

2004 Cadillac SRX

2004 ACCESSORIES & EQUIPMENT Instrument Panel, Gages, & Console - SRX

2004 ACCESSORIES & EQUIPMENT

Instrument Panel, Gages, & Console - SRX

SPECIFICATIONS

FASTENER TIGHTENING SPECIFICATIONS

Fastener Tightening Specifications

Application	Specification	
	Metric	English
Center Support Bracket to Carrier	9 N.m	80 lb in
Console Mounting Fasteners	25 N.m	18 lb ft
Hood Release Lever Fasteners	2 N.m	18 lb in
HVAC Outlet Duct to Carrier	2 N.m	18 lb in
I/P Carrier to Cowl	25 N.m	18 lb ft
I/P Center Trim to Retainer	2 N.m	18 lb in
I/P Cluster to I/P	2 N.m	18 lb in
I/P Compartment Bin Screws	2 N.m	18 lb in
I/P Compartment Door Screws	2 N.m	18 lb in
I/P Retainer to Floor Bracket	9 N.m	80 lb in
Insulator Panel to I/P	2 N.m	18 lb in
Knee Bolster Bracket to I/P	9 N.m	80 lb in
Knee Bolster Trim Screws	2 N.m	18 lb in
Lower I/P Retainer to Carrier	2 N.m	18 lb in
Park Brake Bracket to Carrier	25 N.m	18 lb ft
Park Brake Release Lever Fasteners	2 N.m	18 lb in
Radio to I/P	9 N.m	80 lb in
SIR I/P Module	9 N.m	80 lb in
Upper I/P Retainer to Carrier	9 N.m	80 lb in

FUEL LEVEL SPECIFICATIONS

The information in this table is intended for use with the **J 33431-C** Signal Generator and Instrument Panel Tester. See **Special Tools and Equipment**. The fuel level sensor values represent the test values to be used on the Signal Generator to drive the fuel gage display to the indicated positions. Vehicles that require more than one fuel level sensor calculate gage position from many possible resistance combinations of fuel levels between the two tanks. Therefore, the

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values in the table may not correlate directly to readings taken from the vehicle primary or secondary sending units.

The values in the table are approximate values based on information obtained from properly operating vehicles. Actual results may vary slightly.

Fuel Level Specifications

Fuel Gage Display	Fuel Level Sensor Right - Primary		Fuel Level Sensor Left - Secondary		Fuel Level Parameter	Fuel Level	Fuel Remaining
	Resistance	Volts	Resistance	Volts			
E	65.1 ohms	0.99 V	65.3 ohms	0.99 V	1.0 Gallons	5.0%	3.8L (1.0 gal)
1/4	88.1 ohms	1.33 V	88.3 ohms	1.33 V	5.9 Gallons	29.5%	22.3L (5.9 gal)
1/2	135.4 ohms	1.78 V	135.3 ohms	1.78 V	9.9 Gallons	49.5%	37.5L (9.9 gal)
3/4	183.1 ohms	2.16 V	183.2 ohms	2.16 V	14.1 Gallons	70.5%	53.4L (14.1 gal)
F	225.1-248.5 ohms	2.41-2.50 V	225.2-248.5 ohms	2.41-2.50 V	18-20 Gallons	90.0-104.8%	68.1-75.7L (18.0-20.0 gal)

SCHEMATIC AND ROUTING DIAGRAMS

INSTRUMENT CLUSTER SCHEMATICS

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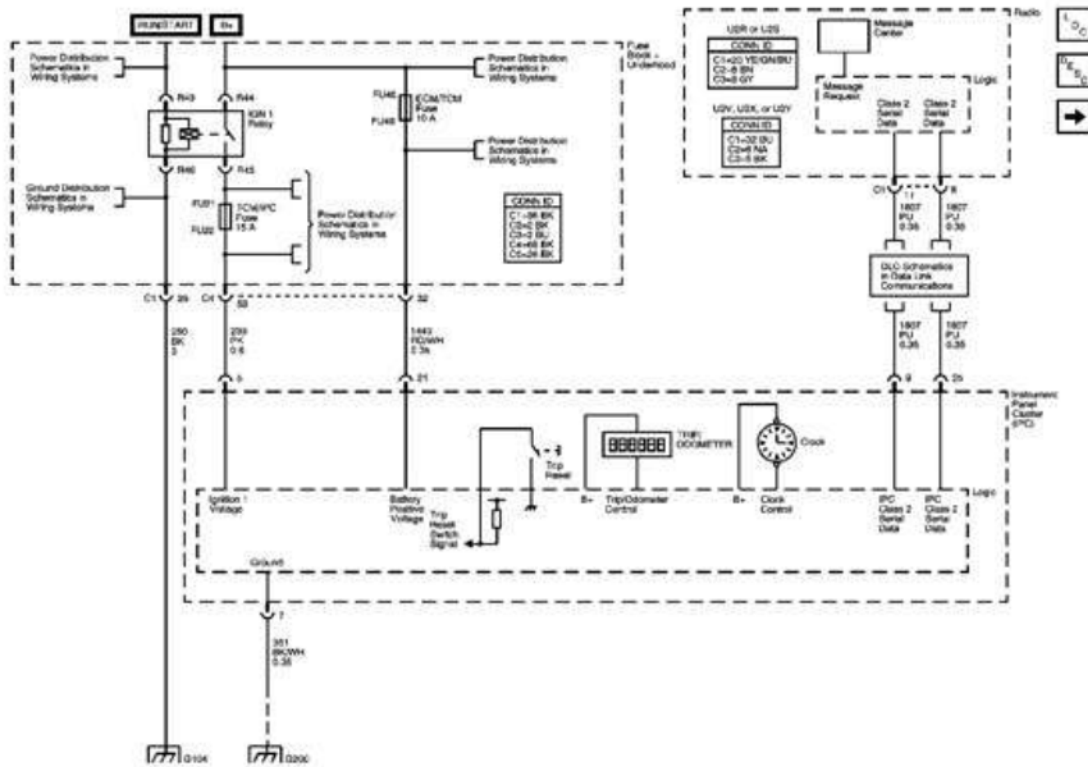
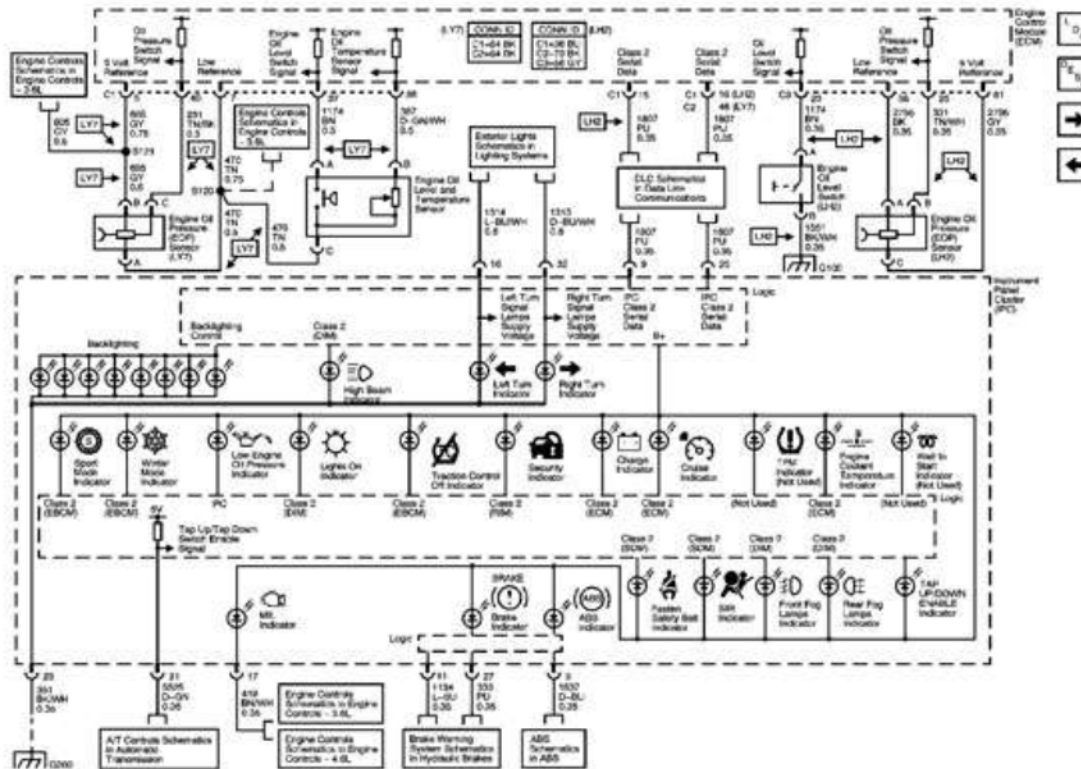


Fig. 1: Power, Ground, Serial Data, Odometer, & Clock
 Courtesy of GENERAL MOTORS CORP.

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Courtesy of GENERAL MOTORS CORP.

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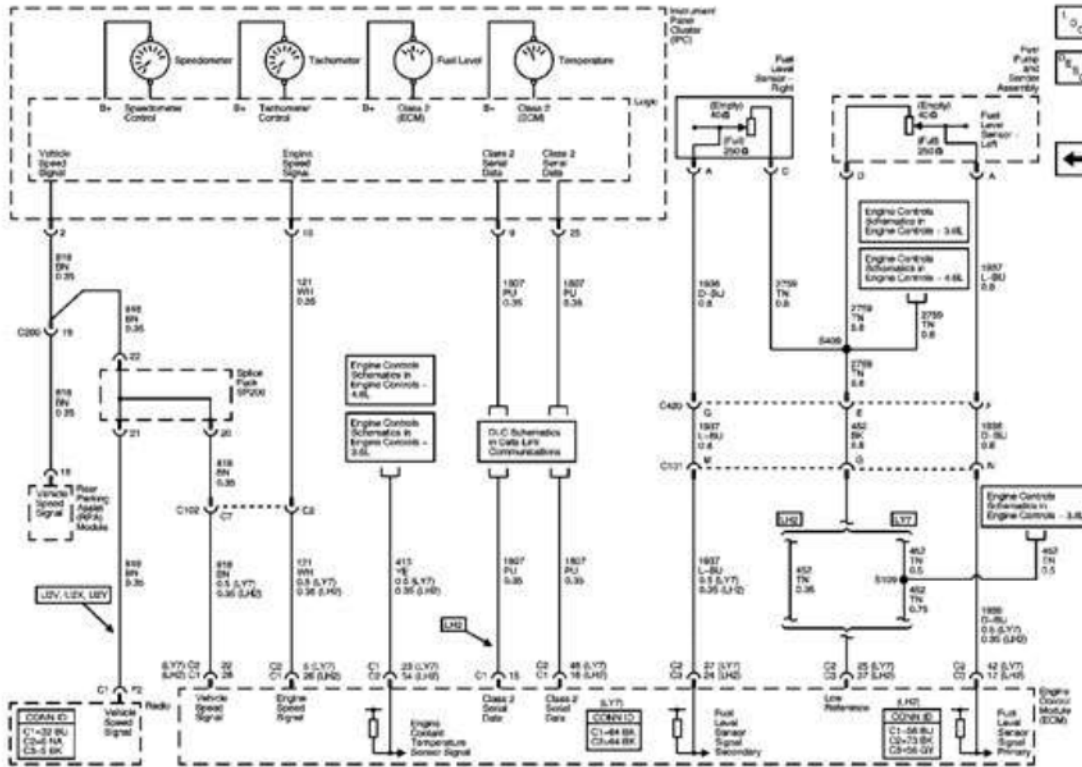


Fig. 3: Gages
 Courtesy of GENERAL MOTORS CORP.

AUDIBLE WARNINGS SCHEMATICS

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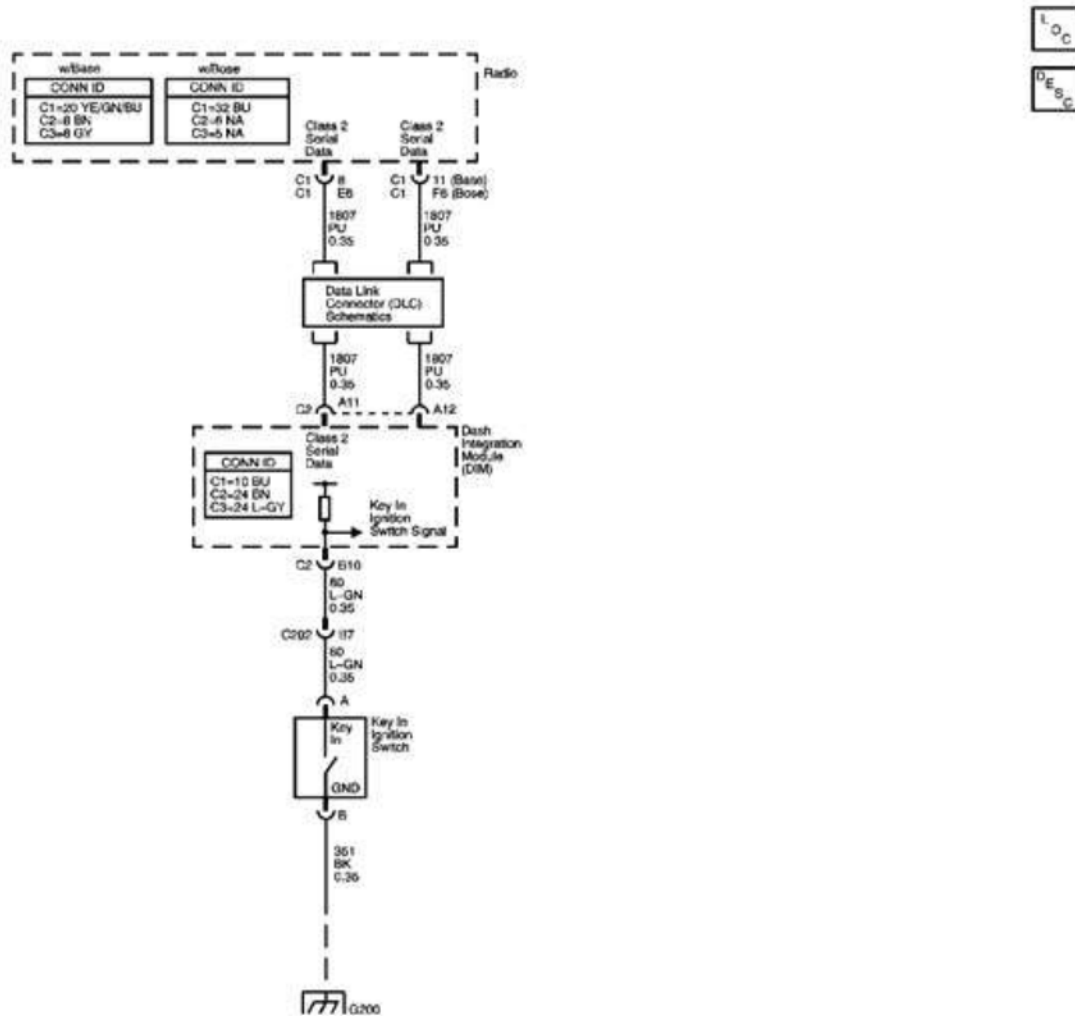


Fig. 4: Audible Warnings Schematics
Courtesy of GENERAL MOTORS CORP.

COMPONENT LOCATOR

INSTRUMENT PANEL, GAGES, AND CONSOLE COMPONENT VIEWS

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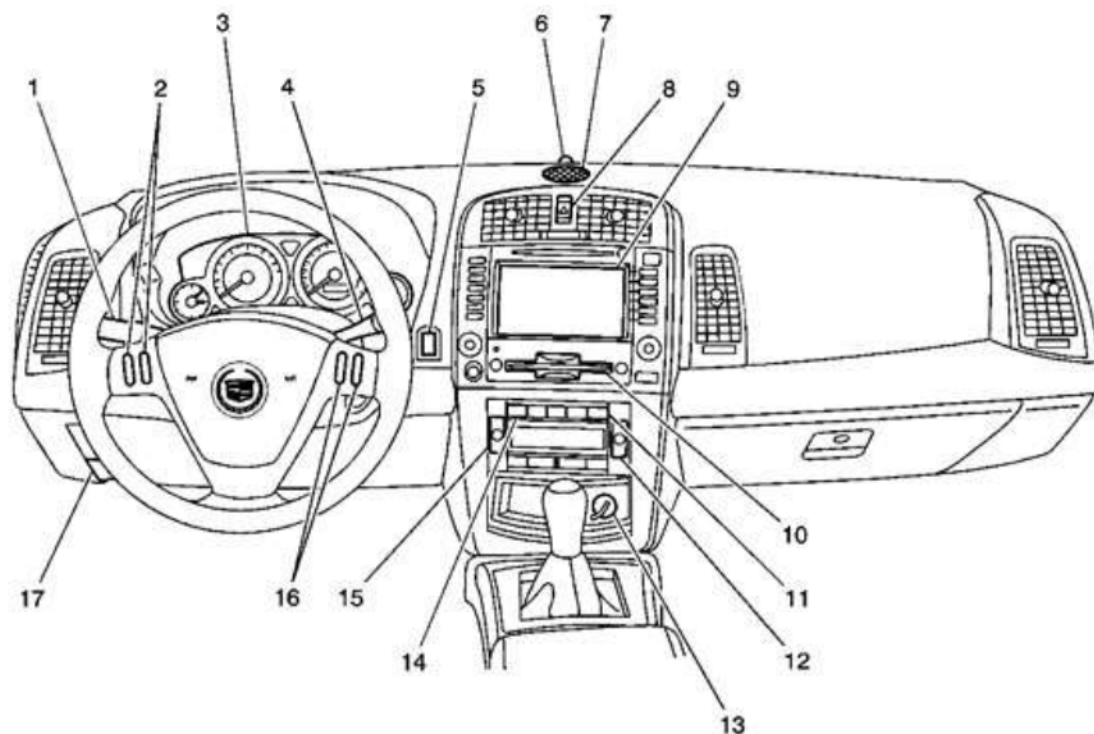


Fig. 5: Instrument Panel Component View
Courtesy of GENERAL MOTORS CORP.

Callouts For Fig. 5

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

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15	HVAC Control Module - Climate Control - Left
16	Steering Wheel Controls - Left
17	Hood Release Lever

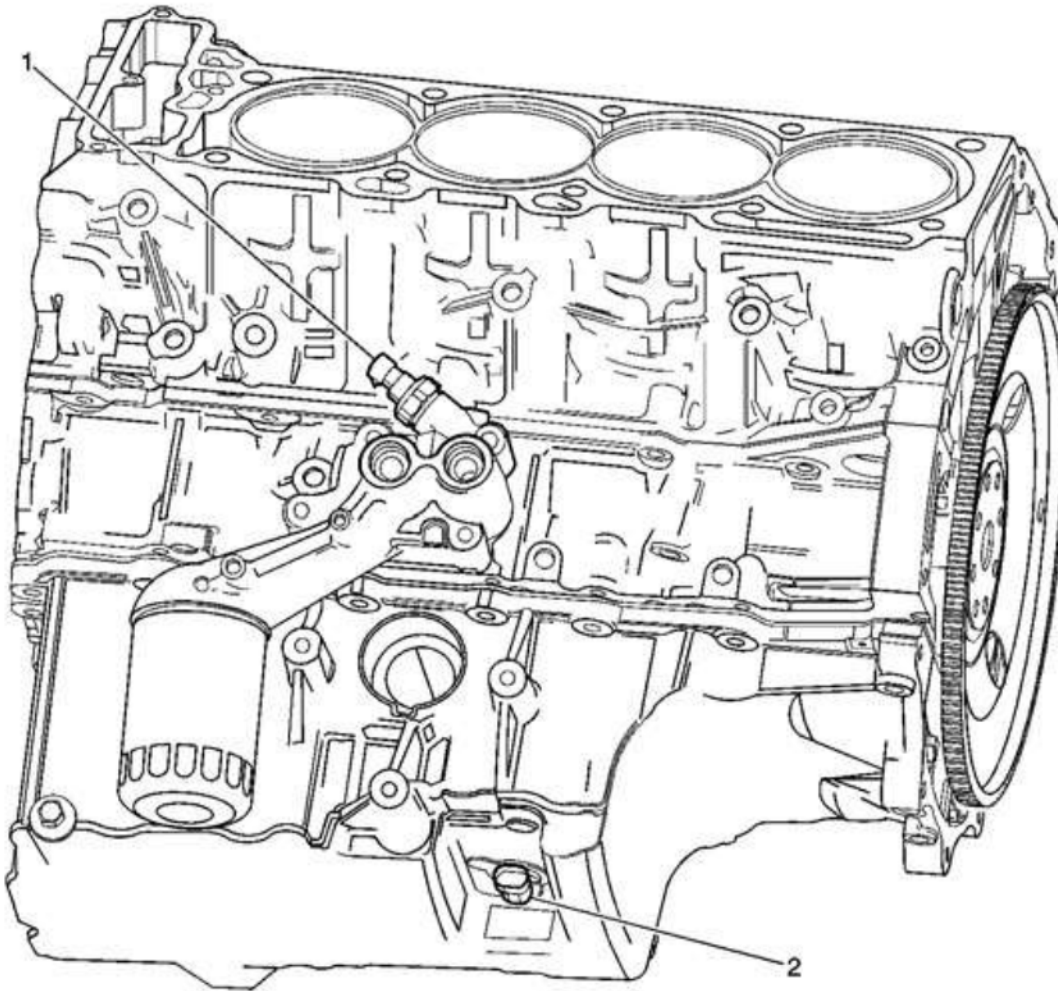


Fig. 6: Left Side Of Engine (LH2) Component View
Courtesy of GENERAL MOTORS CORP.

Callouts For Fig. 6

Callout	Component Name
1	Engine Oil Pressure (EOP) Sensor
2	Engine Oil Level Switch

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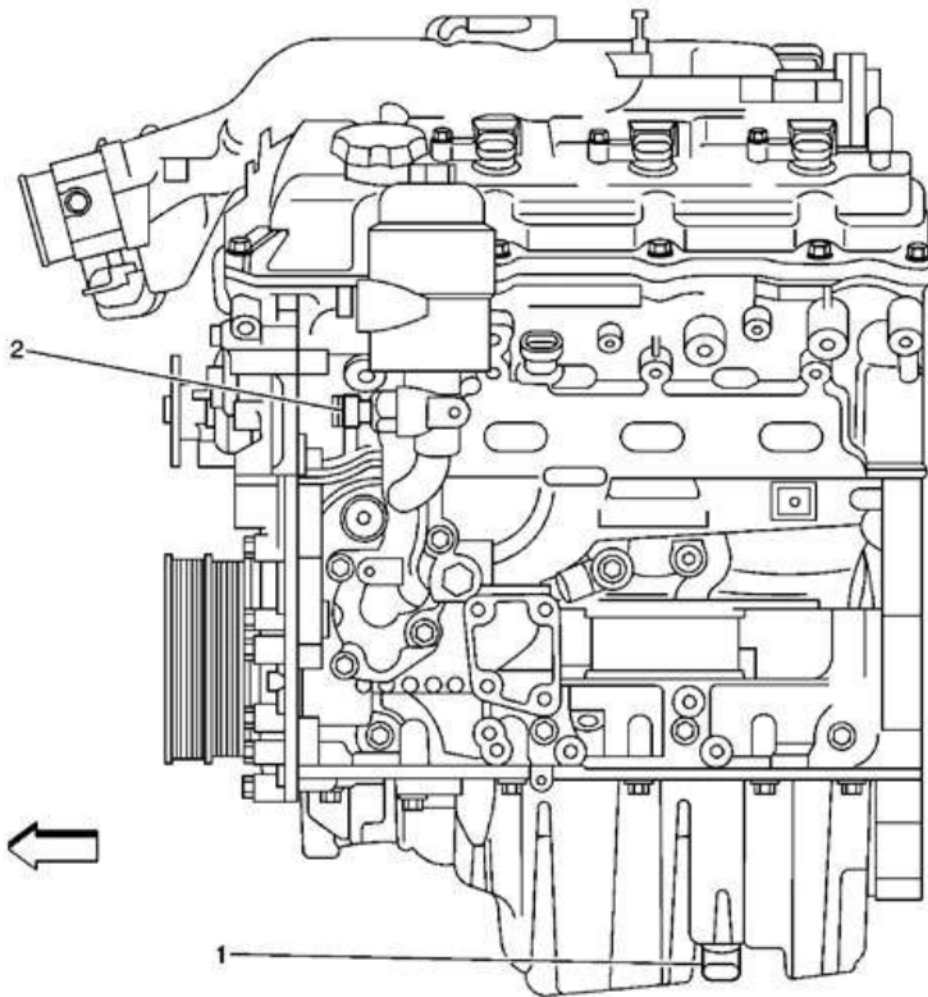


Fig. 7: Left Side Of Engine (LY7) Component View
Courtesy of GENERAL MOTORS CORP.

Callouts For Fig. 7

Callout	Component Name
1	Engine Oil Level and Temperature Sensor
2	Engine Oil Pressure (EOP) Sensor

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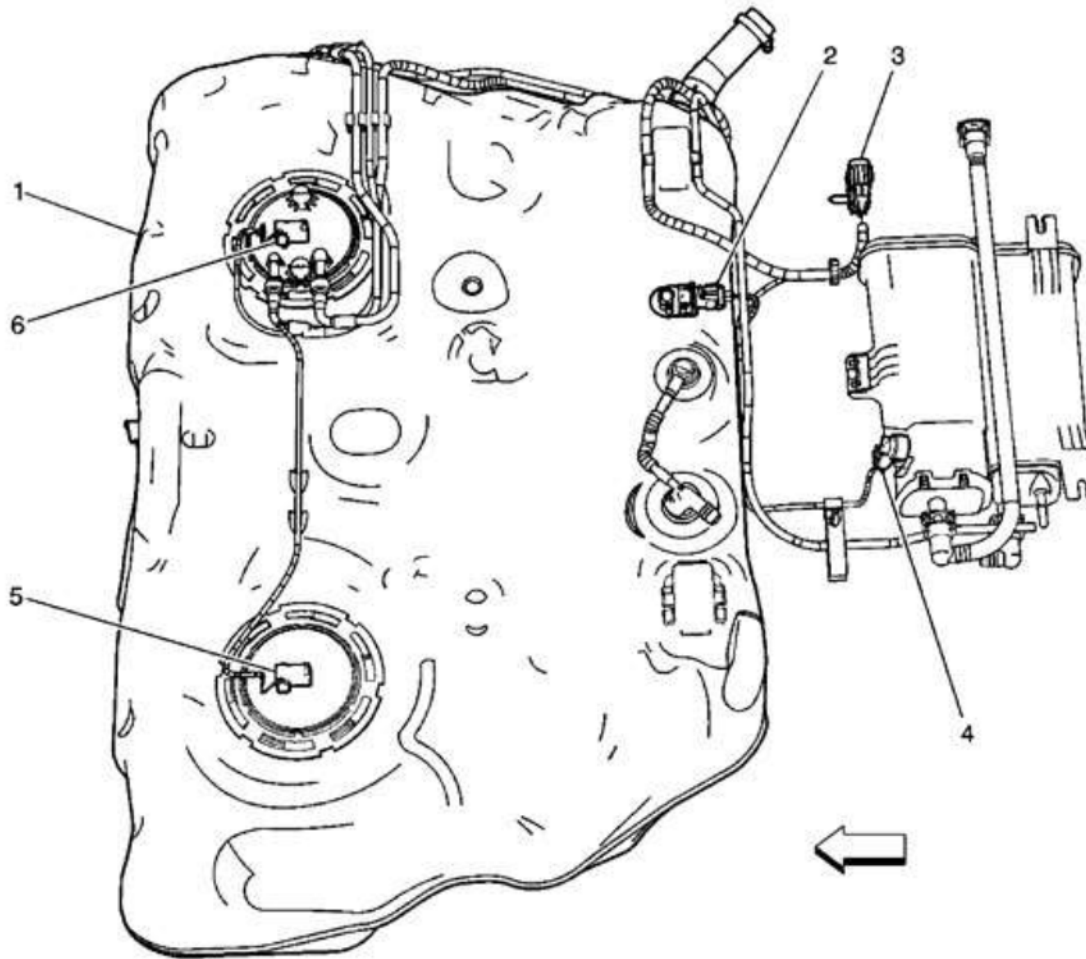


Fig. 8: Fuel Tank & EVAP Solenoid Component View
Courtesy of GENERAL MOTORS CORP.

Callouts For Fig. 8

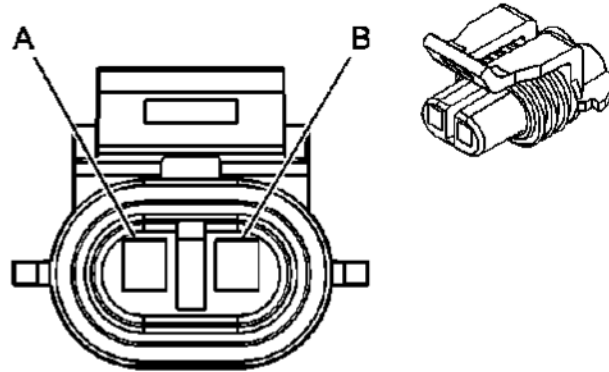
Callout	Component Name
1	Fuel Tank
2	Fuel Tank Pressure (FTP) Sensor
3	C420
4	Evaporative Emission (EVAP) Canister Vent Solenoid Valve
5	Fuel Level Sensor - Right
6	Fuel Pump and Sender Assembly

INSTRUMENT PANEL, GAGES, AND CONSOLE CONNECTOR END VIEWS

Engine Oil Level Switch (LH2) Terminal Identification

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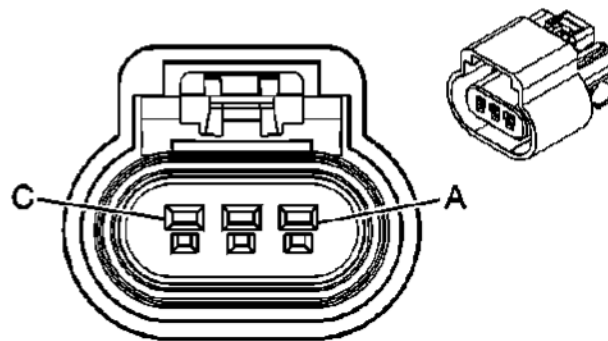


Connector Part Information

- 12052641
- 2-Way F Metri-Pack 150 Series Sealed (BK)

Pin	Wire Color	Circuit No.	Function
A	BN	1174	Oil Level Switch Signal
B	BK/WH	1551	Ground

Engine Oil Level/Temperature Sensor (LY7) Terminal Identification



Connector Part Information

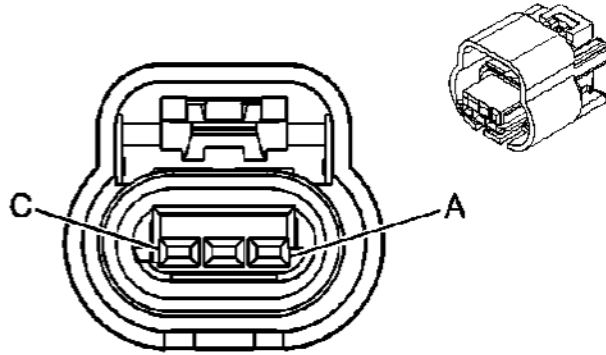
- 15326808
- 3-Way F GT 150 Series Sealed (BK)

Pin	Wire Color	Circuit No.	Function
A	BN	1174	Oil Level Switch Signal
B	D-GN/WH	357	Oil Temperature Sensor Signal
C	TN	470	Low Reference

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Engine Oil Pressure (EOP) Sensor (LH2) Terminal Identification

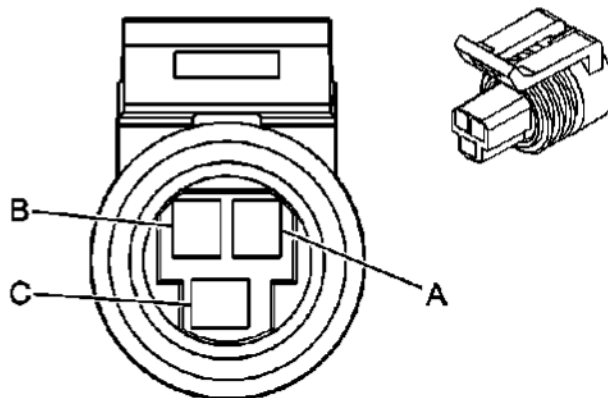


Connector Part Information

- 15336121
- 3-Way F GT 150 Series Sealed (BK)

Pin	Wire Color	Circuit No.	Function
A	BK	2755	Low Reference
B	TN/WH	331	Oil Pressure Switch Signal
C	GY	2705	5-Volt Reference

Engine Oil Pressure (EOP) Sensor (LY7) Terminal Identification



Connector Part Information

- 12065287
- 3-Way F Metri-Pack 150.2 Series Sealed (BK)

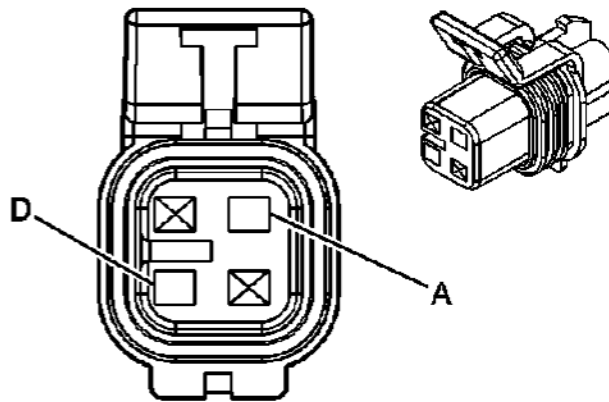
Pin	Wire Color	Circuit No.	Function

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A	TN	470	Low Reference
B	GY	605	5-Volt Reference
C	TN/BK	231	Oil Pressure Switch Signal

Fuel Level Sensor Terminal Identification - Right



Connector Part Information

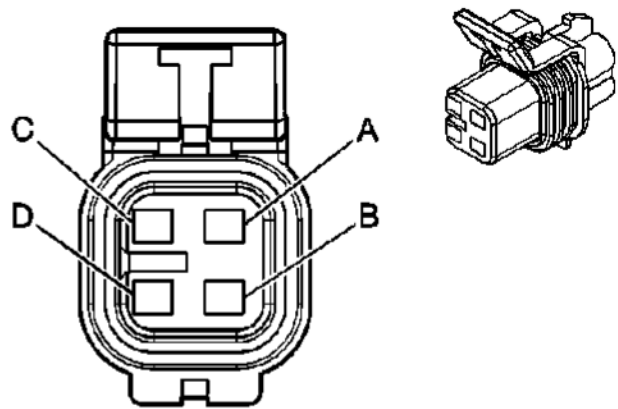
- 12160563
- 2-Way F Metri-Pack 150 Series, Sealed (WH)

Pin	Wire Color	Circuit No.	Function
A	D-BU	1936	Fuel Level Sensor Signal - Secondary
B-C	-	-	Not Available
D	TN	2759	Low Reference

Fuel Pump & Sender Assembly Terminal Identification

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Connector Part Information

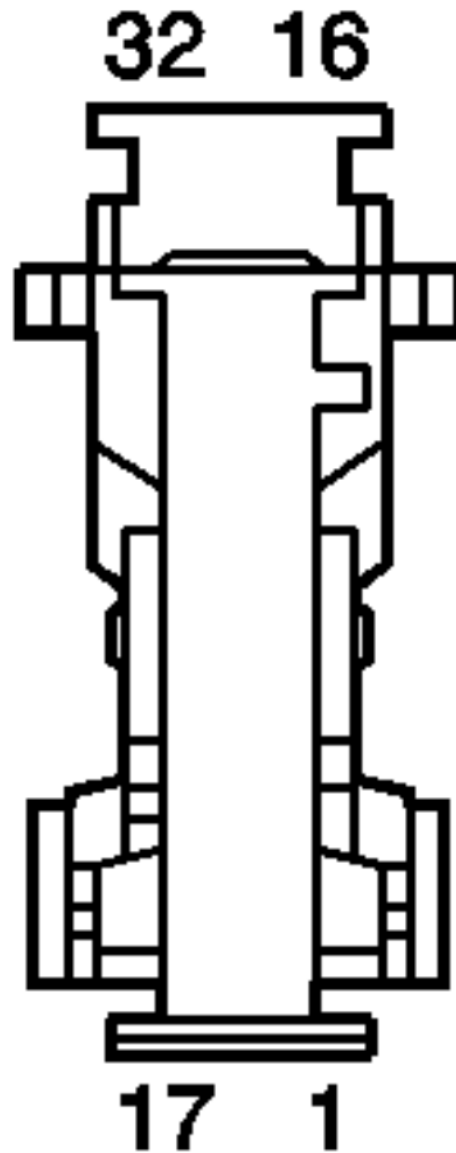
- 12160482
- 4-Way F Metri-Pack 150 Series Sealed (BK)

Pin	Wire Color	Circuit No.	Function
A	L-BU	1937	Fuel Level Sensor Signal - Primary
B	GY	120	Fuel Pump Supply Voltage
C	BK	1050	Ground
D	TN	2759	Low Reference

Instrument Panel Cluster (IPC) Terminal Identification

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		• 32-Way F Amp (GY)	
Pin	Wire Color	Circuit No.	Function
1	-	-	Not Used
2	BN	818	Vehicle Speed Signal
3	D-BU	1537	ABS Indicator Signal
4	-	-	Not Used
5	PK	239	Ignition 1 Voltage
6	-	-	Not Used
7	BK/WH	351	Ground
8	-	-	Not Used
9	PU	1807	Class 2 Serial Data
10	-	-	Not Used
11	L-BU	1134	Park Brake Switch Signal
12-15	-	-	Not Used
16	L-BU/WH	1314	Left Turn Signal Indicator Lamp Supply Voltage
17	BN/WH	419	MIL Control
18	-	-	Not Used
19	WH	121	Engine Speed Signal
20	-	-	Not Used
21	RD/WH	1440	Battery Positive Voltage
22	-	-	Not Used
23	BK/WH	351	Ground
24	-	-	Not Used
25	PU	1807	Class 2 Serial Data
26	-	-	Not Used
27	PU	333	Brake Fluid Level Sensor Signal
28-30	-	-	Not Used
31	D-GN	5525	Tap Up/Tap Down Trans Enable Switch
32	D-BU/WH	1315	Right Turn Signal Indicator Lamp Supply Voltage

DIAGNOSTIC INFORMATION AND PROCEDURES

DIAGNOSTIC STARTING POINT - INSTRUMENT PANEL, GAGES AND CONSOLE

Begin the IP or DIC system diagnosis with **Diagnostic System Check - Instrument Cluster**, or the audible warning system diagnosis with **Diagnostic System Check - Audible Warnings**. The Diagnostic System Check will provide the following information:

- The identification of the control modules which command the system.
- The ability of the control modules to communicate through the serial data circuit.
- The identification of any stored diagnostic trouble codes (DTCs) and their status.

The use of the Diagnostic System Check will identify the correct procedure for diagnosing the system and where the procedure is located.

DIAGNOSTIC SYSTEM CHECK - INSTRUMENT CLUSTER

Test Description

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

- 2:** Lack of communication may be due to a partial malfunction of the class 2 serial data circuit or due to a total malfunction of the class 2 serial data circuit. The specified procedure will determine the particular condition.
- 3:** The symptom list in Symptoms will determine the correct diagnostic procedure to use.
- 4:** The presence of DTCs which begin with "U" indicate that loss of class 2 communications has occurred.

Diagnostic System Check - Instrument Cluster

Step	Action	Yes	No
1	Install a scan tool. Does the scan tool power up?	Go to Step 2	Go to <u>Scan Tool Does Not Power Up</u> in Data Link Communications
	1. Turn the ignition ON, with the engine OFF. 2. Attempt to establish communication with the following control modules: • Audio Amplifier • Dash Integration Module (DIM) • Electronic Brake Control Module (EBCM)		

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2	• Engine Control Module (ECM) • Inflatable Restraint Sensing and Diagnostic Module (SDM) • Instrument Panel Cluster (IPC) • Radio • Rear Integration Module (RIM) • Theft Deterrent Control Module Does the scan tool communicate with the control modules listed above?	Go to Step 3	Go to <u>Scan Tool Does Not Communicate with Class 2 Device</u> in Data Link Communications
3	Select the display DTCs function on the scan tool for the following control modules: • Audio Amplifier • Dash Integration Module (DIM) • Electronic Brake Control Module (EBCM) • Inflatable Restraint Sensing and Diagnostic Module (SDM) • Instrument Panel Cluster (IPC) • Engine Control Module (ECM) • Radio • Rear Integration Module (RIM) • Theft Deterrent Control Module Does the scan tool display any DTCs?	Go to Step 4	Go to <u>Symptoms - Instrument Panel, Gages and Console</u>
4	Does the scan tool display any DTCs which begin with a "U"?	Go to <u>Scan Tool Does Not Communicate with Class 2 Device</u> in Data Link Communications	Go to Step 5
	Does the scan tool display DTC B1000, B1004, B1007, B1009, B1372, B1382, or	Go to <u>Diagnostic Trouble Code</u>	

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5	B1390?	<u>(DTC) List</u> in Body Control System	Go to Step 6
6	Does the scan tool display DTC B1327, B1328, B1513, B1514, P0562, P0563, P0615, P0616, P0617, P0625, P0626, P2500, or P2501?	Go to <u>Diagnostic Trouble Code (DTC) List</u> in Engine Electrical	Go to <u>Diagnostic Trouble Code (DTC) List</u>

DIAGNOSTIC SYSTEM CHECK - DRIVER INFORMATION SYSTEMS

Test Description

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

- 2:** Lack of communication may be due to a partial malfunction of the class 2 serial data circuit or due to a total malfunction of the class 2 serial data circuit. The specified procedure will determine the particular condition.
- 3:** The symptom list in Symptoms will determine the correct diagnostic procedure to use.
- 4:** The presence of DTCs which begin with "U" indicate that loss of class 2 communications has occurred.

Diagnostic System Check - Driver Information Systems

Step	Action	Yes	No
1	Install a scan tool. Does the scan tool power up?	Go to Step 2	Go to <u>Scan Tool Does Not Power Up</u> in Data Link Communications
2	1. Turn the ignition ON, with the engine OFF. 2. Attempt to establish communication with the following control modules: • Engine Control Module (ECM) • Instrument Panel Cluster (IPC) • Radio Does the scan tool communicate with the control modules listed above?	Go to Step 3	Go to <u>Scan Tool Does Not Communicate with Class 2 Device</u> in Data Link Communications
	Select the display DTCs function on the scan		

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3	tool for the following modules: • Engine Control Module (ECM) • Instrument Panel Cluster (IPC) • Radio Does the scan tool display any DTCs?	Go to Step 4	Go to <u>Symptoms - Instrument Panel, Gages and Console</u>
4	Does the scan tool display any other DTCs which begin with a "U"?	Go to <u>Scan Tool Does Not Communicate with Class 2 Device</u> in Data Link Communications	Go to Step 5
5	Does the scan tool display DTC B1000, B1004, B1007, B1009, B1372, B1382, or B1390?	Go to <u>Diagnostic Trouble Code (DTC) List</u> in Body Control Systems	Go to Step 6
6	Does the scan tool display B1327, B1328, B1513, B1514, P0562, P0563, P0615, P0616, P0617, P0625, P0626, P2500, or P2501?	Go to <u>Diagnostic Trouble Code (DTC) List</u> in Engine Electrical	Go to <u>Diagnostic Trouble Code (DTC) List</u>

DIAGNOSTIC SYSTEM CHECK - AUDIBLE WARNINGS

Test Description

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

- 2:** Lack of communication may be due to a partial malfunction of the class 2 serial data circuit or due to a total malfunction of the class 2 serial data circuit. The specified procedure will determine the particular condition.
- 3:** The symptom list in Symptoms will determine the correct diagnostic procedure to use.
- 4:** The presence of DTCs which begin with "U" indicate that loss of class 2 communications has occurred.

Diagnostic System Check - Audible Warnings

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Step	Action	Yes	No
1	Install a scan tool. Does the scan tool power up?	Go to Step 2	Go to <u>Scan Tool Does Not Power Up</u> in Data Link Communications
2	- Turn the ignition ON, with the engine OFF. - Attempt to establish communication with the following control modules: - Audio Amplifier - Dash Integration Module (DIM) - Instrument Panel Cluster (IPC) - Radio Does the scan tool communicate with the control modules listed above?	Go to Step 3	Go to <u>Scan Tool Does Not Communicate with Class 2 Device</u> in Data Link Communications
3	Select the display DTCs function on the scan tool for the following control modules: - Audio Amplifier - Dash Integration Module (DIM) - Instrument Panel Cluster (IPC) - Radio Does the scan tool display any DTCs?	Go to Step 4	Go to <u>Symptoms - Instrument Panel, Gages and Console</u>
4	Does the scan tool display any other DTCs which begin with a "U"?	Go to <u>Scan Tool Does Not Communicate with Class 2 Device</u> in Data Link Communications	Go to Step 5
5	Does the scan tool display DTC B1000, B1004, B1007, B1009, B1372, B1382, or B1390?	Go to <u>Diagnostic Trouble Code (DTC) List</u> in Body Control	

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		Systems	Go to Step 6
6	Does the scan tool display DTC B1327, B1513, or B1514?	Go to <u>Diagnostic Trouble Code (DTC) List</u> in Engine Electrical	Go to <u>Diagnostic Trouble Code (DTC) List</u>

SCAN TOOL OUTPUT CONTROLS

Instrument Panel Cluster (IPC)

Scan Tool Output Control	Additional Menu Selection(s)	Description
Display(s) Test	Output Control	The IPC illuminates all of the display segments and sweeps all gages when you select On.
Cluster Dimming	Output Control	The IPC dims from 0-100% when you select INCREASE or DECREASE by 20% increments.

SCAN TOOL DATA LIST

The scan tool data lists contain all the instrument panel, gage, and console related parameters that are available on the scan tool. The parameters in the list are arranged in alphabetical order. The data list column indicates the location of the parameter within the scan tool menu selections.

Use the scan tool data lists as directed by a diagnostic table or in order to supplement the diagnostic procedures. Begin all of the diagnostic procedures with **Diagnostic System Check - Instrument Cluster**, **Diagnostic System Check - Driver Information Systems** or **Diagnostic System Check - Audible Warnings**.

Use the scan tool data lists only after the following is determined:

- There is no published DTC procedure nor published symptom procedure for the customer concern.
- The DTC or symptom procedure indicated by the diagnostic system check does not resolve the customer concern.

The typical data values are obtained from a properly operating vehicle under the conditions specified in the first row of the scan tool data list table. Comparison of the parameter values from the suspect vehicle with the typical data values may reveal the source of the customer concern.

Dash Integration Module (DIM)

			Typical Data
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Scan Tool Parameter	Data List	Units Displayed	Value
Operating Conditions: Ignition ON/Engine OFF			
Key in Ignition	Inputs	Yes/No	Yes

Engine Control Module (ECM) - 3.6L

Scan Tool Parameter	Data List	Units Displayed	Typical Data Value
Operating Conditions: Engine Idling/Normal Operating Temperature			
Cruise Control Active	IPC Data	Yes/No	No
Current Gear	IPC Data	PRNDL	Varies
ECT Sensor	Engine Data 1 Engine Data 2 EVAP Data IPC Data	Celsius (Fahrenheit)	85-105°C (185-220°F)
Engine Oil Life Remaining	IPC Data	%	Varies
Engine Oil Level Switch	IPC Data	OK/Low	OK
Engine Oil Pressure Sensor	IPC Data	OK/Low	OK
Engine Oil Pressure Sensor	IPC Data	kPa (psi)	Varies w/oil pressure
Engine Oil Pressure Sensor	IPC Data	Volts	Varies w/oil pressure
Engine Speed	Engine Data 1 Engine Data 2 EVAP Data IPC Data	RPM	+/-100 RPM from Desired Idle Speed
Fuel Level Sensor Left	EVAP Data IPC Data	Volts	Varies w/fuel level
Fuel Level Sensor Right	EVAP Data IPC Data	Volts	Varies w/fuel level
Fuel Tank Level Remaining	Engine Data 1 EVAP Data IPC Data	Liters/Gallons	Varies w/fuel level
Fuel Tank Level Remaining	EVAP Data IPC Data	%	Varies w/fuel level
Ignition 0 Signal	Engine Data 1 Engine Data 2 EVAP Data	Yes/No	Yes

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	IPC Data		
Ignition 1 Signal	Engine Data 1 Engine Data 2 EVAP Data IPC Data	Yes/No	Yes
MIL Circuit Status	IPC Data	OK/Low	OK
MIL Command	Engine Data 1 IPC Data	Yes/No	No
Reduced Engine Power	Engine Data 1 Engine Data 2 IPC Data	Yes/No	No
Vehicle Security Status	Engine Data 2 IPC Data	On/Off	Off
Vehicle Speed Sensor	Engine Data 1 Engine Data 2 EVAP Data IPC Data	kilometers per hour (miles per hour)	0 km/h (0 mph)

Engine Control Module (ECM) - 4.6L

Scan Tool Parameter	Data List	Units Displayed	Typical Data Value
Operating Conditions: Engine Idling/Normal Operating Temperature			
Commanded Gear	IPC Data	Shift, 1st, 2nd, 3rd, 4th, 5th, Invalid, Invalid, Reverse, Neutral, Park	Park
Cruise Control Active	IPC Data	Yes / No	No
ECT Sensor	IPC Data	Celsius (Fahrenheit)	85-105°C (185- 220°F)
Engine Oil Pressure Sensor	IPC Data	Volts	0 - 5 V (Varies w/oil pressure)
Engine Oil Pressure Sensor	IPC Data	kPa (psi)	Varies w/oil pressure
Engine Oil Temperature Sensor	IPC Data	Celsius (Fahrenheit)	Varies w/oil temperature
Engine Speed	IPC Data	RPM	+/-100 RPM from Desired Idle Speed

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Fuel Level Sensor Left Tank	IPC Data	Volts	Varies w/fuel level
Fuel Level Sensor Right Tank	IPC Data	Volts	Varies w/fuel level
Fuel Tank Level Remaining	IPC Data	Liters / Gallons	Varies w/fuel level
GEN L - Terminal Signal Command	IPC Data	Off / On	On
Ignition 0 Signal	IPC Data	Off / On	On
Ignition 1 Signal	IPC Data	Volts	9 - 12 V (varies)
MIL Circuit Status	IPC Data	Fault / Indeterminate / Ok	OK
MIL Command	Engine Data 1 IPC Data	Off / On	Off
Vehicle Speed Sensor	Engine Data 1 Engine Data 2 EVAP Data IPC Data	kilometers per hour (miles per hour)	0 km/h (0 mph)

Instrument Panel Cluster (IPC)

Scan Tool Parameter	Data List	Units Displayed	Typical Data Value
Operating Conditions: Ignition ON/Engine OFF/Park Brake Unapplied			
8 Digit GM Part Number	ID Information	Numeric	Varies
ABS Input	Inputs	On/Off	Off
Battery Volts	Data	Volts	9-16 V
Brake Fluid Switch	Data	Volts	Varies w/fluid level
Calibration ID	ID Information	Numeric	Varies
Engine Speed	Data	RPM	0 RPM
Ignition 1	Inputs	On/Off	On
Ignition Counter	Data	Cycles	Varies
Julian Date of Build	ID Information	Numeric	Varies
Left Turn Signal	Inputs	On/Off	Off
Park Brake Switch	Inputs	On/Off	Off
PROM ID	ID Information	Numeric	Varies
Right Turn Signal	Inputs	On/Off	Off
Vehicle Speed	Data	kilometers per hour (miles per	0 km/h (0 mph)

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		hour)	
Year Model Built	ID Information	Numeric	Varies

SCAN TOOL DATA DEFINITIONS

8 Digit GM Part Number

The scan tool displays a numeric value. The GM Part Number of the IPC.

ABS Input

The scan tool displays On or Off. The state of the ABS indicator as commanded by the IPC. The IPC receives a class 2 message from the EBCM requesting illumination.

Battery Volts

The scan tool displays 0-19 volts. The voltage measured at the battery positive voltage circuit of the IPC.

Brake Fluid Switch

The scan tool displays the voltage at the brake fluid switch signal circuit as monitored by the IPC.

Calibration ID

The scan tool displays a numeric value. The identification of the calibration version of the IPC.

Commanded Gear

The scan tool displays Shift, 1st, 2nd, 3rd, 4th, 5th, Invalid, Reverse, Neutral or Park. The scan tool displays the commanded transmission range by the ECM.

Cruise Control Active

The scan tool displays Yes or No. This is the state of the cruise control switch as detected by the ECM

Current Gear

The scan tool displays the current gear of the transmission.

ECT Sensor

The scan tool displays -40 to +151°C (-40 to +304°F). The ECM monitors the voltage at the signal circuit of the engine coolant temperature sensor. The voltage is inversely proportional to the engine coolant temperature.

Engine Oil Life Remaining

The scan tool displays 0-100%. The ECM calculates the amount of oil life remaining.

Engine Oil Level Switch

The scan tool displays OK or Low. The ECM monitors the signal circuit of the engine oil level switch. A closed switch is displayed as Low.

Engine Oil Pressure Sensor

The scan tool displays OK or Low. The ECM monitors the signal circuit of the engine oil pressure sensor.

Engine Oil Pressure Sensor

The scan tool displays the oil pressure in kPa or psi. The ECM calculates the current oil pressure of the engine.

Engine Oil Pressure Sensor

The scan tool displays 0-5 volts. The ECM monitors the signal circuit of the engine oil pressure sensor.

Engine Oil Temperature Sensor

The scan tool display °C (°F). This is the engine oil temperature as monitored by the ECM.

Engine Speed

The scan tool displays 0-8,000 RPM. Engine speed is computed by the ECM from the ignition reference input. It should remain close to desired idle under various engine loads with the engine idling.

Engine Speed

The scan tool displays 0-8,000 RPM. Engine speed is computed by the IPC via a discrete input from the ECM.

Fuel Level

The scan tool displays the approximate value of fuel remaining in liters or gallons. The ECM calculates the amount of fuel remaining in the tanks based on the signal circuits of the fuel level sensors.

Fuel Level Sensor Left

The scan tool displays 0 - 5 volts. The ECM monitors the signal circuit of the secondary fuel level sensor.

Fuel Level Sensor Right

The scan tool displays 0 - 5 volts. The ECM monitors the signal circuit of the primary fuel level sensor.

