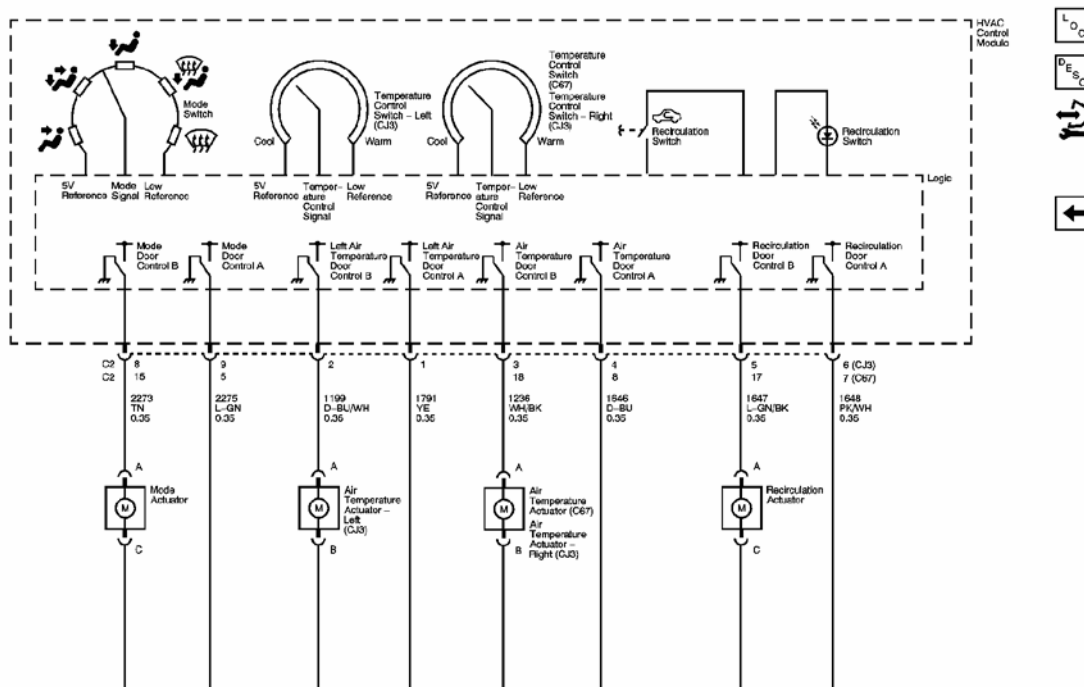
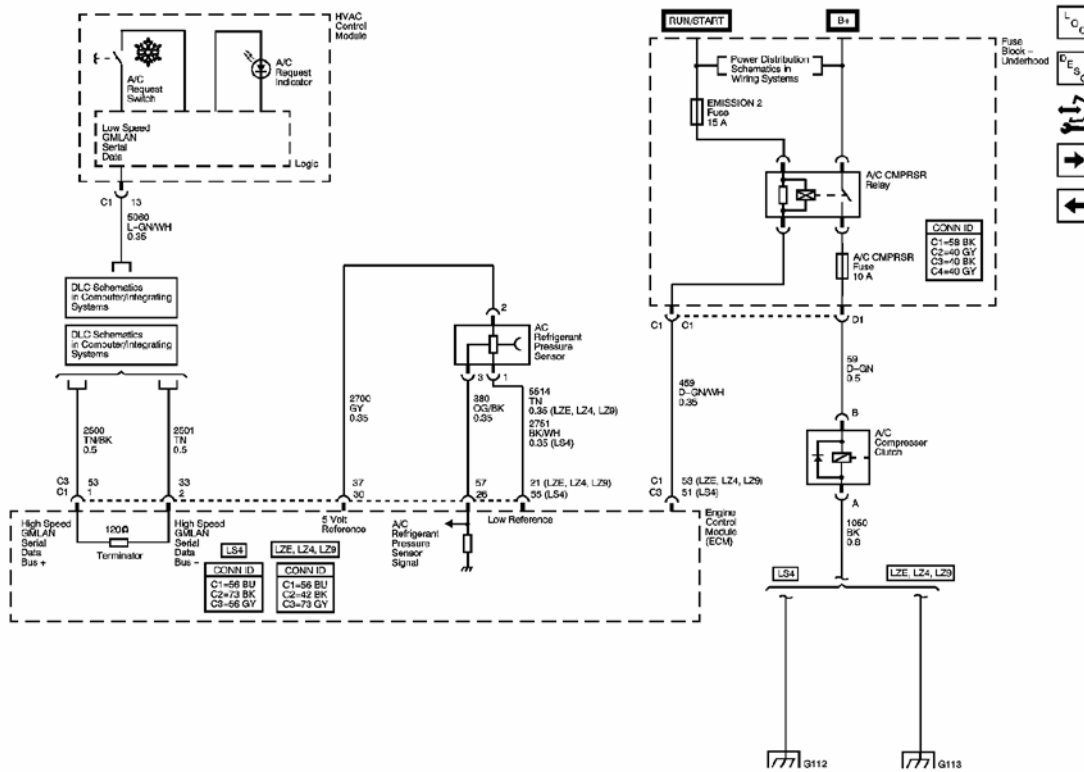


2006 Chevrolet Impala LS

2006 HVAC HVAC Systems - Manual - Impala



Courtesy of GENERAL MOTORS CORP.

COMPONENT LOCATOR

HVAC COMPONENT VIEWS

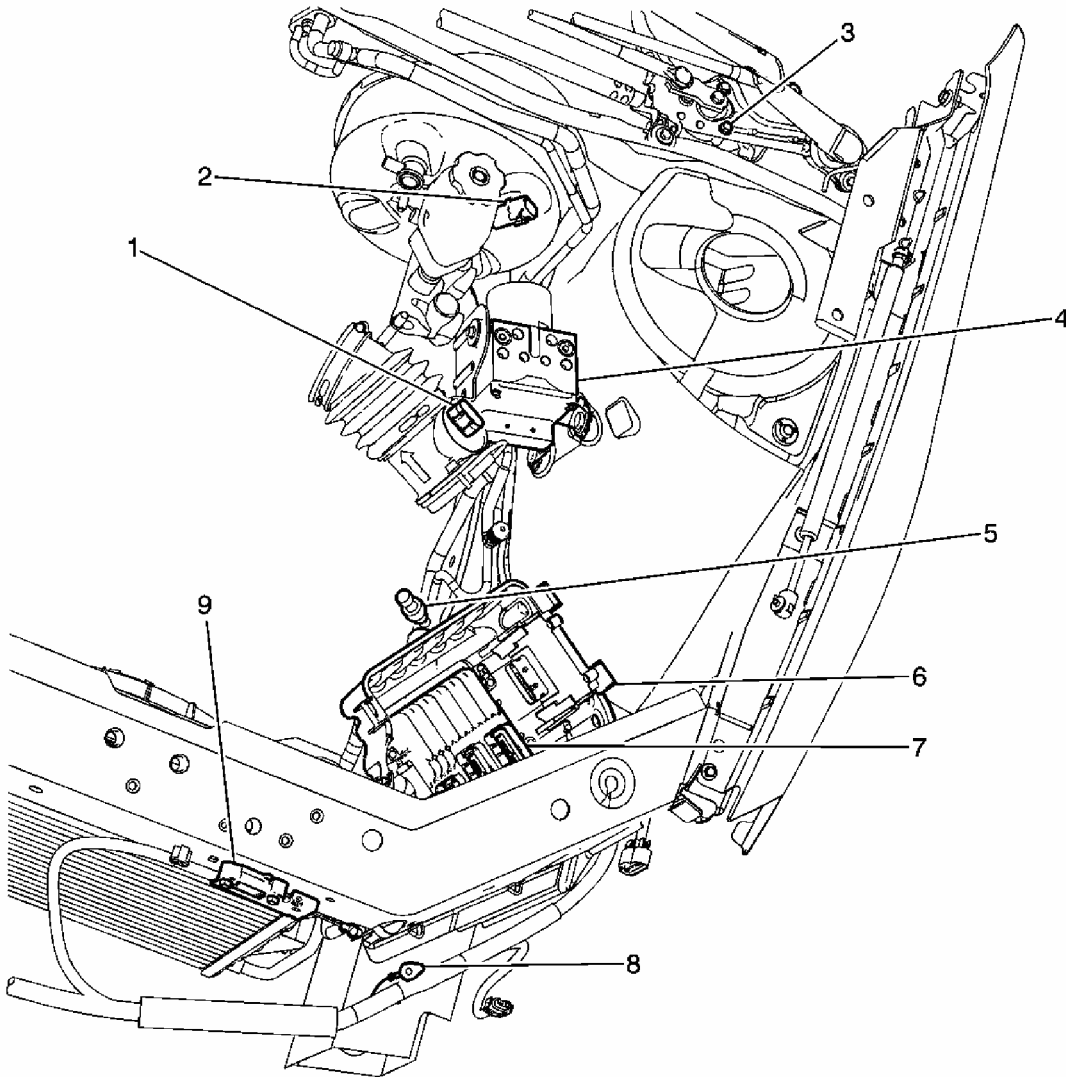


Fig. 4: LF of the Engine Compartment
Courtesy of GENERAL MOTORS CORP.

Callouts For Fig. 4

Callout	Component Name
1	Mass Air Flow (MAF) / Intake Air Temperature (IAT) Sensor
2	Brake Fluid Level Switch
3	Windshield Wiper Motor

2006 Chevrolet Impala LS

2006 HVAC HVAC Systems - Manual - Impala

4	Electronic Brake Control Module (EBCM)
5	A/C Refrigerant Pressure Sensor
6	Transmission Control Module (TCM)
7	Engine Control Module (ECM)
8	G101
9	Inflatable Restraint Front end Sensor - Left

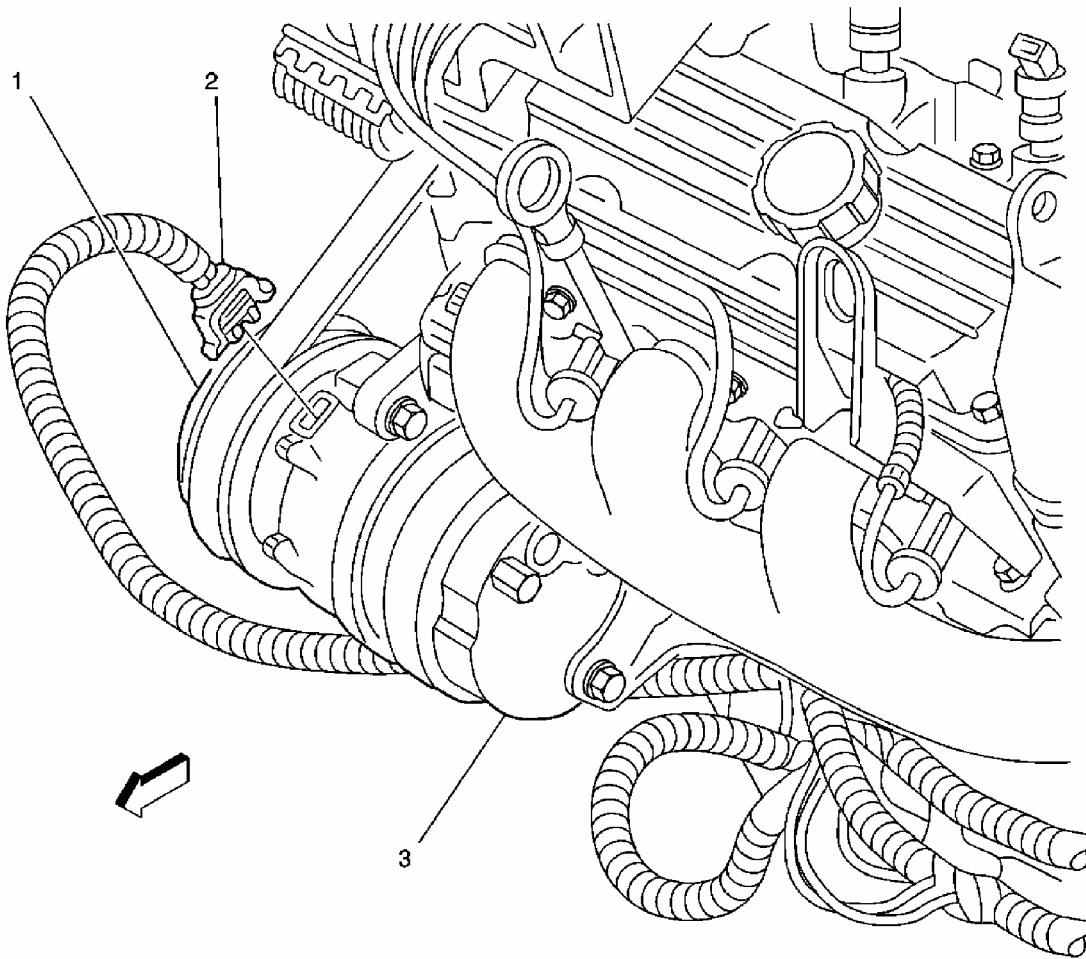


Fig. 5: Lower Right Front Of Engine Components
Courtesy of GENERAL MOTORS CORP.

Callouts For Fig. 5

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

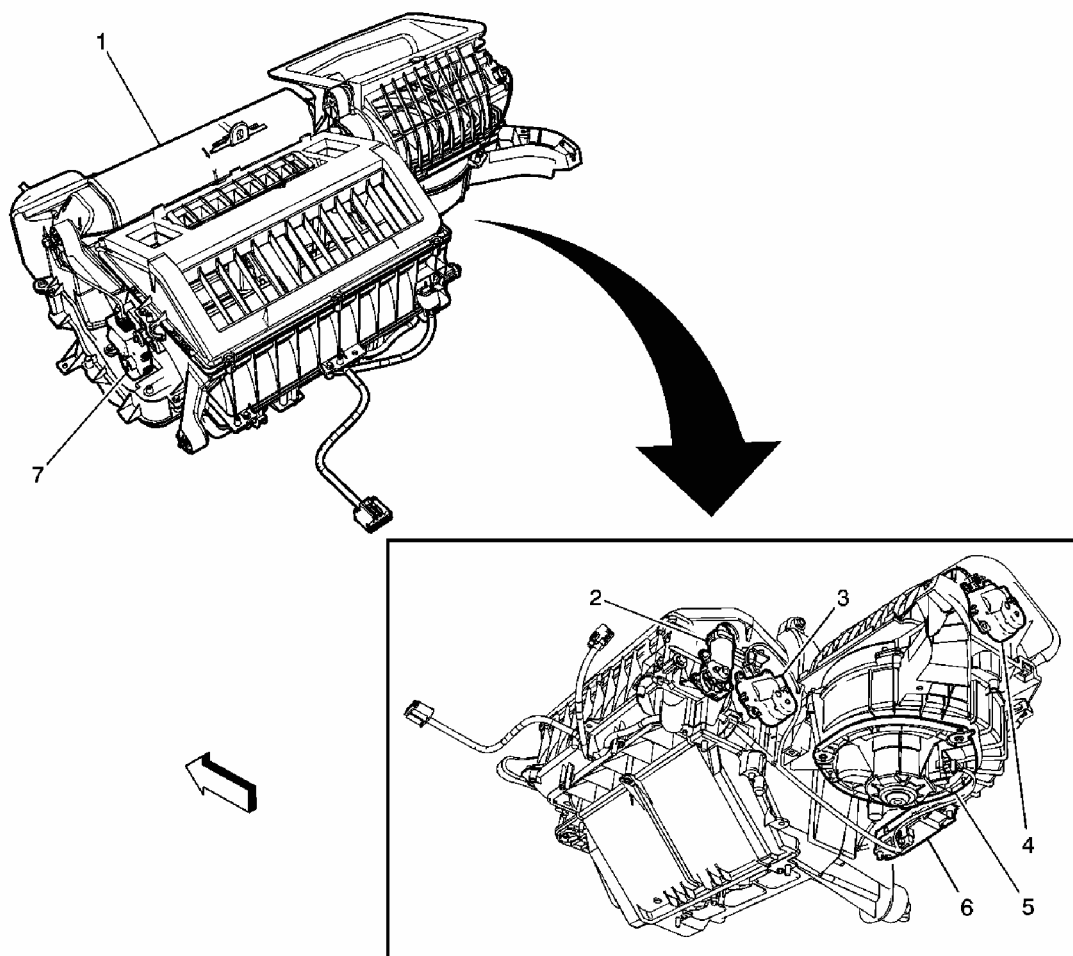


Fig. 6: Interior HVAC Components
Courtesy of GENERAL MOTORS CORP.

