2007 ACCESSORIES & EQUIPMENT

Displays and Gages - Avalanche, Escalade, Suburban, Tahoe & Yukon

SPECIFICATIONS

FASTENER TIGHTENING SPECIFICATIONS

Fastener Tightening Specifications

Application	Specification	
	Metric	English
Instrument Panel Accessory Switch Screws	2 N.m	18 lb in
Instrument Panel Cluster 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. The fuel level sensor values represent the test values to be used on the Signal Generator to drive the fuel gage display to the indicated positions. Vehicles that require more than one fuel level sensor calculate gage position from many possible resistance combinations of fuel levels between the two tanks. Therefore, the values in the table may not correlate directly to readings taken from the vehicle primary or secondary sending units.

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

Fuel Level Specifications

Fuel Gage Display	Resistance	Sender Voltage	Fuel Level	Fuel Remaining
26.0 Gallon Tank				
E	197-250 ohms	2.5 V	0-13%	0-11.9 L (0-3.1 gal)
1/4	150-190 ohms	2.2 V	30-35%	32.8 L (8.7 gal)
1/2	118-140 ohms	1.6 V	50-55%	51.3 L (13.5 gal)
3/4	83-110 ohms	1.25 V	72-78%	74.3 L (19.7 gal)
F	40-66 ohms	1.0 V	88-100%	92.8-98.4 L (24.5-25.9 gal)
Low Fuel Indicator On	208-218 ohms	2.4 V	11-17%	16.5 L (4.3 gal)
Low Fuel Indicator Off	195-206 ohms	2.3 V	14-25%	18.9 L (5 gal)
31.0 Gallon Tank				
E	199-250 ohms	2.5 V	0-13%	0-15.1 L (0-4 gal)
1/4	155-195 ohms	2.3 V	30-35%	41.6 L (11 gal)
1/2	118-148 ohms	1.9 V	50-55%	68.1 L (18 gal)
3/4	83-110 ohms	1.25 V	68-78%	89 L (23.5 gal)

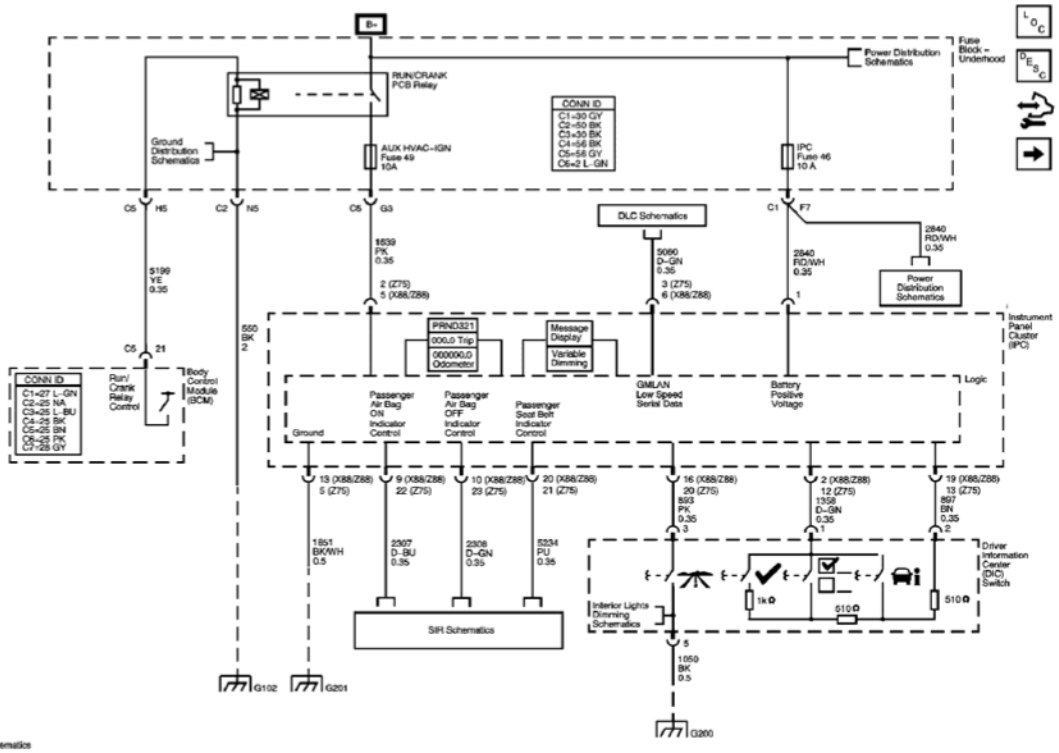
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F	40-58 ohms	0.9 V	88-100%	111.3-117 L (29.4-30.9 gal)
Low Fuel Indicator On	211-235 ohms	2.5 V	11-17%	14.3 L (3.80 gal)
Low Fuel Indicator Off	210-220 ohms	2.4 V	14-26%	19.3 L (5.1 gal)
37.0 Gallon Tank (Dual Fuel Level Senders) **IMPORTANT:** **The resistance values only reflect the specified fuel level when the signal circuits for both the primary and secondary fuel level senders are tied together.** **The fuel remaining values are approximate.**				
E	190-250 ohms	2.4 V	2-14%	18.9 L (5 gal)
1/4	130-158 ohms	2.0 V	31-34%	43.2 L (11.4 gal)
1/2	85-128 ohms	1.8 V	50-58%	70 L (18.5 gal)
3/4	60-80 ohms	1.5 V	70-76%	93.5 L (24.7 gal)
F	24-58 ohms	1.0 V	87-100%	132.5-140.1 L (35-37 gal)
Low Fuel Indicator On	220-240 ohms	2.5 V	11-13%	28.3 L (7.5 gal)
Low Fuel Indicator Off	208-218 ohms	2.4 V	14-16%	30.2 L (8 gal)

SCHEMATIC AND ROUTING DIAGRAMS

INSTRUMENT CLUSTER SCHEMATICS

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SIR Schematics

Fig. 1: Power, Ground, and Driver Information Controls Schematic
Courtesy of GENERAL MOTORS CORP.

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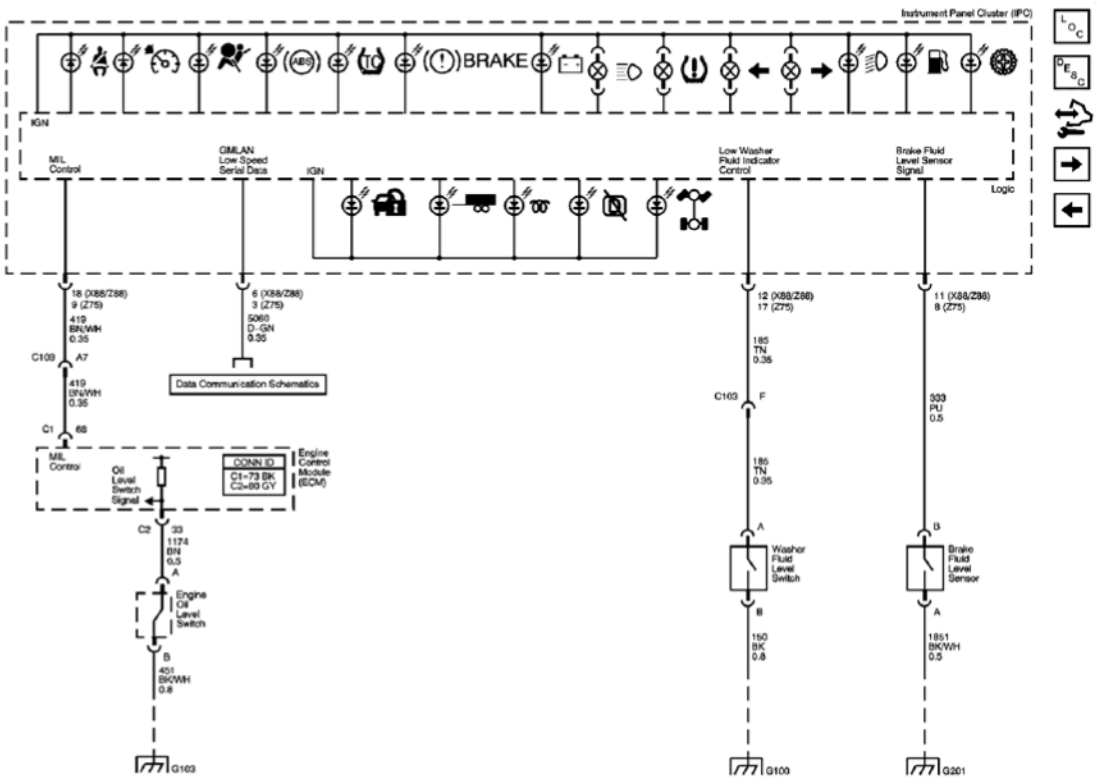


Fig. 2: Indicators Schematic
Courtesy of GENERAL MOTORS CORP.

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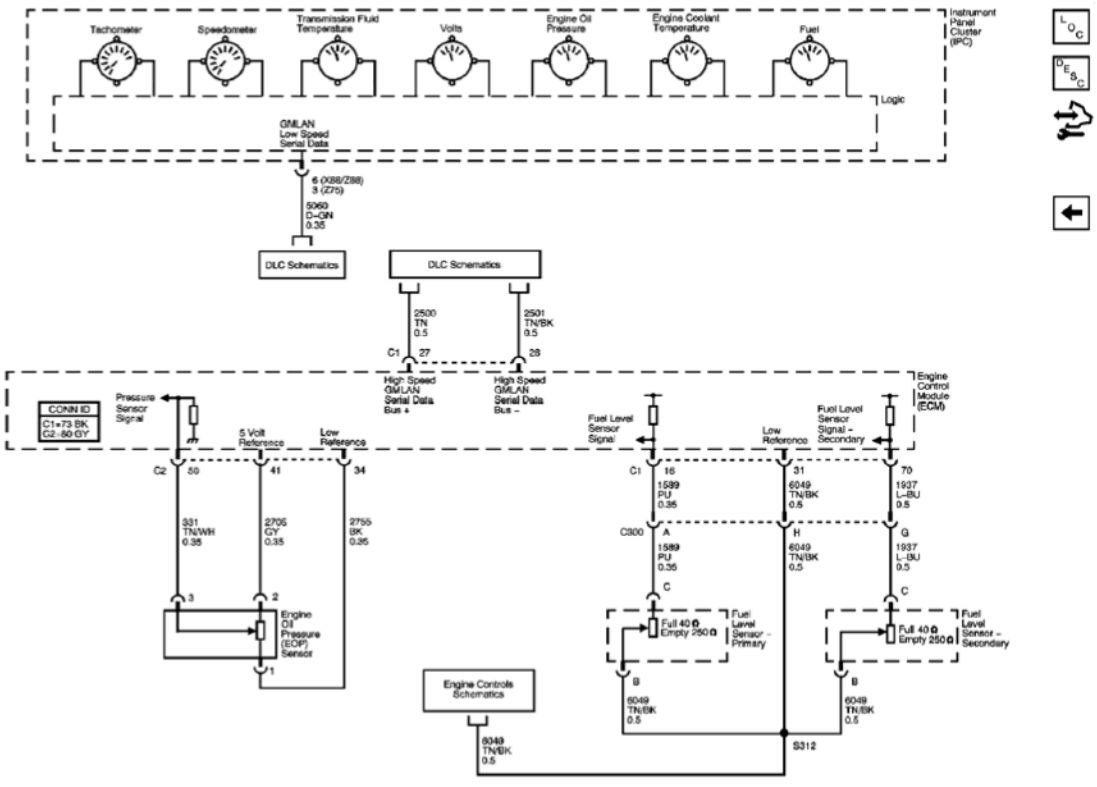


Fig. 3: Gages Schematic
Courtesy of GENERAL MOTORS CORP.

DRIVER INFORMATION SYSTEM SCHEMATICS

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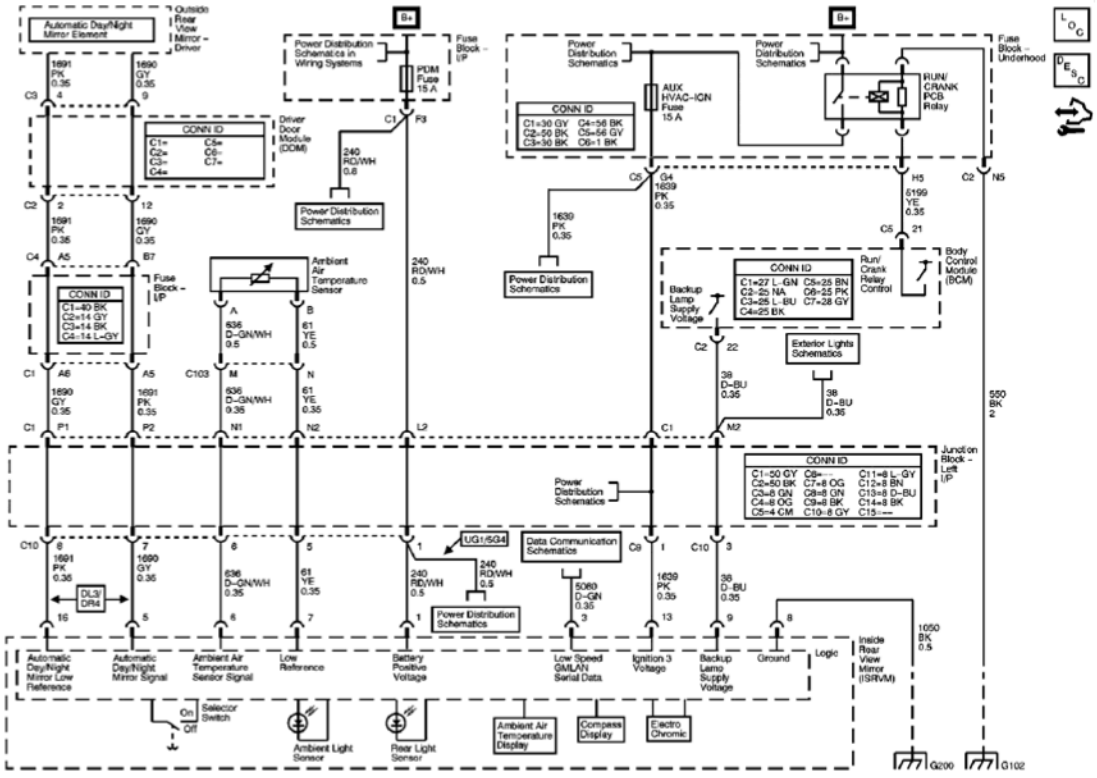


Fig. 4: Inside Rearview Mirror Schematic
Courtesy of GENERAL MOTORS CORP.

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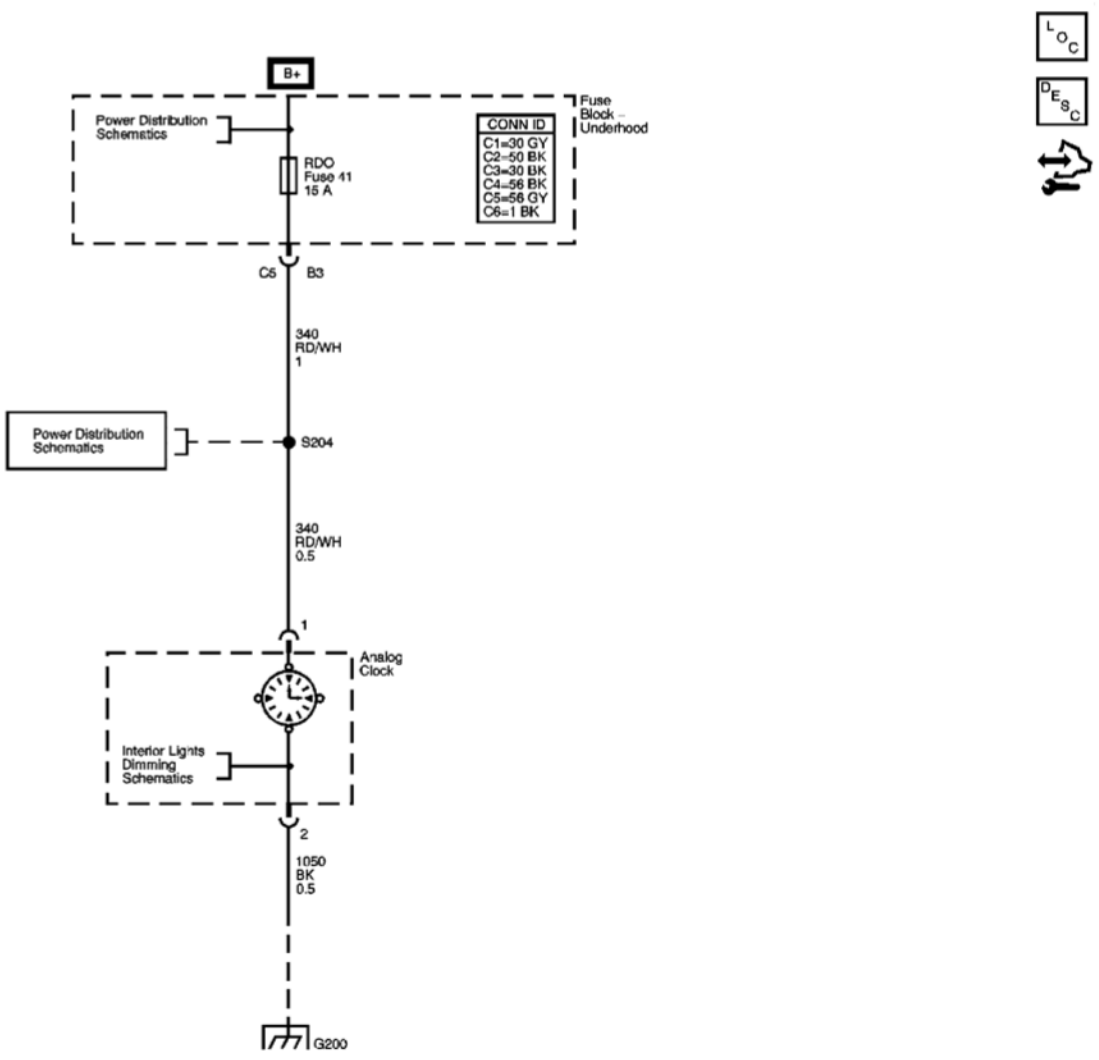


Fig. 5: Analog Clock (Z75) Schematic
Courtesy of GENERAL MOTORS CORP.

AUDIBLE WARNINGS SCHEMATICS

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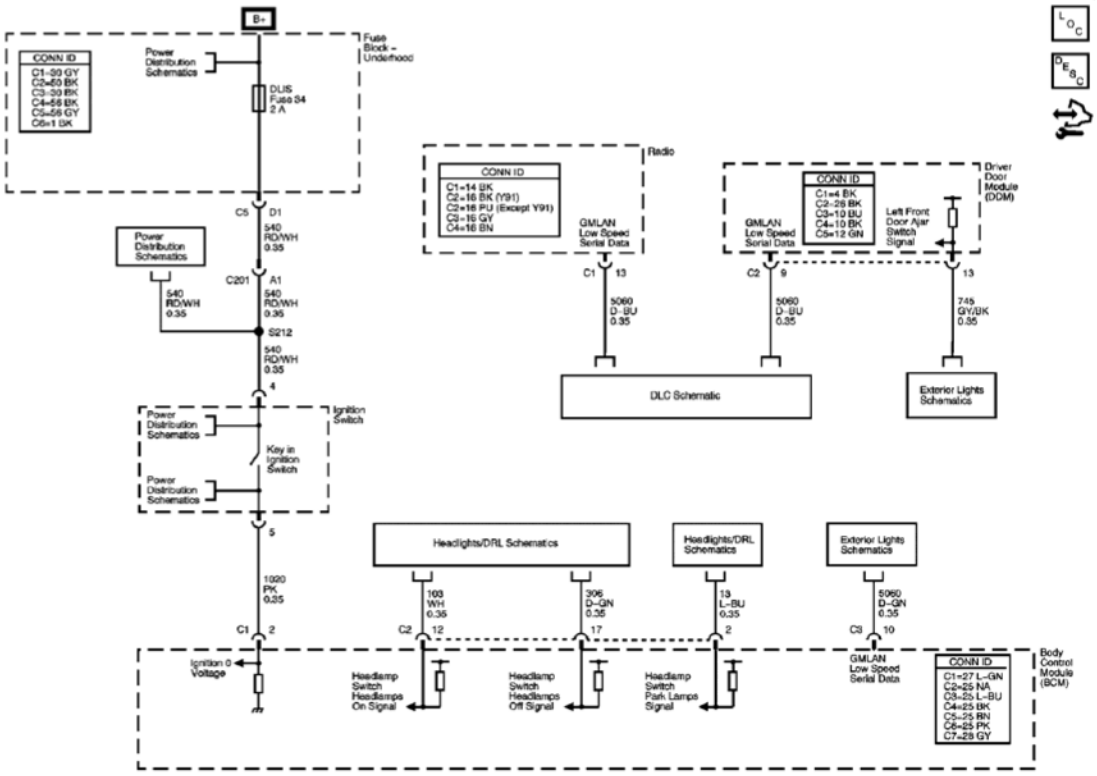


Fig. 6: Audible Warnings Schematic
Courtesy of GENERAL MOTORS CORP.

COMPONENT LOCATOR

DISPLAYS AND GAGES COMPONENT VIEWS

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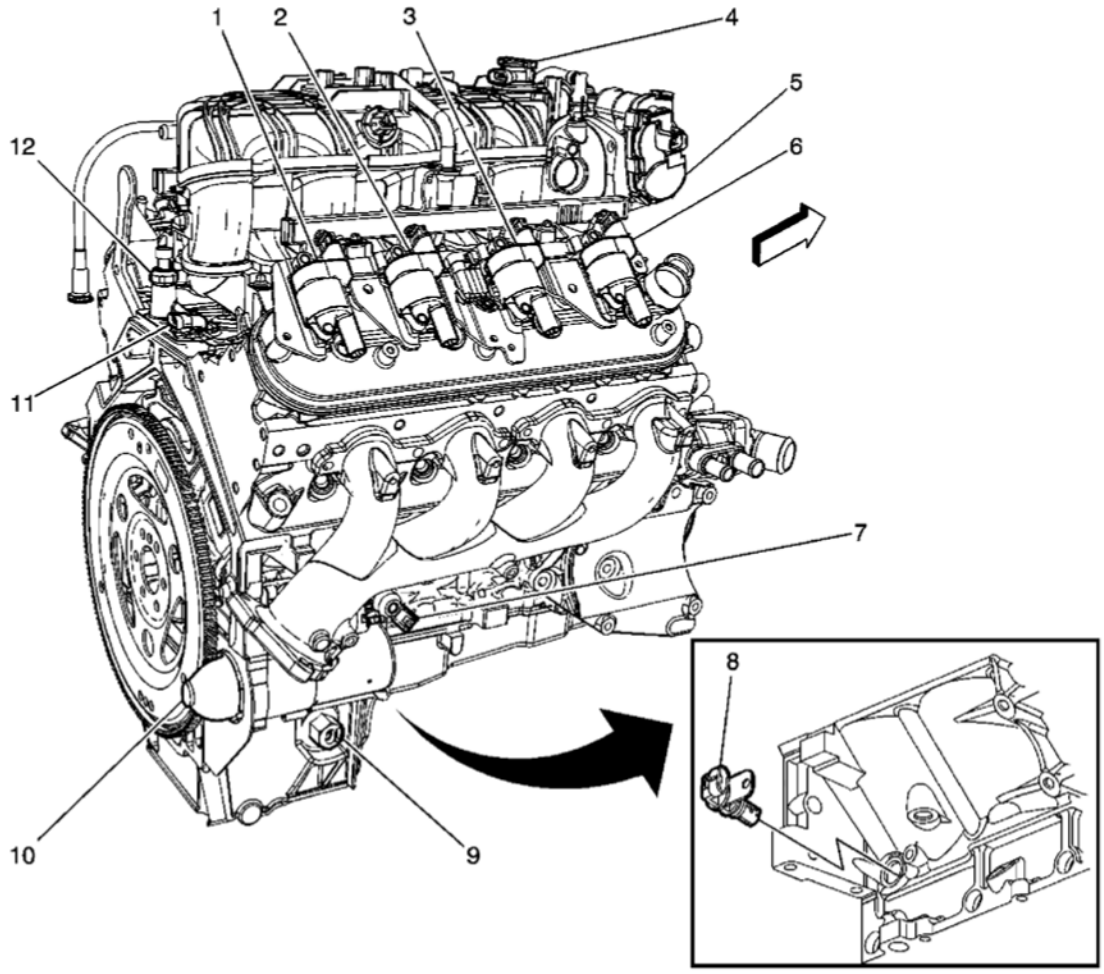


Fig. 7: Right Side Of The Engine
Courtesy of GENERAL MOTORS CORP.