Fuel Tank Level Remaining

The scan tool displays the approximate value of fuel remaining in liters or gallons. The ECM calculates the amount of fuel remaining in the tanks based on the signal circuits of the fuel level sensors.

Fuel Tank Level Remaining

The scan tool displays the approximate value of fuel remaining in percentage. The ECM calculates the amount of fuel remaining in the tanks based on the signal circuits of the fuel level sensors.

GEN L - Terminal

The scan tool displays Off/On. The ECM disables the generator under certain conditions to ease starting or engine load conditions.

Ignition 1

The scan tool displays On/Off. The scan tool displays On if the IPC senses voltage in the ignition 1 voltage circuit.

Ignition 0 Signal

The scan tool displays On/Off. The scan tool displays On when voltage is present at the ignition 0 voltage circuit of the ECM.

Ignition 1 Signal

The scan tool displays 9 - 16 V. This is the voltage present at the Ignition 1 voltage circuit of the ECM.

Ignition Counter

The scan tool displays 0-50. The IPC counts the number of times the ignition is cycled.

Julian Date of Build

The scan tool displays a numeric value. The date of build of the IPC.

Key in Ignition

The scan tool displays Yes or No. The DIM monitors the key in ignition switch circuit. A closed switch with the key in the ignition is displayed as Yes.

Left Turn Signal

The scan tool displays On or Off. The IPC monitors the left turn signal supply voltage circuit. An active turn signal toggles the display between On and Off.

MIL Circuit Status

The scan tool displays OK or Low. The status of the MIL circuit as monitored by the ECM.

MIL Command

The scan tool displays Yes or No. The scan tool displays Yes when the IPC receives a class 2 message from the ECM requesting illumination of the MIL indicator.

Park Brake Switch

The scan tool displays On or Off. The IPC monitors the park brake switch circuit. A closed switch with the parking brake applied is displayed as On.

PROM ID

The scan tool displays a numeric value. The PROM ID of the IPC.

Reduced Engine Power

The scan tool displays Yes or No. The ECM determines if a loss of engine power has occurred.

Right Turn Signal

The scan tool displays On or Off. The IPC monitors the right turn signal lamps supply voltage circuit. An active turn signal toggles the display between On and Off.

Vehicle Security Status

The scan tool display On or Off. The scan tool displays Yes when the IPC receives a class 2 message from the VTD module requesting illumination of the security indicator.

Vehicle Speed Sensor

The scan tool displays 0-255 km/h (0-155 mph). The IPC calculates the vehicle speed signal via a discrete input from the ECM.

Year Model Built

The scan tool a numeric value. The year the vehicle was built.

DIAGNOSTIC TROUBLE CODE (DTC) LIST

Diagnostic Trouble Code (DTC) List

DTC	Diagnostic Procedure	Modules
B1004	Refer to <u>DTC B1004</u> in Body Control System	IPC
B1007	Refer to <u>DTC B1007</u> in Body Control System	IPC
B1009	Refer to <u>DTC B1009</u> in Body	IPC

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	Control System	
B1328	Refer to <u>DTC B1328</u> in Engine Electrical	IPC
BXXXX	Refer to <u>Diagnostic Trouble Code (DTC) List</u> in SIR	SDM
C0267	<u>DTC C0267</u> in Hydraulic Brakes	IPC
CXXXX	Refer to <u>Diagnostic Trouble Code (DTC) List</u> in ABS	EBCM
P0461	<u>DTC P0461 (4.6L LH2) or DTC P0461 (3.6L LY7)</u>	ECM
P0462	<u>DTC P0462 (4.6L LH2) or DTC P0462 (3.6L LY7)</u>	ECM
P0463	<u>DTC P0463 (4.6L LH2) or DTC P0463 (3.6L LY7)</u>	ECM
P0521	<u>DTC P0521</u>	ECM
P0522	<u>DTC P0522</u>	ECM
P0523	<u>DTC P0523</u>	ECM
P2066	<u>DTC P2066 (4.6L LH2) or DTC P2066 (3.6L LY7)</u>	ECM
P2067	<u>DTC P2067 (4.6L LH2) or DTC P2067 (3.6L LY7)</u>	ECM

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P2068	<u>DTC P2068 (4.6L LH2) or DTC P2068 (3.6L LY7)</u>	ECM
PXXXX	Refer to <u>Diagnostic Trouble Code (DTC) List</u> in Engine Controls - 3.6L (LY7) or <u>Diagnostic Trouble Code (DTC) List</u> in Engine Controls - 4.6L (LH2)	ECM

DTC P0461 (4.6L LH2)

Circuit Description

The primary fuel level sender and the secondary fuel level sender change resistance in response to fuel level. The engine control module (ECM) monitors the signal circuit of the primary fuel level sender and the secondary fuel level sender in order to determine the fuel level. When the fuel tanks are full, the resistances of both fuel level senders are high, and the ECM senses a high signal voltage on both the signal circuit of the primary fuel level sender and the signal circuit of the secondary fuel level sender. When the fuel tanks are empty, the resistances of the fuel level senders are low, and the ECM senses a low signal voltage. The ECM uses the signal circuits of the primary fuel level sender and the secondary fuel level sender in order to calculate the percentage of remaining fuel in the tanks. The ECM sends the fuel level percentage via the class 2 serial data circuit to the instrument cluster in order to control the fuel gage. The fuel level information is also used for misfire and evaporative emission (EVAP) diagnostics.

This diagnostic tests for a stuck primary fuel level sensor signal. The ECM sets this DTC if the primary fuel level sensor signal appears to be stuck based on a lack of signal variation expected during normal operation.

Conditions for Running the DTC

The ignition is ON, with the engine running.

Conditions for Setting the DTC

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The ECM does not detect a change in fuel level in the primary fuel tank of at least 3.0L (0.79 gal) over a distance of 320 km (200 mi).

Action Taken When the DTC Sets

- The fuel gage defaults to empty.
- The driver information center (DIC) displays the FUEL LEVEL LOW message.
- The ECM records the operating conditions at the time that the diagnostic test fails. The ECM displays the failure information in the Failure Records on the scan tool.

Conditions for Clearing the DTC

- The DTC becomes history when the conditions for setting the DTC are no longer present.
- The history DTC clears after 40 malfunction free warm-up cycles.
- The ECM receives the clear code command from the scan tool.

Diagnostic Aids

- Use the Freeze Frame/Failure Records data in order to locate an intermittent condition. If you cannot duplicate the DTC, the information included in the Freeze Frame/Failure Records data may help in determining the number of miles since the DTC set. The Fail Counter and Pass Counter can also help in determining the number of ignition cycles that the diagnostic test reported a pass and/or fail. Operate the vehicle within the same freeze frame conditions, including those for RPM, for engine load, for vehicle speed, for temperature, and for others. This will isolate at what point the DTC failed.

Refer to **Testing for Intermittent Conditions and Poor Connections** in Wiring Systems.

- Check if DTC P2066 is also set. Both these codes may set simultaneously if the vehicle was refueled with the engine ON.

DTC P0461 (4.6L LH2)

Step	Action	Yes	No
Schematic Reference: <u>Instrument Cluster Schematics</u>			
1	Did you perform the Instrument Cluster Diagnostic System Check?	Go to Step 2	Go to <u>Diagnostic System Check - Instrument Cluster</u>
	1. Remove the primary fuel level sender. 2. Inspect for the following items:		

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2	- The fuel level sensor is stuck, perhaps due to an interference with the fuel strainer. - The fuel tank contains foreign material, for instance, ice.		
	Did you find and correct the condition?	Go to Step 4	Go to Step 3
3	Replace the primary fuel level sensor. Refer to Fuel Level Sensor Replacement - Primary in Engine Controls - 4.6L (LH2). Did you complete the replacement?	Go to Step 4	-
4	- Use the scan tool in order to clear the DTCs. - 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 P0461 (3.6L LY7)

Circuit Description

The primary fuel level sender and the secondary fuel level sender change resistance in response to fuel level. The engine control module (ECM) monitors the signal circuit of the primary fuel level sender and the secondary fuel level sender in order to determine the fuel level. When the fuel tanks are full, the resistances of both fuel level senders are high, and the ECM senses a high signal voltage on both the signal circuit of the primary fuel level sender and the signal circuit of the secondary fuel level sender. When the fuel tanks are empty, the resistances of the fuel level senders are low, and the ECM senses a low signal voltage. The ECM uses the signal circuits of the primary fuel level sender and the secondary fuel level sender in order to calculate the percentage of remaining fuel in the tanks. The ECM sends the fuel level percentage via the class 2 serial data circuit to the instrument cluster in order to control the fuel gage. The fuel level information is also used for misfire and evaporative emission (EVAP) diagnostics.

This diagnostics tests for the primary fuel level sensor signal movement. The ECM sets this DTC when it detects a difference between engine consumed fuel and change of the fuel level signal of the primary fuel level sensor.

Conditions for Running the DTC

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- Engine is running.
- No fuel level sensor signal failure present.
- Fuel level state is stable.

Conditions for Setting the DTC

- The ECM detects a difference between the engine consumed fuel and change of the fuel level signal of less than 1 L over a range of 30 L or 45.6% of primary fuel tank.
- The above condition is present for greater than 300 seconds.

Action Taken When the DTC Sets

- The fuel gage defaults to empty.
- The driver information center (DIC) displays the FUEL LEVEL LOW message.
- The ECM records the operating conditions at the time that the diagnostic test fails. The ECM displays the failure information in the Failure Records on the scan tool.

Conditions for Clearing the DTC

- The DTC becomes history when the conditions for setting the DTC are no longer present.
- The history DTC clears after 40 malfunction free warm-up cycles.
- The ECM receives the clear code command from the scan tool.

Diagnostic Aids

- Use the Freeze Frame/Failure Records data in order to locate an intermittent condition. If you cannot duplicate the DTC, the information included in the Freeze Frame/Failure Records data may help in determining the number of miles since the DTC set. The Fail Counter and Pass Counter can also help in determining the number of ignition cycles that the diagnostic test reported a pass and/or fail. Operate the vehicle within the same freeze frame conditions, including those for RPM, for engine load, for vehicle speed, for temperature, and for others. This will isolate at what point the DTC failed.

Refer to **Testing for Intermittent Conditions and Poor Connections** in Wiring Systems.

- Check if DTC P2066 is also set. Both these codes may set simultaneously if the vehicle was refueled with the engine ON.

DTC P0461 (3.6L LY7)

Step	Action	Yes	No

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Schematic Reference: Instrument Cluster Schematics

1	Did you perform the Instrument Cluster Diagnostic System Check?	Go to Step 2	Go to <u>Diagnostic System Check - Instrument Cluster</u>
2	1. Remove the primary fuel level sender. 2. Inspect for the following items: • The fuel level sensor is stuck, perhaps due to an interference with the fuel strainer. • The fuel tank contains foreign material, for instance, ice. Did you find and correct the condition?	Go to Step 4	Go to Step 3
3	Replace the primary fuel level sensor. Refer to <u>Fuel Level Sensor Replacement - Primary</u> in Engine Controls - 3.6L (LY7). Did you complete the replacement?	Go to Step 4	-
4	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 P0462 (4.6L LH2)

Circuit Description

The primary fuel level sender and the secondary fuel level sender change resistance in response to fuel level. The engine control module (ECM) monitors the signal circuit of the primary fuel level sender and the secondary fuel level sender in order to determine the fuel level. When the fuel tanks are full, the resistances of both fuel level senders are high, and the ECM senses a high signal voltage on both the signal circuit of the primary fuel level sender and the signal circuit of the secondary fuel level sender. When the fuel tanks are empty, the resistances of the fuel level senders are low, and the ECM senses a low signal voltage. The ECM uses the signal circuits of the primary fuel level sender and the secondary fuel level sender in order to calculate the percentage of remaining fuel in the tanks. The ECM sends the fuel level percentage via the class 2

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serial data circuit to the instrument cluster in order to control the fuel gage. The fuel level information is also used for misfire and evaporative emission (EVAP) diagnostics. This diagnostic tests for a lower than normal primary fuel level sender signal.

Conditions for Running the DTC

The ignition is ON, with the engine ON.

Conditions for Setting the DTC

- The primary fuel level signal is less than 0.5 volts.
- The above condition is present for greater than 20 seconds.

Action Taken When the DTC Sets

- The fuel gage defaults to empty.
- The driver information center (DIC) displays the FUEL LEVEL LOW message.
- The ECM records the operating conditions at the time that the diagnostic test fails. The ECM displays the failure information in the Failure Records on the scan tool.

Conditions for Clearing the DTC

- The DTC becomes history when the conditions for setting the DTC are no longer present.
- The history DTC clears after 40 malfunction free warm-up cycles.
- The ECM receives the clear code command from the scan tool.

Diagnostic Aids

Use the Freeze Frame/Failure Records data in order to locate an intermittent condition. If you cannot duplicate the DTC, the information included in the Freeze Frame/Failure Records data may help in determining the number of miles since the DTC set. The Fail Counter and Pass Counter can also help in determining the number of ignition cycles that the diagnostic test reported a pass and/or fail. Operate the vehicle within the same freeze frame conditions, including those for RPM, for engine load, for vehicle speed, for temperature, and for others. This will isolate at what point the DTC failed.

Refer to **Testing for Intermittent Conditions and Poor Connections** in Wiring Systems.

Test Description

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

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

DTC P0462 (4.6L LH2)

Step	Action	Values	Yes	No
Schematic Reference: <u>Instrument Cluster Schematics</u> Connector End View Reference: <u>Engine Control Module (ECM) Connector End Views</u> - 4.6 L (LH2) or <u>Inline Harness Connector End Views</u> in Wiring Systems				
1	Did you perform the Diagnostic System Check - Instrument Cluster?	-	Go to Step 2	Go to <u>Diagnostic System Check - Instrument Cluster</u>
2	1. Install a scan tool. 2. Turn the ignition ON, with the engine OFF. 3. With a scan tool, observe the Fuel Level Sensor Right parameter in the engine control module (ECM) evaporative emission (EVAP) data list. Does the scan tool indicate that the Fuel Level Sensor Right parameter is less than the specified value?	0.5 V	Go to Step 3	Go to Diagnostic Aids
3	1. Turn the ignition OFF. 2. Disconnect C420, the fuel level sensor. 3. Turn the ignition ON, with the engine OFF. 4. With a scan tool, observe the Fuel Level Sensor Right parameter. Does the scan tool indicate that the Fuel Level Sensor Right parameter is greater than the specified value?	4.5 V	Go to Step 5	Go to Step 4
	Test the signal circuit of the primary fuel			

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4	level sensor for a short to ground. Refer to <u>Circuit Testing</u> and <u>Wiring Repairs</u> in Wiring Systems. Did you find and correct the condition?	-	Go to Step 10	Go to Step 7
5	Test the signal circuit of the primary fuel level sensor for a short to ground between C420 and the primary fuel level sensor. Refer to <u>Circuit Testing</u> and <u>Wiring Repairs</u> in Wiring Systems. Did you find and correct the condition?	-	Go to Step 10	Go to Step 6
6	Inspect for poor connections at the harness connector of the primary fuel level sensor. Refer to <u>Testing for Intermittent Conditions and Poor Connections</u> and <u>Connector Repairs</u> in Wiring Systems. Did you find and correct the condition?	-	Go to Step 10	Go to Step 8
7	Inspect for poor connections at the harness connector of the ECM. Refer to <u>Testing for Intermittent Conditions and Poor Connections</u> and <u>Connector Repairs</u> in Wiring Systems. Did you find and correct the condition?	-	Go to Step 10	Go to Step 9
8	Replace the primary fuel level sensor. Refer to <u>Fuel Level Sensor Replacement - Primary</u> in Engine Controls - 4.6L (LH2). Did you complete the replacement?	-	Go to Step 10	-
9	IMPORTANT: Program the replacement ECM. Replace the ECM. Refer to <u>Engine Control Module (ECM) Replacement</u> in Engine Controls - 4.6L (LH2). 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	-		

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specified in the supporting text.

Does the DTC reset?

Go to **Step 2** System OK

DTC P0462 (3.6L LY7)

Circuit Description

The primary fuel level sender and the secondary fuel level sender change resistance in response to fuel level. The engine control module (ECM) monitors the signal circuit of the primary fuel level sender and the secondary fuel level sender in order to determine the fuel level. When the fuel tanks are full, the resistances of both fuel level senders are high, and the ECM senses a high signal voltage on both the signal circuit of the primary fuel level sender and the signal circuit of the secondary fuel level sender. When the fuel tanks are empty, the resistances of the fuel level senders are low, and the ECM senses a low signal voltage. The ECM uses the signal circuits of the primary fuel level sender and the secondary fuel level sender in order to calculate the percentage of remaining fuel in the tanks. The ECM sends the fuel level percentage via the class 2 serial data circuit to the instrument cluster in order to control the fuel gage. The fuel level information is also used for misfire and evaporative emission (EVAP) diagnostics. This diagnostic tests for a lower than normal primary fuel level sender signal.

Conditions for Running the DTC

- The engine is running.
- The system voltage is between 10 V - 18 V.

Conditions for Setting the DTC

- The primary fuel level signal is about 0.25 volts.
- The primary fuel level sensor signal range is about 5%.
- The above condition is present for about 60 seconds.

Action Taken When the DTC Sets

- The fuel gage defaults to empty.
- The driver information center (DIC) displays the FUEL LEVEL LOW message.
- The ECM records the operating conditions at the time that the diagnostic test fails. The ECM displays the failure information in the Failure Records on the scan tool.

Conditions for Clearing the DTC

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- The DTC becomes history when the conditions for setting the DTC are no longer present.
- The history DTC clears after 40 malfunction free warm-up cycles.
- The ECM receives the clear code command from the scan tool.

Diagnostic Aids

Use the Freeze Frame/Failure Records data in order to locate an intermittent condition. If you cannot duplicate the DTC, the information included in the Freeze Frame/Failure Records data may help in determining the number of miles since the DTC set. The Fail Counter and Pass Counter can also help in determining the number of ignition cycles that the diagnostic test reported a pass and/or fail. Operate the vehicle within the same freeze frame conditions, including those for RPM, for engine load, for vehicle speed, for temperature, and for others. This will isolate at what point the DTC failed.

Refer to **Testing for Intermittent Conditions and Poor Connections** in Wiring Systems.

Test Description

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

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

DTC P0462 (3.6L LY7)

Step	Action	Values	Yes	No
Schematic Reference: <u>Instrument Cluster Schematics</u> Connector End View Reference: <u>Engine Control Module (ECM) Connector End Views</u> - 3.6 L (LY7) or <u>Inline Harness Connector End Views</u> in Wiring Systems				
1	Did you perform the Diagnostic System Check - Instrument Cluster?	-	Go to Step 2	Go to <u>Diagnostic System Check - Instrument Cluster</u>
2	1. Install a scan tool. 2. Turn the ignition ON, with the engine OFF. 3. With a scan tool, observe the Fuel Level Sensor Right parameter in the engine control module (ECM)	0.35 V		

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	evaporative emission (EVAP) data list. Does the scan tool indicate that the Fuel Level Sensor Right parameter is less than the specified value?		Go to Step 3	Go to Diagnostic Aids
3	1. Turn the ignition OFF. 2. Disconnect C420, the fuel level sensor. 3. Turn the ignition ON, with the engine OFF. 4. With a scan tool, observe the Fuel Level Sensor Right parameter. Does the scan tool indicate that the Fuel Level Sensor Right parameter is greater than the specified value?	4.0 V	Go to Step 5	Go to Step 4
4	Test the signal circuit of the primary fuel level sensor for a short to ground. Refer to <u>Circuit Testing</u> and <u>Wiring Repairs</u> in Wiring Systems. Did you find and correct the condition?	-	Go to Step 10	Go to Step 7
5	Test the signal circuit of the primary fuel level sensor for a short to ground between C420 and the primary fuel level sensor. Refer to <u>Circuit Testing</u> and <u>Wiring Repairs</u> in Wiring Systems. Did you find and correct the condition?	-	Go to Step 10	Go to Step 6
6	Inspect for poor connections at the harness connector of the primary fuel level sensor. Refer to <u>Testing for Intermittent Conditions and Poor Connections</u> and <u>Connector Repairs</u> in Wiring Systems. Did you find and correct the condition?	-	Go to Step 10	Go to Step 8
7	Inspect for poor connections at the harness connector of the ECM. Refer to <u>Testing for Intermittent Conditions and Poor Connections</u> and <u>Connector Repairs</u> in	-		

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	Wiring Systems. Did you find and correct the condition?		Go to Step 10	Go to Step 9
8	Replace the primary fuel level sensor. Refer to <u>Fuel Level Sensor Replacement - Primary</u> in Engine Controls - 3.6L (LY7). Did you complete the replacement?	-	Go to Step 10	-
9	IMPORTANT: Program the replacement ECM. Replace the ECM. Refer to <u>Engine Control Module (ECM) Replacement</u> in Engine Controls - 3.6L (LY7). 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 P0463 (4.6L LH2)

Circuit Description

The primary fuel level sender and the secondary fuel level sender change resistance in response to fuel level. The engine control module (ECM) monitors the signal circuit of the primary fuel level sender and the secondary fuel level sender in order to determine the fuel level. When the fuel tanks are full, the resistances of both fuel level senders are high, and the ECM senses a high signal voltage on both the signal circuit of the primary fuel level sender and the signal circuit of the secondary fuel level sender. When the fuel tanks are empty, the resistances of the fuel level senders are low, and the ECM senses a low signal voltage. The ECM uses the signal circuits of the primary fuel level sender and the secondary fuel level sender in order to calculate the percentage of remaining fuel in the tanks. The ECM sends the fuel level percentage via the class 2 serial data circuit to the instrument cluster in order to control the fuel gage. The fuel level information is also used for misfire and evaporative emission (EVAP) diagnostics. This diagnostic tests for a higher than normal primary fuel level sender signal.

Conditions for Running the DTC

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The ignition is ON, with the engine ON.

Conditions for Setting the DTC

- The primary fuel level signal is greater than 4.5 volts.
- The above condition is present for greater than 20 seconds.

Action Taken When the DTC Sets

- The fuel gage defaults to empty.
- The driver information center (DIC) displays the FUEL LEVEL LOW message.
- The ECM records the operating conditions at the time that the diagnostic test fails. The ECM displays the failure information in the Failure Records on the scan tool.

Conditions for Clearing the DTC

- The DTC becomes history when the conditions for setting the DTC are no longer present.
- The history DTC clears after 40 malfunction free warm-up cycles.
- The ECM receives the clear code command from the scan tool.

Diagnostic Aids

Use the Freeze Frame/Failure Records data in order to locate an intermittent condition. If you cannot duplicate the DTC, the information included in the Freeze Frame/Failure Records data may help in determining the number of miles since the DTC set. The Fail Counter and Pass Counter can also help in determining the number of ignition cycles that the diagnostic test reported a pass and/or fail. Operate the vehicle within the same freeze frame conditions, including those for RPM, for engine load, for vehicle speed, for temperature, and for others. This will isolate at what point the DTC failed.

Refer to **Testing for Intermittent Conditions and Poor Connections** in Wiring Systems.

Test Description

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

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

DTC P0463 (4.6L LH2)

Step	Action	Values	Yes	No
Schematic Reference: <u>Instrument Cluster Schematics</u>				

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Connector End View Reference: Engine Control Module (ECM) Connector End Views 4.6 L (LH2) or Inline Harness Connector End Views in Wiring Systems

1	Did you perform the Diagnostic System Check - Instrument Cluster?	-	Go to Step 2	Go to <u>Diagnostic System Check - Instrument Cluster</u>
2	1. Install a scan tool. 2. Turn the ignition ON, with the engine OFF. 3. With a scan tool, observe the Fuel Level Sensor Right parameter in the engine control module (ECM) evaporative emission (EVAP) data list. Does the scan tool indicate that the Fuel Level Sensor Right parameter is greater than the specified value?	4.5 V	Go to Step 3	Go to Diagnostic Aids
3	1. Turn the ignition OFF. 2. Disconnect C420. 3. Connect a 3-ampere fused jumper wire between the signal circuit of the primary fuel level sensor and the low reference circuit of the primary fuel level sensor on the female terminal side of the connector. 4. Turn the ignition ON, with the engine OFF. 5. With a scan tool, observe the Fuel Level Sensor Right parameter. Does the scan tool indicate that the Fuel Level Sensor Right parameter is less than the specified value?	0.5 V	Go to Step 6	Go to Step 4
	Test the signal circuit of the primary fuel			

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4	level sensor for an open, for a high resistance, or for a short to voltage. Refer to <u>Circuit Testing</u> and <u>Wiring Repairs</u> in Wiring Systems. Did you find and correct the condition?	-	Go to Step 12	Go to Step 5
5	Test the low reference circuit of the primary fuel level sensor for an open or for a high resistance. Refer to <u>Circuit Testing</u> and <u>Wiring Repairs</u> in Wiring Systems. Did you find and correct the condition?	-	Go to Step 12	Go to Step 9
6	Test the signal circuit of the fuel level sensor for an open, for a high resistance, or for a short to voltage between C420 and the primary fuel level sensor. Refer to <u>Circuit Testing</u> and <u>Wiring Repairs</u> in Wiring Systems. Did you find and correct the condition?	-	Go to Step 12	Go to Step 7
7	Test the low reference circuit of the fuel level sensor for an open, or for a high resistance between C420 and the primary fuel level sensor. Refer to <u>Circuit Testing</u> and <u>Wiring Repairs</u> in Wiring Systems. Did you find and correct the condition?	-	Go to Step 12	Go to Step 8
8	Inspect for poor connections at the harness connector of the primary fuel level sensor. Refer to <u>Testing for Intermittent Conditions and Poor Connections</u> and <u>Connector Repairs</u> in Wiring Systems. Did you find and correct the condition?	-	Go to Step 12	Go to Step 10
9	Inspect for poor connections at the harness connector of the ECM. Refer to <u>Testing for Intermittent Conditions and Poor Connections</u> and <u>Connector Repairs</u> in Wiring Systems. Did you find and correct the condition?	-	Go to Step 12	Go to Step 11
10	Replace the primary fuel level sensor. Refer to <u>Fuel Level Sensor Replacement - Primary</u> in Engine	-		

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	Controls - 4.6L (LH2). Did you complete the replacement?		Go to Step 12	-
11	IMPORTANT: Program the replacement ECM. Replace the ECM. Refer to <u>Engine Control Module (ECM) Replacement</u> in Engine Controls - 4.6L (LH2). Did you complete the replacement?	-	Go to Step 12	-
12	1. Use the scan tool in order to clear the DTCs. 2. Operate the vehicle within the Conditions for Running the DTC as specified in the supporting text. Does the DTC reset?	-	Go to Step 2	System OK

DTC P0463 (3.6L LY7)

Circuit Description

The primary fuel level sender and the secondary fuel level sender change resistance in response to fuel level. The engine control module (ECM) monitors the signal circuit of the primary fuel level sender and the secondary fuel level sender in order to determine the fuel level. When the fuel tanks are full, the resistances of both fuel level senders are high, and the ECM senses a high signal voltage on both the signal circuit of the primary fuel level sender and the signal circuit of the secondary fuel level sender. When the fuel tanks are empty, the resistances of the fuel level senders are low, and the ECM senses a low signal voltage. The ECM uses the signal circuits of the primary fuel level sender and the secondary fuel level sender in order to calculate the percentage of remaining fuel in the tanks. The ECM sends the fuel level percentage via the class 2 serial data circuit to the instrument cluster in order to control the fuel gage. The fuel level information is also used for misfire and evaporative emission (EVAP) diagnostics. This diagnostic tests for a higher than normal primary fuel level sender signal.

Conditions for Running the DTC

- The engine is running.
- The system voltage is between 10 V - 18 V.
- Fuel level state is stable.

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Conditions for Setting the DTC

- The primary fuel level signal is about 3.2 volts.
- The primary fuel level sensor signal is about 64%.
- The above condition is present for about 60 seconds.

Action Taken When the DTC Sets

- The fuel gage defaults to empty.
- The driver information center (DIC) displays the FUEL LEVEL LOW message.
- The ECM records the operating conditions at the time that the diagnostic test fails. The ECM displays the failure information in the Failure Records on the scan tool.

Conditions for Clearing the DTC

- The DTC becomes history when the conditions for setting the DTC are no longer present.
- The history DTC clears after 40 malfunction free warm-up cycles.
- The ECM receives the clear code command from the scan tool.

Diagnostic Aids

Use the Freeze Frame/Failure Records data in order to locate an intermittent condition. If you cannot duplicate the DTC, the information included in the Freeze Frame/Failure Records data may help in determining the number of miles since the DTC set. The Fail Counter and Pass Counter can also help in determining the number of ignition cycles that the diagnostic test reported a pass and/or fail. Operate the vehicle within the same freeze frame conditions, including those for RPM, for engine load, for vehicle speed, for temperature, and for others. This will isolate at what point the DTC failed.

Refer to **Testing for Intermittent Conditions and Poor Connections** in Wiring Systems.

Test Description

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

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

DTC P0463 (3.6L LY7)

Step	Action	Values	Yes	No
Schematic Reference: <u>Instrument Cluster Schematics</u>				
Connector End View Reference: <u>Engine Control Module (ECM) Connector End</u>				

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Views 3.6 L (LY7) or Inline Harness Connector End Views in Wiring Systems

1	Did you perform the Diagnostic System Check - Instrument Cluster?	-	Go to Step 2	Go to <u>Diagnostic System Check - Instrument Cluster</u>
2	1. Install a scan tool. 2. Turn the ignition ON, with the engine OFF. 3. With a scan tool, observe the Fuel Level Sensor Right parameter in the engine control module (ECM) evaporative emission (EVAP) data list. Does the scan tool indicate that the Fuel Level Sensor Right parameter is greater than the specified value?	4.0 V	Go to Step 3	Go to Diagnostic Aids
3	1. Turn the ignition OFF. 2. Disconnect C420. 3. Connect a 3-ampere fused jumper wire between the signal circuit of the primary fuel level sensor and the low reference circuit of the primary fuel level sensor on the female terminal side of the connector. 4. Turn the ignition ON, with the engine OFF. 5. With a scan tool, observe the Fuel Level Sensor Right parameter. Does the scan tool indicate that the Fuel Level Sensor Right parameter is less than the specified value?	0.35 V	Go to Step 6	Go to Step 4
	Test the signal circuit of the primary fuel level sensor for an open, for a high			

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4	resistance, or for a short to voltage. Refer to <u>Circuit Testing</u> and <u>Wiring Repairs</u> in Wiring Systems. Did you find and correct the condition?	-	Go to Step 12	Go to Step 5
5	Test the low reference circuit of the primary fuel level sensor for an open or for a high resistance. Refer to <u>Circuit Testing</u> and <u>Wiring Repairs</u> in Wiring Systems. Did you find and correct the condition?	-	Go to Step 12	Go to Step 9
6	Test the signal circuit of the fuel level sensor for an open, for a high resistance, or for a short to voltage between C420 and the primary fuel level sensor. Refer to <u>Circuit Testing</u> and <u>Wiring Repairs</u> in Wiring Systems. Did you find and correct the condition?	-	Go to Step 12	Go to Step 7
7	Test the low reference circuit of the fuel level sensor for an open, or for a high resistance between C420 and the primary fuel level sensor. Refer to <u>Circuit Testing</u> and <u>Wiring Repairs</u> in Wiring Systems. Did you find and correct the condition?	-	Go to Step 12	Go to Step 8
8	Inspect for poor connections at the harness connector of the primary fuel level sensor. Refer to <u>Testing for Intermittent Conditions and Poor Connections</u> and <u>Connector Repairs</u> in Wiring Systems. Did you find and correct the condition?	-	Go to Step 12	Go to Step 10
9	Inspect for poor connections at the harness connector of the ECM. Refer to <u>Testing for Intermittent Conditions and Poor Connections</u> and <u>Connector Repairs</u> in Wiring Systems. Did you find and correct the condition?	-	Go to Step 12	Go to Step 11
10	Replace the primary fuel level sensor. Refer to <u>Fuel Level Sensor Replacement - Primary</u> in Engine Controls - 3.6L (LY7).	-	Go to Step	

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	Did you complete the replacement?		12	-
11	IMPORTANT: Program the replacement ECM. Replace the ECM. Refer to <u>Engine Control Module (ECM) Replacement</u> in Engine Controls - 3.6L (LY7). Did you complete the replacement?	-	Go to Step 12	-
12	1. Use the scan tool in order to clear the DTCs. 2. Operate the vehicle within the Conditions for Running the DTC as specified in the supporting text. Does the DTC reset?	-	Go to Step 2	System OK

DTC P0521

Circuit Description

The engine oil pressure (EOP) sensor changes resistance based on engine oil pressure. The engine control module (ECM) monitors the signal circuit of the EOP sensor. When the oil pressure is high, the sensor resistance is high, and the ECM senses a high signal voltage. The ECM sends the EOP information to the instrument panel cluster (IPC) via the class 2 serial data circuit.

Conditions for Running the DTC

The engine is running.

Conditions for Setting the DTC

The ECM does not detect a change in the EOP of at least 34.5 kPa (5.0 psi) over a predetermined variance of the engine speed.

Action Taken When the DTC Sets

- The ECM records the operating conditions at the time the diagnostic test fails. The ECM displays this information in the Failure Records on the scan tool.
- The IPC illuminates the EOP indicator.

Conditions for Clearing the DTC

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- The DTC becomes history when the conditions for setting the DTC are no longer present.
- The history DTC clears after 40 malfunction free warm-up cycles.
- The ECM receives a clear code command from the scan tool.

Diagnostic Aids

Using the Failure Records data may help locate an intermittent condition. If you cannot duplicate the DTC, the information in the Failure Records can help determine how many miles since the DTC set. The Fail Counter and Pass Counter can help determine how many ignition cycles that the diagnostic test reported a pass and/or a fail.

Refer to **Testing for Intermittent Conditions and Poor Connections** in Wiring Systems.

DTC P0521

Step	Action	Values	Yes	No
Schematic Reference: <u>Instrument Cluster Schematics</u>				
1	Did you perform the Diagnostic System Check - Instrument Cluster?	-	Go to Step 2	Go to <u>Diagnostic System Check - Instrument Cluster</u>
2	1. Install a scan tool. 2. Turn the ignition ON, with the engine ON. 3. With the scan tool, observe the Engine Oil Pressure Sensor parameter in the engine control module (ECM) instrument panel cluster (IPC) Data list. Does the Engine Oil Pressure Sensor parameter display values that vary within the specified values when idling and accelerating the engine?	0.7-2.5 V	Go to Diagnostic Aids	Go to Step 3
	Replace the engine oil pressure (EOP) sensor. Refer to <u>Engine Oil Pressure Sensor and/or Switch Replacement</u> in			

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3	Engine Mechanical - 3.6L or <u>Engine Oil Pressure Sensor and/or Switch Replacement</u> in Engine Mechanical - 4.6L (LH2). Did you complete the replacement?	-	Go to Step 4	-
4	1. Use the scan tool in order to clear the DTCs. 2. Operate the vehicle within the Conditions for Running the DTC. Does the DTC reset?	-	Go to Step 2	System OK

DTC P0522

Circuit Description

The engine oil pressure (EOP) sensor changes resistance based on engine oil pressure. The engine control module (ECM) monitors the signal circuit of the EOP sensor. When the oil pressure is high, the sensor resistance is high, and the ECM senses a high signal voltage. When the oil pressure is low, the sensor resistance is low, and the ECM senses a low signal voltage. The ECM sends the EOP information to the instrument panel cluster (IPC) via the class 2 serial data circuit.

Conditions for Running the DTC

The engine is running.

Conditions for Setting the DTC

- The ECM detects that the EOP sensor signal circuit is less than 0.4 volts.
- The above condition is present for greater than 10 seconds.

Action Taken When the DTC Sets

- The ECM records the operating conditions at the time the diagnostic test fails. The ECM displays this information in the Failure Records on the scan tool.
- The IPC illuminates the EOP indicator.

Conditions for Clearing the DTC

- The DTC becomes history when the conditions for setting the DTC are no longer present.
- The history DTC clears after 40 malfunction free warm-up cycles.

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- The ECM receives a clear code command from the scan tool.

Diagnostic Aids

Using the Failure Records data may help locate an intermittent condition. If you cannot duplicate the DTC, the information in the Failure Records can help determine how many miles since the DTC set. The Fail Counter and Pass Counter can help determine how many ignition cycles that the diagnostic test reported a pass and/or a fail.

Refer to **Testing for Intermittent Conditions and Poor Connections** in Wiring Systems.

Test Description

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

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

DTC P0522

Step	Action	Values	Yes	No
Schematic Reference: <u>Instrument Cluster Schematics</u>				
1	Did you perform the Diagnostic System Check - Instrument Cluster?	-	Go to Step 2	Go to <u>Diagnostic System Check - Instrument Cluster</u>
2	1. Install a scan tool. 2. Turn the ignition ON, with the engine OFF. 3. With the scan tool, observe the Engine Oil Pressure Sensor parameter in the engine control module (ECM) instrument panel cluster (IPC) Data list. Does the Engine Oil Pressure Sensor parameter display less than the specified value?	0.4 V	Go to Step 3	Go to Diagnostic Aids
	1. Turn the ignition OFF.			

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3	2. Disconnect the engine oil pressure (EOP) sensor. 3. Connect a 3-ampere fused jumper between the EOP sensor signal circuit and the 5-volt reference circuit of the EOP sensor. 4. With the scan tool, observe the Engine Oil Pressure Sensor parameter. Does the Engine Oil Pressure Sensor parameter display greater than the specified value?	4.6 V	Go to Step 7	Go to Step 4
4	1. Disconnect the fused jumper. 2. Measure the voltage between the 5-volt reference circuit of the EOP sensor and the low reference circuit of the EOP sensor. Does the voltage measure greater than the specified value?	4.6 V	Go to Step 6	Go to Step 5
5	Test the 5-volt reference circuit of the EOP sensor for an open or for a high resistance. Refer to Circuit Testing and to Wiring Repairs in Wiring Systems. Did you find and correct the condition?	-	Go to Step 11	Go to Step 8
6	Test the EOP sensor signal circuit for the following: • An open • A short to ground • High resistance Refer to Circuit Testing and to Wiring Repairs in Wiring Systems. Did you find and correct the condition?	-	Go to Step 11	Go to Step 8
	Inspect for poor connections at the harness			

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7	connector of the EOP sensor. Refer to <u>Testing for Intermittent Conditions and Poor Connections</u> and to <u>Connector Repairs</u> in Wiring Systems. Did you find and correct the condition?	-	Go to Step 11	Go to Step 9
8	Inspect for poor connections at the harness connector of the engine control module (ECM). Refer to <u>Testing for Intermittent Conditions and Poor Connections</u> and to <u>Connector Repairs</u> in Wiring Systems. Did you find and correct the condition?	-	Go to Step 11	Go to Step 10
9	Replace the EOP sensor. Refer to <u>Engine Oil Pressure Sensor and/or Switch Replacement</u> in Engine Mechanical - 3.6L or <u>Engine Oil Pressure Sensor and/or Switch Replacement</u> in Engine Mechanical - 4.6L (LH2). Did you complete the replacement?	-	Go to Step 10	-
10	IMPORTANT: Program the replacement ECM. Replace the ECM. Refer to <u>Engine Control Module (ECM) Replacement</u> in Engine Controls - 3.6L or <u>Engine Control Module (ECM) Replacement</u> in Engine Controls - 4.6L (LH2). Did you complete the replacement?	-	Go to Step 11	-
11	1. Use the scan tool in order to clear the DTCs. 2. Operate the vehicle within the Conditions for Running the DTC. Does the DTC reset?	-	Go to Step 2	System OK

DTC P0523

Circuit Description

The engine oil pressure (EOP) sensor changes resistance based on engine oil pressure. The engine control module (ECM) monitors the signal circuit of the EOP sensor. When the oil pressure is high, the sensor resistance is high, and the ECM senses a high signal voltage. When the oil pressure is low, the sensor resistance is low, and the ECM senses a low signal voltage. The ECM sends the EOP information to the instrument panel cluster (IPC) via the class 2 serial data circuit.

Conditions for Running the DTC

The engine is running.

Conditions for Setting the DTC

- The ECM detects that the EOP sensor signal circuit is greater than 4.6 volts.
- The above condition is present for greater than 9 seconds.

Action Taken When the DTC Sets

The ECM records the operating conditions at the time that the diagnostic test fails. The ECM displays this information in the Failure Records on the scan tool.

Conditions for Clearing the DTC

- The DTC becomes history when the conditions for setting the DTC are no longer present.
- The history DTC is cleared after 40 malfunction-free warm-up cycles.
- The ECM receives the clear code command from the scan tool.

Diagnostic Aids

Using the Failure Records data may help locate an intermittent condition. If you cannot duplicate the DTC, the information in the Failure Records can help in determining how many miles since the DTC set. The Fail Counter and the Pass Counter can help determine how many ignition cycles that the diagnostic test reported a pass and/or a fail.

Refer to **Testing for Intermittent Conditions and Poor Connections** in Wiring Systems.

Test Description

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

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

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Step	Action	Values	Yes	No
Schematic Reference: <u>Instrument Cluster Schematics</u>				
1	Did you perform the Diagnostic System Check - Instrument Cluster?	-	Go to Step 2	Go to <u>Diagnostic System Check - Instrument Cluster</u>
2	1. Install a scan tool. 2. Turn the ignition ON, with the engine OFF. 3. With the scan tool, observe the Engine Oil Pressure Sensor parameter in the engine control module (ECM) instrument panel cluster (IPC) Data list. Does the Engine Oil Pressure Sensor parameter display greater than the specified value?	4.6 V	Go to Step 3	Go to Diagnostic Aids
3	1. Turn the ignition OFF. 2. Disconnect the engine oil pressure (EOP) sensor. 3. With the scan tool, observe the Engine Oil Pressure Sensor parameter. Does the Engine Oil Pressure Sensor parameter display less than the specified value?	0.4 V	Go to Step 4	Go to Step 5
4	1. Turn the ignition OFF. 2. Disconnect the negative battery cable. Refer to <u>Battery Negative Cable Disconnect/Connect Procedure</u> in Engine Electrical. 3. Measure the resistance from the low reference circuit of the EOP sensor to	5 ohms		

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	a good ground. Is the resistance less than the specified value?		Go to Step 7	Go to Step 6
5	Test the EOP sensor signal circuit for a short to voltage. Refer to <u>Circuit Testing</u> and to <u>Wiring Repairs</u> in Wiring Systems. Did you find and correct the condition?	-	Go to Step 11	Go to Step 8
6	1. Disconnect the engine control module (ECM). 2. Test the low reference circuit of the EOP sensor for an open or for a high resistance. Refer to <u>Circuit Testing</u> and to <u>Wiring Repairs</u> in Wiring Systems. Did you find and correct the condition?	-	Go to Step 11	Go to Step 8
7	Inspect for poor connections at the harness connector of the EOP sensor. Refer to <u>Testing for Intermittent Conditions and Poor Connections</u> and to <u>Connector Repairs</u> in Wiring Systems. Did you find and correct the condition?	-	Go to Step 11	Go to Step 9
8	Inspect for poor connections at the harness connector of the ECM. Refer to <u>Testing for Intermittent Conditions and Poor Connections</u> and to <u>Connector Repairs</u> in Wiring Systems. Did you find and correct the condition?	-	Go to Step 11	Go to Step 10
9	Replace the EOP sensor. Refer to <u>Engine Oil Pressure Sensor and/or Switch Replacement</u> in Engine Mechanical - 3.6L or <u>Engine Oil Pressure Sensor and/or Switch Replacement</u> in Engine Mechanical - 4.6L (LH2). Did you complete the replacement?	-	Go to Step 11	-
	IMPORTANT: Program the replacement ECM.			

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10	Replace the ECM. Refer to <u>Engine Control Module (ECM) Replacement</u> in Engine Controls - 3.6L or <u>Engine Control Module (ECM) Replacement</u> in Engine Controls - 4.6L (LH2). Did you complete the replacement?	-	Go to Step 11	-
11	1. Use the scan tool in order to clear the DTCs. 2. Operate the vehicle within the Conditions for Running the DTC. Does the DTC reset?	-	Go to Step 2	System OK

DTC P2066 (4.6L LH2)

Circuit Description

The primary fuel level sender and the secondary fuel level sender change resistance in response to fuel level. The engine control module (ECM) monitors the signal circuit of the primary fuel level sender and the signal circuit of the secondary fuel level sender in order to determine the fuel level. When the fuel tanks are full, the resistances of both fuel level senders are high, and the ECM senses a high signal voltage on both the signal circuit of the primary fuel level sender and the signal circuit of the secondary fuel level sender. When the fuel tanks are empty, the resistances of the fuel level senders are low, and the ECM senses a low signal voltage. The ECM uses the signal circuits of the primary fuel level sender and the secondary fuel level sender in order to calculate the percentage of remaining fuel in the tanks. The ECM sends the fuel level percentage via the class 2 serial data circuit to the instrument cluster in order to control the fuel gage. The fuel level information is also used for misfire and evaporative emission (EVAP) diagnostics.

This diagnostic tests for a stuck secondary fuel level sensor signal. The ECM sets this DTC if the secondary fuel level sensor signal appears to be stuck based on a lack of signal variation expected during normal operation.

Conditions for Running the DTC

The ignition is ON, with the engine ON.

Conditions for Setting the DTC

The ECM does not detect a change in the secondary fuel level of at least 3.0L (0.79 gal) over a distance of 320 km (200 mi).

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Action Taken When the DTC Sets

- The fuel gage defaults to empty.
- The driver information center (DIC) illuminates the FUEL LEVEL LOW message.
- The ECM records the operating conditions at the time that the diagnostic test fails. The ECM displays the failure information in the Failure Records on the scan tool.

Conditions for Clearing the DTC

- The DTC becomes history when the conditions for setting the DTC are no longer present.
- The history DTC clears after 40 malfunction free warm-up cycles.
- The ECM receives the clear code command from the scan tool.

Diagnostic Aids

- Use the Freeze Frame/Failure Records data in order to locate an intermittent condition. If you cannot duplicate the DTC, the information included in the Freeze Frame/Failure Records data may help in determining the number of miles since the DTC set. The Fail Counter and Pass Counter can also help in determining the number of ignition cycles that the diagnostic test reported a pass and/or fail. Operate the vehicle within the same freeze frame conditions, including those for RPM, for engine load, for vehicle speed, for temperature, and for others. This will isolate at what point the DTC failed.

Refer to **Testing for Intermittent Conditions and Poor Connections** in Wiring Systems.

- Check if DTC P0461 is also set. Both these codes may set simultaneously if the vehicle was refueled with the engine ON.

DTC P2066 (4.6L LH2)

Step	Action	Yes	No
Schematic Reference: <u>Instrument Cluster Schematics</u>			
1	Did you perform the Diagnostic System Check - Instrument Cluster?	Go to Step 2	Go to <u>Diagnostic System Check - Instrument Cluster</u>
2	1. Remove the fuel level sender. 2. Inspect for the following items: • The fuel level sensor is stuck, perhaps due to an interference with the fuel		

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	strainer. The fuel tank contains foreign material, for instance, ice.		
	Did you find and correct the condition?	Go to Step 4	Go to Step 3
3	Replace the secondary fuel tank module. Refer to Fuel Tank Module Replacement - Secondary in Engine Controls - 4.6L (LH2). Did you complete the replacement?	Go to Step 4	-
4	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 P2066 (3.6L LY7)

Circuit Description

The primary fuel level sender and the secondary fuel level sender change resistance in response to fuel level. The engine control module (ECM) monitors the signal circuit of the primary fuel level sender and the signal circuit of the secondary fuel level sender in order to determine the fuel level. When the fuel tanks are full, the resistances of both fuel level senders are high, and the ECM senses a high signal voltage on both the signal circuit of the primary fuel level sender and the signal circuit of the secondary fuel level sender. When the fuel tanks are empty, the resistances of the fuel level senders are low, and the ECM senses a low signal voltage. The ECM uses the signal circuits of the primary fuel level sender and the secondary fuel level sender in order to calculate the percentage of remaining fuel in the tanks. The ECM sends the fuel level percentage via the class 2 serial data circuit to the instrument cluster in order to control the fuel gage. The fuel level information is also used for misfire and evaporative emission (EVAP) diagnostics.

This diagnostic tests for the secondary fuel level sensor signal movement. The ECM sets this DTC when it detects a difference between engine consumed fuel and change of the fuel level signal of the secondary fuel level sensor.

Conditions for Running the DTC

- Engine is running.

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- No fuel level sensor signal failure present.
- Fuel level state is stable.

Conditions for Setting the DTC

- The ECM detects a difference between the engine consumed fuel and change of the fuel level signal of less than 1 L over a range of 30 L or 45.6% of the secondary fuel tank.
- The above condition is present for greater than 300 seconds.

Action Taken When the DTC Sets

- The fuel gage defaults to empty.
- The driver information center (DIC) illuminates the FUEL LEVEL LOW message.
- The ECM records the operating conditions at the time that the diagnostic test fails. The ECM displays the failure information in the Failure Records on the scan tool.

Conditions for Clearing the DTC

- The DTC becomes history when the conditions for setting the DTC are no longer present.
- The history DTC clears after 40 malfunction free warm-up cycles.
- The ECM receives the clear code command from the scan tool.

Diagnostic Aids

- Use the Freeze Frame/Failure Records data in order to locate an intermittent condition. If you cannot duplicate the DTC, the information included in the Freeze Frame/Failure Records data may help in determining the number of miles since the DTC set. The Fail Counter and Pass Counter can also help in determining the number of ignition cycles that the diagnostic test reported a pass and/or fail. Operate the vehicle within the same freeze frame conditions, including those for RPM, for engine load, for vehicle speed, for temperature, and for others. This will isolate at what point the DTC failed.

Refer to **Testing for Intermittent Conditions and Poor Connections** in Wiring Systems.

- Check if DTC P0461 is also set. Both these codes may set simultaneously if the vehicle was refueled with the engine ON.

DTC P2066 (3.6L LY7)

Step	Action	Yes	No
Schematic Reference: <u>Instrument Cluster Schematics</u>			

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1	Did you perform the Diagnostic System Check - Instrument Cluster?	Go to Step 2	Go to <u>Diagnostic System Check - Instrument Cluster</u>
2	1. Remove the fuel level sender. 2. Inspect for the following items: • The fuel level sensor is stuck, perhaps due to an interference with the fuel strainer. • The fuel tank contains foreign material, for instance, ice. Did you find and correct the condition?	Go to Step 4	Go to Step 3
3	Replace the secondary fuel tank module. Refer to <u>Fuel Tank Module Replacement - Secondary</u> in Engine Controls - 3.6L (LY7). Did you complete the replacement?	Go to Step 4	-
4	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 P2067 (4.6L LH2)

Circuit Description

The primary fuel level sender and the secondary fuel level sender change resistance in response to fuel level. The engine control module (ECM) monitors the signal circuit of the primary fuel level sender and the signal circuit of the secondary fuel level sender in order to determine the fuel level. When the fuel tanks are full, the resistances of both fuel level senders are high, and the ECM senses a high signal voltage on both the signal circuit of the primary fuel level sender and the signal circuit of the secondary fuel level sender. When the fuel tanks are empty, the resistances of the fuel level senders are low, and the ECM senses a low signal voltage. The ECM uses the signal circuits of the primary fuel level sender and the secondary fuel level sender in order to calculate the percentage of remaining fuel in the tanks. The ECM sends the fuel level percentage via the class 2 serial data circuit to the instrument cluster in order to control the fuel gage. The

fuel level information is also used for misfire and evaporative emission (EVAP) diagnostics. This diagnostic tests for a lower than normal secondary fuel level sender signal.

Conditions for Running the DTC

The ignition is ON, with the engine ON.

Conditions for Setting the DTC

- The secondary fuel level signal is less than 0.5 volts.
- The above condition is present for greater than 20 seconds.

Action Taken When the DTC Sets

- The fuel gage reads inaccurately.
- The driver information center (DIC) illuminates the FUEL LEVEL LOW message.
- The ECM records the operating conditions at the time that the diagnostic test fails. The ECM displays the failure information in the Failure Records on the scan tool.

Conditions for Clearing the DTC

- The DTC becomes history when the conditions for setting the DTC are no longer present.
- The history DTC clears after 40 malfunction free warm-up cycles.
- The ECM receives the clear code command from the scan tool.

Diagnostic Aids

Use the Freeze Frame/Failure Records data in order to locate an intermittent condition. If you cannot duplicate the DTC, the information included in the Freeze Frame/Failure Records data may help in determining the number of miles since the DTC set. The Fail Counter and Pass Counter can also help in determining the number of ignition cycles that the diagnostic test reported a pass and/or fail. Operate the vehicle within the same freeze frame conditions, including those for RPM, for engine load, for vehicle speed, for temperature, and for others. This will isolate at what point the DTC failed.

Refer to **Testing for Intermittent Conditions and Poor Connections** in Wiring Systems.