Callouts For Fig. 6

Callout	Component Name
1	HVAC Module
2	Mode Actuator
3	Temperature Actuator
4	Temperature Actuator
5	Blower Motor
6	Blower Motor Resistor Assembly
7	Recirculation Actuator

2006 Chevrolet Impala LS

2006 HVAC HVAC Systems - Manual - Impala

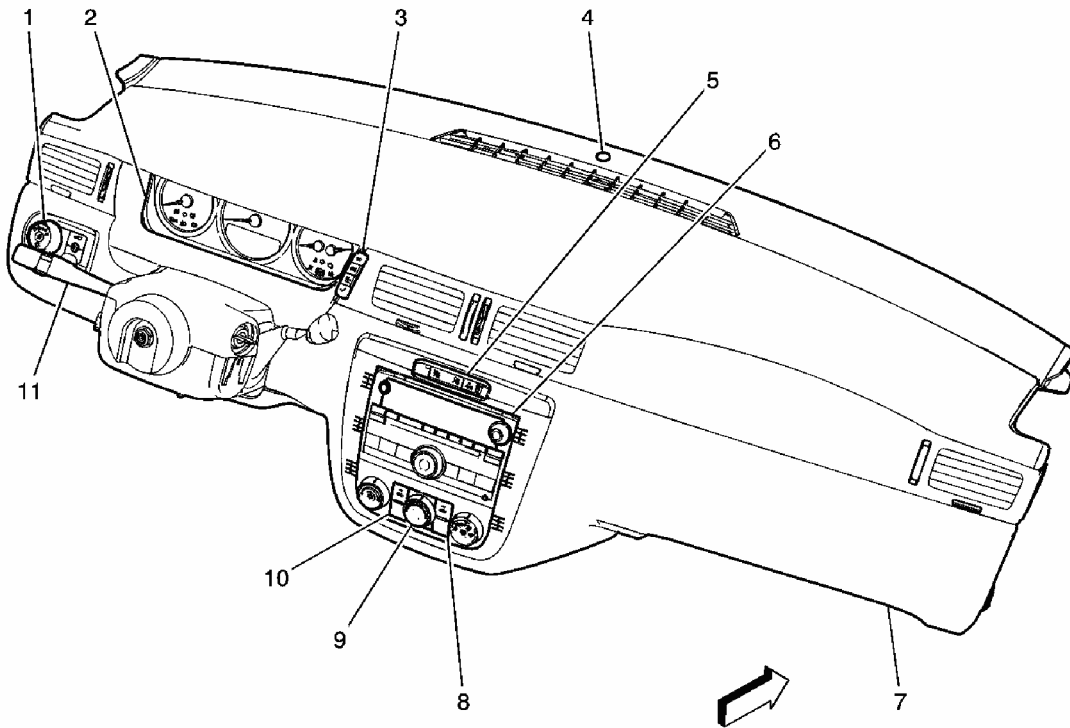


Fig. 7: I/P Components
Courtesy of GENERAL MOTORS CORP.

Callouts For Fig. 7

Callout	Component Name
1	Headlamp Switch
2	Instrument Panel Cluster (IPC)
3	Driver Information Center (DIC) Switch
4	Ambient Light Sensor
5	Inflatable Restraint Passenger Air Bag On/Off Indicator (Sedan w/o 9C1, 9C3)
6	Radio
7	I/P Trim Panel
8	Heated Seat Switch-Passenger (KA7)
9	HVAC Control Module
10	Heated Seat Switch-Driver (KA7)
11	Turn Signal / Multifunction Switch

HVAC CONNECTOR END VIEWS

Ambient Air Temperature Sensor

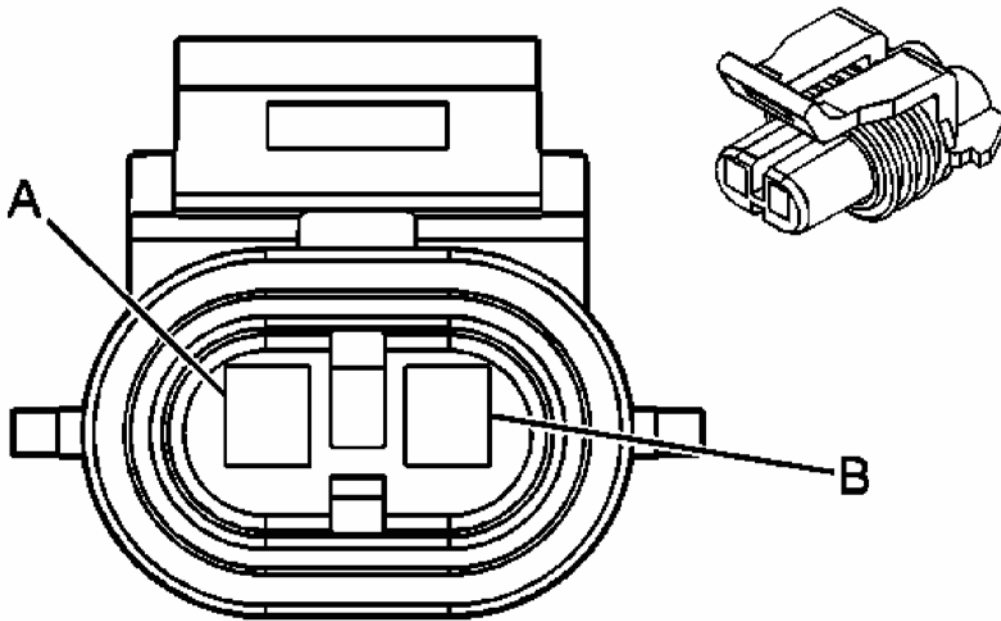


Fig. 8: Sliding Door Detent Switch - (E58/E59) Connector End Views
 Courtesy of GENERAL MOTORS CORP.

HVAC Connector End Views

Connector Part Information

- OEM: 12052642
- Service: 12101856
- Description: 2-Way F Metri-Pack 150 Sealed (GN)

Terminal Part Information

- Terminal/Tray: 12048074/2
- Core/Insulation Crimp: See Terminal Repair Kit
- Release Tool/Test Probe: 12094429/J-35616-2A (GY)

Ambient Air Temperature Sensor

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

A/C Compressor Clutch

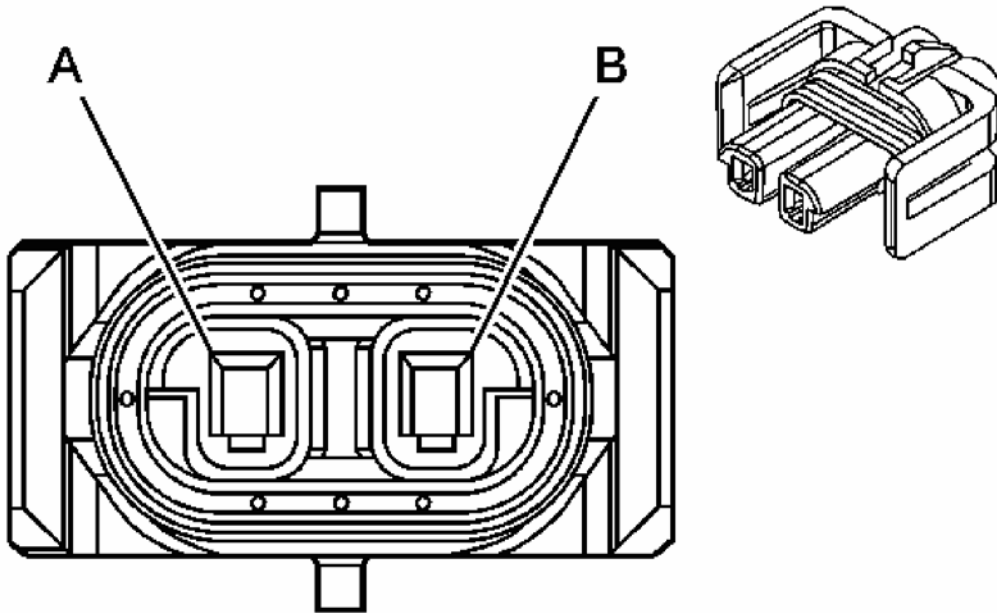


Fig. 9: Connector End View
 Courtesy of GENERAL MOTORS CORP.

HVAC Connector End Views

Connector Part Information

- OEM: 12162017
- Service: 12101937
- Description: 2-Way F Metri-Pack 150 Sealed (GY)

Terminal Part Information

- Terminal/Tray: 12048074/2
- Core/Insulation Crimp: E/1
- Release Tool/Test Probe: 12094429/J-35616-2A (GY)

A/C Compressor Clutch

Pin	Wire Color	Circuit No.	Function
A	BK	1050	Ground
B	D-GN	59	A/C Compressor Clutch Supply Voltage

A/C Refrigerant Pressure Sensor

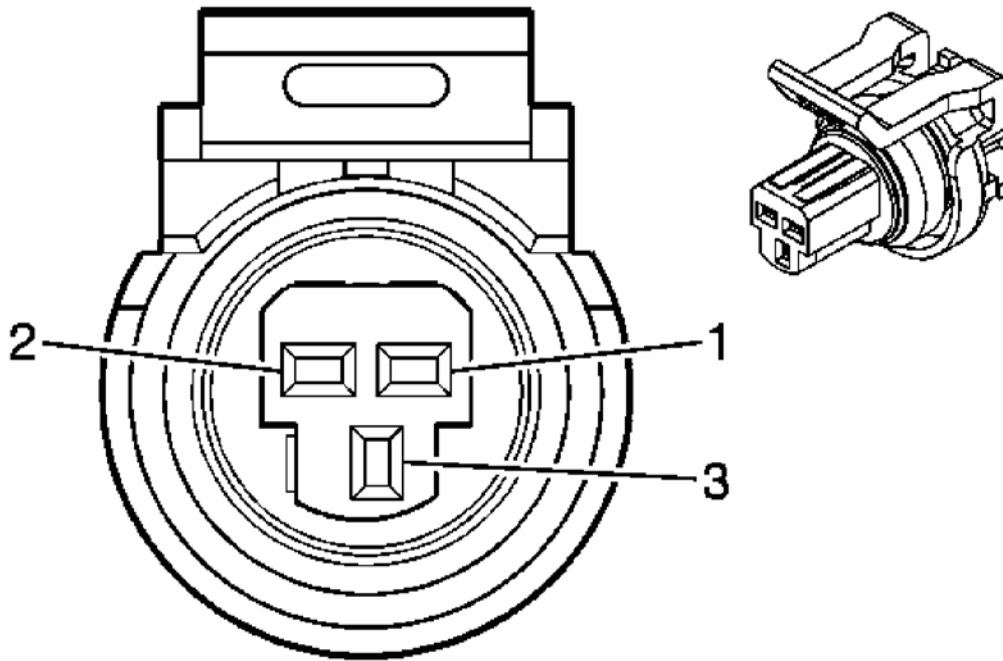


Fig. 10: Connector End View
Courtesy of GENERAL MOTORS CORP.

HVAC Connector End Views

Connector Part Information

- OEM: 15477863
- Service: 88988301
- Description: 3-Way F GT 150 Sealed (BK)

Terminal Part Information

- Terminal/Tray: 15326267/19
- Core/Insulation Crimp: See Terminal Repair Kit
- Release Tool/Test Probe: 15315247/J-35616-2A (GY)

A/C Refrigerant Pressure Sensor

Pin	Wire Color	Circuit No.	Function
1	BK/WH	2751	Low Reference

2006 Chevrolet Impala LS

2006 HVAC HVAC Systems - Manual - Impala

2	GY	2700	A/C Pressure Sensor 5 Volt Reference
3	OG/BK	380	A/C Refrigerant Pressure Sensor Signal
1	TN	5514	Low Reference

Air Temperature Actuator (C67)

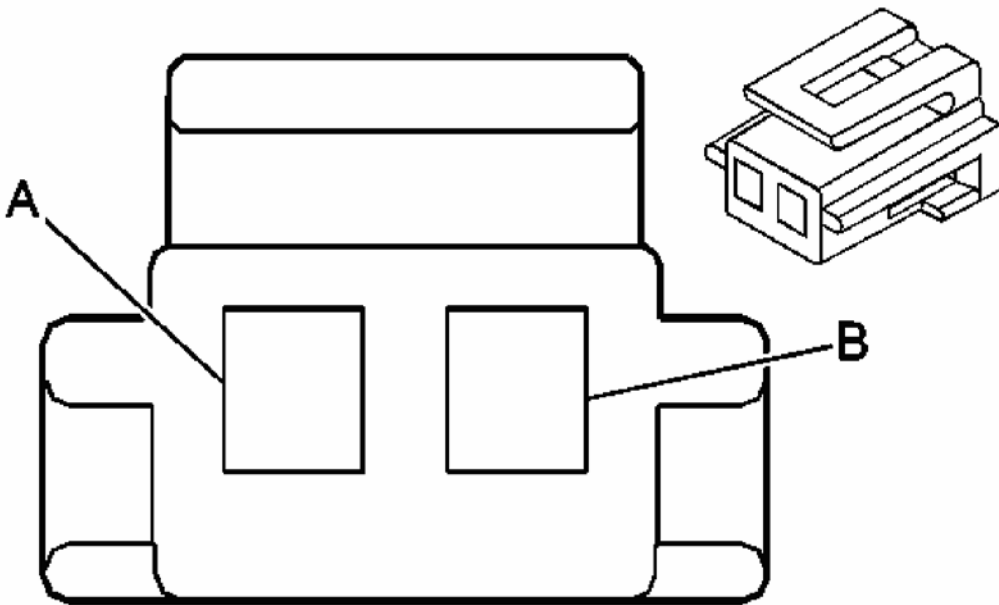


Fig. 11: Connector End View
Courtesy of GENERAL MOTORS CORP.

HVAC Connector End Views

Connector Part Information

- OEM: 12059110
- Service: 88953271
- Description: 2-Way F Metri-Pack 150 (BK)

Terminal Part Information

- Terminal/Tray: 12064971/5
- Core/Insulation Crimp: E/C
- Release Tool/Test Probe: 12094429/J-35616-2A (GY)

Air Temperature Actuator (C67)

Pin	Wire Color	Circuit No.	Function
A	WH/BK	1236	Auxiliary Air Temperature Door Control
B	D-BU	1646	Auxiliary Air Temperature Door Position Signal

Air Temperature Actuator - Left (CJ3)

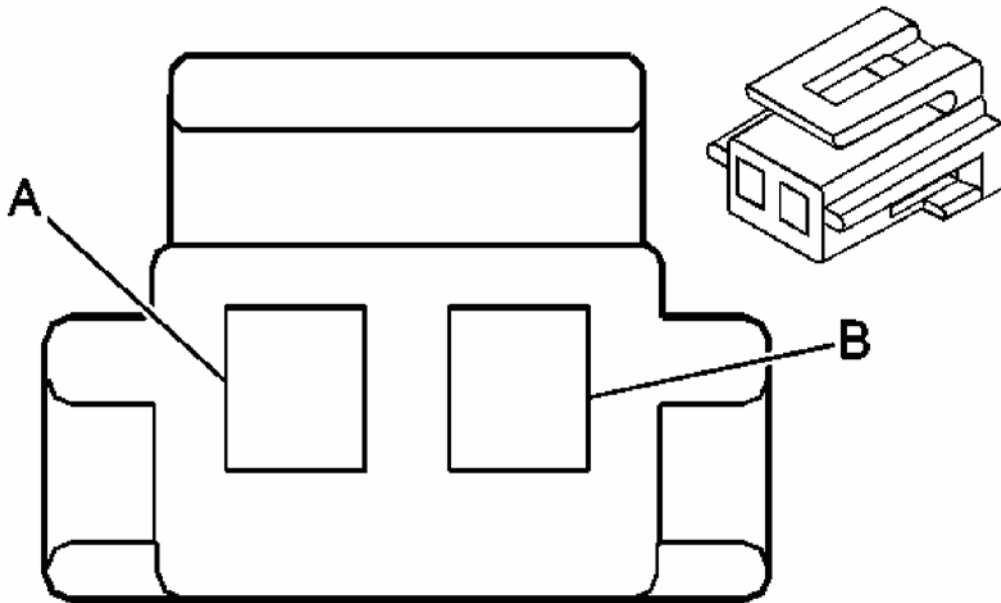


Fig. 12: Connector End View

Courtesy of GENERAL MOTORS CORP.

HVAC Connector End Views

Connector Part Information

- OEM: 12059110
- Service: 88953271
- Description: 2-Way F Metri-Pack 150 (BK)

Terminal Part Information

- Pins: A, B
- Terminal/Tray: 12064971/5

2006 Chevrolet Impala LS

2006 HVAC HVAC Systems - Manual - Impala

- Core/Insulation Crimp: E/C
- Release Tool/Test Probe: 12094429/J-35616-2A (GY)

Air Temperature Actuator - Left (CJ3)

Pin	Wire Color	Circuit No.	Function
A	D-BU/WH	1199	Air Temperature Door Control
B	YE	1791	Low Reference

Air Temperature Actuator - Right (CJ3)

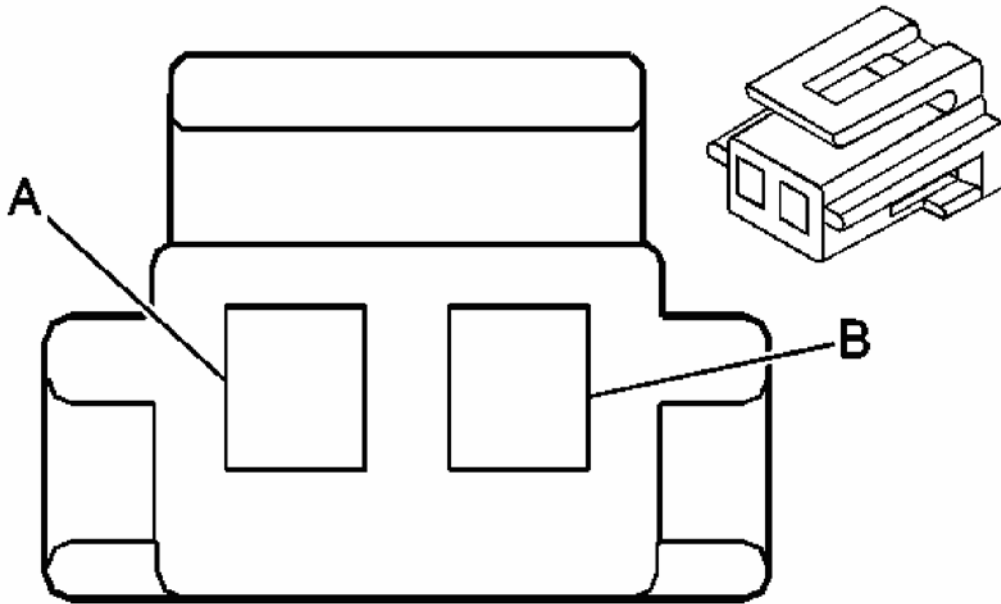


Fig. 13: Connector End View
Courtesy of GENERAL MOTORS CORP.

