2004 HVAC

HVAC Systems - Manual - Ascender

SPECIFICATIONS

FASTENER TIGHTENING SPECIFICATIONS

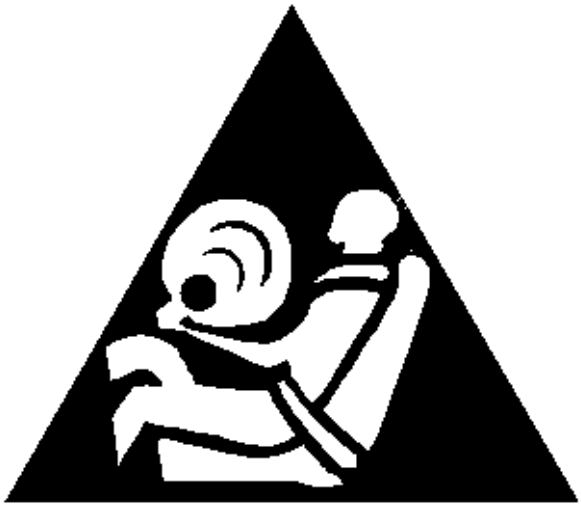
Fastener Tightening Specifications

Application	Specification	
	Metric	English
Actuator Retaining Screws, ALL	1.9 N.m	17 in. lb.
HVAC Control Module Retaining Screws	1.9 N.m	17 in. lb.

SCHEMATIC AND ROUTING DIAGRAMS

HVAC SCHEMATIC ICONS

HVAC Schematic Icons

Icon	Icon Definition
	**CAUTION:** **When performing service on or near the SIR components or the SIR wiring, the SIR system must be disabled. Refer to SIR Disabling and Enabling Zones. Failure to observe the correct procedure could cause deployment of the SIR components, personal injury, or unnecessary SIR system repairs.**

HVAC SCHEMATICS

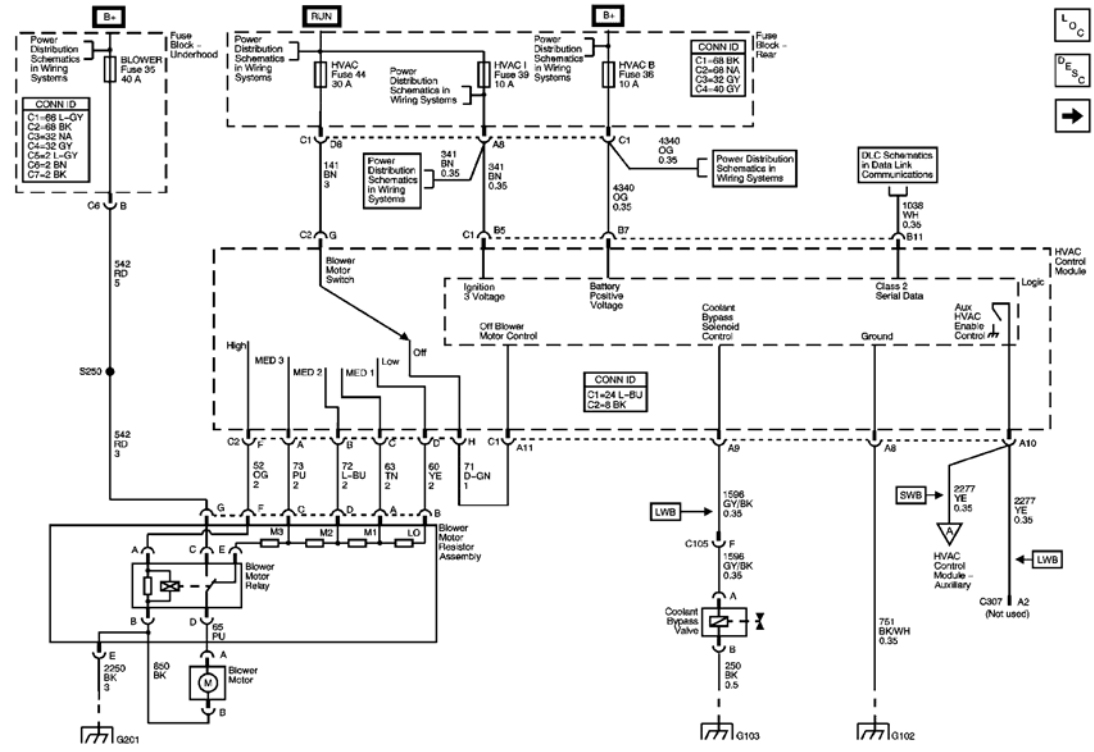


Fig. 1: Module Power, Ground, Serial Data, Blower Motor, and Coolant Bypass Valve Schematic
Courtesy of GENERAL MOTORS CORP.

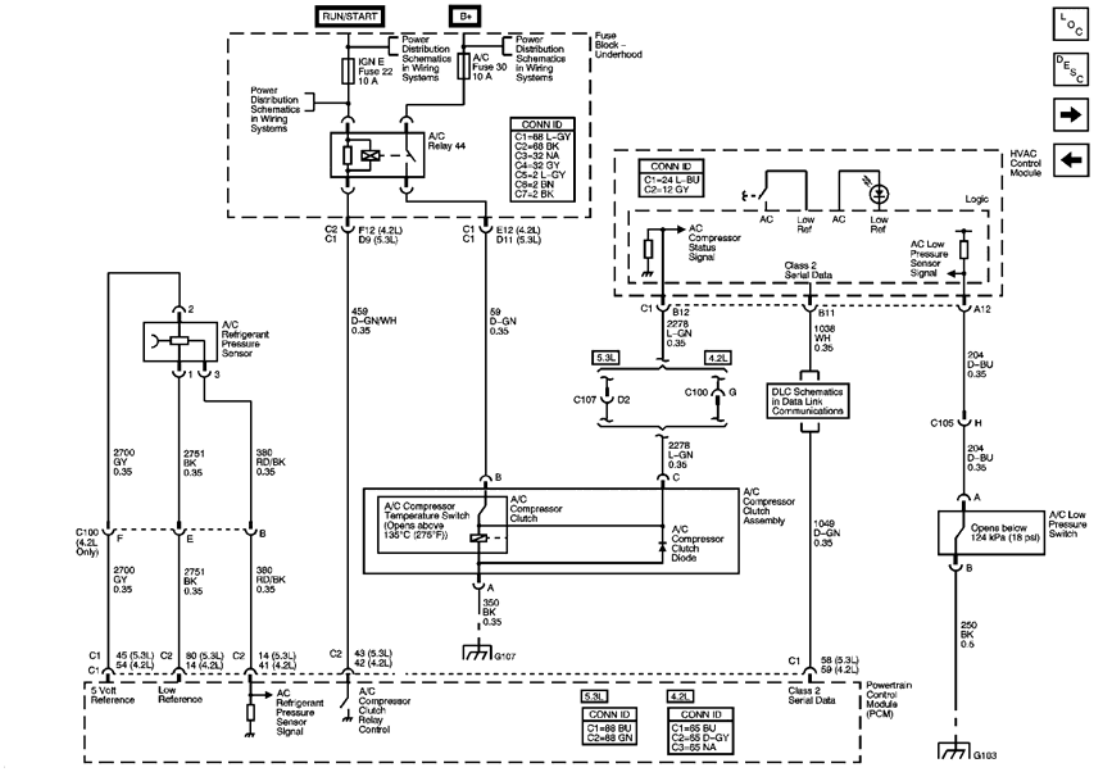


Fig. 2: Compressor Controls Schematic
Courtesy of GENERAL MOTORS CORP.

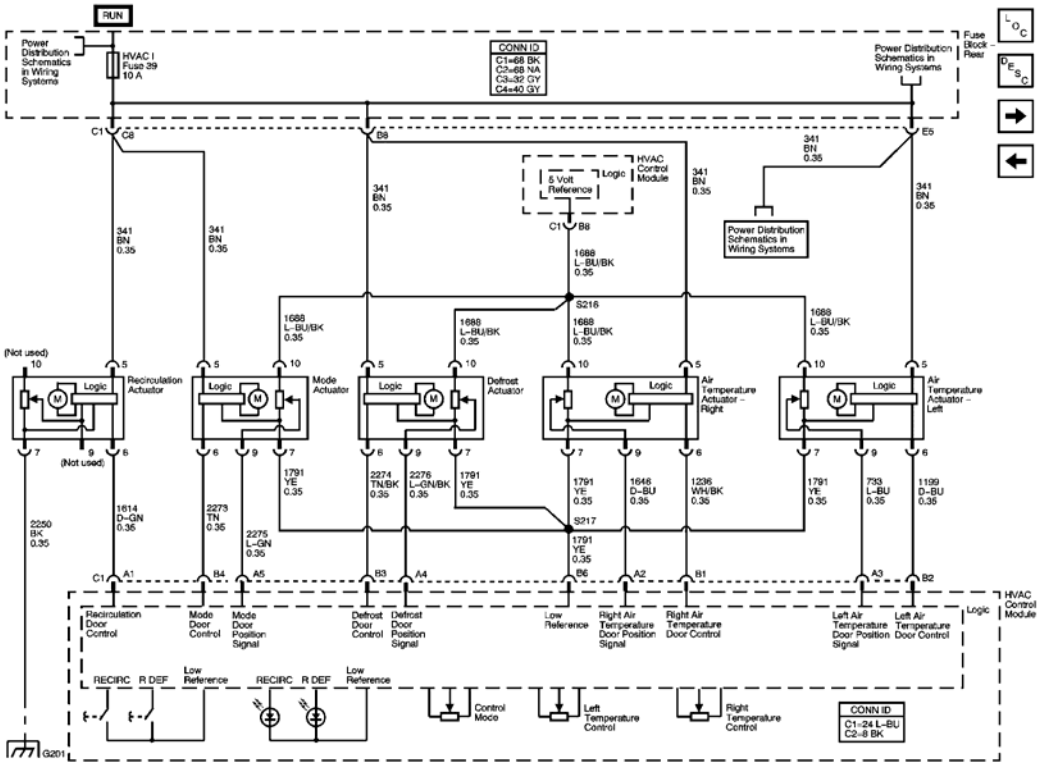


Fig. 3: Air Delivery/Temperature Actuators Schematic
Courtesy of GENERAL MOTORS CORP.

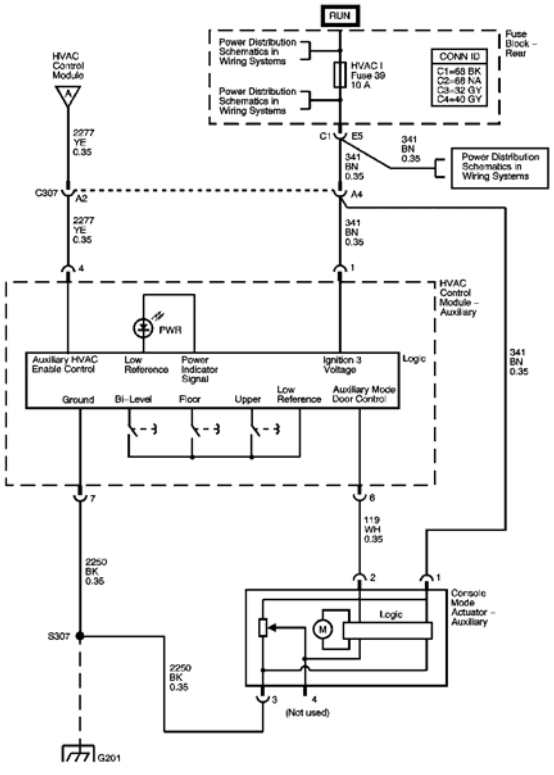


Fig. 4: Rear Mode Controls Schematic - Short Wheel Base
Courtesy of GENERAL MOTORS CORP.

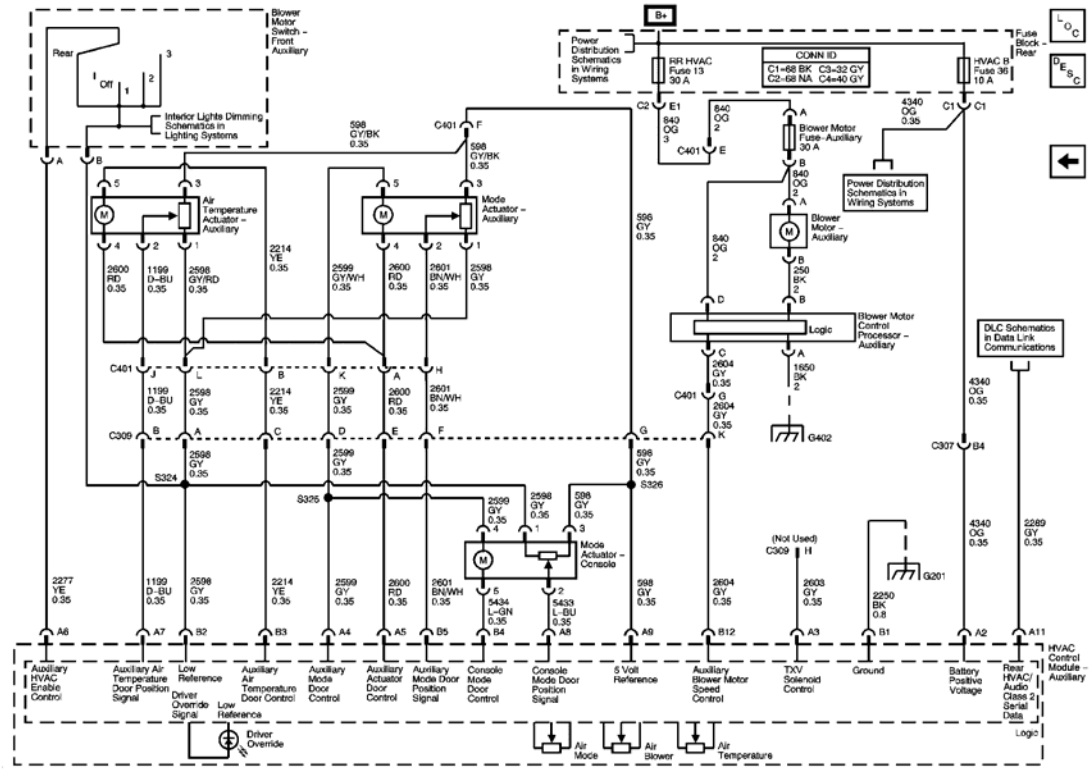


Fig. 5: Rear Mode Controls Schematic - Long Wheel Base
Courtesy of GENERAL MOTORS CORP.

COMPONENT LOCATOR

HVAC COMPONENT VIEWS

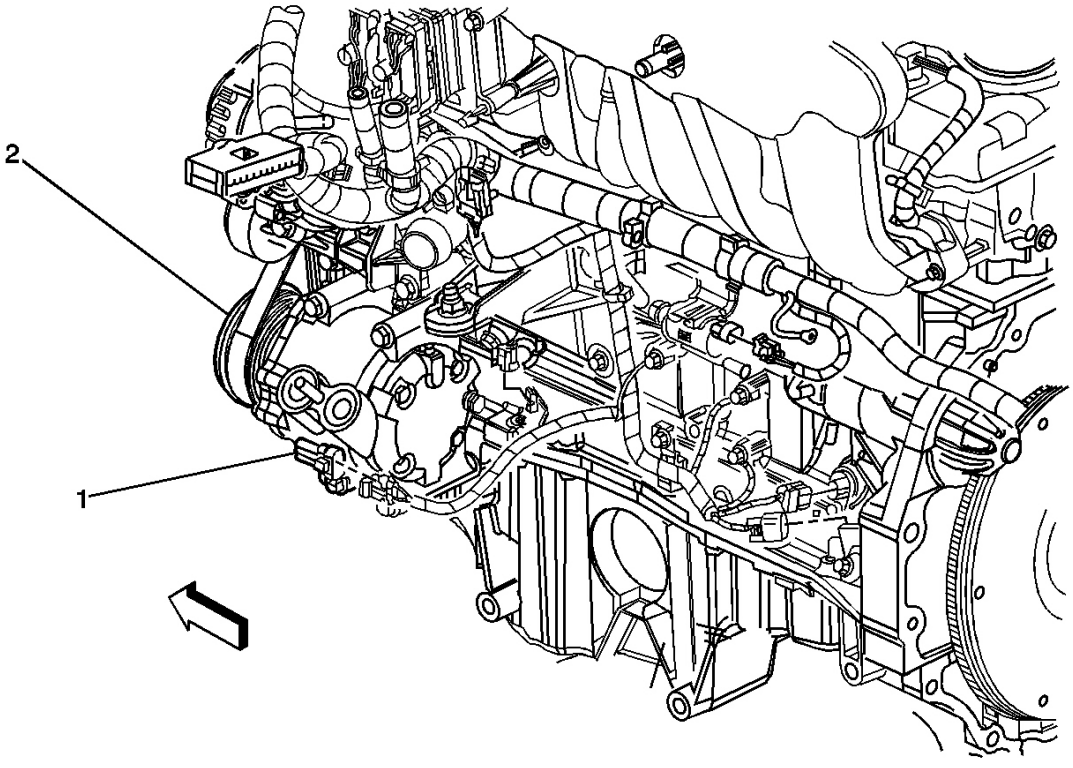


Fig. 6: Identifying Six Cylinder Engine, Left Side Components
Courtesy of GENERAL MOTORS CORP.

Identifying Callouts For Fig. 6

Callout	Component Name
1	A/C Compressor Clutch Connector
2	A/C Compressor

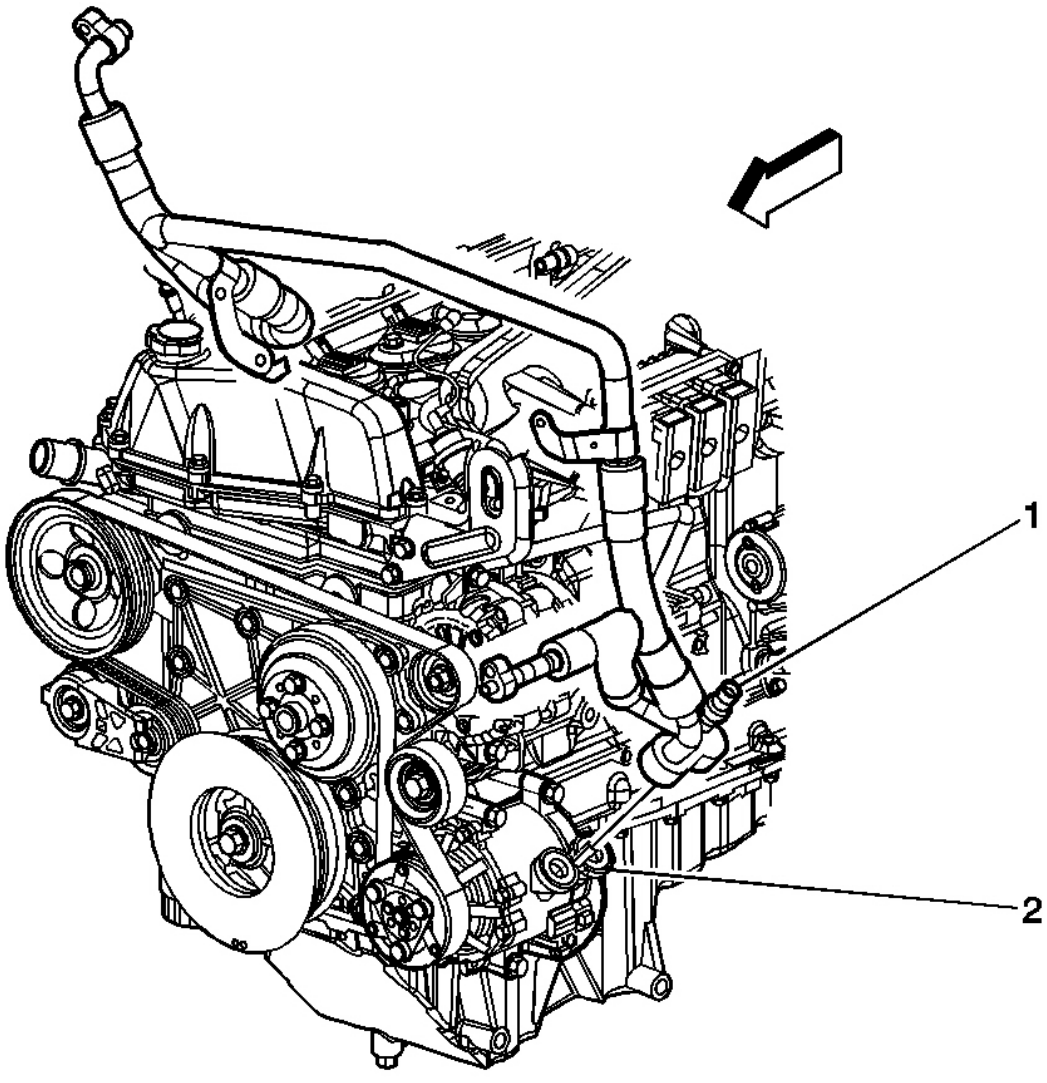


Fig. 7: Identifying A/C Refrigerant Pressure Sensor, Six Cylinder Engine Components
Courtesy of GENERAL MOTORS CORP.

Identifying Callouts For Fig. 7

Callout	Component Name
1	Air Conditioning Refrigerant Pressure Sensor
2	A/C Compressor

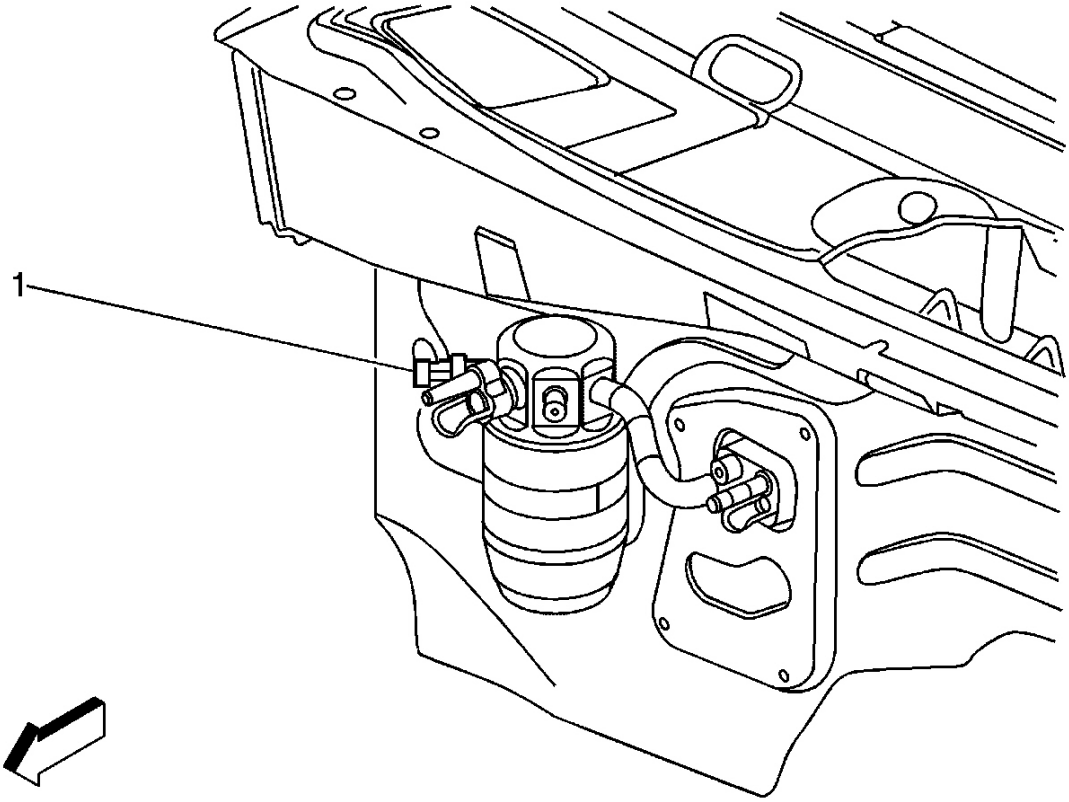


Fig. 8: Identifying Engine Compartment, Right Rear Components
Courtesy of GENERAL MOTORS CORP.

Identifying Callouts For Fig. 8

Callout	Component Name
1	A/C Low Pressure Switch

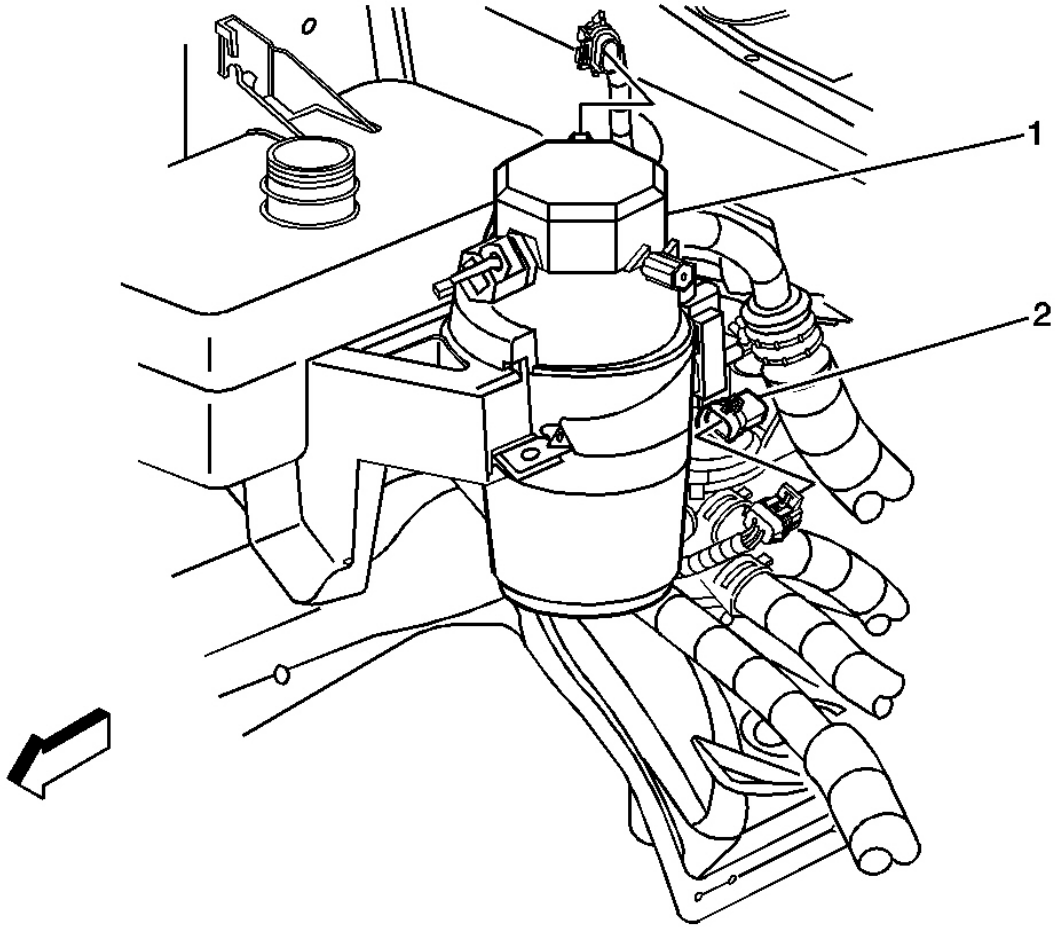


Fig. 9: Identifying Coolant Bypass Valve
Courtesy of GENERAL MOTORS CORP.

Identifying Callouts For Fig. 9

Callout	Component Name
1	Accumulator
2	Coolant Bypass Valve

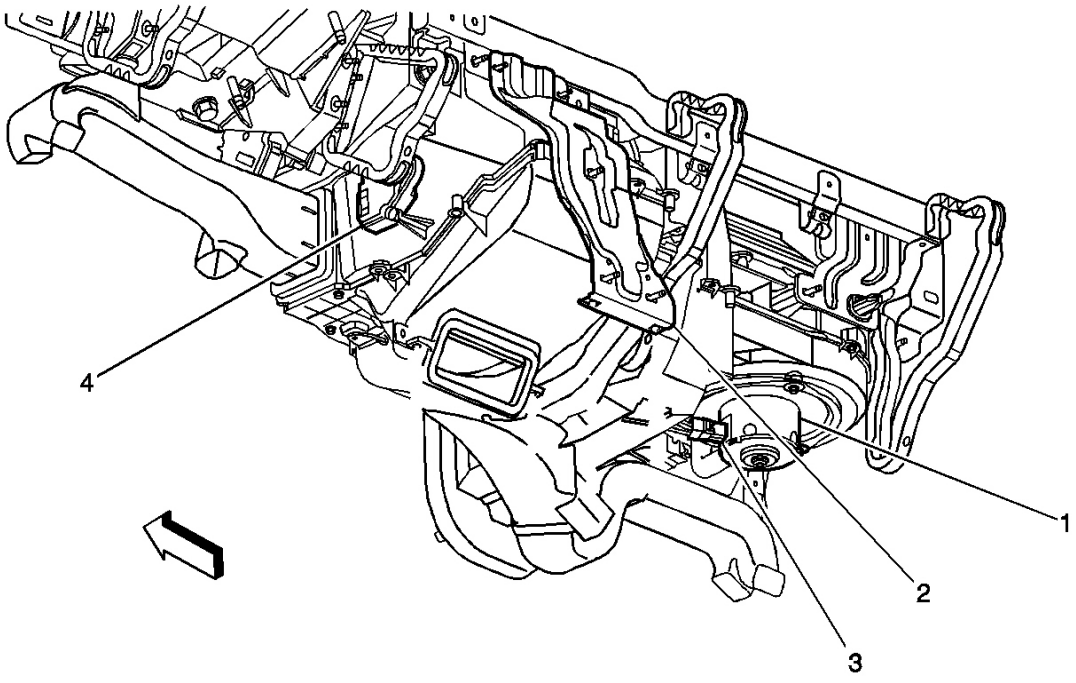


Fig. 10: Identifying Instrument Panel Carrier Components
Courtesy of GENERAL MOTORS CORP.

Identifying Callouts For Fig. 10

Callout	Component Name
1	Blower
2	IP Center Support
3	Blower Motor Control Processor
4	Air Temperature Actuator-Left

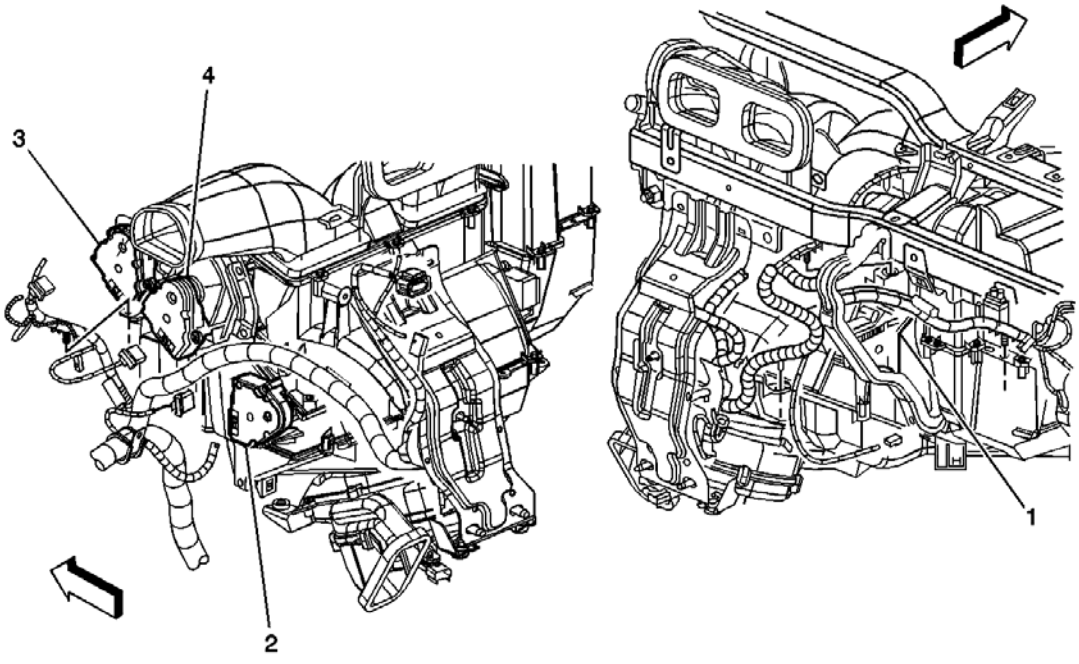


Fig. 11: Identifying Instrument Panel Carrier Components, Left & Right
Courtesy of GENERAL MOTORS CORP.

Identifying Callouts For Fig. 11

Callout	Component Name
1	Air Temperature Actuator-Right
2	Air Temperature Actuator-Left
3	Defrost Actuator
4	Mode Actuator

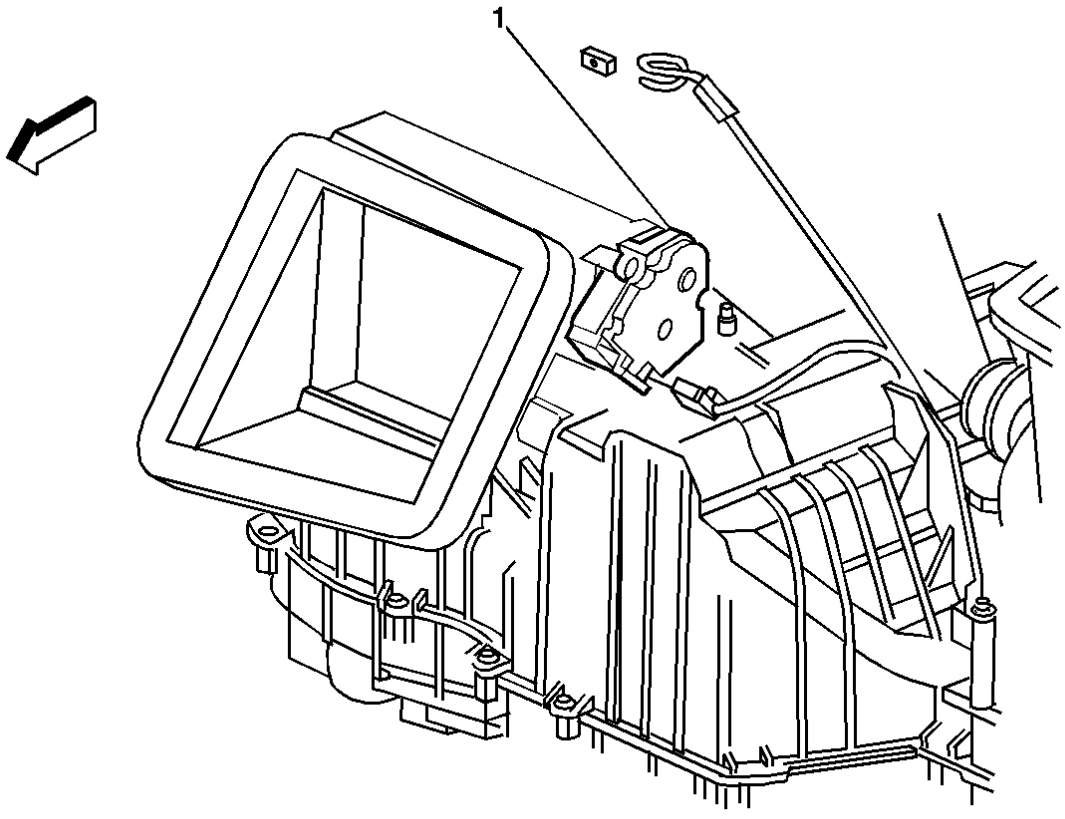


Fig. 12: Identifying Instrument Panel Carrier, Cowl Side
Courtesy of GENERAL MOTORS CORP.

Identifying Callouts For Fig. 12

Callout	Component Name
1	Recirculation Actuator

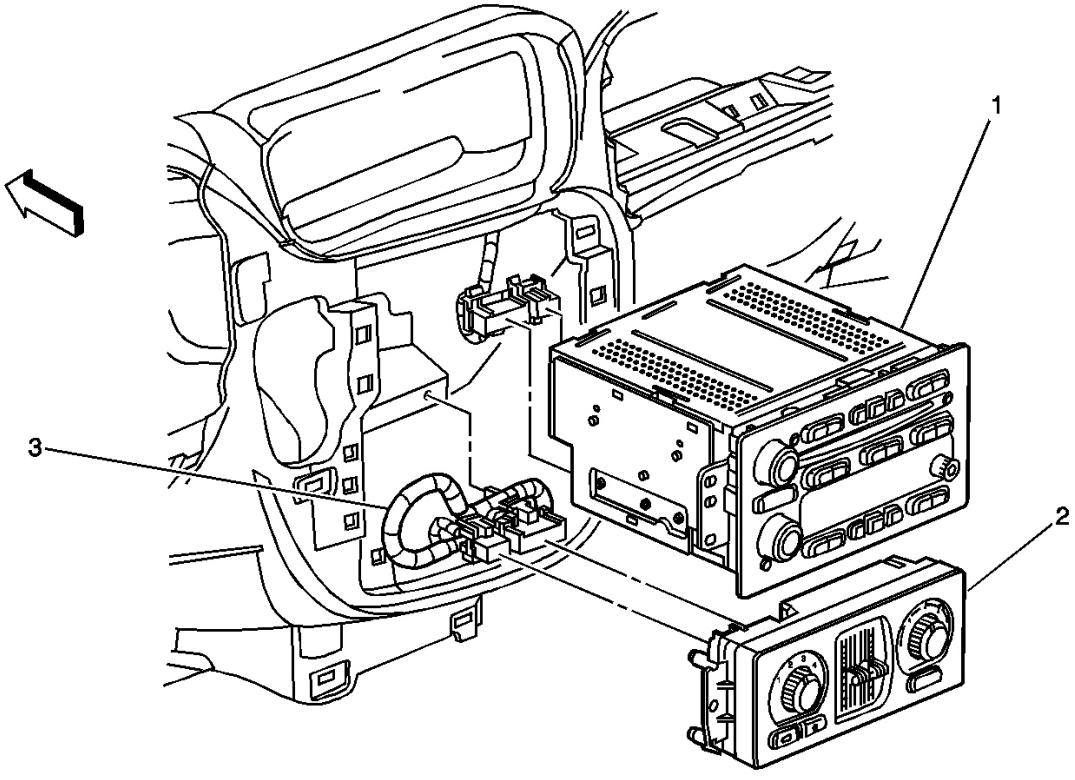


Fig. 13: Identifying Instrument Panel Components, Center
Courtesy of GENERAL MOTORS CORP.