Test Description

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

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

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DTC P2067 (4.6L LH2)

Step	Action	Values	Yes	No
Schematic Reference: <u>Instrument Cluster Schematics</u> Connector End View Reference: <u>Engine Control Module (ECM) Connector End Views</u> 4.6 L (LH2) or <u>Inline Harness Connector End Views</u> in Wiring Systems				
1	Did you perform the Diagnostic System Check - Instrument Cluster?	-	Go to Step 2	Go to <u>Diagnostic System Check - Instrument Cluster</u>
2	1. Install a scan tool. 2. Turn the ignition ON, with the engine OFF. 3. With a scan tool, observe the Fuel Level Sensor Left parameter in the engine control module (ECM) evaporative emission (EVAP) data list. Does the scan tool indicate that the Fuel Level Sensor Left parameter is less than the specified value?	0.5 V	Go to Step 3	Go to Diagnostic Aids
3	1. Turn the ignition OFF. 2. Disconnect C420. 3. Turn the ignition ON, with the engine OFF. 4. With a scan tool, observe the Fuel Level Sensor Left parameter. Does the scan tool indicate that the Fuel Level Sensor Left parameter is greater than the specified value?	4.5 V	Go to Step 5	Go to Step 4
4	Test the signal circuit of the secondary fuel level sensor for a short to ground. Refer to <u>Circuit Testing</u> and <u>Wiring Repairs</u> in Wiring Systems.	-	Go to Step	

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	Did you find and correct the condition?		10	Go to Step 7
5	Test the signal circuit of the secondary fuel level sensor for a short to ground between C420 and the secondary fuel level sensor. Refer to <u>Circuit Testing</u> and <u>Wiring Repairs</u> in Wiring Systems. Did you find and correct the condition?	-	Go to Step 10	Go to Step 6
6	Inspect for poor connections at the harness connector of the secondary fuel level sensor. Refer to <u>Testing for Intermittent Conditions and Poor Connections</u> and <u>Connector Repairs</u> in Wiring Systems. Did you find and correct the condition?	-	Go to Step 10	Go to Step 8
7	Inspect for poor connections at the harness connector of the ECM. Refer to <u>Testing for Intermittent Conditions and Poor Connections</u> and <u>Connector Repairs</u> in Wiring Systems. Did you find and correct the condition?	-	Go to Step 10	Go to Step 9
8	Replace the secondary sender module. Refer to <u>Fuel Tank Module Replacement - Secondary</u> in Engine Controls - 4.6L (LH2). Did you complete the replacement?	-	Go to Step 10	-
9	IMPORTANT: Program the replacement ECM. Replace the ECM. Refer to <u>Engine Control Module (ECM) Replacement</u> in Engine Controls - 4.6L (LH2). 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 P2067 (3.6L LY7)**Circuit Description**

The primary fuel level sender and the secondary fuel level sender change resistance in response to fuel level. The engine control module (ECM) monitors the signal circuit of the primary fuel level sender and the signal circuit of the secondary fuel level sender in order to determine the fuel level. When the fuel tanks are full, the resistances of both fuel level senders are high, and the ECM senses a high signal voltage on both the signal circuit of the primary fuel level sender and the signal circuit of the secondary fuel level sender. When the fuel tanks are empty, the resistances of the fuel level senders are low, and the ECM senses a low signal voltage. The ECM uses the signal circuits of the primary fuel level sender and the secondary fuel level sender in order to calculate the percentage of remaining fuel in the tanks. The ECM sends the fuel level percentage via the class 2 serial data circuit to the instrument cluster in order to control the fuel gage. The fuel level information is also used for misfire and evaporative emission (EVAP) diagnostics. This diagnostic tests for a lower than normal secondary fuel level sender signal.

Conditions for Running the DTC

- The engine is running.
- The system voltage is between 10 V and 18 V.

Conditions for Setting the DTC

- The secondary fuel level sensor signal is about 0.25 volts.
- The secondary fuel level sensor signal range is about 5%.
- The above condition is present for about 60 seconds.

Action Taken When the DTC Sets

- The fuel gage defaults to empty.
- The driver information center (DIC) illuminates the FUEL LEVEL LOW message.
- The ECM records the operating conditions at the time that the diagnostic test fails. The ECM displays the failure information in the Failure Records on the scan tool.

Conditions for Clearing the DTC

- The DTC becomes history when the conditions for setting the DTC are no longer present.
- The history DTC clears after 40 malfunction free warm-up cycles.
- The ECM receives the clear code command from the scan tool.

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Diagnostic Aids

Use the Freeze Frame/Failure Records data in order to locate an intermittent condition. If you cannot duplicate the DTC, the information included in the Freeze Frame/Failure Records data may help in determining the number of miles since the DTC set. The Fail Counter and Pass Counter can also help in determining the number of ignition cycles that the diagnostic test reported a pass and/or fail. Operate the vehicle within the same freeze frame conditions, including those for RPM, for engine load, for vehicle speed, for temperature, and for others. This will isolate at what point the DTC failed.

Refer to **Testing for Intermittent Conditions and Poor Connections** in Wiring Systems.

Test Description

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

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

DTC P2067 (3.6L LY7)

Step	Action	Values	Yes	No
Schematic Reference: <u>Instrument Cluster Schematics</u> Connector End View Reference: <u>Engine Control Module (ECM) Connector End Views</u> 3.6 L (LY7) or <u>Inline Harness Connector End Views</u> in Wiring Systems				
1	Did you perform the Diagnostic System Check - Instrument Cluster?	-	Go to Step 2	Go to <u>Diagnostic System Check - Instrument Cluster</u>
2	1. Install a scan tool. 2. Turn the ignition ON, with the engine OFF. 3. With a scan tool, observe the Fuel Level Sensor Left parameter in the engine control module (ECM) evaporative emission (EVAP) data list. Does the scan tool indicate that the Fuel Level Sensor Left parameter is less than	0.35 V		Go to Diagnostic

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	the specified value?		Go to Step 3	Aids
3	1. Turn the ignition OFF. 2. Disconnect C420. 3. Turn the ignition ON, with the engine OFF. 4. With a scan tool, observe the Fuel Level Sensor Left parameter. Does the scan tool indicate that the Fuel Level Sensor Left parameter is greater than the specified value?	4.0 V		
			Go to Step 5	Go to Step 4
4	Test the signal circuit of the secondary fuel level sensor for a short to ground. Refer to <u>Circuit Testing</u> and <u>Wiring Repairs</u> in Wiring Systems. Did you find and correct the condition?	-	Go to Step 10	Go to Step 7
5	Test the signal circuit of the secondary fuel level sensor for a short to ground between C420 and the secondary fuel level sensor. Refer to <u>Circuit Testing</u> and <u>Wiring Repairs</u> in Wiring Systems. Did you find and correct the condition?	-	Go to Step 10	Go to Step 6
6	Inspect for poor connections at the harness connector of the secondary fuel level sensor. Refer to <u>Testing for Intermittent Conditions and Poor Connections</u> and <u>Connector Repairs</u> in Wiring Systems. Did you find and correct the condition?	-	Go to Step 10	Go to Step 8
7	Inspect for poor connections at the harness connector of the ECM. Refer to <u>Testing for Intermittent Conditions and Poor Connections</u> and <u>Connector Repairs</u> in Wiring Systems. Did you find and correct the condition?	-	Go to Step 10	Go to Step 9
8	Replace the secondary sender module. Refer to <u>Fuel Tank Module Replacement - Secondary</u> in Engine Controls - 3.6L (LY7).	-	Go to Step	

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	Did you complete the replacement?		10	-
9	IMPORTANT: Program the replacement ECM. Replace the ECM. Refer to <u>Engine Control Module (ECM) Replacement</u> in Engine Controls - 3.6L (LY7). 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 P2068 (4.6L LH2)

Circuit Description

The primary fuel level sender and the secondary fuel level sender change resistance in response to fuel level. The engine control module (ECM) monitors the signal circuit of the primary fuel level sender and the signal circuit of the secondary fuel level sender in order to determine the fuel level. When the fuel tanks are full, the resistances of both fuel level senders are high, and the ECM senses a high signal voltage on both the signal circuit of the primary fuel level sender and the signal circuit of the secondary fuel level sender. When the fuel tanks are empty, the resistances of the fuel level senders are low, and the ECM senses a low signal voltage. The ECM uses the signal circuits of the primary fuel level sender and the secondary fuel level sender in order to calculate the percentage of remaining fuel in the tanks. The ECM sends the fuel level percentage via the class 2 serial data circuit to the instrument cluster in order to control the fuel gage. The fuel level information is also used for misfire and evaporative emission (EVAP) diagnostics. This diagnostic tests for a higher than normal secondary fuel level sender signal.

Conditions for Running the DTC

The ignition is ON, with the engine ON.

Conditions for Setting the DTC

- The secondary fuel level signal is greater than 4.5 volts.

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- The above condition is present for greater than 20 seconds.

Action Taken When the DTC Sets

- The fuel gage reads inaccurately.
- The driver information center (DIC) illuminates the FUEL LEVEL LOW message.
- The ECM records the operating conditions at the time that the diagnostic test fails. The ECM displays the failure information in the Failure Records on the scan tool.

Conditions for Clearing the DTC

- The DTC becomes history when the conditions for setting the DTC are no longer present.
- The history DTC clears after 40 malfunction free warm-up cycles.
- The ECM receives the clear code command from the scan tool.

Diagnostic Aids

Use the Freeze Frame/Failure Records data in order to locate an intermittent condition. If you cannot duplicate the DTC, the information included in the Freeze Frame/Failure Records data may help in determining the number of miles since the DTC set. The Fail Counter and Pass Counter can also help in determining the number of ignition cycles that the diagnostic test reported a pass and/or fail. Operate the vehicle within the same freeze frame conditions, including those for RPM, for engine load, for vehicle speed, for temperature, and for others. This will isolate at what point the DTC failed.

Refer to **Testing for Intermittent Conditions and Poor Connections** in Wiring Systems.

Test Description

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

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

DTC P2068 (4.6L LH2)

Step	Action	Values	Yes	No
Schematic Reference: <u>Instrument Cluster Schematics</u> Connector End View Reference: <u>Engine Control Module (ECM) Connector End Views</u> - 4.6 L (LH2) or <u>Inline Harness Connector End Views</u> in Wiring Systems				
	Did you perform the Diagnostic System Check - Instrument Cluster?			Go to Diagnostic

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1		-	Go to Step 2	<u>System Check - Instrument Cluster</u>
2	1. Install a scan tool. 2. Turn the ignition ON, with the engine OFF. 3. With a scan tool, observe the Fuel Level Sensor Left parameter in the engine control module (ECM) evaporative emission (EVAP) data list. Does the scan tool indicate that the Fuel Level Sensor Left parameter is greater than the specified value?	4.5 V	Go to Step 3	Go to Diagnostic Aids
3	1. Turn the ignition OFF. 2. Disconnect C420. 3. Connect a 3-ampere fused jumper wire between the signal circuit of the secondary fuel level sensor and the low reference circuit of the secondary fuel level sensor on the female terminal side of the connector. 4. Turn the ignition ON, with the engine OFF. 5. With a scan tool, observe the Fuel Level Sensor Left parameter. Does the scan tool indicate that the Fuel Level Sensor Left parameter is less than the specified value?	0.5 V	Go to Step 6	Go to Step 4
4	Test the signal circuit of the secondary fuel level sensor for an open, for a high resistance, or for a short to voltage. Refer to Circuit Testing and Wiring Repairs in Wiring Systems.	-	Go to Step	

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	Did you find and correct the condition?		12	Go to Step 5
5	Test the low reference circuit of the secondary fuel level sensor for an open or for a high resistance. Refer to <u>Circuit Testing</u> and <u>Wiring Repairs</u> in Wiring Systems. Did you find and correct the condition?	-	Go to Step 12	Go to Step 9
6	Test the signal circuit of the secondary fuel level sensor for an open, for a high resistance, or for a short to voltage between C420 and the secondary fuel level sensor. Refer to <u>Circuit Testing</u> and <u>Wiring Repairs</u> in Wiring Systems. Did you find and correct the condition?	-	Go to Step 12	Go to Step 7
7	Test the low reference circuit of the secondary fuel level sensor for an open, or for a high resistance between C420 and the secondary fuel level sensor. Refer to <u>Circuit Testing</u> and <u>Wiring Repairs</u> in Wiring Systems. Did you find and correct the condition?	-	Go to Step 12	Go to Step 8
8	Inspect for poor connections at the harness connector of the secondary fuel level sensor. Refer to <u>Testing for Intermittent Conditions and Poor Connections</u> and <u>Connector Repairs</u> in Wiring Systems. Did you find and correct the condition?	-	Go to Step 12	Go to Step 10
9	Inspect for poor connections at the harness connector of the ECM. Refer to <u>Testing for Intermittent Conditions and Poor Connections</u> and <u>Connector Repairs</u> in Wiring Systems. Did you find and correct the condition?	-	Go to Step 12	Go to Step 11
10	Replace the secondary sender module. Refer to <u>Fuel Tank Module Replacement - Secondary</u> in Engine Controls - 4.6L (LH2). Did you complete the replacement?	-	Go to Step 12	-

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11	IMPORTANT: Program the replacement ECM. Replace the ECM. Refer to <u>Engine Control Module (ECM) Replacement</u> in Engine Controls - 4.6L (LH2). Did you complete the replacement?	-	Go to Step 12	-
12	1. Use the scan tool in order to clear the DTCs. 2. Operate the vehicle within the Conditions for Running the DTC as specified in the supporting text. Does the DTC reset?	-	Go to Step 2	System OK

DTC P2068 (3.6L LY7)

Circuit Description

The primary fuel level sender and the secondary fuel level sender change resistance in response to fuel level. The engine control module (ECM) monitors the signal circuit of the primary fuel level sender and the signal circuit of the secondary fuel level sender in order to determine the fuel level. When the fuel tanks are full, the resistances of both fuel level senders are high, and the ECM senses a high signal voltage on both the signal circuit of the primary fuel level sender and the signal circuit of the secondary fuel level sender. When the fuel tanks are empty, the resistances of the fuel level senders are low, and the ECM senses a low signal voltage. The ECM uses the signal circuits of the primary fuel level sender and the secondary fuel level sender in order to calculate the percentage of remaining fuel in the tanks. The ECM sends the fuel level percentage via the class 2 serial data circuit to the instrument cluster in order to control the fuel gage. The fuel level information is also used for misfire and evaporative emission (EVAP) diagnostics. This diagnostic tests for a higher than normal secondary fuel level sender signal.

Conditions for Running the DTC

- The engine is running.
- The system voltage is between 10 V - 18 V.

Conditions for Setting the DTC

- The secondary fuel level signal is about 3.2 volts.

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- The secondary fuel level sensor signal range is about 64%.
- The above condition is present for about 60 seconds.

Action Taken When the DTC Sets

- The fuel gage defaults to empty.
- The driver information center (DIC) illuminates the FUEL LEVEL LOW message.
- The ECM records the operating conditions at the time that the diagnostic test fails. The ECM displays the failure information in the Failure Records on the scan tool.

Conditions for Clearing the DTC

- The DTC becomes history when the conditions for setting the DTC are no longer present.
- The history DTC clears after 40 malfunction free warm-up cycles.
- The ECM receives the clear code command from the scan tool.

Diagnostic Aids

Use the Freeze Frame/Failure Records data in order to locate an intermittent condition. If you cannot duplicate the DTC, the information included in the Freeze Frame/Failure Records data may help in determining the number of miles since the DTC set. The Fail Counter and Pass Counter can also help in determining the number of ignition cycles that the diagnostic test reported a pass and/or fail. Operate the vehicle within the same freeze frame conditions, including those for RPM, for engine load, for vehicle speed, for temperature, and for others. This will isolate at what point the DTC failed.

Refer to **Testing for Intermittent Conditions and Poor Connections** in Wiring Systems.

Test Description

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

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

DTC P2068 (3.6L LY7)

Step	Action	Values	Yes	No
Schematic Reference: <u>Instrument Cluster Schematics</u> Connector End View Reference: <u>Engine Control Module (ECM) Connector End Views</u> 3.6 L (LY7) or <u>Inline Harness Connector End Views</u> in Wiring Systems				
	Did you perform the Diagnostic System			Go to

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1	Check - Instrument Cluster?	-	Go to Step 2	<u>Diagnostic System Check - Instrument Cluster</u>
2	1. Install a scan tool. 2. Turn the ignition ON, with the engine OFF. 3. With a scan tool, observe the Fuel Level Sensor Left parameter in the engine control module (ECM) evaporative emission (EVAP) data list. Does the scan tool indicate that the Fuel Level Sensor Left parameter is greater than the specified value?	4.0 V	Go to Step 3	Go to Diagnostic Aids
3	1. Turn the ignition OFF. 2. Disconnect C420. 3. Connect a 3-ampere fused jumper wire between the signal circuit of the secondary fuel level sensor and the low reference circuit of the secondary fuel level sensor on the female terminal side of the connector. 4. Turn the ignition ON, with the engine OFF. 5. With a scan tool, observe the Fuel Level Sensor Left parameter. Does the scan tool indicate that the Fuel Level Sensor Left parameter is less than the specified value?	0.35 V	Go to Step 6	Go to Step 4
4	Test the signal circuit of the secondary fuel level sensor for an open, for a high resistance, or for a short to voltage. Refer to <u>Circuit Testing</u> and <u>Wiring Repairs</u>	-		

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	in Wiring Systems. Did you find and correct the condition?		Go to Step 12	Go to Step 5
5	Test the low reference circuit of the secondary fuel level sensor for an open or for a high resistance. Refer to <u>Circuit Testing</u> and <u>Wiring Repairs</u> in Wiring Systems. Did you find and correct the condition?	-	Go to Step 12	Go to Step 9
6	Test the signal circuit of the secondary fuel level sensor for an open, for a high resistance, or for a short to voltage between C420 and the secondary fuel level sensor. Refer to <u>Circuit Testing</u> and <u>Wiring Repairs</u> in Wiring Systems. Did you find and correct the condition?	-	Go to Step 12	Go to Step 7
7	Test the low reference circuit of the secondary fuel level sensor for an open, or for a high resistance between C420 and the secondary fuel level sensor. Refer to <u>Circuit Testing</u> and <u>Wiring Repairs</u> in Wiring Systems. Did you find and correct the condition?	-	Go to Step 12	Go to Step 8
8	Inspect for poor connections at the harness connector of the secondary fuel level sensor. Refer to <u>Testing for Intermittent Conditions and Poor Connections</u> and <u>Connector Repairs</u> in Wiring Systems. Did you find and correct the condition?	-	Go to Step 12	Go to Step 10
9	Inspect for poor connections at the harness connector of the ECM. Refer to <u>Testing for Intermittent Conditions and Poor Connections</u> and <u>Connector Repairs</u> in Wiring Systems. Did you find and correct the condition?	-	Go to Step 12	Go to Step 11
10	Replace the secondary sender module. Refer to <u>Fuel Tank Module Replacement - Secondary</u> in Engine Controls - 3.6L (LY7).	-	Go to Step	

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	Did you complete the replacement?		12	-
11	IMPORTANT: Program the replacement ECM. Replace the ECM. Refer to <u>Engine Control Module (ECM) Replacement</u> in Engine Controls - 3.6L (LY7). Did you complete the replacement?	-	Go to Step 12	-
12	1. Use the scan tool in order to clear the DTCs. 2. Operate the vehicle within the Conditions for Running the DTC as specified in the supporting text. Does the DTC reset?	-	Go to Step 2	System OK

SYMPTOMS - INSTRUMENT PANEL, GAGES AND CONSOLE

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

- Before using the symptom diagnostic tables, perform the following tests in order to determine that there are no DTCs set, and that the control modules can communicate via the serial data link:
 - **Diagnostic System Check - Instrument Cluster**
 - **Diagnostic System Check - Driver Information Systems**
 - **Diagnostic System Check - Audible Warnings**
- Review the system operation in order to understand the system functions. Refer to the following description and operations:
 - **Instrument Panel Cluster (IPC) Description and Operation**
 - **Indicator/Warning Message Description and Operation**
 - **Driver Information Center (DIC) Description and Operation**
 - **Audible Warnings Description and Operation**

Visual/Physical Inspection

- Inspect for aftermarket devices which can affect the operation of the instrument panel

cluster or the audible warnings system. Refer to **Checking Aftermarket Accessories** in Wiring Systems.

- Inspect the accessible system components or the visible system components for obvious damage or for obvious conditions which can cause the symptom.
- Inspect for the proper fluid levels.

Intermittent

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

Symptom List

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

Gages and Odometer

- **Instrument Panel Cluster (IPC) Gages Inoperative**
- **Fuel Gage Inaccurate or Inoperative**
- **Tachometer Inaccurate or Inoperative**

Indicators

- **ABS Indicator Always On** in Antilock Brake System
- **ABS Indicator Inoperative** in Antilock Brake System
- **Air Bag Indicator Circuit Malfunction** in SIR
- **Brake Warning Indicator Always On** in Hydraulic Brakes
- **Brake Warning Indicator Inoperative** in Hydraulic Brakes
- **Change Engine Oil Indicator Always On**
- **Change Engine Oil Indicator Inoperative**
- **Door Ajar Indicator Malfunction** in Doors
- **Engine Oil Pressure Indicator Always On**
- **Fog Lamp Indicator Always On** in Lighting Systems
- **Fog Lamp Indicator Always On - Rear** in Lighting Systems
- **Fog Lamp Indicator Inoperative** in Lighting Systems
- **Fog Lamp Indicator Inoperative - Rear** in Lighting Systems

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- **Headlamps Suggested Message On in Daylight Conditions** in Lighting Systems
- **High Beam Indicator Always On** in Lighting Systems
- **High Beam Indicator Inoperative** in Lighting Systems
- **Lights On Indicator Always On** in Lighting Systems
- **Lights On Indicator Inoperative** in Lighting Systems
- **Low Engine Coolant Indicator Always On** in Engine Cooling
- **Low Tire Pressure Indicator Always On** in Tire Pressure Monitoring
- **Low Tire Pressure Indicator Inoperative** in Tire Pressure Monitoring
- **Low Washer Fluid Indicator Malfunction** in Wiper/Washer Systems
- **MPH (Km/h) Indicator Inoperative**
- **Seat Belt Indicator Circuit Malfunction** in Seat Belts
- **Security Indicator Inoperative** in Theft Deterrent
- **Turn Signal Lamps and/or Indicators Always On or Flashing** in Lighting Systems
- **Turn Signal Lamps and/or Indicators Inoperative** in Lighting Systems
- **Traction Control Indicator Always On** in Antilock Brake System
- **Traction Control Indicator Inoperative** in Antilock Brake System
- **Traction Off Indicator Always On** in Antilock Brake System
- **Traction Off Indicator Inoperative** in Antilock Brake System

Driver Information Center

Driver Information Center (DIC) Switch(es) Inoperative

Audible Warnings

- **Chime Always On**
- **Chime Inoperative**

FUEL GAGE INACCURATE OR INOPERATIVE

Diagnostic Aids

- Ensure that the fuel level is in the same range as the customer concern.
- For intermittent diagnosis, refer to **Testing for Intermittent Conditions and Poor Connections** in Wiring Systems.
- Refer to **Fuel Level Specifications** in order to verify the correct fuel level sensor readings.

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The Fuel Level Sensor Left and the Fuel Level Sensor Right parameters are available on the scan tool in the engine control module (ECM) evaporative emission (EVAP) Data list.

Test Description

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

3: This step tests for a high resistance in the primary fuel level sensor signal circuit and the low reference circuit of the fuel level sensors.

4: This step tests for a high resistance in the secondary fuel level signal circuit and the low reference circuit of the fuel level sensors.

18: DTCs will be set in the ECM when you perform this diagnostic table.

Fuel Gage Inaccurate or Inoperative

Step	Action	Values	Yes	No
Schematic Reference: <u>Instrument Cluster Schematics</u> Connector End View Reference: <u>Engine Control Module (ECM) Connector End Views</u> , <u>Engine Control Module (ECM) Connector End Views</u> or <u>Inline Harness Connector End Views</u>				
1	Did you perform the Diagnostic System Check - Instrument Cluster?	-	Go to Step 2	Go to <u>Diagnostic System Check - Instrument Cluster</u>
2	1. Turn the ignition ON, with the engine OFF. 2. Install a scan tool. 3. With the scan tool, perform the Displays Test in the instrument panel cluster (IPC) Special Functions Output Controls list. Does the gage move from 0 to its maximum value and back to 0 when you perform the Displays Test?	-	Go to Step 3	Go to Step 16
	1. Disconnect C420, the fuel level sensor.			

3	2. Connect the J 33431-C Signal Generator and Instrument Panel Tester between the signal circuit of the Fuel Level Sensor Signal Primary and the low reference circuit of the fuel level sensors on the female terminal side. See <u>Special Tools and Equipment</u>. 3. Turn the ignition ON, with the engine OFF. IMPORTANT: Verify the J 33431-C resistance settings with a DMM. See <u>Special Tools and Equipment</u>. 4. Vary the resistance on the J 33431-C from 40-250 ohms. See <u>Special Tools and Equipment</u>. 5. With the scan tool, observe the Fuel Level Sensor Right Volts parameter in engine control module (ECM) evaporative emission (EVAP) Data list. 6. Refer to <u>Fuel Level Specifications</u> in order to convert from resistance to Fuel Level Sensor Right Volts. Does the Fuel Level Sensor Right Volts parameter change smoothly across the specified range?	0.7-2.5 V		Go to Step 4 Go to Step 10
	1. Connect the J 33431-C between the signal circuit of the Fuel Level Sensor Signal Secondary and the low reference circuit of the fuel level sensors on the female terminal side. See <u>Special Tools and Equipment</u>. 2. Turn the ignition ON, with the engine OFF.			

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4	IMPORTANT: Verify the J 33431-C resistance settings with a DMM. See <u>Special Tools and Equipment</u>. 3. Vary the resistance on the J 33431-C from 40-250 ohms. See <u>Special Tools and Equipment</u>. 4. With the scan tool, observe the Fuel Level Sensor Left Volts parameter in ECM EVAP Data list. 5. Refer to <u>Fuel Level Specifications</u> in order to convert from resistance to Fuel Level Sensor Left Volts. Does the Fuel Level Sensor Left Volts parameter change smoothly across the specified range?	0.7-2.5 V		
5	Inspect for the following items: • A poor connection at the harness connector of the suspect fuel level sensor. Refer to <u>Testing for Intermittent Conditions and Poor Connections</u> and <u>Connector Repairs</u> in Wiring Systems. • A high resistance in the Fuel Level Sensor Signal Primary signal circuit or the low reference circuit between the fuel level sensors and C420. • A high resistance in the Fuel Level Sensor Signal Secondary signal circuit or the low reference circuit between the fuel level sensors and C420. • A misaligned fuel level sender. • A deformed fuel tank.	-	Go to Step 5	Go to Step 11

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	Did you find and correct the condition?		Go to Step 18	Go to Step 6
6	1. Remove the primary fuel level sender. 2. Inspect for the following items: • A stuck fuel level sensor For example: the fuel strainer interfering with the sender float arm. • Foreign material in the fuel tank, i.e. ice Did you find and correct the condition?	-	Go to Step 18	Go to Step 7
7	1. With the J 39200 DMM, measure the resistance of the primary fuel level sensor while moving the float arm. 2. Observe both the analog and digital displays on the DMM. Does the resistance change smoothly across the specified range?	40-250 ohms	Go to Step 8	Go to Step 14
8	1. Remove the secondary fuel level sender. 2. Inspect for the following items: • A stuck fuel level sensor For example: the fuel strainer interfering with the sender float arm. • Foreign material in the fuel tank, i.e. ice Did you find and correct the condition?	-	Go to Step 18	Go to Step 9
	1. With the J 39200 DMM, measure			

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9	the resistance of the secondary fuel level sensor while moving the float arm. 2. Observe both the analog and digital displays on the DMM. Does the resistance change smoothly across the specified range?	40-250 ohms	Go to Diagnostic Aids	Go to Step 15
10	Test the Fuel Level Sensor Signal Primary signal circuit for a high resistance. Refer to <u>Circuit Testing</u> and <u>Wiring Repairs</u> in Wiring Systems. Did you find and correct the condition?	-	Go to Step 18	Go to Step 12
11	Test the Fuel Level Sensor Signal Secondary signal circuit for a high resistance. Refer to <u>Circuit Testing</u> and <u>Wiring Repairs</u> in Wiring Systems. Did you find and correct the condition?	-	Go to Step 18	Go to Step 13
12	Test the low reference circuit of the fuel level sensors for a high resistance. Refer to <u>Circuit Testing</u> and <u>Wiring Repairs</u> in Wiring Systems. Did you find and correct the condition?	-	Go to Step 18	Go to Step 13
13	Inspect for poor connections at the harness connector of the ECM. Refer to <u>Testing for Intermittent Conditions and Poor Connections</u> and <u>Connector Repairs</u> in Wiring Systems. Did you find and correct the condition?	-	Go to Step 18	Go to Step 17
14	Replace the primary fuel level sensor. Refer to <u>Fuel Level Sensor Replacement - Primary</u> in Engine Controls - 3.6L (LY7) or <u>Fuel Level Sensor Replacement - Primary</u> in Engine Controls - 4.6L (LH2). Did you complete the replacement?	-	Go to Step 18	-
	Replace the secondary fuel level sensor. Refer to <u>Fuel Tank Module</u>			

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15	<u>Replacement - Secondary</u> in Engine Controls - 3.6L (LY7) or <u>Fuel Tank Module Replacement - Secondary</u> in Engine Controls - 4.6L (LH2). Did you complete the replacement?	-	Go to Step 18	-
16	Replace the IPC. Refer to <u>Instrument Panel Cluster (IPC) Replacement</u> . Did you complete the replacement?	-	Go to Step 18	-
17	IMPORTANT: Program the replacement ECM. Replace the ECM. Refer to <u>Engine Control Module (ECM) Replacement</u> in Engine Controls - 3.6L (LY7) or <u>Engine Control Module (ECM) Replacement</u> in Engine Controls - 4.6L (LH2). Did you complete the replacement?	-	Go to Step 18	-
18	1. Use the scan tool in order to clear the ECM DTCs. 2. Operate the system in order to verify the repair. Did you correct the condition?	-	System OK	Go to Step 2

INSTRUMENT PANEL CLUSTER (IPC) GAGES INOPERATIVE

Instrument Panel Cluster (IPC) Gages Inoperative

Step	Action	Values	Yes	No
Schematic Reference: <u>Instrument Cluster Schematics</u> Connector End View Reference: <u>Instrument Panel, Gages, and Console Connector End Views</u> DEFINITION: This diagnostic procedure applies only to the serial data gages located in the instrument cluster which include the speedometer and the engine coolant temperature gage, if equipped.				
1	Did you perform the Diagnostic System Check - Instrument Cluster?	-		Go to <u>Diagnostic System Check</u> -

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			Go to Step 2	<u>Instrument Cluster</u>
2	1. Turn the ignition ON, with the engine OFF. 2. Install a scan tool. 3. With the scan tool, perform the Display(s) Test. Does the gage move from 0 to its maximum value and back to 0 when you perform the Display(s) Test?	-	Go to Step 3	Go to Step 4
3	1. Install a scan tool. IMPORTANT: If the suspect gage is the speedometer, the drive wheels of the vehicle must be raised and the transmission must be placed in drive or first gear. Refer to <u>Lifting and Jacking the Vehicle</u> in General Information. 2. Start the engine. 3. Observe the suspect Gage parameter in the engine control module (ECM) Data list. Refer to <u>Scan Tool Data List</u>. Does the parameter match the gage display?	-	Go to <u>Testing for Intermittent Conditions and Poor Connections</u> in Wiring Systems	Go to Step 4
4	Replace the instrument panel cluster (IPC). Refer to <u>Instrument Panel Cluster (IPC) Replacement</u>. Did you complete the replacement?	-	Go to Step 5	-
5	1. Use the scan tool in order to clear any induced DTCs. 2. Operate the system in order to verify the repair. Did you correct the condition?	-	System OK	Go to Step 2

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TACHOMETER INACCURATE OR INOPERATIVE

Tachometer Inaccurate or Inoperative

Step	Action	Values	Yes	No
Schematic Reference: <u>Instrument Cluster Schematics</u> Connector End View Reference: <u>Engine Control Module (ECM) Connector End Views</u> or <u>Instrument Panel, Gages, and Console Connector End Views</u>				
1	Did you perform the Diagnostic System Check - Instrument Cluster?	-	Go to Step 2	Go to <u>Diagnostic System Check - Instrument Cluster</u>
2	1. Install a scan tool. 2. Start the engine. 3. With the scan tool, observe the Engine Speed parameter in the engine control module (ECM) Engine Data 1 data list. Does the Engine Speed parameter match the tachometer display?	-	Go to <u>Testing for Intermittent Conditions and Poor Connections</u> in Wiring Systems	Go to Step 3
3	1. Turn the ignition OFF. 2. Disconnect the ECM connector C1. 3. Turn the ignition ON, with the engine OFF. 4. Measure the voltage from the engine speed signal circuit to a good ground. Does the voltage measure greater than the specified value?	9.0 V	Go to Step 5	Go to Step 4
4	Test the engine speed signal circuit for an open, for a high resistance, or for a short to ground. Refer to <u>Circuit Testing</u> and <u>Wiring Repairs</u> in Wiring Systems. Did you find and correct the condition?	-	Go to Step 10	Go to Step 6
	Test the engine speed signal circuit for a			

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5	short to voltage. Refer to <u>Circuit Testing</u> and <u>Wiring Repairs</u> in Wiring Systems. Did you find and correct the condition?	-	Go to Step 10	Go to Step 7
6	Inspect for poor connections at the harness connector of the instrument panel cluster (IPC). Refer to <u>Testing for Intermittent Conditions and Poor Connections</u> and <u>Connector Repairs</u> in Wiring Systems. Did you find and correct the condition?	-	Go to Step 10	Go to Step 8
7	Inspect for poor connections at the harness connector of the ECM. Refer to <u>Testing for Intermittent Conditions and Poor Connections</u> and <u>Connector Repairs</u> in Wiring Systems. Did you find and correct the condition?	-	Go to Step 10	Go to Step 9
8	Replace the IPC. Refer to <u>Instrument Panel Cluster (IPC) Replacement</u> . Did you complete the replacement?	-	Go to Step 10	-
9	IMPORTANT: Program the replacement ECM. Replace the ECM. Refer to <u>Engine Control Module (ECM) Replacement</u> in Engine Controls - 3.6L (LY7) or <u>Engine Control Module (ECM) Replacement</u> in Engine Controls - 4.6L (LH2). Did you complete the replacement?	-	Go to Step 10	-
10	Operate the system in order to verify the repair. Did you correct the condition?	-	System OK	Go to Step 2

CHANGE ENGINE OIL INDICATOR ALWAYS ON

Change Engine Oil Indicator Always On

Step	Action	Values	Yes	No
Schematic Reference: <u>Instrument Cluster Schematics</u>				

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1	Did you perform the Diagnostic System Check - Instrument Cluster?	-	Go to Step 2	Go to <u>Diagnostic System Check - Instrument Cluster</u>
2	Start the engine. Does the CHANGE ENGINE OIL message illuminate in the Radio?	-	Go to Step 3	Go to <u>Testing for Intermittent Conditions and Poor Connections</u> in Wiring Systems
3	1. Install a scan tool. 2. With a scan tool, observe the Engine Oil Life parameter in the engine control module (ECM) instrument panel cluster (IPC) Data list. Does the Engine Oil Life parameter display 0%?	-	Go to Step 4	Go to Step 5
4	Reset the engine oil life. Refer to <u>GM Oil Life System - Resetting (1)</u> in Maintenance and Lubrication. Does the CHANGE ENGINE OIL message turn off?	-	Go to Step 6	Go to Step 5
5	Replace the radio. Refer to <u>Radio Replacement</u> in Entertainment. Did you complete the replacement?	-	Go to Step 6	-
6	Operate the system in order to verify the repair. Did you correct the condition?	-	System OK	Go to Step 2

CHANGE ENGINE OIL INDICATOR INOPERATIVE

Change Engine Oil Indicator Inoperative

Step	Action	Values	Yes	No

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Schematic Reference: Instrument Cluster Schematics

1	Did you perform the Diagnostic System Check - Instrument Cluster?	-	Go to Step 2	Go to <u>Diagnostic System Check - Instrument Cluster</u>
2	1. Install a scan tool. 2. Turn the ignition ON, with the engine OFF. 3. With a scan tool, observe the Engine Oil Life parameter in the engine control module (ECM) instrument panel cluster (IPC) Data list. Does the Engine Oil Life parameter display 0%?	-	Go to Step 3	System OK
3	Replace the radio. Refer to <u>Radio Replacement</u> in Entertainment. Did you complete the replacement?	-	Go to Step 4	-
4	Operate the system in order to verify the repair. Did you correct the condition?	-	System OK	Go to Step 2

ENGINE OIL PRESSURE INDICATOR ALWAYS ON

Engine Oil Pressure Indicator Always On

Step	Action	Yes	No
Schematic Reference: <u>Instrument Cluster Schematics</u> Connector End View Reference: <u>Engine Control Module (ECM) Connector End Views</u> or <u>Inline Harness Connector End Views</u>			
1	Did you perform the Diagnostic System Check - Instrument Cluster?	Go to Step 2	Go to <u>Diagnostic System Check - Instrument Cluster</u>
	Start the engine. Does the engine oil pressure indicator illuminate after the displays test?		Go to <u>Testing for Intermittent Conditions and</u>

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2		Go to Step 3	<u>Poor Connections</u> in Wiring Systems
3	1. Install a scan tool. 2. With a scan tool, observe the Engine Oil Pressure Sensor parameter in the engine control module (ECM) instrument panel cluster (IPC) Data, data list. Does the Engine Oil Pressure Sensor parameter display OK?	Go to Step 10	Go to Step 4
4	1. Turn the ignition OFF. 2. Disconnect the engine oil pressure switch. 3. Start the engine. 4. With the scan tool, observe the Engine Oil Pressure Sensor parameter. Does the Engine Oil Pressure Sensor parameter display OK?	Go to Step 6	Go to Step 5
5	Test the engine oil pressure switch signal circuit for a short to ground. Refer to <u>Circuit Testing</u> and <u>Wiring Repairs</u> in Wiring Systems. Did you find and correct the condition?	Go to Step 11	Go to Step 7
6	Inspect for poor connections at the harness connector of the engine oil pressure switch. Refer to <u>Testing for Intermittent Conditions and Poor Connections</u> and <u>Connector Repairs</u> in Wiring Systems. Did you find and correct the condition?	Go to Step 11	Go to Step 8
7	Inspect for poor connections at the harness connector of the ECM. Refer to <u>Testing for Intermittent Conditions and Poor Connections</u> and <u>Connector Repairs</u> in Wiring Systems. Did you find and correct the condition?	Go to Step 11	Go to Step 9
	Replace the engine oil pressure switch. Refer to <u>Engine Oil Pressure Sensor and/or Switch</u>		

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8	<u>Replacement</u> in Engine Mechanical - 3.6L (LY7) or <u>Engine Oil Pressure Sensor and/or Switch Replacement</u> in Engine Mechanical - 4.6L (LH2). Did you complete the replacement?	Go to Step 11	-
9	IMPORTANT: Program the replacement ECM. Replace the ECM. Refer to <u>Engine Control Module (ECM) Replacement</u> in Engine Controls - 3.6L (LY7) or <u>Engine Control Module (ECM) Replacement</u> in Engine Controls - 4.6L (LH2). Did you complete the replacement?	Go to Step 11	-
10	Replace the IPC. Refer to <u>Instrument Panel Cluster (IPC) Replacement</u> . Did you complete the replacement?	Go to Step 11	-
11	Operate the system in order to verify the repair. Did you correct the condition?	System OK	Go to Step 2

ENGINE OIL TEMPERATURE INDICATOR ALWAYS ON

Engine Oil Temperature Indicator Always On

Step	Action	Value(s)	Yes	No
Schematic Reference: <u>Instrument Cluster Schematics</u> Connector End View Reference: <u>Engine Control Module (ECM) Connector End Views</u> in Engine Controls - 3.6 L or <u>Engine Control Module (ECM) Connector End Views</u> in Engine Controls - 4.6 L				
1	Did you perform the Instrument Cluster Diagnostic System Check?	-	Go to Step 2	Go to <u>Diagnostic System Check - Instrument Cluster</u>
	Start the engine. Does the OIL TEMP HIGH message display in the radio?			Go to <u>Testing for Intermittent</u>

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2		-	Go to Step 3	<u>Conditions and Poor Connections</u> in Wiring Systems
3	1. Install a scan tool. 2. With the scan tool, observe the Engine Oil Temperature Calculated parameter in the IPC ECM data list. Does the Engine Oil Temperature Calculated parameter display a value within the specified range?	30°C - 140°C (86°F - 284 F)	Go to Step 10	Go to Step 4
4	1. Turn the ignition OFF. 2. Disconnect the engine oil temperature switch. 3. Start the engine. 4. With the scan tool, observe the Engine Oil temperature Switch parameter in the IPC ECM data list. Does the Engine Oil Level parameter display at or below the specified value?	30°C (86°F)	Go to Step 6	Go to Step 5
5	Test the signal circuit of the engine oil temperature switch for a short to ground. Refer to <u>Circuit Testing</u> and to <u>Wiring Repairs</u> in Wiring Systems. Did you find and correct the condition?	-	Go to Step 11	Go to Step 7
6	Inspect for poor connections at the harness connector of the engine oil temperature switch. Refer to <u>Testing for Intermittent Conditions and Poor Connections</u> and to <u>Connector Repairs</u> in Wiring Systems. Did you find and correct the condition?	-	Go to Step 11	Go to Step 8
7	Inspect for poor connections at the harness connector of the ECM. Refer to <u>Testing for Intermittent Conditions and Poor Connections</u> and to <u>Connector Repairs</u>	-		

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	in Wiring Systems. Did you find and correct the condition?		Go to Step 11	Go to Step 9
8	Replace the engine oil temperature switch. Refer to <u>Engine Oil Level Sensor and/or Switch Replacement</u> in Engine Mechanical - 4.6 L or to <u>Engine Oil Level Sensor and/or Switch Replacement</u> in Engine Controls 3.6 L. Did you complete the replacement?	-	Go to Step 11	-
9	Replace the ECM. Refer to <u>Engine Control Module (ECM) Replacement</u> in Engine Controls - 3.6 L or to <u>Engine Control Module (ECM) Replacement</u> in Engine Controls - 4.6 L. Did you complete the replacement?	-	Go to Step 11	-
10	Replace the IPC. Refer to <u>Instrument Panel Cluster (IPC) Replacement</u> Did you complete the replacement?	-	Go to Step 11	-
11	Operate the system in order to verify the repair. Did you correct the condition?	-	System OK	Go to Step 2

LOW ENGINE OIL LEVEL INDICATOR ALWAYS ON

Low Engine Oil Level Indicator Always On

Step	Action	Value(s)	Yes	No
Schematic Reference: <u>Instrument Cluster Schematics</u> Schematic Reference: <u>Engine Control Module (ECM) Connector End Views</u> in Engine Controls - 3.6 L or <u>Engine Control Module (ECM) Connector End Views</u> in Engine Controls - 4.6 L				
1	Did you perform the Instrument Cluster Diagnostic System Check?	-	Go to Step 2	Go to <u>Diagnostic System Check - Instrument Cluster</u> Instrument Cluster

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2	Start the engine. Does the LOW OIL LEVEL message display in the DIC?	-	Go to Step 3	Go to <u>Testing for Intermittent Conditions and Poor Connections</u> in Wiring Systems
3	1. Install a scan tool. 2. With the scan tool, observe the Engine Oil Level Switch parameter in the ECM data lists. Does the Engine Oil Level Switch parameter display OK?	-	Go to Step 11	Go to Step 4
4	1. Turn the ignition OFF. 2. Disconnect the engine oil level switch. 3. Connect a 3-ampere fused jumper wire between the engine oil level switch signal circuit and a good ground. 4. Start the engine. 5. With the scan tool, observe the Engine Oil Level Switch parameter. Does the Engine Oil Level parameter display OK?	-	Go to Step 6	Go to Step 5
5	Test the signal circuit of the engine oil level switch for an open, for a high resistance and for a short to ground. Refer to <u>Circuit Testing</u> and to <u>Wiring Repairs</u> in Wiring Systems. Did you find and correct the condition?	-	Go to Step 12	Go to Step 7
6	Test the low reference circuit or the ground circuit of the engine oil level switch for an open or for a high resistance. Refer to <u>Circuit Testing</u> and to <u>Wiring</u>	-		

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	Repairs in Wiring Systems. Did you find and correct the condition?		Go to Step 12	Go to Step 8
7	Inspect for poor connections at the harness connector of the ECM. Refer to Testing for Intermittent Conditions and Poor Connections and to Connector Repairs in Wiring Systems. Did you find and correct the condition?	-	Go to Step 12	Go to Step 9
8	Inspect for poor connections at the harness connector of the engine oil level switch. Refer to Testing for Intermittent Conditions and Poor Connections and to Connector Repairs in Wiring Systems. Did you find and correct the condition?	-	Go to Step 12	Go to Step 10
9	IMPORTANT: Programme the replacement ECM/PCM Replace the ECM. Refer to Engine Control Module (ECM) Replacement in Engine Controls 3.6 L or Engine Control Module (ECM) Replacement in Engine Controls 4.6 L. Did you complete the replacement?	-	Go to Step 12	-
10	Replace the engine oil level switch. Refer to Engine Oil Level Sensor and/or Switch Replacement in Engine Mechanical - 3.6 L (LY7) or Engine Oil Level Sensor and/or Switch Replacement in Engine Mechanical 4.6 L. Did you complete the replacement?	-	Go to Step 12	-
11	Replace the IPC. Refer to Instrument Panel Cluster (IPC) Replacement Did you complete the replacement?	-	Go to Step 12	-
12	Operate the system in order to verify the repair. Did you correct the condition?	-	System OK	Go to Step 2

LOW ENGINE OIL LEVEL INDICATOR INOPERATIVE

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Low Engine Oil Level Indicator Inoperative

Step	Action	Yes	No
Schematic Reference: <u>Instrument Cluster Schematics</u> Connector End View Reference: <u>Engine Control Module (ECM) Connector End Views</u> in Engine Controls - 3.6 L or <u>Engine Control Module (ECM) Connector End Views</u> in Engine Controls - 4.6 L			
1	Did you perform the Diagnostic System Check - Vehicle?	Go to Step 2	Go to Diagnostic System Check - Instrument Cluster
2	1. Turn ON the ignition. 2. With the scan tool, observe the Engine Oil Level Switch parameter in the ECM data list. Does the Engine Oil Level Switch parameter display OK?	Go to Testing for Intermittent Conditions and Poor Connections in Wiring Systems	Go to Step 3
3	Replace the instrument panel cluster (IPC). Refer to Instrument Panel Cluster (IPC) Replacement . Did you complete the replacement?	Go to Step 4	-
4	Operate the system in order to verify the repair. Did you correct the condition?	System OK	Go to Step 2

MPH (KM/H) INDICATOR INOPERATIVE

MPH (Km/h) Indicator Inoperative

Step	Action	Value	Yes	No
Schematic Reference: <u>Instrument Cluster Schematics</u>				
1	Did you perform the Instrument Cluster Diagnostic System Check?	-	Go to Step 2	Go to Diagnostic System Check - Instrument Cluster
	1. Turn the ignition ON, with the		Go to Testing	

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2	engine OFF. 2. Press and release the Eng/Met button. Does the MPH indicator and then the km/h indicator illuminate after each button activation?	-	<u>for Intermittent Conditions and Poor Connections</u> in Wiring Systems	Go to Step 3
3	1. Install a scan tool. 2. With a scan tool, observe the English/Metric Status parameter in the Radio System Configuration data list. 3. Press the Eng/Met button. Does the English/Metric Status parameter display Active?	-	Go to Step 4	Go to Step 5
4	Replace the IPC. Refer to <u>Instrument Panel Cluster (IPC) Replacement</u>. Did you find and correct the condition?	-	Go to Step 6	-
5	Replace the radio. Refer to <u>Radio Replacement</u> in Entertainment. Did you find and correct the condition?	-	Go to Step 6	-
6	Operate the system in order to verify the repair. Did you correct the condition?	-	System OK	Go to Step 2

DRIVER INFORMATION CENTER (DIC) SWITCH(ES) INOPERATIVE

Driver Information Center (DIC) Switch(es) Inoperative

Step	Action	Value(s)	Yes	No
1	Did you review the operation and perform the necessary inspections?	-	Go to Step 2	Go to <u>Symptoms - Instrument Panel, Gages and Console</u>
2	Inspect for poor connections at the radio. Refer to <u>Testing for Intermittent Conditions and Poor Connections</u> and	-		

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	to Connector Repairs in Wiring Systems. Did you find and correct the condition?		Go to Step 4	Go to Step 3
3	Replace the radio. Refer to Radio Replacement in Entertainment. Did you complete the replacement?	-	Go to Step 4	-
4	Operate the system in order to verify the repair. Did you correct the condition?	-	System OK	Go to Step 2

CHIME ALWAYS ON

Chime Always On

Step	Action	Yes	No
Schematic Reference: <u>Audible Warnings Schematics</u> Connector End View Reference: <u>Body Control System Connector End Views</u> or to <u>Inline Harness Connector End Views</u>			
1	Did you perform the Audible Warnings Diagnostic System Check?	Go to Step 2	Go to Diagnostic System Check - Audible Warnings
2	Are any indicators illuminated?	Go to Symptoms - Instrument Panel, Gages and Console	Go to Step 3
3	1. Turn the ignition OFF. 2. Turn the headlamp switch to OFF. 3. Remove the key from the ignition. 4. Open the driver door. Does the chime sound?	Go to Step 4	Go to Testing for Intermittent Conditions and Poor Connections in Wiring Systems
4	1. Turn the ignition OFF. 2. Disconnect the ignition switch. 3. Install a scan tool. 4. Turn the ignition ON, with the engine OFF. 5. With a scan tool, observe the Key in Ignition parameter in the Dash Integration		

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	Module Data list. Does the Key in Ignition parameter display No?	Go to Step 6	Go to Step 5
5	Test the ignition key alarm switch signal circuit for a short to ground. Refer to <u>Circuit Testing</u> and to <u>Wiring Repairs</u> in Wiring Systems. Did you find and correct the condition?	Go to Step 10	Go to Step 7
6	Inspect for poor connections at the harness connector of the key switch. Refer to <u>Testing for Intermittent Conditions and Poor Connections</u> and to <u>Connector Repairs</u> in Wiring Systems. Did you find and correct the condition?	Go to Step 10	Go to Step 8
7	Inspect for poor connections at the harness connector of the Dash Integration Module (DIM). Refer to <u>Testing for Intermittent Conditions and Poor Connections</u> and to <u>Connector Repairs</u> in Wiring Systems. Did you find and correct the condition?	Go to Step 10	Go to Step 9
8	Replace the ignition switch. Refer to <u>Ignition Switch Replacement</u> in Steering Wheel and Column. Did you complete the replacement?	Go to Step 10	-
9	IMPORTANT: Program the replacement DIM. Replace the DIM. Refer to <u>Dash Integration Module Replacement</u> in Body Control System. Did you complete the replacement?	Go to Step 10	-
10	Operate the system in order to verify the repair. Did you correct the condition?	System OK	Go to Step 2

CHIME INOPERATIVE

Chime Inoperative

Step	Action	Yes	No
Schematic Reference: <u>Audible Warnings Schematics</u>			

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1	Did you perform the Audible Warnings Diagnostic System Check?	Go to Step 2	Go to <u>Diagnostic System Check - Audible Warnings</u>
2	1. Turn the ignition OFF, with the key in the ignition. 2. Open the driver door. Does the chime sound?	Go to <u>Testing for Intermittent Conditions and Poor Connections</u> in Wiring Systems	Go to Step 3
3	Do the courtesy lights turn on when you open the drivers door?	Go to Step 4	Go to <u>Courtesy Lamps Inoperative</u> in Lighting Systems
4	1. Turn the ignition ON, with the engine OFF. 2. Turn the radio ON. 3. Adjust the radio balance and fade to the driver front speaker. Does the speaker operate properly?	Go to Step 5	Go to <u>Speakers Inoperative - One or More</u> in Entertainment
5	IMPORTANT: Perform the set up procedure for the replacement radio. Replace the radio. Refer to <u>Radio Replacement</u> in Entertainment. Did you complete the replacement?	Go to Step 6	-
6	Operate the system in order to verify the repair. Did you correct the condition?	System OK	Go to Step 2

REPAIR INSTRUCTIONS

CLOSEOUT/INSULATOR PANEL REPLACEMENT - RIGHT

Removal Procedure

1. Remove the four screws securing the closeout panel to the I/P.
2. Pull down on the panel in order to release the locking tabs (1).

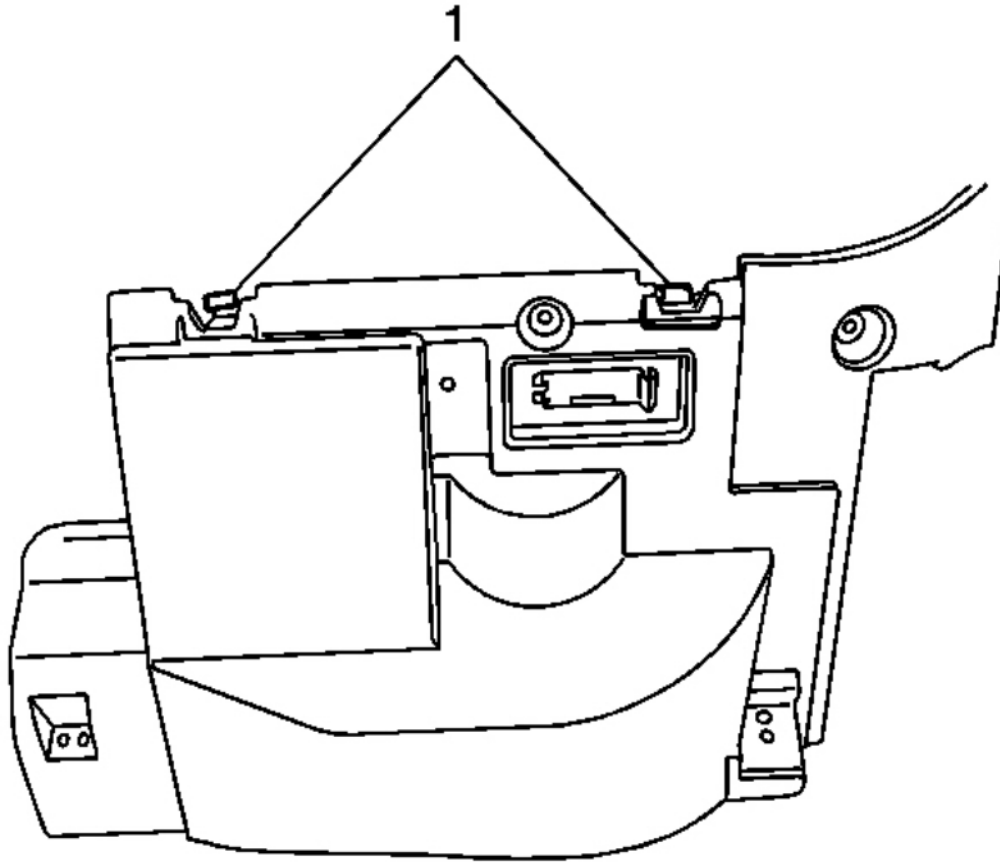


Fig. 9: Locating Closeout Panel Locking Tabs
Courtesy of GENERAL MOTORS CORP.

3. Disconnect the courtesy lamp electrical connector.
4. Remove the closeout panel from the I/P.

Installation Procedure

1. Connect the courtesy lamp electrical connector.
2. Align the closeout panel on the I/P.
3. Push upward on the panel in order to secure the locking tabs (1).