Callouts For Fig. 7

Callout	Component Name
1	Ignition Coil 8
2	Ignition Coil 6
3	Ignition Coil 4
4	Manifold Absolute Pressure (MAP) Sensor
5	Throttle Body
6	Ignition Coil 2
7	Knock Sensor (KS) - 2
8	Oil Level Switch
9	Starter
10	Valve Lifter Oil Manifold (VLOM) Assembly (DOD)
11	Engine Oil Pressure (EOP) Sensor

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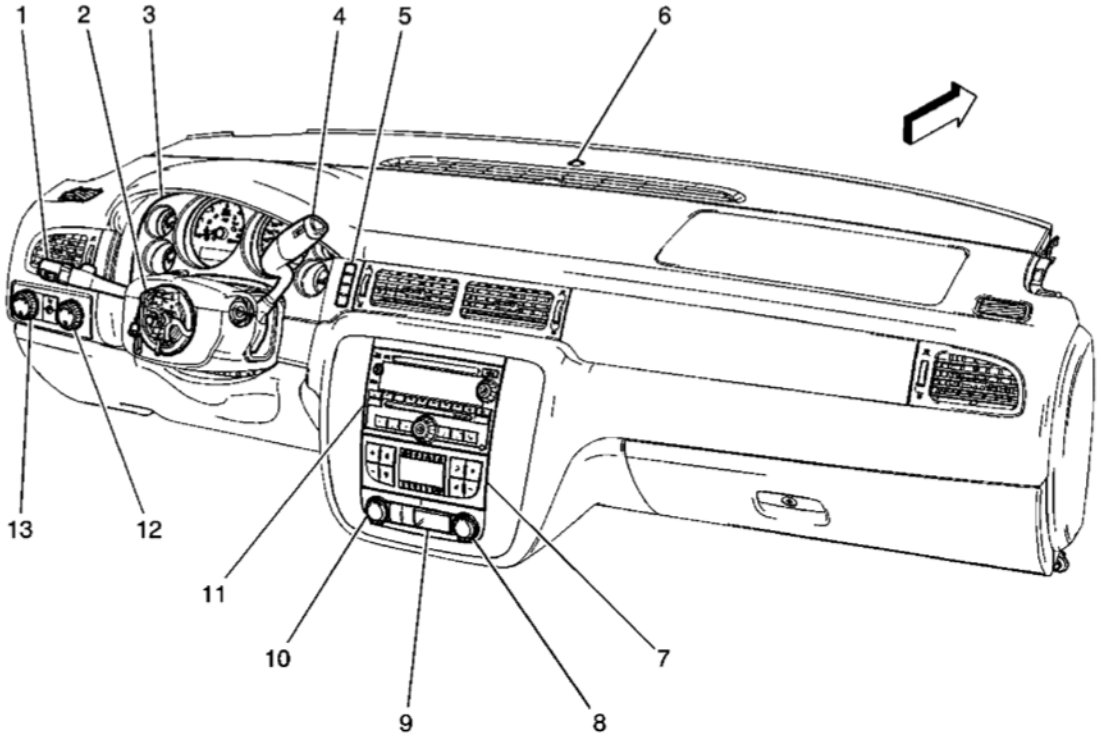


Fig. 8: Front Of The I/P (Except Z75)
Courtesy of GENERAL MOTORS CORP.

Callouts For Fig. 8

Callout	Component Name
1	Turn Signal Multifunction Switch
2	Inflatable Restraint Steering Wheel Module Coil
3	Instrument Panel Cluster (IPC)
4	Tow/Haul Switch
5	Driver Information Center (DIC) Switch
6	Ambient Light/Sunload Sensor Assembly (CJ2) or Ambient Light Sensor (CJ3)
7	HVAC Control Module
8	Auxiliary Power Outlet - Front 2
9	I/P Multifunction Switch Assembly
10	Auxiliary Power Outlet - Front 1
11	Radio
12	Transfer Case Shift Control Switch
13	Headlamp and Panel Dimmer Switch

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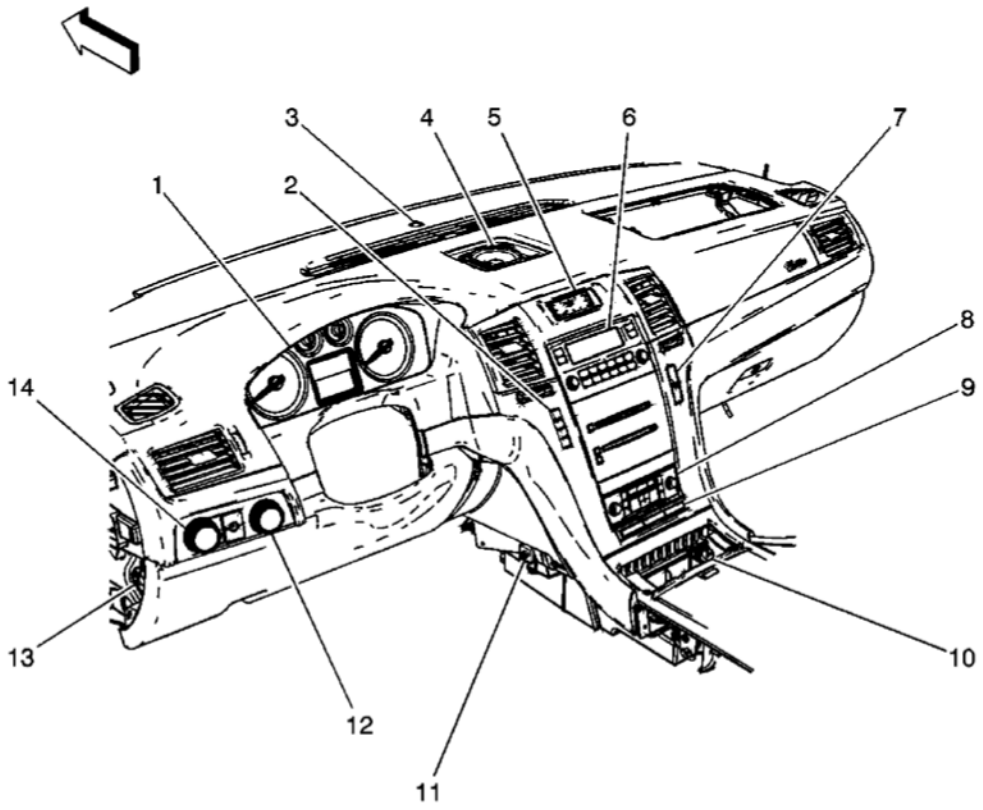


Fig. 9: Front Of The I/P (Z75)
Courtesy of GENERAL MOTORS CORP.

Callouts For Fig. 9

Callout	Component Name
1	Instrument Panel Cluster (IPC)
2	Driver Information Center (DIC) Switch
3	Ambient Light/Sunload Sensor Assembly (CJ2)
4	Speaker - Center
5	Analog Clock
6	Radio
7	Traction Control / Rear Object Detection Switch
8	HVAC Control Module
9	I/P Multifunction Switch Assembly
10	Auxiliary Power Outlet - Front 1
11	Noise Compensation Microphone (Y91)
12	Transfer Case Shift Control Switch

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13	Fuse Block - I/P
14	Headlamp and Panel Dimmer Switch

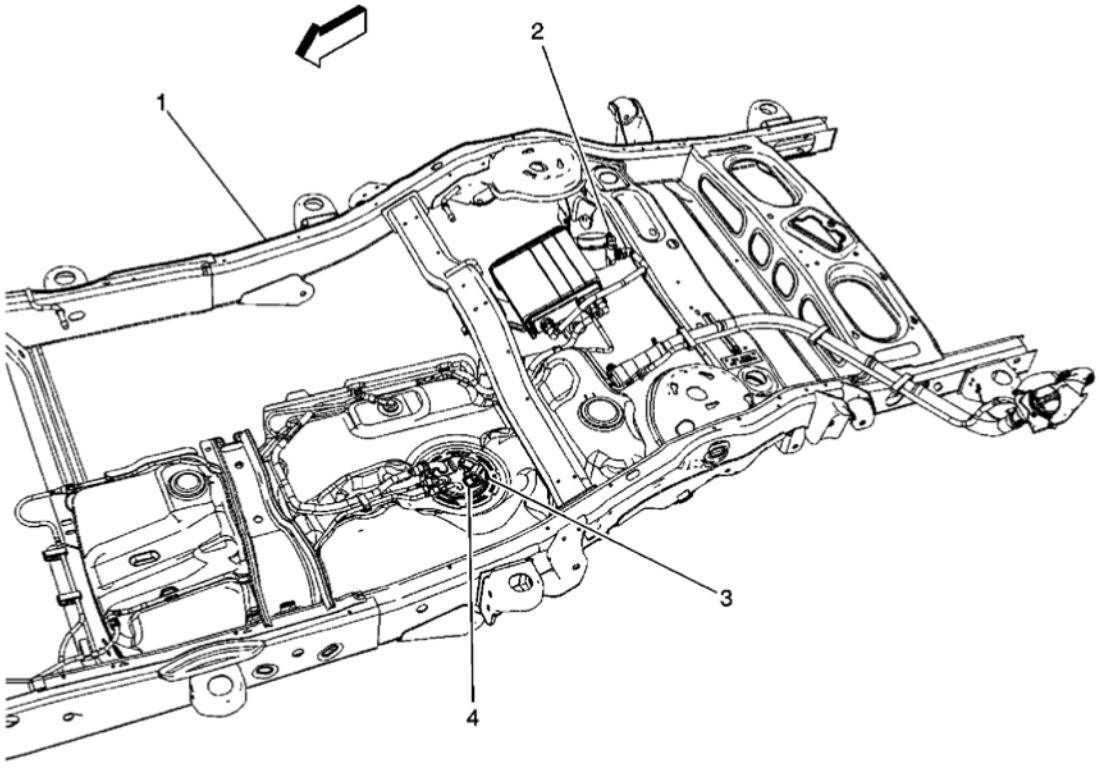


Fig. 10: Chassis Fuel Components (Short Wheel Base)
Courtesy of GENERAL MOTORS CORP.

Callouts For Fig. 10

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

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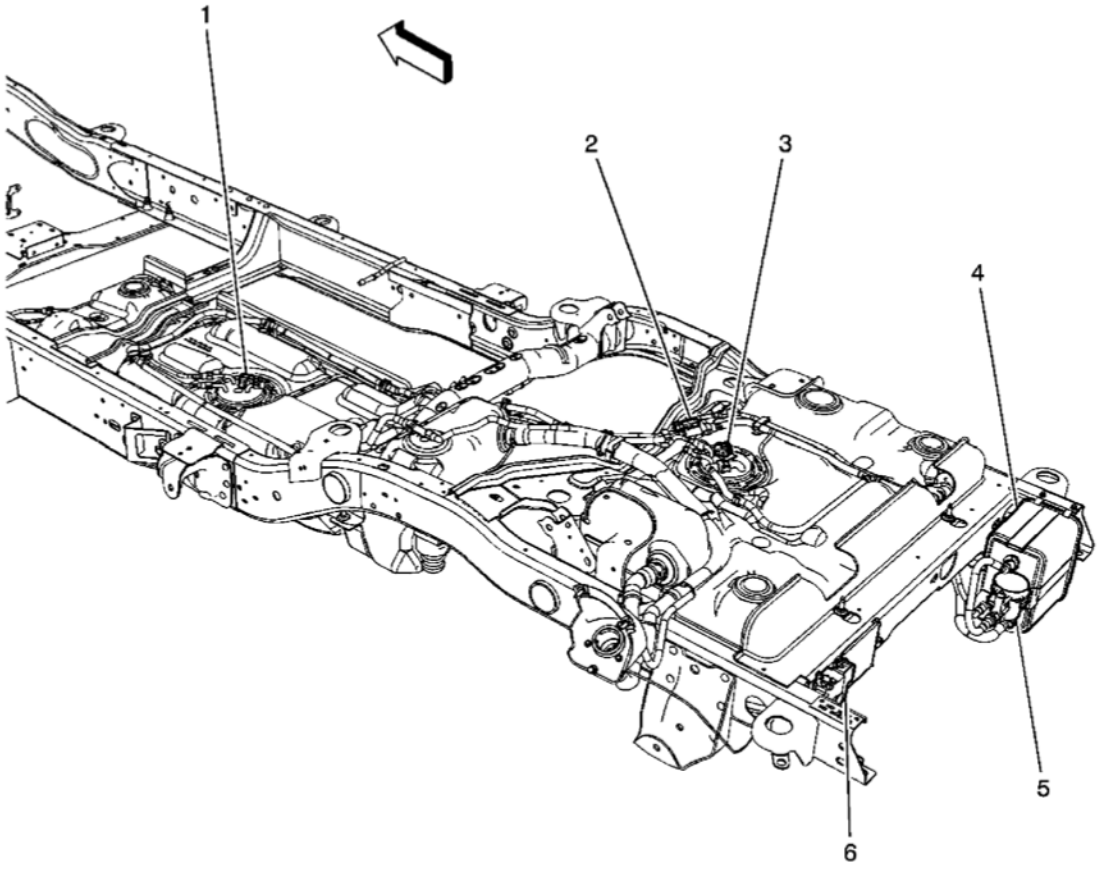


Fig. 11: Chassis Fuel Components (Long Wheel Base)
Courtesy of GENERAL MOTORS CORP.

Callouts For Fig. 11

Callout	Component Name
1	Fuel Pump and Sender Assembly - Primary
2	Fuel Tank Pressure (FTP) Sensor
3	Fuel Pump and Sender Assembly - Secondary (Except NQZ)
4	EVAP Canister
5	Evaporative Emission (EVAP) Canister Vent Solenoid Valve
6	Electronic Suspension control (ESC) Module

VISUAL IDENTIFICATION

DISPLAYS AND GAGES CONNECTOR END VIEWS

Analog Clock (Z75)

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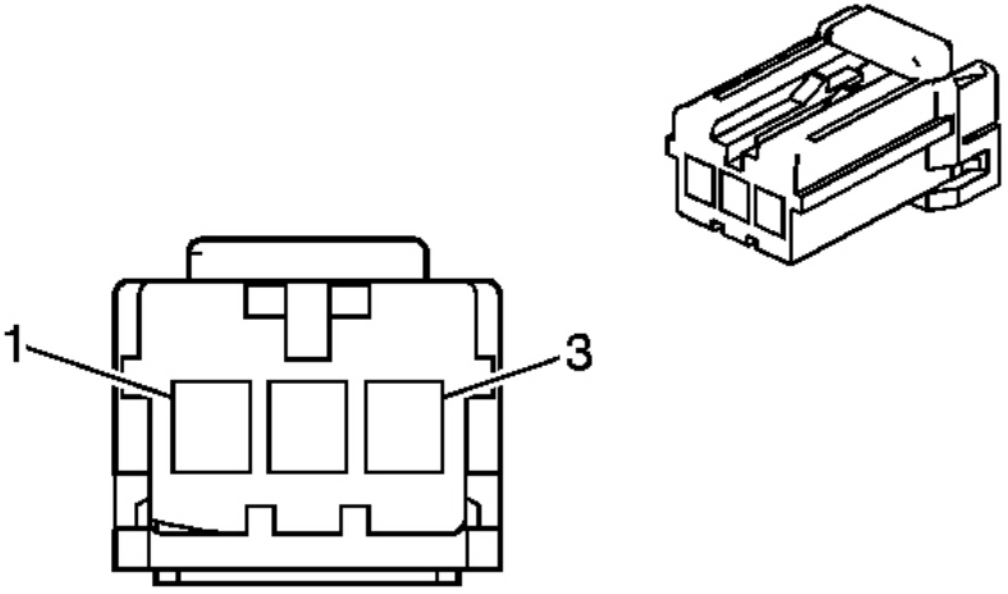


Fig. 12: Analog Clock (Z75) Connector End View
Courtesy of GENERAL MOTORS CORP.

Analog Clock (Z75) Connector Parts Information

Connector Part Information

- OEM: 15368694
- Service: 88953272
- Description: 3-Way F Multilock 070 Series (WH)

Terminal Part Information

- Terminal/Tray: 173630-7/7
- Core/Insulation Crimp: E/4
- Release Tool/Test Probe: 15315247/J-35616-33 (YE)

Analog Clock (Z75) Connector Terminal Identification

Pin	Wire Color	Circuit No.	Function
1	RD/WH	340	Battery Positive Voltage
2	BK	1050	Ground
3	YE	6817	LED Backlight Dimming Control

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Driver Information Center (DIC) Switch

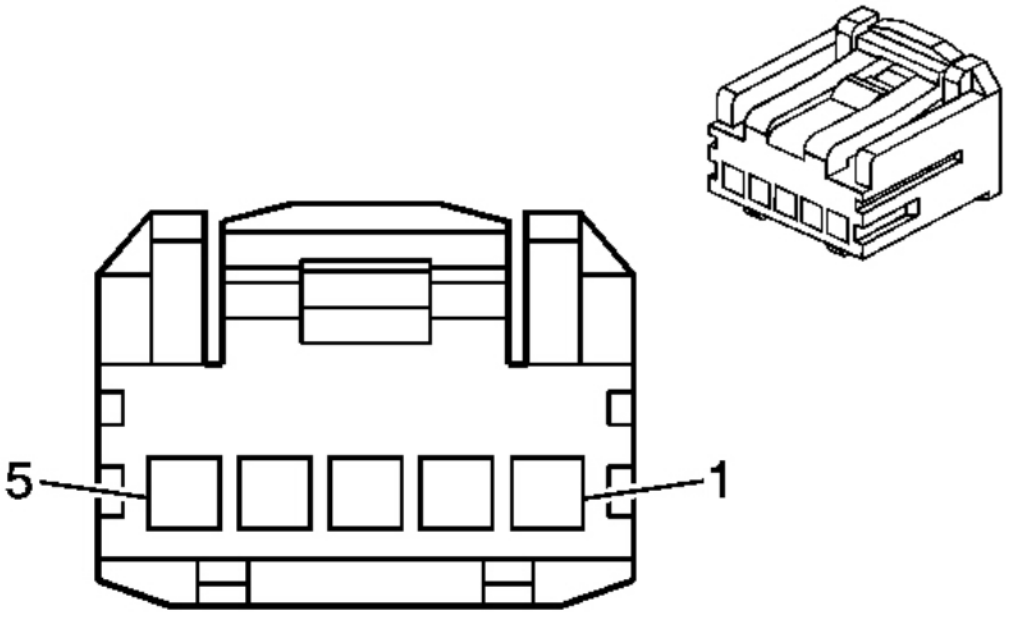


Fig. 13: Driver Information Center (DIC) Switch Connector End View
Courtesy of GENERAL MOTORS CORP.

Driver Information Center (DIC) Switch Connector Parts Information

Connector Part Information

- OEM: 15491277
- Service: 88988747
- Description: 5-Way F HCM Series (BK)

Terminal Part Information

- Terminal/Tray: SHCM-A03T-P025/20
- Core/Insulation Crimp: J/J
- Release Tool/Test Probe: 12094429/J-35616-64B (L-BU)

Driver Information Center (DIC) Switch Connector Terminal Identification

Pin	Wire Color	Circuit No.	Function
1	D-GN/WH	1358	DIC Switch Signal
2	BN	897	DIC Switch Low Reference

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3	PK	893	DIC Select Menu Switch Signal
4	YE	6817	LED Backlight Dimming Control
5	BK	1050	Ground

Engine Oil Pressure (EOP) Sensor

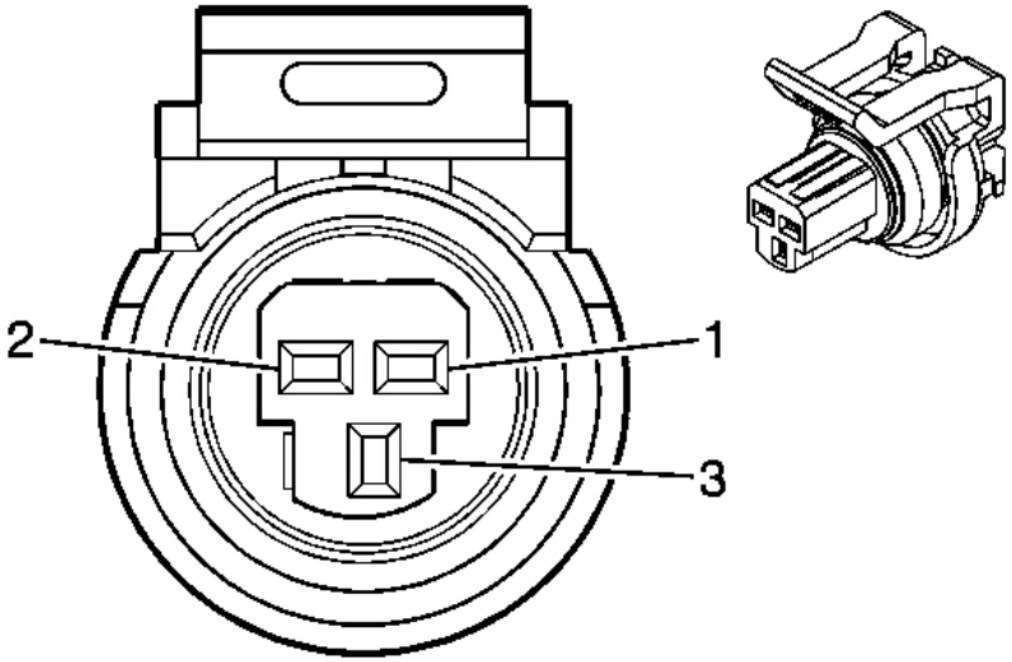


Fig. 14: Engine Oil Pressure (EOP) Sensor Connector End View
Courtesy of GENERAL MOTORS CORP.

Engine Oil Pressure (EOP) Sensor Connector Parts Information

Connector Part Information

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

Terminal Part Information

- Terminal/Tray: 15326267/19
- Core/Insulation Crimp: E/4

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- Release Tool/Test Probe: 15315247/J-35616-2A (GY)

Engine Oil Pressure (EOP) Sensor Connector Terminal Identification

Pin	Wire Color	Circuit No.	Function
1	BK	2755	Low Reference
2	GY	2705	5-Volt Reference
3	TN/WH	331	Oil Pressure Sensor Signal

Fuel Pump and Sender Assembly - Front

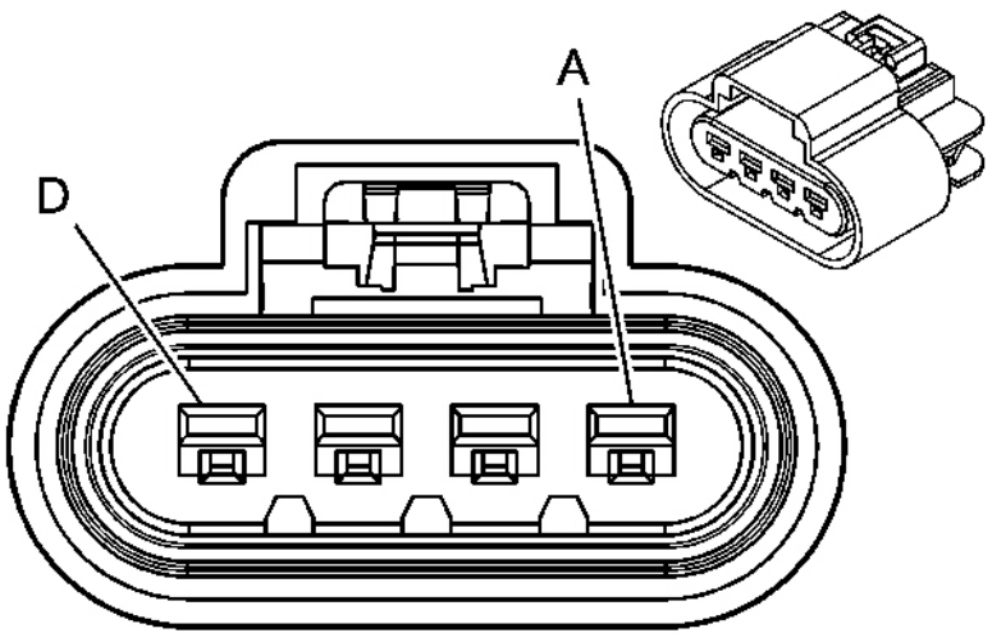


Fig. 15: Fuel Pump and Sender Assembly - Front Connector End View
Courtesy of GENERAL MOTORS CORP.

Fuel Pump and Sender Assembly - Front Connector Parts Information

Connector Part Information

- OEM: 15326631
- Service: 15306360
- Description: 4-Way F GT 280 Series Sealed 5.8 (BK)

Terminal Part Information

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- Pins: A
- Terminal/Tray: 15304720/19
- Core/Insulation Crimp: 4/5
- Release Tool/Test Probe: 15315247/J-35616-4A (PU)

- Pins: B-D
- Terminal/Tray: 15304719/19
- Core/Insulation Crimp: Pins B, C: E/5
- Core/Insulation Crimp: Pin D: 2/5
- Release Tool/Test Probe: 15315247/J-35616-4A (PU)

Fuel Pump and Sender Assembly - Front Connector Terminal Identification

Pin	Wire Color	Circuit No.	Function
A	BK	2150	Ground
B	TN/BK	6049	Fuel Tank Sensor Low Reference
C	PU	1589	Fuel Level Sensor Signal - Primary
D	GY	120	Fuel Pump Supply Voltage

Fuel Pump and Sender Assembly - Rear (Except NQZ)

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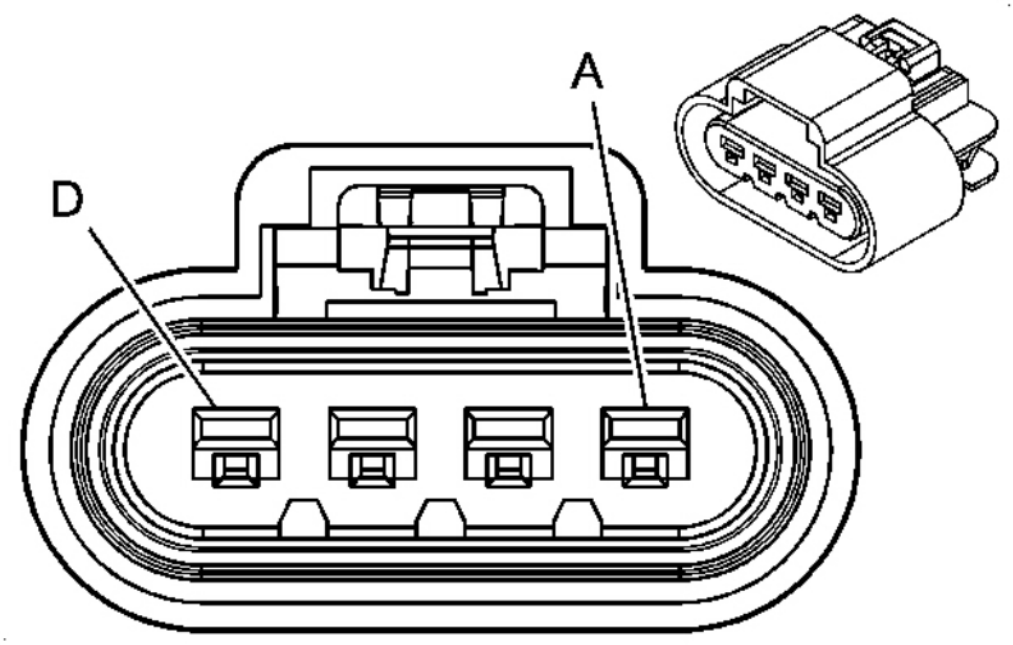


Fig. 16: Fuel Pump and Sender Assembly - Rear (Except NQZ) Connector End View
Courtesy of GENERAL MOTORS CORP.