Identifying Callouts For Fig. 13

Callout	Component Name
1	Radio
2	HVAC Control Module
3	I/P Harness

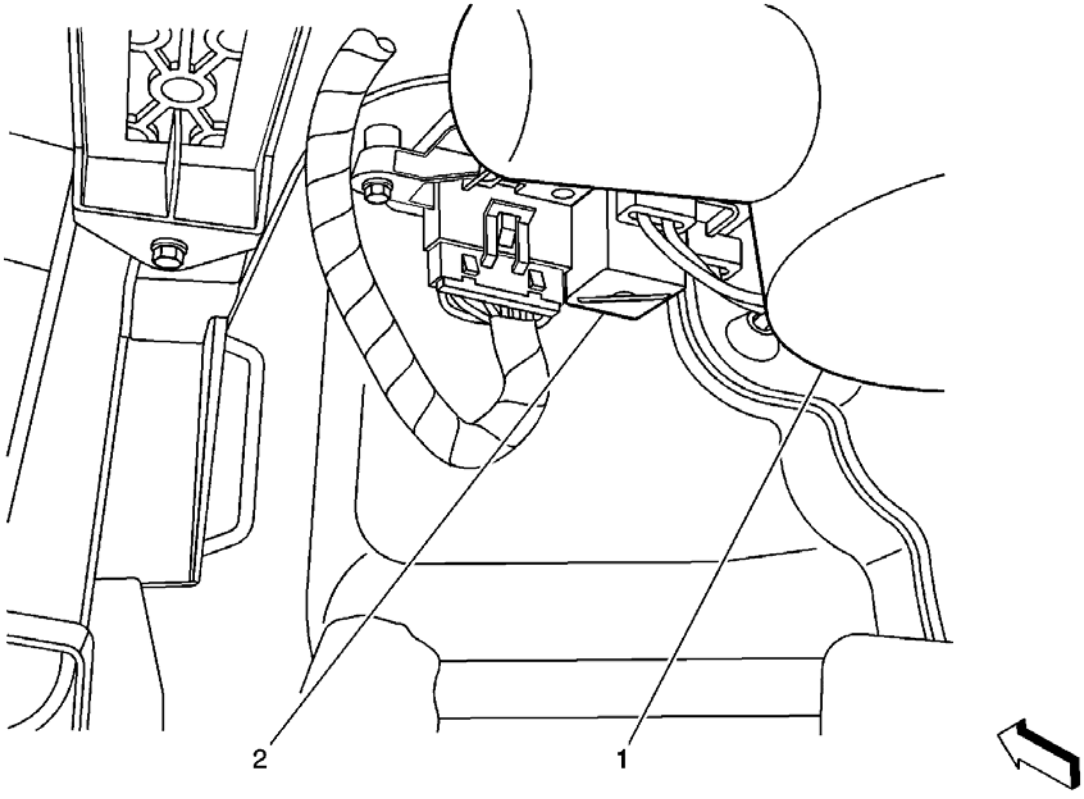


Fig. 14: Identifying Lower I/P Components, Right Side
Courtesy of GENERAL MOTORS CORP.

Identifying Callouts For Fig. 14

Callout	Component Name
1	Blower Motor
2	Blower Motor Resistor Assembly

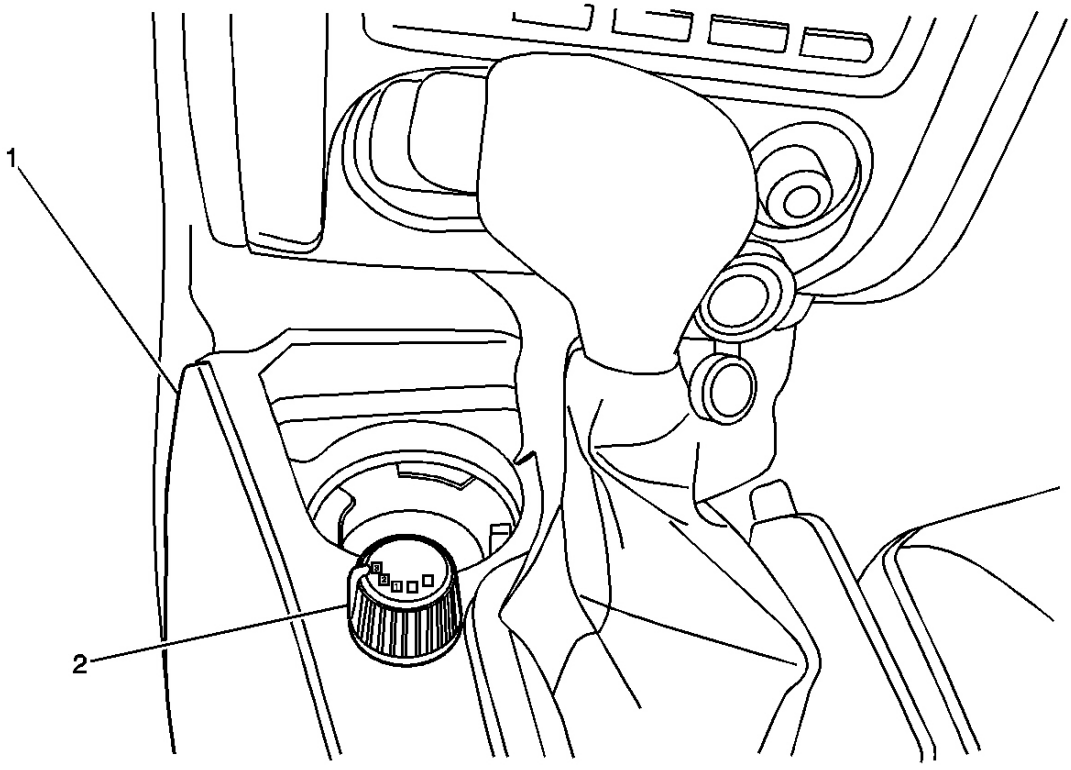


Fig. 15: Identifying Front Auxiliary Blower Motor Switch
Courtesy of GENERAL MOTORS CORP.

Identifying Callouts For Fig. 15

Callout	Component Name
1	Lower Console
2	Blower Motor Switch-Auxiliary

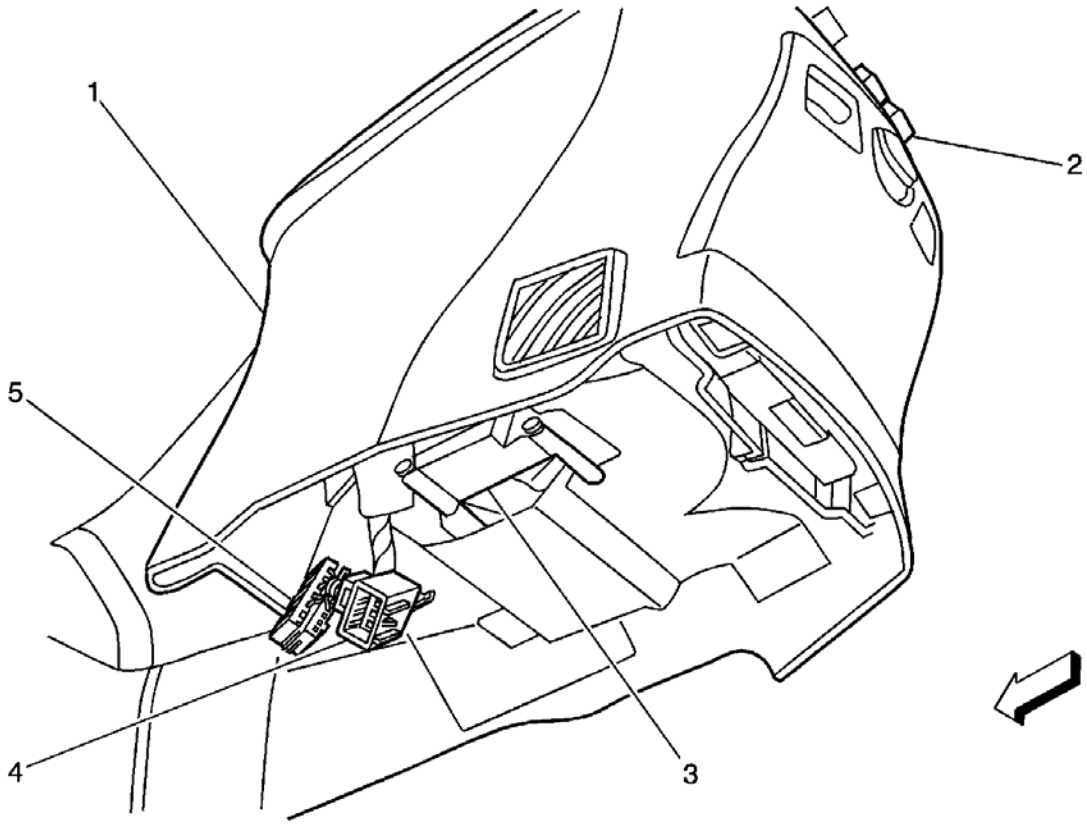


Fig. 16: Identifying Lower Console Components
Courtesy of GENERAL MOTORS CORP.

Identifying Callouts For Fig. 16

Callout	Component Name
1	Lower Console
2	HVAC Control Module-Auxiliary or RSA/HVAC Control Module-Auxiliary
3	Console Mode Actuator
4	C309
5	C307

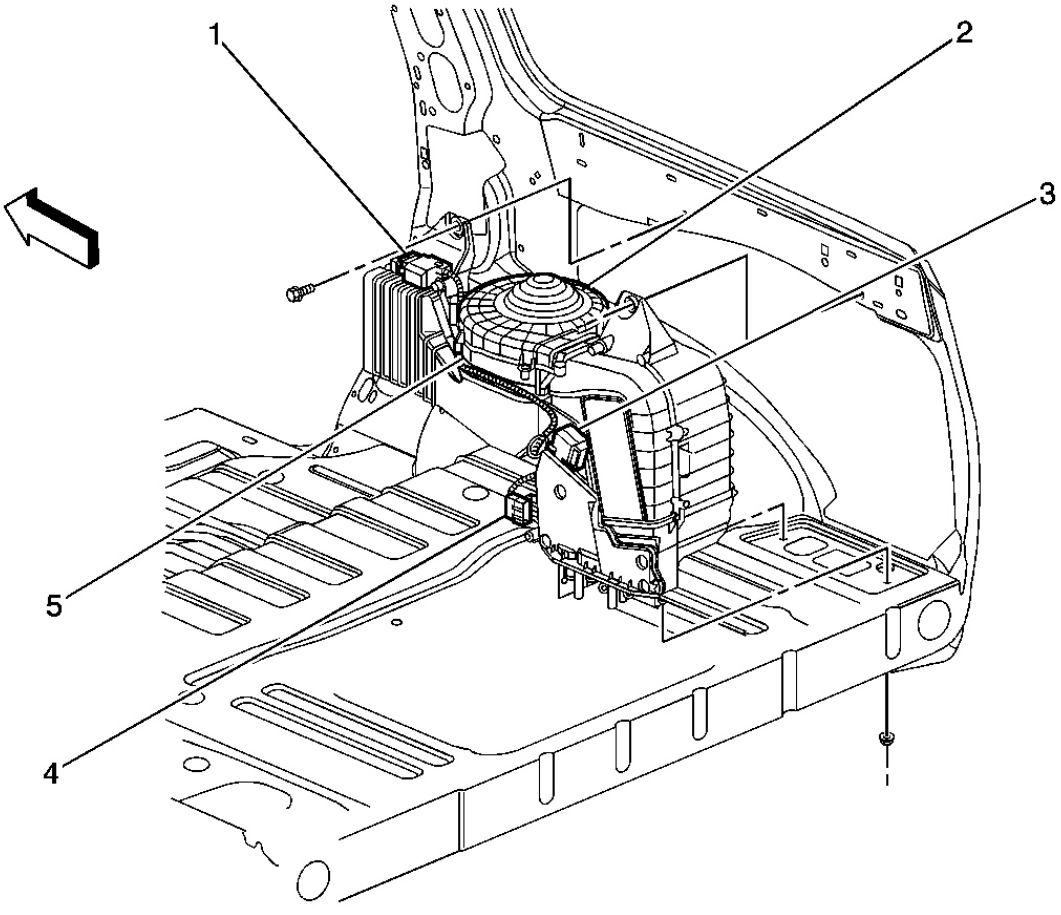


Fig. 17: Identifying HVAC Module Components - Auxiliary, Long Wheel Base
Courtesy of GENERAL MOTORS CORP.

Identifying Callouts For Fig. 17

Callout	Component Name
1	Mode Actuator - Auxiliary
2	Blower - Auxiliary
3	Air Temperature Actuator - Auxiliary
4	C401
5	In-Line 30A Fuse

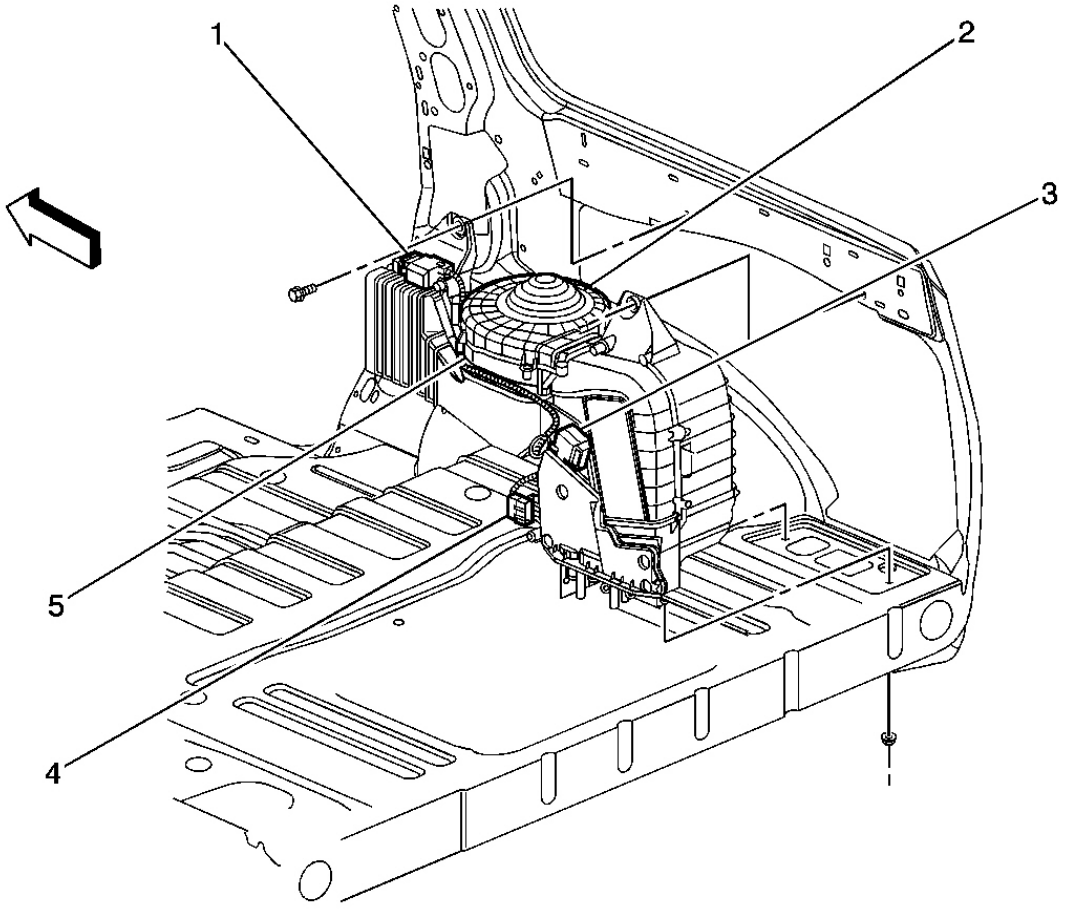


Fig. 18: Identifying HVAC Module Components - Auxiliary
Courtesy of GENERAL MOTORS CORP.

Identifying Callouts For Fig. 18

Callout	Component Name
1	Mode Actuator-Auxiliary
2	Blower-Auxiliary
3	Air Temperature Actuator-Auxiliary
4	C401
5	In-Line 30A Fuse

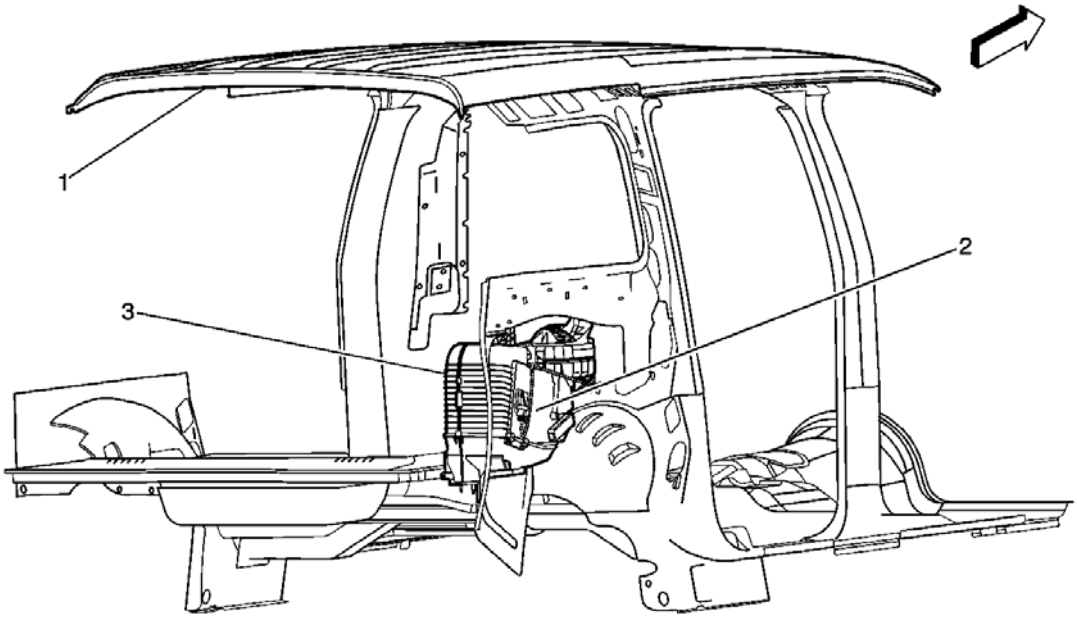


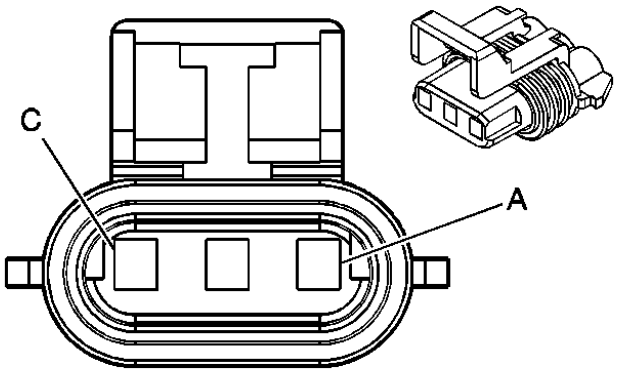
Fig. 19: Blower Motor Control Processor Components - Auxiliary
Courtesy of GENERAL MOTORS CORP.

Identifying Callouts For Fig. 19

Callout	Component Name
1	Body Rear Opening
2	Blower Motor Control Processor-Auxiliary
3	Rear Evaporator and Heater Core

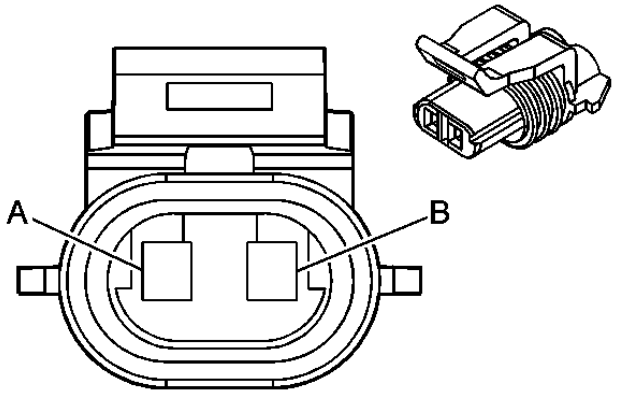
HVAC CONNECTOR END VIEWS

Identifying A/C Compressor Clutch Assembly Connector End View & Functions



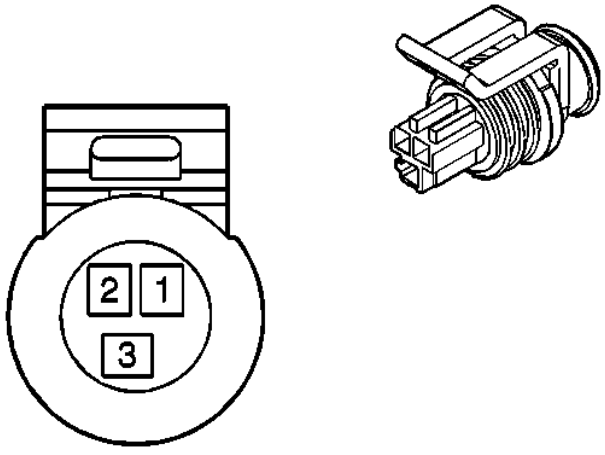
Connector Part Information		• 12110293 • 3-Way F Metri-Pack 150 Series Sealed (BK)	
Pin	**Wire Color**	**Circuit No.**	**Function**
A	BK	350	Ground
B	D-GN	59	A/C Compressor Clutch Supply Voltage
C	L-GN	2278	A/C Compressor Status Signal

Identifying A/C Low Pressure Switch Connector End View & Functions



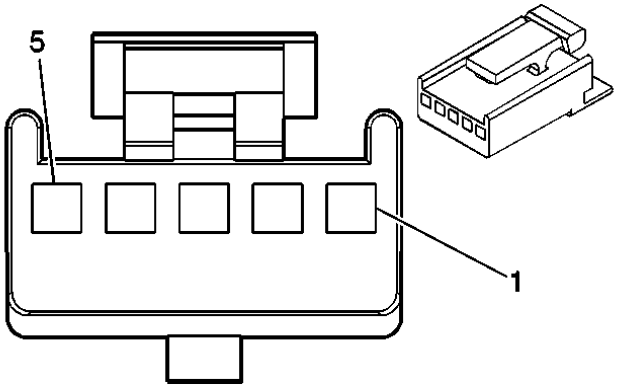
Connector Part Information		• 12052644 • 2-Way F Metri-Pack 150 Series Sealed (GY)	
Pin	**Wire Color**	**Circuit No.**	**Function**
A	D-BU	204	A/C Low Pressure Sensor Signal
B	BK	250	Ground

Identifying A/C Refrigerant Pressure Sensor Connector End View & Functions



Connector Part Information		• 15344137 • 3-Way F GT 150 Sealed 5.2 (BK)	
Pin	**Wire Color**	**Circuit No.**	**Function**
1	BK	2751	Low Reference
2	GY	2700	5-Volt Reference
3	RD/BK	380	A/C Refrigerant Pressure Sensor Signal

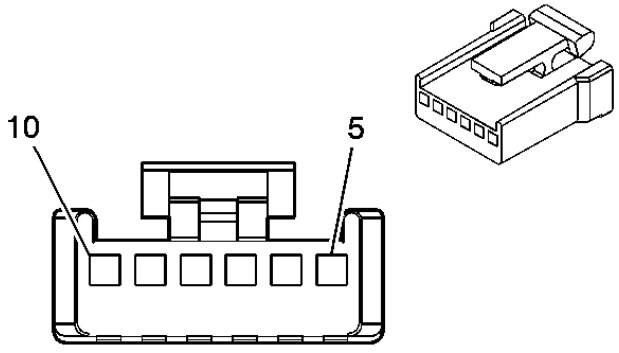
Identifying Air Temperature Actuator - Auxiliary (Long Wheelbase) Connector End View & Functions



Connector Part Information		• 12064982 • 5-Way F Metri-Pack 100 Series (BK)	
Pin	**Wire Color**	**Circuit No.**	**Function**

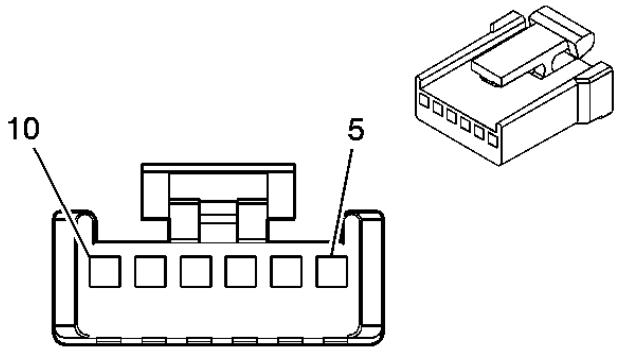
1	GY	2598	Low Reference
2	D-BU	1199	Auxiliary Air Temperature Door Position Signal
3	GY/BK	598	5-Volt Reference
4	RD	2600	Auxiliary Actuator Door Control
5	YE	2214	Auxiliary Air Temperature Door Control

Identifying Air Temperature Actuator - Left - Connector End View & Functions



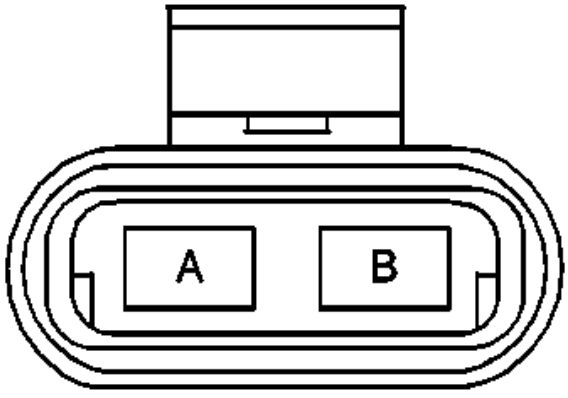
Connector Part Information		• **12040953** • **6-Way F Micro-Pack 100 Series (BK)**	
Pin	**Wire Color**	**Circuit No.**	**Function**
5	BN	341	Ignition 3 Voltage
6	D-BU	1199	Left Air Temperature Door Control
7	YE	1791	Low Reference
8	-	-	Not Used
9	L-BU	733	Left Air Temperature Door Position Signal
10	L-BU/BK	1688	5-Volt Reference

Identifying Air Temperature Actuator - Right - Connector End View & Functions



Connector Part Information		• 12040953 • 6-Way F Micro-Pack 100 Series (BK)	
Pin	**Wire Color**	**Circuit No.**	**Function**
5	BN	341	Ignition 3 Voltage
6	WH/BK	1236	Right Air Temperature Door Control
7	YE	1791	Low Reference
8	-	-	Not Used
9	D-BU	1646	Right Air Temperature Door Position Signal
10	L-BU/BK	1688	5-Volt Reference

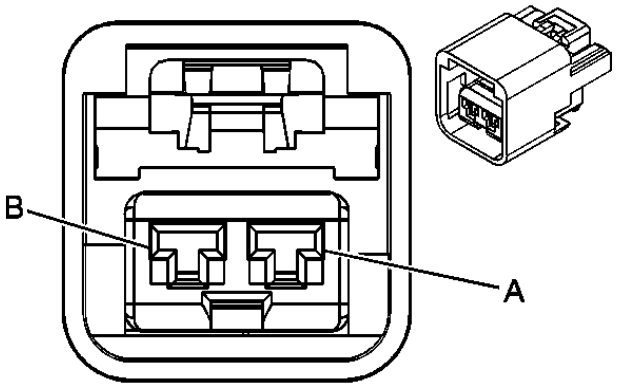
Identifying Blower Motor Connector End View & Functions



Connector Part Information	• 12066681

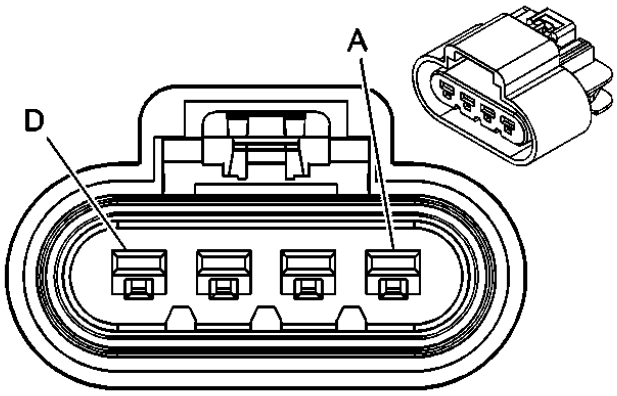
		• **2-Way F Metri-Pack 630 Series, Sealed, Pull-to-Seat (BK)**	
Pin	**Wire Color**	**Circuit No.**	**Function**
A	PU	65	Blower Motor Supply Voltage
B	BK	850	Ground

Identifying Blower Motor - Auxiliary (Long Wheelbase) Connector End View & Functions



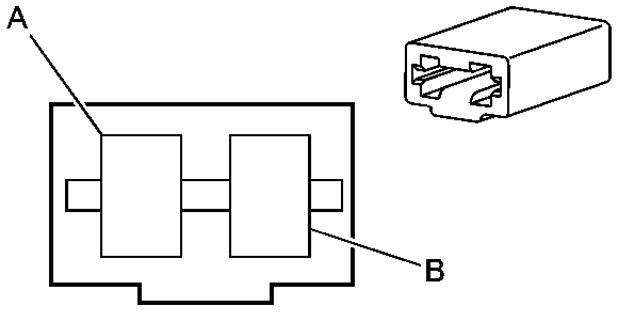
Connector Part Information		• **15326870** • **2-Way F GT 280 Series (BK)**	
Pin	**Wire Color**	**Circuit No.**	**Function**
A	OG	840	Battery Positive Voltage
B	BK	250	Ground

Identifying Blower Motor Control Processor - Auxiliary (Long Wheelbase) Connector End View & Functions



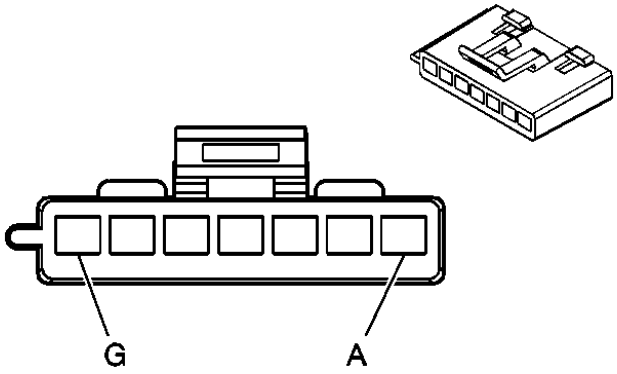
Connector Part Information		• 15326631 • 4-Way F GT 280 Series (BK)	
Pin	**Wire Color**	**Circuit No.**	**Function**
A	BK	1650	Ground
B	BK	250	Ground
C	GY	2604	Auxiliary Blower Motor Speed Control
D	OG	840	Battery Positive Voltage

Identifying Blower Motor Fuse - Auxiliary (Long Wheelbase) Connector End View & Functions



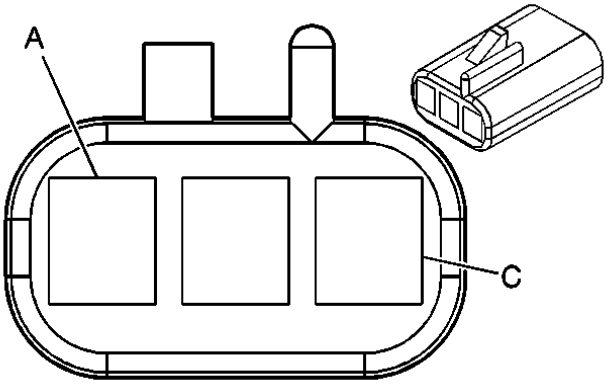
Connector Part Information		• 12010105 • Fuse Holder (BK)	
Pin	**Wire Color**	**Circuit No.**	**Function**
A	OG	840	Battery Positive Voltage
B	OG	840	Battery Positive Voltage
	OG	840	Battery Positive Voltage

Identifying Blower Motor Resistor Assembly Connector End View & Functions



Connector Part Information		• 12052854 • 7-Way F Metri-Pack 280 Series (BK)	
Pin	**Wire Color**	**Circuit No.**	**Function**
A	TN	63	Medium 1 Blower Motor Control
B	YE	60	Low Blower Motor Control
C	PU	73	Medium 3 Blower Motor Control
D	L-BU	72	Medium 2 Blower Motor Control
E	BK	2250	Ground
F	OG	52	High Blower Motor Control
G	RD	542	Battery Positive Voltage

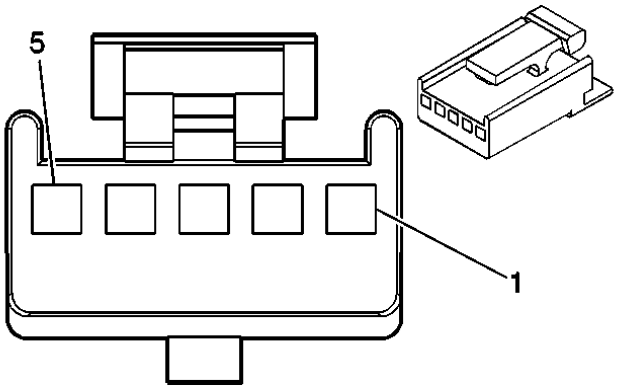
Identifying Blower Motor Switch - Front Auxiliary (Long Wheelbase) Connector End View & Functions



Connector Part Information		• 12047781 • 3-Way F Metri-Pack 150 Series (BK)	
Pin	**Wire Color**	**Circuit No.**	**Function**
A	YE	2277	Auxiliary HVAC Enable Control

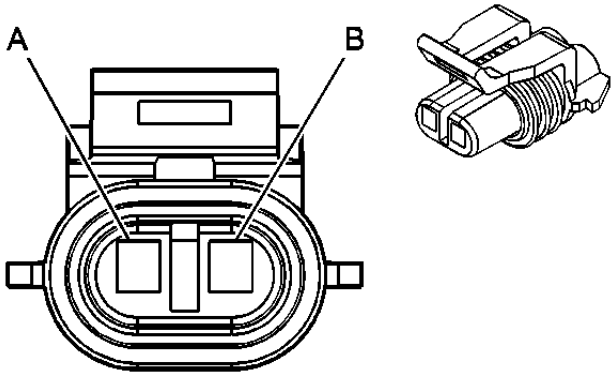
B	GY	2598	Low Reference
C	BN/WH	230	Instrument Panel Lamps Dimming Control

Identifying Console Mode Actuator (Long Wheelbase) Connector End View & Functions



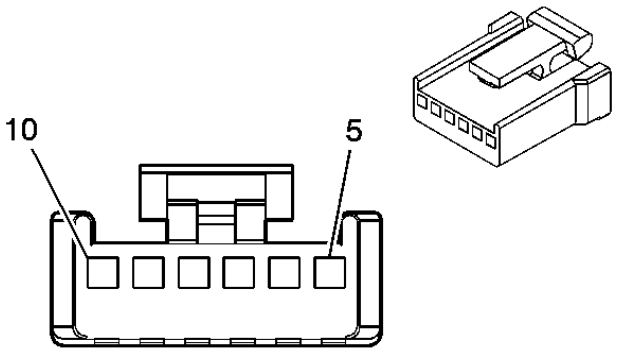
Connector Part Information		• **12064982** • **5-Way F Micro-Pack 100 Series (BK)**	
Pin	**Wire Color**	**Circuit No.**	**Function**
1	GY	2598	Low Reference
2	L-BU	5433	Console Mode Door Position Signal
3	GY	598	5-Volt Reference
4	GY	2599	Auxiliary Mode Door Control
5	L-GN	5434	Console Mode Door Control

Identifying Coolant Bypass Valve (Long Wheelbase) Connector End View & Functions



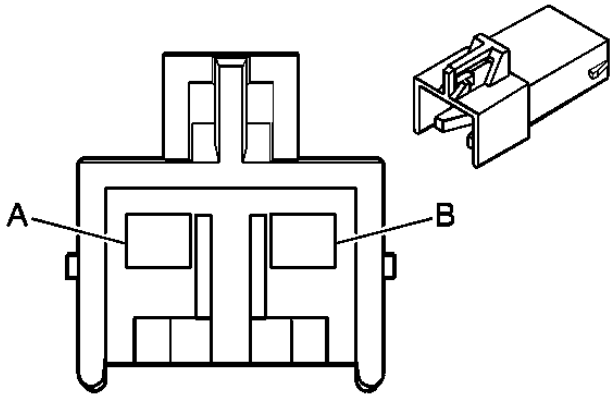
Connector Part Information		• 12052641 • 2-Way F Metri-Pack 150 Series Sealed (BK)	
Pin	**Wire Color**	**Circuit No.**	**Function**
A	GY/BK	1596	Coolant Bypass Solenoid Control
B	BK	250	Ground

Identifying Defrost Actuator Connector End View & Functions



Connector Part Information		• 12040953 • 6-Way F Micro-Pack 100 Series (BK)	
Pin	**Wire Color**	**Circuit No.**	**Function**
5	BN	341	Ignition 3 Voltage
6	TN/BK	2274	Defrost Door Control
7	YE	1791	Low Reference
8	-	-	Not Used
9	L-GN/BK	2276	Defrost Door Position Signal
10	L-BU/BK	1688	5-Volt Reference

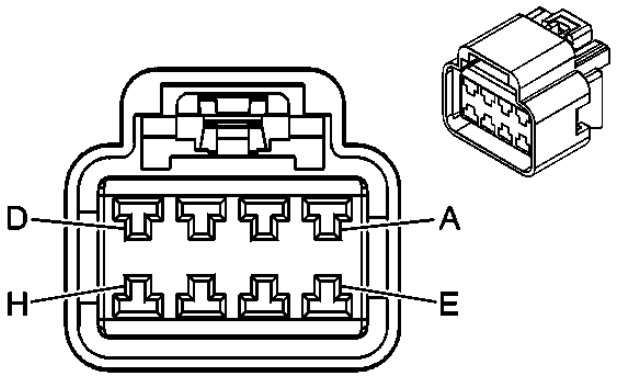
Identifying HVAC Control Module C1 Connector End View & Functions



Connector Part Information		• **12110206** • **24-Way F Micro-Pack 100 Series (L-BU)**	
Pin	**Wire Color**	**Circuit No.**	**Function**
A1	D-GN	1614	Recirculation Door Control
A2	D-BU	1646	Right Air Temperature Door Position Signal
A3	L-BU	733	Left Air Temperature Door Position Signal
A4	L-GN/BK	2276	Defrost Door Position Signal
A5	L-GN	2275	Mode Door Position Signal
A6	-	-	Not Used
A7	BN/WH	230	Instrument Panel Lamps Dimming Control
A8	BK/WH	751	Ground
A9	GY/BK	1596	Coolant Bypass Solenoid Control (Long Wheelbase)
A10	YE	2277	Auxiliary HVAC Enable Control
A11	D-GN	71	OFF Blower Motor Control
A12	D-BU	204	A/C Low Pressure Sensor Signal
B1	WH/BK	1236	Right Air Temperature Door Control
B2	D-BU	1199	Left Air Temperature Door Control
B3	TN/BK	2274	Defrost Door Control
B4	TN	2273	Mode Door Control
B5	BN	341	Ignition 3 Voltage
B6	YE	1791	Low Reference
B7	OG	4340	Battery Positive Voltage
B8	L-BU/BK	1688	5-Volt Reference
B9	BK	2250	Ground
B10	-	-	Not Used
B11	WH	1038	HVAC Class 2 Serial Data

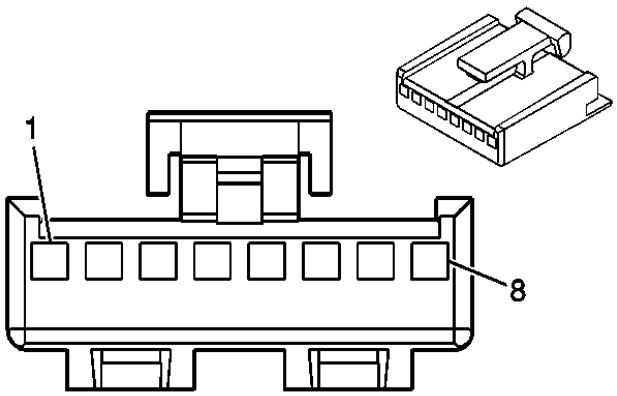
B12	L-GN	2278	A/C Compressor Status Signal

Identifying HVAC Control Module C2 Connector End View & Functions



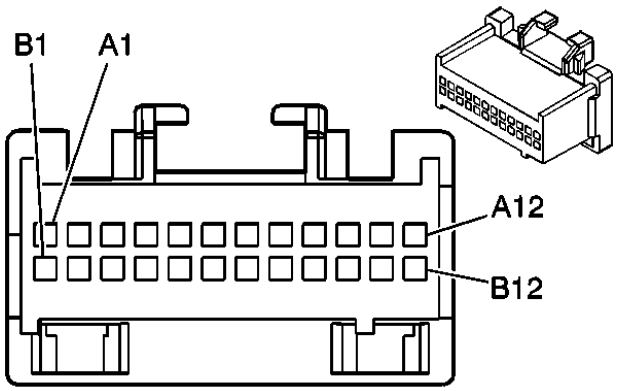
Connector Part Information		• **15326924** • **8-Way F GT 280 (BK)**	
Pin	**Wire Color**	**Circuit No.**	**Function**
A	PU	73	Medium 3 Blower Motor Control
B	L-BU	72	Medium 2 Blower Motor Control
C	TN	63	Medium 1 Blower Motor Control
D	YE	60	Low Blower Motor Control
E	-	-	Not Used
F	OG	52	High Blower Motor Control
G	BN	141	Ignition 3 Voltage
H	D-GN	71	OFF Blower Motor Control

