

2008 Chevrolet Silverado 1500
2008 ACCESSORIES & EQUIPMENT Displays and Gages - Cab & Chassis Sierra, Cab & Chassis Silverado, Sierra & Silverado

2008 ACCESSORIES & EQUIPMENT

Displays and Gages - Cab & Chassis Sierra, Cab & Chassis Silverado, Sierra & Silverado

SPECIFICATIONS

FASTENER TIGHTENING SPECIFICATIONS

Application	Specification	
	Metric	English
Instrument Panel Accessory Switch Screws	2 N.m	18 lb in
Instrument Panel Cluster Assembly Screws	2 N.m	18 lb in

SCHEMATIC AND ROUTING DIAGRAMS

INSTRUMENT CLUSTER SCHEMATICS

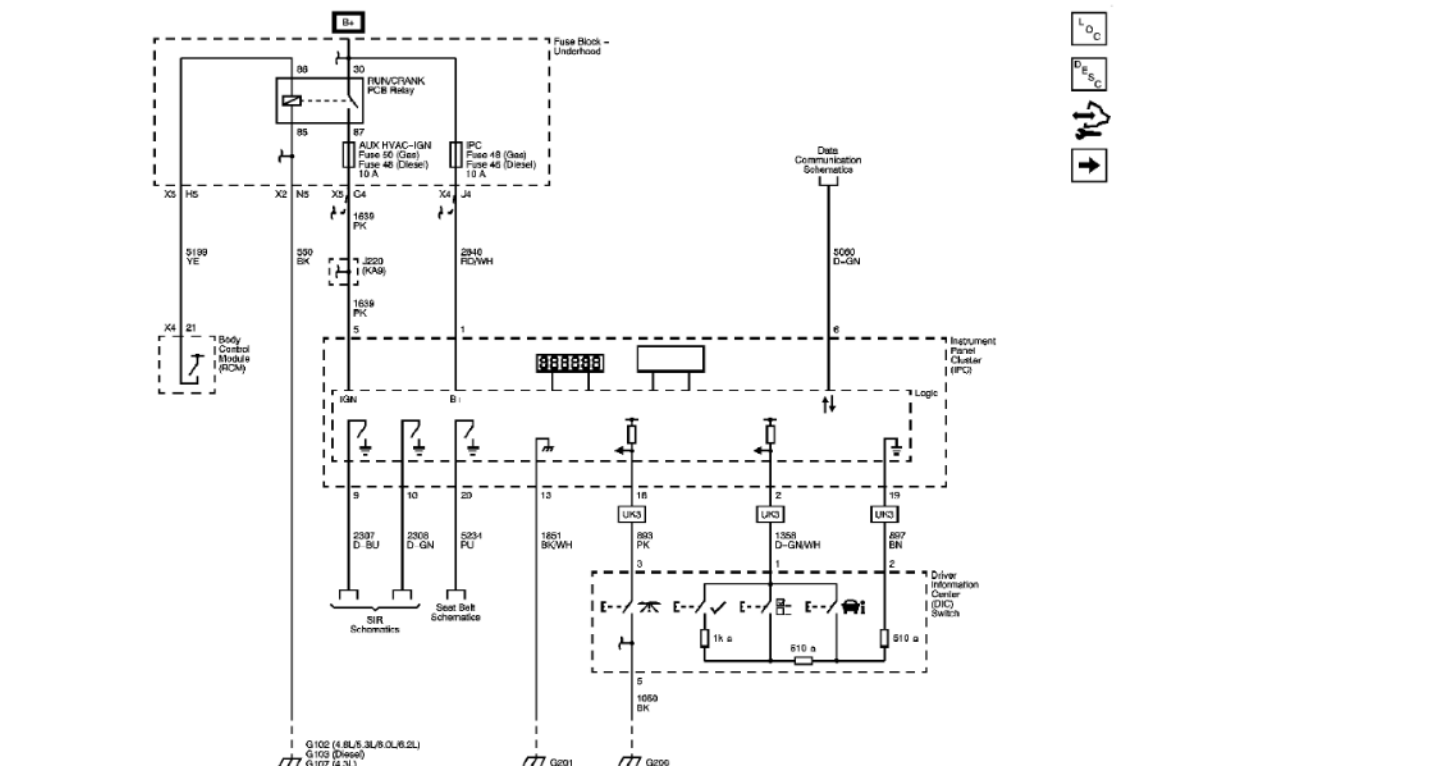


Fig. 1: Power, Ground and Driver Information Switch
Courtesy of GENERAL MOTORS CORP.

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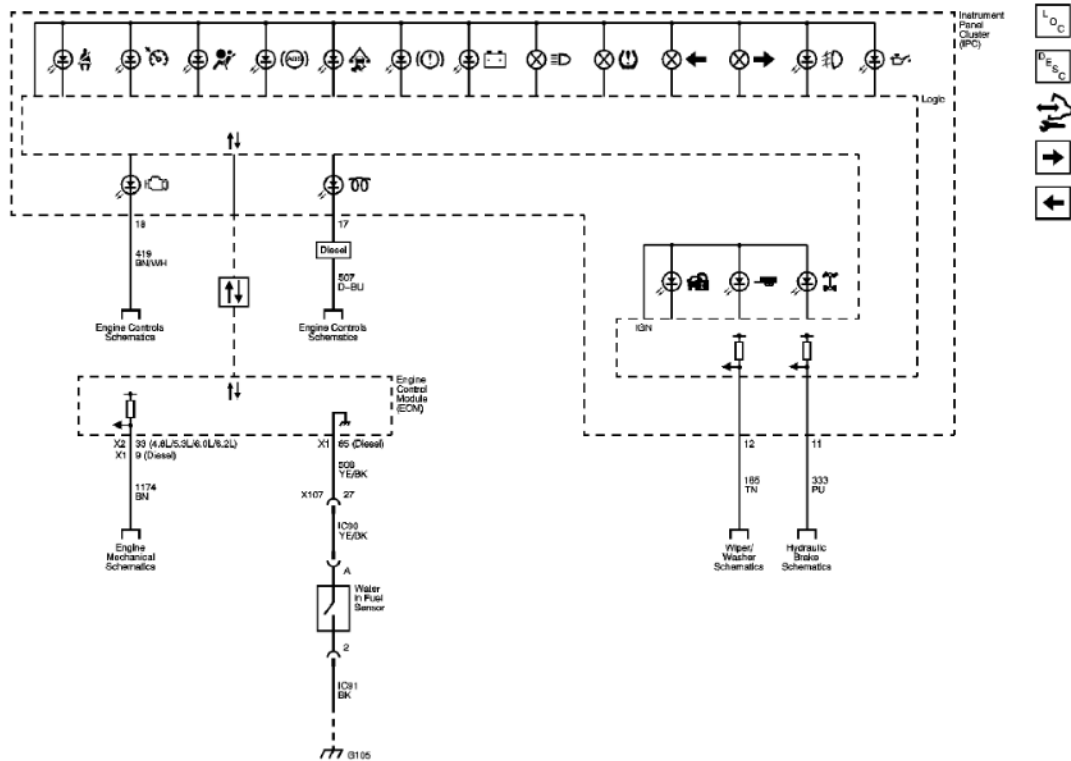


Fig. 2: Indicators

Courtesy of GENERAL MOTORS CORP.

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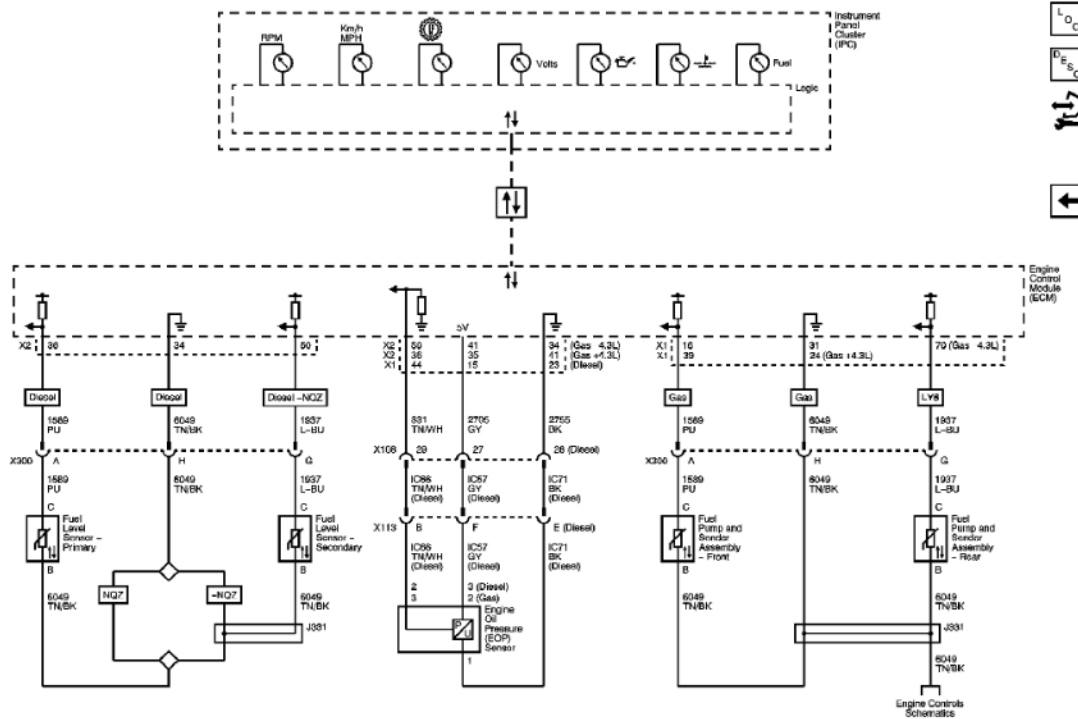


Fig. 3: Gages

Courtesy of GENERAL MOTORS CORP.

DRIVER INFORMATION SYSTEM SCHEMATICS

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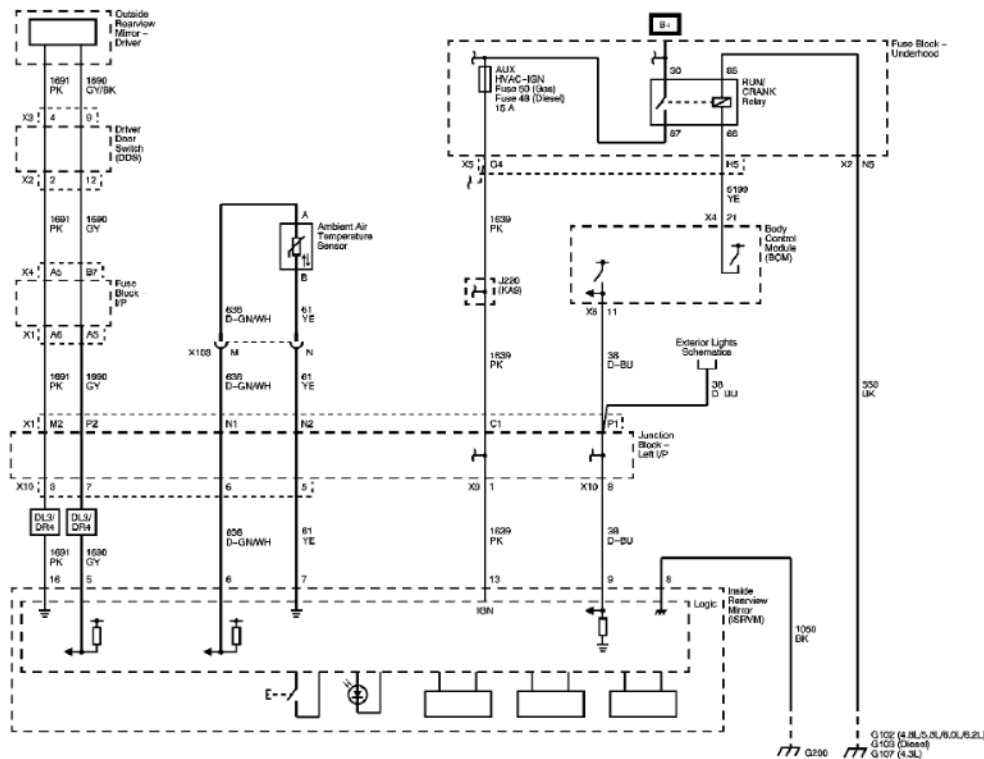


Fig. 4: Driver Information System Schematic
Courtesy of GENERAL MOTORS CORP.

