/C Request Signal	Cooling HVAC Data	Yes/No	Varies
ECT Sensor	Engine Data 1, Cooling HVAC Data	° C/° F	92° C (197° F)
ECT Sensor	Engine Data 1, Cooling HVAC Data	Volts	1.10-1.45 Volts

SCAN TOOL DATA DEFINITIONS**A/C Clutch-Actual**

The scan tool displays On/Off. The HVAC control module displays On when the ECM transmits a class 2 message that the A/C compressor clutch relay is energized.

A/C Clutch-Desired

The scan tool displays Yes/No. The scan tool displays Yes when the HVAC control module determines that conditions for compressor clutch engagement are present.

A/C High Side Pressure

The scan tool displays 0-3450 kPa (0-500 psi). The voltage applied to the ECM input from the A/C refrigerant pressure sensor is converted to a pressure value.

A/C High Side Pressure

The scan tool displays 0-5 volts. The voltage applied to the ECM input for the A/C refrigerant pressure sensor.

A/C Pressure

The scan tool displays 0-3450 kPa (0-500 psi). The voltage applied to the ECM input from the A/C refrigerant pressure sensor is converted to a pressure value and transmitted in a class 2 message to the HVAC control module.

A/C Relay Command

The scan tool displays On/Off. The scan tool displays the control decision for the compressor clutch relay output as determined by the ECM.

A/C Request Signal

The scan tool displays Yes/No. The scan tool displays Yes when the ECM receives a class 2 message from the HVAC control module to engage the A/C compressor clutch. The scan tool displays No when the ECM receives a class 2 message from the HVAC control module to disengage the A/C compressor clutch.

Commanded Blower

The scan tool displays 0-100%. The scan tool displays the control decision for the blower motor speed as determined by the HVAC control module. The scan tool displays 100% when the blower motor is commanded to maximum speed. The scan tool displays 0% when the blower motor is commanded OFF.

Coolant Temperature

The scan tool displays -39 to 140° C (-38 to 284° F). The voltage applied to the ECM input

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from the engine coolant temperature sensor is converted to a temperature value and transmitted in a class 2 message to the HVAC control module.

Driver Temp Dr. Actual

The scan tool displays 0-255 counts (0-5.00 Volts). The voltage applied to the driver air temperature door position input of the HVAC control module.

Driver Temp Dr. Commanded

The scan tool displays 0-255 counts (0-5.00 Volts). The desired position of the driver air temperature actuator as determined by the HVAC control module.

Driver Solar Sensor

The scan tool displays 0-255 counts (0-5.00 Volts). The voltage applied to the driver sunload input of the HVAC control module.

Driver Sunload

The scan tool displays 0-2000 w/m2. The voltage applied to the driver sunload input of the HVAC control module converted to light intensity units.

ECT Sensor

The scan tool displays -39 to 140° C (-38 to 284° F). The voltage applied to the ECM input from the engine coolant temperature sensor is converted to a temperature value.

ECT Sensor

The scan tool displays 0-5 volts. The voltage applied to the ECM input for the engine coolant temperature sensor.

Evaporator Temp

The scan tool displays -39 to 140° C (-38 to 284° F). The voltage applied to the HVAC control module input from the evaporator temperature sensor is converted to a temperature value.

Evaporator Temp

The scan tool displays 0-255 counts (0-5 Volts). The voltage applied to the HVAC control

module input for the evaporator temperature sensor.

Htr./Def./A/C Dr. Actual

The scan tool displays 0-255 counts (0-5.00 Volts). The voltage applied to the mode door position input of the HVAC control module.

Htr./Def./A/C Dr. Commanded

The scan tool displays 0-255 counts (0-5.00 Volts). The desired position of the mode actuator as determined by the HVAC control module.

Inside Air Temp.

The scan tool displays -40 to 215° C (-40 to 419° F). The voltage applied to the HVAC control module input for the inside air temperature sensor is converted to a temperature value.

Inside Air Temp.

The scan tool displays 0-255 counts (0-5.00 Volts). The voltage applied to the HVAC control module input for the inside air temperature sensor.

Low Coolant Status

The scan tool displays OK/Low. The filtered state of the low coolant switch.

Low Coolant Switch

The scan tool displays Open/Closed. The actual state of the low coolant switch.

Outside Air Temp.

The scan tool displays -40 to 215° C (-40 to 419° F). The current value of the ambient air temperature display on the HVAC control module.

Outside Air Temp.

The scan tool displays 0-255 counts (0-5.00 Volts). The voltage applied to the HVAC control module input for the outside air temperature sensor.

Passenger Solar Sensor

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The scan tool displays 0-255 counts (0-5.00 Volts). The voltage applied to the passenger sunload input of the HVAC control module.

Passenger Sunload

The scan tool displays 0-2000 w/m2. The voltage applied to the driver sunload input of the HVAC control module converted to light intensity units.

Passenger Temp Dr. Actual

The scan tool displays 0-255 counts (0-5.00 Volts). The voltage applied to the passenger air temperature door position input of the HVAC control module.

Passenger Temp Dr. Commanded

The scan tool displays 0-255 counts (0-5.00 Volts). The desired position of the passenger air temperature actuator as determined by the HVAC control module.

Pressure Sensor

The scan tool displays OK/Failed. The state of the A/C refrigerant pressure sensor and circuitry.

DIAGNOSTIC TROUBLE CODE (DTC) LIST

Diagnostic Trouble Code (DTC) List

DTC	Diagnostic Procedure	Module(s)
B0126	<u>DTC B0126, B0409, or B0419</u>	HVAC Control Module
B0130	<u>DTC B0130, B0414, or B0424</u>	HVAC Control Module
B0160	<u>DTC B0160 or B0162</u>	HVAC Control Module
B0162	<u>DTC B0160 or B0162</u>	HVAC Control Module
B0164	<u>DTC B0164</u>	HVAC Control Module
B0184	<u>DTC B0184 or B0189</u>	HVAC Control Module
B0189	<u>DTC B0184 or B0189</u>	HVAC Control Module
B0409	<u>DTC B0126, B0409, or B0419</u>	HVAC Control Module
B0414	<u>DTC B0130, B0414, or B0424</u>	HVAC Control Module
B0419	<u>DTC B0126, B0409, or B0419</u>	HVAC Control Module
B0424	<u>DTC B0130, B0414, or B0424</u>	HVAC Control Module
P0531	<u>DTC P0531, P0532, or P0533</u>	ECM

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P0532	<u>DTC P0531, P0532, or P0533</u>	ECM
P0533	<u>DTC P0531, P0532, or P0533</u>	ECM
P0645	<u>DTC P0645, P0646, or P0647</u>	ECM
P0646	<u>DTC P0645, P0646, or P0647</u>	ECM
P0647	<u>DTC P0645, P0646, or P0647</u>	ECM
P1531	<u>DTC P1531</u>	HVAC Control Module

DTC B0126, B0409, OR B0419

Circuit Description

- DTC B0126 is for the mode actuator.
- DTC B0409 is for the driver air temperature actuator.
- DTC B0419 is for the passenger air temperature actuator.

The HVAC door actuator is an electronic motor with a feedback potentiometer. The HVAC control module supplies power and ground to the actuator. The HVAC control module controls the direction of the actuator by changing the polarity of the control circuit. When the actuator reaches the desired position, voltage is removed from the control circuit. The HVAC control module determines the current position of the actuator by monitoring the feedback voltage of the door position signal circuit. The feedback potentiometer position is a function of the actuator position.

Conditions for Running the DTC

- The ignition is ON.
- Ignition voltage is between 9-16 volts.

Conditions for Setting the DTC

The actual door position differs from the commanded door position by 4 counts or greater for more than 16 seconds.

Action Taken When the DTC Sets

The HVAC control module will not command actuator movement past the point where the stall condition is detected and will continue to make use of the remaining nonrestricted range.

Conditions for Clearing the DTC

- The DTC will become history if the HVAC control module no longer detects the condition

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that set the DTC.

- The history DTC will clear after 50 fault free ignition cycles.
- The DTC can be cleared with a scan tool.

Diagnostic Aids

- The condition may be intermittent. Refer to **Testing for Intermittent Conditions and Poor Connections** in Wiring Systems.
- Inspect the appropriate HVAC door and actuator for the following conditions:
 - A misaligned door actuator
 - Broken or binding linkages or door
 - An obstruction that prevents the door from operating within its full range of motion

Test Description

The number below refers to the step number on the diagnostic table.

5: This step verifies that the HVAC control module is able to command the appropriate HVAC actuator through its full range of motion.

DTC B0126, B0409, or B0419

Step	Action	Yes	No
Schematic Reference: <u>HVAC Schematics</u> Connector End View Reference: <u>HVAC Connector End Views</u>			
1	Did you perform the HVAC Diagnostic System Check?	Go to Step 2	Go to <u>Diagnostic System Check - HVAC Systems - Automatic</u>
2	1. Install a scan tool. 2. Turn ON the ignition, with the engine OFF. 3. With a scan tool, select the Climate Control Panel display DTCs function. Does the scan tool indicate that DTC B0130, B0414 or B0424 are set as current or history DTCs?	Go to <u>DTC B0130, B0414, or B0424</u>	Go to Step 3
	With a scan tool, observe the Ignition 3 Input		

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3	parameter in the Climate Control Panel data list. Does the scan tool indicate that the Ignition 3 Input parameter displays Active?	Go to Step 4	Go to Step 11
4	With the scan tool, observe the appropriate Dr. Commanded data parameter and the appropriate Dr. Act data parameter in the Climate Control Panel Data list. Does the scan tool indicate that the appropriate Dr. Commanded value is within 4 counts of the appropriate Dr. Actual parameter?	Go to Step 5	Go to Step 6
5	With the scan tool, command the appropriate HVAC door actuator to the minimum and maximum positions. Does the appropriate Dr. Actual value change by more than 4 counts?	Go to Diagnostic Aids	Go to Step 6
6	1. Turn OFF the ignition. 2. Disconnect HVAC control module. 3. Connect a 3-amp fused jumper wire between the control A circuit of the appropriate HVAC actuator and battery positive voltage. 4. Connect a second 3-amp fused jumper wire between the control B circuit of the appropriate HVAC actuator and a good ground. 5. Observe the actuator drive shaft. Does the actuator shaft rotate?	Go to Step 9	Go to Step 7
7	1. Connect a 3-amp fused jumper wire between the control B circuit of the appropriate HVAC actuator and battery positive voltage. 2. Connect a second 3-amp fused jumper wire between the control A circuit of the appropriate HVAC actuator and a good ground.		

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	3. Observe the actuator drive shaft.		
	Does the actuator shaft rotate?	Go to Step 9	Go to Step 8
8	Test the control A circuit and control B circuit of the appropriate actuator for an open, a high resistance, a short to ground or a short to voltage. Refer to <u>Circuit Testing</u> and <u>Wiring Repairs</u> in Wiring Systems. Did you find and correct the condition?	Go to Step 18	Go to Step 12
9	Test the 5-volt reference circuit of the appropriate actuator for an open. Refer to <u>Circuit Testing</u> and <u>Wiring Repairs</u> in Wiring Systems. Did you find and correct the condition?	Go to Step 18	Go to Step 10
10	Test the position signal circuit of the appropriate actuator for an open, short to ground or short to voltage. Refer to <u>Circuit Testing</u> and <u>Wiring Repairs</u> in Wiring Systems. Did you find and correct the condition?	Go to Step 18	Go to Step 14
11	1. Turn OFF the ignition. 2. Disconnect the HVAC control module. 3. Turn ON the ignition, with the engine OFF. 4. Probe the ignition 3 voltage circuit of the HVAC control module with a test lamp that is connected to a good ground. Does the test lamp illuminate?	Go to Step 14	Go to Step 15
12	Inspect the appropriate HVAC door and appropriate HVAC actuator for the following conditions: • A misaligned HVAC actuator • Broken or binding linkages or door • An obstruction that prevents the door from operating within its full range of motion		

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	Did you find and correct the condition?	Go to Step 18	Go to Step 13
13	Inspect for poor connections at the harness connector of the appropriate HVAC actuator. Refer to <u>Testing for Intermittent Conditions and Poor Connections</u> and <u>Connector Repairs</u> in Wiring Systems. Did you find and correct the condition?	Go to Step 18	Go to Step 16
14	Inspect for poor connections at the harness connector of the HVAC control module. Refer to <u>Testing for Intermittent Conditions and Poor Connections</u> and <u>Connector Repairs</u> in Wiring Systems. Did you find and correct the condition?	Go to Step 18	Go to Step 17
15	Repair the ignition 3 voltage circuit of the HVAC control module. Refer to <u>Wiring Repairs</u> in Wiring Systems. Did you complete the repair?	Go to Step 18	-
16	Replace the appropriate HVAC actuator. Refer to the appropriate replacement procedure: • <u>Mode Actuator Replacement</u> • <u>Air Temperature Actuator Replacement - Right</u> • <u>Air Temperature Actuator Replacement - Left</u> Did you complete the replacement?	Go to Step 18	-
17	Replace the HVAC control module. Refer to <u>HVAC Control Module Replacement</u> . Did you complete the replacement?	Go to Step 18	-
18	1. Use the scan tool in order to clear the DTCs. 2. Operate the vehicle within the Conditions for Running the DTC as specified in the supporting text.		

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Does the DTC reset?	Go to Step 2	System OK
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DTC B0130, B0414, OR B0424

Circuit Description

- B0130 is for the mode actuator.
- B0414 is for the driver air temperature actuator.
- B0424 is for the passenger air temperature actuator.

The HVAC control module controls the HVAC door actuators to regulate the airflow through the HVAC system. Each actuator consists of an electric motor and a potentiometer. The potentiometer inside the door actuator allows the module to monitor the current position of the actuator drive shaft. The module supplies a 5 volt source voltage to the potentiometer on the 5 volt reference circuit. The module supplies ground to the potentiometer through the low reference circuit. The HVAC control module monitors the voltage drop across the potentiometer on the door position signal circuit. When the actuator shaft rotates, the voltage on the door position signal circuit changes.

Conditions for Running the DTC

The ignition is turned ON.

Conditions for Setting the DTC

The HVAC control module detects the door position signal circuit is less than 7 counts or greater than 250 counts for 1 minute.

Action Taken When the DTC Sets

The HVAC control module uses only the minimum and maximum door positions.

Conditions for Clearing the DTC

- The DTC becomes history when the HVAC control module no longer detects the condition that set the DTC.
- The history DTC will clear after 50 fault free ignition cycles.
- The DTC can be cleared with a scan tool.

Diagnostic Aids

- If the condition is not present, refer to **Testing for Intermittent Conditions and Poor**

Connections in Wiring Systems.

- The following conditions may cause multiple DTCs to set:
 - An open, short to ground or short to voltage on the 5 volt reference circuit.
 - An open on the low reference circuit
 - An internally shorted actuator
 - An insufficient 5 volt supply from the HVAC control module on the 5 volt reference circuit
 - An insufficient ground through the HVAC control module on the low reference circuit

Test Description

The numbers below refer to the step numbers on the diagnostic table.

4: Tests for the proper operation of the circuit in the high voltage range.

5: Tests for the proper operation of the circuit in the low voltage range. If the fuse in the jumper opens when you perform this test, the signal circuit is shorted to voltage.

6: Tests for a short to ground in the 5 volt reference circuit.

DTC B0130, B0414, or B0424

Step	Action	Values	Yes	No
Schematic Reference: <u>HVAC Schematics</u> Connector End View Reference: <u>HVAC Connector End Views</u>				
1	Did you perform the HVAC Diagnostic System Check?	-	Go to Step 2	Go to <u>Diagnostic System Check - HVAC Systems - Automatic</u>
2	1. Install a scan tool. 2. Turn ON the ignition, with the engine OFF. 3. With a scan tool, observe the Ignition 3 Input parameter in the Climate Control Panel data list. Does the scan tool indicate that the	-		

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	Ignition 3 Input parameter displays Active?		Go to Step 3	Go to Step 12
3	With a scan tool, observe the appropriate Dr. Actual parameter in the Climate Control Panel HVAC Door Positions data list. Does the scan tool indicate that the appropriate Dr. Actual parameter is within the specified range?	7-250 counts	Go to Diagnostic Aids	Go to Step 4
4	1. Turn OFF the ignition. 2. Disconnect the appropriate HVAC door actuator. 3. Turn ON the ignition, with the engine OFF. 4. With a scan tool, observe the appropriate Dr. Actual parameter. Does the scan tool indicate that the appropriate Dr. Actual parameter is greater than the specified value?	250 counts	Go to Step 5	Go to Step 9
5	1. Turn OFF the ignition. 2. Connect a 3-amp fused jumper wire between the position signal circuit of the appropriate HVAC door actuator and the low reference circuit of the appropriate HVAC door actuator. 3. Turn ON the ignition, with the engine OFF. 4. With a scan tool, observe the appropriate Dr. Actual parameter. Does the scan tool indicate that the appropriate Dr. Actual parameter is less than the specified value?	7 counts	Go to Step 6	Go to Step 10
	1. Turn OFF the ignition. 2. Disconnect the fused jumper wire. 3. Connect a 3-amp fused jumper wire			

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6	between the position signal circuit of the appropriate HVAC door actuator and the 5-volt reference circuit of the appropriate HVAC door actuator. - Turn ON the ignition, with the engine OFF. - With a scan tool, observe the appropriate Dr. Actual parameter. Does the scan tool indicate that the appropriate Dr. Actual parameter is greater than the specified value?	250 counts	Go to Step 8	Go to Step 7
7	Test the 5-volt reference circuit of the appropriate HVAC door actuator for a short to ground. Refer to <u>Circuit Testing</u> and <u>Wiring Repairs</u> in Wiring Systems. Did you find and correct the condition?	-	Go to Step 18	Go to Step 14
8	Test the 5-volt reference circuit of the appropriate HVAC door actuator for a short to voltage, a high resistance, or an open. Refer to <u>Circuit Testing</u> and <u>Wiring Repairs</u> in Wiring Systems. Did you find and correct the condition?	-	Go to Step 18	Go to Step 13
9	Test the signal circuit of the appropriate HVAC door actuator for a short to ground. Refer to <u>Circuit Testing</u> and <u>Wiring Repairs</u> in Wiring Systems. Did you find and correct the condition?	-	Go to Step 18	Go to Step 14
10	Test the signal circuit of the appropriate HVAC door actuator for a short to voltage, a high resistance, or an open. Refer to <u>Circuit Testing</u> and <u>Wiring Repairs</u> in Wiring Systems. Did you find and correct the condition?	-	Go to Step 18	Go to Step 11
11	Test the low reference circuit of the appropriate HVAC door actuator for a high resistance or an open. Refer to	-		

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	<u>Circuit Testing</u> and <u>Wiring Repairs</u> in Wiring Systems. Did you find and correct the condition?		Go to Step 18	Go to Step 14
12	1. Turn OFF the ignition. 2. Disconnect the HVAC control module. 3. Turn ON the ignition, with the engine OFF. 4. Probe the ignition 3 voltage circuit of the HVAC control module with a test lamp that is connected to a good ground. Does the test lamp illuminate?	-	Go to Step 14	Go to Step 15
13	Inspect for poor connections at the harness connector of the appropriate HVAC door actuator. Refer to <u>Testing for Intermittent Conditions and Poor Connections</u> and <u>Connector Repairs</u> in Wiring Systems. Did you find and correct the condition?	-	Go to Step 18	Go to Step 16
14	Inspect for poor connections at the harness connector of the HVAC control module. Refer to <u>Testing for Intermittent Conditions and Poor Connections</u> and <u>Connector Repairs</u> in Wiring Systems. Did you find and correct the condition?	-	Go to Step 18	Go to Step 17
15	Repair the Ignition 3 voltage circuit of the HVAC control module. Refer to <u>Wiring Repairs</u> in Wiring Systems. Did you complete the repair?	-	Go to Step 18	-
16	Replace the appropriate HVAC door actuator. Refer to the appropriate replacement procedure: • <u>Mode Actuator Replacement</u> • <u>Air Temperature Actuator Replacement - Right</u>	-		-

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	• <u>Air Temperature Actuator Replacement - Left</u>			
	Did you complete the replacement?		Go to Step 18	
17	Replace the HVAC control module. Refer to <u>HVAC Control Module Replacement</u> . Did you complete the replacement?	-	Go to Step 18	-
18	1. Use the scan tool in order to clear the DTCs. 2. Operate the vehicle within the Conditions for Running the DTC as specified in the supporting text. Does the DTC reset?	-	Go to Step 2	System OK

DTC B0160 OR B0162

Circuit Description

The ambient air temperature sensor provides the HVAC control module software with the temperature of the air outside the vehicle. That temperature can be displayed in the driver information center (DIC). A reference voltage is supplied to the sensor thermistor and the HVAC control module determines the voltage drop across that device which is proportional to temperature. As the air temperature increases, the resistance decreases and the voltage signal decreases. As the air temperature decreases, the resistance increases and the voltage signal increases.

Conditions for Running the DTC

The ignition is turned ON.

Conditions for Setting the DTC

DTC B0160

The HVAC control module detects the ambient air temperature sensor signal circuit is less than 2 counts for more than 30 seconds.

DTC B0162

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The HVAC control module detects the ambient air temperature sensor signal circuit is more than 253 counts for more than 30 seconds.

Action Taken When the DTC Sets

The driver information center will display 15° C (59° F) for outside air temperature.

DTC B0160

The system operates using a default value of 15° C.

DTC B0162

The system operates using a default value of 15° C.

Conditions for Clearing the DTC

- The DTC will become history if the HVAC control module no longer detects the condition that set the DTC.
- The history DTC will clear after 50 fault free ignition cycles.
- The DTC can be cleared with a scan tool.

Test Description

The numbers below refer to the step numbers on the diagnostic table.

3: Tests for the proper operation of the circuit in the high voltage range.

4: Tests for the proper operation of the circuit in the low voltage range. If the fuse in the jumper opens when you perform this test, the signal circuit is shorted to voltage.

DTC B0160 or B0162

Step	Action	Value(s)	Yes	No
Schematic Reference: <u>HVAC Schematics</u>				
Connector End View Reference: <u>HVAC Connector End Views</u>				
1	Did you perform the HVAC Diagnostic System Check?	-	Go to Step 2	Go to <u>Diagnostic System Check - HVAC Systems - Automatic</u>

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2	1. Install a scan tool. 2. Turn ON the ignition, with the engine OFF. 3. With a scan tool, observe the Outside Air Temp parameter in the Climate Control Panel Open/Short data list. Does the scan tool indicate that the Outside Air Temp parameter is within the specified range?	2-253 counts	Go to <u>Testing for Intermittent Conditions and Poor Connections</u> in Wiring Systems	Go to Step 3
3	1. Turn OFF the ignition. 2. Disconnect the ambient air temperature sensor. 3. Turn ON the ignition, with the engine OFF. 4. With a scan tool, observe the Outside Air Temp parameter. Does the scan tool indicate that the Outside Air Temp parameter is greater than the specified value?	253 counts	Go to Step 4	Go to Step 5
4	1. Turn OFF the ignition. 2. Connect a 3 amp fused jumper wire between the signal circuit of the ambient air temperature sensor and the low reference circuit of the ambient air temperature sensor. 3. Turn ON the ignition, with the engine OFF. 4. With a scan tool, observe the Outside Air Temp parameter. Does the scan tool indicate that the Outside Air Temp parameter is less than the specified value?	2 counts	Go to Step 9	Go to Step 6
	Test the signal circuit of the ambient air			

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5	temperature sensor for a short to ground. Refer to <u>Circuit Testing</u> and <u>Wiring Repairs</u> in Wiring Systems. Did you find and correct the condition?	-	Go to Step 13	Go to Step 10
6	Test the signal circuit of the ambient air temperature sensor for a short to voltage, a high resistance, or an open. Refer to <u>Circuit Testing</u> and <u>Wiring Repairs</u> in Wiring Systems. Did you find and correct the condition?	-	Go to Step 13	Go to Step 7
7	Test the low reference circuit of the ambient air temperature sensor for a high resistance or an open. Refer to <u>Circuit Testing</u> and <u>Wiring Repairs</u> in Wiring Systems. Did you find and correct the condition?	-	Go to Step 13	Go to Step 8
8	Test the signal circuits of the following components for a short to voltage. Refer to <u>Circuit Testing</u> and <u>Wiring Repairs</u> in Wiring Systems: • Left sunload sensor • Right sunload sensor • Ambient light sensor • Inside air temperature sensor • Evaporator temperature sensor Did you find and correct the condition?	-	Go to Step 13	Go to Step 10
9	Inspect for poor connections at the harness connector of the ambient air temperature sensor. Refer to <u>Testing for Intermittent Conditions and Poor Connections</u> and <u>Connector Repairs</u> in Wiring Systems. Did you find and correct the condition?	-	Go to Step 13	Go to Step 11
	Inspect for poor connections at the harness connector of the HVAC control			

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10	module. Refer to <u>Testing for Intermittent Conditions and Poor Connections</u> and <u>Connector Repairs</u> in Wiring Systems. Did you find and correct the condition?	-	Go to Step 13	Go to Step 12
11	Replace the ambient air temperature sensor. Refer to <u>Ambient Air Temperature Sensor Replacement</u> . Did you complete the replacement?	-	Go to Step 13	-
12	Replace the HVAC control module. Refer to <u>HVAC Control Module Replacement</u> . Did you complete the replacement?	-	Go to Step 13	-
13	1. Use the scan tool in order to clear the DTCs. 2. Operate the vehicle within the Conditions for Running the DTC as specified in the supporting text. Does the DTC reset?	-	Go to Step 2	System OK

DTC B0164

Circuit Description

The inside air temperature sensor provides the HVAC control module with the temperature of the air drawn through an aspirator from the passenger compartment across a sensor. A reference voltage is supplied to the sensor thermistor and the HVAC control module determines the voltage drop across that device which is proportional to temperature. As the air temperature increases, the resistance decreases and the voltage signal decreases. As the air temperature decreases, the resistance increases and the voltage signal increases.

Conditions for Running the DTC

The ignition is turned ON.

Conditions for Setting the DTC

The HVAC control module detects the inside air temperature sensor signal circuit is less than 2 counts or greater than 253 counts for 30 seconds.

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Action Taken When the DTC Sets

- If the DTC sets due to the low condition, the HVAC control module will use ambient temperature value as default in-car value. If ambient sensor is also failed, system uses 25° C default.
- If the DTC sets due to the high condition, the HVAC control module will use ambient temperature value as default in-car value. If ambient sensor is also failed, system uses 25° C default.

Conditions for Clearing the DTC

- The DTC will become history if the HVAC control module no longer detects a failure.
- The history DTC will clear after 50 fault free ignition cycles.
- The DTC can be cleared with a scan tool.

Diagnostic Aids

If the condition is not present, refer to **Testing for Intermittent Conditions and Poor Connections** in Wiring Systems.

Test Description

The numbers below refer to the step numbers on the diagnostic table.

3: Tests for the proper operation of the circuit in the high voltage range.

4: Tests for the proper operation of the circuit in the low voltage range. If the fuse in the jumper opens when you perform this test, the signal circuit is shorted to voltage.

DTC B0164

Step	Action	Values	Yes	No
Schematic Reference: <u>HVAC Schematics</u>				
Connector End View Reference: <u>HVAC Connector End Views</u>				
1	Did you perform the HVAC Diagnostic System Check?	-	Go to Step 2	Go to <u>Diagnostic System Check - HVAC Systems - Automatic</u>
	1. Install a scan tool.			

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2	- Turn ON the ignition, with the engine OFF. - With a scan tool, observe the Inside Air Temp parameter in the Climate Control Panel, Open/Short Data list. Does the scan tool indicate that the Inside Air Temp parameter is within the specified range?	2-253 counts	Go to Diagnostic Aids	Go to Step 3
3	- Turn OFF the ignition. - Disconnect the inside air temperature sensor. - Turn ON the ignition, with the engine OFF. - With a scan tool, observe the Inside Air Temp parameter. Does the scan tool indicate that the Inside Air Temp parameter is greater than the specified value?	253 counts	Go to Step 4	Go to Step 5
4	- Turn OFF the ignition. - Connect a 3-amp fused jumper wire between the signal circuit of the inside air temperature sensor and the low reference circuit of the inside air temperature sensor. - Turn ON the ignition, with the engine OFF. - With a scan tool, observe the Inside Air Temp parameter. Does the scan tool indicate that the Inside Air Temp parameter is less than the specified value?	2 counts	Go to Step 9	Go to Step 6
5	Test the signal circuit of the inside air temperature sensor for a short to ground. Refer to Circuit Testing and Wiring	-		

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	Repairs in Wiring Systems. Did you find and correct the condition?		Go to Step 13	Go to Step 10
6	Test the signal circuit of the inside air temperature sensor for a short to voltage, a high resistance, or an open. Refer to Circuit Testing and Wiring Repairs in Wiring Systems. Did you find and correct the condition?	-	Go to Step 13	Go to Step 7
7	Test the low reference circuit of the inside air temperature sensor for a high resistance or an open. Refer to Circuit Testing and Wiring Repairs in Wiring Systems. Did you find and correct the condition?	-	Go to Step 13	Go to Step 8
8	Test the following signal circuits for a short to voltage: • Evaporator temperature sensor • Ambient air temperature sensor • Left sunload sensor • Right sunload sensor • Ambient light sensor Refer to Circuit Testing and Wiring Repairs in Wiring Systems. Did you find and correct the condition?	-	Go to Step 13	Go to Step 10
9	Inspect for poor connections at the harness connector of the inside air temperature sensor. Refer to Testing for Intermittent Conditions and Poor Connections and Connector Repairs in Wiring Systems. Did you find and correct the condition?	-	Go to Step 13	Go to Step 11
10	Inspect for poor connections at the harness connector of the HVAC control module. Refer to Testing for Intermittent Conditions and Poor	-		

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	Connections and Connector Repairs in Wiring Systems. Did you find and correct the condition?		Go to Step 13	Go to Step 12
11	Replace the inside air temperature sensor. Refer to <u>Inside Air Temperature Sensor Replacement</u> . Did you complete the replacement?	-	Go to Step 13	-
12	Replace the HVAC control module. Refer to <u>HVAC Control Module Replacement</u> . Did you complete the replacement?	-	Go to Step 13	-
13	1. Use the scan tool in order to clear the DTCs. 2. Operate the vehicle within the Conditions for Running the DTC as specified in the supporting text. Does the DTC reset?	-	Go to Step 2	System OK

DTC B0184 OR B0189

Circuit Description

- B0184 is for the left sunload sensor circuit.
- B0189 is for the right sunload sensor circuit.

The sunload sensor is a 2-wire photo diode. The vehicle uses left and right sunload sensors. The two sensors are integrated into the sunload sensor assembly along with the ambient light sensor. Low reference and signal circuits enable the sensor to operate. As the sunload increases, the sensor signal decreases. The sensor operates within an intensity range between completely dark and bright. The sensor signal varies between 0-5 volts. The HVAC control module converts the signal to a range between 0-255 counts. The sunload sensor provides the HVAC control module a measurement of the amount of light shining on the vehicle. Bright, or high intensity, light causes the vehicles inside temperature to increase. The HVAC system compensates for the increased temperature by diverting additional cool air into the vehicle.

Conditions for Running the DTC

The ignition is turned ON.

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Conditions for Setting the DTC

The HVAC control module detects the signal circuit is less than 0.09 volt (5 counts) or more than 4.90 volts (250 counts).

Action Taken When the DTC Sets

- If the DTC sets due to a low voltage condition, the HVAC control module will operate the system as if a minimum sunload condition exists.
- If the DTC sets due to a high voltage condition, the HVAC control module will operate the system as if a minimum sunload condition exists.

Conditions for Clearing the DTC

- The DTC will become history if the HVAC control module no longer detects a failure.
- The history DTC will clear after 50 fault free ignition cycles.
- The DTC can be cleared with a scan tool.

Test Description

The numbers below refer to the step numbers on the diagnostic table.

3: Tests for the proper operation of the circuit in the high voltage range.

4: Tests for the proper operation of the circuit in the low voltage range. If the fuse in the jumper opens when you perform this test, the signal circuit is shorted to voltage.

DTC B0184 or B0189

Step	Action	Values	Yes	No
Schematic Reference: <u>HVAC Schematics</u>				
Connector End View Reference: <u>HVAC Connector End Views</u>				
1	Did you perform the HVAC Diagnostic System Check?	-	Go to Step 2	Go to <u>Diagnostic System Check - HVAC Systems - Automatic</u>
	1. Install a scan tool. 2. Turn ON the ignition, with the engine OFF.			