Identifying HVAC Control Module - Auxiliary (Short Wheelbase) Connector End View & Functions



Connector Part Information		• 12052444 • 8-Way F Micro-Pack 100 Series (BK)	
Pin	**Wire Color**	**Circuit No.**	**Function**
1	BN	341	Ignition 3 Voltage
2-3	-	-	Not Used
4	YE	2277	Auxiliary HVAC Enable Control
5	-	-	Not Used
6	WH	119	Auxiliary Mode Door Control
7	BK	2250	Ground
8	BN/WH	230	Instrument Panel Lamps Dimming Control

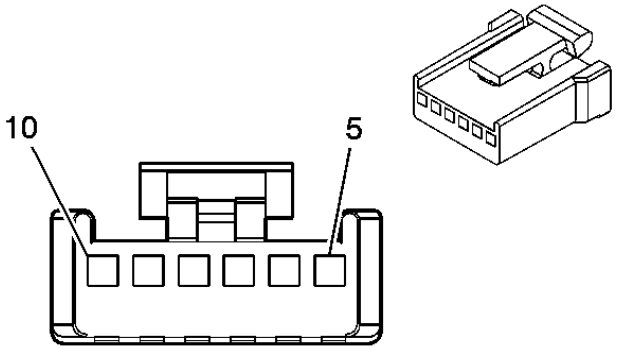
Identifying HVAC Control Module - Auxiliary (Long Wheelbase) - Connector End View & Functions



Connector Part Information		• 12110088 • 24-Way F Micro-Pack 100 Series Sealed (GY)	
Pin	**Wire Color**	**Circuit No.**	**Function**
A1	BK	2250	Ground
A2	-	-	Not Used
A3	-	-	Not Used
A4	-	-	Not Used
A5	-	-	Not Used
A6	-	-	Not Used
A7	-	-	Not Used
A8	-	-	Not Used
A9	-	-	Not Used
A10	-	-	Not Used
A11	-	-	Not Used
A12	-	-	Not Used
B1	-	-	Not Used
B2	-	-	Not Used
B3	-	-	Not Used
B4	-	-	Not Used
B5	-	-	Not Used
B6	-	-	Not Used
B7	-	-	Not Used
B8	-	-	Not Used
B9	-	-	Not Used
B10	-	-	Not Used
B11	-	-	Not Used
B12	-	-	Not Used

Pin	Wire Color	Circuit No.	Function
A1	BN/WH	230	Instrument Panel Lamps Dimming Control
A2	OG	4340	Battery Positive Voltage
A3	GY	2603	TXV Solenoid Control
A4	GY	2599	Auxiliary Mode Door Control
A5	RD	2600	Auxiliary Actuator Door Control
A6	YE	2277	Auxiliary HVAC Enable Control
A7	D-BU	1199	Auxiliary Air Temperature Door Position Signal
A8	L-BU	5433	Console Mode Door Position Signal
A9	GY	598	5-Volt Reference
A10	-	-	Not Used
A11	GY	2289	Rear HVAC/Audio Class 2 Serial Data
A12	-	-	Not Used
B1	BK	2250	Ground
B2	GY	2598	Low Reference
B3	YE	2214	Auxiliary Air Temperature Door Control
B4	L-GN	5434	Console Mode Door Control
B5	BN/WH	2601	Auxiliary Mode Door Position Signal
B6-B11	-	-	Not Used
B12	GY	2604	Auxiliary Blower Motor Speed Control

Identifying Mode Actuator Connector End View & Functions

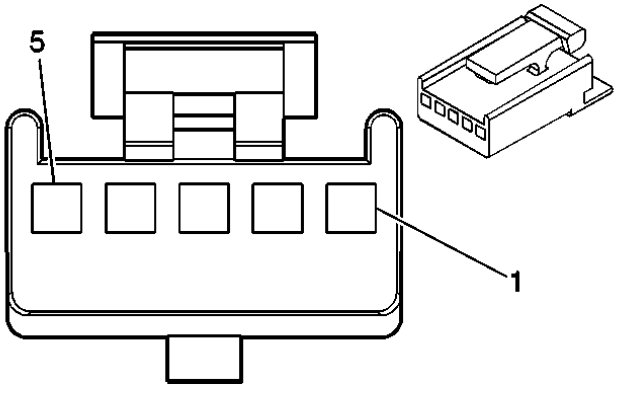


Connector Part Information	• **12040953** • **6-Way F Micro-Pack 100 Series (BK)**

Pin	Wire Color	Circuit No.	Function
5	BN	341	Ignition 3 Voltage
6	TN	2273	Mode Door Control

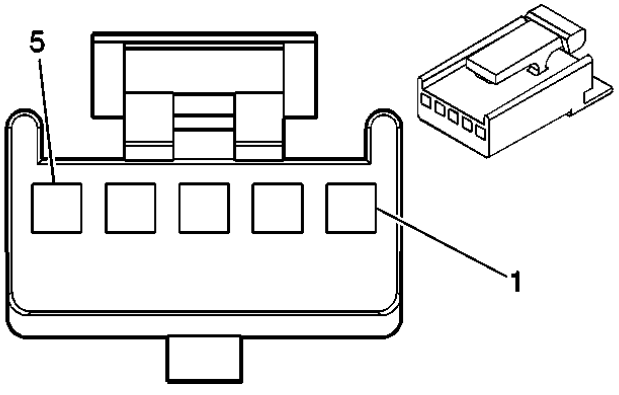
7	YE	1791	Low Reference
8	-	-	Not Used
9	L-GN	2275	Mode Door Position Signal
10	L-BU/BK	1688	5-Volt Reference

Identifying Mode Actuator - Auxiliary (Short Wheelbase) - Connector End View & Functions



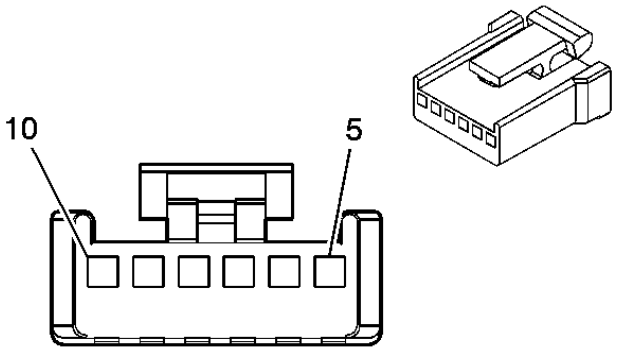
Connector Part Information		• 12064982 • 5-Way F Micro-Pack 100 Series (BK)	
Pin	**Wire Color**	**Circuit No.**	**Function**
1	BN	341	Ignition 3 Voltage
2	WH	119	Auxiliary Mode Door Control
3	BK	2250	Ground
4-5	-	-	Not Used

Identifying Mode Actuator - Auxiliary (Long Wheelbase) - Connector End View & Functions



Connector Part Information		• 12064982 • 5-Way F Metri-Pack 100 Series (BK)	
Pin	**Wire Color**	**Circuit No.**	**Function**
1	GY	2598	Low Reference
2	BN/WH	2601	Auxiliary Mode Door Position Signal
3	GY/BK	598	5-Volt Reference
4	RD	2600	Auxiliary Actuator Door Control
5	GY/WH	2599	Auxiliary Mode Door Control

Identifying Recirculation Actuator Connector End View & Functions



Connector Part Information		• 12040953 • 6-Way F Micro-Pack 100 Series (BK)	
Pin	**Wire Color**	**Circuit No.**	**Function**
5	BN	341	Ignition 3 Voltage
6	D-GN	1614	Recirculation Door Control
7	BK	2250	Ground
8-10	-	-	Not Used

DIAGNOSTIC INFORMATION AND PROCEDURES

DIAGNOSTIC SYSTEM CHECK - HVAC SYSTEMS - MANUAL

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

5: Determine if the HVAC Control Module, Body Control Module or Powertrain Control Module have set DTCs which may affect HVAC operation are present.

6: 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.

7: 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 - Manual

Step	Action	Yes	No
1	Did you review A Diagnostic Starting Point - Heating, Ventilation and Air Conditioning?	Go to **Step 2**	Go to **Diagnostic Starting Point - Heating, Ventilation and Air Conditioning** in Heating, Ventilation and Air Conditioning
2	Install a scan tool. Does the scan tool power up?	Go to **Step 3**	Go to **Scan Tool Does Not Power Up** in Data Link Communications
3	1. Turn ON the ignition, with the engine OFF. 2. Attempt to establish communication with the following control modules: • The HVAC control module • The body control module • The powertrain control module Does the scan tool communicate with the control modules?	Go to **Step 4**	Go to **Scan Tool Does Not Communicate with Class 2 Device** in Data Link Communications
4	**IMPORTANT:** **The engine may start during the following step. Turn OFF the engine as soon as you have observed the Crank power mode.** 1. Access the Class 2 Power Mode in the Diagnostic Circuit Check on the scan tool. 2. Rotate the ignition switch through all positions while observing the Ignition Switch Power Mode parameter. Does the Ignition Switch parameter reading match the ignition switch position for all switch positions?	Go to**Step 5**	Go to**Power Mode Mismatch** in Body Control System
	Select the display DTCs function on the scan tool for		

5	the following modules: • HVAC Control Module • Body Control Module • Powertrain Control Module Does the scan tool display any DTCs?	Go to **Step 6**	Go to **Symptoms - HVAC Systems - Manual**
6	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 7**
7	Does the scan tool display DTC B10XX?	Go to **Diagnostic Trouble Code (DTC) List** in Body Control Systems	Go to **Step 8**
8	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 9**
9	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 - 4.2L or **Diagnostic Trouble Code (DTC) List** in Engine Controls - 4.8L, 5.3L, and 6.0L

SCAN TOOL OUTPUT CONTROLS

HVAC Control Module Scan Tool Output Controls

Scan Tool Output Control	Additional Menu Selection(s)	Description
A/C Permission	Miscellaneous Tests	When you select ON, the HVAC control module changes the state of the A/C Permission parameter to Granted and transmits a clutch enable message to the PCM over the class 2 serial data circuit. The A/C compressor clutch engages and remains engaged until you select OFF. When you select OFF, the HVAC control module changes the state of the A/C Permission parameter to Withheld and transmits a clutch disable message to the PCM over the

		class 2 serial data circuit.
HVAC Actuator Recalibration	-	When you select RESET, the HVAC control module recalibrates the maximum and minimum door positions of each HVAC door. The ambient air temperature display is set to the current value of the Outside Air Temp. Raw parameter.
Left Mix Motor	Motor/Actuator Tests	When you select ON, the HVAC control module commands the left air temperature actuator toward the maximum door position. The actuator moves the door to the full hot position. When you select OFF, the HVAC control module commands the left air temperature actuator toward the minimum door position. The actuator moves the door to the full cold position.
Mode 1 Door Position	Motor/Actuator Tests	When you select ON, the HVAC control module commands the mode actuator toward the maximum door position. The actuator moves the door to the panel position. When you select OFF, the HVAC control module commands the mode actuator toward the minimum door position. The actuator moves the door to the floor position.
Mode 2 Door Position	Motor/Actuator Tests	When you select ON, the HVAC control module commands the defroster actuator toward the maximum door position. The actuator moves the door to the defrost position. When you select OFF, the HVAC control module commands the defroster actuator toward the minimum door position. The actuator moves the door in the opposite direction of the defrost position.
Right Mix Motor	Motor/Actuator Tests	When you select ON, the HVAC control module commands the right air temperature actuator toward the maximum door position. The actuator moves the door to the full cold position. When you select OFF, the HVAC control module commands the right air temperature actuator toward the minimum door position. The actuator moves the door to the full hot position.

Auxiliary HVAC Control Module Scan Tool Output Controls

Scan Tool Output Control	Additional Menu Selection(s)	Description
Air Mix Door	Special Functions	When you select ON, the auxiliary HVAC control module commands the auxiliary air temperature actuator toward the maximum door position. The actuator moves the door to the full hot position. When you select OFF, the auxiliary HVAC control module commands the auxiliary air temperature actuator toward the minimum door position. The actuator moves the door to the full cold position.
		When you select ON, the auxiliary HVAC control module commands the auxiliary blower motor to maximum speed.

Blower Motor	Special Functions	The auxiliary blower motor operates at maximum speed until you select OFF. The auxiliary HVAC control module must be in the ON state before selecting the output control.
Console Door Position	Special Functions	When you select ON, the auxiliary HVAC control module commands the console mode actuator toward the maximum door position. The actuator moves the console mode door to the lower position. When you select OFF, the auxiliary HVAC control module commands the console mode actuator toward the minimum door position. The actuator moves the console mode door to the upper position.
HVAC Actuator Recal.	Special Functions	When you select RESET, the auxiliary HVAC control module recalibrates the maximum and minimum door positions of each auxiliary HVAC door.
Mode Door Position	Special Functions	When you select ON, the auxiliary HVAC control module commands the auxiliary mode actuator toward the maximum door position. The actuator moves the door to the upper position. When you select OFF, the auxiliary HVAC control module commands the auxiliary mode actuator toward the minimum door position. The actuator moves the door to the lower position.
Water Valve	Special Functions	When you select ON, the auxiliary HVAC control module sends a class 2 serial data message to the HVAC control module to command the coolant bypass valve to the closed position. The coolant bypass valve solenoid is engaged and vacuum is applied to the coolant valve. The valve will close. When you select OFF, the auxiliary HVAC control module sends a class 2 serial data message to the HVAC control module to command the coolant bypass valve to the open position. The coolant bypass valve solenoid is disengaged and vacuum is removed from the coolant valve. The valve will open.

PCM 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 PCM must receive an A/C request from the HVAC control module in order to enable the output control. The PCM 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 Head Pressure	A/C Permission	Yes, No	No
A/C Switch	Input/Output	On, Off	Off
AC Compressor Feedback	Input/Output	On, Off	Varies
AC Permission	Input/Output	Withheld, Granted	Varies
AC/Heater Door Actual	Door Positions	Counts	Varies
AC/Heater Door Commanded	Door Positions	Counts	Varies
AC/Heater Motor Drive	Door Positions	Stop, Increase, Decrease	Stop
Air Mix Door Left Commanded	Door Positions	Counts	Varies
Air Mix Door Right Commanded	Door Positions	Counts	Varies
Battery Voltage	Input/Output	Volts	13.5-14.5 V
Blower Motor Status	Input/Output	Active/Inactive	Active
Blower Speed	A/C Permission	Yes, No	No
Defrost Door Actual	Door Positions	Counts	Varies
Defrost Door Commanded	Door Positions	Counts	Varies
Defrost Motor Drive	Door Positions	Stop, Increase, Decrease	Stop
Engine Coolant Temp	A/C Permission	Yes, No	No
Engine Running	A/C Permission	Yes, No	No
Ign. Since Current DTC	Input/Output	Numeric	0
Left Mix Door Actual	Door Positions	Counts	Varies
Left Mix Motor Drive	Door Positions	Stop, Increase, Decrease	Stop
Left Temp. Detent Pos.	Input/Output	0-18	Hot 18/Cold 0
Mode Select Position	Door Positions	Off, Defrost, Heater, Htr/Def, Bi-level, Panel	Varies
Outside Air Temp	A/C Permission	Yes, No	No
Pressure Cycle Switch	A/C Permission	Yes, No	No
Pressure Cycle Switch	Input/Output	Low Pressure, Normal	Varies
Recirculate Switch	Input/Output	On, Off	Off
Right Mix Door Actual	Door Positions	Counts	Varies
Right Mix Motor Drive	Door Positions	Stop, Increase, Decrease	Stop
Right Temp. Detent Pos.	Input/Output	0-18	Hot 18/Cold 0

Rear 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)			
Air Mix Door Actual	Door Positions	Counts	Varies
Air Mix Door Commanded	Door Positions	Counts	Varies

Battery Voltage	Input/Output	Volts	13.5-14.5 V
Console Mode Door Actual	Door Positions	Counts	0.0 Volts
Console Mode Door Commanded	Door Positions	Counts	Varies
Driver Override Switch	Input/Output	Rear, Off, Low, Med, High	Varies
Heater Water Valve	Input/Output	Open, Closed	Closed
Ign. Since Current DTC	Input/Output	Cycles	Varies
Mode Door Actual	Door Positions	Counts	Varies
Mode Door Commanded	Door Positions	Counts	Varies
Rear Blower Speed	Input/Output	Off, Low, Med, High	Varies
Rear HVAC Fan Speed	Input/Output	Off, Low, Med, High	Varies
Rear HVAC Motor Pos.	Door Positions	Lower, Bi-level, Upper	Bi-level
Rear Temp. Select Sw.	Input/Output	Counts	Varies
Rec. Mode from Front Control	Door Positions	Heater, Panel, Defrost, Bi-level, Htr./Def.	Varies

PCM 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	Engine Data 2	kPa, psi	629-845 kPa (85-120 psi)
A/C High Side Pressure	Engine Data 2	Volts	Varies
A/C Relay Command	Engine Data 2	On, Off	Varies
A/C Request Signal	Engine Data 2	Yes, No	Varies
ECT Sensor	Engine Data 2	°C/°F	92°C (197°F)

SCAN TOOL DATA DEFINITIONS

AC Compressor Feedback

The scan tool displays On/Off. The state of the HVAC control module input for the A/C compressor status. When supply voltage is applied to the A/C compressor clutch coil, the voltage is also applied to the input terminal of the HVAC control module and the scan tool displays On. The scan tool displays Off when supply voltage is not applied to the A/C compressor clutch coil.

A/C Head Pressure

The scan tool displays Yes/No. The scan tool displays Yes when the HVAC control module receives a class 2 message from the PCM that the A/C high side pressure is at or above 2413 kPa (350 psi). This action disables an A/C request. The scan tool displays No when the HVAC control module receives a class 2 message from the PCM that the A/C high side pressure is below 2413 kPa (350 psi).

A/C High Side Pressure

The scan tool displays 0-3450 kPa (0-500 psi). The voltage applied to the PCM 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 PCM input for the A/C refrigerant pressure sensor.

A/C Switch

The scan tool displays On/Off. The scan tool displays On when the A/C request switch is active. The scan tool displays Off when the A/C request switch is inactive.

AC Permission

The scan tool displays Withheld/Granted. The scan tool displays Granted when the HVAC control module determines that conditions for compressor clutch engagement are present. The scan tool displays Withheld when the HVAC control module determines that conditions for compressor clutch engagement are not present.

AC/Heater Door Actual

The scan tool displays 0-255 Counts. The voltage applied to the HVAC control module input for the mode door position is converted to a number between 0 and 255 where 51 Counts is approximately equal to 1 V.

AC/Heater Door Commanded

The scan tool displays 0-255 counts. The scan tool displays the desired mode door position as determined by the HVAC control module.

AC/Heater Motor Drive

The scan tool displays Stop, Increase, or Decrease. The scan tool displays the control decision for the actuator output as determined by 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 PCM.

A/C Request Signal

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

the PCM receives a class 2 message from the HVAC control module to disengage the A/C compressor clutch.

Air Mix Door Actual

The scan tool displays 0-255 counts. The voltage applied to the auxiliary air temperature door position input of the auxiliary HVAC control module is converted to a number between 0 and 255 where 51 Counts is approximately equal to 1 V.

Air Mix Door Commanded

The scan tool displays 0-255 counts. The scan tool displays the desired auxiliary air temperature door position as determined by the auxiliary HVAC control module.

Air Mix Door Left Commanded

The scan tool displays 0-255 counts. The scan tool displays the desired left air temperature door position as determined by the HVAC control module.

Air Mix Door Right Commanded

The scan tool displays 0-255 counts. The scan tool displays the desired right air temperature door position as determined by the HVAC control module.

Battery Voltage

The scan tool displays 0-25 volts. The voltage measured from the battery positive voltage circuit and the ground circuit of the HVAC control module.

Battery Voltage

The scan tool displays 0-25 volts. The voltage measured from the battery positive voltage circuit and the ground circuit of the auxiliary HVAC control module.

Blower Speed

The scan tool displays Yes/No. The scan tool displays Yes when the HVAC control module interprets the input of the Off blower motor control circuit has battery positive voltage. This action disables an A/C request. The scan tool displays No when the HVAC control module interprets the input of the Off blower motor control circuit has no voltage.

Console Mode Door Actual

The scan tool displays 0-255 counts. The scan tool displays the desired console mode door position as determined by the auxiliary HVAC control module.

Console Mode Door Commanded

The scan tool displays 0-255 counts. The scan tool displays the desired console mode door position as determined by the auxiliary HVAC control module.

Defrost Door Actual

The scan tool displays 0-255 counts. The voltage applied to the defrost door position input of the HVAC control module is converted to a number between 0 and 255 where 51 Counts is approximately equal to 1 V.

Defrost Door Commanded

The scan tool displays 0-255 counts. The scan tool displays the desired defrost door position as determined by the HVAC control module.

Defrost Motor Drive

The scan tool displays Stop, Increase, or Decrease. The scan tool displays the control decision for the actuator output as determined by the HVAC control module.

Driver Override Switch

The scan tool displays Rear, Off, Low, Med, or High. The scan tool displays the position of the front auxiliary blower motor switch as determined by the auxiliary HVAC control module.

ECT Sensor

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

Engine Coolant Temp

The scan tool displays Yes/No. The scan tool displays Yes when the HVAC control module receives a class 2 message from the PCM that the engine coolant temperature is at or above 123°C (253°F). This action disables an A/C request. The scan tool displays No when the engine coolant temperature is below 123°C (253°F).

Engine Running

The scan tool displays Yes/No. The scan tool displays Yes when the HVAC control module receives a class 2 message from the PCM that the engine is not running. This action disables an A/C request. The scan tool displays No when the HVAC control module receives a class 2 message from the PCM that the engine is running.

Heater Water Valve

The scan tool displays Open or Closed. The scan tool displays the commanded state of the coolant bypass valve.

Ign. Since Current DTC

The scan tool displays 0-100. The number of the ignition cycles since the setting of the most recent current diagnostic trouble code (DTC).

Left Mix Door Actual

The scan tool displays 0-255 counts. The voltage applied to the left air temperature door position input of the HVAC control module is converted to a number between 0 and 255 where 51 Counts is approximately equal to 1 V.

Left Motor Drive

The scan tool displays Stop, Increase, or Decrease. The scan tool displays the control decision for the actuator output as determined by the HVAC control module.

Left Solar Sensor

The scan tool displays 0-255 counts. The voltage applied to the left sunload input of the BCM is converted to a number between 0 and 255 where 51 Counts is approximately equal to 1 V.

Left Temp. Detent Pos.

The scan tool displays a value from 0 to 18. The scan tool displays the position of the left air temperature switch. 0 is displayed for a full cold position. 18 is displayed for a full hot position.

Mode Door Actual

The scan tool displays 0-255 counts. The voltage applied to the auxiliary mode door position input of the auxiliary HVAC control module is converted to a number between 0 and 255 where 51 Counts is approximately equal to 1 V.

Mode Door Commanded

The scan tool displays 0-255 counts. The scan tool displays the desired auxiliary mode door position as determined by the auxiliary HVAC control module.

Mode Select Position

The scan tool displays Off, Auto, Defrost, Heater, Htr/Def, Bi-Level, Panel. The scan tool displays the state of mode operation.

Outside Air Temp

The scan tool displays Yes/No. The scan tool displays Yes when the HVAC control module interprets the input of the ambient air temperature sensor is at or below 1°C (35°F). This action disables an A/C request. The scan tool displays No when the HVAC control module interprets the input of the ambient air

temperature sensor is above 1°C (35°F).

Pressure Cycle Switch

The scan tool displays Yes/No. The scan tool displays Yes when the HVAC control module interprets the input of the A/C low pressure switch is not grounded. This action disables an A/C request. The scan tool displays No when the HVAC control module interprets the input of the A/C low pressure switch is grounded.

Pressure Cycle Switch

The scan tool displays Low Pressure/Normal. The current state of the input from the A/C low pressure switch. The scan tool displays Low Pressure when the switch is open and displays Normal when the switch is closed. The low pressure switch opens when low side pressure decreases to approximately 151 kPa (22 psi) and closes when the low side pressure increases to approximately 275 kPa (40 psi).

Rear Blower Speed

The scan tool displays Off, Low, Med or High. The commanded state of the auxiliary blower motor as determined by the auxiliary HVAC control module.

Rear HVAC Fan Speed

The scan tool displays Off, Low, Med or High. The commanded state of the auxiliary blower motor as determined by the auxiliary HVAC control module.

Rear HVAC Motor Pos.

The scan tool displays Lower, Bi-level or Upper. The actual auxiliary mode door position as determined auxiliary HVAC control module.

Rear Temp. Select Sw.

The scan tool displays a value from 1 to 13 Counts. The scan tool displays the position of the auxiliary air temperature switch. 1 Counts is displayed for a full cold position. 13 Counts is displayed for a full hot position.

Recirculate Switch

The scan tool displays On/Off. The scan tool displays On when the recirculation switch is active. The scan tool displays Off when the recirculation switch is inactive.

Rec. Mode from Front Control

The scan tool displays Heater, Panel, Defrost, Bi-level or Htr./Def. The state of the primary HVAC system, received by class 2 message, as determined by the auxiliary HVAC control module.

Right Mix Door Actual

The scan tool displays 0-255 counts. The voltage applied to the right air temperature door position input of the HVAC control module is converted to a number between 0 and 255 where 51 Counts is approximately equal to 1 V.

Right Motor Drive

The scan tool displays Stop, Increase, or Decrease. The scan tool displays the control decision for the actuator output as determined by the HVAC control module.

Right Temp. Detent Pos.

The scan tool displays a value from 0 to 18. The scan tool displays the position of the right air temperature switch. 0 is displayed for a full cold position. 18 is displayed for a full hot position.

SWC Power

The scan tool displays On/Off. The scan tool displays the control decision for the supply voltage output to the steering wheel controls as determined by the BCM.

SWC Switch Voltage

The scan tool display 0-5 volts. The scan tool displays the voltage applied to the BCM input from the steering wheel controls.

DIAGNOSTIC TROUBLE CODE (DTC) LIST

Diagnostic Trouble Code (DTC) List

DTC	Diagnostic Procedure	Module
B0145	**DTC B0145, B0428, or B3531**	Auxiliary HVAC Control Module
B0248	**DTC B0248, B0263, B0408, or B0418**	HVAC Control Module
B0263	**DTC B0248, B0263, B0408, or B0418**	HVAC Control Module
B0408	**DTC B0248, B0263, B0408, or B0418**	HVAC Control Module
B0414	**DTC B0414, B0424, B3761, or B3770**	HVAC Control Module
B0418	**DTC B0248, B0263, B0408, or B0418**	HVAC Control Module
B0424	**DTC B0414, B0424, B3761, or B3770**	HVAC Control Module
B0428	**DTC B0145, B0428, or B3531**	Auxiliary HVAC Control Module
B1375	**DTC B1375**	HVAC Control Module
B3531	**DTC B0145, B0428, or B3531**	Auxiliary HVAC Control Module
B3761	**DTC B0414, B0424, B3761, or B3770**	HVAC Control Module
B3770	**DTC B0414, B0424, B3761, or B3770**	HVAC Control Module
P0530	**DTC P0530**	PCM

DTC B0145, B0428, OR B3531

Circuit Description

The following DTCs are for the auxiliary HVAC door actuators:

- B0145 is for the auxiliary mode actuator.
- B0428 is for the auxiliary air temperature actuator.
- B3531 is for the auxiliary console mode actuator.

The auxiliary HVAC actuators are a 5 wire bi-directional electric motor that incorporates a feedback potentiometer. Low reference, 5-volt reference, position signal, and two control circuits enable the actuator to operate. The control circuits use either a 0 or 12 volt value to coordinate 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 auxiliary HVAC control module reverses the polarity of the control circuits to move the actuator in the opposite direction. When the actuator shaft rotates, the potentiometer's adjustable contact changes the door position signal between 0-5 volts. This signal then is converted into a count value where as 1 volt will equal 51 counts.

The auxiliary HVAC control module calibrates the travel range of the HVAC door actuators when it is initially powered by the battery positive voltage circuit. During calibration, the module commands the actuators in each direction until door travel is stopped. The module stores the minimum door positions and the maximum door positions of each actuator into memory. The total travel range is calculated by subtracting the minimum door position from the maximum door position.

Conditions for Running the DTC

- Battery voltage is 8.7-16.5 volts.
- The ignition is ON.

Conditions for Setting the DTC

The DTC sets when one of the following conditions are present for 2 minutes:

- The actual door position value for the actuator is less than 5 counts.
- The actual door position value for the actuator is greater than 250 counts.
- The actual door position is not near the commanded door position.
- An auxiliary door actuator door position change request is made.

Action Taken When the DTC Sets

The auxiliary HVAC control module will attempt to position the actuator to its default position. They are as follows:

- B0145 defaults the auxiliary mode actuator to the floor position.
- B0428 defaults the auxiliary air temperature actuator to the full hot position.
- B3531 defaults the console mode actuator to the floor position.

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 100 fault free ignition cycles.
- The DTC can be cleared with a scan tool.

Diagnostic Aids

- If the condition is not present refer to in Wiring Systems.
- If the DTC sets following a calibration of the door actuator, inspect the door and the actuator for the following conditions:
  - A misaligned actuator
  - Broken linkages or binding linkages
  - A broken door or a binding door
  - An obstruction that prevents the door from operating within the full range of motion
  - Missing seals to the door
  - Poor connections at the harness connector of the door actuator

Test Description

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

2: If more than one DTC is set, observe all of the Door Actual parameters for each corresponding DTC. If the door actual parameter is not out of range, then the concern is with the control portion of the actuator.

7: The purpose of this step is to try to determine which actuator is internally shorted or if the auxiliary HVAC control module is creating the fault. After DTC are cleared, it can take up to 4 minutes for DTC to set.

8: After DTC are cleared, it can take up to 4 minutes for DTC to set. The purpose of this step is to try to determine which actuator is internally shorted or if the auxiliary HVAC control module is creating the fault. If both DTCs return the auxiliary control module is internally shorted.

10: The purpose of this step is to try to determine which actuator is internally shorted or if the auxiliary HVAC control module is creating the fault. After DTC are cleared, it can take up to 4 minutes for DTC to set.

11: After DTC are cleared, it can take up to 4 minutes for DTC to set. The purpose of this step is to try to determine which actuator is internally shorted or if the auxiliary HVAC control module is creating the fault. If both DTCs return the auxiliary HVAC control module is internally shorted.

14: If the scan tool does not display all three DTC, then the answer is No.

15: If the scan tool does not display both DTC, then the answer is No.

18: If the fused jumper opens, then the appropriate signal circuit is shorted to a power.

19: If the scan tool parameter reads lower than 5 Counts then the appropriate signal circuit is shorted to a ground.

20: This step tests the 5 volt reference circuit. Test can be done with any auxiliary actuator. The auxiliary

air temperature actuator can be accessed the quickest.

22: If the scan tool displays one DTC when an actuator is disconnected, then the actuator that was disconnected is the area of the fault.

29: The procedure for both auxiliary mode actuators are within the same replacement procedure.

30: After a circuit repair, a recalibration of the actuators must be performed to ensure proper performance from the auxiliary HVAC system.

DTC B0145, B0428, or B3531

Step	Action	Values	Yes	No
Schematic Reference: HVAC Schematics **Connector End View Reference: HVAC Connector End Views**				
1	Did you perform the HVAC Diagnostic System Check?	-	Go to **Step 2**	Go to **Diagnostic System Check - HVAC Systems - Manual**
2	1. Install a scan tool. 2. Turn ON the ignition, with the engine OFF. 3. With the scan tool, observe the appropriate Door Actual Parameter in the Rear HVAC/RSA data list. Is the parameter within the calibrated range value?	20-235 counts	Go to **Step 3**	Go to **Step 14**
3	With the scan tool, observe the Rear HVAC/RSA DTCs. Does the scan tool indicate that only one of the following DTCs are present B0145, B0428, B3531?	-	Go to **Step 12**	Go to **Step 4**
4	Does the scan tool indicate that DTCs B0145 and B3531 are set?	-	Go to **Step 9**	Go to **Step 5**
5	Does the scan tool indicate that DTCs B0145 and B0428 are set?		Go to **Step 6**	Go to Diagnostic Aids
6	Test the auxiliary actuator door control circuit of the auxiliary HVAC actuators for one of the following conditions: • A short to ground • A short to voltage • A high resistance • An open			

	Refer to **Circuit Testing** and to **Wiring Repairs** in Wiring Systems. Did you find and correct the condition?	-	Go to **Step 30**	Go to **Step 7**
7	1. With the scan tool, clear all DTCs. 2. Disconnect the auxiliary air temperature actuator. 3. Wait 4 minutes for DTC to set. 4. With the scan tool, observe the Rear HVAC/RSA DTCs. Does DTC B0145 return along with B0428?	-	Go to **Step 8**	Go to **Step 27**
8	1. Reconnect the auxiliary air temperature actuator. 2. With the scan tool, clear all DTCs. 3. Disconnect the auxiliary mode actuator. 4. Wait 4 minutes for DTC to set. 5. With the scan tool, observe the Rear HVAC/RSA DTCs. Does DTC B0428 return along with B0145?	-	Go to **Step 26**	Go to **Step 27**
9	Test the auxiliary mode door control circuit of the auxiliary console and auxiliary mode door actuator for an open, short to ground or short to voltage. Refer to **Circuit Testing** and to **Wiring Repairs** in Wiring Systems. Did you find and correct the condition?	-	Go to **Step 30**	Go to **Step 10**
10	1. With the scan tool, clear all DTCs. 2. Disconnect the auxiliary mode actuator. 3. Wait 4 minutes for DTC to set. 4. With the scan tool, observe the Rear HVAC/RSA DTCs. Does DTC B3531 return along with B0145?	-	Go to **Step 11**	Go to **Step 27**
11	1. Reconnect the auxiliary mode actuator. 2. With the scan tool, clear all DTCs. 3. Disconnect the auxiliary console actuator. 4. Wait 4 minutes for DTC to set. 5. With the scan tool, observe the Rear HVAC/RSA DTCs.			

	Does DTC B0145 return along with B3531?	-	Go to **Step 26**	Go to **Step 27**

12	Test the appropriate circuits for the DTC.
	• B0145 test the following circuits:
	  ○ The auxiliary mode door control circuit for an open between the splice and auxiliary mode actuator
	  ○ The auxiliary actuator door control circuit for an open between the splice and auxiliary mode actuator
	  ○ The 5 volt reference circuit for an open between the splice and auxiliary mode actuator
	• B0428 test the following circuits:
	  ○ The auxiliary air temperature door control circuit for an open, short to ground or short to voltage
	  ○ The auxiliary actuator door control circuit for an open between the splice and the auxiliary air temperature actuator
	• B3531 test the following circuits:
	  ○ The console mode door control circuit for an open, short to ground or short to voltage
	  ○ The auxiliary mode door control circuit for an open between the splice and the console mode actuator
	Refer to **Circuit Testing** and to **Wiring Repairs** in Wiring Systems.
	Did you find and correct the condition?
		-	Go to **Step 30**	Go to **Step 13**

13	1. Change the appropriate auxiliary switch position. 2. With the scan tool, observe the Commanded Door position for the appropriate actuator. Does the commanded position change with each selection?	-	Go to **Step 27**	Go to **Step 26**
14	With a scan tool, observe the Rear HVAC/RSA DTC List. Does the scan tool display B0145, B0428 and			

	B3531?	-	Go to **Step 20**	Go to **Step 15**
15	Does the scan tool display B0145 and B0428?	-	Go to **Step 20**	Go to **Step 16**
16	1. Disconnect the appropriate auxiliary actuator. 2. Measure the voltage of the 5 volt reference circuit of the appropriate actuator to a good ground. Refer to **Circuit Testing** and to **Wiring Repairs** in Wiring Systems.Does the voltage measure near 5 volts?	-	Go to **Step 17**	Go to **Step 21**
17	1. Disconnect the appropriate auxiliary actuator. 2. Measure the voltage of the 5 volt reference circuit to the low reference circuit of the appropriate auxiliary actuator. Refer to **Circuit Testing** and to **Wiring Repairs** in Wiring Systems.Does the voltage measure near 5 volts?	-	Go to **Step 18**	Go to **Step 24**
18	1. Connect a 3 ampere fused jumper between the low reference circuit and the signal circuit of the appropriate auxiliary actuator. 2. With a scan tool, observe the appropriate Door Actual parameter in the Rear HVAC/RSA data list. Does the scan tool indicate that the appropriate Door Actual parameter is near 0 Counts?	-	Go to **Step 19**	Go to **Step 25**
19	Disconnect the appropriate auxiliary actuator. Does the scan tool indicate that the appropriate Door Actual parameter is over 245 Counts?	-	Go to **Step 27**	Go to **Step 25**
20	**IMPORTANT:** **Ensure that the auxiliary air temperature actuator connector is connected during this step in order to avoid misdiagnosis. Test can be done with any auxiliary actuator. The auxiliary air temperature actuator can be accessed the quickest.** Measure the 5 volt reference circuit at the auxiliary air temperature actuator to a good ground.Refer to **Circuit Testing** in Wiring Systems.Does voltage measure near 5 volts?	-	Go to **Step 23**	Go to **Step 21**
	Test the 5 volt reference circuit of the auxiliary			

21	HVAC actuators for one of the following conditions: • A short to ground • A short to voltage • A high resistance • An open Refer to **Circuit Testing** in Wiring Systems. Did you find and correct the condition?	-	Go to **Step 30**	Go to **Step 22**
22	**IMPORTANT:** **Each actuator must be disconnected and connected one at a time to ensure misdiagnosis does not occur.** 1. Turn ON the ignition, with the engine OFF. 2. With a scan tool, observe the Rear HVAC/RSA DTC List. 3. Disconnect each auxiliary HVAC actuator one at a time. Does the scan tool display B0145, B0428 and B3531?	-	Go to **Step 26**	Go to **Step 27**
23	Connect a test lamp between the battery positive voltage circuit of the auxiliary HVAC control module and the low reference circuit of the auxiliary air temperature actuator. Does the test lamp illuminate?	-	Go to **Step 26**	Go to **Step 24**
24	Test the low reference circuit of the auxiliary HVAC actuators for a high resistance or an open. Refer to Refer to **Circuit Testing** and to **Wiring Repairs** in Wiring Systems. Did you find and correct the condition?	-	Go to **Step 30**	Go to **Step 26**
25	Test the appropriate signal circuit of the auxiliary HVAC actuators for the following conditions: • A short to ground • A short to voltage • A high resistance • An open			

	Refer to **Circuit Testing** and to **Wiring Repairs** in Wiring Systems. Did you find and correct the condition?	-	Go to **Step 30**	Go to **Step 26**
26	Inspect for poor connections at the harness connector of the auxiliary HVAC control module. Refer to **Testing for Intermittent Conditions and Poor Connections** and to **Connector Repairs** in Wiring Systems. Did you find and correct the condition?	-	Go to **Step 30**	Go to **Step 29**
27	Inspect for poor connections at the harness connector of the appropriate auxiliary HVAC actuator. Refer to **Testing for Intermittent Conditions and Poor Connections** and to **Connector Repairs** in Wiring Systems. Did you find and correct the condition?	-	Go to **Step 30**	Go to **Step 28**
28	Replace the appropriate auxiliary HVAC actuator. Refer to the following: • **Air Temperature Actuator Replacement - Auxiliary** • **Mode Actuator Replacement - Console** • **Mode Actuator Replacement - Auxiliary** Did you complete the replacement?	-	Go to **Step 30**	-
29	Replace the auxiliary HVAC control module. Refer to **HVAC Control Module Replacement - Auxiliary**. Did you complete the replacement?	-	Go to **Step 31**	-
30	Recalibrate the actuators. Refer to **Re-Calibrating Actuators (Primary)**. Did you complete the procedure?	-	Go to **Step 31**	-
31	**IMPORTANT:** **Ensure to test system for 2 minutes after clearing DTC to avoid misdiagnosis.** 1. Use the scan tool in order to clear the DTCs. 2. Operate the vehicle within the Conditions for Running the DTC. Does the DTC reset?	-	System OK	Go to **Step 2**

DTC B0248, B0263, B0408, OR B0418

Circuit Description

The following DTCs are for the HVAC door actuators:

- B0248 is for the defrost actuator.
- B0263 is for the mode actuator.
- B0408 is for the left air temperature actuator.
- B0418 is for the right air temperature actuator.