NOTE: Refer to Fastener Notice in Cautions and Notices.

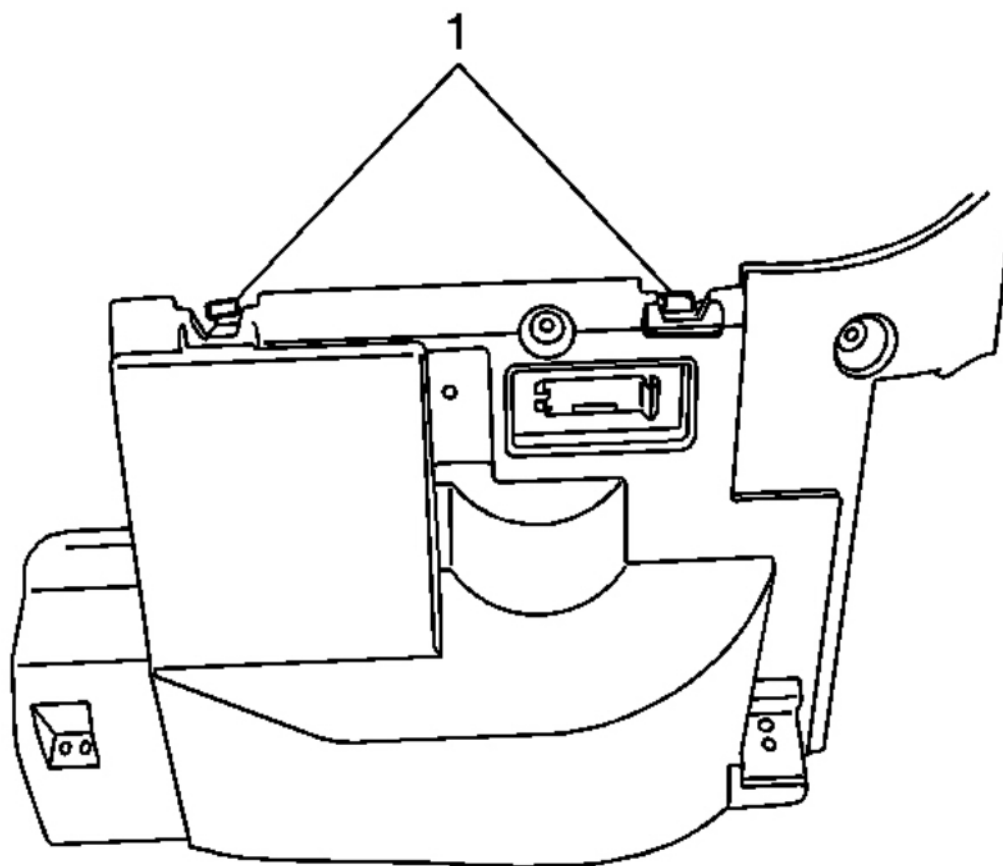


Fig. 10: Locating Closeout Panel Locking Tabs
Courtesy of GENERAL MOTORS CORP.

4. Install the closeout retaining screws.

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

CLOSEOUT/INSULATOR PANEL REPLACEMENT - LEFT

Removal Procedure

1. Remove the screws (2) securing the closeout panel to the I/P.
2. Disconnect the courtesy lamp electrical connector (1).
3. Remove the closeout panel from the I/P.

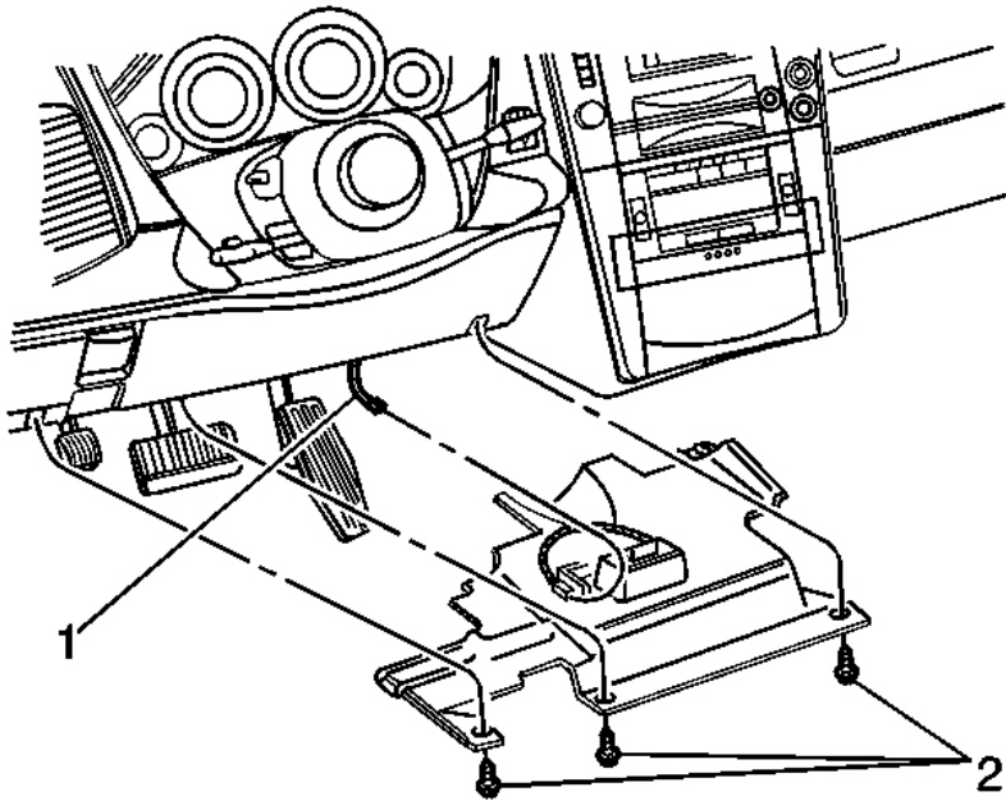


Fig. 11: View Of Left Closeout Panel
Courtesy of GENERAL MOTORS CORP.

Installation Procedure

1. Connect the courtesy lamp electrical connector (1).
2. Align the closeout panel on the I/P.

NOTE: Refer to Fastener Notice in Cautions and Notices.

3. Install the closeout retaining fastener (2).

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

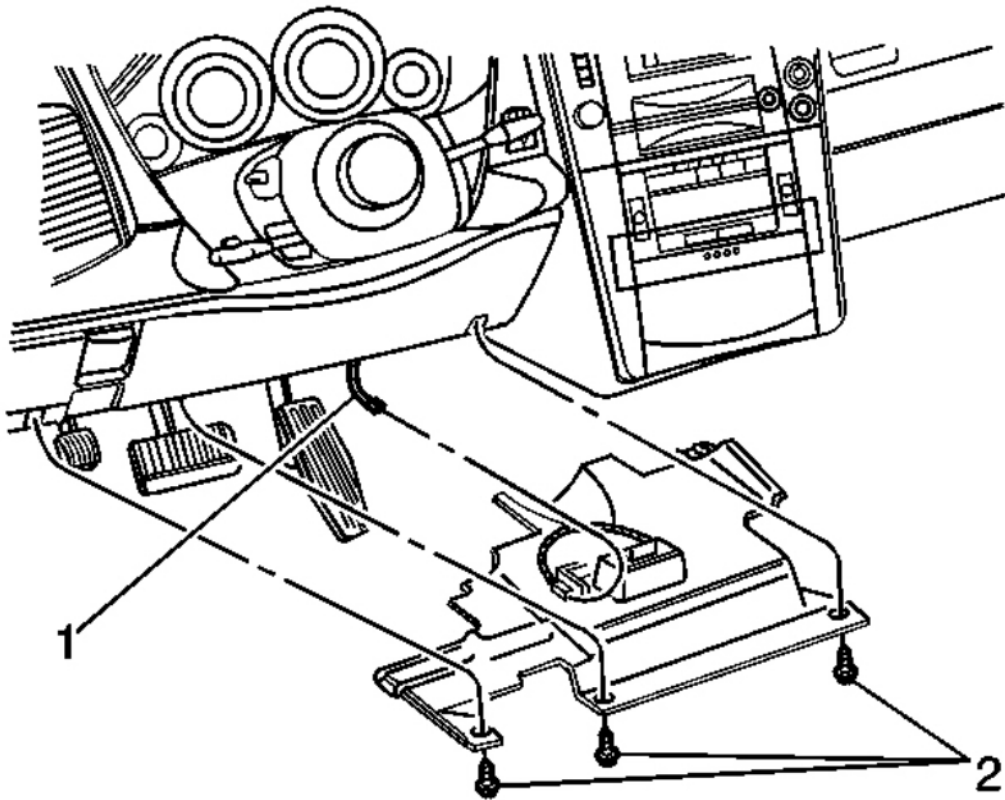


Fig. 12: View Of Left Closeout Panel
Courtesy of GENERAL MOTORS CORP.

KNEE BOLSTER REPLACEMENT

Removal Procedure

1. Remove the left hand closeout panel. Refer to **Closeout/Insulator Panel Replacement - Left.**
2. Remove the screws (2) securing the knee bolster trim (1) to the knee bolster bracket.
3. Remove the knee bolster trim (1).

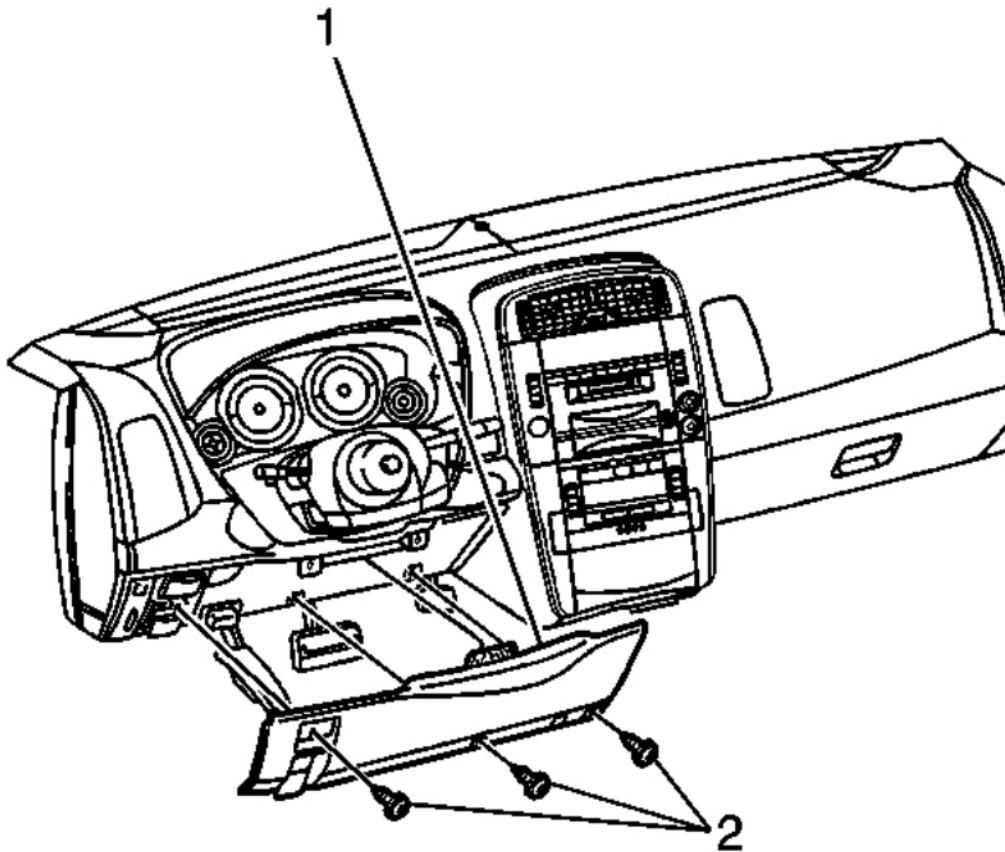


Fig. 13: View Of Knee Bolster Trim
Courtesy of GENERAL MOTORS CORP.

Installation Procedure

1. Install the knee bolster trim (1).

NOTE: Refer to Fastener Notice .

2. Install the retaining screws (2).

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

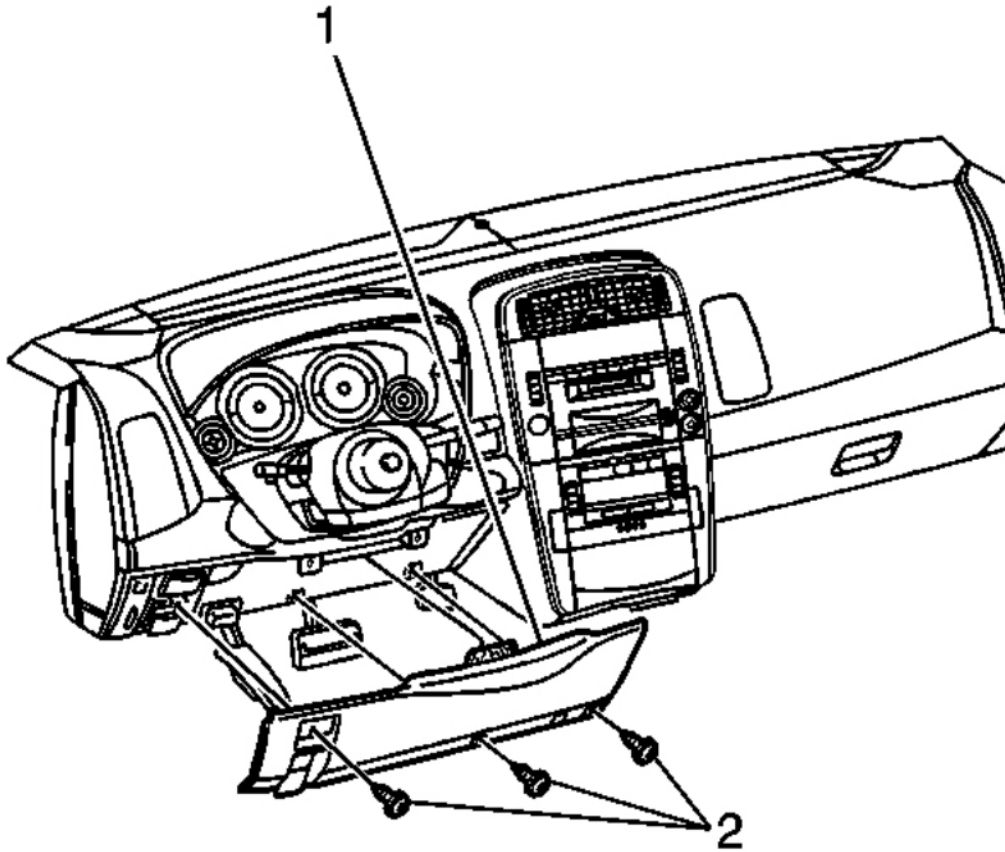


Fig. 14: View Of Knee Bolster Trim
Courtesy of GENERAL MOTORS CORP.

3. Install the lever retainers screws.

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

4. Install the left hand closeout panel. Refer to **Closeout/Insulator Panel Replacement - Left.**

KNEE BOLSTER BRACKET REPLACEMENT - LEFT

Removal Procedure

1. Remove the knee bolster trim. Refer to **Knee Bolster Replacement.**

2. Remove the screws (2) securing the knee bolster bracket to the I/P.
3. Remove the knee bolster bracket.

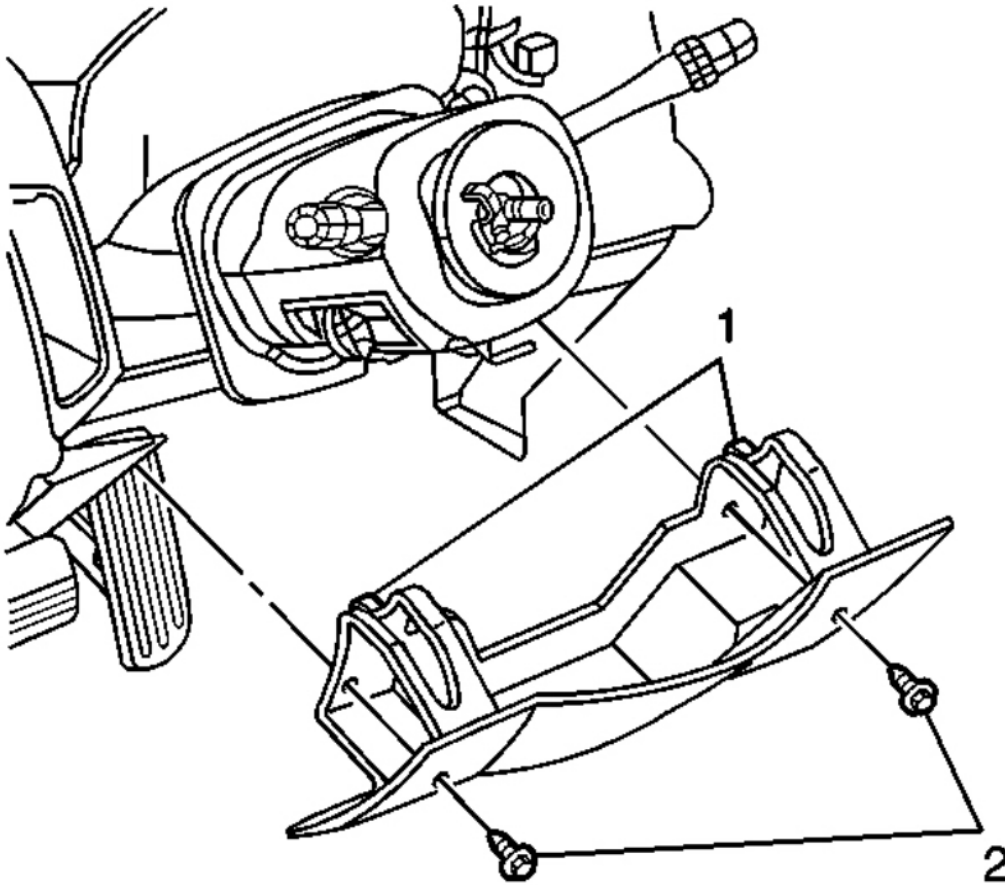


Fig. 15: View Of Left Knee Bolster Bracket
Courtesy of GENERAL MOTORS CORP.

Installation Procedure

1. Align the tabs (1) to the I/P carrier in order to install the knee bolster bracket.

NOTE: Refer to Fastener Notice in Cautions and Notices.

2. Install the screws (2) securing the knee bolster bracket to the I/P.

Tighten: Tighten the fasteners to 9 N.m (80 lb in).

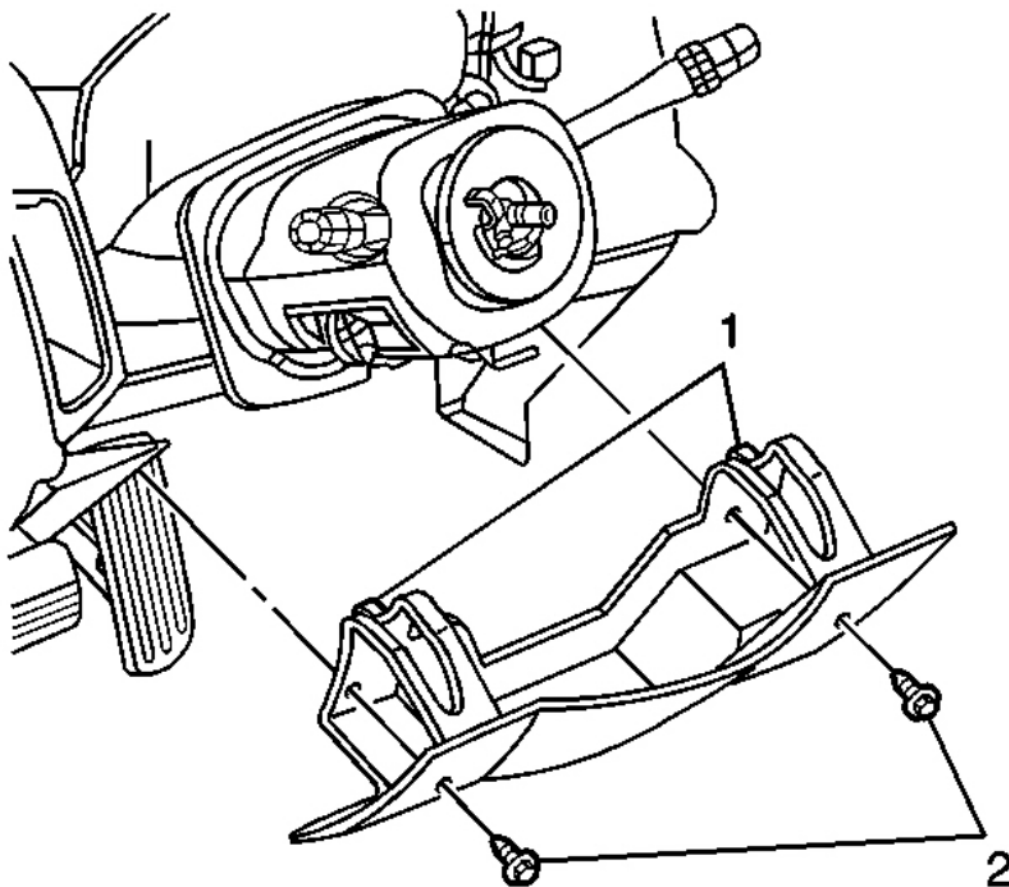


Fig. 16: View Of Left Knee Bolster Bracket
Courtesy of GENERAL MOTORS CORP.

3. Install the knee bolster trim. Refer to **Knee Bolster Replacement**.

TRIM PANEL REPLACEMENT - INSTRUMENT PANEL (I/P) CENTER

Removal Procedure

1. Remove the radio. Refer to **Radio Replacement** in Entertainment.
2. Remove the HVAC control. Refer to **HVAC Control Module Replacement** in HVAC Systems - Automatic (Includes Electronic and Dual Zone).

3. Remove the center HVAC air outlet. Refer to **Deflector Replacement - Instrument Panel Air - Center** in Heating, Ventilation, and Air Conditioning.
4. Remove the screws securing the instrument panel (I/P) center trim panel.

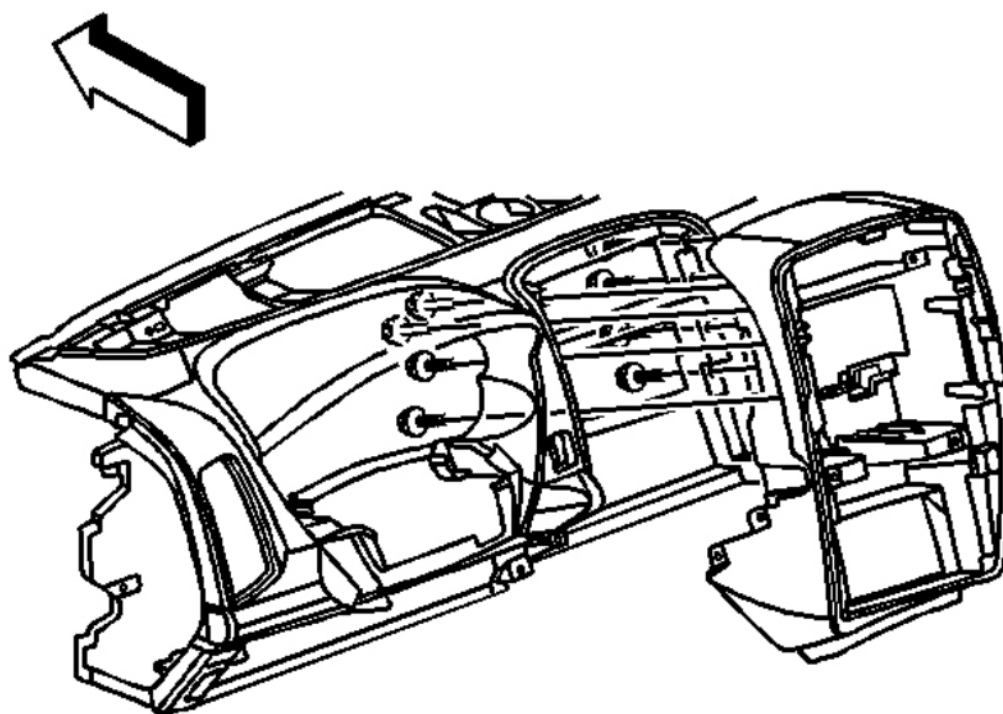


Fig. 17: View Of I/P Center Trim Panel
Courtesy of GENERAL MOTORS CORP.

Installation Procedure

1. Position the center trim panel to the I/P.

NOTE: Refer to Fastener Notice in Cautions and Notices.

2. Install the screws securing the I/P center trim panel.

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

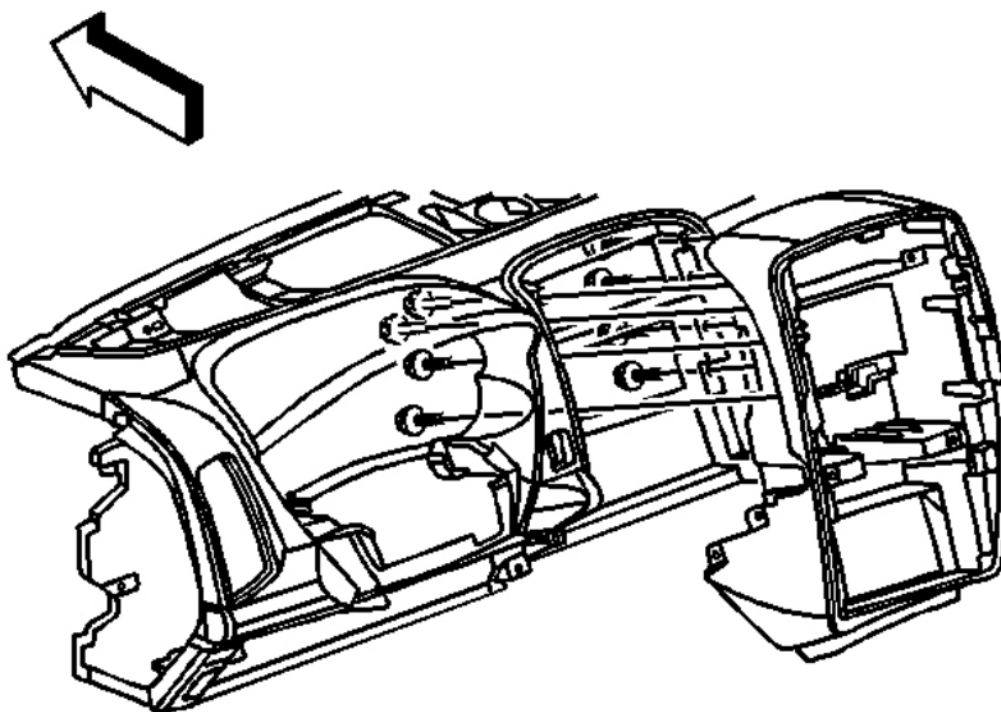


Fig. 18: View Of I/P Center Trim Panel
Courtesy of GENERAL MOTORS CORP.

3. Install the center HVAC air outlet. Refer to **Deflector Replacement - Instrument Panel Air - Center** in Heating, Ventilation, and Air Conditioning.
4. Install the HVAC control. Refer to **HVAC Control Module Replacement** in HVAC Systems - Automatic (Includes Electronic and Dual Zone).
5. Install the radio. Refer to **Radio Replacement** in Entertainment.

TRIM PANEL REPLACEMENT - INSTRUMENT PANEL (I/P) CLUSTER

Removal Procedure

1. Tilt the steering column to the lowest position.
2. Using a small flat bladed tool, pry up on the I/P cluster trim.
3. Remove the trim cover from the vehicle.

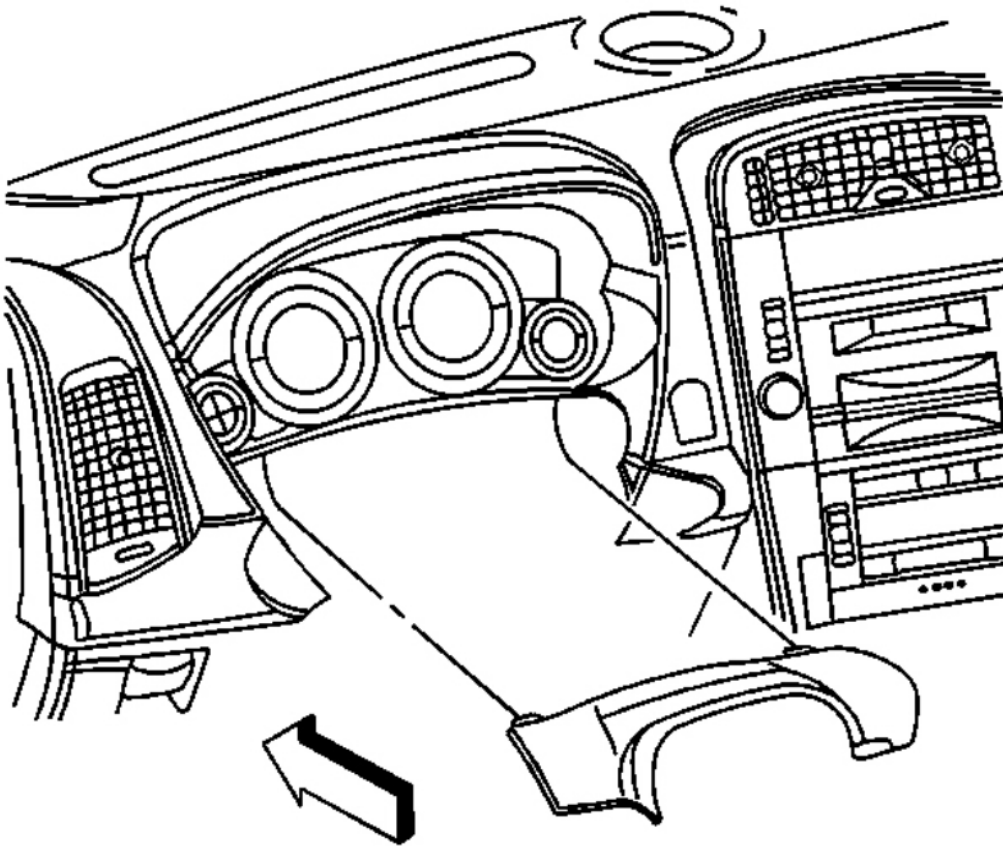


Fig. 19: View Of I/P Cluster Trim Panel
Courtesy of GENERAL MOTORS CORP.

Installation Procedure

1. Position the I/P cluster trim under on the I/P.
2. Push the trim cover forward and down in order to secure.

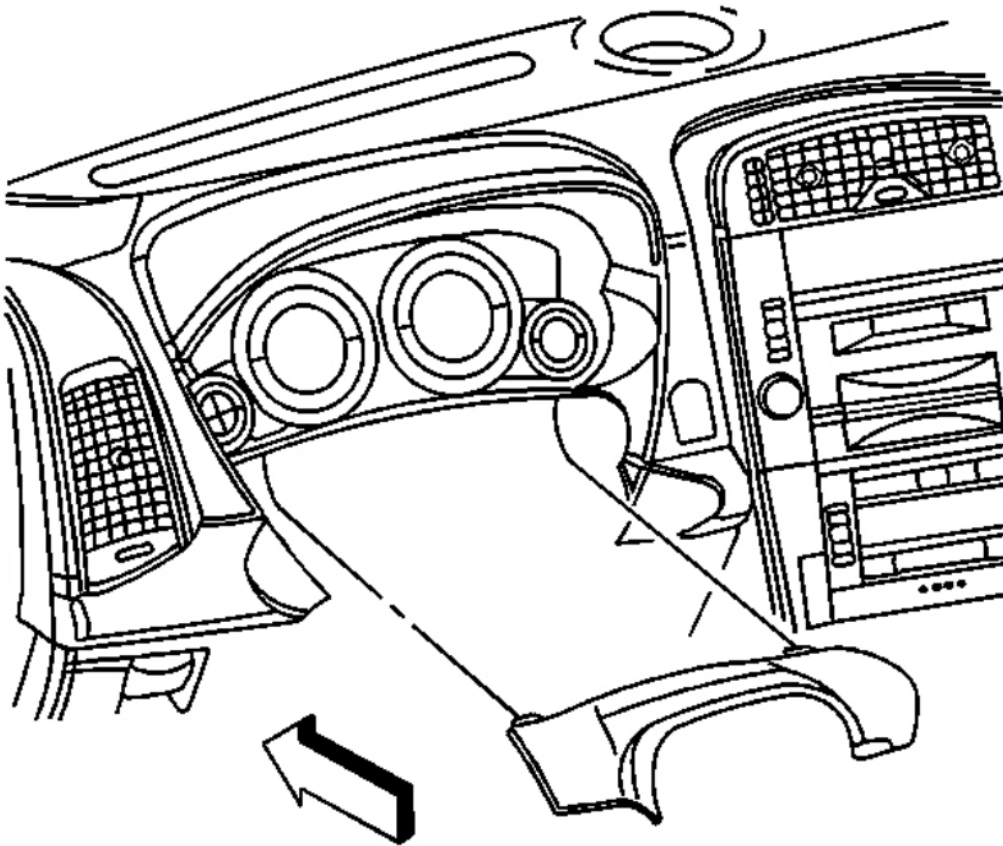


Fig. 20: View Of I/P Cluster Trim Panel
Courtesy of GENERAL MOTORS CORP.

INSTRUMENT PANEL (I/P) OUTER TRIM COVER REPLACEMENT - RIGHT

Removal Procedure

1. Pull out on the outer trim cover (1) in order to release the retaining fasteners.
2. Slide the outer trim cover toward the rear of the vehicle.

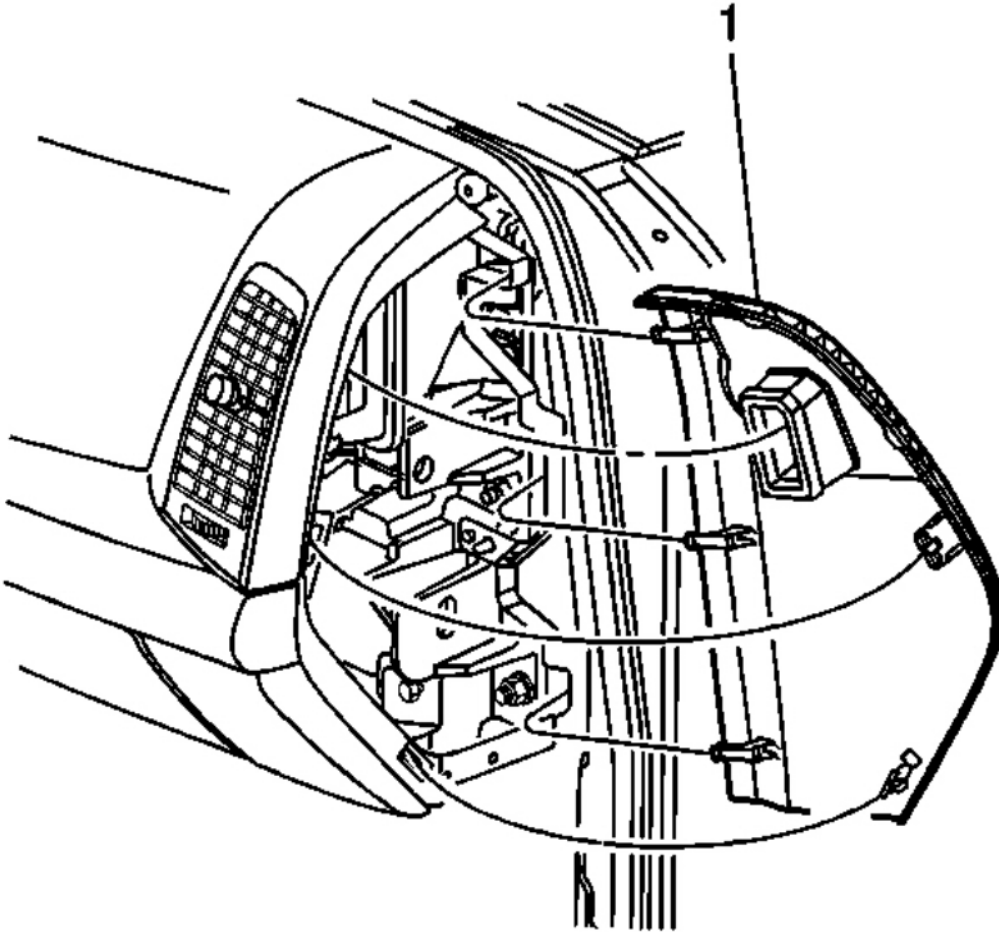


Fig. 21: View Of I/P Outer Trim Cover
Courtesy of GENERAL MOTORS CORP.

Installation Procedure

1. Insert the tabs on the outer trim cover (1) onto the slots on the I/P.
2. Align the retaining fasteners with the I/P.
3. Push the outer trim in order to secure.

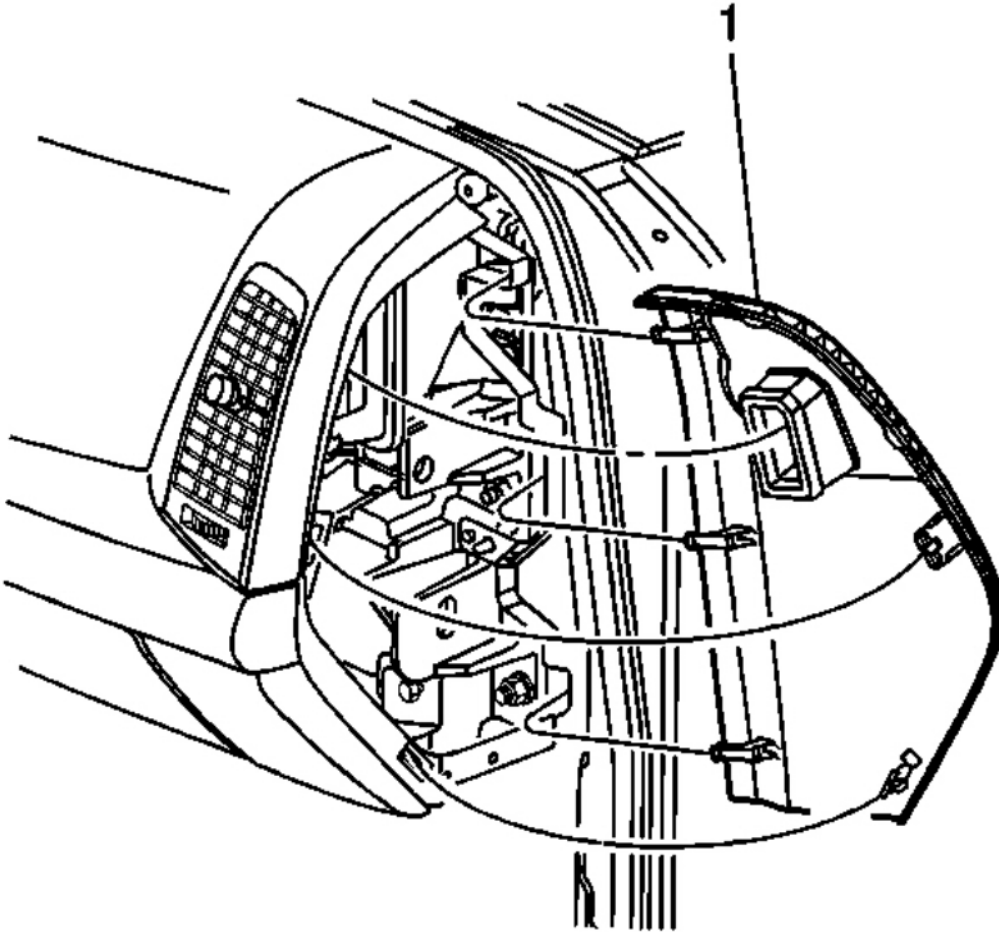


Fig. 22: View Of I/P Outer Trim Cover
Courtesy of GENERAL MOTORS CORP.

INSTRUMENT PANEL (I/P) OUTER TRIM COVER REPLACEMENT - LEFT

Removal Procedure

1. Pull out on the outer trim cover (1) in order to release the retaining fasteners.
2. Slide the outer trim toward the rear of the vehicle.

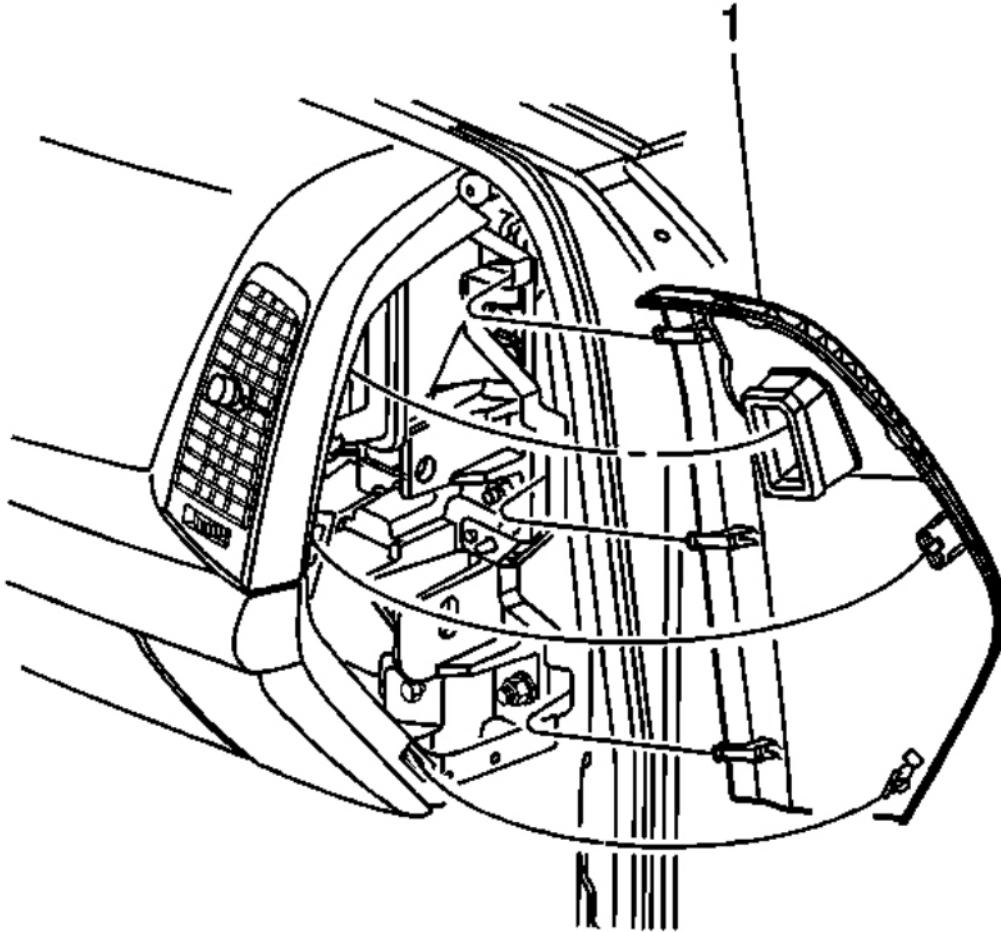


Fig. 23: View Of I/P Outer Trim Cover
Courtesy of GENERAL MOTORS CORP.

Installation Procedure

1. Insert the tabs on the outer trim cover (1) onto the slots on the I/P.
2. Align the retaining fasteners with the I/P.
3. Push the outer trim in order to secure the retaining tabs.

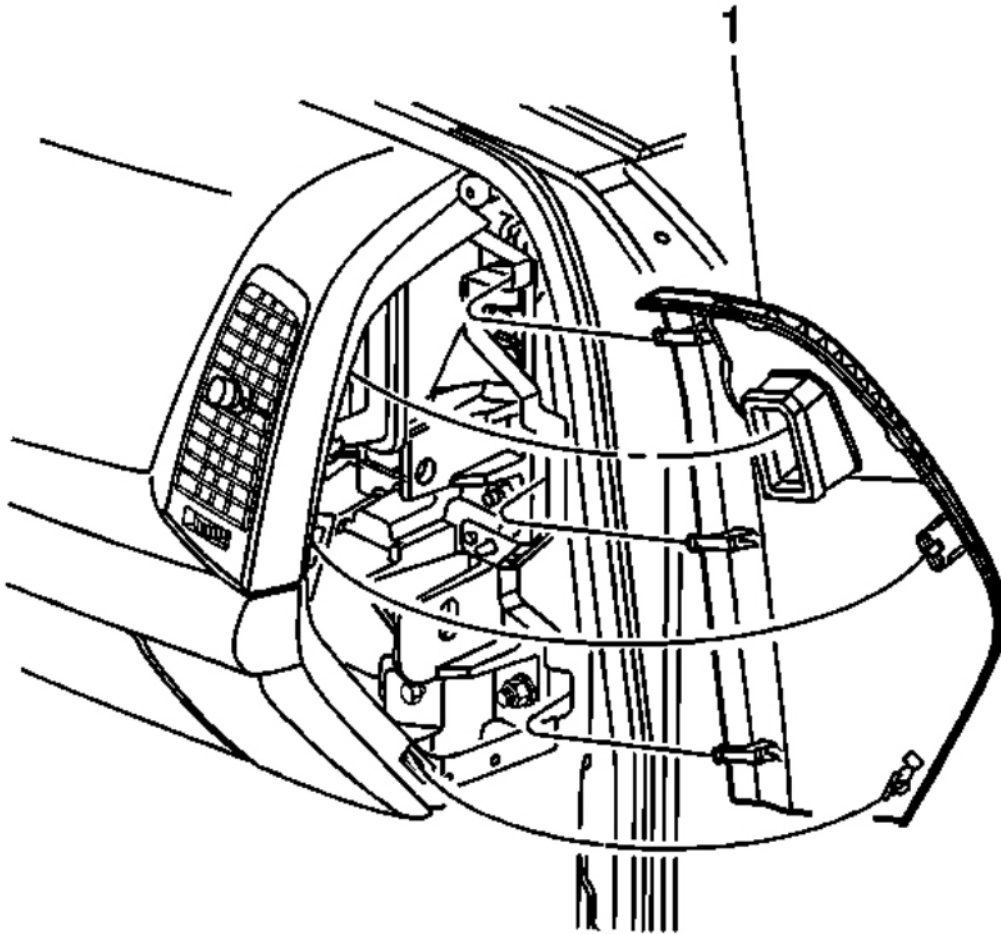


Fig. 24: View Of I/P Outer Trim Cover
Courtesy of GENERAL MOTORS CORP.

COMPARTMENT REPLACEMENT - INSTRUMENT PANEL (I/P)

Removal Procedure

1. Open the I/P compartment door
2. Release the tabs (1) on inboard side of the door arms.

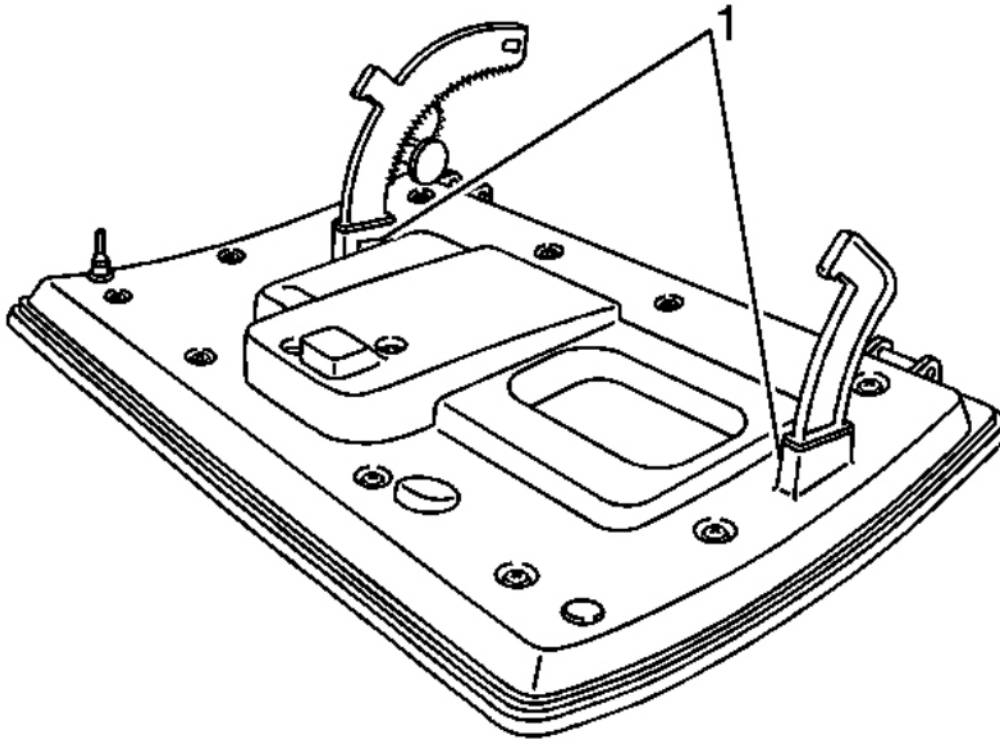


Fig. 25: Locating Door Arm Tabs
Courtesy of GENERAL MOTORS CORP.

3. Lower the door all the way down.
4. Remove the screws securing the I/P compartment door.

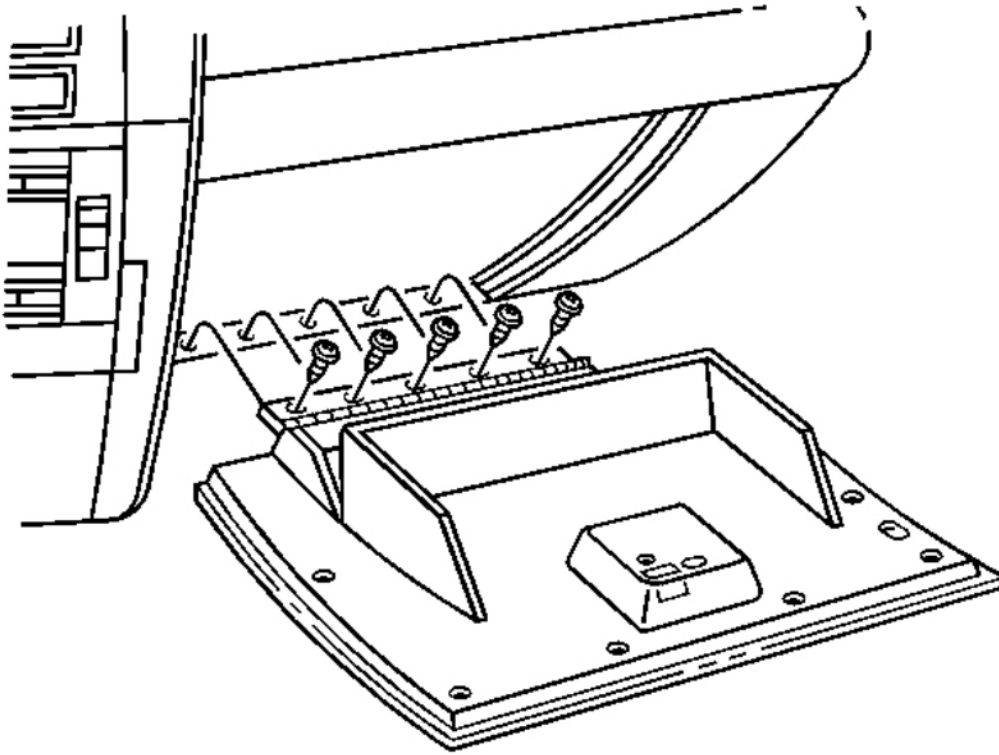


Fig. 26: View Of I/P Compartment Door Screws
Courtesy of GENERAL MOTORS CORP.

5. Remove the screws (2) securing the I/P compartment.

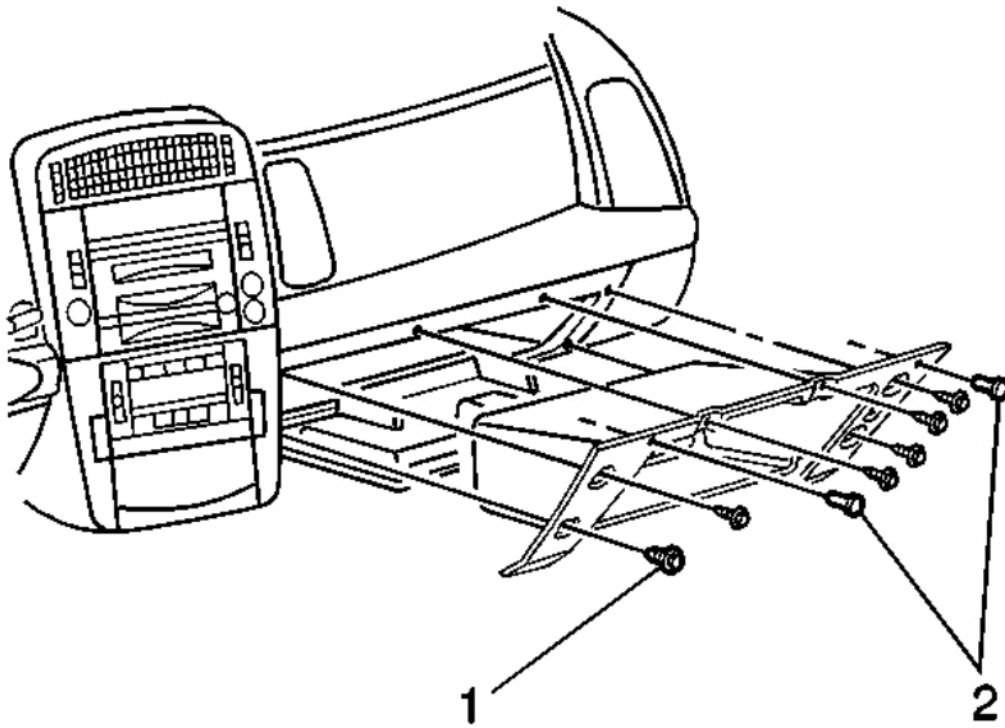


Fig. 27: View Of I/P Compartment Screws
Courtesy of GENERAL MOTORS CORP.

Installation Procedure

1. Position the I/P compartment onto the I/P retainer.

NOTE: Refer to Fastener Notice in Cautions and Notices.