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2	3. With a scan tool, observe the Driver or Passenger Solar Sensor parameter in the Climate Control Panel Open/Short Data list. Does the scan tool indicate that the Solar Sensor parameter is with in the specified range?	0.09-4.90 V	Go to <u>Testing for Intermittent Conditions and Poor Connections</u> in Wiring Systems	Go to Step 3
3	1. Turn OFF the ignition. 2. Disconnect the sunload sensor assembly. 3. Turn ON the ignition, with the engine OFF. 4. With a scan tool, observe the Driver or Passenger Solar Sensor parameter in the Climate Control Panel Open/Short Data list. Does the scan tool indicate that the Solar Sensor parameters are greater than the specified value?	4.90 V	Go to Step 4	Go to Step 5
4	1. Turn OFF the ignition. 2. Connect a 3-amp fused jumper wire between the driver or passenger signal circuit of the sunload sensor assembly and the low reference circuit of the sunload sensor assembly. 3. Turn ON the ignition, with the engine OFF. 4. With a scan tool, observe the Driver or Passenger Solar Sensor parameter in the Climate Control Panel Open/Short Data list. Does the scan tool indicate that the Solar Sensor parameter is less than the specified value?	0.09 V	Go to Step 9	Go to Step 6

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5	Test the driver or passenger signal circuit of the sunload sensor assembly for a short to ground. Refer to <u>Circuit Testing</u> and <u>Wiring Repairs</u> in Wiring Systems. Did you find and correct the condition?	-	Go to Step 13	Go to Step 10
6	Test the driver or passenger signal circuit of the sunload sensor assembly for a short to voltage, a high resistance, or an open. Refer to <u>Circuit Testing</u> and <u>Wiring Repairs</u> in Wiring Systems. Did you find and correct the condition?	-	Go to Step 13	Go to Step 7
7	Test the low reference circuit of the sunload sensor assembly for a high resistance or an open. Refer to <u>Circuit Testing</u> and <u>Wiring Repairs</u> in Wiring Systems. Did you find and correct the condition?	-	Go to Step 13	Go to Step 8
8	Test the following signal circuits for a short to voltage: • Evaporator temperature sensor • Ambient air temperature sensor • Inside air temperature sensor • Left or Right sunload sensor • Ambient light sensor Refer to <u>Circuit Testing</u> and <u>Wiring Repairs</u> in Wiring Systems. Did you find and correct the condition?	-	Go to Step 13	Go to Step 10
9	Inspect for poor connections at the harness connector of the sunload sensor assembly. Refer to <u>Testing for Intermittent Conditions and Poor Connections</u> and <u>Connector Repairs</u> in Wiring Systems. Did you find and correct the condition?	-	Go to Step 13	Go to Step 11
	Inspect for poor connections at the			

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10	harness connector of the HVAC control module. Refer to <u>Testing for Intermittent Conditions and Poor Connections</u> and <u>Connector Repairs</u> in Wiring Systems. Did you find and correct the condition?	-	Go to Step 13	Go to Step 12
11	Replace the sunload sensor assembly. Refer to <u>Sun Load Sensor Replacement</u> . Did you complete the replacement?	-	Go to Step 13	-
12	Replace the HVAC control module. Refer to <u>HVAC Control Module Replacement</u> . Did you complete the replacement?	-	Go to Step 13	-
13	1. Use the scan tool in order to clear the DTCs. 2. Operate the vehicle within the Conditions for Running the DTC as specified in the supporting text. Does the DTC reset?	-	Go to Step 2	System OK

DTC P0531, P0532, OR P0533

Circuit Description

The engine control module (ECM) monitors the high side refrigerant pressure via the air conditioning (A/C) refrigerant pressure sensor. The ECM applies a 5-volt reference and a low reference to the sensor. Changes in the A/C refrigerant pressure cause the A/C refrigerant pressure sensor signal to the ECM to vary. When the pressure is high the signal voltage is high. When the pressure is low the signal voltage is low. When pressure is high the ECM commands the cooling fans on. When pressure is too high or too low the ECM will not allow the A/C compressor clutch to engage. When the DTC is set, the ECM does not allow the A/C compressor clutch to engage. This is done to protect the compressor.

DTC Descriptors

This diagnostic procedure supports the following DTCs:

- DTC P0531 Air Conditioning (A/C) Refrigerant Pressure Sensor Circuit

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- DTC P0532 Air Conditioning (A/C) Refrigerant Pressure Sensor Circuit Low Voltage
- DTC P0533 Air Conditioning (A/C) Refrigerant Pressure Sensor Circuit High Voltage

Conditions for Running the DTC

- The engine is running.
- The A/C is requested.

Conditions for Setting the DTC

P0531

The A/C refrigerant pressure sensor signal voltage is less than 0.2 volt or more than 4.88 volts for more than 3 seconds.

P0532

The A/C refrigerant pressure sensor signal voltage is less than 0.2 volt for more than 3 seconds.

P0533

The A/C refrigerant pressure sensor signal voltage is more than 4.88 volts for more than 3 seconds.

Action Taken When the DTC Sets

- The ECM stores the DTC information into memory when the diagnostic runs and fails.
- The malfunction indicator lamp (MIL) will not illuminate.
- The ECM disables the A/C compressor clutch.
- The ECM records the operating conditions at the time the diagnostic fails. The ECM stores this information in the Failure Records.
- The ECM will report a value of 0 kPa to the HVAC control module.
- The driver information center will display SERVICE A/C SYSTEM.
- The A/C OFF segment will illuminate on the HVAC control module.

Conditions for Clearing the DTC

- A history DTC will clear after 40 consecutive warm-up cycles, if no failures are reported by this or any other non-emission related diagnostic.
- The current DTC will clear when the diagnostic runs and does not fail.
- Use a scan tool in order to clear the diagnostic trouble code.

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Diagnostic Aids

IMPORTANT: Be sure to verify that the ECM engine grounds are secure and clean.

If DTC P0532 or P0533 cannot be duplicated, reviewing the Failure Records vehicle mileage since the diagnostic test last failed may help determine how often the condition that caused the DTC to set occurs. This may assist in diagnosing the condition.

If the condition is not present, refer to **Testing for Intermittent Conditions and Poor Connections** in Wiring Systems.

Test Description

The numbers below refer to the step numbers on the diagnostic table.

- 3:** Tests for the proper operation of the circuit in the low voltage range.
- 4:** Tests for the proper operation of the circuit in the high voltage range. If the fuse in the jumper opens when you perform this test, the signal circuit is shorted to ground.
- 5:** Tests for a short to voltage in the 5-volt reference circuit.

DTC P0531, P0532, or P0533

Step	Action	Values	Yes	No
Schematic Reference: <u>HVAC Schematics</u> Connector End View Reference: <u>HVAC Connector End Views</u>				
1	Did you perform the HVAC Diagnostic System Check?	-	Go to Step 2	Go to <u>Diagnostic System Check - HVAC Systems - Automatic</u> in HVAC Systems - Automatic
	1. Install a scan tool. 2. Turn ON the ignition, with the engine OFF. 3. With a scan tool, observe the Air			

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2	Conditioning (A/C) High Side Pressure parameter in the Powertrain Engine Data 2 list. Does the scan tool indicate that the A/C High Side Pressure parameter is within the specified range?	0.2-4.88 V	Go to Diagnostic Aids	Go to Step 3
3	1. Turn OFF the ignition. 2. Disconnect the A/C refrigerant pressure sensor. 3. Turn ON the ignition, with the engine OFF. 4. With a scan tool, observe the A/C High Side Pressure parameter in the Powertrain Engine Data 2 list. Does the scan tool indicate that the A/C High Side Pressure parameter is less than the specified value?	0.2 V	Go to Step 4	Go to Step 10
4	1. Turn OFF the ignition. 2. Connect a 3-amp fused jumper wire between the 5-volt reference circuit and the A/C refrigerant pressure sensor signal circuit of the A/C refrigerant pressure sensor. 3. Turn ON the ignition, with the engine OFF. 4. With a scan tool, observe the A/C High Side Pressure parameter in the Powertrain Engine Data 2 list. Does the scan tool indicate that the A/C High Side Pressure parameter is greater than the specified value?	4.88 V	Go to Step 5	Go to Step 8
	1. Disconnect the fused jumper wire. 2. Measure the voltage between the 5-volt reference circuit and the low			

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5	reference circuit of the A/C refrigerant pressure sensor. Does the voltage measure less than the specified value?	5.5 V	Go to Step 6	Go to Step 7
6	Does the voltage measure near the specified value?	5 V	Go to Step 12	Go to Step 11
7	Test the 5-volt reference circuit of the A/C refrigerant pressure sensor for short to voltage. Refer to <u>Circuit Testing</u> and <u>Wiring Repairs</u> in Wiring Systems. Did you find and correct the condition?	-	Go to Step 16	Go to Step 13
8	Test the 5-volt reference circuit of the A/C refrigerant pressure sensor for the following: • A short to ground • A high resistance • An open Refer to <u>Circuit Testing</u> and <u>Wiring Repairs</u> in Wiring Systems. Did you find and correct the condition?	-	Go to Step 16	Go to Step 9
9	Test the signal circuit of the A/C refrigerant pressure sensor for the following: • A short to ground • A high resistance • An open Refer to <u>Circuit Testing</u> and <u>Wiring Repairs</u> in Wiring Systems. Did you find and correct the condition?	-	Go to Step 16	Go to Step 13
	Test the signal circuit of the A/C refrigerant pressure sensor for a short to			

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10	voltage. Refer to <u>Circuit Testing</u> and <u>Wiring Repairs</u> in Wiring Systems. Did you find and correct the condition?	-	Go to Step 16	Go to Step 13
11	Test the low reference circuit of the A/C refrigerant pressure sensor for a high resistance or an open. Refer to <u>Circuit Testing</u> and <u>Wiring Repairs</u> in Wiring Systems. Did you find and correct the condition?	-	Go to Step 16	Go to Step 13
12	Inspect for poor connections at the harness connector of the A/C refrigerant pressure sensor. Refer to <u>Testing for Intermittent Conditions and Poor Connections</u> and <u>Connector Repairs</u> in Wiring Systems. Did you find and correct the condition?	-	Go to Step 16	Go to Step 14
13	Inspect for poor connections at the harness connector of the ECM. Refer to <u>Testing for Intermittent Conditions and Poor Connections</u> and <u>Connector Repairs</u> in Wiring Systems. Did you find and correct the condition?	-	Go to Step 16	Go to Step 15
14	Replace the A/C refrigerant pressure sensor. Refer to <u>Air Conditioning (A/C) Refrigerant Pressure Sensor Replacement</u> in Heating, Ventilation and Air Conditioning. Did you complete the replacement?	-	Go to Step 16	-
15	Replace the ECM. Refer to <u>Engine Control Module (ECM) Replacement</u> in Engine Controls - 3.6L (LY7) and <u>Engine Control Module (ECM) Replacement</u> in Engine Controls - 4.6L (LH2). Did you complete the replacement?	-	Go to Step 16	-
16	1. Use the scan tool in order to clear the DTCs. 2. Operate the vehicle within the Conditions for Running the DTC as	-		

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specified in the supporting text.

Does the DTC reset?

Go to **Step 2**

System OK

DTC P0645, P0646, OR P0647

Circuit Description

Ignition voltage is supplied directly to the A/C compressor clutch relay. The engine control module (ECM) controls the relay by grounding the A/C clutch relay control circuit via an internal solid state device called a driver. The primary function of the driver is to supply the ground for the component being controlled. The driver has a fault line which is monitored by the ECM. When the ECM is commanding a component ON, the voltage of the control circuit should be near 0 volts. When the ECM is commanding the control circuit to a component OFF, the voltage potential of the circuit should be near battery voltage. If the fault detection circuit senses a voltage other than what is expected, this DTC will set.

The ECM will monitor the control circuit for the following:

- A short to ground
- A short to voltage
- An open circuit
- An open relay coil
- An internally shorted or excessively low resistance relay coil

When the ECM detects any of the above malfunctions, this DTC is set and the affected driver is disabled.

Conditions for Running the DTC

- The ignition voltage is between 9.0-18.0 volts.
- The engine speed is more than 80 RPM.
- The ECM driver transitions from ON to OFF or from OFF to ON.

Conditions for Setting the DTC

P0645

The ECM detects an open on the control circuit of the A/C compressor clutch relay.

P0646

The ECM detects a short to ground on the control circuit of the A/C compressor clutch relay.

P0647

The ECM detects a short to voltage on the control circuit of the A/C compressor clutch relay.

Action Taken When the DTC Sets

- The ECM will not illuminate the malfunction indicator lamp (MIL).
- The ECM will store conditions which were present when the DTC set as Failure Records data only. This information will not be stored as Freeze Frame data.

Conditions for Clearing the DTC

- A History DTC clears after forty consecutive warm-up cycles have occurred without a malfunction.
- The DTC can be cleared by using a scan tool.

Diagnostic Aids

IMPORTANT: Be sure to verify that the ECM engine grounds are secure and clean.

If DTC P0645,P0646,P0647 cannot be duplicated, reviewing the Failure Records vehicle millage since the diagnostic test last failed may help determine how often the condition that caused the DTC to set occurs. This may assist in diagnosing the condition.

If the condition is not present, refer to **Testing for Intermittent Conditions and Poor Connections** in Wiring Systems.

Test Description

The numbers below refer to the step numbers on the diagnostic table.

- 2:** Listen for an audible click when the A/C compressor clutch relay operates. Command both the ON and OFF states. Repeat the commands as necessary.
- 3:** Tests for voltage at the coil side of the A/C compressor clutch relay. The 10-amp fuse supplies power to the coil side of the A/C compressor clutch relay.
- 4:** Verifies that the engine control module is providing ground to the A/C compressor clutch

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relay. If light always on circuit shorted to ground.

8: Tests for a short to voltage or an open.

10: If the A/C fuse is open ensure to test the A/C compressor clutch supply voltage circuit for short to ground.

DTC P0645, P0646, or P0647

Step	Action	Yes	No
Schematic Reference: <u>HVAC Schematics</u> Connector End View Reference: <u>HVAC Connector End Views</u>			
1	Did you perform the Vehicle Diagnostic System Check?	Go to Step 2	Go to <u>Diagnostic System Check - HVAC Systems - Automatic</u>
2	1. Install a scan tool. 2. Turn ON the ignition, with the engine OFF. 3. With a scan tool, command the A/C Relay ON and OFF in the ECM Special Functions, Engine Output Controls list. Does the A/C Relay turn ON and OFF with each command?	Go to <u>Testing for Intermittent Conditions and Poor Connections</u> in Wiring Systems	Go to Step 3
3	1. Turn OFF the ignition. 2. Disconnect the A/C compressor clutch relay. 3. Turn ON the ignition, with the engine OFF. 4. Probe the battery positive voltage circuit of the A/C compressor clutch relay with a test lamp that is connected to a good ground. Does the test lamp illuminate?	Go to Step 4	Go to Step 8
	1. Connect a test lamp between the control circuit of the A/C compressor clutch relay and the battery positive voltage circuit of the A/C compressor clutch relay.		

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4	2. Start the engine. 3. With a scan tool, command the A/C Relay ON and OFF. Does the test lamp turn ON and OFF with each command?	Go to Step 6	Go to Step 5
5	Test the control circuit of the A/C compressor clutch relay for a short to ground, short to voltage or an open. Refer to <u>Circuit Testing</u> and <u>Wiring Repairs</u> in Wiring Systems. Did you find and correct the condition?	Go to Step 11	Go to Step 7
6	Inspect for poor connections at the A/C compressor clutch relay. Refer to <u>Testing for Intermittent Conditions and Poor Connections</u> and <u>Connector Repairs</u> in Wiring Systems. Did you find and correct the condition?	Go to Step 11	Go to Step 9
7	Inspect for poor connections at the harness connector of the engine control module. Refer to <u>Testing for Intermittent Conditions and Poor Connections</u> and <u>Connector Repairs</u> in Wiring Systems. Did you find and correct the condition?	Go to Step 11	Go to Step 10
8	Repair the battery positive voltage circuit of the A/C compressor clutch relay. Refer to <u>Wiring Repairs</u> in Wiring Systems. Did you complete the repair?	Go to Step 11	-
9	Replace the A/C compressor clutch relay. Did you complete the replacement?	Go to Step 11	-
10	IMPORTANT: Perform the recalibration procedure for the engine control module (ECM). Replace the ECM. Refer to <u>Engine Control Module (ECM) Replacement</u> in Engine Controls - 3.6L (LY7) or <u>Engine Control Module (ECM) Replacement</u> in Engine Controls - 4.6L (LH2). Did you complete the		

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	replacement?	Go to Step 11	-
11	1. Use the scan tool in order to clear the DTCs. 2. Operate the vehicle within the Conditions for Running the DTC as specified in the supporting text.		
	Does the DTC reset?	Go to Step 2	System OK

DTC P1531

Circuit Description

The HVAC control module monitors the evaporator temperature via the evaporator temperature sensor. When the air is cold, the sensor resistance and signal voltage are high. When the air is warm, the sensor resistance and signal voltage are low.

Conditions for Running the DTC

The ignition is turned ON.

Conditions for Setting the DTC

The HVAC control module detects the evaporator temperature sensor signal circuit is less than 0.09 volt (5 counts) or greater than 4.90 volts (250 counts).

Action Taken When the DTC Sets

- The driver information center will display SERVICE A/C SYSTEM.
- The A/C OFF segment will illuminate on the HVAC control module.
- The A/C compressor will be disabled.

Conditions for Clearing the DTC

- The DTC will become history if the HVAC control module no longer detects a failure.
- The history DTC will clear after 50 fault free ignition cycles.
- The DTC can be cleared with a scan tool.

Test Description

The numbers below refer to the step numbers on the diagnostic table.

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3: Tests for the proper operation of the circuit in the high voltage range.

4: Tests for the proper operation of the circuit in the low voltage range. If the fuse in the jumper opens upon performing this test, the signal circuit has a short to voltage.

DTC P1531

Step	Action	Values	Yes	No
Schematic Reference: <u>HVAC Schematics</u> Connector End View Reference: <u>HVAC Connector End Views</u>				
1	Did you perform the HVAC Diagnostic System Check?	-	Go to Step 2	Go to <u>Diagnostic System Check - HVAC Systems - Automatic</u>
2	1. Install a scan tool. 2. Turn ON the ignition, with the engine OFF. 3. With a scan tool, observe the Evaporator Temp parameter in the Climate Control Panel, Open/Short data list. Does the scan tool indicate that the Evaporator temp parameter is within the specified range?	0.09-4.90 V	Go to <u>Testing for Intermittent Conditions and Poor Connections</u> in Wiring Systems	Go to Step 3
3	1. Turn OFF the ignition. 2. Disconnect the evaporator temperature sensor. 3. Turn ON the ignition, with the engine OFF. 4. With a scan tool, observe the Evaporator Temp parameter. Is the Evaporator Temp parameter greater than the specified value?	4.90 V	Go to Step 4	Go to Step 5
	1. Turn OFF the ignition.			

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4	2. Connect a 3-ampere fused jumper wire between the signal circuit of the evaporator temperature sensor and the low reference circuit of the evaporator temperature sensor. 3. Turn ON the ignition, with the engine OFF. 4. With a scan tool, observe the Evaporator Temp parameter. Is the Evaporator Temp parameter less than the specified value?	0.09 V		Go to Step 9	Go to Step 6
5	Test the signal circuit of the evaporator temperature sensor for a short to ground. Refer to <u>Circuit Testing</u> and <u>Wiring Repairs</u> in Wiring Systems. Did you find and correct the condition?	-		Go to Step 13	Go to Step 10
6	Test the signal circuit of the evaporator temperature sensor for one of the following conditions: • A short to voltage • A high resistance • An open Refer to <u>Circuit Testing</u> and <u>Wiring Repairs</u> in Wiring Systems. Did you find and correct the condition?	-		Go to Step 13	Go to Step 7
7	Test the low reference circuit of the evaporator temperature sensor for one of the following conditions: • A high resistance • An open Refer to <u>Circuit Testing</u> and <u>Wiring</u>	-			

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	<u>Repairs</u> in Wiring Systems. Did you find and correct the condition?		Go to Step 13	Go to Step 8
8	Test the following signal circuits for a short to voltage: • Inside air temperature sensor • Ambient air temperature sensor • Left sunload sensor • Right sunload sensor • Ambient light sensor Refer to <u>Circuit Testing</u> and <u>Wiring Repairs</u> in Wiring Systems. Did you find and correct the condition?	-	Go to Step 13	Go to Step 10
9	Inspect for poor connections at the harness connector of the evaporator temperature sensor. Refer to <u>Testing for Intermittent Conditions and Poor Connections</u> and <u>Connector Repairs</u> in Wiring Systems. Did you find and correct the condition?	-	Go to Step 13	Go to Step 11
10	Inspect for poor connections at the harness connector of the HVAC control module. Refer to <u>Testing for Intermittent Conditions and Poor Connections</u> and <u>Connector Repairs</u> in Wiring Systems. Did you find and correct the condition?	-	Go to Step 13	Go to Step 12
11	Replace the evaporator temperature sensor. Refer to <u>Evaporator Core Replacement</u> . Did you complete the replacement?	-	Go to Step 13	-
12	Replace the HVAC control module. Refer to <u>HVAC Control Module Replacement</u> . Did you complete the replacement?	-	Go to Step 13	-
	1. Use the scan tool in order to clear			

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13	the DTCs.	-		
	2. Operate the vehicle within the Conditions for Running the DTC.			
	Does the DTC reset?		Go to Step 2	System OK

SYMPTOMS - HVAC SYSTEMS - AUTOMATIC

IMPORTANT: The following steps must be completed before using the symptom tables.

1. Perform the **Diagnostic System Check - HVAC Systems - Automatic** before using the Symptom Tables in order to verify that all of the following are true:
 - There are no DTCs set.
 - The control modules can communicate via the serial data link.
2. Review the system operation in order to familiarize yourself with the system functions. Refer to the following information:
 - **Air Delivery Description and Operation**
 - **Air Temperature Description and Operation**

Visual/Physical Inspection

- Inspect for aftermarket devices which could affect the operation of the HVAC System. Refer to **Checking Aftermarket Accessories** in Wiring Systems.
- Inspect the easily accessible or visible system components for obvious damage or conditions which could cause the symptom.
- Verify the A/C compressor clutch turns freely and is not seized.
- Verify that the customer is using the correct key to enable personalization and is not inadvertently activating auxiliary HVAC controls.
- The A/C compressor will not operate in cold outside air temperatures. Refer to **Air Temperature Description and Operation**.
- The following conditions may cause window fogging:
 - Wet carpet or mats
 - High humidity
 - Interior water leak
 - Blocked A/C evaporator drain tube

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- Maximum passenger capacity
- Blocked body pressure relief valves
- Inspect the air distribution system for causes of reduced air flow:
 - Obstructed or dirty passenger compartment air filter, if equipped
 - Blocked or damaged air inlet or outlet vents

Intermittent

Faulty electrical connections or wiring may be the cause of intermittent conditions. Refer to **Testing for Intermittent Conditions and Poor Connections** in Wiring Systems.

Symptom List

Refer to a symptom diagnostic procedure from the following list in order to diagnose the symptom:

- **HVAC Compressor Clutch Does Not Engage**
- **HVAC Compressor Clutch Does Not Disengage**
- **Blower Motor Always On**
- **Blower Motor Inoperative**
- **Blower Motor Malfunction**
- **Too Hot in Vehicle**
- **Too Cold in Vehicle**
- **Air Delivery Improper**
- **Air Recirculation Malfunction**
- **Leak Testing** in Heating, Ventilation and Air Conditioning
- **Noise Diagnosis - Blower Motor** in Heating, Ventilation and Air Conditioning
- **Noise Diagnosis - Air Conditioning (A/C) System** in Heating, Ventilation and Air Conditioning
- **Odor Diagnosis** in Heating, Ventilation and Air Conditioning
- **Steering Wheel Controls Inoperative** in Entertainment

HVAC COMPRESSOR CLUTCH DOES NOT ENGAGE

HVAC Compressor Clutch Does Not Engage

Step	Action	Value(s)	Yes	No

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Schematic Reference: HVAC Schematics

Connector End View Reference: HVAC Connector End Views

DEFINITION: The A/C compressor clutch will not engage when an A/C request has been made and a Powertrain DTC has not been set.

1	Did you perform the Diagnostic System Check - Vehicle?	-	Go to Step 2	Go to <u>Diagnostic System Check - HVAC Systems - Automatic</u>
2	1. Start the engine. 2. Place the blower motor switch in the maximum speed position. 3. Ensure the A/C OFF switch is not selected. 4. Place the left air temperature switch in the coldest position. Does the A/C compressor operate?	-	Go to <u>Testing for Intermittent Conditions and Poor Connections</u> in Wiring Systems	Go to Step 3
3	1. Start the engine. 2. Observe the coolant temperature indicator. Is the engine coolant temperature indicator illuminated?	-	Go to <u>Diagnostic System Check - Engine Cooling</u> in Engine Cooling	Go to Step 4
4	1. Turn OFF the ignition. 2. Install the ACR 2000. 3. Record the ambient temperature at the vehicle. 4. Record readings of the low and high side STATIC pressures. 5. Compare the low and the high side pressure values with the allowable limits for the recorded ambient air	Above 16° C (60° F) 345 kPa (50 psi) Above 24° C (75° F) 483 kPa (70 psi)		

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	temperature. Are the low and the high side pressure values within the allowable limits for the recorded ambient air temperature and are the pressure values within 103 kPa (15 psi) of each other?	Above 33° C (90° F) 690 kPa (100 psi)	Go to Step 5	Go to Leak Testing in Heating, Ventilation and Air Conditioning
5	1. Install a scan tool. 2. Turn ON the ignition, with the engine OFF. 3. With a scan tool observe the A/C refrigerant pressure sensor in the engine control module (ECM) data list. 4. Compare the A/C refrigerant pressure sensor parameter on the scan tool with the ACR 2000 high side pressure value. Is the scan tool A/C refrigerant pressure sensor parameter and the ACR 2000 pressure value within 15 psi of each other?	-	Go to Step 6	Go to Step 13
6	With a scan tool, view the evaporator temperature in the HVAC system data. Is the evaporator temperature below 4° C (39F°)?	-	Go to Step 16	Go to Step 7
7	1. Turn OFF the ignition. 2. Disconnect the A/C compressor clutch. 3. Turn ON the ignition, with the engine OFF. 4. Probe the supply voltage circuit of the A/C compressor clutch with a test lamp that is connected to ground. 5. With a scan tool, command the A/C	-		

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	compressor clutch relay ON.			
	Does the test lamp illuminate?		Go to Step 8	Go to Step 9
8	Test the ground circuit of the A/C compressor clutch for a high resistance or for an open. Refer to <u>Circuit Testing</u> and to <u>Wiring Repairs</u> in Wiring Systems. Did you find and correct the condition?	-	Go to Step 25	Go to Step 12
9	Test the voltage supply circuit of the A/C compressor clutch for a high resistance or for an open. Refer to <u>Circuit Testing</u> and to <u>Wiring Repairs</u> in Wiring Systems. Did you find and correct the condition?	-	Go to Step 25	Go to Step 10
10	1. Turn OFF the ignition. 2. Disconnect the A/C compressor clutch relay. 3. Turn ON the ignition, with the engine OFF. 4. Probe the battery positive voltage circuit of the A/C compressor clutch relay with a test lamp that is connected to ground. Does the test lamp illuminate?	-	Go to Step 11	Go to Step 21
11	Inspect for poor connections at the A/C compressor clutch relay. Refer to <u>Testing for Intermittent Conditions and Poor Connections</u> and to <u>Connector Repairs</u> in Wiring Systems. Did you find and correct the condition?	-	Go to Step 25	Go to Step 22
12	Inspect for poor connections at the harness connector of the A/C compressor clutch. Refer to <u>Testing for Intermittent Conditions and Poor Connections</u> and to <u>Connector Repairs</u> in Wiring Systems.	-		

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	Did you find and correct the condition?		Go to Step 25	Go to Step 23
13	1. Disconnect the A/C pressure sensor. 2. With a test lamp connected to battery voltage, probe the ground circuit at the A/C pressure sensor connector. Does the test lamp illuminate?	-	Go to Step 17	Go to Step 14
14	Test the ground circuit of the A/C refrigerant pressure sensor for a high resistance or for an open. Refer to <u>Circuit Testing</u> and to <u>Wiring Repairs</u> in Wiring Systems. Did you find and correct the condition?	-	Go to Step 25	Go to Step 15
15	Inspect for poor connections at the harness connector of the HVAC control module. Refer to <u>Testing for Intermittent Conditions and Poor Connections</u> and to <u>Connector Repairs</u> in Wiring Systems. Did you find and correct the condition?	-	Go to Step 25	Go to Step 24
16	Inspect the evaporator temperature sensor circuits for high resistance. Refer to <u>Circuit Testing</u> and to <u>Wiring Repairs</u> in Wiring Systems. Did you find and correct the condition?	-	Go to Step 25	Go to Step 19
17	Inspect for poor connections at the harness connector of the A/C pressure sensor. Refer to <u>Testing for Intermittent Conditions and Poor Connections</u> and to <u>Connector Repairs</u> in Wiring Systems. Did you find and correct the condition?	-	Go to Step 25	Go to Step 18
18	Replace the A/C refrigerant pressure sensor. Refer to <u>Air Conditioning (A/C) Refrigerant Pressure Sensor Replacement</u> in Heating, Ventilation and Air Conditioning.	-		

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	Did you complete the replacement?		Go to Step 25	-
19	Inspect for poor connections at the harness connector of the evaporator temperature sensor. Refer to <u>Testing for Intermittent Conditions and Poor Connections</u> and to <u>Connector Repairs</u> in Wiring Systems. Did you find and correct the condition?	-	Go to Step 25	Go to Step 20
20	Replace the evaporator temperature sensor. Refer to <u>Evaporator Core Replacement</u> in Heating, Ventilation and Air Conditioning. Did you complete the replacement?	-	Go to Step 25	-
21	Repair the battery positive voltage circuit of the A/C compressor clutch relay. Refer to <u>Wiring Repairs</u> in Wiring Systems. Did you complete the repair?	-	Go to Step 25	-
22	Replace the A/C compressor clutch relay. Did you complete the replacement?	-	Go to Step 25	-
23	Replace the A/C compressor clutch. Refer to <u>Compressor Replacement (LH2 - Standard Cooling)</u> or <u>Compressor Replacement (LH2 - Heavy Duty Cooling)</u> or <u>Compressor Replacement (LY7)</u> in Heating, Ventilation and Air Conditioning. Did you complete the replacement?	-	Go to Step 25	-
24	Replace the HVAC control module. Refer to <u>HVAC Control Module Replacement</u> . Did you complete the replacement?	-	Go to Step 25	-
25	Operate the system in order to verify the repair. Did you correct the condition?	-	System OK	Go to Step 2

HVAC COMPRESSOR CLUTCH DOES NOT DISENGAGE

HVAC Compressor Clutch Does Not Disengage

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Step	Action	Yes	No
Schematic Reference: <u>HVAC Schematics</u> Connector End View Reference: <u>HVAC Connector End Views</u> DEFINITION: The A/C compressor clutch will not disengage when an A/C request has not been made and a Powertrain DTC has not been set.			
1	Did you perform the HVAC Diagnostic System Check?	Go to Step 2	Go to <u>Diagnostic System Check - HVAC Systems - Automatic</u>
2	1. Start the engine. 2. Place the A/C request switch in the OFF position. Is the A/C compressor clutch still engaged?	Go to Step 3	Go to <u>Testing for Intermittent Conditions and Poor Connections</u> in Wiring Systems
3	1. Turn OFF the ignition. 2. Disconnect the A/C compressor clutch. 3. Turn On the ignition, with the engine OFF. 4. Probe the supply voltage circuit of the A/C compressor clutch with a test lamp that is connected to ground. Does the test lamp illuminate?	Go to Step 4	Go to Step 6
4	Test the supply voltage circuit of the A/C compressor clutch for a short to voltage. Refer to <u>Circuit Testing</u> and to <u>Wiring Repairs</u> in Wiring Systems. Did you find and correct the condition?	Go to Step 9	Go to Step 5
5	Inspect for poor connections at the A/C compressor clutch relay. Refer to <u>Testing for Intermittent Conditions and Poor Connections</u> and to <u>Connector Repairs</u> in Wiring Systems. Did you find and correct the condition?	Go to Step 9	Go to Step 7
	Inspect for poor connections at the harness connector of the A/C compressor clutch. Refer to <u>Testing for Intermittent Conditions and</u>		