AUDIBLE WARNINGS SCHEMATICS

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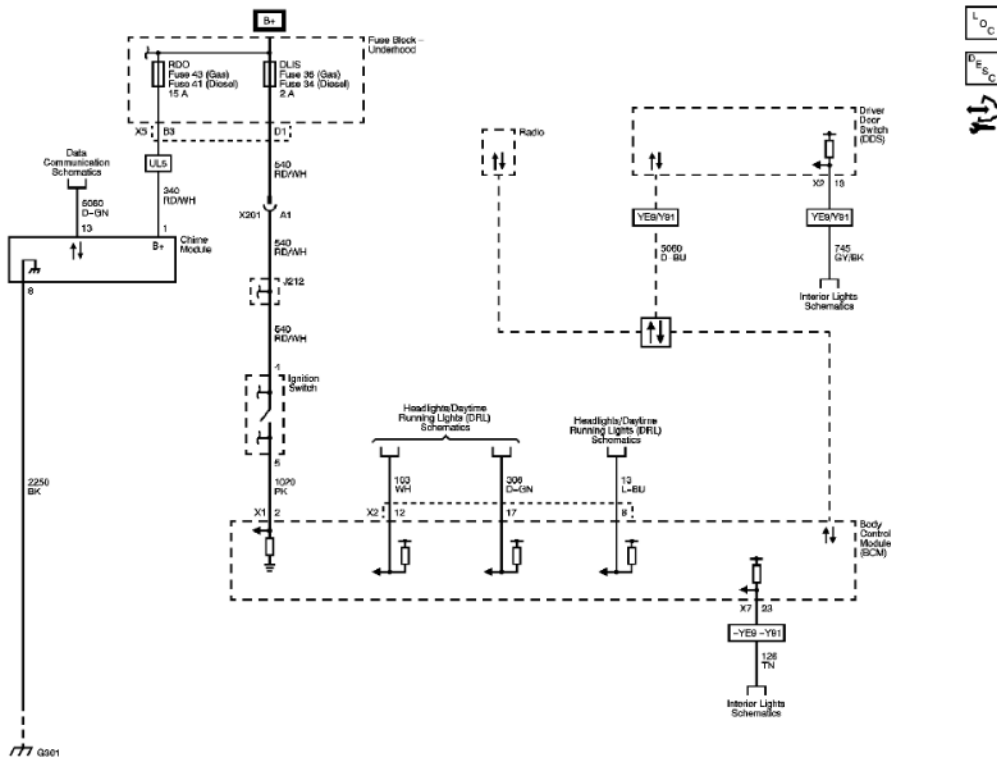


Fig. 5: Audible Warnings Schematic
Courtesy of GENERAL MOTORS CORP.

DIAGNOSTIC INFORMATION AND PROCEDURES

DIAGNOSTIC CODE INDEX

DIAGNOSTIC CODE INDEX

DTC	Description
DTC B3567	B3567 01: Driver Information Center (DIC) Select Switch Circuit Short To Battery B3567 59: Driver Information Center (DIC) Select Switch Circuit/Component Protection Time-Out
DTC P0381	P0381: Wait To Start Lamp Control Circuit
DTC P0461	P0461: Fuel Level Sensor 1 Performance
DTC P0462	P0462: Fuel Level Sensor 1 Low Voltage
DTC P0463	P0463: Fuel Level Sensor 1 High Voltage
DTC P0464	P0464: Fuel Level Sensor 1 Circuit Intermittent
DTC P0521, P0522, or	P0521: Engine Oil Pressure (EOP) Sensor Performance

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<u>P0523</u>	P0522: Engine Oil Pressure (EOP) Sensor Circuit Low Voltage. P0523: Engine Oil Pressure (EOP) Sensor Circuit High Voltage
<u>DTC P2066</u>	P2066: Fuel Level Sensor 2 Performance
<u>DTC P2067</u>	P2067: Fuel Level Sensor 2 Low Voltage
<u>DTC P2068</u>	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.

DTC B3567

Diagnostic Instructions

- Perform the **Diagnostic System Check - Vehicle** prior to using this diagnostic procedure.
- Review **Strategy Based Diagnosis** for an overview of the diagnostic approach.
- **Diagnostic Procedure Instructions** provides an overview of each diagnostic category.

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

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

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). The IPC interfaces with the DIC switches via 3 discrete 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 switches is pressed. The switch input to the cluster is set up in a resistor ladder format for three of the four switches. 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

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Schematic Reference

Instrument Cluster Schematics

Connector End View Reference

Component Connector End Views

Description and Operation

- Driver Information Center (DIC) Description and Operation
- Instrument Cluster Description and Operation

Electrical Information Reference

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

Scan Tool Reference

Control Module References for scan tool information

Circuit/System Testing

1. Ignition OFF, disconnect the harness connector at the DIC switch assembly.
2. Ignition OFF, test for less than 1 ohm between the low reference terminal 2 and ground.
 - If greater than the specified range, test the low reference circuit for an open/high resistance.
3. Ignition OFF, test for less than 1 ohm between the ground terminal 5 and ground.
 - If greater than the specified range, test the ground circuit for an open/high resistance.
4. Ignition ON, verify that all of the scan tool DIC Switch parameters are Inactive.
 - If any are not Inactive, test the appropriate signal circuit terminal 1 or terminal 3 for a short to ground. If the circuit tests normal, replace the IPC.
5. Ignition ON, install a 3-amp fused jumper wire between the signal circuit terminal 1 and the low reference circuit terminal 2. Verify the scan tool DIC Switch parameters, except the DIC Fuel Info. parameter, are Active.

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- 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.
- 6. Ignition ON, install a 3-amp fused jumper wire between the signal circuit terminal 3 and ground. Verify the scan tool DIC Fuel Info. parameter is Active.
 - If not Active, test the signal circuit for a short to voltage or and open/high resistance. If the circuit tests normal, replace the IPC.
- 7. 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.

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

DTC P0381

Diagnostic Instructions

- Perform the **Diagnostic System Check - Vehicle** prior to using this diagnostic procedure.
- Review **Strategy Based Diagnosis** for an overview of the diagnostic approach.
- **Diagnostic Procedure Instructions** provides an overview of each diagnostic category.

DTC Descriptor

DTC P0381

Wait To Start Lamp Control Circuit

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Wait To Start Signal	P0381	P0381	P0381	-

Circuit/System Description

Ignition voltage is supplied directly to the wait to start indicator. The engine control module (ECM) controls the lamp by grounding the control circuit via an internal switch called a driver. The primary function of the driver is to supply the ground for the component being controlled. Each driver has a fault line which is monitored by the ECM. When the ECM is commanding a

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component ON, the voltage of the control circuit should be low, near zero volts. When the ECM is commanding the control circuit to a component OFF, the voltage potential of the circuit should be high, near battery voltage. If the fault detection circuit senses a voltage other than what is expected, the fault line status will change causing the DTC to set.

Conditions for Running the DTC

The ignition voltage is greater than 6 volts but less than 18 volts.

Conditions for Setting the DTC

- The ECM detects that the commanded state of the driver and the actual state of the control circuit do not match.
- The condition must be present for a minimum of 5 seconds.

Action Taken When the DTC Sets

- The ECM stores the DTC information in memory.
- The ECM records the operating conditions at the time the DTC sets. The ECM displays the failure information in the Failure Records on the scan tool.

Conditions for Clearing the DTC

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

Diagnostic Aids

Using the Failure Records data may help locate an intermittent condition. If you cannot duplicate the DTC, the information in the Failure Records can help 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.

The wait to start indicator illuminates only with the ignition ON and the engine OFF. The wait to start indicator will not illuminate during post-start glow plug operation. The wait to start indicator will not stay ON for long at higher engine temperatures.

Reference Information

Schematic Reference

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2008 ACCESSORIES & EQUIPMENT Displays and Gages - Cab & Chassis Sierra, Cab & Chassis Silverado, Sierra & Silverado

- **Instrument Cluster Schematics**
- **Engine Controls Schematics**

Connector End View Reference

Component Connector End Views

Electrical Information Reference

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

Scan Tool Reference

Control Module References for scan tool information

Circuit/System Testing

1. Ignition OFF, disconnect the harness connector X2 at the ECM.
2. Ignition ON, verify that the wait to start indicator is OFF.
 - If not the specified value, test the wait to start indicator control signal circuit terminal 16 for a short to ground. If the circuit tests normal, replace the instrument panel cluster (IPC).
3. Install a 3-amp fused jumper between the wait to start control signal circuit terminal 16 and ground. Verify that the wait to start indicator is ON.
 - If not the specified value, test the wait to start indicator control signal circuit terminal 16 for a short to voltage or an open/high resistance. If the circuit tests normal, replace the IPC.
4. If all circuits test normal, replace the ECM.

Repair Procedures

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

Control Module References for the ECM or IPC replacement, setup, and programming

DTC P0461

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Diagnostic Instructions

- Perform the **Diagnostic System Check - Vehicle** prior to using this diagnostic procedure.
- Review **Strategy Based Diagnosis** for an overview of the diagnostic approach.
- **Diagnostic Procedure Instructions** provides an overview of each diagnostic category.

DTC Descriptor

DTC P0461

Fuel Level Sensor 1 Performance

Diagnostic Fault Information

Circuit	Short to Ground	High Resistance	Open	Short to Voltage	Signal Performance
Fuel Level Sensor Signal	P0462	1	P0463, P0464	P0463	P0461
Fuel Level Sensor Low Reference	-	1	P0463, 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

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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.

Reference Information

Schematic Reference

Instrument Cluster Schematics

Connector End View Reference

Component Connector End Views

Description and Operation

Instrument Cluster Description and Operation

Electrical Information Reference

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

Scan Tool Reference

Control Module References for Scan Tool Information

Component Testing

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1. Ignition OFF, remove the fuel level sender and verify there are no obstructions interfering with the fuel level sender.
 - If any interference is present, repair the fuel sender interference.
2. Ignition OFF, disconnect the harness connector at the fuel level sensor.
3. While sweeping the fuel level sensor through its full range of motion, test for a minimum resistance value of less than 41 ohms and a maximum value greater than 119 ohms between the signal terminal C and the low reference terminal B.
 - If not within the specified range, replace the fuel level sensor.

Repair Procedures

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

- **Fuel Level Sensor Replacement (Extended Cab w/26 Gal Tank)** or **Fuel Level Sensor Replacement (Regular Cab w/34 Gal Tank)** or **Fuel Level Sensor Replacement (Regular Cab w/26 Gal Tank)** for the 4.3L engine
- **Fuel Level Sensor Replacement (15 Reg Cab w/26 gal Tank)** or **Fuel Level Sensor Replacement (15 Ext/Crew Cab w/26 gal Tank)** or **Fuel Level Sensor Replacement (25 Ext/Crew Cab w/26 gal Tank)** or **Fuel Level Sensor Replacement (15/25 Reg/Ext/Crew Cab w/34 gal Tank)** or **Fuel Level Sensor Replacement (35 Reg/Ext/Crew Cab w/34 gal Tank)** for the 4.8L, 5.3L, 6.0L, and 6.2L engines
- **Fuel Level Sensor Replacement (Cab/Chassis - Rear Tank)** for the 6.6L engine
- **Control Module References** for ECM replacement, setup, and programming

DTC P0462

Diagnostic Instructions

- Perform the **Diagnostic System Check - Vehicle** prior to using this diagnostic procedure.
- Review **Strategy Based Diagnosis** for an overview of the diagnostic approach.
- **Diagnostic Procedure Instructions** provides an overview of each diagnostic category.

DTC Descriptor

DTC P0462

Fuel Level Sensor 1 Low Voltage

Diagnostic Fault Information

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Circuit	Short to Ground	High Resistance	Open	Short to Voltage	Signal Performance
Fuel Level Sensor Signal	P0462	1	P0463, P0464	P0463	P0461
Fuel Level Sensor Low Reference	-	1	P0463, 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.

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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Diagnostic Aids

A defective fuel level sensor most likely will not set DTC P0462. The sensor has a 500 ohm default resistor that will prevent it from meeting the code setting criteria of this DTC. Look for problems in the wiring and in the inline and harness connectors at the sensor and ECM.

Reference Information

Schematic Reference

Instrument Cluster Schematics

Connector End View Reference

Component Connector End Views

Description and Operation

Instrument Cluster Description and Operation

Electrical Information Reference

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

Scan Tool Reference

Control Module References for Scan Tool Information

Circuit/System Verification

Ignition ON, verify the scan tool Fuel Tank Level Remaining parameter is 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 display is less than 4 percent.
 - If greater than the specified range, test the signal circuit terminal C for a short to

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ground. If the circuit tests normal, replace the ECM.

3. If all circuits test normal, test or replace the fuel level sensor.

Component Testing

1. Ignition OFF, remove the fuel level sender.
2. While sweeping the fuel level sensor through its full range of motion, test for a minimum resistance value of less than 41 ohms and a maximum value greater than 119 ohms between the signal terminal C and the low reference terminal B.
 - o If not within the specified range, replace the fuel level sensor.

Component Testing

1. Ignition OFF, disconnect the harness connectors at the fuel level sensor.
2. While sweeping the fuel level sensor through its full range of motion, test for a minimum value less than 41 ohms and a maximum value greater than 119 ohms between the signal terminal C and the low reference terminal B.
 - o If not within the specified range, replace the fuel level sensor.

Repair Procedures

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

- **Fuel Level Sensor Replacement (Extended Cab w/26 Gal Tank)** or **Fuel Level Sensor Replacement (Regular Cab w/34 Gal Tank)** or **Fuel Level Sensor Replacement (Regular Cab w/26 Gal Tank)** for the 4.3L engine
- **Fuel Level Sensor Replacement (15 Reg Cab w/26 gal Tank)** or **Fuel Level Sensor Replacement (15 Ext/Crew Cab w/26 gal Tank)** or **Fuel Level Sensor Replacement (25 Ext/Crew Cab w/26 gal Tank)** or **Fuel Level Sensor Replacement (15/25 Reg/Ext/Crew Cab w/34 gal Tank)** or **Fuel Level Sensor Replacement (35 Reg/Ext/Crew Cab w/34 gal Tank)** for the 4.8L, 5.3L, 6.0L, and 6.2L engines
- **Fuel Level Sensor Replacement (Cab/Chassis - Rear Tank)** for the 6.6L engine
- **Control Module References** for ECM replacement, setup, and programming

DTC P0463

Diagnostic Instructions

- Perform the **Diagnostic System Check - Vehicle** prior to using this diagnostic procedure.
- Review **Strategy Based Diagnosis** for an overview of the diagnostic approach.

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- **Diagnostic Procedure Instructions** provides an overview of each diagnostic category.