The HVAC control module controls the HVAC door actuators to regulate the airflow through the HVAC system. Each actuator consists of a stepper motor, a logic circuit, and a potentiometer. The potentiometer inside the door actuator allows the module to monitor the current position of the actuator drive shaft. The logic circuit inside the actuators receives control signals from the HVAC control module and controls the internal stepper motor. When a door positional change is required, the HVAC control module calculates a commanded door position. The module compares the commanded door position to the actual door position and determines the needed direction of motor rotation. The module applies a signal voltage to the door control circuit that is an input to the internal logic circuit of the door actuator. A 5 volt signal increases the door position. A 0 volt signal decreases the door position. When the commanded door position is equal to the actual door position, the HVAC control module sends a 2.5 volt signal to the door actuator and motor rotation stops. The ignition 3 voltage circuit provides source voltage to the logic circuit. The module provides ground to the actuator logic circuit through the low reference circuit.

Conditions for Running the DTC

- Source voltage is 8.7-16.5 volts.
- The ignition is ON.
- The HVAC control module commands the actuator to move.

Conditions for Setting the DTC

The actual door position is not near the commanded door position.

Action Taken When the DTC Sets

The HVAC control module does not command the actuator to move for the remainder of the ignition cycle.

Conditions for Clearing the DTC

- The DTC remains current until the next ignition cycle.
- The history DTC will clear after 100 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.

- Inspect the appropriate door and door actuator for the following conditions:
  - A misaligned door actuator
  - Binding linkages
  - A binding door
  - An obstruction that prevents the door actuator from operating within the full range of motion
- If the scan tool indicates that the Door Actual parameter is 5-10 counts from the Commanded Door parameter, then perform the recalibration procedure for the HVAC door actuators. Refer to **Re-Calibrating Actuators (Primary)**.

Test Description

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

2: Determines if the HVAC door actuator is stalled.

3: Applies control circuit voltages to the input of the HVAC door actuator.

DTC B0248, B0263, B0408, or B0418

Step	Action	Yes	No
Schematic Reference: HVAC Schematics **Connector End View Reference: HVAC Connector End Views**			
1	Did you perform the HVAC Diagnostic System Check?	Go to **Step 2**	Go to **Diagnostic System Check - HVAC Systems - Manual**
2	1. Install a scan tool. 2. Turn ON the ignition, with the engine OFF. 3. With a scan tool, command the appropriate HVAC door actuator ON and OFF while observing the corresponding Door Actual parameter. Does the scan tool indicate that the value of the appropriate Door Actual parameter changes?	Go to Diagnostic Aids	Go to **Step 3**
3	1. Observe the appropriate HVAC door actuator drive shaft. 2. Connect a 3 amp fused jumper wire between door control circuit at the appropriate HVAC control module and a good ground. 3. Disconnect the fused jumper wire. 4. Connect a 3 amp fused jumper wire between the door control circuit and the 5 volt reference circuit at the appropriate HVAC control module.		

	Does the drive shaft of the appropriate HVAC door actuator rotate?	Go to **Step 8**	Go to **Step 4**
4	Test the door control circuit of the appropriate HVAC door actuator for a short to voltage, for a short to ground, or for an open. Refer to **Circuit Testing** and to **Wiring Repairs** in Wiring Systems. Did you find and correct the condition?	Go to **Step 12**	Go to **Step 5**
5	1. Turn OFF the ignition. 2. Disconnect the fused jumper wire. 3. Disconnect the appropriate HVAC door actuator. 4. Turn ON the ignition, with the engine OFF. 5. Probe the ignition 3 voltage circuit of the appropriate HVAC door actuator with a test lamp that is connected to ground. Does the test lamp illuminate?	Go to **Step 6**	Go to **Step 9**
6	Inspect the appropriate door and the door actuator for the following conditions: • A misaligned door actuator. • Binding linkages • A binding door • An obstruction that prevents the HVAC door actuator from operating within the full range of motion Did you find and correct the condition?	Go to **Step 12**	Go to **Step 7**
7	Inspect for poor connections at the harness connector of the appropriate HVAC door actuator. Refer to **Testing for Intermittent Conditions and Poor Connections** and to **Connector Repairs** in Wiring Systems. Did you find and correct the condition?	Go to **Step 12**	Go to **Step 10**
8	Inspect for poor connections at the harness connector of the HVAC control module. Refer to **Testing for Intermittent Conditions and Poor Connections** and to **Connector Repairs** in Wiring Systems. Did you find and correct the condition?	Go to **Step 12**	Go to **Step 11**
9	Repair the ignition 3 voltage circuit of the appropriate HVAC door actuator. Refer to **Wiring Repairs** in Wiring Systems. Did you complete the repair?	Go to **Step 12**	-
	IMPORTANT:		

10	**Perform the calibration procedure for HVAC door actuators.** Replace the HVAC door actuator. Refer to the appropriate replacement procedure: • **Air Temperature Actuator Replacement - Right** • **Air Temperature Actuator Replacement - Left** • **Defroster Actuator Replacement** • **Mode Actuator Replacement** Did you complete the replacement?	Go to **Step 12**	-
11	Replace the HVAC control module. Refer to **HVAC Control Module Replacement**. Did you complete the replacement?	Go to **Step 12**	-
12	1. Use the scan tool in order to clear the DTCs. 2. Operate the vehicle according to the Conditions for Running the DTC as specified in the supporting text. Does the DTC set again?	Go to **Step 2**	System OK

DTC B0414, B0424, B3761, OR B3770

Circuit Description

The following DTCs are for the HVAC door actuators:

- B0414 is for the left air temperature actuator.
- B0424 is for the right air temperature actuator.
- B3761 is for the defrost actuator.
- B3770 is for the mode actuator.

The HVAC control module controls the HVAC door actuators to regulate the airflow through the HVAC system. Each actuator consists of a stepper motor, a logic circuit, 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. The module converts the voltage value to a count value where 1 volt is approximately equal to 51 counts.

The HVAC control module calibrates the travel range of the HVAC door actuators when it is initially powered by the battery positive voltage circuit. During calibration, the module commands the actuators in each direction until door travel is stopped. The module stores the minimum door positions and the maximum door positions of each actuator into memory. The total travel range is calculated by subtracting the minimum door position from the maximum door position. The door actuators can be calibrated again with a scan tool.

Conditions for Running the DTC

- Battery voltage is 8.7-16.5 volts.
- The ignition is ON.

Conditions for Setting the DTC

The DTC sets when one of the following conditions are present:

- The actual door position value for the actuator is less than 5 counts.
- The actual door position value for the actuator is greater than 250 counts.
- The actuator fails calibration because the calculated travel range value is too great or too small.

Action Taken When the DTC Sets

- If the DTC sets because the actual door position value is out of range, the HVAC control module will command the actuator to a default position.
- If the DTC sets because the actuator failed a calibration, the HVAC control module will attempt to calibrate the motor in the next transition from OFF to RUN mode.

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 100 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.
- If the DTC sets following a calibration of the door actuator, inspect the door and the actuator for the following conditions:
  - A misaligned actuator
  - Broken linkages or binding linkages
  - A broken door or a binding door
  - An obstruction that prevents the door from operating within the full range of motion
  - Missing seals to the door

  - Poor connections at the harness connector of the door actuator
- If a signal circuit of an actuator is short to ground and the resistance across the internal potentiometer is low, then this condition could cause a multiple DTC concern.

Test Description

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

3: At least two of the DTC's must be set as current DTC to ensure correct diagnosis. If only one DTC is present then the answer is No.

6: Tests for the proper operation of the circuit in the low voltage range.

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

8: Tests for a short to voltage in the 5-volt reference circuit.

9: Tests for a high resistance or for an open in the low reference circuit.

10: This step tests for an open on the low reference circuit that is common to all of the actuators. Choose the easiest HVAC door actuator that set a DTC to start the diagnosis.

11: Disconnecting each actuator, one at a time, isolates the disconnected actuators signal circuit from the 5 volt reference circuit that is common to all the actuators.

DTC B0414, B0424, B3761, or B3770

Step	Action	Values	Yes	No
Schematic Reference: HVAC Schematics **Connector End View Reference: HVAC Connector End Views**				
1	Did you perform the HVAC Diagnostic System Check?	-	Go to **Step 2**	Go to **Diagnostic System Check - HVAC Systems - Manual**
2	Is DTC B1375 set as a current DTC?	-	Go to **Diagnostic Trouble Code (DTC) List**	Go to **Step 3**
3	With a scan tool, observe the Heating and Air Conditioning DTC list. Does the scan tool indicate that at least 2 of the following DTC B0414, B0424, B3761 and B3770 are set as current DTC?	-	Go to **Step 10**	Go to **Step 4**
	1. Install a scan tool. 2. Turn ON the ignition, with the engine OFF. 3. With the scan tool, observe the appropriate			

4	Door Actual parameter in the Heating and Air Conditioning data list. Does the scan tool indicate that the appropriate Door Actual parameter is within the specified range?	5-250 counts	Go to **Step 5**	Go to **Step 6**
5	1. Install a scan tool. 2. Turn ON the ignition, with the engine OFF. 3. With a scan tool, command the appropriate HVAC door actuator ON and OFF while observing the corresponding Door Actual parameter. Does the scan tool indicate that the value of the appropriate Door Actual parameter changes?	-	Go to Diagnostic Aids	Go to **Step 19**
6	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 Door Actual parameter. Does the scan tool indicate that the appropriate Door Actual parameter is less than the specified value?	5 counts	Go to **Step 7**	Go to **Step 17**
7	1. Turn OFF the ignition. 2. Connect a 3-ampere fused jumper between the 5-volt reference circuit and the door position signal circuit of the appropriate HVAC door actuator. 3. Turn ON the ignition, with the engine OFF. 4. With a scan tool, observe the appropriate Door Actual parameter. Does the scan tool indicate that the appropriate Door Actual parameter is greater than the specified value?	230 counts	Go to **Step 8**	Go to **Step 15**
	1. Disconnect the fused jumper. 2. Measure the voltage between the 5-volt reference circuit and the low reference			

8	circuit of the appropriate HVAC door actuator. Does the voltage measure less than the specified value?	5.5 V	Go to **Step 9**	Go to **Step 14**
9	1. Turn OFF the ignition. 2. Disconnect the negative battery cable. 3. Measure the resistance from the low reference circuit of the appropriate HVAC door actuator to a good ground. Does the resistance measure less than the specified value?	5 ohms	Go to **Step 22**	Go to **Step 18**
10	1. Disconnect the most accessible affected HVAC door actuator. 2. Probe the low reference circuit of the HVAC door actuator with a test lamp from battery positive voltage. Does the test lamp illuminate?	-	Go to **Step 11**	Go to **Step 18**
11	1. Turn ON the ignition, with the engine OFF. 2. With a scan tool, observe the Heating and Air Conditioning DTC list. 3. While observing DTC list, disconnect and connect the electrical connector for each affected HVAC door actuator. Did the scan tool indicate that only one DTC was present when a HVAC door actuator was disconnected?	-	Go to **Step 13**	Go to **Step 12**
12	Test the 5-volt reference circuit of the appropriate HVAC door actuator for an open. Refer to and to in Wiring Systems. Did you find and correct the condition?	-	Go to **Step 26**	Go to **Step 23**
13	Test the appropriate door position signal circuit of the HVAC door actuator for a short to ground. Refer to and to in Wiring Systems. Did you find and correct the condition?	-	Go to **Step 26**	Go to **Step 22**
14	Test the 5-volt reference circuit of the appropriate HVAC door actuator for a short to voltage. Refer to **Circuit Testing** and to **Wiring Repairs** in Wiring Systems. Did you find and correct the condition?	-	Go to **Step 26**	Go to **Step 23**

15	Test the 5-volt reference circuit of the appropriate HVAC door actuator for a short to ground, for a high resistance, or for an open. Refer to **Circuit Testing** and to **Wiring Repairs** in Wiring Systems. Did you find and correct the condition?	-	Go to **Step 26**	Go to **Step 16**
16	Test the door position signal circuit of the appropriate HVAC door actuator for a short to ground, for a high resistance, or for an open. Refer to **Circuit Testing** and to **Wiring Repairs** in Wiring Systems. Did you find and correct the condition?	-	Go to **Step 26**	Go to **Step 23**
17	Test the door position signal circuit of the appropriate HVAC door actuator for a short to voltage. Refer to **Circuit Testing** and to **Wiring Repairs** in Wiring Systems. Did you find and correct the condition?	-	Go to **Step 26**	Go to **Step 23**
18	1. Disconnect the HVAC control module. 2. Test the low reference circuit of the appropriate HVAC door actuator for a high resistance or for an open. Refer to **Circuit Testing** and to **Wiring Repairs** in Wiring Systems. Did you find and correct the condition?	-	Go to **Step 26**	Go to **Step 23**
19	1. Observe the appropriate HVAC door actuator drive shaft. 2. Connect a 3 amp fused jumper wire between door control circuit at the appropriate HVAC control module and a good ground. 3. Disconnect the fused jumper wire. 4. Connect a 3 amp fused jumper wire between the door control circuit and the 5 volt reference circuit at the appropriate HVAC control module. Does the drive shaft of the appropriate HVAC door actuator rotate?	-	Go to **Step 23**	Go to **Step 20**
20	Test the door control circuit of the appropriate HVAC door actuator for a short to voltage, for a short to ground, or for an open. Refer to **Circuit Testing** and to **Wiring Repairs** in Wiring Systems. Did you find and correct the condition?	-	Go to **Step 26**	Go to **Step 21**

21	Test the ignition 3 voltage circuit of the appropriate HVAC door actuator for an open or a high resistance. Refer to **Circuit Testing** and to **Wiring Repairs** in Wiring Systems. Did you find and correct the condition?	-	Go to **Step 26**	Go to **Step 22**
22	Inspect for poor connections at the harness connector of the appropriate HVAC door actuator. Refer to **Testing for Intermittent Conditions and Poor Connections** and to **Connector Repairs** in Wiring Systems. Did you find and correct the condition?	-	Go to **Step 26**	Go to **Step 24**
23	Inspect for poor connections at the harness connector of the HVAC control module. Refer to **Testing for Intermittent Conditions and Poor Connections** and to **Connector Repairs** in Wiring Systems. Did you find and correct the condition?	-	Go to **Step 26**	Go to **Step 25**
24	**IMPORTANT:** **Perform the calibration procedure for HVAC door actuators.** Replace the HVAC door actuator. Refer to the appropriate replacement procedure: • **Air Temperature Actuator Replacement - Right** • **Air Temperature Actuator Replacement - Left** • **Defroster Actuator Replacement** • **Mode Actuator Replacement** Did you complete the replacement?	-	Go to **Step 26**	-
25	Replace the HVAC control module. Refer to **HVAC Control Module Replacement**. Did you complete the replacement?	-	Go to **Step 26**	-
26	1. Use the scan tool in order to clear the DTCs. 2. Operate the vehicle according to the Conditions for Running the DTC, as specified in the supporting text. Does the DTC set again?	-	Go to **Step 4**	System OK

DTC B1375

Circuit Description

The ignition 3 voltage circuit is a discrete input to the HVAC control module. The HVAC control modules uses the input to determine that the ignition switch is in the RUN position. When the ignition switch is in the RUN position, ignition voltage is applied to the input.

Conditions for Running the DTC

- Source voltage is 8.7-16.5 volts.
- The HVAC control module receives a RUN power mode message from the BCM over the class 2 serial data circuit.

Conditions for Setting the DTC

The HVAC control module does not detect ignition voltage on the ignition 3 voltage input.

Action Taken When the DTC Sets

The HVAC control module will continue to operate using the class 2 power mode messaging.

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 100 fault free ignition cycles.
- The DTC can be cleared with a scan tool.

DTC B1375

Step	Action	Yes	No
Schematic Reference: HVAC Schematics **Connector End View Reference: HVAC Connector End Views**			
1	Did you perform the HVAC Diagnostic System Check?	Go to **Step 2**	Go to **Diagnostic System Check - HVAC Systems - Manual**
2	1. Install a scan tool. 2. Turn ON the ignition, with the engine OFF. 3. Select the HVAC control module display DTC function on the scan tool. Does the scan tool indicate that B1375 is a current DTC?	Go to **Step 3**	Go to **Testing for Intermittent Conditions and Poor Connections** in Wiring Systems
	1. Turn OFF the ignition. 2. Disconnect the HVAC control module.		

3	3. Turn ON the ignition, with the engine OFF. 4. Probe the ignition 3 voltage circuit with a test lamp that is connected to a good ground. Does the test lamp illuminate?	Go to **Step 4**	Go to **Step 5**
4	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 7**	Go to **Step 6**
5	Repair the ignition 3 voltage circuit. Refer to **Wiring Repairs** in Wiring Systems. Did you complete the repair?	Go to **Step 7**	-
6	Replace the HVAC control module. Refer to **HVAC Control Module Replacement**. Did you complete the replacement?	Go to **Step 7**	-
7	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 P0530

Circuit Description

The powertrain control module (PCM) monitors the high side refrigerant pressure via an A/C refrigerant pressure sensor. When the pressure is high the signal voltage is high. When the pressure is low the signal voltage is low. When pressure is too high the PCM will not allow the A/C compressor clutch to engage.

Conditions for Running the DTC

The PCM detects an A/C request.

Conditions for Setting the DTC

- The A/C refrigerant pressure sensor signal is less than 0.1 volts for 5 seconds.
- The A/C refrigerant pressure sensor signal is greater than 4.9 volts for 5 seconds.

Action Taken When the DTC Sets

The malfunction indicator lamp (MIL) will not illuminate.

Conditions for Clearing the DTC

- The DTC will become history if the PCM no longer detects a failure.
- The history DTC will clear after 40 fault-free ignition cycles.
- The DTC can be cleared with a scan tool.

Diagnostic Aids

For an intermittent, 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.

6: Tests for a high resistance or an open in the low reference circuit.

DTC P0530

Step	Action	Value(s)	Yes	No
Schematic Reference: HVAC Schematics **Connector End View Reference: HVAC Connector End Views**				
1	Did you perform the HVAC Diagnostic System Check?	-	Go to **Step 2**	Go to **Diagnostic System Check - HVAC Systems - Manual**
2	1. Turn ON the ignition with the engine OFF. 2. With a scan tool, observe the A/C High Side Pressure parameter in the Powertrain Engine Data list. Does the scan tool indicate the A/C High Side Pressure parameter is within the specified range?	0.1-4.9 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.	0.09 V		

	Does the scan tool indicate that the A/C High Side Pressure parameter is less than the specified value?		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 of the A/C refrigerant pressure sensor and the 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. Does the scan tool indicate that the A/C High Side Pressure parameter is greater than the specified value?	4.9 V	Go to **Step 8**	Go to **Step 5**
5	1. Disconnect the fused jumper wire. 2. Measure the voltage between the 5-volt reference circuit of the A/C refrigerant pressure sensor and the low reference circuit of the A/C refrigerant pressure sensor. Does the voltage measure less than the specified value?	5.1 V	Go to **Step 6**	Go to **Step 7**
6	1. Turn OFF the ignition. 2. Disconnect the negative battery cable. 3. Measure the resistance from the low reference circuit of the A/C refrigerant pressure sensor to a good ground. Does the resistance measure less than the specified value?	5 ohms	Go to **Step 12**	Go to **Step 11**
7	Test the 5-volt reference circuit of the A/C refrigerant pressure sensor for a short to voltage. Refer to **Circuit Testing** and **Wiring Repairs** 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 a short to ground, 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 16**	Go to **Step 9**

9	Test the signal circuit of the A/C refrigerant pressure sensor for a short to ground, 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 16**	Go to **Step 13**
10	Test the signal circuit of the A/C refrigerant pressure sensor for a short to voltage. Refer to **Circuit Testing** and **Wiring Repairs** in Wiring Systems. Did you find and correct the condition?	-	Go to **Step 16**	Go to **Step 13**
11	1. Disconnect the powertrain control module. 2. Test the low reference circuit of the A/C refrigerant pressure 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 16**	Go to **Step 13**
12	Inspect for poor connections at the harness connector of the A/C refrigerant pressure 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 16**	Go to **Step 14**
13	Inspect for poor connections at the harness connector of the powertrain 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**
14	Replace the A/C refrigerant pressure sensor. Refer to **Air Conditioning (A/C) Refrigerant Pressure Sensor Replacement** in Heating, Ventilation and Air Conditioning. Did you complete the replacement?	-	Go to **Step 16**	Go to **Step 15**
15	**IMPORTANT:** **Perform the programming procedure for the powertrain control module.** Replace the PCM. Refer to **Powertrain Control Module (PCM) Replacement** in Engine Controls-4.2L or **Powertrain Control Module (PCM) Replacement** in Engine Controls-4.8L, 5.3L, and 6.0L.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 specified in the supporting text. Does the DTC reset?	-	Go to **Step 2**	System OK

SYMPTOMS - HVAC SYSTEMS - MANUAL

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

1. Perform the **Diagnostic System Check - HVAC Systems - Manual** before using the Symptom Tables in order to verify that all of the following are true:
   - There are no DTCs set.
   - The control module(s) 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

1. Inspect for aftermarket devices which could affect the operation of the HVAC System. Refer to **Checking Aftermarket Accessories** in Wiring Systems.
2. Inspect the easily accessible or visible system components for obvious damage or conditions which could cause the symptom.
3. Verify the A/C compressor clutch turns freely and is not seized.
4. Verify that the customer is using the correct key to enable personalization and is not inadvertently activating auxiliary HVAC controls.
5. The A/C compressor will not operate in cold ambient air temperatures. Refer to **Air Temperature Description and Operation**.
6. The following conditions may cause window fogging:
   - Wet carpet or mats
   - High humidity
   - Interior water leak
   - Blocked A/C evaporator drain tube
   - Maximum passenger capacity
   - Blocked body pressure relief valves
7. 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**
- **Blower Motor Always On - Auxiliary (Body Type VIN 6)Blower Motor Always On - Auxiliary (Body Type VIN 3)**
- **Blower Motor Inoperative - Auxiliary (Body Type VIN 6)Blower Motor Inoperative - Auxiliary (Body Type VIN 3)**
- **Blower Motor Malfunction - Auxiliary (Body Type VIN 6)Blower Motor Malfunction - Auxiliary (Body Type VIN 3)**
- **Too Hot in Vehicle**
- **Too Cold in Vehicle**
- **Too Hot in Vehicle - Auxiliary**
- **Too Cold in Vehicle - Auxiliary**
- **Air Delivery Improper**
- **Air Delivery Improper - Auxiliary (With Body Type VIN 3)**
- **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
- **Noise Diagnosis - HVAC Module** in Heating, Ventilation and Air Conditioning
- **Odor Diagnosis** in Heating, Ventilation and Air Conditioning

HVAC COMPRESSOR CLUTCH DOES NOT ENGAGE

Diagnostic Aids

- The A/C compressor is protected from overheating by the compressor temperature switch, which is mounted at the rear of the A/C compressor. The switch is wired internally to the compressor and is not serviceable. The switch opens and disengages the compressor clutch when temperatures reach 135°C

(275°F). The switch closes when the compressor temperature cools to 120°C (248°F).

- A/C compressor clutch will not engage under the following conditions:
  - The A/C high side line pressure is over 2413 kPa (350 psi).
  - The A/C low side line pressure is under 151 kPa (22 psi).
  - Throttle angle is at 100 percent.
  - Engine speed is more than 5500 RPM.
  - Engine coolant temperature (ECT) is more than 123°C (253°F).
  - Ambient air temperature is less than 1°C (35°F).
  - Engine is idling at a low unstable RPM.

Test Description

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

2: The A/C compressor output is disabled if the engine is idling at a low unstable RPM.

3: The A/C compressor relay output is disabled if engine coolant temperature is above 123°C (253°F). The engine coolant indicator will illuminate at this temperature.

4: This step ensures that the HVAC control module is receiving an input from the A/C switch.

5: These actions will enable the A/C compressor to operate.

6: This test ensures that there is sufficient refrigerant in the A/C system. The specific values come from the A/C System Performance Test in Heating, Ventilation and Air Conditioning.

8: The A/C low pressure switch parameter is out of range when the HVAC control module interprets the signal being below 151 kPa (22 psi) or above 275 kPa (40 psi).

9: This action will simulate a closed switch condition. If the Pressure Cycle Switch parameter reads Low Pressure than there is a circuit condition or a condition with the HVAC control module.

12: The A/C compressor relay output from the powertrain control module (PCM) is disabled if the A/C high side system pressure is interpreted to be higher than 2413 kPa (350 psi).

HVAC Compressor Clutch Does Not Engage

Step	Action	Values	Yes	No
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 HVAC Diagnostic System Check?	-	Go to **Step 2**	Go to **Diagnostic System Check - HVAC Systems - Manual**
				Go to **Rough, Unstable, or Incorrect Idle**

2	1. Start the engine. 2. Set the parking brake. 3. Place the vehicle in drive and allow the engine to idle. 4. Observe the engine RPM. Does the engine idle at a steady RPM?	-	Go to **Step 3**	**and Stalling** in Engine Controls - 4.8L, 5.3L, and 6.0L or **Rough, Unstable, or Incorrect Idle and Stalling** in Engine Controls -4.2L
3	1. Start the engine. 2. Observe the coolant temperature indicator. Is the engine coolant temperature indicator illuminated?	-	Go to **Engine Coolant Temperature Indicator Always On** in Engine Cooling	Go to **Step 4**
4	1. Install a scan tool. 2. Turn ON the ignition, with the engine OFF. 3. Using a scan tool, observe the A/C Switch parameter in the Heating and Air Conditioning data list while pressing the A/C request switch. Does the A/C Switch parameter change states when the A/C request switch is pressed?	-	Go to **Step 5**	Go to **Step 26**
5	**IMPORTANT:** **For A/C compressor operation, the ambient air temperature display must be above 1°C (35°F).** Refer to **Ambient Air Temperature Update Procedure** . 1. Start the engine. 2. Place the blower motor switch in the maximum speed position. 3. Place the A/C request switch in the ON position. 4. Place the left air temperature switch in the coldest position. Does the A/C compressor clutch engage?	-	Go to **Testing for Intermittent Conditions and Poor Connections** in Wiring Systems	Go to **Step 6**
	1. Park the vehicle inside or out of direct			

6	sunlight. 2. Open the window in order to ventilate the interior of the vehicle. 3. Turn OFF the ignition. 4. If the A/C system was operating, then wait for approximately 2 minutes. 5. Install **J 43600** . 6. Record the ambient temperature at the vehicle. 7. Record readings of the low and high side STATIC pressures. 8. Compare the low and the high side pressure values with the allowable limits for the recorded ambient air temperature. Are the low and the high side pressure values within the allowable limits for the recorded ambient air temperature. Are the pressure values within 103 kPa (15 psi) of each other?	Above 16°C (60°F) 345 kPa (50 psi) Above 24°C (75°F) 483 kPa (70 psi) Above 33°C (90°F) 690 kPa (100 psi)	Go to **Step 7**	Go to **Leak Testing** in Heating, Ventilation and Air Conditioning
7	1. Start the engine. 2. With a scan tool, observe the A/C Permission parameter in the Heating and Air Conditioning data list. Does the A/C Permission parameter display Granted?	-	Go to **Step 14**	Go to **Step 8**
8	1. Turn the ignition OFF. 2. Turn ON the ignition, with the engine OFF. 3. With a scan tool, observe the Pressure Cycle Switch parameter in the Heating and Air Conditioning data list. Does the Pressure Cycle Switch parameter display Normal?	-	Go to **Step 12**	Go to **Step 9**
9	1. Turn OFF the ignition. 2. Disconnect the A/C low pressure switch. 3. Turn ON the ignition, with the engine OFF. 4. Connect a 3-ampere fused jumper between the signal circuit and the ground circuit of the A/C low pressure switch.	-		

	5. Observe the Pressure Cycle Switch parameter in the Heating and Air Conditioning data list. Does the Pressure Cycle Switch parameter display Normal?		Go to **Step 23**	Go to **Step 10**
10	Test the signal circuit of the A/C low pressure switch for a high resistance or for an open. Refer to **Circuit Testing** and to **Wiring Repairs** in Wiring Systems. Did you find and correct the condition?	-	Go to **Step 35**	Go to **Step 11**
11	Test the ground circuit of the A/C low pressure switch for a high resistance or for an open. Refer to **Circuit Testing** and to **Wiring Repairs** in Wiring Systems. Did you find and correct the condition?	-	Go to **Step 35**	Go to **Step 26**
12	With a scan tool, observe the A/C High Side Pressure parameter in the Powertrain data list. Is the parameter less than the specified value?	2413 kPa (350 psi)	Go to **Step 26**	Go to **Step 13**
13	1. Turn OFF the ignition. 2. If the A/C system was operating, then wait for approximately 2 minutes. 3. Install **J 43600** . 4. Turn ON the ignition, with the engine OFF. 5. With a scan tool, observe the A/C High Side Pressure Sensor parameter in the Powertrain data list. 6. Compare the A/C high side pressure on the scan tool to the high side pressure on **J 43600** . Are the high side pressure values within 103 kPa (15 psi) of each other?	-	Go to **Air Conditioning (A/C) System Performance Test** in Heating, Ventilation and Air Conditioning	Go to **Step 24**
14	With a scan tool, observe the AC Compressor Feedback parameter in the Heating and Air Conditioning data list. Does the AC Compressor Feedback parameter display On?	-	Go to **Step 15**	Go to **Step 16**
15	Test the ground circuit of the A/C compressor clutch for a high resistance or for an open. Refer to **Circuit Testing** and to **Wiring Repairs** in Wiring Systems. Did you find and correct the condition?	-	Go to **Step 35**	Go to **Step 25**

16	1. Start the engine. 2. With a scan tool, command the A/C Permission to Granted and Withheld. Does the relay turn ON and OFF with each command?	-	Go to **Step 17**	Go to **Step 19**
17	1. Turn OFF the ignition. 2. Test the battery positive voltage circuit of the A/C compressor clutch relay for a high resistance or for an open. Refer to **Circuit Testing** and to **Wiring Repairs** in Wiring Systems. Did you find and correct the condition?	-	Go to **Step 35**	Go to **Step 18**
18	Test the supply voltage circuit of the A/C compressor clutch for a high resistance or for an open. Refer to **Circuit Testing** and to **Wiring Repairs** in Wiring Systems. Did you find and correct the condition?	-	Go to **Step 35**	Go to **Step 22**
19	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 ignition 3 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 20**	Go to **Step 28**
20	1. Start the engine. 2. Connect a test lamp between the control circuit and the ignition 3 voltage circuit of the A/C compressor clutch relay. 3. With a scan tool, command the A/C Permission to Granted. Does the test lamp illuminate?	-	Go to **Step 22**	Go to **Step 21**
21	1. Turn OFF the ignition. 2. Test the A/C compressor clutch control circuit of the PCM for a high resistance or for an open. Refer to **Circuit Testing** and to **Wiring Repairs** in Wiring Systems.	-		

	Did you find and correct the condition?		Go to **Step 35**	Go to **Step 27**
22	1. Turn OFF the ignition. 2. Inspect for poor connections at the A/C compressor clutch relay. Refer to **Testing for Intermittent Conditions and Poor Connections** and to **Connector Repairs** in Wiring Systems. Did you find and correct the condition?	-	Go to **Step 35**	Go to **Step 29**
23	Inspect for poor connections at the harness connector of the A/C low pressure switch. Refer to **Testing for Intermittent Conditions and Poor Connections** and to **Connector Repairs** in Wiring Systems. Did you find and correct the condition?	-	Go to **Step 35**	Go to **Step 30**
24	Inspect for poor connections at the harness connector of the A/C refrigerant pressure sensor. Refer to **Testing for Intermittent Conditions and Poor Connections** and to **Connector Repairs** in Wiring Systems. Did you find and correct the condition?	-	Go to **Step 35**	Go to **Step 31**
25	Inspect for poor connections at the harness connector of the A/C compressor. Refer to **Testing for Intermittent Conditions and Poor Connections** and to **Connector Repairs** in Wiring Systems. Did you find and correct the condition?	-	Go to **Step 35**	Go to **Step 32**
26	Inspect for poor connections at the harness connector of the HVAC control module. Refer to **Testing for Intermittent Conditions and Poor Connections** and to **Connector Repairs** in Wiring Systems. Did you find and correct the condition?	-	Go to **Step 35**	Go to **Step 33**
27	Inspect for poor connections at the harness connector of the powertrain control module (PCM). Refer to **Testing for Intermittent Conditions and Poor Connections** and to **Connector Repairs** in Wiring Systems. Did you find and correct the condition?	-	Go to **Step 35**	Go to **Step 34**
28	Repair the ignition 3 voltage circuit of the A/C compressor clutch relay. Refer to **Wiring Repairs** in Wiring Systems. Did you complete the repair?	-	Go to **Step 35**	-
29	Replace the A/C compressor clutch relay. Did you complete the replacement?	-	Go to **Step 35**	-

30	Replace the A/C low pressure switch. Refer to **Air Conditioning (A/C) Low Pressure Switch Replacement** in Heating, Ventilation, and Air Conditioning. Did you complete the replacement?	-	Go to **Step 35**	-
31	Replace the A/C refrigerant pressure sensor. Refer to **Air Conditioning (A/C) Refrigerant Pressure Sensor Replacement** in Heating, Ventilation and Air Conditioning. Did you complete the replacement?	-	Go to **Step 35**	-
32	Replace the A/C compressor. Refer to **Compressor Replacement (Short Wheel Base)** and **Compressor Replacement (Long Wheel Base)** in Heating, Ventilation and Air Conditioning. Did you complete the replacement?	-	Go to **Step 35**	-
33	Replace the HVAC control module. Refer to **HVAC Control Module Replacement** . Did you complete the replacement?	-	Go to **Step 35**	-
34	**IMPORTANT:** **Program the PCM.** Replace the PCM. Refer to **Powertrain Control Module (PCM) Replacement** in Engine Controls-4.2L or **Powertrain Control Module (PCM) Replacement** in Engine Controls-4.8L, 5.3L, and 6.0L.Did you complete the replacement?	-	Go to **Step 35**	-
35	Operate the system in order to verify the repair. Did you correct the condition?	-	System OK	Go to **Step 5**

HVAC COMPRESSOR CLUTCH DOES NOT DISENGAGE

Test Description

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

2: These actions will disable the HVAC control module output to powertrain control module (PCM).

HVAC Compressor Clutch Does Not Disengage

Step	Action	Yes	No
Schematic Reference: HVAC Schematics **Connector End View Reference: HVAC Connector End Views** 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 **Diagnostic System Check - HVAC Systems - Manual**
2	1. Start the engine. 2. Place the mode switch in the PANEL position. 3. Place the A/C request switch in the OFF position. Does the A/C compressor clutch engage?	Go to **Step 3**	Go to **Testing for Intermittent Conditions and Poor Connections** 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 7**
4	Test the supply voltage circuit of the A/C compressor clutch for a short to voltage. Refer to **Circuit Testing** and to **Wiring Repairs** in Wiring Systems. Did you find and correct the condition?	Go to **Step 14**	Go to **Step 5**
5	1. Turn OFF the ignition. 2. Disconnect the A/C compressor clutch relay. 3. Turn On the ignition, with the engine OFF. 4. Connect a test lamp between the control circuit and the ignition-3 voltage circuit of the A/C compressor clutch relay. Does the test lamp illuminate?	Go to **Step 6**	Go to **Step 8**
6	Test the control circuit of the A/C compressor clutch relay for a short to ground. Refer to **Circuit Testing** and to **Wiring Repairs** in Wiring Systems. Did you find and correct the condition?	Go to **Step 14**	Go to **Step 10**
7	Test the status signal circuit of the A/C compressor for a short to voltage. Refer to **Circuit Testing** and to **Wiring Repairs** in Wiring Systems. Did you find and correct the condition?	Go to **Step 14**	Go to **Step 9**
8	Inspect for poor connections at the A/C compressor clutch relay. Refer to **Testing for Intermittent Conditions and Poor Connections** and to **Connector Repairs** in Wiring Systems. Did you find and correct the condition?	Go to **Step 14**	Go to **Step 11**

9	Inspect for poor connections at the harness connector of the A/C compressor clutch. Refer to **Testing for Intermittent Conditions and Poor Connections** and to **Connector Repairs** in Wiring Systems. Did you find and correct the condition?	Go to **Step 14**	Go to **Step 12**
10	Inspect for poor connections at the harness connector of the powertrain control module (PCM). Refer to **Testing for Intermittent Conditions and Poor Connections** and to **Connector Repairs** in Wiring Systems. Did you find and correct the condition?	Go to **Step 14**	Go to **Step 13**
11	Replace the A/C compressor clutch relay. Did you complete the replacement?	Go to **Step 14**	-
12	Replace the A/C compressor. Refer to **Compressor Replacement (Short Wheel Base)** and to **Compressor Replacement (Long Wheel Base)** in Heating, Ventilation and Air Conditioning. Did you complete the replacement?	Go to **Step 14**	-
13	**IMPORTANT:** **Program the PCM.** Replace the PCM. Refer to **Powertrain Control Module (PCM) Replacement** in Engine Controls-4.2L or **Powertrain Control Module (PCM) Replacement** in Engine Controls-4.8L, 5.3L, and 6.0L.Did you complete the replacement?	Go to **Step 14**	-
14	Operate the system in order to verify the repair. Did you correct the condition?	System OK	Go to **Step 3**

BLOWER MOTOR ALWAYS ON

Test Description

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

2: This step checks for continuous operation of the blower motor.

3: The test lamp should not illuminate while connected to any of the blower motor control circuits when the blower motor switch is in the OFF position. Illumination of the test lamp during this step indicates a malfunctioning blower motor switch or a short to voltage on a blower motor control circuit.

4: Test the blower motor control circuit that illuminated the test lamp in Step 3.

Blower Motor Always On

Step	Action	Yes	No
Schematic Reference: HVAC Schematics **Connector End View Reference: HVAC Connector End Views**			

DEFINITION: The blower motor is ON while the blower motor switch is in the OFF position.

