

Displays and Gauges

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Description and Operation

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Audible Warnings Description and Operation

The audible warnings alert the driver of a system concern or a critical vehicle condition. The smart junction block inside the I/P fuse block generates the audible warnings through the speaker. The smart junction block receives audible warning requests via the serial data circuit. If the radio receives multiple audible warning requests, the warning with the highest priority sounds first.

Fasten Safety Belt Warning

The smart junction block activates the fasten safety belt audible warning as requested by the SDM. The SDM sends a serial data message to the smart junction indicating the chime as a multiple gong. The fasten safety belt warning sounds and the fasten safety belt indicator illuminates when the following occurs:

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

Additional Warnings

The following warnings have an associated instrument cluster indicator or driver information center message:

- Turn Signal Indicators—The chime producer activates the audible warning as requested by the BCM. 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 serial data message to the chime producer.

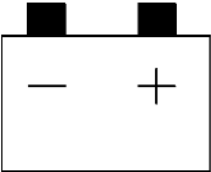
Refer to [Indicator/Warning Message Description and Operation](#).

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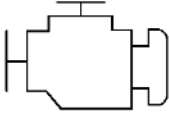
Indicator/Warning Message Description and Operation

Instrument Cluster Indicators

Symbol	Reference
	ABS
Click here for full size	
	Air Bag
Click here for full size	
	Brake
Click here for full size	

Symbol	Reference
 Click here for full size	Parking Brake
 Click here for full size	Charge
 Click here for full size	Engine Oil Pressure Low

Symbol	Reference
 Click here for full size	Fasten Safety Belt
 Click here for full size	Front Fog Lamps
 Click here for full size	High Beam

Symbol	Reference
	Malfunction Indication Lamp
Click here for full size	
	Rear Fog Lamps
Click here for full size	
	Turn Signals
Click here for full size	

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Instrument Cluster Description and Operation

Displays Test

Certain instrument cluster features are tested when the ignition is turned on in order to verify the features are working properly. The following occurs when the ignition is turned on:

- The ABS indicator illuminates briefly.
- The battery indicator illuminates briefly.
- The brake indicator illuminates briefly.
- The door ajar indicator illuminates briefly.
- The fuel level low indicator illuminates briefly.
- The oil pressure low indicator illuminates briefly.

Indicators and Warning Messages

Refer to [Indicator/Warning Message Description and Operation](#).

Trip

The trip odometer can be accessed through the on the top of instrument cluster driver information center switch Up/Down function.

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 instrument cluster.

Fuel Range is calculated using the equation:

Fuel Range = Range

Distance/Range Fuel Used.

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

The engine control module (ECM) sends the fuel range value to the instrument cluster. The instrument cluster receives a serial data message with fuel information.

The fuel range value is retained during ignition OFF. The Fuel Range display cannot be reset. LOW is displayed when fuel range is below a predetermined value.

Average Vehicle Speed

Average speed is calculated using the equation:

Average Speed = Average Speed Distance/Average Speed 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

Fuel Level Gauge

The instrument cluster displays the fuel level based on the information from the ECM. The ECM converts the data from the fuel level sensors to a fuel level signal. The ECM sends the fuel level signal via a Low Speed CAN-Bus signal to the instrument cluster. If the fuel level falls under 11% the instrument cluster switches on the low fuel level indicator. The fuel gauge defaults to empty if:

- The ECM detects a malfunction in the fuel level sensor circuit.
- The instrument cluster detects a loss of serial data communications with the ECM.

Speedometer

The instrument cluster displays the vehicle speed based on the information from the ECM. The ECM sends the vehicle speed information via a Low Speed CAN-Bus signal to the instrument cluster.

The speedometer defaults to 0 km/h (0 MPH) if:

The instrument cluster detects a loss of serial data communications with the ECM.

Tachometer

The instrument cluster displays the engine speed based on the information from the ECM. The ECM converts the data from the engine speed sensor to an engine revolution signal. The ECM sends the engine speed information via a Low Speed CAN-Bus signal to the instrument cluster.