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6	Poor Connections and to Connector Repairs in Wiring Systems. Did you find and correct the condition?	Go to Step 9	Go to Step 8
7	Replace the A/C compressor clutch relay. Refer to Compressor Relay Replacement in Heating, Ventilation, and Air Conditioning. Did you complete the replacement?	Go to Step 9	-
8	Replace the A/C compressor. Refer to Compressor Replacement (LH2 - Standard Cooling) or Compressor Replacement (LH2 - Heavy Duty Cooling) or Compressor Replacement (LY7) in Heating, Ventilation, and Air Conditioning. Did you complete the replacement?	Go to Step 9	-
9	Operate the system in order to verify the repair. Did you correct the condition?	System OK	Go to Step 3

BLOWER MOTOR ALWAYS ON

Blower Motor Always On

Step	Action	Yes	No
Schematic Reference: <u>HVAC Schematics</u> Connector End View Reference: <u>HVAC Connector End Views</u> DEFINITION: The blower motor operates with the HVAC controls in the OFF position or the blower motor operates at high speed only.			
1	Did you perform the HVAC Diagnostic System Check?	Go to Step 2	Go to Diagnostic System Check - HVAC Systems - Automatic
2	1. Turn ON the ignition, with the engine OFF. 2. Turn OFF the HVAC control module. Is the blower motor OFF?	Go to Step 3	Go to Step 8
3	1. Turn ON the HVAC control module. 2. Operate the blower motor switch from minimum to maximum.		Go to Blower

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	Does the blower motor only operate at high speed?	Go to Step 4	<u>Motor Malfunction</u>
4	1. Turn OFF the ignition. 2. Unplug the blower control processor. 3. Turn ON the ignition. 4. Turn ON the HVAC control module. 5. With a test lamp connected to battery positive probe the blower motor speed control circuit. 6. Operate the blower switch from minimum to maximum. Does the test lamp intensity change?	Go to Step 6	Go to Step 5
5	Test the blower motor speed control circuit for a short to ground. Refer to <u>Circuit Testing</u> and <u>Wiring Repairs</u> in Wiring Systems. Did you find and correct the condition?	Go to Step 11	Go to Step 8
6	Test the blower motor fan control circuit for a short to ground. Refer to <u>Circuit Testing</u> and <u>Wiring Repairs</u> in Wiring Systems. Did you find and correct the condition?	Go to Step 11	Go to Step 7
7	Inspect for poor connections at the harness connector of the blower motor control processor. Refer to <u>Testing for Intermittent Conditions and Poor Connections</u> and <u>Connector Repairs</u> in Wiring Systems. Did you find and correct the condition?	Go to Step 11	Go to Step 9
8	Inspect for poor connections at the harness connector of the HVAC control module. Refer to <u>Testing for Intermittent Conditions and Poor Connections</u> and <u>Connector Repairs</u> in Wiring Systems. Did you find and correct the condition?	Go to Step 11	Go to Step 10
9	Replace the blower motor control processor. Refer to <u>Blower Motor Control Processor Replacement</u>. Did you complete the replacement?	Go to Step 11	-

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10	Replace the HVAC control module. Refer to <u>Blower Motor Control Processor Replacement</u> . Did you complete the replacement?	Go to Step 11	-
11	Operate the system in order to verify the repair. Did you correct the condition?	System OK	Go to Step 2

BLOWER MOTOR INOPERATIVE

Blower Motor Inoperative

Step	Action	Yes	No
Schematic Reference: <u>HVAC Schematics</u> Connector End View Reference: <u>HVAC Connector End Views</u> DEFINITION: The blower motor is inoperative in all speed positions.			
1	Did you perform the HVAC Diagnostic System Check?	Go to Step 2	Go to <u>Diagnostic System Check - HVAC Systems - Automatic</u>
2	1. Turn ON the ignition, with the engine OFF. 2. Place the blower motor switch in each speed position. Does the blower motor operate in any of the speed positions?	Go to <u>Blower Motor Malfunction</u>	Go to Step 3
3	1. Turn OFF the ignition. 2. Disconnect the blower motor connector. 3. Turn ON the ignition, with the engine OFF. 4. Turn ON the HVAC control module. 5. Connect a test lamp between the blower motor supply voltage circuit and the blower motor fan control circuit. 6. Place the blower motor switch in the maximum speed position. Does the test lamp illuminate?	Go to Step 14	Go to Step 4

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4	Probe the supply voltage circuit of the blower motor with a test lamp that is connected to a good ground. Does the test lamp illuminate?	Go to Step 9	Go to Step 5
5	1. Turn OFF the ignition. 2. Remove the blower motor relay. 3. Test the battery positive voltage circuit on the switch side and the coil side of the relay connector with a test lamp connected to ground. Does the test lamp illuminate?	Go to Step 6	Go to Step 17
6	1. Turn ON the ignition with the engine OFF. 2. Turn ON the HVAC control module. 3. Probe the blower motor relay control circuit with a test lamp that is connected to voltage. Does the test lamp illuminate?	Go to Step 7	Go to Step 8
7	Test the blower motor supply voltage circuit for an open, short to ground or high resistance. Refer to <u>Circuit Testing</u> and <u>Wiring Repairs</u> in Wiring Systems. Did you find and correct the condition?	Go to Step 22	Go to Step 13
8	Test the blower motor relay control circuit for an open, short to voltage or high resistance. Refer to <u>Circuit Testing</u> and <u>Wiring Repairs</u> in Wiring Systems. Did you find and correct the condition?	Go to Step 22	Go to Step 16
9	1. Turn OFF the ignition. 2. Disconnect the blower motor control processor. 3. Turn ON the ignition. 4. Place the blower switch on high speed. 5. Probe the blower motor speed control circuit with a test lamp connected to		

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	battery voltage.		
	Does the test lamp illuminate?	Go to Step 11	Go to Step 10
10	Test the blower motor speed control circuit for an open, short to ground, short to voltage or high resistance. Refer to <u>Circuit Testing</u> and <u>Wiring Repairs</u> in Wiring Systems. Did you find and correct the condition?	Go to Step 22	Go to Step 16
11	Test the ground circuit of the blower motor control processor for an open or high resistance. Refer to <u>Circuit Testing</u> and <u>Wiring Repairs</u> in Wiring Systems. Did you find and correct the condition?	Go to Step 22	Go to Step 12
12	Test the ground circuit between the blower motor and the blower motor control processor for an open, short to voltage or high resistance. Refer to <u>Circuit Testing</u> and <u>Wiring Repairs</u> in Wiring Systems. Did you find and correct the condition?	Go to Step 22	Go to Step 15
13	Inspect for poor connections at the harness connector of the blower motor relay. Refer to <u>Testing for Intermittent Conditions and Poor Connections</u> and <u>Connector Repairs</u> in Wiring Systems. Did you find and correct the condition?	Go to Step 22	Go to Step 18
14	Inspect for poor connections at the harness connector of the blower motor. Refer to <u>Testing for Intermittent Conditions and Poor Connections</u> and <u>Connector Repairs</u> in Wiring Systems. Did you find and correct the condition?	Go to Step 22	Go to Step 19
15	Inspect for poor connections at the harness connector of the blower motor control processor. Refer to <u>Testing for Intermittent Conditions and Poor Connections</u> and <u>Connector Repairs</u> in Wiring Systems. Did you find and correct the condition?	Go to Step 22	Go to Step 20
	Inspect for poor connections at the harness connector of the HVAC control module. Refer		

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16	to <u>Testing for Intermittent Conditions and Poor Connections</u> and <u>Connector Repairs</u> in Wiring Systems. Did you find and correct the condition?	Go to Step 22	Go to Step 21
17	Repair the battery positive voltage circuit of the blower motor relay. Refer to <u>Wiring Repairs</u> in Wiring Systems. Did you complete the repair?	Go to Step 22	-
18	Replace the blower motor relay. Did you complete the replacement?	Go to Step 22	-
19	Replace the blower motor. Refer to <u>Blower Motor Replacement</u> in Heating, Ventilation and Air Conditioning. Did you complete the replacement?	Go to Step 22	-
20	Replace the blower motor control processor. Refer to <u>Blower Motor Control Processor Replacement</u> . Did you complete the replacement?	Go to Step 22	-
21	Replace the HVAC control module. Refer to <u>HVAC Control Module Replacement</u> . Did you complete the replacement?	Go to Step 22	-
22	Operate the system in order to verify the repair. Did you correct the condition?	System OK	Go to Step 2

BLOWER MOTOR MALFUNCTION

Blower Motor Malfunction

Step	Action	Values	Yes	No
Schematic Reference: <u>HVAC Schematics</u> Connector End View Reference: <u>HVAC Connector End Views</u> DEFINITION: The blower motor operates in at least one speed position.				
1	Did you perform the HVAC Diagnostic System Check?	-	Go to Step 2	Go to <u>Diagnostic System Check - HVAC Systems - Automatic</u>

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2	1. Turn ON the ignition, with the engine OFF. 2. Place the blower motor switch in each speed position. Does the blower motor operate at the desired speeds?	-	Go to <u>Testing for Intermittent Conditions and Poor Connections</u> in Wiring Systems	Go to Step 3
3	1. Turn OFF the ignition. 2. Disconnect the blower motor. 3. Turn ON the ignition, with the engine OFF. 4. Connect a test lamp between the blower motor supply voltage circuit and the blower motor fan control circuit of the blower motor. 5. Place the blower motor switch from the minimum speed position to the maximum speed position. Does the test lamp illuminate and increase intensity?	-	Go to Step 9	Go to Step 4
4	1. Turn OFF the ignition. 2. Disconnect the blower motor control processor. 3. Turn ON the ignition, with the engine OFF. 4. With a test lamp connected to battery voltage, probe the blower motor speed control circuit at the blower motor control processor. 5. Place the blower motor switch from the minimum speed position to the maximum speed position. Does the test lamp illuminate and increase intensity?	-	Go to Step 6	Go to Step 5

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5	Test the blower motor speed control circuit of the HVAC control module for high resistance. Refer to <u>Circuit Testing</u> and <u>Wiring Repairs</u> in Wiring Systems. Did you find and correct the condition?	-	Go to Step 15	Go to Step 11
6	Test the battery positive voltage circuit of the blower motor control processor for a high resistance. Refer to <u>Circuit Testing</u> and <u>Wiring Repairs</u> in Wiring Systems. Did you find and correct the condition?	-	Go to Step 15	Go to Step 7
7	Test the ground circuit of the blower motor control processor for a high resistance. Refer to <u>Circuit Testing</u> and <u>Wiring Repairs</u> in Wiring Systems. Did you find and correct the condition?	-	Go to Step 15	Go to Step 8
8	Test the blower motor fan control circuit of the blower motor for a high resistance. Refer to <u>Circuit Testing</u> and <u>Wiring Repairs</u> in Wiring Systems. Did you find and correct the condition?	-	Go to Step 15	Go to Step 10
9	Inspect for poor connections at the harness connector of the blower motor. Refer to <u>Testing for Intermittent Conditions and Poor Connections</u> and <u>Connector Repairs</u> in Wiring Systems. Did you find and correct the condition?	-	Go to Step 15	Go to Step 12
10	Inspect for poor connections at the harness connector of the blower motor control processor. Refer to <u>Testing for Intermittent Conditions and Poor Connections</u> and <u>Connector Repairs</u> in Wiring Systems. Did you find and correct the condition?	-	Go to Step 15	Go to Step 13
11	Inspect for poor connections at the harness connector of the HVAC control module. Refer to <u>Testing for Intermittent Conditions and Poor Connections</u> and <u>Connector Repairs</u> in	-		

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	Wiring Systems. Did you find and correct the condition?		Go to Step 15	Go to Step 14
12	Replace the blower motor. Refer to <u>Blower Motor Replacement</u> in Heating, Ventilation and Air Conditioning. Did you complete the replacement?	-	Go to Step 15	-
13	Replace the blower motor control processor. Refer to <u>Blower Motor Control Processor Replacement</u> . Did you complete the replacement?	-	Go to Step 15	-
14	Replace the HVAC control module. Refer to <u>HVAC Control Module Replacement</u> . Did you complete the replacement?	-	Go to Step 15	-
15	Operate the system in order to verify the repair. Did you correct the condition?	-	System OK	Go to Step 2

BLOWER MOTOR ALWAYS ON - AUXILIARY

Blower Motor Always On - Auxiliary

Step	Action	Yes	No
Schematic Reference: <u>HVAC Schematics</u> DEFINITION: The auxiliary blower motor is ON while the auxiliary blower motor switches are in the OFF position.			
1	Did you review the HVAC operation and perform the necessary inspections?	Go to Step 2	Go to <u>Diagnostic System Check - HVAC Systems - Automatic</u>
2	1. Turn ON the ignition, with the engine OFF. 2. Place the rear auxiliary blower motor switch in the OFF position. 3. Place the front auxiliary blower motor switch in the OFF position. Is the auxiliary blower motor OFF?	Go to Step 3	Go to Step 4
			Go to Testing

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			<u>for Intermittent Conditions and Poor Connections in Wiring Systems</u>
3	Turn the rear auxiliary blower motor switch to any speed position Does the auxiliary blower motor operate?	Go to Step 5	
4	1. Turn OFF the ignition. 2. Disconnect the auxiliary blower motor resistor assembly. 3. Disconnect the front auxiliary blower motor switch. 4. Connect a test lamp to battery positive voltage and probe each of the auxiliary blower motor speed control circuits at the auxiliary blower motor resistor assembly connector. Does the test lamp illuminate?	Go to Step 6	Go to Step 8
5	Inspect the rear auxiliary blower motor switch enable circuit for a short to ground. Refer to <u>Wiring Repairs</u> in Wiring Systems. Did you find and correct the condition?	Go to Step 9	Go to Step 7
6	Repair the short to ground in the appropriate auxiliary blower motor speed control circuit. Refer to <u>Wiring Repairs</u> in Wiring Systems. Did you complete the repair?	Go to Step 9	-
7	Inspect for poor connections at the harness connector of the front auxiliary HVAC control assembly. Refer to <u>Testing for Intermittent Conditions and Poor Connections</u> and <u>Connector Repairs</u> in Wiring Systems. Did you find and correct the condition?	Go to Step 9	Go to Step 8
8	Replace the front auxiliary HVAC control assembly. Refer to <u>HVAC Control Module Replacement</u> . Did you complete the replacement?	Go to Step 9	-
9	Operate the system in order to verify the repair. Did you correct the condition?	System OK	Go to Step 2

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BLOWER MOTOR INOPERATIVE - AUXILIARY

Test Description

The numbers below refer to the step numbers on the diagnostic table.

2: This step tests to verify that the auxiliary blower motor operates.

3: This step determines if the malfunction is on the supply voltage side of the auxiliary blower motor.

4: This step determines if the malfunction is the auxiliary blower motor or on the grounding side of the auxiliary blower motor.

Blower Motor Inoperative - Auxiliary

Step	Action	Yes	No
Schematic Reference: <u>HVAC Schematics</u>			
DEFINITION: The auxiliary blower motor is inoperative in all speed positions.			
1	Did you review the auxiliary HVAC operation and perform the necessary inspections?	Go to Step 2	Go to <u>Diagnostic System Check - HVAC Systems - Automatic</u>
2	1. Turn ON the ignition, with the engine OFF. 2. Turn the auxiliary blower motor switch to high speed Does the auxiliary blower motor operate?	Go to <u>Testing for Intermittent Conditions and Poor Connections</u> in Wiring Systems	Go to Step 3
3	1. Turn OFF the ignition. 2. Disconnect the auxiliary blower motor. 3. Turn ON the ignition, with the engine OFF. 4. Set the front auxiliary blower motor switch to operate at high speed. 5. Connect a test lamp between the auxiliary blower motor supply voltage circuit and a good ground. Does the test lamp illuminate?	Go to Step 4	Go to Step 6
	Connect a test lamp between the auxiliary		

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4	blower motor supply voltage circuit and the auxiliary blower motor ground circuit. Does the test lamp illuminate?	Go toStep 14	Go toStep 5
5	Test the ground circuit of the auxiliary blower motor for an open or high resistance. Refer to Circuit Testing and Wiring Repairs in Wiring Systems. Did you find and correct the condition?	Go toStep 21	Go toStep 11
6	1. Turn OFF the ignition. 2. Disconnect the primary quarter A/C relay. 3. Turn ON the ignition, with the engine OFF. 4. Probe the ignition 3 voltage circuit of the primary quarter A/C relay with a test lamp that is connected to a good ground. Does the test lamp illuminate?	Go toStep 7	Go toStep 16
7	Probe the primary quarter A/C relay battery positive voltage circuit with a test lamp that is connected to a good ground. Does the test lamp illuminate?	Go toStep 8	Go toStep 17
8	Probe the primary quarter A/C relay ground circuit with a test lamp that is connected to battery positive voltage. Does the test lamp illuminate?	Go toStep 10	Go toStep 9
9	Repair the ground circuit of the primary quarter A/C relay for an open or high resistance. Refer to Wiring Repairs in Wiring Systems. Did you find and correct the condition?	Go toStep 21	-
10	Inspect the auxiliary blower motor supply voltage circuit for an open, high resistance or short to voltage. Refer to Circuit Testing and Wiring Repairs in Wiring Systems. Did you find and correct the condition?	Go toStep 21	Go toStep 13
	1. Turn OFF the ignition. 2. Disconnect the auxiliary blower motor switch.		

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11	3. Probe the auxiliary blower motor ground circuit at the auxiliary blower motor switch with a test lamp that is connected to battery positive voltage. Does the test lamp illuminate?	Go to Step 15	Go to Step 12
12	Repair the auxiliary blower motor switch ground circuits for an open or high resistance. Refer to Wiring Repairs in Wiring Systems. Did you find and correct the condition?	Go to Step 21	-
13	Inspect for poor connections at the harness connector of the primary quarter A/C relay. Refer to Testing for Intermittent Conditions and Poor Connections and Connector Repairs in Wiring Systems. Did you find and correct the condition?	Go to Step 21	Go to Step 18
14	Inspect for poor connections at the harness connector of the auxiliary blower motor. Refer to Testing for Intermittent Conditions and Poor Connections and Connector Repairs in Wiring Systems. Did you find and correct the condition?	Go to Step 21	Go to Step 20
15	Inspect for poor connections at the harness connector of the auxiliary blower motor switch. Refer to Testing for Intermittent Conditions and Poor Connections and Connector Repairs in Wiring Systems. Did you find and correct the condition?	Go to Step 21	Go to Step 19
16	Repair the ignition 3 voltage circuit of the primary quarter A/C relay. Refer to Wiring Repairs in Wiring Systems. Did you complete the repair?	Go to Step 21	-
17	Repair the battery positive voltage circuit of the primary quarter A/C relay. Refer to Wiring Repairs in Wiring Systems. Did you complete the repair?	Go to Step 21	-
18	Replace the primary quarter A/C relay. Did you complete the replacement?	Go to Step 21	-

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19	Replace front auxiliary blower motor switch. Refer to <u>HVAC Control Module Replacement</u> . Did you complete the replacement?	Go to Step 21	-
20	Replace auxiliary blower motor. Refer to <u>Blower Motor Replacement - Auxiliary</u> in Heating, Ventilation and Air Conditioning. Did you complete the replacement?	Go to Step 21	-
21	Operate the system in order to verify the repair. Did you correct the condition?	System OK	Go to Step 2

BLOWER MOTOR MALFUNCTION - AUXILIARY

Blower Motor Malfunction - Auxiliary

Step	Action	Yes	No
Schematic Reference: <u>HVAC Schematics</u> DEFINITION: The auxiliary blower motor switches do not operate in each speed position.			
1	Did you review the HVAC operation and perform the necessary inspections?	Go to Step 2	Go to <u>Diagnostic System Check - HVAC Systems - Automatic</u>
2	1. Turn ON the ignition, with the engine OFF. 2. Place the front auxiliary blower motor switch in each speed position. 3. Place the front auxiliary blower motor switch in the rear position. 4. Place the rear auxiliary blower motor switch in each speed position. Does the auxiliary blower motor work properly in each speed position?	Go to <u>Testing for Intermittent Conditions and Poor Connections</u> in Wiring Systems	Go to Step 3
	1. Turn OFF the ignition. 2. Disconnect the auxiliary blower motor resistor. 3. Turn ON the ignition, with the engine OFF.		

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3	4. With a test lamp that is connected to battery positive voltage probe each auxiliary blower motor control circuit and place the appropriate control switch in the appropriate position for the control circuit being tested. Does the test lamp illuminate for each control circuit?	Go to Step 8	Go to Step 4
4	Test the appropriate auxiliary blower motor control circuit for an open, high resistance or short to voltage. Refer to <u>Circuit Testing</u> and <u>Wiring Repairs</u> in Wiring Systems. Did you find and correct the condition?	Go to Step 12	Go to Step 5
5	Is the condition present from the front auxiliary control?	Go to Step 6	Go to Step 7
6	Inspect for poor connections at the harness connector of the front auxiliary HVAC control assembly. Refer to <u>Testing for Intermittent Conditions and Poor Connections</u> and <u>Connector Repairs</u> in Wiring Systems. Did you find and correct the condition?	Go to Step 12	Go to Step 10
7	Inspect for poor connections at the harness connector of the rear auxiliary HVAC control assembly. Refer to <u>Testing for Intermittent Conditions and Poor Connections</u> and <u>Connector Repairs</u> in Wiring Systems. Did you find and correct the condition?	Go to Step 12	Go to Step 11
8	Inspect for poor connections at the harness connector of the auxiliary blower motor resistor. Refer to <u>Testing for Intermittent Conditions and Poor Connections</u> and <u>Connector Repairs</u> in Wiring Systems. Did you find and correct the condition?	Go to Step 12	Go to Step 9
9	Replace the auxiliary blower motor resistor. Refer to <u>Blower Motor Resistor Replacement - Auxiliary</u> Refer to <u>Recirculation Actuator Replacement</u> in		

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	Heating, Ventilation, and Air Conditioning. Did you complete the replacement?	Go to Step 12	-
10	Replace the front auxiliary HVAC control assembly. Refer to <u>HVAC Control Module Replacement</u> . Did you complete the replacement?	Go to Step 12	-
11	Replace the rear auxiliary HVAC control assembly. Refer to <u>HVAC Control Module Replacement</u> . Did you complete the replacement?	Go to Step 12	-
12	Operate the system in order to verify the repair. Did you correct the condition?	System OK	Go to Step 2

TOO HOT IN VEHICLE

Test Description

The numbers below refer to the step numbers on the diagnostic table.

6: The ambient air temperature must be above 3° C (38° F) for this A/C compressor test.

7: The specified values are from the A/C System Performance Test.

Too Hot in Vehicle

Step	Action	Values	Yes	No
Schematic Reference: <u>HVAC Schematics</u> Connector End View Reference: <u>HVAC Connector End Views</u> DEFINITION: The temperature cannot be adjusted, or cooling is insufficient during A/C operation.				
1	Did you perform the HVAC Diagnostic System Check?	-	Go to Step 2	Go to <u>Diagnostic System Check - HVAC Systems - Automatic</u>
2	Place the blower motor switch in each speed position. Does the blower motor operate in any speed position?	-	Go to Step 3	Go to <u>Blower Motor Inoperative</u>

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3	Does the blower motor operate at the desired speeds?	-	Go to Step 4	Go to <u>Blower Motor Malfunction</u>
4	1. Start the engine. 2. Place the mode switch in the panel position. 3. Place the recirculation switch in the ON position. 4. Observe the recirculation door. 5. Place the recirculation switch in the OFF position. Does the recirculation door move from the recirculation position to the outside air position?	-	Go to Step 5	Go to <u>Air Recirculation Malfunction</u>
5	Does the customer concern occur when the air conditioning is ON?	-	Go to Step 6	Go to Step 8
6	IMPORTANT: The ambient air temperature must be above 3°C (38°F). 1. Start the engine. 2. Place the left air temperature switch in the coldest position. 3. Place the mode switch in the bi-level position. 4. Place the A/C request switch to the ON position. Does the A/C compressor operate?	-	Go to Step 7	Go to <u>HVAC Compressor Clutch Does Not Engage</u>
7	Perform the A/C system performance test. Refer to <u>Air Conditioning (A/C) System Performance Test (LH2 - Standard Cooling)</u> or <u>Air Conditioning (A/C) System Performance Test (LH2 - Heavy Duty Cooling)</u> or <u>Air Conditioning (A/C) System Performance Test (LY7 - w/o</u>	-		

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	<u>C57 - Standard Cooling)</u> or <u>Air Conditioning (A/C) System Performance Test (LY7 - w/ C57 - Standard Cooling)</u> in Heating, Ventilation, and Air Conditioning. Did you find and correct the condition?			Go to Step 25	Go to Step 8
8	Inspect the inside air temperature sensor for proper installation. Refer to <u>Inside Air Temperature Sensor Replacement</u>. Did you find and correct the condition?	-		Go to Step 25	Go to Step 9
9	Turn ON the ignition with the engine OFF. Place the mode switch in panel position. Place the blower motor switch in maximum speed position. Inspect for airflow through the inside air temperature sensor by placing a 5 cm (2 in) square piece of paper over the sensor air inlet. Does the paper stay in place?	-		Go to Step 10	Go to Step 16
10	1. Install a thermometer near the inside air temperature sensor. 2. With a scan tool, observe the Inside Air Temp parameter in the Climate Control Panel data list. Does the scan tool indicate the sensor temperatures is within 3° C (5° F) of the thermometer temperature?	-		Go to Step 11	Go to Step 14
11	1. Turn OFF the ignition. 2. Cover the sunload sensor. 3. Start the engine. 4. Adjust driver side temperature to 22° C (72° F). 5. With a scan tool, observe the Driver and Passenger Solar Sensor parameter in the Climate Control	220 Counts			

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	Panel Open/Short data list. Is the Solar Sensor parameter greater than the specified value?		Go to Step 12	Go to Step 19
12	1. Uncover the sunload sensor. 2. Direct a light source at the sunload sensor. 3. Observe the Driver and Passenger Sunload parameter. Do the counts change?	-	Go to Step 13	Go to Step 19
13	Test the resistance of the ambient air temperature sensor. Refer to <u>Sensor Resistance Table</u> . Is the resistance near the value in the Sensor Resistance Table?	-	Go to <u>Testing for Intermittent Conditions and Poor Connections</u> in Wiring Systems	Go to Step 15
14	Test the resistance of the inside air temperature sensor. Refer to <u>Sensor Resistance Table</u> . Is the resistance near the value in the Sensor Resistance Table?	-	Go to Step 20	Go to Step 18
15	Inspect for poor connections at the harness connector of the ambient air temperature sensor. Refer to <u>Testing for Intermittent Conditions and Poor Connections</u> and <u>Connector Repairs</u> in Wiring Systems. Did you find and correct the condition?	-	Go to Step 25	Go to Step 17
16	Inspect the aspirator tube for a air leak or obstruction. Did you find and correct the condition?	-	Go to Step 25	-
17	Inspect for poor connections at the harness connector of the ambient air temperature sensor. Refer to <u>Testing for Intermittent Conditions and Poor</u>	-		

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	<u>Connections</u> and <u>Connector Repairs</u> in Wiring Systems. Did you find and correct the condition?		Go to Step 25	Go to Step 23
18	Inspect for poor connections at the harness connector of the inside air temperature sensor. Refer to <u>Testing for Intermittent Conditions and Poor Connections</u> and <u>Connector Repairs</u> in Wiring Systems. Did you find and correct the condition?	-	Go to Step 25	Go to Step 21
19	Inspect for poor connections at the harness connector of the sunload sensor. Refer to <u>Testing for Intermittent Conditions and Poor Connections</u> and <u>Connector Repairs</u> in Wiring Systems. Did you find and correct the condition?	-	Go to Step 25	Go to Step 22
20	Inspect for poor connections at the harness connector of the HVAC control module. Refer to <u>Testing for Intermittent Conditions and Poor Connections</u> and <u>Connector Repairs</u> in Wiring Systems. Did you find and correct the condition?	-	Go to Step 25	Go to Step 24
21	Replace the inside air temperature sensor. Refer to <u>Inside Air Temperature Sensor Replacement</u> . Did you complete the replacement?	-	Go to Step 25	-
22	Replace the sunload sensor. Refer to <u>Sun Load Sensor Replacement</u> . Did you complete the replacement?	-	Go to Step 25	-
23	Replace the ambient air temperature sensor. Refer to <u>Ambient Air Temperature Sensor Replacement</u> . Did you complete the replacement?	-	Go to Step 25	-
24	Replace the HVAC Control Module. Refer to <u>HVAC Control Module Replacement</u> . Did you complete the replacement?	-	Go to Step 25	-

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25	Operate the system in order to verify the repair. Did you correct the condition?	-	System OK	Go to Step 2
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TOO COLD IN VEHICLE

Too Cold in Vehicle

Step	Action	Values	Yes	No
Schematic Reference: <u>HVAC Schematics</u> Connector End View Reference: <u>HVAC Connector End Views</u> DEFINITION: The temperature cannot be adjusted, or heating is insufficient.				
1	Did you perform the HVAC Diagnostic System Check?	-	Go to Step 2	Go to <u>Diagnostic System Check - HVAC Systems - Automatic</u>
2	Place the blower motor switch in each speed position. Does the blower motor operate in any speed position?	-	Go to Step 3	Go to <u>Blower Motor Inoperative</u>
3	Does the blower motor operate at the desired speeds?	-	Go to Step 4	Go to <u>Blower Motor Malfunction</u>
4	1. Install a scan tool. 2. Turn ON the ignition with the engine OFF. 3. With a scan tool, command the water pump control ON in the climate control panel special functions, miscellaneous test. Does the after boil coolant pump operate?	-	Go to Step 5	Go to <u>After Boil Coolant Pump Inoperative</u> in Engine Cooling
	1. Start the engine. 2. Place the mode switch in the panel position.			

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5	3. Place the recirculation switch in the ON position. 4. Observe the recirculation door. 5. Place the recirculation switch in the OFF position. Does the recirculation door move from the recirculation position to the outside air position?	-	Go to Step 6	Go to <u>Air Recirculation Malfunction</u>
6	Place the passenger temperature switch in the OFF position. Does the Too Cold in vehicle condition occur when heating or defrosting is desired?	-	Go to Step 7	Go to Step 9
7	1. Start the engine. 2. Turn OFF the HVAC controls. Does the A/C compressor operate?	-	Go to <u>HVAC Compressor Clutch Does Not Disengage</u>	Go to Step 8
8	Inspect the cooling system for the following conditions: • A low coolant level • A loose or worn accessory drive belt • A leaking radiator hose or heater hose • A kinked radiator hose or heater hose • A missing radiator cap pressure seal • A leaking radiator cap Refer to <u>Heating Performance Diagnostic</u> in Heating, Ventilation and Air Conditioning. Did you find and correct the condition?	-	Go to Step 25	Go to Step 9

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9	- Place the mode switch in panel position. - Turn ON the ignition with the engine OFF. - Place the blower motor switch in maximum speed position. - Inspect for airflow through the inside air temperature sensor by placing a 5 cm (2 in) square piece of paper over the sensor air inlet. Does the paper stay in place?	-	Go to Step 10	Go to Step 16
10	- Install a thermometer near the inside air temperature sensor. - With a scan tool, observe the Inside Air Temp parameter in the Climate Control Panel data list. Does the scan tool indicate the sensor temperatures is within 3° C (5° F) of the thermometer temperature?	-	Go to Step 11	Go to Step 14
11	- Turn OFF the ignition. - Cover the sunload sensor. - Turn ON the ignition. - With a scan tool, observe the Driver and Passenger Solar Sensor parameter in the Climate Control Panel Open/Short data list. Is the Solar Sensor parameter greater than the specified value?	220 counts	Go to Step 12	Go to Step 19
12	- Uncover the sunload sensor. - Direct a light source at the sunload sensor. - Observe the Driver and Passenger Sunload parameter.	-		

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	Do the counts change?		Go to Step 13	Go to Step 19
13	Test the resistance of the ambient air temperature sensor. Refer to <u>Sensor Resistance Table</u> . Is the resistance near the value in the Sensor Resistance Table?	-	Go to <u>Testing for Intermittent Conditions and Poor Connections</u> in Wiring Systems	Go to Step 15
14	Test the resistance of the inside air temperature sensor. Refer to <u>Sensor Resistance Table</u> . Is the resistance near the value in the Sensor Resistance Table?	-	Go to Step 20	Go to Step 18
15	Inspect for poor connections at the harness connector of the ambient air temperature sensor. Refer to <u>Testing for Intermittent Conditions and Poor Connections</u> and <u>Connector Repairs</u> in Wiring Systems. Did you find and correct the condition?	-	Go to Step 25	Go to Step 17
16	Inspect the aspirator tube for a air leak or obstruction. Did you find and correct the condition?	-	Go to Step 25	-
17	Inspect for poor connections at the harness connector of the ambient air temperature sensor. Refer to <u>Testing for Intermittent Conditions and Poor Connections</u> and <u>Connector Repairs</u> in Wiring Systems. Did you find and correct the condition?	-	Go to Step 25	Go to Step 23
18	Inspect for poor connections at the harness connector of the inside air temperature sensor. Refer to <u>Testing for Intermittent Conditions and Poor Connections</u> and <u>Connector Repairs</u> in Wiring Systems. Did you find and correct the condition?	-	Go to Step 25	Go to Step 21

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19	Inspect for poor connections at the harness connector of the sunload sensor. Refer to <u>Testing for Intermittent Conditions and Poor Connections</u> and <u>Connector Repairs</u> in Wiring Systems. Did you find and correct the condition?	-	Go to Step 25	Go to Step 22
20	Inspect for poor connections at the harness connector of the HVAC control module. Refer to <u>Testing for Intermittent Conditions and Poor Connections</u> and <u>Connector Repairs</u> in Wiring Systems. Did you find and correct the condition?	-	Go to Step 25	Go to Step 24
21	Replace the inside air temperature sensor. Refer to <u>Inside Air Temperature Sensor Replacement</u> . Did you complete the replacement?	-	Go to Step 25	-
22	Replace the sunload sensor. Refer to <u>Sun Load Sensor Replacement</u> . Did you complete the replacement?	-	Go to Step 25	-
23	Replace the ambient air temperature sensor. Refer to <u>Ambient Air Temperature Sensor Replacement</u> . Did you complete the replacement?	-	Go to Step 25	-
24	Replace the HVAC Control Module. Refer to <u>HVAC Control Module Replacement</u> . Did you complete the replacement?	-	Go to Step 25	-
25	Operate the system in order to verify the repair. Did you correct the condition?	-	System OK	Go to Step 2

AIR DELIVERY IMPROPER

Diagnostic Aids

- The condition may be intermittent. Refer to **Testing for Intermittent Conditions and Poor Connections** in Wiring Systems.
- Inspect the air delivery system for the following conditions:

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- A dirty HVAC air filter
- An obstruction to the airflow
- Air leaks
- Misaligned air ducts
- Broken or binding linkages or doors

Air Delivery Improper

Step	Action	Yes	No
Schematic Reference: <u>HVAC Schematics</u> Connector End View Reference: <u>HVAC Connector End Views</u>			
1	Did you perform the HVAC Diagnostic System Check?	Go to Step 2	Go to <u>Diagnostic System Check - HVAC Systems - Automatic</u>
2	1. Turn ON the ignition, with the engine OFF. 2. Turn OFF the HVAC control module. Is the blower motor OFF?	Go to Step 3	Go to <u>Blower Motor Always On</u>
3	Place the blower motor switch in each speed position. Does the blower motor operate in any of the speed positions?	Go to Step 4	Go to <u>Blower Motor Inoperative</u>
4	Does the blower motor operate in each speed position?	Go to Step 5	Go to <u>Blower Motor Malfunction</u>
5	1. Place the blower motor switch in the maximum speed position. 2. Place the mode switch in the bi-level position. 3. Place the recirculation switch in the ON position. 4. Observe the drive shaft of the recirculation actuator. 5. Place the recirculation switch in the OFF position.		