1	Did you perform the HVAC diagnostic system check?	Go to **Step 2**	Go to **Diagnostic System Check - HVAC Systems - Manual**
2	1. Turn ON the ignition, with the engine OFF. 2. Place the blower motor switch in the OFF position. Is the blower motor OFF?	Go to **Testing for Intermittent Conditions and Poor Connections** in Wiring Systems	Go to **Step 3**
3	**IMPORTANT:** **The blower motor switch must remain in the OFF position during this step.** 1. Turn OFF the ignition. 2. Disconnect the blower motor resistor assembly connector. 3. Turn On the ignition, with the engine OFF. 4. Probe each blower motor control circuit with a test lamp that is connected to a good ground. Does the test lamp illuminate while connected to any of the blower motor control circuits?	Go to **Step 4**	Go to **Step 5**
4	Test the appropriate blower motor control circuit for a short to voltage. Refer to **Circuit Testing** and **Wiring Repairs** in Wiring Systems. Did you find and correct the condition?	Go to **Step 10**	Go to **Step 7**
5	Visually inspect the blower motor supply voltage circuit of the blower motor harness for a short to voltage with the vehicle harness. Refer to **Circuit Testing** and **Wiring Repairs** in Wiring Systems. Did you find and correct the condition?	Go to **Step 10**	Go to **Step 6**
6	Inspect for poor connections at the harness connectors of the blower motor resistor assembly. 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 10**	Go to **Step 8**
7	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 10**	Go to **Step 9**
	Replace the blower motor resistor assembly. Refer to		

8	**Blower Motor Resistor Assembly Replacement** in Heating, Ventilation and Air Conditioning. Did you complete the replacement?	Go to **Step 10**	-
9	Replace the HVAC control module. Refer to **HVAC Control Module Replacement**. Did you complete the replacement?	Go to **Step 10**	-
10	Operate the system in order to verify the repair. Did you correct the condition?	System OK	Go to **Step 2**

BLOWER MOTOR INOPERATIVE

Test Description

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

6: This step tests the output from the blower motor switch. Loss of blower motor switch output would indicate a malfunctioning switch or a circuit malfunction in the supply voltage to the switch.

7: There are two ignition 3 voltage circuits at the HVAC control module. Test the circuit that provides the supply voltage to the blower motor switch.

Blower Motor Inoperative

Step	Action	Yes	No
Schematic Reference: HVAC Schematics **Connector End View Reference: HVAC Connector End Views** 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 **Diagnostic System Check - HVAC Systems - Manual**
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 **Blower Motor Malfunction**	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 a good ground. 5. Place the blower motor switch in the minimum speed position. Does the test lamp illuminate?	Go to **Step 4**	Go to **Step 6**

4	Connect a test lamp between the blower motor supply voltage circuit and the blower motor ground circuit. Does the test lamp illuminate?	Go to **Step 8**	Go to **Step 5**
5	Test the ground circuit of the blower motor resistor assembly for an open or high resistance. Refer to **Circuit Testing** and **Wiring Repairs** in Wiring Systems. Did you find and correct the condition?	Go to **Step 16**	Go to **Step 9**
6	1. Turn OFF the ignition. 2. Disconnect the blower motor resistor assembly connector. 3. Turn ON the ignition, with the engine OFF. 4. Place the blower motor switch in the minimum speed position. 5. Connect a test lamp between the low blower motor control circuit of the blower motor resistor assembly and a good ground. Does the test lamp illuminate?	Go to **Step 9**	Go to **Step 7**
7	1. Turn OFF the ignition. 2. Disconnect the HVAC control module. 3. Turn ON the ignition, with the engine OFF. 4. Connect a test lamp between the ignition 3 voltage circuit of the blower motor switch and a good ground. Does the test lamp illuminate?	Go to **Step 11**	Go to **Step 12**
8	Inspect for poor connections at the harness connector of the 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 16**	Go to **Step 13**
9	Visually inspect the blower motor harness of the blower motor resistor assembly for an open. Refer to **Circuit Testing** and **Wiring Repairs** in Wiring Systems. Did you find and correct the condition?	Go to **Step 16**	Go to **Step 10**
10	Inspect for poor connections at the harness connector of the blower motor resistor assembly. 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 14**
	Inspect for poor connections at the harness connector		

11	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**
12	Repair the ignition 3 voltage circuit of the blower motor switch. Refer to **Wiring Repairs** in Wiring Systems. Did you complete the repair?	Go to **Step 16**	-
13	Replace the blower motor. Refer to **Blower Motor Replacement** in Heating, Ventilation and Air Conditioning. Did you complete the replacement?	Go to **Step 16**	-
14	Replace the blower motor resistor assembly. Refer to **Blower Motor Resistor Assembly Replacement** in Heating, Ventilation and Air Conditioning. 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**

BLOWER MOTOR MALFUNCTION

Test Description

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

5: This step tests the output of the blower motor switch in each speed position and through each blower motor control circuit.

6: Test the circuit that did not illuminate the test lamp in Step 5.

Blower Motor Malfunction

Step	Action	Yes	No
Schematic Reference: HVAC Schematics **Connector End View Reference: HVAC Connector End Views** DEFINITION: The blower motor operates in at least one, but not all, speed positions.			
1	Did you perform the HVAC Diagnostic System Check?	Go to **Step 2**	Go to **Diagnostic System Check - HVAC Systems - Manual**
2	1. Turn ON the ignition, with the engine OFF. 2. Place the blower motor switch in each speed position.	Go to **Testing for Intermittent Conditions and Poor Connections**	

	Does the blower motor operate at the desired speeds?	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 a good ground. 5. Place the blower motor switch in each speed position. Does the test lamp illuminate in each speed position?	Go to **Step 7**	Go to **Step 4**
4	1. Turn OFF the ignition. 2. Disconnect the blower motor resistor assembly connector. 3. Turn ON the ignition, with the engine OFF. 4. Connect a test lamp between the battery positive voltage circuit of the blower motor resistor assembly and a good ground. Does the test lamp illuminate?	Go to **Step 5**	Go to **Step 12**
5	**IMPORTANT:** **The blower motor switch must be in the correct speed position for the blower motor control circuit being tested.** Probe each blower motor control circuit with a test lamp that is connected to a good ground and place the blower motor switch in the appropriate speed position for the blower motor control circuit being tested.When the blower motor switch is in each speed position, does the test lamp illuminate?	Go to **Step 10**	Go to **Step 6**
6	Test the appropriate blower motor control circuit for an open or high resistance. Refer to **Circuit Testing** and **Wiring Repairs** in Wiring Systems. Did you find and correct the condition?	Go to **Step 16**	Go to **Step 11**
7	1. Connect a test lamp between the blower motor supply voltage circuit and the blower motor ground circuit. 2. Place the blower motor switch in each speed position. Does the test lamp illuminate in each speed position?	Go to **Step 9**	Go to **Step 8**
	Test the ground circuit of the blower motor resistor assembly for a high resistance. Refer to **Circuit**		

8	**Testing** and **Wiring Repairs** in Wiring Systems. Did you find and correct the condition?	Go to **Step 16**	Go to **Step 10**
9	Inspect for poor connections at the harness connector of the 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 16**	Go to **Step 13**
10	Inspect for poor connections at the harness connectors of the blower motor resistor assembly. 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 14**
11	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**
12	Repair the battery positive voltage circuit of the blower motor resistor assembly. Refer to **Wiring Repairs** in Wiring Systems. Did you complete the repair?	Go to **Step 16**	-
13	Replace the blower motor. Refer to **Blower Motor Replacement** in Heating, Ventilation and Air Conditioning. Did you complete the replacement?	Go to **Step 16**	-
14	Replace the blower motor resistor assembly. Refer to **Blower Motor Resistor Assembly Replacement** in Heating, Ventilation and Air Conditioning. 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**

BLOWER MOTOR ALWAYS ON - AUXILIARY (BODY TYPE VIN 6)

Blower Motor Always On - Auxiliary (Body Type VIN 6)

Step	Action	Values	Yes	No
Schematic Reference: HVAC Schematics **Connector End View Reference: HVAC Connector End Views** DEFINITION: The auxiliary blower motor operates with the HVAC controls in the OFF position.				
	Did you perform the HVAC Diagnostic System Check?			Go to **Diagnostic**

1		-	Go to **Step 2**	**System Check - HVAC Systems - Automatic**
2	1. Turn the ignition ON, with the engine OFF. 2. Turn OFF the auxiliary HVAC controls. Is the auxiliary blower motor OFF?	-	Go to **Testing for Intermittent Conditions and Poor Connections** in Wiring Systems	Go to **Step 3**
3	With the scan tool observe the auxiliary Blower Motor PWM Speed parameter in the REAR HVAC/RSA data list. Does the scan tool indicate that the auxiliary Blower Motor PWM Speed parameter is near the specified value?	0%	Go to **Step 4**	Go to **Step 6**
4	1. Turn the ignition OFF. 2. Disconnect the auxiliary HVAC control module. 3. Turn ON the ignition, with the engine OFF. Is the auxiliary blower motor OFF?	-	Go to **Step 6**	Go to **Step 5**
5	Inspect for poor connections at the harness connector of the auxiliary blower motor control processor. Refer to **Wiring Repairs** and **Connector Repairs** in Wiring Systems. Did you find and correct the condition?	-	Go to **Step 9**	Go to **Step 7**
6	Inspect for poor connections at the harness connector of the auxiliary HVAC control module. Refer to **Circuit Testing** and **Wiring Repairs** in Wiring Systems. Did you find and correct the condition?	-	Go to **Step 9**	Go to **Step 8**
7	Replace the auxiliary blower motor control processor. Refer to **Blower Motor Processor Replacement - Auxiliary** . Did you complete the replacement?	-	Go to **Step 9**	-
8	**IMPORTANT:** **Perform the recalibration procedure for the auxiliary HVAC control module.** Replace the auxiliary HVAC control module. Refer to **HVAC Control Module Replacement - Auxiliary** .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**

BLOWER MOTOR ALWAYS ON - AUXILIARY (BODY TYPE VIN 3)

Blower Motor Always On - Auxiliary (Body Type VIN 3)

Step	Action	Yes	No
Schematic Reference: HVAC Schematics **Connector End View Reference:** **HVAC Connector End Views** DEFINITION: The auxiliary blower motor operates with the auxiliary blower motor switch in the OFF position.			
1	Did you perform the HVAC Diagnostic System Check?	Go to **Step 2**	Go to **Diagnostic System Check - HVAC Systems - Automatic**
2	Turn the auxiliary HVAC controls OFF. Is the auxiliary blower motor OFF?	Go to **Testing for Intermittent Conditions and Poor Connections** in Wiring Systems	Go to **Step 3**
3	Disconnect the auxiliary HVAC control module. Is the auxiliary blower motor OFF?	Go to **Step 4**	Go to **Step 5**
4	Inspect for poor connections at the harness connector of the auxiliary HVAC control module. Refer to **Wiring Repairs** and **Connector Repairs** in Wiring Systems. Did you find and correct the condition?	Go to **Step 7**	Go to **Step 6**
5	Repair a short to voltage in the appropriate auxiliary blower motor speed control circuit. Refer to **Circuit Testing** and **Wiring Repairs** in Wiring Systems. Did you find and correct the condition?	Go to **Step 7**	-
6	Replace the auxiliary HVAC control module. Refer to **HVAC Control Module Replacement - Auxiliary**. Did you complete the replacement?	Go to **Step 7**	-
7	Operate the system in order to verify the repair. Did you correct the condition?	System OK	Go to **Step 3**

BLOWER MOTOR INOPERATIVE - AUXILIARY (BODY TYPE VIN 6)

Blower Motor Inoperative - Auxiliary (Body Type VIN 6)

Step	Action	Values	Yes	No
Schematic Reference: **HVAC Schematics** **Connector End View Reference:** **HVAC Connector End Views** DEFINITION: The auxiliary blower motor is inoperative in all speed positions from both the front and rear controls.				

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. Place the front auxiliary blower motor switch in each speed position. Does the auxiliary blower motor operate in any of the speed positions?		Go to **Blower Motor Malfunction - Auxiliary (Body Type VIN 6)** and **Blower Motor Malfunction - Auxiliary (Body Type VIN 3)**	Go to **Step 3**
3	1. Turn ON the ignition, with the engine OFF. 2. Place the auxiliary blower motor switch in each speed position. Does the auxiliary blower motor operate in any of the speed positions?	-	Go to **Blower Motor Malfunction**	Go to **Step 4**
4	1. Turn OFF the ignition. 2. Disconnect the auxiliary blower motor connector. 3. Turn ON the ignition, with the engine OFF. 4. Connect a test lamp between the auxiliary blower motor supply voltage circuit and the auxiliary blower motor ground circuit. 5. Place the auxiliary blower motor switch in the minimum speed position. Does the test lamp illuminate?	-	Go to **Step 11**	Go to **Step 5**
5	Test the battery positive voltage circuit of the auxiliary blower motor control processor for an open, high resistance or short to ground. Refer to **Circuit Testing** and **Wiring Repairs** in Wiring Systems. Did you find and correct the condition?	-	Go to **Step 17**	Go to **Step 6**
	Test the ground circuit of the auxiliary blower motor control processor for an open or high			

6	resistance. Refer to **Circuit Testing** and **Wiring Repairs** in Wiring Systems. Did you find and correct the condition?	-	Go to **Step 17**	Go to **Step 7**
7	**IMPORTANT:** **Ensure that the auxiliary blower motor control processor connector and the auxiliary HVAC control module connectors are connected during this step in order to avoid misdiagnosis.** 1. Place the auxiliary blower motor switch in any position except OFF. 2. Measure the frequency from the auxiliary blower motor speed control circuit of the auxiliary HVAC control module to a good ground. Does the frequency measure near the specified value?	35 Hz	Go to **Step 12**	Go to **Step 8**
8	1. Turn the ignition OFF. 2. Disconnect the auxiliary HVAC control module. 3. Turn ON the ignition, with the engine OFF. 4. Measure the voltage from the auxiliary blower motor speed control circuit of the auxiliary HVAC control module to a good ground. Does the voltage measure near the specified value?	8-12.5 V	Go to **Step 10**	Go to **Step 9**
9	Test the auxiliary blower motor speed control circuit of the auxiliary HVAC control module for an open or a short to ground. Refer to **Circuit Testing** and **Wiring Repairs** in Wiring Systems. Did you find and correct the condition?	-	Go to **Step 17**	Go to **Step 12**
10	Test the auxiliary blower motor speed control circuit of the auxiliary HVAC control module for a short to voltage. Refer to **Circuit Testing** and **Wiring Repairs** in Wiring Systems. Did you find and correct the condition?	-	Go to **Step 17**	Go to **Step 13**
11	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 17**	Go to **Step 14**
12	Inspect for poor connections at the harness connector of the auxiliary blower motor control processor. 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 17**	Go to **Step 15**
13	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 17**	Go to **Step 16**
14	Replace the auxiliary blower motor. Refer to **Blower Motor Replacement - Auxiliary (Body VIN Type 6)** and **Blower Motor Replacement - Auxiliary (Body VIN Type 3)** in Heating, Ventilation and Air Conditioning. Did you complete the replacement?	-	Go to **Step 17**	-
15	Replace the auxiliary blower motor control processor. Refer to **Blower Motor Processor Replacement - Auxiliary** . Did you complete the replacement?	-	Go to **Step 17**	-
16	**IMPORTANT:** **Perform the recalibration procedure for the auxiliary HVAC control module.** Replace the auxiliary HVAC control module. Refer to **HVAC Control Module Replacement - Auxiliary** .Did you complete the replacement?	-	Go to **Step 17**	-
17	Operate the system in order to verify the repair. Did you correct the condition?	-	System OK	Go to **Step 2**

BLOWER MOTOR INOPERATIVE - AUXILIARY (BODY TYPE VIN 3)

Test Description

2: The auxiliary system will not operate with the primary system in the DEFROST position.

Blower Motor Inoperative - Auxiliary (Body Type VIN 3)

Step	Action	Yes	No
Schematic Reference: HVAC Schematics **Connector End View Reference: HVAC Connector End Views** DEFINITION: The auxiliary blower motor is inoperative in all blower motor switch positions.			

1	Did you perform the HVAC Diagnostic System Check?	Go to **Step 2**	Go to **Diagnostic System Check - HVAC Systems - Automatic**
2	**IMPORTANT:** **The auxiliary blower motor only operates at MEDIUM and HIGH speed. When the auxiliary blower switch is placed in the lowest speed setting the air flow through the center console to the rear is provided by the primary blower motor. The air speed will vary depending on the front blower motor setting.** 1. Turn ON the ignition, with the engine OFF. 2. Place the primary mode switch on the HVAC control module to the floor position. 3. Place the front blower motor switch in the minimum speed position. 4. Place the auxiliary blower motor switch in the medium speed position and the maximum speed position. Does the auxiliary blower motor operate in either of the speed positions?	Go to **Testing for Intermittent Conditions and Poor Connections** in Wiring Systems	Go to **Step 3**
3	1. Cycle the auxiliary blower switch through all speed positions: 2. Observe the Rear HVAC Fan Speed parameter in the Rear HVAC/RSA data list. Does the Rear HVAC Fan Speed parameter change with each command?	Go to **Step 4**	Go to **Step 7**
4	1. Turn the ignition OFF. 2. Disconnect the auxiliary blower motor. 3. Turn ON the ignition, with the engine OFF. 4. Connect a test lamp between the auxiliary blower motor high speed control circuit and a good ground. 5. Place the auxiliary blower motor switch in the maximum speed position. Does the test lamp illuminate?	Go to **Step 5**	Go to **Step 7**
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 to **Step 10**	Go to **Step 6**
6	Inspect for poor connections at the harness connector of the auxiliary blower motor. Refer to **Wiring Repairs** and **Connector Repairs** in Wiring Systems. Did you find and correct the condition?	Go to **Step 10**	Go to **Step 8**
7	Inspect for poor connections at the harness connector of the auxiliary HVAC control module. Refer to **Wiring Repairs** and **Connector Repairs** in Wiring Systems. Did you find and correct the condition?	Go to **Step 10**	Go to **Step 9**
8	Replace the auxiliary blower motor. Refer to **Blower Motor Replacement - Auxiliary (Body VIN Type 6)** and **Blower Motor Replacement - Auxiliary (Body VIN Type 3)** in Heating, Ventilation and Air Conditioning. Did you complete the replacement?	Go to **Step 10**	-
9	Replace the auxiliary HVAC control module. Refer to **HVAC Control Module Replacement - Auxiliary**. Did you complete the replacement?	Go to **Step 10**	-
10	Operate the system in order to verify the repair. Did you correct the condition?	System OK	Go to **Step 3**

BLOWER MOTOR MALFUNCTION - AUXILIARY (BODY TYPE VIN 6)

Blower Motor Malfunction - Auxiliary (Body Type VIN 6)

Step	Action	Values	Yes	No
Schematic Reference: HVAC Schematics **Connector End View Reference: HVAC Connector End Views** DEFINITION: The auxiliary blower motor operates in at least one speed position from at least one auxiliary control.				
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. With a scan tool, observe the Driver Override Switch parameter in the REAR HVAC/RSA data list. 3. Place the front auxiliary blower motor switch in each position. Does the scan tool indicate that the Driver			

	Override Switch parameter changes state?		Go to **Step 6**	Go to **Step 3**
3	Test the Auxiliary HVAC Enable Control circuit of the front auxiliary blower motor switch for an open, short to voltage or short to ground. Refer to **Circuit Testing** and **Wiring Repairs** in Wiring Systems. Did you find and correct the condition?		Go to **Step 22**	Go to **Step 4**
4	Test the Low Reference circuit of the front auxiliary blower motor switch for an open. Refer to **Circuit Testing** and **Wiring Repairs** in Wiring Systems. Did you find and correct the condition?		Go to **Step 22**	Go to **Step 5**
5	1. Turn the ignition OFF. 2. Disconnect the auxiliary HVAC control module. 3. Turn ON the ignition, with the engine OFF. 4. Connect a volt meter between the Auxiliary HVAC Enable Control circuit and ground. 5. Place the front auxiliary blower motor switch from the minimum speed position to the maximum speed position. Does the volt meter read properly for each position?	Rear 5.0V Off-1.0V Pos.1 2.0V Pos.2 3.0V Pos.3 4.0V	Go to **Step 16**	Go to **Step 17**
6	**IMPORTANT:** **Ensure that the front auxiliary blower control switch is in the REAR position during the remainder of this table in order to avoid misdiagnosis.** 1. Turn ON the ignition, with the engine OFF. 2. Place the front auxiliary blower motor switch in the REAR position. 3. With a scan tool, observe the Rear Fan Up Button parameter in the REAR HVAC/RSA data list. 4. Activate the auxiliary fan up switch. Does the scan tool indicate that the Rear Fan Up Button parameter changes state?	-	Go to **Step 7**	Go to **Step 16**
	1. With a scan tool, observe the Rear Fan			

7	Down Button parameter in the REAR HVAC/RSA data list. 2. Activate the auxiliary fan down switch. Does the scan tool indicate that the rear Fan Down Button parameter changes state?	-	Go to **Step 8**	Go to **Step 16**
8	Place the auxiliary blower motor switch in each speed position. Does the auxiliary blower motor operate at the desired speeds?	-	Go to **Testing for Intermittent Conditions and Poor Connections** in Wiring Systems	Go to **Step 9**
9	1. Turn the ignition OFF. 2. Disconnect the auxiliary blower motor. 3. Turn ON the ignition, with the engine OFF. 4. Connect a test lamp between the auxiliary blower motor supply voltage circuit and the auxiliary blower motor ground circuit of the auxiliary blower motor. 5. Place the auxiliary blower motor switch from the minimum speed position to the maximum speed position. Does the test lamp illuminate and increase intensity?	-	Go to **Step 14**	Go to **Step 10**
10	Test the battery positive voltage circuit of the auxiliary blower motor control processor for a high resistance. Refer to **Circuit Testing** and **Wiring Repairs** in Wiring Systems. Did you find and correct the condition?	-	Go to **Step 22**	Go to **Step 11**
11	Test the ground circuit of the auxiliary blower motor control processor for a high resistance. Refer to **Circuit Testing** and **Wiring Repairs** in Wiring Systems. Did you find and correct the condition?	-	Go to **Step 22**	Go to **Step 12**
	IMPORTANT: **Ensure that the auxiliary blower motor control processor and auxiliary HVAC control module connectors are connected during this step in order to avoid misdiagnosis.** 1. Turn ON the ignition, with the engine OFF.			

12	2. Measure the voltage from the auxiliary blower motor speed control circuit of the auxiliary HVAC control module to a good ground. 3. Place the auxiliary blower motor switch from the minimum speed position to the maximum speed position. Does the voltage continually decrease within the specified range?	13.0-1.5 V	Go to **Step 15**	Go to **Step 13**
13	1. Turn the ignition OFF. 2. Disconnect the auxiliary HVAC control module. 3. Turn ON the ignition, with the engine OFF. 4. Measure the voltage from the auxiliary blower speed control circuit of the auxiliary HVAC control module to a good ground. Does the voltage measure near the specified value?	8-12.5 V	Go to **Step 16**	Go to **Step 15**
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 22**	Go to **Step 19**
15	Inspect for poor connections at the harness connector of the auxiliary blower motor control processor. 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 22**	Go to **Step 20**
16	Inspect for poor connections at the harness connector of the auxiliary 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 22**	Go to **Step 21**
17	Inspect for poor connections at the harness connector of the front 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 22**	Go to **Step 18**
18	Replace the front auxiliary blower motor switch. Refer to **Blower Motor Replacement** in Heating, Ventilation and Air Conditioning. Did you complete the replacement?		Go to **Step 22**	-
19	Replace the auxiliary blower motor. Refer to **Blower Motor Replacement** in Heating, Ventilation and Air Conditioning. Did you complete the replacement?	-	Go to **Step 22**	-
20	Replace the auxiliary blower motor control processor. Refer to **Blower Motor Control Processor Replacement** . Did you complete the replacement?	-	Go to **Step 22**	-
21	**IMPORTANT:** **Perform the recalibration procedure for the auxiliary HVAC control module.** Replace the auxiliary HVAC control module. Refer to **HVAC Control Module Replacement** .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 - AUXILIARY (BODY TYPE VIN 3)

Blower Motor Malfunction - Auxiliary (Body Type VIN 3)

Step	Action	Yes	No
Schematic Reference: HVAC Schematics **Connector End View Reference: HVAC Connector End Views** DEFINITION: The auxiliary blower motor operates in at least one speed position.			
1	Did you perform the HVAC Diagnostic System Check?	Go to **Step 2**	Go to **Diagnostic System Check - HVAC Systems - Automatic**
2	**IMPORTANT:** **The auxiliary blower motor only operates at MEDIUM and HIGH speed. When the auxiliary blower switch is placed in the lowest speed setting the air flow through the center console to the rear is provided by the primary blower motor. The air speed will vary depending on the front blower motor setting.** 1. Turn ON the ignition, with the engine OFF.		

	2. Place the front mode switch in the bi-level position. 3. Place the front blower motor switch in the minimum speed position. 4. Place the auxiliary blower motor switch in the medium speed position and the maximum speed position. Does the auxiliary blower motor operate in each speed position?	Go to **Testing for Intermittent Conditions and Poor Connections** in Wiring Systems	Go to **Step 3**
3	1. Cycle the auxiliary blower switch through all speed positions: 2. Observe the Rear HVAC Fan Speed parameter in the Rear HVAC/RSA data list. Does the Rear HVAC Fan Speed parameter change with each command?	Go to **Step 4**	Go to **Step 8**
4	1. Turn the ignition OFF. 2. Disconnect the harness connector of the auxiliary blower motor. 3. Turn ON the ignition, with the engine OFF. 4. Place the auxiliary blower motor switch in the maximum speed position. 5. Connect a test lamp between the auxiliary blower motor high speed control circuit and a good ground. Does the test lamp illuminate?	Go to **Step 5**	Go to **Step 6**
5	1. Place the auxiliary blower motor switch in the medium speed position. 2. Connect a test lamp between the auxiliary blower motor medium speed control circuit and a good ground. Does the test lamp illuminate?	Go to **Step 9**	Go to **Step 7**
6	Test the auxiliary blower motor high speed control circuit for an open, a high resistance or a short to ground. Refer to **Circuit Testing** and **Wiring Repairs** in Wiring Systems. Did you find and correct the condition?	Go to **Step 12**	Go to **Step 8**
7	Test the auxiliary blower motor medium speed control circuit for an open, a high resistance or a short to ground. Refer to **Circuit Testing** and **Wiring Repairs**		

	in Wiring Systems. Did you find and correct the condition?	Go to **Step 12**	Go to **Step 8**
8	Inspect for poor connections at the harness connector of the auxiliary HVAC control module. Refer to **Wiring Repairs** and **Connector Repairs** in Wiring Systems. Did you find and correct the condition?	Go to **Step 12**	Go to **Step 10**
9	Inspect for poor connections at the harness connector of the auxiliary blower motor. Refer to **Wiring Repairs** and **Connector Repairs** in Wiring Systems. Did you find and correct the condition?	Go to **Step 12**	Go to **Step 11**
10	Replace the auxiliary HVAC control module. Refer to **HVAC Control Module Replacement - Auxiliary**. Did you complete the replacement?	Go to **Step 12**	-
11	Replace the auxiliary blower motor. Refer to **Blower Motor Replacement - Auxiliary (Body VIN Type 6)** and **Blower Motor Replacement - Auxiliary (Body VIN Type 3)** in Heating, Ventilation and Air Conditioning. 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 3**

TOO HOT IN VEHICLE

Too Hot in Vehicle

Step	Action	Yes	No
Schematic Reference: HVAC Schematics **Connector End View Reference: HVAC Connector End Views** DEFINITION: The temperature cannot be adjusted, or the cooling is insufficient during A/C operation.			
1	Did you perform the HVAC Diagnostic System Check?	Go to **Step 2**	Go to **Diagnostic System Check - HVAC Systems - Manual**
2	**IMPORTANT:** **If during this diagnostic procedure the HVAC control module is disconnected a recalibration of actuators must be performed to avoid misdiagnosis.** 1. Recalibrate actuators. Refer to **Re-Calibrating Actuators (Primary)**. 2. Turn ON the ignition, with the engine OFF. 3. Observe the **Diagnostic Trouble Code (DTC) List**.	Go to **Diagnostic**	

	Does the scan tool display any DTC B0414, B0424, B3761 or B3770?	**Trouble Code (DTC) List**	Go to **Step 3**
3	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 **Step 4**	Go to **Blower Motor Inoperative**
4	Does the blower motor operate at the desired speed?	Go to **Step 5**	Go to **Blower Motor Malfunction**
5	1. Place the mode switch in the PANEL position. 2. Place the recirculation switch in the ON position. 3. Observe the recirculation door. 4. 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 **Air Recirculation Malfunction**
6	Does the customer concern occur when the A/C is OFF?	Go to **Step 9**	Go to **Step 7**
7	**IMPORTANT:** **Ambient air temperature must be above 3°C (36°F).** 1. Start the engine. 2. Place the blower motor switch in the maximum speed position. 3. Place the A/C request switch in the ON position. 4. Place the left air temperature switch in the coldest position. Does the A/C compressor operate?	Go to **Step 8**	Go to **HVAC Compressor Clutch Does Not Engage**
8	Perform the refrigerant system performance test. Refer to **Air Conditioning (A/C) System Performance Test** in Heating, Ventilation and Air Conditioning. Did you find and correct the condition?	Go to **Step 12**	Go to **Step 9**
9	1. Turn ON the ignition, with the engine OFF. 2. With a scan tool, observe the Left Mix Door Actual and the Right Mix Door Actual parameters in the Heating and Air Conditioning Door Positions data list. 3. Place the left and right air temperature switches		

	from the coldest position to the warmest position. Does the Left Mix Door Actual and the Right Mix Door Actual parameters counts change?	System OK	Go to **Step 10**
10	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 12**	Go to **Step 11**
11	Replace the HVAC control module. Refer to **HVAC Control Module Replacement**. 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 COLD IN VEHICLE

Too Cold in Vehicle

Step	Action	Yes	No
Schematic Reference: HVAC Schematics **Connector End View Reference: HVAC Connector End Views** DEFINITION: The temperature cannot be adjusted, or the heating is insufficient.			
1	Did you perform the HVAC Diagnostic System Check?	Go to **Step 2**	Go to **Diagnostic System Check - HVAC Systems - Manual**
2	**IMPORTANT:** **If during this diagnostic procedure the HVAC control module is disconnected a recalibration of actuators must be performed to avoid misdiagnosis.** 1. Recalibrate actuators. Refer to **Re-Calibrating Actuators (Primary)**. 2. Turn ON the ignition, with the engine OFF. 3. Observe the **Diagnostic Trouble Code (DTC) List**. Does the scan tool display any DTC B0414, B0424, B3761 or B3770?	Go to **Diagnostic Trouble Code (DTC) List**	Go to **Step 3**
3	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 **Step 4**	Go to **Blower Motor Inoperative**
4	Does the blower motor operate at the desired speed?	Go to **Step 5**	Go to **Blower Motor Malfunction**
5	1. Place the mode switch in the PANEL position. 2. Place the recirculation switch in the ON position. 3. Observe the recirculation door. 4. 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 **Air Recirculation Malfunction**
6	1. Start the engine. 2. Place the mode switch in the Panel position. 3. Place the A/C request switch in the OFF position. Does the A/C compressor operate?	Go to **HVAC Compressor Clutch Does Not Disengage**	Go to **Step 7**
7	Perform the Heating Performance Diagnostic. Refer to **Heating Performance Diagnostic (Body VIN Type 6)** and **Heating Performance Diagnostic (Body VIN Type 3)** in Heating, Ventilation and Air Conditioning. Did you find and correct the condition?	Go to **Step 11**	Go to **Step 8**
8	1. Turn ON the ignition, with the engine OFF. 2. With a scan tool, observe the Left Mix Door Actual and the Right Mix Door Actual parameters in the Heating and Air Conditioning Door Positions data list. 3. Place the left and right air temperature switches from the coldest position to the warmest position. Does the Left Mix Door Actual and the Right Mix Door Actual parameters counts change?	System OK	Go to **Step 9**
9	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 11**	Go to **Step 10**
	IMPORTANT: **Perform the recalibration procedure for the HVAC control module. Refer to Re-Calibrating Actuators**		

	(Primary).		
10	Replace the HVAC control module. Refer to **HVAC Control Module Replacement**.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**

TOO HOT IN VEHICLE - AUXILIARY

Test Description

The numbers below refers to the step number in the diagnostic table.

7: To request A/C operation the primary HVAC controls must be set to enable the A/C compressor.

11: If the test light remains illuminated the answer is No.

19: The primary HVAC control module controls the coolant bypass valve. It receives a Class 2 message from the auxiliary HVAC control module for the proper position of valve.

Too Hot in Vehicle - Auxiliary

Step	Action	Yes	No
Schematic Reference: HVAC Schematics **Connector End View Reference: HVAC Connector End Views** DEFINITION: The auxiliary temperature cannot be adjusted, or the auxiliary cooling is insufficient during A/C operation.			
1	Did you perform the HVAC Diagnostic System Check?	Go to **Step 2**	Go to **Diagnostic System Check - HVAC Systems - Automatic**
2	1. Recalibrate actuators. Refer to **Re-Calibrating Actuators (Primary)**. 2. Turn ON the ignition, with the engine OFF. 3. With a scan tool, observe the DTC list in Rear HVAC/RSA. Does the scan tool display DTC B0145, B0428, or B3531?	Go to **Diagnostic Trouble Code (DTC) List**	Go to **Step 3**
3	1. With a scan tool, observe the Rear Temp. Select Sw. parameter in the Rear HVAC/RSA data list. 2. Rotate the auxiliary air temperature switch from the coldest position to the warmest position. Does the scan tool indicate the Rear Temp. Select Sw. parameter increase from 1 to 13 Counts?	Go to **Step 4**	Go to **Step 18**

4	1. Turn ON the ignition, with the engine OFF. 2. Place the auxiliary blower motor switch in each speed position. Does the auxiliary blower motor operate in any of the speed positions?	Go to **Step 5**	Go to **Blower Motor Inoperative - Auxiliary (Body Type VIN 6)** or **Blower Motor Inoperative - Auxiliary (Body Type VIN 3)**
5	Does the auxiliary blower motor operate at the desired speed?	Go to **Step 6**	Go to **Blower Motor Malfunction - Auxiliary (Body Type VIN 6)** or **Blower Motor Malfunction - Auxiliary (Body Type VIN 3)**
6	Does the customer concern occur when the A/C is OFF?	Go to **Step 9**	Go to **Step 7**
7	**IMPORTANT:** **Ambient air temperature must be above 3°C (36°F).** 1. Start the engine. 2. Place the blower motor switch in the maximum speed position. 3. Place the A/C request switch in the ON position. 4. Place temperature switch in the coldest position. Does the A/C compressor operate?	Go to **Step 8**	Go to **HVAC Compressor Clutch Does Not Engage**
8	Perform the refrigerant system performance test. Refer to **Air Conditioning (A/C) System Performance Test** in Heating, Ventilation and Air Conditioning. Did you find and correct the condition?	Go to **Step 21**	Go to **Step 9**
9	1. Turn ON the ignition, with the engine OFF. 2. Place the auxiliary blower motor switch in the Rear position. 3. With a scan tool, observe the Air Mix Door Actual parameter in the Rear HVAC/RSA data list. 4. Place the auxiliary air temperature switch from the coldest position to the warmest position. Does the Air Mix Door Actual parameter counts change?	Go to **Step 10**	Go to **Step 19**
	1. Turn ON the ignition, with the engine OFF.		

10	2. Place the auxiliary air temperature switch to the coldest position. 3. Start the engine. 4. Allow the engine to reach its normal operating temperature. 5. Feel the inlet and outlet hoses of the coolant bypass valve. Does the inlet hose feel warmer than the outlet hose of the coolant bypass valve?	System OK	Go to **Step 11**
11	1. Turn OFF the engine. 2. Disconnect the electrical connector of the coolant bypass valve. 3. Turn ON the ignition, with the engine OFF. 4. Connect a test lamp between the coolant bypass solenoid control circuit and the ground circuit of the coolant bypass valve. 5. With a scan tool, command the Water Valve ON and OFF. Does the test lamp illuminate on and off with each command?	Go to **Vacuum Control System Diagnostic**	Go to **Step 12**
12	Does the test lamp remain illuminated when commanded to OFF?	Go to **Step 15**	Go to **Step 13**
13	1. Connect a test lamp between the coolant bypass solenoid control circuit of the coolant bypass valve and a good ground. 2. With a scan tool, command the Water Valve ON and OFF. Does the test lamp illuminate with each command?	Go to **Step 16**	Go to **Step 14**
14	Test the coolant bypass solenoid control circuit of the coolant bypass valve for one of the following conditions: • A short to ground • A high resistance • An open Refer to **Circuit Testing** and to **Wiring Repairs** in Wiring Systems. Did you find and correct the condition?	Go to **Step 21**	Go to **Step 17**

15	Test the coolant bypass solenoid control circuit of the coolant bypass valve for a short to voltage. Refer to **Circuit Testing** and to **Wiring Repairs** in Wiring Systems. Did you find and correct the condition?	Go to **Step 21**	Go to **Step 18**
16	Repair the ground circuit of the coolant bypass valve. Refer to **Wiring Repairs** in Wiring Systems. Did you complete the repair?	Go to **Step 21**	-
17	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 21**	Go to **Step 19**
18	Inspect for poor connections at the harness connector of the auxiliary 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 21**	Go to **Step 20**
19	Replace the HVAC control module. Refer to **HVAC Control Module Replacement**. Did you complete the replacement?	Go to **Step 21**	-
20	Replace the auxiliary HVAC control module. Refer to **HVAC Control Module Replacement - Auxiliary**. 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**

TOO COLD IN VEHICLE - AUXILIARY

Test Description

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

16: The primary HVAC control module controls the coolant bypass valve. It receives a Class 2 message from the auxiliary HVAC control module for the proper position of valve.

Too Cold in Vehicle - Auxiliary

Step	Action	Yes	No
Schematic Reference: HVAC Schematics **Connector End View Reference: HVAC Connector End Views** DEFINITION: The auxiliary temperature cannot be adjusted, or the auxiliary heating is insufficient.			
1	Did you perform the HVAC Diagnostic System Check?	Go to **Step 2**	Go to **Diagnostic System Check - HVAC Systems - Automatic**

2	1. Recalibrate actuators. Refer to **Re-Calibrating Actuators (Primary)**. 2. Turn ON the ignition, with the engine OFF. 3. With a scan tool, observe the DTC list in Rear HVAC/RSA. Does the scan tool display DTC B0145, B0428, or B3531?	Go to **Diagnostic Trouble Code (DTC) List**	Go to **Step 3**
3	1. With a scan tool, observe the Rear Temp. Select Sw. parameter in the Rear HVAC/RSA data list. 2. Rotate the auxiliary air temperature switch from the coldest position to the warmest position. Does the scan tool indicate the Rear Temp. Select Sw. parameter increase from 1 to 13 Counts?	Go to **Step 4**	Go to **Step 17**
4	1. Turn ON the ignition, with the engine OFF. 2. Place the auxiliary blower motor switch in each speed position. Does the auxiliary blower motor operate in any of the speed positions?	Go to **Step 5**	Go to **Blower Motor Inoperative - Auxiliary (Body Type VIN 6)** or **Blower Motor Inoperative - Auxiliary (Body Type VIN 3)**
5	Does the auxiliary blower motor operate at the desired speed?	Go to **Step 6**	Go to **Blower Motor Malfunction - Auxiliary (Body Type VIN 6)** or **Blower Motor Malfunction - Auxiliary (Body Type VIN 3)**
6	1. Start the engine. 2. Place the mode switch in the Panel position. 3. Place the A/C request switch in the OFF position. Does the A/C compressor operate?	Go to **HVAC Compressor Clutch Does Not Disengage**	Go to **Step 7**
7	Perform the Heating Performance Diagnostic. Refer to **Heating Performance Diagnostic (Body VIN Type 6)** and **Heating Performance Diagnostic (Body VIN Type 3)** in Heating, Ventilation and Air Conditioning. Did you find and correct the condition?	Go to **Step 18**	Go to **Step 9**
	1. Turn ON the ignition, with the engine OFF.		

