

2006 Chevrolet HHR LT

2006 ACCESSORIES & EQUIPMENT Instrument Panel, Gages & Console - HHR

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Instrument Panel, Gages & Console - HHR

SPECIFICATIONS

FASTENER TIGHTENING SPECIFICATIONS

Fastener Tightening Specifications

Application	Specification	
	Metric	English
Front Floor Console Center Extension Screw	2 N.m	18 lb in
Front Floor Console Nuts	2 N.m	18 lb in
Front Floor Console Trim Plate Screws	2 N.m	18 lb in
Instrument Panel Center Compartment Screws	2 N.m	18 lb in
Instrument Panel Center Support Bracket Screws	2 N.m	18 lb in
Instrument Panel Cluster Assembly Screws	2 N.m	18 lb in
Instrument Panel Cluster Trim Plate Bezel Screws	2 N.m	18 lb in
Instrument Panel Compartment Dampener to Compartment Screw	2 N.m	18 lb in
Instrument Panel Compartment Latch Screws	2 N.m	18 lb in
Instrument Panel Compartment Striker Screws	2 N.m	18 lb in
Instrument Panel Retainer Bolts/Screws	2 N.m	18 lb in
Instrument Panel Tie Bar Assembly to Body Bolts	25 N.m	18 lb ft
Instrument Panel Tie Bar Assembly to HVAC Module Bolts	4 N.m	35 lb in
Instrument Panel Upper Trim Pad Screws	2 N.m	18 lb in
Knee Bolster Reinforcement Bolts	2 N.m	18 lb in
Knee Bolster Screws	2 N.m	18 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**. 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 2 tanks. Therefore, the values in the table may not correlate directly to readings taken from the vehicle primary or secondary sending units.

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

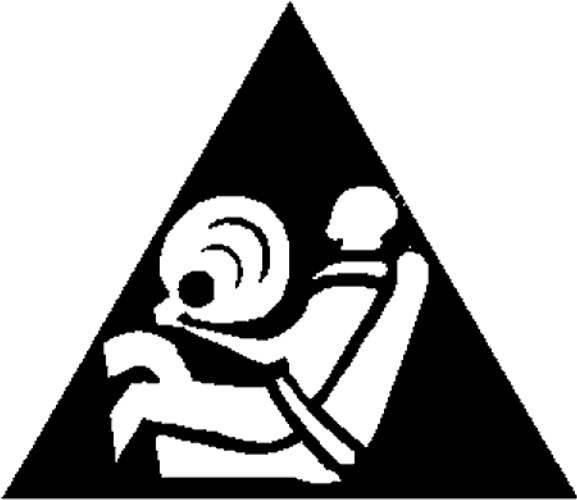
Fuel Level Specifications

Fuel Gage Display	Resistance (ohm)	Fuel Level (%)	Fuel Level Voltage
E	40-47	0-13%	0.8 V
1/4	81.3	29%	1.3 V
1/2	138	54%	1.8 V
3/4	200	81%	2.3 V
F	230-250	98-100%	2.5 V

SCHEMATIC AND ROUTING DIAGRAMS

INSTRUMENT PANEL, GAGES, AND CONSOLE SCHEMATIC ICONS

Instrument Panel, Gages, and Console Schematic Icons

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

INSTRUMENT CLUSTER SCHEMATICS

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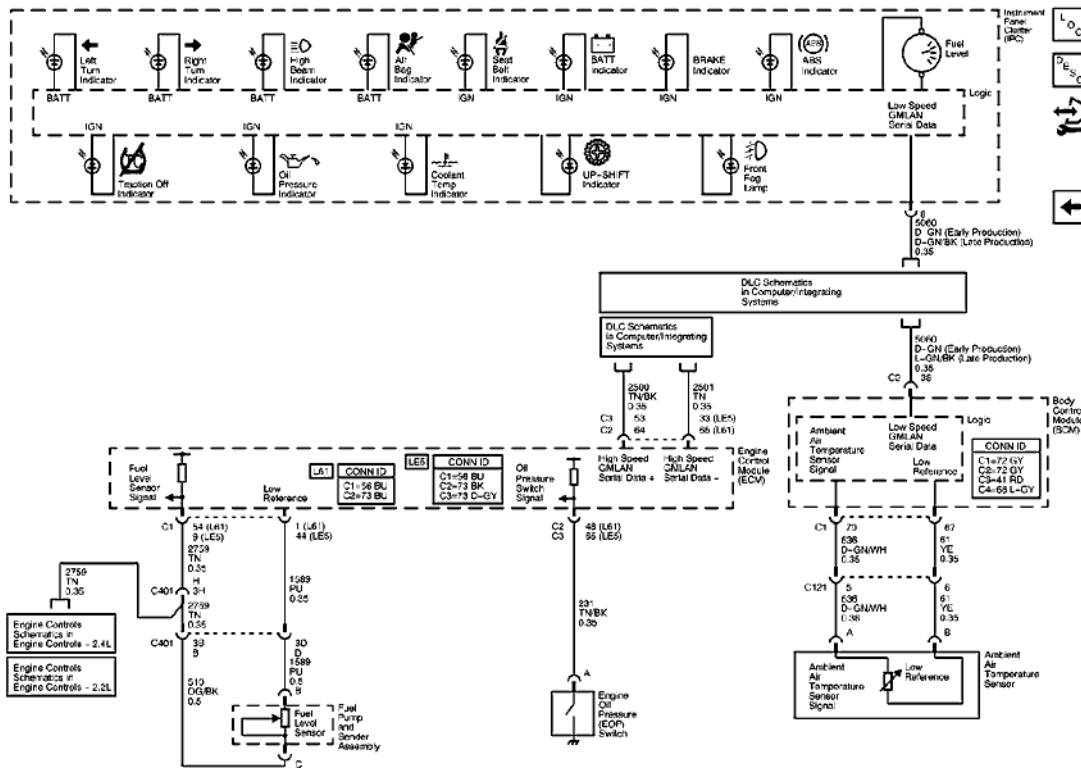


Fig. 2: Ambient Air Temperature Sensor, EOP Sensor, Fuel Level Sensor, and Indicators

Courtesy of GENERAL MOTORS CORP.

AUDIBLE WARNINGS SCHEMATICS

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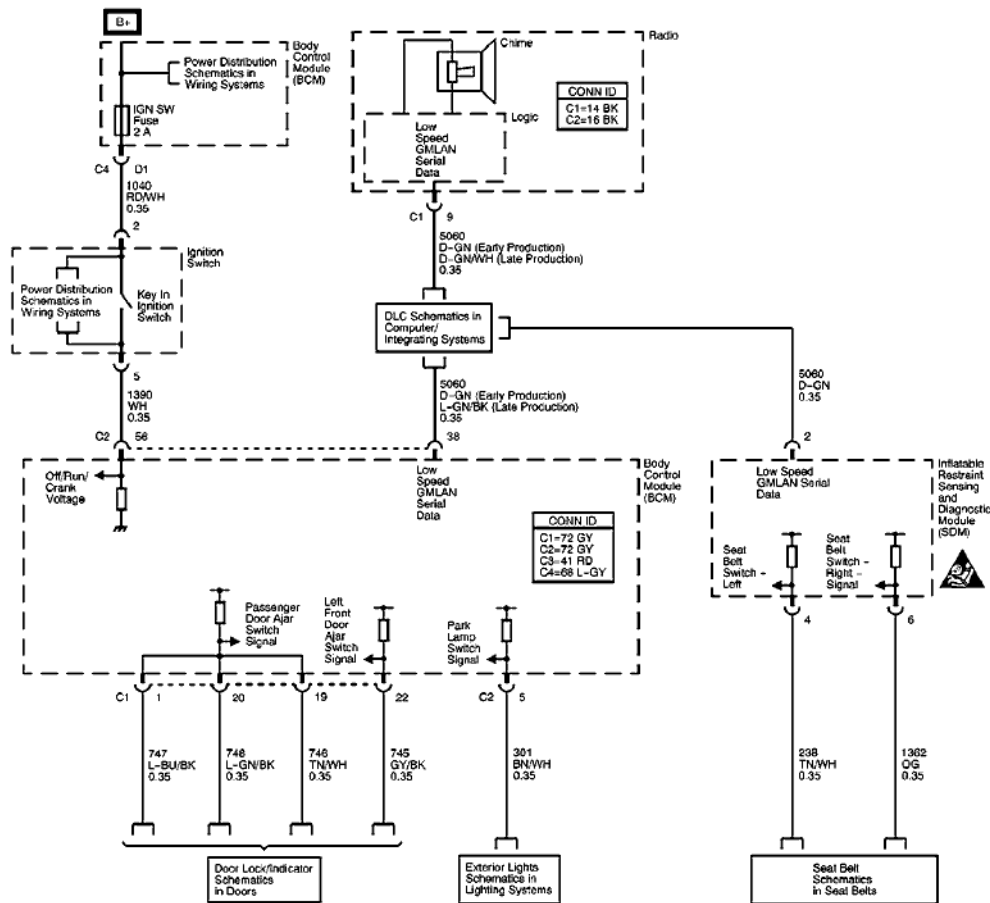


Fig. 3: Audible Warnings Schematic
Courtesy of GENERAL MOTORS CORP.

COMPONENT LOCATOR

INSTRUMENT PANEL, GAGES, AND CONSOLE COMPONENT VIEWS

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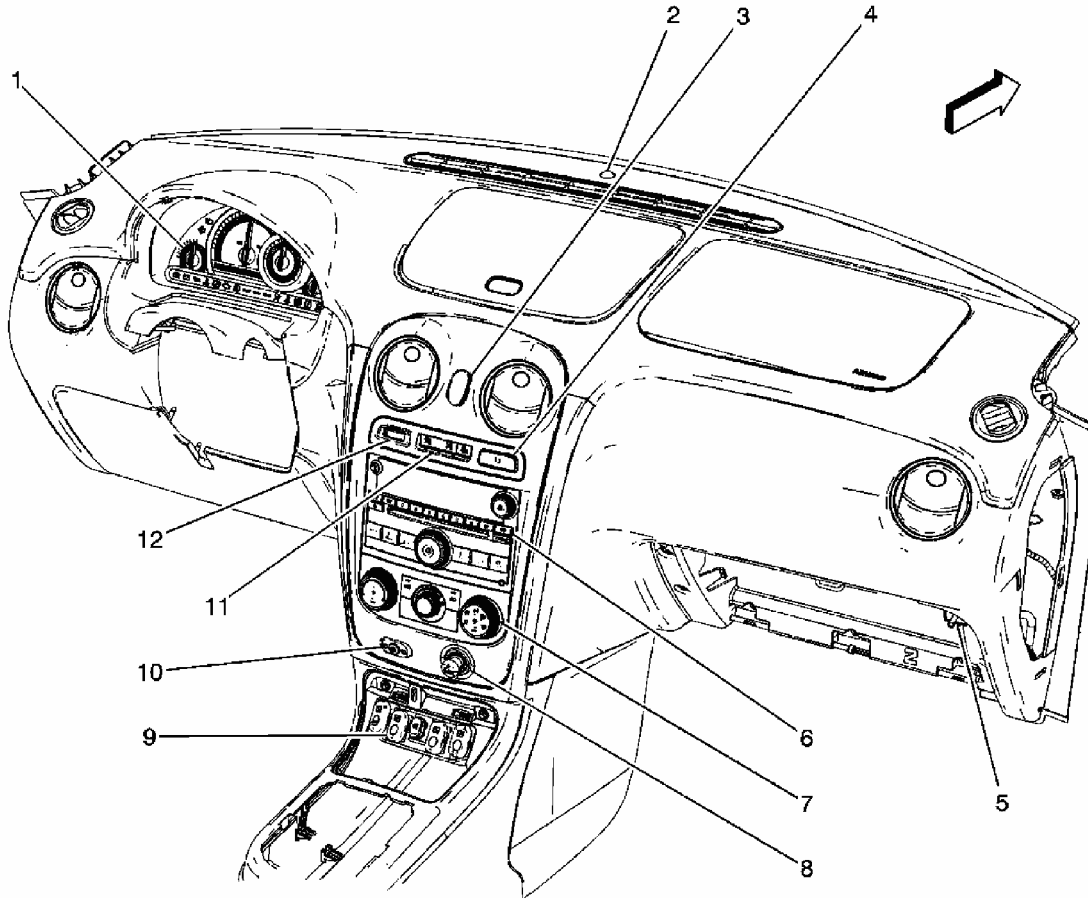


Fig. 4: I/P Components
Courtesy of GENERAL MOTORS CORP.

Callouts For Fig. 4

Callout	Component Name
1	Instrument Panel Cluster (IPC)
2	Ambient Light Sensor
3	Hazard Switch
4	Fog Lamp Switch (T37)
5	I/P Compartment
6	Radio
7	HVAC Control Assembly
8	Cigar Lighter (DT4)
9	Master Window Switch
10	Rear Wiper / Washer Switch
11	Inflatable Restraint Passenger Air Bag ON / OFF Indicator
12	Instrument Panel (I/P) Dimmer Switch

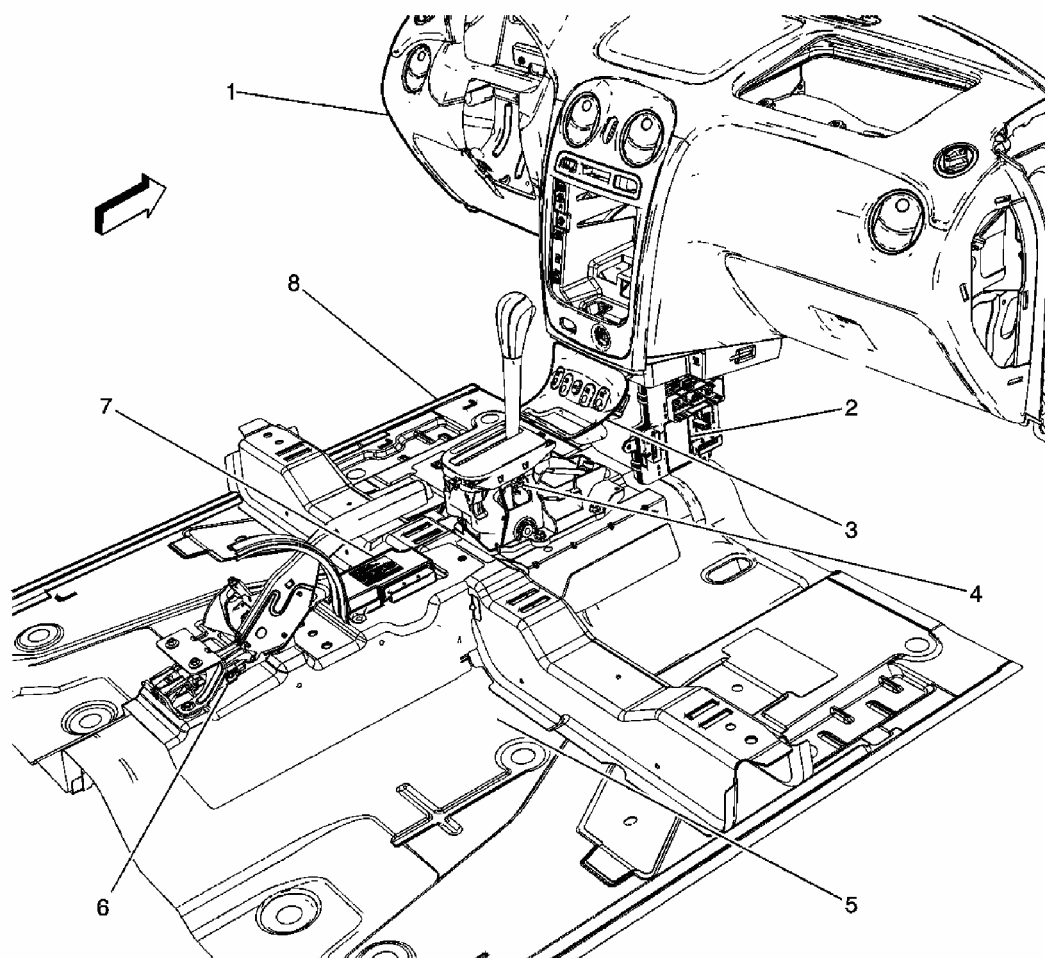


Fig. 5: Center Console Components
Courtesy of GENERAL MOTORS CORP.

Callouts For Fig. 5

Callout	Component Name
1	I/P Trim
2	Body Control Module (BCM)
3	Master Window Switch
4	A/T Shift Lock Control Solenoid (MN5)
5	Floor Panel
6	Park Brake Switch
7	Inflatable Restraint Sensing and Diagnostic Module (SDM)
8	Floor Panel

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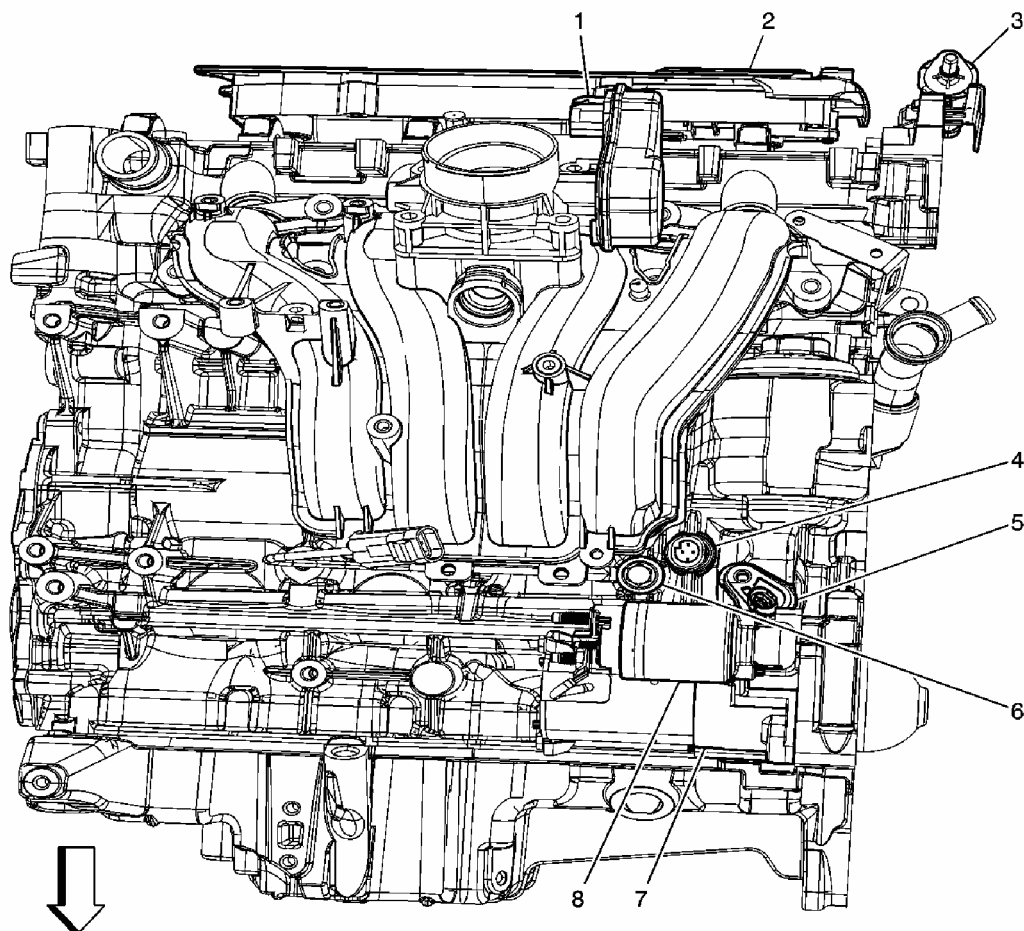


Fig. 6: Front of the Engine (L61)
Courtesy of GENERAL MOTORS CORP.

Callouts For Fig. 6

Callout	Component Name
1	Throttle Actuator Control (TAC) Module
2	Ignition Control Module (ICM)
3	Evaporative Emission (EVAP) Canister Purge Solenoid
4	Engine Oil Pressure (EOP) Switch
5	Crankshaft Position (CKP) Sensor
6	Knock Sensor (KS)
7	Starter
8	Starter Solenoid

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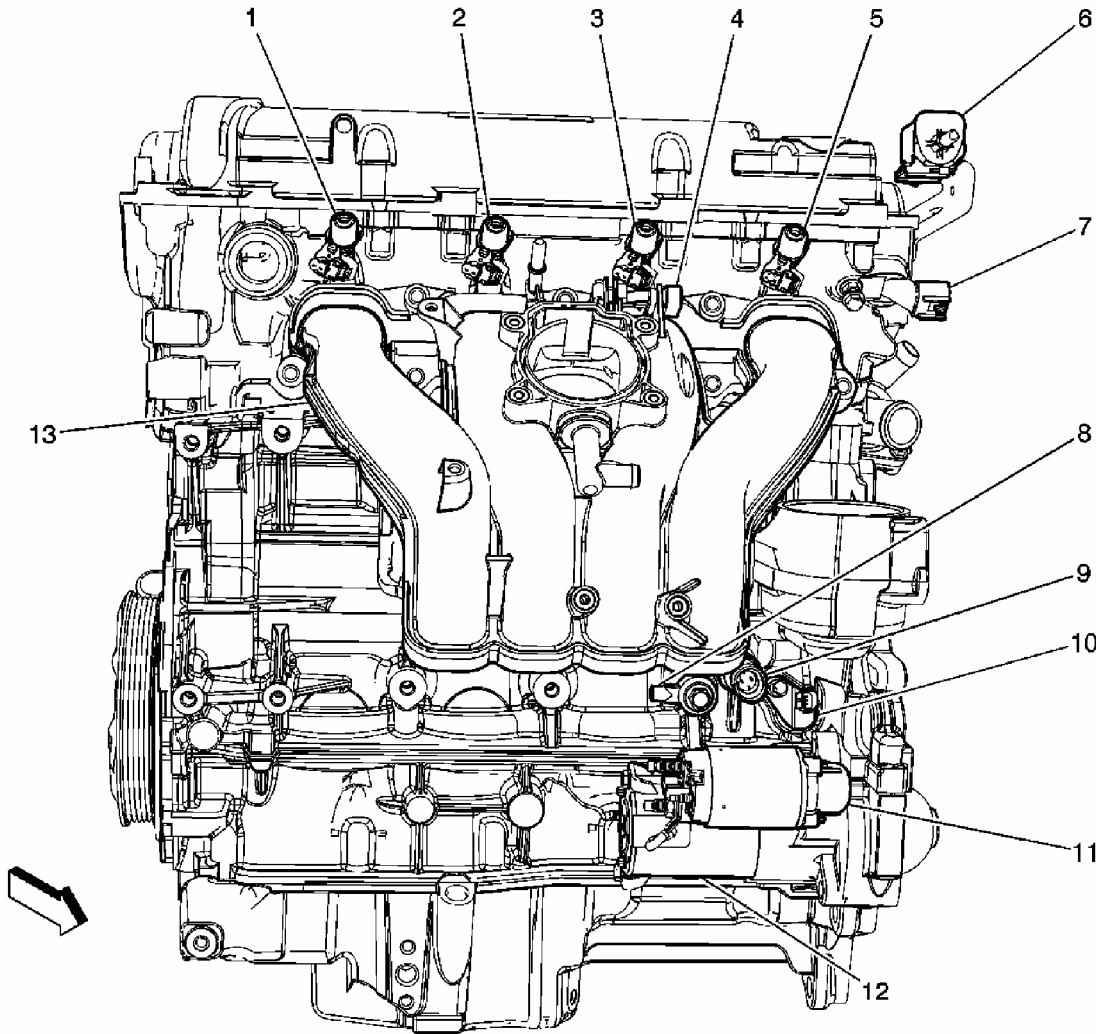


Fig. 7: Front of the Engine (LE5)
Courtesy of GENERAL MOTORS CORP.