The tachometer defaults to 0 RPM if:

- The ECM detects a malfunction in the engine speed sensor circuit.
- The instrument cluster detects a loss of serial data communications with the ECM.

Note:

Actual RPM from the engine, RPM from the data display of scan tool and RPM from the instrument cluster are not equal. Refer to the follow chart if the RPM information is needed for the diagnosis.

Actual RPM	600	700	800	900	1000	1100	1200	1300	1400
Scan tool RPM	600	600	600	600	800	1000	1000	1200	1200
Cluster RPM Segment(s)	3	3	3	3	4	5	5	6	6

Actual RPM	1500	1600	1700	1800	1900	2000	2100	2200	2300
Scan tool RPM	1400	1600	1600	1800	1800	2000	2000	2200	2200
Cluster RPM Segment(s)	7	8	8	9	9	10	10	11	11

Related Part Information

Part Name	Catalog Name	Part Code
Instrument Cluster	CLUSTER,INST(W/PAD)	0025A
Instrument Cluster	CLUSTER,INST (W/HSG)	0030A
Instrument Cluster	CLUSTER KIT,INST	0049Z
Instrument Cluster	CLUSTER,INST	0050A
Instrument Cluster	CLUSTER,INST	0050B
Instrument Cluster	CLUSTER PKG,INST	0051A
Instrument Cluster	CLUSTER,INST	SJ490
Instrument Cluster	CLUSTER PKG,INST	SJ533

Diagnostic Information and Procedures

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DTC B1512-B1537

Symptoms

Diagnostic Trouble Codes - Diagnostic Trouble Code B1513

Diagnostic Trouble Codes - Diagnostic Trouble Code B1514

Diagnostic Trouble Codes - Diagnostic Trouble Code B1515

Diagnostic Trouble Codes - Diagnostic Trouble Code B1516

Diagnostic Trouble Codes - Diagnostic Trouble Code B1517

Diagnostic Trouble Codes - Diagnostic Trouble Code B1518

Diagnostic Trouble Codes - Diagnostic Trouble Code B1519

Diagnostic Trouble Codes - Diagnostic Trouble Code B1520

Diagnostic Trouble Codes - Diagnostic Trouble Code B1521

Diagnostic Trouble Codes - Diagnostic Trouble Code B1522

Diagnostic Trouble Codes - Diagnostic Trouble Code B1523

Diagnostic Trouble Codes - Diagnostic Trouble Code B1524

Diagnostic Trouble Codes - Diagnostic Trouble Code B1525

Diagnostic Trouble Codes - Diagnostic Trouble Code B1526

Diagnostic Trouble Codes - Diagnostic Trouble Code B1527

Diagnostic Trouble Codes - Diagnostic Trouble Code B1528

Diagnostic Trouble Codes - Diagnostic Trouble Code B1529

Diagnostic Trouble Codes - Diagnostic Trouble Code B1530

Diagnostic Trouble Codes - Diagnostic Trouble Code B1531

Diagnostic Trouble Codes - Diagnostic Trouble Code B1532

Diagnostic Trouble Codes - Diagnostic Trouble Code B1533

Diagnostic Trouble Codes - Diagnostic Trouble Code B1534

Diagnostic Trouble Codes - Diagnostic Trouble Code B1535

Diagnostic Trouble Codes - Diagnostic Trouble Code B1536

Diagnostic Trouble Codes - Diagnostic Trouble Code B1537

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 B1517 03

Battery Voltage below Threshold

DTC B1517 07

Battery Voltage above Threshold

Circuit/System Description

The instrument panel cluster (IPC) has the internal circuit to monitor input voltage to IPC and determines if this voltage is within normal range. Abnormal voltage can cause the component damage or data error. The IPC monitors the voltage of system continuously and will set DTC B1517 if detecting the voltage is out of normal range.

Conditions for Setting the DTC

- Input voltage to IPC is lower than 8V for 8seconds.
- Input voltage to IPC is higher than 18V for 8seconds.

Action Taken When the DTC Sets

- The DTC becomes history when the conditions for setting the DTC are no longer present.
- The history DTC clears after 50 malfunction-free warm-up cycles.