HVAC Connector End Views

Connector Part Information

- OEM: 12059110
- Service: 88953271
- Description: 2-Way F Metri-Pack 150 (BK)

Terminal Part Information

- Pins: A, B

- Terminal/Tray: 12064971/5
- Core/Insulation Crimp: E/C
- Release Tool/Test Probe: 12094429/J-35616-2A (GY)

Air Temperature Actuator - Right (CJ3)

Pin	Wire Color	Circuit No.	Function
A	WH/BK	1236	Auxiliary Air Temperature Door Control
B	D-BU	1646	Auxiliary Air Temperature Door Position Signal

Blower Motor

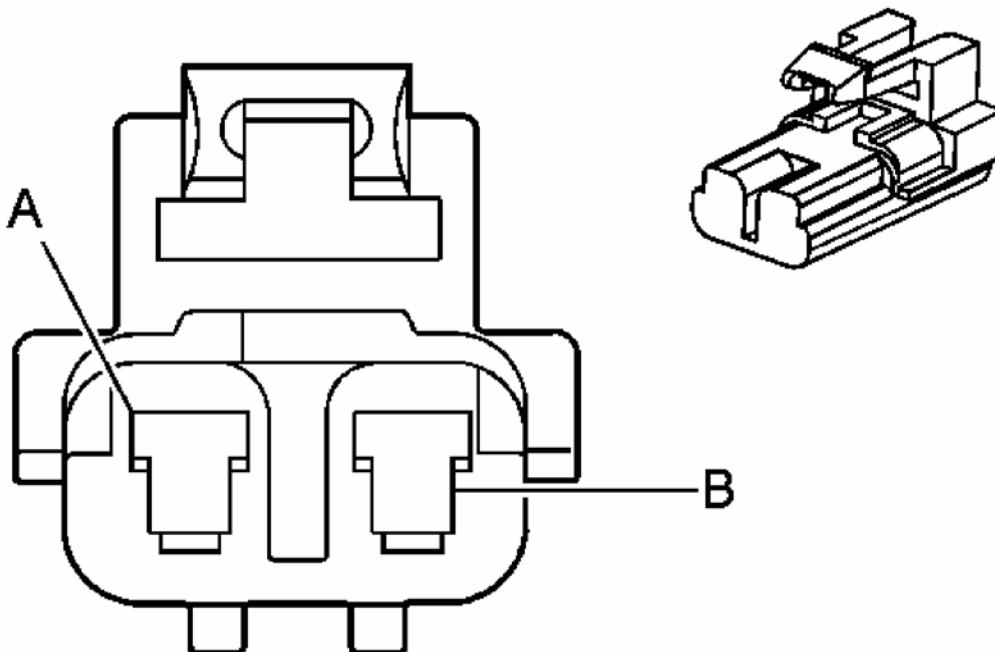


Fig. 14: Blower Motor Connector End View
Courtesy of GENERAL MOTORS CORP.

HVAC Connector End Views

Connector Part Information

- OEM: 12084957

- Service: 12126461
- Description: 2-Way F Metri-Pack 280 (BK)

Terminal Part Information

- Pins: A, B
- Terminal/Tray: 12015858/4
- Core/Insulation Crimp: F/G
- Release Tool/Test Probe: 12094430/J-35616-4A (PU)

Blower Motor

Pin	Wire Color	Circuit No.	Function
A	PU	65	Blower Motor Supply Voltage
B	OG	5987	TBD

Blower Motor Control Processor

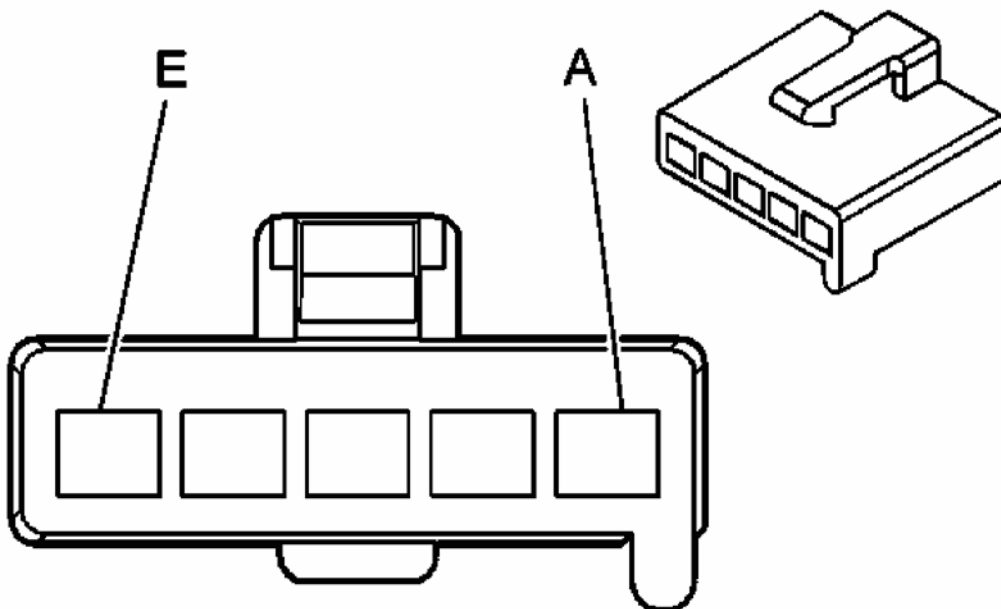


Fig. 15: Connector End View
Courtesy of GENERAL MOTORS CORP.

HVAC Connector End Views

Connector Part Information

2006 Chevrolet Impala LS

2006 HVAC HVAC Systems - Manual - Impala

- OEM: 12041429
- Service: 12167129
- Description: 5-Way F Metri-Pack 280 (BK)

Terminal Part Information

- Pins: A, C, D, E
- Terminal/Tray: 12015858/4
- Core/Insulation Crimp: F/G
- Release Tool/Test Probe: 12094430/J-35616-4A (PU)
- Pins: B
- Terminal/Tray: 12034046/2
- Core/Insulation Crimp: See Terminal Repair Kit
- Release Tool/Test Probe: 12094430/J-35616-4A (PU)

Blower Motor Control Processor

Pin	Wire Color	Circuit No.	Function
A	BK	150	Ground
B	GY/BK	754	Blower Motor Speed Control
C	RD	442	Battery Positive Voltage
D	OG	5987	TBD
E	PU	65	Blower Motor Supply Voltage

HVAC Control Module C1

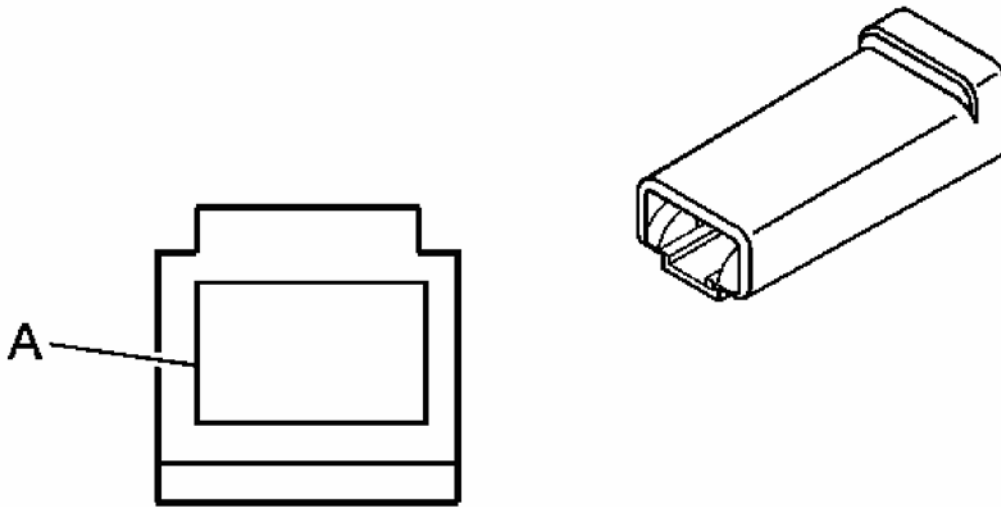


Fig. 16: Connector End View
Courtesy of GENERAL MOTORS CORP.

HVAC Connector End Views

Connector Part Information

- OEM: 15429808
- Service: See Catalog
- Description: 16-Way F Micro 64 Modular (BU)

Terminal Part Information

- Pins: 1, 2, 3, 4, 8, 9, 10, 12, 13
- Terminal/Tray: 15359541/4
- Core/Insulation Crimp: M/M
- Release Tool/Test Probe: 15381651-2/J-35616-64A (L-BU)

HVAC Control Module C1

Pin	Wire Color	Circuit No.	Function
1	PU/WH	1382	LED Dimming Signal/LED Dimming Supply
2	PK	1139	Ignition 1 Voltage
3	BK/WH	1551	Ground
4	RD/WH	1840	Battery Positive Voltage

2006 Chevrolet Impala LS

2006 HVAC HVAC Systems - Manual - Impala

5-7	-	-	Not Used
8	WH	193	Rear Defog Relay Control
9	L-GN/BK	735	Ambient Air Temperature Sensor Signal
10	BK	1450	Ground
11	-	-	Not Used
12	YE	61	Low Reference
13	D-GN	5060	Low Speed GMLAN Serial Data
14-16	-	-	Not Used

HVAC Control Module C2 (C67)

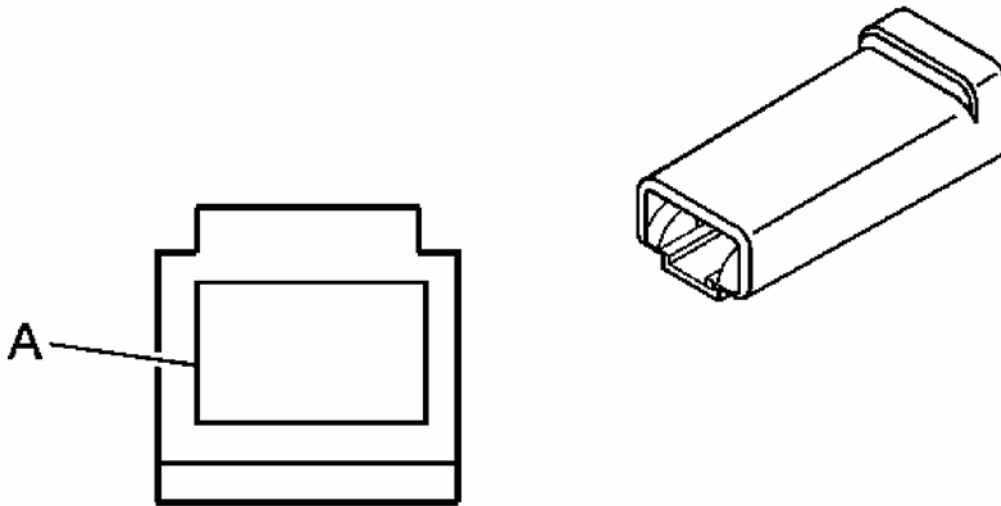


Fig. 17: Connector End View
Courtesy of GENERAL MOTORS CORP.

HVAC Connector End Views

Connector Part Information

- OEM: 15491304
- Service: See Catalog
- Description: 20-Way F Receptacle 0.64 (GY)

Terminal Part Information

- Pins: 4, 5, 7, 8, 15, 17, 18

2006 Chevrolet Impala LS

2006 HVAC HVAC Systems - Manual - Impala

- Terminal/Tray: 7116-4618-02/14
- Core/Insulation Crimp: P/P
- Release Tool/Test Probe: J-38125-215/J-35616-64A (L-BU)
- Pins: 3, 4, 5, 6, 7, 8, 9
- Terminal/Tray: 15359541/4
- Core/Insulation Crimp: M/M
- Release Tool/Test Probe: 15381651-2/J-35616-64A (L-BU)
- Pins: 1-3, 9-14, 19-20
- Terminal/Tray: 12034046/2
- Core/Insulation Crimp: See Terminal Repair Kit
- Release Tool/Test Probe: 12094430/J-35616-4A (PU)
- Pins: 4, 5, 6, 7, 8, 15, 16, 17, 18
- Terminal/Tray: 7116-4618-02/14
- Core/Insulation Crimp: P/P
- Release Tool/Test Probe: J-38125-215/J-35616-64A (L-BU)
- Pins: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10-16
- Terminal/Tray: 15359541/4
- Core/Insulation Crimp: Pins 1, 2, 3, 4, 5, 6, 7, 8, 9 - M/M
- Core/Insulation Crimp: Pins 10-16 - M/M
- Release Tool/Test Probe: 15381651-2/J-35616-64A (L-BU)

HVAC Control Module C2 (C67)

Pin	Wire Color	Circuit No.	Function
1-3	-	-	Not Used
4	GY/BK	754	Blower Motor Speed Control
5	L-GN	2275	Mode Door Position Signal
6	-	-	Not Used
7	PK/WH	1648	Recirculation Door Control A
8	D-BU	1646	Auxiliary Air Temperature Door Position Signal
9-14	-	-	Not Used
15	TN	2273	Mode Door Control
16	-	-	Not Used
17	L-GN/BK	1647	Recirculation Door Control B

2006 Chevrolet Impala LS

2006 HVAC HVAC Systems - Manual - Impala

18	WH/BK	1236	Auxiliary Air Temperature Door Control
19-20	-	-	Not Used
1-2	-	-	Not Used
3	WH/BK	1236	Auxiliary Air Temperature Door Control
4	D-BU	1646	Auxiliary Air Temperature Door Position Signal
5	L-GN/BK	1647	Recirculation Door Control B
6	PK/WH	1648	Recirculation Door Control A
7	GY/BK	754	Blower Motor Speed Control
8	TN	2273	Mode Door Control
9	L-GN	2275	Mode Door Position Signal
10-16	-	-	Not Used

HVAC Control Module C2 (CJ3)

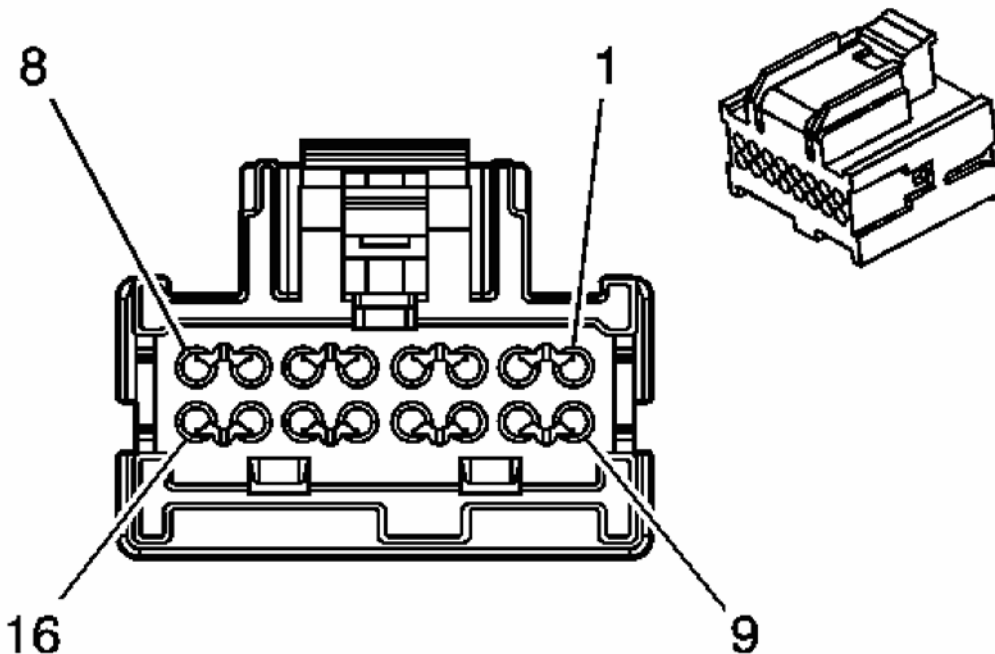


Fig. 18: Connector End View
Courtesy of GENERAL MOTORS CORP.

HVAC Connector End Views**Connector Part Information**

- OEM: 15416970
- Service: See Catalog
- Description: 16-Way F Micro 64 Modular (BK)

Terminal Part Information**HVAC Control Module C2 (CJ3)**

Pin	Wire Color	Circuit No.	Function
1	YE	1791	Low Reference
2	D-BU/WH	1199	Air Temperature Door Control
3	WH/BK	1236	Auxiliary Air Temperature Door Control
4	D-BU	1646	Auxiliary Air Temperature Door Position Signal
5	L-GN/BK	1647	Recirculation Door Control B
6	PK/WH	1648	Recirculation Door Control A
7	GY/BK	754	Blower Motor Speed Control
8	TN	2273	Mode Door Control
9	L-GN	2275	Mode Door Position Signal
10-16	-	-	Not Used

Mode Actuator

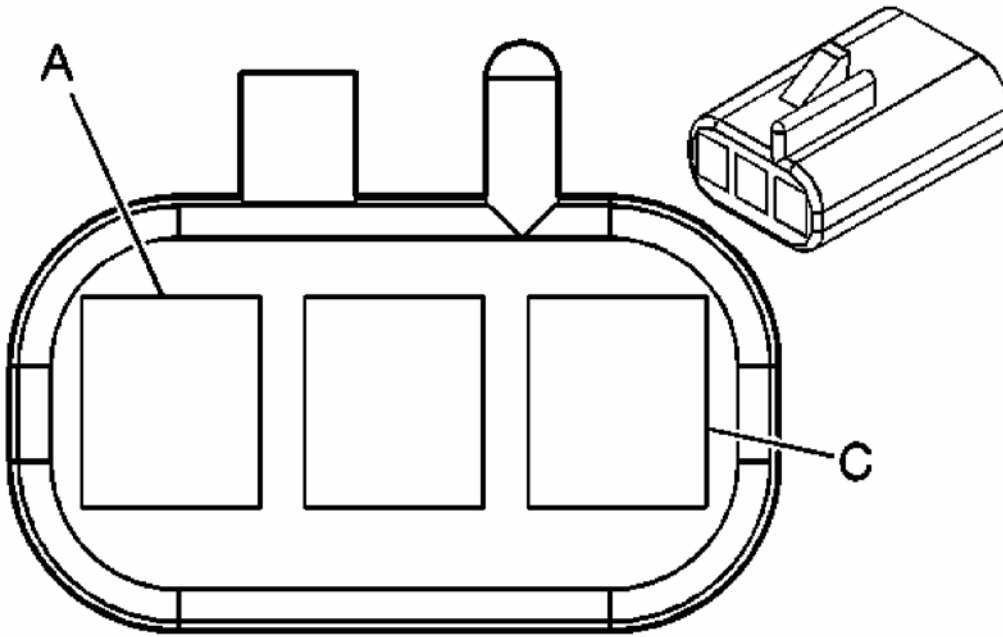


Fig. 19: Connector End Views
 Courtesy of GENERAL MOTORS CORP.