8	2. Place the auxiliary blower motor switch in the Rear position. 3. With a scan tool, observe the Air Mix Door Actual parameter in the Rear HVAC/RSA data list. 4. Place the auxiliary air temperature switch from the coldest position to the warmest position. Does the Air Mix Door Actual parameter counts change?	Go to **Step 9**	Go to **Step 15**
9	1. Turn ON the ignition, with the engine OFF. 2. Place the auxiliary air temperature switch to the warmest position. 3. Start the engine. 4. Allow the engine to reach its normal operating temperature. 5. Feel the inlet and outlet hoses of the coolant bypass valve. Does the inlet hose feel as warm as the outlet hose of the coolant bypass valve?	System OK	Go to **Step 10**
10	1. Turn OFF the engine. 2. Disconnect the electrical connector of the coolant bypass valve. 3. Turn ON the ignition, with the engine OFF. 4. Connect a test lamp between the coolant bypass solenoid control circuit and the ground circuit of the coolant bypass valve. 5. With a scan tool, command the Water Valve ON and OFF. Does the test lamp illuminate with each command?	Go to **Vacuum Control System Diagnostic**	Go to **Step 11**
11	1. Connect a test lamp between the coolant bypass solenoid control circuit of the coolant bypass valve and a good ground. 2. With a scan tool, command the Water Valve ON and OFF. Does the test lamp illuminate with each command?	Go to **Step 13**	Go to **Step 12**
	Test the coolant bypass solenoid control circuit of the coolant bypass valve for one of the following conditions:		

12	• A short to ground • A high resistance • An open Refer to **Circuit Testing** and to **Wiring Repairs** in Wiring Systems. Did you find and correct the condition?	Go to **Step 18**	Go to **Step 14**
13	Repair the ground circuit of the coolant bypass valve. Refer to **Wiring Repairs** in Wiring Systems. Did you complete the repair?	Go to **Step 18**	-
14	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 18**	Go to **Step 16**
15	Inspect for poor connections at the harness connector of the auxiliary 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 18**	Go to **Step 17**
16	Replace the HVAC control module. Refer to **HVAC Control Module Replacement**. Did you complete the replacement?	Go to **Step 18**	-
17	Replace the auxiliary HVAC control module. Refer to **HVAC Control Module Replacement - Auxiliary**. Did you complete the replacement?	Go to **Step 18**	-
18	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:
  - An obstruction to the airflow
  - Air leaks
  - Misaligned air ducts
  - Broken or binding linkages or doors
- If the scan tool indicates that the Door Actual parameter is 5-10 counts from the Commanded Door parameter, then perform the recalibration procedure for the HVAC door actuators. Refer to **Re-**

Calibrating Actuators (Primary).

Air Delivery Improper

Step	Action	Yes	No
Schematic Reference: HVAC Schematics **Connector End View Reference: HVAC Connector End Views**			
1	Did you perform the HVAC Diagnostic System Check?	Go to **Step 2**	Go to **Diagnostic System Check - HVAC Systems - Manual**
2	1. Turn ON the ignition, with the engine OFF. 2. Place the blower motor switch in the OFF position. Is the blower motor OFF?	Go to **Step 3**	Go to **Blower Motor Always On**
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 **Blower Motor Inoperative**
4	Does the blower motor operate in each speed position?	Go to **Step 5**	Go to **Blower Motor Malfunction**
5	1. With a scan tool, observe the Mode Select Position parameter in the Heating and Air Conditioning data list. 2. Place the mode switch in each position. Does the scan tool indicate that the Mode Select Position parameter displays the correct mode switch positions?	Go to **Step 6**	Go to **Step 8**
6	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 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 7**	Go to **Air Recirculation Malfunction**
	1. Place the front mode switch in the floor position. 2. Turn ON the auxiliary HVAC control module. 3. Place the auxiliary mode switch in the vent		

7	position. 4. Observe the airflow from the auxiliary outlets. 5. Place the front mode switch in the defrost position. Does air flow from the auxiliary outlets when the front mode switch is in the defrost position?	Go to **Air Delivery Improper - Auxiliary (With Body Type VIN 3)**	Go to Diagnostic Aids
8	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 10**	Go to **Step 9**
9	Replace the HVAC control module. Refer to **HVAC Control Module Replacement**. Did you complete the replacement?	Go to **Step 10**	-
10	Operate the system in order to verify the repair. Did you correct the condition?	System OK	Go to **Step 2**

AIR DELIVERY IMPROPER - AUXILIARY (WITH BODY TYPE VIN 3)

Air Delivery Improper - Auxiliary (With Body Type VIN 3)

Step	Action	Value(s)	Yes	No
Schematic Reference: HVAC Schematics **Connector End View Reference: HVAC Connector End Views** DEFINITION: Air does not flow correctly from the auxiliary air distribution outlets.				
1	Did you perform the HVAC Diagnostic System Check?	-	Go to **Step 2**	Go to **Diagnostic System Check - HVAC Systems - Manual**
2	1. Turn ON the ignition, with the engine OFF. 2. Place the blower motor switch in the maximum position. 3. Place the mode switch in the defrost position. 4. With a scan tool, observe the Rear HVAC parameter in the Heating and Air Conditioning data list. Does the scan tool indicate that the Rear HVAC parameter displays Disabled?	-	Go to **Step 3**	Go to **Step 22**
	1. Place the front mode switch in the floor position.			

3	2. With a scan tool, observe the Rear HVAC parameter in the Heating and Air Conditioning data list. Does the scan tool indicate that the Rear HVAC parameter displays Enabled?	-	Go to **Step 4**	Go to **Step 22**
4	1. Turn ON the headlamps. 2. Place the instrument panel dimmer switch in the brightest position. 3. Turn ON the auxiliary HVAC control module. Does the power indicator of the auxiliary HVAC control module illuminate?	-	Go to **Step 5**	Go to **Step 7**
5	Place the auxiliary mode switch in each position. Is the airflow sufficient from the correct auxiliary outlets in each mode?	-	Go to **Step 6**	Go to **Step 11**
6	Place the front mode switch in the defrost position. Is there airflow from the auxiliary outlets?	-	Go to **Step 15**	Go to **Testing for Intermittent Conditions and Poor Connections** in Wiring Systems
7	1. Turn OFF the ignition. 2. Disconnect the auxiliary HVAC control module. 3. Turn ON the ignition with the engine OFF. 4. Probe the ignition 3 voltage circuit of the auxiliary HVAC control module with a test lamp that is connected to a good ground. Does the test lamp illuminate?	-	Go to **Step 8**	Go to **Step 23**
8	Test the ground circuit of the auxiliary HVAC control module for an open or high resistance. Refer to **Circuit Testing** and **Wiring Repairs** in Wiring Systems. Did you find and correct the condition?	-	Go to **Step 28**	Go to **Step 9**
9	Probe the auxiliary HVAC enable control circuit of the auxiliary HVAC control module with a test lamp that is connected to battery positive voltage. Does the test lamp illuminate?	-	Go to **Step 10**	Go to **Step 21**

10	Test the auxiliary HVAC enable control circuit of the auxiliary HVAC control module for a short to ground. Refer to **Circuit Testing** and **Wiring Repairs** in Wiring Systems. Did you find and correct the condition?	-	Go to **Step 28**	Go to **Step 22**
11	1. Turn OFF the ignition. 2. Disconnect the auxiliary mode actuator. 3. Turn ON the ignition, with the engine OFF. 4. Probe the ignition 3 voltage circuit of the auxiliary mode actuator with a test lamp that is connected to a good ground. Does the test lamp illuminate?	-	Go to **Step 12**	Go to **Step 24**
12	1. Measure the voltage from the auxiliary mode door control circuit of the auxiliary mode actuator to a good ground. 2. Place the auxiliary mode switch in each position. Does the voltage measure near the specified values?	3-5 V FLOOR 7-9 V BI-LEVEL 11-13 V PANEL	Go to **Step 13**	Go to **Step 14**
13	Test the ground circuit of the auxiliary mode actuator for an open or high resistance. Refer to **Circuit Testing** and **Wiring Repairs** in Wiring Systems. Did you find and correct the condition?	-	Go to **Step 28**	Go to **Step 19**
14	Test the auxiliary mode door control circuit of the auxiliary mode actuator for an open, a high resistance, a short to ground or a short to voltage. Refer to **Circuit Testing** and **Wiring Repairs** in Wiring Systems. Did you find and correct the condition?	-	Go to **Step 28**	Go to **Step 21**
15	Does the power indicator illuminate on the auxiliary HVAC control module?	-	Go to **Step 16**	Go to **Step 18**
16	1. Turn OFF the ignition. 2. Disconnect the auxiliary HVAC control module. 3. Turn ON the ignition, with the engine OFF. 4. Place the front mode switch in the defrost position. 5. Measure the voltage from the auxiliary	B+		

	HVAC enable control circuit to battery positive voltage. Does the voltage measure near the specified value?		Go to **Step 21**	Go to **Step 17**
17	Test the auxiliary HVAC enable control circuit of the auxiliary HVAC control module for an open or a short to voltage. Refer to **Circuit Testing** and **Wiring Repairs** in Wiring Systems. Did you find and correct the condition?	-	Go to **Step 28**	Go to **Step 22**
18	1. Measure the voltage from the auxiliary mode door control circuit of the auxiliary mode actuator to a good ground. 2. Turn OFF the auxiliary HVAC control module. Does the voltage measure near the specified value?	0 V	Go to **Step 19**	Go to **Step 21**
19	Inspect the auxiliary mode door and the auxiliary mode actuator for the following : • Misaligned auxiliary mode actuator • Broken or binding linkages or auxiliary mode door • Obstruction that prevents the recirculation actuator from operating within its full range of motion • Missing seals to the auxiliary mode door • Misaligned seals to the auxiliary mode door Did you find and correct the condition?	-	Go to **Step 28**	Go to **Step 20**
20	Inspect for poor connections at the harness connector of the auxiliary mode actuator. 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 28**	Go to **Step 25**
21	Inspect for poor connections at the harness connector of the auxiliary 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 28**	Go to **Step 26**

22	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 28**	Go to **Step 27**
23	Repair the ignition 3 voltage circuit of the auxiliary HVAC control module. Refer to **Wiring Repairs** in Wiring Systems. Did you complete the repair?	-	Go to **Step 28**	-
24	Repair the ignition 3 voltage circuit of the auxiliary mode actuator. Refer to **Wiring Repairs** in Wiring Systems. Did you complete the repair?	-	Go to **Step 28**	-
25	Replace the auxiliary mode actuator. Refer to **Mode Actuator Replacement - Auxiliary**. Did you complete the replacement?	-	Go to **Step 28**	-
26	Replace the auxiliary HVAC control module. Refer to **HVAC Control Module Replacement - Auxiliary**. Did you complete the replacement?	-	Go to **Step 28**	-
27	Replace the HVAC control module. Refer to **HVAC Control Module Replacement**. Did you complete the replacement?	-	Go to **Step 28**	-
28	Operate the system in order to verify the repair. Did you correct the condition?	-	System OK	Go to **Step 2**

AIR RECIRCULATION MALFUNCTION

Air Recirculation Malfunction

Step	Action	Yes	No
Schematic Reference: HVAC Schematics **Connector End View Reference: HVAC Connector End Views** DEFINITION: Air recirculation is inoperative or is always ON.			
1	Did you perform the HVAC Diagnostic System Check?	Go to **Step 2**	Go to **Diagnostic System Check - HVAC Systems - Manual**
2	1. Turn ON the ignition, with the engine OFF. 2. With a scan tool observe the Recirculate Switch parameter. 3. Activate the recirculation switch. Does the scan tool indicate that the Recirculate Switch parameter changes state?	Go to **Step 3**	Go to **Step 10**

3	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 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 **Testing for Intermittent Conditions and Poor Connections** in Wiring Systems	Go to **Step 4**
4	1. Turn OFF the ignition. 2. Disconnect the HVAC control module. 3. Turn On the ignition, with the engine OFF. 4. Observe the recirculation door. 5. Connect a 3 amp fused jumper wire between the recirculation door control circuit of the HVAC control module and a good ground. Does recirculation door move?	Go to **Step 10**	Go to **Step 5**
5	1. Turn OFF the ignition. 2. Disconnect the recirculation actuator. 3. Turn ON the ignition, with the engine OFF. 4. 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 11**
6	Test the ground circuit of the recirculation actuator for an open or high resistance. Refer to **Circuit Testing** and **Wiring Repairs** in Wiring Systems. Did you find and correct the condition?	Go to **Step 14**	Go to **Step 7**
7	Test the recirculation door control circuit of the recirculation actuator for an open, a high resistance, a short to ground, or a short to voltage. Refer to **Circuit Testing** and **Wiring Repairs** in Wiring Systems. Did you find and correct the condition?	Go to **Step 14**	Go to **Step 8**
	Inspect the recirculation door and the recirculation actuator for the following conditions: • A misaligned recirculation actuator Refer to **Recirculation Actuator Replacement**.		

8	• 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 14**	Go to **Step 9**
9	Inspect for poor connections at the harness connector of the recirculation actuator. 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 14**	Go to **Step 12**
10	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 14**	Go to **Step 13**
11	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 14**	-
12	Replace the recirculation actuator. Refer to **Recirculation Actuator Replacement**. Did you complete the replacement?	Go to **Step 14**	-
13	Replace the HVAC control module. Refer to **HVAC Control Module Replacement**. Did you complete the replacement?	Go to **Step 14**	-
14	Operate the system in order to verify the repair. Did you correct the condition?	System OK	Go to **Step 3**

VACUUM CONTROL SYSTEM DIAGNOSTIC

Vacuum Control System Diagnostic

Step	Action	Yes	No
1	1. Start the engine. 2. Allow engine to reach operating temperature. 3. Turn the temperature setting to the hot position. Does warm air flow out of the rear HVAC outlet ducts?	Go to **Step 5**	Go to **Step 2**
	Using an external vacuum source, apply vacuum to the coolant by pass valve assembly.		Go to **Coolant Bypass Valve**

2	Does the valve open and close?	Go to **Step 5**	**Replacement** in Heating, Ventilation and Air Conditioning
3	With the coolant by-pass valve removed, inspect the valve for binding. Does the valve move freely?	Go to **Step 5**	Go to **Step 4**
4	Replace the coolant by pass valve. Refer to **Coolant Bypass Valve Replacement** . Is the repair complete?	Go to **Step 5**	Go to **Coolant Bypass Valve Replacement** in Heating, Ventilation and Air Conditioning
5	Cycle the HVAC controls in order to verify proper operation. Did you find and correct the condition?	System OK	Go to **Step 2**

RE-CALIBRATING ACTUATORS (PRIMARY)

When replacing the HVAC control module it will be necessary to allow the HVAC control module to perform a calibration process. When installing the HVAC control module be sure to perform the following:

IMPORTANT: Do not adjust any controls on the HVAC control module while the HVAC control module is self-calibrating. If interrupted, improper HVAC performance will result.

1. Place the ignition switch to the OFF position.
2. Disconnect the scan tool.
3. Install the HVAC control module.
4. Connect all previously disconnected components.
5. Start the vehicle.
6. Wait 40 seconds for the HVAC control module to self-calibrate.
7. Verify that no DTCs have set as current DTCs.

When replacing the HVAC actuator it will be necessary to allow the HVAC control module to perform a calibration process. When installing the HVAC actuator be sure to perform one of the following:

IMPORTANT: Do not adjust any controls on the HVAC control module while the HVAC control module is self-calibrating. If interrupted, improper HVAC performance will result.

Preferred Method (w/Scan Tool)

1. Clear all DTCs.

2. Place the ignition switch in the OFF position.
3. Install the HVAC actuator.
4. Connect all previously disconnected components.
5. Start the vehicle.
6. With the scan tool, initiate the Motor Re-calibration feature of the Heating and Air Conditioning Special Functions menu.
7. Verify that no DTCs have set as current DTCs.

IMPORTANT: Do not adjust any controls on the HVAC control module while the HVAC control module is self-calibrating. If interrupted, improper HVAC performance will result.

Alternate Method (w/o Scan Tool)

1. Clear all DTCs.
2. Place the ignition switch to the OFF position.
3. Install the HVAC actuator.
4. Connect all previously disconnected components.
5. Remove the HVAC B fuse for a minimum of 10 seconds.
6. Install the HVAC B fuse.
7. Start the vehicle.
8. Wait 40 seconds for the HVAC control module to self-calibrate.
9. Verify that no DTCs have set as current DTCs.

REPAIR INSTRUCTIONS

HVAC CONTROL MODULE REPLACEMENT

Removal Procedure

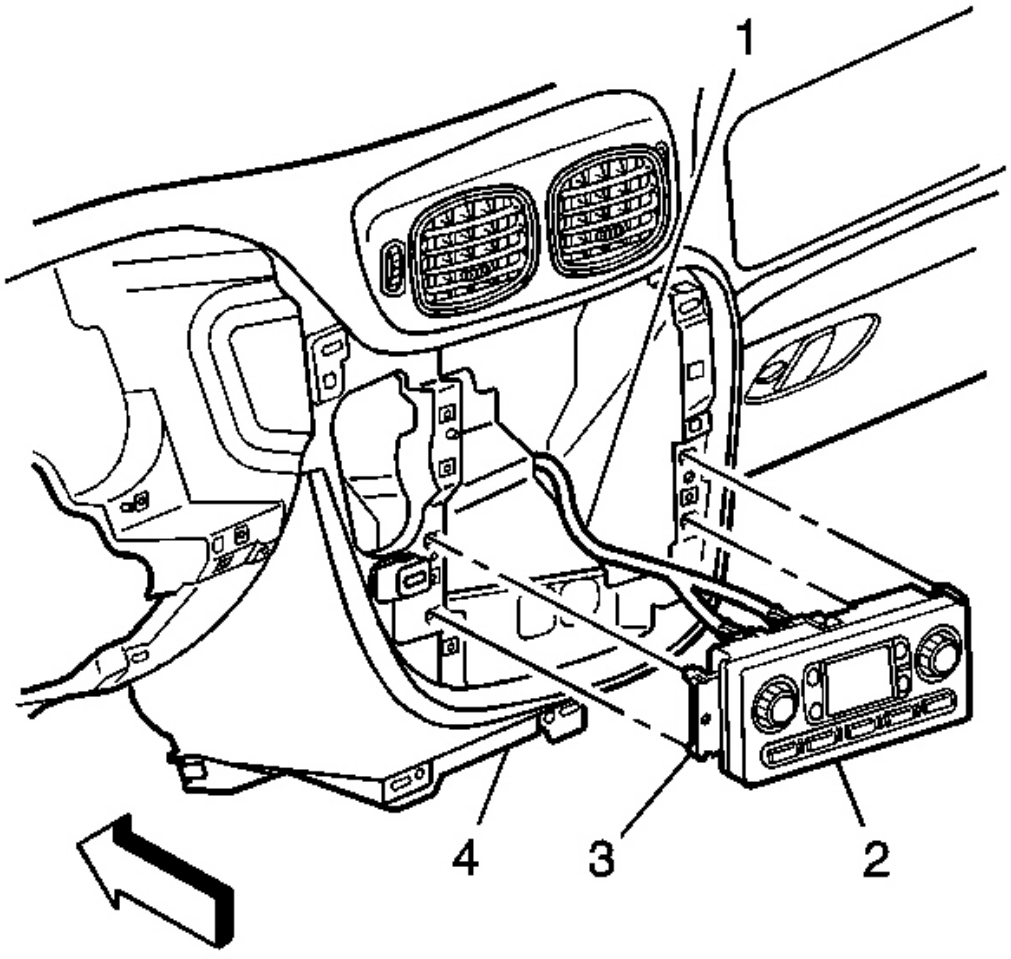


Fig. 20: Removing/Installing HVAC Control Module
Courtesy of GENERAL MOTORS CORP.

1. Remove the I/P accessory trim plate. Refer to **Trim Plate Replacement - Instrument Panel (I/P) Accessory** and **Bezel Replacement - Instrument Panel (I/P) Cluster** in Instrument Panel, Gages and Console.
2. Remove the control module retaining screws.
3. Depress the HVAC control module retaining tabs (3) and remove the HVAC control module (2) from the instrument panel (4).
4. Disconnect the electrical connectors (1) from the HVAC control module (2).

Installation Procedure

IMPORTANT: The key should be in the OFF position when connecting the electrical connectors to ensure proper calibration.

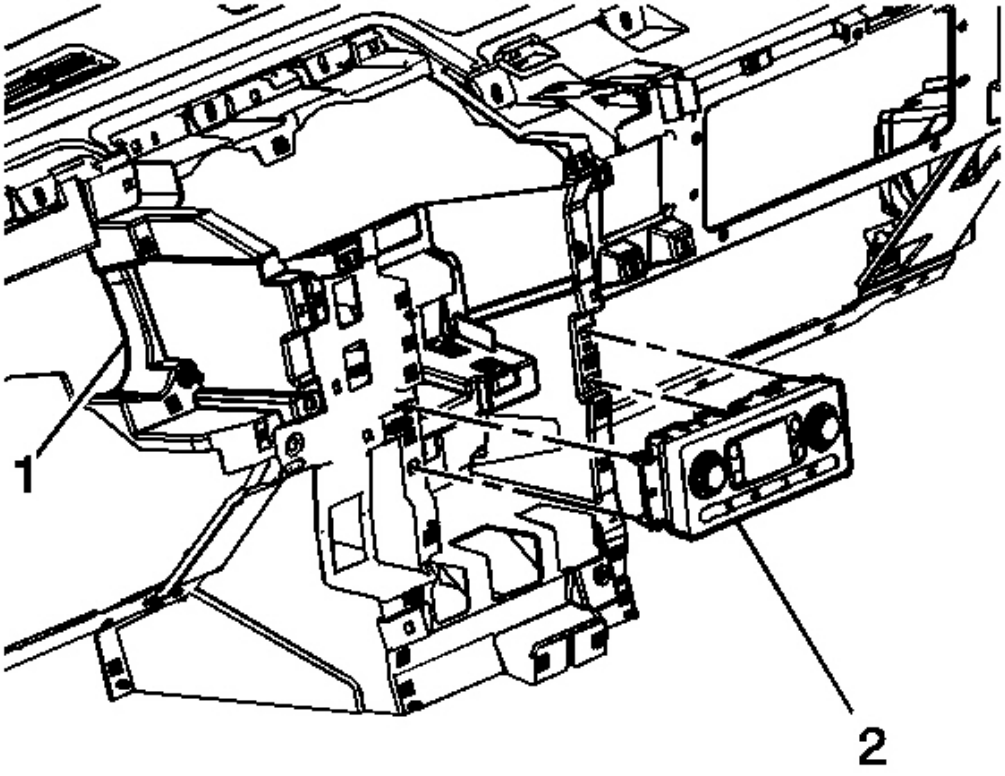


Fig. 21: HVAC Control Module & I/P Panel
Courtesy of GENERAL MOTORS CORP.

1. Connect the electrical connectors to the HVAC control module (2).

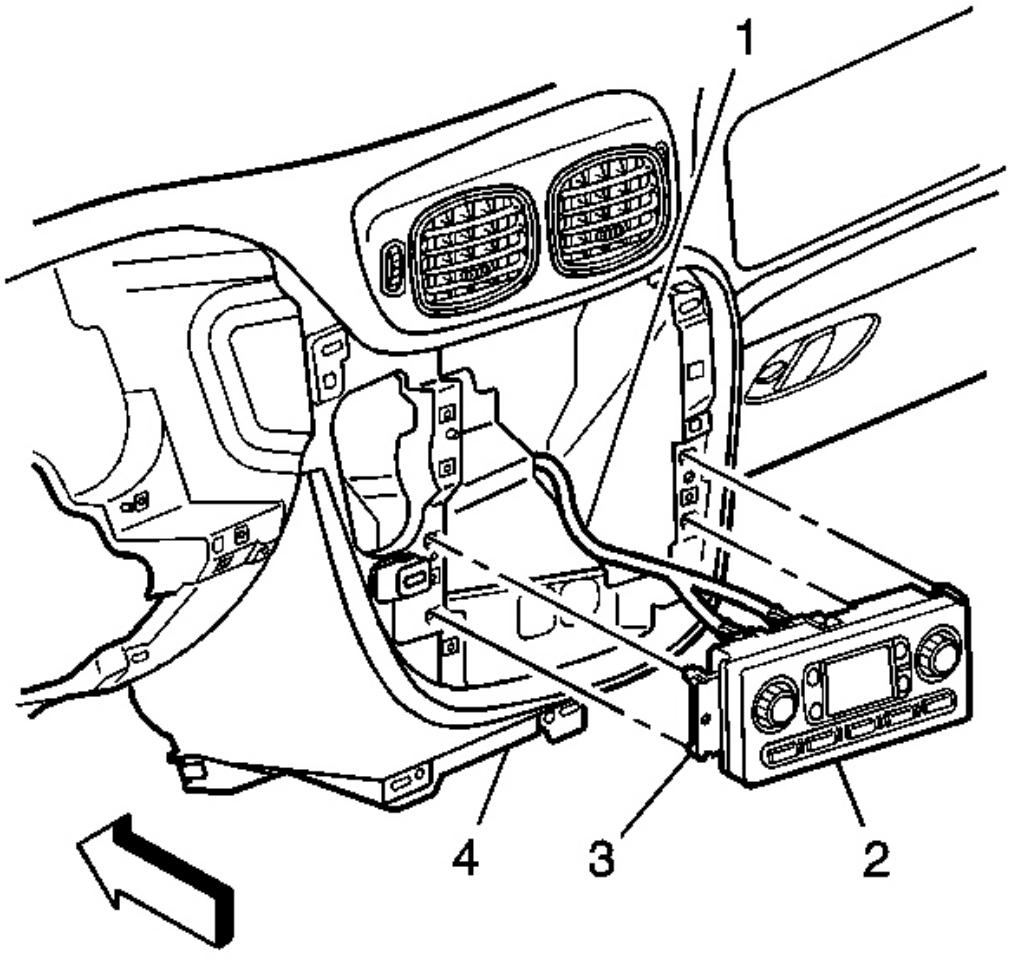


Fig. 22: Removing/Installing HVAC Control Module
Courtesy of GENERAL MOTORS CORP.

2. Install the HVAC control module (2) to the instrument panel (4), ensuring that the HVAC control module retaining tabs (3) lock into place.

NOTE: Refer to Fastener Notice in Cautions and Notices.

3. Install the HVAC control module retaining screws.

Tighten: Tighten the screws to 1.9 N.m (17 ft. lb.).

4. Install the I/P accessory trim plate. Refer to **Trim Plate Replacement - Instrument Panel (I/P)**

Accessory or **Bezel Replacement - Instrument Panel (I/P) Cluster** in Instrument Panel, Gages and Console.

IMPORTANT: Do not adjust any controls on the HVAC control module while the HVAC control module is calibrating.
If interrupted, improper HVAC performance will result.

5. Start the engine and let run for 1 minute.

AIR TEMPERATURE ACTUATOR REPLACEMENT - RIGHT

Removal Procedure

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

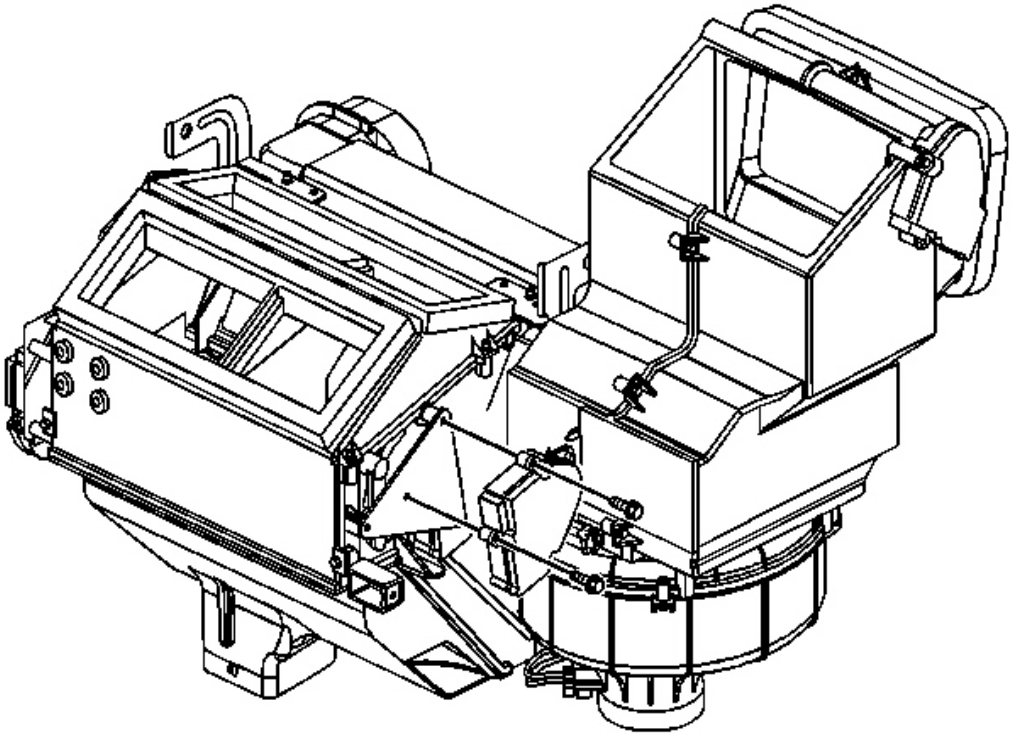


Fig. 23: View Of HVAC Module
Courtesy of GENERAL MOTORS CORP.

2. Remove the right side air temperature actuator retaining screws.
3. Disconnect the right side air temperature actuator electrical connector.
4. Remove the right side air temperature actuator.

Installation Procedure

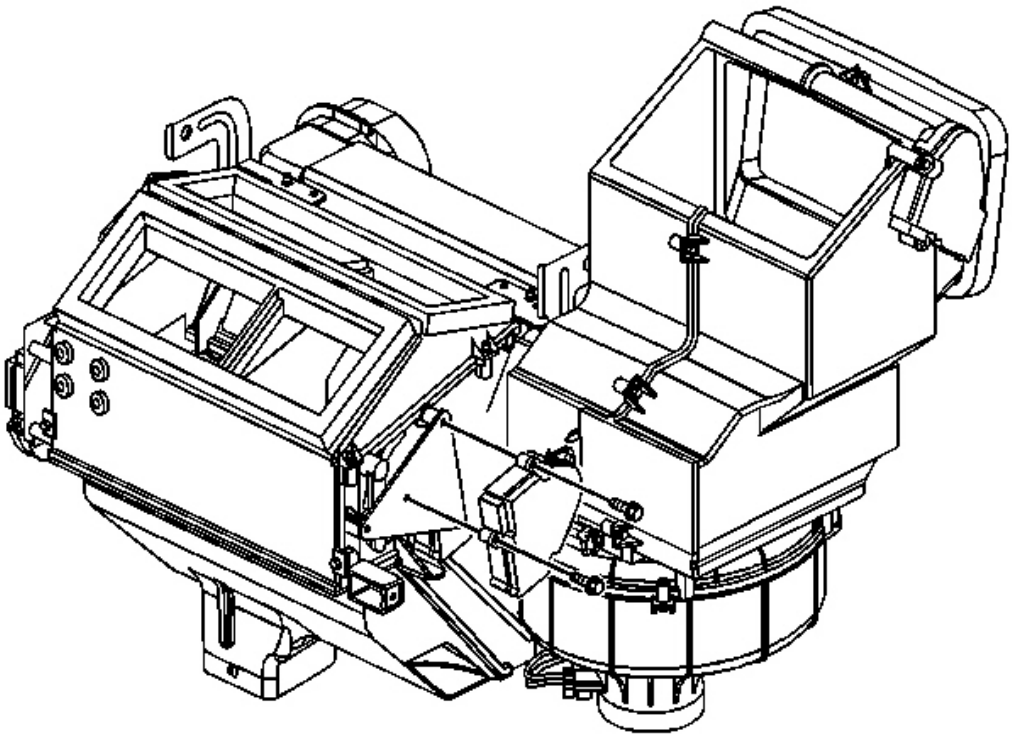


Fig. 24: View Of HVAC Module
Courtesy of GENERAL MOTORS CORP.

1. Install the right side air temperature actuator.

NOTE: Refer to Fastener Notice in Cautions and Notices.

2. Install the right side air temperature actuator retaining screws.

   Tighten: Tighten the screws to 1.9 N.m (17 in. lb.).

3. Connect the right side air temperature actuator electrical connector.

4. Install the I/P carrier. Refer to **Instrument Panel (I/P) Carrier Replacement** in Instrument Panel, Gages and Console.
5. Recalibrate the air temperature actuator on vehicles equipped with automatic climate control (C68). Refer to **Re-Calibrating Actuators (Primary)**.

AIR TEMPERATURE ACTUATOR REPLACEMENT - LEFT

Removal Procedure

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

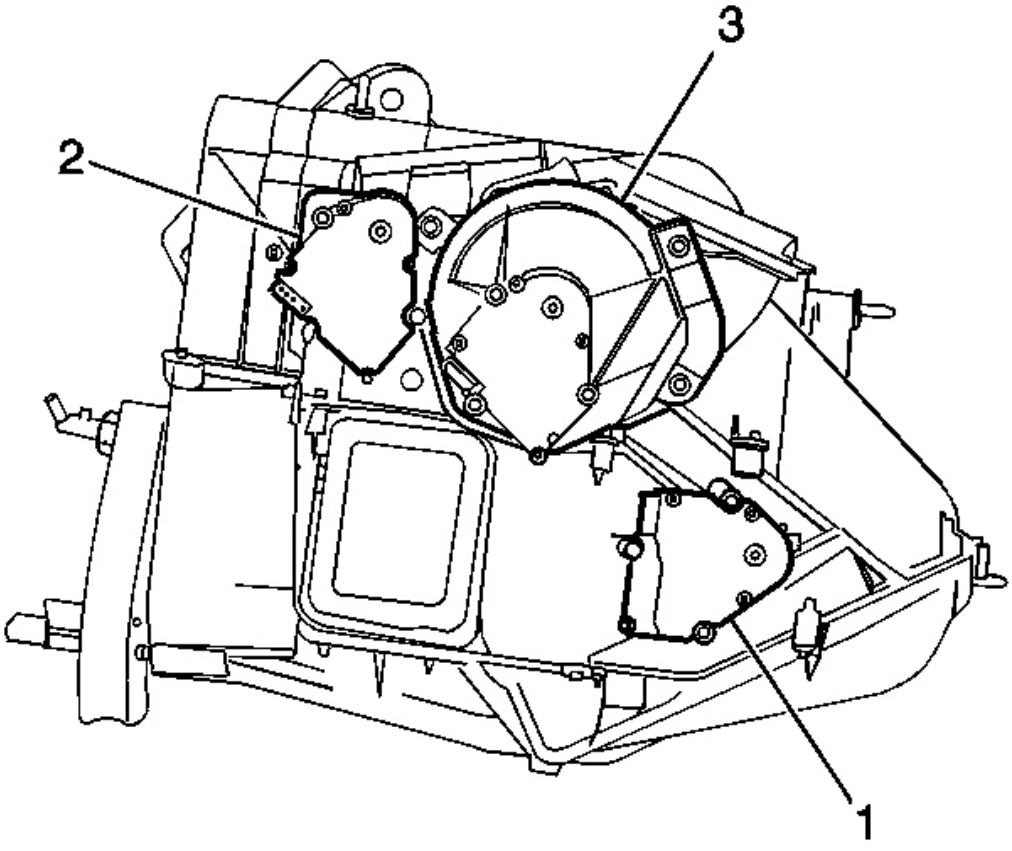


Fig. 25: Removing/Installing Mode & Air Temperature Actuator
Courtesy of GENERAL MOTORS CORP.

2. Remove the left side air temperature actuator (1) retaining screws.

3. Disconnect the left side air temperature actuator electrical connector.
4. Remove the left side air temperature actuator.

Installation Procedure

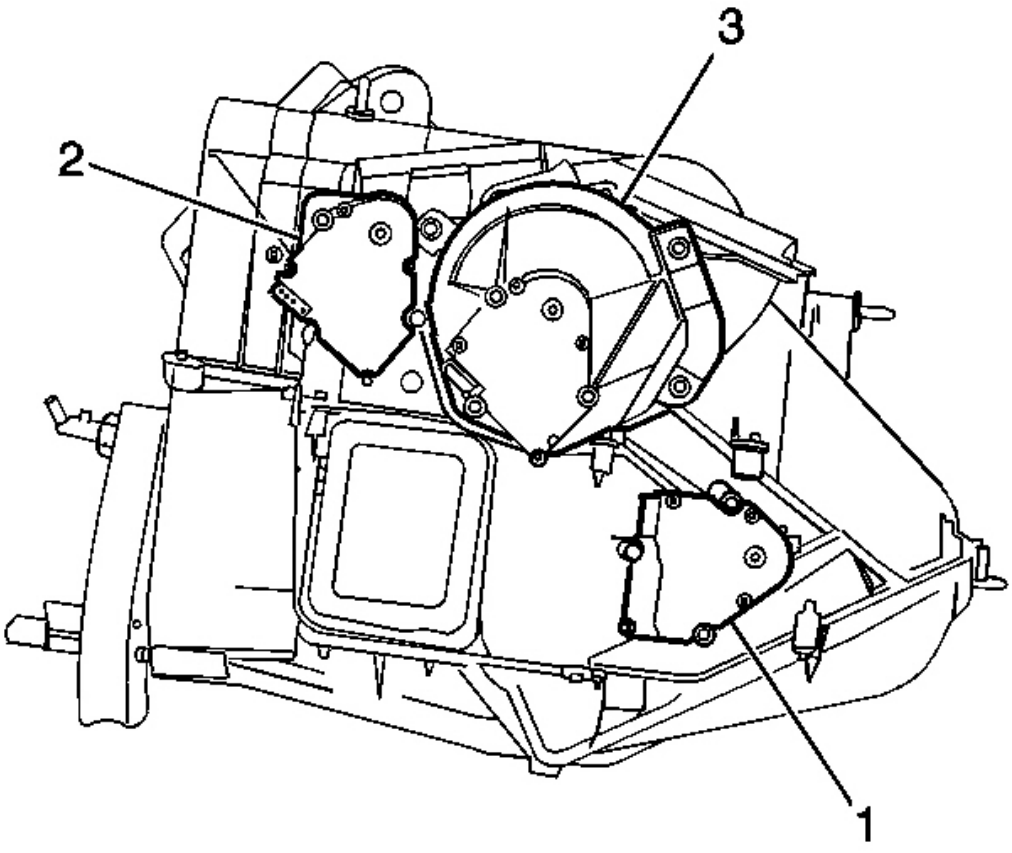


Fig. 26: Removing/Installing Mode & Air Temperature Actuator
Courtesy of GENERAL MOTORS CORP.

1. Install the left side air temperature actuator (1).

NOTE: Refer to Fastener Notice in Cautions and Notices.

2. Install the left side air temperature actuator retaining screws.

Tighten: Tighten the screws to 1.9 N.m (17 in. lb.).

3. Connect the electrical connector to the left side air temperature actuator.
4. Install the I/P carrier. Refer to **Instrument Panel (I/P) Carrier Replacement** in Instrument Panel, Gages and Console.
5. Calibrate the air temperature actuator on vehicles equipped with automatic climate control (C68). Refer to **Re-Calibrating Actuators (Primary)**.