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	Does the recirculation door move from the recirculation position to the outside air position?	Go to Step 6	Go to <u>Air Recirculation Malfunction</u>
6	1. Place the mode switch in the PANEL position. 2. Observe the drive shaft of the mode actuator. 3. Place the defrost switch in the ON position. Does the drive shaft of the mode actuator rotate?	Go to Diagnostic Aids	Go to Step 7
7	Inspect for poor connections at the harness connector of the HVAC control module. Refer to <u>Testing for Intermittent Conditions and Poor Connections</u> and <u>Connector Repairs</u> in Wiring Systems. Did you find and correct the condition?	Go to Step 9	Go to Step 8
8	Replace the HVAC control module. Refer to <u>HVAC Control Module Replacement</u>. Did you complete the replacement?	Go to Step 9	-
9	Operate the system in order to verify the repair. Did you correct the condition?	System OK	Go to Step 2

AIR RECIRCULATION MALFUNCTION

Diagnostic Aids

- If the control A circuit of the recirculation actuator is shorted to ground, the following conditions will occur.
 - The recirculation actuator will operate properly when recirculation is requested.
 - The recirculation actuator will continually modulate between the outside air and recirculation positions when outside air is requested.
- If the control B circuit of the recirculation actuator is shorted to ground, the following conditions will occur.
 - The recirculation actuator will operate properly when outside air is requested.
 - The recirculation actuator will continually modulate between the outside air and recirculation positions when recirculation is requested.

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- The condition may be intermittent - Refer to **Testing for Intermittent Conditions and Poor Connections** in Wiring Systems.
- Inspect the recirculation door and the recirculation actuator for the following conditions:
 - A misaligned recirculation actuator - Refer to **Recirculation Actuator Replacement** .
 - Broken or binding linkages
 - A broken or binding recirculation door
 - An obstruction that prevents the recirculation door from operating within its full range of motion
 - Missing seals to the recirculation door
 - Misaligned seals to the recirculation door

Air Recirculation Malfunction

Step	Action	Yes	No
Schematic Reference: <u>HVAC Schematics</u> Connector End View Reference: <u>HVAC Connector End Views</u> DEFINITION: Air recirculation is inoperative or is always ON.			
1	Did you perform the HVAC Diagnostic System Check?	Go to Step 2	Go to <u>Diagnostic System Check - HVAC Systems - Automatic</u>
2	1. Turn ON the ignition, with the engine OFF. 2. Place the blower motor switch in the maximum speed position. 3. Place the mode switch in the bi-level position. 4. Place the recirculation switch in the outside air position. 5. Place the recirculation switch in the recirculation position. Do you hear an audible difference in the airflow when the recirculation switch is placed in the recirculation position?	Go to Diagnostic Aids	Go to Step 3
	1. Place the recirculation switch in the		

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3	outside air position. - Observe the drive shaft of the recirculation actuator. - Place the recirculation switch in the recirculation position. Does the drive shaft of the recirculation actuator rotate?	Go to Diagnostic Aids	Go to Step 4
4	- Observe the drive shaft of the recirculation actuator. - With a scan tool, command the recirculation actuator to the recirculation position and to the outside air position. Does the drive shaft of the recirculation actuator rotate?	Go to Step 12	Go to Step 5
5	- Turn the ignition OFF. - Disconnect the recirculation actuator. - Turn ON the ignition, with the engine OFF. - Probe the ignition 3 voltage circuit of the recirculation actuator with a test lamp that is connected to a good ground. Does the test lamp illuminate?	Go to Step 6	Go to Step 13
6	- Connect a test lamp between the ignition 3 voltage circuit and the door control A circuit of the recirculation actuator. - With a scan tool, command the recirculation actuator to the recirculation position and to the outside air position. Does the test lamp illuminate with either command?	Go to Step 7	Go to Step 8
	Connect a test lamp between the ignition 3 voltage circuit and the door control B circuit of the recirculation actuator.		

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7	2. With a scan tool, command the recirculation actuator to the recirculation position and to the outside air position. Does the test lamp illuminate with either command?	Go to Step 10	Go to Step 9
8	Test the control A circuit of the recirculation actuator for an open, a high resistance, a short to ground, or a short to voltage. Refer to <u>Circuit Testing</u> and <u>Wiring Repairs</u> in Wiring Systems. Did you find and correct the condition?	Go to Step 16	Go to Step 12
9	Test the control B circuit of the recirculation actuator for an open, a high resistance, a short to ground, or a short to voltage. Refer to <u>Circuit Testing</u> and <u>Wiring Repairs</u> in Wiring Systems. Did you find and correct the condition?	Go to Step 16	Go to Step 12
10	Inspect the recirculation door and the recirculation actuator for the following conditions: • A misaligned recirculation actuator - Refer to <u>Recirculation Actuator Replacement</u> . • Broken or binding linkages • A broken or binding recirculation door • An obstruction that prevents the recirculation door from operating within its full range of motion • Missing seals to the recirculation door • Misaligned seals to the recirculation door Did you find and correct the condition?	Go to Step 16	Go to Step 11
	Inspect for poor connections at the harness connector of the recirculation actuator. Refer to <u>Testing for Intermittent Conditions and</u>		

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11	Poor Connections and Connector Repairs in Wiring Systems. Did you find and correct the condition?	Go to Step 16	Go to Step 14
12	Inspect for poor connections at the harness connector of the HVAC control module. Refer to Testing for Intermittent Conditions and Poor Connections and Connector Repairs in Wiring Systems. Did you find and correct the condition?	Go to Step 16	Go to Step 15
13	Repair the ignition 3 voltage circuit of the recirculation actuator. Refer to Wiring Repairs in Wiring Systems. Did you complete the repair?	Go to Step 16	-
14	Replace the recirculation actuator. Refer to Recirculation Actuator Replacement . Did you complete the replacement?	Go to Step 16	-
15	Replace the HVAC control module. Refer to HVAC Control Module Replacement . Did you complete the replacement?	Go to Step 16	-
16	Operate the system in order to verify the repair. Did you correct the condition?	System OK	Go to Step 3

AFTERBLOW ENABLE PROCEDURE

Afterblow is a feature that dries the evaporator core by operating the blower motor after the engine is turned off. This reduces the amount of microbial growth that can create undesirable odors. The vehicle does not come equipped with the afterblow feature turned on. If the afterblow feature is required due to an odor concern, it must be turned on by reprogramming the HVAC control module, refer to **Service Programming System (SPS)** in Vehicle Control Systems.

After the HVAC control module has been programmed for afterblow, the following conditions must be met for afterblow to operate:

- The engine has been turned off for at least 30 minutes.
- The ambient air temperature is at least 21° C (70° F).
- The A/C compressor operated for more than 2 minutes.
- The system voltage is at least 12 volts.

Once the above conditions have been met, the following sequence of events will occur:

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1. The blower motor will run for 20 seconds.
2. The blower motor will be off for 10 minutes.
3. The blower motor will run for and additional 20 seconds.

REPAIR INSTRUCTIONS

HVAC CONTROL MODULE REPLACEMENT

Removal Procedure

1. Turn the engine OFF.
2. Apply parking brake and place the transmission into the lowest gear setting.

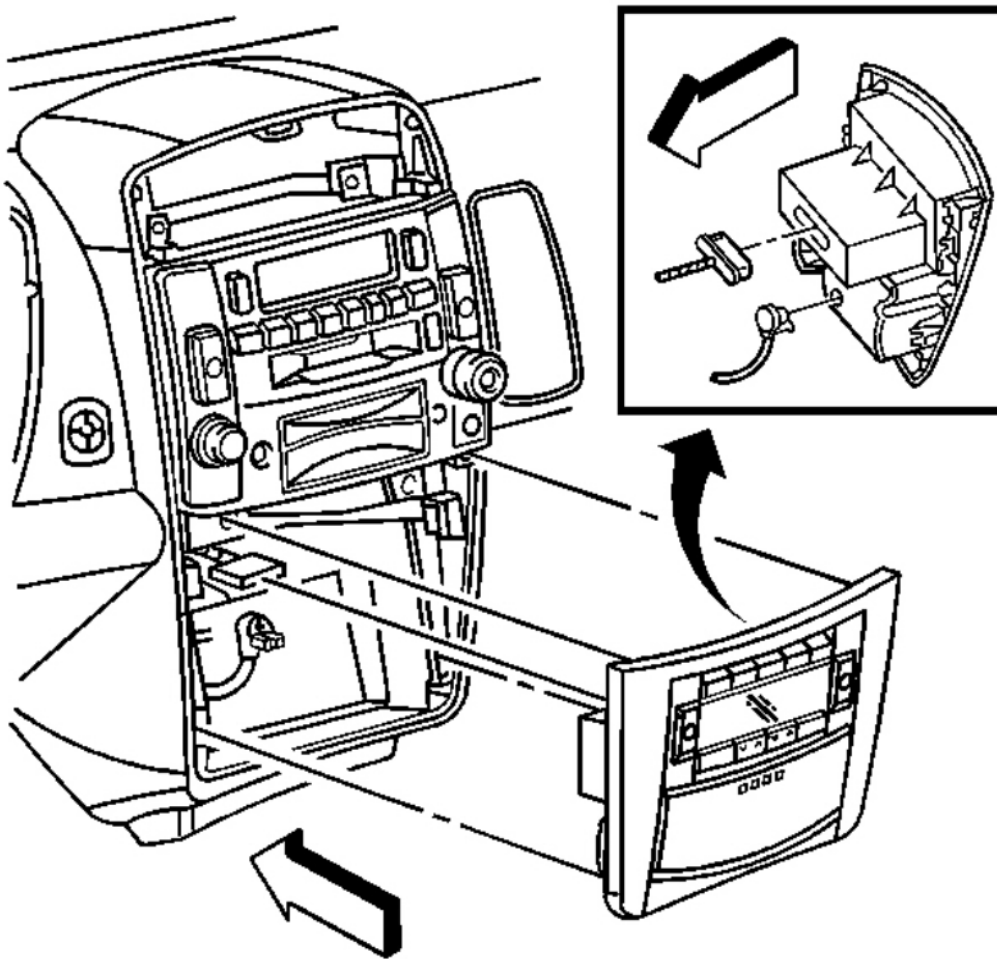


Fig. 11: View Of HVAC Control Module Trim Plate
Courtesy of GENERAL MOTORS CORP.

3. Remove the screw behind the ashtray.
4. Remove the HVAC control module trim plate by pulling outward on right and left side.

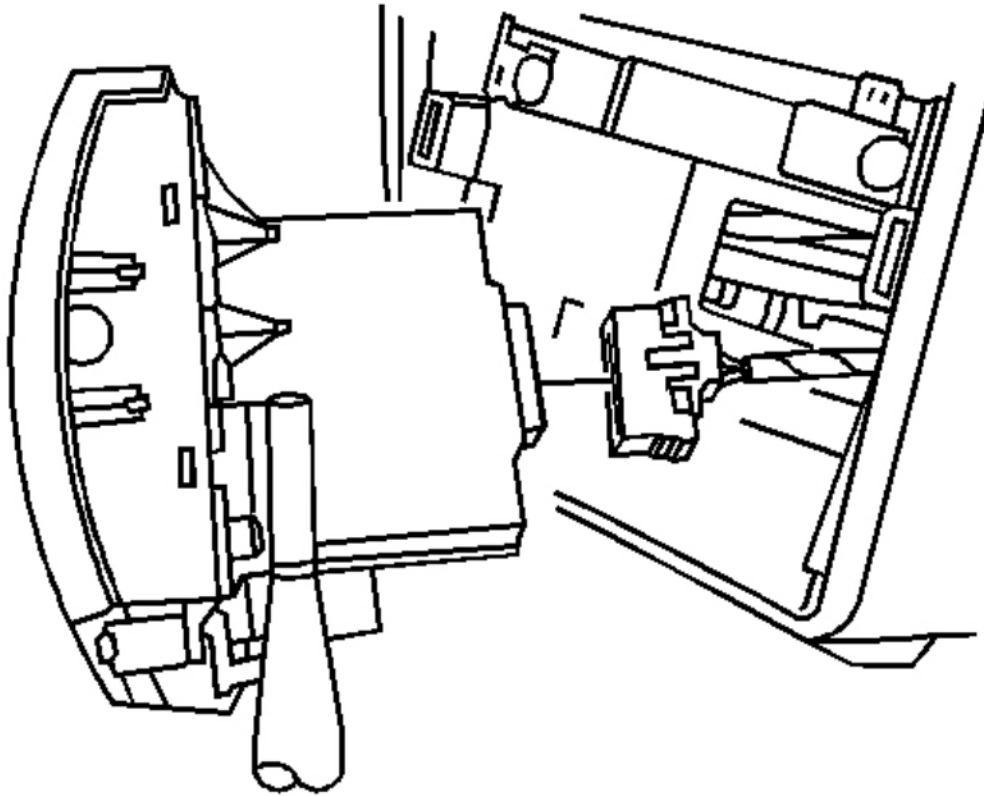


Fig. 12: View Of HVAC Control Module Electrical Connector
Courtesy of GENERAL MOTORS CORP.

5. Disconnect the HVAC control module electrical connector.
6. Disconnect the ash tray electrical connector.
7. Remove the HVAC control module screws (1).

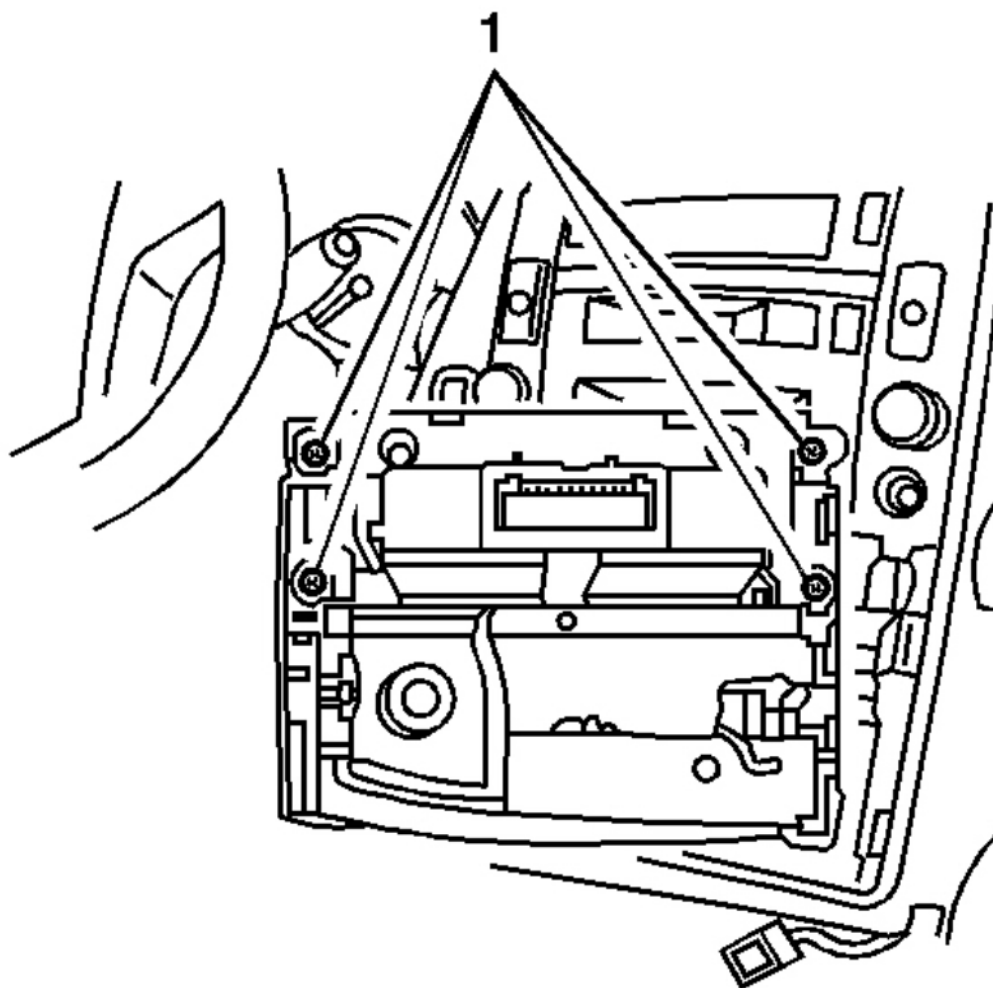


Fig. 13: Locating HVAC Control Module Screws
Courtesy of GENERAL MOTORS CORP.

8. Remove the HVAC control module.

Installation Procedure

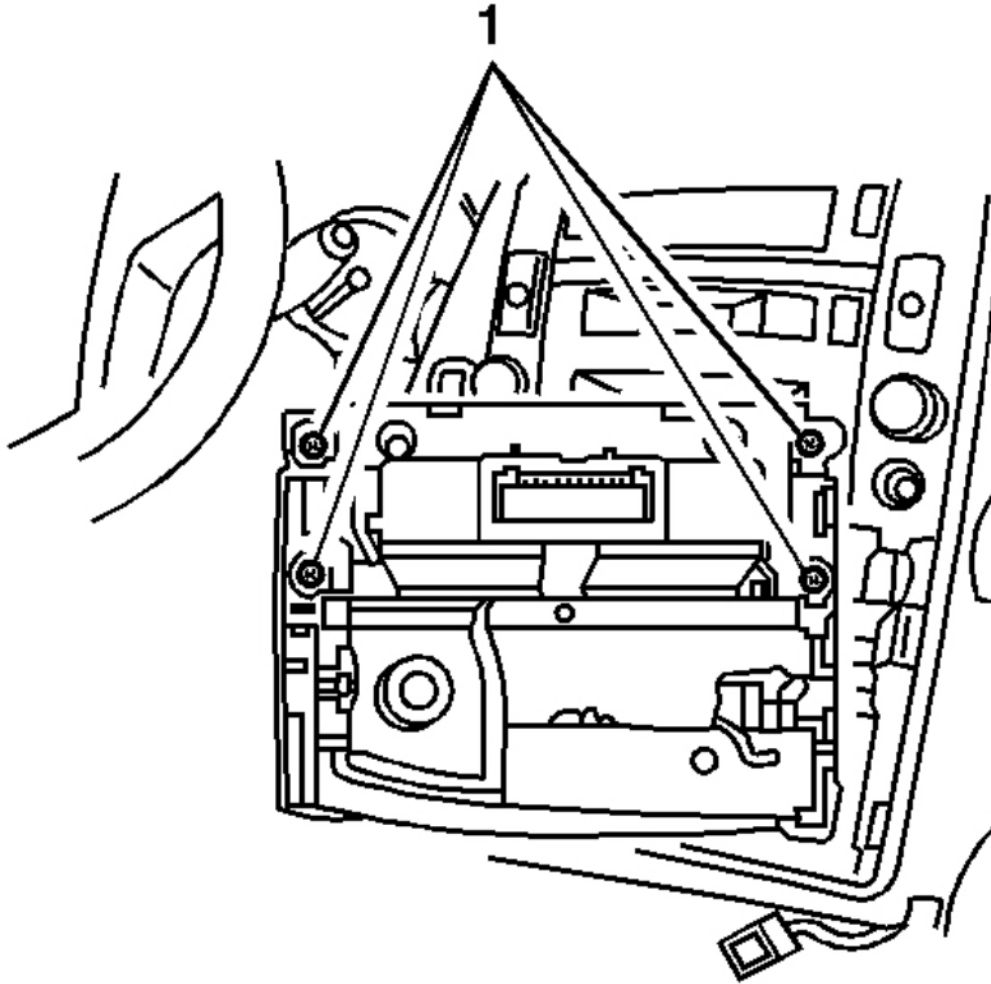


Fig. 14: Locating HVAC Control Module Screws
Courtesy of GENERAL MOTORS CORP.

1. Install the HVAC control module into the trim plate.

NOTE: Refer to Fastener Notice in Cautions and Notices.

2. Install the HVAC control module screws (1).

Tighten: Tighten the screws to 2 N.m (18 lb in).

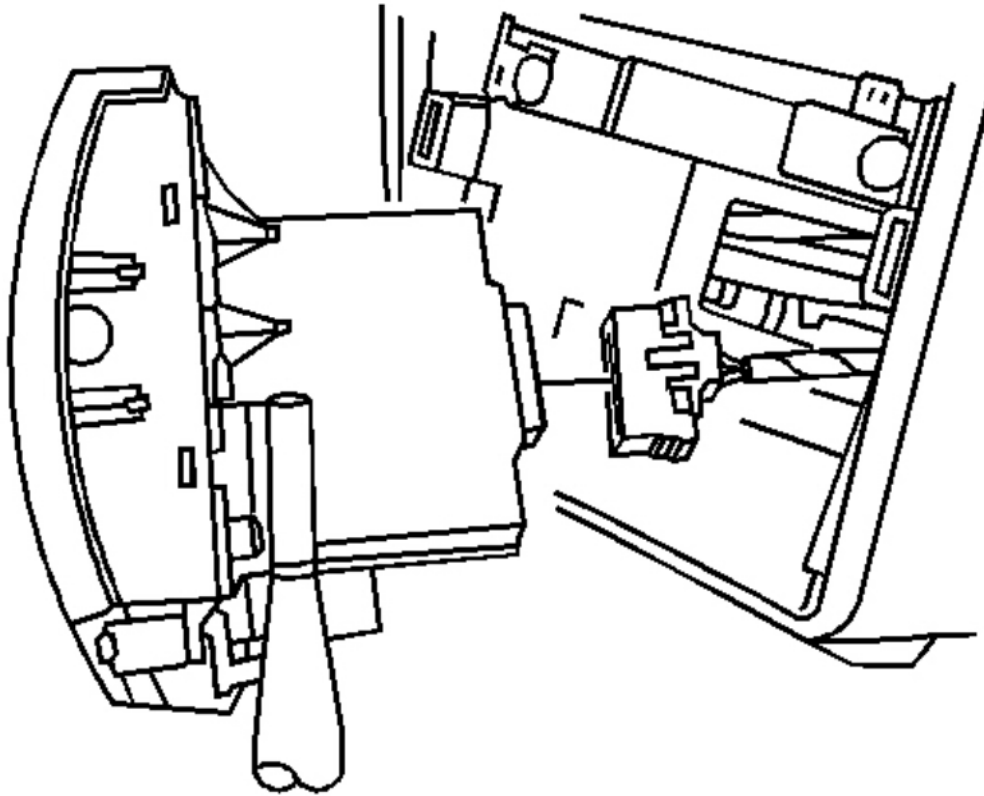


Fig. 15: View Of HVAC Control Module Electrical Connector
Courtesy of GENERAL MOTORS CORP.

3. Connect the HVAC control module electrical connector.
4. Connect the ash tray electrical connector.

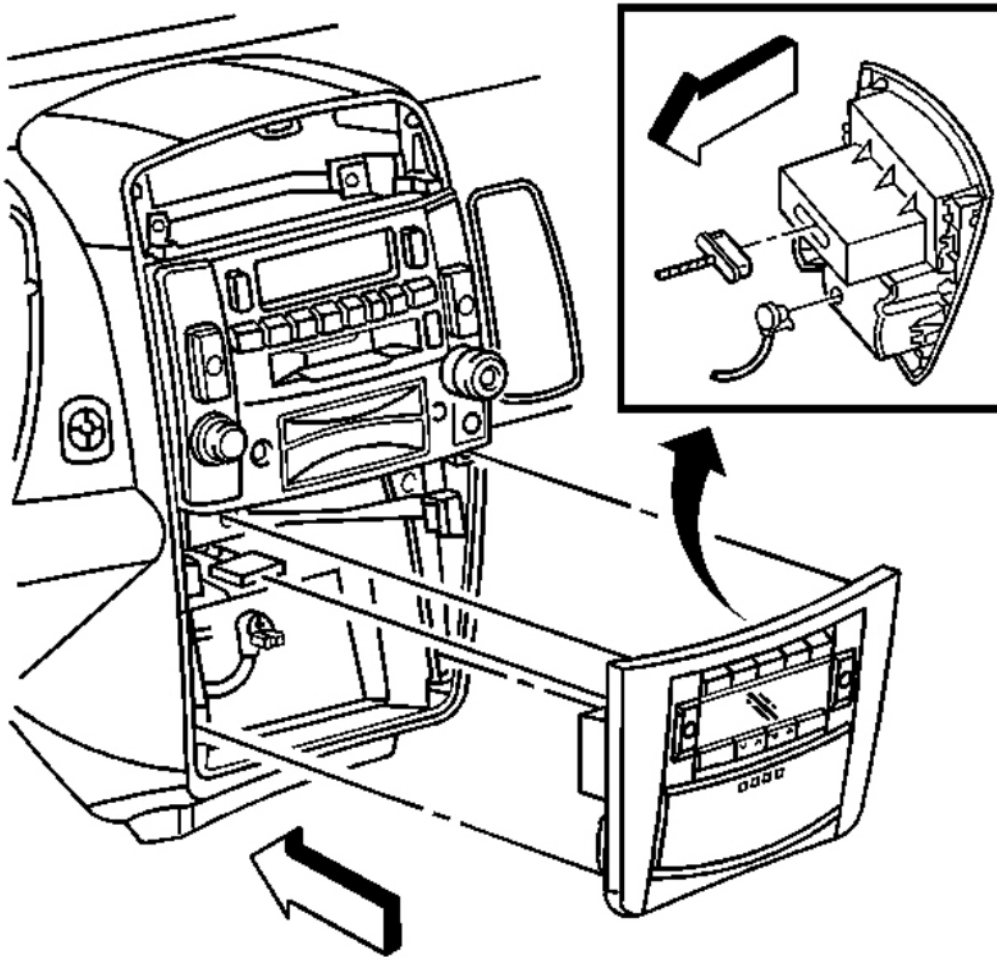


Fig. 16: View Of HVAC Control Module Trim Plate
Courtesy of GENERAL MOTORS CORP.

5. Install the HVAC control module trim plate by pressing trim until tabs engage.
6. Install the screw behind the ashtray.

Tighten: Tighten the screw to 2 N.m (18 lb in).

7. Place the transmission in park and unapply the parking brake.

BLOWER MOTOR CONTROL PROCESSOR REPLACEMENT

Removal Procedure

1. Remove the right sound insulator. Refer to **Closeout/Insulator Panel Replacement - Right** in Instrument Panel, Gages, and Console.

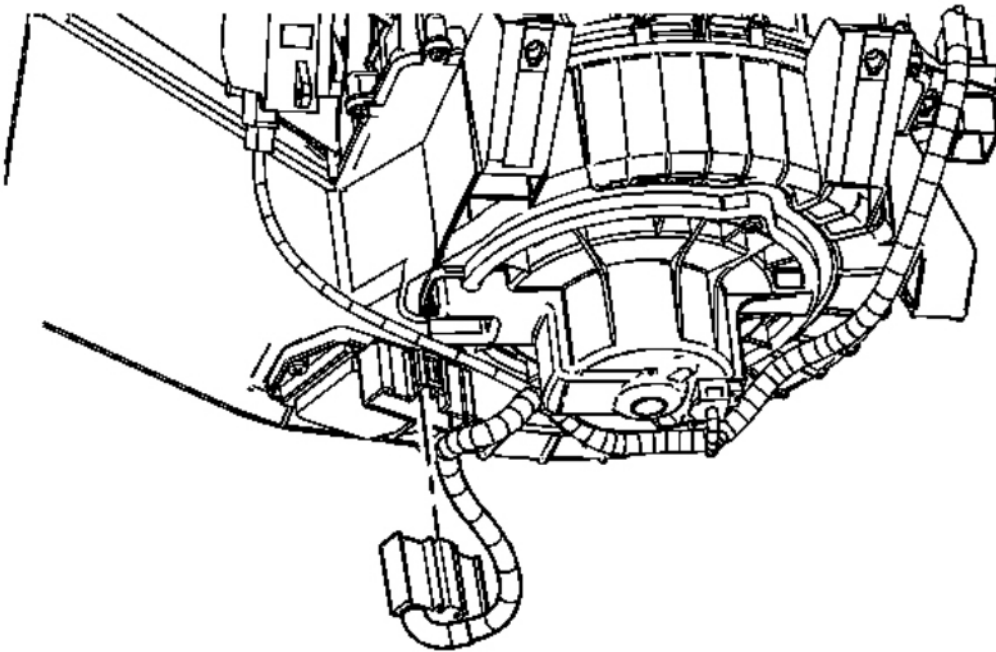


Fig. 17: View Of Blower Motor Control Processor Electrical Connector
Courtesy of GENERAL MOTORS CORP.

2. Disconnect the electrical connector from the blower motor control processor.

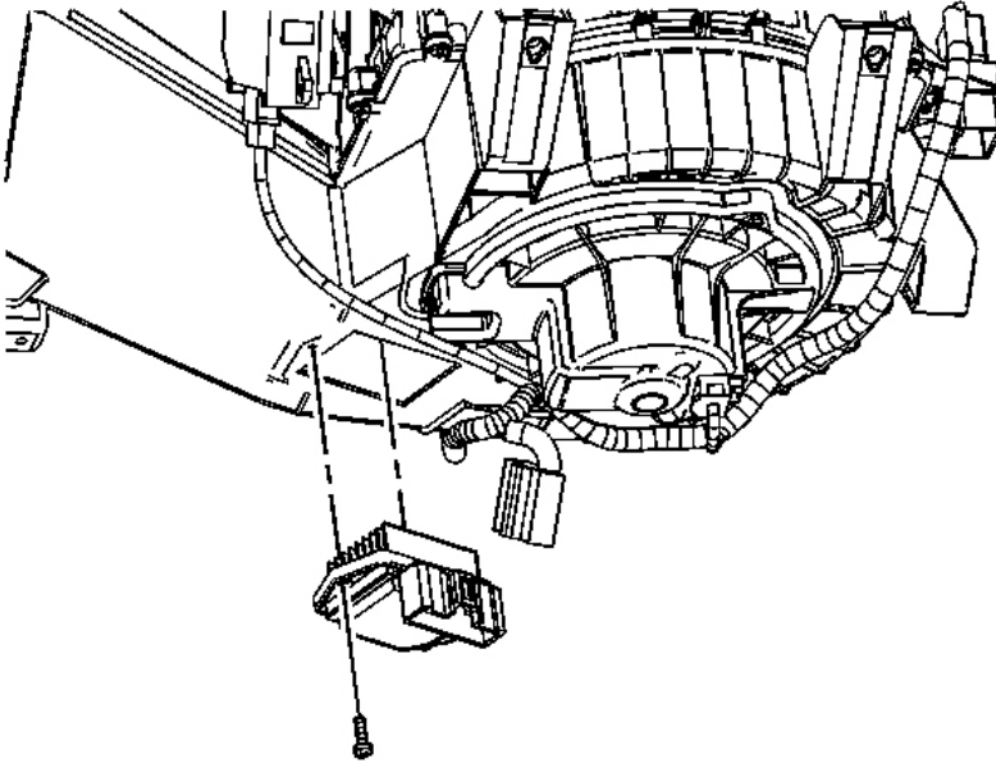


Fig. 18: View Of Blower Motor Control Processor
Courtesy of GENERAL MOTORS CORP.