HVAC Connector End Views

Connector Part Information

- OEM: 12047781
- Service: 12101864
- Description: 3-Way F Metri-Pack 150 (BK)

Terminal Part Information

- Pins: A, C
- Terminal/Tray: 12064971/5
- Core/Insulation Crimp: E/C
- Release Tool/Test Probe: 12094429/J-35616-2A (GY)
- Pins: A, C, B
- Terminal/Tray: 12064971/5
- Core/Insulation Crimp: Pins A, C - E/C
- Core/Insulation Crimp: Pins B - E/C

2006 Chevrolet Impala LS

2006 HVAC HVAC Systems - Manual - Impala

- Release Tool/Test Probe: 12094429/J-35616-2A (GY)

Mode Actuator

Pin	Wire Color	Circuit No.	Function
A	TN	2273	Mode Door Control
B	-	-	Not Used
C	L-GN	2275	Mode Door Position Signal

Recirculation Actuator

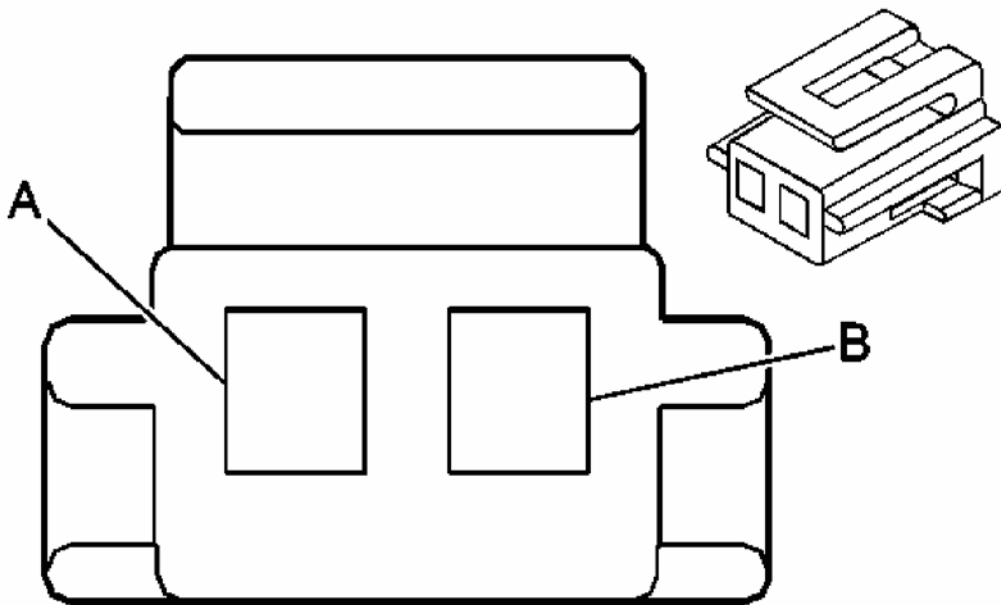


Fig. 20: Connector End View

Courtesy of GENERAL MOTORS CORP.

HVAC Connector End Views

Connector Part Information

- OEM: 12059110
- Service: 88953271
- Description: 2-Way F Metri-Pack 150 (BK)

Terminal Part Information

- Pins: A, B

2006 Chevrolet Impala LS

2006 HVAC HVAC Systems - Manual - Impala

- Terminal/Tray: 12064971/5
- Core/Insulation Crimp: E/C
- Release Tool/Test Probe: 12094429/J-35616-2A (GY)
- Pins: A, B
- Terminal/Tray: 12064971/5
- Core/Insulation Crimp: E/C
- Release Tool/Test Probe: 12094429/J-35616-2A (GY)

Recirculation Actuator

Pin	Wire Color	Circuit No.	Function
A	L-GN/BK	1647	Recirculation Door Control B
B	PK/WH	1648	Recirculation Door Control A

DIAGNOSTIC INFORMATION AND PROCEDURES

DIAGNOSTIC CODE INDEX

DIAGNOSTIC CODE INDEX

DTC	Description
DTC B0158	Outside Air Temperature Sensor Circuit
DTC B0223, B0233, B0248, B0268, B0408, B0418, or B0428	MULTIPLE VALUES Refer to DTC B0223, B0233, B0248, B0268, B0408, B0418, or B0428
DTC P0532 or P0533	Air Conditioning (A/C) Refrigerant Pressure Sensor Circuit Low Voltage, Air Conditioning (A/C) Refrigerant Pressure Sensor Circuit High Voltage
DTC P0645	Air Conditioning Clutch Relay Control Circuit

SCAN TOOL OUTPUT CONTROLS

PCM Scan Tool Output Controls

Scan Tool Output Control	Additional Menu Selection(s)	Description
A/C Relay	Engine Output Controls	The powertrain control module (PCM) energizes the A/C relay to engage the A/C compressor clutch when you select ON. The A/C compressor clutch should remain engaged until commanded OFF.

SCAN TOOL DATA LIST

2006 Chevrolet Impala LS

2006 HVAC HVAC Systems - Manual - Impala

Use the Scan Tool Data Display Values and Definitions Information in order to assist in diagnosing the HVAC system. Compare the vehicles actual scan tool data with the typical data display value table information. Use the data information in order to aid in understanding the nature of the problem when the vehicle does not match with the typical data display values.

The scan tool data values were taken from a known good vehicle under the following conditions:

- The ignition switch is in the ON position.
- The engine is running at idle.
- The vehicle is in PARK.
- The doors are closed.
- The windows are closed.
- The A/C is ON.
- The ambient air temperatures are at 22-27°C (70-80°F).

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	1100 kPa/159 psi
A/C High Side Pressure	Engine Data 2	Volts	2.18 Volts
A/C Off For WOT	Engine Data 2	Yes/No	No
A/C Pressure Disable	Engine Data 2	Yes/No	No
A/C Relay Circuit Status	Output Driver Data	OK/Fault/Invalid State	OK
A/C Relay Command	Engine Data 1/Engine Data 2/EGR Data/Misfire Data	On/Off	On
A/C Request Signal	Engine Data 2	Yes/No	Yes

SCAN TOOL DATA DEFINITIONS

The HVAC Scan Tool Data Definitions contains a brief description of all HVAC related parameters available on the scan tool. The list is in alphabetical order. A given parameter may appear in any one of the data lists. In some cases, the parameter may appear more than once or in more than one data list in order to group certain related parameters together.

PCM - A/C Relay Command

The scan tool displays On or Off. On is displayed when the powertrain control module (PCM) has energized the A/C compressor clutch relay.

PCM - Engine Data 2 - A/C High Side Pressure

The scan tool displays -103 to +3119 kPa (-14 to +452 psi). This parameter represents the A/C refrigerant pressure sensor voltage signal converted to pressure.

PCM - Engine Data 2 - A/C High Side Pressure

The scan tool displays 0-5 volts. The output of the A/C refrigerant pressure sensor.

PCM - Engine Data 2 - A/C Off For WOT

The scan tool displays Yes or No. Yes indicates that the PCM has disabled the A/C compressor, because the throttle position (TP) sensor signal is at wide open throttle.

PCM - Engine Data 2 - A/C Pressure Disable

The scan tool displays Yes or No. Yes is displayed when the system pressure exceeds 3034 kPa (440 psi).

PCM - Engine Data 2 - A/C Request Signal

The scan tool displays Yes or No. Yes is displayed when the HVAC control module is requesting A/C system operation.

PCM - Output Driver Data - A/C Relay Circuit Status

The scan tool displays OK, Fault, or Invalid State. The scan tool indicates the diagnostic state of the A/C relay control circuit.

DTC B0158**Circuit Description**

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

DTC Descriptors

This diagnostic procedure supports the following DTC:

DTC B0158**Outside Air Temperature Sensor Circuit**

This vehicle has DTCs which include DTC Symptoms. For more information on DTC Symptoms, refer to **DTC Symptom Description** .

DTC B0158

DTC Symptom	DTC Symptom Descriptor
05	Short to Battery or Open
06	Short to Ground or Open

Conditions for Running the DTC

The ignition is turned ON.

Conditions for Setting the DTC

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

Action Taken When the DTC Sets

- The DIC will display 15°C (59°F) for outside air temperature.
- The DIC will display SERVICE A/C SYSTEM.

The system operates using a default value.

Conditions for Clearing the DTC

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

Test Description

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

3: This step tests for the proper operation of the circuit in the high voltage range.

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

voltage.

DTC B0158

Step	Action	Values	Yes	No
Schematic Reference: HVAC Schematics				
Connector End View Reference: HVAC Connector End Views				
1	Did you perform the Diagnostic System Check - Vehicle?	-	Go to Step 2	Go to <u>Diagnostic System Check - Vehicle</u>
2	1. Install a scan tool. 2. Turn ON the ignition, with the engine OFF. 3. With a scan tool, observe the Appropriate Air Temp parameter in the Climate Control Panel, Open/Short Data list. Does the scan tool indicate that the Appropriate Air Temp parameter is within the specified range?	2-253 Counts	Go to <u>Testing for Intermittent Conditions and Poor Connections</u>	Go to Step 3
3	1. Turn OFF the ignition. 2. Disconnect the appropriate air temperature sensor. 3. Turn ON the ignition, with the engine OFF. 4. With a scan tool, observe the Appropriate Air Temp parameter. Does the scan tool indicate that the Appropriate Air Temp parameter is greater than the specified value?	253 Counts	Go to Step 4	Go to Step 5
	1. Turn OFF the ignition. 2. Connect a 3-amp fused jumper wire between the signal circuit of the appropriate air temperature sensor and the low reference circuit of the			

2006 Chevrolet Impala LS

2006 HVAC HVAC Systems - Manual - Impala

4	appropriate air temperature sensor. 3. Turn ON the ignition, with the engine OFF. 4. With a scan tool, observe the Appropriate Air Temp parameter. Does the scan tool indicate that the Appropriate Air Temp parameter is less than the specified value?	2 Counts	Go to Step 9	Go to Step 6
5	Test the signal circuit of the appropriate air temperature sensor for a short to ground. Refer to Circuit Testing and Wiring Repairs . Did you find and correct the condition?	-	Go to Step 13	Go to Step 10
6	Test the signal circuit of the appropriate air temperature sensor for a short to voltage, a high resistance, or an open. Refer to Circuit Testing and Wiring Repairs . Did you find and correct the condition?	-	Go to Step 13	Go to Step 7
7	Test the low reference circuit of the appropriate air temperature sensor for a high resistance or an open. Refer to Circuit Testing and Wiring Repairs . Did you find and correct the condition?	-	Go to Step 13	Go to Step 8
8	Test the following signal circuits for a short to voltage: • Ambient air temperature sensor • Ambient light sensor Refer to Circuit Testing and Wiring Repairs . Did you find and correct the condition?	-	Go to Step 13	Go to Step 10
	Inspect for poor connections at the			

2006 Chevrolet Impala LS

2006 HVAC HVAC Systems - Manual - Impala

9	harness connector of the appropriate air temperature sensor. Refer to <u>Testing for Intermittent Conditions and Poor Connections</u> and <u>Connector Repairs</u> . Did you find and correct the condition?	-	Go to Step 13	Go to Step 11
10	Inspect for poor connections at the harness connector of the HVAC control module. Refer to <u>Testing for Intermittent Conditions and Poor Connections</u> and <u>Connector Repairs</u> . Did you find and correct the condition?	-	Go to Step 13	Go to Step 12
11	Replace the appropriate air temperature sensor. Did you complete the replacement?	-	Go to Step 13	-
12	Replace the HVAC control module. Refer to <u>Control Module References</u> for replacement, setup, and programming. Did you complete the replacement?	-	Go to Step 13	-
13	1. Use the scan tool in order to clear the DTCs. 2. Operate the vehicle within the Conditions for Running the DTC as specified in the supporting text. Does the DTC reset?	-	Go to Step 2	System OK

DTC B0223, B0233, B0248, B0268, B0408, B0418, OR B0428

Circuit Description

The HVAC control module controls the HVAC actuators to regulate the airflow through the HVAC system. Each actuator is a 2-wire bi-directional electric motor. 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 the appropriate control circuit for the commanded direction. The HVAC control module reverses the polarity of the control circuits to move the actuator in the opposite direction.

The HVAC control module determines the door position by counting motor pulses on one of the control circuits. The HVAC control module converts the pulses to counts with a range of 0-255 counts.

When a calibration or recalibration procedure is performed, the HVAC control module calculates the door travel range. The HVAC control module compares the total number of pulses to calibrated limits. If the total pulse count is less than or equal to the maximum calibrated limit and more than or equal to the minimum calibrated limit, then the calibration is considered successful.

- Air Flow Control 3 Circuit refers to the mode actuator.
- Air Flow Control 7 Circuit refers to the recirculation actuator.
- Temperature Control 1 Circuit refers to the driver temperature actuator.
- Temperature Control 2 Circuit refers to the passenger temperature actuator.
- Temperature Control 3 Circuit refers to the rear temperature actuator.

DTC Descriptors

This diagnostic procedure supports the following DTCs:

DTC B0223 05

Recirculate Position Command Circuit short to battery or open

DTC B0223 06

Recirculate Position Command Circuit short to ground or open

DTC B0223 61

Recirculate Position Command Circuit actuator stuck

DTC B0233 05

Air Flow Control Circuit short to battery or open

DTC B0233 06

Air Flow Control Circuit short to ground or open

DTC B0233 61

Air Flow Control Circuit actuator stuck

DTC B0248 05

Air Flow Control 3 Circuit short to battery or open

DTC B0248 06

Air Flow Control 3 Circuit short to ground or open

DTC B0248 61

Air Flow Control 3 Circuit actuator stuck

DTC B0268 05

Air Flow Control 7 Circuit short to battery or open

DTC B0268 06

Air Flow Control 7 Circuit short to ground or open

DTC B0268 61

Air Flow Control 7 Circuit actuator stuck

DTC B0408 05

Temperature Control 1 Circuit short to battery or open

DTC B0408 06

Temperature Control 1 Circuit short to ground or open

DTC B0408 61

Temperature Control 1 Circuit actuator stuck

DTC B0418 05

Temperature Control 2 Circuit short to battery or open

DTC B0418 06

Temperature Control 2 Circuit short to ground or open

DTC B0418 61

Temperature Control 2 Circuit actuator stuck

DTC B0418 05

Temperature Control 2 Circuit short to battery or open

DTC B0418 06

Temperature Control 2 Circuit short to ground or open

DTC B0418 61

Temperature Control 2 Circuit actuator stuck

DTC B0428 05

Temperature Control 3 Circuit short to battery or open

DTC B0428 06

Temperature Control 3 Circuit short to ground or open

DTC B0428 61

Temperature Control 3 Circuit actuator stuck

Conditions for Running the DTC

The HVAC control module has completed a calibration/recalibration of the actuator.

Conditions for Setting the DTC

The HVAC control module does not detect any movement of the actuator, after 2 unsuccessful attempts at moving the actuator.

Action Taken When the DTC Sets

The HVAC control module will recalibrate the appropriate actuator each time the ignition switch is turned ON.

Conditions for Clearing the DTC

- The DTC will become history if the HVAC control module no longer detects a failure.
- The history DTC will clear after 100 fault-free ignition cycles.
- The DTC can be cleared with a scan tool.

Diagnostic Aids

Inspect the appropriate actuator door and actuator for the following conditions:

2006 Chevrolet Impala LS

2006 HVAC HVAC Systems - Manual - Impala

- A misaligned actuator
- Broken or binding linkages or actuator door
- Obstruction that prevents the actuator door from operating within its full range of motion
- Missing seals to the actuator door
- Misaligned seals to the actuator door

Test Description

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

3: This step drives the actuator in one direction. The actuator shaft will not move if the actuator door is already in the position you are attempting to drive it to.

4: This step drives the actuator in the opposite direction.