Callouts For Fig. 7

Callout	Component Name
1	Fuel Injector 1
2	Fuel Injector 2
3	Fuel Injector 3
4	Manifold Absolute Pressure (MAP) Sensor
5	Fuel Injector 4
6	Evaporative Emission (EVAP) Canister Purge Solenoid Valve
7	Camshaft Position (CMP) Sensor - Intake
8	Knock Sensor (KS)
9	Engine Oil Pressure (EOP) Switch
10	Crankshaft Position (CKP) Sensor

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11	Starter Solenoid
12	Starter
13	Intake Manifold

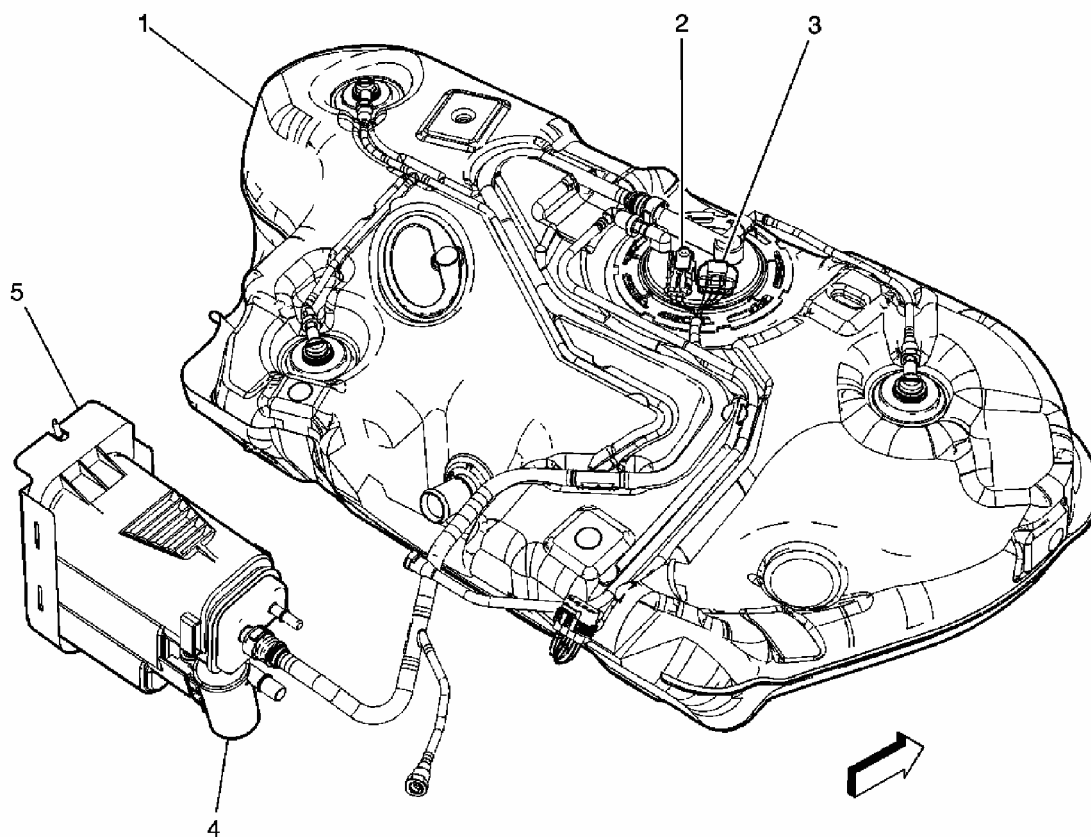


Fig. 8: Fuel Tank Components
Courtesy of GENERAL MOTORS CORP.

Callouts For Fig. 8

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

INSTRUMENT PANEL, GAGES, AND CONSOLE CONNECTOR END VIEWS

Ambient Air Temperature Sensor

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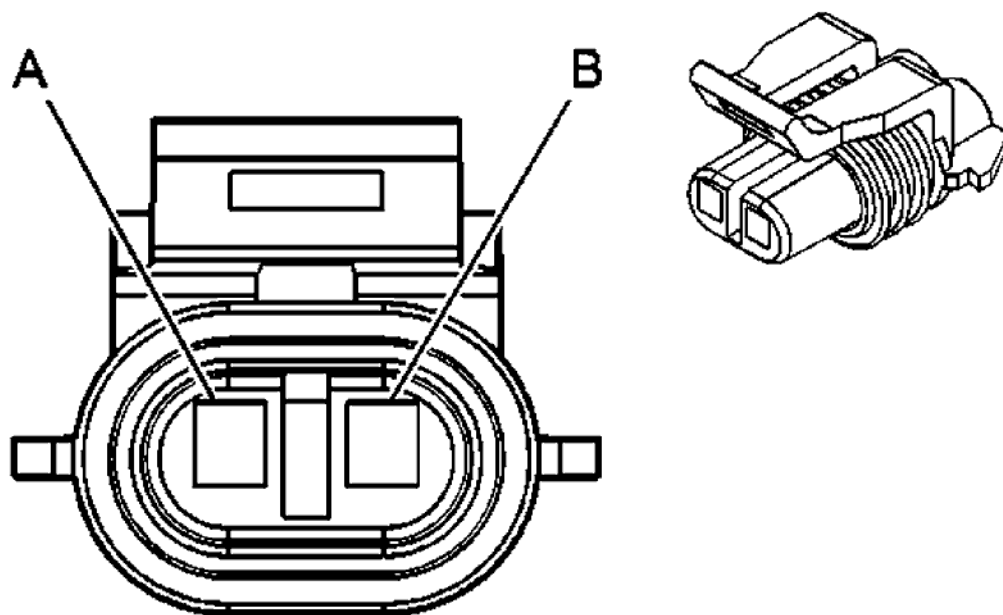


Fig. 9: Connector End Views
Courtesy of GENERAL MOTORS CORP.

Instrument Panel, Gages, and Console Connector End Views

Connector Part Information

- OEM: 12052641
- Service: 12102747
- Description: 2-Way F Metri-Pack 150 Series (BK)

Terminal Part Information

- Pins:
- Terminal:
- Core/Insulation Crimp:
- Release Tool/Test Probe:

Ambient Air Temperature Sensor

Pin	Wire Color	Circuit No.	Function
A	D-GN/WH	636	Outside Ambient Air Temperature Sensor Signal
B	YE	61	Outside Ambient Temperature

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Sensor Low Reference

Engine Oil Pressure (EOP) Switch

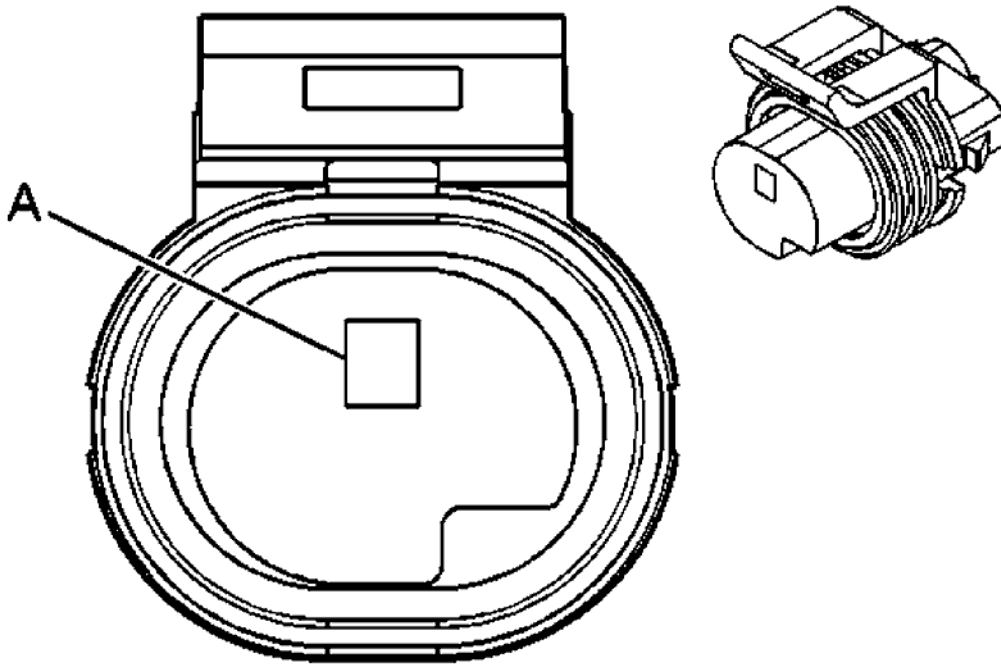


Fig. 10: Engine Oil Pressure (EOP) Switch Connector
Courtesy of GENERAL MOTORS CORP.

Instrument Panel, Gages, and Console Connector End Views

Connector Part Information

- OEM: 12065299
- Service: 12085500
- Description: 4-Way F Metri-Pack 150 Series Sealed (L-GY)

Terminal Part Information

- Pins:
- Terminal:
- Core/Insulation Crimp:
- Release Tool/Test Probe:

Engine Oil Pressure (EOP) Switch

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Pin	Wire Color	Circuit No.	Function
A	TN/BK	231	Oil Pressure Switch Signal
B-D	-	-	Not Available

Fuel Pump and Sender Assembly

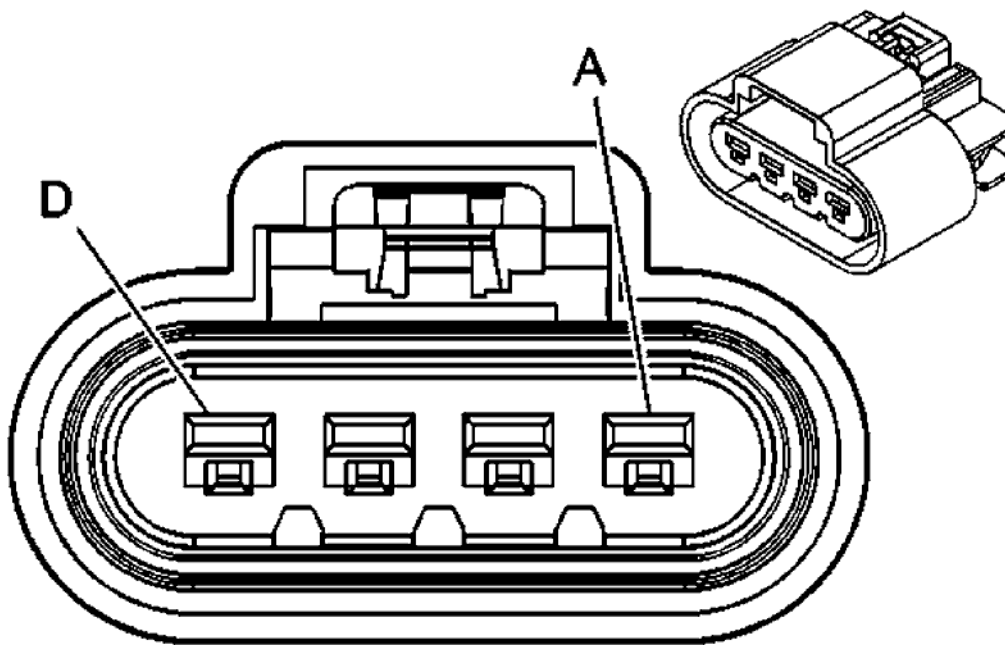


Fig. 11: Fuel Pump and Sender Assembly Connector
Courtesy of GENERAL MOTORS CORP.

Instrument Panel, Gages, and Console Connector End Views

Connector Part Information

- OEM: 15326631
- Service: 15306360
- Description: 4-Way F GT 280 Series Sealed (BK)

Terminal Part Information

- Pins:
- Terminal:
- Core/Insulation Crimp:
- Release Tool/Test Probe:

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Fuel Pump and Sender Assembly

Pin	Wire Color	Circuit No.	Function
A	BK	850	Ground
B	PU	1589	Primary Fuel Level Sensor Signal
C	OG/BK	510	Fuel Sender Low Reference
D	GY	120	Fuel Pump Supply Voltage

Instrument Panel Cluster (IPC)

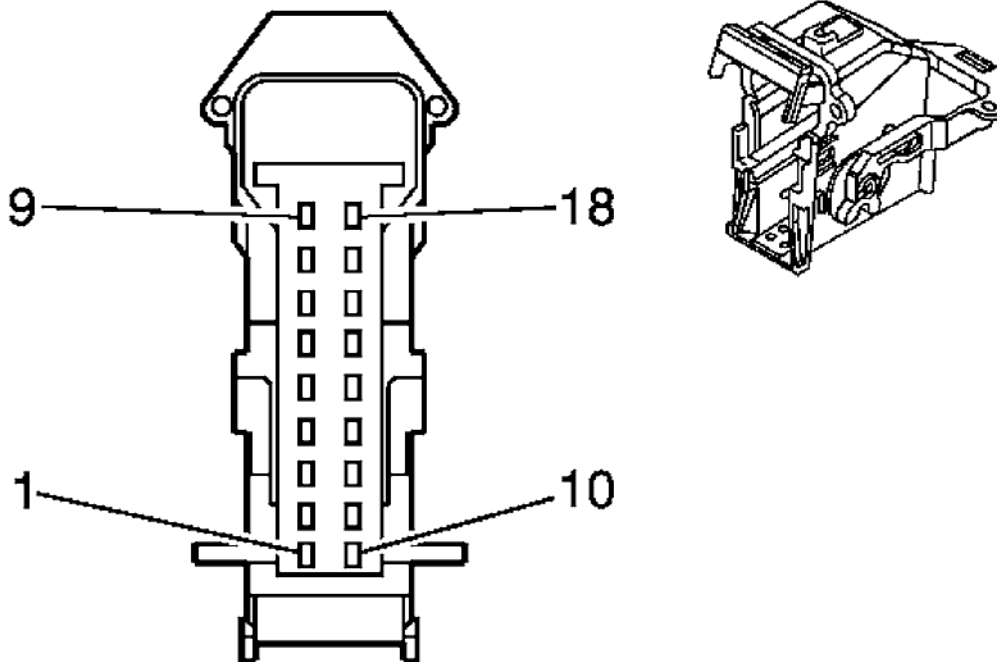


Fig. 12: Instrument Panel Cluster (IPC) Connector
Courtesy of GENERAL MOTORS CORP.

Instrument Panel, Gages, and Console Connector End Views

Connector Part Information

- OEM: 1326132-9
- Service: 88988783
- Description: 18-Way F 0.64 MM Lever Assist (BK)

Terminal Part Information

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- Pins:
- Terminal:
- Core/Insulation Crimp:
- Release Tool/Test Probe:

Instrument Panel Cluster (IPC)

Pin	Wire Color	Circuit No.	Function
1-5	-	-	Not Used
6	BK/WH	651	Signal Ground
7	-	-	Not Used
8	D-GN	5060	Low Speed GMLAN Serial Data (Early Production)
	D-GN/BK	5060	Low Speed GMLAN Serial Data (Late Production)
9	D-GN/WH	1358	Driver Information Center Switch Signal
10	D-GN	264	Security Indicator Supply Voltage
11	BN/WH	419	Check Engine Indicator Control
12	-	-	Not Used
13	PK	339	Run/Crank Ignition 1 Voltage
14	RD/WH	1440	Battery Positive Voltage
15-18	-	-	Not Used

DIAGNOSTIC INFORMATION AND PROCEDURES

DIAGNOSTIC CODE INDEX

DIAGNOSTIC CODE INDEX

DTC	Description
DTC B2961	** DESCRIPTION NOT COLLECTED **
DTC P0461	**DESCRIPTION NOT COLLECTED **
DTC P0462	**DESCRIPTION NOT COLLECTED **
DTC P0463	**DESCRIPTION NOT COLLECTED **
DTC P0464	**DESCRIPTION NOT COLLECTED **
DTC P0520	**DESCRIPTION NOT COLLECTED **

DIAGNOSTIC STARTING POINT - INSTRUMENT PANEL, GAGES AND CONSOLE

Begin the Instrument Panel (I/P) System diagnosis with **Diagnostic System Check - Vehicle** in Vehicle DTC Information. 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 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.

SCAN TOOL OUTPUT CONTROLS

Instrument Panel Cluster (IPC)

Scan Tool Output Control	Additional Menu Selections	Description
Special Functions	DIC All Segment Test	All segments of the driver information center (DIC) illuminates when ON is selected from the scan tool.
Special Functions	Dimming	The instrument panel cluster (IPC) dims from 0 - 100 percent when commanded ON from the scan tool.
Special Functions	Display Test	The IPC illuminates all of the indicators for seven seconds when commanded ON from the scan tool. The IPC turns off the indicators when commanded OFF from the scan tool or the IPC turns the indicators OFF after the seven seconds.
Special Functions	IPC Gage Sweep Test	The IPC drives all of the gages at or above maximum for a few seconds when commanded from the scan tool. The IPC Display Test will end after one cycle of the gage sweep.

Engine Control Module (ECM)

Scan Tool Output Control	Additional Menu Selections	Description
Special Functions	Malfunction Indicator Lamp (MIL)	The engine control module (ECM) commands the MIL indicator ON and OFF.

SCAN TOOL DATA LIST

The scan tool data lists contain all the instrument panel, gages, 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 the **Diagnostic System Check - Vehicle** .

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.

Body Control Module (BCM)

Scan Tool Parameter	Data List	Units Displayed	Typical Data Value
Operating Conditions: Ignition ON/Engine OFF/Seat Belt Buckled/High Beams OFF/Park Brake Unapplied			
Ambient Air Temp. Sensor	HVAC Data	Volts	Varies
Battery Voltage	Keyless/Remote Start Data	Normal/Out of Range	Normal
Battery Voltage Signal	Power Mode	Volts	Varies
DIC Switch	Chassis Data	Menu/Reset	Menu
Door Ajar Switch	Keyless/Remote Start Data	Door Closed/Door Ajar	Door Closed
Driver Door Ajar Sw.	Keyless/Remote Start Data	Door Closed/Door Ajar	Door Closed
Key In Ignition Cylinder Switch	Power Mode	Yes/No	Yes
Headlamp Off Switch	Lighting Data	On/Off	Off
Headlamp On Switch	Lighting Data	On/Off	Off
Hazard Lamp Switch	Keyless/Remote Start Data Lighting Data	On/Off	Off
High Beam Relay Command	Lighting Data	On/Off	Off
High Beam Select Switch	Lighting Data	Active/Inactive	Inactive
Hood Ajar Switch	Keyless/Remote Start Data	Closed/Ajar	Closed
Ignition Mode Switch	Power Mode	Volts	Varies

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Ignition Switch Accessory Signal	Power Mode	Active/Inactive	Active
Left Turn Signal Switch	Lighting Data	Active/Inactive	Inactive
Low Beam Relay Command	Lighting Data	On/Off	Off
Park Brake Switch	Lighting Data	Active/Inactive	Inactive
Park Lamp Switch	Lighting Data	On/Off	Off
Park Lamp Relay Cmd.	Lighting Data	On/Off	Off
Passenger Seat Belt Indicator Commanded	Lighting Data	On/Off	Off
Right Turn Signal Switch	Lighting Data	On/Off	Off
Security Indicator Command	Theft Information	On/Off	Off
Trunk Ajar Switch	Keyless/Remote Start Data	Trunk Closed/Trunk Ajar	Trunk Closed

Instrument Panel Cluster (IPC)

Scan Tool Parameter	Data List	Units Displayed	Typical Data Value
Operating Conditions: Ignition ON/Engine OFF/Seat Belt Buckled/High Beams OFF/Park Brake Unapplied			
Battery Voltage Signal	IPC Data	Volts	Varies
DIC Information Switch	IPC Data	Active/Inactive	Inactive
DIC Switch Input	IPC Data	Volts	Varies
Ignition 1 Input	IPC Data	Active/Inactive	Active
Menu Switch	IPC Data	On/Off	Off
Reset Switch	IPC Data	Active/Inactive	Inactive

Engine Control Module (ECM)

Scan Tool Parameter	Data List	Units Displayed	Typical Data Value
Operating Conditions: Engine Idling/Normal Operating Temperature			
Cruise Control Active	TAC Data Cruise Control Data IPC Data	Yes/No	No
ECT Sensor	Engine Data EVAP Data Fuel Trim Data HO2S Ignition Data Induction Misfire Data	Celsius (Fahrenheit)	Varies 85 - 105°C (185 - 220°F)

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	TAC Data HVAC Data IPC Data		
Engine Oil Life Remaining	IPC Data	Percent	0 - 100%
Engine Oil Pressure Switch	Engine Data Misfire Data IPC Data	OK/Low	OK
Engine Speed	Engine Data EVAP Data Fuel Trim Data HO2S Ignition Data Induction Misfire Data TAC Data Cruise Control Data Theft Data HVAC Data IPC Data	RPM	+/-100 RPM from Desired Idle Speed
Fuel Level Sensor	EVAP Data IPC Data	Volts	0 - 5 Volts Varies w/fuel level
Fuel Pump Relay Command	Engine Data	On/Off	Off
Fuel Tank Level Remaining	Engine Data EVAP Data Misfire Data IPC Data	Percent (%)	0 - 100% Varies w/fuel level
Ignition Accessory Signal	IPC Data	On/Off	Off
Ignition 1 Signal	Engine Data EVAP Data Fuel Trim Data HO2S Ignition Data Induction Misfire Data TAC Data Cruise Control Data Theft Data HVAC Data IPC Data	Volts	9 - 16 Volts Varies

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MIL Command	Engine Data EVAP Data Ignition Data IPC Data	On/Off	Off
MIL Requested by DTC	Engine Data EVAP Data Ignition Data	Yes/No	No
Non-Driven Wheel Speed	Cruise Control Data IPC Data	kph (mph)	0 kph (0 mph)
Reduced Engine Power	TAC Data IPC Data	Active/Inactive	Inactive
Traction Control Status	Cruise Control Data TAC Data	Active/Inactive	Inactive
Vehicle Speed Sensor	Engine Data EVAP Data HO2S Ignition Data Induction Misfire Data TAC Data Cruise Control Data HVAC Data IPC Data	kph (mph)	0 kph (0 mph)

SCAN TOOL DATA DEFINITIONS**Ambient Air Temp Sensor**

The scan tool displays voltage. This is the ambient air temperature sensor voltage as monitored by the body control module (BCM). The BCM converts the sensor voltage to a temperature value and sends the information via GMLAN serial data circuit to the instrument panel cluster (IPC) for display.

Battery Voltage

The scan tool displays Normal or Out of Range. This is the state of the battery voltage as monitored by the BCM.

Battery Voltage Signal

The scan tool displays 0-19 V. This is the voltage measured at the battery positive

voltage circuit of the BCM.