DEFROSTER ACTUATOR REPLACEMENT

Removal Procedure

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

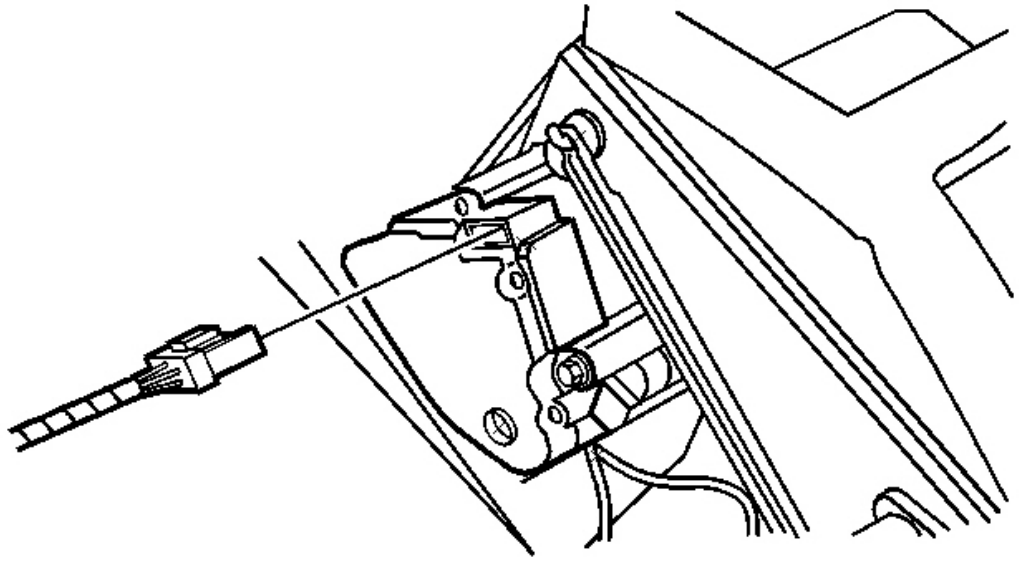


Fig. 27: Locating Actuator Connector
Courtesy of GENERAL MOTORS CORP.

2. Disconnect the electrical connector from the defroster actuator.
3. Remove the screws from the defroster actuator.
4. Remove the defroster actuator.

Installation Procedure

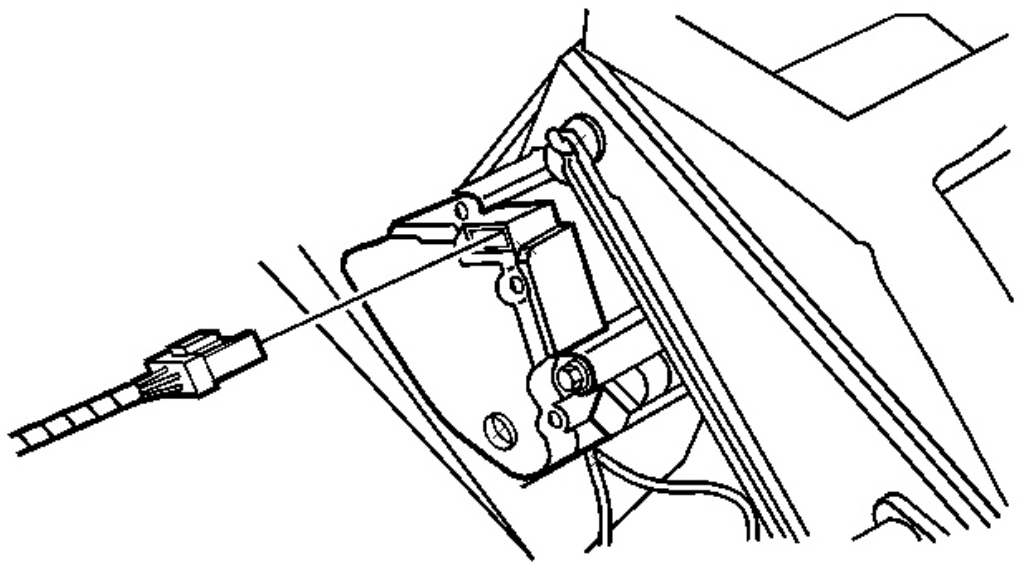


Fig. 28: Locating Actuator Connector
Courtesy of GENERAL MOTORS CORP.

1. Install the defroster actuator.

NOTE: Refer to Fastener Notice in Cautions and Notices.

2. Install the defroster actuator screws.

   Tighten: Tighten the screws to 1.9 N.m (17 in. lb.).

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

MODE ACTUATOR REPLACEMENT

Removal Procedure

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

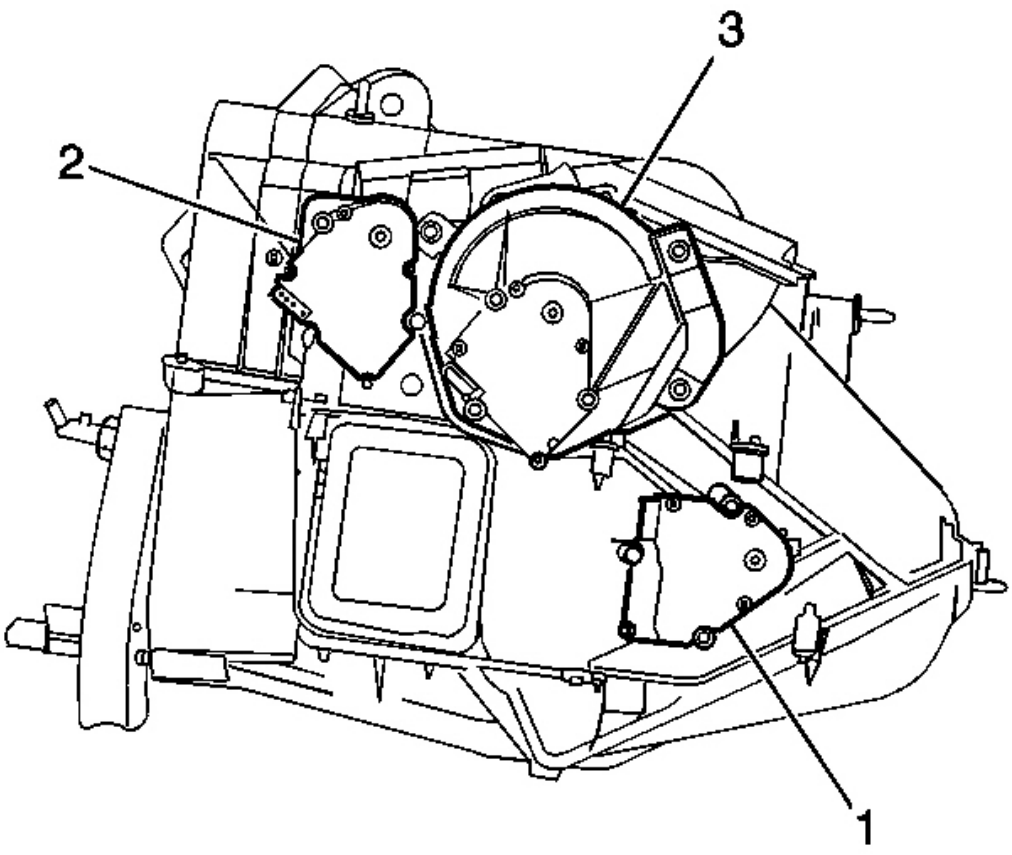


Fig. 29: Removing/Installing Mode & Air Temperature Actuator
Courtesy of GENERAL MOTORS CORP.

2. Disconnect the electrical connector from the mode actuator.
3. Remove the screws from the mode actuator (3).
4. Remove the mode actuator.

Installation Procedure

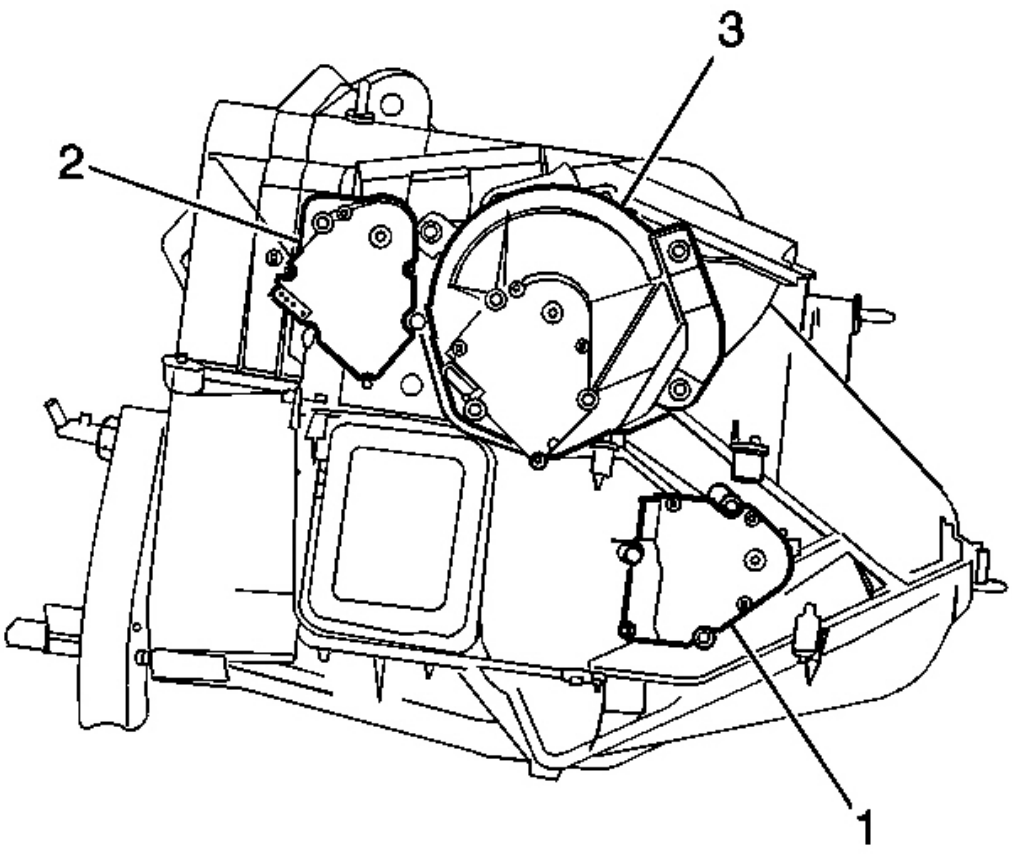


Fig. 30: Removing/Installing Mode & Air Temperature Actuator
Courtesy of GENERAL MOTORS CORP.

1. Install the mode actuator (3).

NOTE: Refer to Fastener Notice in Cautions and Notices.

2. Install the screws to the mode actuator (3).

   Tighten: Tighten the screws to 1.9 N.m (17 in. lb.).

3. Connect the mode actuator electrical connector.
4. Install the I/P carrier. Refer to **Instrument Panel (I/P) Carrier Replacement** in Instrument Panel, Gages and Console.
5. Calibrate the air temperature actuator on vehicles equipped with automatic climate control (C68). Refer to **Re-Calibrating Actuators (Primary)**.

RECIRCULATION ACTUATOR REPLACEMENT

Removal Procedure

1. Remove the HVAC module assembly. Refer to **HVAC Module Assembly Replacement** in Heating, Ventilation and Air Conditioning.
2. Remove the air inlet assembly screws.

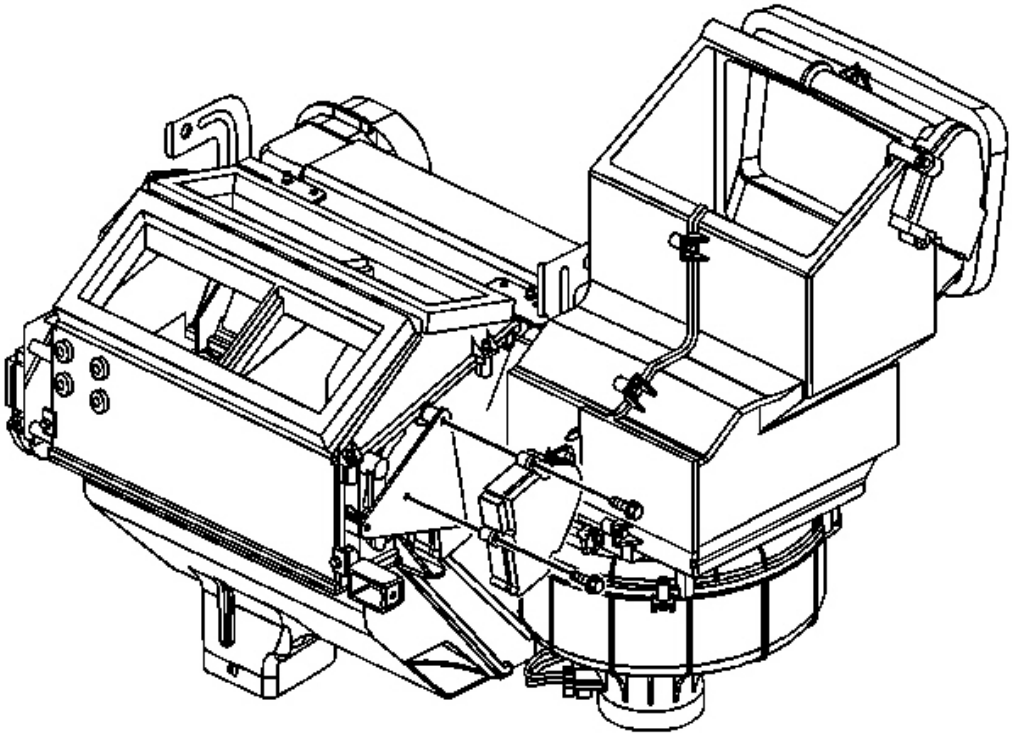


Fig. 31: View Of HVAC Module
Courtesy of GENERAL MOTORS CORP.

3. Remove the air inlet assembly.
4. Remove the recirculation actuator screws.
5. Remove the electrical connector from the recirculation actuator.
6. Remove the recirculation actuator.

Installation Procedure

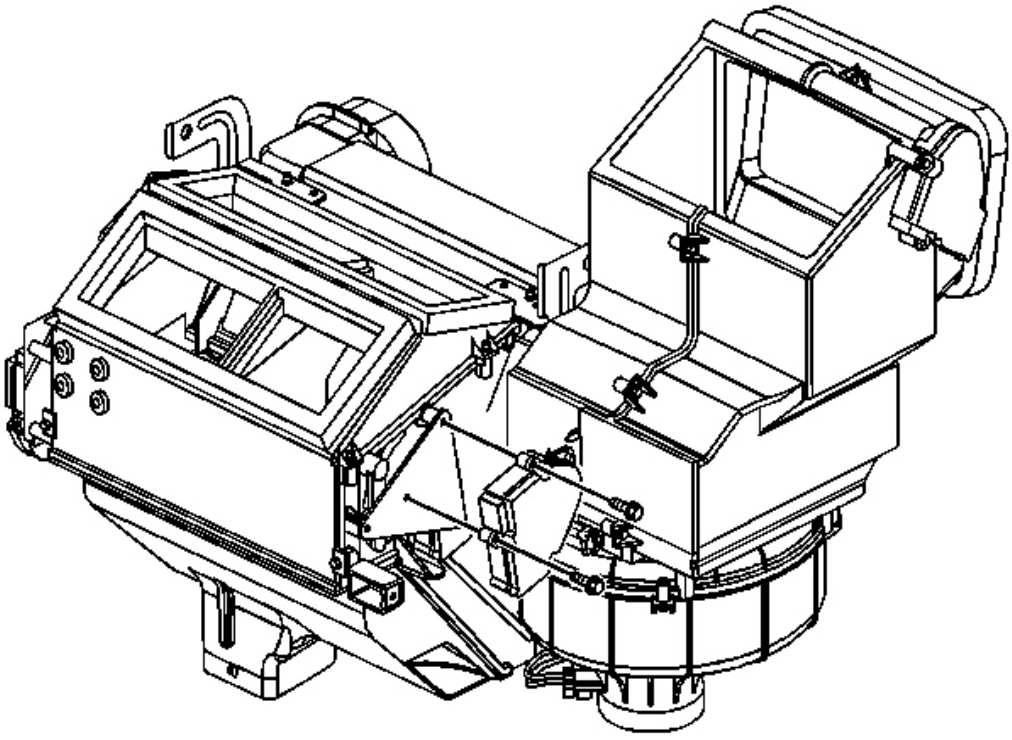


Fig. 32: View Of HVAC Module
Courtesy of GENERAL MOTORS CORP.

1. Install the recirculation actuator.

NOTE: Refer to Fastener Notice in Cautions and Notices.

2. Install the screws to the recirculation actuator.

   Tighten: Tighten the screws to 1.9 N.m (17 in. lb.).

3. Install the air inlet assembly.
4. Install the air inlet assembly screws.

   Tighten: Tighten the screws to 1.9 N.m (17 in. lb.).

5. Connect the electrical connector to the recirculation actuator.
6. Install the HVAC module assembly. Refer to **HVAC Module Assembly Replacement** in Heating, Ventilation and Air Conditioning.

HVAC CONTROL MODULE REPLACEMENT - AUXILIARY

Removal Procedure

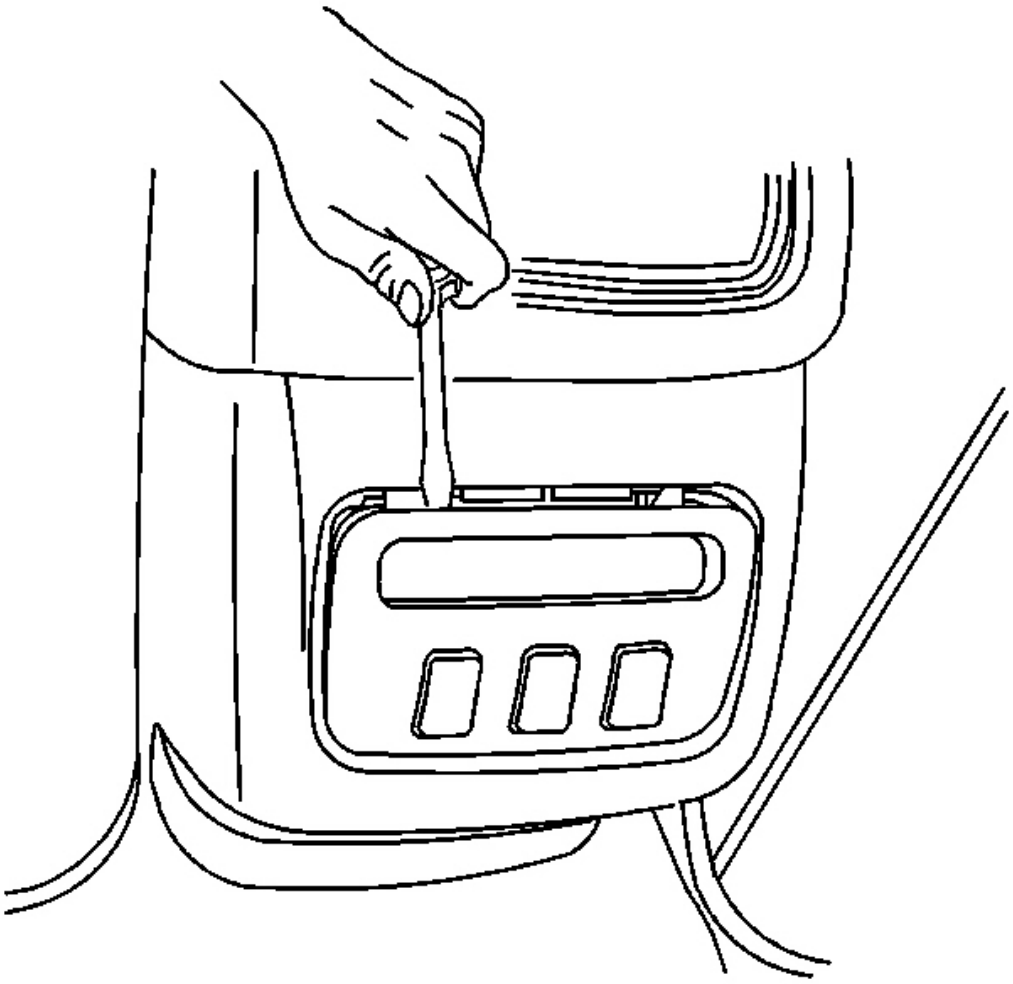


Fig. 33: Removing Auxiliary HVAC Control Module
Courtesy of GENERAL MOTORS CORP.

1. Using a flat bladed tool, carefully pry out on the top of the HVAC control-auxiliary.
2. Remove the HVAC control-auxiliary from the center console/seat.

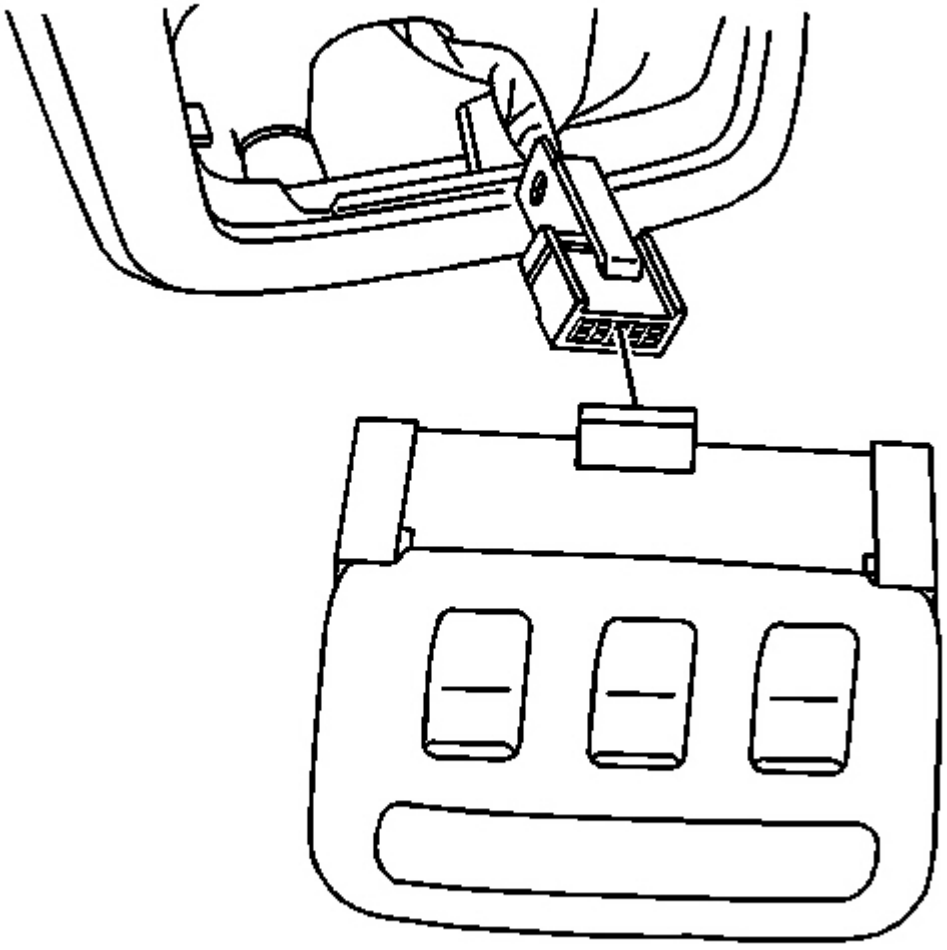


Fig. 34: Removing/Installing Connector
Courtesy of GENERAL MOTORS CORP.

3. Disconnect the electrical connector.
4. Remove the rear HVAC control-auxiliary from the vehicle.

Installation Procedure

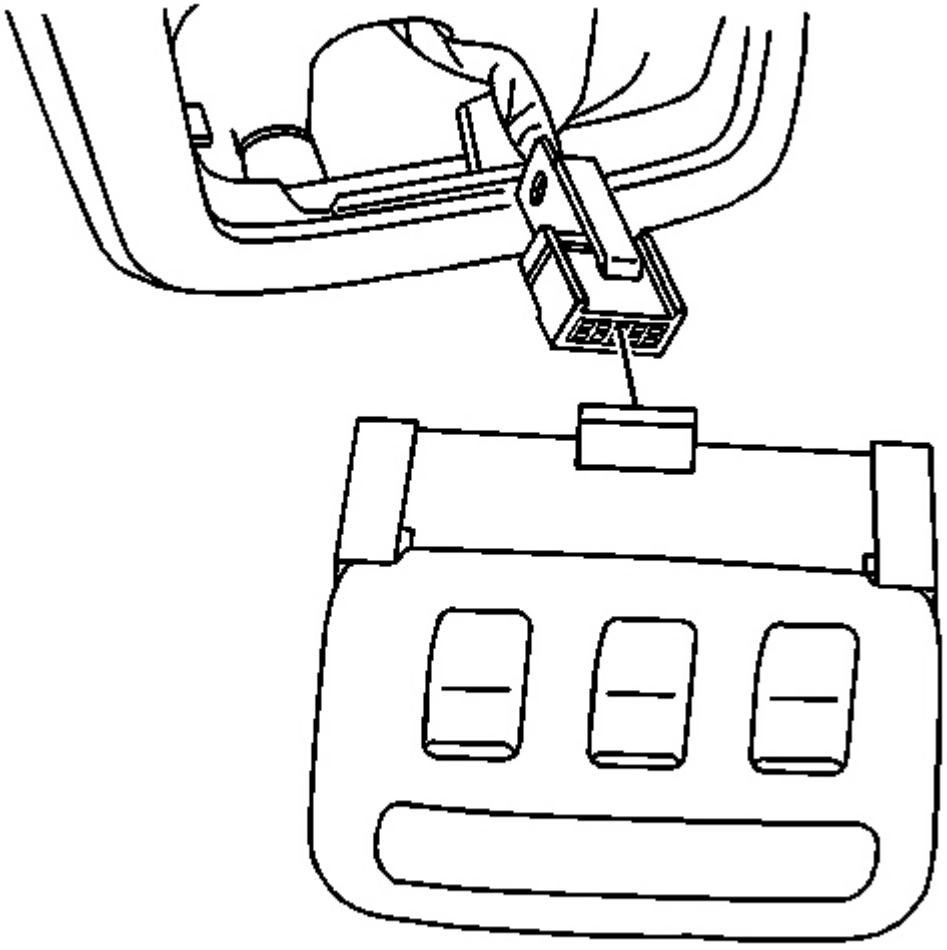


Fig. 35: Removing/Installing Connector
Courtesy of GENERAL MOTORS CORP.

1. Connect the rear HVAC control-auxiliary electrical connector.

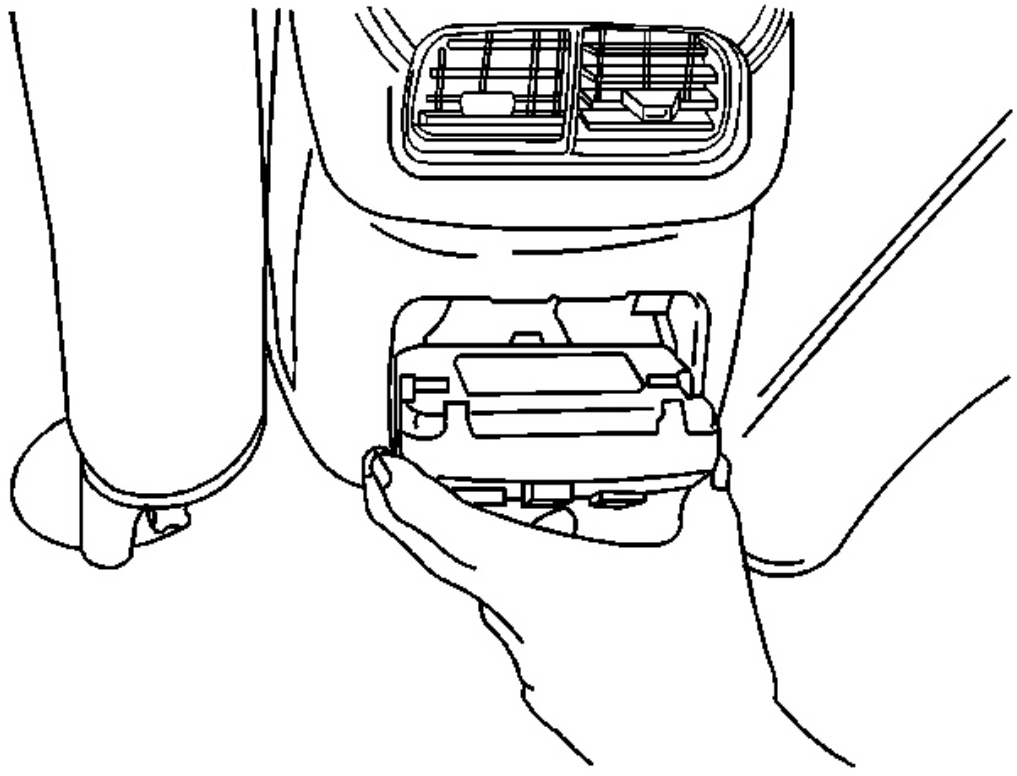


Fig. 36: Installing Auxiliary HVAC Control Module
Courtesy of GENERAL MOTORS CORP.

2. Install the HVAC control-auxiliary in the console bottom first.
3. Push in at the top of the HVAC control-auxiliary in order to engage the HVAC control-auxiliary in the console/seat.

FRONT AUXILIARY BLOWER MOTOR SWITCH REPLACEMENT

Removal Procedure

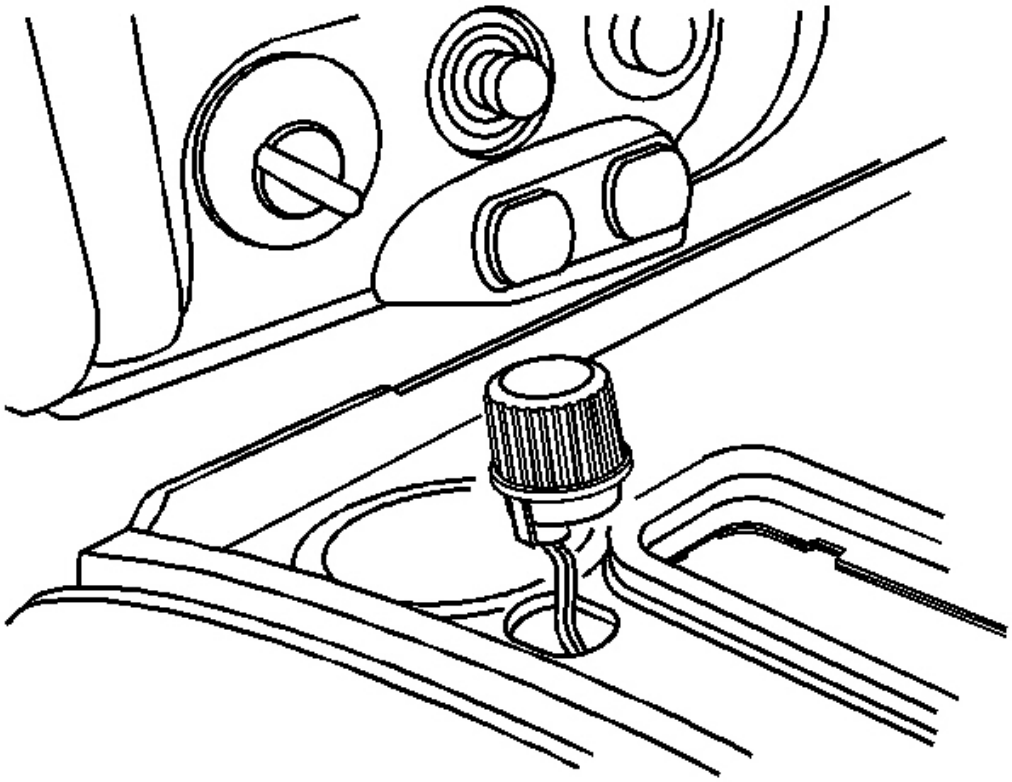


Fig. 37: Removing/Installing Front Auxiliary Blower Motor Switch
Courtesy of GENERAL MOTORS CORP.

1. Press downward and to the right on the front auxiliary blower motor switch.
2. Remove the front auxiliary blower motor switch from the console.
3. Disconnect the electrical connector from the front auxiliary blower motor switch.

Installation Procedure

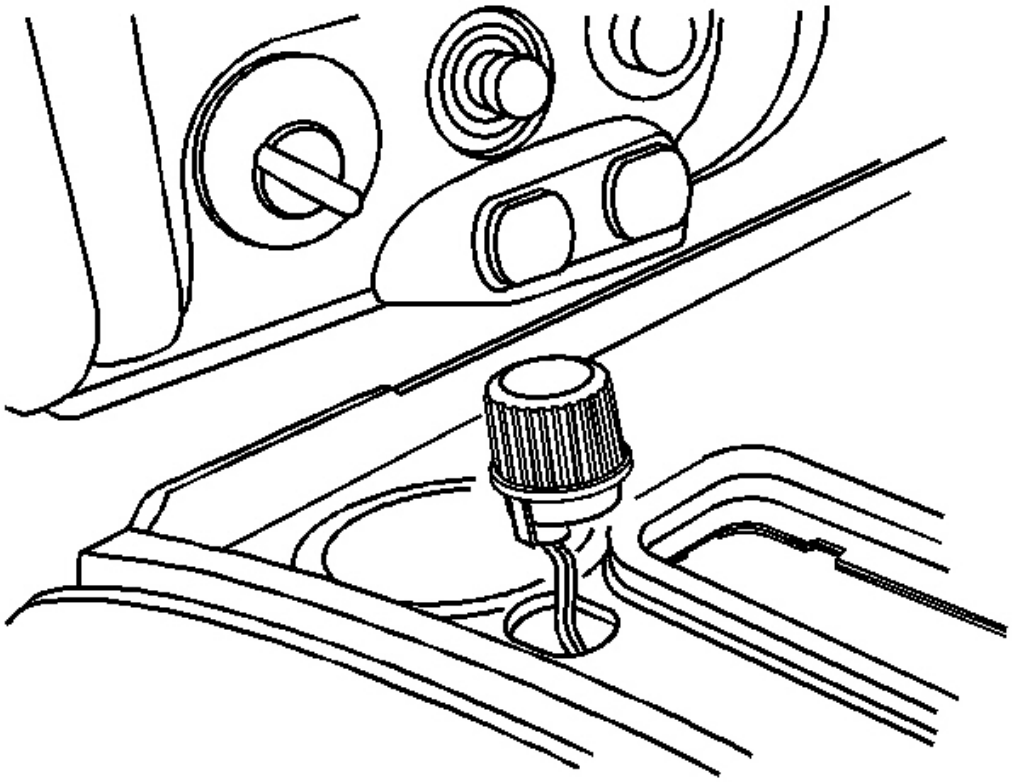


Fig. 38: Removing/Installing Front Auxiliary Blower Motor Switch
Courtesy of GENERAL MOTORS CORP.

1. Connect the electrical connector to the front auxiliary blower motor switch.
2. Install the front auxiliary blower motor switch to console.
3. Press the front auxiliary blower motor switch into the console.

AIR TEMPERATURE ACTUATOR REPLACEMENT - AUXILIARY

Removal Procedure

1. Remove the right rear quarter trim panel. Refer to **Trim Panel Replacement - Rear Quarter - Right (Short Wheelbase)** and **Trim Panel Replacement - Rear Quarter - Right (Long Wheelbase)** in Interior Trim.
2. Disconnect the electrical connector from the air temperature actuator.
3. Remove the retaining screws from the air temperature actuator.

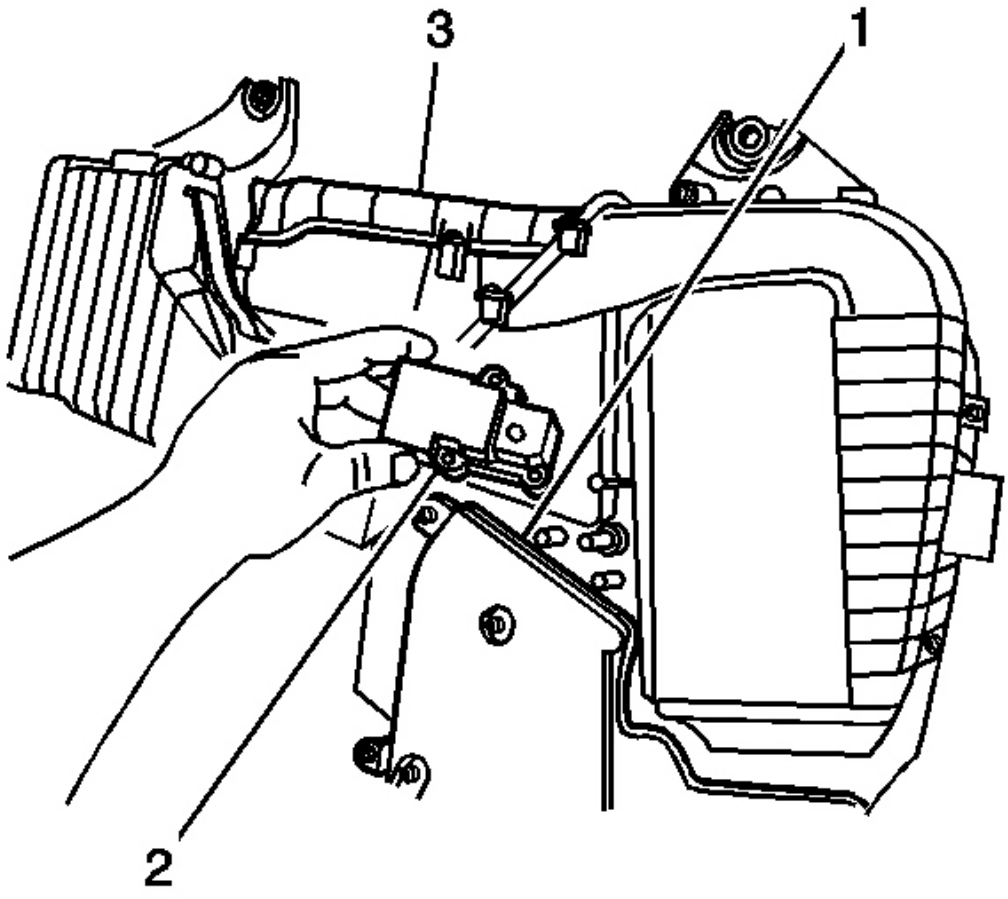


Fig. 39: Removing/Installing Auxiliary HVAC Air Temperature Actuator
Courtesy of GENERAL MOTORS CORP.

4. Remove the air temperature actuator (1) from the rear HVAC module.

Installation Procedure

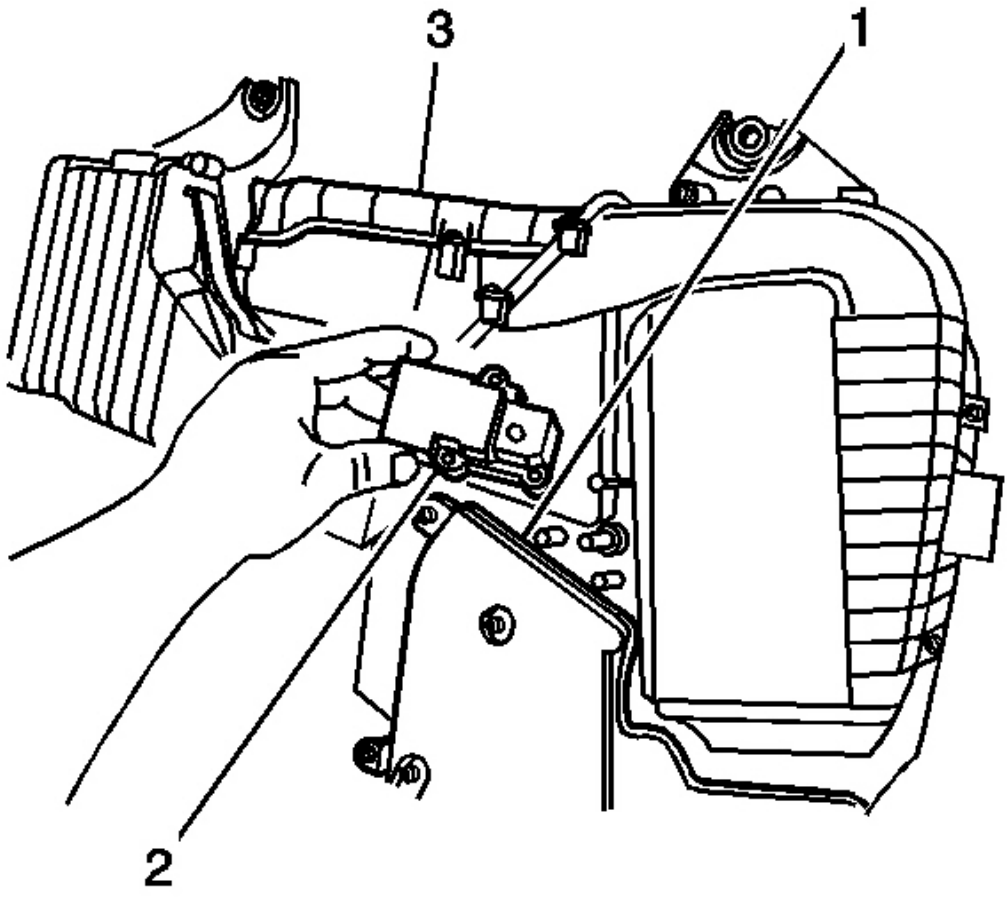


Fig. 40: Removing/Installing Auxiliary HVAC Air Temperature Actuator
Courtesy of GENERAL MOTORS CORP.