DTC B0223, B0233, B0248, B0268, B0408, B0418, or B0428

Step	Action	Values	Yes	No
Schematic Reference: HVAC Schematics				
Connector End View Reference: HVAC Connector End Views				
1	Did you perform the Diagnostic System Check - Vehicle?	-	Go to Step 2	Go to <u>Diagnostic System Check - Vehicle</u>
2	Test the appropriate door control A circuit and the appropriate door control B circuit for an open, high resistance, short to ground, or a short to voltage. Refer to <u>Circuit Testing</u> and <u>Wiring Repairs</u> . Did you find and correct the condition?	-	Go to Step 10	Go to Step 3
3	1. Turn OFF the ignition. 2. Disconnect the HVAC control module. 3. Connect a 10-amp fused jumper wire between the actuator door control A circuit of the appropriate actuator and battery positive voltage. 4. Connect a 10-amp fused jumper wire between the actuator door	-		

2006 Chevrolet Impala LS

2006 HVAC HVAC Systems - Manual - Impala

	control B circuit of the appropriate actuator and a good ground.		Go to Step 7	Go to Step 4
	Does the actuator shaft rotate?			
4	1. Connect a 10-amp fused jumper wire between the actuator door control B circuit of the appropriate actuator and battery positive voltage. 2. Connect a 10-amp fused jumper wire between the actuator door control A circuit of the appropriate actuator and a good ground.	-	Go to Step 7	Go to Step 5
	Does the actuator shaft rotate?			
5	Inspect the appropriate door and actuator for the following conditions: • A misaligned actuator • Broken or binding linkages or actuator door • An obstruction that prevents the actuator door from operating within its full range of motion • Missing seals to the actuator door • Misaligned seals to the actuator door	-	Go to Step 10	Go to Step 6
	Did you find and correct the condition?			
6	Inspect for poor connections at the harness connector of the appropriate actuator. Refer to Testing for Intermittent Conditions and Poor Connections and Connector Repairs . 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	-		

2006 Chevrolet Impala LS

2006 HVAC HVAC Systems - Manual - Impala

	Connections and Connector Repairs Did you find and correct the condition?		Go to Step 10	Go to Step 9
8	IMPORTANT: Perform the recalibration procedure for the appropriate actuator. Replace the appropriate actuator. Refer to the following: • <u>HVAC Control Assembly Replacement</u> • <u>Mode Actuator Replacement</u> • <u>Air Temperature Actuator Replacement - Left</u> • <u>Air Temperature Actuator Replacement - Right</u> • Rear air temperature actuator Did you complete the replacement?	-	Go to Step 10	-
9	Replace the HVAC control module. Refer to <u>HVAC Control Assembly Replacement</u> for replacement, setup, and programming. Did you complete the replacement?	-	Go to Step 10	-
10	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 P0532 OR P0533

Circuit Description

The powertrain control module (PCM) monitors the high side refrigerant pressure through 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 high, the PCM commands the cooling fans on. When pressure is too high or too low, the PCM will not allow the A/C compressor clutch to engage. The PCM sends the A/C pressure data to the dash integration module (DIM) over the class 2 serial data circuit. The DIM will command the inline A/C orifice solenoid to increase or decrease the high side pressure. This keeps the high side

pressure in a normal operating range. This will prevent the A/C compressor clutch from disengaging under normal operating conditions. The DIM will not request A/C compressor clutch engagement if the A/C pressure is too high.

DTC Descriptors

This diagnostic procedure supports the following DTCs:

DTC P0532

Air Conditioning (A/C) Refrigerant Pressure Sensor Circuit Low Voltage

DTC P0533

Air Conditioning (A/C) Refrigerant Pressure Sensor Circuit High Voltage

Conditions for Running the DTC

The engine is running.

Conditions for Setting the DTC

- A/C pressure of less than 0.1 volt or more than 4.92 volts
- The condition must be present for more than 5 seconds

Action Taken When the DTC Sets

- The PCM will not illuminate the malfunction indicator lamp (MIL)
- The PCM will store the conditions present when the DTC set as Fail Records data only.

Conditions for Clearing the DTC

- The history DTC will clear after 40 consecutive warm-up cycles have occurred without a malfunction.
- The DTC can be cleared by using the scan tool Clear DTC Information function.

Diagnostic Aids

Test the following conditions:

- Visually inspect the sensor for contamination or damage.
- Inspect for the following that may affect the sensors accuracy:
 - A malfunction within the refrigerant system causing low pressure
 - Visually inspect the A/C components and lines for damage.
- Refer to **Testing for Intermittent Conditions and Poor Connections** .

Test Description

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

4: This step tests for the proper operation of the circuit in the low voltage range.

5: This step 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.

6: This step tests for a short to voltage in the 5-volt reference circuit.

7: This step tests for a high resistance or an open in the low reference circuit.

DTC P0532 or P0533

Step	Action	Values	Yes	No
Schematic Reference: NEED LINK MISSING MISSING Connector End View Reference: NEED LINK MISSING MISSING				
1	Did you perform the Diagnostic System Check - Vehicle?	-	Go to Step 2	Go to Diagnostic System Check - Vehicle
2	IMPORTANT: The ambient air temperature must be above 3°C (38°F). 1. Turn OFF the ignition. 2. Inspect the A/C compressor for free rotation operation. 3. Start the engine. 4. Place the HVAC Control Module in the OFF position. Does the A/C compressor operate?	-	Go to NEED LINK or step	Go to Step 3
3	1. Install a scan tool. 2. Turn ON the ignition, with the engine OFF. 3. With a scan tool, observe the A/C High Side Pressure parameter in the powertrain control module Engine Data 2 list. Does the scan tool indicate that the	0.1-4.9 V	Go to	

2006 Chevrolet Impala LS

2006 HVAC HVAC Systems - Manual - Impala

	A/C High Side Pressure parameter is within the specified range?		Diagnostic Aids	Go to Step 4
4	1. Turn OFF the ignition. 2. Disconnect the A/C refrigerant pressure sensor. 3. Turn ON the ignition, with the engine OFF. 4. With a scan tool, observe the A/C High Side Pressure parameter in the powertrain control module Engine Data 2 list. Does the scan tool indicate that the A/C High Side Pressure parameter is less than the specified value?	0.1 V	Go to Step 5	Go to Step 11
5	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 in the powertrain control module Engine Data 2 list. 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 6	Go to Step 9
6	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	4.9 V		

2006 Chevrolet Impala LS

2006 HVAC HVAC Systems - Manual - Impala

	pressure sensor.			
	Does the voltage measure less than the specified value?		Go to Step 7	Go to Step 8
7	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		
			Go to Step 13	Go to Step 12
8	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 . Did you find and correct the condition?	-		
			Go to Step 17	Go to Step 14
9	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 . Did you find and correct the condition?	-		
			Go to Step 17	Go to Step 10
10	Test the signal circuit of the A/C refrigerant pressure sensor for a short to ground. Refer to Circuit Testing and Wiring Repairs . Did you find and correct the condition?	-		
			Go to Step 17	Go to Step 14
11	Test the signal circuit of the A/C refrigerant pressure sensor for a short to voltage. Refer to Circuit Testing and Wiring Repairs . Did you find and correct the condition?	-		
			Go to Step 17	Go to Step 14
	1. Disconnect the HVAC control module. 2. Test the low reference circuit of			

2006 Chevrolet Impala LS

2006 HVAC HVAC Systems - Manual - Impala

12	the A/C refrigerant pressure sensor for a high resistance or an open. Refer to Circuit Testing and Wiring Repairs . Did you find and correct the condition?	-	Go to Step 17	Go to Step 14
13	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 . Did you find and correct the condition?	-	Go to Step 17	Go to Step 15
14	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 . Did you find and correct the condition?	-	Go to Step 17	Go to Step 16
15	Replace the A/C refrigerant pressure sensor. Refer to NEED LINK MISSING MISSING . Did you complete the replacement?	-	Go to Step 17	-
16	Replace the powertrain control module. Refer to Control Module References for replacement, setup, and programming. Did you complete the replacement?	-	Go to Step 17	-
17	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 P0645

Circuit Description

Ignition voltage is supplied directly to the A/C compressor clutch relay. The powertrain control module (PCM) controls the relay by grounding the control circuit through an internal solid state device called a driver. The primary function of the driver is to supply the ground for the component being controlled. Each driver has a fault line, which is monitored by the PCM. When the PCM is commanding a component ON, the voltage of the control circuit should be near 0 volts. When the PCM is commanding the control circuit to a component OFF, the voltage potential of the circuit should be near battery voltage.

DTC Descriptor

This diagnostic procedure supports the following DTC:

DTC P0645**Air Conditioning Clutch Relay Control Circuit****Conditions for Running the DTC**

- The ignition voltage is between 9-18 volts.
- The PCM driver is activated for at least 0.5 second.

Conditions for Setting the DTC

The PCM detects an improper voltage level on the output circuit that controls the A/C relay.

Action Taken When the DTC Sets

- The PCM will not illuminate the malfunction indicator lamp (MIL).
- The PCM stores the failure records.
- The A/C compressor clutch is disabled.

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 consecutive warm-up cycles have occurred without a malfunction.
- The DTC can be cleared with a scan tool.

Test Description

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

3: Listen for an audible click when the A/C compressor clutch relay operates. Command both the ON and OFF states. Repeat the commands, as necessary.

2006 Chevrolet Impala LS

2006 HVAC HVAC Systems - Manual - Impala

4: This step tests for voltage at the coil side of the A/C compressor clutch relay. The 10-amp fuse supplies power to the coil side of the A/C compressor clutch relay.

5: This step verifies that the PCM is providing ground to the A/C compressor clutch relay.

6: This step tests if ground is constantly being applied to the A/C compressor clutch relay.

7: This step tests for a short to voltage or an open.

13: Perform the programming procedure for the PCM.

DTC P0645

Step	Action	Yes	No
Schematic Reference: HVAC Schematics Connector End View Reference: HVAC Connector End Views			
1	Did you perform the Diagnostic System Check - Vehicle?	Go to Step 2	Go to <u>Diagnostic System Check - Vehicle</u>
2	IMPORTANT: The ambient air temperature must be above 3°C (38°F). 1. Turn OFF the ignition. 2. Inspect the A/C compressor for free rotation operation. 3. Start the engine. 4. Place the HVAC control module in the OFF position. Does the A/C compressor operate?	Go to <u>HVAC Compressor Clutch Does Not Disengage</u>	Go to Step 3
3	1. Install a scan tool. 2. Turn ON the ignition, with the engine OFF. 3. With a scan tool, command the A/C Relay ON and OFF in the Special Functions, Engine Output Controls list. Does the A/C Relay turn ON and OFF with each command?	Go to <u>Testing for Intermittent Conditions and Poor Connections</u>	Go to Step 4
	1. Turn OFF the ignition. 2. Disconnect the A/C compressor clutch relay.		

2006 Chevrolet Impala LS

2006 HVAC HVAC Systems - Manual - Impala

4	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 a good ground. Does the test lamp illuminate?	Go to Step 5	Go to Step 11
5	1. Connect a test lamp between the control circuit of the A/C compressor clutch relay and the ignition 3 voltage circuit of the A/C compressor clutch relay. 2. With a scan tool, command the A/C Relay ON and OFF. Does the test lamp turn ON and OFF with each command?	Go to Step 9	Go to Step 6
6	Does the test lamp remain illuminated with each command?	Go to Step 8	Go to Step 7
7	Test the control circuit of the A/C compressor clutch relay for a short to voltage or an open. Refer to Circuit Testing and Wiring Repairs . Did you find and correct the condition?	Go to Step 14	Go to Step 10
8	Test the control circuit of the A/C compressor clutch relay for a short to ground. Refer to Circuit Testing and Wiring Repairs . Did you find and correct the condition?	Go to Step 14	Go to Step 10
9	Inspect for poor connections at the A/C compressor clutch relay. Refer to Testing for Intermittent Conditions and Poor Connections and Connector Repairs . 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 Connector Repairs . Did you find and correct the condition?	Go to Step 14	Go to Step 13
	Repair the ignition 3 voltage circuit of the A/C compressor clutch relay. Refer to		

11	Wiring Repairs . Did you complete the repair?	Go to Step 14	-
12	Replace the A/C compressor clutch relay. Refer to Relay Replacement (Within an Electrical Center) or Relay Replacement (Attached to Wire Harness) . Did you complete the replacement?	Go to Step 14	-
13	Replace the PCM. Refer to Control Module References for replacement, setup, and programming. Did you complete the replacement?	Go to Step 14	-
14	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: Review the system operation in order to familiarize yourself with the system functions. Refer to:

- **Air Delivery Description and Operation**
- **Air Temperature Description and Operation**

Visual/Physical Inspection

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

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

Intermittent

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

Symptom List

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

- **HVAC Compressor Clutch Does Not Engage**
- **HVAC Compressor Clutch Does Not Disengage**
- **Blower Motor Always On**
- **Blower Motor Inoperative**
- **Blower Motor Malfunction**
- **Too Hot in Vehicle**
- **Too Cold in Vehicle**
- **Air Delivery Improper**
- **Leak Testing**
- **Defrosting Insufficient**
- **Noise Diagnosis - Blower Motor**
- **Noise Diagnosis - Air Conditioning (A/C) System**
- **Noise Diagnosis - HVAC Module**
- **Odor Diagnosis**

HVAC COMPRESSOR CLUTCH DOES NOT ENGAGE**Test Description**

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

2: The A/C compressor relay output is disabled if engine coolant temperature is above 124°C (255°F).

3: Placing the fan switch in the ON position, along with placing the air temperature control switch in a cold setting, activates A/C operation. For the purpose of this and

future steps where A/C operation is necessary, bi-level mode is used for consistent testing.

6: The HVAC control module is inoperative when the module does not respond to any operator control requests to enable the A/C compressor. The blower motor may still operate independent of the A/C controls.

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 Diagnostic System Check - Vehicle?	-	Go to Step 2	Go to <u>Diagnostic System Check - Vehicle</u>
2	1. Install a scan tool. 2. Start the engine. 3. With a scan tool, observe the Engine Coolant Temperature Sensor (ECT) parameter in the Powertrain data list. Does the scan tool indicate that the ECT parameter is above the specified temperature?	124°C (255°F)	Go to <u>Engine Overheating</u>	Go to Step 3
3	IMPORTANT: Ambient air temperature must be above 3°C (38°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 air temperature switch in the coldest position. Does the A/C compressor operate?	-	Go to <u>Testing for Intermittent Conditions and Poor Connections</u>	Go to Step 4
	1. Park the vehicle inside or in the shade.			

2006 Chevrolet Impala LS

2006 HVAC HVAC Systems - Manual - Impala

4	- Open the windows in order to ventilate the interior of the vehicle. - Turn OFF the ignition. - Install the J 43600 ACR 2000 Air Conditioning Service Center. - Record the ambient air temperature at the vehicle. - Record readings of the low and high side STATIC pressures. - Compare the pressure values with the specifications for the ambient air temperature. Refer to <u>Air Conditioning (A/C) System Performance Test (LZE, LZ4, LZ9)</u> or <u>Air Conditioning (A/C) System Performance Test (LS4)</u>. Are the pressure values within specifications for the ambient air temperature, and within 103 kPa (15 psi) of each other?	-	Go to Step 5	Go to 48125
5	- Turn ON the ignition, with the engine OFF. - With a scan tool, observe the A/C High Side Pressure parameter in the Powertrain Control Module engine data 2 list. - Compare the A/C High Side Pressure on the scan tool to the high side pressure value on the J 43600. Are the high side pressure values within 103 kPa (15 psi) of each other?	-	Go to Step 6	Go to Step 16
6	Is the HVAC control module inoperative?	-	Go to Step 15	Go to Step 7

2006 Chevrolet Impala LS

2006 HVAC HVAC Systems - Manual - Impala

7	1. Start the engine. 2. With a scan tool, observe the A/C Request Signal parameter in the Powertrain Control Module engine data 2 list. 3. Place the air temperature switch in the coldest position. 4. Place the A/C request switch in the ON position. Does the scan tool indicate that the A/C Request Signal parameter is YES?	-	Go to Step 8	Go to Step 27
8	With a scan tool, observe the A/C Relay Command status in the powertrain control module (PCM) data list. Does the scan tool indicate that the A/C Relay Command status is ON?	-	Go to Step 9	Go to Step 28
9	With a scan tool, command the A/C Relay ON and OFF. Does the A/C compressor clutch relay turn ON and OFF with each command?	-	Go to Step 13	Go to Step 10
10	1. Turn OFF the ignition. 2. Disconnect the A/C compressor clutch relay. 3. Turn ON the ignition, with the engine OFF. 4. Probe the coil side battery positive voltage circuit of the A/C compressor clutch relay with a test lamp that is connected to a good ground. Does the test lamp illuminate?	-	Go to Step 11	Go to Step 23
	1. Connect a test lamp between the A/C compressor clutch relay control circuit of the A/C compressor clutch relay and the coil side battery positive voltage			

2006 Chevrolet Impala LS

2006 HVAC HVAC Systems - Manual - Impala

11	supply circuit of the A/C compressor clutch relay. 2. With a scan tool, command the A/C Relay ON and OFF. Does the test lamp turn ON and OFF with each command?	-	Go to Step 25	Go to Step 12
12	Does the test lamp remain illuminated with each command?	-	Go to Step 19	Go to Step 18
13	1. Turn OFF the ignition. 2. Disconnect the A/C compressor clutch relay. 3. Probe the switch side battery positive voltage circuit of the A/C compressor clutch relay with a test lamp that is connected to a good ground. Does the test lamp illuminate?	-	Go to Step 14	Go to Step 22
14	Connect a 10-amp fused jumper wire between the switch side battery positive voltage circuit of the A/C compressor clutch relay and the A/C compressor clutch supply voltage circuit of the A/C compressor clutch. Does the A/C compressor clutch engage?	-	Go to Step 25	Go to Step 20
15	Test the ignition 3 voltage circuit of the HVAC control module for the following: • A short to ground • A high resistance • An open Refer to Circuit Testing and Wiring Repairs . Did you find and correct the condition?	-	Go to Step 34	Go to Step 17
	Test the ground circuit of the A/C refrigerant pressure sensor for an			