DTC Descriptor

DTC P0463

Fuel Level Sensor 1 High Voltage

Diagnostic Fault Information

Circuit	Short to Ground	High Resistance	Open	Short to Voltage	Signal Performance
Fuel Level Sensor Signal	P0462	1	P0463, P0464	P0463	P0461
Fuel Level Sensor Low Reference	-	1	P0463, 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

- 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.

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- 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.

Diagnostic Aids

A defective fuel level sensor most likely will not set DTC P0463. The sensor has a 500 ohm default resistor that will prevent it from meeting the code setting criteria of this DTC. Look for problems in the wiring and in the inline and harness connectors at the sensor and ECM.

Reference Information

Schematic Reference

Instrument Cluster Schematics

Connector End View Reference

Component Connector End Views

Description and Operation

Instrument Cluster Description and Operation

Electrical Information Reference

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

Scan Tool Reference

Control Module References for Scan Tool Information

Circuit/System Verification

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Ignition ON, verify the scan tool Fuel Tank Level Remaining parameter is 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 terminal B and ground.
 - o If greater than the specified range, 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 wire between the signal circuit terminal C and the low reference circuit terminal B. Verify the scan tool Fuel Tank Level Remaining parameter display is greater than 98 percent.
 - o If less than the specified range, 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.

Component Testing

1. Ignition OFF, remove the fuel level sender.
2. While sweeping the fuel level sensor through its full range of motion, test for a minimum resistance value of less than 41 ohms and a maximum value greater than 119 ohms between the signal terminal C and the low reference terminal B.
 - o If not within the specified range, replace the fuel level sensor.

Repair Procedures

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

- **Fuel Level Sensor Replacement (Extended Cab w/26 Gal Tank) or Fuel Level Sensor Replacement (Regular Cab w/34 Gal Tank) or Fuel Level Sensor Replacement (Regular Cab w/26 Gal Tank)** for the 4.3L engine
- **Fuel Level Sensor Replacement (15 Reg Cab w/26 gal Tank) or Fuel Level Sensor Replacement (15 Ext/Crew Cab w/26 gal Tank) or Fuel Level Sensor Replacement (25 Ext/Crew Cab w/26 gal Tank) or Fuel Level Sensor Replacement (15/25 Reg/Ext/Crew Cab w/34 gal Tank) or Fuel Level Sensor Replacement (35 Reg/Ext/Crew Cab w/34 gal Tank)** for the 4.8L, 5.3L, 6.0L, and 6.2L engines
- **Fuel Level Sensor Replacement (Cab/Chassis - Rear Tank)** for the 6.6L engine
- **Control Module References** for ECM replacement, setup, and programming

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DTC P0464

Diagnostic Instructions

- Perform the **Diagnostic System Check - Vehicle** prior to using this diagnostic procedure.
- Review **Strategy Based Diagnosis** for an overview of the diagnostic approach.
- **Diagnostic Procedure Instructions** provides an overview of each diagnostic category.

DTC Descriptor

DTC P0464

Fuel Level Sensor 1 Circuit Intermittent

Diagnostic Fault Information

Circuit	Short to Ground	High Resistance	Open	Short to Voltage	Signal Performance
Fuel Level Sensor Signal	P0462	1	P0463, P0464	P0463	P0461
Fuel Level Sensor Low Reference	-	1	P0463, 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.

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.

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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.

Reference Information

Schematic Reference

Instrument Cluster Schematics

Connector End View Reference

Component Connector End Views

Description and Operation

Instrument Cluster Description and Operation

Electrical Information Reference

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

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• Wiring Repairs

Scan Tool Reference

Control Module References for Scan Tool Information

Circuit/System Testing

1. Ignition OFF, disconnect the harness connector at the fuel level sensor.
2. Ignition OFF, test for less than 1 ohm between the fuel level sensor low reference circuit terminal B and ground.
 - If greater than the specified range, test the low reference circuit for an open/high resistance. If the circuit tests normal, replace the ECM.
3. Install a Signal Generator and Instrument Panel Tester between the fuel level sensor signal circuit terminal C and the fuel level sensor low reference circuit terminal B.
4. Ignition ON, vary the signal generator resistance between 40 and 250 ohms. Verify that the scan tool Fuel Tank Level Remaining parameter displays a range that varies between 5 and 95 percent as the signal generator resistance changes.
 - If not within the specified range, test the signal circuit for an open/high resistance. If the circuit test normal, replace the ECM.
5. If all circuits test normal, perform the fuel level sensor component test before replacing the fuel level sensor.

Component Testing

1. Ignition OFF, disconnect the harness connectors at the fuel level sensor.
2. While sweeping the fuel level sensor through its full range of motion, test for a minimum value less than 41 ohms and a maximum value greater than 119 ohms of resistance between the signal terminal C and the low reference terminal B.
 - If not within the specified range, replace the fuel level sensor.

Repair Procedures

Perform the Diagnostic Repair Verification after completing the diagnostic procedure.

- Fuel Level Sensor Replacement (Extended Cab w/26 Gal Tank) or Fuel Level Sensor Replacement (Regular Cab w/34 Gal Tank) or Fuel Level Sensor Replacement (Regular Cab w/26 Gal Tank) for the 4.3L engine
- Fuel Level Sensor Replacement (15 Reg Cab w/26 gal Tank) or Fuel Level Sensor

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Replacement (15 Ext/Crew Cab w/26 gal Tank) or Fuel Level Sensor Replacement (25 Ext/Crew Cab w/26 gal Tank) or Fuel Level Sensor Replacement (15/25 Reg/Ext/Crew Cab w/34 gal Tank) or Fuel Level Sensor Replacement (35 Reg/Ext/Crew Cab w/34 gal Tank) for the 4.8L, 5.3L, 6.0L, and 6.2L engines

- Fuel Level Sensor Replacement (Cab/Chassis - Rear Tank) for the 6.6L engine
- Control Module References for the ECM replacement, setup, and programming

DTC P0521, P0522, OR P0523

Diagnostic Instructions

- Perform the Diagnostic System Check - Vehicle prior to using this diagnostic procedure.
- Review Strategy Based Diagnosis for an overview of the diagnostic approach.
- Diagnostic Procedure Instructions provides an overview of each diagnostic category.

DTC Descriptors

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

Diagnostic Fault Information

Circuit	Short to Ground	High Resistance	Open	Short to Voltage	Signal Performance
Engine Oil Pressure 5-Volt Reference	P0522	1	P0522	P0523	P0521
Engine Oil Pressure Sensor Signal	P0522	1	P0522	P0523	P0521
Low Reference	-	1	P0523	-	P0521

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1. Engine Oil Pressure Indicator Malfunction

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.

Conditions for Setting the DTC

P0521

The ECM detects that the difference between the predicted oil pressure and the actual oil pressure is either less than 47 kPa (6.8 psi) or greater than 50 kPa (7.3 psi).

P0522

- 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.

P0523

- 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

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

Reference Information

Schematic Reference

Instrument Cluster Schematics

Connector End View Reference

Component Connector End Views

Description and Operation

Instrument Cluster Description and Operation

Electrical Information Reference

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

Scan Tool Reference

Control Module References for scan tool information

Circuit/System Verification

1. Engine running, observe the scan tool Engine Oil Pressure Sensor parameter. The reading should be between 41-448 kPa (6-65 psi).
2. Verify the engine oil pressure, refer to Oil Pressure Diagnosis and Testing .

Circuit/System Testing

1. Ignition OFF, disconnect the harness connector at the engine oil pressure (EOP) sensor.
2. Ignition OFF, test for less than 1.0 ohm between the low reference circuit terminal 1 and ground.
 - If greater than the specified range, test the low reference circuit for an open/high

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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 terminal 2 and ground.
 - If less than the specified range, 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 the specified range, 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 less than 8 kPa (1.2 psi).
 - If greater than the specified range, test the signal circuit terminal 3 for a short to voltage or an open/high resistance. If the circuit tests normal, replace the ECM.
5. Install a 3A fused jumper wire between the signal circuit terminal 3 and the 5-volt reference circuit terminal 2. Verify the scan tool Engine Oil Pressure Sensor parameter is greater than 550 kPa (80 psi).
 - If less than the specified range, test the signal circuit for a short to ground or an open/high resistance. If the circuit tests normal, replace the ECM.
6. 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 4.3L engine
- **Engine Oil Pressure Sensor and/or Switch Replacement** for the 4.8L, 5.3L, 6.0L, and 6.2L engines
- **Engine Oil Pressure Sensor and/or Switch Replacement** for the 6.6L engine
- **Control Module References** for ECM replacement, setup, and programming

DTC P2066

Diagnostic Instructions

- Perform the **Diagnostic System Check - Vehicle** prior to using this diagnostic procedure.
- Review **Strategy Based Diagnosis** for an overview of the diagnostic approach.
- **Diagnostic Procedure Instructions** provides an overview of each diagnostic category.

DTC Descriptor

DTC P2066

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Fuel Level Sensor 2 Performance

Diagnostic Fault Information

Circuit	Short to Ground	High Resistance	Open	Short to Voltage	Signal Performance
Fuel Level Sensor Signal Secondary	P2067	1	P2068	P2068	P2066
Fuel Level Sensor Low Reference	-	1	P2068	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

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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.

Reference Information

Schematic Reference

Instrument Cluster Schematics

Connector End View Reference

Component Connector End Views

Description and Operation

Instrument Cluster Description and Operation

Electrical Information Reference

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

Scan Tool Reference

Control Module References for Scan Tool Information

Component Testing

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1. Ignition OFF, remove the secondary fuel level sender and verify there are no obstructions interfering with the fuel level sender.
 - If any interference is present, repair the fuel sender interference.
2. Ignition OFF, disconnect the harness connector at the secondary fuel level sensor.
3. While sweeping the fuel level sensor through its full range of motion, test for a minimum resistance value of less than 41 ohms and a maximum value greater than 119 ohms between the signal terminal C and the low reference terminal B.
 - If not within the specified range, replace the secondary fuel level sensor.

Repair Procedures

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

- **Fuel Level Sensor Replacement (Extended Cab w/26 Gal Tank)** or **Fuel Level Sensor Replacement (Regular Cab w/34 Gal Tank)** or **Fuel Level Sensor Replacement (Regular Cab w/26 Gal Tank)** for the 4.3L engine
- **Fuel Level Sensor Replacement (15 Reg Cab w/26 gal Tank)** or **Fuel Level Sensor Replacement (15 Ext/Crew Cab w/26 gal Tank)** or **Fuel Level Sensor Replacement (25 Ext/Crew Cab w/26 gal Tank)** or **Fuel Level Sensor Replacement (15/25 Reg/Ext/Crew Cab w/34 gal Tank)** or **Fuel Level Sensor Replacement (35 Reg/Ext/Crew Cab w/34 gal Tank)** for the 4.8L, 5.3L, 6.0L, and 6.2L engines
- **Fuel Level Sensor Replacement (Cab/Chassis - Rear Tank)** for the 6.6L engine
- **Control Module References** for ECM replacement, setup, and programming

DTC P2067

Diagnostic Instructions

- Perform the **Diagnostic System Check - Vehicle** prior to using this diagnostic procedure.
- Review **Strategy Based Diagnosis** for an overview of the diagnostic approach.
- **Diagnostic Procedure Instructions** provides an overview of each diagnostic category.

DTC Descriptor

DTC P2067

Fuel Level Sensor 2 Low Voltage

Diagnostic Fault Information

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

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

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

Reference Information

Schematic Reference

Instrument Cluster Schematics

Connector End View Reference

Component Connector End Views

Description and Operation

Instrument Cluster Description and Operation

Electrical Information Reference

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

Scan Tool Reference

Control Module References for Scan Tool Information

Circuit/System Verification

Ignition ON, verify the scan tool Fuel Tank Level Remaining parameter is between 4-98 percent.

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 display is less than 4 percent.
 - If greater than the specified value, test the secondary signal circuit terminal C 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.

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Component Testing

1. Ignition OFF, remove the secondary fuel level sender.
2. While sweeping the fuel level sensor through its full range of motion, test for a minimum resistance value of less than 41 ohms and a maximum value greater than 119 ohms between the signal terminal C and the low reference terminal B.
 - o If not within the specified range, replace the secondary fuel level sensor.

Repair Procedures

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

- **Fuel Level Sensor Replacement (Extended Cab w/26 Gal Tank)** or **Fuel Level Sensor Replacement (Regular Cab w/34 Gal Tank)** or **Fuel Level Sensor Replacement (Regular Cab w/26 Gal Tank)** for the 4.3L engine
- **Fuel Level Sensor Replacement (15 Reg Cab w/26 gal Tank)** or **Fuel Level Sensor Replacement (15 Ext/Crew Cab w/26 gal Tank)** or **Fuel Level Sensor Replacement (25 Ext/Crew Cab w/26 gal Tank)** or **Fuel Level Sensor Replacement (15/25 Reg/Ext/Crew Cab w/34 gal Tank)** or **Fuel Level Sensor Replacement (35 Reg/Ext/Crew Cab w/34 gal Tank)** for the 4.8L, 5.3L, 6.0L, and 6.2L engines
- **Fuel Level Sensor Replacement (Cab/Chassis - Rear Tank)** for the 6.6L engine
- **Control Module References** for ECM replacement, setup, and programming

DTC P2068

Diagnostic Instructions

- Perform the **Diagnostic System Check - Vehicle** prior to using this diagnostic procedure.
- Review **Strategy Based Diagnosis** for an overview of the diagnostic approach.
- **Diagnostic Procedure Instructions** provides an overview of each diagnostic category.