3. Remove the blower motor control processor retaining screw.
4. Remove the blower motor control processor from the vehicle.

Installation Procedure

1. Install the blower motor control processor.

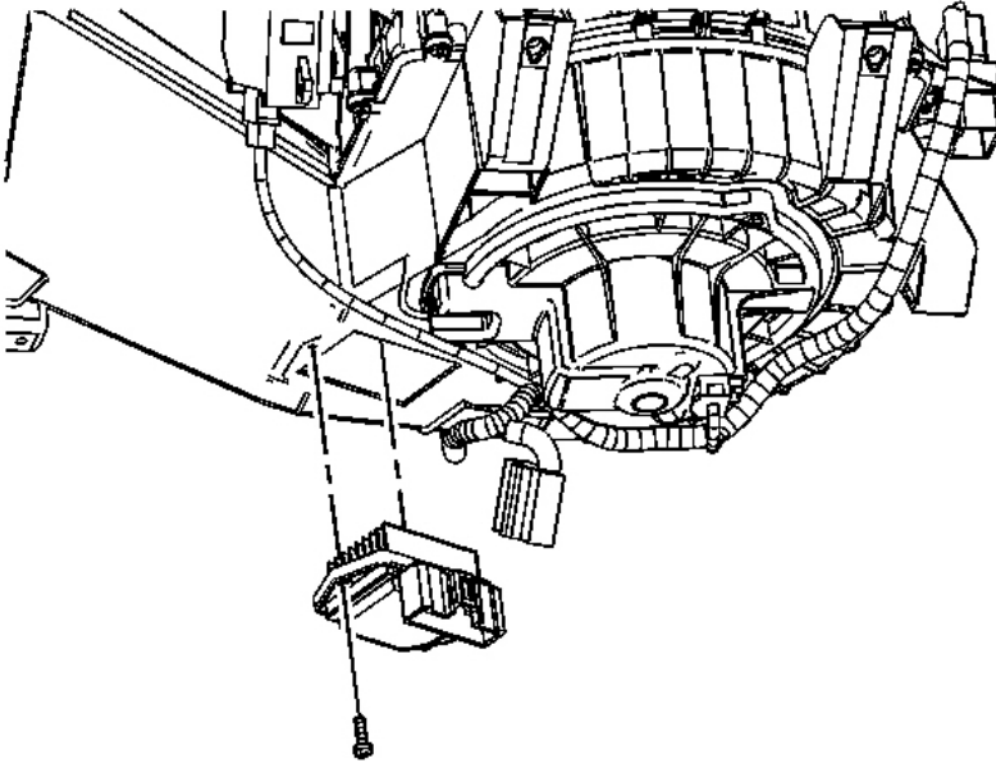


Fig. 19: View Of Blower Motor Control Processor
Courtesy of GENERAL MOTORS CORP.

NOTE: Refer to Fastener Notice in Cautions and Notices.

2. Install the blower motor control processor retaining screw.

Tighten: Tighten the screw to 1 N.m (9 lb in).

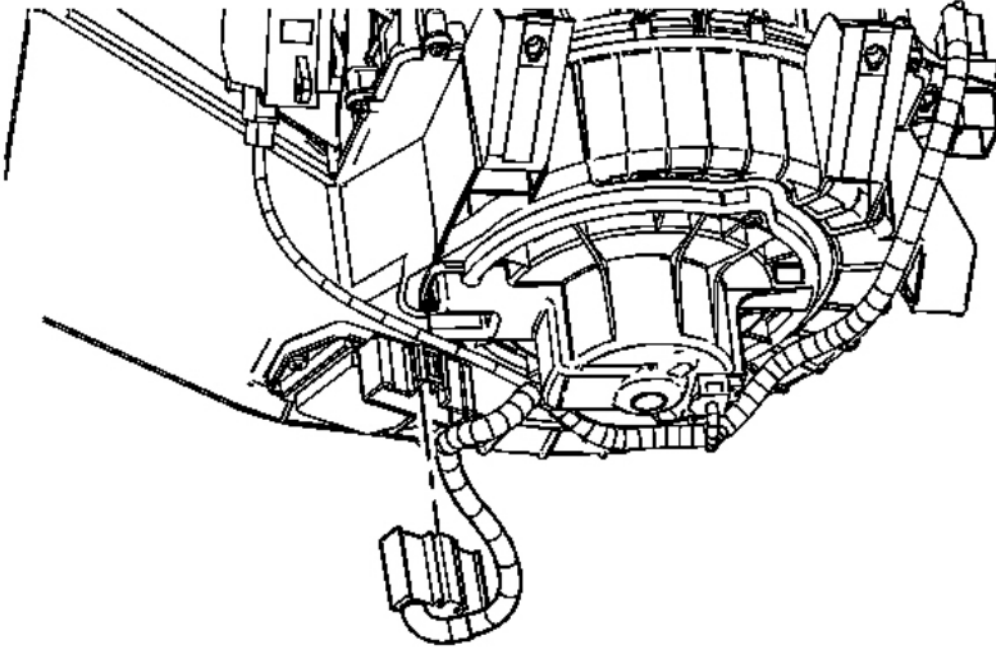


Fig. 20: View Of Blower Motor Control Processor Electrical Connector
Courtesy of GENERAL MOTORS CORP.

3. Connect the electrical connector to the blower motor control processor.
4. Install the right sound insulator. Refer to **Closeout/Insulator Panel Replacement - Right** in Instrument Panel, Gages, and Console.

RECIRCULATION ACTUATOR REPLACEMENT

Removal Procedure

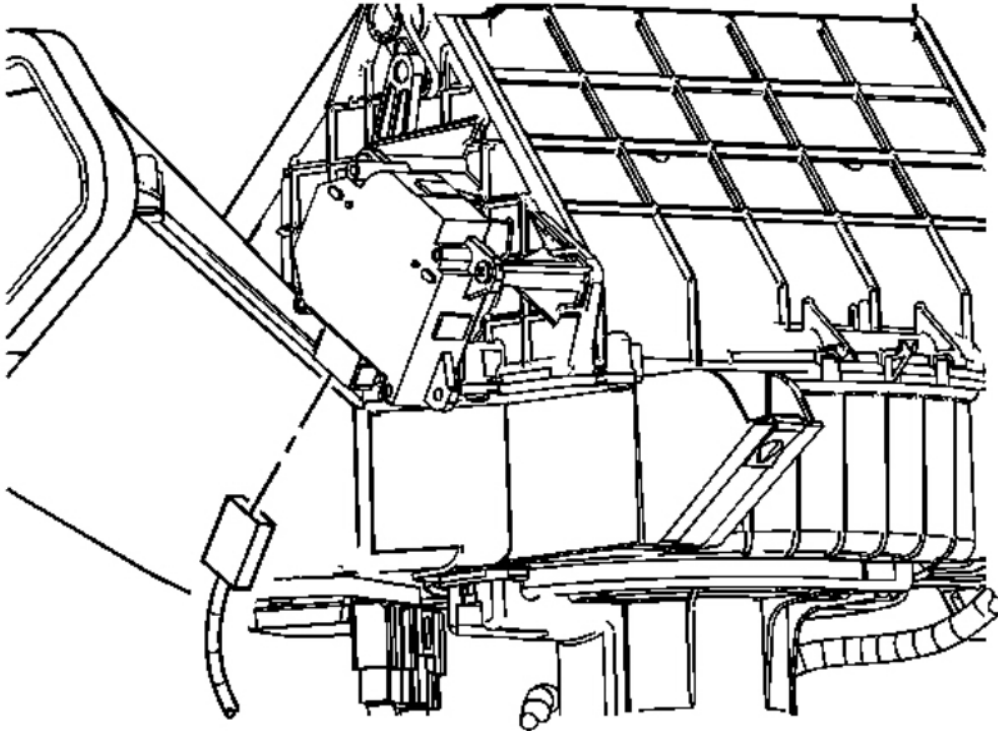


Fig. 21: View Of Recirculation Actuator Electrical Connector
Courtesy of GENERAL MOTORS CORP.

1. Remove the air inlet assembly. Refer to **Air Inlet Assembly Replacement** in Heating, Ventilation and Air Conditioning.
2. Disconnect the electrical connector from the recirculation actuator.

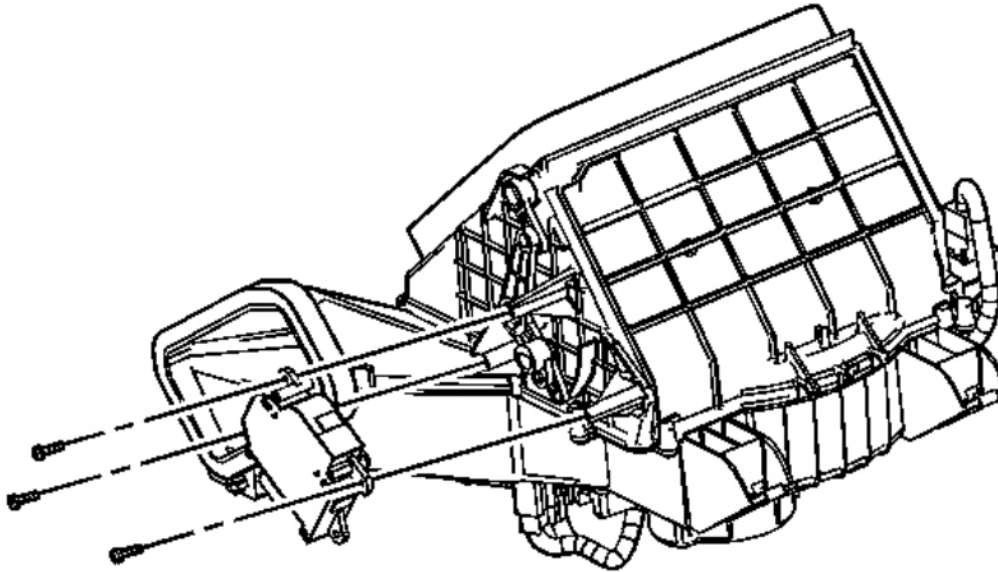


Fig. 22: View Of Recirculation Actuator
Courtesy of GENERAL MOTORS CORP.

3. Remove the recirculation actuator screws.
4. Remove the recirculation actuator.

Installation Procedure

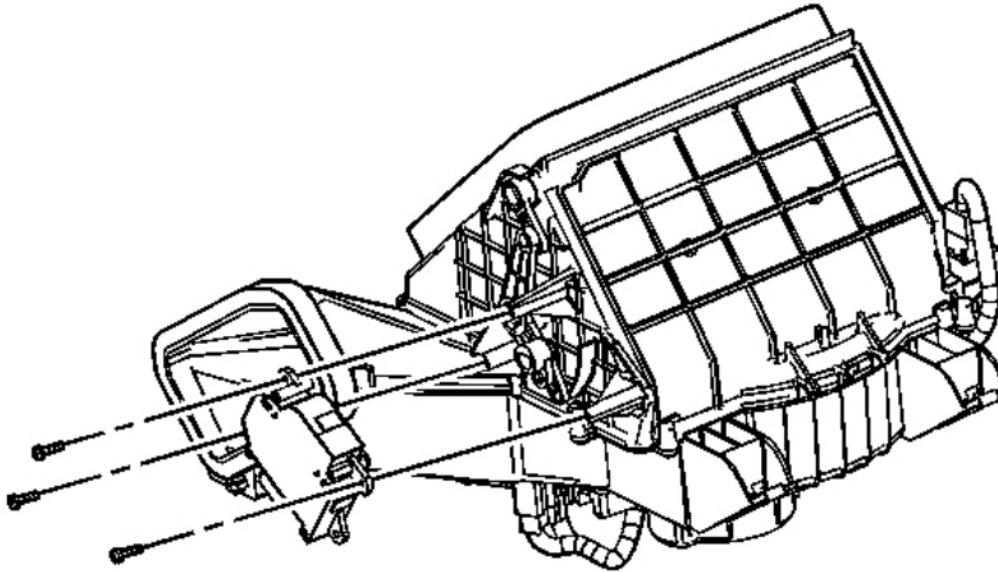


Fig. 23: View Of Recirculation Actuator
Courtesy of GENERAL MOTORS CORP.

1. Install the recirculation actuator.

NOTE: Refer to Fastener Notice in Cautions and Notices.

2. Install the recirculation actuator screws.

Tighten: Tighten the screws to 1 N.m (9 lb in).

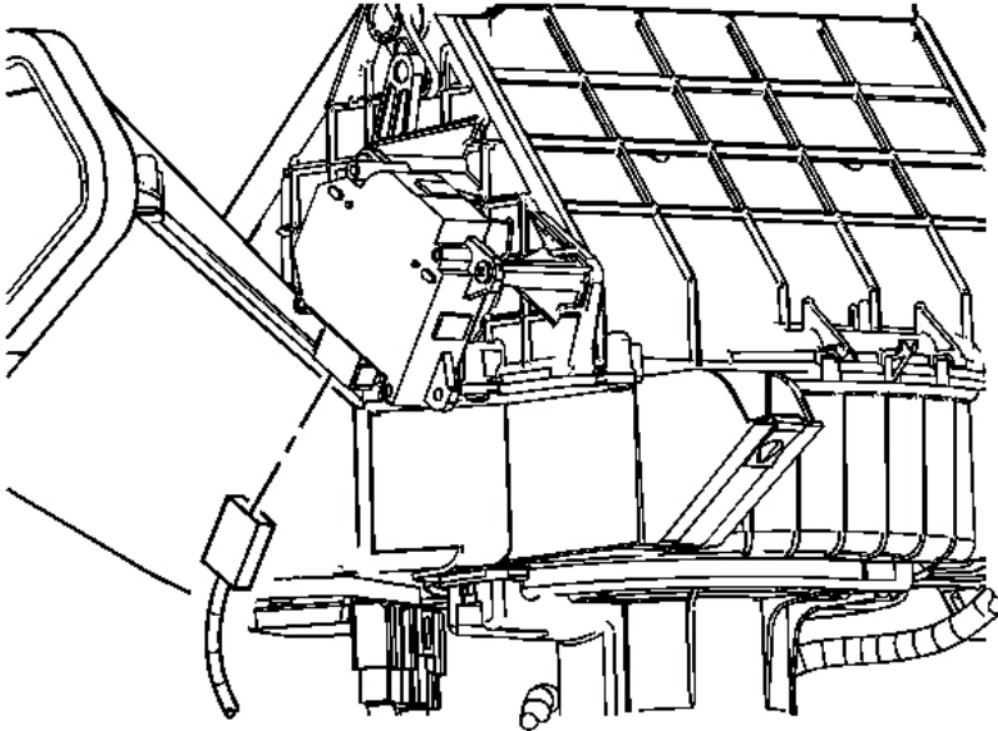


Fig. 24: View Of Recirculation Actuator Electrical Connector
Courtesy of GENERAL MOTORS CORP.

3. Connect the electrical connector to the recirculation actuator.
4. Install the air inlet assembly. Refer to **Air Inlet Assembly Replacement** in Heating, Ventilation and Air Conditioning.

MODE ACTUATOR REPLACEMENT

Removal Procedure

1. Remove the instrument panel (I/P) carrier. Refer to **Instrument Panel (I/P) Carrier Replacement** in Instrument Panel, Gages and Console.

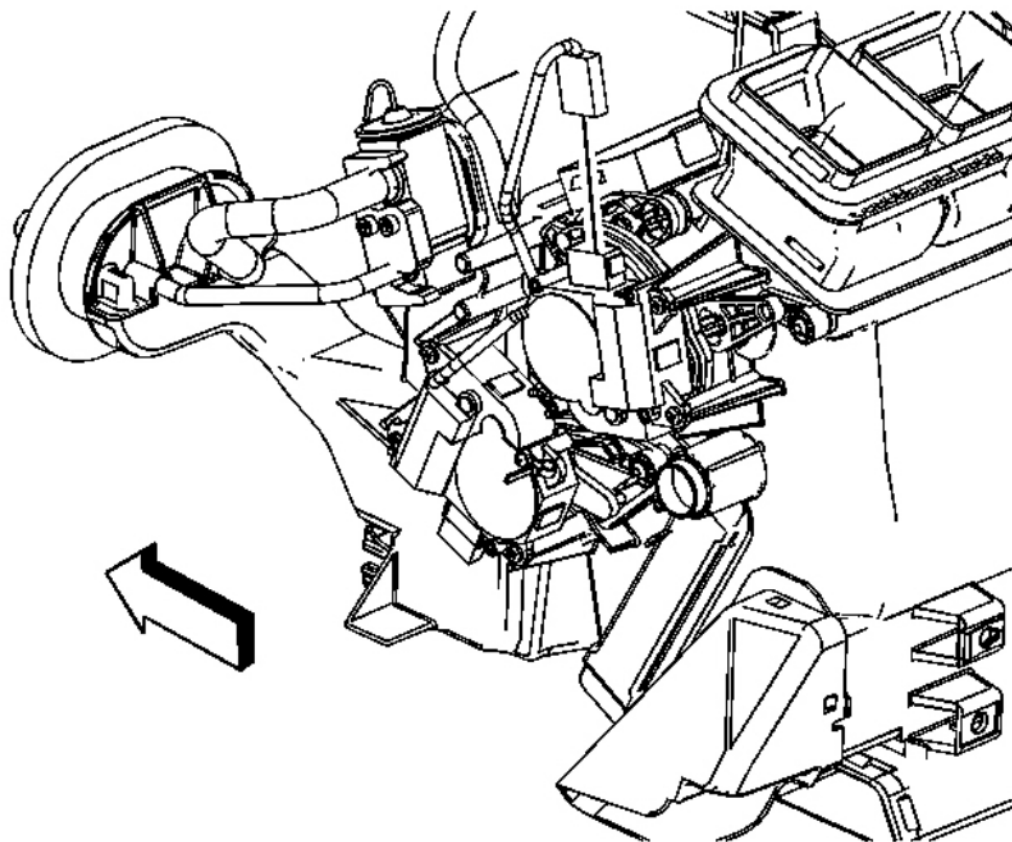


Fig. 25: View Of Mode Actuator Electrical Connector
Courtesy of GENERAL MOTORS CORP.

2. Disconnect the mode actuator electrical connector.

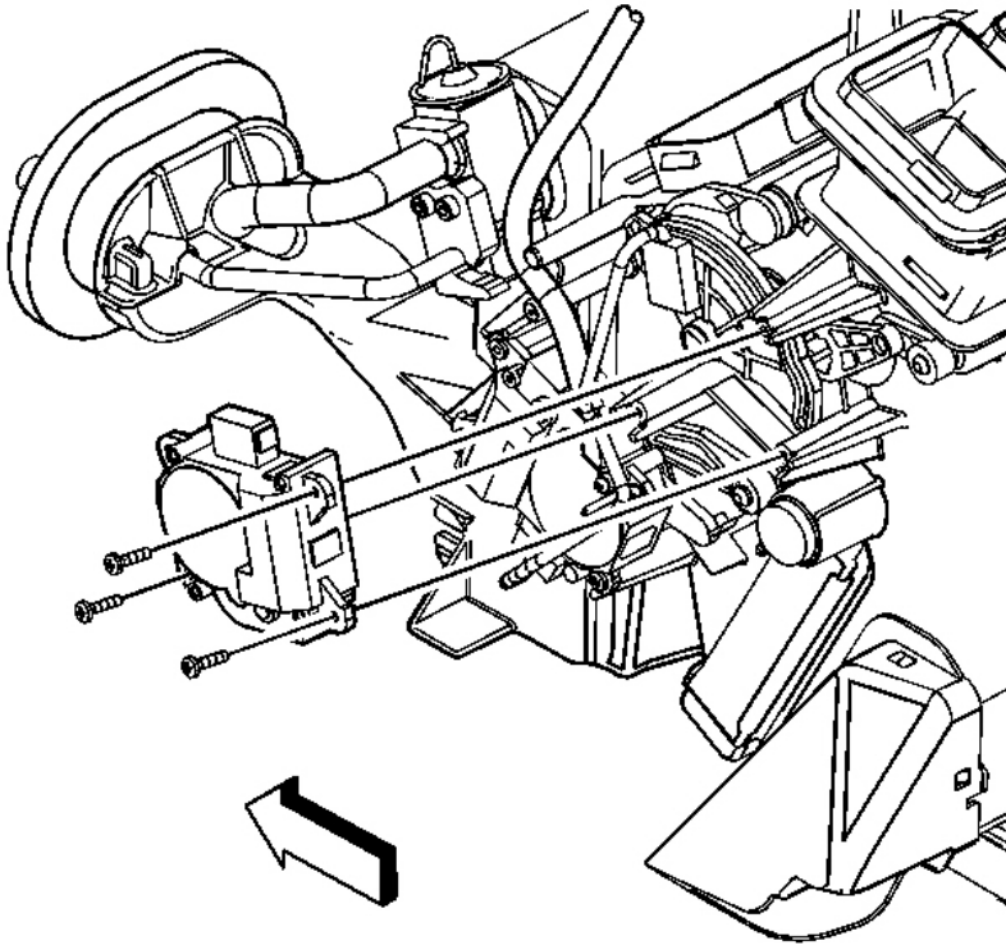


Fig. 26: View Of Mode Actuator
Courtesy of GENERAL MOTORS CORP.

3. Remove the mode actuator screws.
4. Remove the mode actuator.

Installation Procedure

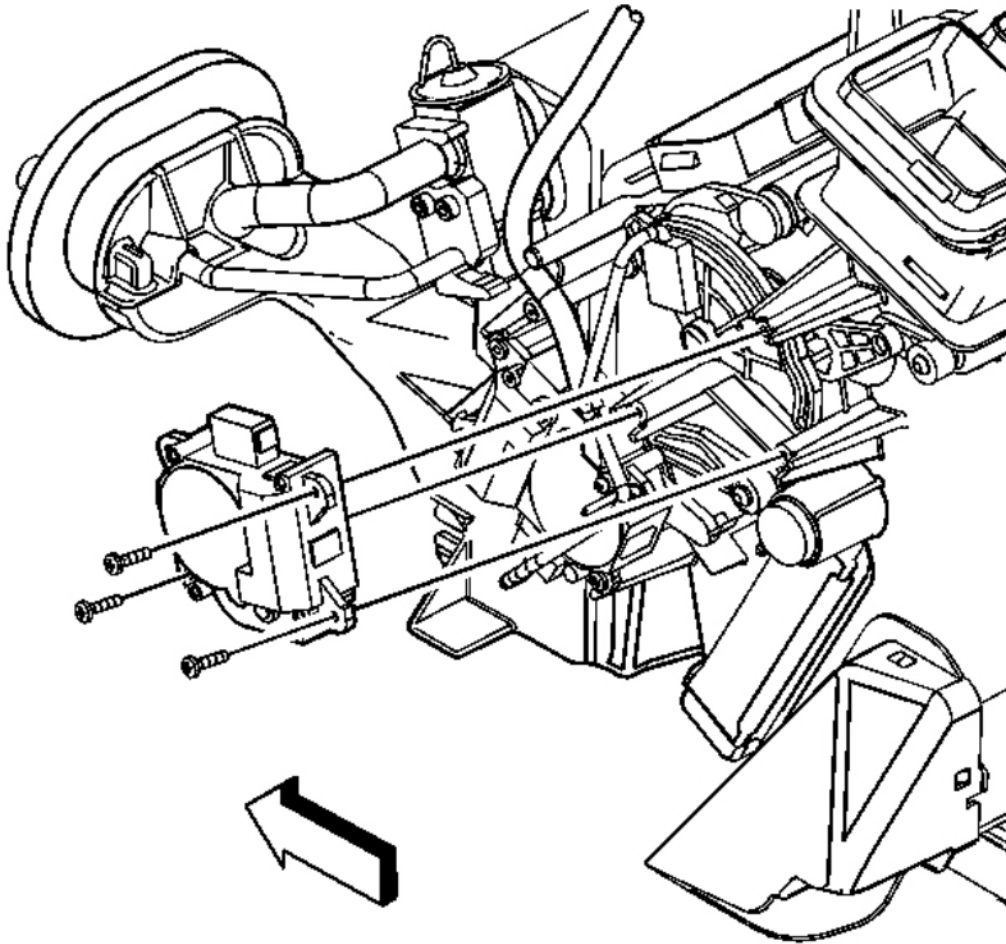


Fig. 27: View Of Mode Actuator
Courtesy of GENERAL MOTORS CORP.

1. If replacing the mode actuator, transfer the lever from the old actuator to the new actuator.
2. Install the mode actuator.

NOTE: Refer to Fastener Notice in Cautions and Notices.

3. Install the mode actuator screws.

Tighten: Tighten the screws to 1 N.m (9 lb in).

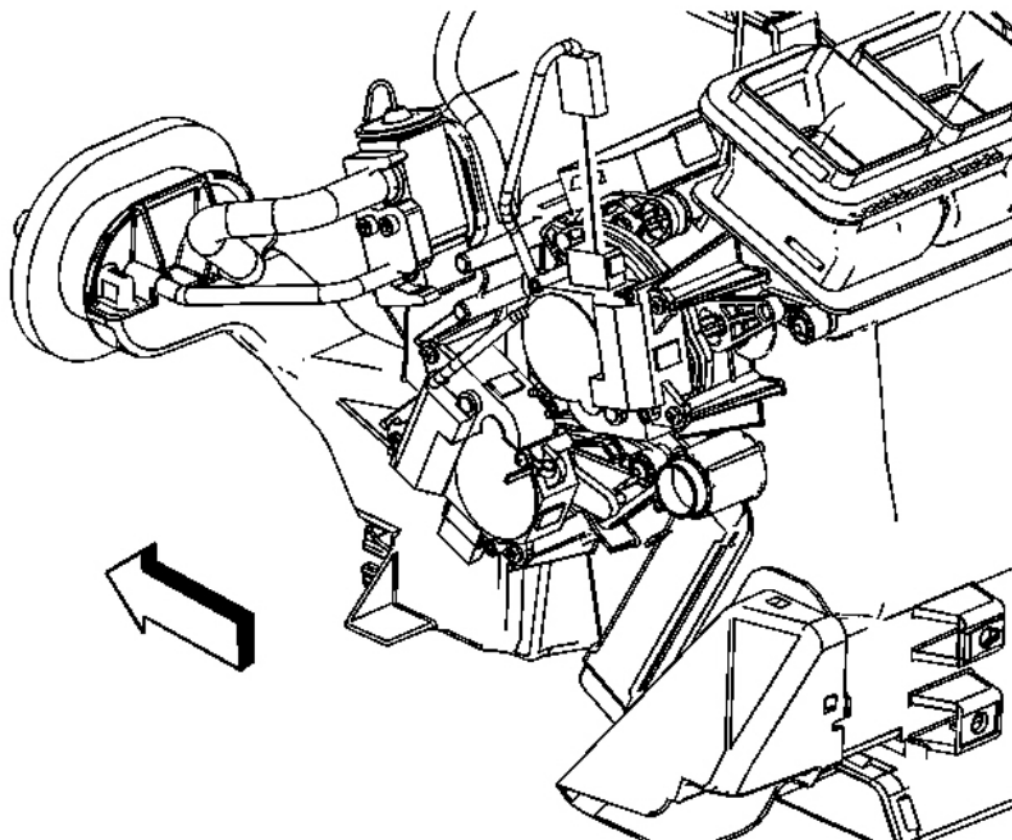


Fig. 28: View Of Mode Actuator Electrical Connector
Courtesy of GENERAL MOTORS CORP.

4. Connect the electrical connector to the actuator.
5. Install the I/P carrier. Refer to **Instrument Panel (I/P) Carrier Replacement** in Instrument Panel, Gages and Console.

AIR TEMPERATURE ACTUATOR REPLACEMENT - RIGHT

Removal Procedure

1. Remove the right closeout panel. Refer to **Closeout/Insulator Panel Replacement - Right** in Instrument Panel, Gages and Console.

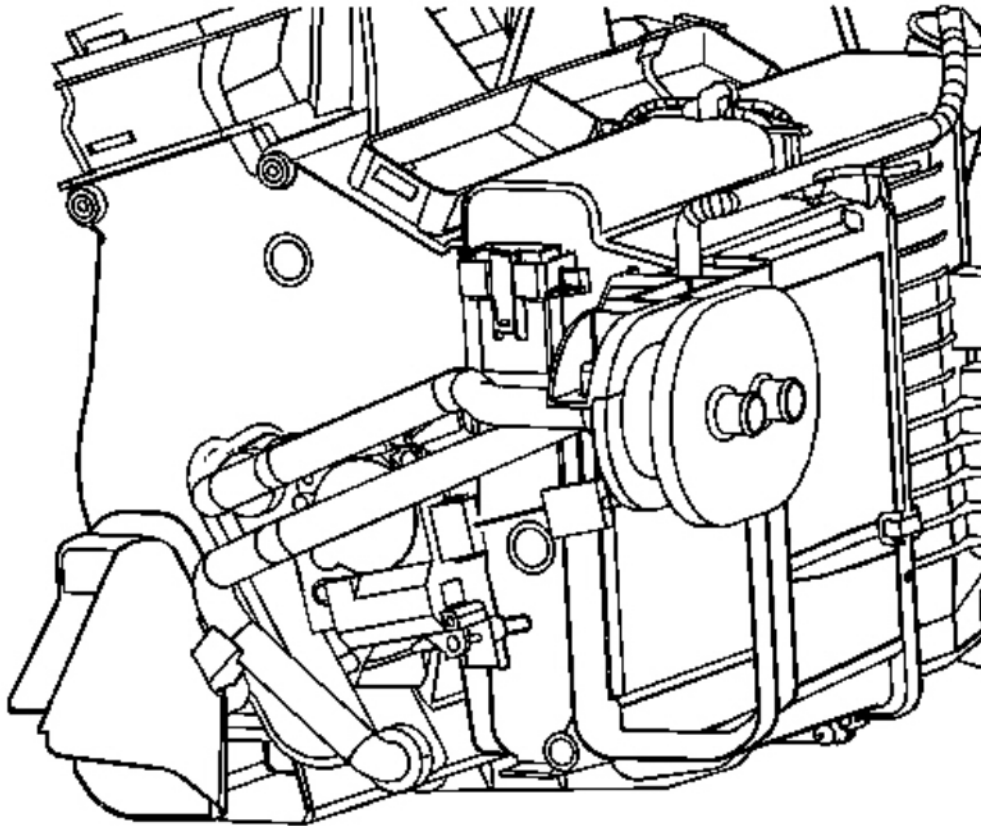


Fig. 29: View Of Right Air Temperature Actuator Electrical Connector
Courtesy of GENERAL MOTORS CORP.

2. Remove the instrument panel compartment. Refer to **Compartment Replacement - Instrument Panel (I/P)** in Instrument Panel, Gages and Console.
3. Disconnect the right air temperature actuator electrical connector.