Fuel Pump and Sender Assembly - Rear (Except NQZ) Connector Parts Information

Connector Part Information

- OEM: 15326631
- Service: 15306360
- Description: 4-Way F GT 280 Series Sealed 5.8 (BK)

Terminal Part Information

- Pins: A
- Terminal/Tray: 15304720/19
- Core/Insulation Crimp: 4/5
- Release Tool/Test Probe: 15315247/J-35616-4A (PU)

- Pins: B-D
- Terminal/Tray: 15304719/19
- Core/Insulation Crimp: Pins B, C: E/5
- Core/Insulation Crimp: Pin D: 2/5

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- Release Tool/Test Probe: 15315247/J-35616-4A (PU)

Fuel Pump and Sender Assembly - Rear (Except NQZ) Connector Terminal Identification

Pin	Wire Color	Circuit No.	Function
A	BK	2150	Ground
B	TN/BK	6049	Fuel Tank Sensor Low Reference
C	L-BU	1937	Secondary Fuel Level Sensor Signal
D	L-GN	1058	Fuel Balance Pump Supply Voltage

I/P Multifunction Switch Assembly (X88/Z88)

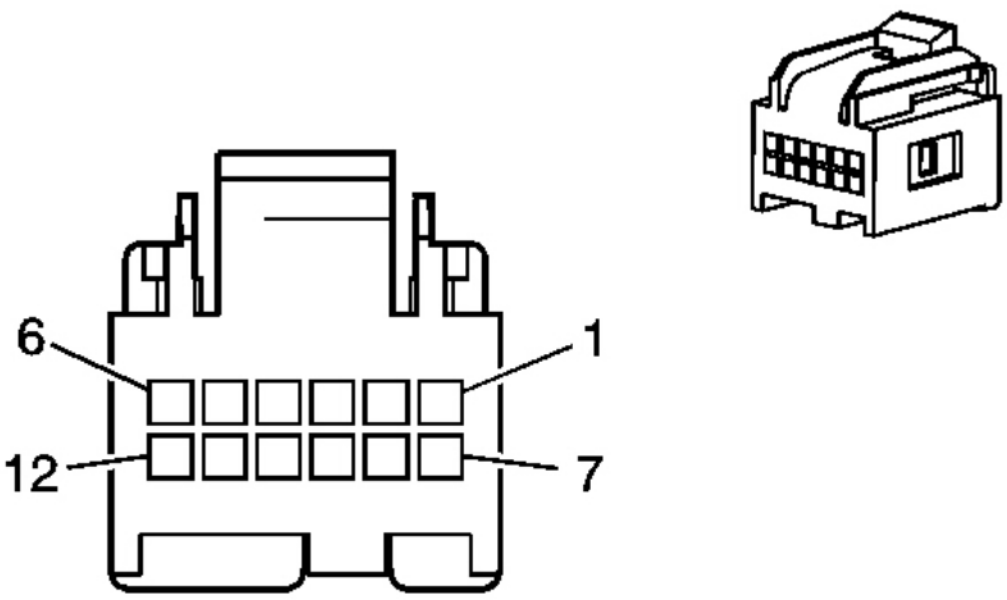


Fig. 17: I/P Multifunction Switch Assembly (X88/Z88) Connector End View
Courtesy of GENERAL MOTORS CORP.

I/P Multifunction Switch Assembly (X88/Z88) Connector Parts Information

Connector Part Information

- OEM: 13551678
- Service: 89047364
- Description: 12-Way F Receptacle 0.64 Series (BK)

Terminal Part Information

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- Terminal/Tray: 7116-4618-02/14
- Core/Insulation Crimp: P/P
- Release Tool/Test Probe: J-38125-215/J-35616-64B (L-BU)

I/P Multifunction Switch Assembly (X88/Z88) Connector Terminal Identification

Pin	Wire Color	Circuit No.	Function
1	L-BU	1788	Traction Control Switch Signal (JL4)
2	GY	2555	Rear Park Assist Disable Signal (UD7)
3	BK	1850	Ground
4	YE	6817	LED Backlight Dimming Control
5	BN	5852	Rear Park Assist LED Disable Signal (UD7)
6	PU/WH	6816	Indicator Dimming Control
7	L-GN	6096	Washer Fluid Heated Control Switch Signal (XA7)
8	D-BU/WH	5970	Washer Fluid Heated Control Switch LED Supply Voltage (XA7)
10	OG/BK	5285	Adjustable Pedals Motor Rearward Control (JF4)
11	YE/BK	5813	Park Enable Supply Voltage (JF4)
12	PU	5286	Adjustable Pedals Motor Forward Control (JF4)

I/P Multifunction Switch Assembly (Z75)

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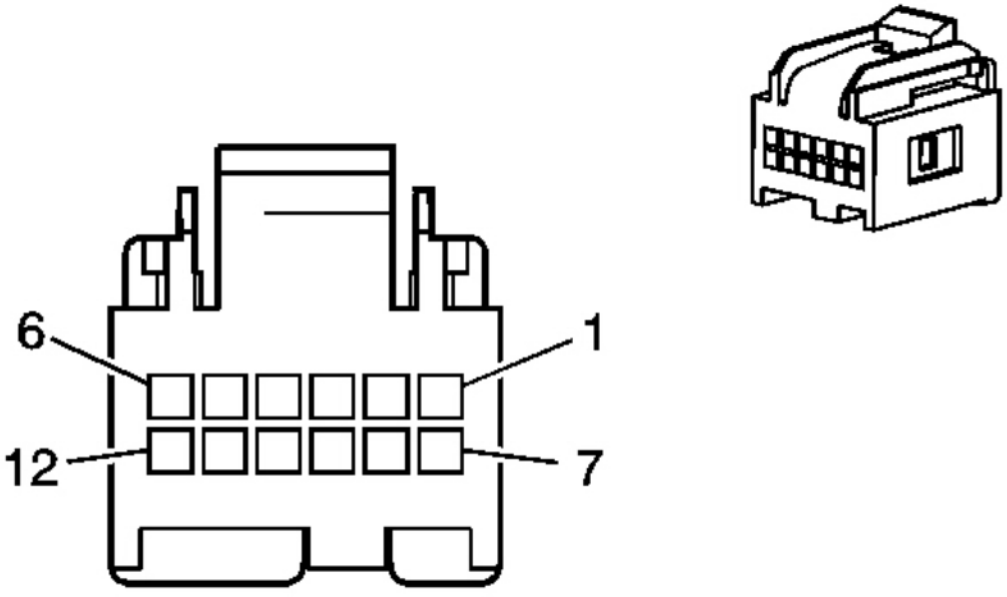


Fig. 18: I/P Multifunction Switch Assembly (Z75) Connector End View
Courtesy of GENERAL MOTORS CORP.

I/P Multifunction Switch Assembly (Z75) Connector Parts Information

Connector Part Information

- OEM: 13551678
- Service: 89047364
- Description: 12-Way F Receptacle 0.64 Series (BK)

Terminal Part Information

- Terminal/Tray: 7116-4618-02/14
- Core/Insulation Crimp: P/P
- Release Tool/Test Probe: J-38125-215/J-35616-64B (L-BU)

I/P Multifunction Switch Assembly (Z75) Connector Terminal Identification

Pin	Wire Color	Circuit No.	Function
1	BK	1850	Ground
2	L-GN	6096	Washer Fluid Heated Control Switch Signal (XA7)
3	YE	6817	LED Backlight Dimming Control

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4	OG/BK	5285	Adjustable Pedals Motor Rearward Control (JF4)
5	YE/BK	5813	Park Enable Supply Voltage (JF4)
6	PU	5286	Adjustable Pedals Motor Forward Control (JF4)
7	PU/WH	6816	Indicator Dimming Control
8	D-BU/WH	5970	Washer Fluid Heated Control Switch LED Supply Voltage (XA7)
9-12	-	-	Not Used

Instrument Panel Cluster (IPC) (X88/Z88)

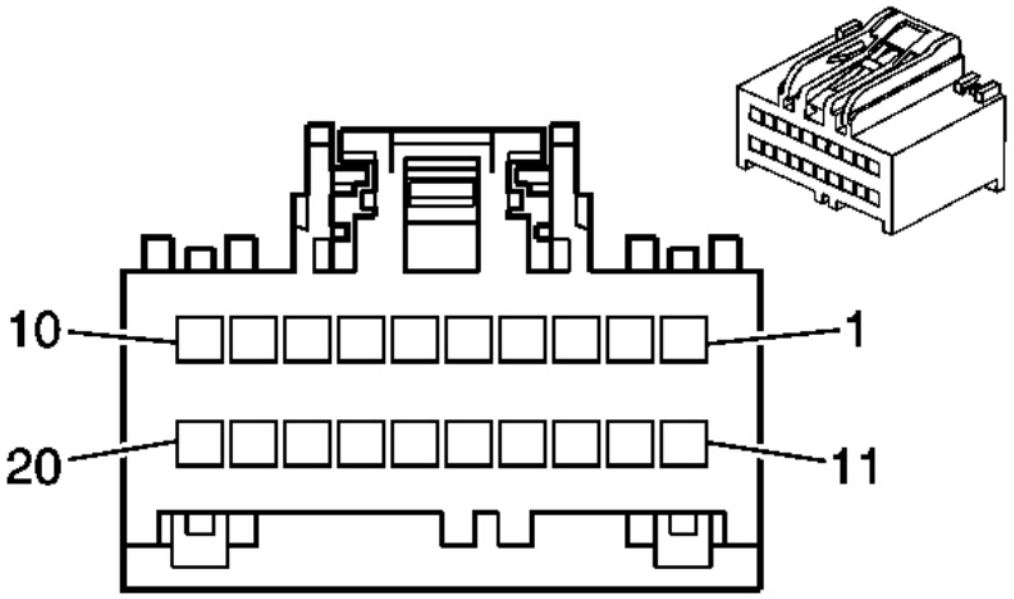


Fig. 19: Instrument Panel Cluster (IPC) (X88/Z88) Connector End View
Courtesy of GENERAL MOTORS CORP.

Instrument Panel Cluster (IPC) (X88/Z88) Connector Parts Information

Connector Part Information

- OEM: 15489824
- Service: 15126711
- Description: 20-Way F 0.64 Series (BK)

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Terminal Part Information

- Terminal/Tray: 7116-4618-02/14
- Core/Insulation Crimp: P/P
- Release Tool/Test Probe: J-38125-215/J-35616-64B (L-BU)

Instrument Panel Cluster (IPC)(X88/Z88) Connector Terminal Identification

Pin	Wire Color	Circuit No.	Function
1	RD/WH	2840	Battery Positive Voltage
2	D-GN/WH	1358	DIC Switch Signal
3-4	-	-	Not Used
5	PK	1639	Ignition 1 Voltage
6	D-GN	5060	Low Speed GMLAN Serial Data
7	-	-	Not Used
8	YE	6817	LED Backlight Dimming Control
9	D-BU	2307	Passenger Air Bag On Indicator Control
10	D-GN	2308	Passenger Air Bag Off Indicator Control
11	PU	333	Brake Fluid Level Sensor Signal
12	TN	185	Low Washer Fluid Indicator Control
13	BK/WH	1851	Ground
14-15	-	-	Not Used
16	PK	893	DIC Select Menu Switch Signal
17	-	-	Not Used
18	BN/WH	419	MIL Control
19	BN	897	DIC Switch Low Reference
20	PU	5234	Passenger Seat Belt Indicator

Instrument Panel Cluster (IPC) (Z75)

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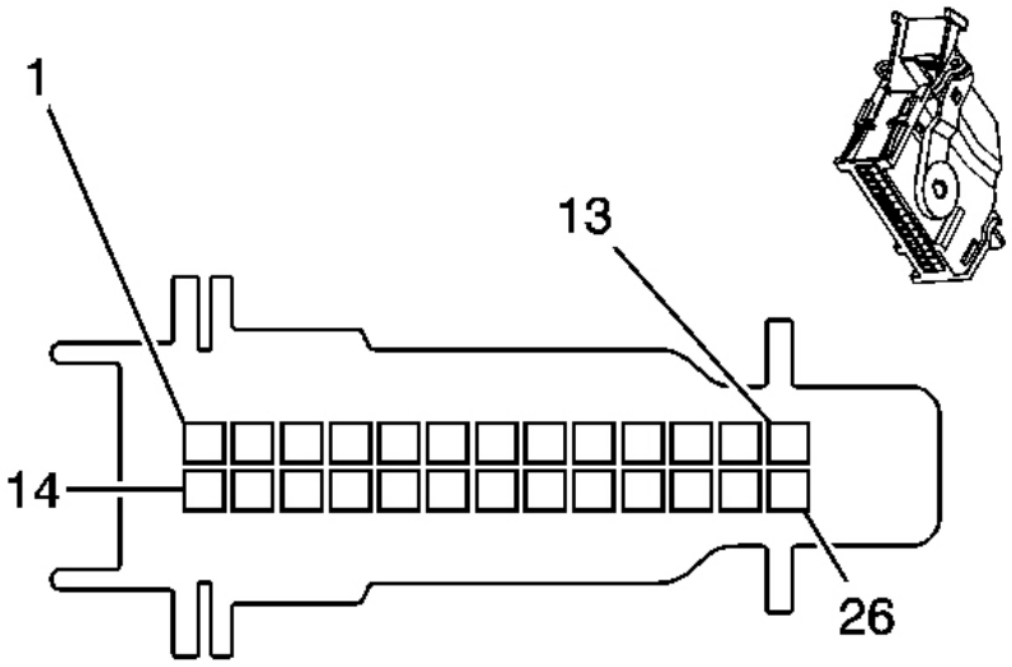


Fig. 20: Instrument Panel Cluster (IPC) (Z75) Connector End View
Courtesy of GENERAL MOTORS CORP.

Instrument Panel Cluster (IPC) (Z75) Connector Parts Information

Connector Part Information

- OEM: 15393409
- Service: 88987996
- Description: 26-Way F Lever Assisted (BK)

Terminal Part Information

- Terminal/Tray: 638551-1/16
- Core/Insulation Crimp: Pins 1-3, 9-23: J/J
- Core/Insulation Crimp: Pins 5, 8: K/K
- Release Tool/Test Probe: 15315247/J-35616-64B (L-BU)

Instrument Panel Cluster (IPC) (Z75) Connector Terminal Identification

Pin	Wire Color	Circuit No.	Function
1	RD/WH	2840	Battery Positive Voltage

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2	PK	1639	Ignition 1 Voltage
3	D-GN	5060	Low Speed GMLAN Serial Data
4	-	-	Not Used
5	BK/WH	1851	Ground
6-7	-	-	Not Used
8	PU	333	Brake Fluid Level Sensor Signal
9	BN/WH	419	MIL Control
10-11	-	-	Not Used
12	D-GN/WH	1358	DIC Switch Signal
13	BN	897	DIC Switch Low Reference
14-16	-	-	Not Used
17	TN	185	Low Washer Fluid Indicator Control
18-19	-	-	Not Used
20	PK	893	DIC Select Menu Switch Signal
21	PU	5234	Passenger Seat Belt Indicator
22	D-BU	2307	Passenger Air Bag On Indicator Control
23	D-GN	2308	Passenger Air Bag Off Indicator Control
24-26	-	-	Not Used

Oil Level Switch

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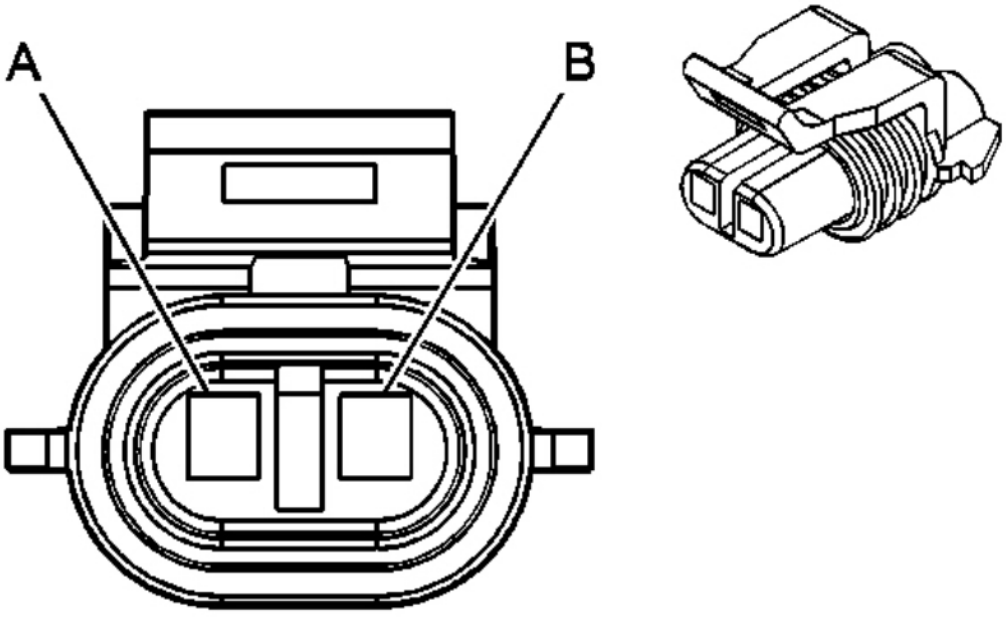


Fig. 21: Oil Level Switch Connector End View
Courtesy of GENERAL MOTORS CORP.

Oil Level Switch Connector Parts Information

Connector Part Information

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

Terminal Part Information

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

Oil Level Switch Connector Terminal Identification

Pin	Wire Color	Circuit No.	Function
A	BN	1174	Oil Level Switch Signal
B	BK/WH	451	Ground

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DIAGNOSTIC INFORMATION AND PROCEDURES

DIAGNOSTIC CODE INDEX

DIAGNOSTIC CODE INDEX

DTC	Description
DTC B3567	Driver Information Center (DIC) Select Switch Circuit
DTC P0461	Fuel Level Sensor 1 Performance
DTC P0462	Fuel Level Sensor 1 Low Voltage
DTC P0463	Fuel Level Sensor 1 High Voltage
DTC P0464	Fuel Level Sensor 1 Circuit Intermittent
DTC P0521	Engine Oil Pressure (EOP) Sensor Performance
DTC P0522	Engine Oil Pressure (EOP) Sensor Circuit Low Voltage
DTC P0523	Engine Oil Pressure (EOP) Sensor Circuit High Voltage
DTC P2066	Fuel Level Sensor 2 Performance
DTC P2067	Fuel Level Sensor 2 Low Voltage
DTC P2068	Fuel Level Sensor 2 High Voltage

DIAGNOSTIC STARTING POINT - DISPLAYS AND GAGES

Begin the displays and gages system diagnosis with **Diagnostic System Check - Vehicle** or the audible warning system diagnosis with **Diagnostic System Check - Vehicle** . The Diagnostic System Check will provide the following information:

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

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

SCAN TOOL OUTPUT CONTROLS

Instrument Panel Cluster (IPC)

Scan Tool Output Control	Additional Menu Selections	Description
IPC Gages	Special Functions	The instrument panel cluster (IPC) drives all of the gages at or below minimum for a few seconds when you select ON, then drives all of the gages at or above maximum for a few seconds. The IPC Display Test will end after one cycle of the gages sweep.
Display Test	Special Functions	The IPC illuminates all of the indicators for 7 seconds when you select ON. The IPC turns off the indicators after the 7 seconds.

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Dimming	Special Functions	The IPC increases or decreases the dimming intensity in increments of 20 percent between a range of 0-100 percent.

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 **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/High Beams OFF/Doors Closed/Trunk Closed/Park Brake Unapplied/Seatbelt Buckled			
Accy/RAP Relay Command	Power Mode	On/Off	Off
Battery Voltage	Charging Info	Volts	0-18 V
Hazard Lamp Switch	Exterior Lighting	Active/Inactive	Inactive
Headlamp Switch	Exterior Lighting	Active/Inactive	Inactive
High Beam Relay Command	Exterior Lighting	On/Off	Off
High Beam Select Switch	Exterior Lighting	Active/Inactive	Inactive
Ign. Off/Run/Crank	Power Mode	Key Out/ACC/Key In/Off/Crank/Run	Key In/Off
Key In Ignition Status	Power Mode	Key In/Key Out	Key In
Left Rear Door Ajar Switch	Doors	Door Closed/Door Ajar	Door Closed
Low Beam Relay Command	Exterior Lighting	On/Off	Off
Park Brake Switch	Inputs	Applied/Released	Released
Park Lamp Relay Cmd.	Exterior Lighting	On/Off	Off
Parklamp Switch	Exterior Lighting	Active/Inactive	Inactive
Right Rear Door Ajar Sw.	Doors	Door Closed/Door Ajar	Door Closed

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Driver Door Switch

Scan Tool Parameter	Data List	Units Displayed	Typical Data Value
Operating Conditions: Ignition ON/Engine OFF/High Beams OFF/Doors Closed/Trunk Closed/Park Brake Unapplied/Seat Belt Buckled			
Driver Door Ajar Sw.	Inputs	Active/Inactive	Inactive

Engine Control Module (ECM)

Scan Tool Parameter	Data List	Units Displayed	Typical Data Value
Operating Conditions: Engine Idling/Normal Operating Temperature			
ECT Sensor	Engine Data Cyl. Deactivation Data EVAP Data Fuel Trim Data HO2S Data Ignition Data Induction Data Misfire Data TAC Data Cooling/HVAC Data Cruise Control Data Electrical/Theft Data IPC Data Auto. Transmission Data	Celsius (Fahrenheit)	85-105°C (185-220°F) (Varies)
Engine Oil Level Switch	Engine Data Cyl. Deactivation Data Cruise Control Data	OK/Low	OK
Engine Oil Life Remaining	Cyl. Deactivation Data	Percent	0-100% (Varies)
Engine Oil Pressure Sensor	Engine Data Cyl. Deactivation Data Misfire Data Electrical/Theft Data	kPa (psi)	41 kPa (6 psi)
Engine Oil Pressure Switch	Engine Data	OK/Low	OK
Engine Speed	Engine Data Cyl. Deactivation Data EVAP Data HO2S Data Ignition Data Induction Data	RPM	±100 RPM from

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	Misfire Data TAC Data Cooling/HVAC Data Cruise Control Data Electrical/Theft Data Auto. Transmission Data		Desired Idle Speed
Fuel Level Sensor	EVAP Data	Volts	0-5 V (Varies)
Fuel Tank Level Remaining	Enhanced EVAP Data	Gallons (Liters)	Varies
Fuel Tank Level Remaining	Engine Data Cyl. Deactivation Data EVAP Data Misfire Data	Percent	0-100% (Varies)
Fuel Tank Rated Capacity	EVAP Data	Gallons (Liters)	Varies
Ignition 1 Signal	Engine Data Cyl. Deactivation Data EVAP Data HO2S Data Ignition Data Induction Data Misfire Data TAC Data Cooling/HVAC Data Cruise Control Data Electrical/Theft Data IPC Data Auto. Transmission Data	Volts	9-16 V (Varies)
MIL (Malfunction Indicator Lamp) Command	Engine Data	On/Off	Off
MIL Requested By DTC	Engine Data Cyl. Deactivation Data EVAP Data HO2S Data Ignition Data Induction Data Misfire Data TAC Data Electrical/Theft Data Auto. Transmission Data	Yes/No	No
MIL Circuit Status	Engine Data	Short Gnd/Open/Short to	OK

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		B+/OK/Incomplete	
Reduced Engine Power	Cyl. Deactivation Data EVAP Data TAC Data Electrical/Theft Data Auto. Transmission Data	Active/Inactive	Inactive
Start Up ECT	EVAP Data Fuel Trim Data HO2S Data Cooling/HVAC Data	Celsius (Fahrenheit)	85-105°C (185-220°F) (Varies)
TR Sw.	Auto. Transmission Data	Park/Reverse/Neutral/Drive 5/Drive 4/Drive 3/Drive 2/Drive 1	Park
Trans. Fluid Temp	IPC Data Auto. Transmission Data	Celsius (Fahrenheit)	85-105°C (185-220°F) (Varies)
Vehicle Speed Circuit 2 Status	Cruise Control Data	Short Gnd/Open/Short to B+/OK/Incomplete	OK
Vehicle Speed Sensor	Engine Data Cyl. Deactivation Data EVAP Data HO2S Data Ignition Data Induction Data Misfire Data TAC Data Cooling/HVAC Data Electrical/Theft Data Auto. Transmission Data	Miles per hour (Kilometers per hour)	0 km/h (0 mph)

Instrument Panel Cluster (IPC)

Scan Tool Parameter	Data List	Units Displayed	Typical Data Value
Operating Conditions: Ignition ON/Engine OFF/Seat Belt Buckled/High Beams OFF/Park Brake Unapplied/Park Lamps ON			
Battery Voltage	Data Display	Volts	9-16 V (Varies)
Brake Fluid	Data Display	OK/Low	OK
Brake Fluid Switch	Data Display	Volts	Varies
DIC Fuel Info	Data Display	Active/Inactive	Inactive
DIC Information Switch	Data Display	Active/Inactive	Inactive
DIC Personalization	Data Display	Active/Inactive	Inactive
Ignition 1 Input	Data Display	Active/Inactive	Active

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Ignition Cycle Counter	Data Display	Cycles	0-255
LCD Dimming	Data Display	Percent	0-100% (Varies)
Odo/Trip Reset Switch	Data Display	Active/Inactive	Inactive
Passenger Seatbelt Indicator Commanded	Data Display	On/Off	Off
Passenger Seatbelt Indicator Status	Data Display	On/Off	Off
Set/Reset Switch	Data Display	Active/Inactive	Inactive
Washer Fluid Level	Data Display	OK/Low	OK

Passenger Door Switch

Scan Tool Parameter	Data List	Units Displayed	Typical Data Value
Operating Conditions: Ignition ON/Engine OFF/High Beams OFF/Doors Closed/Trunk Closed/Park Brake Unapplied/Seatbelt Buckled			
Passenger Door Ajar Sw.	Inputs	Active/Inactive	Inactive

SCAN TOOL DATA DEFINITIONS

Accy/RAP Relay Command

The scan tool displays On or Off. This is the state of the Accy/RAP relay command as monitored by the body control module (BCM).