DTC Descriptor

DTC P2068

Fuel Level Sensor 2 High Voltage

Diagnostic Fault Information

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

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- The history DTC clears after 40 malfunction-free warm-up cycles.

Reference Information

Schematic Reference

Instrument Cluster Schematics

Connector End View Reference

Component Connector End Views

Description and Operation

Instrument Cluster Description and Operation

Electrical Information Reference

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

Scan Tool Reference

Control Module References for Scan Tool Information

Circuit/System Verification

Ignition ON, verify the scan tool Fuel Tank Level Remaining parameter is 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 between the low reference circuit terminal B and ground.
 - If greater than the specified range, 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 wire between the secondary signal circuit terminal C and the low reference circuit terminal B. Verify the scan tool Fuel Tank Level Remaining parameter display is greater than 98 percent.

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- If less than the specified range, 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.

Component Testing

1. Ignition OFF, remove the secondary fuel level sender.
2. While sweeping the fuel level sensor through its full range of motion, test for a minimum resistance value of less than 41 ohms and a maximum value greater than 119 ohms between the secondary signal terminal B and the low reference terminal C.
 - If not within the specified range, replace the secondary fuel level sensor.

Repair Procedures

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

- **Fuel Level Sensor Replacement (Extended Cab w/26 Gal Tank)** or **Fuel Level Sensor Replacement (Regular Cab w/34 Gal Tank)** or **Fuel Level Sensor Replacement (Regular Cab w/26 Gal Tank)** for the 4.3L engine
- **Fuel Level Sensor Replacement (15 Reg Cab w/26 gal Tank)** or **Fuel Level Sensor Replacement (15 Ext/Crew Cab w/26 gal Tank)** or **Fuel Level Sensor Replacement (25 Ext/Crew Cab w/26 gal Tank)** or **Fuel Level Sensor Replacement (15/25 Reg/Ext/Crew Cab w/34 gal Tank)** or **Fuel Level Sensor Replacement (35 Reg/Ext/Crew Cab w/34 gal Tank)** for the 4.8L, 5.3L, 6.0L, and 6.2L engines
- **Fuel Level Sensor Replacement (Cab/Chassis - Rear Tank)** for the 6.6L engine
- **Control Module References** for 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.
 - 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:

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- **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 Tank)**
- **Hourmeter Inaccurate or Inoperative**
- **Speedometer and/or Odometer Inaccurate or Inoperative**
- **Tachometer Inaccurate or Inoperative**
- **Volt Gage Inaccurate or Inoperative**

Indicators

- **Compass Malfunction (Mirror)**
- **Engine Oil Pressure Indicator Malfunction**

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- **Door Ajar Indicator Malfunction (w/AN3)** or **Door Ajar Indicator Malfunction (w/o AN3)**
- **Four-Wheel Drive Indicator Always On** for the MP 1222/1225/1226-NQG transfer case
- **Four-Wheel Drive Indicator Inoperative** for the MP 1222/1225/1226-NQG transfer case
- **Transfer Case Shift Control Switch Inoperative** for the MP 1625/1626-NQF transfer case
- **Transfer Case Shift Control Switch Indicator Always On - Two or More** for the MP 1625/1626-NQF transfer case
- **Transfer Case Shift Control Switch Indicator Inoperative - One or More** for the MP 1625/1626-NQF transfer case
- **Service Indicator Always On** for the MP 1625/1626-NQF transfer case
- **Transfer Case Shift Control Switch Indicator Always On - Two or More** for the MP 3023/3024-NQH transfer case
- **Transfer Case Shift Control Switch Indicator Inoperative - One or More** for the MP 3023/3024-NQH transfer case
- **Service Indicator Always On** for the MP 3023/3024-NQH transfer case
- **Brake Warning Indicator Malfunction**
- **ABS Indicator Malfunction**
- **StabiliTrak Indicator Malfunction**
- **Traction Off Indicator Malfunction**
- **Charge Indicator Malfunction**
- **Water-in-Fuel Lamp Always On**
- **Malfunction Indicator Lamp (MIL) Diagnosis** for the 4.3L engine
- **Malfunction Indicator Lamp (MIL) Diagnosis** for the 4.8L, 5.3L, 6.0L, 6.2L, or 7.0L engine
- **Malfunction Indicator Lamp (MIL) Diagnosis** for the 6.6L (LMM) engine
- **Tow/Haul Switch/Indicator Always On or Inoperative** for the 4L60-E/4L65-E/4L70-E automatic transmission
- **Tow/Haul Switch/Indicator Always On or Inoperative** for the 6L50/6L80/6L90 automatic transmission
- **Low Washer Fluid Indicator Malfunction**
- **High Beam Indicator Malfunction**
- **Turn Signal Lamps and/or Indicators Malfunction**

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- **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 Malfunction**
- **Outside Air Temperature Display Inaccurate or Inoperative**

Instrument Cluster Dimming

Interior Backlighting Malfunction (w/AN3) or **Interior Backlighting Malfunction (w/o AN3)**

Driver Information Center (DIC)

Driver Information Center (DIC) Switch Malfunction

Audible Warnings

Chime Malfunction

CHARGE INDICATOR MALFUNCTION

Diagnostic Instructions

- Perform the **Diagnostic System Check - Vehicle** prior to using this diagnostic procedure.
- Review **Strategy Based Diagnosis** for an overview of the diagnostic approach.
- **Diagnostic Procedure Instructions** provides an overview of each diagnostic category.

Circuit/System Description

The engine control module (ECM) uses the generator turn ON signal circuit to control the load of the generator on the engine. A high side driver in the ECM applies a voltage to the voltage regulator. This signals the voltage regulator to turn the field circuit ON and OFF. The ECM monitors the state of the generator turn ON signal circuit. The ECM should detect low voltage on the generator turn on signal circuit when the ignition is ON and the engine is OFF, or when the charging system malfunctions. With the engine running, the ECM should detect high voltage on the generator turn on signal circuit. The ECM performs key ON and RUN tests to determine the status of the generator turn on signal circuit. If a malfunction is detected the ECM will illuminate the charge indicator in the instrument panel cluster (IPC).

Reference Information

2008 Chevrolet Silverado 1500

2008 ACCESSORIES & EQUIPMENT Displays and Gages - Cab & Chassis Sierra, Cab & Chassis Silverado, Sierra & Silverado

Schematic Reference

- Instrument Cluster Schematics
- Starting and Charging Schematics

Connector End View Reference

Component Connector End Views

Description and Operation

- Instrument Cluster Description and Operation
- Charging System Description and Operation

Electrical Information Reference

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

Scan Tool Reference

Control Module References for scan tool information

Circuit/System Verification

1. Ignition ON, engine running, verify the scan tool Battery Voltage parameter is between 12.5 and 15.5 volts.
 - If not within the specified range, refer to Charging System Test .
2. Ignition ON, perform the display test with the scan tool. The charge indicator should turn ON and OFF when changing between the commanded states.
 - If the indicator does not turn ON and OFF between commanded states, 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

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2008 ACCESSORIES & EQUIPMENT Displays and Gages - Cab & Chassis Sierra, Cab & Chassis Silverado, Sierra & Silverado

CHIME MALFUNCTION

Diagnostic Instructions

- Perform the **Diagnostic System Check - Vehicle** prior to using this diagnostic procedure.
- Review **Strategy Based Diagnosis** for an overview of the diagnostic approach.
- **Diagnostic Procedure Instructions** provides an overview of each diagnostic category.

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Key In Ignition B+	-	1	-	-
Key In Ignition Signal	1	1	1	-
1. Chime Malfunction				

Circuit/System Description

The radio generates the audible warning through the left speaker. The radio receives audible warning requests via the serial data circuit from the instrument panel cluster (IPC) or the body control module (BCM).

Reference Information

Schematic Reference

- **Instrument Cluster Schematics**
- **Audible Warnings Schematics**
- **Body Control System Schematics**
- **Radio/Navigation System Schematics**

Connector End View Reference

Component Connector End Views

Description and Operation

Audible Warnings Description and Operation

Electrical Information Reference

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2008 ACCESSORIES & EQUIPMENT Displays and Gages - Cab & Chassis Sierra, Cab & Chassis Silverado, Sierra & Silverado

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

Scan Tool Reference

Control Module References for scan tool information

Circuit/System Verification

IMPORTANT: Before performing this diagnostics, make sure no indicator(s) are illuminated after the IPC performs the displays test. If any indicators are illuminated after the bulb test, perform the indicator diagnostics before this diagnostic.

1. Ignition ON, headlamp switch OFF, verify the scan tool Headlamp Switch ON parameter is Inactive.
 - If not Inactive, refer to **Headlamps Malfunction** .
2. Ignition ON, park lamp switch OFF, verify the scan tool Park Lamp Switch parameter is Inactive.
 - If not Inactive, refer to **Park, License, and/or Tail Lamps Malfunction** .
3. Ignition ON, doors closed, verify the scan tool Door Ajar Switch parameters are Inactive/Door Closed.
 - If not Inactive/Door Closed, refer to **Courtesy Lamps Malfunction (w/AN3)** or **Courtesy Lamps Malfunction (w/o AN3)** .
4. Ignition ON, radio ON, adjust the radio balance and fade to the left front speaker.
 - If the speaker does not operate properly, refer to **Speaker Malfunction** .
5. Verify that the Key In Ignition Status parameter is Key In when the key is in the ignition and Key Out when the key is out of the ignition.

Circuit/System Testing

1. Ignition OFF, disconnect the harness connector at the ignition switch.
2. Ignition ON, verify that a test lamp illuminates between the B+ circuit terminal 4 and ground.
 - If the test lamp does not illuminate, test the B+ circuit for an open/high resistance. If

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the circuit tests normal and the DLIS circuit fuse is open, test the signal circuit terminal 5 for a short to ground.

3. Verify the scan tool Key In Ignition Status parameter is Key Out.
 - If not the specified value, test the signal circuit terminal 5 for a short to voltage. If the circuit tests normal, replace the BCM.
4. Install a 3A fused jumper wire between the signal circuit terminal 5 and the B+ circuit terminal 4. Verify the scan tool Key in Ignition Status parameter is Key In.
 - If not the specified value, test the signal circuit for an open/high resistance. If the circuit tests normal, replace the BCM.
5. If all circuits test normal, test or replace the ignition switch.

Repair Procedures

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

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

COMPASS MALFUNCTION (MIRROR)

Diagnostic Instructions

- Perform the **Diagnostic System Check - Vehicle** prior to using this diagnostic procedure.
- Review **Strategy Based Diagnosis** for an overview of the diagnostic approach.
- **Diagnostic Procedure Instructions** provides an overview of each diagnostic category.

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. As the vehicle travels with or against the earth's 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

- **Instrument Cluster Schematics**
- **Inside Rearview Mirror Schematics**

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2008 ACCESSORIES & EQUIPMENT Displays and Gages - Cab & Chassis Sierra, Cab & Chassis Silverado, Sierra & Silverado

Connector End View Reference

Component Connector End Views

Description and Operation

Instrument Cluster Description and Operation

Electrical Information Reference

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

Scan Tool Reference

Control Module References for scan tool information

Circuit/System Verification

1. Ignition ON, compass ON, verify that there is a compass reading on the display.
 - If the display is blank, replace the ISRVM.
 - 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**

Control Module References for ISRVM replacement, setup and programming

DRIVER INFORMATION CENTER (DIC) SWITCH MALFUNCTION

Diagnostic Instructions

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- Perform the **Diagnostic System Check - Vehicle** prior to using this diagnostic procedure.
- Review **Strategy Based Diagnosis** for an overview of the diagnostic approach.
- **Diagnostic Procedure Instructions** provides an overview of each diagnostic category.

Diagnostic Fault Information

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

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). 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 for three of the four switches. 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.

Reference Information

Schematic Reference

Instrument Cluster Schematics

Connector End View Reference

Component Connector End Views

Description and Operation

- **Instrument Cluster Description and Operation**
- **Automatic Day-Night Mirror Description and Operation**

Electrical Information Reference

- **Circuit Testing**

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

Scan Tool Reference

Control Module References for scan tool information

Circuit/System Testing

1. Ignition OFF, disconnect the harness connector at the DIC switch assembly.
2. Ignition OFF, test for less than 1 ohm between the low reference terminal 2 and ground.
 - If greater than the specified range, test the low reference circuit for an open/high resistance.
3. Ignition OFF, test for less than 1 ohm between the ground terminal 5 and ground.
 - If greater than the specified range, test the ground circuit for an open/high resistance.
4. Ignition ON, verify that all of the scan tool DIC Switch parameters are Inactive.
 - If any are not Inactive, test the appropriate signal circuit terminal 1 or terminal 3 for a short to ground. If the circuit tests normal, replace the IPC.
5. Ignition ON, install a 3-amp fused jumper wire between the signal circuit terminal 1 and the low reference circuit terminal 2. Verify the scan tool DIC Switch parameters, except the DIC Fuel Info. parameter, 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.
6. Ignition ON, install a 3-amp fused jumper wire between the signal circuit terminal 3 and ground. Verify the scan tool DIC Fuel Info. 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 IPC.
7. 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 Display Switch Replacement (without RPO SLT)** or **Driver Information Display Switch Replacement (with RPO SLT)**
- **Control Module References** for IPC replacement, setup, and programming

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ENGINE COOLANT TEMPERATURE GAGE INACCURATE OR INOPERATIVE

Diagnostic Instructions

- Perform the **Diagnostic System Check - Vehicle** prior to using this diagnostic procedure.
- Review **Strategy Based Diagnosis** for an overview of the diagnostic approach.
- **Diagnostic Procedure Instructions** provides an overview of each diagnostic category.