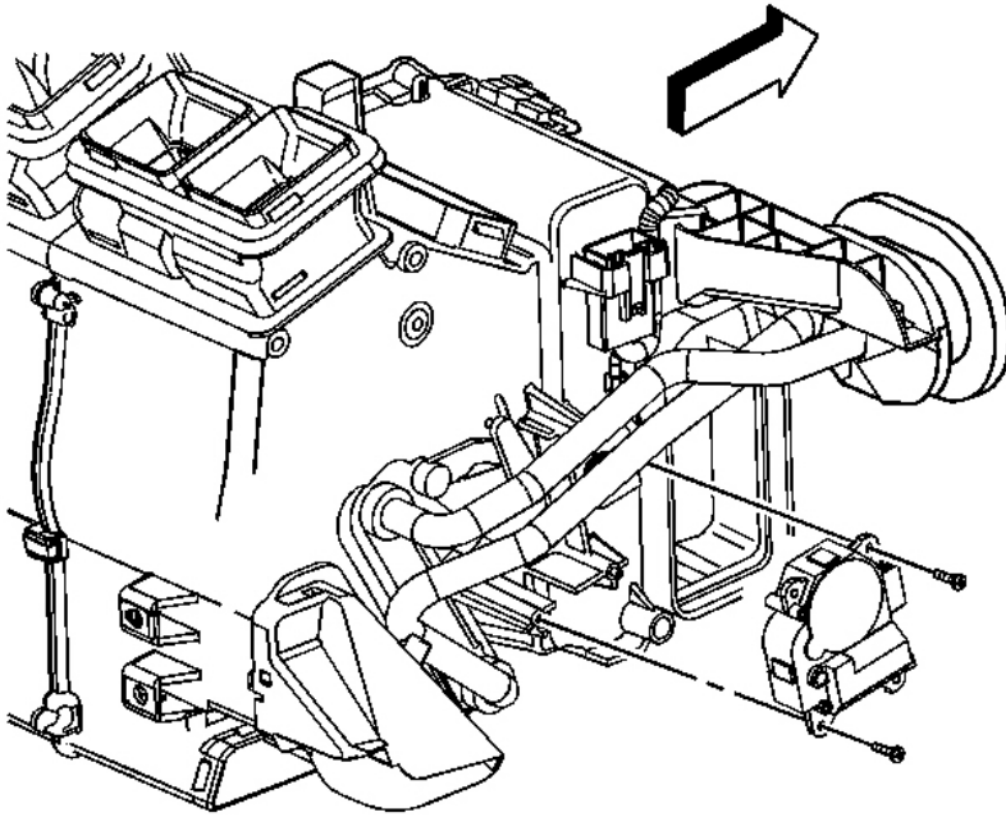


Fig. 30: View Of Right Air Temperature Actuator
Courtesy of GENERAL MOTORS CORP.

4. Remove the right air temperature actuator screws.
5. Remove the right air temperature actuator.

Installation Procedure

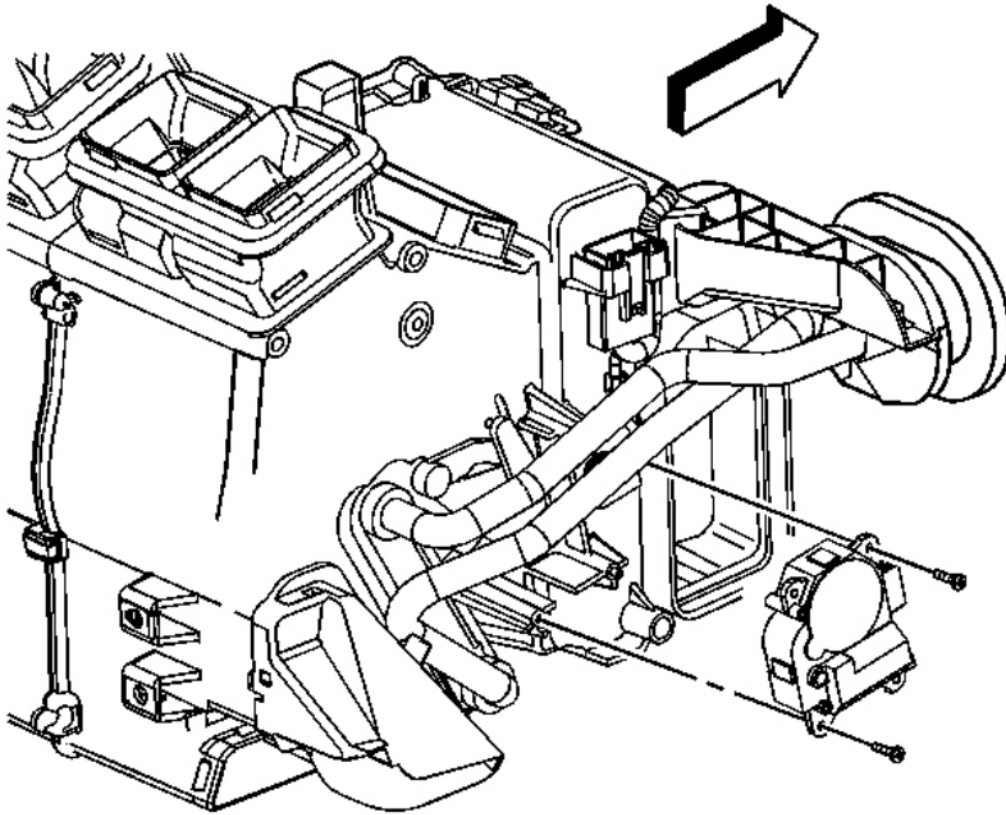


Fig. 31: View Of Right Air Temperature Actuator
Courtesy of GENERAL MOTORS CORP.

1. Install the right air temperature actuator.

NOTE: Refer to Fastener Notice in Cautions and Notices.

2. Install the right air temperature actuator screws.

Tighten: Tighten the screws to 1 N.m (9 lb in).

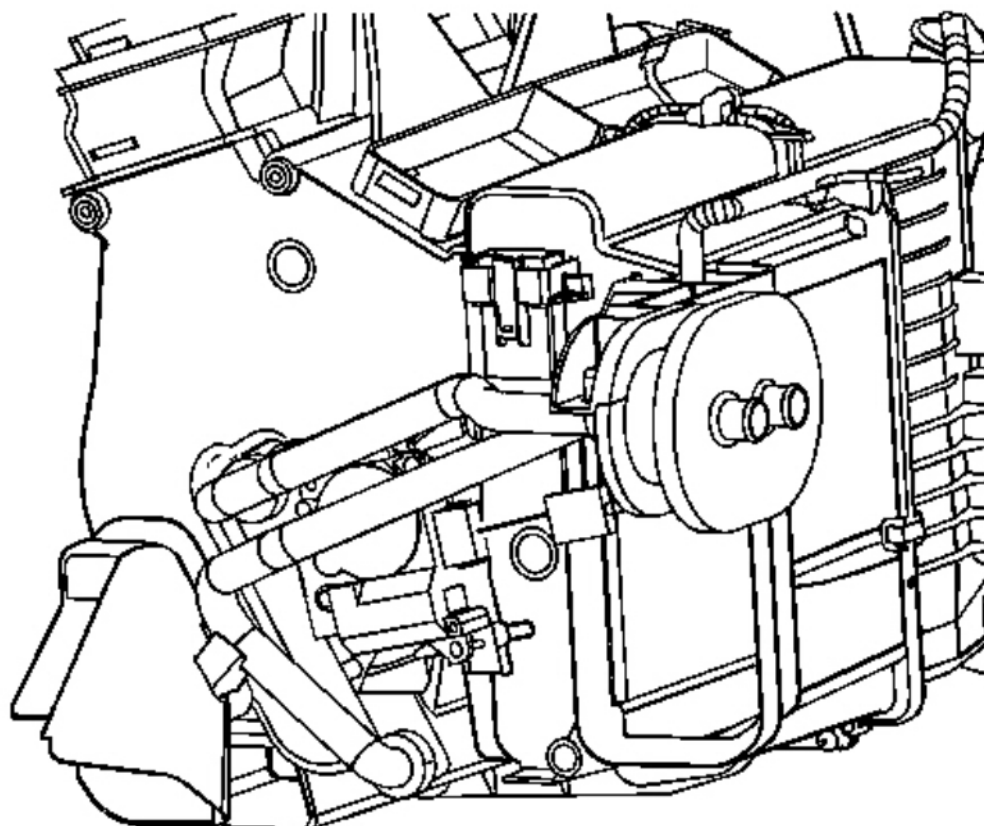


Fig. 32: View Of Right Air Temperature Actuator Electrical Connector
Courtesy of GENERAL MOTORS CORP.

3. Connect the right air temperature actuator electrical connector.
4. Install the instrument panel compartment. Refer to **Compartment Replacement - Instrument Panel (I/P)** in Instrument Panel, Gages and Console.
5. Install the right closeout panel. Refer to **Closeout/Insulator Panel Replacement - Right** in Instrument Panel, Gages and Console.

AIR TEMPERATURE ACTUATOR REPLACEMENT - LEFT

Removal Procedure

1. Remove the instrument panel (I/P) carrier. Refer to **Instrument Panel (I/P) Carrier**

Replacement in Instrument Panel, Gages and Console.

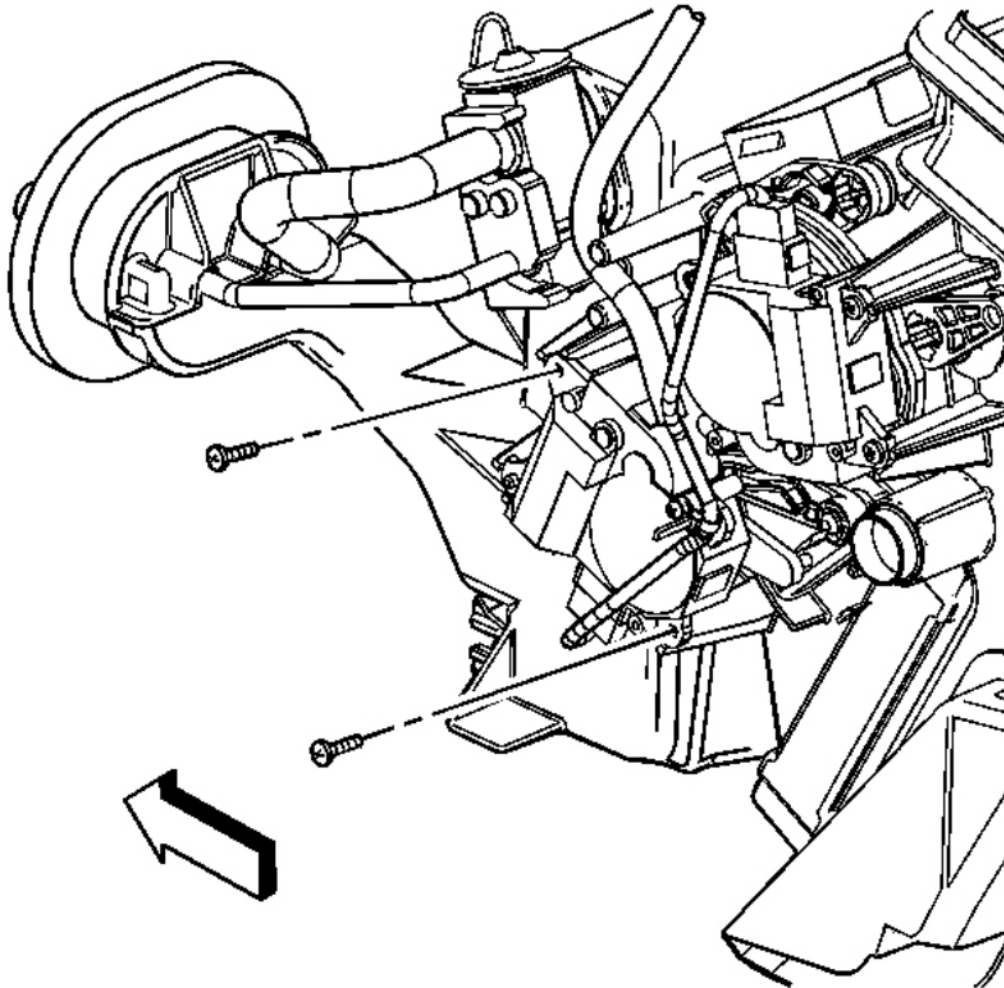


Fig. 33: View Of Left Air Temperature Actuator Screws
Courtesy of GENERAL MOTORS CORP.

2. Remove the left air temperature actuator screws.
3. Remove the left air temperature actuator harness screw.

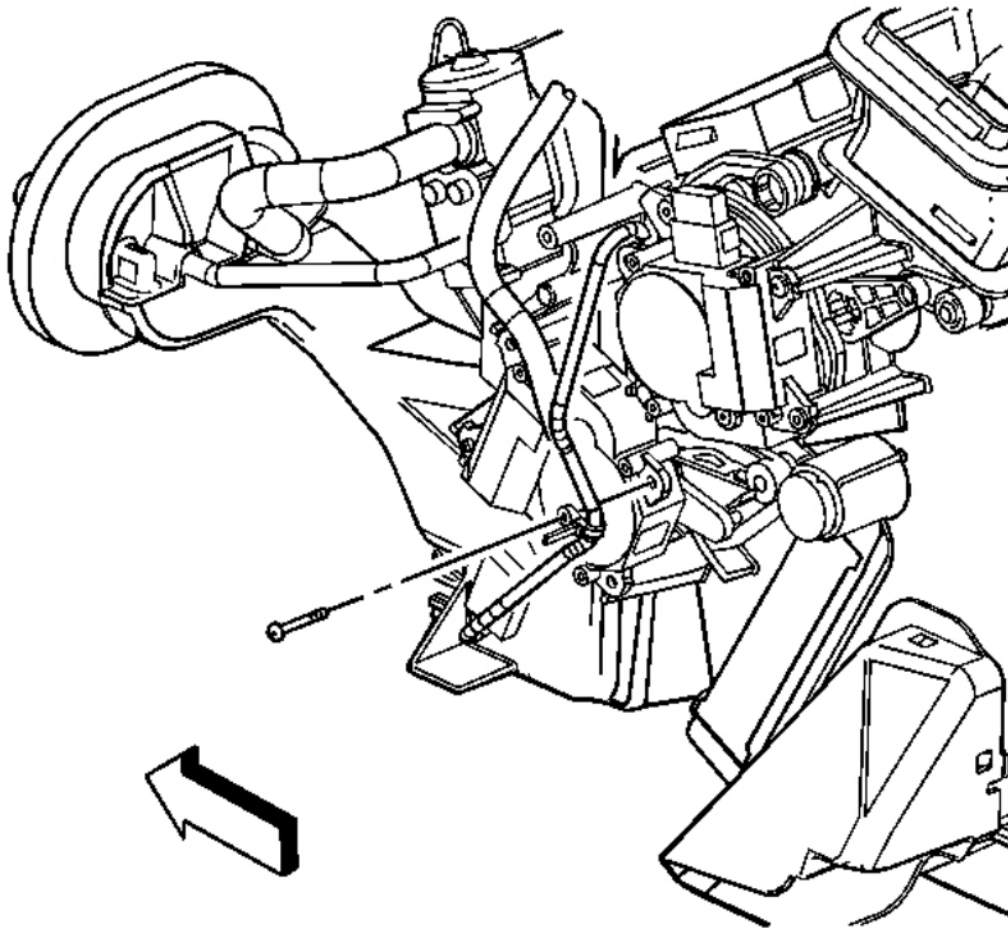


Fig. 34: View Of Left Air Temperature Actuator Harness Screw
Courtesy of GENERAL MOTORS CORP.

4. Disconnect the left air temperature actuator electrical connector from the actuator.

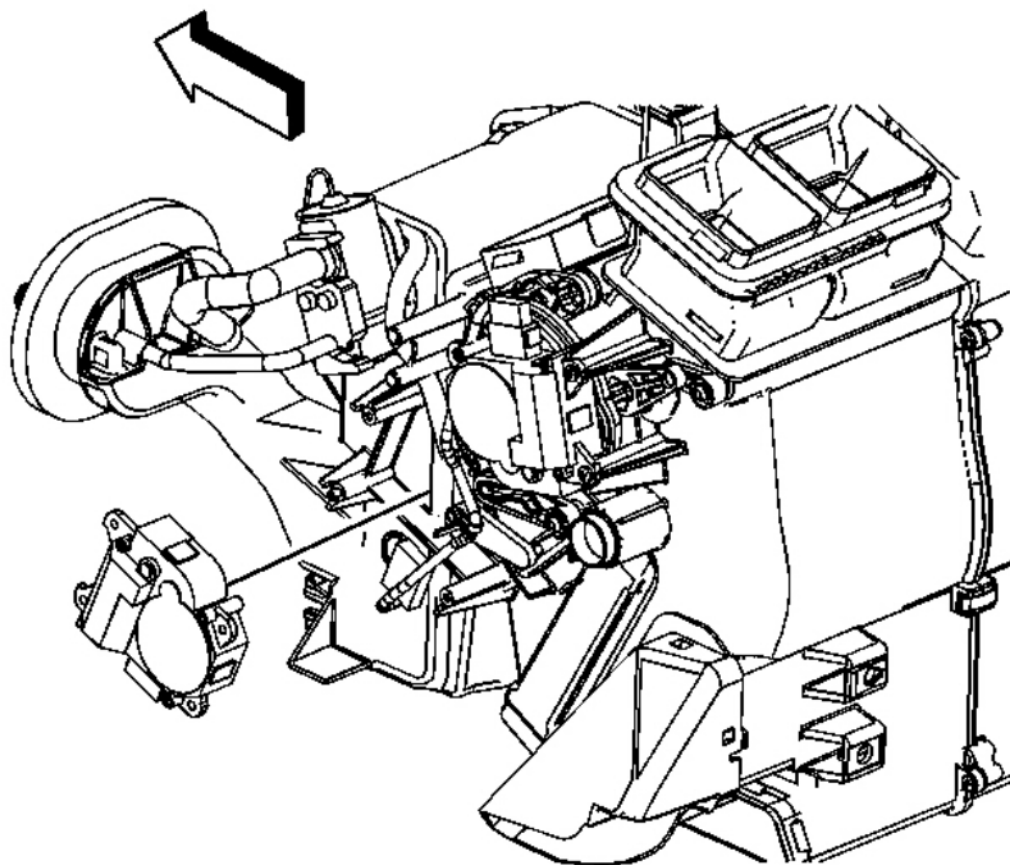


Fig. 35: View Of Left Air Temperature Actuator
Courtesy of GENERAL MOTORS CORP.

5. Remove the left air temperature actuator.

Installation Procedure

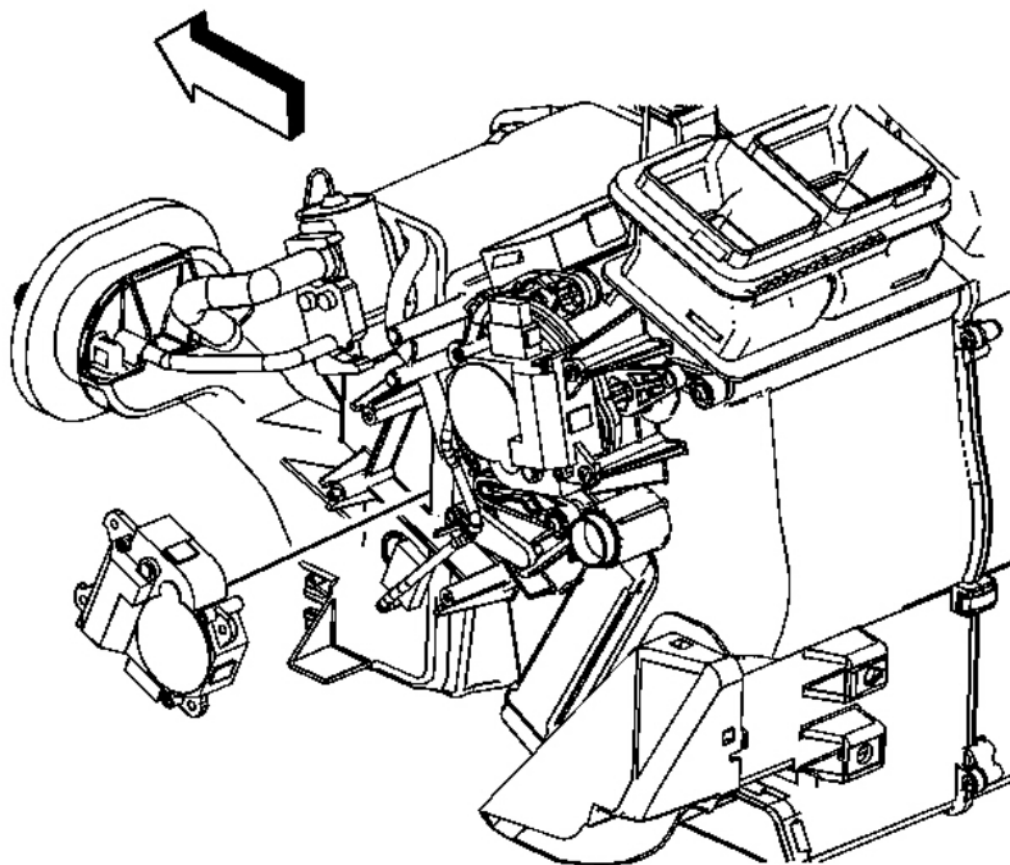


Fig. 36: View Of Left Air Temperature Actuator
Courtesy of GENERAL MOTORS CORP.

1. Install the left air temperature actuator.

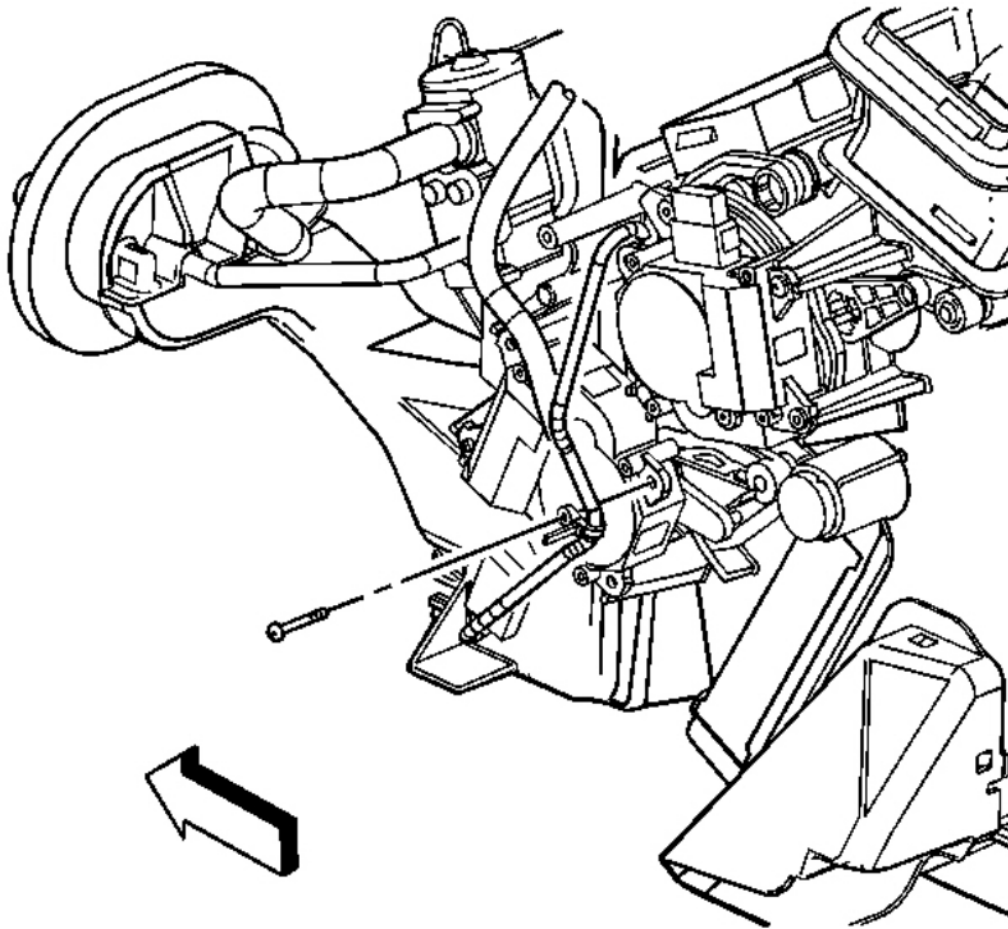


Fig. 37: View Of Left Air Temperature Actuator Harness Screw
Courtesy of GENERAL MOTORS CORP.

NOTE: Refer to Fastener Notice in Cautions and Notices.

2. Install the left air temperature actuator harness screw.

Tighten: Tighten the screws to 1 N.m (9 lb in).

3. Connect the left air temperature actuator electrical connector to the actuator.

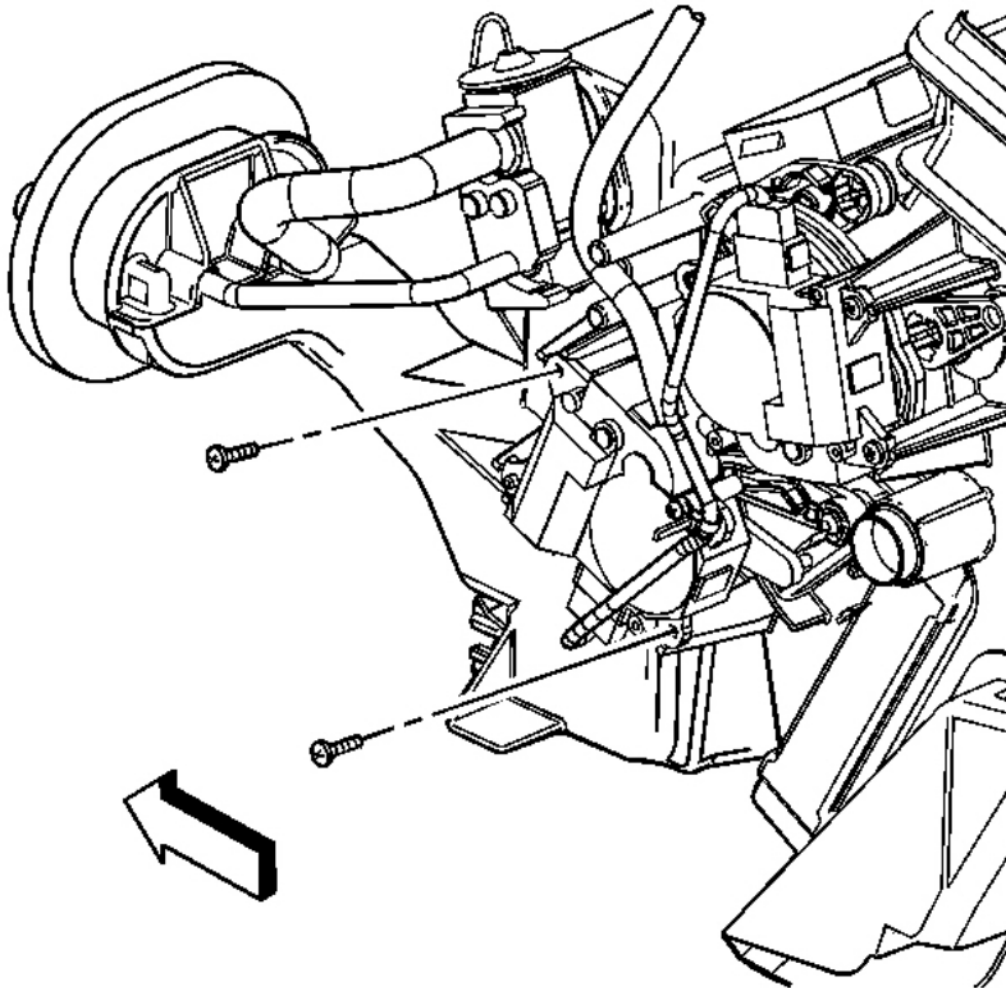


Fig. 38: View Of Left Air Temperature Actuator Screws
Courtesy of GENERAL MOTORS CORP.

4. Install the left air temperature actuator screws.

Tighten: Tighten the screws to 1 N.m (9 lb in).

5. Install the instrument panel (I/P) carrier. Refer to **Instrument Panel (I/P) Carrier Replacement** in Instrument Panel, Gages and Console.

Removal Procedure

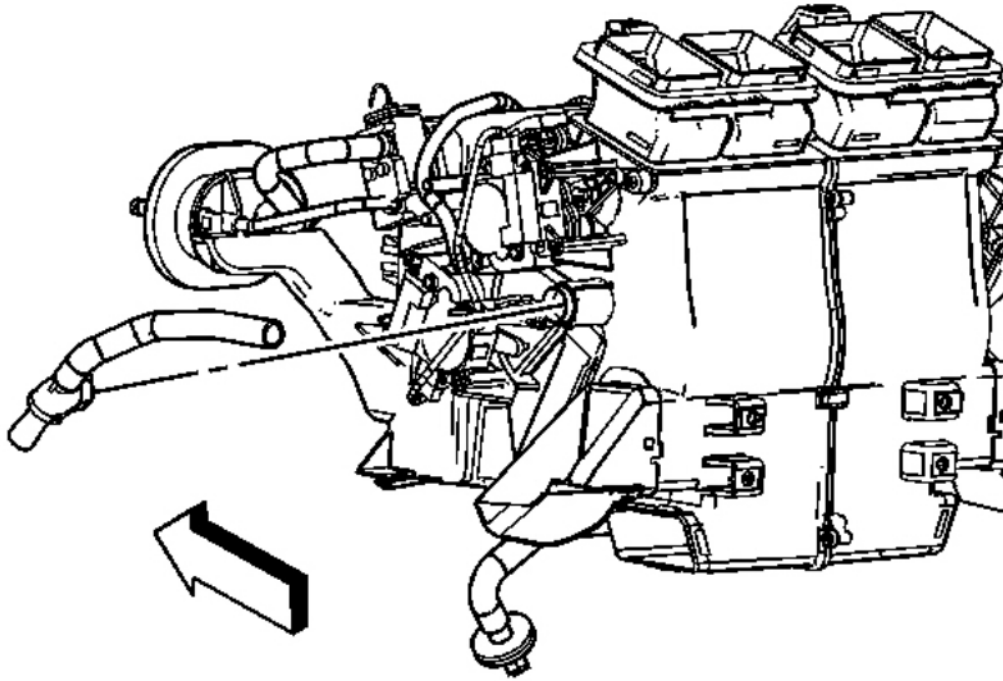


Fig. 39: View Of Aspirator Hose
Courtesy of GENERAL MOTORS CORP.

1. Remove the knee bolster. Refer to **Knee Bolster Replacement** in Instrument Panel, Gages, and Console.
2. Disconnect the aspirator hose from the HVAC module.

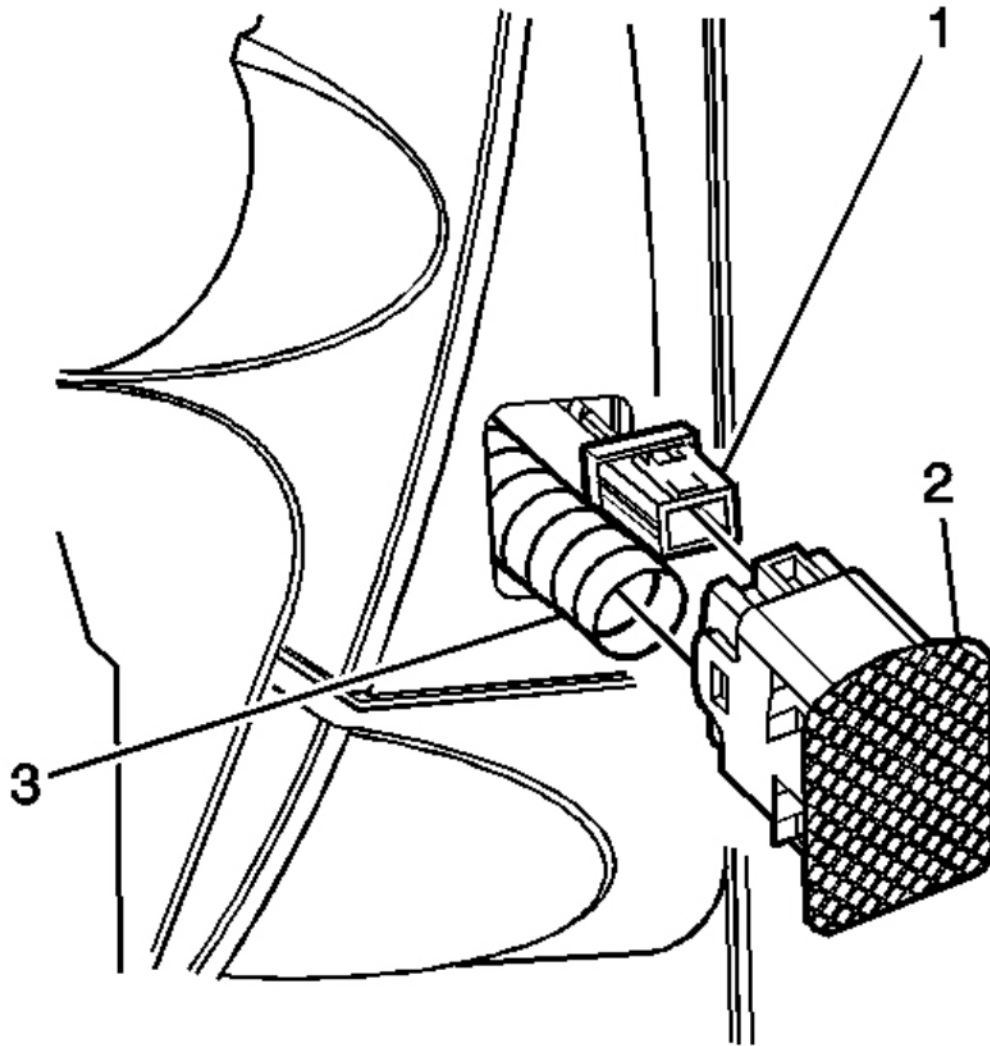


Fig. 40: View Of Air Temperature Sensor & Aspirator Hose
Courtesy of GENERAL MOTORS CORP.