Battery Voltage

The scan tool displays 0-18 volts. This is the voltage at the battery positive voltage circuit of the BCM.

Battery Voltage

The scan tool displays 0-18 volts. The battery voltage as monitored by the instrument panel cluster (IPC).

Brake Fluid

The scan tool displays OK or Low. This is the state of the brake fluid level switch as monitored by the IPC.

Brake Fluid Switch

The scan tool displays 0-5 volts. The IPC monitors the brake fluid switch signal circuit where a low voltage indicates low brake fluid.

DIC Fuel Info

The scan tool displays Active or Inactive. The IPC monitors the fuel button of the DIC switch. A closed switch is displayed as Active.

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DIC Information

The scan tool displays Active or Inactive. The IPC monitors the information button of the DIC switch. A closed switch is displayed as Active.

DIC Personalization

The scan tool displays Active or Inactive. The IPC monitors the personalization button of the DIC switch. A closed switch is displayed as Active.

Driver Door Ajar Sw.

The scan tool displays Active or Inactive. The driver door module monitors the signal circuit of the driver door ajar switch. An open switch is displayed as Active with the door open.

ECT Sensor

The scan tool displays -39 to +140°C (-38 to +284°F). This is the engine coolant temperature as monitored by the engine control module (ECM). The voltage is inversely proportional to the engine coolant temperature.

Engine Oil Level Switch

The scan tool displays OK or Low. This is the state of the engine oil level switch as monitored by the ECM. A closed switch is displayed as OK.

Engine Oil Life Remaining

The scan tool displays 0-100 percent. This is the engine oil life index that is calculated and maintained by the ECM.

Engine Oil Pressure Sensor

The scan tool displays 0-5 volts. The ECM monitors the engine oil pressure sensor signal circuit where a low voltage indicates low pressure.

Engine Speed

The scan tool displays 0-9999 RPM. Engine speed is computed by the ECM from the 3X reference input. It should remain close to desired idle under various engine loads with the engine idling.

Fuel Level Sensor

The scan tool displays 0-5 volts. The ECM monitors the fuel level sensor signal circuit where 0 V is an empty tank.

Engine Oil Pressure Switch

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

Fuel Tank Level Remaining

The scan tool displays gallons (liters). This is the amount of fuel remaining in the fuel tank as determined by the ECM.

Fuel Tank Level Remaining

The scan tool displays 0-100%. The scan tool displays in percentage the amount of fuel remaining in the fuel tank as determined by the ECM.

Fuel Tank Rated Capacity

The scan tool displays gallons (liters). This is the fuel tank rated capacity as determined by the ECM.

Hazard Lamp Switch

The scan tool displays Active or Inactive. The BCM monitors the hazard switch signal circuit. When the hazard lamp is off the signal is displayed as Inactive.

Headlamp Switch

The scan tool displays Active or Inactive. The BCM monitors the signal circuit of the headlamp switch. A closed switch is displayed as Active.

High Beam Relay Command

The scan tool displays the commanded state of the high beam relay. The scan tool displays On when the BCM allows the high beam relay to go to ground to activate the high beam lamps.

High Beam Select Switch

The scan tool displays Active or Inactive. This is the position of the high beam select switch where an on switch is displayed as Active.

Ign. Off/Run/Crank

The scan tool displays Key Out/ACC/Key In/Off/Crank/Run. The power mode status as monitored by the BCM.

Ignition 1 Input

The scan tool displays Active or Inactive. The scan tool displays Active when the ignition switch is in the RUN or CRANK position

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Ignition 1 Signal

The scan tool displays 0-16 V. The ignition 1 signal represents the system voltage detected by the ECM at the ignition voltage circuit.

Ignition Cycle Counter

The scan tool displays 0-255. The IPC counts the number of times the ignition is cycled.

Key In Ignition Status

The scan tool displays Key In or Key Out. The BCM monitors the signal circuit of the ignition key alarm switch. The scan tool displays Key In when the ignition key is fully inserted into the ignition switch cylinder.

LCD Dimming

The scan tool displays 0-100 percent. This is the dimming level of the backlight of the IPC.

Left Rear Door Ajar Switch

The scan tool displays Door Closed/Door Ajar. The BCM monitors the signal circuit of the left rear door ajar switch. An open switch is displayed as Door Ajar with the door open.

Low Beam Relay Command

The scan tool displays On or Off. The BCM monitors the low beam relay output signal. When the low beam switch is turned Off the signal is displayed as Off.

MIL (Malfunction Indicator Lamp) Command

The scan tool displays On or Off. This is the commanded state of the malfunction indicator lamp (MIL) by the ECM.

MIL Requested By DTC

The scan tool displays Yes or No. This is the parameter that indicates if the commanded state of the MIL was set by a DTC.

MIL Circuit Status

The scan tool displays Short Gnd/Open/Short to B+/OK/Incomplete. The ECM monitors the status of the MIL signal circuit

Odo/Trip Reset Switch

The scan tool displays Active or Inactive. The IPC monitors the trip reset stem on the cluster. A closed

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switch is displayed as Active.

Park Brake Switch

The scan tool displays Applied or Released. The BCM monitors the park brake signal circuit, where a closed switch with the park brake applied is displayed as Applied.

Park Lamp Relay Cmd.

The scan tool displays the commanded state of the park lamp relay. The scan tool displays On when the BCM allows the park lamp relay to go to ground to activate the park lamps.

Parklamp Switch

The scan tool displays Active or Inactive. The BCM monitors the signal circuit of the parklamp switch. A closed switch is displayed as Active.

Passenger Door Ajar Switch

The scan tool displays Active or Inactive. The passenger door module monitors the signal circuit of the passenger door ajar switch. An open switch is displayed as On with the door open.

Passenger Seatbelt Indicator Commanded

The scan tool displays On or Off. This is the state of the passenger safety belt indicator as commanded by the IPC.

Passenger Seatbelt Indicator Status

The scan tool displays On or Off. This is the state of the passenger safety belt indicator as monitored by the IPC.

Reduced Engine Power

The scan tool displays Active or Inactive. This is the state of the Reduced Engine Power indicator as monitored by the ECM.

Right Rear Door Ajar Sw.

The scan tool displays Door Closed/Door Ajar. The BCM monitors the signal circuit of the right rear door ajar switch. An open switch is displayed as Door Ajar with the door open.

Set/Reset Switch

The scan tool displays Active/Inactive. The IPC monitors the set/reset button of the DIC switch. A closed switch is displayed as Active.

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TR Sw.

The scan tool displays Park/Reverse/Neutral/Drive. The gear position status as monitored by the ECM.

Trans. Fluid Temp

The scan tool displays -40°C to +215°C (-40°F to +419°F). This is the ECM monitored transmission fluid temperature data.

Vehicle Speed Circuit 2 Status

The scan tool displays Short Gnd/Open/Short to B+/OK/Incomplete. The ECM monitors the status of the vehicle speed signal circuit

Vehicle Speed Sensor

The scan tool displays 0-255 km/h (0-159 mph). The ECM monitors the voltage at the signal circuit of the vehicle speed sensor. The voltage is proportional to the vehicle speed.

Washer Fluid Level

The scan tool displays OK/Low. The IPC monitors the windshield washer solvent level switch, where a closed switch with low washer fluid is displayed as Low.

DTC B3567

DTC Descriptors

DTC B3567 01

Driver Information Center (DIC) Select Switch Circuit Short To Battery

DTC B3567 59

Driver Information Center (DIC) Select Switch Circuit /Component Protection Time-Out

Diagnostic Fault Information

Perform the **Diagnostic System Check - Vehicle** prior to using this diagnostic procedure.

DTC B3567

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
DIC Switch Signal Circuit	1	1	B3567 01	B3567 59
DIC Switch Ground Reference Circuit	-	1	-	-
1. Driver Information Center (DIC) Switch(es) Inoperative				

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Circuit/System Description

The driver information switches are normally open momentary switches. Power is provided to the driver information center (DIC) switches via the instrument panel cluster (IPC) ignition 1 voltage circuit. The IPC ignition 1 voltage circuit is fused in the body control module (BCM). The IPC interfaces with the DIC switches via 3 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 PERSONALIZATION, SET/RESET, TRIP/FUEL, AND VEHICLE INFO switches. A stuck switch or a short to battery sets a DTC.

Conditions for Running the DTC

The ignition is in ACCESSORY or RUN.

Conditions for Setting the DTC

- The IPC detects that the DIC switch is stuck.
- The IPC detects that the DIC switch signal circuit is shorted to battery.

Action Taken When the DTC Sets

The IPC ignores the DIC switch inputs.

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 engine control module (ECM) receives a clear code command from the scan tool.

Diagnostic Aids

- When the DIC switches are stuck, only the TRIP/FUEL switch functions correctly. When the TRIP/FUEL switch is stuck, all other DIC switches function correctly.
- Only the DIC signal circuit can be diagnosed as shorted to battery.

Reference Information

Schematic Reference

Instrument Cluster Schematics

Connector End View Reference

- **Door Lock Schematics**
- **Inline Harness Connector End Views**

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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. Verify all of the scan tool DIC Switch parameters except the TRIP/FUEL parameter are Inactive.
   - If not Inactive, replace the IPC.
3. Ignition ON, install a 3-amp fused jumper wire between the signal circuit and ground. Verify all of the scan tool DIC Switch parameters except the TRIP/FUEL parameter are Active.
   - If not Active, test the signal circuit of the DIC switch assembly for a short to voltage. If the circuit tests normal, replace the IPC.
4. If all circuits test normal, test or replace the DIC switch assembly.

Repair Procedures

Perform the **Diagnostic Repair Verification** after completing the diagnostic procedure.

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

DTC P0461

DTC Descriptor

DTC P0461

Fuel Level Sensor 1 Performance

Diagnostic Fault Information

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				

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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. The 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

The ECM detects a change in fuel level less than 10 liters (1.3 gallons) over a distance of 241.4 km (150 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

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Fuel Level Specifications

Schematic Reference

- **Instrument Cluster Schematics**
- **Engine Controls Schematics** for the 4.8L, 5.3L, 6.0L, and 6.2L engines

Connector End View Reference

- **Displays and Gages Connector End Views**
- **Engine Control Module Connector End Views** for the 4.8L, 5.3L, 6.0L, and 6.2L engines

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, remove the fuel level sender and verify that there is no obstructions interfering with the fuel level sender.
    - If interference is present, remove the obstruction.
2. If no interference is present, replace the fuel level sender.

Repair Procedures

Perform the **Diagnostic Repair Verification** after completing the diagnostic procedure.

- **Fuel Level Sensor Replacement (1500 Series)** or **Fuel Level Sensor Replacement (1500 Series w/E85)** or **Fuel Level Sensor Replacement (2500 - 43.5L (11.5 gal) Tank - Rear)** or **Fuel Level Sensor Replacement (2500 - 98.4L (26 gal) Tank - Front)** for the 4.8L, 5.3L, 6.0L, and 6.2L engines
- **Control Module References** for the ECM replacement, setup, and programming

DTC P0462

DTC Descriptor

DTC P0462

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Fuel Level Sensor 1 Low Voltage

Diagnostic Fault Information

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. The fuel information is also used for misfire, evaporative emission (EVAP), and other onboard diagnostics.

Conditions for Running the DTC

- The ignition is ON, with the engine running.
- The system voltage is between 11-18 volts.

Conditions for Setting the DTC

- The sender output is less than 0.5 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.

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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 4.8L, 5.3L, 6.0L, and 6.2L engines

Connector End View Reference

- **Displays and Gages Connector End Views**
- **Engine Control Module Connector End Views** for the 4.8L, 5.3L, 6.0L, and 6.2L engines

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 4-98 percent.

Circuit/System Testing

1. Ignition OFF, disconnect the harness connector at the fuel level sensor.
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 ground. If the circuit tests normal, replace the ECM.
3. If all circuits test normal, test or replace the fuel level sensor.

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Repair Procedures

Perform the **Diagnostic Repair Verification** after completing the diagnostic procedure.

- **Fuel Level Sensor Replacement (1500 Series)** or **Fuel Level Sensor Replacement (1500 Series w/E85)** or **Fuel Level Sensor Replacement (2500 - 43.5L (11.5 gal) Tank - Rear)** or **Fuel Level Sensor Replacement (2500 - 98.4L (26 gal) Tank - Front)** for the 4.8L, 5.3L, 6.0L, and 6.2L engines
- **Control Module References** for the ECM replacement, setup, and programming

DTC P0463

DTC Descriptor

DTC P0463

Fuel Level Sensor 1 High Voltage

Diagnostic Fault Information

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. The fuel information is also used for misfire, evaporative emission (EVAP), and other on-board diagnostics.

Conditions for Running the DTC

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- The ignition is ON, with the engine running.
- The system voltage is between 11-18 volts.

Conditions for Setting the DTC

- The sensor output is greater than 3.5 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 4.8L, 5.3L, 6.0L, and 6.2L engines

Connector End View Reference

- **Displays and Gages Connector End Views**
- **Engine Control Module Connector End Views** for the 4.8L, 5.3L, 6.0L, and 6.2L engines

Electrical Information Reference

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

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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 4-98 percent.

Circuit/System Testing

1. Ignition OFF, disconnect the harness connector at the fuel level sensor.
2. Ignition OFF, test for less than 1 ohm of resistance between the low reference circuit and ground.
   - If greater than 1 ohm, test the low reference circuit for a short to voltage or an open/high resistance. If the circuit tests normal, replace the ECM.
3. Ignition ON, install a 3-amp fused jumper between the signal circuit and the low reference circuit. Verify 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 voltage or an open/high resistance. If the circuit tests normal, replace the ECM.
4. If all circuits test normal, test or replace the fuel level sensor.

Repair Procedures

Perform the **Diagnostic Repair Verification** after completing the diagnostic procedure.

- **Fuel Level Sensor Replacement (1500 Series)** or **Fuel Level Sensor Replacement (1500 Series w/E85)** or **Fuel Level Sensor Replacement (2500 - 43.5L (11.5 gal) Tank - Rear)** or **Fuel Level Sensor Replacement (2500 - 98.4L (26 gal) Tank - Front)** for the 4.8L, 5.3L, 6.0L, and 6.2L engines
- **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

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				

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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. The fuel information is also used for misfire, evaporative emission (EVAP), and other on-board 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 possible refueling event. A refueling event test is executed to confirm that a refueling event has occurred. If refueling is confirmed, the test for DTC P0464 is considered passing. The refueling event test must pass 2 out of 3 times, 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 less than 30 seconds.
- Both conditions above occur 2 out of 3 times as part of a refueling event test.

Action Taken When the DTC Sets

- 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.

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

Diagnostic Aids

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

Reference Information

Schematic Reference

- **Instrument Cluster Schematics**
- **Engine Controls Schematics** for the 4.8L, 5.3L, 6.0L, and 6.2L engines

Connector End View Reference

- **Displays and Gages Connector End Views**
- **Engine Control Module Connector End Views** for the 4.8L, 5.3L, 6.0L, and 6.2L engines

Electrical Information Reference

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

Scan Tool Reference

- **Fuel Level Specifications**
- **Scan Tool Data List**

Circuit/System Testing

1. Ignition OFF, disconnect the harness connector at the fuel level sensor. 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. Verify that the scan tool Fuel Tank Level Remaining parameter displays the correct fuel level percent.
    - If the fuel level percent is incorrect, test the signal circuit and the low reference circuit for an open/high resistance. If the circuits test normal, replace the ECM.
3. If all circuits test normal, test or replace the fuel level sensor.

Repair Procedures

Perform the **Diagnostic Repair Verification** after completing the diagnostic procedure.

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- **Fuel Level Sensor Replacement (1500 Series)** or **Fuel Level Sensor Replacement (1500 Series w/E85)** or **Fuel Level Sensor Replacement (2500 - 43.5L (11.5 gal) Tank - Rear)** or **Fuel Level Sensor Replacement (2500 - 98.4L (26 gal) Tank - Front)** for the 4.8L, 5.3L, 6.0L, and 6.2L engines
- **Control Module References** for ECM or IPC replacement, setup, and programming

DTC P0521

DTC Descriptor

DTC P0521

Engine Oil Pressure (EOP) Sensor Performance

Diagnostic Fault Information

Perform the **Diagnostic System Check - Vehicle** prior to using this diagnostic procedure.

DTC P0521

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Engine Oil Pressure 5-Volts Reference Circuit	P0522	P0522	-	P0521
Engine Oil Pressure Sensor Signal Circuit	P0522	P0522	P0523	P0521
Low Reference	-	P0523	-	P0521

Circuit/System Description

The engine oil pressure (EOP) sensor changes voltage based on the engine oil pressure. The EOP sensor is a 3-wire sensor comprising of the signal circuit, the low reference circuit and the 5-volt reference circuit. The engine control module (ECM) supplies 5 volts to the EOP sensor via the 5-volt reference circuit and provides ground via the EOP low reference circuit. The ECM monitors the signal circuit of the EOP sensor to determine if the EOP sensor voltage is within the normal operating range of approximately 1-4 volts. When the engine oil pressure is high, the EOP sensor voltage is high and the ECM senses a high signal voltage. When the engine oil pressure is low, the EOP sensor voltage is low and the ECM senses a low signal voltage. The ECM sends the EOP information to the instrument panel cluster (IPC) via GMLAN serial data message. The ECM can also predict oil pressure as a function of engine speed and engine temperature.

Conditions for Running the DTC

- The engine is running with engine speed between 1,000-3,500 RPM.
- Oil temperature is less than 140°C (284°F).

Conditions for Setting the DTC

The ECM detects that the difference between the predicted oil pressure and the actual oil pressure is either less

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than 47 kPa (6.8 psi) or greater than 50 kPa (7.3 psi).

Action Taken When the DTC Sets

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

Conditions for Clearing the DTC

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

Reference Information

Schematic Reference

- **Instrument Cluster Schematics**
- **Engine Controls Schematics** for the 4.8L, 5.3L, 6.0L and 6.2L engines

Connector End View Reference

- **Displays and Gages Connector End Views**
- **Engine Control Module Connector End Views** for the 4.8L, 5.3L, 6.0L and 6.2L engines
- **Inline Harness 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 Verification

Engine ON, observe the Engine Oil Pressure Sensor parameter. The reading should be between 41-448 kPa (6-65 psi).

Circuit/System Testing

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1. Engine ON, transmission in park, vary the engine speed by 500 RPM.
2. Verify the scan tool Engine Oil Pressure Sensor parameter changes by more than 34.5 kPa (5 psi).
    - If less than 34.5 kPa (5 psi), replace the EOP sensor.

Repair Procedures

Perform the **Diagnostic Repair Verification** after completing the diagnostic procedure.

Engine Oil Pressure Sensor and/or Switch Replacement for the 4.8L, 5.3L, 6.0L, and 6.2L engines

DTC P0522

DTC Descriptor

DTC P0522

Engine Oil Pressure (EOP) Sensor Circuit Low Voltage

Diagnostic Fault Information

Perform the **Diagnostic System Check - Vehicle** prior to using this diagnostic procedure.

DTC P0522

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Engine Oil Pressure 5-Volt Reference Circuit	P0522	P0522	P0523	P0521
Engine Oil Pressure Sensor Signal Circuit	P0522	P0523	P0523	P0521
Low Reference	-	P0523	-	P0521

Circuit/System Description

The engine oil pressure (EOP) sensor changes voltage based on the engine oil pressure. The EOP sensor is a 3-wire sensor comprising of the signal circuit, the low reference circuit and the 5-volt reference circuit. The engine control module (ECM) supplies 5 volts to the EOP sensor via the 5-volt reference circuit and provides ground via the EOP low reference circuit. The ECM monitors the signal circuit of the EOP sensor to determine the EOP sensor voltage is within the normal operating range of approximately 1-4 volts. When the engine oil pressure is high, the EOP sensor voltage is high and the ECM senses a high signal voltage. When the engine oil pressure is low, the EOP sensor voltage is low and the ECM senses a low signal voltage. The ECM sends the EOP information to the instrument panel cluster (IPC) via GMLAN serial data message.

Conditions for Running the DTC

The engine is running.

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Conditions for Setting the DTC

- The ECM detects that the EOP sensor signal circuit is less than 0.1 volt.
- The above condition is present for greater than 10 seconds.

Action Taken When the DTC Sets

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

Conditions for Clearing the DTC

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

Reference Information

Schematic Reference

- **Instrument Cluster Schematics**
- **Engine Controls Schematics** for 4.8L, 5.3L, 6.0L and 6.2L engines

Connector End View Reference

- **Displays and Gages Connector End Views**
- **Engine Control Module Connector End Views** for 4.8L, 5.3L, 6.0L and 6.2L engines
- **Inline Harness 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 EOP sensor.
2. Ignition ON, test for 4.8-5.2 volts between the 5-volt reference circuit and ground.

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- If less than 4.8 volts, test the 5-volt reference circuit for a short to ground or an open/high resistance. If the circuit test normal, replace the ECM.
- If greater than 5.2 volts, test the 5-volt reference circuit for a short to voltage. If the circuit tests normal, replace the ECM.

3. Install a 3-amp fused jumper wire between the signal circuit and the 5-volt reference circuit. Verify the scan tool Engine Oil Pressure Sensor parameter is greater than 550 kPa (80 psi).
   - If less than 550 kPa (80 psi), test the signal circuit for a short to ground. If the circuit tests normal, replace the ECM.
4. If all circuits test normal, test or replace the EOP sensor.

Repair Procedures

Perform the **Diagnostic Repair Verification** after completing the diagnostic procedure.

- **Engine Oil Pressure Sensor and/or Switch Replacement** for 4.8L, 5.3L, 6.0L and 6.2L engines
- **Control Module References** for ECM replacement, setup and programming

DTC P0523

DTC Descriptor

DTC P0523

Engine Oil Pressure (EOP) Sensor Circuit High Voltage

Diagnostic Fault Information

Perform the **Diagnostic System Check - Vehicle** prior to using this diagnostic procedure.

DTC P0523

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Engine Oil Pressure 5-Volt Reference Circuit	P0522	P0522	P0523	P0521
Engine Oil Pressure Sensor Signal Circuit	P0522	P0523	P0523	P0521
Low Reference	-	P0523	-	P0521

Circuit/System Description

The engine oil pressure (EOP) sensor changes voltage based on the engine oil pressure. The EOP sensor is a 3-wire sensor comprising of the signal circuit, the low reference circuit and the 5-volt reference circuit. The engine control module (ECM) supplies 5 volts to the EOP sensor via the 5-volt reference circuit and provides ground via the EOP low reference circuit. The ECM monitors the signal circuit of the EOP sensor to determine the EOP sensor voltage is within the normal operating range of approximately 1-4 volts. When the engine oil

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pressure is high, the EOP sensor voltage is high and the ECM senses a high signal voltage. When the engine oil pressure is low, the EOP sensor voltage is low and the ECM senses a low signal voltage. The ECM sends the EOP information to the instrument panel cluster (IPC) via GMLAN serial data message.

Conditions for Running the DTC

The engine is running.

Conditions for Setting the DTC

- The ECM detects that the EOP sensor signal circuit is greater than 4.4 volts.
- The above condition is present for greater than 10 seconds.

Action Taken When the DTC Sets

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

Conditions for Clearing the DTC

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

Reference Information

Schematic Reference

- **Instrument Cluster Schematics**
- **Engine Controls Schematics** for the 4.8L, 5.3L, 6.0L and 6.2L engines

Connector End View Reference

- **Displays and Gages Connector End Views**
- **Engine Control Module Connector End Views** for the 4.8L, 5.3L, 6.0L and 6.2L engines
- **Inline Harness Connector End Views**

Electrical Information Reference

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

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Scan Tool Reference

Scan Tool Data List

Circuit/System Testing

1. Ignition OFF, disconnect the harness connector at the EOP sensor.
2. Ignition OFF, test for less than 1 ohm of resistance between the low reference circuit and ground.
   - If greater than 1 ohm, test the low reference circuit for a short to voltage or an open/high resistance. If the circuit tests normal, replace the ECM.
3. Ignition ON, test for 4.8-5.2 volts between the 5-volt reference circuit and ground.
   - If less than 4.8 volts, test the 5-volt reference circuit for a short to ground or an open/high resistance. If the circuit test normal, replace the ECM.
   - If greater than 5.2 volts, test the 5-volt reference circuit for a short to voltage. If the circuit tests normal, replace the ECM.
4. Install a 3-amp fused jumper wire between the signal circuit and the low reference circuit. Verify the scan tool Engine Oil Pressure Sensor parameter is less than 8 kPa (1.2 psi).
   - If greater than 8 kPa (1.2 psi), test the signal circuit for a short to voltage or an open/high resistance. If the circuit tests normal, replace the ECM.
5. If all circuits test normal, test or replace the EOP sensor.

Repair Procedures

Perform the **Diagnostic Repair Verification** after completing the diagnostic procedure.

- **Engine Oil Pressure Sensor and/or Switch Replacement** for the 4.8L, 5.3L, 6.0L and 6.2L engines
- **Control Module References** for ECM replacement, setup and programming

DTC P2066

DTC Descriptor

DTC P2066

Fuel Level Sensor 2 Performance

Diagnostic Fault Information

Perform the **Diagnostic System Check - Vehicle** prior to using this diagnostic procedure.