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

Component Connector End Views

Description and Operation

Instrument Cluster Description and Operation

Electrical Information Reference

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

Scan Tool Reference

Control Module References for scan tool information

Circuit/System Verification

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Ignition ON, perform the engine coolant gage sweep test with the scan tool. Verify that the engine coolant temperature gage sweeps from its low to high position.

- 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 MALFUNCTION

Diagnostic Instructions

- Perform the **Diagnostic System Check - Vehicle** prior to using this diagnostic procedure.
- Review **Strategy Based Diagnosis** for an overview of the diagnostic approach.
- **Diagnostic Procedure Instructions** provides an overview of each diagnostic category.

Diagnostic Fault Information

Circuit	Short to Ground	High Resistance	Open	Short to Voltage	Signal Performance
Engine Oil Pressure 5-Volt Reference	P0522	1	P0522	P0523	P0521
Engine Oil Pressure Sensor Signal	P0522	1	P0522	P0523	P0521
Low Reference	-	1	P0523	-	P0521
1. Engine Oil Pressure Indicator Malfunction					

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

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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

Connector End View Reference

Component Connector End Views

Description and Operation

Instrument Cluster Description and Operation

Electrical Information Reference

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

Scan Tool Reference

Control Module References for scan tool information

Circuit/System Verification

1. Engine running, observe the scan tool Engine Oil Pressure Sensor parameter. The reading should be between 41-448 kPa (6-65 psi).
2. Verify the engine oil pressure, refer to Oil Pressure Diagnosis and Testing .

Circuit/System Testing

1. Ignition OFF, disconnect the harness connector at the engine oil pressure (EOP) sensor.
2. Ignition OFF, test for less than 1.0 ohm between the low reference circuit terminal 1 and ground.
 - If greater than the specified range, test the low reference circuit for an open/high

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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 terminal 2 and ground.
 - If less than the specified range, 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 the specified range, 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 less than 8 kPa (1.2 psi).
 - If greater than the specified range, test the signal circuit terminal 3 for a short to voltage or an open/high resistance. If the circuit tests normal, replace the ECM.
5. Install a 3A fused jumper wire between the signal circuit terminal 3 and the 5-volt reference circuit terminal 2. Verify the scan tool Engine Oil Pressure Sensor parameter is greater than 550 kPa (80 psi).
 - If less than the specified range, test the signal circuit for a short to ground or an open/high resistance. If the circuit tests normal, replace the ECM.
6. 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 4.3L engine
- **Engine Oil Pressure Sensor and/or Switch Replacement** for the 4.8L, 5.3L, 6.0L, and 6.2L engines
- **Engine Oil Pressure Sensor and/or Switch Replacement** for the 6.6L engine
- **Control Module References** for ECM replacement, setup, and programming

FUEL GAGE INACCURATE OR INOPERATIVE (SINGLE TANK)

Diagnostic Instructions

- Perform the **Diagnostic System Check - Vehicle** prior to using this diagnostic procedure.
- Review **Strategy Based Diagnosis** for an overview of the diagnostic approach.
- **Diagnostic Procedure Instructions** provides an overview of each diagnostic category.

Diagnostic Fault Information

	Short to	High		Short to	Signal
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Circuit	Ground	Resistance	Open	Voltage	Performance
Fuel Level Sensor Signal	P0462	1	P0463, P0464	P0463	P0461
Fuel Level Sensor Low Reference	-	1	P0463, 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 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

Schematic Reference

Instrument Cluster Schematics

Connector End View Reference

Component Connector End Views

Description and Operation

Instrument Cluster Description and Operation

Electrical Information Reference

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

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Scan Tool Reference

Control Module References for scan tool information

Circuit/System Verification

Ignition ON, verify DTC P0461, P0462, P0463, or P0464 is not set

- If any of the DTCs are set, refer to **Diagnostic Trouble Code (DTC) List - Vehicle** .

Circuit/System Testing

1. Ignition OFF, disconnect the harness connector at the fuel level sensor.
2. Ignition OFF, test for less than 1.0 ohm between the fuel level sensor low reference circuit terminal B and ground.
 - If greater than the specified range, test the low reference circuit for an open/high resistance. If the circuit tests normal, replace the ECM.
3. Install a Signal Generator and Instrument Panel Tester between the signal circuit terminal C and ground.
4. Ignition ON, vary the signal generator resistance between 40-250 ohms. Verify that the scan tool Fuel Tank Level Remaining parameter displays a range that varies between 5 and 95 percent as the signal generator resistance changes.
 - If not within the specified range, test the signal circuit for an open/high resistance. If the circuits test normal, replace the ECM.
5. Vary the signal generator resistance between 40-250 ohms. Verify that the fuel gage displays a range that varies between empty and full as the signal generator resistance changes.
 - If the gage is incorrect, replace the IPC.
6. If all circuits test normal, perform the fuel level sensor component test before replacing the fuel level sensor.

Component Testing

1. Ignition OFF, remove the fuel level sender.
2. While sweeping the fuel level sensor through its full range of motion, test for a minimum value less than 41 ohms and a maximum value greater than 119 ohms between the signal terminal C and the low reference terminal B.
 - If not within the specified range, replace the fuel level sensor.

Repair Procedures

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2008 ACCESSORIES & EQUIPMENT Displays and Gages - Cab & Chassis Sierra, Cab & Chassis Silverado, Sierra & Silverado

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

- **Fuel Level Sensor Replacement (Extended Cab w/26 Gal Tank)** or **Fuel Level Sensor Replacement (Regular Cab w/34 Gal Tank)** or **Fuel Level Sensor Replacement (Regular Cab w/26 Gal Tank)** for the 4.3L engine
- **Fuel Level Sensor Replacement (15 Reg Cab w/26 gal Tank)** or **Fuel Level Sensor Replacement (15 Ext/Crew Cab w/26 gal Tank)** or **Fuel Level Sensor Replacement (25 Ext/Crew Cab w/26 gal Tank)** or **Fuel Level Sensor Replacement (15/25 Reg/Ext/Crew Cab w/34 gal Tank)** or **Fuel Level Sensor Replacement (35 Reg/Ext/Crew Cab w/34 gal Tank)** for the 4.8L, 5.3L, 6.0L, and 6.2L engines
- **Fuel Level Sensor Replacement (Cab/Chassis - Rear Tank)** for the 6.6L engine
- **Control Module References** for the ECM or IPC replacement, setup, and programming

FUEL GAGE INACCURATE OR INOPERATIVE (DUAL TANK)

Diagnostic Instructions

- Perform the **Diagnostic System Check - Vehicle** prior to using this diagnostic procedure.
- Review **Strategy Based Diagnosis** for an overview of the diagnostic approach.
- **Diagnostic Procedure Instructions** provides an overview of each diagnostic category.

Diagnostic Fault Information

Circuit	Short to Ground	High Resistance	Open	Short to Voltage	Signal Performance
Fuel Level Sensor Signal	P0462, P2067	1	P0463, P0464, P2068	P0463, P2068	P0461, P2066
Fuel Level Sensor Low Reference	-	1	P0463, P0464, P2068	P0463, P2068	P0461, P2066
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 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

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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

Schematic Reference

Instrument Cluster Schematics

Connector End View Reference

Component Connector End Views

Description and Operation

Instrument Cluster Description and Operation

Electrical Information Reference

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

Scan Tool Reference

Control Module References for scan tool information

Circuit/System Verification

Ignition ON, verify DTC P0461, P0462, P0463, P0464, P2066, P2067, or P2068 is not set

- If any of the DTCs are set, refer to Diagnostic Trouble Code (DTC) List - Vehicle .

Circuit/System Testing

1. Ignition OFF, disconnect the harness connector at the primary and secondary fuel level sensors.

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2. Ignition OFF, test for less than 1.0 ohm between the primary fuel level sensor low reference circuit terminal B and ground.
 - If greater than the specified range, test the low reference circuit for an open/high resistance. If the circuit tests normal, replace the ECM.
3. Ignition OFF, test for less than 1.0 ohm between the secondary fuel level sensor low reference circuit terminal B and ground.
 - If greater than the specified range, test the low reference circuit for an open/high resistance. If the circuit tests normal, replace the ECM.
4. Jumper the primary fuel level sensor signal circuit terminal C to secondary fuel level sensor signal circuit terminal C. Install a Signal Generator and Instrument Panel Tester between the jumped signal circuits and ground.
5. Ignition ON, vary the signal generator resistance between 40-250 ohms. Verify that the scan tool Fuel Tank Level Remaining parameter displays a range that varies between 5 and 95 percent as the signal generator resistance changes.
 - If not within the specified range, test both signal circuits for an open/high resistance. If the circuits test normal, replace the ECM.
6. Vary the signal generator resistance between 40-250 ohms. Verify that the fuel gage displays a range that varies between empty and full as the signal generator resistance changes.
 - If the gage is incorrect, replace the IPC.
7. If all circuits test normal, perform the fuel level sensor component test before replacing either the primary or secondary fuel level sensor.

Component Testing

1. Ignition OFF, remove the primary and secondary fuel level senders.
2. While sweeping the primary fuel level sensor through its full range of motion, test for a minimum value less than 41 ohms and a maximum value greater than 119 ohms between the signal terminal C and the low reference terminal B.
 - If not within the specified range, replace the primary fuel level sensor.
3. While sweeping the secondary fuel level sensor through its full range of motion, test for a minimum value less than 41 ohms and a maximum value greater than 119 ohms between the signal terminal C and the low reference terminal B.
 - If not within the specified range, replace the secondary fuel level sensor.

Repair Procedures

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

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2008 ACCESSORIES & EQUIPMENT Displays and Gages - Cab & Chassis Sierra, Cab & Chassis Silverado, Sierra & Silverado

- **Fuel Level Sensor Replacement (Extended Cab w/26 Gal Tank)** or **Fuel Level Sensor Replacement (Regular Cab w/34 Gal Tank)** or **Fuel Level Sensor Replacement (Regular Cab w/26 Gal Tank)** for the 4.3L engine
- **Fuel Level Sensor Replacement (15 Reg Cab w/26 gal Tank)** or **Fuel Level Sensor Replacement (15 Ext/Crew Cab w/26 gal Tank)** or **Fuel Level Sensor Replacement (25 Ext/Crew Cab w/26 gal Tank)** or **Fuel Level Sensor Replacement (15/25 Reg/Ext/Crew Cab w/34 gal Tank)** or **Fuel Level Sensor Replacement (35 Reg/Ext/Crew Cab w/34 gal Tank)** for the 4.8L, 5.3L, 6.0L, and 6.2L engines
- **Fuel Level Sensor Replacement (Cab/Chassis - Rear Tank)** for the 6.6L engine
- **Control Module References** for the ECM or IPC replacement, setup, and programming

HOURLY METER INACCURATE OR INOPERATIVE

Diagnostic Instructions

- Perform the **Diagnostic System Check - Vehicle** prior to using this diagnostic procedure.
- Review **Strategy Based Diagnosis** for an overview of the diagnostic approach.
- **Diagnostic Procedure Instructions** provides an overview of each diagnostic category.

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

Component Connector End Views

Description and Operation

Instrument Cluster Description and Operation

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2008 ACCESSORIES & EQUIPMENT Displays and Gages - Cab & Chassis Sierra, Cab & Chassis Silverado, Sierra & Silverado

Electrical Information Reference

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

Scan Tool Reference

Control Module References for scan tool information

Circuit/System Verification

With the engine running, verify that the time on the hourmeter increments properly.

- If the time does not increment 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 replacement, setup, and programming

INSTRUMENT CLUSTER INOPERATIVE

Diagnostic Instructions

- Perform the **Diagnostic System Check - Vehicle** prior to using this diagnostic procedure.
- Review **Strategy Based Diagnosis** for an overview of the diagnostic approach.
- **Diagnostic Procedure Instructions** provides an overview of each diagnostic category.

Circuit/System Description

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

Reference Information

Schematic Reference

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2008 ACCESSORIES & EQUIPMENT Displays and Gages - Cab & Chassis Sierra, Cab & Chassis Silverado, Sierra & Silverado

Instrument Cluster Schematics

Connector End View Reference

Component Connector End Views

Description and Operation

Instrument Cluster Description and Operation

Electrical Information Reference

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

Scan Tool Reference

Control Module References for scan tool information

Circuit/System Testing

1. Ignition OFF, disconnect the IPC.
2. Ignition ON, verify that a test lamp illuminates between the following appropriate RUN/CRANK relay voltage circuit and a ground.
 - Terminal 2 Cadillac
 - Terminal 5 Chevrolet/GMC
 - If the test lamp does not illuminate, repair the RUN/CRANK voltage circuit for a short to ground or an open/high resistance.
3. Verify that a test lamp illuminates between the following appropriate RUN/CRANK relay voltage circuit and appropriate IPC ground circuit.
 - Terminal 2 and 5 Cadillac
 - Terminal 5 and 13 Chevrolet/GMC
 - 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

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

Control Module References for IPC replacement, setup, and programming

OUTSIDE AIR TEMPERATURE DISPLAY INACCURATE OR INOPERATIVE

Diagnostic Instructions

- Perform the **Diagnostic System Check - Vehicle** prior to using this diagnostic procedure.
- Review **Strategy Based Diagnosis** for an overview of the diagnostic approach.
- **Diagnostic Procedure Instructions** provides an overview of each diagnostic category.