2. Install the screws (2) securing the I/P compartment.

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

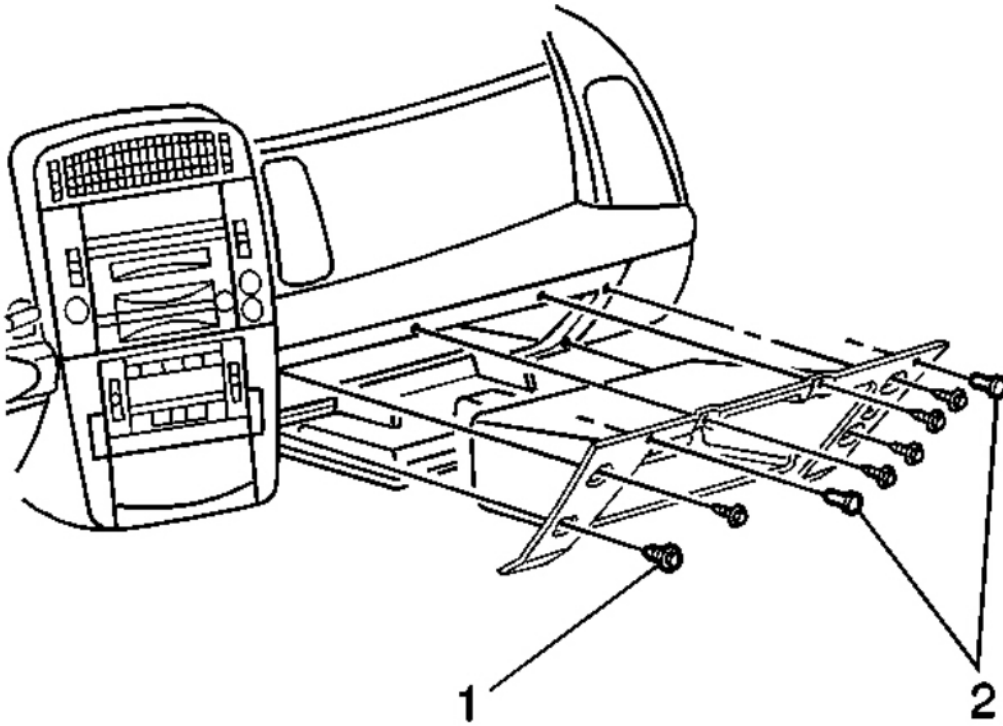


Fig. 28: View Of I/P Compartment Screws
Courtesy of GENERAL MOTORS CORP.

3. Install the I/P compartment door.

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

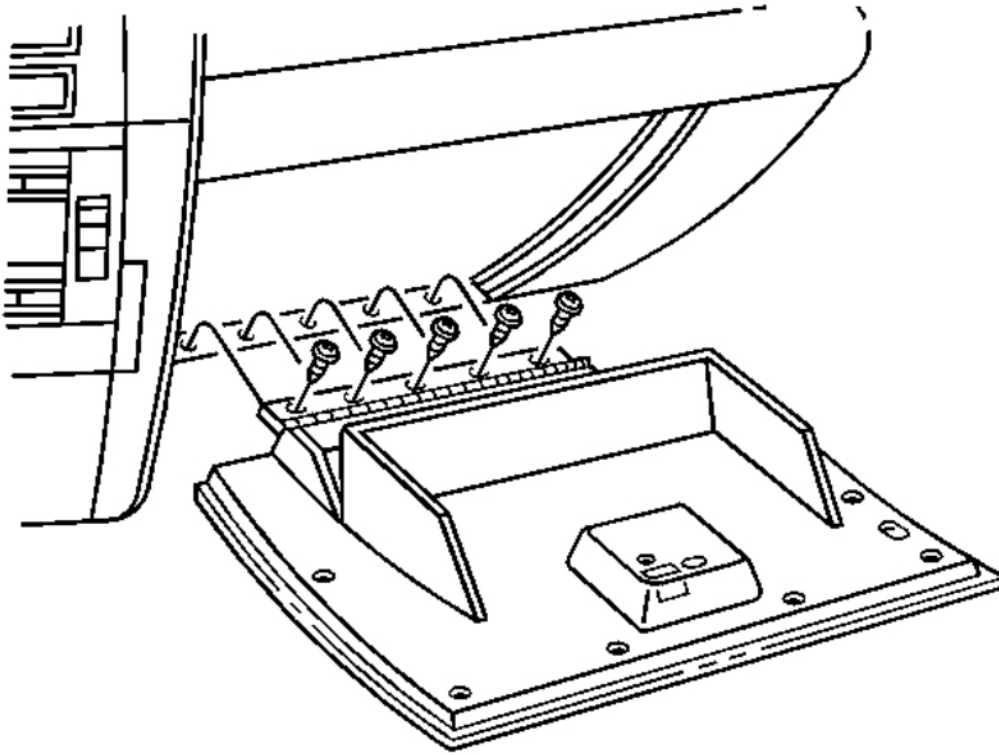


Fig. 29: View Of I/P Compartment Door Screws
Courtesy of GENERAL MOTORS CORP.

4. Reinstall the door arms. Insure the tabs (1) are secured to the I/P compartment door.

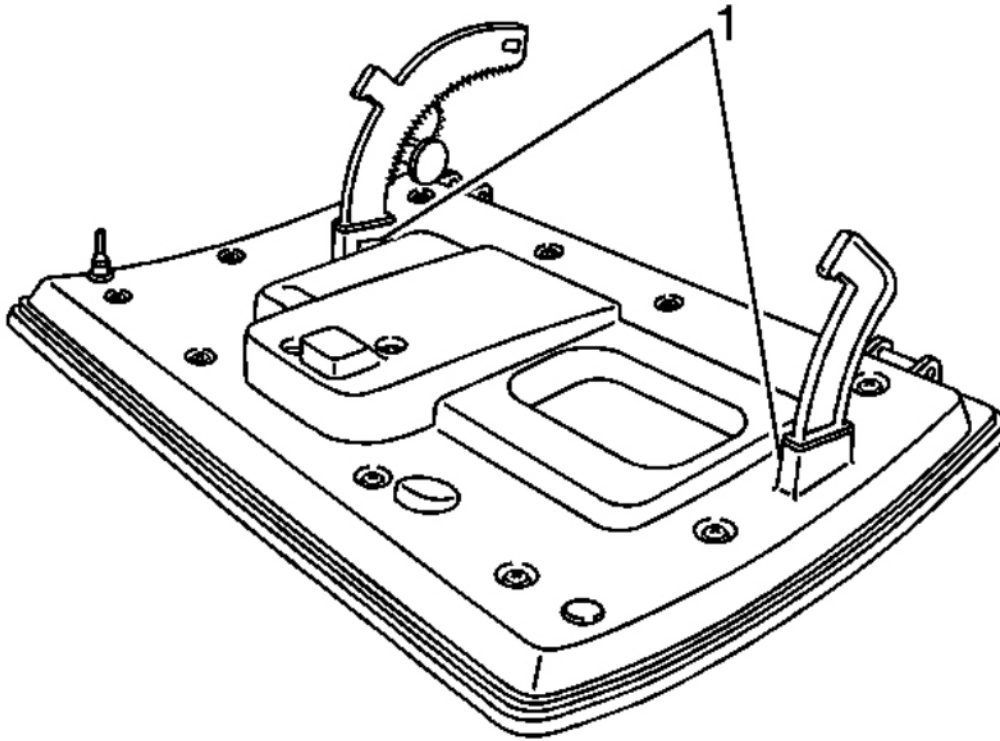


Fig. 30: Locating Door Arm Tabs
Courtesy of GENERAL MOTORS CORP.

DEFROSTER GRILLE REPLACEMENT

Removal Procedure

1. Using a flat bladed tool pry upward on the grille in order to release the retaining fasteners.
2. Disconnect the sunload sensor wiring connector (4).
3. Remove the grille (1) from the I/P retainer.

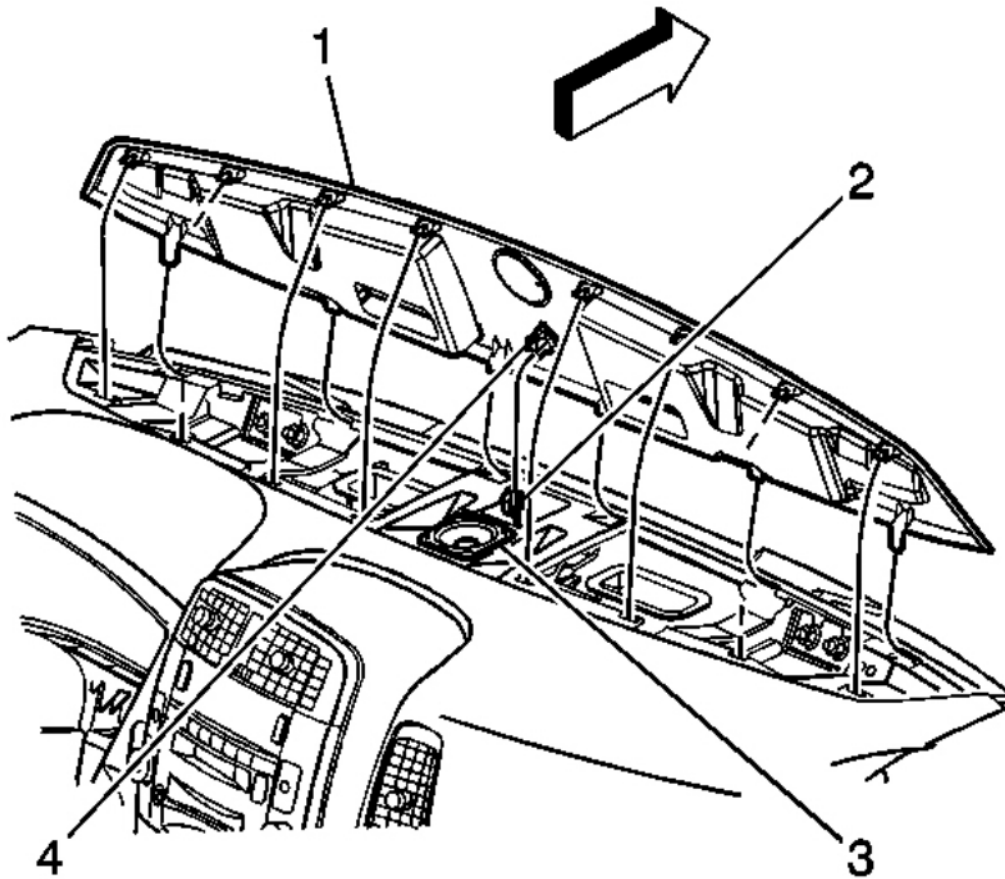


Fig. 31: View Of Defroster Grille
Courtesy of GENERAL MOTORS CORP.

Installation Procedure

1. Line up the tabs on the front of the defroster grille with the holes on the I/P retainer.
2. Connect the sunload sensor wiring connector (4).
3. lower the grille (1) and seat the retainers on the I/P.

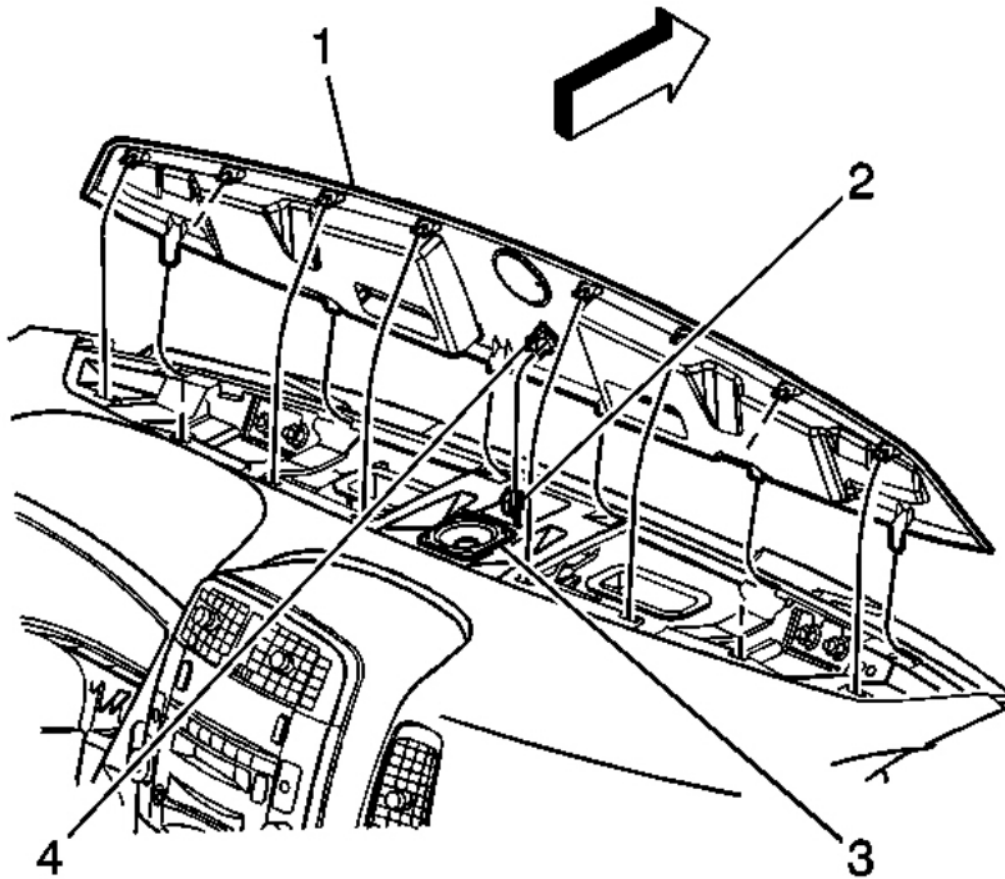


Fig. 32: View Of Defroster Grille
Courtesy of GENERAL MOTORS CORP.

SUNLOAD AND TWILIGHT SENTINEL SENSOR REPLACEMENT

Removal Procedure

1. Remove the defroster grille (1). Refer to **Defroster Grille Replacement**.
2. Disconnect the electrical connector (4).

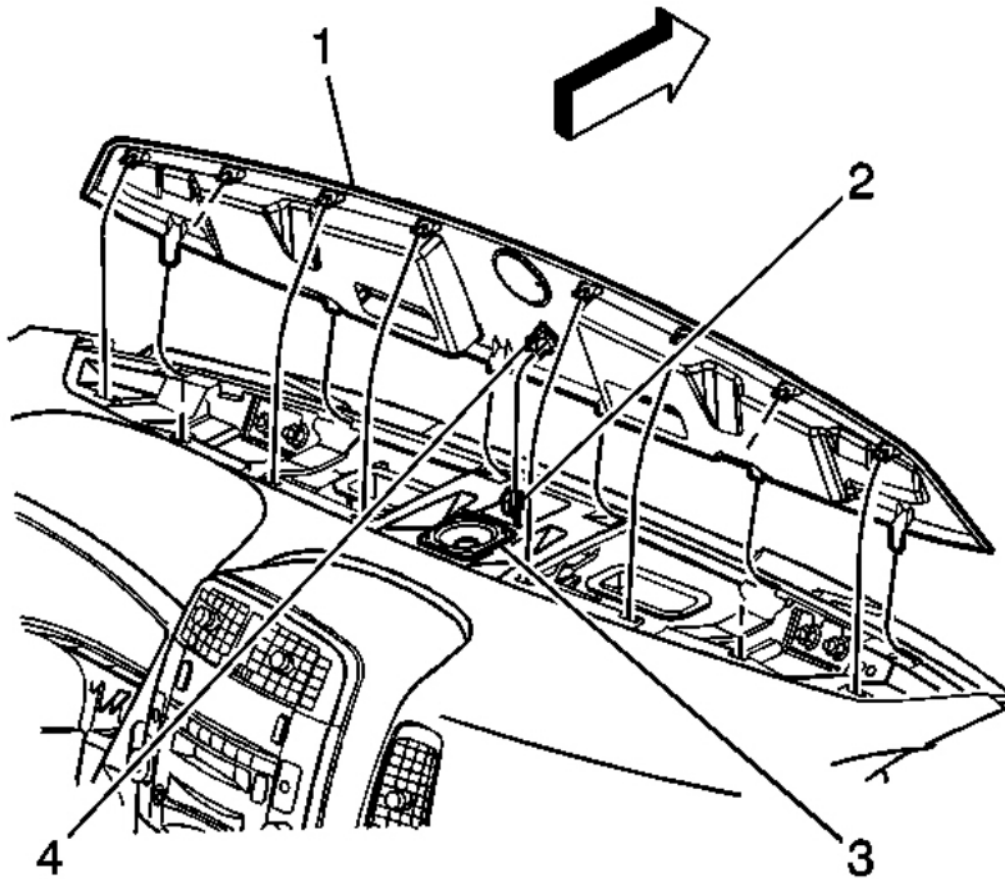


Fig. 33: View Of Defroster Grille
Courtesy of GENERAL MOTORS CORP.

3. Twist the sensor in order to release it from the defroster grille.

Installation Procedure

1. Install the sensor to the defroster grille (1).
2. Connect the electrical connector (4).
3. Install the defroster grille. Refer to **Defroster Grille Replacement**.

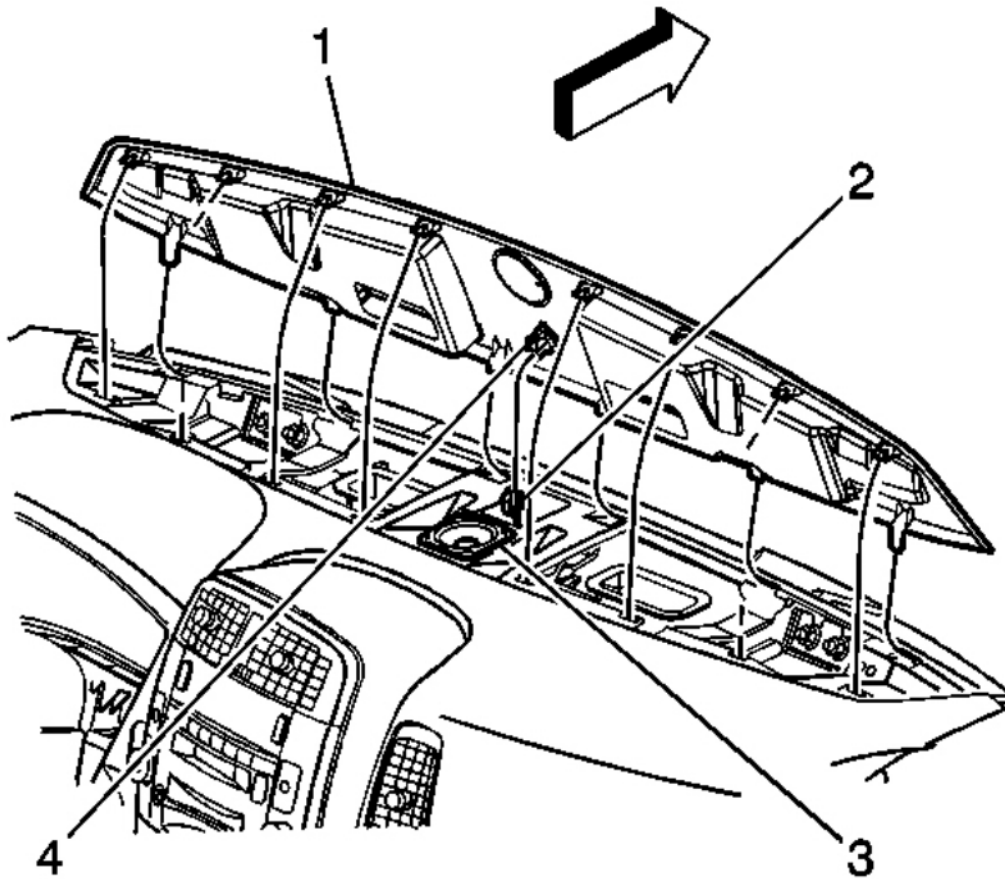


Fig. 34: View Of Defroster Grille
Courtesy of GENERAL MOTORS CORP.

INSTRUMENT PANEL (I/P) RETAINER REPLACEMENT

Removal Procedure

If the retainer is to be replaced with a new retainer, the shipping strap (1) must be cut off the new retainer after installation of the retainer to the instrument panel (I/P) carrier.

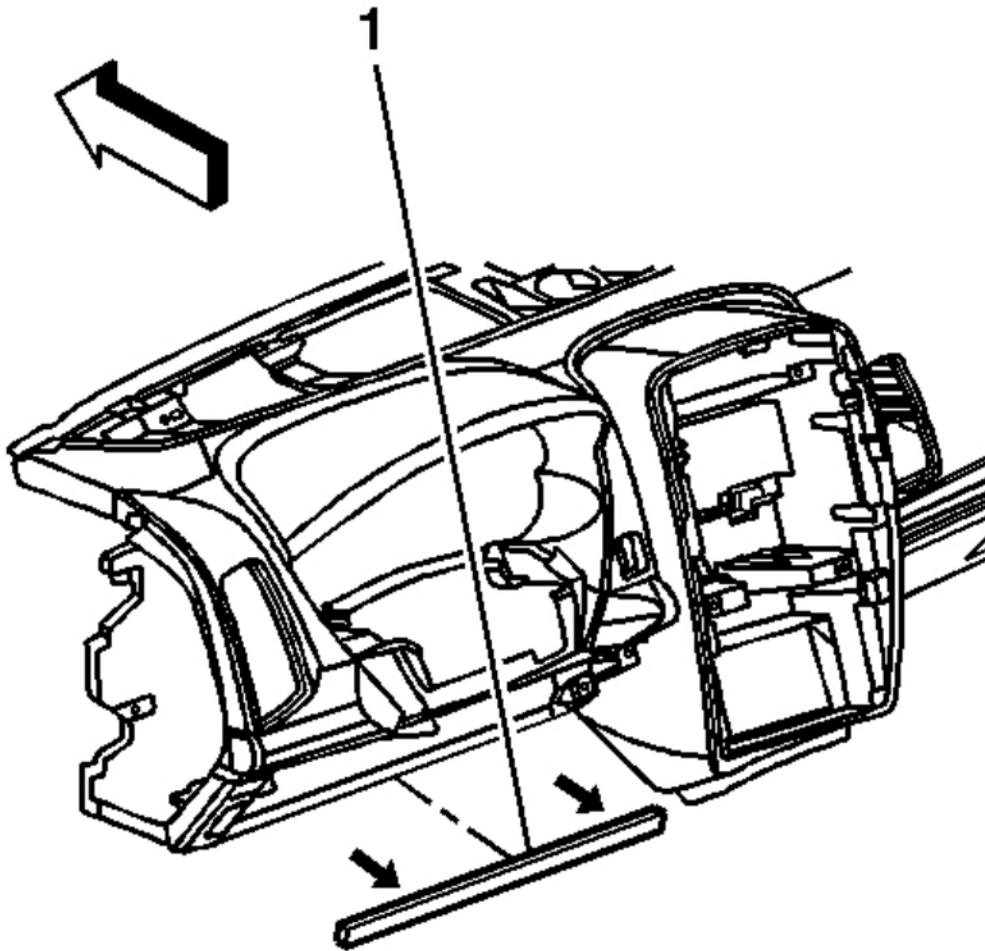


Fig. 35: View Of Shipping Strap
Courtesy of GENERAL MOTORS CORP.

1. Remove the center console. Refer to Console Replacement - Front Floor.
2. Remove the upper A/C vents.

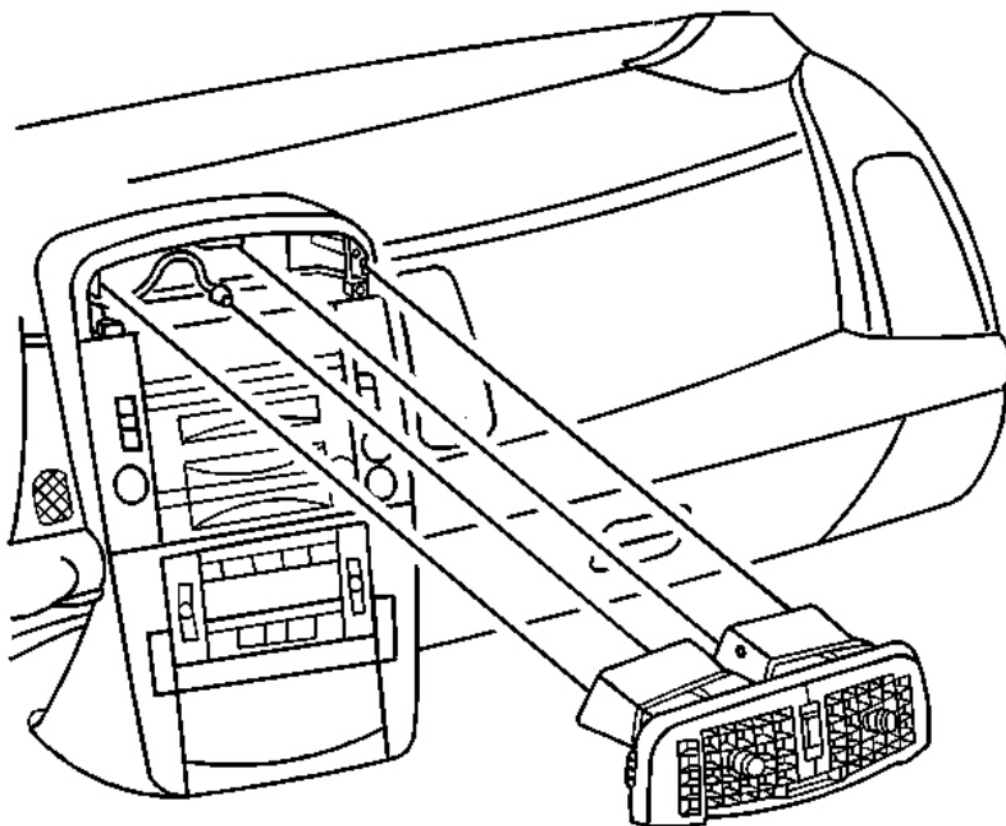


Fig. 36: View Of Center I/P Air Vent And Hazard Switch Connector
Courtesy of GENERAL MOTORS CORP.

3. Remove the radio assembly. Refer to **Radio Replacement** in Entertainment.
4. Remove the instrument panel (I/P) compartment assembly. Refer to **Compartment Replacement - Instrument Panel (I/P)**.
5. Remove the I/P cluster. Refer to **Instrument Panel Cluster (IPC) Replacement**.
6. Remove the defroster grille. Refer to **Defroster Grille Replacement**.
7. Remove the left and right I/P closeout panel. Refer to **Closeout/Insulator Panel Replacement - Right**, and **Closeout/Insulator Panel Replacement - Left**.
8. Lower the steering column. Refer to **Steering Column Replacement** in Steering Wheel and Column.
9. Remove the bolts securing the lower retainer support bracket.

10. Remove the screws securing the side of the retainer to the I/P carrier.

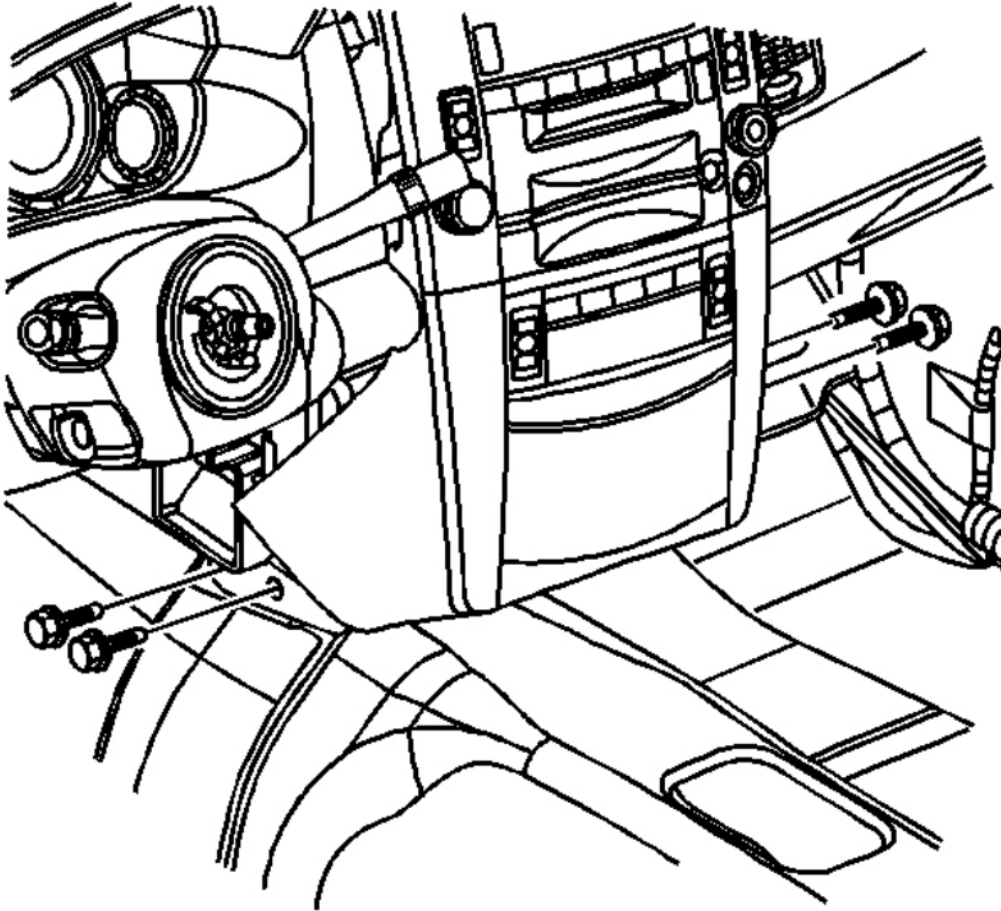


Fig. 37: View Of Lower Retainer Support Bracket Bolts
Courtesy of GENERAL MOTORS CORP.

11. Remove the screws securing the lower center stack.

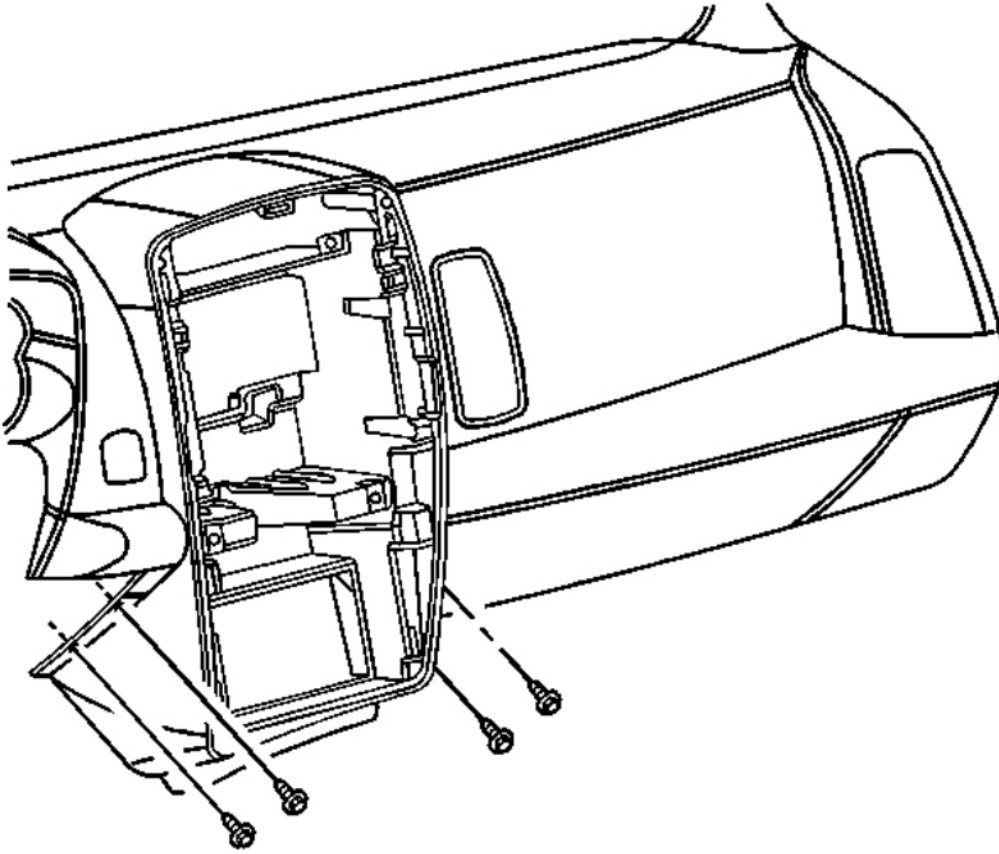


Fig. 38: View Of Lower Center Stack Screws
Courtesy of GENERAL MOTORS CORP.

12. Remove the screws behind the I/P compartment securing the I/P retainer to the I/P carrier.

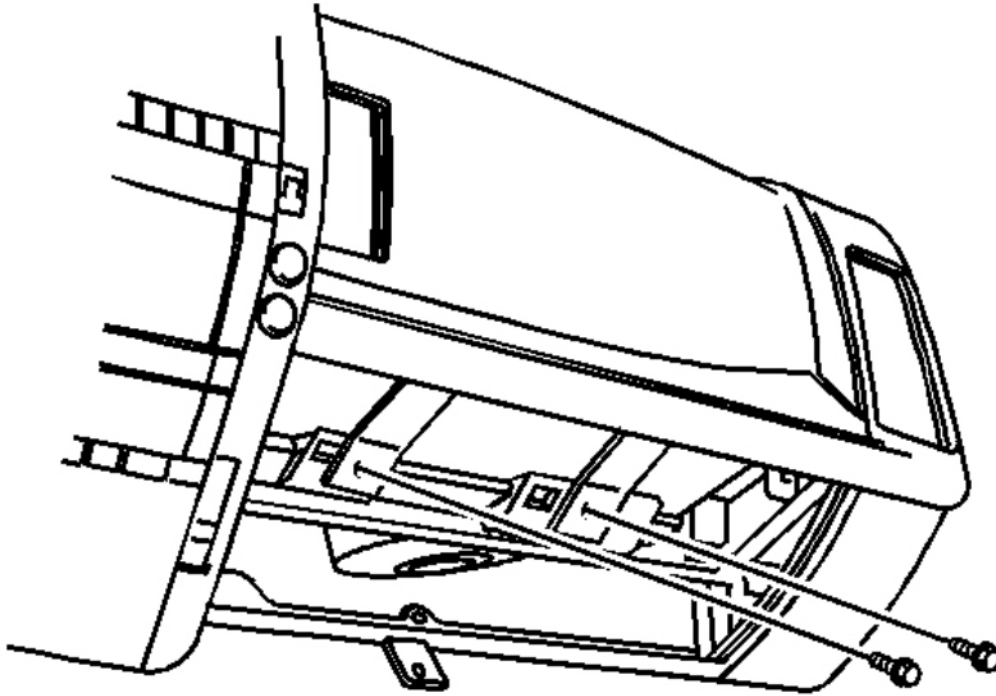


Fig. 39: View Of I/P Retainer Screws
Courtesy of GENERAL MOTORS CORP.

13. Disconnect the passenger side inline connector.
14. Disconnect the air temperature sensor and the aspirator tube.
15. Remove the screws securing the retainer to the to I/P carrier.

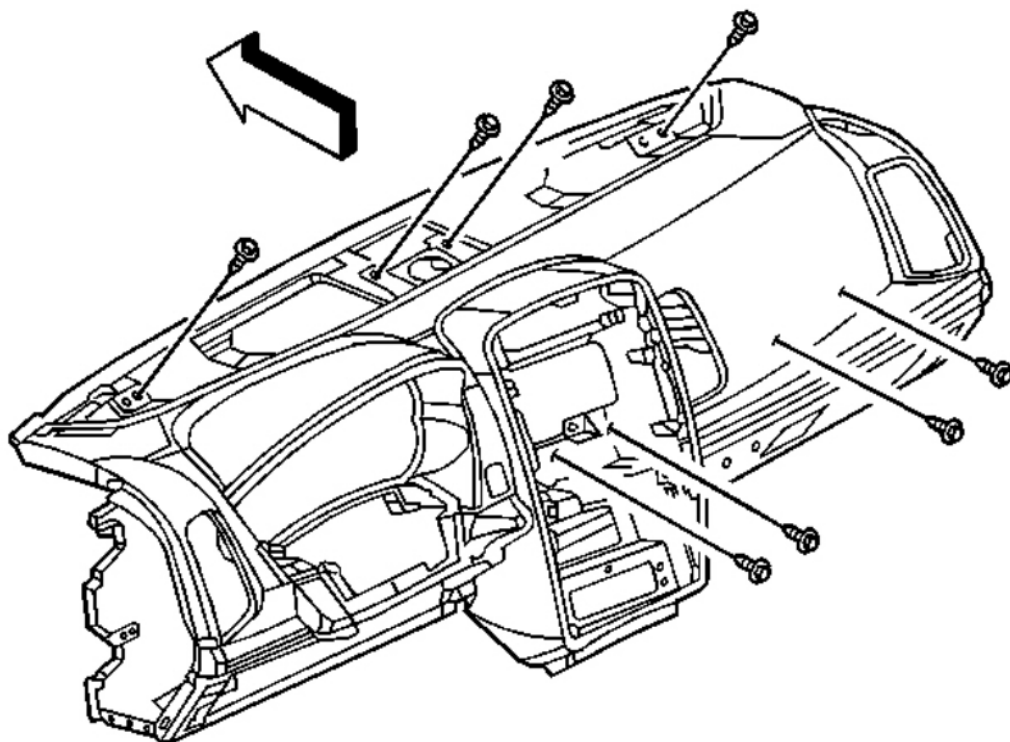


Fig. 40: View Of Retainer-To-I/P Carrier Screws
Courtesy of GENERAL MOTORS CORP.

16. Remove the upper retainer to carrier screws.

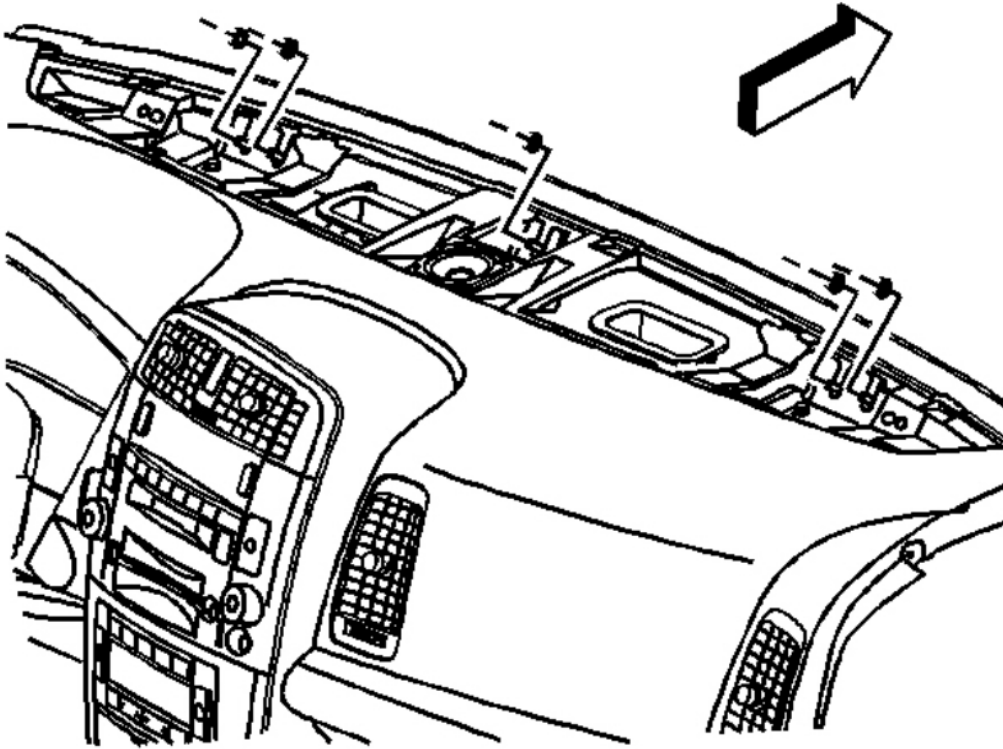


Fig. 41: View Of Upper Retainer-To-Carrier Screws
Courtesy of GENERAL MOTORS CORP.

17. Remove the I/P retainer.

Installation Procedure

1. Install the I/P retainer onto the I/P carrier.
2. Install the upper I/P retainer screws.

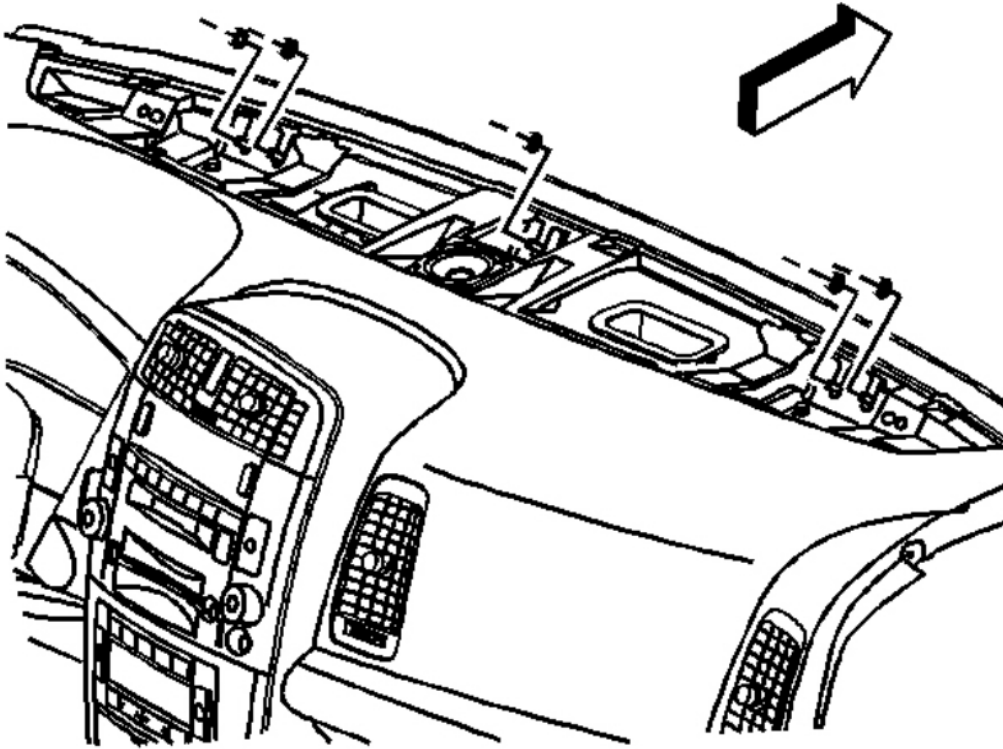


Fig. 42: View Of Upper Retainer-To-Carrier Screws
Courtesy of GENERAL MOTORS CORP.

3. Connect the air temperature sensor and the aspirator tube.
4. Connect the passenger side inline connector.

NOTE: Refer to Fastener Notice in Cautions and Notices.

5. Install the screws securing the retainer to the I/P carrier.

Tighten: Tighten the fasteners to 9 N.m (80 lb in).

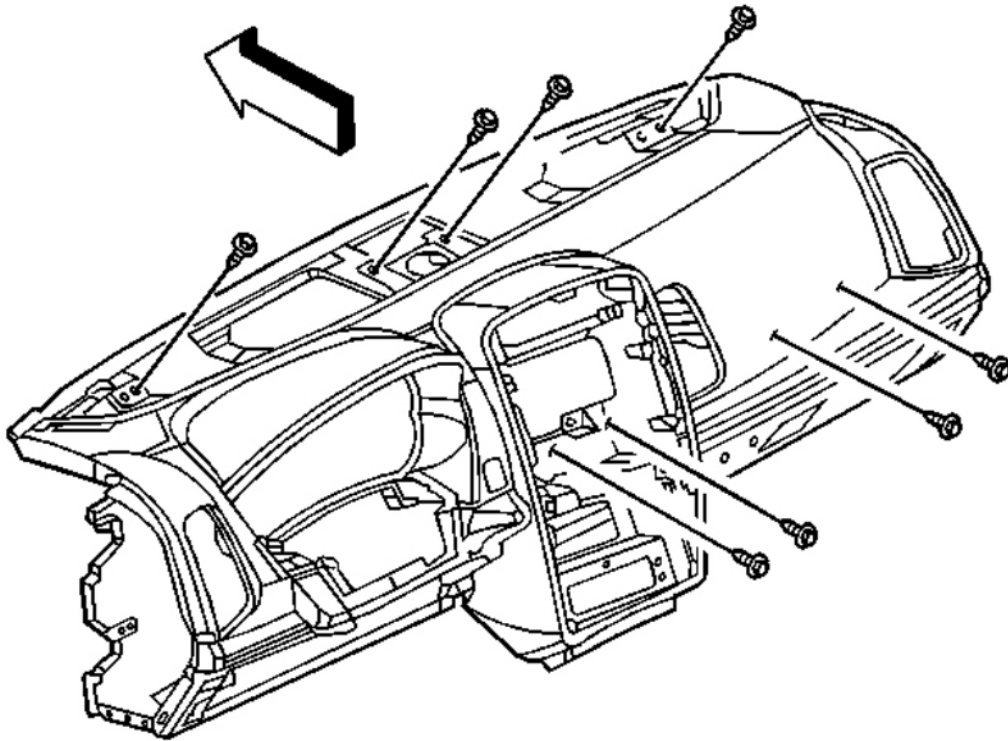


Fig. 43: View Of Retainer-To-I/P Carrier Screws
Courtesy of GENERAL MOTORS CORP.

6. Install the screws behind the I/P compartment securing the I/P retainer to the I/P carrier.

Tighten: Tighten the screws to 9 N.m (80 lb in).

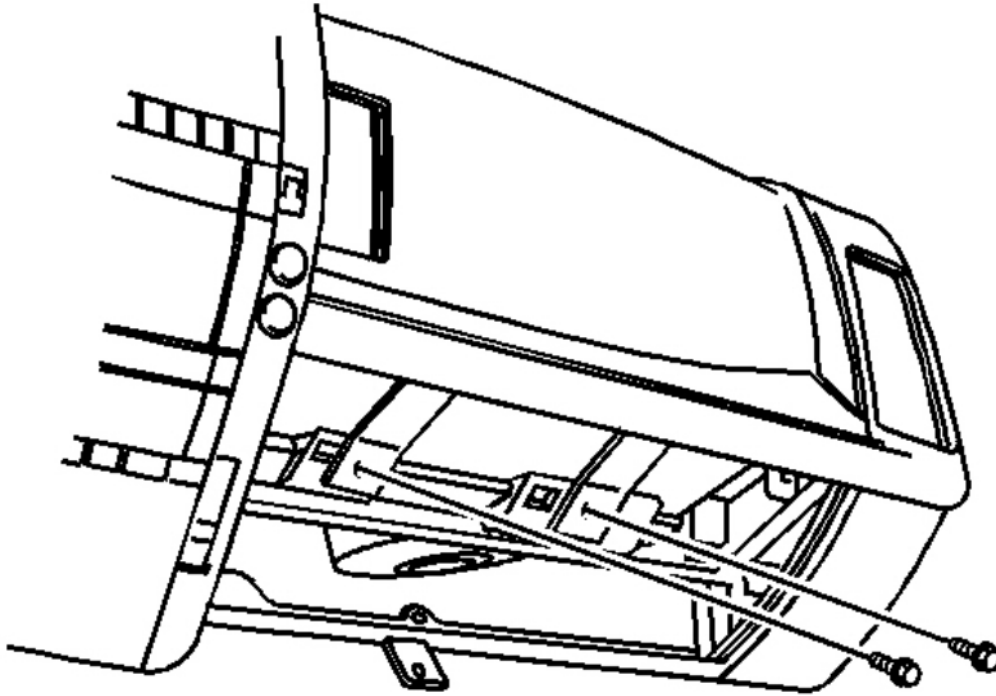


Fig. 44: View Of I/P Retainer Screws
Courtesy of GENERAL MOTORS CORP.

7. Install the screws securing the lower center stack.

Tighten: Tighten the screws to 9 N.m (80 lb in).

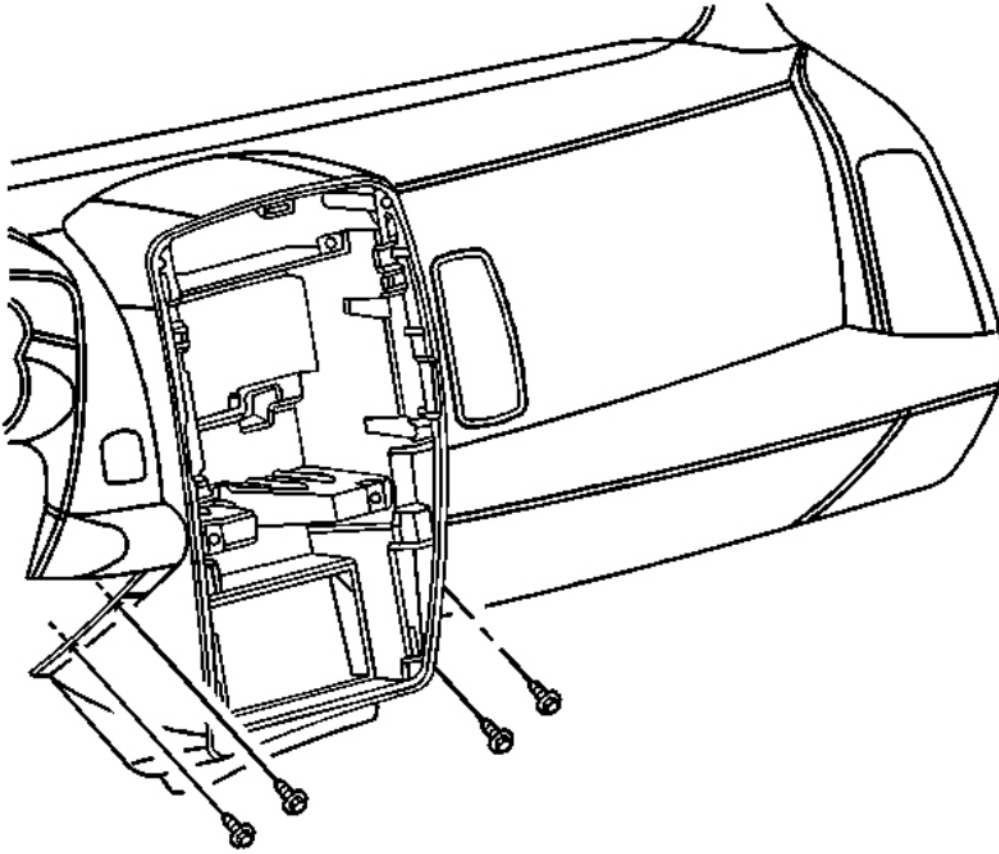


Fig. 45: View Of Lower Center Stack Screws
Courtesy of GENERAL MOTORS CORP.

8. Install the fasteners securing the side of the retainer the center support.

Tighten: Tighten the fasteners to 9 N.m (80 lb in).

9. Install the bolts securing the lower retainer support bracket.

Tighten: Tighten the fasteners to 25 N.m (18 lb ft).

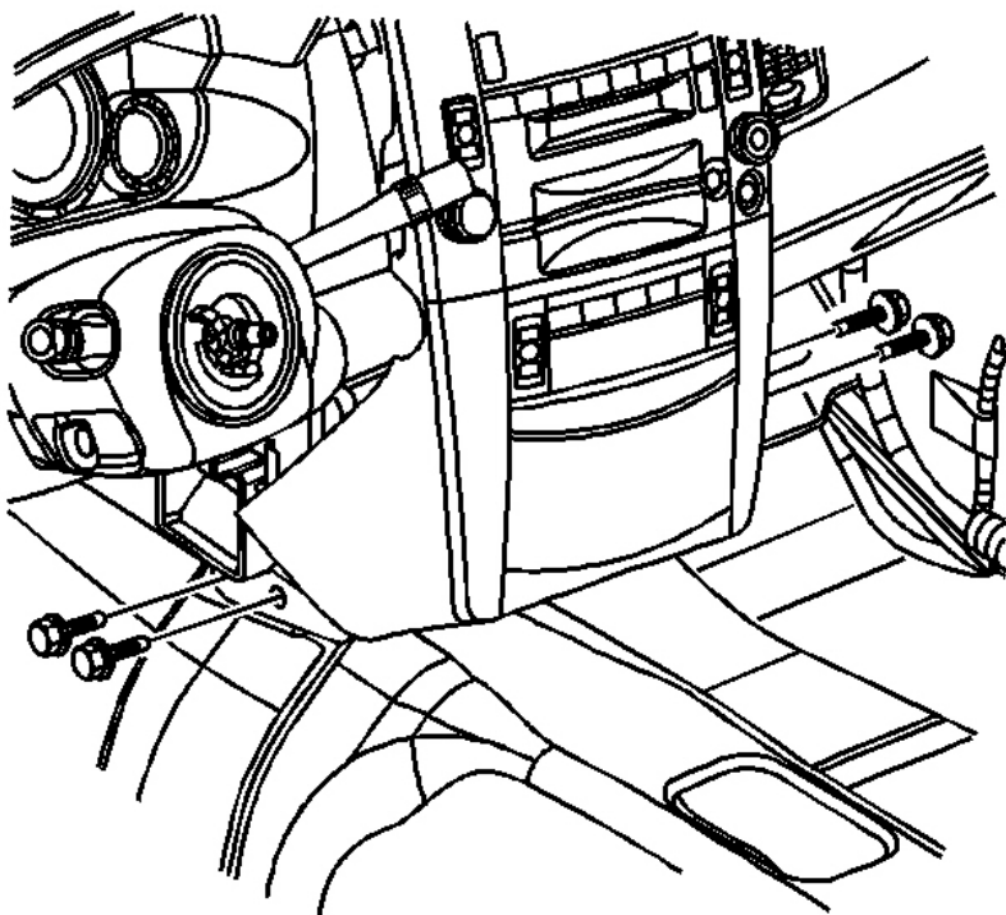


Fig. 46: View Of Lower Retainer Support Bracket Bolts
Courtesy of GENERAL MOTORS CORP.

10. Raise the steering column. Refer to **Steering Column Replacement** in Steering Wheel and Column.
11. Install the left and right I/P closeout panel. Refer to **Closeout/Insulator Panel Replacement - Right** and **Closeout/Insulator Panel Replacement - Left**.
12. Install the defroster grille. Refer to **Defroster Grille Replacement**.
13. Install the I/P cluster. Refer to **Instrument Panel Cluster (IPC) Replacement**.
14. Install the I/P compartment assembly. Refer to **Compartment Replacement - Instrument Panel (I/P)**.