DTC P2066

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Fuel Level Sensor Reference Voltage Circuit	P2067	-	-	P2066

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Fuel Level Sensor Signal Secondary Circuit	P2067	P2068 1	P2068	P2066
Fuel Level Sensor Low Reference Circuit	-	P2068 1	P2068	P2066
1. Fuel Gage Inaccurate or Inoperative				

Circuit/System Description

The primary fuel level sender and the secondary fuel level sender changes resistance based on fuel level. The engine control module (ECM) monitors the signal circuits of the primary fuel level sender and the secondary fuel level sender in order to determine the fuel level. When the fuel tank is full, the resistances of both fuel level senders are low and the ECM senses a low signal voltage on both the signal circuits of the primary fuel level sender and the secondary fuel level sender. When the fuel tanks are empty, the resistances of the fuel level senders are high and the ECM senses a high signal voltage. The ECM uses the signal circuits of the primary fuel level sender and the secondary fuel level sender in order to calculate the percentage of remaining fuel in the tank. The ECM sends the fuel level percentage via GMLAN serial data circuit to the instrument cluster in order to control the fuel gage. The 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.
- Fuel level is greater than 32 liters (8.5 gallons).

Conditions for Setting the DTC

- The ECM detects a change in fuel level less than 3 liters (0.8 gallon) over a distance greater than 282 km (175 miles).
- The vehicle is at rest and the primary fuel tank increases by 3 liters (0.8 gallon) and the secondary fuel tank does not decrease by 3 liters (0.8 gallon) when the transfer pump is on greater than 500 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.

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- 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 4.8L, 5.3L, 6.0L, and 6.2L engines

Connector End View Reference

- **Displays and Gages Connector End Views**
- **Engine Control Module Connector End Views** for the 4.8L, 5.3L, 6.0L, and 6.2L engines

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, remove the secondary fuel level sender and verify that there is no obstructions interfering with the fuel level sender.
    - If interference is present, remove the obstruction.
2. If no interference is present, replace the secondary fuel level sender.

Repair Procedures

Perform the **Diagnostic Repair Verification** after completing the diagnostic procedure.

- **Fuel Level Sensor Replacement (1500 Series)** or **Fuel Level Sensor Replacement (1500 Series w/E85)** or **Fuel Level Sensor Replacement (2500 - 43.5L (11.5 gal) Tank - Rear)** or **Fuel Level Sensor Replacement (2500 - 98.4L (26 gal) Tank - Front)** for the 4.8L, 5.3L, 6.0L, and 6.2L engines
- **Control Module References** for the ECM replacement, setup, and programming

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DTC P2067

DTC Descriptor

DTC P2067

Fuel Level Sensor 2 Low Voltage

Diagnostic Fault Information

Perform the **Diagnostic System Check - Vehicle** prior to using this diagnostic procedure.

DTC P2067

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Fuel Level Sensor Reference Voltage Circuit	P2067	-	-	P2066
Fuel Level Sensor Signal Secondary Circuit	P2067	P2068 1	P2068	P2066
Fuel Level Sensor Low Reference Circuit	-	P2068 1	P2068	P2066
1. Fuel Gage Inaccurate or Inoperative				

Circuit/System Description

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

Conditions for Running the DTC

- The ignition is ON, with the engine running.
- The system voltage is between 11-18 volts.

Conditions for Setting the DTC

- The secondary sender output is less than 0.5 volt.
- The above condition is present for greater than 30 seconds.

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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 4.8L, 5.3L, 6.0L, and 6.2L engines

Connector End View Reference

- **Displays and Gages Connector End Views**
- **Engine Control Module Connector End Views** for the 4.8L, 5.3L, 6.0L, and 6.2L engines

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 4-98 percent.

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Circuit/System Testing

1. Ignition OFF, disconnect the harness connector at the secondary fuel level sensor.
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 secondary signal circuit for a short to ground. If the circuit tests normal, replace the ECM.
3. If all circuits test normal, test or replace the secondary fuel level sensor.

Repair Procedures

Perform the **Diagnostic Repair Verification** after completing the diagnostic procedure.

- **Fuel Level Sensor Replacement (1500 Series)** or **Fuel Level Sensor Replacement (1500 Series w/E85)** or **Fuel Level Sensor Replacement (2500 - 43.5L (11.5 gal) Tank - Rear)** or **Fuel Level Sensor Replacement (2500 - 98.4L (26 gal) Tank - Front)** for the 4.8L, 5.3L, 6.0L, and 6.2L engines
- **Control Module References** for the ECM replacement, setup, and programming

DTC P2068

DTC Descriptor

DTC P2068

Fuel Level Sensor 2 High Voltage

Diagnostic Fault Information

Perform the **Diagnostic System Check - Vehicle** prior to using this diagnostic procedure.

DTC P2068

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Fuel Level Sensor Reference Voltage Circuit	P2067	-	-	P2066
Fuel Level Sensor Signal Circuit	P2067	P2068 1	P2068	P2066
Fuel Level Sensor Low Reference Circuit	-	P2068 1	P2068	P2066
1. Fuel Gage Inaccurate or Inoperative				

Circuit/System Description

The primary fuel level sender and the secondary fuel level sender changes resistance based on fuel level. The engine control module (ECM) monitors the signal circuits of the primary fuel level sender and the secondary fuel level sender in order to determine the fuel level. When the fuel tank is full, the resistances of both fuel level senders are low and the ECM senses a low signal voltage on both the signal circuits of the primary fuel level

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sender and the secondary fuel level sender. When the fuel tanks are empty, the resistances of the fuel level senders are high and the ECM senses a high signal voltage. The ECM uses the signal circuits of the primary fuel level sender and the secondary fuel level sender in order to calculate the percentage of remaining fuel in the tank. The ECM sends the fuel level percentage via GMLAN serial data circuit to the instrument cluster in order to control the fuel gage. The fuel information is also used for misfire, evaporative emission (EVAP), and other onboard 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 secondary sensor output is greater than 3.5 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 4.8L, 5.3L, 6.0L, and 6.2L engines

Connector End View Reference

- **Displays and Gages Connector End Views**
- **Engine Control Module Connector End Views** for the 4.8L, 5.3L, 6.0L, and 6.2L engines

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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 4-98 percent.

Circuit/System Testing

1. Ignition OFF, disconnect the harness connector at the secondary fuel level sensor.
2. Ignition OFF, test for less than 1 ohm of resistance between the low reference circuit and ground.
    - If greater than 1 ohm, test the low reference circuit for a short to voltage or an open/high resistance. If the circuit tests normal, replace the ECM.
3. Ignition ON, install a 3-amp fused jumper between and secondary signal circuit and the low reference circuit. Verify the scan tool Fuel Tank Level Remaining parameter is greater than 98 percent.
    - If less than 98 percent, test the secondary signal circuit for a short to voltage or an open/high resistance. If the circuit tests normal, replace the ECM.
4. If all circuits test normal, test or replace the secondary fuel level sensor.

Repair Procedures

Perform the **Diagnostic Repair Verification** after completing the diagnostic procedure.

- **Fuel Level Sensor Replacement (1500 Series)** or **Fuel Level Sensor Replacement (1500 Series w/E85)** or **Fuel Level Sensor Replacement (2500 - 43.5L (11.5 gal) Tank - Rear)** or **Fuel Level Sensor Replacement (2500 - 98.4L (26 gal) Tank - Front)** for the 4.8L, 5.3L, 6.0L, and 6.2L engines
- **Control Module References** for the ECM replacement, setup, and programming

SYMPTOMS - DISPLAYS AND GAGES

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.

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- 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:
   - **Instrument Cluster Description and Operation**
   - **Indicator/Warning Message Description and Operation**
   - **Driver Information Center (DIC) Description and Operation**
   - **Audible Warnings Description and Operation**

Visual/Physical Inspection

- Inspect for aftermarket devices which could affect the operation of the Instrument Cluster or Audible Warning Systems. 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 proper fluid level.

Intermittent

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

Symptom List

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

Gages and Odometer

- **Instrument Cluster Inoperative**
- **Engine Coolant Temperature Gage Inaccurate or Inoperative**
- **Fuel Gage Inaccurate or Inoperative (Single Tank)** or **Fuel Gage Inaccurate or Inoperative (Dual Tanks)**
- **Hourmeter Inaccurate or Inoperative**
- **Odometer Trip/Reset Switch Inoperative**
- **Speedometer and/or Odometer Inaccurate or Inoperative**
- **Tachometer Inaccurate or Inoperative**

Indicators

- **Change Engine Oil Indicator Always On**
- **Door Ajar Indicator Malfunction**
- **Engine Oil Pressure Indicator Always On**
- **Low Engine Oil Level Indicator Always On**

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- **Mirrors - Compass Display Inoperative or Inaccurate**
- **Mirrors - Temperature Display Inaccurate**
- **Mirrors - Temperature Displays SC or OC**
- **Lift Gate/Lift Gate Window Ajar Indicator Malfunction**
- **Service Indicator Always On** for the NVG 246-NP8 transfer case
- **Service Indicator Inoperative** for the NVG 246-NP8 transfer case
- **Brake Warning Indicator Always On**
- **Brake Warning Indicator Inoperative**
- **ABS Indicator Always On**
- **ABS Indicator Inoperative**
- **Stability System Caution Indicator Always On**
- **Stability System Caution Indicator Inoperative**
- **Low Tire Pressure Indicator Always On**
- **Low Tire Pressure Indicator Inoperative**
- **Charge Indicator Always On**
- **Charge Indicator Inoperative**
- **Malfunction Indicator Lamp (MIL) Diagnosis** for the 4.8L, 5.3L, 6.0L, and 6.2L engines
- **Tow/Haul Switch/Indicator Always On or Inoperative** for the 4L80-E automatic transmission
- **Low Washer Fluid Indicator Malfunction**
- **Fog Lamp Indicator Inoperative**
- **Fog Lamp Indicator Inoperative - Rear**
- **High Beam Indicator Always On**
- **High Beam Indicator Inoperative**
- **Turn Signal Lamps and/or Indicators Always On or Flashing**
- **Turn Signal Lamps and/or Indicators Inoperative**
- **Air Bag Indicator Circuit Malfunction**
- **Passenger Presence System Indicator Circuit Malfunction**
- **Seat Belt Indicator Circuit Malfunction - Driver**
- **Seat Belt Indicator Circuit Malfunction - Passenger**
- **Security Indicator Inoperative**

Instrument Cluster Dimming

- **Interior Backlighting Does Not Dim**
- **Interior Backlighting Inoperative**

Driver Information Center (DIC)

Driver Information Center (DIC) Switch(es) Inoperative

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Audible Warnings

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

CHANGE ENGINE OIL INDICATOR ALWAYS ON

Diagnostic Fault Information

Perform the **Diagnostic System Check - Vehicle** prior to using this diagnostic procedure.

Circuit/System Description

The engine control module (ECM) determines when the engine oil should be changed and calculates the oil life in percent. The ECM sends this information via high speed GMLAN to the body control module (BCM). The instrument panel cluster (IPC) receives this information from the BCM through low speed GMLAN and illuminates the oil level percent in the driver information center (DIC). The IPC will illuminate the CHANGE ENGINE OIL message when the oil needs to be changed.

Reference Information

Schematic Reference

Instrument Cluster Schematics

Connector End View Reference

Displays and Gages 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 Verification

1. Verify the scan tool Engine Oil Life Remaining parameter is greater than 0 percent.
    - If equal to 0 percent, reset the engine oil life.
2. If the percent value is normal, replace the IPC.

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Repair Procedures

Perform the **Diagnostic Repair Verification** after completing the diagnostic procedure.

- **GM Oil Life System Resetting**
- **Control Module References** for PCM or IPC replacement, setup, and programming.

CHIME ALWAYS ON

Diagnostic Fault Information

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**
- **Steering Wheel Schematics**
- **Radio/Navigation System Schematics**

Connector End View Reference

- **Displays and Gages Connector End Views**
- **Data Communication Connector End Views**
- **Entertainment/Communication 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

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1. Ignition ON, headlamp switch OFF, verify the scan tool Headlamp Switch parameter is Inactive.
    - If not Inactive, test the headlamps 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 Inactive.
    - If not Inactive, 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 Status parameter is Key Out.
    - If not Key Out, 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 are Inactive.
    - If not Inactive, go to **Courtesy Lamps Always On** .
5. If all circuits test normal, replace the BCM.

Repair Procedures

Perform the **Diagnostic Repair Verification** after completing the diagnostic procedure.

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

CHIME INOPERATIVE

Diagnostic Fault Information

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**
- **Radio/Navigation System Schematics**

Connector End View Reference

- **Displays and Gages Connector End Views**
- **Entertainment/Communication Connector End Views**

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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. The courtesy lamps should illuminate.
   - If the courtesy lamps do not illuminate, refer to **Courtesy Lamps Inoperative** .
2. Ignition ON, radio ON, adjust the radio balance and fade to the left front speaker.
   - If the speaker does not operate properly, refer to **Speakers Inoperative - One or More** .
3. If the speaker operates properly, replace the radio.

Repair Procedures

Perform the **Diagnostic Repair Verification** after completing the diagnostic procedure.

Control Module References for radio replacement, setup, and programming

DOOR AJAR INDICATOR MALFUNCTION

Diagnostic Fault Information

Perform the **Diagnostic System Check - Vehicle** prior to using this diagnostic procedure.

Circuit/System Description

The driver door module (DDM) and the passenger door module (PDM) receive a discrete input from the driver door ajar switch and the passenger door ajar switch respectively. Likewise, the body control module (BCM) receives a discrete input from both the left and right rear door ajar switches. The door ajar switches are normally open when the doors are fully closed. When a door is opened, the door ajar switch contacts close providing a path to ground. The driver information center (DIC) located at the bottom of the instrument panel cluster (IPC), illuminates the appropriate door ajar message when one of the doors is open. The IPC receives a GMLAN serial data message from the BCM, DDM, or PDM indicating the door ajar status. If this message is displayed and the vehicle speed is greater than 8.1 km/h (5 mph), a chime will sound.

Reference Information

Schematic Reference

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Instrument Cluster Schematics

Connector End View Reference

Displays and Gages 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, open and close the driver and passenger doors. Check to see if the courtesy lamps are operating properly.
    - If the courtesy lamps are not operating properly, refer to **Courtesy Lamps Always On** and **Courtesy Lamps Inoperative** .
2. If the courtesy lamps are operating properly, replace the IPC.

Repair Procedures

Perform the **Diagnostic Repair Verification** after completing the diagnostic procedure.

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

DRIVER INFORMATION CENTER (DIC) SWITCH(ES) INOPERATIVE

Diagnostic Fault Information

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 instrument panel cluster (IPC) ignition 1 voltage circuit. The IPC ignition 1 voltage circuit is fused in the body control module (BCM). The IPC interfaces with the DIC switches via 3 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 PERSONALIZATION, SET/RESET, TRIP/FUEL, AND VEHICLE INFO switches.

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Reference Information

Schematic Reference

Instrument Cluster Schematics

Connector End View Reference

- **Displays and Gages Connector End Views**
- **Engine Controls Schematics** for the 4.8L, 5.3L, 6.0L, and 6.2L engines

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 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, 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, 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 a short to voltage or an open/high resistance. If the circuit tests normal, replace the IPC.
5. If all the circuits test normal, test or replace the DIC switch assembly.

Repair Procedures

Perform the **Diagnostic Repair Verification** after completing the diagnostic procedure.

- **Driver Information Center Switch Replacement (Cadillac)** or **Driver Information Center Switch Replacement (Except Cadillac)**
- **Control Module References** for IPC replacement, setup, and programming

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ENGINE COOLANT TEMPERATURE GAGE INACCURATE OR INOPERATIVE

Diagnostic Fault Information

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 high speed GMLAN serial data to the body control module (BCM). The BCM then sends the information via low speed GMLAN to the IPC in order to display the engine temperature.

Reference Information

Schematic Reference

Instrument Cluster Schematics

Connector End View Reference

Displays and Gages 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.
    - If the engine coolant gage does not sweep from its low to high position, replace the IPC.

Repair Procedures

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

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Diagnostic Fault Information

Perform the **Diagnostic System Check - Vehicle** prior to using this diagnostic procedure.

Circuit/System Description

The engine oil pressure (EOP) sensor changes voltage based on the engine oil pressure. The EOP sensor is a 3-wire sensor comprising of the signal circuit, the low reference circuit and the 5-volt reference circuit. The engine control module (ECM) supplies 5 volts to the EOP sensor via the 5-volt reference circuit and provides ground via the EOP low reference circuit. The ECM monitors the signal circuit of the EOP sensor to determine the EOP sensor voltage is within the normal operating range of approximately 1-4 volts. When the engine oil pressure is high, the EOP sensor voltage is high and the ECM senses a high signal voltage. When the engine oil pressure is low, the EOP sensor voltage is low and the ECM senses a low signal voltage. The ECM sends the EOP information via high speed GMLAN to the body control module (BCM). The BCM then sends the EOP information to the instrument panel cluster (IPC) via low speed GMLAN serial data.

Reference Information

Schematic Reference

- **Instrument Cluster Schematics**
- **Engine Controls Schematics** for 4.8L, 5.3L, 6.0L, and 6.2L engines

Connector End View Reference

- **Displays and Gages Connector End Views**
- **Engine Control Module Connector End Views** for 4.8L, 5.3L, 6.0L, and 6.2L engines
- **Inline Harness 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 of the EOP sensor.
2. Ignition OFF, test for less than 1 ohm of resistance between the low reference circuit and ground.
    - If greater than 1 ohm, test the low reference circuit for a short to voltage or an open/high resistance.

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If the circuit tests normal, replace the ECM.

3. Ignition ON, test for 4.8-5.2 volts between the 5-volt reference circuit and ground.
    - If less than 4.8 volts, test the 5-volt reference circuit for a short to ground or an open/high resistance. If the circuit tests normal, replace the ECM.
    - If greater than 5.2 volts, test the 5-volt reference circuit for a short to voltage. If the circuit tests normal, replace the ECM.
4. Verify the scan tool Engine Oil Pressure Sensor parameter is greater than 550 kPa (80 psi).
    - If less than 550 kPa (80 psi), test the signal circuit for a short to ground. If the circuit tests normal replace the ECM.
5. Install a 3-amp fused jumper between the signal circuit and the low reference circuit. Verify the scan tool Engine Oil Pressure Sensor parameter is less than 8 kPa (1.2 psi).
    - If greater than 8 kPa (1.2 psi), test the signal circuit for a short to voltage or an open/high resistance. If the circuit tests normal, replace the ECM.
6. Ignition ON, command the indicators OFF with the scan tool.
    - If the EOP indicator does not turn OFF, replace the IPC.
7. If all circuits test normal, replace the EOP sensor.

Repair Procedures

Perform the **Diagnostic Repair Verification** after completing the diagnostic procedure.

- **Engine Oil Pressure Sensor and/or Switch Replacement** for 4.8L, 5.3L, 6.0L, and 6.2L engines
- **Control Module References** for the PCM or IPC replacement, setup, and programming

FUEL GAGE INACCURATE OR INOPERATIVE (SINGLE TANK)

Diagnostic Fault Information

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 high speed GMLAN serial data to the body control module (BCM). The BCM then sends the fuel information to the instrument panel cluster (IPC) via low speed GMLAN in order to display the fuel gage. The fuel information is also used for misfire and evaporative emission (EVAP) diagnostics.

Reference Information

Fuel Level Specifications

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Fuel Level Specifications

Schematic Reference

- **Instrument Cluster Schematics**
- **Engine Controls Schematics** for the 4.8L, 5.3L, 6.0L, and 6.2L engines

Connector End View Reference

- **Displays and Gages Connector End Views**
- **Engine Control Module Connector End Views** for the 4.8L, 5.3L, 6.0L, and 6.2L engines

Electrical Information Reference

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

Scan Tool Reference

- **Fuel Level Specifications**
- **Scan Tool Data List**

Circuit/System Testing

1. Ignition OFF, disconnect the harness connector at the fuel level sensor. 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. Verify that the scan tool Fuel Tank Level Remaining parameter displays the correct fuel level percent.
    - If the fuel level percent is incorrect, test the signal circuit and the low reference circuit for an open/high resistance. If the circuits test normal, replace the ECM.
3. Ignition ON, vary the resistance on the signal generator from 40-250 ohms and monitor the fuel gage.
    - If the gage is incorrect, replace the IPC.
4. If all circuits test normal, test or replace the fuel level sensor.

Repair Procedures

Perform the **Diagnostic Repair Verification** after completing the diagnostic procedure.

- **Fuel Level Sensor Replacement (1500 Series)** or **Fuel Level Sensor Replacement (1500 Series w/E85)** or **Fuel Level Sensor Replacement (2500 - 43.5L (11.5 gal) Tank - Rear)** or **Fuel Level Sensor Replacement (2500 - 98.4L (26 gal) Tank - Front)** for the 4.8L, 5.3L, 6.0L, and 6.2L engines
- **Control Module References** for ECM and IPC replacement, setup, and programming

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FUEL GAGE INACCURATE OR INOPERATIVE (DUAL TANKS)

Diagnostic Fault Information

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 circuits of the primary and secondary fuel level sensors in order to determine the fuel level. When the fuel tanks are full, the sensor resistances are low and the ECM senses a low signal voltage. When the fuel tanks are empty, the sensor resistances are high and the ECM senses a high signal voltage. The ECM uses the signal circuits of the primary and secondary fuel level sensors in order to calculate the percentage of remaining fuel in the tanks. The ECM sends the fuel level percentage via high speed GMLAN serial data to the body control module (BCM). The BCM then sends the fuel level information to the instrument panel cluster (IPC) via low speed GMLAN in order to display the fuel level. The fuel information is also used for misfire and evaporative emission (EVAP) diagnostics.

Reference Information

Fuel Level Specifications

Fuel Level Specifications

Schematic Reference

- **Instrument Cluster Schematics**
- **Engine Controls Schematics** for the 4.8L, 5.3L, 6.0L, and 6.2L engines

Connector End View Reference

- **Displays and Gages Connector End Views**
- **Engine Control Module Connector End Views** for the 4.8L, 5.3L, 6.0L, and 6.2L engines

Electrical Information Reference

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

Scan Tool Reference

- **Fuel Level Specifications**
- **Scan Tool Data List**

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Circuit/System Testing

1. Ignition OFF, disconnect the harness connector at the primary and secondary fuel level sensors. Jumper the 2 signal circuits together and then install a signal generator and instrument panel tester between the signal circuits and the low reference circuit.
2. 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 incorrect, test both signal circuits and the low reference circuit for an open/high resistance. If the circuits test normal, replace the ECM.
3. Ignition ON, vary the resistance on the signal generator from 40-250 ohms and monitor the fuel gage.
    - If the gage is incorrect, replace the IPC.
4. If all circuits test normal, test or replace either the primary or secondary fuel level sensor.

Repair Procedures

Perform the **Diagnostic Repair Verification** after completing the diagnostic procedure.

- **Fuel Level Sensor Replacement (1500 Series)** or **Fuel Level Sensor Replacement (1500 Series w/E85)** or **Fuel Level Sensor Replacement (2500 - 43.5L (11.5 gal) Tank - Rear)** or **Fuel Level Sensor Replacement (2500 - 98.4L (26 gal) Tank - Front)** for the 4.8L, 5.3L, 6.0L, and 6.2L engines
- **Control Module References** for ECM and IPC replacement, setup, and programming

HOURMETER INACCURATE OR INOPERATIVE

Diagnostic Fault Information

Perform the **Diagnostic System Check - Vehicle** prior to using this diagnostic procedure.

Circuit/System Description

The instrument panel cluster (IPC) can display the accumulated engine run time hours when the cluster is in the OFF AWAKE or ACC, RAP and in the RUN positions. The IPC stores the accumulated engine run time hours in a non-volatile format. The hourmeter will update every 6 minutes and will not change if the battery is disconnected or removed.

Reference Information

Schematic Reference

Instrument Cluster Schematics

Connector End View Reference

Displays and Gages 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. Verify the hourmeter operation.
    - If the hourmeter does not operate properly, replace the IPC.

Repair Procedures

Perform the **Diagnostic Repair Verification** after completing the diagnostic procedure.

- **Instrument Cluster Description and Operation**
- **Control Module References** for IPC and ECM replacement, setup, and programming.

INSTRUMENT CLUSTER INOPERATIVE

Diagnostic Fault Information

Perform the **Diagnostic System Check - Vehicle** prior to using this diagnostic procedure.

Circuit/System Description

Voltage is supplied to the instrument panel cluster (IPC) through the battery voltage circuit and the ignition 1 voltage circuit. The IPC will operate when the ignition 1 voltage circuit is in the RUN/START position.

Reference Information

Schematic Reference

Instrument Cluster Schematics

Connector End View Reference

Displays and Gages Connector End Views

Electrical Information Reference

- **Circuit Testing**

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- **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 IPC.
2. Ignition ON, verify that a test lamp illuminates between the ignition 1 voltage circuit and a ground.
   - If the test lamp does not illuminate, repair the ignition 1 voltage circuit for a short to ground or an open/high resistance.
3. Verify that a test lamp illuminates between the ignition 1 voltage circuit and the IPC ground circuit.
   - If the test lamp does not illuminate, repair the IPC ground circuit for an open/high resistance.
4. If all circuits test normal, replace the IPC

Repair Procedures

Perform the **Diagnostic Repair Verification** after completing the diagnostic procedure.

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

LIFT GATE/LIFT GATE WINDOW AJAR INDICATOR MALFUNCTION

Diagnostic Fault Information

Perform the **Diagnostic System Check - Vehicle** prior to using this diagnostic procedure.

Circuit/System Description

The body control module (BCM) receives an input from both the liftgate and liftglass ajar switches. The ajar switches are normally open when the liftgate and the liftglass are fully closed. When either the liftgate or liftglass is opened, the appropriate ajar switch contacts close providing a path to ground. The driver information center (DIC) located at the bottom of the instrument panel cluster (IPC), illuminates the rear access open message when either the glass or the gate is open. The IPC receives a GMLAN serial data message from the BCM indicating the liftgate or liftglass ajar status. If this message is displayed and the vehicle speed is greater than 8.1 km/h (5 mph), a chime will sound.