Circuit/System Description

The inside rearview mirror (ISRV) 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 ISRV senses a larger voltage drop across the sensor, indicating a lower temperature. As the resistance of the ambient air temperature sensor decreases, the ISRV 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

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-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
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

Inside Rearview Mirror Schematics

Connector End View Reference

Component Connector End Views

Description and Operation

- Instrument Cluster Description and Operation
- Automatic Day-Night Mirror Description and Operation

Electrical Information Reference

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

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Scan Tool Reference

Control Module References for scan tool information

Circuit/System Testing

1. Ignition OFF, disconnect the ambient air temperature sensor.
2. Ignition OFF, test for less than 1 ohm between the low reference circuit terminal B and ground.
 - o If greater than the specified range, test the ground circuit for an open/high resistance. If the circuit tests normal replace the ISRVM.
3. Ignition ON, verify that OC is displayed on the ISRVM display.
 - o If not the specified value, test the signal circuit for a short to ground. If the circuit tests normal replace the ISRVM.
4. Ignition ON, install a 3-amp fused jumper wire between the signal circuit terminal A and ground. Verify that SC is displayed on the ISRVM display.
 - o If not the specified value, test the signal circuit for an open/high resistance. If the circuit tests normal replace the ISRVM.
5. If all circuits test normal, 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

SPEEDOMETER AND/OR ODOMETER INACCURATE OR INOPERATIVE

Diagnostic Instructions

- Perform the **Diagnostic System Check - Vehicle** prior to using this diagnostic procedure.
- Review **Strategy Based Diagnosis** for an overview of the diagnostic approach.
- **Diagnostic Procedure Instructions** provides an overview of each diagnostic category.

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

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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

Component Connector End Views

Electrical Information Reference

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

Scan Tool Reference

Control Module References for scan tool information

Circuit/System Verification

1. Ignition ON, perform the speedometer gage sweep test with the scan tool. Verify that the speedometer gage sweeps from its low to high position.
 - If the speedometer gage does not sweep from its low to high position, replace the IPC.
2. Ignition OFF, raise the vehicles drive wheels.
3. 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,

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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 Instructions

- Perform the **Diagnostic System Check - Vehicle** prior to using this diagnostic procedure.
- Review **Strategy Based Diagnosis** for an overview of the diagnostic approach.
- **Diagnostic Procedure Instructions** provides an overview of each diagnostic category.

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

Component Connector End Views

Description and Operation

Instrument Cluster Description and Operation

Electrical Information Reference

- **Circuit Testing**
- **Connector Repairs**

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

Scan Tool Reference

Control Module References for scan tool information

Circuit/System Verification

Ignition ON, perform the tachometer gage sweep test with the scan tool. Verify that the tachometer gage sweeps from its low to high position.

- 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

VOLT GAGE INACCURATE OR INOPERATIVE

Diagnostic Instructions

- Perform the **Diagnostic System Check - Vehicle** prior to using this diagnostic procedure.
- Review **Strategy Based Diagnosis** for an overview of the diagnostic approach.
- **Diagnostic Procedure Instructions** provides an overview of each diagnostic category.

Circuit/System Description

The instrument panel cluster (IPC) displays the vehicle voltage based on the information from the body control module (BCM). The BCM provides voltage information to the IPC via serial data.

Diagnostic Aids

The voltmeter may fluctuate between 12 and 14 volts. This is normal operation. For further information, refer to **Charging System Description and Operation** or refer to Voltmeter Gage under the Instrument Panel section in the owners manual.

Reference Information

Schematic Reference

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Instrument Cluster Schematics

Connector End View Reference

Component Connector End Views

Description and Operation

Instrument Cluster Description and Operation

Electrical Information Reference

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

Scan Tool Reference

Control Module References for scan tool information

Circuit/System Verification

Ignition ON, perform the volt gage sweep test with the scan tool. Verify that the volt gage sweeps from its low to high position.

- If the volt 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

REPAIR INSTRUCTIONS

DRIVER INFORMATION DISPLAY SWITCH REPLACEMENT (WITHOUT RPO SLT)

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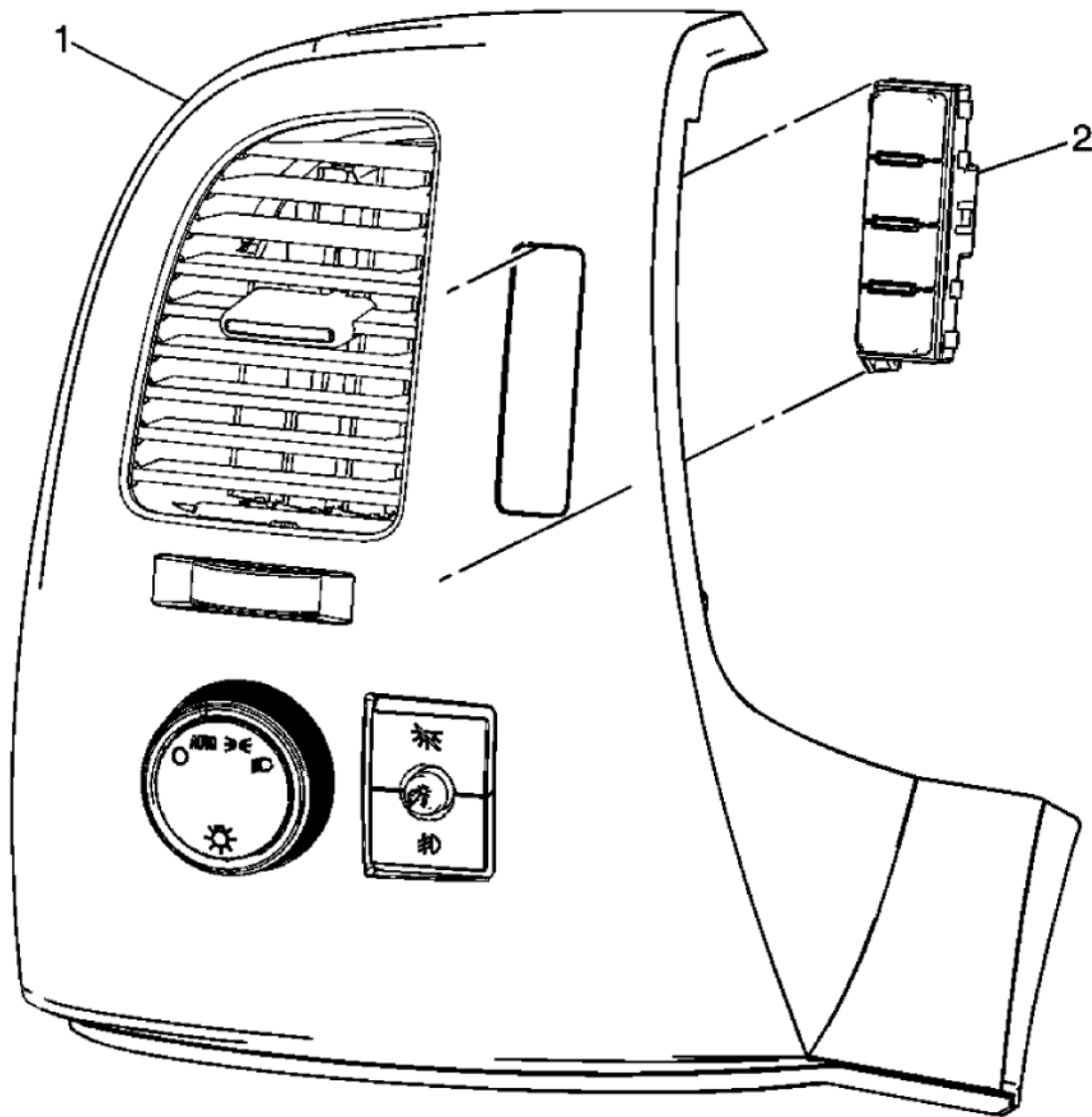


Fig. 6: View Of Instrument Panel Trim Plate & Drivers Information Center Switch Assembly

Courtesy of GENERAL MOTORS CORP.

Callout	Component Name
1	Instrument Panel Trim Plate Refer to <u>Instrument Panel Trim Plate Replacement (Without RPO SLT)</u>
2	Drivers Information Center Switch Assembly Tip: Release the retaining tabs securing the Switch to the instrument panel trim plate.

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DRIVER INFORMATION DISPLAY SWITCH REPLACEMENT (WITH RPO SLT)

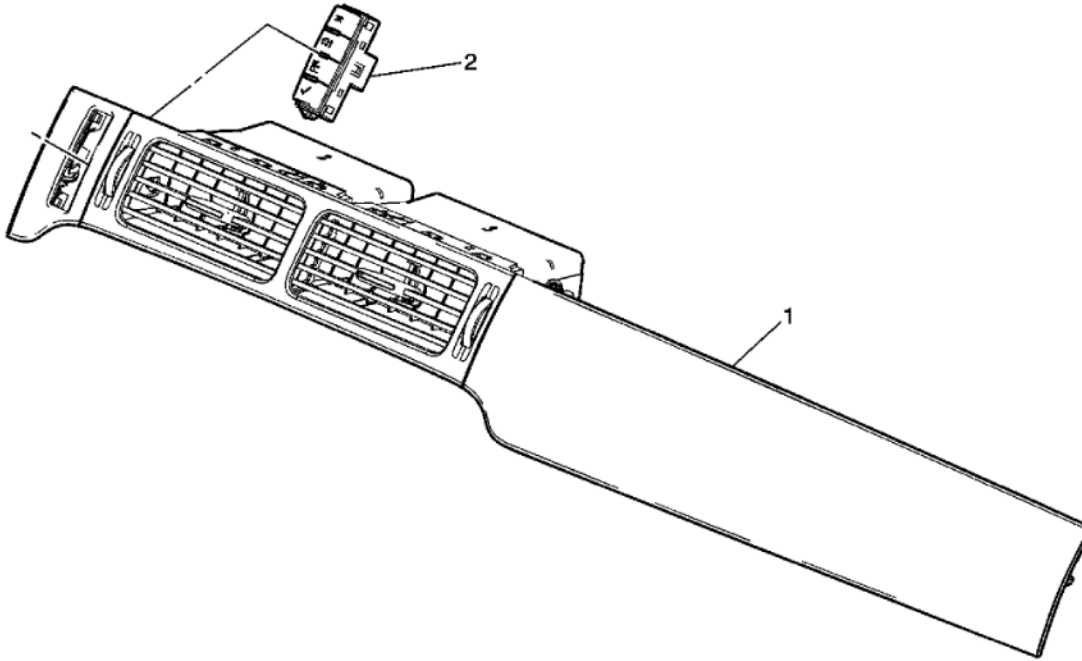


Fig. 7: View Of Driver Information Center Switch Assembly & Accessory Trim Plate
Courtesy of GENERAL MOTORS CORP.

Callout	Component Name
1	Instrument Panel Center Trim Plate Tip: Refer to <u>Instrument Panel Center Trim Panel Replacement (with RPO SLT)</u> .
2	Driver Information Switch Assembly

INSTRUMENT CLUSTER REPLACEMENT (WITHOUT RPO SLT)

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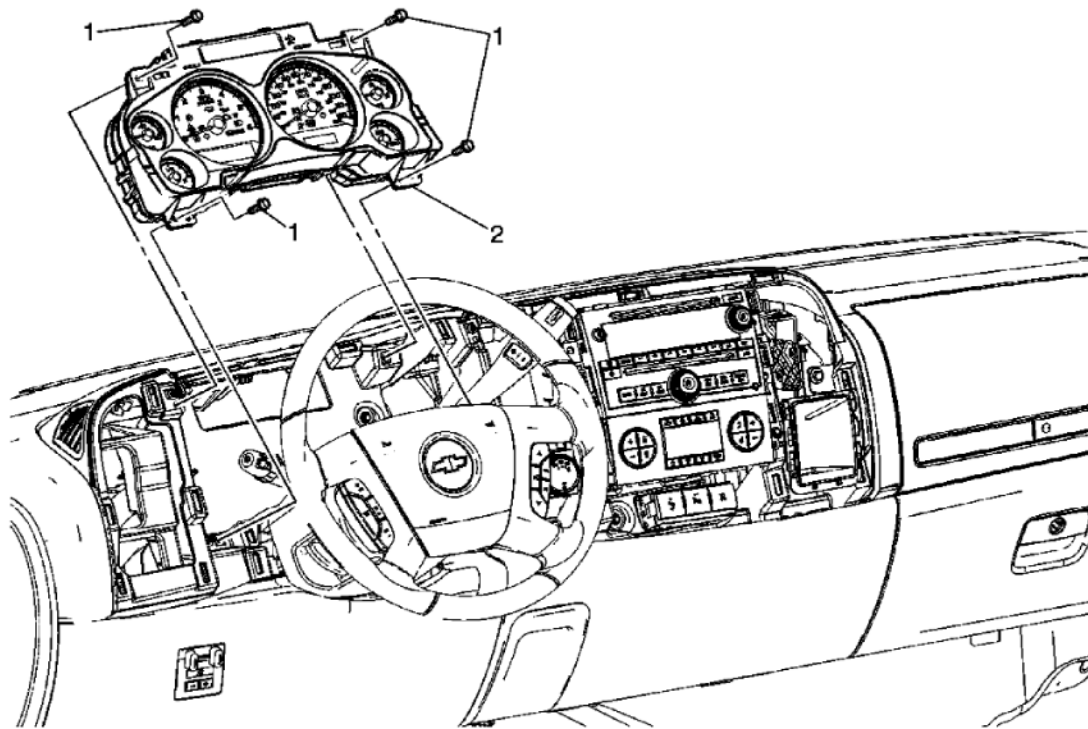


Fig. 8: View Of Instrument Panel Cluster Assembly & Screws
Courtesy of GENERAL MOTORS CORP.