Battery Voltage Signal

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

Cruise Control Active

The scan tool displays Yes or No. This is state of the cruise control switch signal as monitored by the engine control module (ECM).

DIC Information Switch

The scan tool displays Active or Inactive. This is the state of the driver information center (DIC) information switch as monitored by the IPC.

DIC Switch

The scan tool displays Menu/Reset. This is the DIC switch inputs as monitored by the BCM via GMLAN serial data. The BCM is responsible for driving DIC displays via GMLAN.

DIC Switch Input

The scan tool displays voltage. This is the DIC switch input as monitored by the IPC.

Driver Door Ajar Sw

The scan tool displays Door Closed or Door Ajar. This is the state of the driver door ajar switch as monitored by the BCM.

Door Ajar Switch:

The scan tool displays Door Closed or Door Ajar. This is the state of the passenger door ajar switch as monitored by the BCM.

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 remaining engine oil life.

Engine Oil Pressure Switch

The scan tool displays Ok or Low. This is the status of the engine oil pressure switch signal as monitored by the ECM.

Engine Speed

The scan tool displays 0-8000 RPM. The engine speed is computed by the ECM from the ignition reference input. It should remain close to the desired idle under various engine loads.

Fuel Level Sensor

The scan tool displays 0-5 volts. The ECM monitors the signal circuit of the fuel level sensor and the fuel data is sent via the GMLAN to the IPC for display.

Fuel Pump Relay Command

The scan tool displays On or Off. The state of the fuel pump as commanded by the ECM.

Fuel Tank Level Remaining

The scan tool displays 0-100%. The ECM calculates the amount of fuel remaining in the tank based on the input from the fuel level sensor signal circuit.

Hazard Lamp Switch

The scan tool displays On or Off. The BCM monitors the hazard lamp switch circuit. When the hazard switch is turned Off the signal is displayed as Off.

Headlamp Off Switch

The scan tool displays On or Off. This is the status of the headlamp-off switch as monitored by the BCM.

Headlamp On Switch

The scan tool displays On or Off. This is the status of the headlamp-on switch as monitored by the BCM.

High Beam Relay Command

The scan tool displays On or Off. The state of the high beam relay as commanded by the BCM.

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High Beam Select Switch

The scan tool displays Active or Inactive. The state of the high beam switch as monitored by the BCM.

Hood Ajar Switch

The scan tool displays Closed or Ajar. This is the status of the hood ajar switch as monitored by the BCM.

Ignition 1 input

The scan tool displays Active or Inactive. The scan tool displays Active when voltage is present at the ignition 1 input of the IPC.

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 Accessory Signal

The scan tool displays On or Off. The scan tool displays On when voltage is present at the ignition accessory signal circuit of the ECM.

Ignition Switch Accessory Signal

The scan tool displays Active or Inactive. The scan tool displays Active when voltage is present at the ignition accessory switch signal circuit of the BCM.

Ignition Mode Switch

The scan tool displays 9-16 V. The state of the ignition switch circuit as monitored by the BCM.

Key In Ignition Cylinder Switch

The scan tool displays Yes or No. This is the status of the key-in-ignition cylinder switch as monitored by the BCM. When the key is in the ignition cylinder, the scan tool displays On.

Left Turn Signal Switch

The scan tool displays Active or Inactive. The state of left turn signal switch input detected by the BCM. The indicator turns on when the switch is closed.

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Low Beam Relay Command

The scan tool displays On or Off. The state of the low beam relay as commanded by the BCM.

Menu Switch

The scan tool displays Off or On. This is the status of the DIC menu switch as monitored by the IPC.

MIL Command

The scan tool displays On or Off. This is the commanded state of the malfunction indicator lamp (MIL) by the ECM. The MIL should be On in the IPC when scan tool displays MIL Command is On.

MIL Requested by DTC

The scan tool displays Yes or No. This is the state where the MIL is commanded On by an ECM diagnostic trouble code.

Non-Driven Wheel Speed

The scan tool displays 0-255 km/h (0-155 mph). This is the vehicle non-driven wheel speed as monitored by the ECM.

Park Brake Switch

The scan tool displays Active or Inactive. The state of the park brake switch as monitored by the BCM.

Passenger Seat Belt Indicator Command

The scan tool displays On or Off. The state of the passenger seat belt indicator as commanded by the BCM.

Low Beam Relay Cmd

The scan tool displays On or Off. The state of the park lamp relay as commanded by the BCM.

Park Lamp Switch

The scan tool displays On or Off. This is the status of the park lamp switch as monitored by the BCM.

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Reduced Engine Power

The scan tool displays Active or Inactive. This is the state of the Reduced Engine Power indicator as commanded by the ECM. The IPC receives a GMLAN serial data message from the ECM requesting the display of the indicator in the DIC.

Reset Switch

The scan tool displays Active or Inactive. This is the status of the DIC reset switch as monitored by the IPC.

Right Turn Signal Switch

The scan tool displays Active or Inactive. The state of right turn signal switch input detected by the BCM. The indicator turns on when the switch is closed.

Security Indicator Command

The scan tool displays On or Off. This is the commanded state of the security indicator lamp by the BCM. The security indicator should be On in the IPC when scan tool displays Security Indicator Command is On.

Traction Control Status

The scan tool displays Active or Inactive. This is the state of the traction control as commanded by the ECM.

Trunk Ajar Switch

The scan tool displays Trunk Closed or Trunk Ajar. This is the status of the trunk ajar switch as monitored by the BCM.

Vehicle Speed Sensor

The scan tool displays 0-255 km/h (0-155 mph). This is the vehicle speed as calculated by the ECM.

DTC B2961

DTC Descriptor

DTC B2961

Key In Ignition Circuit

Diagnostic Fault Information

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IMPORTANT: Always perform the Diagnostic System Check - Vehicle prior to using this diagnostic procedure.

DTC B2961

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Ignition Key Alarm Switch Signal Circuit	-	B2961	-	-

Circuit/System Description

The body control module (BCM) monitors the ignition key alarm switch. When the key is in the ignition, the ignition key alarm switch is closed and the signal circuit is low. When the key is not in the ignition, the ignition key alarm switch is open and the signal circuit is high.

Conditions for Running the DTC

The ignition is ON.

Conditions for Setting the DTC

- The ignition 1 voltage circuit is active and the key in ignition switch signal circuit is inactive and the signal circuit is high.
- The above condition is present for greater than 5 seconds.

Action Taken When the DTC Sets

The BCM stores DTC B2961 in memory.

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 100 malfunction-free warm-up cycles.
- The BCM 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.

Reference Information

Schematic Reference

2006 Chevrolet HHR LT

2006 ACCESSORIES & EQUIPMENT Instrument Panel, Gages & Console - HHR

- Instrument Cluster Schematics
- Body Control System Schematics
- Column/Ignition Lock Schematics

Connector End View Reference

- Instrument Panel, Gages, and Console Connector End Views
- Computer/Integrating Systems Connector End Views
- Steering Wheel and Column Connector End Views

Electrical Information Reference

- Circuit Testing
- Connector Repairs
- Testing for Intermittent Conditions and Poor Connections
- Wiring Repairs

Scan Tool Reference

Scan Tool Data List

Circuit/System Testing

1. Ignition ON, verify the Key In Ignition parameter displays Yes.
 - If Yes, verify that the scan tool Battery Voltage parameter displays Normal. If Normal, repair the short to voltage in the ignition 1 voltage circuit.
 - If not Normal, replace the BCM.
2. Ignition ON, verify the Key In Ignition parameter displays No.
 - If No, test the signal circuit of the key in ignition switch for an open/high resistance. If the circuit tests normal, test the voltage circuit of the key in ignition switch for an open/high resistance.
 - If all circuits test normal, replace the ignition switch.

Repair Instructions

IMPORTANT: Always perform the Diagnostic Repair Verification after completing the diagnostic procedure.

- Ignition Switch Replacement
- Control Module References for BCM replacement, setup, and programming.

DTC P0461

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2006 ACCESSORIES & EQUIPMENT Instrument Panel, Gages & Console - HHR

DTC Descriptor

DTC P0461

Fuel Level Sensor Circuit Performance

Diagnostic Fault Information

IMPORTANT: Always perform the Diagnostic System Check - Vehicle prior to using this diagnostic procedure.

DTC P0461

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Fuel Level Sensor Reference Voltage Circuit	P0462	-	-	P0461
Fuel Level Sensor Signal Circuit	P0462	P0463 1 P0464	P0463	P0461
Fuel Level Sensor Low Reference Circuit	-	P0463 1 P0464	P0463	P0461
1. Fuel Gage Inaccurate or Inoperative				

Circuit/System Description

The fuel level sensor changes resistance in response to the fuel level. The engine control module (ECM) monitors the signal circuit of the fuel level sensor in order to determine the fuel level. When the fuel tank is full, the sensor resistance is low and the ECM senses a low signal voltage. When the fuel tank is empty, the sensor resistance is high and the ECM senses a high signal voltage. The ECM uses the signal circuit of the fuel level sensor in order to calculate the percentage of remaining fuel in the tank. The ECM sends the fuel level percentage via GMLAN serial data circuit to the instrument cluster in order to control the fuel gage. Then fuel information is also used for misfire and evaporative emission (EVAP) diagnostics.

This diagnostic tests for a stuck fuel level sensor signal. The ECM sets this DTC if the 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 engine is running.

Conditions for Setting the DTC

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The ECM does not detect a change in fuel level of at least 1.6 percent over a distance of 193 km (120 miles).

Action Taken When the DTC Sets

- The fuel gage defaults to empty.
- The low fuel indicator illuminates.
- 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 a clear code command from the scan tool.

Reference Information

Fuel Level Specifications

Fuel Level Specifications

Schematic Reference

- Instrument Cluster Schematics
- Engine Controls Schematics for the 2.2L engine
- Engine Controls Schematics for the 2.4L engine

Connector End View Reference

- Instrument Panel, Gages, and Console Connector End Views
- Engine Control Module (ECM) Connector End Views for the 2.2L engine
- Engine Control Module (ECM) Connector End Views for the 2.4L engine

Electrical Information Reference

- Circuit Testing
- Connector Repairs
- Testing for Intermittent Conditions and Poor Connections
- Wiring Repairs

Scan Tool Reference

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Scan Tool Data List

Circuit/System Testing

1. Ignition OFF, remove the fuel level sender.
2. Check if the fuel level sensor is stuck, due to an interference with the fuel strainer, or check if the fuel tank contains foreign material, such as ice.
 - o If all of the above conditions are not present, replace the fuel level sensor.

Repair Instructions

IMPORTANT: Always perform the Diagnostic Repair Verification after completing the diagnostic procedure.

- **Fuel Level Sensor Replacement** for the 2.2L engine
- **Fuel Level Sensor Replacement** for the 2.4L engine
- **Control Module References** for the ECM replacement, setup, and programming.

DTC P0462

DTC Descriptor

DTC P0462

Fuel Level Sensor Circuit Low Voltage

Diagnostic Fault Information

IMPORTANT: Always perform the Diagnostic System Check - Vehicle prior to using this diagnostic procedure.

DTC P0462

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Fuel Level Sensor Reference Voltage Circuit	P0462	-	-	P0461
Fuel Level Sensor Signal Circuit	P0462	P0463 1 P0464	P0463	P0461
Fuel Level Sensor Low Reference Circuit	-	P0463 1 P0464	P0463	P0461
1. Fuel Gage Inaccurate or Inoperative				

Circuit/System Description

The fuel level sensor changes resistance in response to the fuel level. The engine control module (ECM) monitors the signal circuit of the fuel level sensor in order to determine the fuel level. When the fuel tank is full, the sensor resistance is low and the ECM senses a low signal voltage. When the fuel tank is empty, the sensor resistance is high and the ECM senses a high signal voltage. The ECM uses the signal circuit of the fuel level sensor in order to calculate the percentage of remaining fuel in the tank. The ECM sends the fuel level percentage via GMLAN serial data circuit to the instrument cluster in order to control the fuel gage. Then fuel information is also used for misfire and evaporative emission (EVAP) diagnostics.

Conditions for Running the DTC

- The ignition is ON, with the engine running.
- The system voltage is between 9-16 volts.

Conditions for Setting the DTC

- The sender output is less than 0.39 volt.
- The above condition is present for greater than 30 seconds.

Action Taken When the DTC Sets

- The fuel gage defaults to empty.
- The low fuel indicator illuminates.
- 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 a clear code command from the scan tool.

Reference Information**Fuel Level Specifications****Fuel Level Specifications****Schematic Reference**

- **Instrument Cluster Schematics**
- **Engine Controls Schematics** for the 2.2L engine

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- Engine Controls Schematics for the 2.4L engine

Connector End View Reference

- Instrument Panel, Gages, and Console Connector End Views
- Engine Control Module (ECM) Connector End Views for the 2.2L engine
- Engine Control Module (ECM) Connector End Views for the 2.4L engine

Electrical Information Reference

- Circuit Testing
- Connector Repairs
- Testing for Intermittent Conditions and Poor Connections
- Wiring Repairs

Scan Tool Reference

Scan Tool Data List

Circuit/System Verification

Ignition ON, observe the scan tool Fuel Tank Level Remaining parameter. The reading should be between 4 percent and 98 percent.

Circuit/System Testing

1. Ignition OFF, disconnect C401.
2. Ignition ON, verify that the scan tool Fuel tank Level Remaining parameter is greater than 98 percent.
 - If less than 98 percent, test the signal circuit for a short to ground. If the circuit tests normal, replace the ECM.
- If greater than 98 percent, test the signal circuit for a short to ground between C401 and the fuel level sender. If the circuit tests normal, replace the fuel level sender.

Repair Instructions

IMPORTANT: Always perform the Diagnostic Repair Verification after completing the diagnostic procedure.

- Fuel Level Sensor Replacement for the 2.2L engine
- Fuel Level Sensor Replacement for the 2.4L engine
- Control Module References for the ECM replacement, setup, and programming

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DTC P0463

DTC Descriptor

DTC P0463

Fuel Level Sensor Circuit High Voltage

Diagnostic Fault Information

IMPORTANT: Always perform the Diagnostic System Check - Vehicle prior to using this diagnostic procedure.

DTC P0463

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Fuel Level Sensor Reference Voltage Circuit	P0462	-	-	P0461
Fuel Level Sensor Signal Circuit	P0462	P0463 1 P0464	P0463	P0461
Fuel Level Sensor Low Reference Circuit	-	P0463 1 P0464	P0463	P0461
1. Fuel Gage Inaccurate or Inoperative				

Circuit/System Description

The fuel level sensor changes resistance in response to the fuel level. The engine control module (ECM) monitors the signal circuit of the fuel level sensor in order to determine the fuel level. When the fuel tank is full, the sensor resistance is low and the ECM senses a low signal voltage. When the fuel tank is empty, the sensor resistance is high and the ECM senses a high signal voltage. The ECM uses the signal circuit of the fuel level sensor in order to calculate the percentage of remaining fuel in the tank. The ECM sends the fuel level percentage via GMLAN serial data circuit to the instrument cluster in order to control the fuel gage. Then fuel information is also used for misfire and evaporative emission (EVAP) diagnostics.

Conditions for Running the DTC

- The ignition is ON, with the engine running.
- The system voltage is between 9-16 volts.

Conditions for Setting the DTC

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- The sensor output is greater than 2.9 volts.
- The above condition is present for greater than 30 seconds.

Action Taken When the DTC Sets

- The fuel gage defaults to empty.
- The low fuel indicator illuminates.
- 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 a clear code command from the scan tool.

Reference Information

Fuel Level Specifications

Fuel Level Specifications

Schematic Reference

- Instrument Cluster Schematics
- Engine Controls Schematics for the 2.2L engine
- Engine Controls Schematics for the 2.4L engine

Connector End View Reference

- Instrument Panel, Gages, and Console Connector End Views
- Engine Control Module (ECM) Connector End Views for the 2.2L engine
- Engine Control Module (ECM) Connector End Views for the 2.4L engine

Electrical Information Reference

- Circuit Testing
- Connector Repairs
- Testing for Intermittent Conditions and Poor Connections
- Wiring Repairs

Scan Tool Reference

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Scan Tool Data List

Circuit/System Verification

Ignition ON, observe the scan tool Fuel Tank Level Remaining parameter. The reading should be between 4 percent and 98 percent.

Circuit/System Testing

1. Ignition OFF, disconnect C401, install a 3-amp fused jumper between the signal circuit and the low reference circuit.
2. Ignition ON, verify that the scan tool Fuel Tank Level Remaining parameter is less than 4 percent.
 - If greater than 4 percent, test the signal circuit for a short to voltage or an open/high resistance. If the circuit tests normal, test the low reference circuit for a short to voltage or an open/high resistance.
- If all circuits test normal, replace the ECM.
- If less than 4 percent, test the signal circuit for a short to voltage or an open/high resistance between C401 and the fuel level sender. If the circuit tests normal, test the low reference circuit for a short to voltage or an open/high resistance between C401 and the fuel level sender.
- If all circuits test normal, replace the fuel level sender.

Repair Instructions

IMPORTANT: Always perform the Diagnostic Repair Verification after completing the diagnostic procedure.

- **Fuel Level Sensor Replacement** for the 2.2L engine
- **Fuel Level Sensor Replacement** for the 2.4L engine
- **Control Module References** for the ECM replacement, setup, and programming.

DTC P0464

DTC Descriptor

DTC P0464

Fuel Level Sensor 1 Circuit Intermittent

Diagnostic Fault Information

IMPORTANT: Always perform the Diagnostic System Check - Vehicle prior to using this diagnostic procedure.

DTC P0464

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Fuel Level Sensor Reference Voltage Circuit	P0462	-	-	P0461
Fuel Level Sensor Signal Circuit	P0462	P0463 P0464 1	P0463	P0461
Fuel Level Sensor Low Reference Circuit	-	P0463 P0464 1	P0463	P0461
1. Fuel Gage Inaccurate or Inoperative				

Circuit/System Description

The fuel level sensor changes resistance in response to the fuel level. The engine control module (ECM) monitors the signal circuit of the fuel level sensor in order to determine the fuel level. When the fuel tank is full, the sensor resistance is low and the ECM senses a low signal voltage. When the fuel tank is empty, the sensor resistance is high and the ECM senses a high signal voltage. The ECM uses the signal circuit of the fuel level sensor in order to calculate the percentage of remaining fuel in the tank. The ECM sends the fuel level percentage via GMLAN serial data circuit to the instrument cluster in order to control the fuel gage. Then fuel information is also used for misfire and evaporative emission (EVAP) diagnostics.

This diagnostic tests for an intermittent fuel level sender signal. If a change in fuel level is detected DTC P0442 is aborted due to a refueling event. A refueling event test is executed to confirm that a refueling event has occurred. If refueling is confirmed, the test is considered passing. Otherwise, the DTC will set indicating an intermittent signal problem.

Conditions for Running the DTC

- The ignition is OFF.
- DTC P0442 is running.

Conditions for Setting the DTC

- The fuel level change is greater than 10 percent.
- The above condition is present for greater than 30 seconds.

Action Taken When the DTC Sets

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- DTC P0442 is aborted.
- The ECM records the operating conditions at the time the diagnostic 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 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.

Reference Information

Schematic Reference

- **Instrument Cluster Schematics**
- **Engine Controls Schematics** for the 2.2L engine
- **Engine Controls Schematics** for the 2.4L engine

Connector End View Reference

- **Instrument Panel, Gages, and Console Connector End Views**
- **Engine Control Module (ECM) Connector End Views** for the 2.2L engine
- **Engine Control Module (ECM) Connector End Views** for the 2.4L engine

Electrical Information Reference

- **Circuit Testing**
- **Connector Repairs**
- **Testing for Intermittent Conditions and Poor Connections**
- **Wiring Repairs**

Scan Tool Reference

Scan Tool Data List

Circuit/System Testing

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1. Ignition OFF, disconnect C401, install a signal generator and instrument panel tester between the signal circuit and the low reference circuit.
2. Ignition ON, vary the resistance on the signal generator from 40-250 ohms and monitor the fuel gage.
 - If the fuel gage displays the correct fuel level, test the signal circuit for an open/high resistance between C401 and the fuel level sender. If the circuit tests normal, test the low reference circuit for an open/high resistance between C401 and the fuel level sender.
 - If all circuits test normal, replace the fuel level sender.
3. Ignition ON, vary the resistance on the signal generator from 40-250 ohms. Verify that the scan tool Fuel Tank Level Remaining parameter displays the correct fuel level percent.
 - If the fuel level percent is correct, replace the instrument panel cluster (IPC).
 - If the fuel level percent is incorrect, test the signal circuit for an open/high resistance. If the circuit tests normal, test the low reference circuit for an open/high resistance.
 - If all circuits test normal, replace the ECM.

Repair Instructions

IMPORTANT: Always perform the Diagnostic Repair Verification after completing the diagnostic procedure.

- **Fuel Level Sensor Replacement** for the 2.2L engine
- **Fuel Level Sensor Replacement** for the 2.4L engine
- **Control Module References** for ECM or IPC replacement, setup, and programming

DTC P0520

DTC Descriptor

DTC P0520

Engine Oil Pressure (EOP) Sensor Circuit

Diagnostic Fault Information

IMPORTANT: Always perform the Diagnostic System Check - Vehicle prior to using this diagnostic procedure.

DTC P0520

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
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Engine Oil Pressure Sensor Signal Circuit	1	P0520	-	-
1. Engine Oil Pressure Indicator Always On				

Circuit/System Description

The engine oil pressure (EOP) switch is a normally closed switch that opens with the proper oil pressure. With the ignition switch turned ON and the engine not running, the engine control module (ECM) should detect a low signal voltage input. With the engine running, the pressure switch opens, and the ECM should detect a high signal voltage input. The ECM tests the state of the EOP circuit with the ignition switch turned ON, and the engine turned OFF.

Conditions for Running the DTC

The ignition is ON, with the engine ON.

Conditions for Setting the DTC

- The ECM detects that the EOP sensor signal circuit is pulled high.
- The above condition is present for greater than 5 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 instrument panel cluster (IPC) illuminates the engine oil pressure 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.
- The powertrain control module (PCM) 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.

Reference Information

Schematic Reference

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- **Instrument Cluster Schematics**
- **Engine Controls Schematics** for the 2.2L engine.
- **Engine Controls Schematics** for the 2.4L engine.

Connector End View Reference

- **Instrument Panel, Gages, and Console Connector End Views**
- **Engine Control Module (ECM) Connector End Views** for the 2.2L engine
- **Engine Control Module (ECM) Connector End Views** for the 2.4L engine

Electrical Information Reference

- **Circuit Testing**
- **Connector Repairs**
- **Testing for Intermittent Conditions and Poor Connections**
- **Wiring Repairs**

Scan Tool Reference

Scan Tool Data List

Circuit/System Testing

1. Ignition OFF, disconnect the EOP switch.
2. Ignition OFF, test for less than 1 ohm of resistance between the ground circuit and ground.
 - If greater than 1 ohm, test the ground circuit for an open/high resistance.
3. Ignition ON, install a 3-amp fused jumper wire between the signal circuit and ground. Verify the scan tool Engine Oil Pressure Switch parameter is Low.
 - If not Low, test the signal circuit of the EOP switch for an open/high resistance. If the circuit tests normal replace the ECM.
 - If low, replace the EOP switch.