Reference Information

Schematic Reference

Instrument Cluster Schematics

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Connector End View Reference

Displays and Gages 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 both the liftgate and liftglass ajar switches.
2. Ignition OFF, test for less than 1 ohm of resistance between the low reference circuit and ground.
    - If greater than 1 ohm, test the ground circuit for an open/high resistance.
3. Ignition ON, verify the scan tool Liftgate Ajar Switch parameter is Inactive.
    - If not Inactive, test the signal circuit for a short to ground. If the circuit tests normal, replace the BCM.
4. Ignition ON, check to see that the rear access open message is not displayed.
    - If the message is displayed in the DIC, replace the IPC.
5. Ignition ON, install a 3-amp fused jumper wire between the signal circuit and ground. Verify the scan tool Liftgate Ajar Switch parameter is Active.
    - If not Active, test the signal circuit for a short to voltage or an open/high resistance. If the circuit tests normal replace the BCM.
6. Ignition ON, check to see that the rear access open message is displayed.
    - If the message is not displayed in the DIC, replace the IPC.
7. If all circuits test normal, test or replace the liftgate ajar switch or the liftglass ajar switch.

Repair Procedures

Perform the **Diagnostic Repair Verification** after completing the diagnostic procedure.

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

LOW ENGINE OIL LEVEL INDICATOR ALWAYS ON

Diagnostic Fault Information

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Perform the **Diagnostic System Check - Vehicle** prior to using this diagnostic procedure.

Circuit/System Description

The engine oil level switch is a normally closed switch that opens when there is a low engine oil condition. When the switch is open the engine control module (ECM) will detect a high signal voltage input. During a low engine oil condition the ECM sends a high speed GMLAN message to the body control module (BCM). The BCM then sends a message via low speed GMLAN to the instrument panel cluster (IPC) requesting illumination of the ENGINE OIL LOW ADD OIL message in the driver information center (DIC).

Reference Information

Schematic Reference

- **Instrument Cluster Schematics**
- **Engine Controls Schematics** for the 4.8L, 5.3L, 6.0L, and 6.2L engines

Connector End View Reference

- **Displays and Gages Connector End Views**
- **Engine Control Module Connector End Views** for the 4.8L, 5.3L, 6.0L, and 6.2L engines
- **Inline Harness 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 of the engine oil level 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. Install a 3-amp fused jumper wire between the signal circuit and ground. Verify the scan tool Engine Oil Level Switch parameter is OK.
    - If not OK, test the signal circuit for an open/high resistance. If the circuit tests normal, replace the ECM.
4. If all circuits test normal, test or replace the engine oil level switch.

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Repair Procedures

Perform the **Diagnostic Repair Verification** after completing the diagnostic procedure.

- **Engine Oil Level Sensor and/or Switch Replacement**
- **Control Module References** for ECM or IPC replacement, setup, and programming

MIRRORS - COMPASS DISPLAY INOPERATIVE OR INACCURATE

Diagnostic Fault Information

Perform the **Diagnostic System Check - Vehicle** prior to using this diagnostic procedure.

Circuit/System Description

The inside rearview mirror (ISRVM) uses 2 magnetic field sensors for compass direction. One sensor is for north and south, the other is for east and west. The ISRVM supplies a signal and low reference to each sensor. As the vehicle travels with or against the earths magnetic pull, there will be a change in voltage on one or both sensors. As a result of the change in voltage, the ISRVM changes the heading on the compass display. The internal fault detection for the compass is handled by the ISRVM.

Reference Information

Schematic Reference

Driver Information System Schematics

Connector End View Reference

Displays and Gages 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, compass ON, verify that there is a compass reading on the display.
    - If the display is blank, replace the ISRVM.

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- If the display shows the letter C or CAL, perform the compass calibration procedure. Refer to **Compass Calibration and Magnetic Variance**.

2. Verify that the compass reading on the display is correct.
   - If not correct, perform the compass magnetic variation adjustment procedure. Refer to **Compass Calibration and Magnetic Variance**.
3. If the display is still incorrect, replace the ISRVM.

Repair Procedures

Perform the **Diagnostic Repair Verification** after completing the diagnostic procedure.

Control Module References for ISRVM replacement, setup, and programming

MIRRORS - TEMPERATURE DISPLAY INACCURATE

Diagnostic Fault Information

Perform the **Diagnostic System Check - Vehicle** prior to using this diagnostic procedure.

Circuit/System Description

The inside rear view mirror (ISRVM) applies 5 volts to the ambient air temperature sensor. The ambient air temperature sensor is a thermistor which varies in resistance as the temperature changes. As the resistance of the ambient air temperature sensor increases, the ISRVM senses a larger voltage drop across the sensor, indicating a lower temperature. As the resistance of the ambient air temperature sensor decreases, the ISRVM senses a smaller voltage drop across the sensor, indicating a higher temperature.

Diagnostic Aids

The following table will be used to measure the resistance of the sensor and compare it with the actual ambient temperature. The mirror's temperature accuracy should be within 5 degrees of the actual temperature. The actual temperature should not be taken from a radio station, a sign displaying the temperature, etc. A temperature measuring tool such as a thermometer should be used. Some temperature measuring tools may be within 5 degrees of the actual temperature. Make sure to consult the manufacturer for the accuracy of the tool. This comparison can make the mirror seem off by 5-10 degrees of the actual temperature when it is not.

Ambient Air Temperature Sensor Resistance

°C	°F	Minimum Resistance K Ohms	Maximum Resistance K Ohms
-35	-31	234.81	250.59
-30	-22	171.69	182.31
-25	-13	126.82	133.99
-20	-4	94.63	99.49
-15	5	71.30	74.58
-10	14	54.21	56.43

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-5	23	41.48	43.17
0	32	32.00	33.31
5	41	24.96	25.83
10	50	19.61	20.19
15	59	15.49	15.94
20	68	12.31	12.67
25	77	9.85	10.12
30	86	7.96	8.15
35	95	6.45	6.61
40	104	5.27	5.39
45	113	4.32	4.42
50	122	3.56	3.64
55	131	2.95	3.02
60	140	2.46	2.52

Reference Information

Schematic Reference

Driver Information System Schematics

Connector End View Reference

Displays and Gages 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 ambient air temperature sensor. 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 2.5K to 230K. Verify that the temperature displayed on the ISRVM matches the ambient temperature resistance chart.
    - If the temperature displayed is incorrect, test the signal circuit and the low reference circuit for an

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open/high resistance. If the circuits test normal, replace the ISRVM.

3. If the temperature displayed is correct, replace the ambient air temperature sensor.

Repair Procedures

Perform the **Diagnostic Repair Verification** after completing the diagnostic procedure.

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

MIRRORS - TEMPERATURE DISPLAYS SC OR OC

Diagnostic Fault Information

Perform the **Diagnostic System Check - Vehicle** prior to using this diagnostic procedure.

Circuit/System Description

The inside rearview mirror (ISRVM) applies 5 volts to the ambient air temperature sensor. The ambient air temperature sensor is a thermistor which varies in resistance as the temperature changes. As the resistance of the ambient air temperature sensor increases, the ISRVM senses a larger voltage drop across the sensor, indicating a lower temperature. As the resistance of the ambient air temperature sensor decreases, the ISRVM senses a smaller voltage drop across the sensor, indicating a higher temperature.

Diagnostic Aids

The following table will be used to measure the resistance of the sensor and compare it with the actual ambient temperature. The mirror's temperature accuracy should be within 5 degrees of the actual temperature. The actual temperature should not be taken from a radio station, a sign displaying the temperature, etc. A temperature measuring tool such as a thermometer should be used. Some temperature measuring tools may be within 5 degrees of the actual temperature. Make sure to consult the manufacturer for the accuracy of the tool. This comparison can make the mirror seem off by 5-10 degrees of the actual temperature when it is not.

Ambient Air Temperature Sensor Resistance

°C	°F	Minimum Resistance K Ohms	Maximum Resistance K Ohms
-35	-31	234.81	250.59
-30	-22	171.69	182.31
-25	-13	126.82	133.99
-20	-4	94.63	99.49
-15	5	71.30	74.58
-10	14	54.21	56.43
-5	23	41.48	43.17
0	32	32.00	33.31
5	41	24.96	25.83
10	50	19.61	20.19

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15	59	15.49	15.94
20	68	12.31	12.67
25	77	9.85	10.12
30	86	7.96	8.15
35	95	6.45	6.61
40	104	5.27	5.39
45	113	4.32	4.42
50	122	3.56	3.64
55	131	2.95	3.02
60	140	2.46	2.52

Reference Information

Schematic Reference

Driver Information System Schematics

Connector End View Reference

Displays and Gages 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 ohm of resistance between the low reference circuit and ground.
    - If greater than 1 ohm, test the ground circuit for an open/high resistance.
3. Ignition ON, verify that OC is displayed on the ISRVM display.
    - If OC is not displayed, test the signal circuit for a short to ground.
4. Ignition ON, install a 3-amp fused jumper wire between the signal circuit and ground. Verify that SC is displayed on the ISRVM display.
    - If SC is not displayed, test the signal circuit for an open/high resistance. If the circuit tests normal replace the ISRVM.

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5. If the display is correct, replace the ambient air temperature sensor.

Repair Procedures

Perform the **Diagnostic Repair Verification** after completing the diagnostic procedure.

Control Module References for ISRVM replacement, setup, and programming

ODOMETER TRIP/RESET SWITCH INOPERATIVE

Diagnostic Fault Information

Perform the **Diagnostic System Check - Vehicle** prior to using this diagnostic procedure.

Circuit/System Description

The instrument panel cluster (IPC) calculates the mileage based on the vehicle speed signal circuit from the engine control module (ECM). The ECM sends the vehicle speed information via high speed GMLAN serial data to the body control module (BCM). The BCM then sends the information via low speed GMLAN to the IPC indicating the value of the odometer. The odometer will display error if an internal 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

Displays and Gages 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, press the trip reset button a few times to verify the odometer and trip odometer.

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- If the odometer display does not switch between trip and odometer, replace the IPC.

Repair Procedures

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

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 ECM sends the vehicle speed information via high speed GMLAN serial data circuit to the body control module (BCM). The BCM then sends the information via low speed GMLAN to the IPC to order to display the vehicle speed and miles traveled.

Diagnostic Aids

Check for the following DTCs:

- **DTC B1000**
- **DTC U2100**
- **DTC U2105-U2199**

Reference Information

Schematic Reference

Instrument Cluster Schematics

Connector End View Reference

Displays and Gages Connector End Views

Electrical Information Reference

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

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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.
3. Verify that the odometer is operating properly.
    - If the odometer is not operating properly, replace the IPC.

Repair Procedures

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

Perform the **Diagnostic System Check - Vehicle** prior to using this diagnostic procedure.

Circuit/System Description

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 ECM sends the engine speed information via high speed GMLAN serial data circuit to the body control module (BCM). The BCM then sends the information via low speed GMLAN to the IPC to order to display the engine speed.

Reference Information

Schematic Reference

Instrument Cluster Schematics

Connector End View Reference

Displays and Gages Connector End Views

Electrical Information Reference

- Circuit Testing
- Connector Repairs

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- **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.
    - If the tachometer gage does not sweep from its low to high position, replace the IPC.

Repair Procedures

Perform the **Diagnostic Repair Verification** after completing the diagnostic procedure.

Control Module References for IPC replacement, setup, and programming

REPAIR INSTRUCTIONS

AMBIENT AIR TEMPERATURE SENSOR REPLACEMENT (CJ2)

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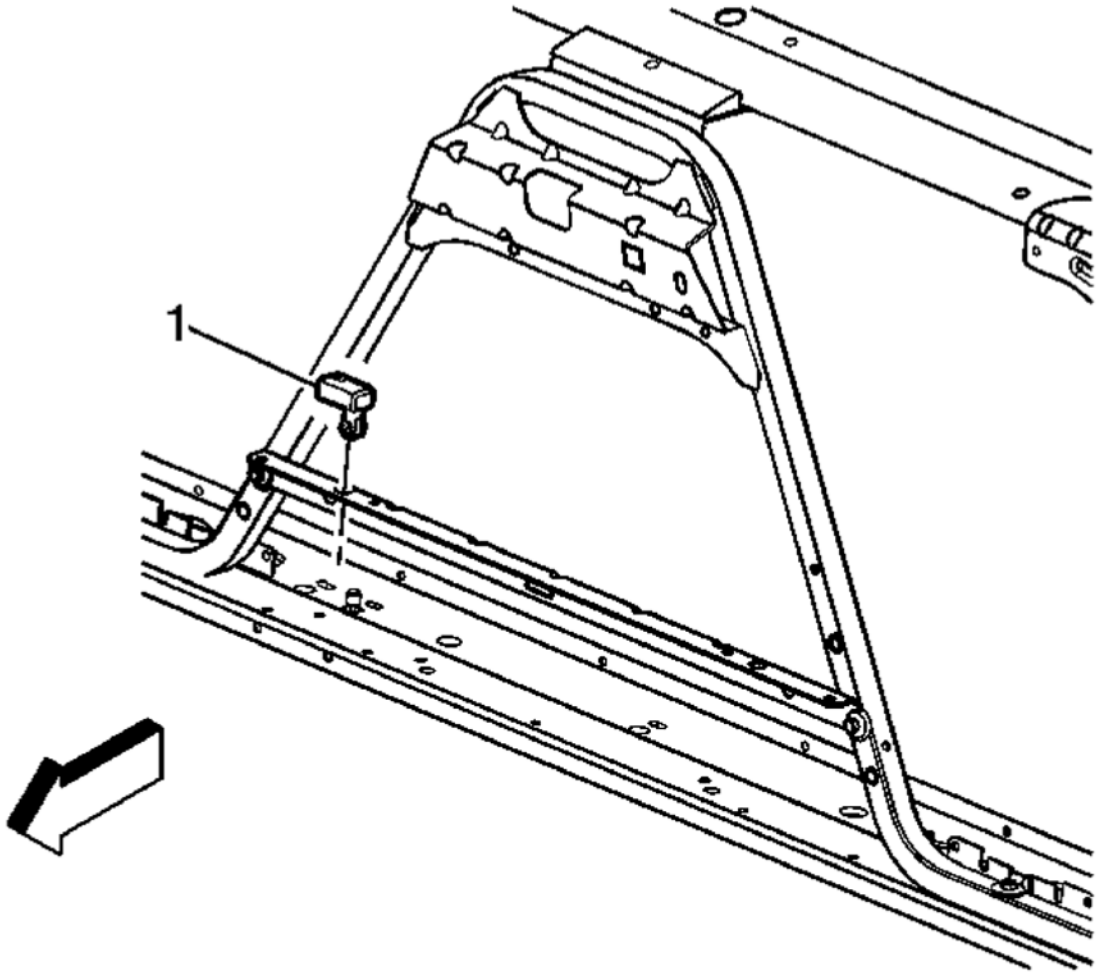


Fig. 22: Locating Ambient Air Temperature Sensor
Courtesy of GENERAL MOTORS CORP.

Ambient Air Temperature Sensor Replacement (CJ2)

Callout	Component Name
Preliminary Procedure: Remove the top portion of the grille and gently pull forward. Refer to **Fascia Grille Replacement (Suburban)** or **Fascia Grille Replacement (Yukon)** or **Fascia Grille Replacement (Escalade)** or **Fascia Grille Replacement (Tahoe Z71)** .	
1	Ambient Air Temperature Sensor **Tip:** 1. Disconnect the electrical connector. 2. Snap the new sensor into the steel support gently or the new sensor could break.

AMBIENT AIR TEMPERATURE SENSOR REPLACEMENT (DF5)

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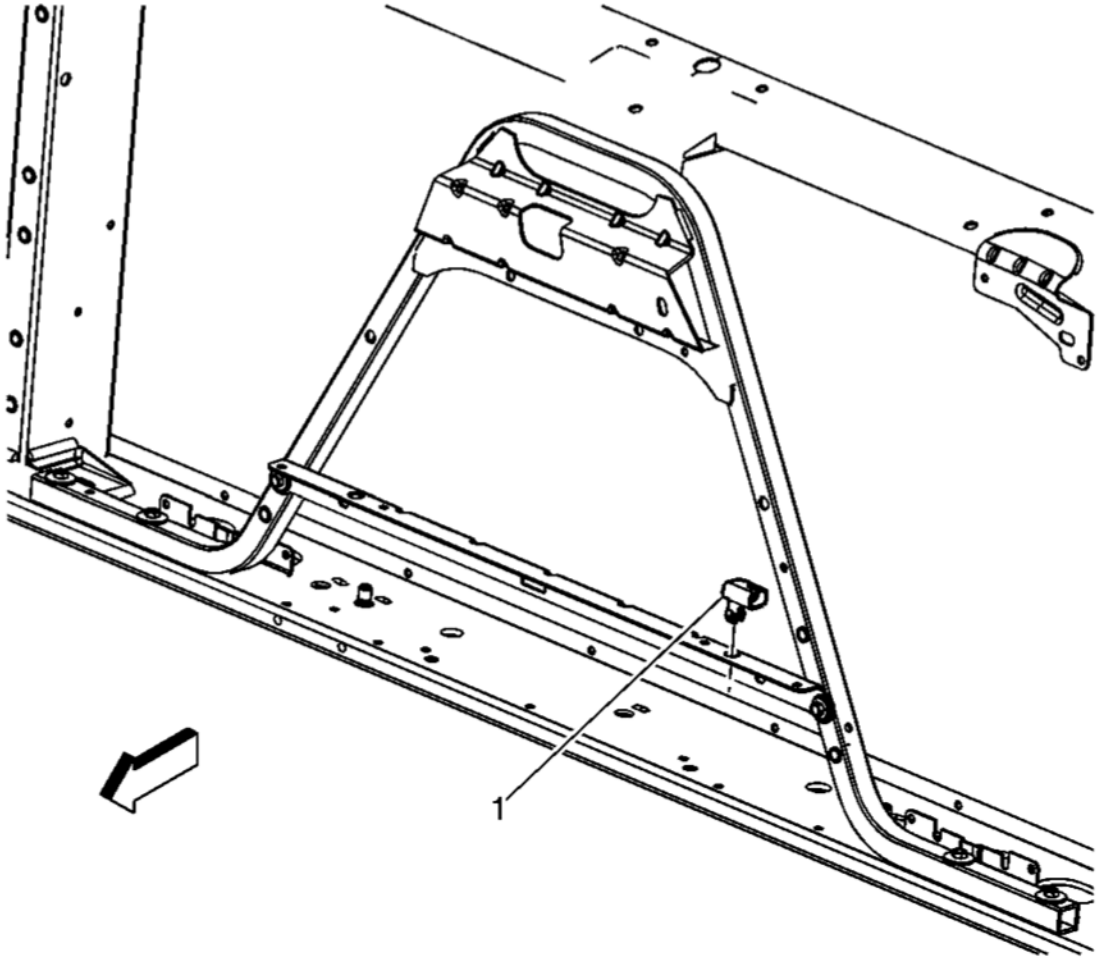


Fig. 23: Locating Ambient Air Temperature Sensor
Courtesy of GENERAL MOTORS CORP.

Ambient Air Temperature Sensor Replacement (DF5)

Callout	Component Name
Preliminary Procedure: Remove the top portion of the grille and gently pull forward. Refer to **Fascia Grille Replacement (Suburban)** or **Fascia Grille Replacement (Yukon)** or **Fascia Grille Replacement (Escalade)** or **Fascia Grille Replacement (Tahoe Z71)** .	
1	Ambient Air Temperature Sensor **Tip:** 1. Disconnect the electrical connector. 2. Snap the new sensor into the steel support gently or the new sensor could break.

DRIVER INFORMATION CENTER SWITCH REPLACEMENT (CADILLAC)

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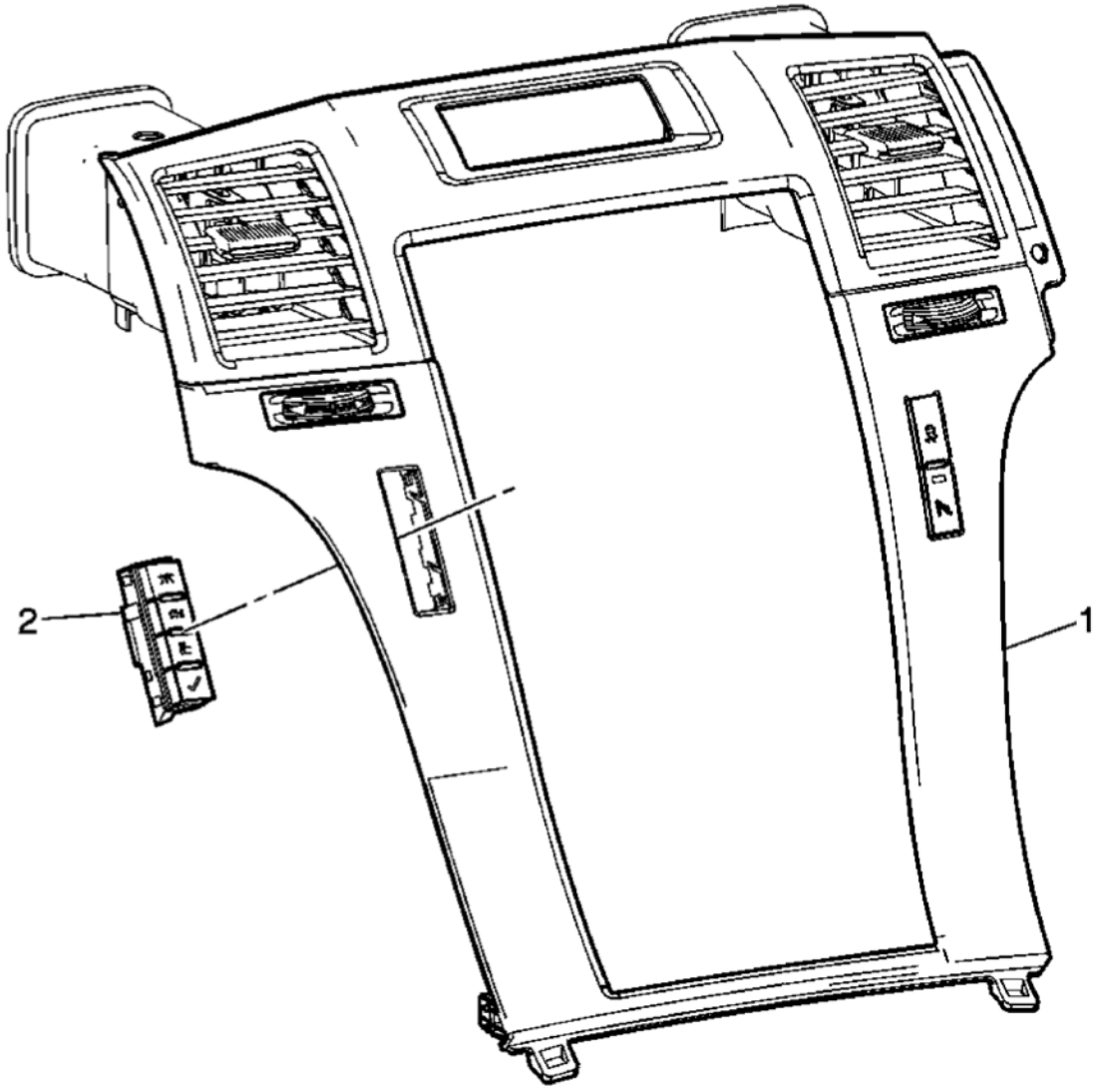


Fig. 24: View Of Driver Information Center Switch Assembly & Accessory Trim Plate
Courtesy of GENERAL MOTORS CORP.

Driver Information Center Switch Replacement (Cadillac)

Callout	Component Name
1	Instrument Panel Accessory Trim Plate **Tip:** Refer to **Instrument Panel Accessory Trim Plate Replacement (Cadillac)** or **Instrument Panel Accessory Trim Plate Replacement (Except Cadillac)** .
1	Driver Information Center Switch Assembly **Tip:** Release the tabs securing the switch assembly to the accessory trim plate.

DRIVER INFORMATION CENTER SWITCH REPLACEMENT (EXCEPT CADILLAC)

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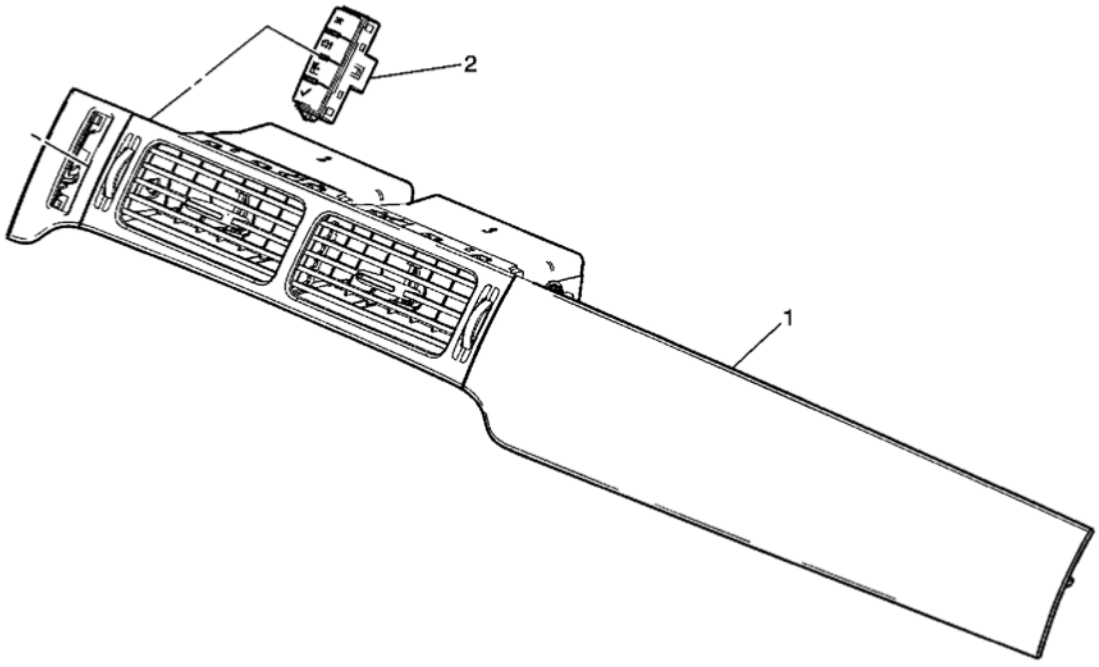


Fig. 25: View Of Driver Information Center Switch Assembly & Accessory Trim Plate
Courtesy of GENERAL MOTORS CORP.