15. Install the radio assembly. Refer to **Radio Replacement** in Entertainment.
16. Install the upper A/C vents.

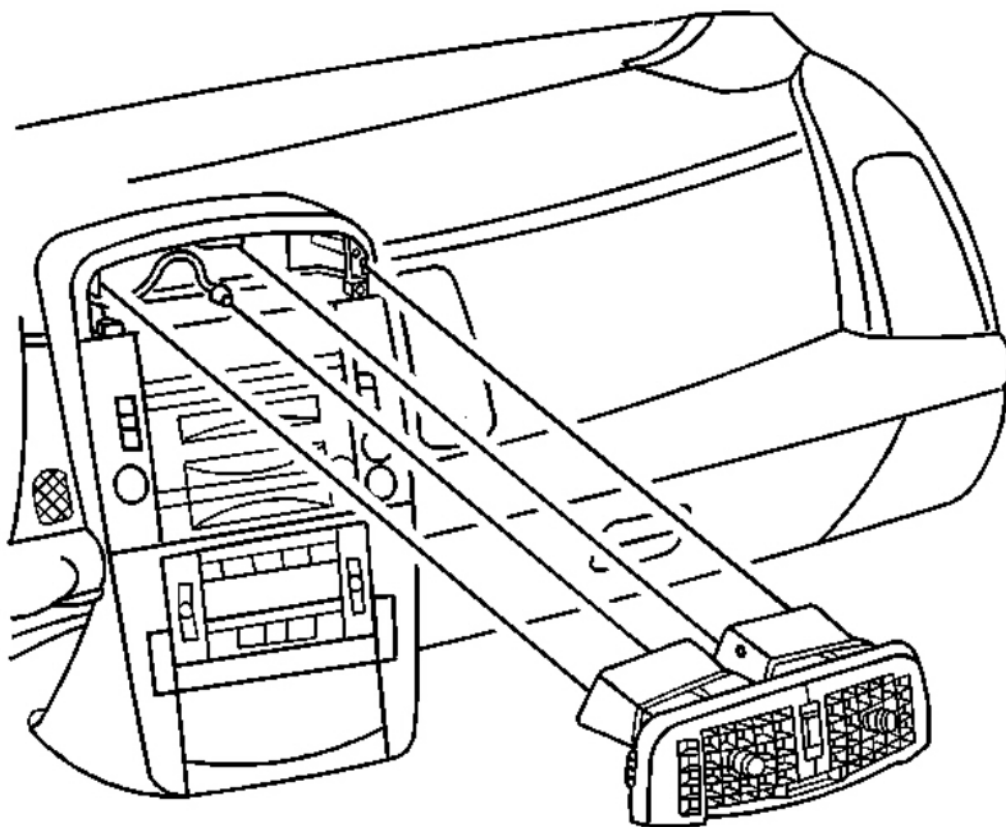


Fig. 47: View Of Center I/P Air Vent And Hazard Switch Connector
Courtesy of GENERAL MOTORS CORP.

17. Install the center console. Refer to **Console Replacement - Front Floor**.

INSTRUMENT PANEL CLUSTER (IPC) REPLACEMENT

Removal Procedure

1. Remove the I/P cluster trim cover. Refer to **Trim Panel Replacement - Instrument Panel (I/P) Cluster**.
2. Remove the screws (2) securing the cluster to the I/P.

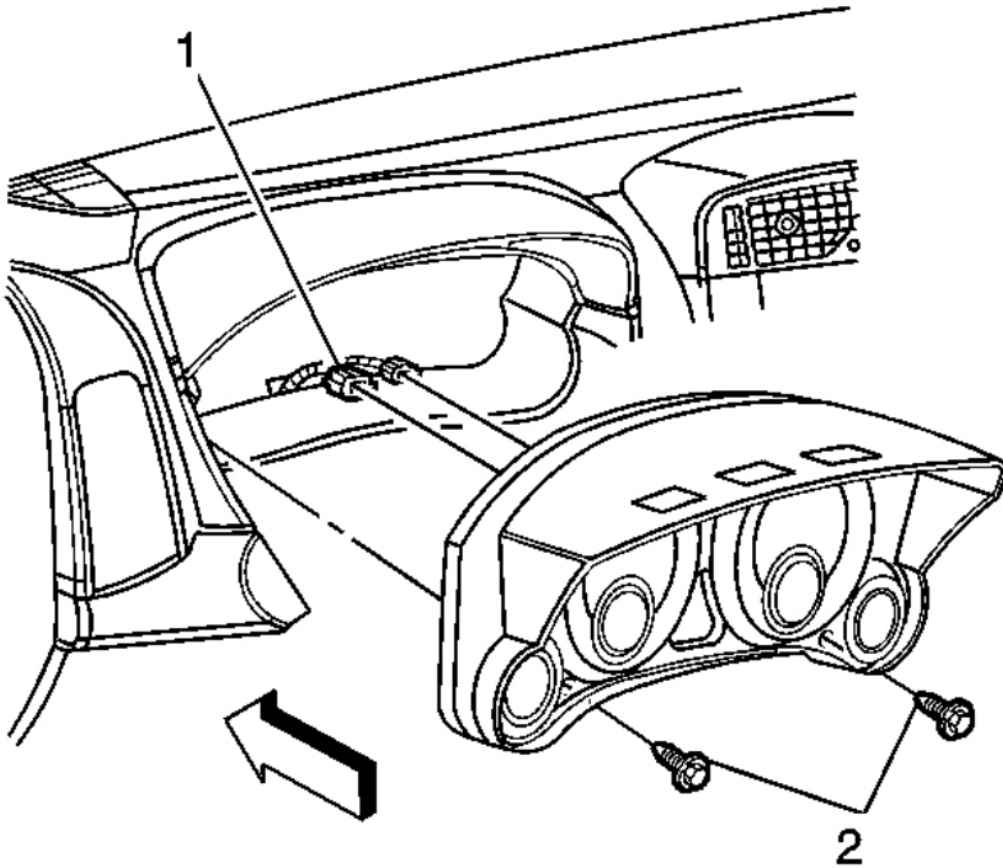


Fig. 48: View Of I/P Cluster Screws & Electrical Connector
Courtesy of GENERAL MOTORS CORP.

3. Install a small flat bladed tool (1) between the I/P cluster and the I/P.
4. Pry up on the I/P in order to release the retainers on the cluster.

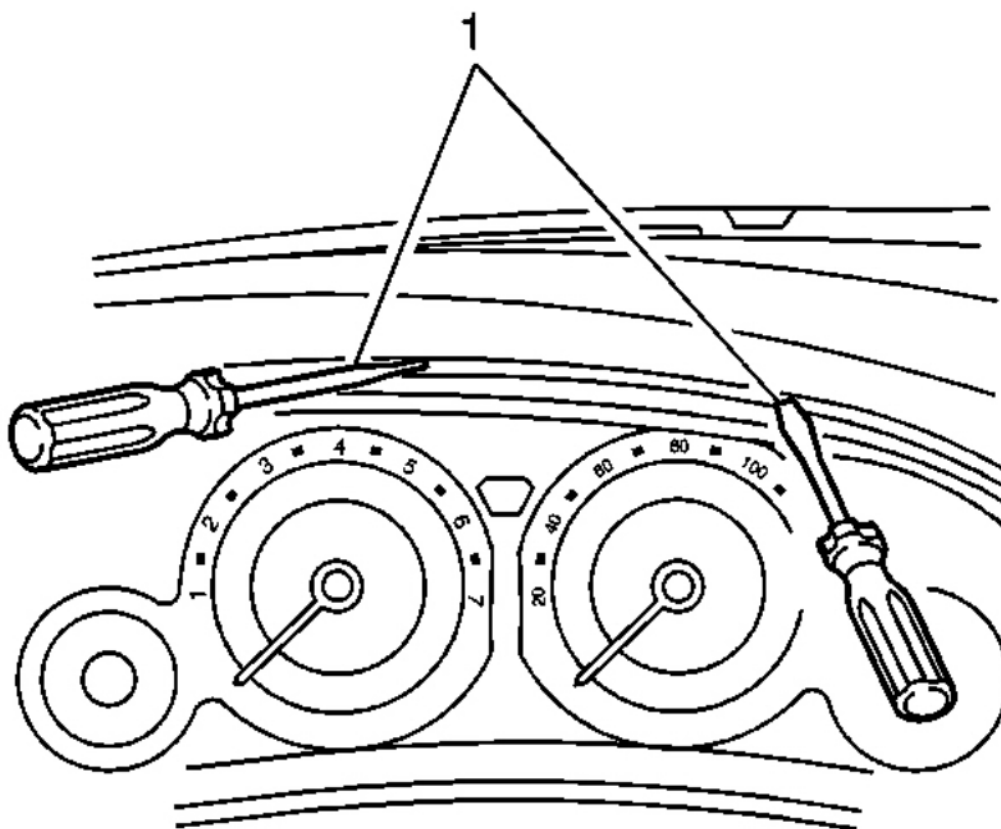


Fig. 49: Releasing I/P Cluster Retainers
Courtesy of GENERAL MOTORS CORP.

5. Pull out on the cluster and disconnect the electrical connectors.

Installation Procedure

1. Position the cluster on the I/P.
2. Connect the electrical connectors (1) on the back of the cluster.
3. Push the cluster into the I/P in order to lock in the cluster retainers.

NOTE: Refer to Fastener Notice in Cautions and Notices.

4. Install the fasteners (2) in order to secure the cluster to the I/P.

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

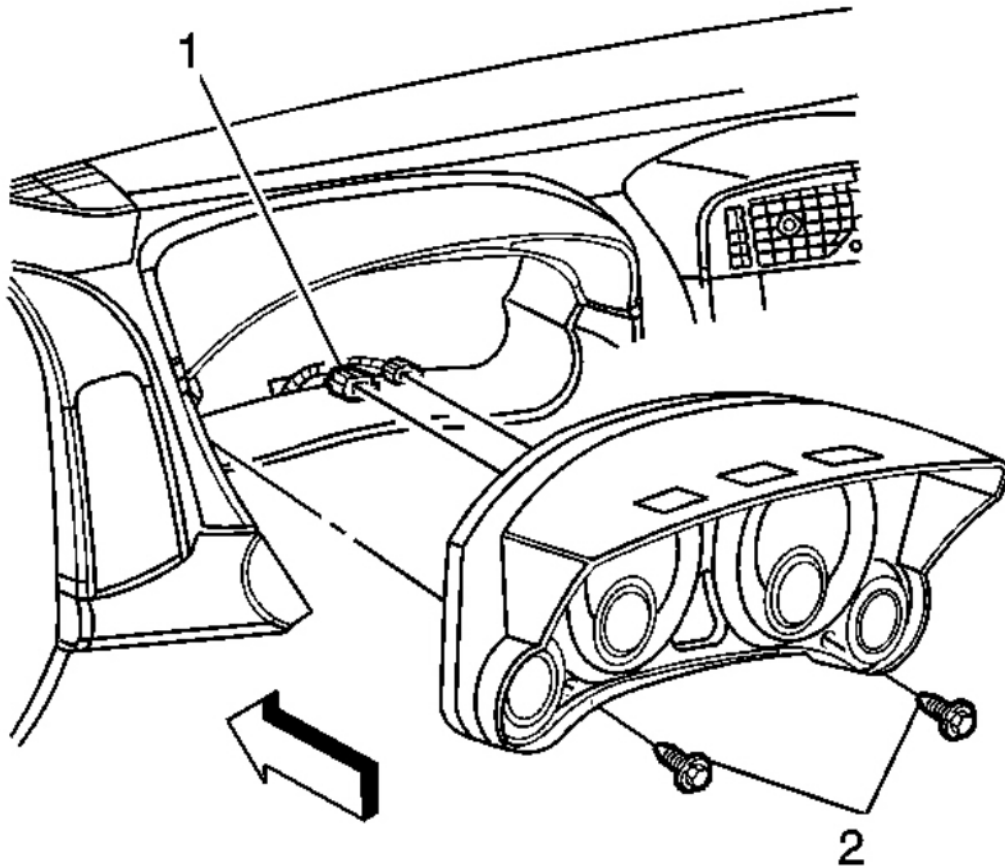


Fig. 50: View Of I/P Cluster Screws & Electrical Connector
Courtesy of GENERAL MOTORS CORP.

LATCH REPLACEMENT - INSTRUMENT PANEL (I/P) ASH TRAY

Removal Procedure

1. Remove the screw behind the ashtray assembly.
2. Pull out the ashtray assembly.
3. Disconnect the electrical connectors.

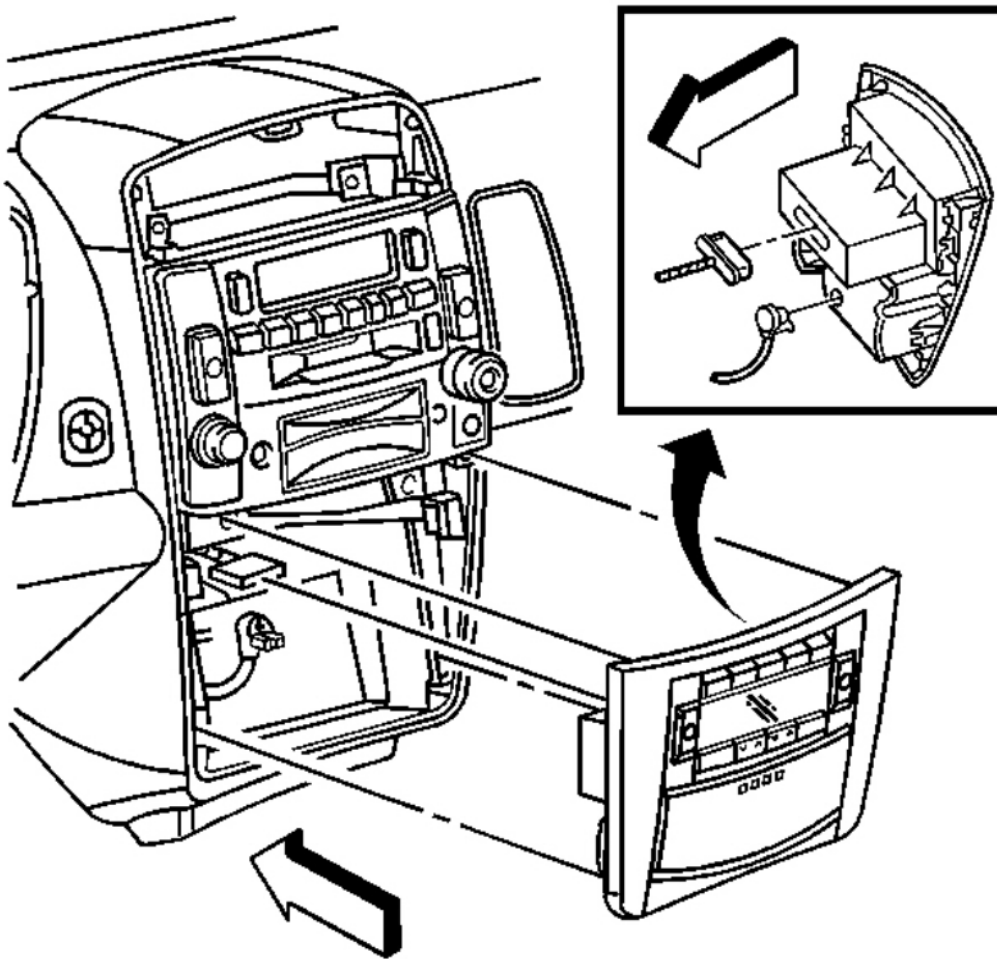


Fig. 51: View Of Ashtray Assembly
Courtesy of GENERAL MOTORS CORP.

4. Open the ashtray door.
5. Push the ashtray latch retaining tabs (1) with a small flat-bladed tool to release it from the ashtray assembly.

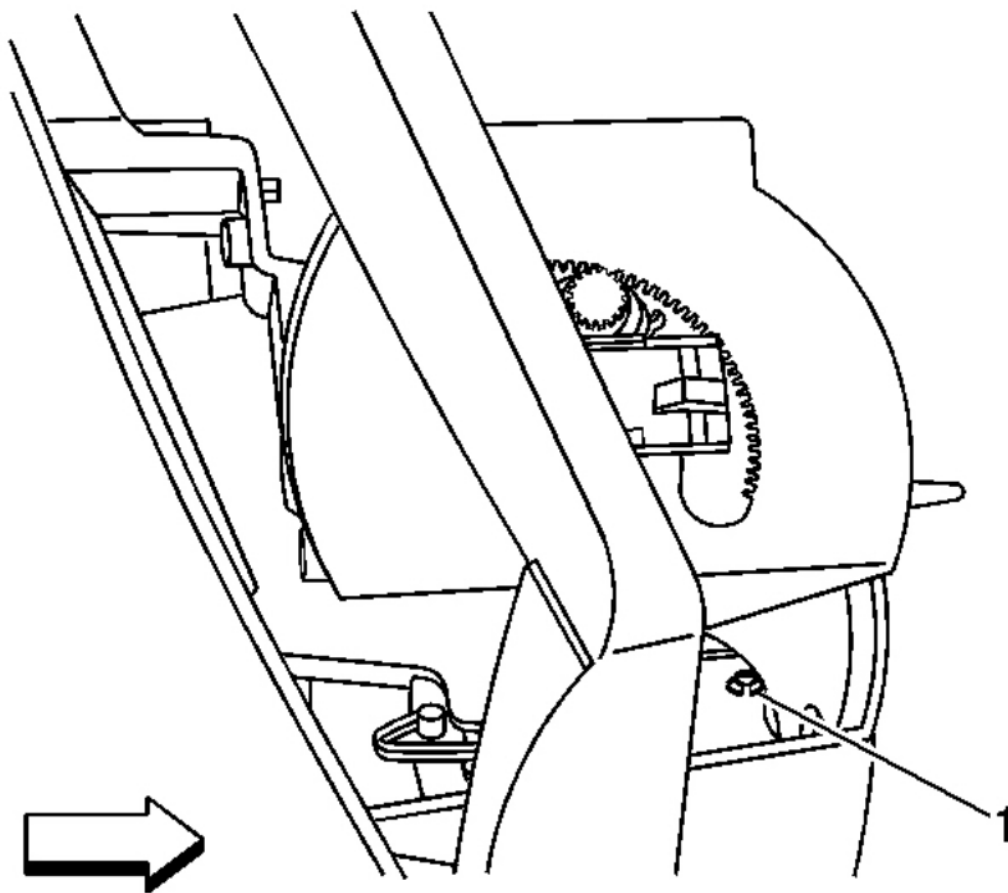


Fig. 52: Locating Ashtray Latch Retaining Tabs
Courtesy of GENERAL MOTORS CORP.

Installation Procedure

1. Install the ashtray latch (1) to the ashtray assembly.

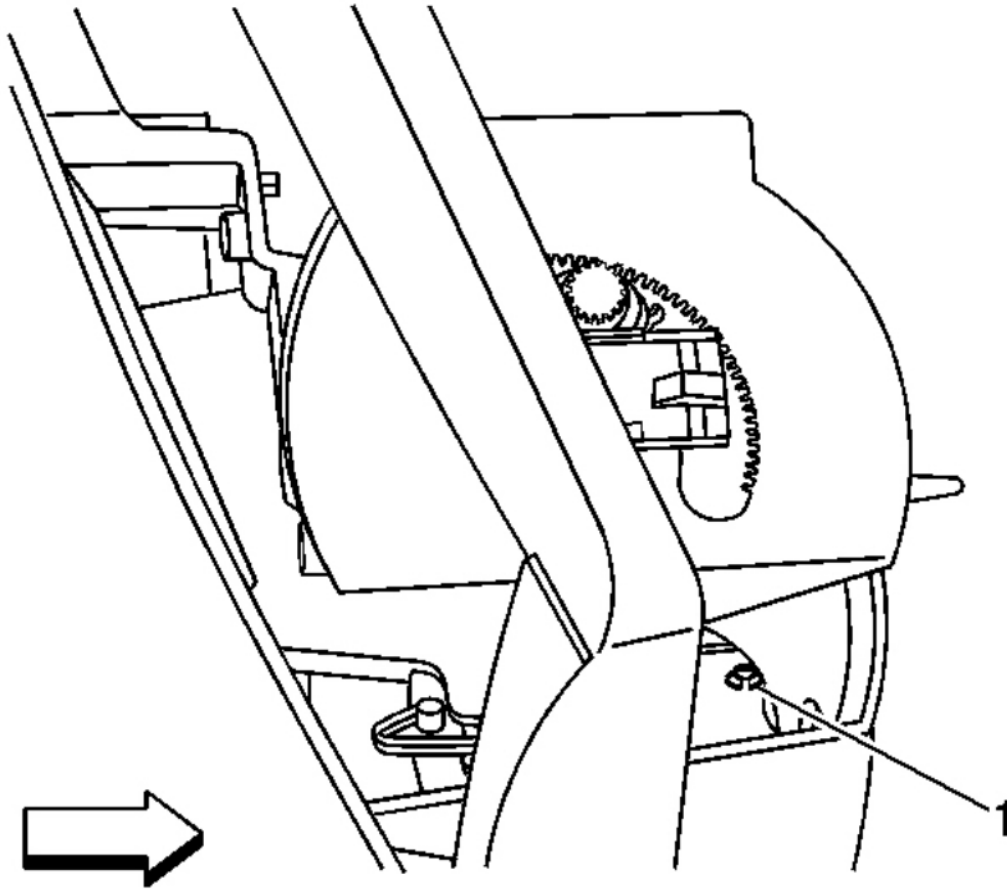


Fig. 53: Locating Ashtray Latch Retaining Tabs
Courtesy of GENERAL MOTORS CORP.

2. Ensure that the ashtray door functions properly.
3. Connect the electrical connectors.

NOTE: Refer to Fastener Notice in Cautions and Notices.

4. Install the ashtray assembly. Secure with the ashtray screw.

Tighten: Tighten the screw to 2 N.m (17 lb in).

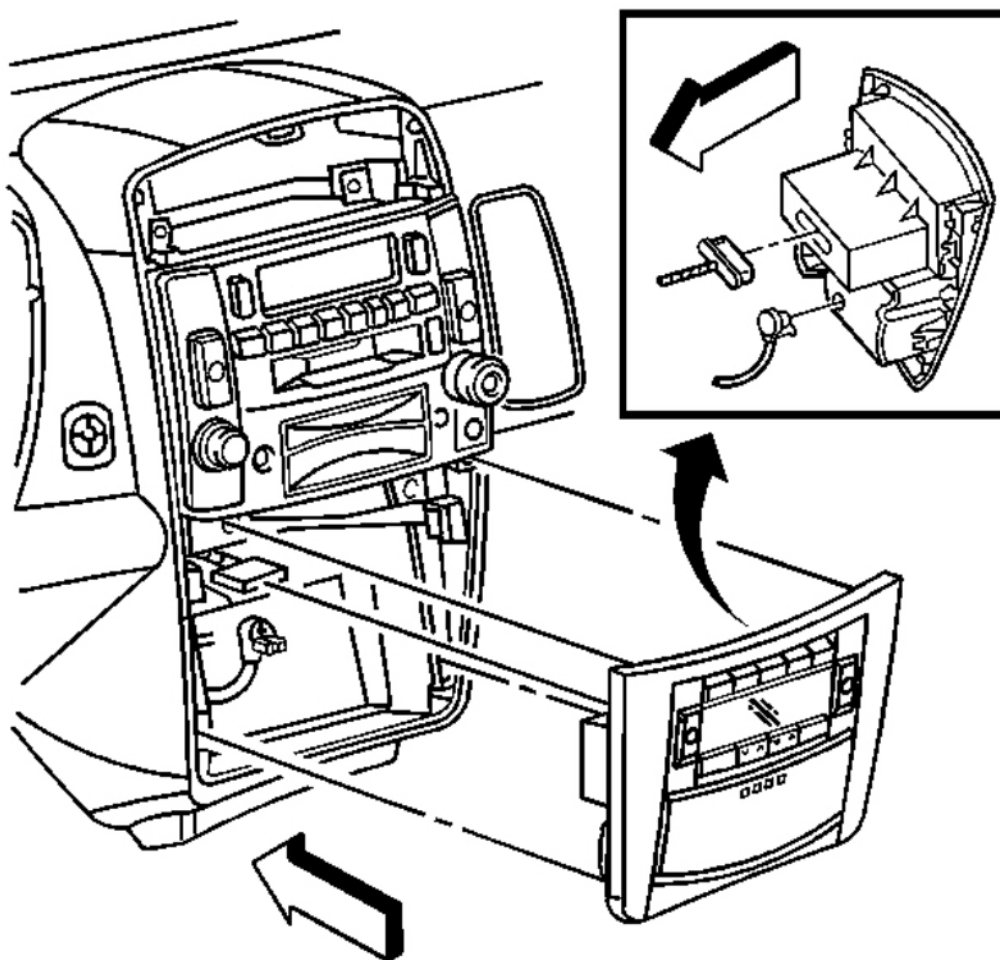


Fig. 54: View Of Ashtray Assembly
Courtesy of GENERAL MOTORS CORP.

INSTRUMENT PANEL (I/P) CARRIER REPLACEMENT

Removal Procedure

1. Remove the instrument panel (I/P) retainer. Refer to **Instrument Panel (I/P) Retainer Replacement**.
2. Remove the HVAC ducts. Refer to **Air Outlet Duct Replacement - Instrument Panel (I/P) - Upper Left**, **Air Outlet Duct Replacement - Instrument Panel (I/P) - Upper Right**, and **Defroster Duct Replacement - Windshield** in Heating, Ventilation and Air

Conditioning.

3. On vehicles with a manual shift transmission, loosen the nuts (2) on the pedal bracket.

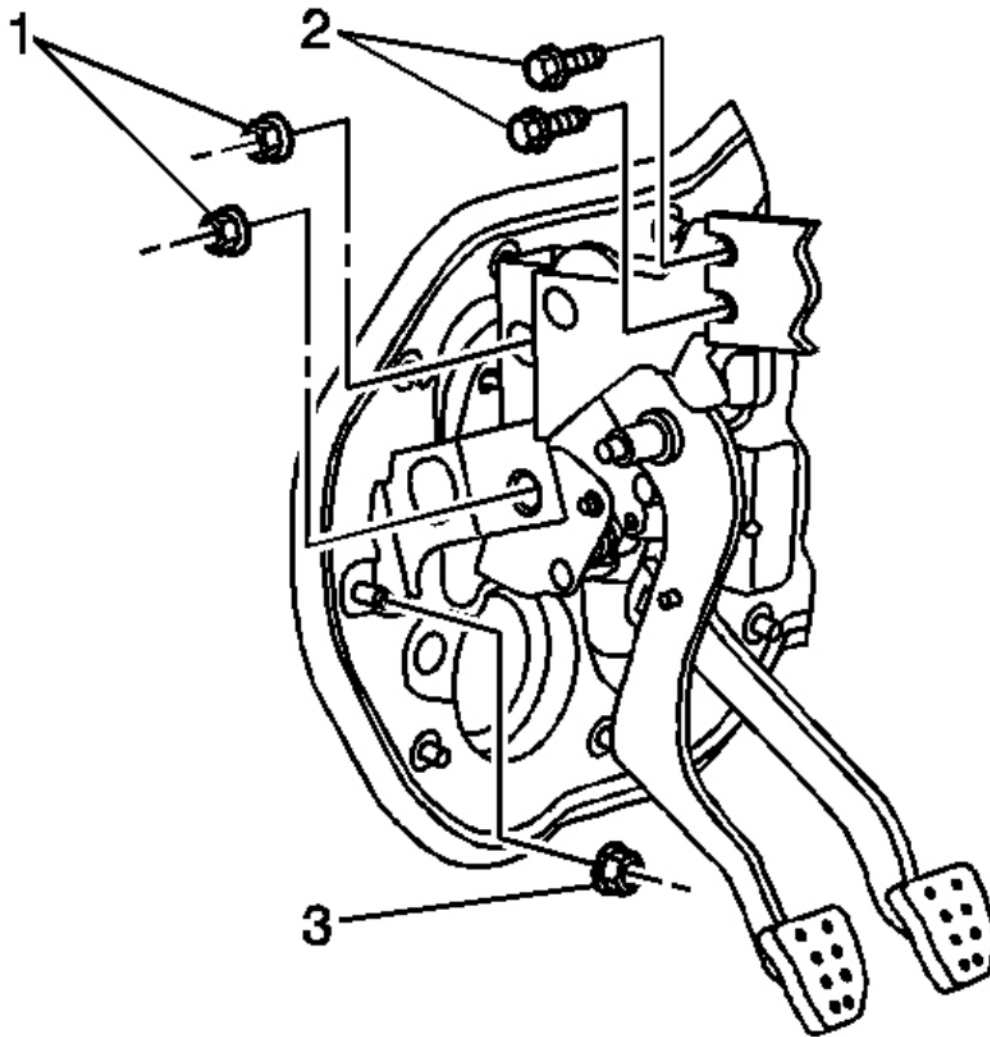


Fig. 55: View Of Pedal Bracket Nuts
Courtesy of GENERAL MOTORS CORP.

4. Remove the parking brake pedal assembly. Refer to **Park Brake Pedal Assembly Replacement** in Park Brake.

5. On vehicles with an automatic transmission, loosen the 2 nuts (1) securing the brake pedal bracket to the carrier.

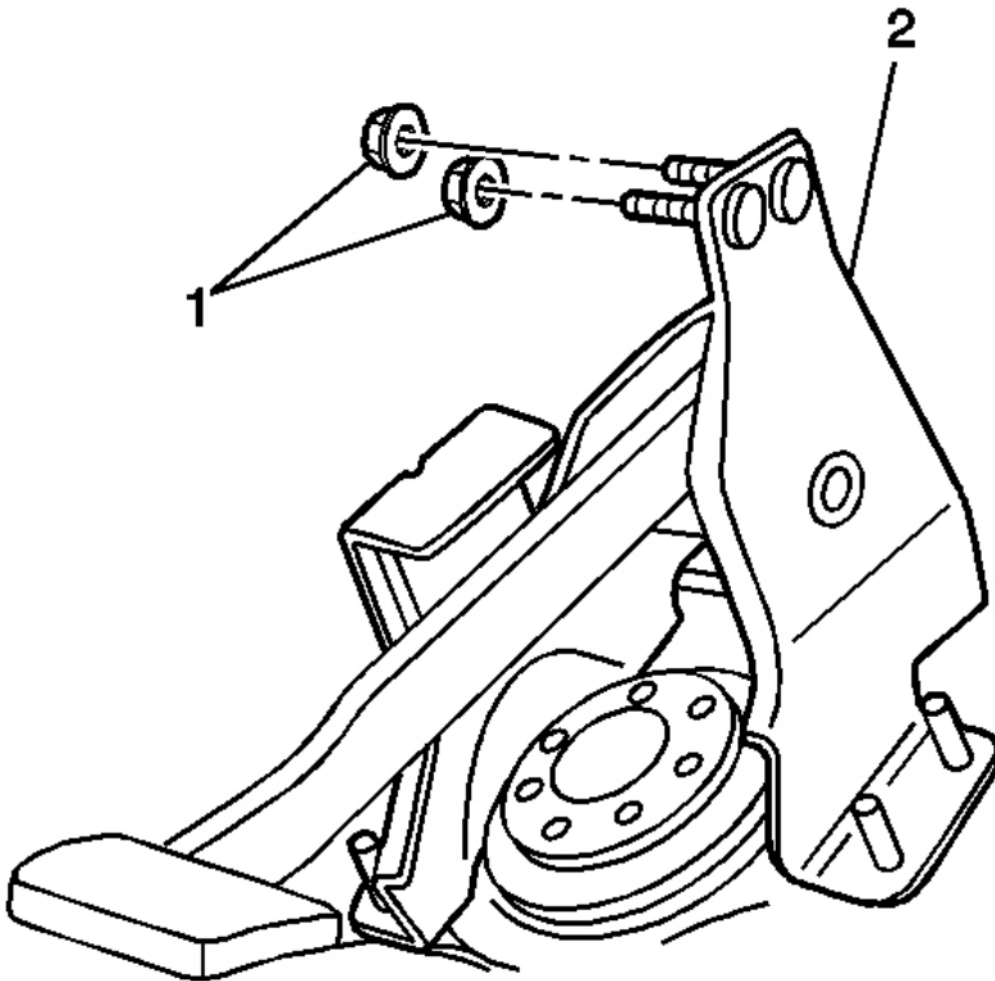


Fig. 56: View Of Brake Pedal Bracket Nuts
Courtesy of GENERAL MOTORS CORP.

IMPORTANT: Note the location and routing of the wiring harness and harness retainers.

6. Disconnect all electrical wire retainers from the carrier assembly.

7. Remove the nuts securing the carrier to the cowl.

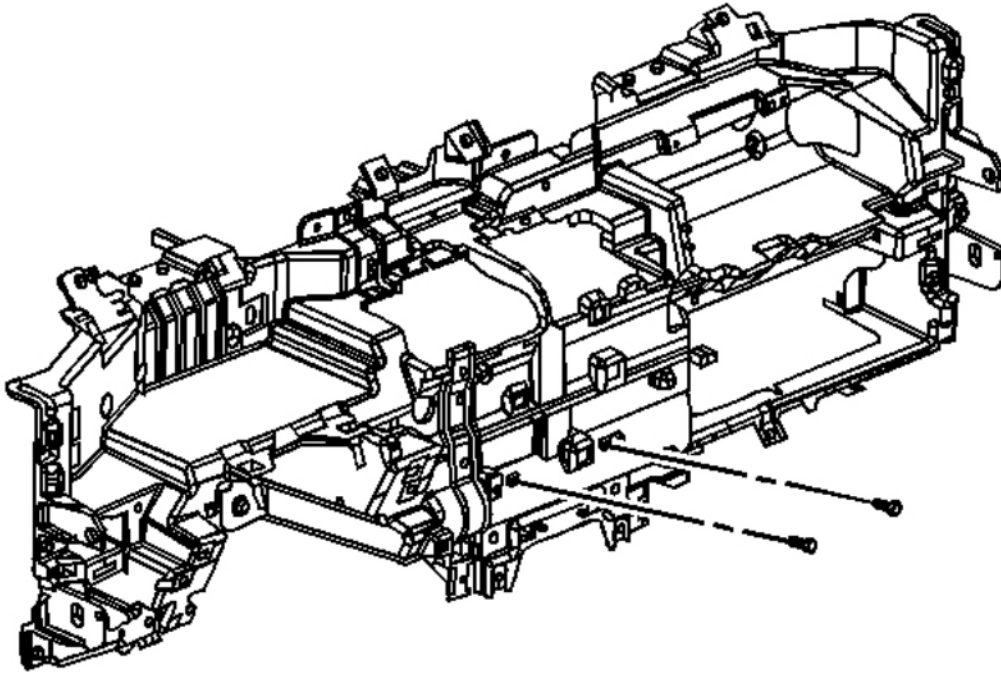


Fig. 57: View Of Carrier Nuts
Courtesy of GENERAL MOTORS CORP.

8. Remove the carrier assembly.

Installation Procedure

1. Install the carrier assembly.

NOTE: Refer to Fastener Notice in Cautions and Notices.

2. Install the bolts securing the carrier to the cowl.

Tighten: Tighten the bolts to 9 N.m (80 lb in).

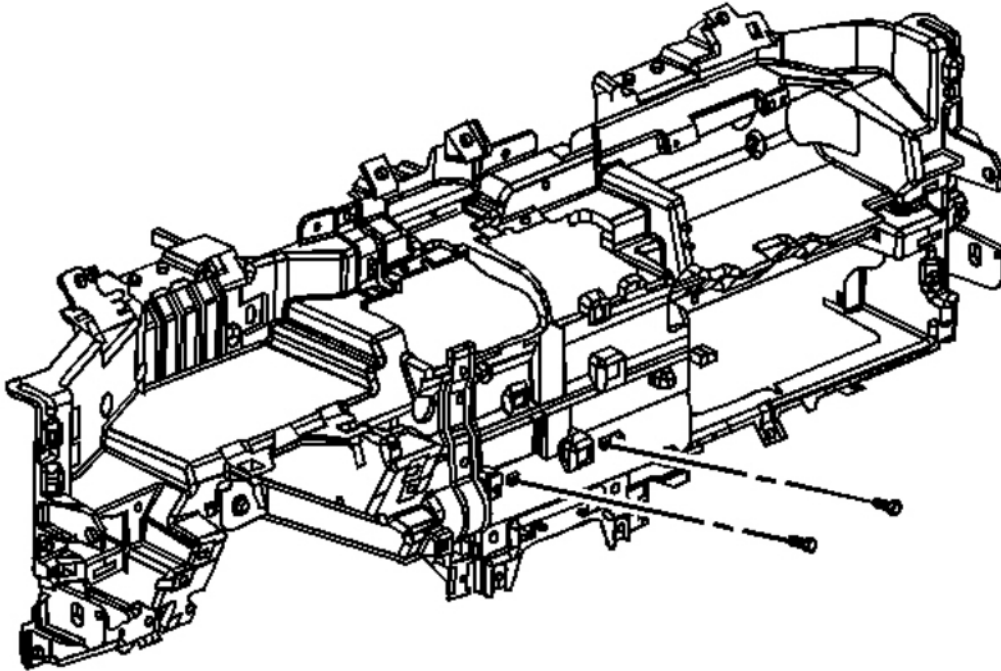


Fig. 58: View Of Carrier Nuts
Courtesy of GENERAL MOTORS CORP.

3. Install the nuts securing the carrier to the firewall under the A pillar.

Tighten: Tighten the nuts to 9 N.m (80 lb in).

4. Connect all electrical wire retainers to the carrier assembly.
5. On vehicles with a manual shift transmission, loosen the nuts (2) on the pedal bracket.

Tighten: Tighten the nuts to 25 N.m (18 lb ft).

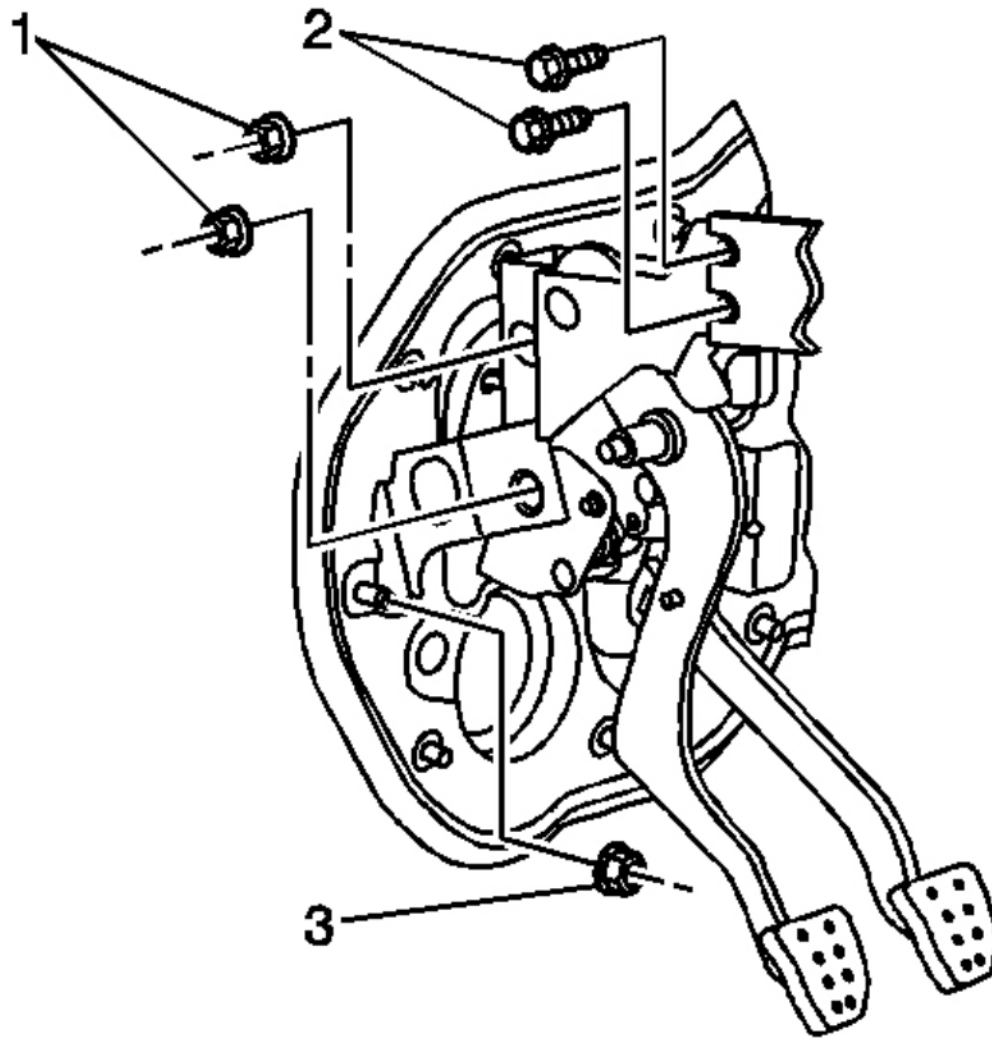


Fig. 59: View Of Pedal Bracket Nuts
 Courtesy of GENERAL MOTORS CORP.

6. Install the parking brake pedal assembly. Refer to **Park Brake Pedal Assembly Replacement** in Park Brake.
7. Install the 2 nuts (1) securing the brake pedal bracket to the cowl.

Tighten: Tighten the nuts to 25 N.m (18 lb ft).

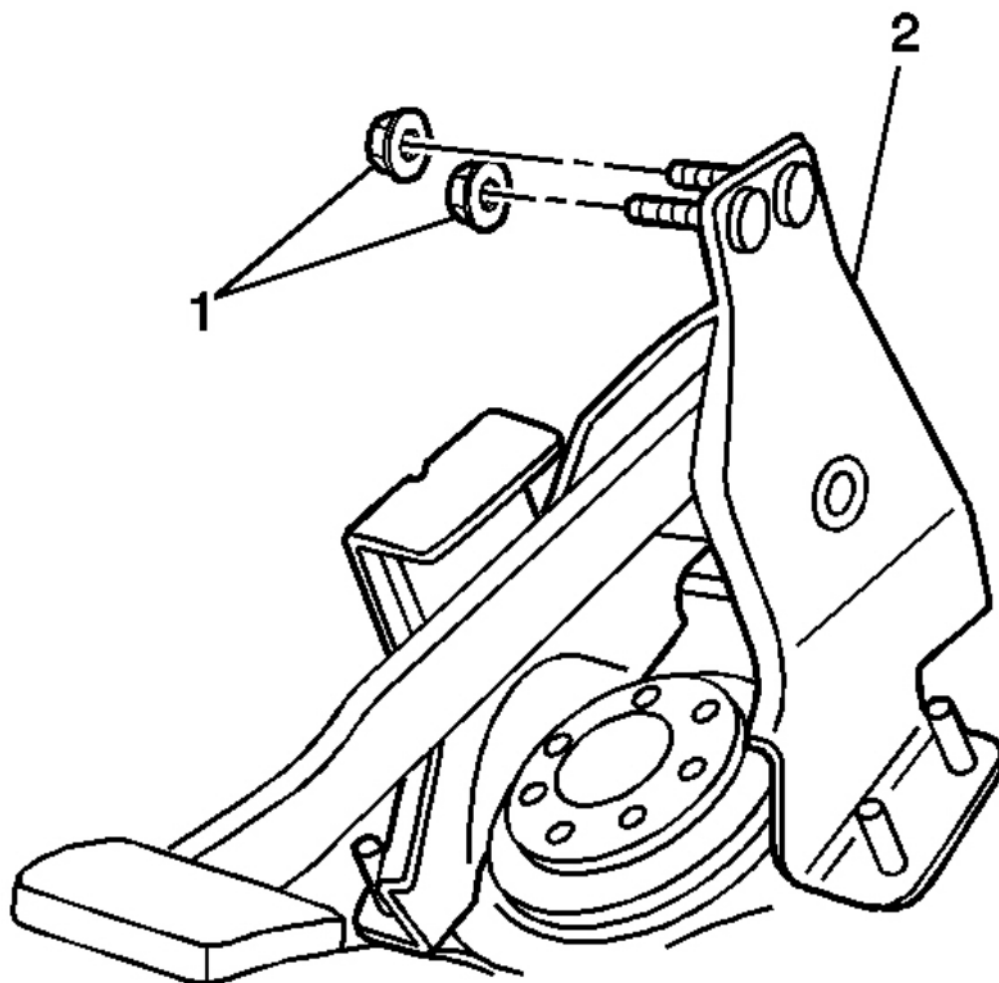


Fig. 60: View Of Brake Pedal Bracket Nuts
Courtesy of GENERAL MOTORS CORP.

8. Install the HVAC ducts. Refer to **Air Outlet Duct Replacement - Instrument Panel (I/P) - Upper Left** , **Air Outlet Duct Replacement - Instrument Panel (I/P) - Upper Right** , and **Defroster Duct Replacement - Windshield** in Heating, Ventilation and Air Conditioning.
9. Install the I/P retainer. Refer to **Instrument Panel (I/P) Retainer Replacement**.

Removal Procedure

1. Remove the center floor console. Refer to **Console Replacement - Front Floor**.
2. Remove the screws (1) under the front of the trim securing the upper trim to the console base.

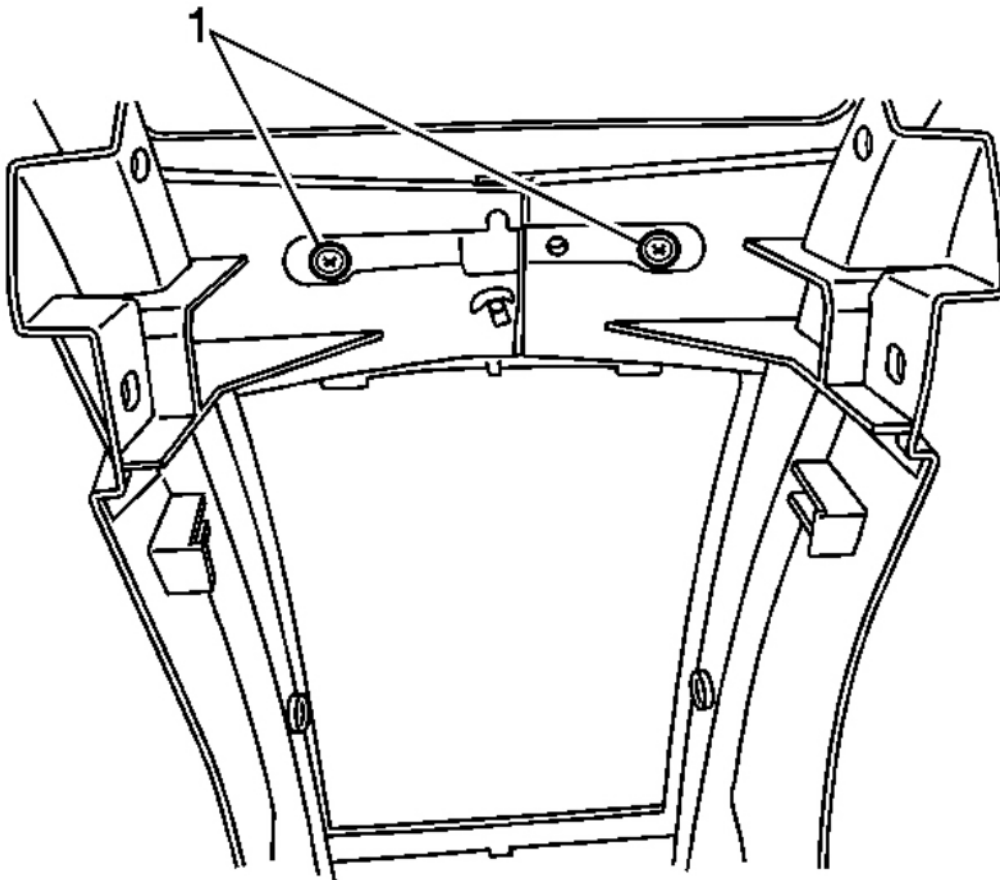


Fig. 61: Locating Upper Trim To Console Base Screws
Courtesy of GENERAL MOTORS CORP.

3. Pull up on the upper trim (1) in order to release the retainers securing the upper trim to the console base.

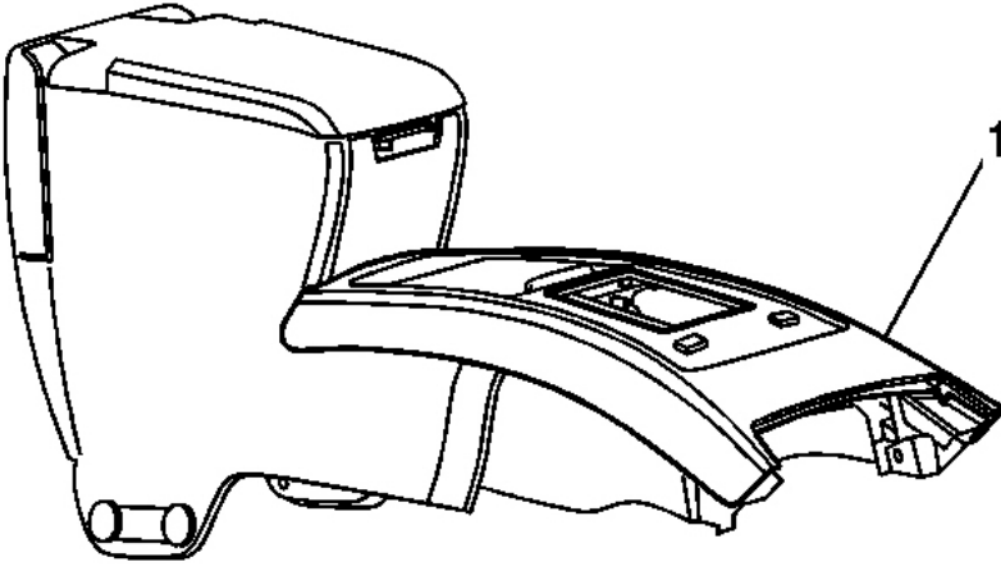


Fig. 62: View Of Upper Console Trim
Courtesy of GENERAL MOTORS CORP.

Installation Procedure

1. Push down on the upper trim (1) in order to attach the retainers securing the upper trim to the console base.

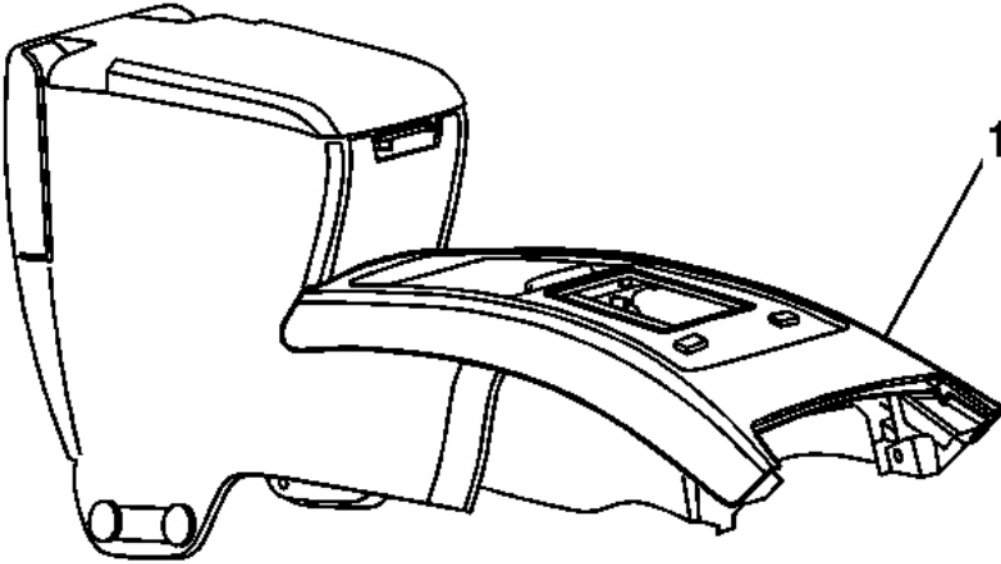


Fig. 63: View Of Upper Console Trim
Courtesy of GENERAL MOTORS CORP.

2. Install the screws (1) under the front of the trim securing the upper trim the console base.

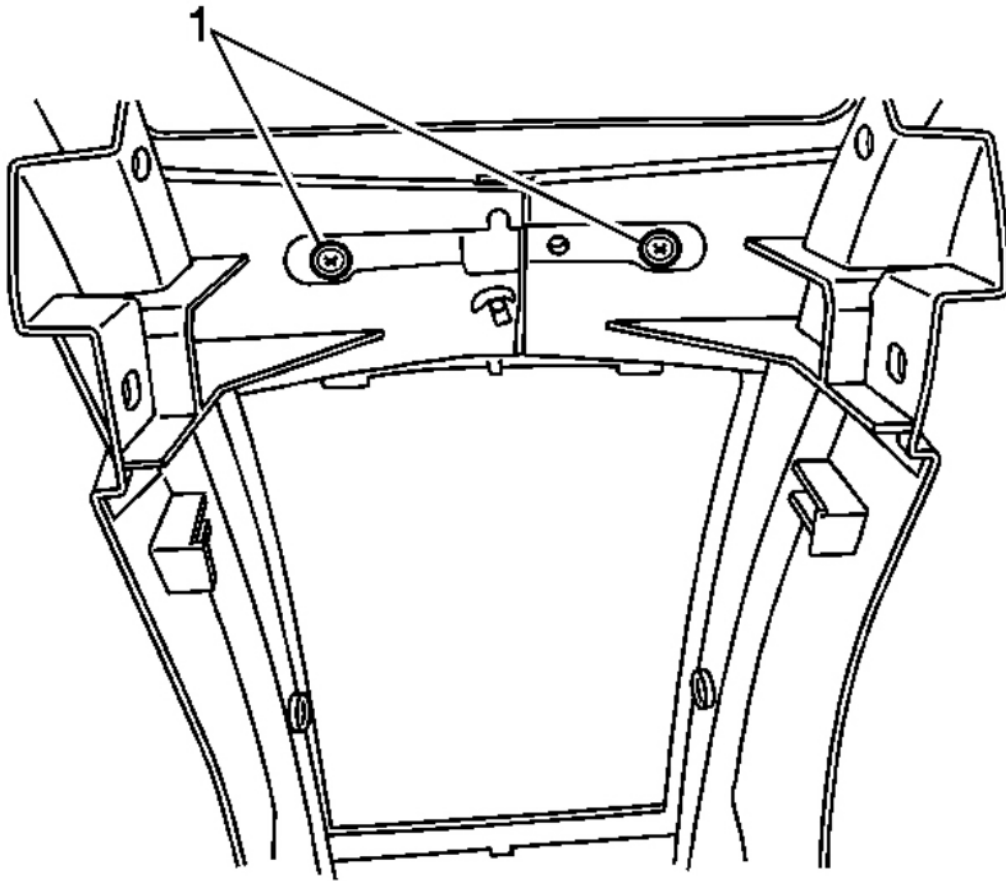


Fig. 64: Locating Upper Trim To Console Base Screws
Courtesy of GENERAL MOTORS CORP.