Repair Instructions

IMPORTANT: Always perform the Diagnostic Repair Verification after completing the diagnostic procedure.

- **Engine Oil Pressure Sensor and/or Switch Replacement** for the 2.2L engine
- **Engine Oil Pressure Sensor and/or Switch Replacement** for the 2.4L engine
- **Control Module References** for the ECM replacement, setup, and programming

SYMPTOMS - INSTRUMENT PANEL, GAGES AND CONSOLE

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

1. Perform the **Diagnostic System Check - Vehicle** , before using the Symptom Tables in order to verify that all of the following are true:
 - There are no DTCs set.
 - The control modules can communicate via the serial data link.
2. Review the system operation in order to familiarize yourself with the system functions. Refer to the following procedures:
 - **Instrument Panel Cluster (IPC) Description and Operation**
 - **Indicator/Warning Message Description and Operation**
 - **Audible Warnings Description and Operation**

Visual/Physical Inspection

- Inspect for aftermarket devices which could affect the operation of the instrument panel cluster (IPC) or audible warnings system. Refer to **Checking Aftermarket Accessories** .
- Inspect the easily accessible or visible system components for obvious damage or conditions which could 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** .

Symptom List

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

Gages and Odometer

- **Fuel Gage Inaccurate or Inoperative**
- **Speedometer and/or Odometer Inaccurate or Inoperative**
- **Tachometer Inaccurate or Inoperative**

Indicators

- **Brake Warning Indicator Always On**

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- Brake Warning Indicator Inoperative
- ABS Indicator Always On
- ABS Indicator Inoperative
- Charge Indicator Always On
- Charge Indicator Inoperative
- Malfunction Indicator Lamp (MIL) Diagnosis for the 2.4L engine
- Malfunction Indicator Lamp (MIL) Inoperative for the 2.2L engine
- Malfunction Indicator Lamp (MIL) Always On
- Engine Oil Pressure Indicator Always On
- High Beam Indicator Inoperative
- Turn Signal Lamps and/or Indicators Inoperative
- Seat Belt Indicator Circuit Malfunction - Driver
- Seat Belt Indicator Circuit Malfunction - Passenger
- Air Bag Indicator Circuit Malfunction

Driver Information Center (DIC)

- Driver Information Center (DIC) Switch(es) Inoperative
- Outside Air Temperature Display Inaccurate or Inoperative

Audible Warnings

- Chime Always On
- Chime Inoperative

ENGINE COOLANT TEMPERATURE GAGE INACCURATE OR INOPERATIVE

Diagnostic Fault Information

IMPORTANT: Always perform the Diagnostic System Check - Vehicle prior to using this diagnostic procedure.

Circuit/System Description

The instrument panel cluster (IPC) displays the engine coolant temperature as determined by the engine control module (ECM). The ECM sends the temperature data via GMLAN serial data circuit to the body control module (BCM). The BCM sends the GMLAN message to the IPC in order to control the engine temperature gage and display the engine temperature.

Reference Information

Schematic Reference

Instrument Cluster Schematics

Connector End View Reference

Instrument Panel, Gages, and Console Connector End Views

Electrical Information Reference

- **Circuit Testing**
- **Connector Repairs**
- **Testing for Intermittent Conditions and Poor Connections**
- **Wiring Repairs**

Scan Tool Reference

Scan Tool Data List

Circuit/System Testing

1. Ignition ON, perform the engine coolant gage sweep test with the scan tool.
 - o If the engine coolant gage does not sweep from its low to high position, replace the instrument panel cluster (IPC).

Repair Instructions

IMPORTANT: Always perform the Diagnostic Repair Verification after completing the diagnostic procedure.

Control Module References for IPC replacement, setup, and programming.

FUEL GAGE INACCURATE OR INOPERATIVE

Diagnostic Fault Information

IMPORTANT: Always perform the Diagnostic System Check - Vehicle prior to using this diagnostic procedure.

Circuit/System Description

The fuel level sensor changes resistance in response to the fuel level. The engine control module (ECM) monitors the signal circuit of the fuel level sensor in order to determine the fuel level. When the fuel tank is full, the sensor resistance is low and the ECM senses a low signal voltage. When the fuel tank is empty, the sensor resistance is high and the ECM senses a high signal voltage. The ECM uses the signal circuit of the fuel level sensor in order to calculate the percentage of remaining fuel in the tank. The ECM sends the fuel level percentage via serial data circuit to the instrument cluster in order to control the fuel gage.

Then fuel information is also used for misfire and evaporative emission (EVAP) diagnostics.

Reference Information

Schematic Reference

- **Instrument Cluster Schematics**
- **Engine Controls Schematics** for the 2.2L engine
- **Engine Controls Schematics** for the 2.4L engine

Connector End View Reference

- **Instrument Panel, Gages, and Console Connector End Views**
- **Engine Control Module (ECM) Connector End Views** for the 2.2L engine
- **Engine Control Module (ECM) Connector End Views** for the 2.4L engine

Electrical Information Reference

- **Circuit Testing**
- **Connector Repairs**
- **Testing for Intermittent Conditions and Poor Connections**
- **Wiring Repairs**

Scan Tool Reference

Scan Tool Data List

Circuit/System Testing

1. Ignition OFF, disconnect C401, install a signal generator and instrument panel tester between the signal circuit and the low reference circuit.
2. Ignition ON, vary the resistance on the signal generator from 40-250 ohms and monitor the fuel gage.
 - If the fuel gage displays the correct fuel level, test the signal circuit for an open/high resistance between C401 and the fuel level sender. If the circuit tests normal, test the low reference circuit for an open/high resistance between C401 and the fuel level sender.
 - If all circuits test normal, replace the fuel level sender.
3. Ignition ON, vary the resistance on the signal generator from 40-250 ohms. Verify that the scan tool Fuel Tank Level Remaining parameter displays the correct fuel level percent.
 - If the fuel level percent is correct, replace the instrument panel cluster (IPC).
 - If the fuel level percent is incorrect, test the signal circuit for an open/high

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resistance. If the circuit tests normal, test the low reference circuit for an open/high resistance.

- If all circuits test normal, replace the ECM.

Repair Instructions

IMPORTANT: Always perform the Diagnostic Repair Verification after completing the diagnostic procedure.

- Fuel Level Sensor Replacement for the 2.2L engine
- Fuel Level Sensor Replacement for the 2.4L engine
- Control Module References for the ECM and IPC replacement, setup, and programming

ODOMETER TRIP/RESET SWITCH INOPERATIVE

Diagnostic Fault Information

IMPORTANT: Always perform the Diagnostic System Check - Vehicle prior to using this diagnostic procedure.

Circuit/System Description

The body control module (BCM) calculates the mileage based on the vehicle speed signal circuit from the engine control module (ECM). The BCM then sends a GMLAN serial data message to the instrument panel cluster (IPC) indicating the value of the odometer. The odometer will display 'error' if an internal BCM memory failure is detected. The odometer displays either miles or kilometers and the desired units can be accessed by pressing the trip/reset switch.

Reference Information

Schematic Reference

Instrument Cluster Schematics

Connector End View Reference

Instrument Panel, Gages, and Console Connector End Views

Electrical Information Reference

- Circuit Testing
- Connector Repairs
- Testing for Intermittent Conditions and Poor Connections

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• Wiring Repairs

Scan Tool Reference

Scan Tool Data List

Circuit/System Testing

1. Ignition ON, press the trip reset button.
 - o If the odometer display does not switch between trip and odometer, replace the instrument panel cluster.

Repair Instructions

IMPORTANT: Always perform the Diagnostic Repair Verification after completing the diagnostic procedure.

Control Module References for IPC replacement, setup, and programming

SPEEDOMETER AND/OR ODOMETER INACCURATE OR INOPERATIVE

Diagnostic Fault Information

IMPORTANT: Always perform the Diagnostic System Check - Vehicle prior to using this diagnostic procedure.

Circuit/System Description

The instrument panel cluster (IPC) displays the vehicle speed based on the information from the engine control module (ECM). The ECM converts the data from the vehicle speed sensor to a 4000 pulses/mile signal. The PCM sends the vehicle speed information via GMLAN serial data circuit to the body control module (BCM). The BCM sends the GMLAN message to the IPC in order to control the speedometer gage and display the vehicle speed and miles traveled.

Diagnostic Aids

Check for the following DTCs:

- DTC B1000
- DTC B1009
- DTC U2100
- DTC U2103
- DTC U2105-U2199

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Reference Information

Schematic Reference

Instrument Cluster Schematics

Connector End View Reference

Instrument Panel, Gages, and Console Connector End Views

Electrical Information Reference

- Circuit Testing
- Connector Repairs
- Testing for Intermittent Conditions and Poor Connections
- Wiring Repairs

Scan Tool Reference

Scan Tool Data List

Circuit/System Testing

1. Ignition OFF, raise the vehicles drive wheels.
2. Engine ON, transmission in drive, verify the scan tool Vehicle Speed Sensor parameter matches the speedometer display.
 - If the Vehicle Speed Sensor parameter does not match the speedometer display, replace the IPC.
 - If the odometer is not operating properly, replace the IPC.

Repair Instructions

IMPORTANT: Always perform the Diagnostic Repair Verification after completing the diagnostic procedure.

Control Module References for IPC replacement, setup, and programming.

TACHOMETER INACCURATE OR INOPERATIVE

Diagnostic Fault Information

IMPORTANT: Always perform the Diagnostic System Check - Vehicle prior to using this diagnostic procedure.

Circuit/System Description

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The instrument panel cluster (IPC) displays the engine speed based on the information from the engine control module (ECM). The ECM converts the data from the engine speed sensor to a 2 pulses/engine revolution signal. The PCM sends the engine speed information via GMLAN serial data circuit to the body control module (BCM). The BCM sends the GMLAN message to the IPC in order to control the tachometer gage and display the engine speed.

Reference Information

Schematic Reference

Instrument Cluster Schematics

Connector End View Reference

Instrument Panel, Gages, and Console Connector End Views

Electrical Information Reference

- Circuit Testing
- Connector Repairs
- Testing for Intermittent Conditions and Poor Connections
- Wiring Repairs

Scan Tool Reference

Scan Tool Data List

Circuit/System Testing

1. Ignition ON, perform the tachometer gage sweep test with the scan tool.
 - o If the tachometer gage does not sweep from its low to high position, replace the instrument panel cluster (IPC).

Repair Instructions

IMPORTANT: Always perform the Diagnostic Repair Verification after completing the diagnostic procedure.

Control Module References for IPC replacement, setup, and programming

ENGINE OIL PRESSURE INDICATOR ALWAYS ON

Diagnostic Fault Information

IMPORTANT: Always perform the Diagnostic System Check - Vehicle prior to

using this diagnostic procedure.

Circuit/System Description

The engine oil pressure (EOP) switch is a normally closed switch that opens with the proper oil pressure. With the ignition switch turned ON and the engine not running, the engine control module (ECM) should detect a low signal voltage input. With the engine running, the pressure switch opens, and the ECM should detect a high signal voltage input. The ECM tests the state of the EOP circuit with the ignition switch turned ON, and the engine turned OFF. If the ECM detects a high voltage input on the EOP signal circuit, DTC P1189 will set.

Reference Information

Schematic Reference

- **Instrument Cluster Schematics**
- **Engine Controls Schematics** for the 2.2L engine
- **Engine Controls Schematics** for the 2.4L engine

Connector End View Reference

- **Instrument Panel, Gages, and Console Connector End Views**
- **Engine Control Module (ECM) Connector End Views** for the 2.2L engine
- **Engine Control Module (ECM) Connector End Views** for the 2.4L engine

Electrical Information Reference

- **Circuit Testing**
- **Connector Repairs**
- **Testing for Intermittent Conditions and Poor Connections**
- **Wiring Repairs**

Scan Tool Reference

Scan Tool Data List

Circuit/System Testing

1. Ignition ON, verify the scan tool Engine Oil Pressure Switch parameter is Low.
 - If not Low, replace the instrument panel cluster (IPC).
2. Ignition OFF, disconnect the EOP switch.
3. Ignition ON, engine ON, verify the scan tool Engine Oil Pressure Switch parameter is Ok.

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- If Ok, replace the EOP switch.
- If Low, test the signal circuit of the EOP switch for a short to ground. If the circuit tests normal, replace the ECM.

Repair Instructions

IMPORTANT: Always perform the Diagnostic Repair Verification after completing the diagnostic procedure.

- Engine Oil Pressure Sensor and/or Switch Replacement for the 2.2L engine
- Engine Oil Pressure Sensor and/or Switch Replacement for the 2.4L engine
- Control Module References for the PCM and IPC replacement, setup, and programming

DRIVER INFORMATION CENTER (DIC) SWITCH(ES) INOPERATIVE

Diagnostic Fault Information

IMPORTANT: Always perform the Diagnostic System Check - Vehicle prior to using this diagnostic procedure.

Circuit/System Description

The driver information switches are normally open momentary switches. Power is provided to the driver information center (DIC) switches via the IPC ignition 1 voltage circuit. The IPC ignition 1 voltage circuit is fused in the body control module (BCM). The instrument panel cluster (IPC) interfaces with the DIC switches via two discreet circuits. The switch input to the cluster is pulled low or grounded when a switch is activated. The IPC reads the voltage at the analog input to determine which switch(es) is pressed. The switch input to the cluster is set up in a resistor ladder format. The DIC switches include the INFO and the SELECT/RESET switches. A simultaneous press and hold of the INFO and SELECT/RESET switch activates the MENU switch. The MENU switch is the third embedded switch used to activate the various DIC menus.

Reference Information

Schematic Reference

Instrument Cluster Schematics

Connector End View Reference

- Instrument Panel, Gages, and Console Connector End Views
- Steering Wheel and Column Connector End Views

Electrical Information Reference

- Circuit Testing
- Connector Repairs
- Testing for Intermittent Conditions and Poor Connections
- Wiring Repairs

Scan Tool Reference

Scan Tool Data List

Circuit/System Testing

1. Ignition OFF, disconnect the harness connector at the DIC switch assembly.
2. Ignition OFF, test for less than 1.0 ohm of resistance between the ground circuit and ground.
 - If greater than 1.0 ohm, test the ground circuit for an open/high resistance.
3. Ignition ON, verify all of the scan tool DIC Switch parameters are Inactive.
 - If any are not Inactive, test the signal circuit for a short to ground. If the circuit tests normal, test the ignition voltage circuit of the IPC for an open/high resistance.
 - If all circuits test normal, replace the IPC.
4. Ignition ON, install a 3-amp fused jumper wire between the signal circuit and ground. Verify all of the scan tool DIC Switch parameters are Active.
 - If any are not Active, test the signal circuit for an open/high resistance. If the circuit tests normal, test the ignition voltage circuit of the IPC for an open/high resistance. If the circuits test normal, replace the IPC.
 - If all are Active, replace the DIC switch assembly.

Repair Instructions

IMPORTANT: Always perform the Diagnostic Repair Verification after completing the diagnostic procedure.

- Steering Wheel Control Switch Assembly Replacement
- Control Module References for PCM or IPC replacement, setup, and programming

OUTSIDE AIR TEMPERATURE DISPLAY INACCURATE OR INOPERATIVE

Diagnostic Fault Information

IMPORTANT: Always perform the Diagnostic System Check - Vehicle prior to using this diagnostic procedure.

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Circuit/System Description

The outside air temperature sensor is a variable resistor interfaced to the body control module (BCM). The BCM provides the logic for reading the sensor, filtering the data and transmitting this information via the GM LAN Low Speed Bus to the instrument panel cluster (IPC) for display. The temperature is sent to the IPC in Degrees Celsius. The IPC is responsible for displaying the temperature and converting to Degrees Fahrenheit if necessary. Two GM LAN Low Speed Bus signals are ultimately generated. An un-filtered value and a filtered value for use by the IPC display. The BCM also provides the sensor out-of-range detection and compensates for engine temperature by utilizing vehicle speed and engine off time duration. The algorithm for all messages is executed at a rate of once every 1 second.

Reference Information

Schematic Reference

Instrument Cluster Schematics

Connector End View Reference

- Instrument Panel, Gages, and Console Connector End Views
- Computer/Integrating Systems Connector End Views

Electrical Information Reference

- Circuit Testing
- Connector Repairs
- Testing for Intermittent Conditions and Poor Connections
- Wiring Repairs

Scan Tool Reference

Scan Tool Data List

Circuit/System Testing

1. Ignition OFF, disconnect the ambient air temperature sensor.
2. Ignition OFF, test for less than 1.0 ohm of resistance between the low reference circuit and ground.
 - If greater than 1.0 ohm, test the ground circuit for an open/high resistance.
3. Ignition ON, verify the scan tool Ambient Air Temp. Sensor parameter is greater than 4.7 volts.
 - If less than 4.7 volts, test the signal circuit for a short to ground.

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4. Ignition ON, install a 3-amp fused jumper wire between the signal circuit and ground. Verify the scan tool Ambient Air Temp. Sensor parameter is less than 0.4 volts.
 - If greater than 0.4 volts, test the signal circuit for an open/high resistance. If the circuit tests normal replace the BCM.
 - If the scan tool parameter is normal, replace the ambient air temperature sensor.

Repair Instructions

IMPORTANT: Always perform the Diagnostic Repair Verification after completing the diagnostic procedure.

- Ambient Air Temperature Gage Sensor Replacement
- Control Module References for BCM replacement, setup, and programming.

CHIME ALWAYS ON

Diagnostic Fault Information

IMPORTANT: Always perform the Diagnostic System Check - Vehicle prior to using this diagnostic procedure.

Circuit/System Description

The radio generates the audible warning through the left front speaker. The radio receives audible warning requests via GMLAN serial data from the body control module (BCM).

Reference Information

Schematic Reference

- Instrument Cluster Schematics
- Body Control System Schematics
- Column/Ignition Lock Schematics
- Radio/Audio System Schematics

Connector End View Reference

- Instrument Panel, Gages, and Console Connector End Views
- Computer/Integrating Systems Connector End Views
- Steering Wheel and Column Connector End Views
- Entertainment Connector End Views

Electrical Information Reference

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- **Circuit Testing**
- **Connector Repairs**
- **Testing for Intermittent Conditions and Poor Connections**
- **Wiring Repairs**

Scan Tool Reference

Scan Tool Data List

Circuit/System Testing

1. Ignition ON, headlamp switch OFF, verify the scan tool Headlamp Off Switch parameter is Off.
 - If not Off, test the headlamps off signal circuit for an open or short to voltage. If the circuit tests normal, replace the headlamp switch.
2. Ignition ON, park lamp switch OFF, verify the scan tool Park Lamp Switch parameter is Off.
 - If not Off, test the park lamp switch signal circuit for an open or short to voltage. If the circuit tests normal, replace the headlamp switch.
3. Ignition OFF, key out of the ignition, verify the scan tool Key In Ignition Cylinder parameter is No.
 - If not No, test the key in ignition switch signal circuit for an open or short to voltage. If the circuit tests normal, replace the ignition switch.
4. Ignition ON, doors closed, verify the scan tool Door Ajar Switch parameters.
 - If any parameter displays Door Ajar, go to **Courtesy Lamps Always On** .
 - If all parameters display Door Closed, replace the BCM.

Repair Instructions

IMPORTANT: Always perform the **Diagnostic Repair Verification** after completing the diagnostic procedure.

- **Ignition Switch Replacement**
- **Multifunction, Turn Signal Switch Replacement**
- **Control Module References** for BCM replacement, setup, and programming.

CHIME INOPERATIVE

Diagnostic Fault Information

IMPORTANT: Always perform the **Diagnostic System Check - Vehicle** prior to using this diagnostic procedure.

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Circuit/System Description

The radio generates the audible warning through the left front speaker. The radio receives audible warning requests via GMLAN serial data from the body control module (BCM).

Reference Information

Schematic Reference

- Instrument Cluster Schematics
- Radio/Audio System Schematics

Connector End View Reference

- Instrument Panel, Gages, and Console Connector End Views
- Entertainment Connector End Views

Electrical Information Reference

- Circuit Testing
- Connector Repairs
- Testing for Intermittent Conditions and Poor Connections
- Wiring Repairs

Scan Tool Reference

Scan Tool Data List

Circuit/System Testing

1. Ignition OFF, key in the ignition, open the driver door.
 - If the courtesy lamps do not illuminate, go to **Courtesy Lamps Inoperative** .
2. Ignition ON, radio ON, adjust the radio balance and fade to the left front speaker.
 - If the speaker operates properly, replace the radio.
 - If the speaker does not operate properly, go to **Speakers Inoperative - One or More** .

Repair Instructions

IMPORTANT: Always perform the **Diagnostic Repair Verification** after completing the diagnostic procedure.

Control Module References for radio replacement, setup, and programming

REPAIR INSTRUCTIONS

INSULATOR REPLACEMENT - INSTRUMENT PANEL (I/P)

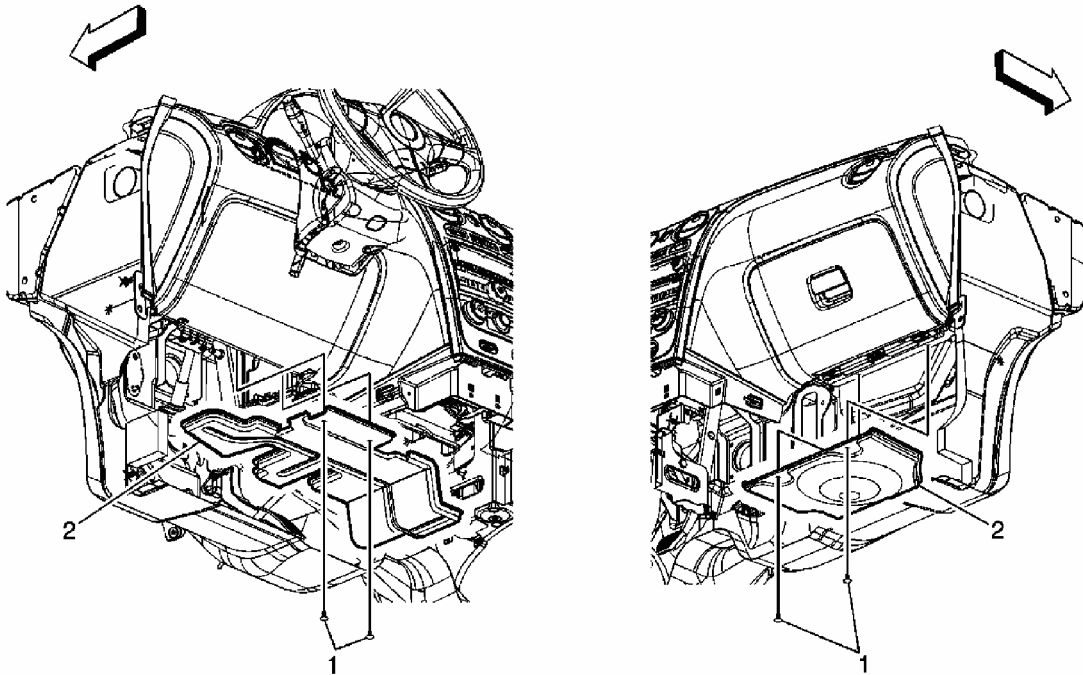


Fig. 13: Insulator Replacement - Instrument Panel (I/P)
Courtesy of GENERAL MOTORS CORP.