2006 Chevrolet Impala LS

2006 HVAC HVAC Systems - Manual - Impala

16	open. Refer to Circuit Testing and Wiring Repairs . Did you find and correct the condition?	-	Go to Step 34	Go to Step 24
17	Test the ground circuit of the HVAC control module for an open. Refer to Circuit Testing and Wiring Repairs . Did you find and correct the condition?	-	Go to Step 34	Go to Step 27
18	Test the A/C compressor clutch relay control circuit of the A/C compressor clutch relay for an open. Refer to Circuit Testing and Wiring Repairs . Did you find and correct the condition?	-	Go to Step 34	Go to Step 28
19	Test the A/C compressor clutch relay control circuit of the A/C compressor clutch relay for a short to ground. Refer to Circuit Testing and Wiring Repairs . Did you find and correct the condition?	-	Go to Step 34	Go to Step 28
20	Test the A/C compressor clutch supply voltage circuit at the A/C compressor clutch for the following: • A short to ground • A high resistance • An open Refer to Circuit Testing and Wiring Repairs . Did you find and correct the condition?	-	Go to Step 34	Go to Step 21
21	Test the ground circuit of the A/C compressor clutch for a high resistance or an open. Refer to Circuit Testing and Wiring Repairs . Did you find and correct the	-		Go to Step

2006 Chevrolet Impala LS

2006 HVAC HVAC Systems - Manual - Impala

	condition?		Go to Step 34	26
22	Repair the switch side battery positive voltage circuit of the A/C compressor clutch relay. Refer to Wiring Repairs . Did you complete the repair?	-	Go to Step 34	-
23	Repair the coil side battery positive voltage circuit of the A/C compressor clutch relay. Refer to Wiring Repairs . Did you complete the repair?	-	Go to Step 34	-
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 Connector Repairs . Did you find and correct the condition?	-	Go to Step 34	Go to Step 29
25	Inspect for poor connections at the A/C compressor clutch relay. Refer to Testing for Intermittent Conditions and Poor Connections and Connector Repairs . Did you find and correct the condition?	-	Go to Step 34	Go to Step 30
26	Inspect for poor connections at the harness connector of the A/C compressor clutch. Refer to Testing for Intermittent Conditions and Poor Connections and Connector Repairs . Did you find and correct the condition?	-	Go to Step 34	Go to Step 31
27	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 . Did you find and correct the condition?	-	Go to Step 34	Go to Step 32
	Inspect for poor connections at the			

2006 Chevrolet Impala LS

2006 HVAC HVAC Systems - Manual - Impala

28	harness connector of the PCM. Refer to Testing for Intermittent Conditions and Poor Connections and Connector Repairs . Did you find and correct the condition?	-	Go to Step 34	Go to Step 33
29	Replace the A/C refrigerant pressure sensor. Refer to Air Conditioning (A/C) Refrigerant Pressure Sensor Replacement . Did you complete the replacement?	-	Go to Step 34	-
30	Replace the A/C compressor clutch relay. Refer to Relay Replacement (Within an Electrical Center) or Relay Replacement (Attached to Wire Harness) . Did you complete the replacement?	-	Go to Step 34	-
31	Replace the A/C compressor clutch. Refer to Compressor Clutch Assembly Replacement . Did you complete the replacement?	-	Go to Step 34	-
32	Replace the HVAC control module. Refer to Control Module References for replacement, setup, and programming. Did you complete the replacement?	-	Go to Step 34	-
33	Replace the PCM. Refer to Control Module References for replacement, setup, and programming. Did you complete the replacement?	-	Go to Step 34	-
34	Operate the system in order to verify the repair. Did you correct the condition?	-	System OK	Go to Step 4

HVAC COMPRESSOR CLUTCH DOES NOT DISENGAGE

HVAC Compressor Clutch Does Not Disengage

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 disengage when an A/C request has not been made and a Powertrain DTC has not been set.				
	Did you perform the Diagnostic			Go to

2006 Chevrolet Impala LS

2006 HVAC HVAC Systems - Manual - Impala

1	System Check - Vehicle?	-	Go to Step 2	<u>Diagnostic System Check - Vehicle</u>
2	1. Start the engine. 2. Place the blower motor switch in the OFF position. 3. Place the A/C request switch in the OFF position. Does the A/C compressor operate?	-	Go to Step 3	Go to <u>Testing for Intermittent Conditions and Poor Connections</u>
3	With a scan tool, observe the A/C Relay Command status in the powertrain control module (PCM) engine data 2 list. Does the scan tool indicate that the A/C Relay Command status is ON?	-	Go to Step 4	Go to Step 5
4	With a scan tool, observe the A/C Request Signal parameter in the PCM engine data 2 list. Does the scan tool indicate that the A/C Request Signal parameter is YES?	-	Go to Step 10	Go to Step 11
5	Remove the A/C compressor clutch relay. Does the A/C compressor clutch turn OFF?	-	Go to Step 6	Go to Step 8
6	Measure the resistance between the switch side A/C compressor clutch relay terminals. Does the resistance measurement equal the specified value?	infinity	Go to Step 7	Go to Step 9
7	Test the A/C compressor clutch relay control circuit for a short to ground. Refer to <u>Circuit Testing</u> and <u>Wiring Repairs</u> . Did you find and correct the condition?	-	Go to Step 16	Go to Step 11
8	Test the A/C compressor clutch supply voltage circuit for a short to voltage. Refer to <u>Circuit Testing</u> and <u>Wiring Repairs</u> .	-		

2006 Chevrolet Impala LS

2006 HVAC HVAC Systems - Manual - Impala

	Did you find and correct the condition?		Go to Step 16	Go to Step 13
9	Inspect for poor connections at the A/C compressor clutch relay. Refer to <u>Testing for Intermittent Conditions and Poor Connections</u> and <u>Connector Repairs</u> . Did you find and correct the condition?	-	Go to Step 16	Go to Step 12
10	Inspect for poor connections at the harness connector of the HVAC control module. Refer to <u>Testing for Intermittent Conditions and Poor Connections</u> and <u>Connector Repairs</u> . 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 PCM. Refer to <u>Testing for Intermittent Conditions and Poor Connections</u> and <u>Connector Repairs</u> . Did you find and correct the condition?	-	Go to Step 16	Go to Step 15
12	Replace the A/C compressor clutch relay. Refer to <u>Relay Replacement (Within an Electrical Center)</u> or <u>Relay Replacement (Attached to Wire Harness)</u> . Did you complete the replacement?	-	Go to Step 16	-
13	Replace the A/C compressor clutch. Refer to <u>Compressor Clutch Assembly Replacement</u> . Did you complete the replacement?	-	Go to Step 16	-
14	Replace the HVAC control module. Refer to <u>Control Module References</u> for replacement, setup, and programming. Did you complete the replacement?	-	Go to Step 16	-
15	Replace the PCM. Refer to <u>Control Module References</u> for replacement, setup, and programming. Did you complete the replacement?	-	Go to Step 16	-

2006 Chevrolet Impala LS

2006 HVAC HVAC Systems - Manual - Impala

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

Blower Motor Always On

Step	Action	Values	Yes	No
Schematic Reference: HVAC Schematics Connector End View Reference: HVAC Connector End Views DEFINITION: The blower motor is ON while the HVAC control is in the OFF position.				
1	Did you perform the Diagnostic System Check - Vehicle?	-	Go to Step 2	Go to Diagnostic System Check - Vehicle
2	1. Turn ON the ignition, with the engine OFF. 2. Turn OFF the HVAC controls. Is the blower motor OFF?	-	Go to Testing for Intermittent Conditions and Poor Connections	Go to Step 3
3	1. Install a scan tool. 2. With the scan tool, observe the Desired Blower Mtr Speed parameter in the Heating and Air Conditioning data list. Does the scan tool indicate that the Desired Blower Mtr Speed parameter is near the specified value?	0 counts	Go to Step 4	Go to Step 7
4	Disconnect the HVAC control module. Does the blower motor continue to operate?	-	Go to Step 5	Go to Step 7
5	Inspect or test the blower motor housing and the blower motor speed control circuit in the blower motor harness for a short to ground. Refer to Circuit Testing and Wiring Repairs . Did you find and correct the	-		

2006 Chevrolet Impala LS

2006 HVAC HVAC Systems - Manual - Impala

	condition?		Go to Step 10	Go to Step 6
6	Inspect for poor connections at the harness connector of the blower motor control processor. Refer to <u>Testing for Intermittent Conditions and Poor Connections</u> and <u>Connector Repairs</u> . 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 <u>Testing for Intermittent Conditions and Poor Connections</u> and <u>Connector Repairs</u> . Did you find and correct the condition?	-	Go to Step 10	Go to Step 9
8	Replace the blower motor control processor. Refer to <u>Blower Motor Replacement</u> . Did you complete the replacement?	-	Go to Step 10	-
9	Replace the HVAC control module. Refer to <u>Control Module References</u> for replacement, setup, and programming. 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 INOPERATIVE

Blower Motor Inoperative

Step	Action	Values	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 Diagnostic System Check - Vehicle?	-	Go to Step 2	Go to <u>Diagnostic System Check - Vehicle</u>

2006 Chevrolet Impala LS

2006 HVAC HVAC Systems - Manual - Impala

2	1. Turn ON the ignition, with the engine OFF. 2. Place the blower 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 connector. 3. Turn ON the ignition, with the engine OFF. 4. Connect a test lamp between the blower motor supply voltage circuit and the blower motor control circuit. 5. Place the blower motor switch in the minimum speed position. Does the test lamp illuminate?	-	Go to Step 9	Go to Step 4
4	Test the battery positive voltage circuit of the blower motor control processor for an open, a high resistance or a short to ground. Refer to Circuit Testing and Wiring Repairs . Did you find and correct the condition?	-	Go to Step 15	Go to Step 5
5	Test the ground circuit of the blower motor control processor for an open or a high resistance. Refer to Circuit Testing and Wiring Repairs . Did you find and correct the condition?	-	Go to Step 15	Go to Step 6
	IMPORTANT: Ensure that the blower motor control processor connector and			

2006 Chevrolet Impala LS

2006 HVAC HVAC Systems - Manual - Impala

6	the HVAC control module connectors are connected during this step in order to avoid misdiagnosis. 1. Measure the voltage from the blower motor speed control circuit at the HVAC control module to a good ground. 2. With a scan tool, command the blower motor OFF and ON. Does the voltage measure near the specified values for each commanded state?	5 V OFF 1 V ON			
			Go to Step 10	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. Measure the voltage from the blower motor speed control circuit of the HVAC control module to a good ground. Does the voltage measure near the specified value?	5 V			
			Go to Step 11	Go to Step 8	
8	Test the blower motor speed control circuit of the HVAC control module for an open, short to ground or short to voltage. Refer to Circuit Testing and Wiring Repairs . Did you find and correct the condition?		Go to Step 15		
	Inspect for poor connections at the harness connector of the blower motor. Refer to				Go to Step 10

2006 Chevrolet Impala LS

2006 HVAC HVAC Systems - Manual - Impala

9	<u>Testing for Intermittent Conditions and Poor Connections and Connector Repairs</u> . Did you find and correct the condition?	-	Go to Step 15	Go to Step 12
10	Inspect for poor connections at the harness connector of the blower motor control processor. Refer to <u>Testing for Intermittent Conditions and Poor Connections and Connector Repairs</u> . Did you find and correct the condition?	-	Go to Step 15	Go to Step 13
11	Inspect for poor connections at the harness connector of the HVAC control module. Refer to <u>Testing for Intermittent Conditions and Poor Connections and Connector Repairs</u> . Did you find and correct the condition?	-	Go to Step 15	Go to Step 14
12	Replace the blower motor. Refer to <u>Blower Motor Replacement</u> . Did you complete the replacement?	-	Go to Step 15	-
13	Replace the blower motor control processor. Refer to <u>Blower Motor Replacement</u> . Did you complete the replacement?	-	Go to Step 15	-
14	Replace the HVAC control module. Refer to <u>Control Module References</u> for replacement, setup, and programming. Did you complete the replacement?	-	Go to Step 15	-
15	Operate the system in order to verify the repair.	-		

Did you correct the condition?

System OK

Go to **Step 2****BLOWER MOTOR MALFUNCTION****Test Description**

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

- 2:** This step will determine if one or more blower speeds are inoperative.
- 3:** This step determines if the HVAC control module and blower motor control processor are attempting to control the blower motor speed.
- 5:** The measured voltage on the blower motor speed control circuit should steadily decrease from 4.6 volts to 1.1 volts as the blower motor speed is adjusted from the minimum speed position to the maximum speed position.

Blower Motor Malfunction

Step	Action	Values	Yes	No
Schematic Reference: <u>HVAC Schematics</u> Connector End View Reference: <u>HVAC Connector End Views</u> DEFINITION: The blower motor operates in at least one, but not all, speed positions.				
1	Did you perform the Diagnostic System Check - Vehicle?	-	Go to Step 2	Go to Diagnostic System Check - Vehicle
2	1. Turn ON the ignition, with the engine OFF. 2. Place the blower motor switch in each speed position. Does the blower motor operate at the desired speeds?	-	Go to Testing for Intermittent Conditions and Poor Connections	Go to Step 3
3	1. Turn OFF the ignition. 2. Disconnect the blower motor connector. 3. Turn ON the ignition, with the engine OFF. 4. Connect a test lamp between the blower motor supply voltage circuit and the blower motor control circuit. 5. Place the blower motor switch	-		

2006 Chevrolet Impala LS

2006 HVAC HVAC Systems - Manual - Impala

	from the minimum speed position to the maximum speed position. Does the test lamp illuminate and increase intensity?		Go to Step 7	Go to Step 4
4	Test the battery positive voltage circuit and ground circuit of the blower motor control processor for high resistance. Refer to Circuit Testing and Wiring Repairs . Did you find and correct the condition?	-	Go to Step 13	Go to Step 5
5	IMPORTANT: Ensure that the blower motor control processor and HVAC control module connectors are connected during this step in order to avoid misdiagnosis. 1. Backprobe and measure the voltage from the blower motor speed control circuit at the HVAC control module to a good ground. 2. Gradually adjust the blower motor switch from the minimum speed position to the maximum speed position. Does the measured voltage continuously decrease between the specified values?	4.7-1 V	Go to Step 8	Go to Step 6
6	1. Turn OFF the ignition. 2. Disconnect the HVAC control module. 3. Turn ON the ignition, with the engine OFF. 4. Measure the voltage from the blower motor speed control circuit of the HVAC control module to a good ground. Does the voltage measure near the	5 V		

2006 Chevrolet Impala LS

2006 HVAC HVAC Systems - Manual - Impala

	specified value?		Go to Step 8	Go to Step 9
7	Inspect for poor connections at the harness connector of the blower motor. Refer to <u>Testing for Intermittent Conditions and Poor Connections</u> and <u>Connector Repairs</u> . Did you find and correct the condition?	-	Go to Step 13	Go to Step 10
8	Inspect for poor connections at the harness connector of the blower motor control processor. Refer to <u>Testing for Intermittent Conditions and Poor Connections</u> and <u>Connector Repairs</u> . Did you find and correct the condition?	-	Go to Step 13	Go to Step 11
9	Inspect for poor connections at the harness connector of the HVAC control module. Refer to <u>Testing for Intermittent Conditions and Poor Connections</u> and <u>Connector Repairs</u> . Did you find and correct the condition?	-	Go to Step 13	Go to Step 12
10	Replace the blower motor. Refer to <u>Blower Motor Replacement</u> . Did you complete the replacement?	-	Go to Step 13	-
11	Replace the blower motor control processor. Refer to <u>Blower Motor Replacement</u> . Did you complete the replacement?	-	Go to Step 13	-
12	Replace the HVAC control module. Refer to <u>Control Module References</u> for replacement, setup, and programming. Did you complete the replacement?	-	Go to Step 13	-
13	Operate the system in order to verify the repair. Did you correct the condition?	-	System OK	Go to Step 2

TOO HOT IN VEHICLE

Too Hot in Vehicle

Step	Action	Values	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 Diagnostic System Check - Vehicle?	-	Go to Step 2	Go to <u>Diagnostic System Check - Vehicle</u>
2	1. Turn ON the ignition, with the engine OFF. 2. Place the blower motor switch in each speed position. Does the blower motor operate in any of the speed positions?	-	Go to Step 3	Go to <u>Blower Motor Inoperative</u>
3	Does the blower motor operate at the desired speeds?	-	Go to Step 4	Go to <u>Blower Motor Malfunction</u>
4	When the A/C is ON, does the customer concern occur?	-	Go to Step 5	Go to Step 7
5	1. Start the engine. 2. Place the blower motor switch in the maximum speed position. 3. Place the mode switch in the MAX position. Does the recirculation door move to the recirculation position?	-	Go to Step 6	Go to <u>Air Delivery Improper</u>
6	1. Place the blower motor switch in the maximum speed position. 2. Place the mode switch in the MAX position. 3. Place the temperature switch in the coldest position. Does the A/C compressor operate?	-	Go to Step 7	Go to <u>HVAC Compressor Clutch Does Not Engage</u>
	Perform the refrigerant system performance test. Refer to <u>Air</u>			