3. Install the center floor console. Refer to Console Replacement - Front Floor.

TRIM PLATE REPLACEMENT - CONSOLE FRONT

Removal Procedure

1. With a flat tool, pry on the top of the trim plate (1) in order to release the retainers.
2. Remove the trim plate.

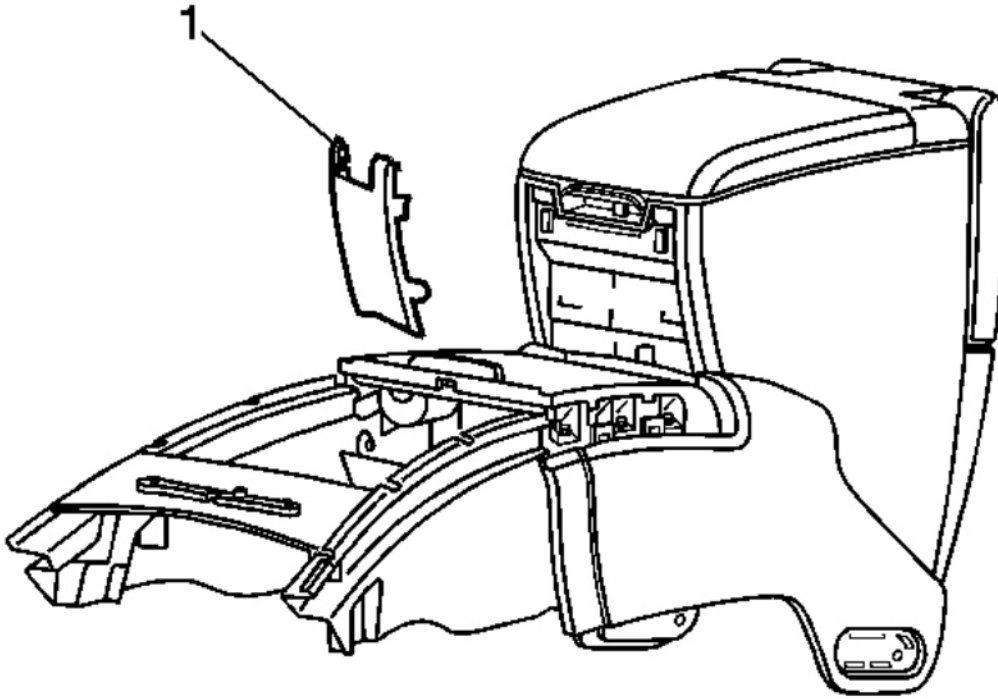


Fig. 65: View Of Front Console Trim Plate
Courtesy of GENERAL MOTORS CORP.

Installation Procedure

1. Locate the front trim plate (1) to the console mounting holes.
2. Push the trim plate (1) in order to secure the retainers.

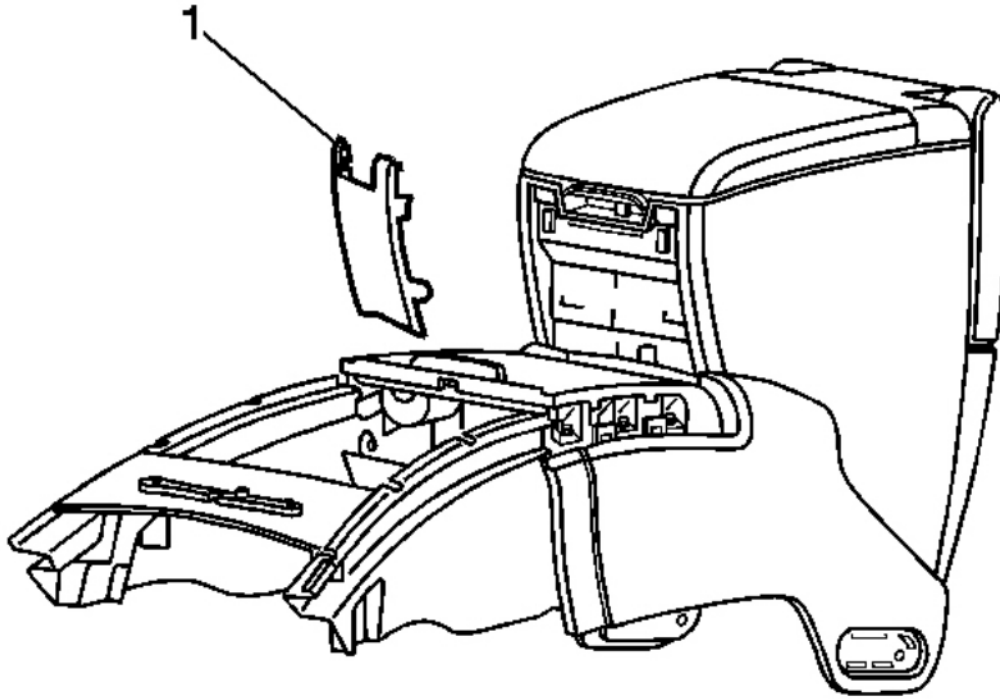


Fig. 66: View Of Front Console Trim Plate
Courtesy of GENERAL MOTORS CORP.

CONSOLE SHIFT LEVER BEZEL REPLACEMENT

Removal Procedure

1. Pry the rear of the shifter trim plate up with a blunt tool to release the trim from the console.
2. Pull upward on the trim plate.
3. Disconnect the traction control electrical connector.
4. Remove the trim plate.

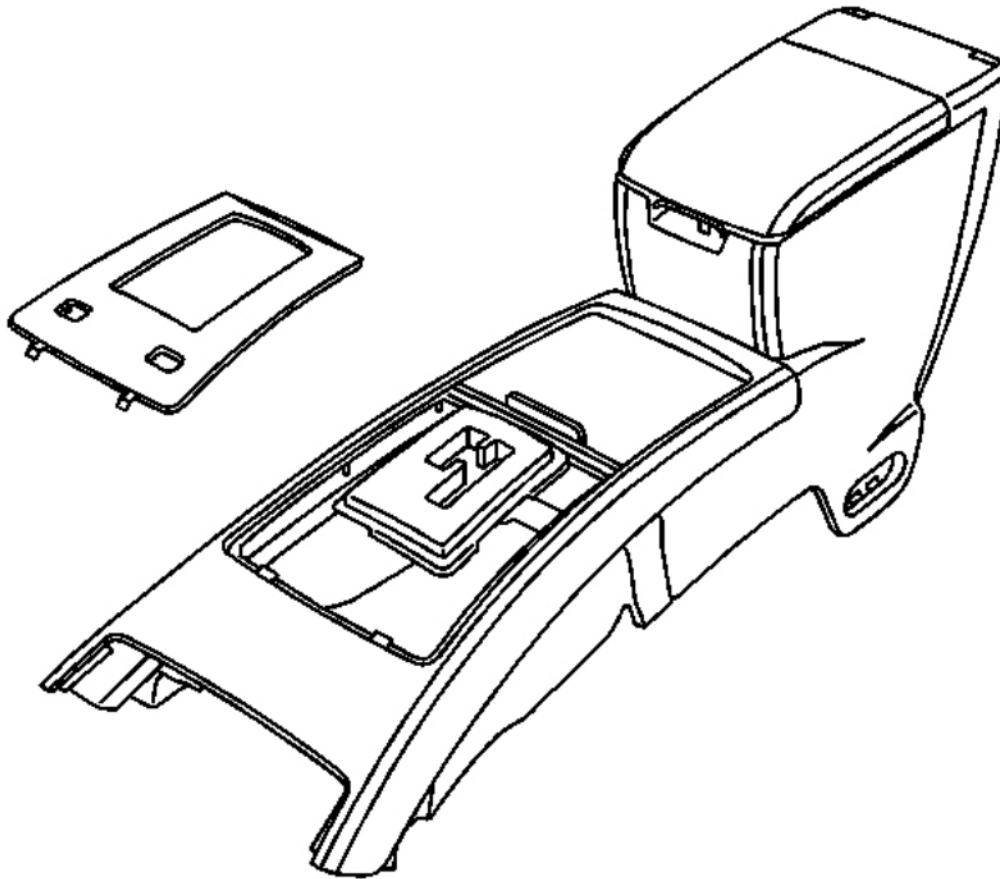


Fig. 67: View Of Console Shift Lever Trim Plate
Courtesy of GENERAL MOTORS CORP.

Installation Procedure

1. Connect the traction control electrical connector.
2. Install the trim plate to the console with the front tabs.
3. Push down on the rear of the trim plate to lock it onto the console.

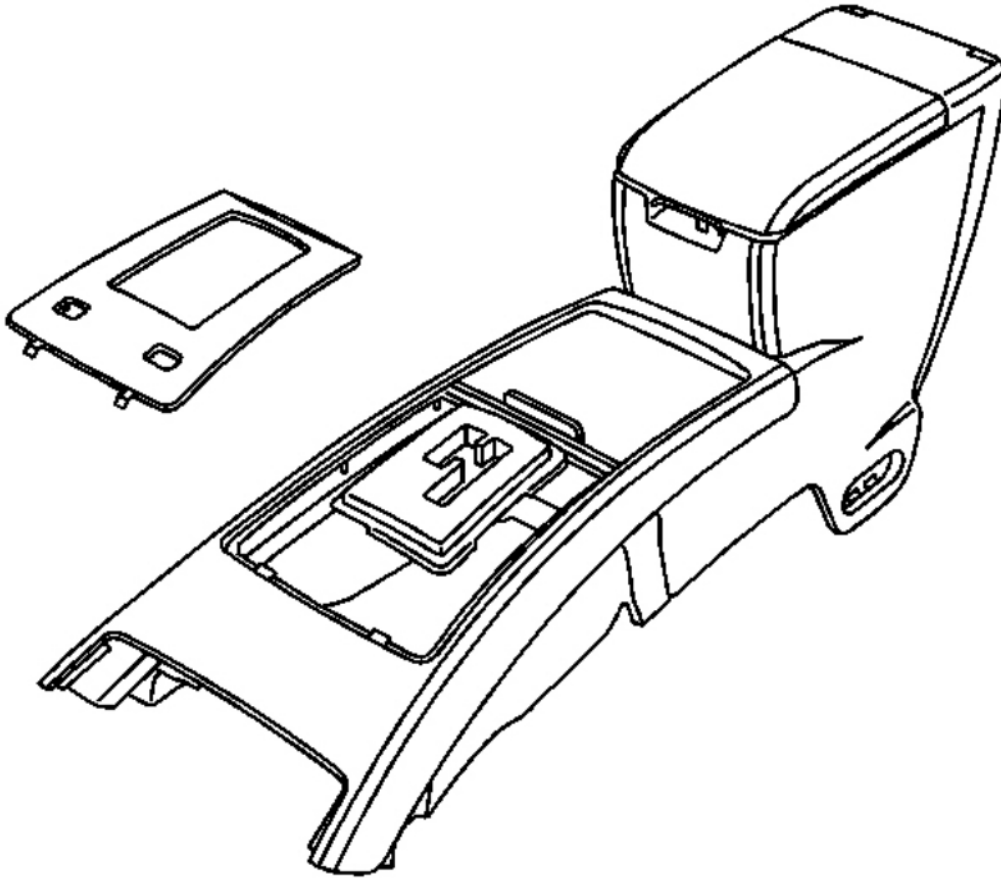


Fig. 68: View Of Console Shift Lever Trim Plate
Courtesy of GENERAL MOTORS CORP.

CONSOLE REPLACEMENT - FRONT FLOOR

Repair Procedure

1. Remove the shifter trim bezel. Refer to **Console Shift Lever Bezel Replacement**.
2. Disconnect the traction control electrical connector from the shifter trim bezel.

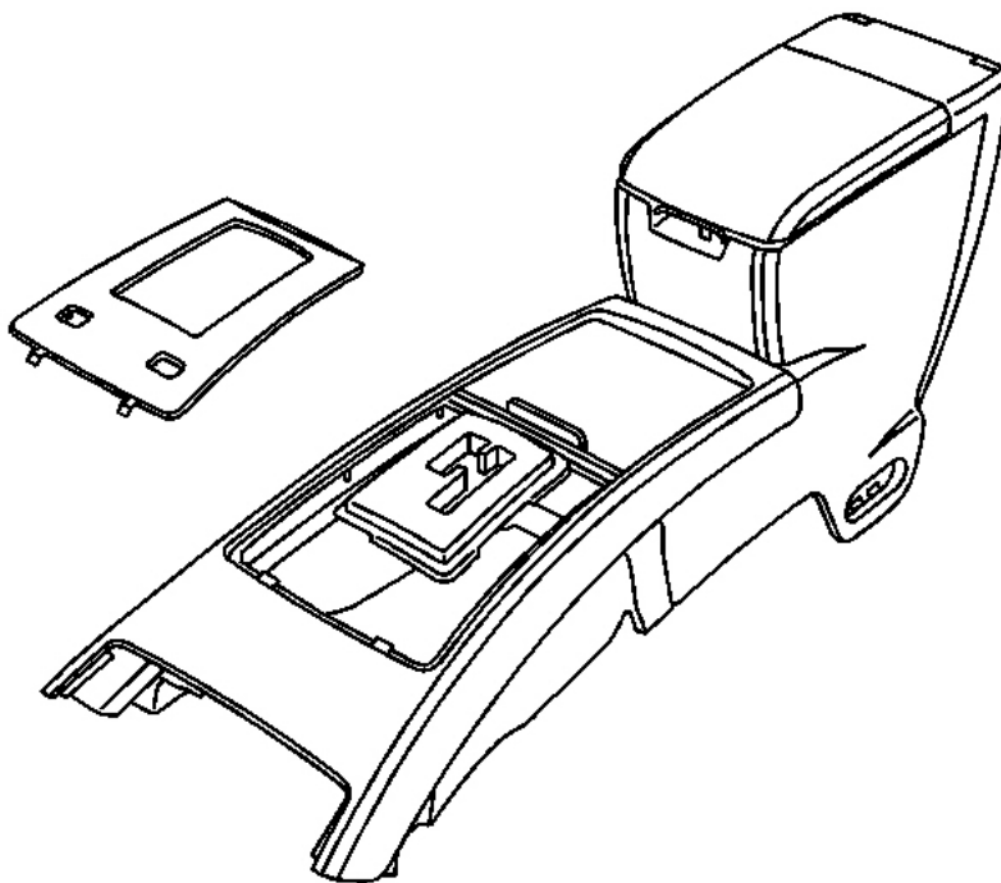


Fig. 69: View Of Console Shift Lever Trim Plate
Courtesy of GENERAL MOTORS CORP.

3. Disconnect the right and left console harness connectors (1).

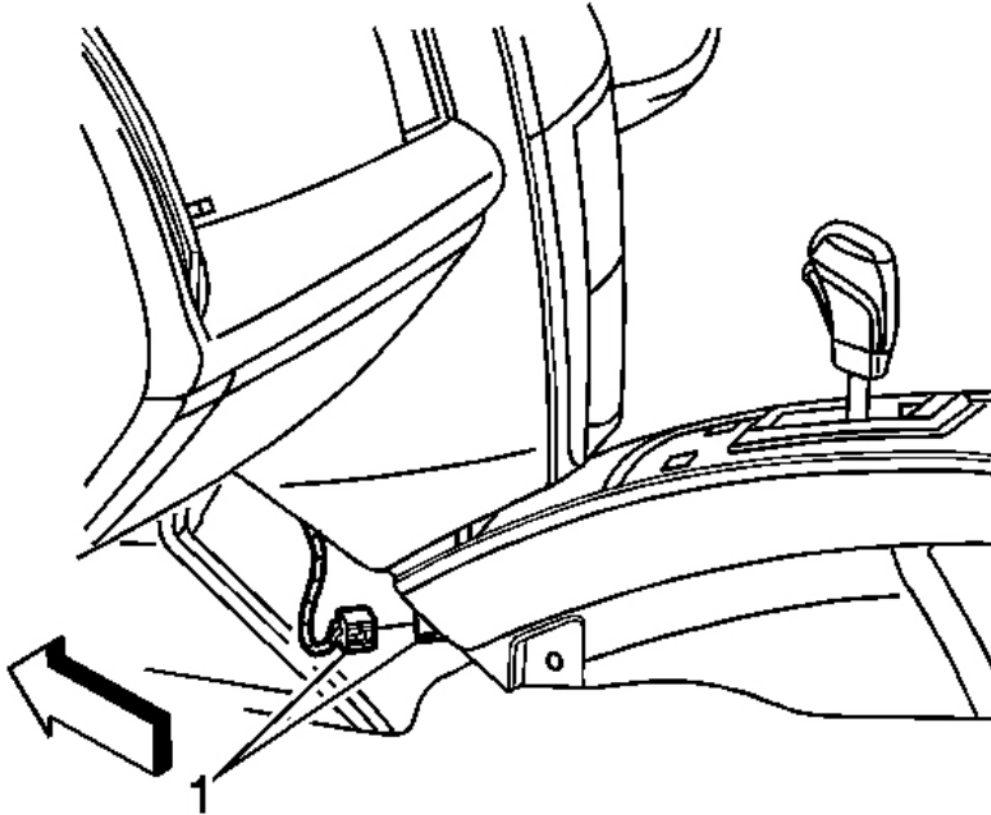


Fig. 70: View Of Console Harness Connectors
Courtesy of GENERAL MOTORS CORP.

4. Remove the 6 screws (1) securing the console to the floor.

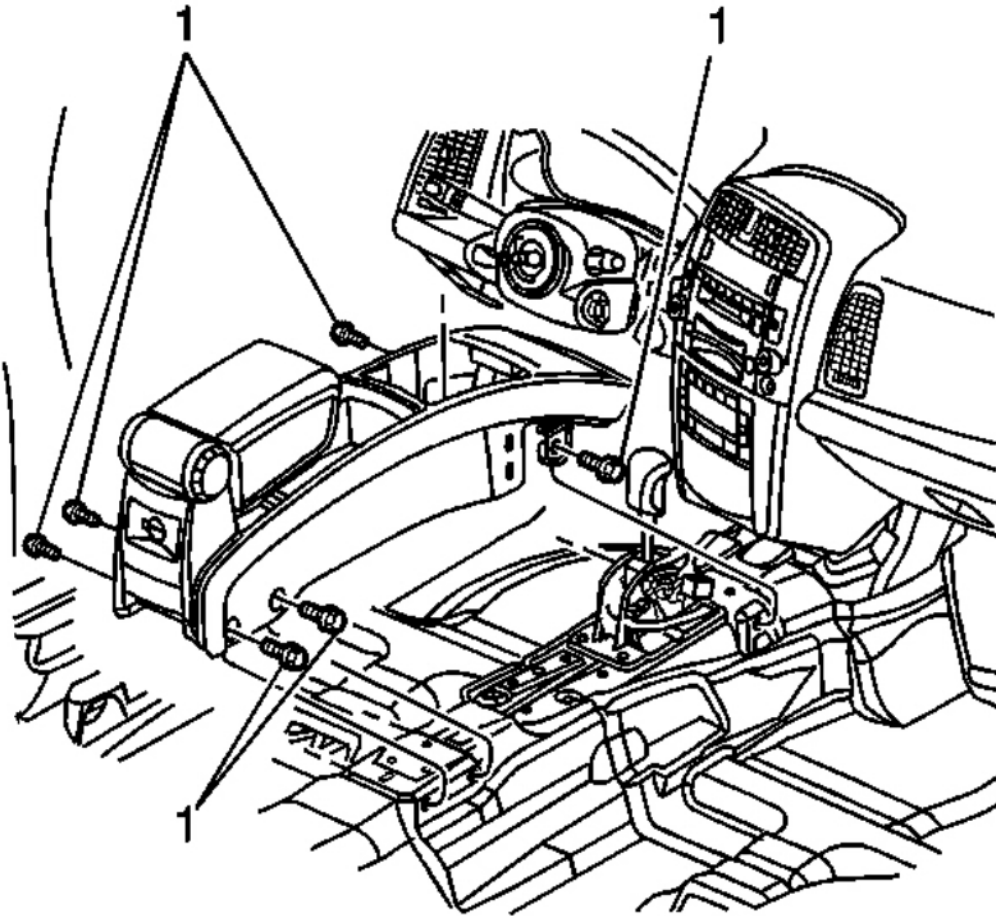


Fig. 71: View Of Console-To-Floor Screws
Courtesy of GENERAL MOTORS CORP.

5. Remove the console from the vehicle.

Installation Procedure

1. Position the console on the floor of the vehicle.

NOTE: Refer to Fastener Notice in Cautions and Notices.

2. Install the screws (1) securing the console to the floor.

Tighten: Tighten the fasteners to 25 N.m (18 lb ft).

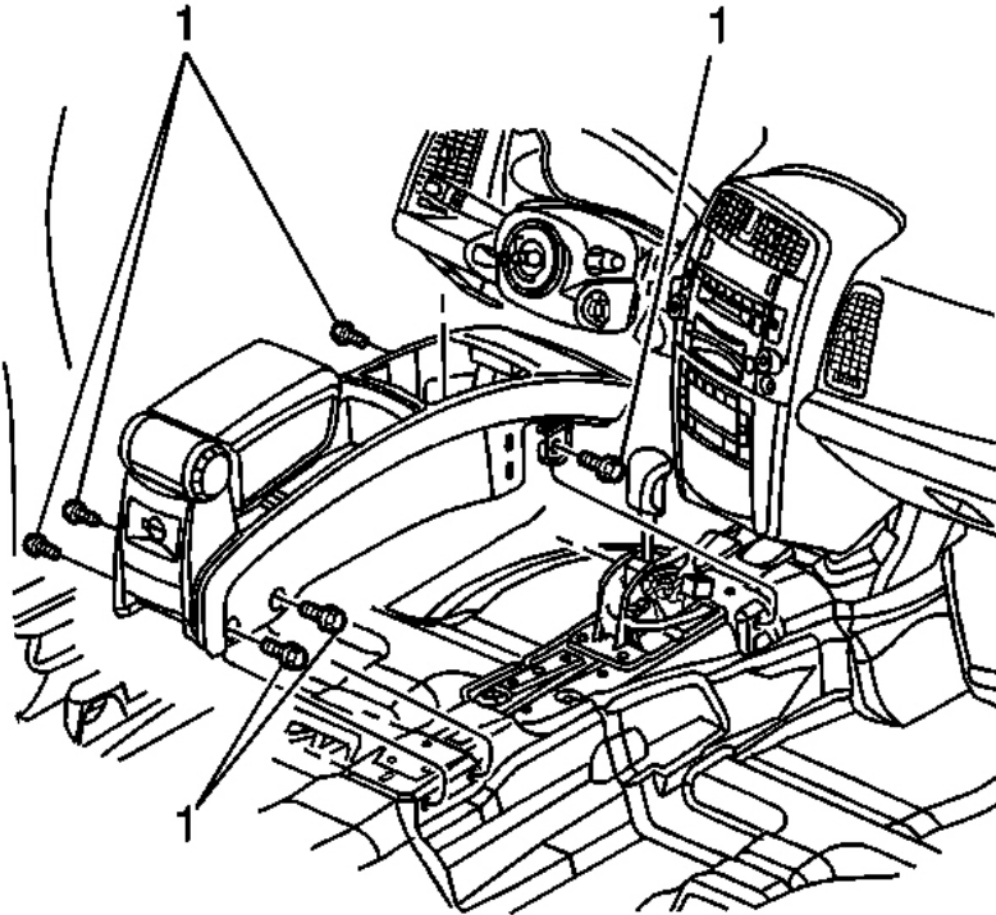


Fig. 72: View Of Console-To-Floor Screws
Courtesy of GENERAL MOTORS CORP.

3. Connect the right and left console harness connectors (1).

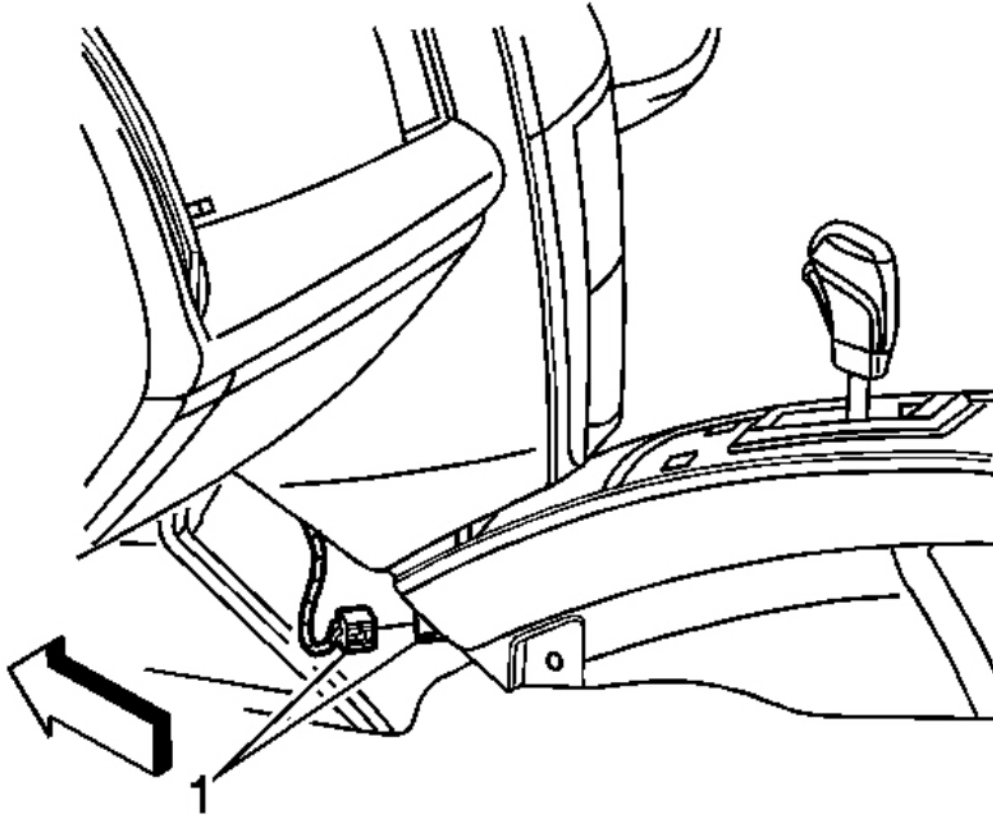


Fig. 73: View Of Console Harness Connectors
Courtesy of GENERAL MOTORS CORP.

4. Install the traction control electrical connector.
5. Install the shifter trim cover. Refer to **Console Shift Lever Bezel Replacement**.

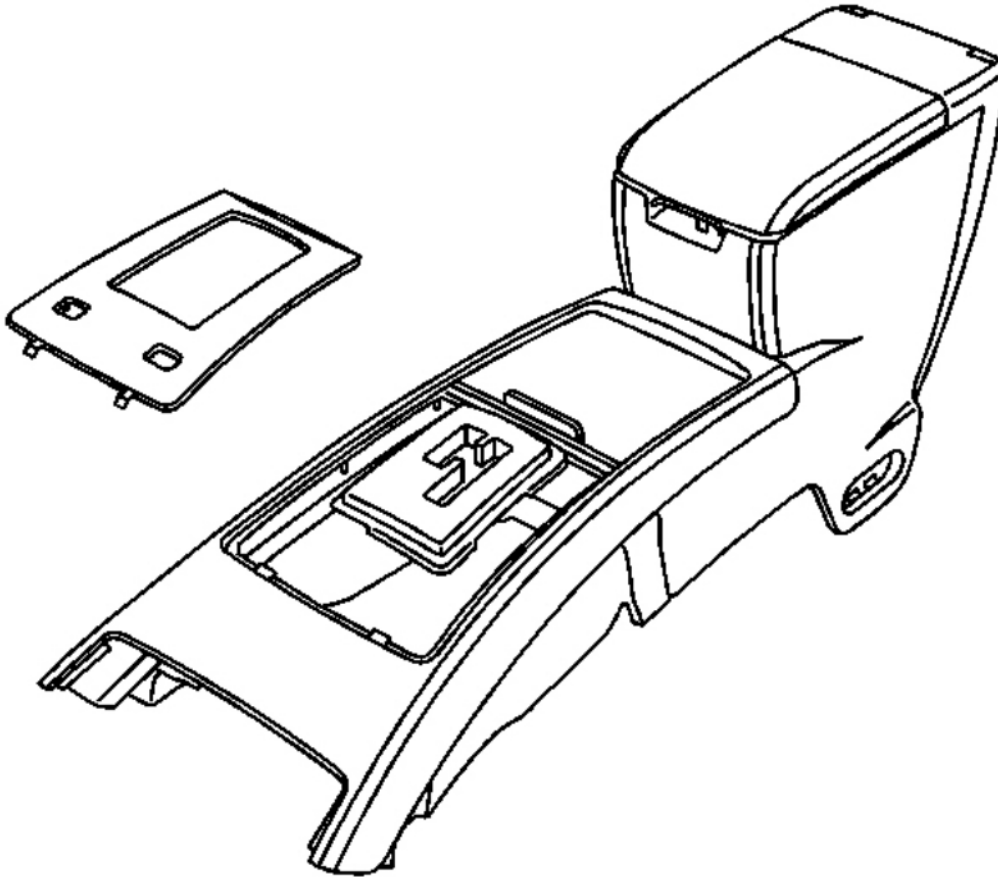


Fig. 74: View Of Console Shift Lever Trim Plate
Courtesy of GENERAL MOTORS CORP.

BRACKET REPLACEMENT - CONSOLE FLOOR

Removal Procedure

1. Remove the center console. Refer to **Console Replacement - Front Floor**.
2. Remove the rear end panel. Refer to **Center Console End Panel Replacement (w/ DVD)** or **Center Console End Panel Replacement (w/o DVD)**.
3. Remove the 8 bolts securing the rear base bracket to the console.

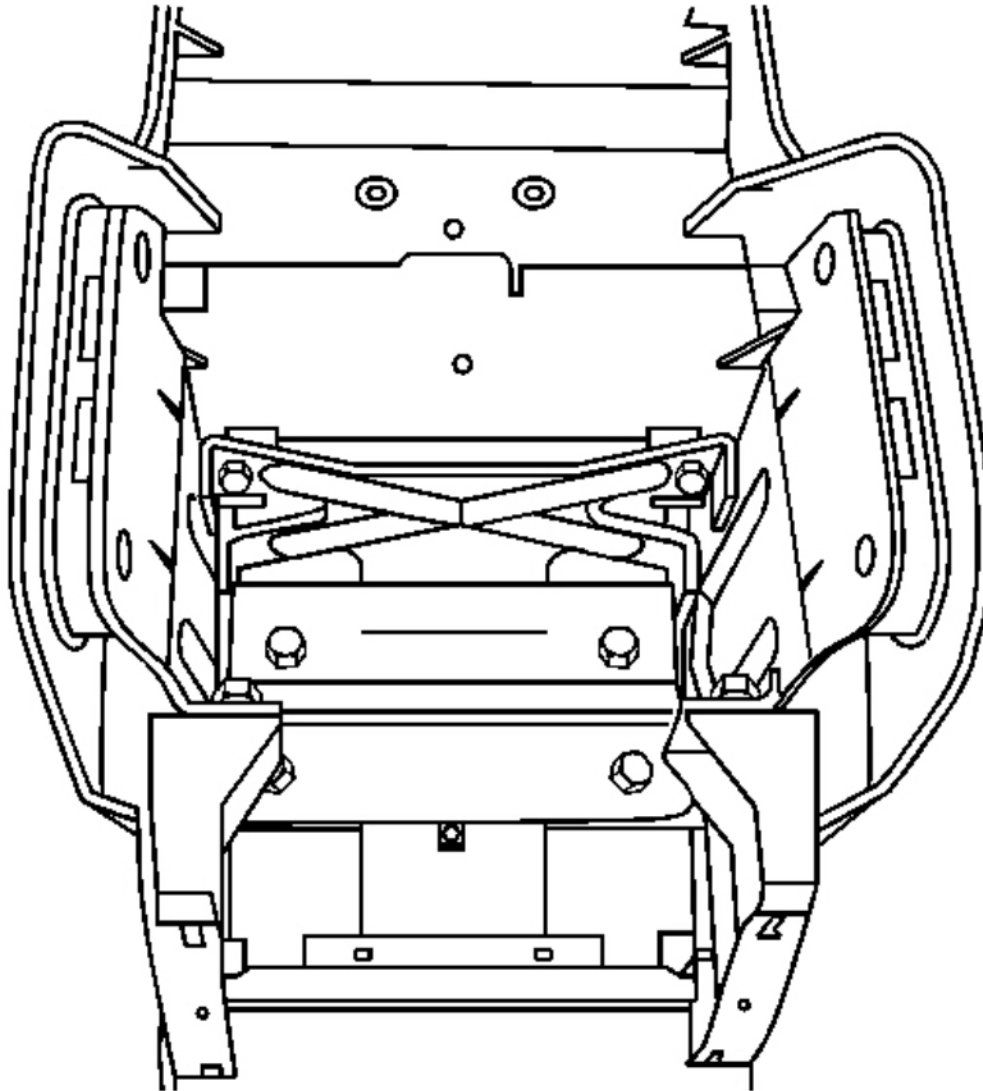


Fig. 75: View Of Console Floor Bracket
Courtesy of GENERAL MOTORS CORP.

Installation Procedure

1. Locate the base bracket on the console.

NOTE: Refer to Fastener Notice in Cautions and Notices.

2. Install the 8 bolts securing the rear base bracket to the console.

Tighten: Tighten the bolts to 9 N.m (80 lb in).

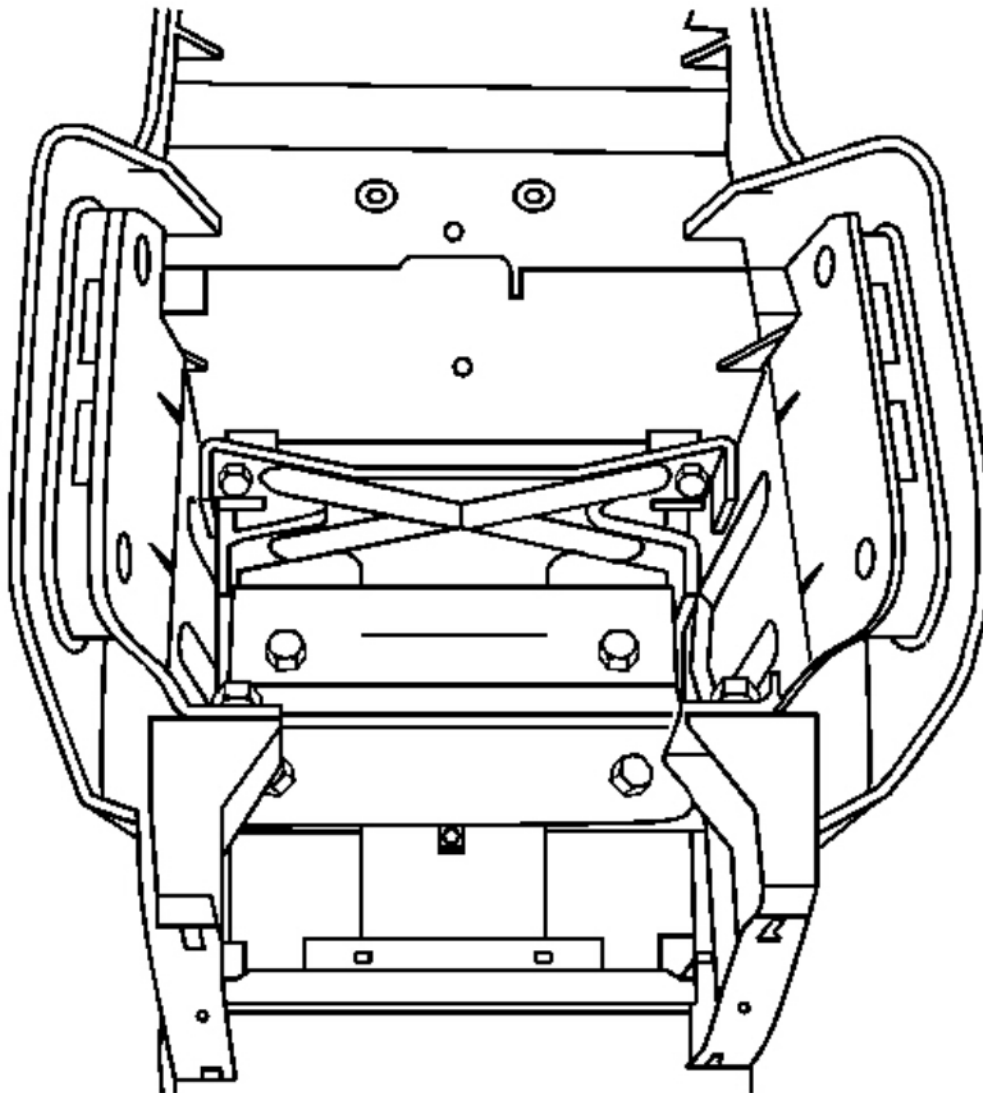


Fig. 76: View Of Console Floor Bracket

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Courtesy of GENERAL MOTORS CORP.

3. Install the rear end panel. Refer to **Center Console End Panel Replacement (w/ DVD)** or **Center Console End Panel Replacement (w/o DVD)**.
4. Install the center console. Refer to **Console Replacement - Front Floor**.

CONSOLE ARMREST REPLACEMENT - FRONT FLOOR (WITH DVD)

Removal Procedure

1. Open the DVD display screen.
2. Remove the 2 screws (1) under the armrest filler trim.

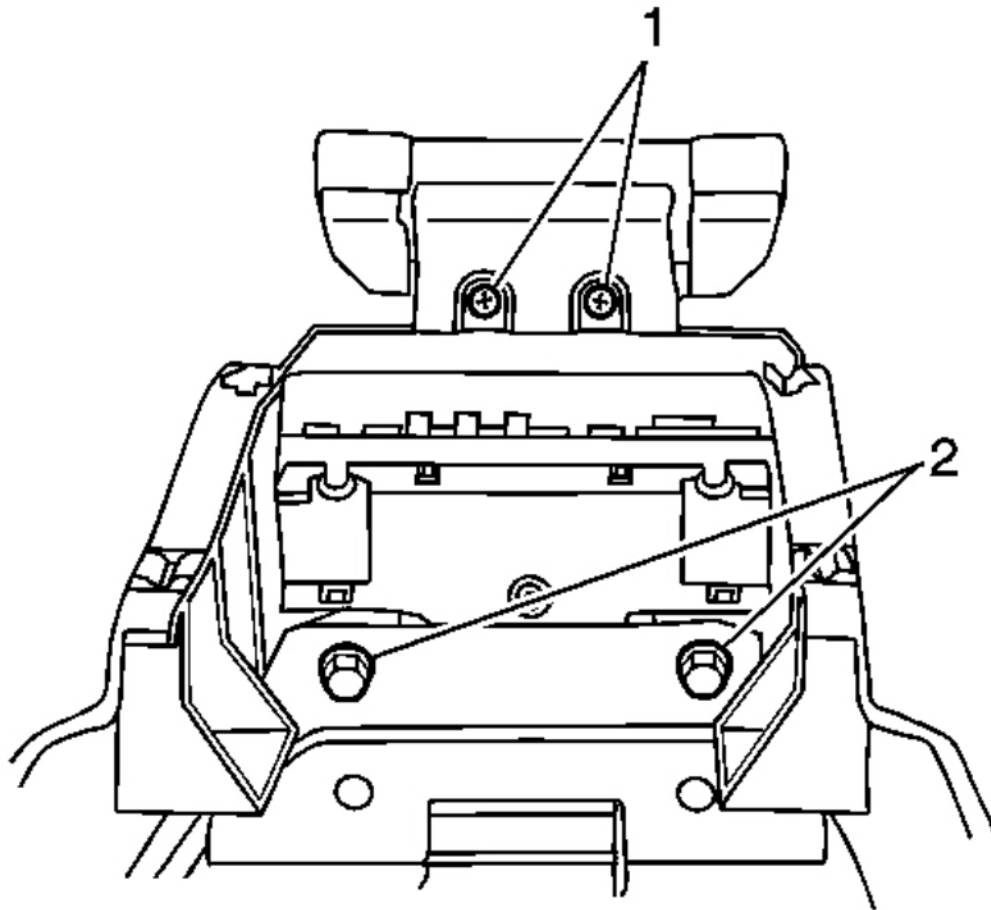


Fig. 77: View Of Armrest Filler Trim Screws
Courtesy of GENERAL MOTORS CORP.

3. Pull up on the armrest filler trim in order to release the retaining tabs.
4. Remove the armrest retaining screws (2).

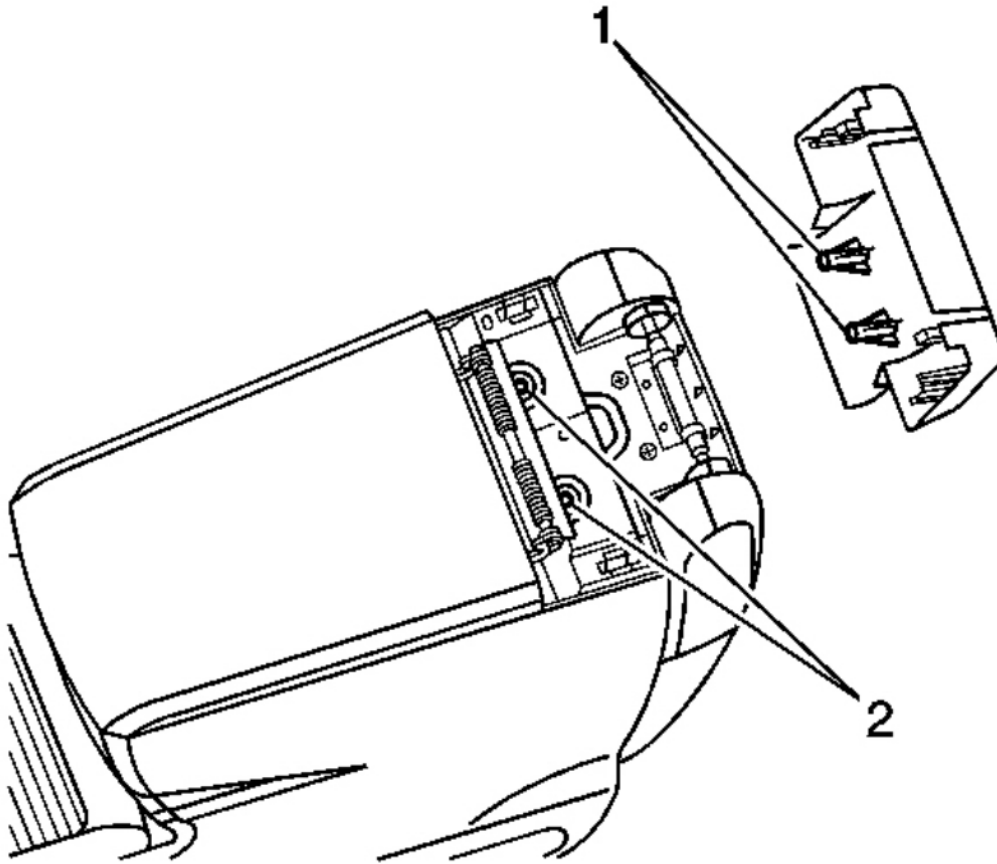


Fig. 78: View Of Armrest Retaining Screws
Courtesy of GENERAL MOTORS CORP.

5. Remove the armrest.

Installation Procedure

1. Locate the armrest to the console.

NOTE: Refer to Fastener Notice in Cautions and Notices.

2. Install the armrest retaining screws (2).

Tighten: Tighten the armrest retaining screws to 9 N.m (80 lb in).

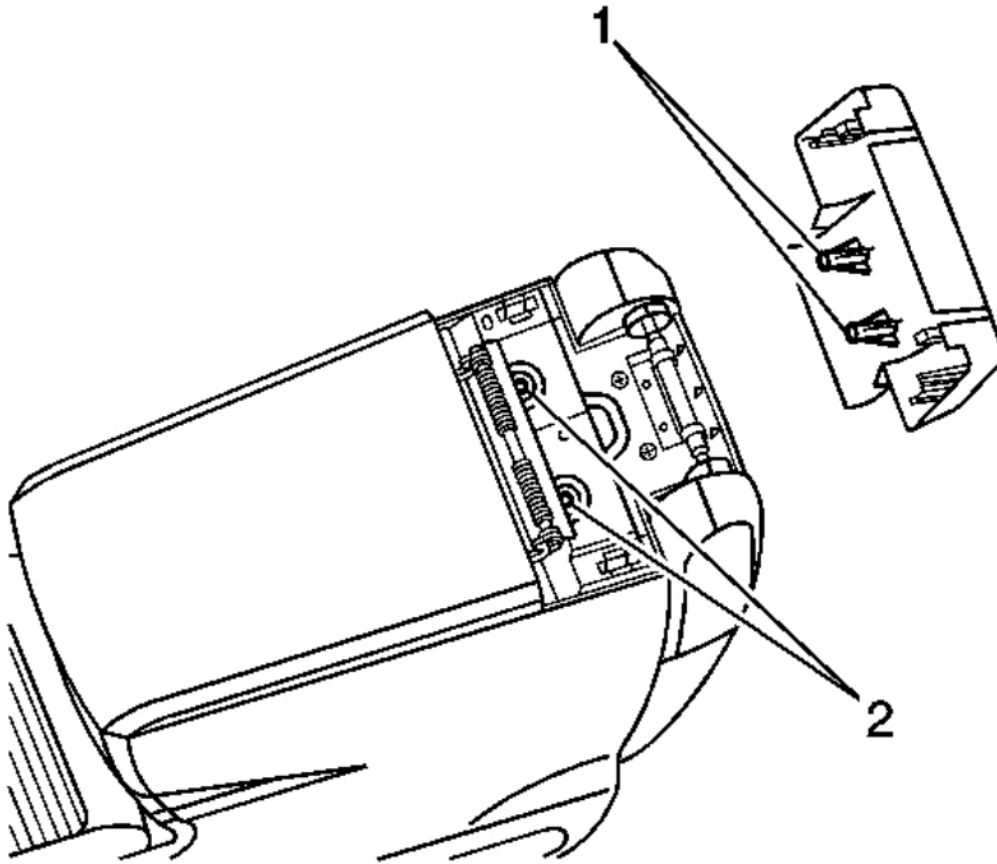


Fig. 79: View Of Armrest Retaining Screws
Courtesy of GENERAL MOTORS CORP.

3. Install the armrest filler trim to the top on the console.
4. Install the armrest filler screws (1).

Tighten: Tighten the screws to 9 N.m (80 lb in).

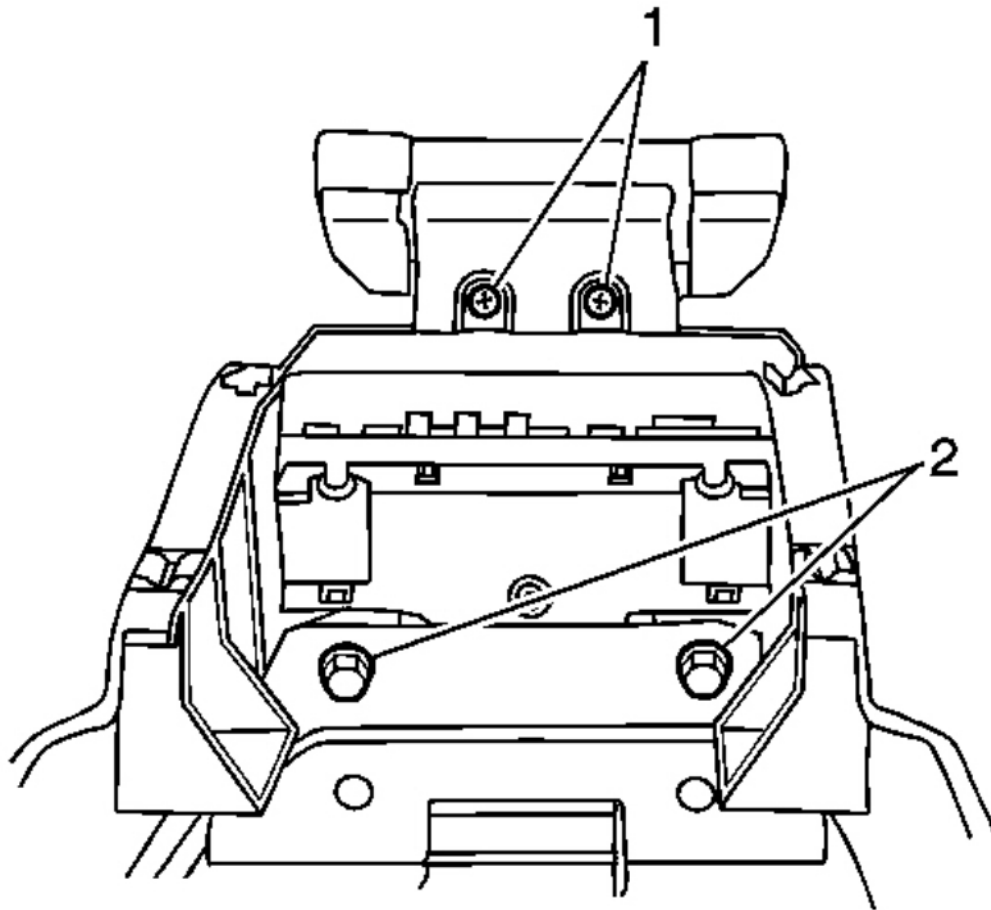


Fig. 80: View Of Armrest Filler Trim Screws
Courtesy of GENERAL MOTORS CORP.

CONSOLE ARMREST REPLACEMENT - FRONT FLOOR (W/O DVD)

Removal Procedure

1. Pull up on the rear of the console filler trim (1) in order to release the retaining tabs.

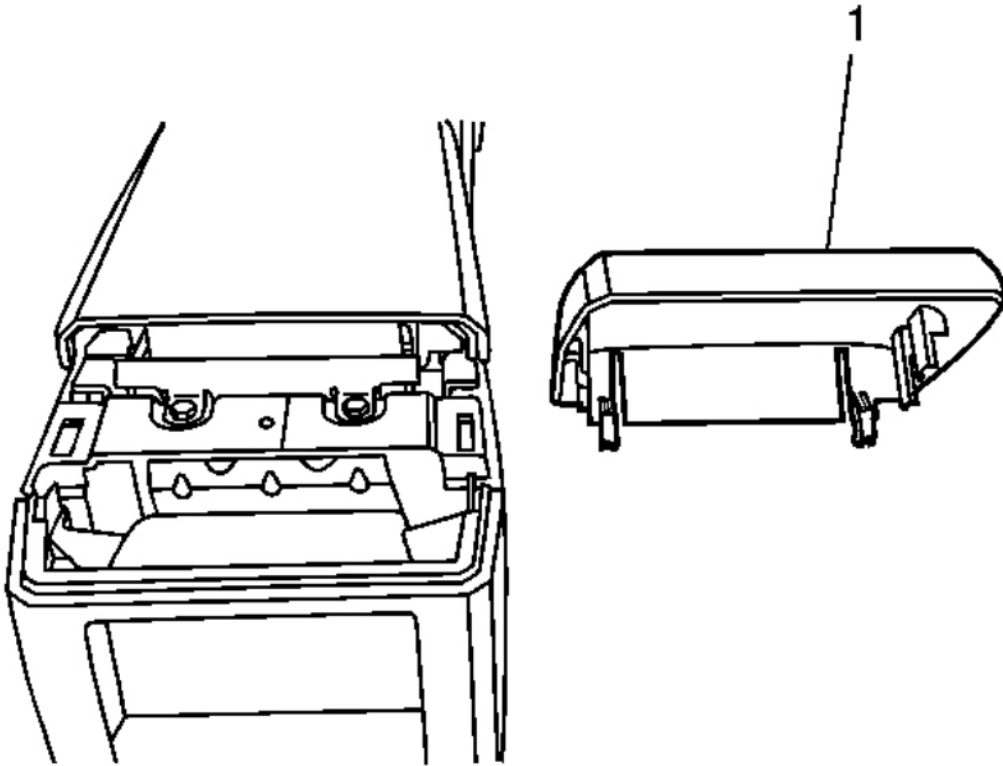


Fig. 81: View Of Console Filler Trim
Courtesy of GENERAL MOTORS CORP.

2. Remove the armrest retaining screws (1).

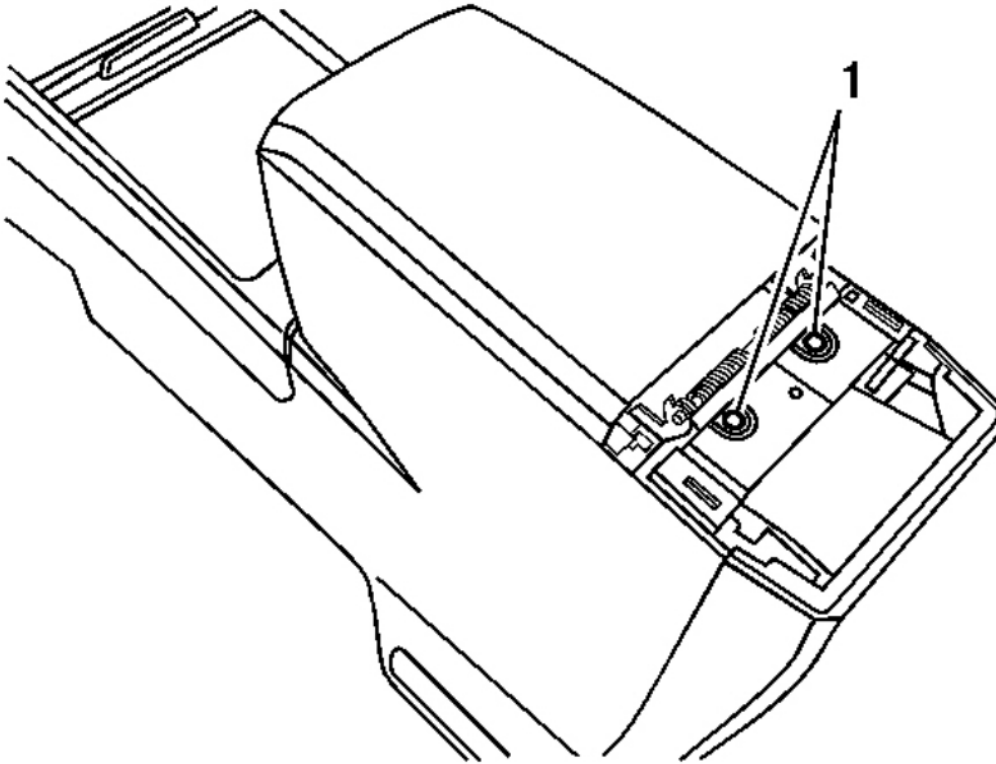


Fig. 82: Locating Armrest Retaining Screws
Courtesy of GENERAL MOTORS CORP.