Insulator Replacement - Instrument Panel (I/P)

Callout	Component Name
Fastener Tightening Specifications: Refer to Fastener Tightening Specifications.	
1	Retainer, Push Pin (Qty: 2)
2	Panel Assembly, Insulator/Closeout

KNEE BOLSTER REINFORCEMENT REPLACEMENT

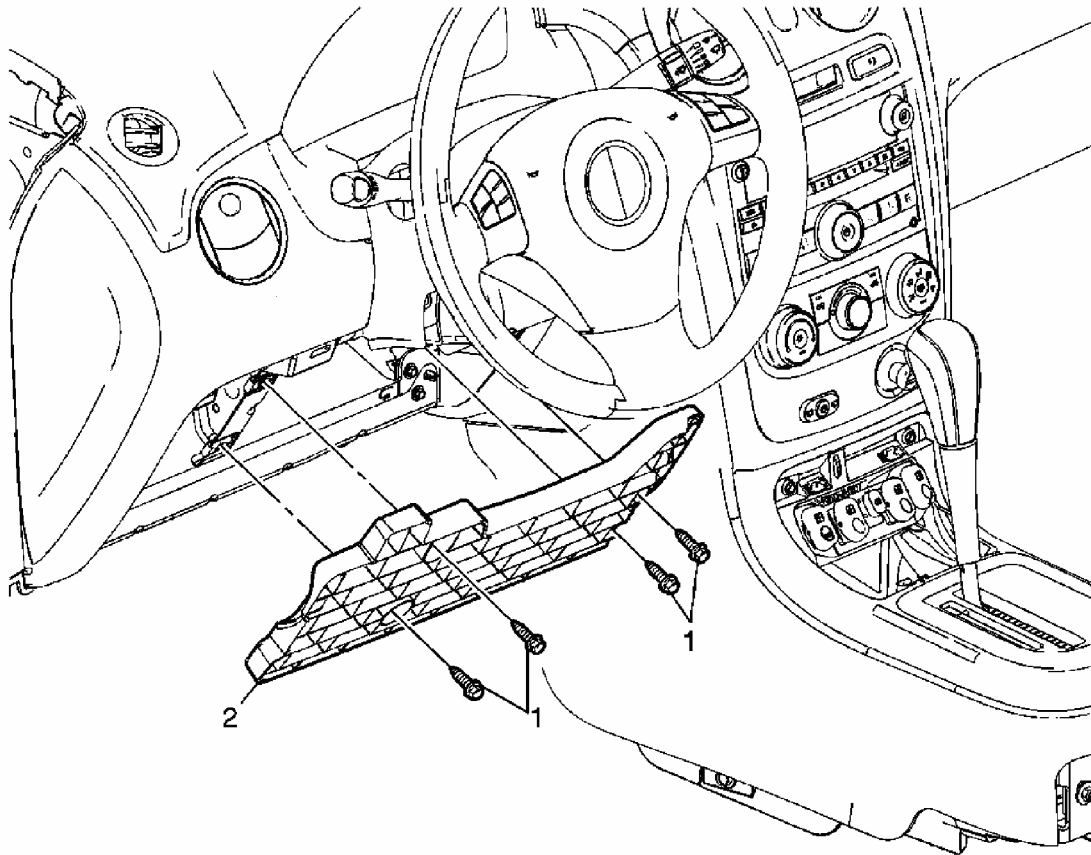


Fig. 14: Knee Bolster Reinforcement Replacement
Courtesy of GENERAL MOTORS CORP.

Knee Bolster Reinforcement Replacement

Callout	Component Name
NOTE: Refer to Fastener Notice .	
Fastener Tightening Specifications: Refer to Fastener Tightening Specifications . Preliminary Procedure: Remove the driver knee bolster assembly. Refer to Knee Bolster Replacement .	
1	Screw, Driver Knee Bolster Reinforcement (Qty: 4) Tighten: 2 N.m (18 lb in)
2	Reinforcement Assembly, Driver Knee Bolster

KNEE BOLSTER REPLACEMENT

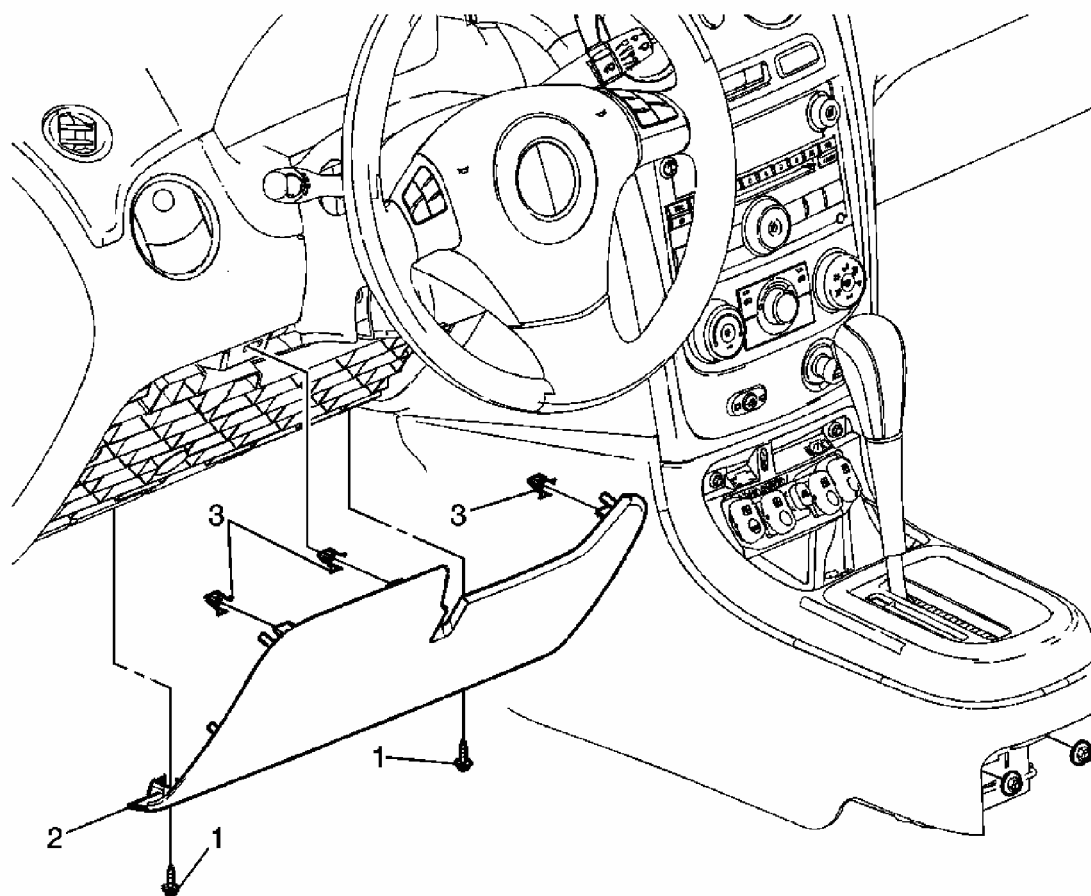


Fig. 15: Knee Bolster Replacement
 Courtesy of GENERAL MOTORS CORP.

Knee Bolster Replacement

Callout	Component Name
NOTE: Refer to Fastener Notice .	
Fastener Tightening Specifications: Refer to Fastener Tightening Specifications .	
1	Screw, Driver Knee Bolster (Qty: 2) Tighten: 2 N.m (18 lb in)
2	Bolster Assembly, Driver Knee
3	Clip, Retainer (Qty: 3)

TRIM PLATE REPLACEMENT - INSTRUMENT PANEL (I/P) ACCESSORY

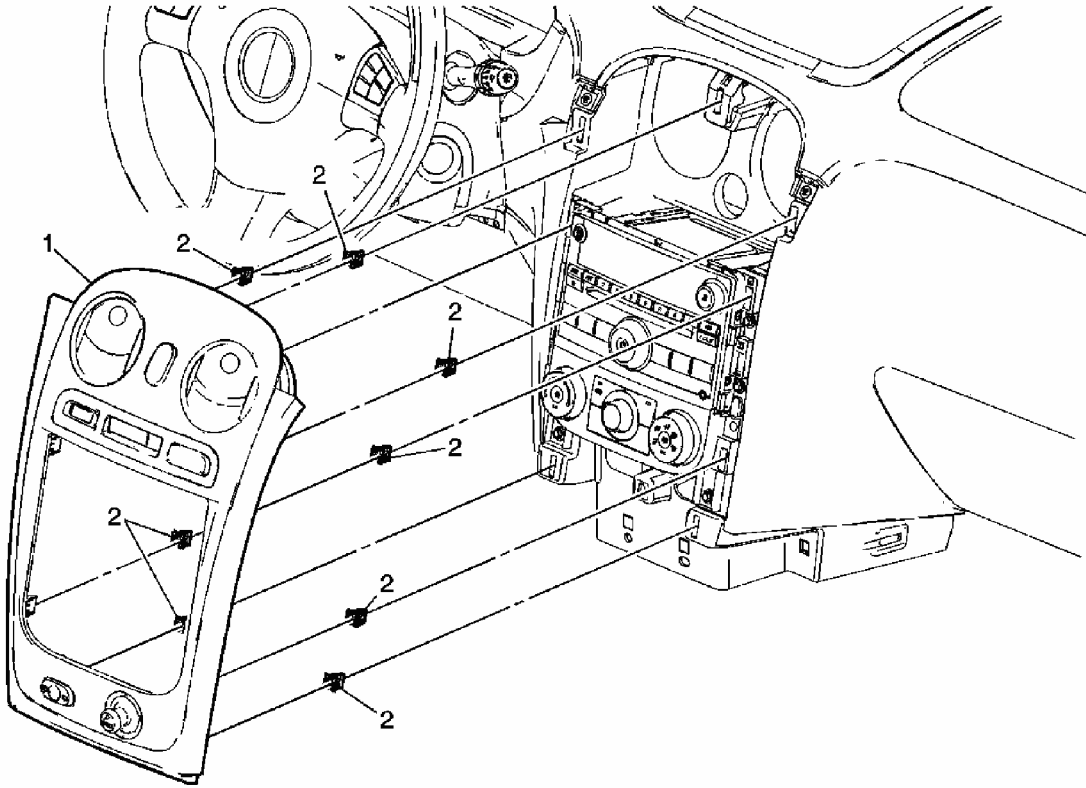


Fig. 16: Trim Plate Replacement - Instrument Panel (I/P) Accessory
 Courtesy of GENERAL MOTORS CORP.

Trim Plate Replacement - Instrument Panel (I/P) Accessory

Callout	Component Name
Fastener Tightening Specifications: Refer to Fastener Tightening Specifications.	
1	Plate Assembly, Instrument Panel Accessory Trim Tip: Disconnect the electrical connectors.
2	Clip, Retainer (Qty: 8)

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

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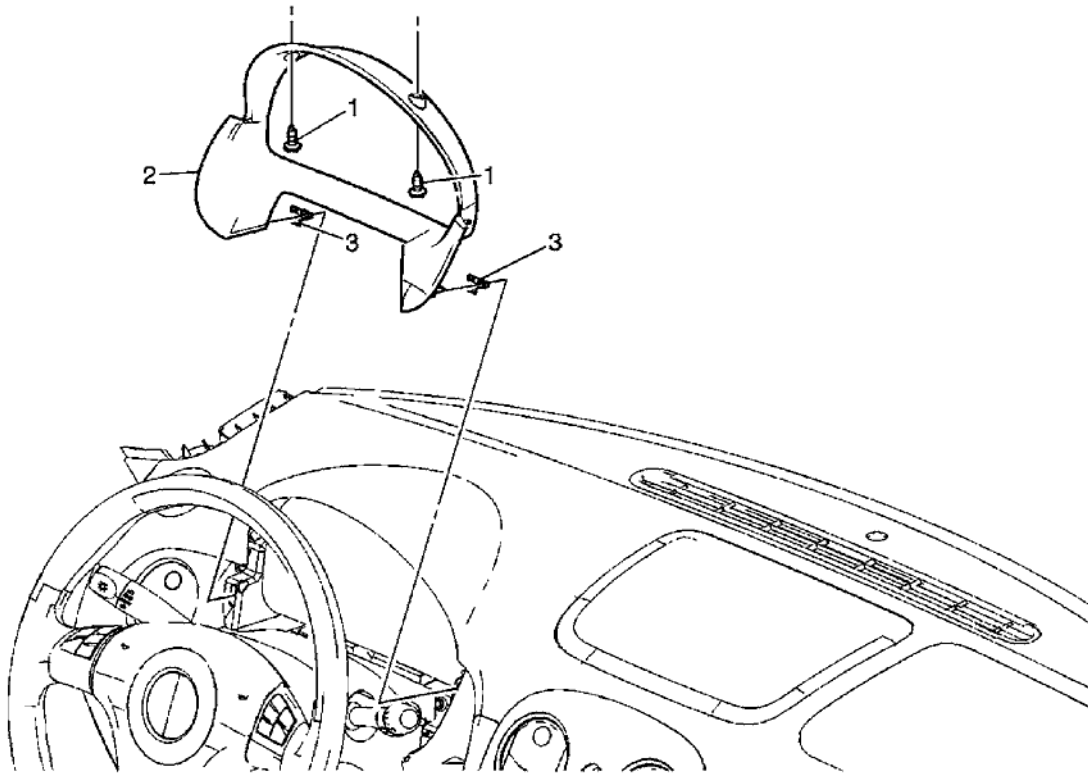


Fig. 17: Trim Plate Bezel Replacement - Instrument Panel (I/P) Cluster
Courtesy of GENERAL MOTORS CORP.

Trim Plate Bezel Replacement - Instrument Panel (I/P) Cluster

Callout	Component Name
NOTE: Refer to Fastener Notice .	
Fastener Tightening Specifications: Refer to Fastener Tightening Specifications . Preliminary Procedure: Remove the steering column trim covers. Refer to Steering Column Trim Covers Replacement .	
1	Screw, Instrument Panel Cluster Trim Plate (Qty: 2) Tighten: 2 N.m (18 lb in)
2	Plate Assembly, Instrument Panel Cluster Trim
3	Clip, Retainer (Qty: 2)

INSTRUMENT PANEL (I/P) OUTER TRIM COVER REPLACEMENT

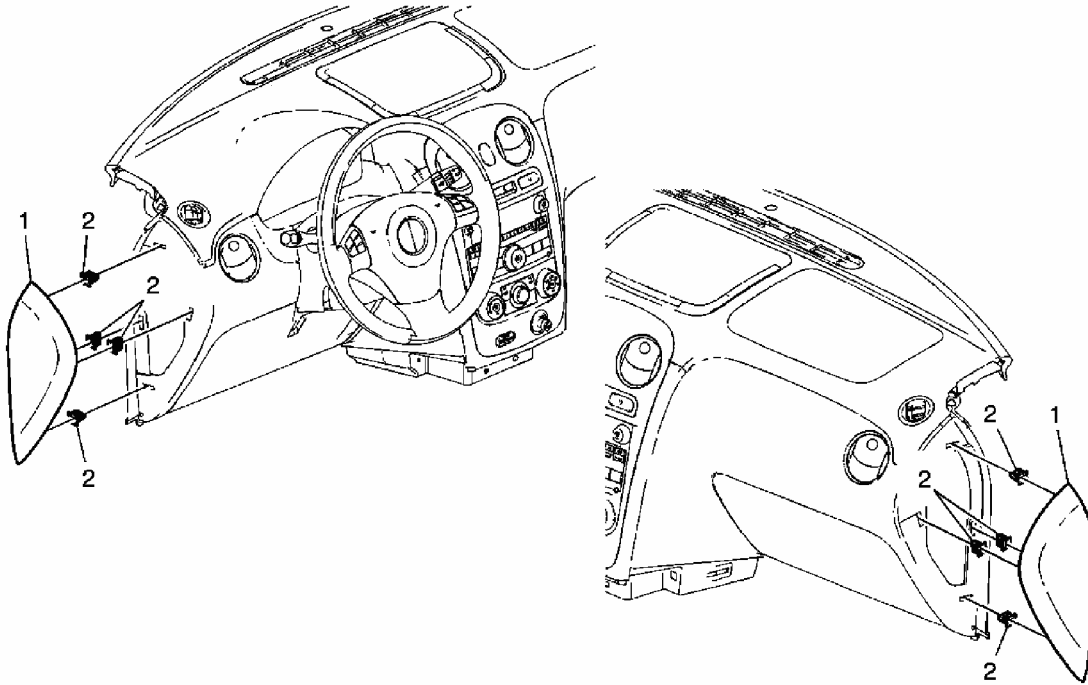


Fig. 18: Instrument Panel (I/P) Outer Trim Cover Replacement
Courtesy of GENERAL MOTORS CORP.

Instrument Panel (I/P) Outer Trim Cover Replacement

Callout	Component Name
Fastener Tightening Specifications: Refer to <u>Fastener Tightening Specifications</u>.	
1	Cover Assembly, Instrument Panel Outer Trim
2	Clip, Retainer (Qty: 4)

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

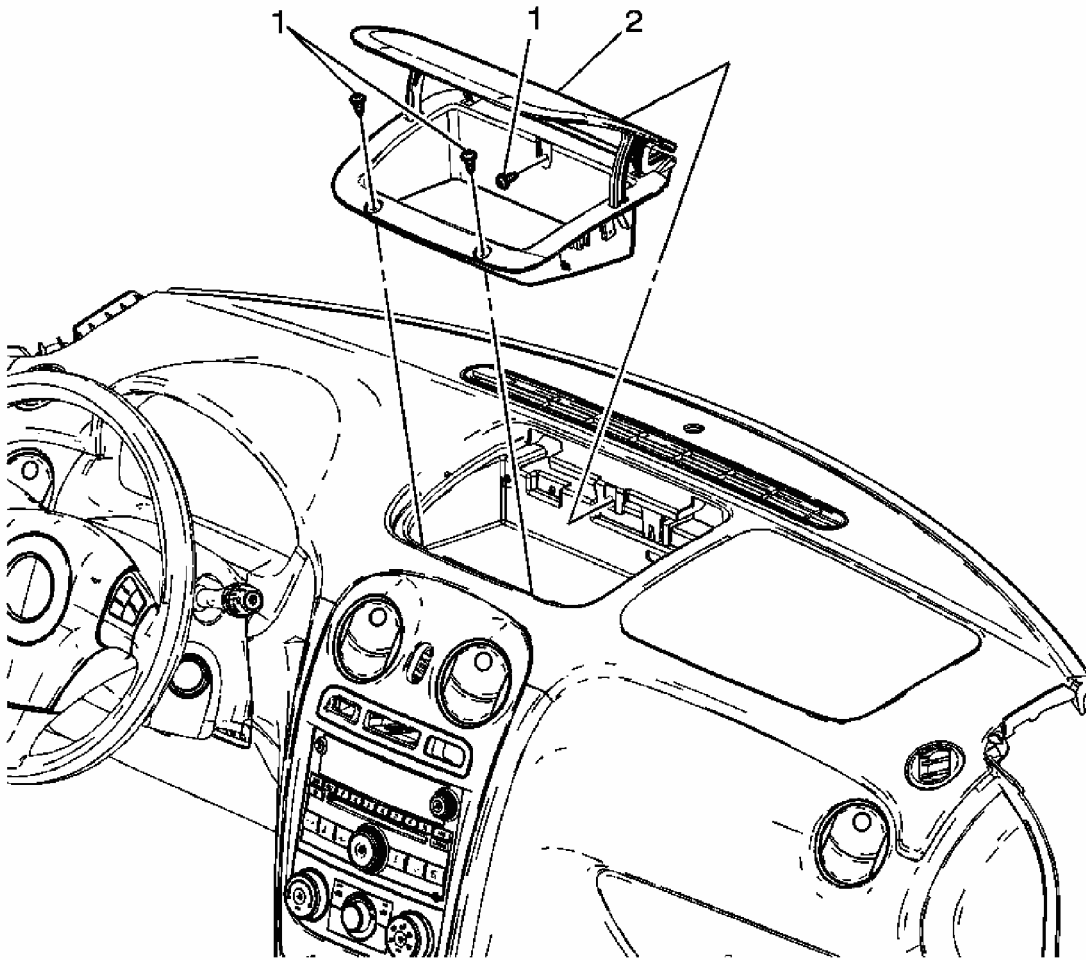


Fig. 19: Compartment Replacement - Instrument Panel (I/P) - Center
Courtesy of GENERAL MOTORS CORP.

Compartment Replacement - Instrument Panel (I/P) - Center

Callout	Component Name
NOTE: Refer to Fastener Notice .	
Fastener Tightening Specifications: Refer to Fastener Tightening Specifications .	
1	Screw, Instrument Panel Center Compartment (Qty: 3) Tighten: 2 N.m (18 lb in)
2	Compartment Assembly, Instrument Panel Center

COMPARTMENT REPLACEMENT - INSTRUMENT PANEL (I/P)

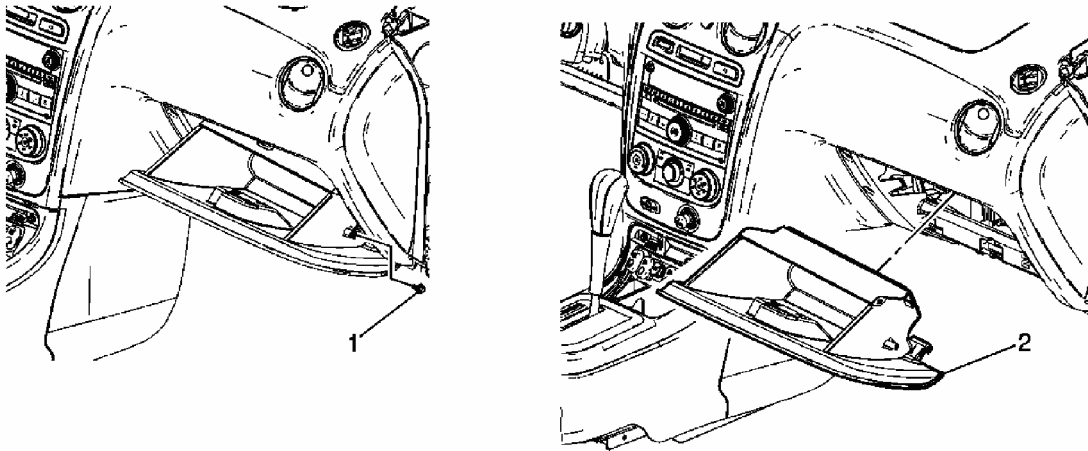


Fig. 20: Compartment Replacement - Instrument Panel (I/P)
 Courtesy of GENERAL MOTORS CORP.

Compartment Replacement - Instrument Panel (I/P)

Callout	Component Name
NOTE: Refer to <u>Fastener Notice</u> .	
Fastener Tightening Specifications: Refer to <u>Fastener Tightening Specifications</u> .	
1	Screw, Instrument Panel Compartment Dampener (Qty: 1) Tighten: 2 N.m (18 lb in)
2	Compartment Assembly, Instrument Panel Tip: 1. Squeeze the sides of the compartment and pull the compartment out of the instrument panel opening past the stops. 2. Detach the instrument panel compartment latch from the instrument panel.