3. Remove the inside air temperature sensor (2) from the instrument panel (I/P) by gently prying outward.
4. Disconnect the aspirator hose (3) from the inside air temperature sensor.
5. Remove the aspirator hose.

Installation Procedure

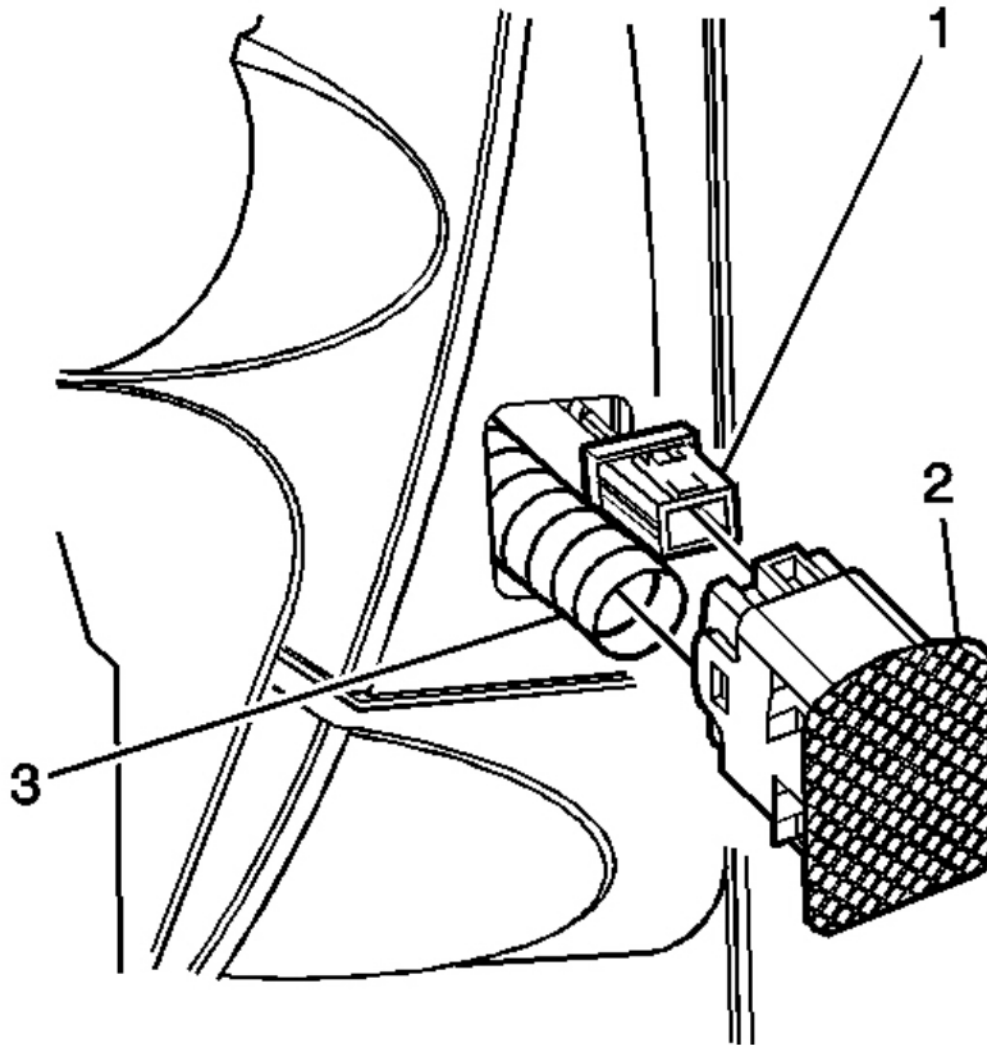


Fig. 41: View Of Air Temperature Sensor & Aspirator Hose
Courtesy of GENERAL MOTORS CORP.

1. Install the aspirator hose.
2. Connect the aspirator hose (3) to the inside air temperature sensor.
3. Install the inside air temperature sensor (2) to the I/P.

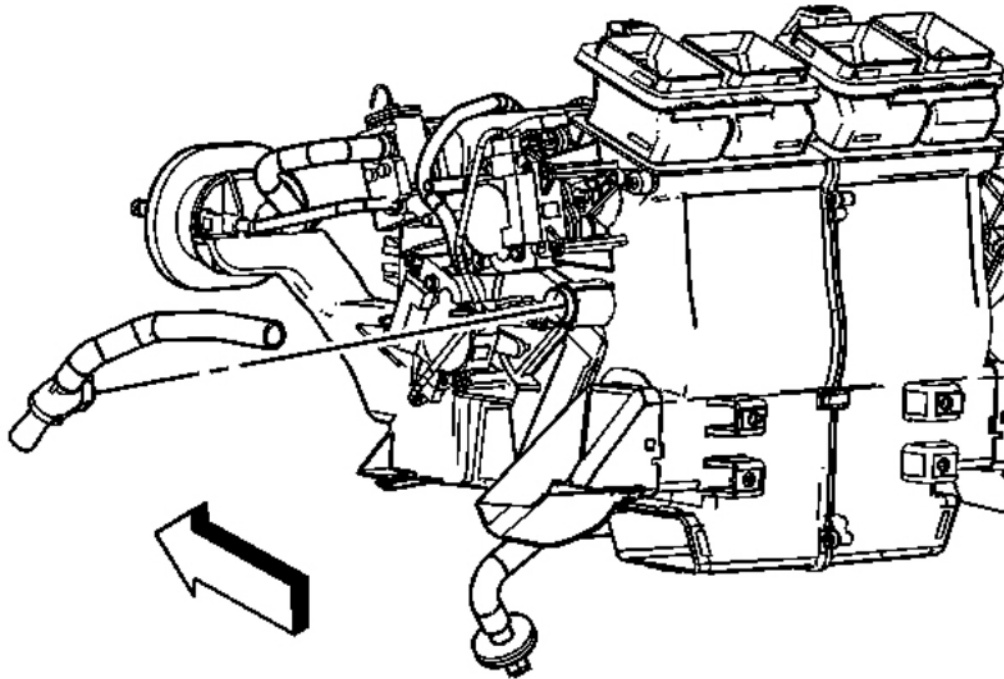


Fig. 42: View Of Aspirator Hose
Courtesy of GENERAL MOTORS CORP.

4. Connect the aspirator hose to the HVAC module.
5. Install the knee bolster. Refer to **Knee Bolster Replacement** in Instrument Panel, Gages, and Console.

AMBIENT AIR TEMPERATURE SENSOR REPLACEMENT

Removal Procedure

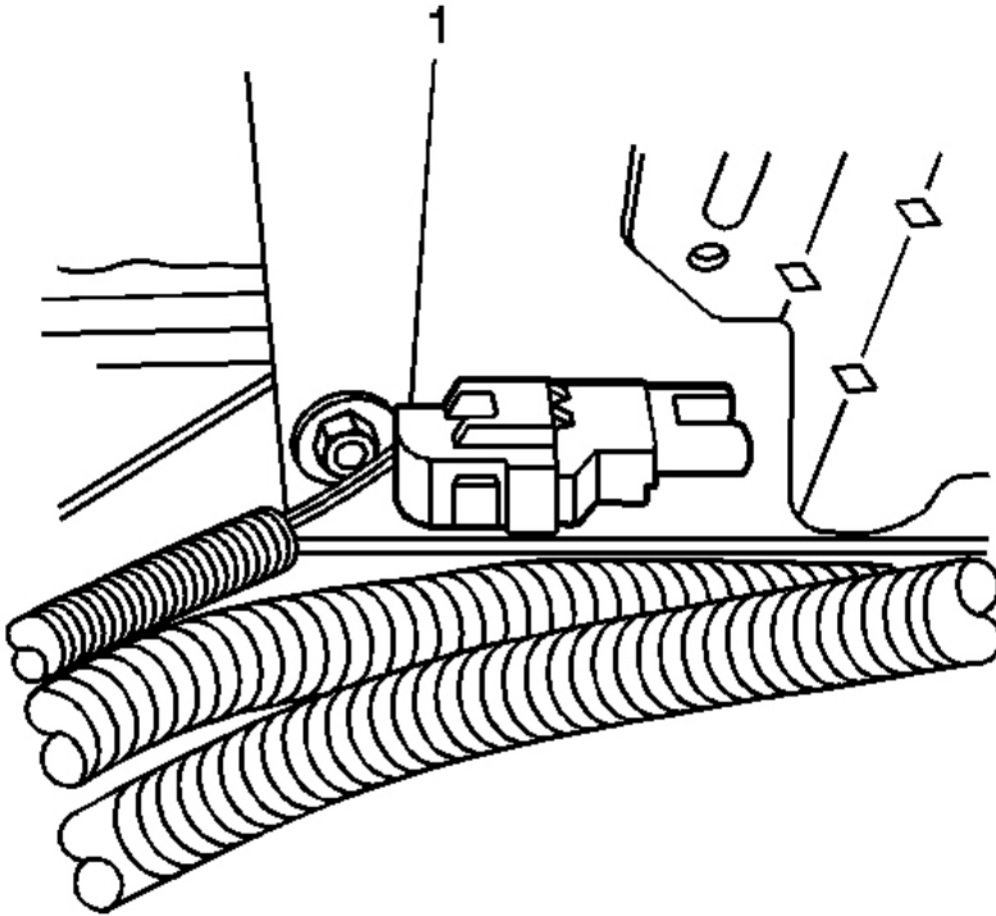


Fig. 43: View Of Ambient Air Temperature Sensor Electrical Connector
Courtesy of GENERAL MOTORS CORP.

1. Disconnect the ambient air temperature sensor electrical connector (1).
2. Release the ambient air temperature sensor from the clip.
3. Remove the ambient air temperature sensor from the vehicle.

Installation Procedure

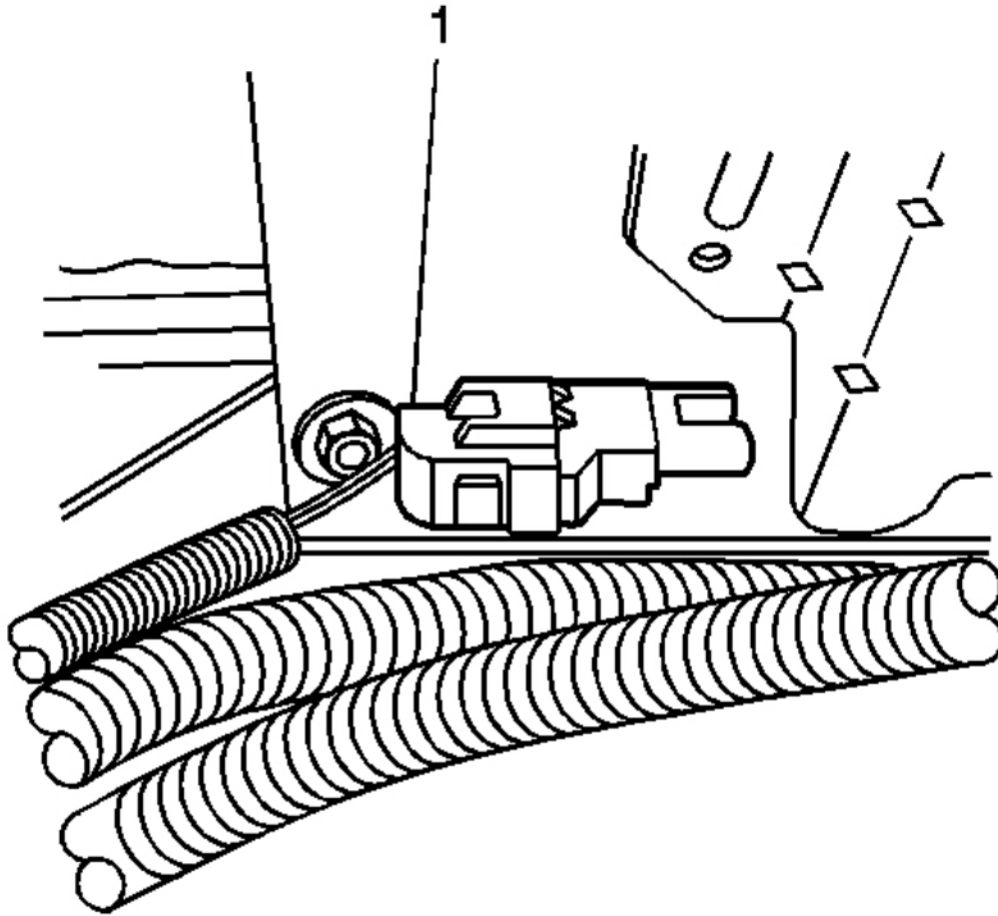


Fig. 44: View Of Ambient Air Temperature Sensor Electrical Connector
Courtesy of GENERAL MOTORS CORP.

1. Place the ambient air temperature sensor in position.
2. Engage the ambient air temperature sensor into the clip.
3. Connect the ambient air temperature electrical connector (1).

INSIDE AIR TEMPERATURE SENSOR REPLACEMENT

Removal Procedure

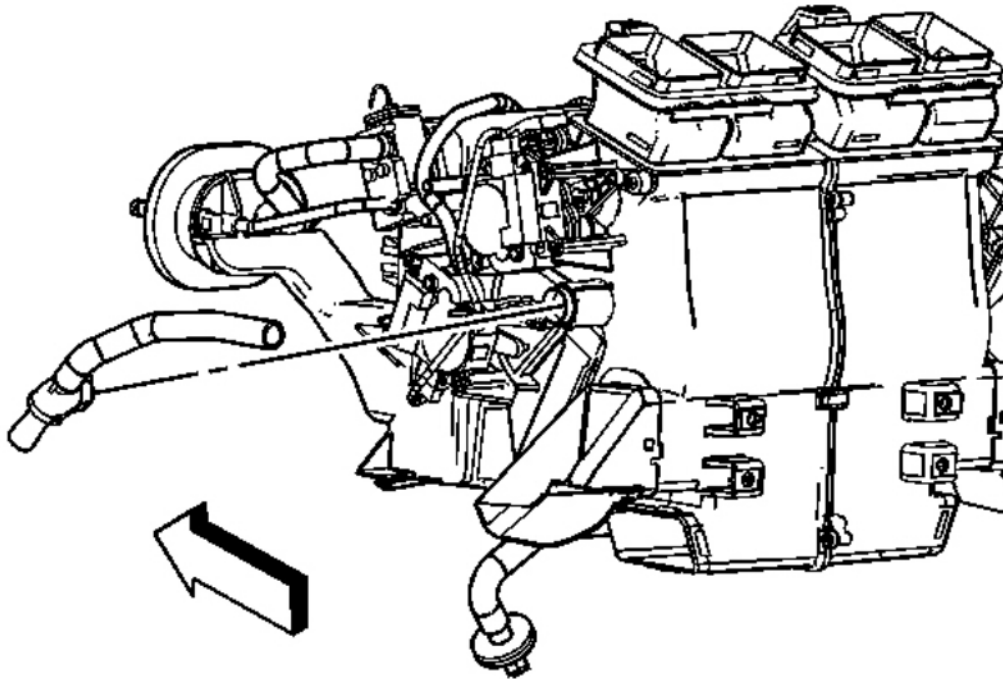


Fig. 45: View Of Aspirator Hose
Courtesy of GENERAL MOTORS CORP.

1. Remove the knee bolster. Refer to **Knee Bolster Replacement** in Instrument Panel, Gages and Console.
2. Disconnect the aspirator hose from the HVAC module.

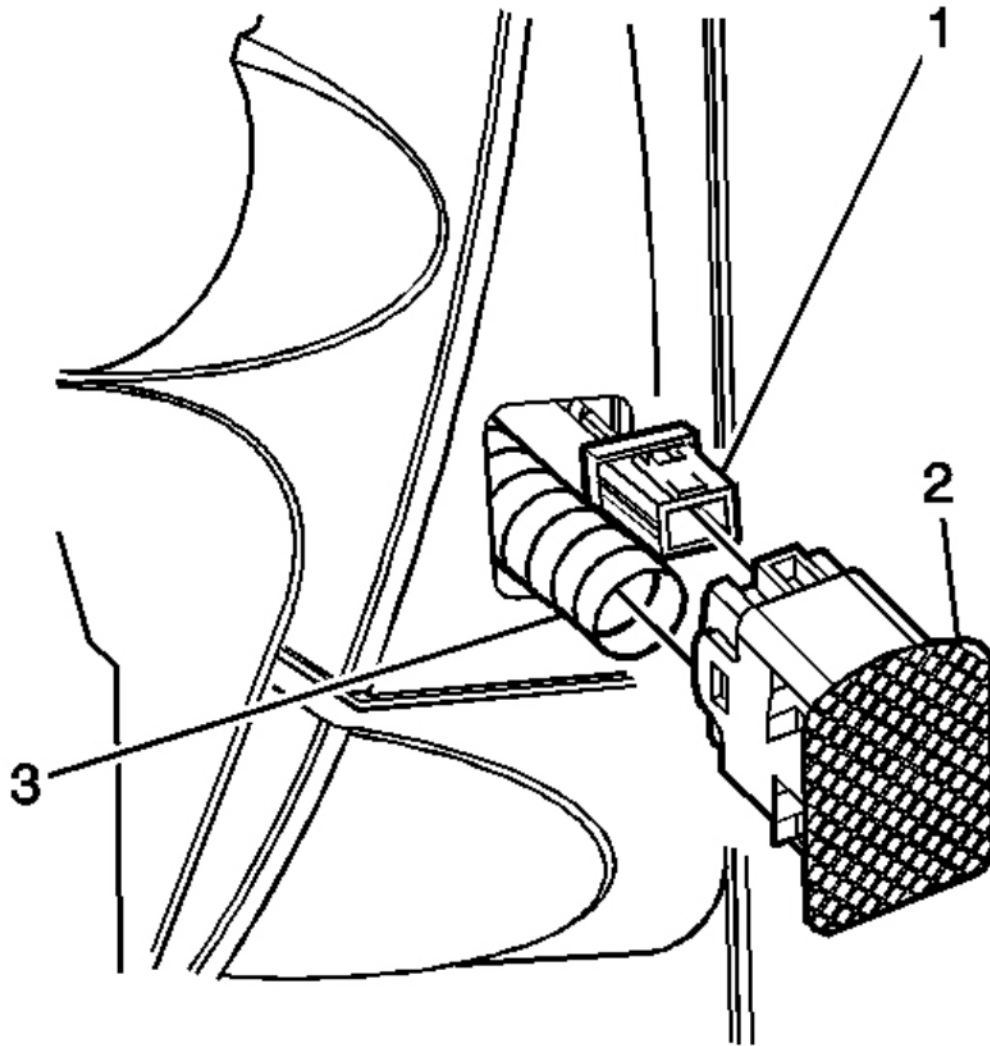


Fig. 46: View Of Air Temperature Sensor & Aspirator Hose
Courtesy of GENERAL MOTORS CORP.

3. Remove the inside air temperature sensor (2) from the I/P by gently prying outward.
4. Disconnect the inside air temperature sensor (2) electrical connection (1).
5. Disconnect the aspirator hose (3) from the inside temperature sensor (2).
6. Remove the inside air temperature sensor (2).

Installation Procedure

1. Install the inside air temperature sensor (2).
2. Connect the aspirator hose (3) to the inside temperature sensor (2).

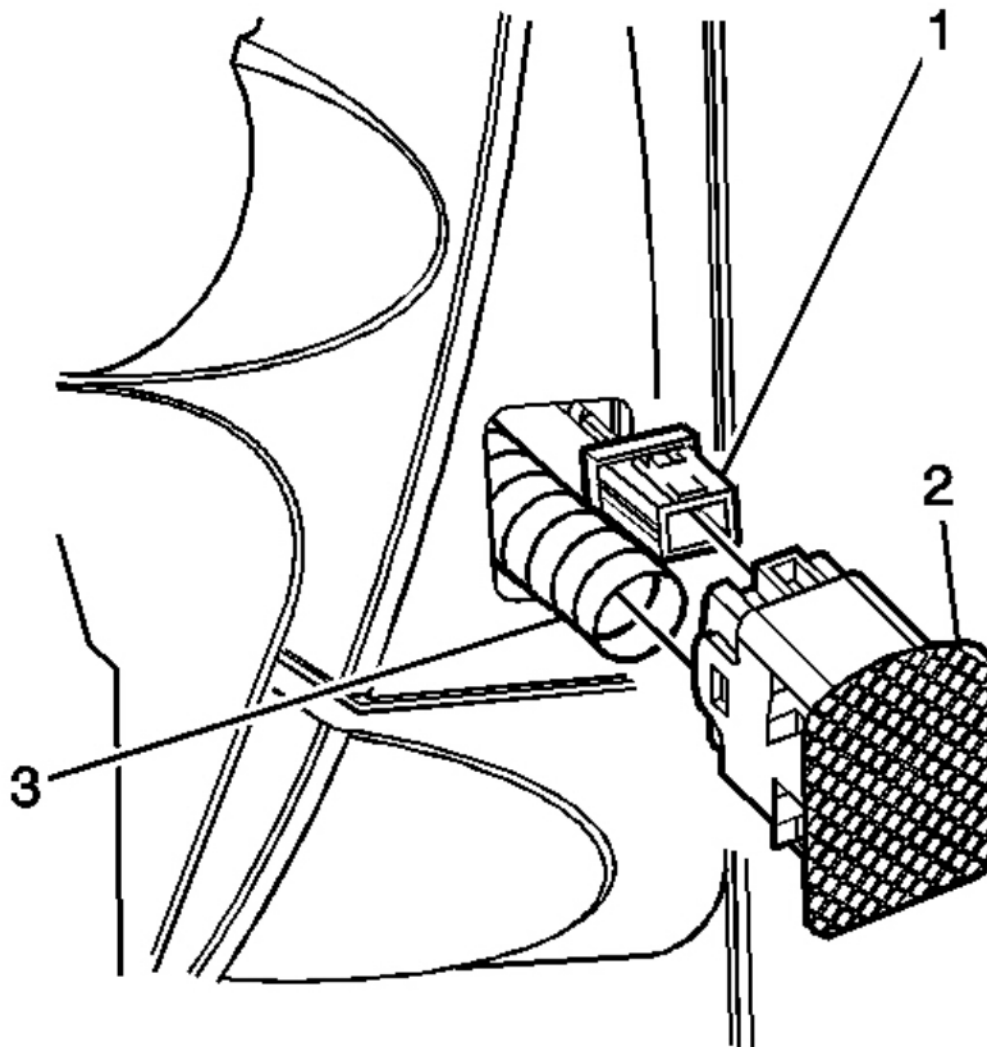


Fig. 47: View Of Air Temperature Sensor & Aspirator Hose
Courtesy of GENERAL MOTORS CORP.

3. Connect the inside air temperature sensor electrical connector (1).

IMPORTANT: Assure that the foam seal tape is in place and covering the openings on the sides of the grille assembly (2).

4. Install the inside air temperature sensor (2) into the I/P.

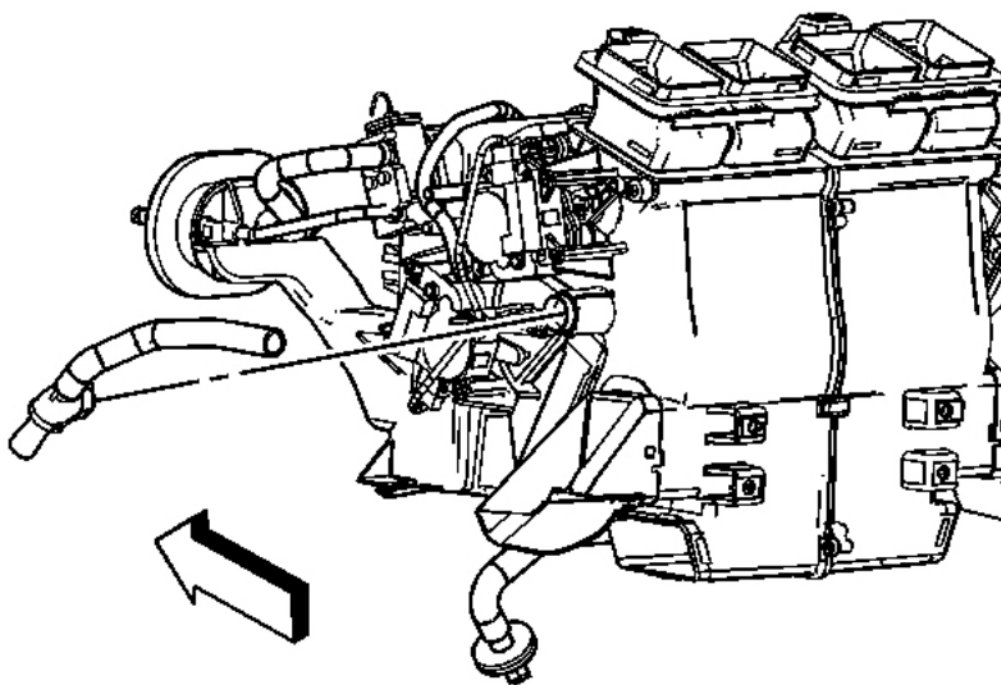


Fig. 48: View Of Aspirator Hose
Courtesy of GENERAL MOTORS CORP.

5. Connect the aspirator hose to the HVAC module.
6. Install the knee bolster. Refer to **Knee Bolster Replacement** in Instrument Panel, Gages and Console.

SUN LOAD SENSOR REPLACEMENT

Removal Procedure

1. Remove the defroster grille. Refer to **Defroster Grille Replacement** in Instrument Panel, Gages and Console.

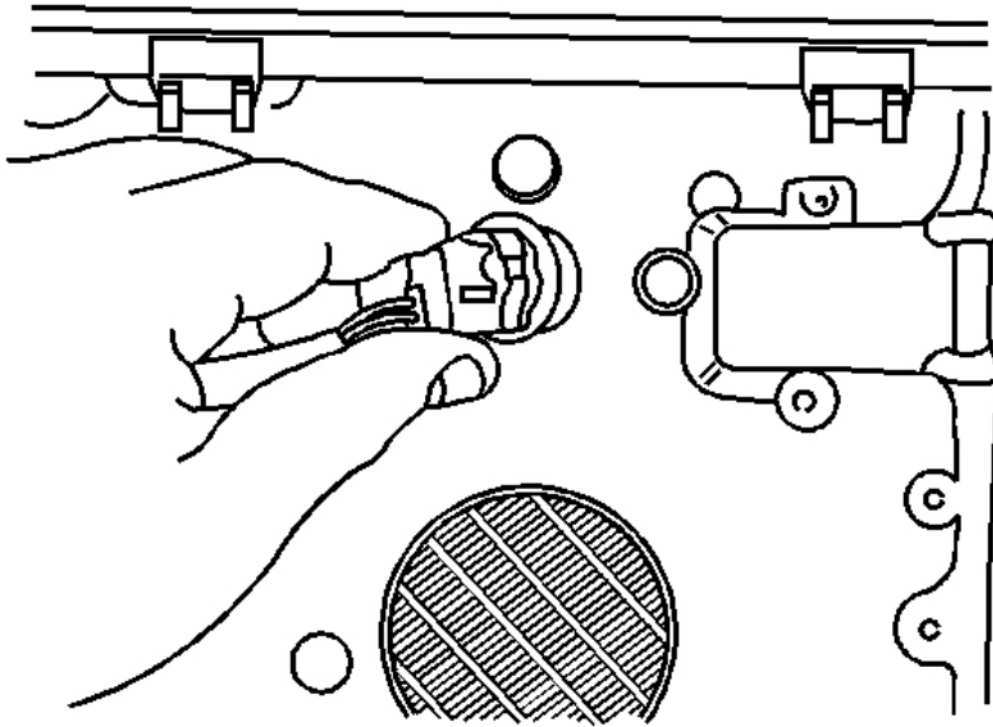


Fig. 49: View Of Sunload Sensor
Courtesy of GENERAL MOTORS CORP.

2. Remove the sunload sensor from the defroster grille by twisting the sensor 1/4 turn counter clockwise.
3. Disconnect the sunload sensor electrical connector.
4. Remove the sunload sensor.

Installation Procedure

1. Connect the sunload sensor electrical connector.

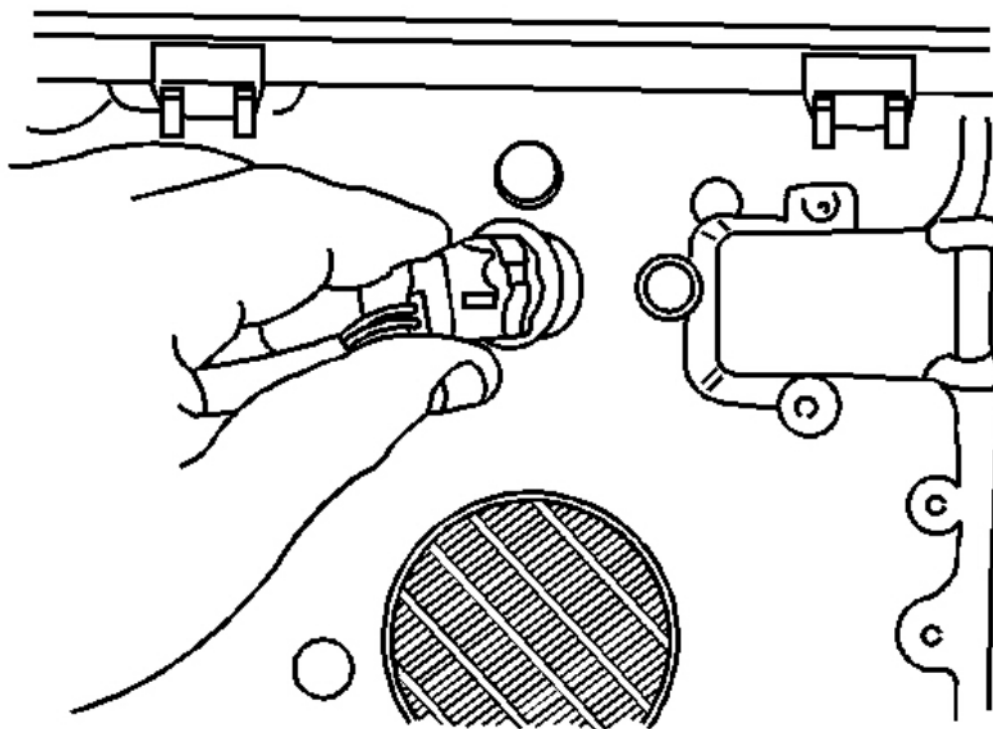


Fig. 50: View Of Sunload Sensor
Courtesy of GENERAL MOTORS CORP.

2. Install the sunload sensor to the defroster grille by twisting the sensor 1/4 turn clockwise.
3. Install the defroster grille. Refer to **Defroster Grille Replacement** in Instrument Panel, Gages and Console.

BLOWER MOTOR SWITCH REPLACEMENT - AUXILIARY (FRONT)

Removal Procedure

IMPORTANT: Gently pull downward at the front edge of the overhead console to disengage the fasteners.