3. Remove the armrest.

Installation Procedure

1. Locate the armrest onto the console.

NOTE: Refer to Fastener Notice in Cautions and Notices.

2. Install the armrest retaining screws (1)

Tighten: Tighten the armrest retaining screws to 9 N.m (80 lb in).

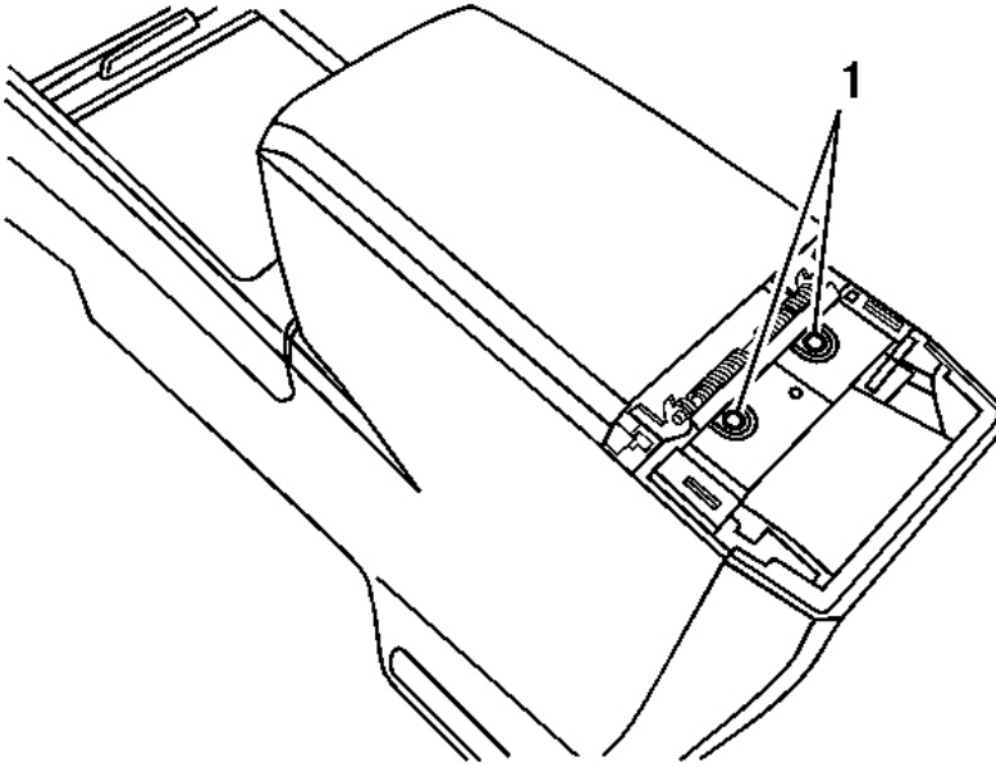


Fig. 83: Locating Armrest Retaining Screws
Courtesy of GENERAL MOTORS CORP.

3. Locate the armrest filler trim onto the console with the front retaining tabs.
4. Push down on the rear of the armrest filler trim (1) in order to secure the retaining tabs.

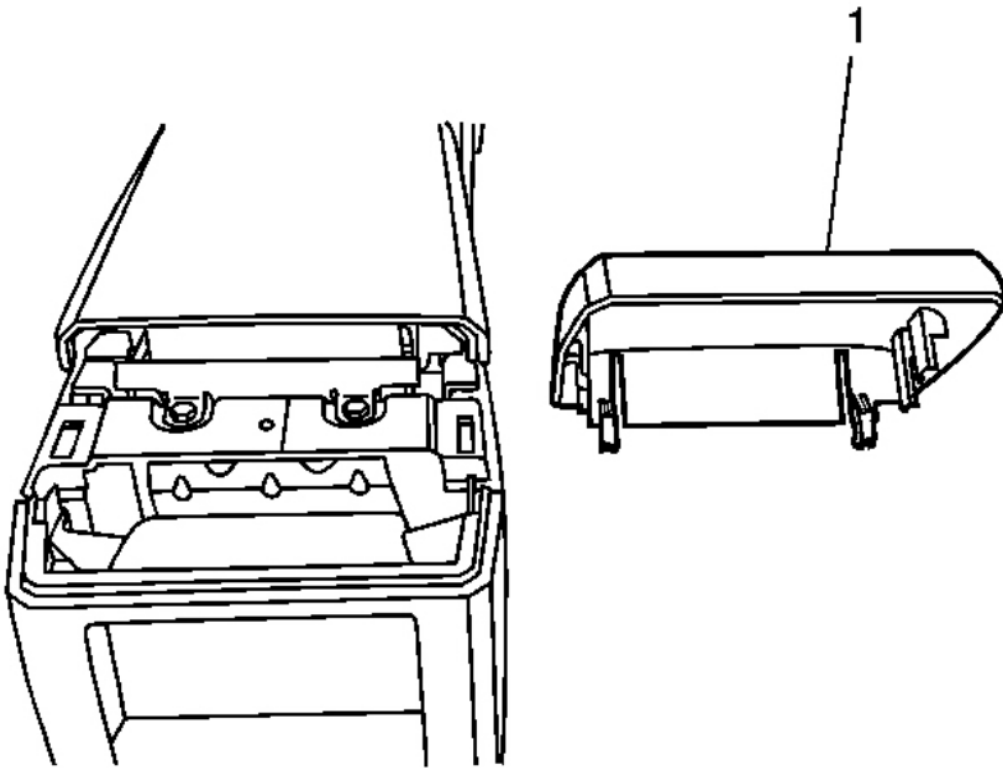


Fig. 84: View Of Console Filler Trim
Courtesy of GENERAL MOTORS CORP.

CUPHOLDER REPLACEMENT - FRONT FLOOR CONSOLE

Removal Procedure

1. Remove the center console. Refer to **Console Replacement - Front Floor.**
2. Remove the top trim (1).

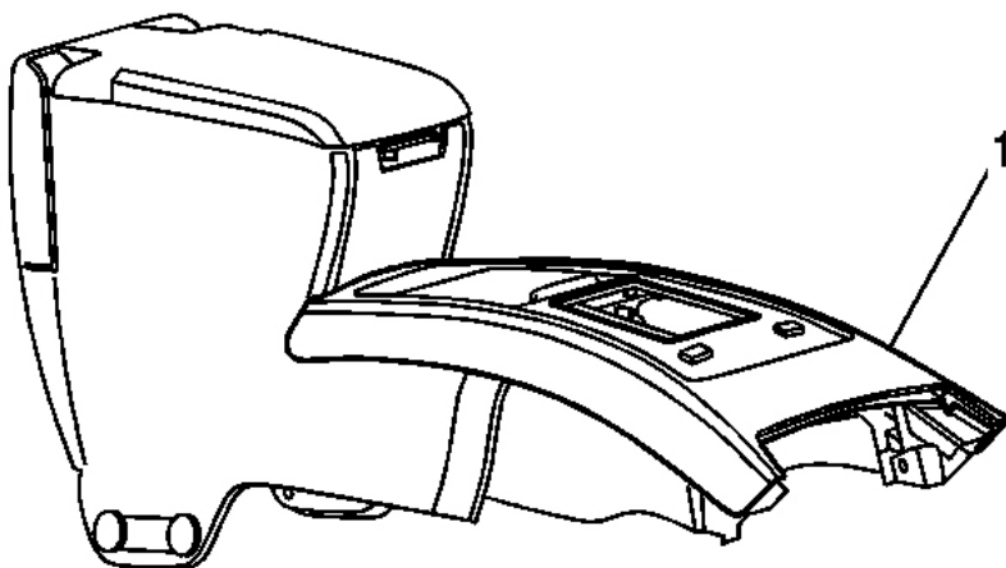


Fig. 85: View Of Upper Console Trim
Courtesy of GENERAL MOTORS CORP.

3. Remove the 6 retaining screws on the cup holder (1).

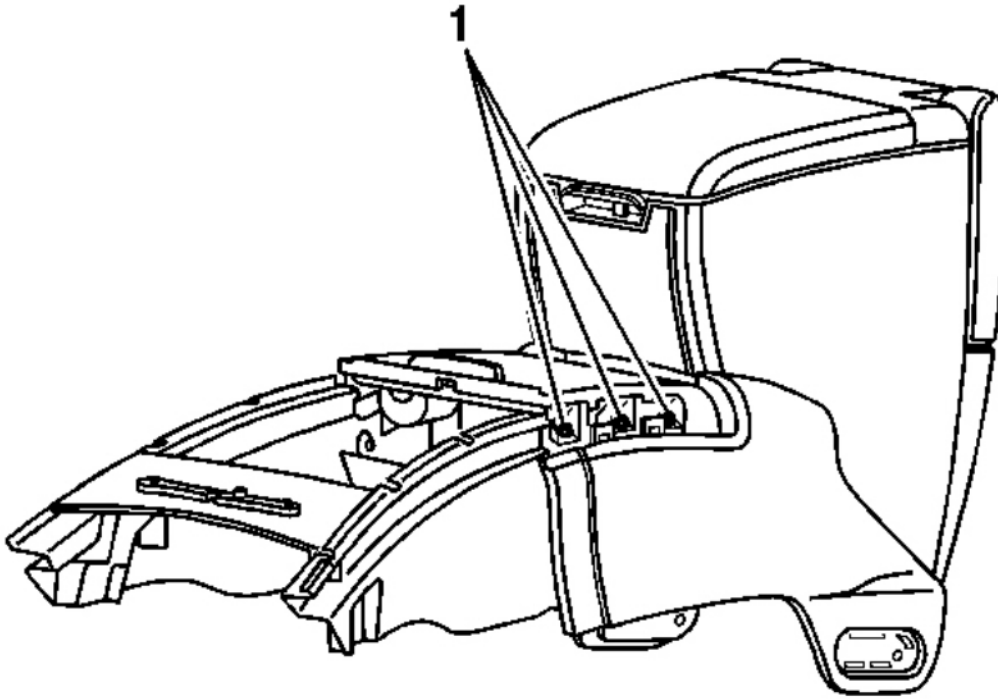


Fig. 86: View Of Cupholder Retaining Screws
Courtesy of GENERAL MOTORS CORP.

4. Remove the cup holder (1) from the console.

Installation Procedure

1. Install the cup holder (1) onto the console.

NOTE: Refer to Fastener Notice in Cautions and Notices.

2. Install the 6 retaining screws to the cup holder (1) securing it to the console.

Tighten: Tighten the screws to 2 N.m (9 lb in).

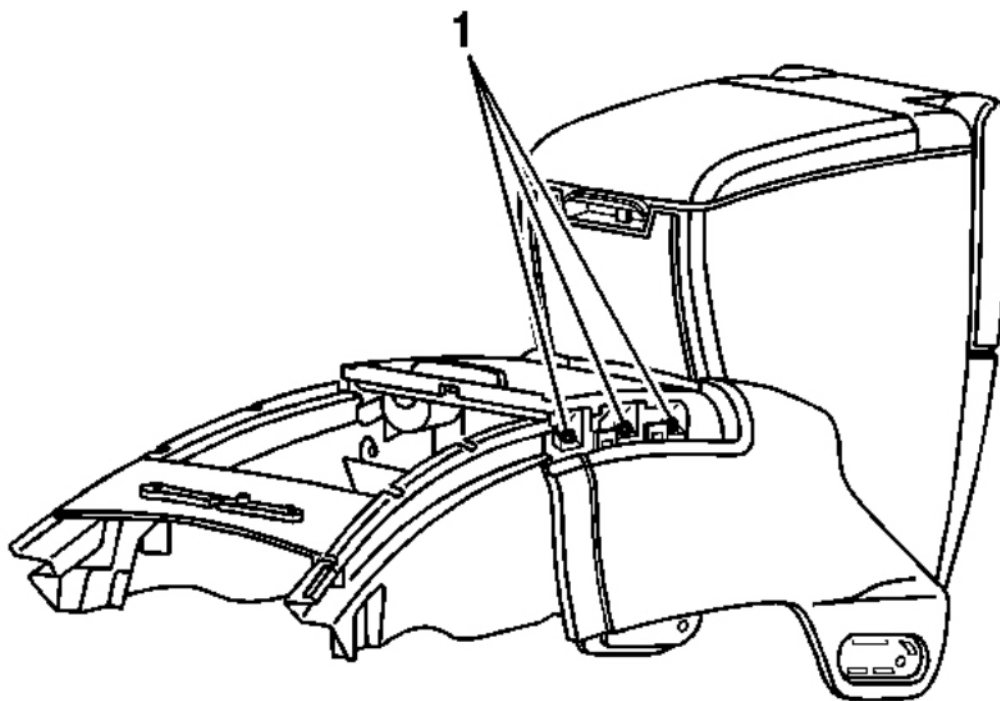


Fig. 87: View Of Cupholder Retaining Screws
Courtesy of GENERAL MOTORS CORP.

3. Install the top trim (1).

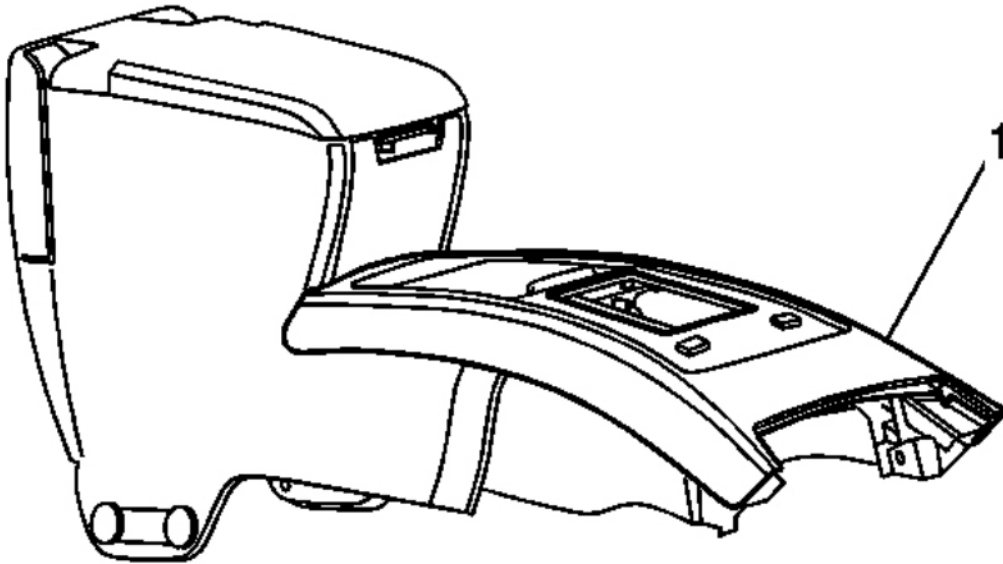


Fig. 88: View Of Upper Console Trim
Courtesy of GENERAL MOTORS CORP.

4. Install the center console. Refer to **Console Replacement - Front Floor**.

CENTER CONSOLE END PANEL REPLACEMENT (W/ DVD)

Removal Procedure

1. Pull the rear end panel (1) to release the retainer clips securing the end panel to the console base.
2. Disconnect the power outlet electrical connector.
3. Remove the rear end panel.

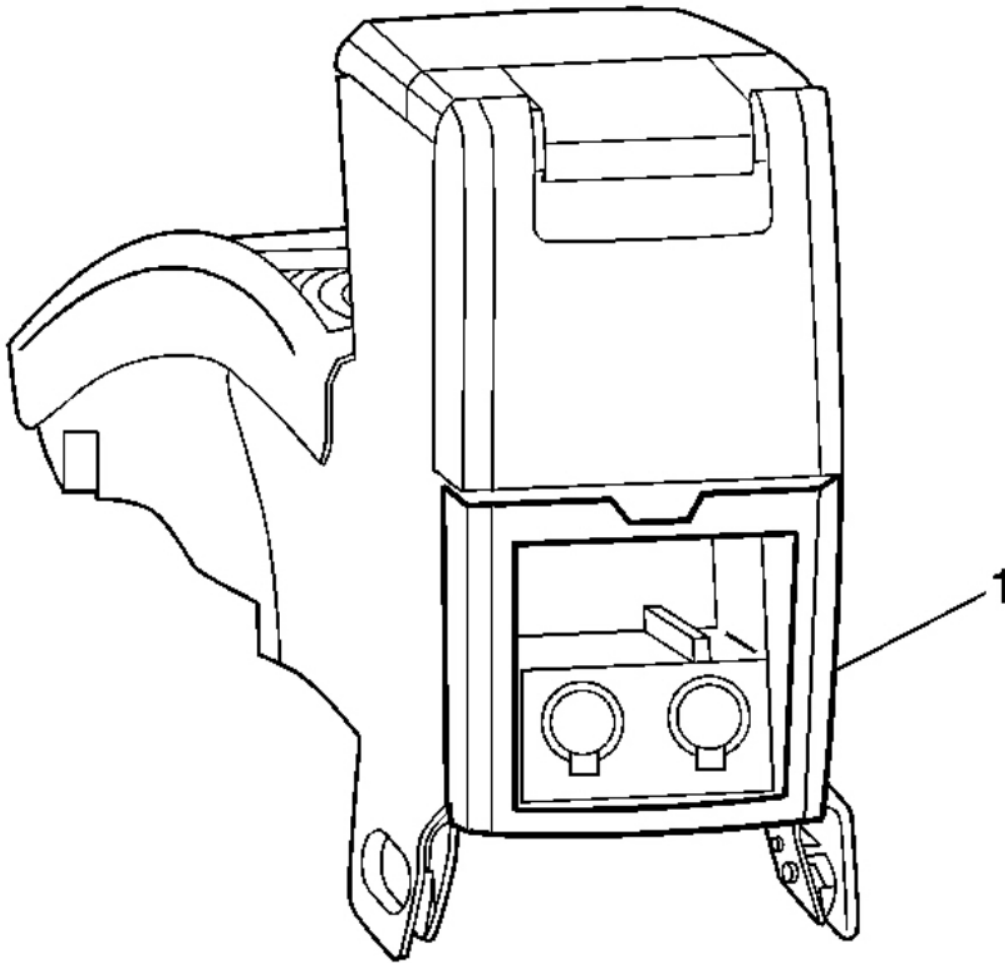


Fig. 89: View Of Center Console Rear End Panel - w/DVD
Courtesy of GENERAL MOTORS CORP.

Installation Procedure

1. Connect the power outlet electrical connector.
2. Locate the rear end panel (1) the console base.

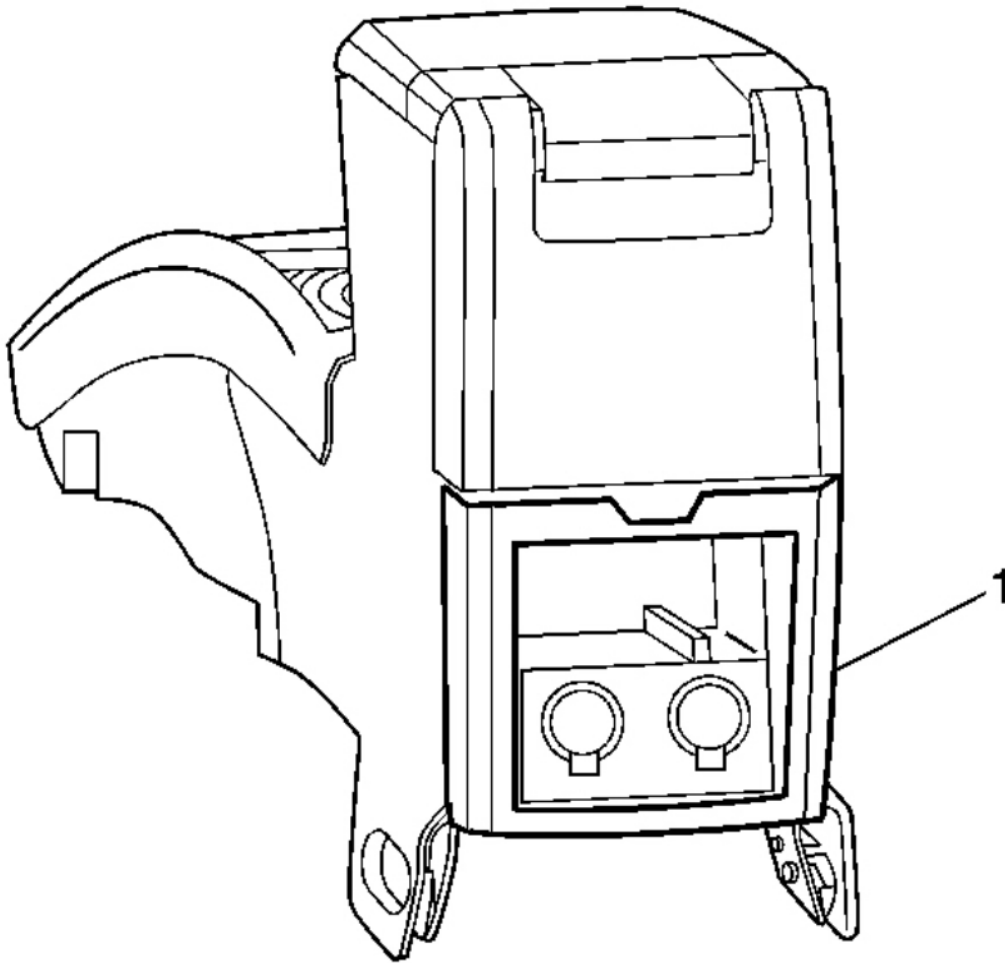


Fig. 90: View Of Center Console Rear End Panel - w/DVD
Courtesy of GENERAL MOTORS CORP.

3. Push the end panel in order to secure the retaining clips.

CENTER CONSOLE END PANEL REPLACEMENT (W/O DVD)

Removal Procedure

1. Pull the rear end panel (1) to release the retainer clips securing the end panel to the console base.
2. Disconnect the power outlet electrical connector.

3. Remove the rear end panel.

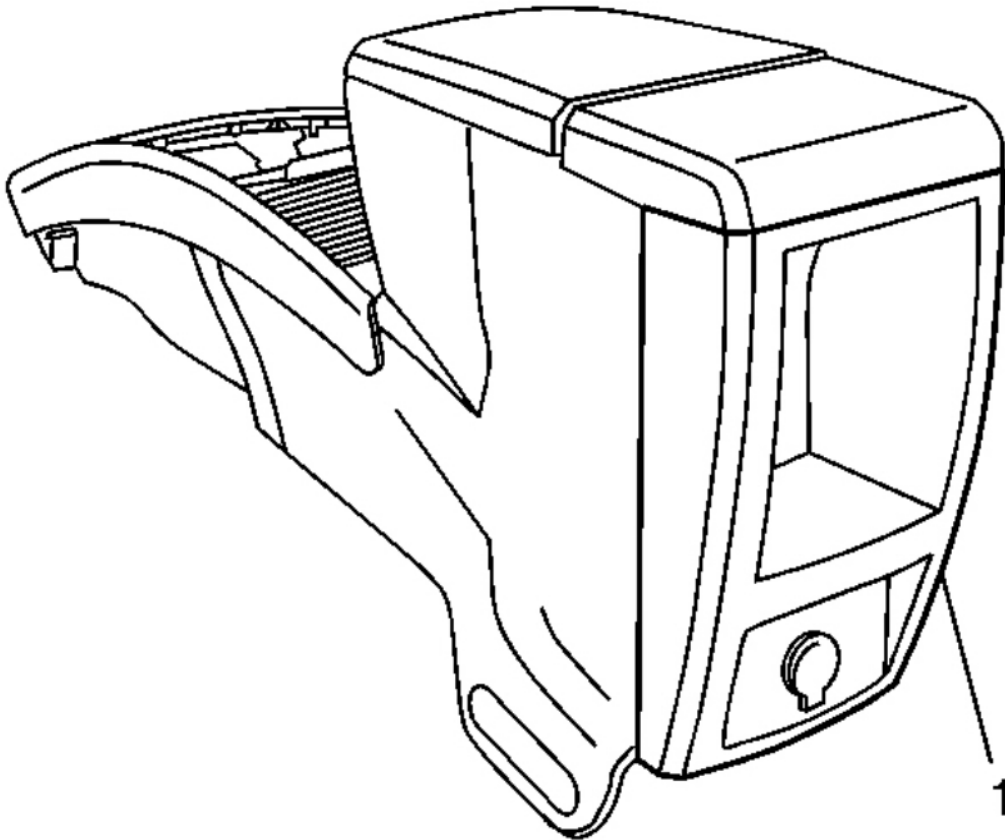


Fig. 91: View Of Center Console Rear End Panel - w/o DVD
Courtesy of GENERAL MOTORS CORP.

Installation Procedure

1. Reconnect the power outlet electrical connector.
2. Locate the rear end panel (1) the console base.

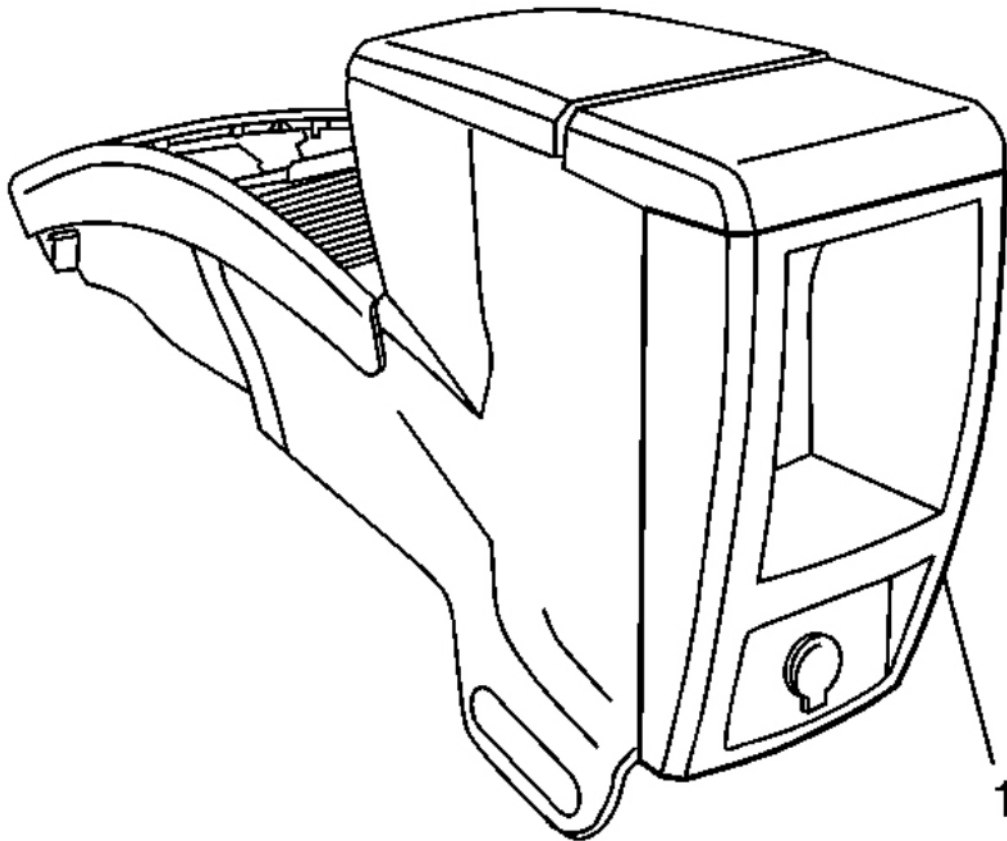


Fig. 92: View Of Center Console Rear End Panel - w/o DVD
Courtesy of GENERAL MOTORS CORP.

3. Push the end panel in order to secure the retaining clips.

DESCRIPTION AND OPERATION

INSTRUMENT PANEL CLUSTER (IPC) DESCRIPTION AND OPERATION

Displays Test

Certain instrument panel cluster (IPC) features are tested when the ignition is turned on in order to verify that the features are working properly. The following indicators illuminate briefly at key up, unless otherwise noted:

- ABS
- Air bag-Flashes 7 times
- BRAKE
- Charge indicator-Stays ON
- Coolant temp
- Cruise
- Fasten safety belt-Flashes
- Low oil pressure indicator
- Malfunction indicator lamp (MIL)-Stays ON
- Security
- Traction OFF

Indicators and Warning Messages

Refer to **Indicator/Warning Message Description and Operation**.

Clock

The radio sends current time to the instrument panel cluster (IPC) via class 2. The IPC receives a class 2 message from the radio indicating the time. The IPC analog clock, if equipped, zeroes itself to 12:00 during key up and then resets to the current time via the class 2 message received from the radio.

Engine Coolant Temperature Gage

The engine control module (ECM) sends the coolant temperature to the body control module (BCM) via class 2. The instrument panel cluster (IPC) displays the engine coolant temperature, as determined by the BCM. The IPC receives a class 2 message from the BCM indicating the engine coolant temperature. The engine coolant temperature gage, if equipped, defaults to 75°C (160°F) or below if:

- The ECM detects a malfunction in the engine coolant temperature sensor circuit.
- The IPC detects a loss of class 2 communications with the BCM.
- The BCM detects a loss of class 2 communications with the ECM.

Refer to **Cooling System Description and Operation** in Engine Cooling for more information.

Fuel Gage

The engine control module (ECM) sends fuel level percent to the instrument panel cluster (IPC) via class 2. The IPC displays the fuel level as determined by the ECM. The IPC receives a class 2 message from the ECM indicating the fuel level percent. The fuel gage defaults to E (empty) if:

- The ECM detects a malfunction in the fuel level sensor circuit.
- The IPC detects a loss of class 2 communications with the ECM.

When the fuel level is less than 4 percent, the low fuel indicator illuminates. Refer to **Evaporative Emission (EVAP) Control System Description** in Engine Controls - 3.6L (LY7) or **Engine Control Module (ECM) Replacement** in Engine Controls - 4.6L (LH2) for more information.

Odometer

The instrument panel cluster (IPC) displays the vehicle and trip mileage, as determined by the engine control module (ECM). The IPC calculates the vehicle mileage based on the speed pulses from the vehicle speed sensor (VSS) signal and calculating the mileage for odometer displays. The odometer will display 'error' if an internal IPC memory failure is detected and DTC B1009 is set.

Speedometer

The instrument panel cluster (IPC) displays the vehicle speed based on the information from the engine control module (ECM). The ECM sends a 4,000 pulses per mile signal to the cluster discretely. The IPC calculates the vehicle speed using the time difference between consecutive pulses. The speedometer will default to zero if the time duration since the last speed pulse is greater than or equal to 1 second.

Tachometer

The instrument panel cluster (IPC) receives a discrete input from the engine control module (ECM) indicating vehicle speed. Each engine revolution is represents 2 input pulses to the ECM. The instantaneous engine speed is calculated by the ECM using the time difference between the 2 input pulses. The tachometer will default to 0 RPM if:

- The ignition is in OFF, ACCESSORY, or CRANK.
- The time duration since the last pulse is greater than or equal to 1 second.

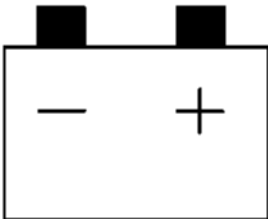
INDICATOR/WARNING MESSAGE DESCRIPTION AND OPERATION

IPC Indicators

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2004 Cadillac SRX

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Symbol	Description
	ABS: Refer to <u>ABS Description and Operation</u> in Antilock Brake System
	Air Bag: Refer to <u>SIR System Description and Operation</u> in SIR
 (Export) BRAKE (Domestic)	Brake: Refer to <u>Brake Warning System Description and Operation</u> in Hydraulic Brakes
	Charge: Refer to <u>Charging System Description and Operation</u> in Engine Electrical

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2004 ACCESSORIES & EQUIPMENT Instrument Panel, Gages, & Console - SRX



Cruise: Refer to **Cruise Control Description and Operation** in Cruise Control



Engine Coolant Temperature: Refer to **Cooling System Description and Operation** in Engine Cooling

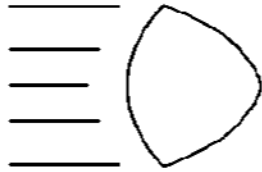


Fasten Safety Belt: Refer to **Seat Belt System Description and Operation** in Seat Belts

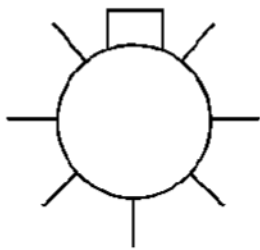
Front Fog Lamps: Refer to **Exterior Lighting Systems Description and Operation** in Lighting Systems

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km/h



High Beam: Refer to **Exterior Lighting Systems Description and Operation** in Lighting Systems

km/h: Refer to Indicator/Warning Message Description and Operation

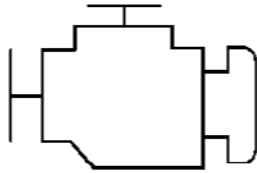
Lights On: Refer to **Exterior Lighting Systems Description and Operation** in Lighting Systems

Low Engine Oil Pressure: Refer to Indicator/Warning Message Description and Operation

Malfunction Indicator Lamp (MIL): Refer to

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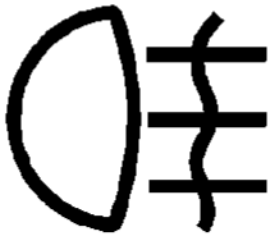
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Engine Control Module (ECM)
Description in Engine Controls - 3.6L (LY7)
 or **Engine Control Module (ECM)**
Description in Engine Controls - 4.6L (LH2)

MPH

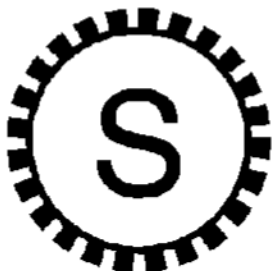
MPH: Refer to Indicator/Warning Message
 Description and Operation



Rear Fog Lamps: Refer to **Exterior
 Lighting Systems Description and
 Operation** in Lighting Systems



Security: Refer to **Theft Systems
 Description and Operation** in Theft
 Deterrent



Sport Mode: Refer to **Transmission
 Indicators and Messages** in Automatic
 Transmission - 5L40-E or **Transmission
 Indicators and Messages** in Automatic
 Transmission - 5L50-E

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Tire Pressure Monitor: Refer to **Tire Pressure Monitor Description and Operation** in Tire Pressure Monitoring



Traction Control Off: Refer to **ABS Description and Operation** in Antilock Brake System



Turn Signals: Refer to **Exterior Lighting Systems Description and Operation** in Lighting Systems



Winter Mode: Refer to **Transmission Indicators and Messages** in Automatic Transmission - 5L40-E or **Transmission Indicators and Messages** in Automatic Transmission - 5L50-E

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Radio Warning Messages

Symbol	Description
BATTERY NOT CHARGING SERVICE CHARGING SYS	Refer to <u>Charging System Description and Operation</u> in Engine Electrical
BATTERY SAVER ACTIVE	Refer to <u>Charging System Description and Operation</u> in Engine Electrical
BATTERY VOLTAGE HIGH	Refer to <u>Charging System Description and Operation</u> in Engine Electrical
BATTERY VOLTAGE LOW	Refer to <u>Charging System Description and Operation</u> in Engine Electrical
CHANGE AC FILTER	Refer to <u>Air Temperature Description and Operation</u> in HVAC Systems
CHANGE BRAKE PADS	Refer to <u>Hydraulic Brake System Description and Operation</u> in Hydraulic Brakes
CHANGE ENGINE OIL	Refer to Indicator/Warning Message Description and Operation
CHANGE TRANS FLUID	Refer to <u>Transmission Indicators and Messages</u> in Automatic Transmission - 5L40-E or <u>Transmission Indicators and Messages</u> in Automatic Transmission - 5L50-E
CHECK BRAKE FLUID	Refer to <u>Hydraulic Brake System Description and Operation</u> in Hydraulic Brakes
CHECK COOLANT LEVEL	Refer to <u>Cooling System Description and Operation</u> in Engine Cooling
CHECK GAS CAP	Refer to <u>Evaporative Emission (EVAP) Control System Description</u> in Engine Controls - 3.6L (LY7) or <u>Engine Control Module (ECM) Replacement</u> in Engine Controls - 4.6L (LH2)
CHECK OIL LEVEL	Refer to Indicator/Warning Message Description and Operation
CHECK WASHER FLUID	Refer to <u>Wiper/Washer System Description and Operation</u> in Wipers/Washer Systems

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DRIVER DOOR AJAR	Refer to <u>Door Ajar Indicator Description and Operation</u> in Doors
Driver #	Refer to <u>Personalization Description and Operation</u> in Personalization
ENGINE COOLANT HOT IDLE ENGINE	Refer to <u>Cooling System Description and Operation</u> in Engine Cooling
ENGINE HOT - AC OFF	Refer to <u>Cooling System Description and Operation</u> in Engine Cooling
ENGINE OVERHEATED STOP ENGINE	Refer to <u>Cooling System Description and Operation</u> in Engine Cooling
ENGINE POWER REDUCED	Refer to <u>Throttle Actuator Control (TAC) System Description</u> in Engine Controls - 3.6L (LY7) or <u>Throttle Actuator Control (TAC) System Description</u> in Engine Controls - 4.6L (LH2)
FUEL LEVEL LOW	Refer to Indicator/Warning Message Description and Operation
HEADLAMPS SUGGESTED	Refer to <u>Exterior Lighting Systems Description and Operation</u> in Lighting Systems
ICE POSSIBLE	Refer to Indicator/Warning Message Description and Operation
LEFT REAR DOOR AJAR	Refer to <u>Door Ajar Indicator Description and Operation</u> in Doors
OIL PRESSURE LOW STOP ENGINE	Refer to Indicator/Warning Message Description and Operation
PASSENGER DOOR AJAR	Refer to <u>Door Ajar Indicator Description and Operation</u> in Doors
PERSONALIZATION OFF	Refer to <u>Personalization Description and Operation</u> in Personalization
RIGHT REAR DOOR AJAR	Refer to <u>Door Ajar Indicator Description and Operation</u> in Doors
SERVICE AC SYSTEM	Refer to <u>Air Temperature Description and Operation</u> in HVAC Systems
SERVICE AIR BAG	Refer to <u>SIR System Description and Operation</u> in SIR
	Refer to <u>Charging System Description and</u>

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SERVICE ELECTRICAL SYS	<u>Operation</u> in Engine Electrical
SERVICE FUEL SYSTEM	Refer to <u>Fuel System Description</u> in Engine Controls - 3.6L (LY7) or <u>Fuel System Description</u> in Engine Controls - 4.6L (LH2)
SERVICE IDLE CONTROL	Refer to <u>Throttle Actuator Control (TAC) System Description</u> in Engine Controls - 3.6L (LY7) or <u>Throttle Actuator Control (TAC) System Description</u> in Engine Controls - 4.6L (LH2)
SERVICE STABILITY SYS	Refer to <u>ABS Description and Operation</u> in Antilock Brake System
SERVICE STEERING SYS	Refer to <u>Variable Effort Steering System Description and Operation</u> in Variable Effort Steering
SERVICE SUSPENSION SYS	Refer to <u>Symptoms - Suspension General Diagnosis</u> in Suspension
SERVICE THEFT SYSTEM	Security: Refer to <u>Theft Systems Description and Operation</u> in Theft Deterrent
SERVICE TRANSMISSION	Refer to <u>Transmission Indicators and Messages</u> in Automatic Transmission - 5L40-E or <u>Transmission Indicators and Messages</u> in Automatic Transmission - 5L50-E
SERVICE VEHICLE SOON	Refer to Indicator/Warning Message Description and Operation
STABILITY SYS ENGAGED	Refer to <u>ABS Description and Operation</u> in Antilock Brake System
STABILITY SYS OFF	ABS: Refer to <u>ABS Description and Operation</u> in Antilock Brake System
STABILITY SYS READY	Refer to <u>ABS Description and Operation</u> in Antilock Brake System
STARTING DISABLED REMOVE KEY	Refer to <u>Theft Systems Description and Operation</u> in Theft Deterrent
STARTING DISABLED - THROTTLE PROBLEM	Refer to <u>Throttle Actuator Control (TAC) System Description</u> in Engine Controls - 3.6L (LY7) or <u>Throttle Actuator Control</u>

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	<u>(TAC) System Description</u> in Engine Controls - 4.6L (LH2)
THEFT ATTEMPTED	Refer to <u>Theft Systems Description and Operation</u> in Theft Deterrent
TOP SPEED FUEL CUT-OFF (Export Only)	Refer to Indicator/Warning Message Description and Operation
TRACTION ENGAGED	Refer to <u>ABS Description and Operation</u> in Antilock Brake System
TRACTION SUSPENDED	ABS: Refer to <u>ABS Description and Operation</u> in Antilock Brake System
TRANS HOT IDLE ENGINE	Refer to <u>Transmission Indicators and Messages</u> in Automatic Transmission - 5L40-E or <u>Transmission Indicators and Messages</u> in Automatic Transmission - 5L50-E
TRUNK OPEN	Refer to <u>Luggage Compartment Description and Operation</u> in Body Rear End
TURN SIGNAL ON	Refer to <u>Exterior Lighting Systems Description and Operation</u> in Lighting Systems
VEHICLE OVERSPEED (Export Only)	Refer to Indicator/Warning Message Description and Operation
WD DR:# PA:#	Refer to <u>Personalization Description and Operation</u> in Personalization
WD DR:# PA:# LR:# RR:#	Refer to <u>Personalization Description and Operation</u> in Personalization

CHECK OIL LEVEL

This message indicates that a low oil level exists. To reset the CHECK OIL LEVEL message, the engine control module (ECM) must detect a temperature reduction of the engine coolant of at least 22°C (39°F) in between ignition cycles. The ECM uses the engine coolant temperature (ECT) sensor in order to detect the temperature of the engine coolant. Perform the following in order to reset the CHECK OIL LEVEL message:

1. Verify the correct engine oil level after repairs.
2. Start the engine and allow to reach operating temperature.

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3. Turn the engine OFF and allow the engine coolant temperature to achieve the desired coolant temperature reduction.

NOTE: Confirmation of coolant temperature reduction can be accomplished with the use of a scan tool.

4. Turn the ignition ON (Run/Crank) for at least 1 second. Do not start the engine.
5. Turn the ignition OFF until the ECM de-energizes.
6. Start the engine.
7. Confirm the CHECK OIL LEVEL message is no longer displayed. If the message is displayed, check the engine oil dipstick level and add oil as needed.

CHANGE ENGINE OIL

The driver information center (DIC) illuminates the CHANGE ENGINE OIL message when the engine control module (ECM) determines that the engine oil life is 0 percent. The ECM sends a class 2 message to the radio requesting illumination. After the oil is changed, reset the engine oil monitor. Refer to **GM Oil Life System - Resetting (1)** in Maintenance and Lubrication.

ICE POSSIBLE

The radio illuminates the ICE POSSIBLE message when the outside air temperature drops below 2.0°C (36°F). When the temperature rises above 5.5°C (42°F), the ICE POSSIBLE message turns OFF. The radio receives a class 2 message indicating the outside air temperature from the dash integration module (DIM).

km/h and MPH

km/h

The instrument panel cluster (IPC) illuminates the km/h indicator when the radio detects that metric units have been requested via the Eng/Met button. The radio sends a class 2 message indicating the requested units to the IPC.

MPH

The IPC illuminates the MPH indicator when the radio detects that English units have been requested via the Eng/Met button. The radio sends a class 2 message indicating the requested units to the IPC.

LOW FUEL

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The radio illuminates the FUEL LEVEL LOW message in the radio when the instrument panel cluster (IPC) determines that the fuel level is less than 9.48 liters (2.5 gallons). The IPC receives a class 2 message indicating the fuel level from the engine control module (ECM).

LOW OIL LEVEL

The radio illuminates the CHECK OIL LEVEL message when the engine control module (ECM) detects low engine oil level, and the signal circuit is low. The ECM only monitors the signal circuit of the engine oil level switch for a brief period when the key moves from ON to START. The radio receives a class 2 message requesting illumination from the ECM.

LOW OIL PRESSURE

The radio illuminates the OIL PRESSURE LOW STOP ENGINE message when the engine control module (ECM) detects low engine oil pressure, and the signal circuit is low. The radio receives a class 2 message requesting illumination from the ECM.

SERVICE VEHICLE SOON

The radio illuminates the SERVICE VEHICLE SOON message when the engine control module (ECM) detects certain malfunctions that are not related to the emissions system. The radio receives a class 2 message requesting illumination from the ECM.

TOP SPEED FUEL CUT OFF (Export Only)

The radio illuminates the TOP SPEED FUEL CUT OFF message when the engine control module (ECM) detects that the vehicle speed is more than 120 km/h (75 mph). The radio receives a class 2 message requesting illumination from the ECM.

VEHICLE OVERSPEED (Export Only)

The radio illuminates the VEHICLE OVERSPEED message when the instrument panel cluster (IPC) detects that the vehicle speed is more than 120 km/h (75 mph). The radio receives a class 2 message requesting illumination from the IPC.

DRIVER INFORMATION CENTER (DIC) DESCRIPTION AND OPERATION

The radio displays the current driver ID when it first powers up. The radio then returns to the last display status before no power condition.

There are 4 buttons on the radio:

- ENG/MET

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- Fuel Info
- Reset
- Trip

ENG/MET

The ENG/MET button is used in order to change the instrument panel cluster (IPC) displays between English and metric units. The km/h indicator or the MPH indicator illuminate in the IPC accordingly.

FUEL INFO

The FUEL INFO button is used in order to navigate through the following driver information center (DIC) modes:

- Average fuel economy (AFE)
- Average vehicle speed
- Battery voltage
- Engine oil life
- Fuel range
- Fuel used
- Instantaneous fuel economy (IFE)
- Feature programming
- Phone
- Timer
- Trip odometer 1
- Trip odometer 2
- Transmission fluid life

Average Fuel Economy (AFE)

Average fuel economy is calculated using the equation: $AFE = \text{Distance/Fuel}$

- Distance = The accumulated distance travelled since the last reset of this value
- Fuel = The accumulated fuel consumption since the last reset of this value

The instrument panel cluster (IPC) receives a class 2 message from the engine control module (ECM) regarding fuel usage information. The value of this mode is retained during ignition OFF

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and can be changed between English units and metric units by pressing the ENG/MET button on the DIC switch. Press and hold the Reset button on the radio switch for one second in order to reset the AFE display.

Average Vehicle Speed

Average speed is calculated using the equation: Average Speed = Distance/Ignition On

- Distance = The accumulated distance travelled since the last reset of this value
- Ignition On = The accumulated ignition on time since the last reset of this value

Ignition on time is measured from the time that the ignition is turned ON to the time when the ignition is turned OFF. The value of this mode is retained during ignition OFF. Press and hold the Reset button on the radio switch for one second in order to reset the average speed display.

Battery Voltage

The IPC receives a class 2 message from the ECM for battery voltage data. When the battery voltage is below the normal operating range, the DIC displays BATTERY VOLTAGE LOW and the actual battery voltage. When the battery voltage is greater than the normal operating range, the DIC displays BATTERY VOLTAGE HIGH and the actual battery voltage. The charging system indicator also illuminates when the battery voltage is outside the normal operating range.

Engine Oil Life

The ECM sends the oil life remaining percentage to the radio via class 2 serial data messages. The radio displays the current percentage of the GM Oil Life System as determined by the ECM. When the oil life remaining percentage drops below 10 percent, the radio displays CHANGE ENGINE OIL. When the engine oil is changed, reset the engine oil life in order to clear the oil life remaining percentage display. Press and hold the Reset button on the DIC switch for 5 seconds until the radio displays NORMAL 100 percent.

Feature Programming

Personalization features may be set for the vehicle or the driver. Vehicle features do not change with each driver. Specific drivers are recognized by the vehicle through the keyless entry transmitters, the memory buttons, or the DIC.

For more information on the personalization for this vehicle, refer to **Personalization Description and Operation** in Personalization.

Fuel Range

This message indicates the estimated distance that the vehicle can travel under the current fuel economy and fuel level conditions since the last reset of the value. Fuel range is calculated using the equation: $\text{Fuel Range} = \text{Distance Sum} / \text{Fuel Sum}$.

- Distance Sum = The accumulated distance travelled since the last reset of this value.
- Fuel Sum = The accumulated fuel delivered since the last reset of this value

The radio receives a class 2 message from the ECM with fuel information. The value of this mode is retained during ignition OFF and can be changed between English units and metric units by pressing the ENG/MET button on the radio. The fuel range display cannot be reset.

Fuel Used

The IPC calculates and displays the total amount of fuel used since the last reset of the value.

The IPC receives a class 2 message from the ECM with fuel information. The value of this mode is retained during ignition OFF and can be changed between English units and metric units by pressing the ENG/MET button on the radio switch. Press and hold the Reset button on the DIC switch for one second in order to reset the Fuel Used display.

Instantaneous Fuel Economy (IFE)

Instantaneous fuel economy (IFE) is calculated using the equation: $\text{IFE} = \text{Distance} / \text{Fuel}$.

- Distance = The accumulated distance travelled since the last reset of this value
- Fuel = The accumulated fuel delivered since the last reset of this value

The radio receives a class 2 message from the ECM with fuel information. The distance information is calculated by the IPC using the vehicle speed signal from the ECM. The value of this mode is retained during ignition OFF and can be changed between English units and metric units by pressing the ENG/MET button on the radio. The IFE display cannot be reset.

Trans Fluid

The ECM sends the oil life remaining percentage to the radio via class 2 serial data messages. The radio displays the current percentage of the GM Trans Fluid Life System as determined by the ECM. When the oil life remaining percentage drops below 10 percent, the radio displays CHANGE TRANS FLUID. When the transmission fluid is changed, reset the trans fluid life in order to clear the fluid life remaining percentage display. Press and hold the Reset button on the DIC switch for 5 seconds until the radio displays NORMAL 100 percent.

Reset

Press the Reset button on the radio for one second in order to acknowledge and/or reset the current radio display.

Trip

Press the Trip button on the radio switch in order to change the display to one of the following choices:

- The trip odometer 1
- The trip odometer 2

Trip Odometer 1 and Trip Odometer 2

The radio determines vehicle trip odometer mileage based on the vehicle speed signal (VSS) from the engine control module (ECM). The trip odometer displays accumulated km (mi) since the last reset of this value. The trip odometer is capable of displaying up to 999.9 km (999.9 mi). Trip odometer information is not retained when the battery is disconnected. Press and hold the Reset button on the radio for one second in order to reset the trip odometer display.

Indicators and Warning Messages

For more information on driver information center (DIC) warning messages, refer to **Indicator/Warning Message Description and Operation**.

AUDIBLE WARNINGS DESCRIPTION AND OPERATION

The audible warnings alert the driver of a system concern or a critical vehicle condition. The audio amplifier generates the audible warnings through the left front speaker. The audio amplifier receives audible warning requests via the GMLAN serial data line. If the audio amplifier receives multiple audible warning requests, the warning with the highest priority sounds first. The following lists the audible warning priority and the pulse rate:

1. Fast rate chime-200 pulses per minute
2. Medium rate chime-150 pulses per minute
3. Slow rate chime-50 pulses per minute
4. Single chime

Fasten Safety Belt Warning

The audio amplifier activates the fasten safety belt audible warning as requested by the instrument panel module (IPM). The IPM sends a GMLAN message to the audio amplifier indicating the chime frequency at a slow rate and a duration of 8 seconds. The fasten safety belt warning sounds

and the fasten safety belt indicator illuminates when the following occurs:

- The ignition switch transitions to ON.
- The inflatable restraint sensing and diagnostic module (SDM) detects that the driver's seat belt is not buckled and the signal is low. The SDM sends a GMLAN message to the IPM indicating the seat belt status. The instrument panel cluster (IPC) receives a GMLAN message from the IPM indicating the driver seat belt status.

If the seat belt is buckled when the ignition is turned ON, the chime does not sound. If the seat belt is buckled while the chime is sounding, the chime stops. If the seat belt is unbuckled after the initial transition to ON, the chime does not sound.

Lights On Warning

The audio amplifier activates the lights on warning as requested by the instrument panel module (IPM). The IPM sends a GMLAN message to the audio amplifier indicating the chime frequency of a fast rate and at a continuous duration. The lights on warning sounds when the following occurs:

- The ignition is OFF.
- The IPM determines that the driver door is open and the signal circuit is low.
- The IPM determines that the headlamp switch is in the park or head position.

Park Brake Warning

The audio amplifier activates the park brake audible warning as requested by the instrument panel cluster (IPC). The IPC sends a GMLAN message to the audio amplifier indicating the chime frequency of a fast rate and at a continuous duration. The park brake warning sounds and the BRAKE indicator illuminates when the following occurs:

- The ignition is ON.
- The vehicle speed is greater than 8 km/h (4.9 mph). The IPC receives a GMLAN message from the engine control module (ECM) indicating the vehicle speed.
- The IPC determines that the park brake is engaged and the signal circuit is low.

Additional Warnings

The following warnings have an associated instrument panel cluster (IPC) indicator:

- Hot coolant temperature-The audio amplifier activates the audible warning as requested by the instrument panel module (IPM). The IPM sends a GMLAN message to the audio

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amplifier indicating the chime frequency of a medium rate and at a continuous duration.

- Low fuel-The audio amplifier activates the audible warning as requested by the IPM. The IPM sends a GMLAN message to the audio amplifier indicating the chime frequency of a medium rate and at a continuous duration.

Refer to **Indicator/Warning Message Description and Operation**.

SPECIAL TOOLS AND EQUIPMENT

SPECIAL TOOLS

Special Tools

Illustration	Tool Number/ Description
	J 33431-C Signal Generator and Instrument Panel Tester