2006 Chevrolet Impala LS

2006 HVAC HVAC Systems - Manual - Impala

7	<u>Conditioning (A/C) System Performance Test (LZE, LZ4, LZ9) or Air Conditioning (A/C) System Performance Test (LS4) .</u> Did you find and correct the condition?	-	Go to Step 18	Go to Step 8
8	1. Observe the drive shaft of the air temperature actuator. 2. Place the air temperature switch from the coldest position to the warmest position. Does the air temperature actuator drive shaft rotate at all?	-	Go to Step 9	Go to Step 10
9	Inspect the air temperature door and the air temperature actuator for the following conditions: • A misaligned air temperature actuator-Refer to <u>Air Temperature Actuator Replacement - Right</u> or <u>Air Temperature Actuator Replacement - Left</u>. • Broken or binding linkages or air temperature door • An obstruction that prevents the air temperature door from operating within its full range of motion • Missing seals to the air temperature door • Misaligned seals to the air temperature door Did you find and correct the condition?	-	Go to Step 18	Go to Step 10
10	Test the control A and control B circuits of the air temperature actuator for an open or a high resistance. Refer to <u>Circuit Testing</u> and <u>Wiring</u>	-		

2006 Chevrolet Impala LS

2006 HVAC HVAC Systems - Manual - Impala

	Repairs . Did you find and correct the condition?		Go to Step 18	Go to Step 11
11	1. Connect a test lamp between the air temperature actuator control A circuit and the control B circuit. 2. Move the air temperature control from hot to cold. Does the test lamp illuminate with each command?	-	Go to Step 14	Go to Step 12
12	Test the ignition 3 voltage circuit of the HVAC control module for the following: • An open • A high resistance • A short to ground Refer to Circuit Testing and Wiring Repairs . Did you find and correct the condition?	-	Go to Step 18	Go to Step 13
13	Test the ground circuit of the HVAC control module for an open or high resistance. Refer to Circuit Testing and Wiring Repairs . Did you find and correct the condition?	-	Go to Step 18	Go to Step 15
14	Inspect for poor connections at the harness connector of the air temperature actuator. Refer to Testing for Intermittent Conditions and Poor Connections and Connector Repairs . Did you find and correct the condition?	-	Go to Step 18	Go to Step 16
	Inspect for poor connections at the harness connector of the HVAC control module. Refer to Testing for			

2006 Chevrolet Impala LS

2006 HVAC HVAC Systems - Manual - Impala

15	<u>Intermittent Conditions and Poor Connections and Connector Repairs</u> . Did you find and correct the condition?	-	Go to Step 18	Go to Step 17
16	Replace the air temperature actuator. Refer to <u>Air Temperature Actuator Replacement - Right</u> or <u>Air Temperature Actuator Replacement - Left</u> . Did you complete the replacement?	-	Go to Step 18	-
17	Replace the HVAC control module. Refer to <u>Control Module References</u> for replacement, setup, and programming. 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

TOO COLD IN VEHICLE

Too Cold in Vehicle

Step	Action	Values	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 Diagnostic System Check - Vehicle?	-	Go to Step 2	Go to <u>Diagnostic System Check - Vehicle</u>
2	1. Turn ON the ignition, with the engine OFF. 2. Place the blower motor switch in each speed position. Does the blower motor operate in any of the speed positions?	-	Go to Step 3	Go to <u>Blower Motor Inoperative</u>
3	Does the blower motor operate at the desired speeds?	-	Go to Step 4	Go to <u>Blower Motor Malfunction</u>

2006 Chevrolet Impala LS

2006 HVAC HVAC Systems - Manual - Impala

4	Inspect the cooling system for the following conditions: • A low coolant level • A loose or worn accessory drive belt • A leaking radiator hose or heater hose • A kinked radiator hose or heater hose • A missing radiator cap pressure seal • A leaking radiator cap Refer to <u>Heating Performance Diagnostic</u> . Did you find and correct the condition?	-	Go to Step 18	Go to Step 5
5	1. Start the engine. 2. Place the blower motor switch in the maximum speed position. 3. Place the mode switch in the MAX position. Does the recirculation door move to the recirculation position?	-	Go to Step 6	Go to <u>Air Delivery Improper</u>
6	Place the mode switch in the VENT or HTR positions. Does the A/C compressor operate?	-	Go to <u>HVAC Compressor Clutch Does Not Disengage</u>	Go to Step 7
7	1. Observe the drive shaft of the air temperature actuator. 2. Place the air temperature switch from the coldest position to the warmest position. Does the air temperature actuator drive shaft rotate at all?	-	Go to Step 8	Go to Step 10
	Inspect the air temperature door and			

8	the air temperature actuator for the following conditions: • A misaligned air temperature actuator-Refer to <u>Air Temperature Actuator Replacement - Right</u> or <u>Air Temperature Actuator Replacement - Left</u>. • Broken or binding linkages or air temperature door • An obstruction that prevents the air temperature door from operating within its full range of motion • Missing seals to the air temperature door • Misaligned seals to the air temperature door Did you find and correct the condition?	-	Go to Step 18	Go to Step 9
9	Test the air temperature actuator control A and control B circuits of the air temperature actuator for an open or a high resistance. Refer to <u>Circuit Testing</u> and <u>Wiring Repairs</u> . Did you find and correct the condition?	-	Go to Step 18	Go to Step 10
10	1. Connect a test lamp between the air temperature actuator control A circuit and the control B circuit. 2. Move the air temperature control from hot to cold. Does the test lamp illuminate with each command?	-	Go to Step 13	Go to Step 11
	Test the ignition 3 voltage circuit of the HVAC control module for the			

2006 Chevrolet Impala LS

2006 HVAC HVAC Systems - Manual - Impala

11	following: • An open • A high resistance • A short to ground Refer to Circuit Testing and Wiring Repairs . Did you find and correct the condition?	-	Go to Step 18	Go to Step 12
12	Test the ground circuit of the HVAC control module for an open or high resistance. Refer to Circuit Testing and Wiring Repairs . Did you find and correct the condition?	-	Go to Step 18	Go to Step 15
13	Inspect for poor connections at the harness connector of the air temperature actuator. Refer to Testing for Intermittent Conditions and Poor Connections and Connector Repairs . Did you find and correct the condition?	-	Go to Step 18	Go to Step 14
14	Inspect the air temperature actuator, door and any attaching linkage for binding or a condition that prevents drive shaft rotation. 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 HVAC control module. Refer to Testing for Intermittent Conditions and Poor Connections and Connector Repairs . Did you find and correct the condition?	-	Go to Step 18	Go to Step 17
16	Replace the air temperature actuator. Refer to Air Temperature Actuator Replacement - Right or Air Temperature Actuator	-		

2006 Chevrolet Impala LS

2006 HVAC HVAC Systems - Manual - Impala

	Replacement - Left. Did you complete the replacement?		Go to Step 18	-
17	Replace the HVAC control module. Refer to Control Module References for replacement, setup, and programming. 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

Air Delivery Improper

Step	Action	Yes	No
Schematic Reference: HVAC Schematics Connector End View Reference: HVAC Connector End Views DEFINITION: Air does not flow correctly from the air distribution outlets.			
1	Did you perform the Diagnostic System Check - Vehicle?	Go to Step 2	Go to Diagnostic System Check - Vehicle
2	1. Turn ON the ignition, with the engine OFF. 2. Turn OFF the HVAC controls. 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 each speed position?	Go to Step 4	Go to Blower Motor Inoperative
4	Does the blower motor operate at the desired speeds?	Go to Step 5	Go to Blower Motor Malfunction
5	1. Install a scan tool. 2. With a scan tool, observe the current DTC list. Does the scan tool display any DTCs?	Go to 49559	Go to Step 6
6	Place the mode switch in each mode position. Does the air flow from the correct air distribution outlets in each selected mode	Go to Testing for Intermittent Conditions and Poor	

2006 Chevrolet Impala LS

2006 HVAC HVAC Systems - Manual - Impala

	position?	Connections	Go to Step 7
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 . Did you find and correct the condition?	Go to Step 10	Go to Step 8
8	Inspect and the air distribution system for the following conditions: • A restricted passenger compartment air filter • An obstruction restricting air flow • Air leaks • Misaligned ducts Did you find and correct the condition?	Go to Step 10	Go to Step 9
9	Replace the HVAC control module. Refer to Control Module References for replacement, setup, and programming. 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

RE-CALIBRATING ACTUATORS

Calibration Procedure

Use the following steps to perform the calibration update:

1. Turn OFF the ignition.
2. Remove the battery positive voltage circuit fuse of the HVAC Control Module.

IMPORTANT: The module memory will not clear if the battery positive voltage circuit fuse is installed in less than 60 seconds.

3. Wait 60 seconds.
4. Install the fuse.

REPAIR INSTRUCTIONS

HVAC CONTROL ASSEMBLY REPLACEMENT

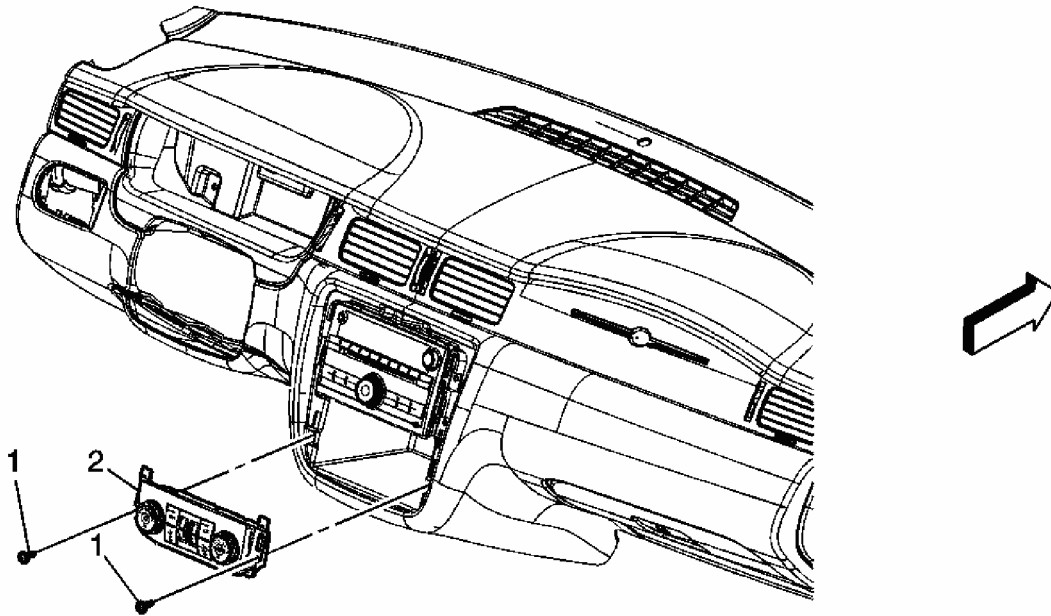


Fig. 21: Replacing HVAC Control Assembly
Courtesy of GENERAL MOTORS CORP.

HVAC Control Assembly Replacement

Callout	Component Name
NOTE: Refer to Fastener Notice .	
Fastener Tightening Specifications: Refer to Fastener Tightening Specifications . Preliminary Procedure: Remove the accessory trim plate. Refer to Trim Plate Replacement - Instrument Panel (I/P) Accessory (Impala) or Trim Plate Replacement - Instrument Panel (I/P) Accessory (Monte Carlo) .	
1	Screw, Heater and A/C Control Assembly (Qty: 2) Tip: Disconnect the HVAC control assembly electrical connector. Tighten: 1.5 N.m (13 lb in)
2	Control Assembly, Heater and Air Conditioning

RIGHT AIR TEMPERATURE ACTUATOR REPLACEMENT

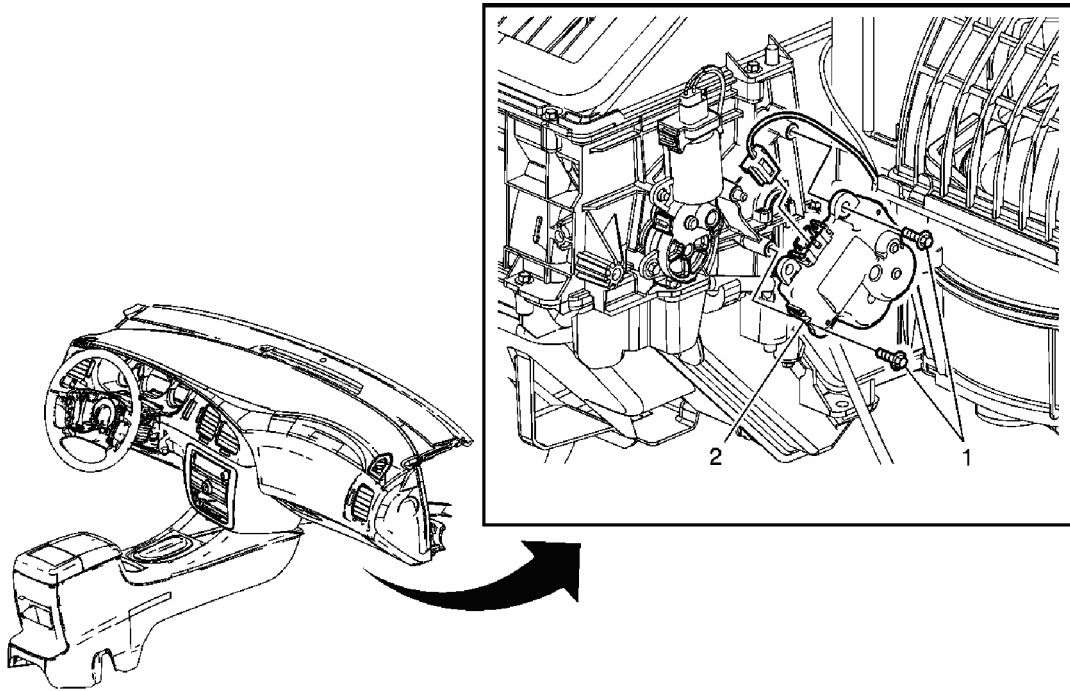


Fig. 22: Replacing Right Air Temperature Actuator
Courtesy of GENERAL MOTORS CORP.

Air Temperature Actuator Replacement - Right

Callout	Component Name
NOTE: Refer to Fastener Notice .	
Fastener Tightening Specifications: Refer to Fastener Tightening Specifications .	
Preliminary Procedure	
1. Remove the instrument panel (I/P) compartment inner panel. Refer to Instrument Panel Compartment Inner Panel Replacement (Impala) .	
2. Disconnect the right air temperature actuator electrical connector.	
1	Screw, Temperature Actuator - Right (Qty: 2) Tighten: 1.5 N.m (13 lb in)
2	Actuator, Temperature - Right

LEFT AIR TEMPERATURE ACTUATOR REPLACEMENT

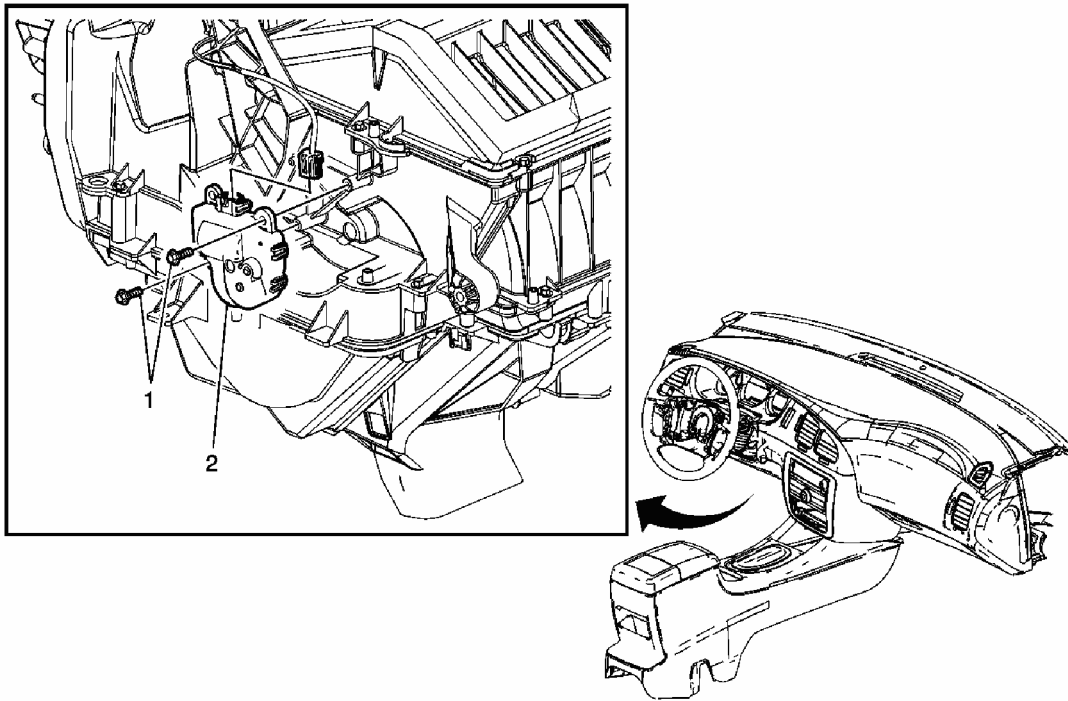


Fig. 23: Replacing Left Air Temperature Actuator
Courtesy of GENERAL MOTORS CORP.