STRIKER REPLACEMENT - INSTRUMENT PANEL (I/P) COMPARTMENT

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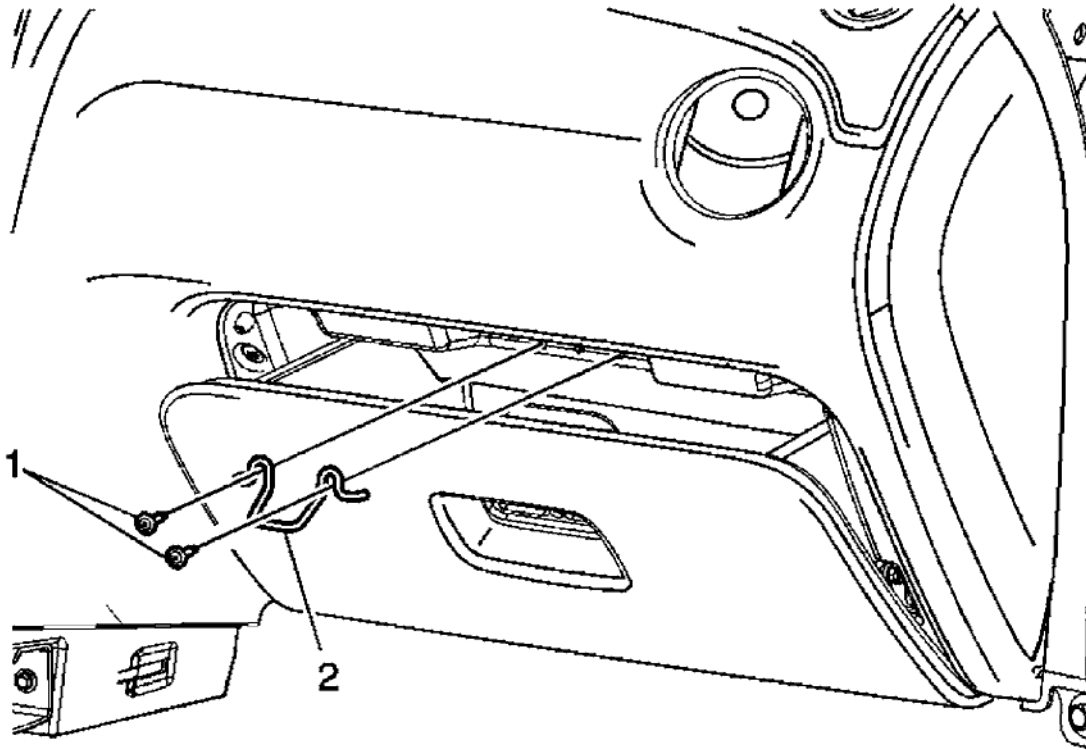


Fig. 21: Compartment Replacement - Instrument Panel (I/P)
Courtesy of GENERAL MOTORS CORP.

Striker Replacement - Instrument Panel (I/P) Compartment

Callout	Component Name
NOTE: Refer to <u>Fastener Notice</u> .	
Fastener Tightening Specifications: Refer to <u>Fastener Tightening Specifications</u> .	
1	Screws, Instrument Panel Compartment Striker (Qty: 2) Tighten: 2 N.m (18 lb in)
2	Striker, Instrument Panel Compartment

LATCH REPLACEMENT - INSTRUMENT PANEL (I/P) COMPARTMENT

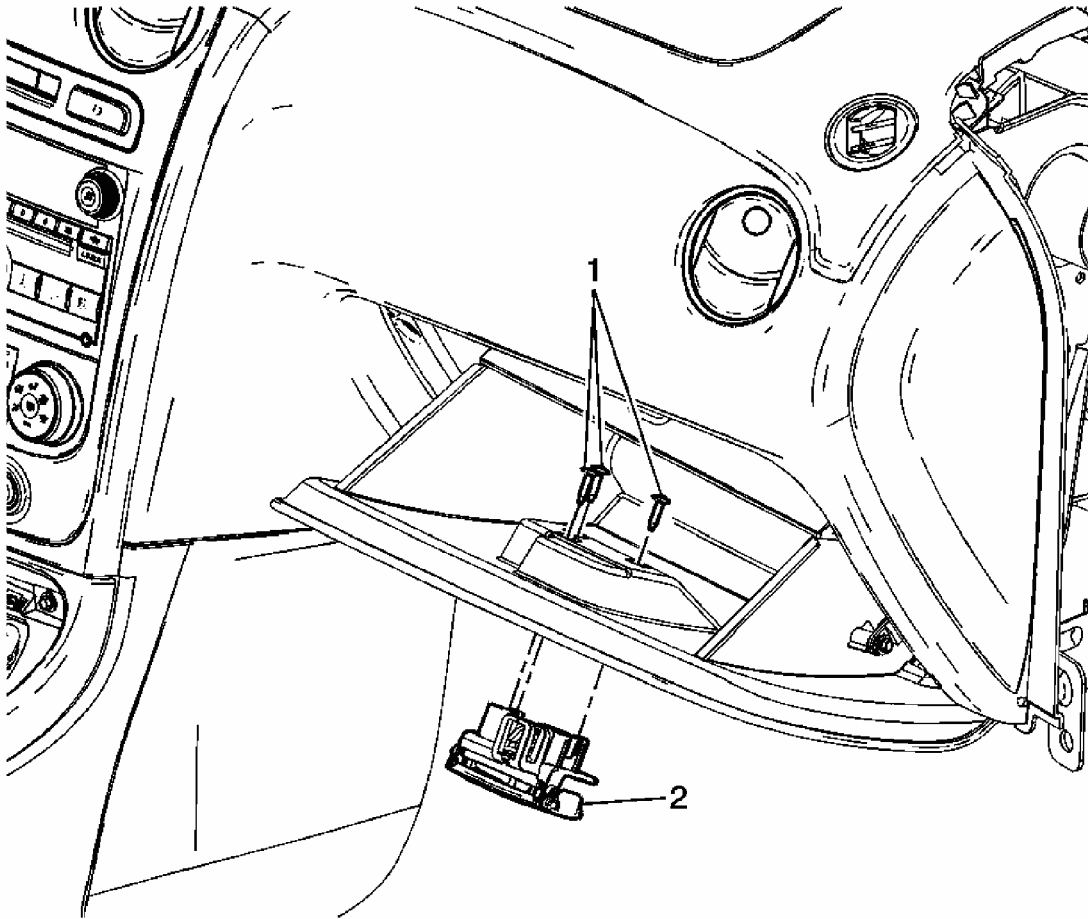


Fig. 22: Latch Replacement - Instrument Panel (I/P) Compartment
Courtesy of GENERAL MOTORS CORP.

Latch Replacement - Instrument Panel (I/P) Compartment

Callout	Component Name
NOTE: Refer to <u>Fastener Notice</u> .	
Fastener Tightening Specifications: Refer to <u>Fastener Tightening Specifications</u> .	
1	Screw, Instrument Panel Compartment Latch (Qty: 3) Tighten: 2 N.m (18 lb in)
2	Latch Assembly, Instrument Panel Compartment

DAMPENER REPLACEMENT - I/P COMPARTMENT

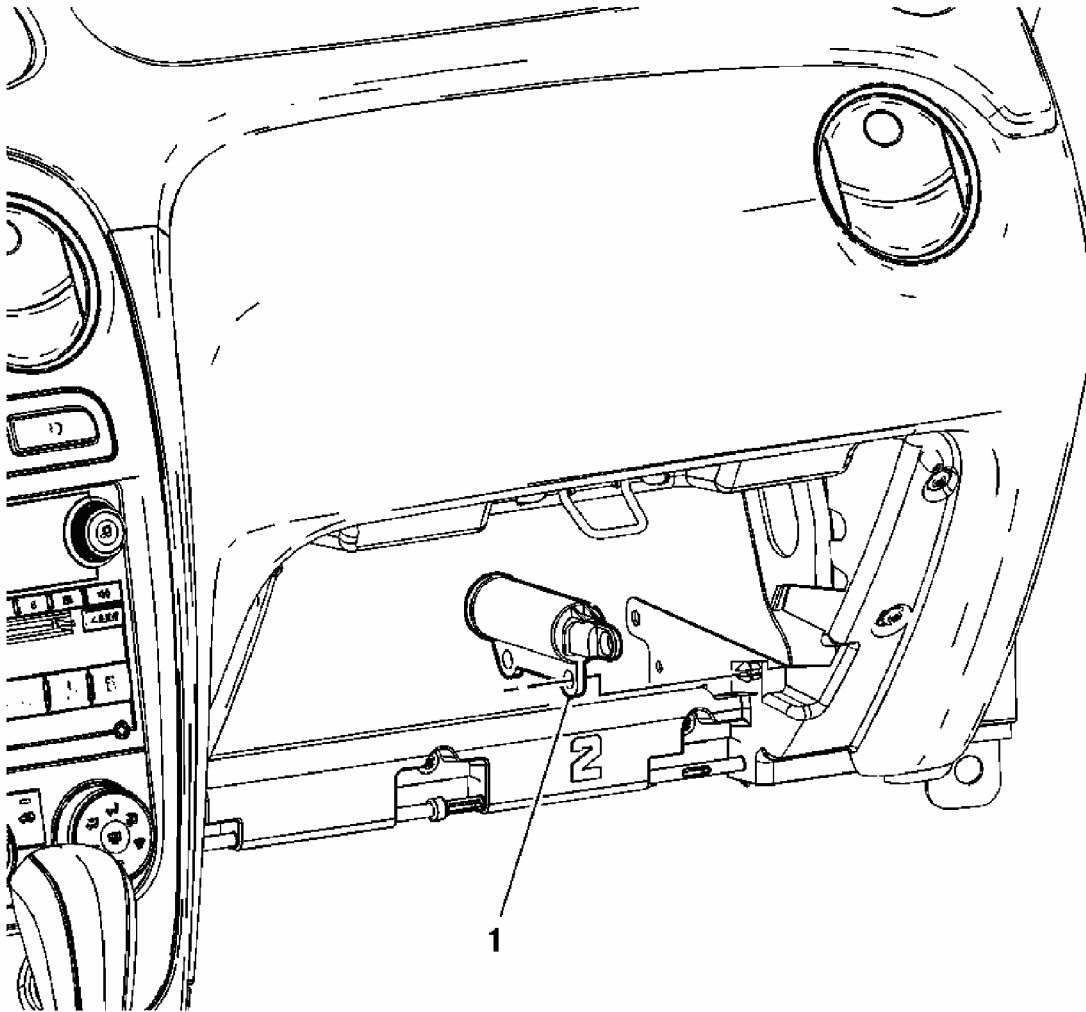


Fig. 23: Latch Replacement - Instrument Panel (I/P) Compartment
Courtesy of GENERAL MOTORS CORP.

Dampener Replacement - I/P Compartment

Callout	Component Name
NOTE: Refer to <u>Fastener Notice</u> .	
Fastener Tightening Specifications: Refer to <u>Fastener Tightening Specifications</u> . Preliminary Procedure: Remove the instrument panel compartment. Refer to <u>Compartment Replacement - Instrument Panel (I/P)</u> .	
1	Dampener Assembly, Instrument Panel Compartment

TRIM PAD REPLACEMENT - INSTRUMENT PANEL (I/P) UPPER

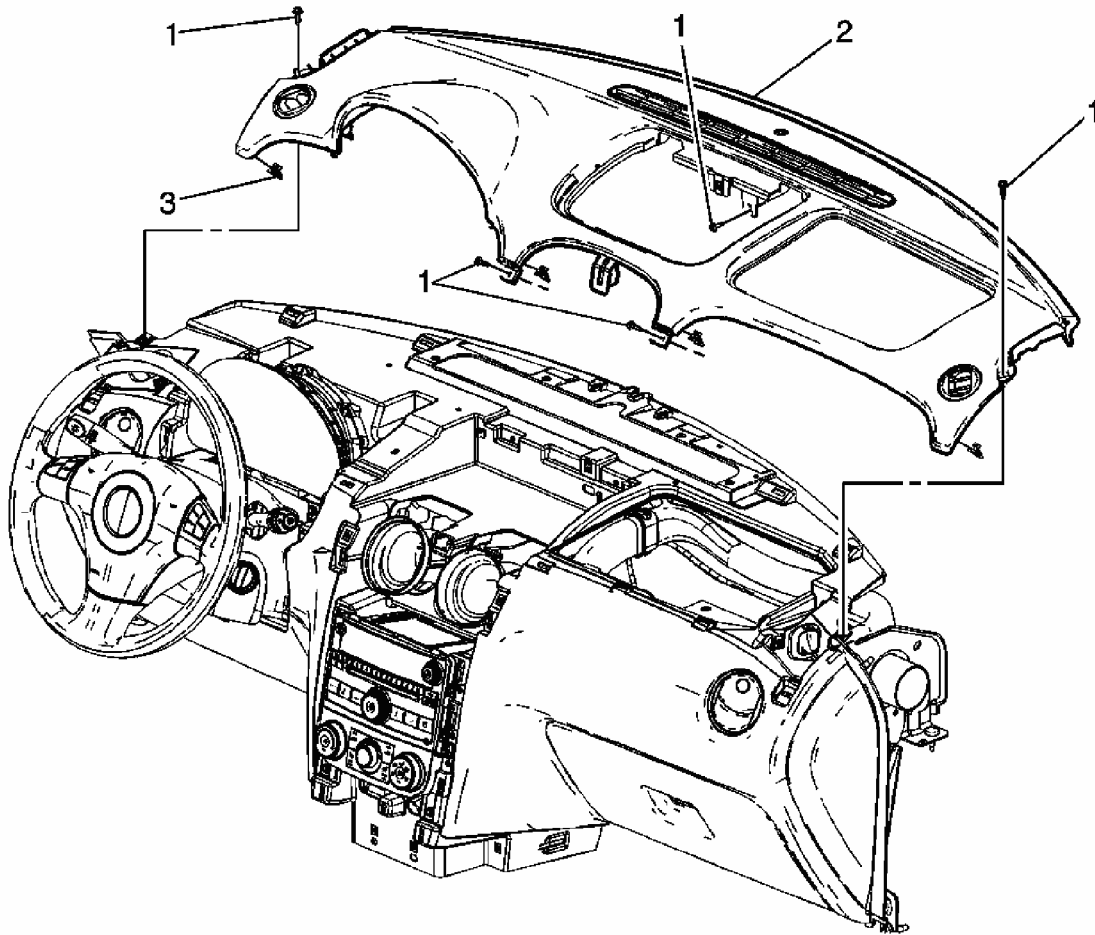


Fig. 24: Trim Pad Replacement - Instrument Panel (I/P) Upper
 Courtesy of GENERAL MOTORS CORP.

Trim Pad Replacement - Instrument Panel (I/P) Upper

Callout	Component Name
NOTE: Refer to <u>Fastener Notice</u> . Fastener Tightening Specifications: Refer to <u>Fastener Tightening Specifications</u>. Preliminary Procedures 1. Remove the windshield garnish moldings. Refer to <u>Windshield Garnish Molding Replacement</u> . 2. Remove the instrument panel cluster bezel trim plate. Refer to <u>Trim Plate Bezel Replacement - Instrument Panel (I/P) Cluster</u>. 3. Remove the instrument panel accessory trim plate. Refer to <u>Trim Plate Replacement - Instrument Panel (I/P) Accessory</u>.	

4. Remove the instrument panel center compartment. Refer to **Compartment Replacement - Instrument Panel (I/P) - Center**.
5. Remove the instrument panel inflatable restraint. Refer to **Inflatable Restraint Instrument Panel Module Replacement**.

1	Screw, Instrument Panel Upper Trim Pad (Qty: 5) Tighten: 2 N.m (18 lb in)
2	Pad Assembly, Instrument Panel Upper Trim Tip: Disconnect the electrical connectors.
3	Clip, Retainer (Qty: 14)

BRACKET REPLACEMENT - INSTRUMENT PANEL (I/P) CENTER SUPPORT

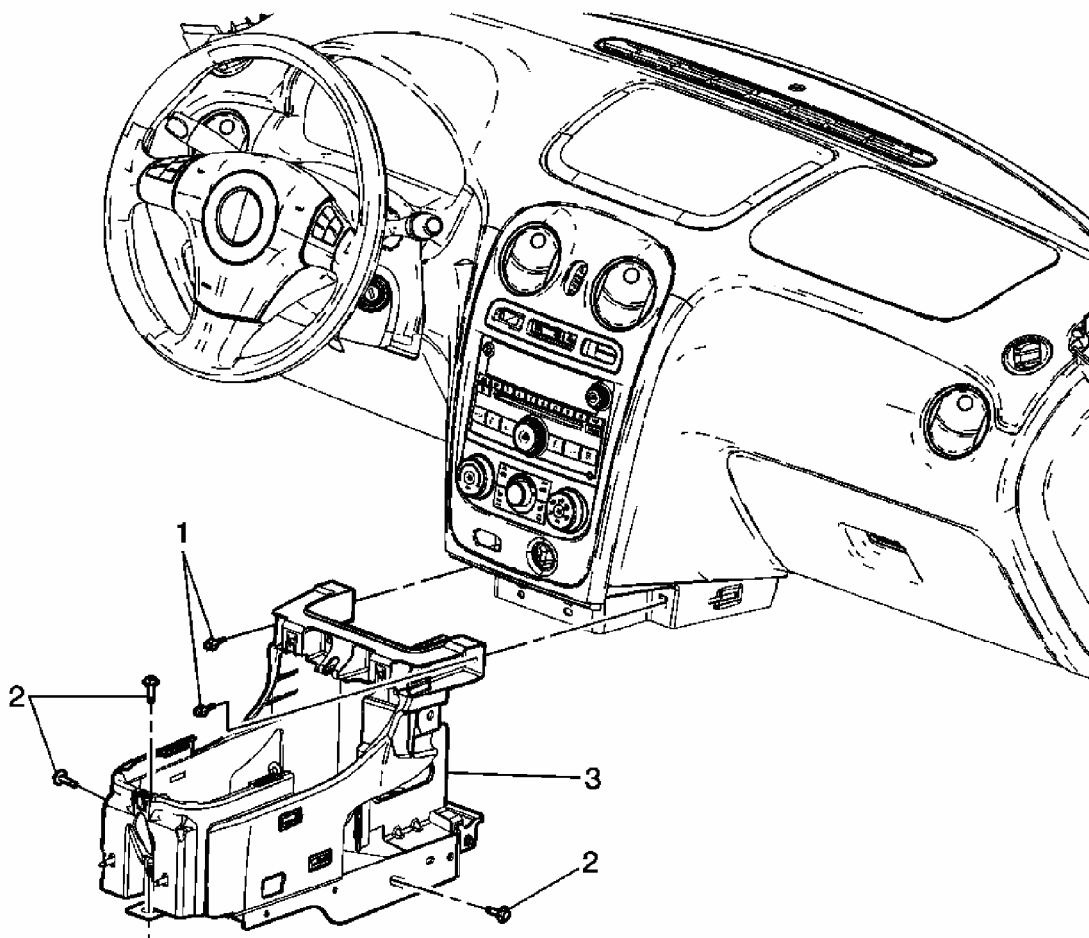


Fig. 25: Bracket Replacement - Instrument Panel (I/P) Center Support
Courtesy of GENERAL MOTORS CORP.

Bracket Replacement - Instrument Panel (I/P) Center Support

Callout	Component Name
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NOTE:

Refer to Fastener Notice .

Fastener Tightening Specifications: Refer to Fastener Tightening Specifications.

Preliminary Procedures

1. Remove the center console extension. Refer to Extension Replacement - Floor Console - Center.
2. Remove the console. Refer to Console Replacement.
3. Disconnect the shift control cables. Refer to Shift Control Cable Replacement - Floor Shift (Automatic Transmission) or Shift Cable Replacement (Manual Transmission).
4. Remove the body control module. Refer to Body Control Module Replacement .

1	Instrument Panel Center Support Bracket Screws (Qty: 2) Tighten: 2 N.m (18 lb in)
2	Instrument Panel Center Support Bracket Bolts (Qty: 3) Tighten: 25 N.m (18 lb ft)
3	Instrument Panel Center Support Bracket Assembly Tip: Remove the shift control assembly from the instrument panel center support bracket. Refer to <u>Floor Shift Control Replacement</u> (Automatic Transmission) or <u>Shift Control Replacement</u> (Manual Transmission).

INSTRUMENT PANEL (I/P) RETAINER REPLACEMENT

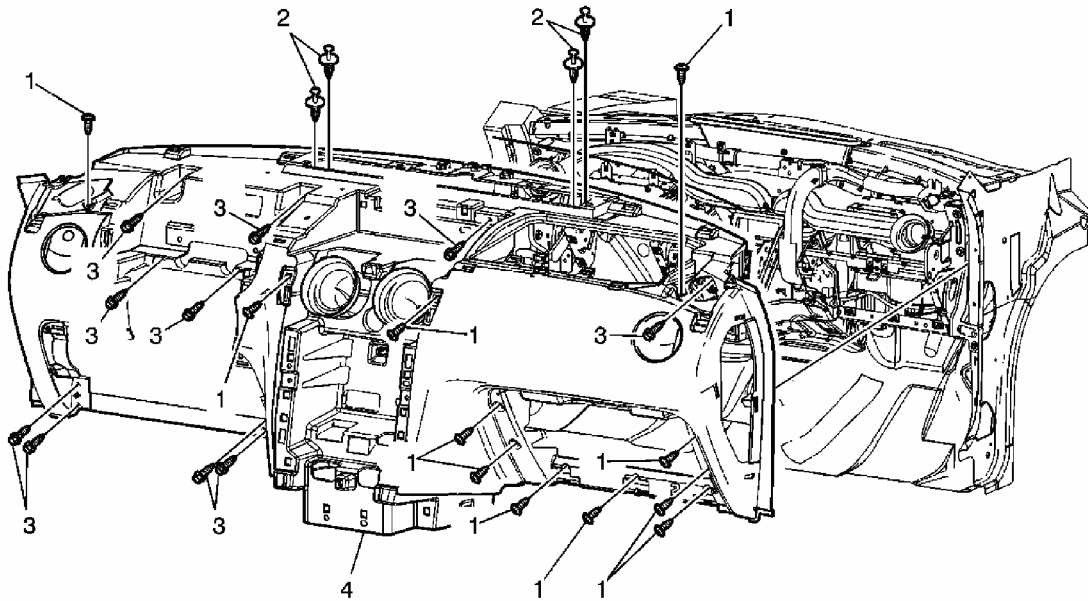


Fig. 26: Instrument Panel (I/P) Retainer Replacement
 Courtesy of GENERAL MOTORS CORP.