Driver Information Center Switch Replacement (Except Cadillac)

Callout	Component Name
1	Instrument Panel Center Trim Plate **Tip:** Refer to **Trim Panel Replacement - Instrument Panel (I/P) Center (Cadillac)** or **Trim Panel Replacement - Instrument Panel (I/P) Center (Except Cadillac)** .
2	Driver Information Switch Assembly

INSTRUMENT CLUSTER REPLACEMENT (CADILLAC)

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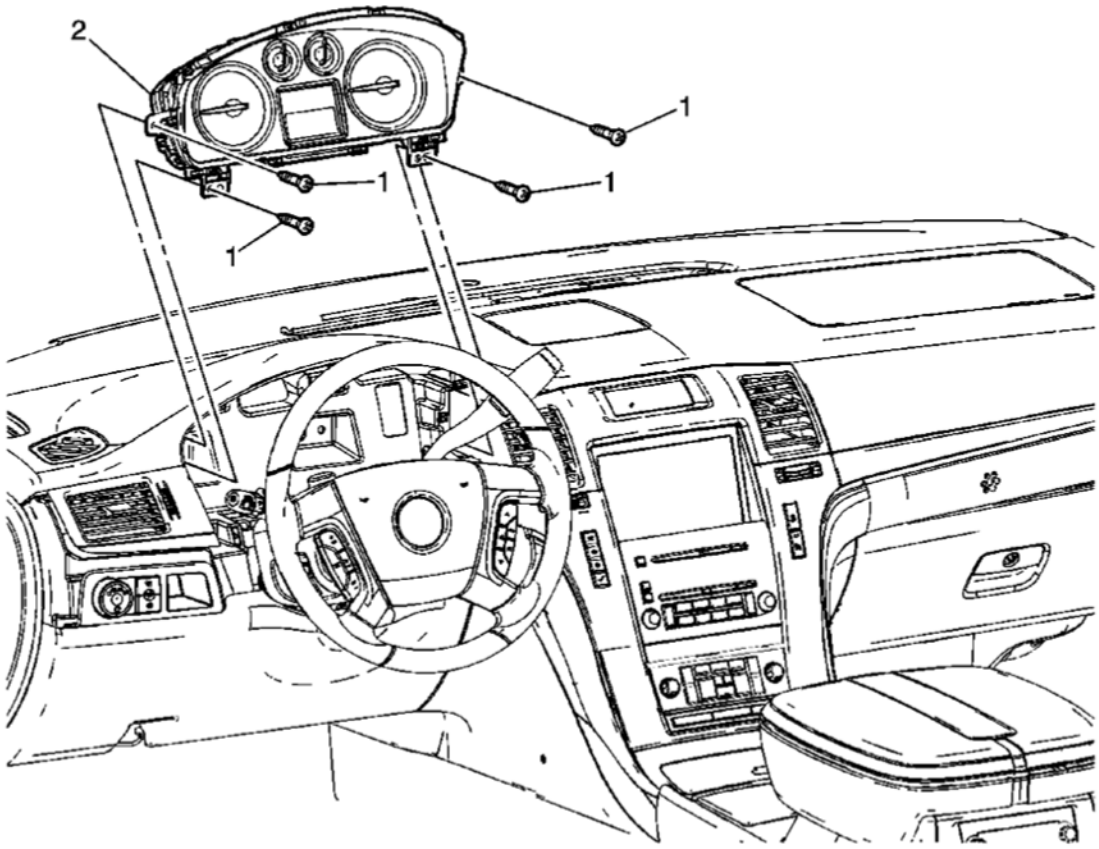


Fig. 26: View Of Instrument Panel Cluster Assembly, Bolts & Screws
Courtesy of GENERAL MOTORS CORP.

Instrument Cluster Replacement (Cadillac)

Callout	Component Name
Preliminary Procedure: Remove the instrument panel cluster trim plate bezel. Refer to **Trim Panel Replacement - Instrument Panel (I/P) Cluster (Cadillac)** or **Trim Panel Replacement - Instrument Panel (I/P) Cluster (Except Cadillac)** .	
1	Instrument Panel Cluster Assembly Bolts/Screws (Qty: 4) **NOTE:** **Refer to Fastener Notice .** **Tighten:** 2 N.m (18 lb in)
2	Instrument Panel Cluster Assembly **Tip:** • Disconnect electrical connections. • A replacement cluster must be programmed. Refer to **Control Module References** .

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INSTRUMENT CLUSTER REPLACEMENT (EXCEPT CADILLAC)

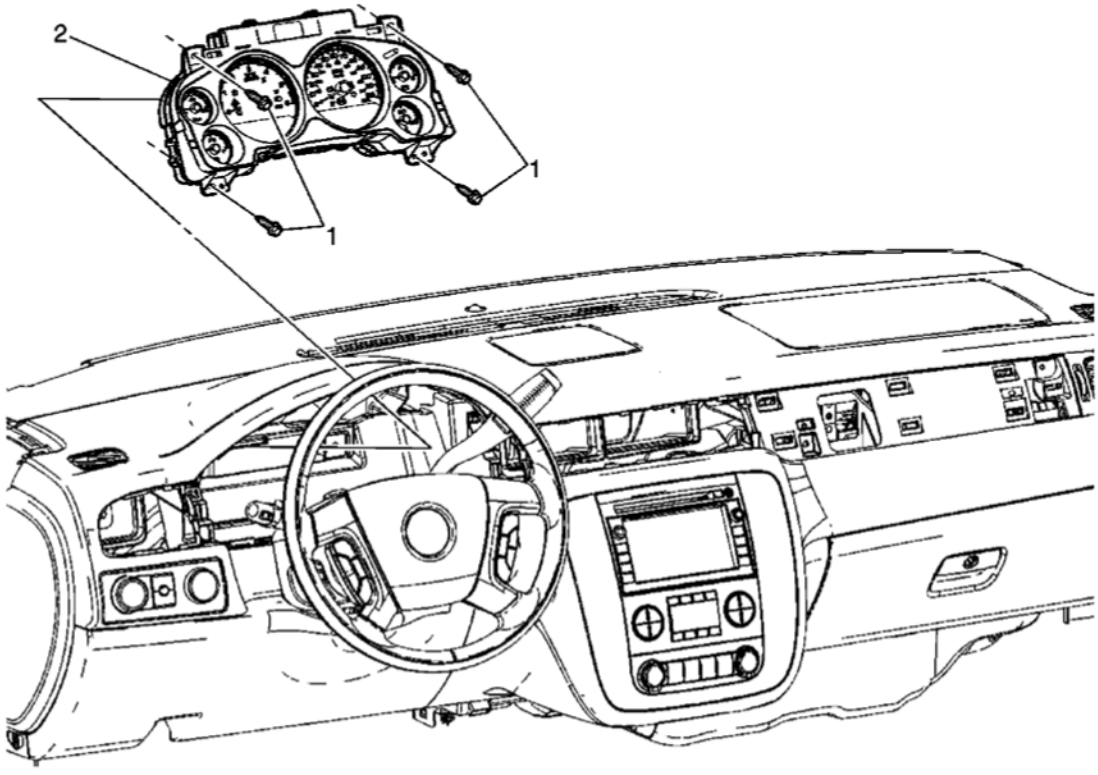


Fig. 27: View Of Instrument Panel Cluster Assembly & Screws
Courtesy of GENERAL MOTORS CORP.

Instrument Cluster Replacement (Except Cadillac)

Callout	Component Name
Preliminary Procedure: Remove the instrument panel cluster trim plate. Refer to **Trim Panel Replacement - Instrument Panel (I/P) Cluster (Cadillac)** or **Trim Panel Replacement - Instrument Panel (I/P) Cluster (Except Cadillac)** .	
1	Instrument Panel Cluster Screws (Qty: 4) **NOTE:** **Refer to Fastener Notice .** **Tighten:** 2 N.m (18 lb in)
2	Instrument Panel Cluster Assembly **Tip:** A replacement cluster must be programmed. Refer to **Control Module References** .

CLOCK REPLACEMENT

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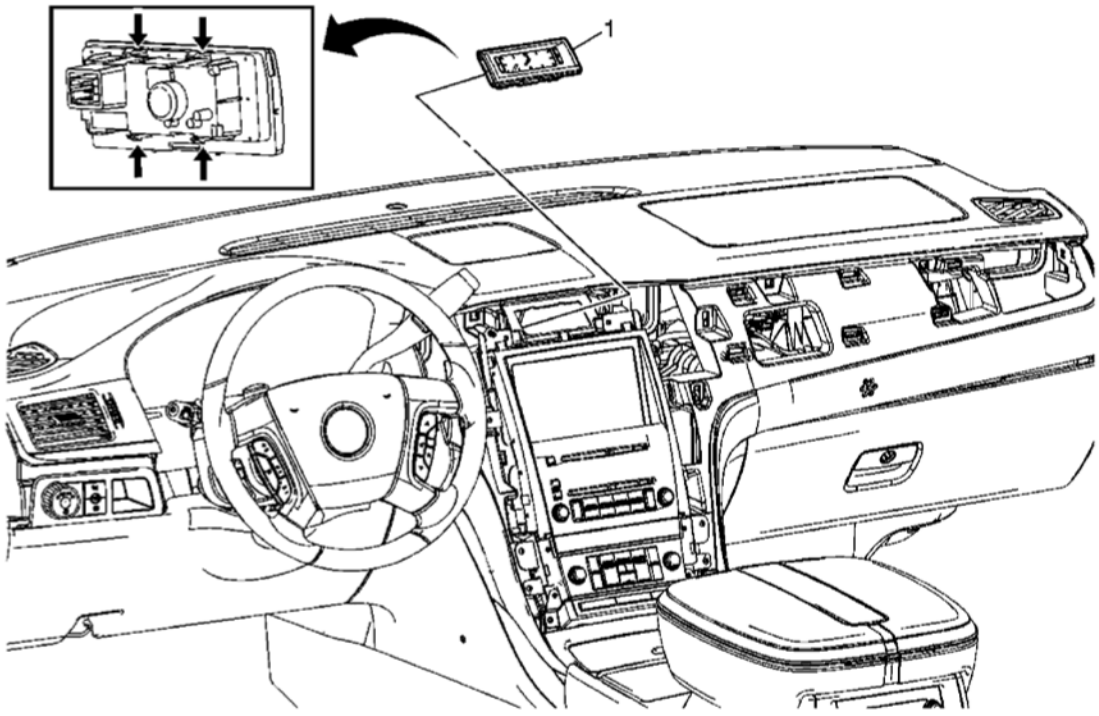


Fig. 28: View Of Clock Assembly
Courtesy of GENERAL MOTORS CORP.

Clock Replacement

Callout	Component Name
Preliminary Procedure: Remove the instrument panel accessory trim plate. Refer to **Instrument Panel Accessory Trim Plate Replacement (Cadillac)** or **Instrument Panel Accessory Trim Plate Replacement (Except Cadillac)** .	
1	Clock Assembly **Tip:** 1. Disconnect the electrical connection. 2. Squeeze the tabs to release the clock from the instrument panel accessory trim plate.

ACCESSORY SWITCH REPLACEMENT (CADILLAC)

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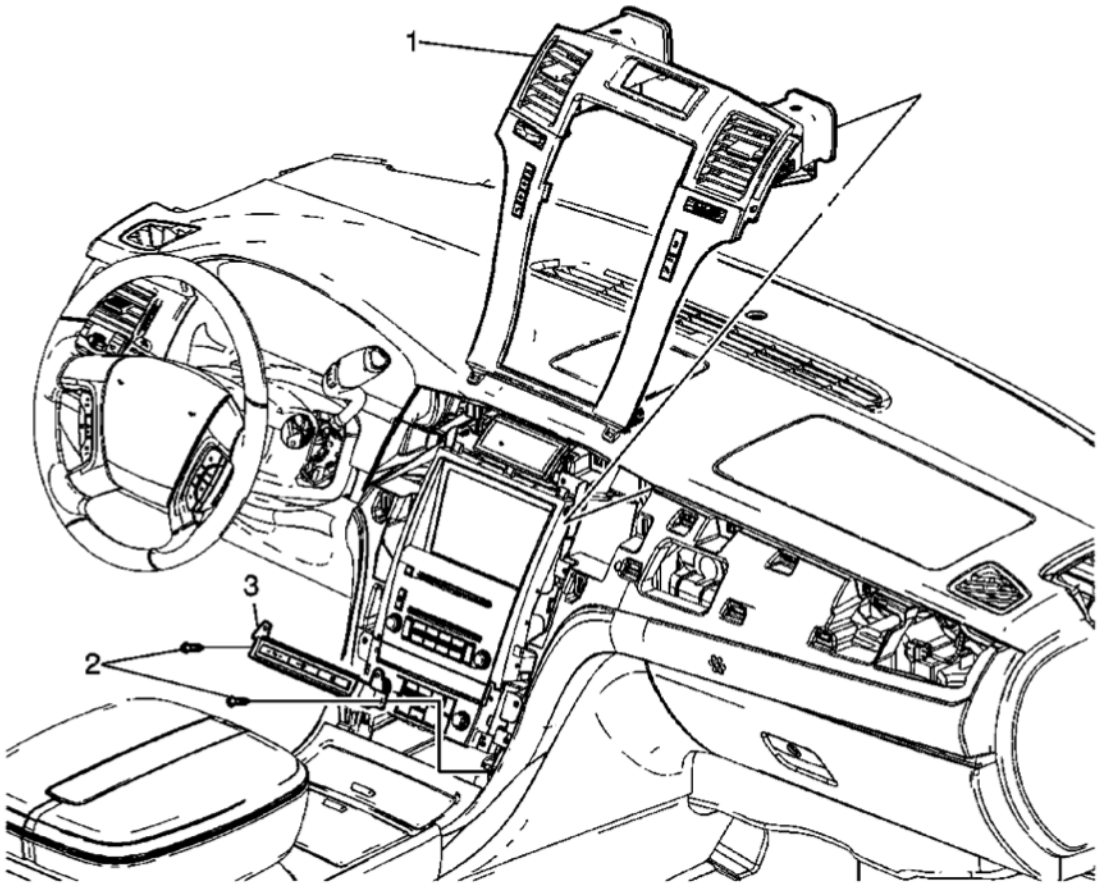


Fig. 29: View Of Instrument Panel Accessory Switch Assembly, Trim Plates & Screws
Courtesy of GENERAL MOTORS CORP.

Accessory Switch Replacement (Cadillac)

Callout	Component Name
1	Instrument Panel Accessory Trim Plate Refer to **Instrument Panel Accessory Trim Plate Replacement (Cadillac)** or **Instrument Panel Accessory Trim Plate Replacement (Except Cadillac)** .
2	Instrument Panel Accessory Switch Screws (Qty: 2) **NOTE:** **Refer to Fastener Notice .** **Tighten:** 2 N.m (18 lb in)
3	Instrument Panel Accessory Switch Assembly **Tip:** Disconnect the electrical connection.

ACCESSORY SWITCH REPLACEMENT (EXCEPT CADILLAC)

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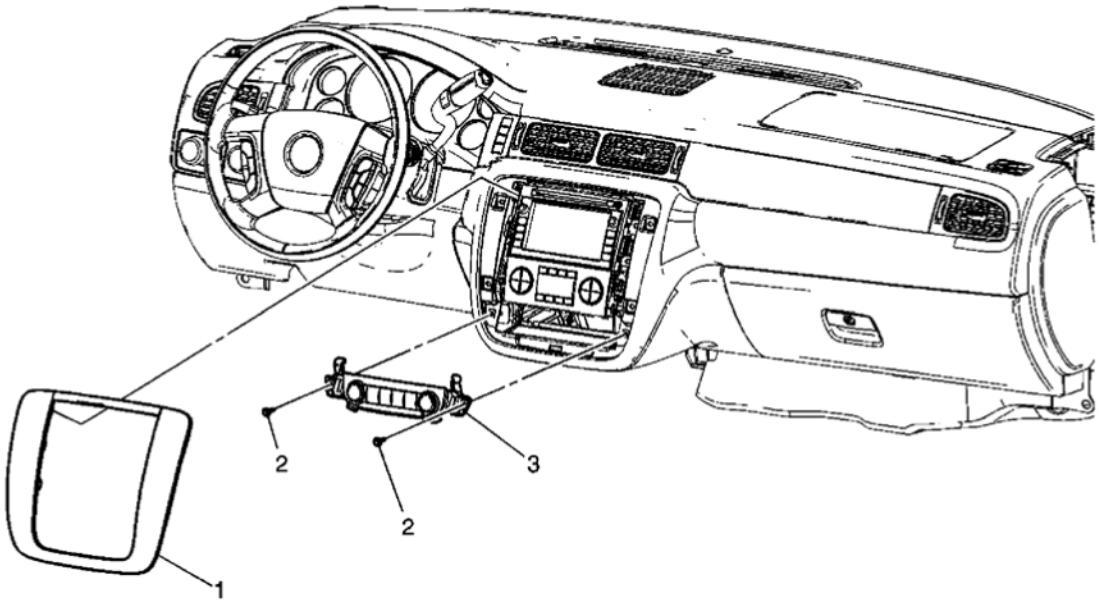


Fig. 30: View Of Instrument Panel Accessory Switch Assembly, Trim Plates & Screws
Courtesy of GENERAL MOTORS CORP.

Accessory Switch Replacement (Except Cadillac)

Callout	Component Name
1	Instrument Panel Accessory Trim Plate Refer to **Instrument Panel Accessory Trim Plate Replacement (Cadillac)** or **Instrument Panel Accessory Trim Plate Replacement (Except Cadillac)** .
2	Instrument Panel Accessory Switch Screws (Qty: 2) **NOTE:** **Refer to Fastener Notice .** **Tighten:** 2 N.m (18 lb in)
3	Instrument Panel Accessory Switch Assembly **Tip:** Disconnect the electrical connections.

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 circuit. If the radio receives multiple audible warning requests, the warning with the highest priority sounds first. On vehicles without a radio, a chime module generates the audible warnings and receives audible warning requests via GMLAN. Either the radio or the chime module is the chime procedure. The following lists the audible warning priority and the pulse rate:

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

Fasten Safety Belt Warning

The chime producer activates the fasten safety belt audible warning as requested by the body control module (BCM). The BCM sends a GMLAN message to the audio amplifier indicating the chime frequency at a slow rate and a duration of 8 seconds. The fasten safety belt warning sounds and the fasten safety belt indicator illuminates when the following occurs:

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

Lights On Warning

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

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

Brake Warning

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

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

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- The Traction Control System (TCS) and the Vehicle Stability Enhancement System (VSES) have failed.

Key-In-Ignition Warning

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

- The ignition switch is OFF.
- The BCM determines that the driver door is open and the signal circuit is low. The IPC also receives a GMLAN message from the BCM indicating the door ajar status
- The BCM determines that the key-in-ignition switch is open and the signal circuit is high. The IPC receives a GMLAN message from the BCM indicating the key-in-ignition status.

Door Ajar Warning

The chime producer activates the door ajar audible warning as requested by the body control module (BCM). The BCM sends a GMLAN message to the chime producer indicating the chime frequency of a medium rate and continuous duration. The door ajar warning sounds and the appropriate door ajar indicator illuminates in the drivers information center (DIC) when the following occurs:

- The BCM determines that a door (driver door, passenger door, left rear door, right rear door) is open and the signal circuit is low. The IPC also receives a GMLAN message from the BCM indicating the door ajar status.
- The vehicle is not in PARK. The BCM receives a GMLAN message from the engine control module (ECM)/BCM indicating the gear position.

Additional Warnings

The following warnings have an associated instrument panel cluster (IPC) indicator or driver information center (DIC) message:

- Engine Overheated Stop Engine Message-The chime producer activates the audible warning as requested by the BCM. The BCM sends a GMLAN message to the chime producer indicating the chime frequency of a fast rate and at a continuous duration.
- Engine Power Is Reduced Message-The chime producer activates the audible warning as requested by the BCM. The BCM sends a GMLAN message to the chime producer indicating the chime frequency of a medium rate and at a continuous duration.
- Fuel Level Low Message-The chime producer activates the audible warning as requested by the BCM. The BCM sends a GMLAN message to the chime producer indicating the chime frequency of a fast rate and at a continuous duration.
- Hood Open Message-The chime producer activates the audible warning as requested by the BCM. The BCM sends a GMLAN message to the chime producer indicating the chime frequency of a medium rate and at a finite duration.
- Oil Pressure Indicator-The chime producer activates the audible warning as requested by the BCM. The

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BCM sends a GMLAN message to the chime producer indicating the chime frequency of a fast rate and at a continuous duration.

- Park Assist Fault Clean Rear Bumper Message-The chime producer activates the audible warning as requested by the BCM. The BCM sends a GMLAN message to the chime producer indicating the chime frequency of a medium rate and at a finite duration.
- Rear Access Open Message-The chime producer activates the audible warning as requested by the BCM. The BCM sends a GMLAN message to the chime producer indicating the chime frequency of a medium rate and at a finite duration.
- Tire Pressure Low Indicator-The chime producer activates the audible warning as requested by the BCM. The BCM sends a GMLAN message to the chime producer indicating the chime frequency of a fast rate and at a continuous duration.
- Turn Signal Indicators-The chime producer activates the audible warning as requested by the IPC. The chime produces two different chimes, one when the turn signal turns off and another when the turn signal turns on.
- Vehicle Overspeed Message-The chime producer activates the audible warning as requested by the BCM. The BCM sends a GMLAN message to the chime producer indicating the chime frequency of a medium rate and at a finite duration.
- Transmission Hot Idle Engine Message-The chime producer activates the audible warning as requested by the BCM. The BCM sends a GMLAN message to the chime producer indicating the chime frequency of a fast rate and at a continuous duration.

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

COMPASS CALIBRATION AND MAGNETIC VARIANCE

Compass Calibration

Before calibrating the compass, drive the vehicle to an open area that is magnetically clean or free of large metallic objects such as high tension power lines or large steel buildings. Verify there are no magnetized roof antennas, magnets on or hanging from the mirror, or any other magnetized objects on the inside or outside of the vehicle close to the mirror.

1. Start the engine.

IMPORTANT: Before calibrating the compass, make sure the mirror has the correct zone number. Refer to Compass Magnetic Variation Adjustment.

2. Press and hold the switch for the compass, which may be depicted as COMP, COMPASS, or on/off (w/UE1) depending on the type of mirror on the vehicle, until the letter "C" or "CAL" is displayed.
3. Drive the vehicle in circles at a speed of less than 8 km/h (5 mph) until the "C" or "CAL" is replaced by a proper vehicle heading. The calibration procedure is now complete.

Compass Magnetic Variation Adjustment

Magnetic variation adjustments are required when the compass displays a constant error in heading. Variation is

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the difference between magnetic north and true north due to geographical location.

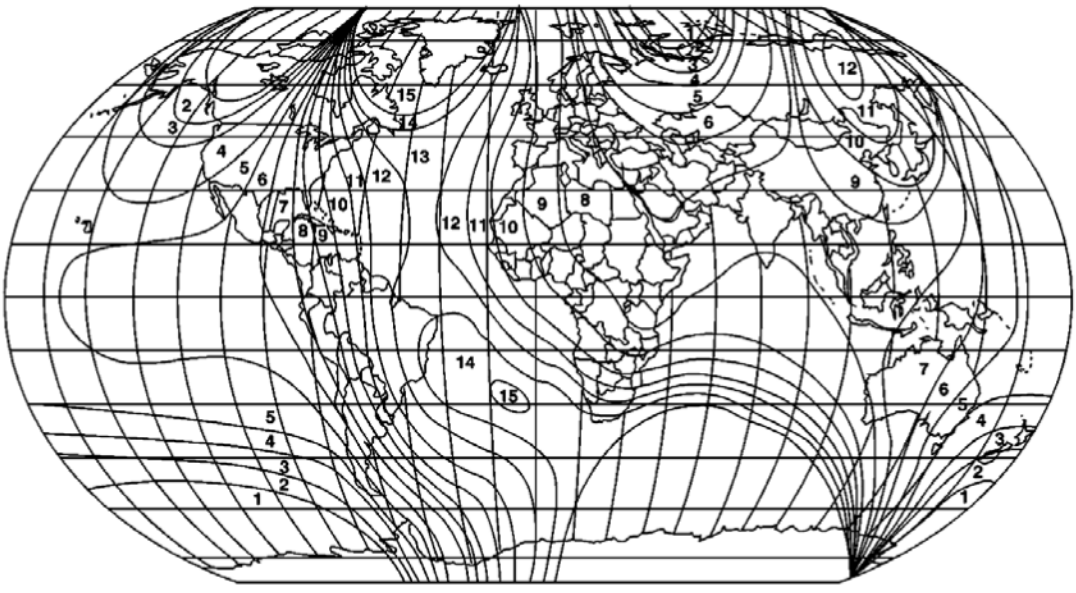


Fig. 31: World Magnetic Variation Map
Courtesy of GENERAL MOTORS CORP.