Air Temperature Actuator Replacement - Left

Callout	Component Name
NOTE: Refer to <u>Fastener Notice</u> .	
Fastener Tightening Specifications: Refer to <u>Fastener Tightening Specifications</u> .	
Preliminary Procedure	
1. Remove the left knee bolster bracket. Refer to <u>Knee Bolster Bracket Replacement - Left</u> .	
2. Disconnect the left air temperature actuator electrical connector.	
1	Screw, Temperature Actuator - Left (Qty: 2) Tighten: 1.5 N.m (13 lb in)
2	Actuator, Temperature - Left

MODE ACTUATOR REPLACEMENT

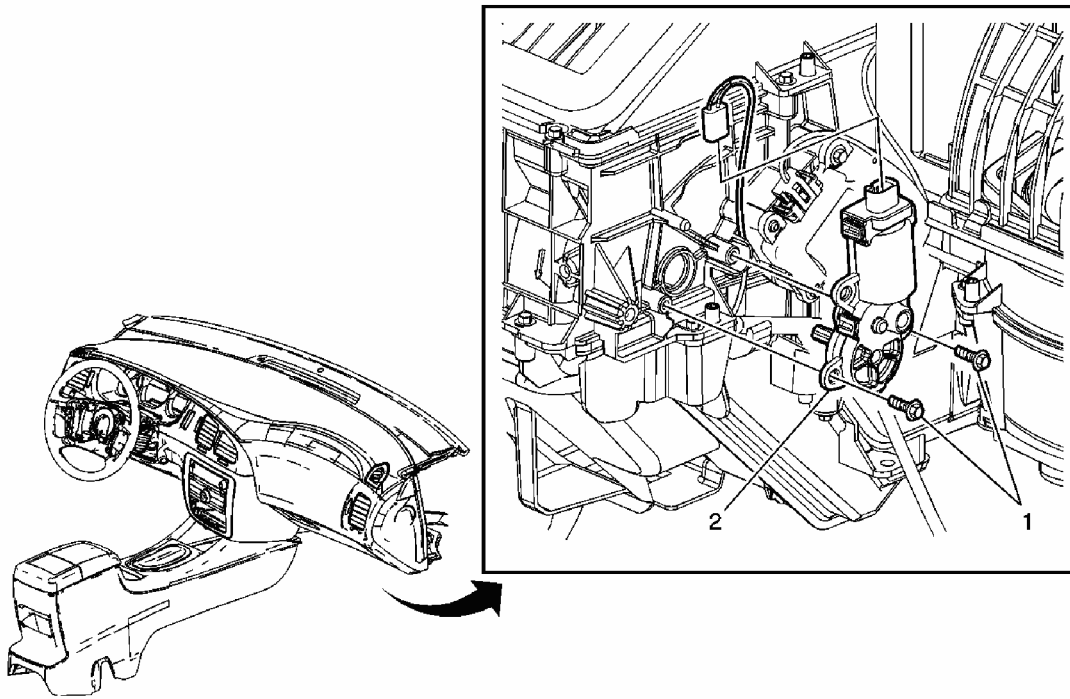


Fig. 24: Replacing Mode Actuator
Courtesy of GENERAL MOTORS CORP.

Mode Actuator Replacement

Callout	Component Name
NOTE: Refer to <u>Fastener Notice</u> .	
Fastener Tightening Specifications: Refer to <u>Fastener Tightening Specifications</u> .	
Preliminary Procedure	
1. Remove the instrument panel (I/P) compartment. Refer to <u>Compartment Replacement - Instrument Panel (I/P) (Monte Carlo)</u> .	
2. Disconnect the mode actuator electrical connector.	
1	Screw, Mode Actuator (Qty: 2) Tighten: 1.5 N.m (13 lb in)
2	Actuator, Mode

RECIRCULATION ACTUATOR REPLACEMENT

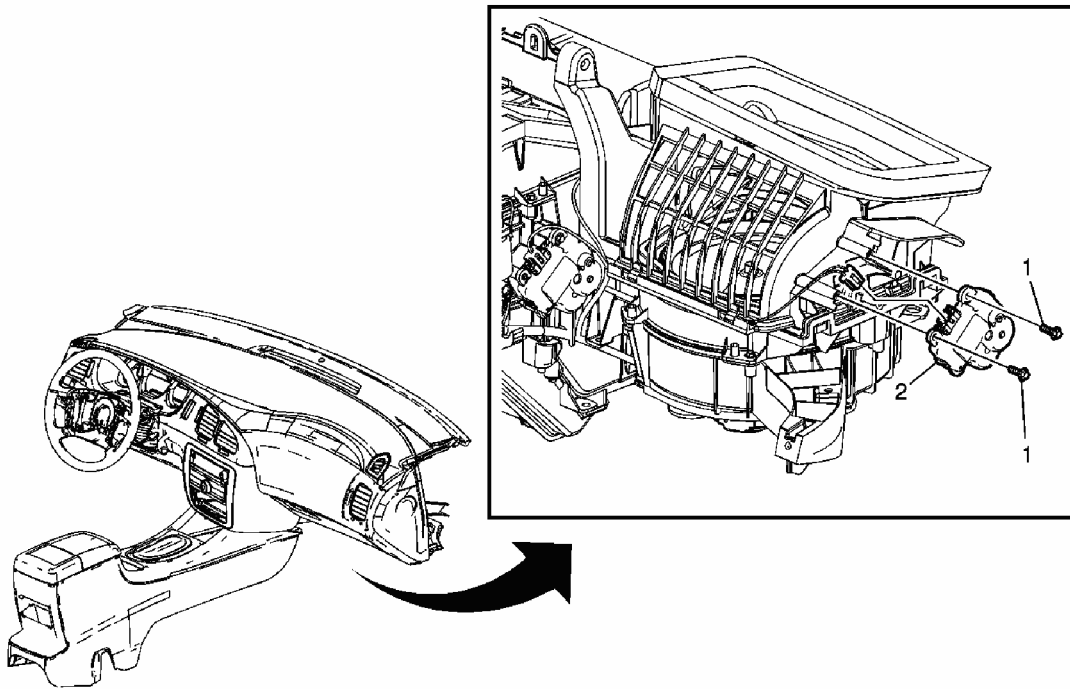


Fig. 25: Replacing Recirculation Actuator
Courtesy of GENERAL MOTORS CORP.

Recirculation Actuator Replacement

Callout	Component Name
NOTE: Refer to <u>Fastener Notice</u> .	
Fastener Tightening Specifications: Refer to <u>Fastener Tightening Specifications</u> .	
Preliminary Procedure	
1. Remove the right closeout panel. Refer to <u>Closeout/Insulator Panel Replacement - Right</u> .	
2. Disconnect the recirculation actuator electrical connector.	
1	Screw, Recirculation Actuator (Qty: 2) Tighten: 1.5 N.m (13 lb in)
2	Actuator, Recirculation

DESCRIPTION AND OPERATION

AIR DELIVERY DESCRIPTION AND OPERATION

The air delivery controls are divided into 4 areas:

- HVAC Control Components
- Air Speed
- Air Distribution
- 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 (KAM). If the battery positive voltage circuit loses power, all HVAC DTCs and settings will be erased from KAM. The control module supports the following features:

Air Delivery Description and Operation

Feature	Availability
Afterblow	Optional
Purge	No
Personalization	No
Actuator Calibration	Yes

Mode/Recirculation Actuator

The mode/recirculation actuator is a 2 wire bi-directional electric motor. 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 the appropriate control circuit for the commanded direction. The HVAC control module reverses the polarity of the control circuits to move the actuator in the opposite direction.

The HVAC control module determines the door position by counting motor pulses on one of the control circuits. These pulses are small voltage fluctuations that occur when the brush is shorted across 2 commutator contacts as the motor rotates. As the actuator shaft rotates, the HVAC control module monitors the voltage drop across an internal resistance to detect the pulses. The HVAC control module converts the pulses to counts with a range of 0-255 counts. The HVAC control module uses a range of 0-255 counts to index the actuator position.

Mode Valve Assembly

The film valve system has several operating characteristics:

- The cycle time for a mode change will vary based on the starting point of the film valve relative to the requested mode position.
- The maximum time to achieve a mode change occur when the film valve travels between vent and defrost.
- Mode change times may vary slightly based on variations in system airflow, temperature and voltage.
- The amount of air rush noise heard when a mode change is requested that causes the film valve to move through 3 or more primary modes is dependent on blower speed.
- Recalibration will typically occur when the engine is OFF. The actuator noise heard during recalibration may be more noticeable than during normal operation.

Blower Motor Control Processor

The blower motor control processor is an interface between the HVAC control module and the blower motor. The blower motor speed control, battery positive voltage and ground circuits enable the control processor to operate. The HVAC control module provides a pulse width modulation (PWM) signal to the control processor in order to command the blower motor speed. The processor supplies 12 volts to the blower motor through the blower motor voltage supply circuit. The control processor uses the blower motor ground as a low side control to adjust the blower motor speed.

Air Speed

The blower motor forces air to circulate within the vehicles interior. The vehicle operator determines the blower motor's speed by placing the blower motor switch in a desired speed position. The blower motor will only operate if the blower motor switch is in any position other than OFF, and the ignition switch is in the RUN position, with the exception of afterblow.

Once a blower speed is selected, the blower speed remains constant, until a new speed is selected.

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

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

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

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

and ground, increase.

Afterblow

Afterblow is a feature that dries the evaporator core by operating the blower motor after the engine is turned OFF. This reduces the amount of microbial growth that can create undesirable odors. The vehicle does not come equipped with the afterblow feature turned ON. If the afterblow feature is required due to an odor concern, it must be turned ON by the scan tool.

The following conditions must be met for afterblow to operate:

- The A/C compressor operated for more than 10 seconds.
- The A/C compressor, after operating for more than 10 seconds has not been deactivated for more than 10 minutes.
- The system voltage is at least 11 volts to start and 10 volts to continue to run.
- The ignition has been in the OFF position for at least 20 minutes.

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

- The blower will run for 4 minutes at 59 percent blower speed.
- The recirculation door moves to the Outside Air position.
- The mode valve moves to the Floor position.

Air Distribution

The HVAC control module controls the mode actuator in order to distribute airflow to a desired outlet. The mode switch provides the vehicle operator with the ability to override the automatic setting. When the mode switch is moved to heater through Defrost positions, the A/C compressor clutch engages and the recirculation actuator will be moved to the Outside Air position. When VENT is pressed, the following will occur:

- The mode valve will be moved to the Panel position.
- The recirculation actuator will follow user request if the blower is ON and the power mode is in Run.
- The A/C compressor will follow user request if the blower is ON and the power mode is in Run.

Recirculation Operation

The HVAC control module controls the air intake through the recirculation actuator. Recirculation is not available when the mode is in heater through Defrost. The operator must activate the blower for Recirculation operation.

Remote Start

Remote Start Activation

The following describes the HVAC control head functionality upon receiving the remote start active serial data message and a power mode status is set to off/awake. The intake air temperature (IAT) on manual systems, is utilized to determine the moding of the following features: Blower Mode (Bi-level, Floor, Defrost, Recirc and Rear Defrost. These features are determined by the IAT during activation sequence and are maintained for the duration of engine run time. Calibrated temperatures are utilized to provide low, mid and high temperature ranges for the selectable feature. Blower and mode have the range to select any valid feature positions. When the remote start active serial data is received, ignition-OFF loop HVAC algorithms will act the same as if a run power mode was received, i.e. re-calibration, afterblow, ignition-OFF motor positioning etc. The OFF timer and the ignition ON timer have the functionality as in the Run mode.

Remote Start De-activation

When the remote start is exited, class 2 power mode equals run mode or remote start engine. In the case of manual settings, the displays will revert to the actual state of operation of the features, on the basis of their normal control algorithms.

AIR TEMPERATURE DESCRIPTION AND OPERATION

The air temperature controls are divided into 4 areas

- HVAC Control Components
- 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 control module supports the following features:

Air Temperature Description and Operation

Feature	Availability
Afterblow	Optional
Purge	No
Personalization	No
Actuator Calibration	Yes

Air Temperature Actuator

The air temperature actuator is a 2-wire bi-directional electric motor. Two control circuits enable the actuator to operate. The control circuits use either a 0-volt 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 the appropriate control circuit for the commanded direction. The HVAC control module reverses the polarity of the control circuits to move the actuator in the opposite direction.

The HVAC control module determines the door position by counting motor pulses on one of the control circuits. These pulses are small voltage fluctuations that occur when the brush is shorted across 2 commutator contacts as the motor rotates. As the actuator shaft rotates, the HVAC control module monitors the voltage drop across an internal resistance to detect the pulses. The HVAC control module converts the pulses to counts with a range of 0-255 counts. The HVAC control module uses a range of 0-255 counts to index the actuator position.

A/C Refrigerant Pressure Sensor

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

The A/C refrigerant pressure sensor protects the A/C system from operating when an excessively high or low pressure condition exists. The powertrain control module (PCM) disables the compressor clutch under the following conditions:

- A/C pressure is more than 3034 kPa (440 psi). The clutch will be enabled after the pressure decreases to less than 2068 kPa (300 psi).
- A/C pressure is less than 241 kPa (35 psi). The clutch will be enabled after the pressure increases to more than 248 kPa (36 psi).

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. The vehicle operator can determine the passenger compartment temperature by adjusting the air temperature switch. Regardless of the temperature setting, the following can affect 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

The A/C system can be engaged by either pressing the A/C switch or by selecting the following modes:

- Max A/C
- Heater
- Mix-Blend
- Front Defrost

The A/C LED will not illuminate unless the driver presses the A/C request switch on the HVAC control module. Otherwise, the A/C system may be running without the A/C LED indicator illuminated. The following conditions must be met in order for the powertrain control module (PCM) to turn ON the compressor clutch:

- The ambient air temperature is above 4°C (40°F).
- The engine coolant temperature (ECT) is less than 124°C (255°F).
- The A/C pressure is between 241-3034 kPa (35-440 psi).

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

- The throttle position is 100 percent.
- The A/C pressure is more than 3034 kPa (440 psi).
- The A/C pressure is less than 241 kPa (35 psi).
- The engine coolant temperature (ECT) is more than 124°C (255°F).
- The engine speed is more than 5480 RPM for at least 409 seconds.
- A transmission shift has occurred.
- The PCM detects excessive torque load.
- The PCM detects insufficient idle quality.
- The PCM detects a hard launch condition.

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

Remote Start

Remote Start Activation

The following describes the HVAC control head functionality upon receiving the remote start active serial data message and a power mode status is set to OFF/awake. The intake air temperature (IAT) on manual systems, is utilized to determine the moding of the following features: Blower Mode (Bi-level, Floor, Defrost, Recirc and Rear Defrost. These features are

determined by the IAT during activation sequence and are maintained for the duration of engine run time. Calibrated temperatures are utilized to provide low, mid and high temperature ranges for the selectable feature. Blower and mode have the range to select any valid feature positions. When the remote start active serial data is received, ignition-OFF loop HVAC algorithms will act the same as if a run power mode was received, i.e. re-calibration, afterblow, ignition-OFF motor positioning etc. The OFF timer and the ignition ON timer have the functionality as in the Run mode.

Remote Start De-activation

When the remote start is exited, class 2 power mode equals run mode or remote start engine. In the case of manual settings, the displays will revert to the actual state of operation of the features, on the basis of their normal control algorithms.

Engine Coolant

Engine coolant is the key element of the heating system. The thermostat controls 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 assembly. The heat of the coolant flowing through the heater core is absorbed by the ambient air drawn through the HVAC module assembly. Heated air is distributed to the passenger compartment through the HVAC module assembly for passenger comfort.

The amount of heat delivered to the passenger compartment is controlled by opening or closing the air temperature door. The coolant exits the heater core through the return heater hose and recirculates 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 a very low temperature gas that can transfer the undesirable heat and moisture from the passenger compartment to the outside air.

A Delphi model CVC7 piston type compressor is used on this model year vehicle. The A/C compressor is belt driven and operates when the magnetic clutch is engaged. The compressor builds pressure on the vapor refrigerant, which adds heat to the refrigerant. The refrigerant is discharged from the compressor through the discharge hose and is forced to flow to the condenser and then through the balance of the A/C system. The A/C system is mechanically protected with the use of a high pressure relief valve. If the high pressure switch were to fail or if the refrigerant system becomes restricted and refrigerant pressure continues 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 TXV.

The TXV is located at the evaporator inlet. The TXV is the dividing point for the high and the low pressure sides of the 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 TXV. 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 HVAC module and passes through the evaporator core. Warm and moist air causes the liquid refrigerant to 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 completes the A/C cycle of heat removal. At the compressor, the refrigerant is compressed again and the cycle of heat removal is repeated.

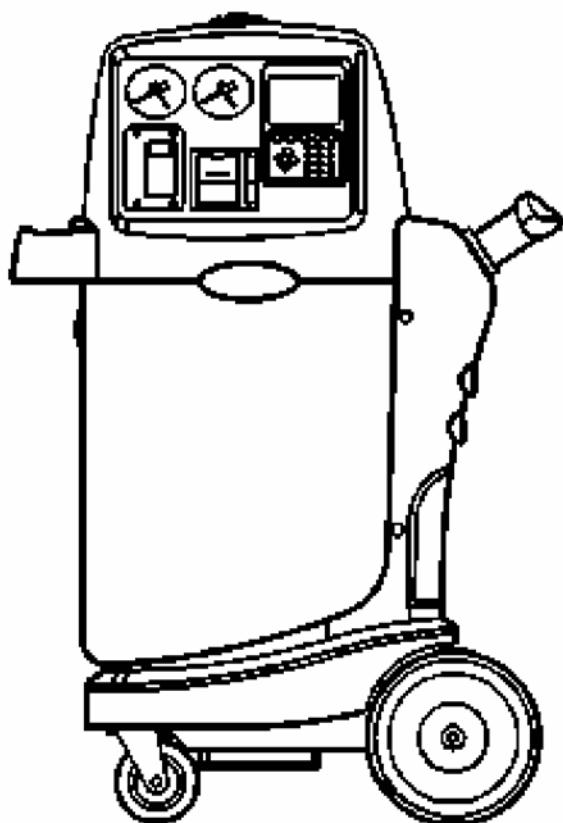
The conditioned air is distributed through the HVAC module for passenger comfort. The heat and moisture removed from the passenger compartment condenses and is discharged from the HVAC module as water.

SPECIAL TOOLS AND EQUIPMENT

SPECIAL TOOLS

Special Tools

Illustration	Tool Number/ Description



J 43600
ACR 2000 Air Conditioning
Service Center