Instrument Panel (I/P) Retainer Replacement

Callout	Component Name
NOTE: Refer to Fastener Notice . Fastener Tightening Specifications: Refer to Fastener Tightening Specifications. Preliminary Procedures 1. Remove the instrument panel center support bracket. Refer to Bracket Replacement - Instrument Panel (I/P) Center Support. 2. Lower the steering column and position out of the way. Refer to Steering Column Replacement . 3. Remove the instrument panel cluster assembly. Refer to Instrument Panel Cluster (IPC) Replacement. 4. Remove the instrument panel upper trim pad assembly. Refer to Trim Pad Replacement - Instrument Panel (I/P) Upper. 5. Remove the HVAC control assembly. Refer to HVAC Control Assembly Replacement . 6. Remove the radio. Refer to Radio Replacement . 7. Remove the left and right windshield garnish moldings. Refer to Windshield Garnish Molding Replacement .	

8. Remove the left and right instrument panel end covers. Refer to **Instrument Panel (I/P) Outer Trim Cover Replacement**.
9. Remove the instrument panel compartment assembly. Refer to **Compartment Replacement - Instrument Panel (I/P)**.

1	Screw, Instrument Panel Retainer (Qty: 11) Tighten: 2 N.m (18 lb in)
2	Push Pin Fasteners, Instrument Panel Retainer (Qty: 4)
3	Bolt, Instrument Panel Retainer (Qty: 10) Tighten: 2 N.m (18 lb in)
4	Retainer Assembly, Instrument Panel Tip: 1. Note routing of the wiring harness to aid in the reinstallation. 2. Disconnect electrical connectors. 3. With the aid of an assistant, remove the retainer from the vehicle.

INSTRUMENT PANEL CLUSTER (IPC) REPLACEMENT

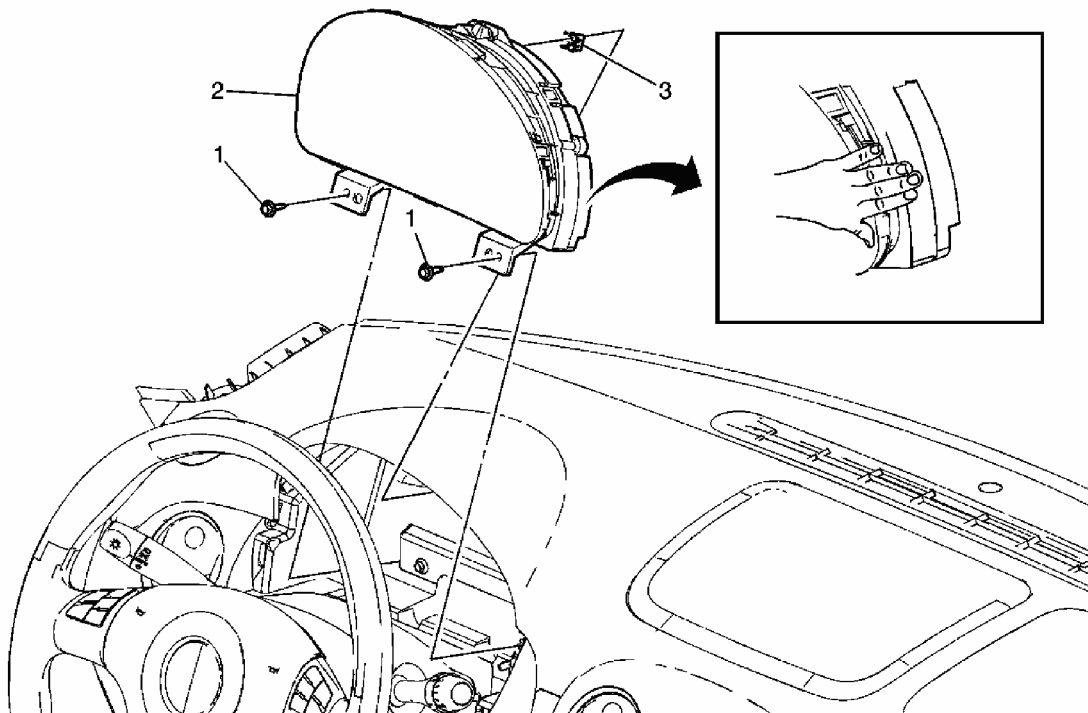


Fig. 27: Instrument Panel (I/P) Retainer Replacement
Courtesy of GENERAL MOTORS CORP.

Instrument Panel Cluster (IPC) Replacement

Callout	Component Name
NOTE: Refer to Fastener Notice .	
Fastener Tightening Specifications: Refer to Fastener Tightening Specifications . Preliminary Procedure: Remove the instrument panel cluster trim bezel. Refer to Trim Plate Bezel Replacement - Instrument Panel (I/P) Cluster .	
1	Screw, Instrument Panel Cluster (Qty: 2) Tighten: 2 N.m (18 lb in)
2	Cluster Assembly, Instrument Panel Tip: Disconnect the electrical connector.
3	Clip, Retainer (Qty: 1)

INSTRUMENT PANEL TIE BAR REPLACEMENT

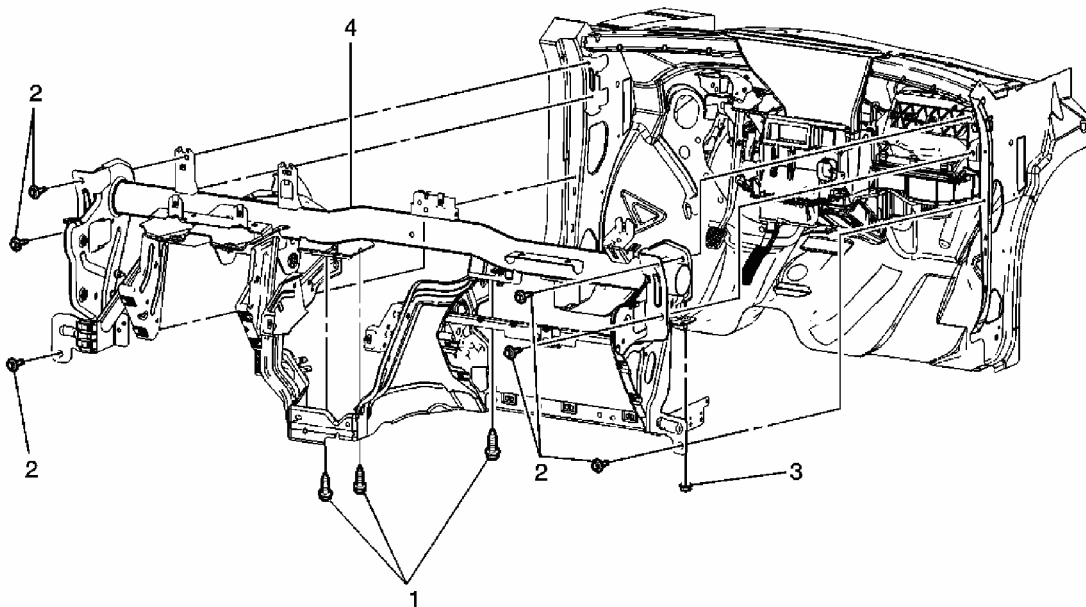


Fig. 28: Instrument Panel Tie Bar Replacement
Courtesy of GENERAL MOTORS CORP.

Instrument Panel Tie Bar Replacement

Callout	Component Name
NOTE: Refer to Fastener Notice .	
Fastener Tightening Specifications: Refer to Fastener Tightening Specifications .	

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Preliminary Procedure

1. Remove the instrument panel retainer. Refer to **Instrument Panel (I/P) Retainer Replacement**.
2. Remove the bolts securing the brake pedal assembly to the carrier. Refer to **Brake Pedal Assembly Replacement**.
3. Remove the air distribution duct assembly. Refer to **Air Distribution Duct Replacement**.
4. Remove the right defogger outlet duct assembly. Refer to **Defogger Outlet Duct Replacement - Side Window, RH**.
5. Remove the left defogger outlet duct assembly. Refer to **Defogger Outlet Duct Replacement - Side Window, LH**.

1	Instrument Panel Tie Bar Assembly to HVAC Module Bolts (Qty: 3) Tighten: 4 N.m (35 lb in)
2	Instrument Panel Tie Bar Assembly to Body Bolts (Qty: 6) Tighten: 25 N.m (18 lb ft)
3	Instrument Panel Tie Bar Assembly to HVAC Module Nut (Qty: 1) Tighten: 4 N.m (35 lb in)
4	Instrument Panel Tie Bar Assembly Tip: 1. Note the routing of the wiring harness prior to removal to aid in the reinstallation. 2. With the aid of an assistant, remove the carrier from the vehicle.

CONSOLE ACCESSORY SWITCH MOUNT PLATE REPLACEMENT

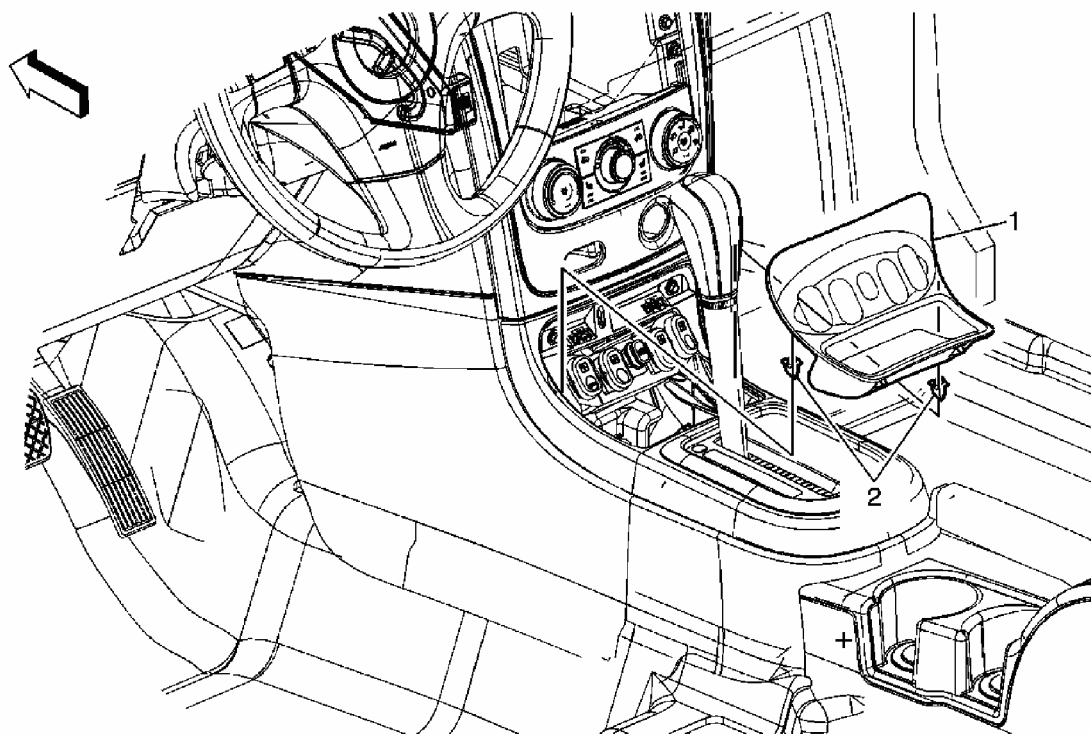


Fig. 29: Console Accessory Switch Mount Plate Replacement
Courtesy of GENERAL MOTORS CORP.

Console Accessory Switch Mount Plate Replacement

Callout	Component Name
Fastener Tightening Specifications: Refer to Fastener Tightening Specifications.	
1	Switch Plate Assembly, Console
2	Clip, Retainer (Qty: 2)

TRIM PLATE REPLACEMENT - CONSOLE REAR

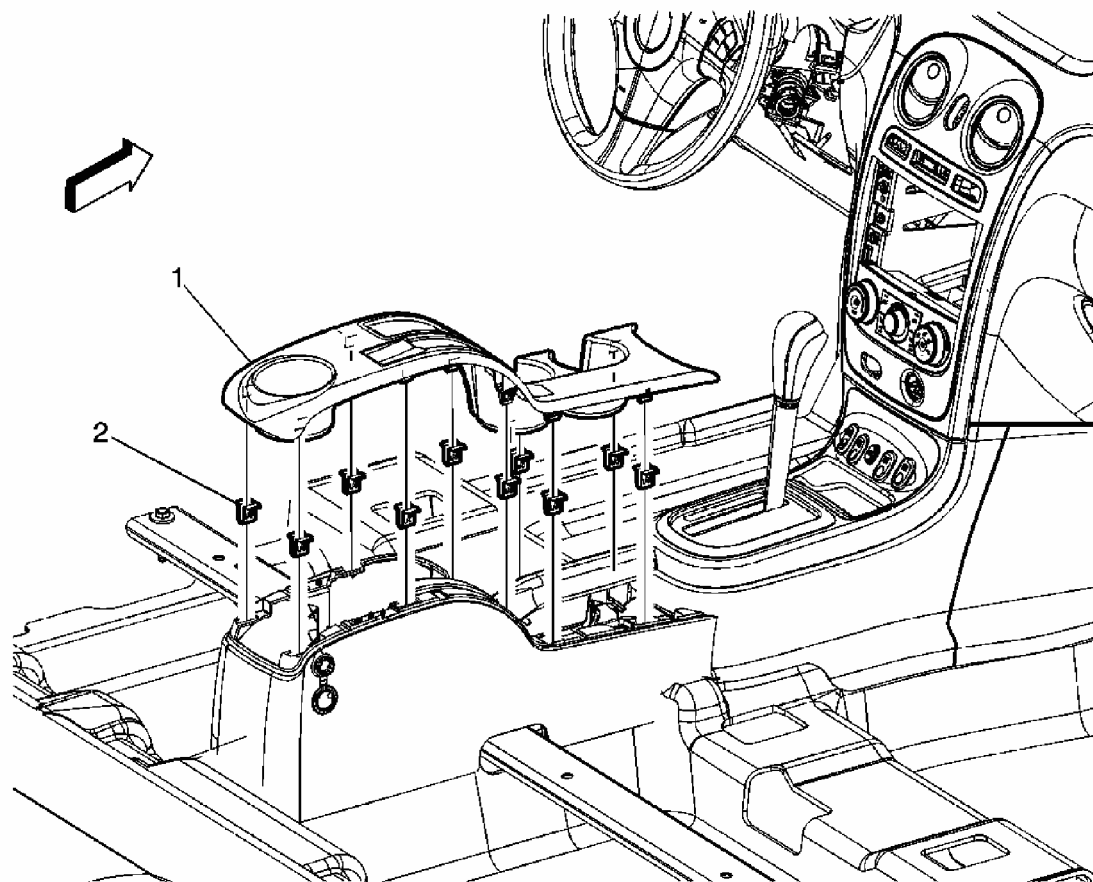


Fig. 30: Console Accessory Switch Mount Plate Replacement
 Courtesy of GENERAL MOTORS CORP.

Trim Plate Replacement - Console Rear

Callout	Component Name
Fastener Tightening Specifications: Refer to Fastener Tightening Specifications .	
Preliminary Procedure: Remove the front seat armrests. Refer to Armrest Replacement - Front Seat .	
1	Plate Assembly, Console Rear Trim
2	Clip, Retainer (Qty: 10)

CONSOLE SHIFT LEVER BEZEL REPLACEMENT

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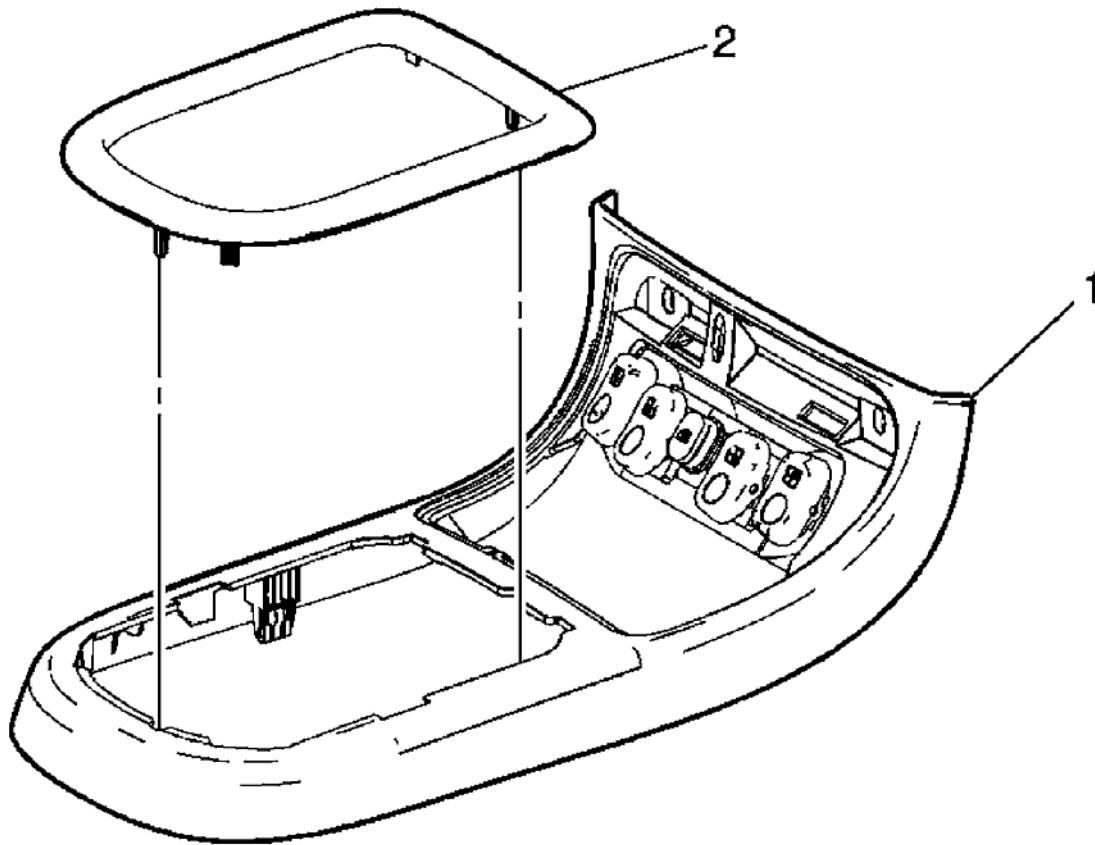


Fig. 31: Console Shift Lever Bezel Replacement
Courtesy of GENERAL MOTORS CORP.

Console Shift Lever Bezel Replacement

Callout	Component Name
Fastener Tightening Specifications: Refer to Fastener Tightening Specifications.	
1	Console Assembly, Front Floor Refer to Console Replacement - Front Floor .
2	Bezel, Console Shift Tip: 1. The Console shift bezel is replaceable on cars equipped with automatic transmissions. Cars equipped with manual transmissions the bezel is not serviceable. 2. The shifter bezel and front floor console plate must be removed as one assembly. 3. The console shift bezel retainers must be released from the underside of the console upper trim plate.

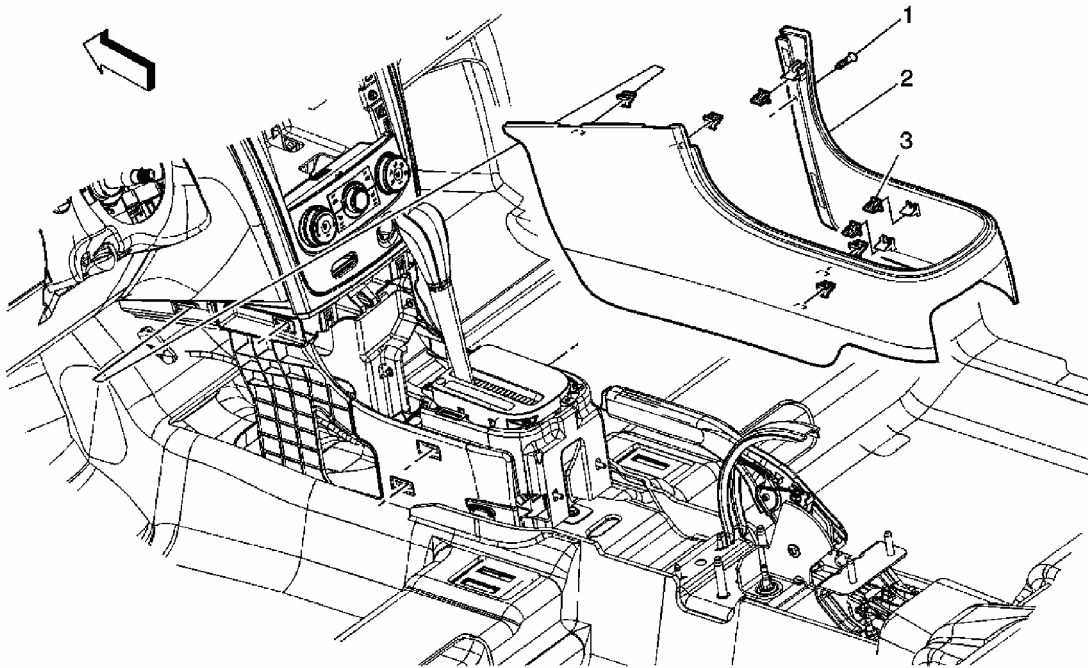


Fig. 32: Extension Replacement - Floor Console - Center
 Courtesy of GENERAL MOTORS CORP.

Extension Replacement - Floor Console - Center

Callout	Component Name
NOTE: Refer to <u>Fastener Notice</u> . Fastener Tightening Specifications: Refer to <u>Fastener Tightening Specifications</u>. Preliminary Procedures 1. Remove the front floor console trim plate. Refer to <u>Console Replacement - Front Floor</u>. 2. Remove the front floor console side extension. Refer to <u>Extension Replacement - Floor Console - Side</u>. 3. Loosen the rear console trim plate. Refer to <u>Trim Plate Replacement - Console Rear</u>.	
1	Front Floor Console Extension Assembly Screw (Qty: 1) Tighten: 2 N.m (18 lb in)
2	Front Floor Console Extension Assembly
3	Retainer Clip (Qty: 7)

EXTENSION REPLACEMENT - FLOOR CONSOLE - SIDE

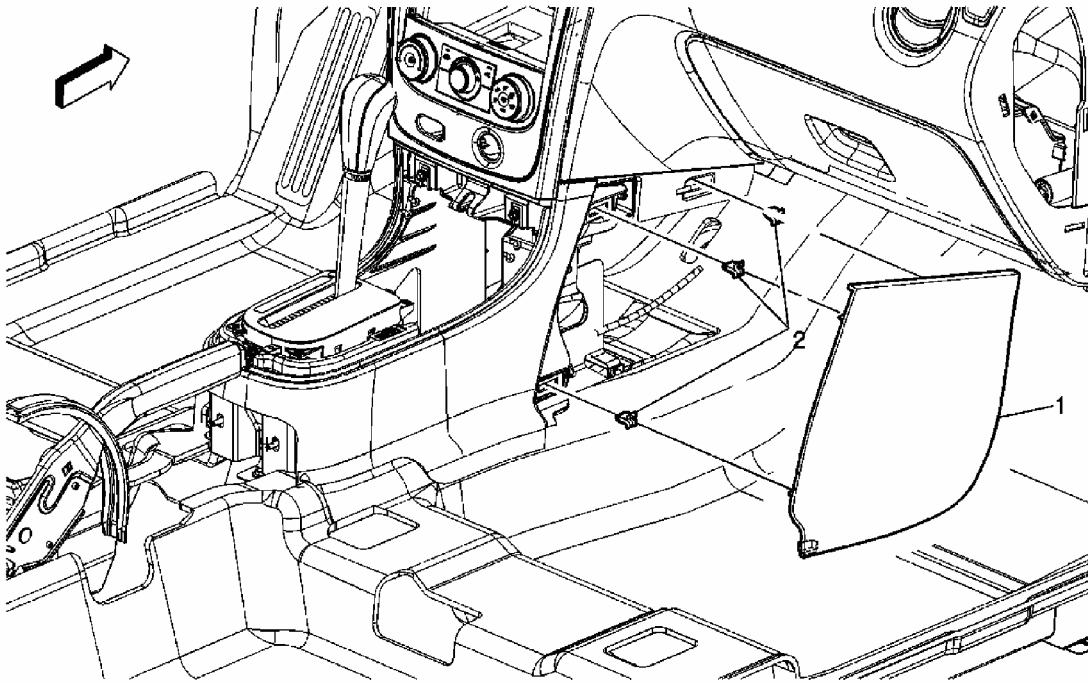


Fig. 33: Extension Replacement - Floor Console - Side
Courtesy of GENERAL MOTORS CORP.