Callout	Component Name
Preliminary Procedure: Remove the instrument panel cluster trim panel. Refer to <u>Instrument Cluster Trim Panel Replacement (with RPO SLT)</u> or <u>Instrument Cluster Trim Panel Replacement (Without RPO SLT)</u> .	
1	Instrument Panel Cluster Assembly Screw (Qty 4) NOTE: Refer to <u>Fastener Notice</u> . Tighten: 2 N.m (18 lb in)
2	Instrument Panel Cluster Assembly. Tip: 1. Disconnect the electrical connections. 2. A replacement cluster assembly must be programmed. Refer to <u>Control Module References</u> .

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ACCESSORY SWITCH REPLACEMENT (WITH RPO SLT)

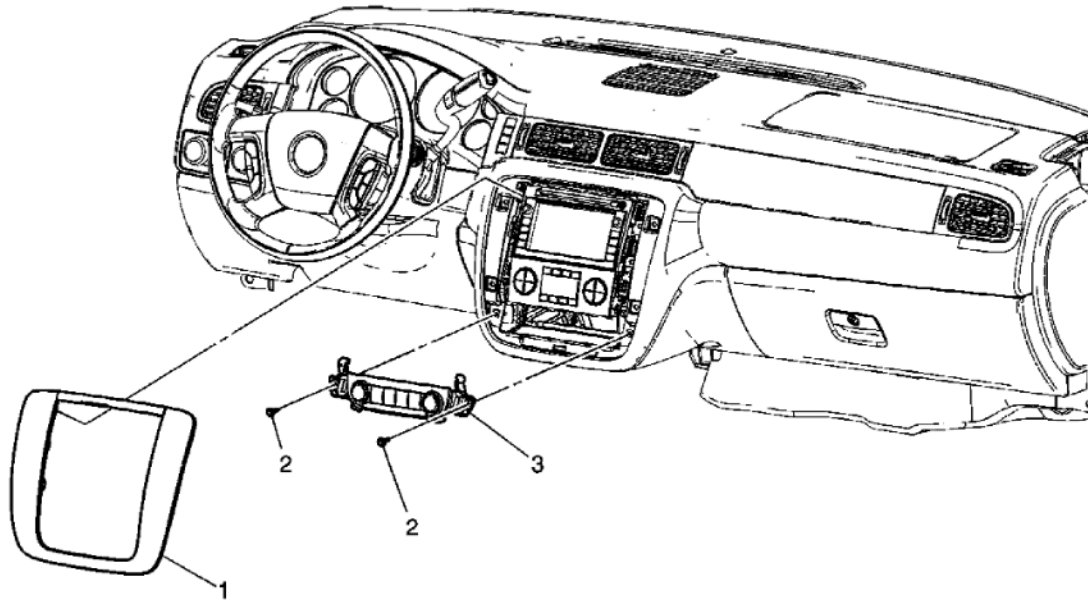


Fig. 9: View Of Instrument Panel Accessory Switch Assembly & Components
Courtesy of GENERAL MOTORS CORP.

Callout	Component Name
1	Instrument Panel Accessory Trim Plate Refer to <u>Instrument Panel Accessory Trim Plate Replacement (without RPO SLT)</u> or <u>Instrument Panel Accessory Trim Plate Replacement (with RPO SLT)</u> .
2	Instrument Panel Accessory Switch Screws (Qty: 2) NOTE: Refer to <u>Fastener Notice</u> . Tighten: 2 N.m (18 lb in)
3	Instrument Panel Accessory Switch Assembly Tip: Disconnect the electrical connections.

ACCESSORY SWITCH REPLACEMENT (WITHOUT RPO SLT)

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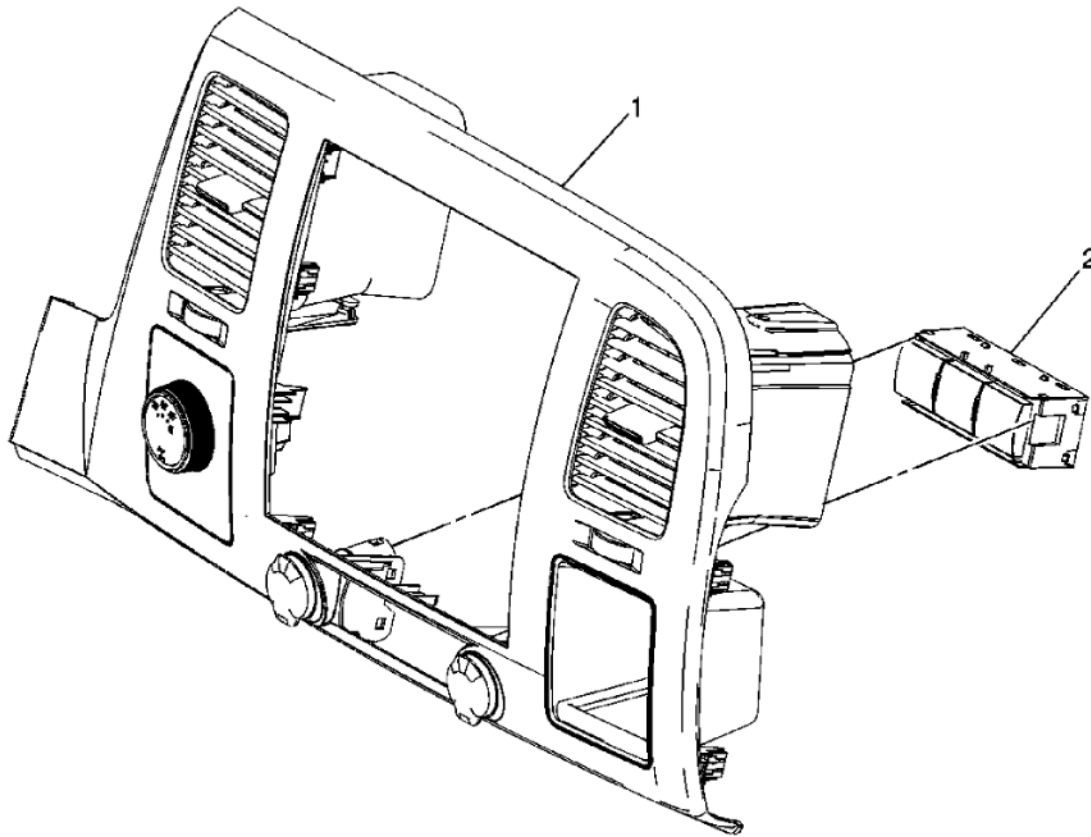


Fig. 10: View Of Instrument Panel Accessory Trim Plate & Switch Assembly
Courtesy of GENERAL MOTORS CORP.

Callout	Component Name
1	Instrument Panel Accessory Trim Plate Refer to <u>Instrument Panel Accessory Trim Plate Replacement (without RPO SLT)</u> or <u>Instrument Panel Accessory Trim Plate Replacement (with RPO SLT)</u>
2	Instrument Panel Accessory Switch Assembly Tip: Release the retaining tabs securing the switch to the instrument panel accessory trim plate.

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

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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:

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

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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.
- 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.

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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 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.

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

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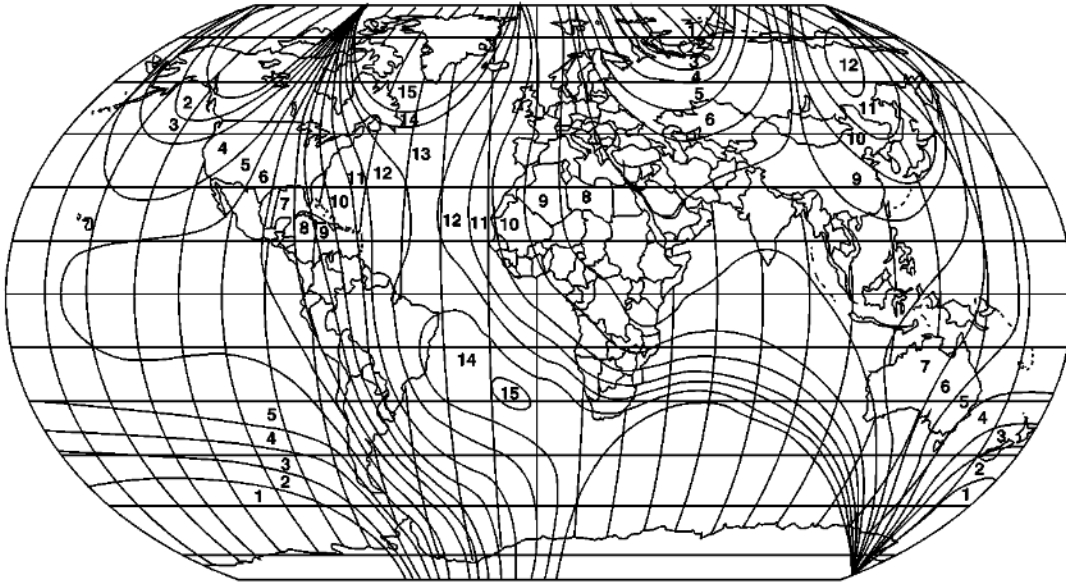


Fig. 11: World Magnetic Variation Map
Courtesy of GENERAL MOTORS CORP.

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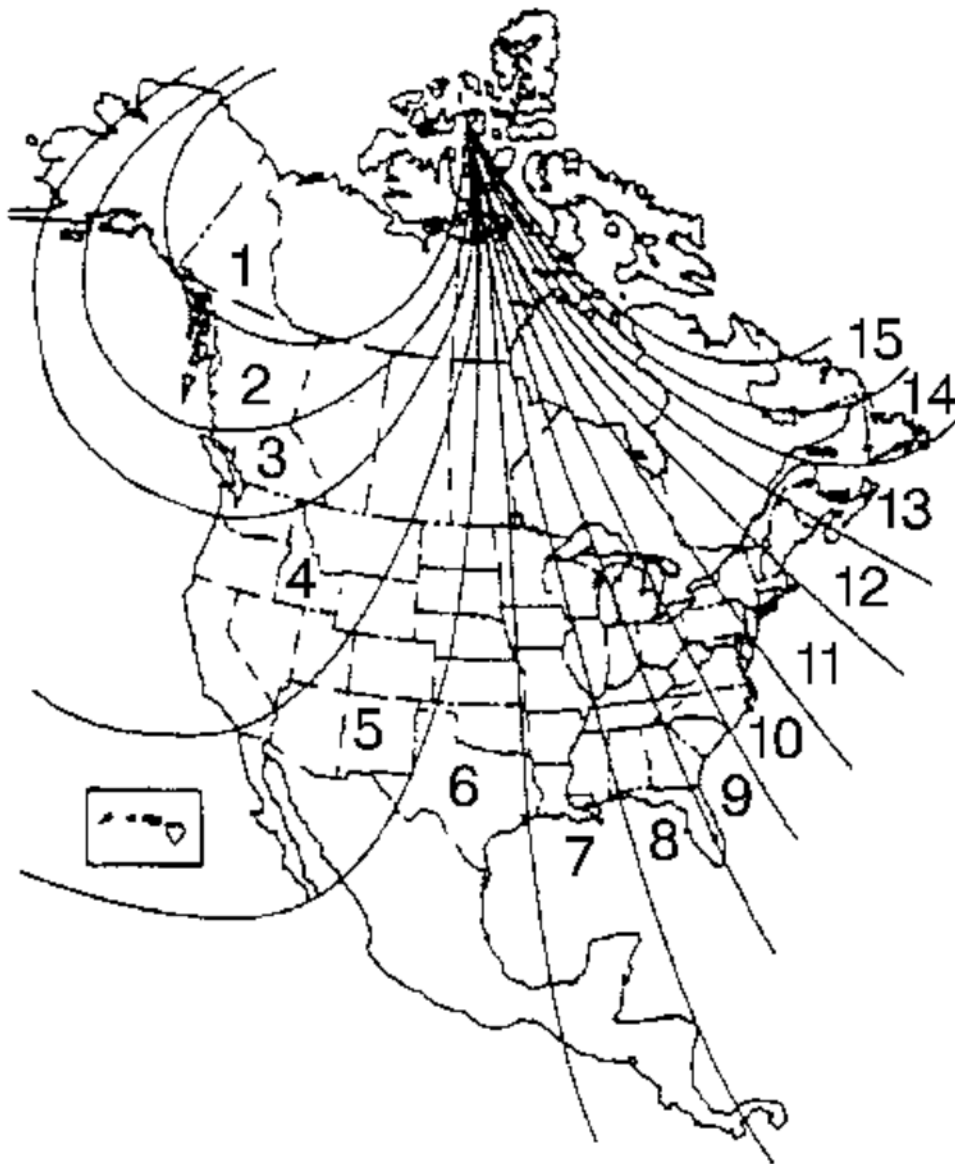


Fig. 12: Illustrating Magnetic Variation Zones
Courtesy of GENERAL MOTORS CORP.

1. Locate your current geographic location on the World Magnetic Variation Map.
2. Turn ON the ignition, with the engine OFF.

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3. 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 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.

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

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- 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
- 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

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- Park Tilt Mirrors
- Smart High Beams

Average Fuel Economy

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

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

The 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: $\text{Average Speed} = \text{AVS Distance} / \text{AVS Time}$

- 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

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: $\text{Fuel Range} = \text{Range Distance} / \text{Range Fuel Used}$.

- 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

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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: $IFE = \text{Distance} / \text{Fuel Used}$.