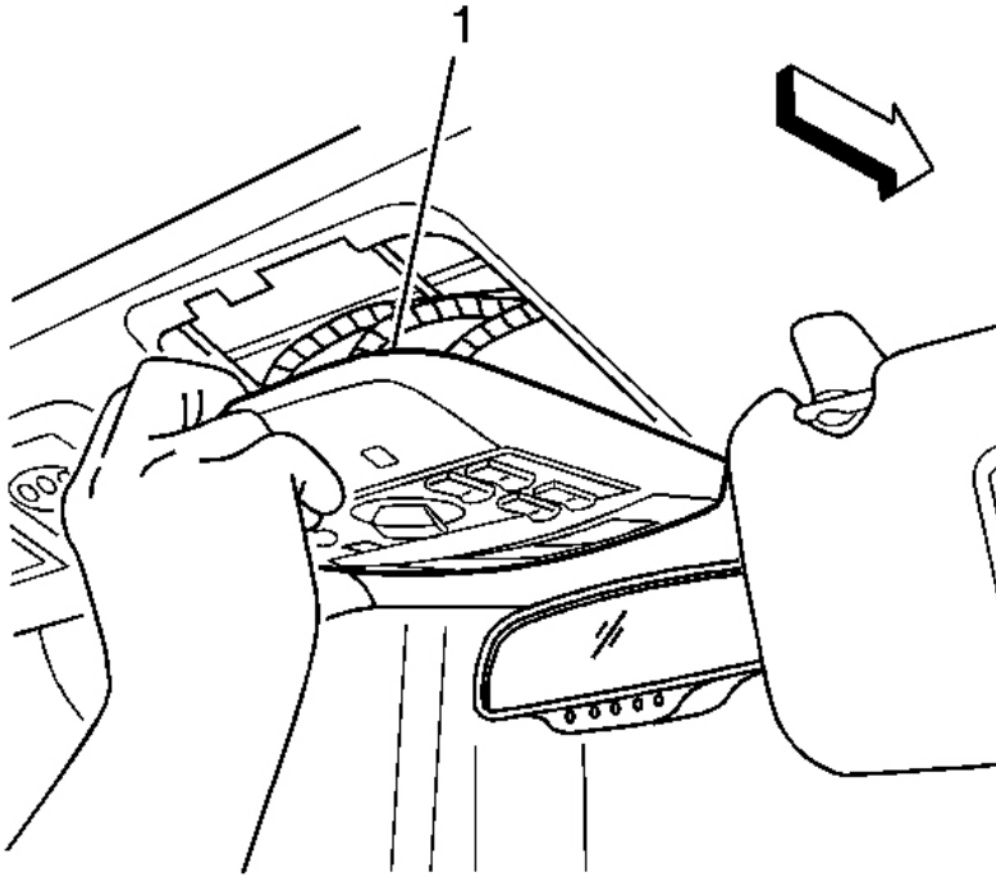


Fig. 51: View Of Overhead Console
Courtesy of GENERAL MOTORS CORP.

1. Remove the overhead console (1).
2. Disconnect the blower motor switch electrical connector.
3. Remove the blower motor switch screws.
4. Remove the blower motor switch from the dome lamp housing.

Installation Procedure

1. Install the blower motor switch to the dome lamp housing.

NOTE: Refer to Fastener Notice in Cautions and Notices.

2. Install the blower motor switch screws.

Tighten: Tighten the screws to 1 N.m (9 lb in).

3. Connect the blower motor switch electrical connector.

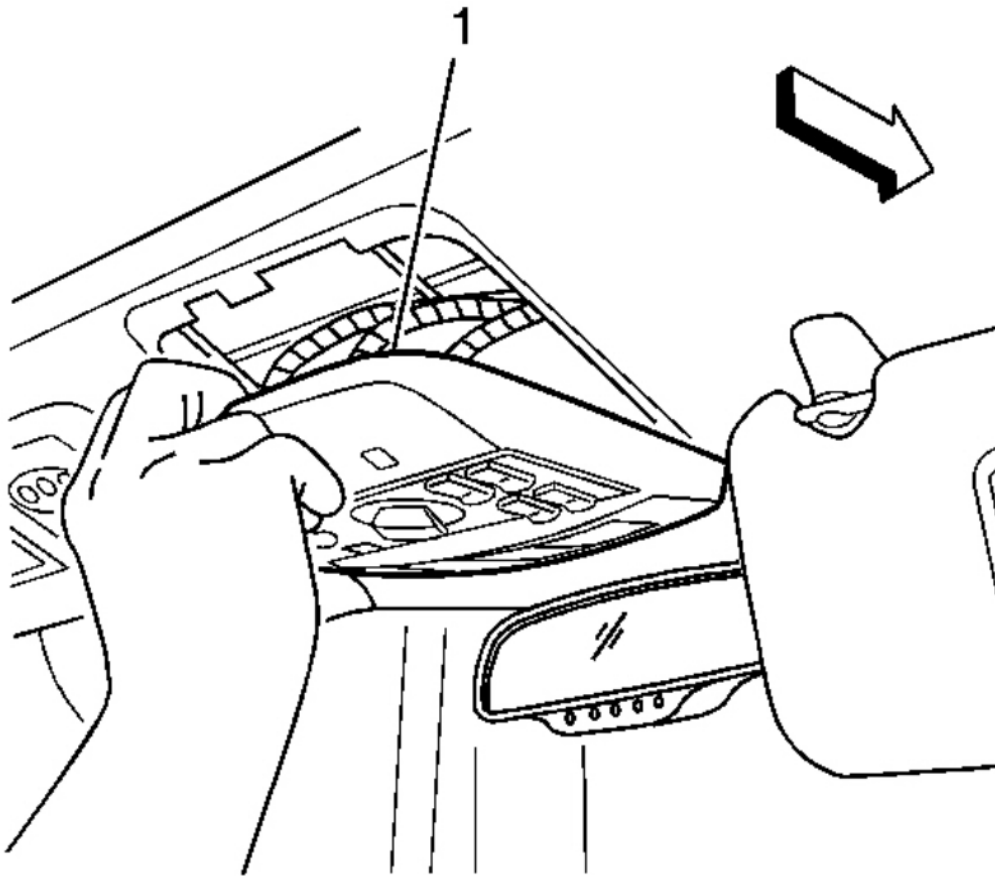


Fig. 52: View Of Overhead Console
Courtesy of GENERAL MOTORS CORP.

4. Install the overhead console (1).

BLOWER MOTOR SWITCH REPLACEMENT - AUXILIARY (REAR)

Removal Procedure

IMPORTANT: Gently pull downward at the front edge of the center dome lamp assembly to disengage the fasteners.

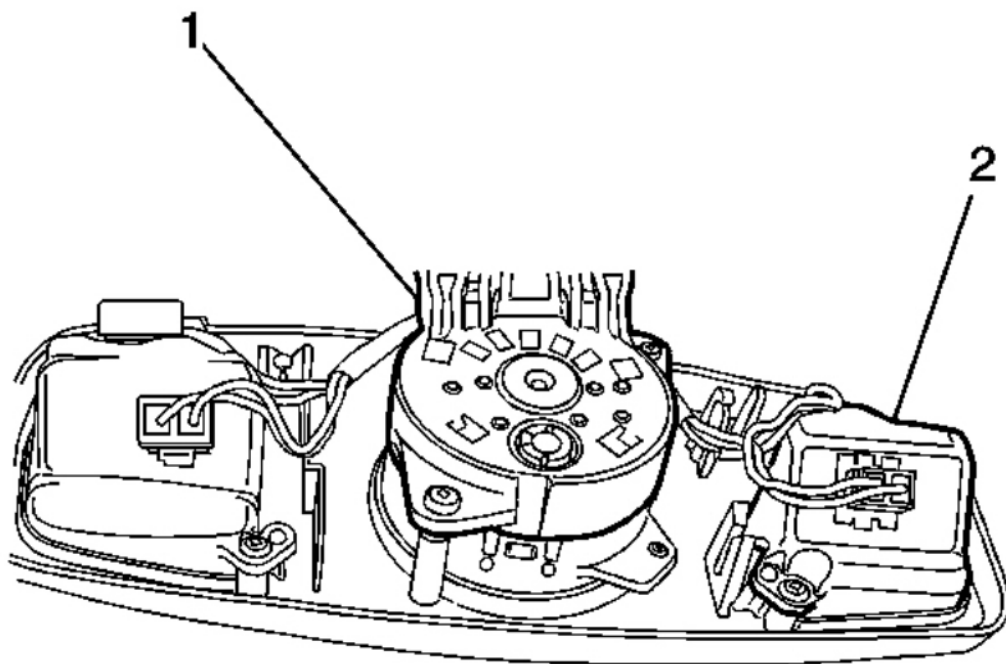


Fig. 53: Locating Auxiliary Blower Motor Switch
Courtesy of GENERAL MOTORS CORP.

1. Remove the center dome lamp assembly.
2. Disconnect the auxiliary blower motor switch (1) electrical connector.
3. Remove the auxiliary blower motor switch (1) screws.
4. Remove the auxiliary blower motor switch (1) from the dome lamp housing.

Installation Procedure

1. Install the auxiliary blower motor switch (1) to the dome lamp housing.

NOTE: Refer to Fastener Notice in Cautions and Notices.

2. Install the auxiliary blower motor switch (1) screws.

Tighten: Tighten the screws to 1 N.m (9 lb in).

3. Connect the auxiliary blower motor switch (1) electrical connector.

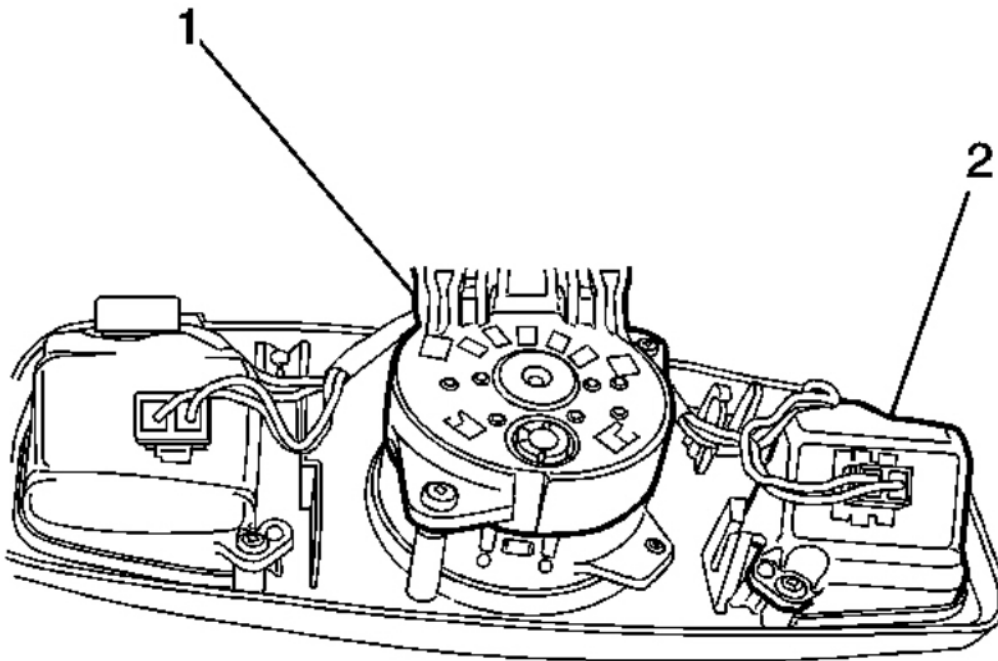


Fig. 54: Locating Auxiliary Blower Motor Switch
Courtesy of GENERAL MOTORS CORP.

4. Install the center dome lamp assembly.

DESCRIPTION AND OPERATION

AIR DELIVERY DESCRIPTION AND OPERATION

The Air Delivery Description and Operation is divided into 5 primary areas:

- HVAC Control Components
- Air Speed
- Air Speed Auxiliary

2004 Cadillac SRX

2004 HVAC HVAC Systems - Automatic - SRX

- Air Distribution
- Recirculation
- Automatic Operation

HVAC Control Components

HVAC Control Module

The HVAC control module is a class 2 device that interfaces between the operator and the HVAC system to maintain air temperature and distribution settings. The battery positive voltage circuit provides power that the control module uses for keep alive memory (KAM). The dash integration module (DIM), which is the vehicle power mode master, provides a device on signal. The control module supports the following features:

Air Delivery Description and Operation

Feature	Availability
Afterblow	Available if reprogrammed by the technician
Purge	Yes
Personalization	Yes
Actuator Calibration	No
Heated Seat Control	Optional

The HVAC control module will receive information that defines the current driver of the vehicle from the driver door module (DDM) through class 2 communication. The HVAC system will memorize the following system configurations for up to 2 unique drivers:

- Driver set temperature
- Passenger set temperature
- Mode
- Blower motor speed
- A/C compressor request, auto ON or A/C OFF

This information shall be stored inside the HVAC control module memory. When a different driver identification button is selected the HVAC control module will recall the appropriate driver settings. When the HVAC control module is first turned on, the last stored settings for the current driver will be activated except for the rear defrost and heated seat settings.

Mode Actuator

The mode actuator is a 5-wire bi-directional electric motor that incorporates a feedback potentiometer. Low reference, 5-volt reference, position signal, and 2 control circuits enable the actuator to operate. The control circuits use either a 0 or 12-volt value to co-ordinate the actuator movement. When the actuator is at rest, both control circuits have a value of 0 volts. In order to move the actuator, the HVAC control module grounds one of the control circuits while providing the other with 12 volts. The HVAC control module reverses the polarity of the control circuits to move the actuator in the opposite direction. When the actuator shaft rotates, the potentiometers adjustable contact changes the door position signal between 0-5 volts. The HVAC control module uses a range of 0-255 counts to index the actuator position. The door position signal voltage is converted to a 0-255 count range. When the module sets a commanded, or targeted, value, one of the control circuits is grounded. As the actuator shaft rotates the changing position signal is sent to the module. Once the position signal and the commanded value are the same, the module removes power and ground from the control circuits.

Recirculation Actuator

The recirculation actuator is a 3-wire uni-directional electric motor. Ignition 3 voltage and two control circuits enable the actuator to operate. The control circuits are either grounded or opened during normal operation. In order to move the actuator, the HVAC control module grounds one of the control circuits.

Blower Motor Relay

The blower motor relay provides a supply voltage to the blower motor and blower motor control processor. The HVAC control module commands the blower motor relay ON anytime the commanded blower speed is not OFF.

Blower Motor Control Processor

The blower motor control processor is an interface between the HVAC control module and the blower motor. The blower motor speed control, blower motor supply voltage and ground circuits enable the control processor to operate. The HVAC control module provides a PWM signal to the control processor in order to command the blower motor speed. The control processor uses the blower motor ground as a low side control to adjust the blower motor speed.

Air Speed

The blower motor forces air to circulate within the vehicles interior. The vehicle operator determines the blower motors speed by placing the blower motor switch in a desired speed position or by selecting automatic operation. In manual operation, once a blower speed is selected, the blower speed remains constant until a new speed is selected. In automatic operation, the HVAC control module will determine what blower speed is necessary in order to achieve or

maintain a desired temperature.

As the requested blower speed increases, the following conditions occur:

- The HVAC control module increases the amount of time that the blower motor speed control circuit is modulated to ground.
- The voltage and duty cycle, measured between the blower motor speed control circuit and ground, decrease.

As the requested blower speed decreases, the following conditions occur:

- The HVAC control module decreases the amount of time that the blower motor speed control circuit is modulated to ground.
- The voltage and duty cycle, measured between the blower motor speed control circuit and ground, increase.

Afterblow

Afterblow is a feature that dries the evaporator core by operating the blower motor after the engine is turned off. This reduces the amount of microbial growth that can create undesirable odors. The vehicle does not come equipped with the afterblow feature turned on. If the afterblow feature is required due to an odor concern, it must be turned on by reprogramming the HVAC control module, refer to **Service Programming System (SPS)** in Programming.

After the HVAC control module has been programmed for afterblow, the following conditions must be met for afterblow to operate:

- The engine has been turned off for at least 30 minutes.
- The ambient air temperature is at least 21° C (70° F).
- The A/C compressor operated for more than 2 minutes before shut down.
- The system voltage is at least 12 volts.

Once the above conditions have been met, the following sequence of events will occur:

1. The blower motor will RUN for 20 seconds.
2. The blower motor will be OFF for 10 minutes.
3. The blower motor will RUN for and additional 20 seconds.

The HVAC control module receives class 2 messages from the radio interface that the driver has activated a steering wheel control switch. The steering wheel control buttons control several different functions including the following HVAC functions:

- Fan speed increase
- Fan speed decrease
- Driver set temperature increase
- Driver set temperature decrease

In order to configure the steering wheel controls, refer to **Radio/Audio System Description and Operation** in Entertainment.

Auxiliary Air Speed

Auxiliary A/C has a blower motor that is independent to that system. Voltage is supplied to the auxiliary blower motor from the rear fuse block. The auxiliary A/C blower motor switch applies ground to the auxiliary blower motor control circuit that corresponds to the selected blower speed. The resistors and the blower motor are in a series circuit. The following list represents the number of resistors in series with the auxiliary blower motor per particular speed request:

- Low speed-3 resistors
- Medium 1 speed-2 resistors
- Medium 2 speed-1 resistor

When the operator requests High speed, ground is applied directly to the auxiliary blower motor.

Air Distribution

The HVAC control module controls the mode actuator in order to distribute airflow to a desired outlet. The mode switch provides the vehicle operator with the ability to override the automatic setting. When the mode door is moved to the defrost position, the A/C compressor clutch engages and the recirculation actuator will be moved to the outside air position. In the outside air position, the incoming air is filtered by the passenger compartment air filter.

IMPORTANT: The HVAC system allows air to the outboard panel outlets in all air distribution modes. This allows air to be circulated higher in the cabin under any operating condition. The panel outlets have three operating positions, open, side window defogger and closed. To eliminate air from these outlets, the individual outlet thumb wheel must be turned to the OFF or side window defogger

position.

Recirculation

The HVAC control module controls the air intake through the recirculation actuator. Recirculation is not available when the mode is in defrost. When the mode is in defog, Recirculation will only be available for 10 minutes. In the outside air position, the incoming air is filtered by the passenger compartment air filter.

Automatic Operation

In automatic operation, the HVAC control module will maintain the comfort level inside of the vehicle by controlling the A/C compressor clutch, the blower motor, the air temperature actuators, mode actuator and recirculation.

To place the HVAC system in full automatic operation, the AUTO selection must be activated.

Once the desired temperature is reached, the blower motor, mode, recirculation and temperature actuators will automatically adjust to maintain the temperature selected. The HVAC control module performs the following functions to maintain the desired air temperature:

- Regulate blower motor speed
- Position the air temperature actuator
- Position the mode actuator
- Position the recirculation actuator
- Request A/C operation

When the warmest position is selected in automatic operation the blower speed will increase gradually until the vehicle reaches normal operating temperature. When normal operating temperature is reached the blower will stay on high speed and the air temperature actuators will stay in the full heat position. The mode actuator will remain in the floor position.

When the coldest position is selected in automatic operation the blower will stay on high and the air temperature actuators will stay in the full cold position. The mode actuator will remain in the panel position and the recirculation actuator will remain in the recirculation position.

In cold temperatures, the automatic HVAC system will provide heat in the most efficient manner. The vehicle operator can select an extreme temperature setting but the system will not warm the vehicle any faster. In warm temperatures, the automatic HVAC system will also provide air conditioning in the most efficient manner. Selecting an extreme cool temperature will not cool

the vehicle any faster.

AIR TEMPERATURE DESCRIPTION AND OPERATION

The air temperature controls are divided into 3 primary areas:

- Automatic Operation
- The Heating and Air Conditioning System
- The A/C Cycle

HVAC Control Components

HVAC Control Module

The HVAC control module is a class 2 device that interfaces between the operator and the HVAC system to maintain air temperature and distribution settings. The battery positive voltage circuit provides power that the control module uses for keep alive memory (KAM). The dash integration module (DIM), which is the vehicle power mode master, provides a device on signal. The control module supports the following features:

Air Temperature Description and Operation

Feature	Availability
Afterblow	Available if reprogrammed by the technician
Purge	Yes
Personalization	Yes
Actuator Calibration	No
Heated Seat Control	Optional

The HVAC control module will receive information that defines the current driver of the vehicle from the driver door module (DDM) through class 2 communication. The HVAC system will memorize the following system configurations for up to 2 unique drivers:

- Driver set temperature
- Passenger set temperature
- Mode
- Blower motor speed
- A/C compressor request, auto ON or A/C OFF

This information shall be stored inside the HVAC control module memory. When a different

driver identification button is selected the HVAC control module will recall the appropriate driver settings. When the HVAC control module is first turned on, the last stored settings for the current driver will be activated except for the rear defrost and heated seat settings.

Air Temperature Actuators

The air temperature actuator is a 5-wire bi-directional electric motor that incorporates a feedback potentiometer. Low reference, 5-volt reference, position signal, and 2 control circuits enable the actuator to operate. The control circuits use either a 0 or 12-volt value to co-ordinate the actuator movement. When the actuator is at rest, both control circuits have a value of 0 volts. In order to move the actuator, the HVAC control module grounds one of the control circuits while providing the other with 12 volts. The HVAC control module reverses the polarity of the control circuits to move the actuator in the opposite direction. When the actuator shaft rotates, the potentiometers adjustable contact changes the door position signal between 0-5 volts. The HVAC control module uses a range of 0-255 counts to index the actuator position. The door position signal voltage is converted to a 0-255 count range. When the module sets a commanded, or targeted, value, one of the control circuits is grounded. As the actuator shaft rotates the changing position signal is sent to the module. Once the position signal and the commanded value are the same, the module removes power and ground from the control circuits.

Air Temperature Sensors

The air temperature sensors are 2-wire negative temperature co-efficient thermistors. The vehicle uses the following air temperature sensors:

- Ambient
- Inside

A signal and low reference circuit enables the sensor to operate. As the air temperature surrounding the sensor increases, the sensor resistance decreases. The sensor signal decreases as the resistance decreases. The sensor signal varies between 0-5 volts. The HVAC control module converts the signal to a range between 0-255 counts.

The inside temperature sensor operates within a temperature range between -6.5° C and 57.5° C (20.3-135.5° F). If the sensor is shorted to ground, voltage, or an open, the system will operate using an estimated default value to allow the system to operate. The ambient sensor operates within a temperature range between -30 to 51° C (-22 to 123.8° F). If the HVAC control module has determined that the ambient temperature sensor has failed, the driver information center (DIC) display shall display 59° F in place of the outside air temperature. If the sensor is shorted to ground, voltage, or an open, the system will operate using an estimated default value to allow the system to operate. If the engine coolant temperature is not more than 3° C (5.4° F) above the

sensor reading, or if the engine has not been started in 3 hours, then the actual ambient air temperature sensor reading is displayed. Also at vehicle speeds greater than 35 km/h (22 mph), the ambient air temperature displayed may be allowed to increase, but only at a slow, filtered rate. The driver information center (DIC) displays the ambient air temperature value that it receives from the HVAC control module through a class 2 message. The ambient air temperature value can be updated by an outside air instant update feature.

To use this feature, press the following switches on the HVAC control module simultaneously:

- AUTO
- MODE UP
- LEFT TEMPERATURE UP

Sunload Sensor

The sunload sensor is a 2-wire photo diode. The vehicle uses left and right sunload sensors. The 2 sensors are integrated into the sunload sensor assembly along with the ambient light sensor. Low reference and signal circuits enable the sensor to operate. As the sunload increases, the sensor signal decreases. The sensor operates within an intensity range between completely dark and bright. The sensor signal varies between 0-5 volts. The HVAC control module converts the signal to a range between 0-255 counts. The sunload sensor provides the HVAC control module a measurement of the amount of light shining on the vehicle. Bright, or high intensity, light causes the vehicles inside temperature to increase. The HVAC system compensates for the increased temperature by diverting additional cool air into the vehicle. If the sensor is open or shorted, no sunload adjustment occurs and the SERVICE A/C SYSTEM message is displayed.

Evaporator Temperature Sensor

The HVAC control module monitors the temperature of the air passing through the evaporator by the A/C evaporator air temperature sensor. This sensor is located on the evaporator core. The temperature is used to cycle the A/C compressor ON and OFF to prevent the evaporator core from freezing. A thermistor inside the sensor varies its resistance to monitor the evaporator air temperature. The HVAC control module monitors the voltage drop across the thermistor when supplied with a 5-volt reference signal. The HVAC control module will send a class 2 message to the ECM to stop requesting the A/C compressor clutch operation if the temperature drops below 3° C (37° F). The sensor must be above 4° C (39° F) to request the A/C compressor clutch again.

The sensor operates within a temperature range between -40° C to 215° C (-40 to 355° F). If the HVAC control module detects an open in the evaporator temperature sensor or circuit, the class 2 message sent to the ECM will not submit the A/C ON request. The HVAC control module will then send a request to the Radio for display of the SERVICE A/C SYSTEM that will be

displayed on the DIC. The HVAC control module will also display A/C OFF on the module as long as the condition is present.

A/C Refrigerant Pressure Sensor

The A/C refrigerant pressure sensor is a 3-wire piezoelectric pressure transducer. A 5-volt reference, low reference, and signal circuits enable the sensor to operate. The A/C pressure signal can be between 0-5 volts. When the A/C refrigerant pressure is low, the signal value is near 0 volts. When the A/C refrigerant pressure is high, the signal value is near 5 volts.

The A/C refrigerant pressure sensor prevents the A/C system from operating when an excessively high or low pressure condition exists.

If the ECM detects a failure in the A/C refrigerant pressure sensor or circuit, the class 2 message sent to the HVAC control module will be invalid. The HVAC control module will then send a request to the radio for display of the SERVICE A/C SYSTEM that will be displayed on the DIC. The HVAC control module will also display A/C OFF on the module as long as the condition is present.

Heating and A/C Operation

The purpose of the heating and A/C system is to provide the following:

- Heated air
- Cooled air
- Remove humidity from the interior of the vehicle
- Reduce windshield fogging

Regardless of the temperature setting, the following can effect the rate that the HVAC system can achieve a desired temperature:

- Recirculation actuator setting
- Difference between inside and desired temperature
- Difference between ambient and desired temperature
- Blower motor speed setting
- Mode setting

The HVAC control module commands or monitors the following actions when an air temperature setting is selected.

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2004 HVAC HVAC Systems - Automatic - SRX

- **WARMEST POSITION** - The air temperature actuator door position directs maximum air flow through the heater core.
- **COLDEST POSITION** - The air temperature actuator door position directs maximum air flow around the heater core.

BETWEEN THE WARMEST AND COLDEST POSITION - The following sensors are monitored to direct the appropriate amount of air through the heater core to achieve the desired temperature:

- Sunload
- Ambient temperature
- Inside temperature

The A/C system is engaged by selecting any switch on the HVAC control module except the A/C OFF switch. The A/C switch will illuminate A/C OFF when the A/C switch is selected. The control module sends a class 2 A/C request message to the engine control module (ECM) for A/C compressor clutch operation. The following conditions must be met in order for the ECM to turn on the compressor clutch:

- HVAC control module
 - Evaporator Temperature more than 4° C (39° F)
 - Control module operating range 9 and 16 volts
- ECM
 - Engine coolant temperature (ECT) is less than 125° C (257° F) or 120° C (248° F) for PV8
 - Engine RPM is between 0 RPM and 6000 RPM
 - A/C pressure is between 3137 kPa (455 psi) or 2850 kPa (413 psi) for PV8 and 193 kPa (28 psi) or 200 kPa (29 psi) for PV8.

Once engaged, the compressor clutch will be disengaged for the following conditions:

- Throttle position is 100 percent.
- A/C pressure is more than 3137 kPa (455 psi) or 2850 kPa (413 psi) for PV8.
- A/C pressure is less than 193 kPa (28 psi) or 200 kPa (29 psi) for PV8.
- Engine coolant temperature (ECT) is more than 125° C (257° F) or 120° C (248° F) for PV8.
- Engine speed is more than 5,500 RPM.

- Transmission shift
- ECM detects excessive torque load.
- ECM detects insufficient idle quality.
- ECM detects a hard launch condition.

When the compressor clutch disengages, the compressor clutch diode protects the electrical system from a voltage spike.

Dual Zone Operation

The HVAC control module has temperature settings for the driver and the passenger. If the passengers setting is turned off then the drivers setting controls both driver and passenger temperature actuators. The passengers setting can not be used without the drivers setting also being ON. The passengers setting can be turned ON or OFF by pressing the power button in the center of the passengers temperature rocker switch. When the passengers setting is ON, the passenger temperature can be adjusted independently from the drivers setting and the passenger temperature is displayed on the passengers side of the control module. A different sunload on one side of the vehicle may cause different discharge air temperatures even when the passengers setting is not turned ON.

Automatic Operation

In automatic operation, the HVAC control module will maintain the comfort level inside of the vehicle by controlling the A/C compressor clutch, the blower motor, the air temperature actuators, mode actuator and recirculation.

To place the HVAC system in automatic mode, the following is required:

- The blower motor switch must be in the AUTO position.
- The air temperature switch must be in any other position other than 60 or 90 degrees.
- The mode switch must be in the AUTO position.

Once the desired temperature is reached, the blower motor, mode, recirculation and temperature actuators will automatically adjust to maintain the temperature selected. The HVAC control module performs the following functions to maintain the desired air temperature:

- Regulate blower motor speed
- Position the air temperature actuator
- Position the mode actuator

- Position the recirculation actuator
- Request A/C operation

When the warmest position is selected in automatic operation the blower speed will increase gradually until the vehicle reaches normal operating temperature. When normal operating temperature is reached the blower will stay on high speed and the air temperature actuators will stay in the full heat position. When the coldest position is selected in automatic operation the blower will stay on high and the air temperature actuators will stay in the full cold position.

In cold temperatures, the automatic HVAC system will provide heat in the most efficient manner. The vehicle operator can select an extreme temperature setting but the system will not warm the vehicle any faster. In warm temperatures, the automatic HVAC system will also provide air conditioning in the most efficient manner. Selecting an extreme cool temperature will not cool the vehicle any faster.

Steering Wheel Controls

The HVAC control module receives class 2 messages from the radio interface that the driver has activated a steering wheel control switch. The steering wheel control buttons can be reconfigured to control the following functions:

- Fan speed increase
- Fan speed decrease
- Driver set temperature increase
- Driver set temperature decrease

In order to configure the steering wheel controls, refer to **Radio/Audio System Description and Operation** in Entertainment. The HVAC system interprets the fan and set temperature switches on the steering wheel as if the driver had activated the same switch function on the HVAC control module.

A/C Cycle

Refrigerant is the key element in an air conditioning system. R-134a is presently the only EPA approved refrigerant for automotive use. R-134a is an very low temperature gas that can transfer the undesirable heat and moisture from the passenger compartment to the outside air.

The Denso 10S20 fixed displacement swash plate A/C compressor is belt driven and operates when the magnetic clutch is engaged. The compressor builds pressure on the vapor refrigerant. Compressing the refrigerant also adds heat to the refrigerant. The refrigerant is discharged from

the compressor, through the discharge hose, and forced to flow to the condenser and then through the balance of the A/C system. The A/C system is mechanically protected with the use of a high pressure relief valve. If the high pressure switch were to fail or if the refrigerant system becomes restricted and refrigerant pressure continued to rise, the high pressure relief will pop open and release refrigerant from the system.

Compressed refrigerant enters the condenser in a high temperature, high pressure vapor state. As the refrigerant flows through the condenser, the heat of the refrigerant is transferred to the ambient air passing through the condenser. Cooling the refrigerant causes the refrigerant to condense and change from a vapor to a liquid state.

The condenser is located in front of the radiator for maximum heat transfer. The condenser is made of aluminum and aluminum cooling fins, which allows rapid heat transfer for the refrigerant. The semi-cooled liquid refrigerant exits the condenser and flows through the liquid line, to the thermal expansion valve.

The thermal expansion valve is located in the liquid line between the condenser and the evaporator. The thermal expansion valve is the dividing point for the high and the low pressure sides of the A/C system. As the refrigerant passes through the thermal expansion valve, the pressure of the refrigerant is lowered. Due to the pressure differential of the liquid refrigerant, the refrigerant will begin to vaporize at the thermal expansion valve. The thermal expansion valve also meters the amount of liquid refrigerant that can flow into the evaporator.

Refrigerant exiting the thermal expansion valve flows into the evaporator core in a low pressure, liquid state. Ambient air is drawn through the HVAC module and passes through the evaporator core. Warm and moist air will cause the liquid refrigerant boil inside of the evaporator core. The boiling refrigerant absorbs heat from the ambient air and draws moisture onto the evaporator. The refrigerant exits the evaporator back through the thermal expansion valve and into the suction line and back to the compressor, in a vapor state completing the A/C cycle of heat removal. At the compressor, the refrigerant is compressed again and the cycle of heat removal is repeated.

The conditioned air is distributed through the HVAC module for passenger comfort. The heat and moisture removed from the passenger compartment will also change form, or condense, and is discharged from the HVAC module as water under the vehicle.

SPECIAL TOOLS AND EQUIPMENT

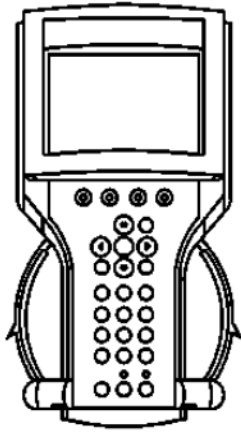
SPECIAL TOOLS

Special Tools

Illustration	Tool Number/ Description
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7000081
TECH 2 Diagnostic Scan Tool