Extension Replacement - Floor Console - Side

Callout	Component Name
Fastener Tightening Specifications: Refer to Fastener Tightening Specifications.	
1	Extension Assembly, Front Floor Console
2	Clip, Retainer (Qty: 3)

CONSOLE REPLACEMENT

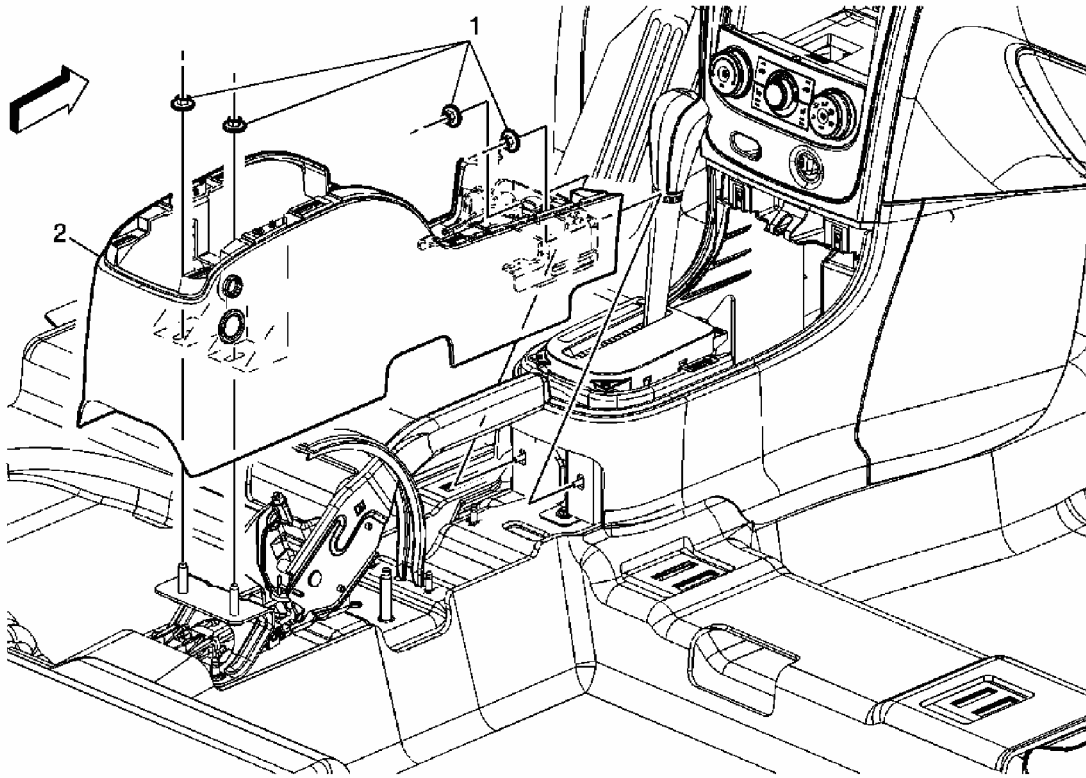


Fig. 34: Console Replacement
 Courtesy of GENERAL MOTORS CORP.

Console Replacement

Callout	Component Name
NOTE: Refer to <u>Fastener Notice</u> .	
Fastener Tightening Specifications: Refer to <u>Fastener Tightening Specifications</u> .	
Preliminary Procedure	
1. Remove the rear console trim plate. Refer to <u>Trim Plate Replacement - Console Rear</u> .	
2. Remove the Front Seat Armrests. Refer to <u>Armrest Replacement - Front Seat</u> .	
1	Rear Floor Console Assembly Nuts (Qty: 2) Tighten: 2 N.m (18 lb in)
2	Rear Floor Console Assembly Tip: Disconnect the electrical connector.

CONSOLE REPLACEMENT - FRONT FLOOR

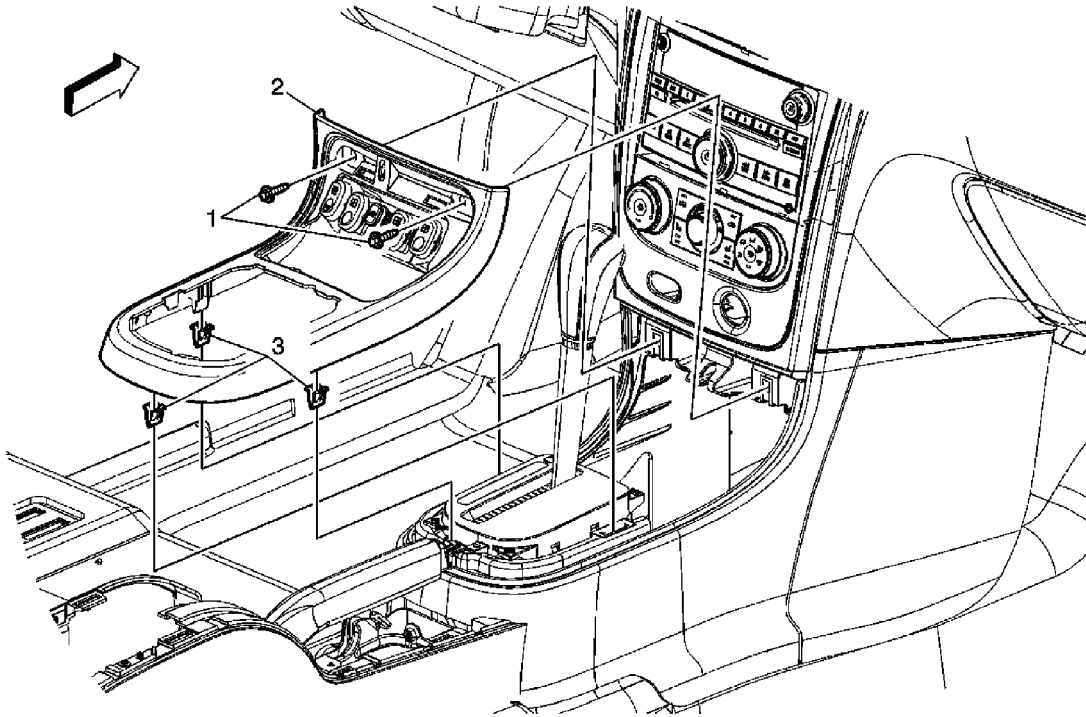


Fig. 35: Console Replacement - Front Floor
Courtesy of GENERAL MOTORS CORP.

Console Replacement - Front Floor

Callout	Component Name
NOTE: Refer to Fastener Notice .	
Fastener Tightening Specifications: Refer to Fastener Tightening Specifications . Preliminary Procedure: Remove the console accessory switch mount plate. Refer to Console Accessory Switch Mount Plate Replacement .	
1	Screw, Front Floor Console (Qty: 2) Tighten: 2 N.m (18 lb in)
2	Console, Front Floor Tip: Disconnect the electrical connector.
3	Clip, Retainer (Qty: 3)

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 the features are working properly. The following indicators illuminate briefly at key up unless otherwise noted:

- Antilock Brake System (ABS) Indicator
- Battery Indicator
- Brake System Indicator
- Coolant Temperature Indicator
- Engine Oil Pressure Indicator
- Tire Pressure Low Indicator

Indicators and Warning Messages

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

Fuel Gage

The instrument panel cluster (IPC) displays the fuel level as determined by the engine control module (ECM). The IPC receives a GMLAN message from the body control module (BCM) indicating the fuel level volume. The fuel gage defaults to empty (E) if:

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

When the fuel level is less than a certain low percentage, LOW FUEL message displays in the driver information center (DIC).

Odometer

The vehicle odometer is calculated and stored electronically in the body control module (BCM) and is sent via GMLAN to the instrument panel cluster (IPC) for display. The BCM calculates and stores the mileage based on the vehicle speed GMLAN message from the engine control module (ECM). The IPC displays the season odometer information from the BCM in the driver information center (DIC). The odometer will display error if the IPC detects an invalid odometer data from the BCM. After an invalid odometer data is received from the BCM, the IPC will display the last known odometer reading for 1.5 seconds before error is displayed in the DIC.

Speedometer

The instrument panel cluster (IPC) displays the vehicle speed based on GMLAN serial data message from the body control module (BCM). The BCM receives vehicle speed data from the engine control module (ECM) via the GMLAN serial data circuit. The speedometer will default to 0 km/h (0 mph) if:

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- The ECM detects a malfunction in the vehicle speed sensor circuit.
- The BCM detects a loss of GMLAN communications with the ECM.
- The IPC detects a loss of GMLAN communications with the BCM.

Tachometer

The instrument panel cluster (IPC) displays the engine speed as determined by the engine control module (ECM). The IPC receives a GMLAN message from the body control module (BCM) indicating the engine speed. The tachometer will default to 0 RPM if:

- The ECM detects a malfunction in the engine speed sensor circuit.
- The BCM detects a loss of GMLAN communications with the ECM.
- The IPC detects a loss of GMLAN communications with the BCM.

INDICATOR/WARNING MESSAGE DESCRIPTION AND OPERATION

Indicators

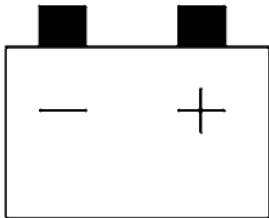
Symbol	Description
	ABS: Refer to <u>ABS Description and Operation</u>
	Air Bag: Refer to <u>SIR System Description and Operation</u>
	Brake: Refer to <u>Brake Warning System Description and Operation</u>

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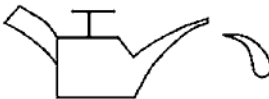
(Export)
BRAKE



Charge: Refer to **Charging System Description and Operation**



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

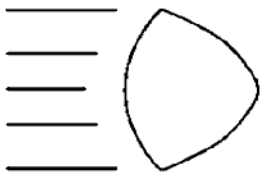


Engine Oil Pressure: Refer to **Indicator/Warning Message Description and Operation**

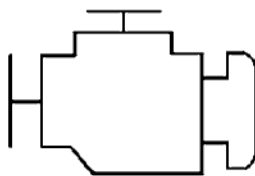
Front Fog Lamps: Refer to **Exterior Lighting Systems Description and Operation**

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



Engine Control Module (ECM)
Description for the 2.2L engine
or
MIL: Refer to **Engine Control Module (ECM) Description** for the 2.4L engine



Seatbelt: Refer to **Seat Belt System Description and Operation**

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Security: Refer to 59400



Stability Not Ready: Refer to **ABS Description and Operation**



Traction Disabled: Refer to **ABS Description and Operation**



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

Upshift Indicator: Refer to
Indicator/Warning Message Description
and Operation

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Driver Information Center

Symbol	Description
AUTO LIGHTS OFF	Refer to <u>Exterior Lighting Systems Description and Operation</u>
AUTO LIGHTS ON	Refer to <u>Exterior Lighting Systems Description and Operation</u>
BATTERY SAVE	Refer to <u>Charging System Description and Operation</u>
BRAKE FLUID LOW	Refer to <u>Brake Warning System Description and Operation</u>
CHANGE OIL SOON	Refer to Indicator/Warning Message Description and Operation
CHECK CHARGE SYSTEM	Refer to <u>Charging System Description and Operation</u>
CHECK GAS CAP	Refer to Indicator/Warning Message Description and Operation
CRUISE ENGAGED	Refer to <u>Cruise Control Description and Operation</u>
DOOR AJAR	Refer to <u>Power Door Locks Description and Operation</u>
ENGINE POWER REDUCED	Refer to <u>Cooling System Description and Operation</u>
GATE AJAR	Refer to <u>Luggage Compartment Description and Operation</u>
ICE POSSIBLE	Refer to Indicator/Warning Message Description and Operation
KEY FOB BATT LOW	Refer to <u>Keyless Entry System Description and Operation</u>
LOW COOLANT LEVEL	Refer to <u>Cooling System Description and Operation</u>

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LOW FUEL	Refer to Indicator/Warning Message Description and Operation
LOW OIL LEVEL	Refer to Indicator/Warning Message Description and Operation
LOW TRACTION	Refer to <u>ABS Description and Operation</u>
POWER STEERING	Refer to <u>Power Steering System Description and Operation</u>
PARKING BRAKE	Refer to <u>Park Brake System Description and Operation</u>
SERVICE AIR BAG	Refer to <u>SIR System Description and Operation</u>
SERVICE VEHICLE SOON	Refer to Indicator/Warning Message Description and Operation
START DISABLED	Refer to <u>Starting System Description and Operation</u>

CHANGE OIL SOON

The driver information center (DIC) displays the CHANGE ENGINE OIL message when the engine control module (ECM) determines that the engine oil life is 0 percent. The ECM sends a GMLAN serial data message to the BCM to request the DIC to display the CHANGE ENGINE OIL message. After the oil is changed, reset the engine oil monitor. Refer to **GM Oil Life System - Resetting** .

ENGINE OIL PRESSURE

The instrument panel cluster (IPC) illuminates the engine oil pressure (EOP) indicator when the engine control module (ECM) detects the EOP is low from the EOP sensor/switch. The ECM sends a GMLAN serial data message to the body control module (BCM) indicating a low EOP condition. The IPC receives a GMLAN message from the BCM requesting the EOP indicator.

ICE POSSIBLE

The driver information center (DIC) displays the ICE POSSIBLE message when the outside air temperature drops below 2°C (36°F). When the temperature rises above 5.5°C (42°F), the ICE POSSIBLE message turns OFF. The DIC receives a GMLAN message indicating the outside air temperature from the body control module (BCM).

LOW FUEL

The driver information center (DIC) displays the low fuel indicator as determined by the engine control module (ECM). The ECM monitors the fuel level sensor signal and will request the LOW FUEL message from the body control module (BCM) when the fuel level is less than 14 percent. The DIC receives a GMLAN message from the BCM requesting

display of the LOW FUEL message.

LOW OIL LEVEL

The driver information center (DIC) displays the LOW OIL LEVEL message when the engine control module (ECM) detects a low oil level condition from the engine oil level sensor/switch. The ECM sends a GMLAN serial data message to the body control module (BCM) requesting a low oil level message. The DIC receives a GMLAN message from the BCM requesting the engine oil level message.

SERVICE VEHICLE SOON

The driver information center (DIC) displays the SERVICE VEHICLE SOON message when the following conditions exists:

- The body control module (BCM) detects certain malfunctions that are not emissions related. The DIC receives a GMLAN message requesting the display of SERVICE VEHICLE SOON from the BCM.
- The DIC detects a loss of GMLAN communications with the BCM.

UPSHIFT INDICATOR

The Upshift indicator notifies the driver when to shift the transmission. The instrument panel cluster (IPC) illuminates the Upshift indicator as determined by the engine control module (ECM). The IPC receives a GMLAN serial data message from the body control module (BCM) requesting illumination of the indicator.

DRIVER INFORMATION CENTER (DIC) DESCRIPTION AND OPERATION

The driver information center (DIC) displays important vehicle information when it first powers up. The DIC is also used to display odometer and outside air temperature when other important vehicle information is not being displayed. The DIC switches are hardwired to and read by the instrument panel cluster (IPC). The body control module (BCM) is responsible for driving and processing the DIC display through GMLAN serial data. The BCM is responsible for reading the outside air temperature (OAT) and season odometer. The outside air temperature and season odometer is transmitted to the IPC over GMLAN for display in the DIC. The OAT data is transmitted in degrees Celsius and the cluster is responsible for converting the OAT to Fahrenheit.

There are 2 DIC buttons on the IPC:

- INFO
- RESET/SELECT

The 2 DIC buttons however provide 3 switch functions. Pressing the INFO and RESET/SELECT button at the same time and holding for 2 seconds will enter the

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personalization menu.

INFO

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

- AV SPEED
- ECON
- COOLANT
- FUEL RANGE
- OIL LIFE
- TRIP A
- TRIP B

Other instrument panel cluster (IPC) information displayed in the DIC are Season odometer and Outside Air Temp.

AV SPEED

Average speed is calculated using the equation: $\text{Average Speed} = \text{Distance} / \text{Ignition On}$

- 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/SELECT button on the DIC for 1 second in order to reset the average speed display.

ECON

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

- 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 DIC receives a serial data message from the body control module (BCM) regarding fuel usage information. The value of this mode is retained during ignition OFF and can be changed between English units and metric units. Press and hold the RESET/SELECT button on the DIC switch for 1 second in order to reset the ECON display.

COOLANT

The DIC receives GMLAN serial data message from the BCM requesting the display of the

coolant temperature. The coolant temperature is sent to the BCM as determined by the engine control module (ECM) via GMLAN serial data message.

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 DIC receives a GMLAN serial data message from the BCM with fuel information. The value of this mode is retained during ignition OFF and can be changed between English units and metric units. The FUEL RANGE display cannot be reset.

OIL LIFE

The engine control module (ECM) sends the oil life remaining percentage to the BCM via a GMLAN serial data message. The DIC receives a serial data message from the BCM indicating the remaining oil life. The DIC displays the current percentage of the GM Oil Life System as determined by the ECM.

TRIP A and TRIP B

The DIC displays vehicle trip odometer mileage based on the vehicle speed signal (VSS) from the BCM. 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 INFO button on the DIC for 1 second in order to reset the trip odometer display.

RESET/SELECT

The RESET/SELECT button is used in order to acknowledge a warning message, reset an option, or to select an option. Press and hold for 0.25 seconds to perform RESET/SELECT.

MENU

The MENU button is used in order to navigate through the following personalization modes:

- AUTO UNLK
- DELAY LOCK
- EXT LIGHTS
- LANGUAGE
- LIGHT FLASH

- LOCK HORN
- OIL-LIFE RESET
- REMOTE START
- UNITS
- UNLK
- UNLOCK HORN

OIL-LIFE RESET

The engine control module (ECM) sends the oil life remaining percentage to the body control module (BCM) via a GMLAN serial data message. The driver information center (DIC) receives a GMLAN serial data message from the BCM indicating the remaining oil life. The DIC 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 DIC 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/SELECT button for 5 seconds until the DIC acknowledges.

For more information on the rest of the personalization modes, refer to **Personalization Description and Operation**.

Outside Air Temperature

The outside air temperature is read by the body control module (BCM) and transmitted over serial data to the instrument panel cluster (IPC) for display in the driver information center (DIC). The BCM provides the logic for reading the outside air temperature sensor. The BCM sends the temperature to the IPC in Celsius. The IPC is responsible for displaying the temperature and converting to Fahrenheit.

Odometer

The odometer information is stored in the body control module (BCM) and is transmitted to the instrument panel cluster (IPC) for display in the driver information center (DIC). The IPC stores a backup copy of the odometer value in case the IPC does not receive a valid odometer reading from the BCM. The last known good odometer value from the BCM is displayed by the IPC before ERROR is displayed in the DIC.

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

radio generates the audible warnings through the left front speaker. The radio receives audible warning requests via the GMLAN serial data line. If the radio receives multiple audible warning requests, the warning with the highest priority sounds first. The following lists the audible warning priority and the pulse rate:

- Fast rate chime (200 pulses per minute)
- Medium rate chime (150 pulses per minute)
- Slow rate chime (50 pulses per minute)
- Single chime

Fasten Safety Belt Warning

The radio activates the fasten safety belt audible warning as requested by the body control module (BCM). The BCM sends a GMLAN message to the radio indicating the chime frequency (slow rate) and duration (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 BCM detects that the driver seat belt is not buckled (signal circuit is low). The radio receives a GMLAN message from the BCM 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.

Key-In-Ignition Warning

The radio activates the key-in-ignition audible warning as requested by the body control module (BCM). The BCM sends a GMLAN message to the radio indicating the chime frequency (medium rate) and duration (continuous). The key-in-ignition warning sounds when the following occurs:

- The ignition switch is OFF.
- The BCM determines that the driver door is open (signal circuit is low).
- The BCM determines that the ignition key alarm switch is closed (signal circuit is low).

Lights On Warning

The radio activates the lights on warning as requested by the body control module (BCM). The BCM sends a GMLAN message to the radio indicating the chime frequency (fast rate) and duration (continuous). The lights on warning sounds when the following occurs:

- The ignition is OFF.
- The BCM determines that the driver door is open (signal circuit is low).

- The BCM determines that the headlamp switch is in the PARK or HEAD position.

Park Brake Warning

The radio activates the park brake audible warning as requested by the body control module (BCM). The BCM sends a GMLAN message to the radio indicating the chime frequency (fast rate) and duration (continuous). The park brake warning sounds and the brake indicator illuminates when the following occurs:

- The ignition is ON.
- The vehicle speed is greater than 5 km/h (3.1 mph). The BCM receives a GMLAN message from the powertrain control module (PCM) indicating the vehicle speed.
- The BCM determines that the park brake is engaged (signal circuit is low).

Turn Signal On Warning

The radio activates the turn signal on audible warning as requested by the body control module (BCM). The BCM sends a GMLAN message to the radio indicating the chime frequency (single chime in phase with turn signal indicator) and duration (continuous). The turn signal on warning sounds when the following occurs:

- The ignition is ON.
- The BCM detects that the turn signal is active for greater than 1.2 km (0.75 mi). The BCM calculates the distance based on a class 2 message from the powertrain control module (PCM) indicating the vehicle speed.

Additional Warnings

The following warnings have an associated radio indicator:

- Antilock Brake System
- Air Bag
- Brake Warning
- Charging System
- High Engine Coolant Temperature
- Low Fuel
- Low Engine Oil Pressure
- Service Vehicle Soon

The body control module (BCM) sends a GMLAN message to the radio indicating the chime frequency (medium rate) and duration (3 seconds). The warning sounds once per ignition cycle when an indicator illuminates and the engine is running for greater than 6.5 seconds.

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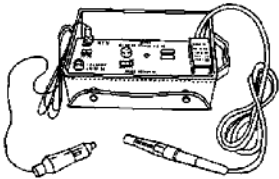
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For a description of each indicator, refer to Indicator/Warning Message Description and Operation.

SPECIAL TOOLS AND EQUIPMENT

SPECIAL TOOLS

Special Tools

Illustration	Tool Number/Description
	J 35616-A Connector Test Adapter Kit
	J 33431-C Signal Generator and Instrument Panel Tester
	J 39400-A Halogen Leak Detector