- 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

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

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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
- German
- Italian
- French
- Spanish
- Arabic

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- Chinese
- Korean

INDICATOR/WARNING MESSAGE DESCRIPTION AND OPERATION

Indicators

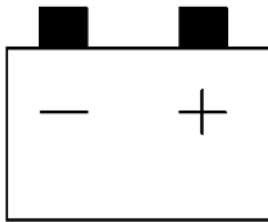
Symbol	Reference
	ABS: Refer to <u>ABS Description and Operation (With JL4)</u> or <u>ABS Description and Operation (Without JL4)</u>
	Air Bag: Refer to <u>SIR System Description and Operation</u>
	Brake: Refer to <u>Brake Warning System Description and Operation</u>

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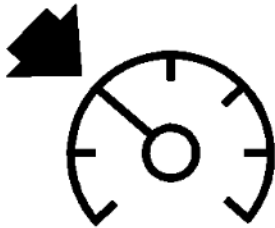
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(Canada)
BRAKE (U.S.)



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



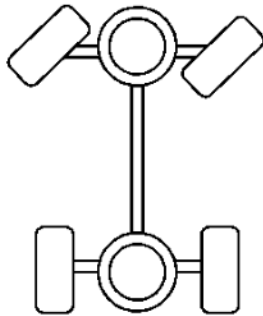
(Canada)
CRUISE (U.S.)

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

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

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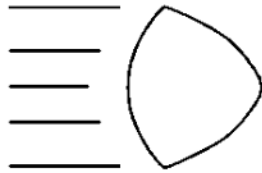
Four Wheel Drive: Refer to **Transfer Case Description and Operation** for the MP 1222/1225/1226-NQG transfer case or **Transfer Case Description and Operation** for the MP 1625/1626-NQF transfer case or **Special Tools** for the MP 3023/3024-NQH transfer case



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

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



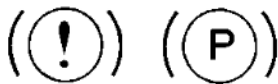
Lights On: Refer to **Exterior Lighting Systems Description and Operation**



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

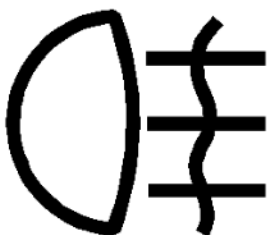
MPH

MPH: Refer to **Indicator/Warning Message Description and Operation**



PARK BRAKE

Park Brake: Refer to **Park Brake System Description and Operation (w/Rear Drum)** or **Park Brake System Description and Operation (w/Rear Disc)**



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

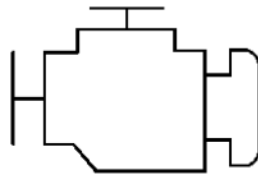
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(Canada)
SECURITY (U.S.)

SECURITY: Refer to **Content Theft Deterrent (CTD) Description and Operation**



(Canada)
SERVICE ENGINE SOON (U.S.)

Malfunction Indicator Lamp (MIL): Refer to **Engine Control Module Description** for the 4.3L engine
or
Engine Control Module Description for the 4.8L, 5.3L, 6.0L, 6.2L, or 7.0L engine
or
Engine Control Module Description for the 6.6L engine



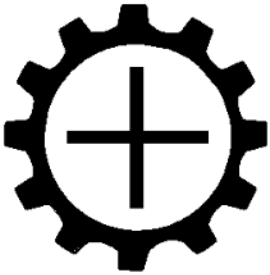
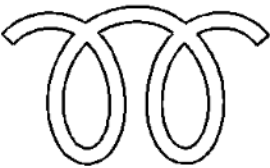
Tire Pressure Monitor: Refer to **Tire Pressure Monitor Description and Operation**



TOW/HAUL: Refer to **Transmission Indicators and Messages (TCM)** for the 4L60-E/4L65-E/4L70-E transmission
or
Transmission Indicators and Messages for the 6L50/6L80/6L90 transmission
or
Transmission Indicators and Messages for

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	the Allison transmission
	Turn Signals: Refer to <u>Exterior Lighting Systems Description and Operation</u>
	Upshift Indicator: Refer to <u>Indicator/Warning Message Description and Operation</u>
	VDC: Refer to <u>ABS Description and Operation (With JL4)</u> or <u>ABS Description and Operation (Without JL4)</u>
	Wait to Start: Refer to <u>Engine Control Module Description</u> for the 6.6L engine

DIC Warning Messages

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Message	Reference
AUTOMATIC LIGHT CONTROL OFF	Refer to <u>Exterior Lighting Systems Description and Operation</u>
AUTOMATIC LIGHT CONTROL ON	Refer to <u>Exterior Lighting Systems Description and Operation</u>
BATTERY SAVER ACTIVE	Refer to <u>Charging System Description and Operation</u>
BRAKE FLUID LOW ADD BRAKE FLUID	Refer to <u>Brake Warning System Description and Operation</u>
BUCKLE PASSENGER SEATBELT	Refer to <u>Seat Belt System Description and Operation</u>
BUCKLE SEATBELT	Refer to <u>Seat Belt System Description and Operation</u>
CHANGE ENGINE OIL SOON	Refer to <u>Indicator/Warning Message Description and Operation</u>
CHECK LEFT FRONT TIRE PRESSURE	Refer to <u>Tire Pressure Monitor Description and Operation</u>
CHECK LEFT REAR TIRE PRESSURE	Refer to <u>Tire Pressure Monitor Description and Operation</u>
CHECK RIGHT FRONT TIRE PRESSURE	Refer to <u>Tire Pressure Monitor Description and Operation</u>
CHECK RIGHT REAR TIRE PRESSURE	Refer to <u>Tire Pressure Monitor Description and Operation</u>
CHECK SPARE TIRE PRESSURE	Refer to <u>Tire Pressure Monitor Description and Operation</u>
CHECK TRAILER WIRING	Refer to <u>Trailer Brake Controls Description and Operation</u>
COOLANT LEVEL LOW ADD COOLANT	Refer to <u>Cooling System Description and Operation</u>
DRIVER DOOR OPEN	Refer to <u>Door Ajar Indicator Description and Operation (w/AN3)</u> or <u>Door Ajar Indicator Description and Operation (w/o AN3)</u>
ENGINE OVERHEATED IDLE ENGINE	Refer to <u>Cooling System Description and Operation</u>
ENGINE HOT TURN A/C OFF	Refer to <u>Cooling System Description and</u>

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	<u>Operation</u>
ENGINE POWER IS REDUCED	Refer to <u>Engine Control Module Description</u> for the 4.3L engine or <u>Engine Control Module Description</u> for the 4.8L, 5.3L, 6.0L, 6.2L, or 7.0L engine or <u>Engine Control Module Description</u> for the 6.6L engine
ENGINE OIL LOW ADD OIL	Refer to Indicator/Warning Message Description and Operation
ENGINE OVERHEATED STOP ENGINE	Refer to <u>Cooling System Description and Operation</u>
FUEL LEVEL LOW	Refer to <u>Indicator/Warning Message Description and Operation</u>
HOOD OPEN	Refer to <u>Door Ajar Indicator Description and Operation (w/AN3)</u> or <u>Door Ajar Indicator Description and Operation (w/o AN3)</u>
LEFT REAR DOOR OPEN	Refer to <u>Door Ajar Indicator Description and Operation (w/AN3)</u> or <u>Door Ajar Indicator Description and Operation (w/o AN3)</u>
OIL PRESSURE LOW STOP ENGINE	Refer to <u>Indicator/Warning Message Description and Operation</u>
PARK ASSIST FAULT CLEAN REAR BUMPER	Refer to <u>Object Detection Description and Operation</u>
PARK ASSIST OFF	Refer to <u>Object Detection Description and Operation</u>
PASSENGER DOOR OPEN	Refer to <u>Door Ajar Indicator Description and Operation (w/AN3)</u> or <u>Door Ajar Indicator Description and Operation (w/o AN3)</u>
PROGRAM CLUSTER	Refer to <u>Indicator/Warning Message Description and Operation</u>
RAINSense WIPERS ACTIVE	Refer to <u>Wiper/Washer System Description and Operation</u>

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REMOTE KEY LEARNING ACTIVE	Refer to <u>Keyless Entry System Description and Operation</u>
REMOTE KEY LEARNING COMPLETE	Refer to <u>Keyless Entry System Description and Operation</u>
REPLACE BATTERY IN REMOTE KEY	Refer to <u>Keyless Entry System Description and Operation</u>
RIGHT REAR DOOR OPEN	Refer to <u>Door Ajar Indicator Description and Operation (w/AN3)</u> or <u>Door Ajar Indicator Description and Operation (w/o AN3)</u>
SERVICE 4 WHEEL DRIVE	Refer to <u>Transfer Case Description and Operation</u> for the MP 1222/1225/1226-NQG transfer case or <u>Transfer Case Description and Operation</u> for the MP 1625/1626-NQF transfer case or <u>Special Tools</u> for the MP 3023/3024-NQH transfer case
SERVICE AIR BAG	Refer to <u>SIR System Description and Operation</u>
SERVICE BATTERY CHARGING SYSTEM	Refer to <u>Charging System Description and Operation</u>
SERVICE BRAKE BOOSTER	Refer to <u>Brake Warning System Description and Operation</u>
SERVICE PARK ASSIST	Refer to <u>Object Detection Description and Operation</u>
SERVICE POWER STEERING	Refer to <u>Power Steering System Description and Operation</u>
SERVICE STABILITRAK	Refer to <u>ABS Description and Operation (With JL4)</u> or <u>ABS Description and Operation (Without JL4)</u>
SERVICE THEFT DETERRENT SYSTEM	Refer to <u>Immobilizer Description and Operation</u>
SERVICE TIRE MONITOR SYSTEM	Refer to <u>Tire Pressure Monitor Description and Operation</u>
	Refer to <u>ABS Description and Operation</u>

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SERVICE TRACTION CONTROL	<u>(With JL4) or ABS Description and Operation (Without JL4)</u>
SERVICE TRAILER BRAKE SYSTEM	Refer to <u>Trailer Brake Controls Description and Operation</u>
SERVICE TRANSMISSION	Refer to <u>Transmission Indicators and Messages (TCM)</u> for the 4L60-E/4L65-E/4L70-E transmission or <u>Transmission Indicators and Messages</u> for the 6L50/6L80/6L90 transmission or <u>Transmission Indicators and Messages</u> for the Allison transmission
SHIFT INHIBITED SELECT N TO RESET	Refer to <u>Transmission Indicators and Messages (TCM)</u> for the 4L60-E/4L65-E/4L70-E transmission or <u>Transmission Indicators and Messages</u> for the 6L50/6L80/6L90 transmission or <u>Transmission Indicators and Messages</u> for the Allison transmission
STABILITRAK OFF	Refer to <u>ABS Description and Operation (With JL4) or ABS Description and Operation (Without JL4)</u>
STARTING DISABLED THEFT PROBLEM	Refer to <u>Content Theft Deterrent (CTD) Description and Operation</u>
STARTING DISABLED SERVICE THROTTLE	Refer to <u>Throttle Actuator Control (TAC) System Description</u>
THEFT ATTEMPTED	Refer to <u>Content Theft Deterrent (CTD) Description and Operation</u>
TIGHTEN GAS CAP	Refer to <u>Indicator/Warning Message Description and Operation</u>
TIRE LEARNING ACTIVE	Refer to <u>Tire Pressure Monitor Description and Operation</u>
TRACTION CONTROL OFF	Refer to <u>ABS Description and Operation (With JL4) or ABS Description and Operation (Without JL4)</u>

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TRAILER CONNECTED	Refer to <u>Trailer Brake Controls Description and Operation</u>
TRAILER NOT CONNECTED	Refer to <u>Trailer Brake Controls Description and Operation</u>
TRANSMISSION HOT IDLE ENGINE	Refer to <u>Transmission Indicators and Messages (TCM)</u> for the 4L60-E/4L65-E/4L70-E transmission or <u>Transmission Indicators and Messages</u> for the 6L50/6L80/6L90 transmission or <u>Transmission Indicators and Messages</u> for the Allison transmission
TURN SIGNAL ON	Refer to <u>Exterior Lighting Systems Description and Operation</u>
VEHICLE OVERSPEED	Refer to <u>Indicator/Warning Message Description and Operation</u>
VEHICLE SPEED LIMITED	Refer to <u>Indicator/Warning Message Description and Operation</u>
WASHER FLUID LOW ADD FLUID	Refer to <u>Wiper/Washer System Description and Operation</u>
WATER IN FUEL SERVICE REQUESTED	Refer to <u>Indicator/Warning Message Description and Operation</u>

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.

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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).

VEHICLE SPEED LIMITED

The instrument panel cluster (IPC) illuminates the VEHICLE SPEED LIMITED message in the driver information center (DIC).

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

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condition. The IPC receives a class 2 message from the ECM requesting illumination.

UPSHIFT INDICATOR

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

WATER IN FUEL SERVICE REQUIRED

The instrument panel cluster (IPC) illuminates the WATER IN FUEL message in the driver information center (DIC) when the engine control module (ECM) detects a low signal from the water in fuel sensor. The IPC receives a serial data 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.

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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:

- The ECM detects a malfunction in the engine coolant temperature sensor circuit.
- The IPC detects a loss of GMLAN communications with the ECM.
- The body control module (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 vehicle odometer is calculated and stored electronically in the instrument panel cluster (IPC). 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

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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.

Battery Gage

The instrument panel cluster (IPC) displays the voltage as determined by the regulated voltage control (RVC). The IPC receives a GMLAN message from the BCM indicating the battery voltage. When the engine is ON, the gage should be between 10-16 volts. The gage will default to 0 volts if the IPC detects a loss of communication with the BCM.