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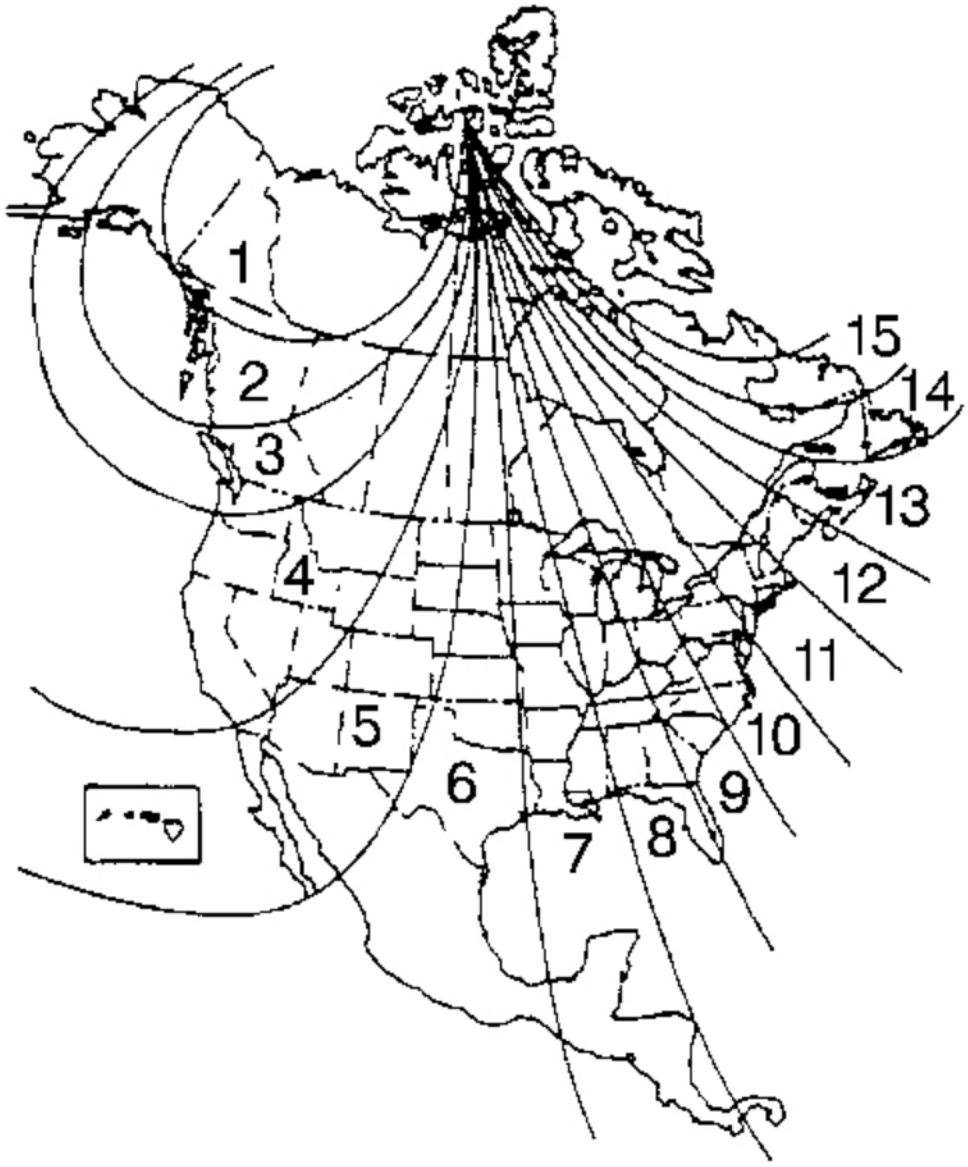


Fig. 32: Illustrating Magnetic Variation Zones
Courtesy of GENERAL MOTORS CORP.

1. Locate your current geographic location on the World Magnetic Variation Map.
2. Turn ON the ignition, with the engine OFF.
3. Press and hold the switch for the compass, which may be depicted as COMP, COMPASS, or on/off

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(w/UE1) depending on the type of mirror on the vehicle, until a zone number appears on the compass display.

4. Depress the switch for the compass to select the desired zone number.
5. Wait 5 seconds. The display will return to a compass heading. The variance procedure is now complete.
6. Calibrate the compass. Refer to **Compass Calibration** mentioned above.

DOOR AJAR INDICATOR DESCRIPTION AND OPERATION

Door Ajar Indicator System Components

The door ajar indicator system consists of the following components:

- The driver door switch (DDS)
- The passenger door switch (PDS)
- The body control module (BCM)
- The instrument panel cluster (IPC)
- The driver information center (DIC)
- The driver door ajar switch
- The passenger door ajar switch
- The left rear door ajar switch
- The right rear door ajar switch
- The liftgate ajar switch

Driver Door Ajar And Passenger Door Ajar

The driver door switch (DDS) and passenger door switch (PDS) receive a discrete input from the respective door ajar switch to indicate the status of the door. The DDS or PDS then communicates this status to the instrument panel cluster (IPC) via LAN message. The IPC, upon receipt of this LAN message, will illuminate the appropriate door ajar message in the driver information center (DIC) and also send a LAN message to the radio to activate the door ajar audible warning when the following conditions are met:

- The transmission is removed from PARK
- The vehicle speed is greater then 8.05 km/h (5 mph)

Left Rear Door Ajar And Right Rear Door Ajar

The body control module (BCM) receives a discrete inputs from both the left and right rear door and liftgate ajar switches to indicate the status of the doors and liftgate. The BCM then communicates this status to the instrument panel cluster (IPC) via LAN message. The IPC, upon receipt of this LAN message, will illuminate the appropriate door ajar message in the driver information center (DIC) and also send a LAN message to the radio to activate the door ajar audible warning when the following conditions are met:

- The transmission is removed from PARK
- The vehicle speed is greater then 8.05 km/h (5 mph)

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DRIVER INFORMATION CENTER (DIC) DESCRIPTION AND OPERATION

The driver information center (DIC) displays the DIC WOW for 5 seconds when it first powers up. If enabled through Personalization, the DIC then returns to the last display status before no power condition.

There are 4 switch functions for the DIC.

- Personalization
- Set/Reset
- Trip/Fuel
- Vehicle Info

Trip/Fuel

The Trip/Fuel switch is used to navigate between vehicle information parameters. Cycle through the following vehicle parameters by successive pressing of the Trip/Fuel switch

- Accell Rate
- Average Fuel Economy (AFE)
- Average Vehicle Speed (AVE)
- Fuel Range
- Fuel Used
- Instantaneous Fuel Economy (IFE)/ Displacement on Demand (DOD)
- Maximum Speed
- Odometer
- Trans Temp
- Trip A
- Trip B
- Trip Time

Vehicle Info

The Vehicle Info switch is used to navigate between vehicle information parameters. Cycle through the following vehicle parameters by successive pressing of the Vehicle Info switch.

- Blank Display
- English/Metric Units
- Key Fob Programming Menu
- Left Front Tire Pressure
- Left Rear Tire Pressure
- Oil Life Index (OLI)
- Right Front Tire Pressure

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- Right Rear Tire Pressure
- Tire Programming Menu

Personalization

The Personalization switch is used to set personalization features for both the vehicle and the driver. Many of the parameters in the Trip/Fuel menu and the Vehicle Info menu can be programmed through the Personalization switch. In addition to the parameters in the Trip/Fuel and Vehicle Info menus, the following features can also be programmed.

- Approach Lighting
- Automatic Door Lock
- Automatic Door Unlock
- Chime Volume
- Delayed Door Lock
- Display Language
- Easy Exit Seat
- Exit Lighting
- Memory Seat Recall
- Remote Door Lock
- Remote Door Unlock
- Remote Start
- Park Tilt Mirrors
- Smart High Beams

Average Fuel Economy

Average fuel economy is calculated using the equation: AFE = Distance/Fuel

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

The engine control module (ECM) sends the average fuel economy GMLAN message to the instrument panel cluster (IPC). The value of this mode is retained during ignition OFF and can be changed between English units and metric units by selecting from the driver information center (DIC) options menu.

Average Speed

Average speed is calculated using the equation: Average Speed = AVS Distance/AVS Time

- 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

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Oil Life Remaining

The ECM sends the oil life remaining percentage to the IPC via GMLAN message. The instrument panel cluster receives a GMLAN message indicating the engine oil life remaining. 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 5 percent, the DIC displays CHANGE ENGINE OIL SOON. When the engine oil is changed, reset the GM Oil Life System. Refer to **GM Oil Life System Resetting** .

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 battery connection to the IPC. Fuel Range is calculated using the equation: Fuel Range = Range Distance/Range Fuel Used.

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

The ECM sends the fuel range value to the IPC. The IPC receives a GMLAN message with fuel information. The fuel range value is retained during ignition OFF and can be changed between English and Metric units by accessing the DIC English/Metric menu. The Fuel Range display cannot be reset. LOW is displayed when fuel range is below a predetermined value.

Fuel Used

The DIC calculates and displays the total amount of fuel used since the last reset operation. You can reset the fuel used mode by depressing and holding the Set/Reset button for more than 3 seconds. The value of this mode is retained during ignition OFF.

Instantaneous Fuel Economy (IFE)

Instantaneous fuel economy (IFE) is calculated using the equation: IFE = Distance/Fuel Used.

- Distance = The accumulated distance travelled for the last 2 seconds
- Fuel = The accumulated fuel delivered for the last 2 seconds

The IPC receives a GMLAN message from the ECM. The distance information is calculated by the IPC using the vehicle speed information from the ECM. These values are retained during ignition OFF and can be changed between English and Metric units accessing the DIC English/Metric menu. The IFE display cannot be reset.

Tire Pressure Monitor

The IPC receives a GMLAN message from the tire pressure monitoring (TPM) system for front and rear tire pressure data. The DIC will display the pressure for each of the front and rear tires. When a tire with low air pressure is present, the DIC displays XXXX XXXX TIRE PRESSURE LOW.

Trip Time

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The timer records elapsed time starting from activation. When the DIC displays the timer, pressing the Set/Reset switch for 1 second on the DIC resets the timer. Pressing the Set/Reset button on the DIC switch for approximately 1 second starts and stops the timer. The DIC displays the timer in one of the following formats:

The DIC displays the timer in the following format: XX: XX:XX:

The first XX represents hours elapsed, the second XX represents minutes elapsed, and the third XX represents seconds elapsed. The maximum range of the timer is 99 hours, 59 minutes, and 59 seconds. After the maximum range is reached, the timer displays all zeros (00:00:00).

Park Assist Menu

The park assist menu is displayed in the DIC. The DIC displays the current state of the park assist until the IPC receives a message indicating otherwise. The DIC displays (- - -) when communication with park assist is lost.

Fuel Display

Parameter	Update Rate	Range	Reset Value	Units
Average Fuel Economy	1 second	0.0-99.9	99.9	MPG or L/100 KM
Instant Fuel Economy	2 seconds	0-70	N/A	MPG or L/100 KM
Fuel Range	1 second	0-999	N/A	MI/KM
Fuel Used	1 second	0-999.9	0.0	Gal/L

English/Metric

The English/Metric mode is used to toggle between English and Metric units and can be accessed through the driver information center (DIC) Vehicle Info switch.

Trip A/B

The trip odometer A or B can be accessed through the DIC Trip/Fuel switch function.

Trip Display

DIC Trip Display	Range	
	Metric	English
ODOMETER	######km	######MI
TRIP A	####.#km	####.#MI
TRIP B	####.#km	####.#MI

Language

The driver information center (DIC) is capable of displaying in 8 languages

- English

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- German
- Italian
- French
- Spanish
- Arabic
- Chinese
- Korean

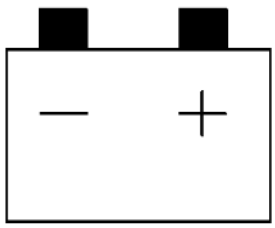
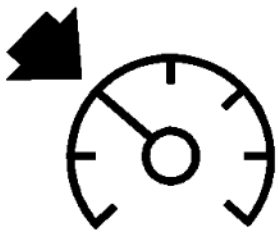
INDICATOR/WARNING MESSAGE DESCRIPTION AND OPERATION

Indicators

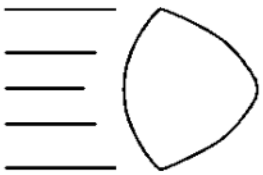
Indicator/Warning Message Description and Operation

Symbol	Description
	ABS: Refer to **ABS Description and Operation (8600 GVW or Less)** or **ABS Description and Operation (Over 8600 GVW)**
	Air Bag: Refer to **SIR System Description and Operation**

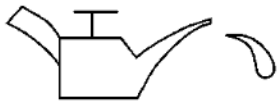
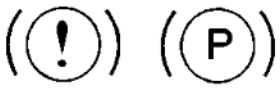
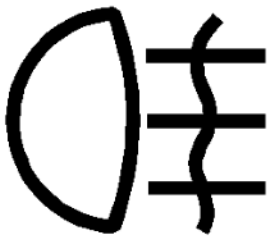
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  (Canada) BRAKE (U.S.)	Brake: Refer to **Brake Warning System Description and Operation**
	Charge: Refer to **Charging System Description and Operation**
 (Canada) CRUISE (U.S.)	CRUISE: Refer to **Cruise Control Description and Operation**

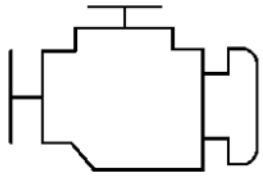
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	Fasten Safety Belt: Refer to **Seat Belt System Description and Operation**
	Front Fog Lamps: Refer to **Exterior Lighting Systems Description and Operation**
	High Beam: Refer to **Exterior Lighting Systems Description and Operation**
	Lights On: Refer to **Exterior Lighting Systems Description and Operation**

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	Low Engine Oil Pressure: Refer to **Indicator/Warning Message Description and Operation**
MPH	MPH: Refer to **Indicator/Warning Message Description and Operation**
 PARK BRAKE	Park Brake: Refer to **Park Brake System Description and Operation**
	Rear Fog Lamps: Refer to **Exterior Lighting Systems Description and Operation**
 (Canada) SECURITY (U.S.)	SECURITY: Refer to **Content Theft Deterrent (CTD) Description and Operation**
	Malfunction Indicator Lamp (MIL): Refer to **Engine Control Module Description** for the 4.8L, 5.3L, 6.0L and 6.2L engine

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 (Canada) SERVICE ENGINE SOON (U.S.)	
	Tire Pressure Monitor: Refer to **Tire Pressure Monitor Description and Operation**
	TOW/HAUL: Refer to **Transmission Indicators and Messages (TCM)** for the 6L80-E transmission or **Transmission Indicators and Messages** for the 4L60-E/4L65-E/4L70-E transmission
	Turn Signals: Refer to **Exterior Lighting Systems Description and Operation**
	VDC: Refer to **ABS Description and Operation (8600 GVW or Less)** or **ABS Description and Operation (Over 8600 GVW)**

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DIC Warning Messages

Indicator/Warning Message Description and Operation

Symbol	Description
ALL WHEEL DRIVE DISABLED	Refer to **Transfer Case Description and Operation** for the NVG 246-NP8 transfer case or **Transfer Case Description and Operation** for the BW 4485-NR3 transfer case
AUTOMATIC LIGHT CONTROL OFF	Refer to **Exterior Lighting Systems Description and Operation**
AUTOMATIC LIGHT CONTROL ON	Refer to **Exterior Lighting Systems Description and Operation**
BATTERY SAVER ACTIVE	Refer to **Charging System Description and Operation**
BRAKE FLUID LOW ADD BRAKE FLUID	Refer to **Brake Warning System Description and Operation**
BUCKLE PASSENGER SEATBELT	Refer to **Seat Belt System Description and Operation**
BUCKLE SEATBELT	Refer to **Seat Belt System Description and Operation**
CHANGE ENGINE OIL SOON	Refer to **Indicator/Warning Message Description and Operation**
CHECK LEFT FRONT TIRE PRESSURE	Refer to **Tire Pressure Monitor Description and Operation**
CHECK LEFT REAR TIRE PRESSURE	Refer to **Tire Pressure Monitor Description and Operation**
CHECK RIGHT FRONT TIRE PRESSURE	Refer to **Tire Pressure Monitor Description and Operation**

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CHECK RIGHT REAR TIRE PRESSURE	Refer to **Tire Pressure Monitor Description and Operation**
CHECK SPARE TIRE PRESSURE	Refer to **Tire Pressure Monitor Description and Operation**
COOLANT LEVEL LOW ADD COOLANT	Refer to **Cooling System Description and Operation**
DRIVER DOOR OPEN	Refer to **Door Ajar Indicator Description and Operation**
ENGINE HOT TURN A/C OFF	Refer to **Cooling System Description and Operation**
ENGINE POWER IS REDUCED	Refer to **Engine Control Module Description** for the 4.8L, 5.3L, 6.0L and 6.2L engine
ENGINE OIL LOW ADD OIL	Refer to **Indicator/Warning Message Description and Operation**
ENGINE OVERHEATED STOP ENGINE	Refer to **Cooling System Description and Operation**
FUEL LEVEL LOW	Refer to **Indicator/Warning Message Description and Operation**
LEFT REAR DOOR OPEN	Refer to **Door Ajar Indicator Description and Operation**
OIL PRESSURE LOW STOP ENGINE	Refer to **Indicator/Warning Message Description and Operation**
PARK ASSIST FAULT CLEAN REAR BUMPER	Refer to **Object Detection Description and Operation**
PARK ASSIST OFF	Refer to **Object Detection Description and Operation**
PASSENGER DOOR OPEN	Refer to **Door Ajar Indicator Description and Operation**
PROGRAM CLUSTER	Refer to **Indicator/Warning Message Description and Operation**
REAR ACCESS OPEN	Refer to **Lift Gate/Lift Gate Window Ajar Indicator Description and Operation**
REMOTE KEY LEARNING ACTIVE	Refer to **Keyless Entry System Description and Operation**
REMOTE KEY LEARNING COMPLETE	Refer to **Keyless Entry System Description and Operation**
REPLACE BATTERY IN REMOTE KEY	Refer to **Keyless Entry System Description and Operation**
RIGHT REAR DOOR OPEN	Refer to **Door Ajar Indicator Description and Operation**
SERVICE ALL WHEEL DRIVE	Refer to **Transfer Case Description and Operation** for the NVG 246-NP8 transfer case or **Transfer Case Description and Operation** for the

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	BW 4485-NR3 transfer case
SERVICE AIR BAG	Refer to **SIR System Description and Operation**
SERVICE BATTERY CHARGING SYSTEM	Refer to **Charging System Description and Operation**
SERVICE BRAKE BOOSTER	Refer to **Brake Warning System Description and Operation**
SERVICE PARK ASSIST	Refer to **Object Detection Description and Operation**
SERVICE STABILITRAK	Refer to **ABS Description and Operation (8600 GVW or Less)** or **ABS Description and Operation (Over 8600 GVW)**
SERVICE SUSPENSION SYSTEM	Refer to **Electronic Suspension Control Description and Operation** .
SERVICE THEFT DETERRENT SYSTEM	Refer to **Immobilizer Description and Operation**
SERVICE TIRE MONITOR SYSTEM	Refer to **Tire Pressure Monitor Description and Operation**
SERVICE TRACTION CONTROL	Refer to **ABS Description and Operation (8600 GVW or Less)** or **ABS Description and Operation (Over 8600 GVW)**
STABILITRAK OFF	Refer to **ABS Description and Operation (8600 GVW or Less)** or **ABS Description and Operation (Over 8600 GVW)**
STARTING DISABLED SERVICE THROTTLE	Refer to **Throttle Actuator Control (TAC) System Description**
THEFT ATTEMPTED	Refer to **Content Theft Deterrent (CTD) Description and Operation**
TIGHTEN GAS CAP	Refer to **Indicator/Warning Message Description and Operation**
TIRE LEARNING ACTIVE	Refer to **Tire Pressure Monitor Description and Operation**
TRACTION CONTROL OFF	Refer to **ABS Description and Operation (8600 GVW or Less)** or **ABS Description and Operation (Over 8600 GVW)**
TRANSMISSION HOT IDLE ENGINE	Refer to **Transmission Indicators and Messages (TCM)** for the 4L60-E transmission or **Transmission Indicators and Messages** for the 4L60-E/4L65-E/4L70-E transmission
TURN SIGNAL ON	Refer to **Exterior Lighting Systems Description and Operation**
VEHICLE OVERSPEED	Refer to **Indicator/Warning Message Description and Operation**
WASHER FLUID LOW ADD FLUID	Refer to **Wiper/Washer System Description and Operation**

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CHANGE ENGINE OIL SOON

The instrument panel cluster (IPC) illuminates the CHANGE ENGINE OIL SOON message when the engine control module (ECM) determines that the engine oil should be changed. The IPC receives a class 2 message from the ECM requesting illumination. Once the oil is changed, perform the engine oil monitor reset procedure in order to clear the Change Engine Oil indicator. Refer to **GM Oil Life System Resetting** .

ENGINE OIL LOW

The instrument panel cluster (IPC) illuminates the ENGINE OIL LOW message in the driver information center (DIC) when the engine control module (ECM) detects a low engine oil level condition. The ECM only monitors the oil level switch signal circuit for a brief period between key on and ignition crank. The IPC receives a class 2 message from the ECM requesting illumination.

FUEL LEVEL LOW

The instrument panel cluster (IPC) illuminates the FUEL LEVEL LOW message in the driver information center (DIC) and the LOW FUEL indicator when the IPC detects that the fuel level is less than a pre-determined value. The IPC receives a class 2 message from the engine control module (ECM) indicating fuel level percent.

KM/H

The instrument panel cluster (IPC) displays the km/h indicator when the cluster detects that Metric units have been requested.

MPH

The instrument panel cluster (IPC) displays the MPH indicator when the cluster detects that English units have been requested.

OIL PRESSURE LOW

The instrument panel cluster (IPC) illuminates the OIL PRESSURE LOW message in the driver information center (DIC) when the engine control module (ECM) detects a low oil pressure condition with the signal circuit low. The IPC receives a class 2 message from the ECM requesting illumination.

PROGRAM CLUSTER

The instrument panel cluster (IPC) illuminates the PROGRAM CLUSTER message in the driver information center (DIC) when the IPC needs to be programmed. Refer to **Instrument Cluster Programming and Setup** for setup and programming.

VEHICLE OVERSPEED

The instrument panel cluster (IPC) illuminates the VEHICLE OVERSPEED indicator when the IPC detects that the vehicle speed is more than 120 km/h (75 mph).

SHIFT INDICATOR

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The instrument panel cluster (IPC) illuminates the shift indicator when the engine control module (ECM) determines that the vehicle should be shifted to the next higher gear. The IPC receives a class 2 message from the ECM requesting illumination.

TIGHTEN GAS CAP

The instrument panel cluster (IPC) illuminates the TIGHTEN GAS CAP message in the driver information center (DIC) when the engine control module (ECM) detects a low fuel pressure condition. The IPC receives a class 2 message from the ECM requesting illumination.

INSTRUMENT CLUSTER 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 occurs at key up:

- The air bag indicator flashes 7 times (not IPC controlled).
- The ABS indicator illuminates briefly.
- The battery indicator illuminates briefly.
- The brake indicator illuminates briefly.
- The coolant temperature indicator illuminates briefly.
- The cruise engage indicator illuminates briefly.
- The engine oil pressure indicator illuminates briefly.
- The malfunction indicator lamp (MIL) illuminates briefly (not IPC controlled).
- The seat belt indicator illuminates for 70 seconds or until the driver seat belt is latched (not IPC controlled).
- The security indicator illuminates briefly.
- The tire pressure low indicator illuminates briefly.
- The vehicle dynamics caution (VDC) indicator illuminates briefly.
- All segments of the driver information center (DIC) illuminate briefly.
- All odometer segments illuminate briefly.
- The PRNDL segment illuminates briefly.

Indicators and Warning Messages

Refer to **Indicator/Warning Message Description and Operation**, **Data Link Communications Description and Operation** , and **Body Control System Description and Operation** .

Engine Coolant Temperature Gage

The instrument panel cluster (IPC) displays the engine coolant temperature as determined by the engine control module (ECM). The IPC receives a GMLAN message from the ECM indicating the engine coolant temperature. The engine coolant temperature gage defaults to 60°C (140°F) or below if:

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

Fuel Gage

The instrument panel cluster (IPC) displays the fuel level as determined by the ECM. The IPC receives a GMLAN message from the ECM indicating the fuel level percent. The fuel gage defaults to empty if:

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

When the fuel level is less than a pre-determined value, the low fuel indicator illuminates in the IPC.

Odometer

The IPC contains a season odometer and trip odometer A or B. Momentarily press the DIC trip/fuel button on the IPC in order to toggle between the season odometer and the trip odometer. Press the DIC set/reset button for greater than 0.25 seconds, while the trip odometer is displayed, in order to reset the trip odometer. The IPC displays the vehicle mileage and trip mileage as determined by the IPC. The IPC calculates the mileage based on the GMLAN vehicle speed information from the ECM. The odometer will display 'error' if an internal IPC memory failure is detected. The odometer displays either miles or kilometers and can be set through the personalization programming menu in the DIC.

PRNDL Display

The IPC displays the selected gear position as determined by the ECM. The IPC receives a GMLAN message from the ECM indicating the gear position. The PRNDL display blanks if:

- The ECM detects a malfunction in the transmission range switch circuit.
- The IPC detects a loss of GMLAN communications with the ECM.

Speedometer

The IPC displays the vehicle speed as determined by the ECM. The IPC calculates the mileage based on the GMLAN vehicle speed information from the ECM. The speedometer defaults to 0 km/h (0 mph) if the IPC detects a loss of GMLAN communications with the ECM.

Tachometer

The IPC displays the engine speed as determined by the ECM. The IPC receives a GMLAN message from the ECM indicating the engine speed. The tachometer will default to 0 RPM if:

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

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LIFT GATE/LIFT GATE WINDOW AJAR INDICATOR DESCRIPTION AND OPERATION

GATE AJAR Indicator

The instrument panel cluster (IPC) illuminates the GATE AJAR indicator when the body control module (BCM) detects that the liftgate or liftglass is ajar or open. The IPC receives a LAN message from the BCM requesting illumination. If the vehicle is in the forward or reverse gear position, the BCM activates an audible warning.

SPECIAL TOOLS AND EQUIPMENT

SPECIAL TOOLS

Special Tools

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

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