1. Install the air temperature actuator (2) to the rear HVAC module.

NOTE: Refer to Fastener Notice in Cautions and Notices.

2. Install the screws to the actuator.

Tighten: Tighten the screws to 1.9 N.m (17 in. lb.).

3. Connect the electrical connector to the air temperature actuator.
4. Recalibrate the air temperature actuator. Refer to **Re-Calibrating Actuators (Primary)**.
5. Install the right rear quarter trim panel. Refer to **Trim Panel Replacement - Rear Quarter - Right**

(Short Wheelbase) and **Trim Panel Replacement - Rear Quarter - Right (Long Wheelbase)** in Interior Trim.

MODE ACTUATOR REPLACEMENT - CONSOLE

Removal Procedure

1. Remove the floor console. Refer to **Console Replacement** in Instrument Panel, Gages, and Console.
2. Rotate the console.
3. Remove the screw from the air outlet duct.
4. Remove the air outlet duct from the floor console.

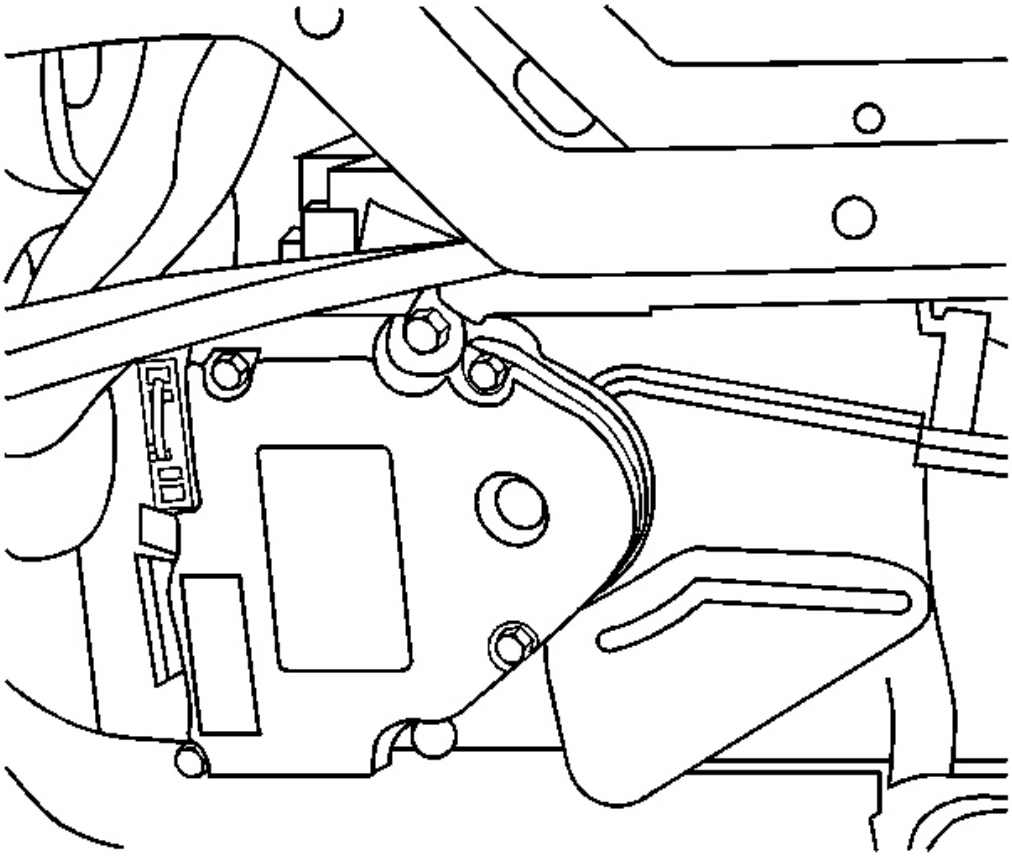


Fig. 41: Removing Rear Mode Actuator Retaining Screws
Courtesy of GENERAL MOTORS CORP.

5. Remove the rear mode actuator retaining screws.

6. Disconnect the electrical connector.

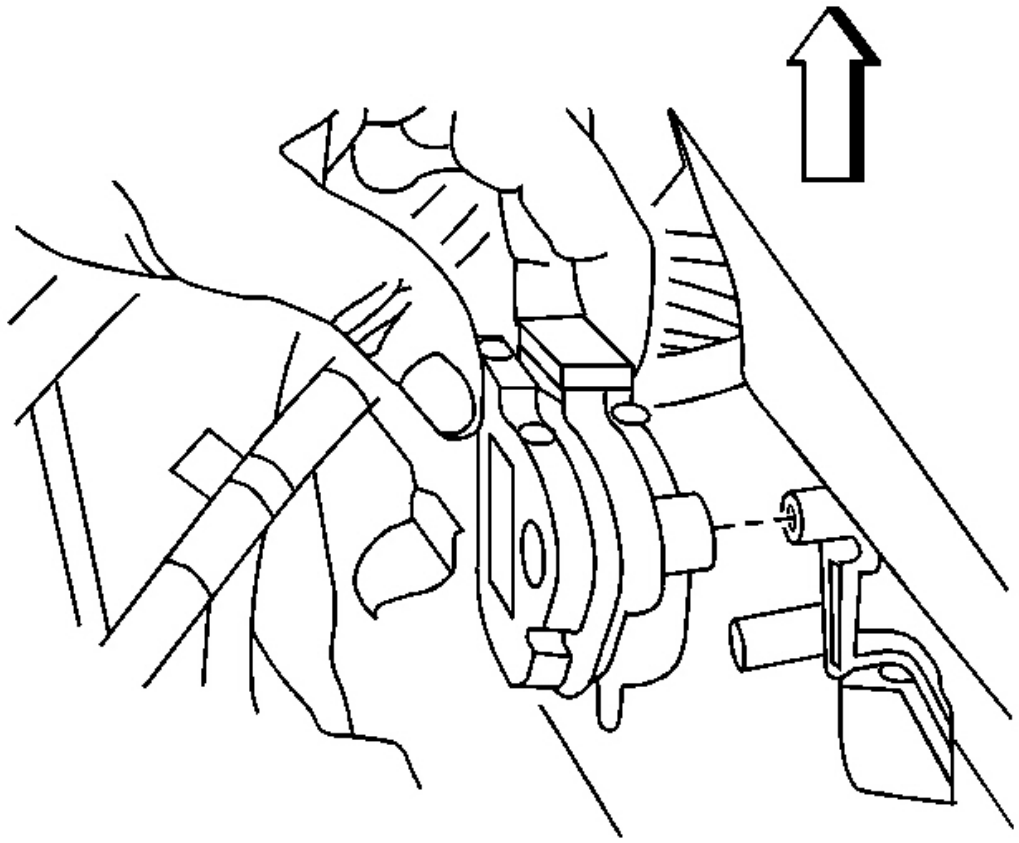


Fig. 42: Removing Actuator Assembly
Courtesy of GENERAL MOTORS CORP.

7. Remove the rear mode actuator.

Installation Procedure

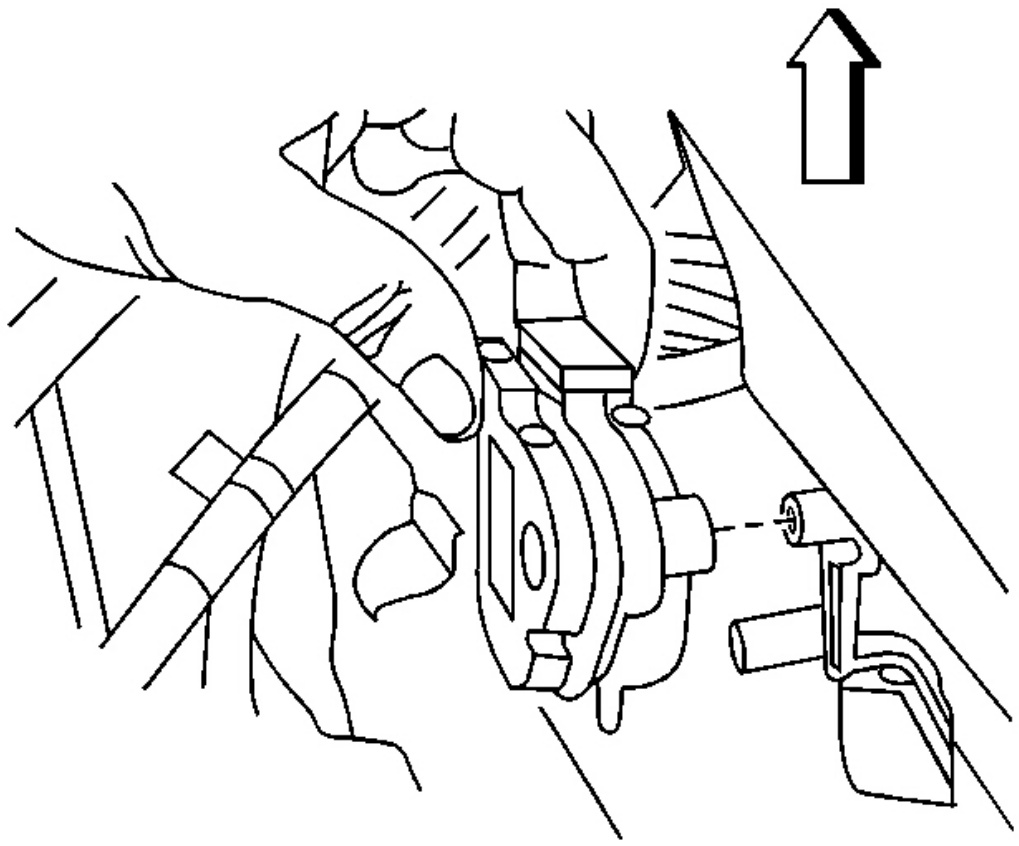


Fig. 43: Removing Actuator Assembly
Courtesy of GENERAL MOTORS CORP.

1. Install the mode actuator.
2. Connect the electrical connector.

NOTE: Refer to Fastener Notice in Cautions and Notices.

3. Install the screws to the mode actuator.

   Tighten: Tighten the screws to 1.9 N.m (17 in. lb.).

4. Install the air outlet duct to the console.
5. Install the screw to the air outlet duct.

   Tighten: Tighten the screw to 1.9 N.m (17 in. lb.).

6. Install the console. Refer to **Console Replacement** in Instrument Panel, Gages, and Console.

MODE ACTUATOR REPLACEMENT - AUXILIARY

Removal Procedure

1. Remove the right rear quarter trim panel. Refer to **Trim Panel Replacement - Rear Quarter - Right (Short Wheelbase)** and **Trim Panel Replacement - Rear Quarter - Right (Long Wheelbase)** in Interior Trim.

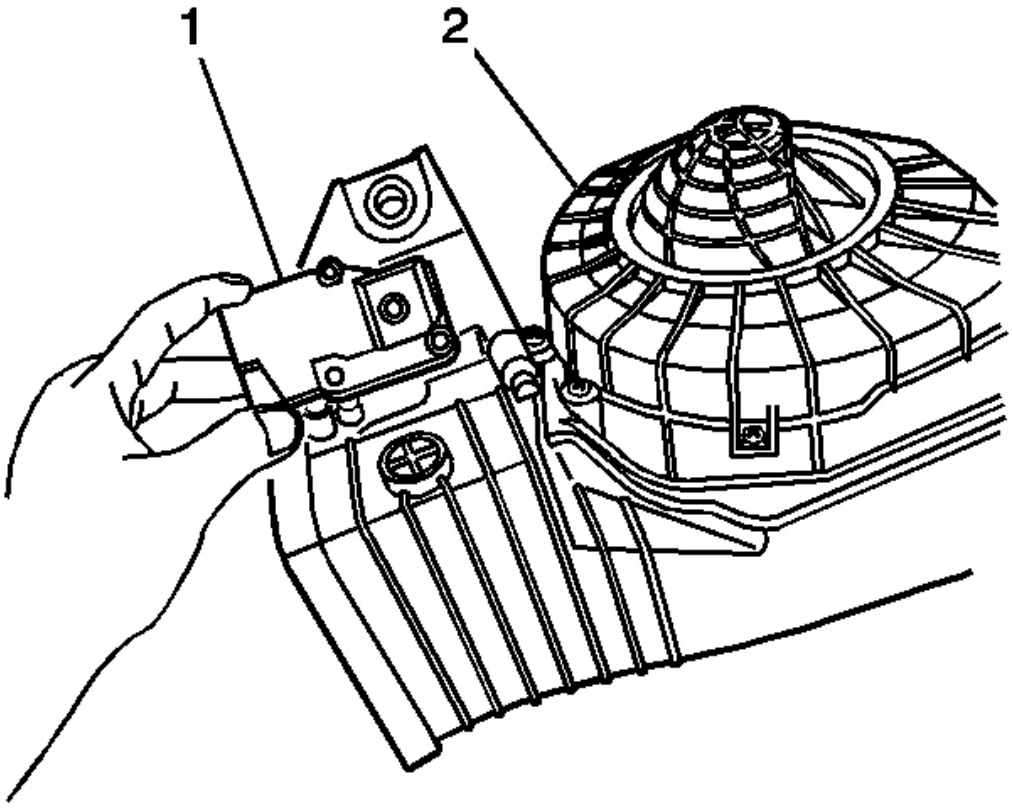


Fig. 44: Removing/Installing Auxiliary Mode Actuator
Courtesy of GENERAL MOTORS CORP.

2. Disconnect the electrical connector from the mode actuator-auxiliary (1).
3. Remove the mode actuator-auxiliary (1) from the HVAC module-auxiliary.
4. Remove the retaining screws from the mode actuator-auxiliary.

Installation Procedure

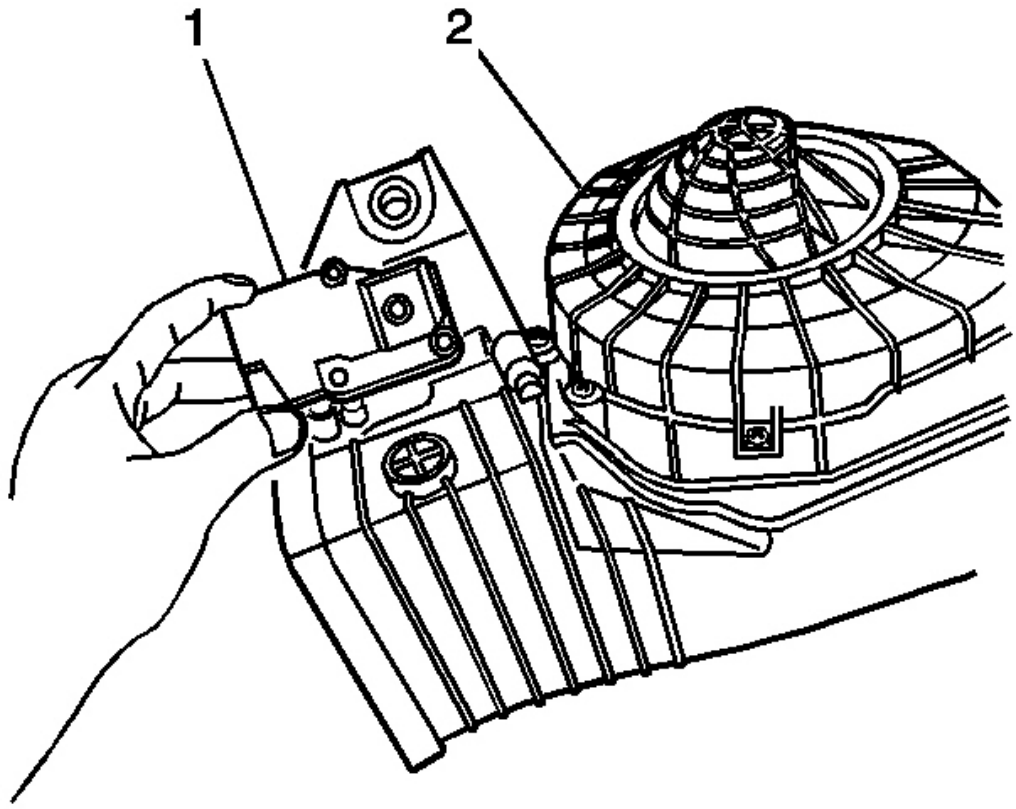


Fig. 45: Removing/Installing Auxiliary Mode Actuator
Courtesy of GENERAL MOTORS CORP.

1. Install the mode actuator (1) to the HVAC module-auxiliary.

NOTE: Refer to Fastener Notice in Cautions and Notices.

2. Install the screws to the mode actuator-auxiliary.

   Tighten: Tighten the screws to 1.9 N.m (17 in. lb.).

3. Connect the electrical connector to the mode actuator-auxiliary (1).
4. Install the right rear quarter trim panel. Refer to **Trim Panel Replacement - Rear Quarter - Right (Short Wheelbase)** and **Trim Panel Replacement - Rear Quarter - Right (Long Wheelbase)** in Interior Trim.

5. Calibrate the HVAC module actuators. Refer to **Re-Calibrating Actuators (Primary)** and **Re-Calibrating Actuators (Auxiliary HVAC)** in HVAC Systems - Automatic.

DESCRIPTION AND OPERATION

AIR DELIVERY DESCRIPTION AND OPERATION

The air delivery description and operation is divided into 6 areas:

- HVAC Control Components
- Air Speed
- Auxiliary Air Speed
- Air Delivery
- Auxiliary Air Delivery
- Recirculation 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 (AM). If the battery positive voltage circuit loses power, all HVAC DTCs and settings will be erased from AM. The body control module (BCM), which is the vehicle mode master, provides a device on signal. The control module supports the following features:

Air Delivery Description and Operation

Feature	Availability
Afterblow	No
Purge	No
Personalization	No
Actuator Calibration	Yes

Auxiliary HVAC Control Module

The auxiliary HVAC control module is a class 2 device that interfaces between the rear seat occupants and the auxiliary HVAC system to maintain auxiliary air temperature and auxiliary air distribution settings. The battery positive voltage circuit provides power that the control module uses for keep alive memory (KAM). If the battery positive voltage circuit loses power, all auxiliary HVAC DTCs and settings will be erased from KAM. The auxiliary HVAC control module will perform a recalibration of the electric actuators when commanded with a scan tool or if KAM is lost. This will ensure the actuators are moving with in the calibrated range.

Defrost Actuator

The defrost actuator is a 5 wire bi-directional electric motor that incorporates a feedback potentiometer. Ignition

3 voltage, low reference, control, 5 volt reference and position signal circuits enable the actuator to operate. The control circuit uses either a 0, 2.5 or 5 volt signal to command the actuator movement. When the actuator is at rest, the control circuit value is 2.5 volts. A 0 or 5 volt control signal commands the actuator movement in opposite directions. When the actuator shaft rotates, the potentiometer's 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, the control signal is changed to either 0 or 5 volts depending upon the direction that the actuator needs to rotate to reach the commanded value. 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 changes the control signal to 2.5 volts.

Mode Actuator

The mode actuator is a 5 wire bi-directional electric motor that incorporates a feedback potentiometer. Ignition 3 voltage, low reference, control, 5 volt reference and position signal circuits enable the actuator to operate. The control circuit uses either a 0, 2.5 or 5 volt signal to command the actuator movement. When the actuator is at rest, the control circuit value is 2.5 volts. A 0 or 5 volt control signal commands the actuator movement in opposite directions. When the actuator shaft rotates, the potentiometer's 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, the control signal is changed to either 0 or 5 volts depending upon the direction that the actuator needs to rotate to reach the commanded value. 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 changes the control signal to 2.5 volts.

Auxiliary Mode Actuator

The auxiliary mode actuator is a 5 wire bi-directional electric motor that incorporates a feedback potentiometer. Low reference, 5 volt reference, position signal, and two 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 auxiliary HVAC control module grounds one of the control circuits while providing the other with 12 volts. The control module reverses the polarity of the control circuits to move the actuator in the opposite direction. When the actuator shaft rotates, the potentiometer's adjustable contact changes the door position signal between 0-5 volts.

The auxiliary 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 grounds both control circuits.

Auxiliary Console Mode Actuator

The auxiliary console mode actuator is a 5 wire bi-directional electric motor that incorporates a feedback potentiometer. Low reference, 5 volt reference, position signal, and two 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 auxiliary HVAC control module grounds one of the control circuits while providing the other with 12 volts. The control module reverses the polarity of the control circuits to move the actuator in the opposite direction. When the actuator shaft rotates, the potentiometer's adjustable contact changes the door position signal between 0-5 volts.

The auxiliary 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 grounds both control circuits.

Air Speed - Front Control

The blower motor forces outside air into the vehicle's interior. The vehicle operator determines the blower motor's speed when the driver places the blower switch in one of 5 blower speeds. The blower motor will always operate in any switch position other than OFF, as long as the ignition switch is in the RUN position. The blower motor and mode switches are located within the HVAC control module. The blower motor OFF input is connected in series with the HVAC control module by the off blower motor control circuit.

Depending upon the selected speed, power is provided to the blower motor from either the ignition 3 voltage or battery positive voltage circuits from the fuse block. The battery positive voltage circuit only provides power when the High blower switch position is selected. Power and ground are provided to the HVAC control module by the ignition 3 voltage and the ground circuits.

Low Blower Speed

When the Low 1 blower speed is selected, the HVAC control module applies voltage to the blower motor resistor assembly through the low blower motor control circuit. Voltage is divided between 4 series resistors, a blower relay, and the blower motor to achieve the desired blower speed. The blower motor is grounded through the ground circuit.

Medium Blower Speeds

When the Medium 1 blower speed is selected, the HVAC control module applies voltage to the blower motor resistor assembly through the medium 1 blower motor control circuit. Voltage is divided between 3 series resistors, a blower relay, and the blower motor to achieve the desired blower speed. The blower motor is grounded through the ground circuit.

When the Medium 2 blower speed is selected, the HVAC control module applies voltage to the blower motor resistor assembly through the medium 2 blower motor control circuit. Voltage is divided between 2 series resistors, a blower relay, and the blower motor to achieve the desired blower speed. The blower motor is grounded through the ground circuit.

When the Medium 3 blower speed is selected, the HVAC control module applies voltage to the blower motor resistor assembly through the medium 3 blower motor control circuit. Voltage is divided between a series resistor, a blower relay, and the blower motor to achieve the desired blower speed. The blower motor is grounded through the ground circuit.

High Blower Speed

When the High blower speed is selected, the HVAC control module applies voltage to the blower motor resistor assembly through the high blower motor control circuit. The voltage energizes the blower relay, causing the blower motor to be connected directly to the battery positive voltage circuit. The blower motor and blower motor relay are grounded through the ground circuit.

Air Speed - Auxiliary

There are two separate controls for the auxiliary HVAC system. There is the front auxiliary blower motor switch and the auxiliary HVAC control module. If the front auxiliary blower motor switch is in any other position than OFF or REAR, then the auxiliary air temperature actuator mimics the set passenger temperature. The auxiliary mode will mimic the primary mode. If the front auxiliary blower motor switch is in the REAR position, then the system will only function with inputs to the auxiliary HVAC control module. If the front auxiliary blower motor switch is in the OFF position, then the auxiliary HVAC control module does not respond to input. The auxiliary HVAC control module can not request A/C operation from the PCM. The rotary blower switche on the auxiliary HVAC control module provides the operator the ability to select several blower speeds. The auxiliary HVAC control module provides a pulse width modulated (PWM) signal to the auxiliary blower motor through the auxiliary blower motor speed control circuit. The auxiliary blower motor changes speed based on the received PWM signal from the auxiliary HVAC control module. Power and ground are provided to the auxiliary blower motor through the battery positive voltage and ground circuits. Power and ground are provided to the auxiliary HVAC control module by the ignition 3 voltage and the ground circuits.

Air Distribution

The HVAC control module controls the distribution of air by the use of a defrost actuator and a mode actuator. The modes that may be selected are:

- Defrost
- Defog
- Panel
- Bi-Level
- Floor

The mode and defrost actuators are connected to the mode and defrost doors by a cam type linkage system. Depending on the position of the door, air is directed through the HVAC module and distributed through various ducts leading to the outlets in the dash. If the HVAC control module detects a fault with the mode or defrost doors the HVAC control module will try to drive the actuator for a predetermined amount of time, to defrost, which is the defaulted position for the mode and defrost door actuators. When the mode switch is placed in the defrost or defog positions the A/C is commanded on and the recirculation door is moved to the outside air position to help reduce window fogging. A/C is available in all modes and recirculation is only available in the panel and bi-level modes.

Mode Actuator

The mode actuator is an electronic stepper motor with feedback potentiometers. The HVAC control module sends signals to the mode door actuator through the mode door control circuit. Zero volts drives the actuator in

one direction while 5-volts moves the actuator in the opposite direction. When the actuator receives 2.5 volts, the actuator rotation stops. A 5-volt reference signal is sent out over the 5-volt reference circuit to the mode actuator. When you select a desired mode setting, logic determines the value of the mode actuator signals. The HVAC control module's software uses this reference voltage in order to determine the position of the mode actuator through the mode door position signal circuit. The motor moves the mode door to the desired position.

Defrost Actuator

The defrost actuator operates the same as the mode actuator. The HVAC control module sends signals to the mode door actuator through the defrost door control circuit. Zero volts drives the actuator in one direction while 5-volts moves the actuator in the opposite direction. When the actuator receives 2.5 volts, the actuator rotation stops. A 5-volt reference signal is sent out over the 5-volt reference circuit to the defrost actuator. When you select a defrost setting, logic determines the value of the defrost actuator signals. The HVAC control module's software uses this reference voltage in order to determine the position of the mode actuator through the defrost door position signal circuit. The motor moves the defrost door to the desired position.

Front Defrost

When defrost is selected, the A/C compressor is activated. The A/C compressor clutch will engage when ambient temperatures are above 3°C (38°F). The blower motor will be activated, regardless of the coolant temperature. The HVAC control module will override the auxiliary HVAC control module so a high volume of air is delivered to the front defrost vents. The rear window defogger does not affect the HVAC system.

Air Distribution - Auxiliary Control

The auxiliary HVAC system provides ventilation for the rear seat occupants.

The auxiliary mode actuator shares a control circuit with the auxiliary air temperature actuator. The auxiliary mode is controlled by a rotary knob on the auxiliary HVAC control module. If change of position is required for both actuators, then the auxiliary HVAC control module positions the auxiliary air temperature actuator first. All control circuits for the auxiliary actuators are at a low voltage potential until a change of position is required. The module then applies a high voltage potential to the appropriate control circuit, which will rotate the actuator.

Recirculation Operation

The HVAC control module controls the air intake through the recirculation actuator. The recirculation switch closes the recirculation door in order to circulate the air within the vehicle. The outside air switch opens the recirculation door in order to route outside air into the vehicle. Regardless of the blower motor switch position, recirculation is available only in the panel and bi-level mode switch positions. Including the OFF position. The mode switch must be placed in either the panel or bi-level position before the blower motor switch is placed in the OFF position. In order to reduce windshield fogging, outside air is circulated when the mode switch is in the defrost or defog positions. If the recirculation switch is pressed into the ON position when the mode switch is in an unavailable mode position, then the recirculation switch LED will flash 3 times. If the HVAC control module detects a fault with the recirc door the HVAC control module will try to drive the actuator for a predetermined amount of time, to outside air, which is the defaulted position for the recirculation actuator.

AIR TEMPERATURE DESCRIPTION AND OPERATION

The air temperature controls are divided into 5 areas:

- HVAC Control Components
- Heating and A/C Operation
- Auxiliary Heating and A/C Operation
- Engine Coolant
- 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). If the battery positive voltage circuit loses power, all HVAC DTCs and settings will be erased from KAM. The body control module (BCM), which is the vehicle mode master, provides a device on signal. The control module supports the following features:

Air Temperature Description and Operation

Feature	Availability
Afterblow	No
Purge	No
Personalization	No
Actuator Calibration	Yes

Auxiliary HVAC Control Module - VIN 6

The auxiliary HVAC control module is a class 2 device that interfaces between the rear seat occupants and the auxiliary HVAC system to maintain auxiliary air temperature and auxiliary air distribution settings. The battery positive voltage circuit provides power that the control module uses for keep alive memory (KAM). If the battery positive voltage circuit loses power, all auxiliary HVAC DTCs and settings will be erased from KAM. The auxiliary HVAC control module will perform a recalibration of the electric actuators when commanded with a scan tool or if KAM is lost. This will ensure the actuators are moving with in the calibrated range.

Air Temperature Actuator

The air temperature actuators are a 5-wire bi-directional electric motor that incorporates a feedback potentiometer. Ignition 3 voltage, low reference, control, 5-volt reference and position signal circuits enable the actuator to operate. The control circuit uses either a 0, 2.5 or 5-volt signal to command the actuator movement. When the actuator is at rest, the control circuit value is 2.5 volts. A 0 or 5 volt control signal commands the actuator movement in opposite directions. When the actuator shaft rotates, the potentiometer's 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, the control signal is changed to either 0 or 5 volts depending upon the direction that the actuator needs to rotate to reach the

commanded value. 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 changes the control signal to 2.5 volts.

Auxiliary Air Temperature Actuator - VIN 6

The auxiliary 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 auxiliary HVAC control module grounds 1 of the control circuits while providing the other with 12 volts. The control module reverses the polarity of the control circuits to move the actuator in the opposite direction. When the actuator shaft rotates, the potentiometer's adjustable contact changes the door position signal between 0-5 volts.

The auxiliary 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, 1 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 grounds both control circuits.

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 PCM converts the voltage signal to a pressure value.

The A/C refrigerant pressure sensor protects the A/C system from operating when an excessively high pressure condition exists. The PCM disables the compressor clutch if the A/C pressure is more than 2413 kPa (350 psi). The clutch will be enabled after the pressure decreases to less than 1578 kPa (229 psi).

A/C Low Pressure Switch

The A/C low pressure switch protects the A/C system from a low pressure condition that could damage the A/C compressor or cause evaporator icing. The HVAC control module applies 5 volts to the A/C low pressure switch signal circuit. The switch will open when the A/C low side pressure reaches 124 kPa (18 psi). This prevents the A/C compressor from operating. The switch will then close when A/C low pressure side reaches 275 kPa (40 psi). This enables the A/C compressor to turn back ON.

Coolant Bypass Valve

The coolant bypass valve controls coolant flow to the auxiliary heater core. Integral to the coolant bypass valve is an electric solenoid that controls vacuum flow to open and close the valve. When the HVAC control module applies 12 volts to the integral solenoid, the solenoid applies vacuum to a diaphragm that closes the water valve. This action restricts coolant flow to the auxiliary heater core. The coolant bypass valve is normally open to allow coolant flow.

Heating and A/C Operation

The purpose of the heating and A/C system is to provide heated and cooled air to the interior of the vehicle. The A/C system will also remove humidity from the interior and reduce windshield fogging. Regardless of the temperature setting, the following can effect the rate that the HVAC system can achieve the desired temperature:

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

The manual HVAC system is a dual temperature zone system. There are 2 separate air temperature levers. Moving the air temperature levers to the upward position diverts most of the airflow through the heater core, which increases the outlet air temperature. Moving the air temperature levers to the most downward position diverts most of the airflow around the heater core, which decreases the outlet air temperature. The right air temperature actuator controls the duct air temperature flowing through the center console to the second row seating passengers. The air temperature offset can be as much as 16.7°C (30°F).

Pressing the A/C button enables the HVAC control module to request A/C compressor engagement and turn ON the A/C button LED. The HVAC control module sends a class 2 message to the PCM for A/C compressor engagement. The PCM will provide a ground for the A/C compressor relay enabling it to close its internal contacts to send battery voltage to the A/C compressor clutch coil. The A/C compressor diode will prevent a voltage spike, resulting from the collapse of the magnetic field of the coil, from entering the vehicle electrical system when the compressor is disengaged. Defrost and Defog mode selections will request A/C operation but not turn ON the A/C LED.

The following conditions must be met in order for the A/C compressor clutch to turn ON:

- Ambient air temperature above 1°C (35°F).
- A/C low pressure switch signal circuit is grounded.
- A/C refrigerant pressure sensor parameter is less than 2413 kPa (350 psi).
- A/C compressor temperature switch contacts are closed.
- PCM receives an A/C request from the HVAC control module.
- Engine coolant temperature (ECT) is less than 123°C (253°F).
- The engine RPM is more than 550 RPM.
- The throttle position is less than 100 percent.

The HVAC control module monitors the A/C low pressure switch signal circuit. If the voltage signal on this circuit has no voltage drop the module will interpret this condition as a low pressure, disabling the A/C request. The A/C low pressure switch will open its internal contacts at 151 kPa (22 psi). Then close the contacts at 275 kPa (40 psi) to resume A/C operation. This switch assists in cycling the A/C compressor and prevents A/C compressor operation if system has a low refrigerant level.

The PCM monitors the A/C refrigerant pressure sensor signal circuit. The voltage signal on this circuit is proportional to the refrigerant pressure inside the A/C high side pressure line. As the pressure inside the line increases, so does the voltage signal. If the pressure is above 2413 kPa (350 psi), the A/C compressor output is disabled. When the pressure lowers to 1578 kPa (229 psi), the PCM enables the compressor to operate.

The sensor information is used by the PCM to determine the following:

- The A/C high side pressure
- An A/C system load on the engine
- An excessive A/C high side pressure
- The heat load at the A/C condenser

The A/C compressor has an A/C compressor temperature switch. This switch protects the compressor from over heating. The switch interrupts power to the compressor clutch coil. When the compressor core temperature rises above 135°C (275°F) the switch opens, disabling the compressor clutch coil. When the temperature lowers to 120°C (248°F) the switch closes, enabling the compressor clutch coil. This switch is not a serviceable part, it is integral to the A/C compressor.

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

- Ambient air temperature is less than 1°C (35°F).
- A/C compressor temperature switch contacts are open.
- Throttle position is 100 percent.
- The A/C low pressure switch is open.
- A/C high side pressure is more than 2413 kPa (350 psi).
- A/C low side pressure is less than 151 kPa (22 psi).
- Engine coolant temperature (ECT) is more than 123°C (253°F).
- Engine speed is more than 5,500 RPM.
- Transmission shift
- PCM detects excessive torque load.
- PCM detects insufficient idle quality.
- PCM detects a hard launch condition.

Auxiliary Heating and A/C Operation

There are 2 separate controls for the auxiliary HVAC system. There is the front auxiliary blower motor switch and the auxiliary HVAC control module. If the front auxiliary blower motor switch is in any other position than OFF or REAR, then the auxiliary air temperature actuator mimics the set passenger temperature. The auxiliary mode will mimic the primary mode. If the front auxiliary blower motor switch is in the REAR position, then the system will only function with inputs to the auxiliary HVAC control module. If the front auxiliary blower motor switch is in the OFF position, then the auxiliary HVAC control module does not respond to input. The auxiliary HVAC control module can not request A/C operation from the PCM.

The auxiliary air temperature switch is a rotary knob switch. Turning the air temperature switch to the warmest position diverts most of the airflow through the heater core, which increases the outlet air temperature. Turning the air temperature switch to the coolest position diverts most of the airflow around the heater core, which decreases the outlet air temperature.

The auxiliary air temperature actuator shares a control circuit with the auxiliary mode actuator. If change of position is required for both actuators, then the module positions the auxiliary air temperature actuator first. All control circuits for the auxiliary actuators are at a low voltage potential until a change of position is required. The module then applies a high voltage potential to the appropriate control circuit, which will rotate the actuator.

The coolant bypass valve controls coolant flow to the auxiliary heater core. If a cool air temperature is selected, the auxiliary HVAC control module sends a class 2 message to the HVAC control module to close the valve. When the HVAC control module applies 12 volts to the coolant bypass solenoid control circuit, the solenoid opens. When the solenoid is open, a diaphragm closes the water valve when vacuum is applied. This action restricts coolant flow to the auxiliary heater core. The coolant bypass valve is a normally open valve.

Engine Coolant

Engine coolant is the essential element of the heating system. The thermostat controls the normal engine operating coolant temperature. The thermostat also creates a restriction for the cooling system that promotes a positive coolant flow and helps prevent cavitation.

Coolant enters the heater core through the inlet heater hose, in a pressurized state. The heater core is located inside the HVAC module. The ambient air drawn through the HVAC module absorbs the heat of the coolant flowing through the heater core. Heated air is distributed to the passenger compartment, through the HVAC module, for passenger comfort. Opening or closing the air temperature door controls the amount of heat delivered to the passenger compartment. The coolant exits the heater core through the return heater hose and recirculated back through the engine cooling system.

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 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 A/C refrigerant pressure sensor 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 tubing 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 orifice tube.

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

Refrigerant exiting the orifice tube 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 through the suction line and back to the compressor, in a vapor state, and 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.

A/C Cycle with Auxiliary

The auxiliary A/C system operates from the vehicles primary A/C system. The front or primary A/C system must be ON to allow the rear A/C system to function.

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 A/C system used on this vehicle is a non cycling system. Non cycling A/C systems use a high pressure switch to protect the A/C system from excessive pressure. The high pressure switch will OPEN the electrical signal, to the compressor clutch, in the event that the refrigerant pressure becomes excessive. After the high and low side of the A/C system pressure equalize, the high pressure switch will CLOSE. Closing the high pressure switch will complete the electrical circuit to the compressor clutch. The A/C system is also 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.

The 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.

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 tubing 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. The liquid line flow is split and the liquid refrigerant flows to both the front or primary A/C system, and to the liquid line for the rear A/C system.

The liquid refrigerant, flowing to the rear A/C system, flows into the rear TXV. The rear TXV is located at the rear evaporator inlet. The TXV is the dividing point for the high and the low pressure sides of the rear A/C system. As the refrigerant passes through the TXV, the pressure on the refrigerant is lowered. Due to the pressure differential on the liquid refrigerant, the refrigerant will begin to boil at the expansion device. The TXV also meters the amount of liquid refrigerant that can flow into the evaporator.

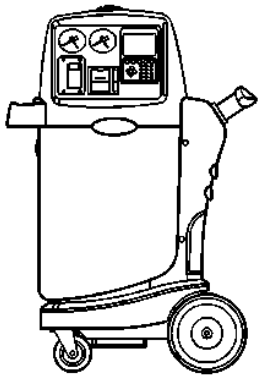
Refrigerant exiting the TXV flows into the evaporator core in a low pressure, liquid state. Ambient air is drawn through the rear A/C module and passes through the evaporator core. Warm and moist air will cause the liquid refrigerant boil inside of the evaporator core. The boiling refrigerant absorbs heat from the ambient air and draws moisture onto the evaporator. The refrigerant exits the evaporator through the suction line and back to the primary A/C systems suction line. Refrigerant in the primary A/C system suction line flows back to the compressor, in a vapor state, and completes 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 rear A/C module for passenger comfort. The heat and moisture removed from the rear passenger compartment will also change form, or condense, and is discharged from the rear A/C module as water.

SPECIAL TOOLS AND EQUIPMENT

SPECIAL TOOLS

Special Tools

Illustration	Tool Number/ Description
	J 43600 ACR 2000 Air Conditioning Service Center