Reference Information

Schematic Reference

[Instrument Cluster Schematics](#).

Connector End View Reference

[Master Electrical Component List](#)

Description and Operation

[Instrument Cluster Description and Operation](#)

Electrical Information Reference

- [Circuit Testing](#)
- [Testing for Intermittent Conditions and Poor Connections](#)
- [Wiring Repairs](#)
- [Connector Repairs](#)

Circuit/System Verification

1. Idle the engine, and test for B+ between the battery positive and negative terminals.
2.
 - If not within the specified range, test the battery charging system. Refer to [Charging System Test](#).
3. Ignition OFF, disconnect the harness connector at the cluster.
4. Ignition ON, test for 8-18V between the B+ and ignition circuit terminal and ground.

Circuit/System Testing

Note:

Circuit/System Verification must be performed before proceeding with Circuit/System Testing.

1. Ignition OFF, disconnect the X1, X2 harness connectors at the cluster.
2. Test for less than 5V between the follow ground circuit terminals and ground.

3.

- The terminal X1â€“5
- The terminal X1â€“16
- The terminal X2â€“6

4.

- If greater than the specified range, test for ground circuit for an open/high resistance.

5. Ignition ON, connect the test lamp between the follow ignition circuit terminals and ground.

6.

- The terminal X1â€“1
- The terminal X1â€“17
- The terminal X1â€“18

7.

- If the test lamp does not illuminate, test the circuit for an open/high resistance or short to ground

8. If all circuits test normal, replace the instrument cluster.

Repair Instructions

Perform the [Diagnostic Repair Verification](#) after completing the diagnostic procedure.

- [Instrument Cluster Replacement](#)
- [Control Module References](#) for module setup and programming

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DTC P0461-P0463 (with LCP)

Symptoms

Diagnostic Trouble Codes - 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 Descriptors

DTC P0462

Fuel Level Sensor Circuit Low Voltage

DTC P0463

Fuel Level Sensor Circuit High Voltage

Diagnostic Fault Information

Circuit	Short to Ground	High Resistance	Open	Short to Voltage	Signal Performance
Fuel Level Sensor Signal	P0462	1	P0463	P0463	â€”
Low Reference	â€”	1	P0463	P0463	â€”
1. Fuel gauge 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 information to the instrument panel cluster (IPC) in order to display the fuel level.

Conditions for Running the DTC

- The ignition is ON.
- The DTC runs continuously when the above conditions are met.

Conditions for Setting the DTC

P0462

The ECM detects that the fuel level sensor signal voltage is less than 0.21 V.

P0463

The ECM detects that the fuel level sensor signal voltage is greater than 4.96 V.

Action Taken When the DTC Sets

DTC P0462 and P0463 are Type E DTCs.

Conditions for Clearing the DTC

DTC P0462 and P0463 are Type E DTCs.

Reference Information

Schematic Reference

[Instrument Cluster Schematics](#)

Connector End View Reference

[Master Electrical Component List](#)

Description and Operation

[Instrument Cluster Description and Operation](#)

Electrical Information Reference

- [Circuit Testing](#)
- [Testing for Intermittent Conditions and Poor Connections](#)
- [Wiring Repairs](#)
- [Connector Repairs](#)

DTC Type Reference

[Powertrain Diagnostic Trouble Code \(DTC\) Type Definitions](#)

Scan Tool Reference

[Control Module References](#) for scan tool information

Circuit/System Verification

Ignition ON, verify that the scan tool ECM Fuel Level Sensor parameter is between 0.5V and 2.5V and varies with fuel level.

Circuit/System Testing

Note:

Circuit/System Verification must be performed before proceeding with Circuit/System Testing.

1. Ignition OFF, disconnect the harness connector at the B46 Fuel Level Sensor.
2. Ignition OFF, test for less than 1 Ω between the low reference circuit terminal 2 and ground.
3.
 - If greater than the specified range, test the low reference circuit for an open/high resistance. If the circuit tests normal, replace the K20 ECM.
4. Ignition ON, verify the scan tool Fuel Level Sensor parameter is greater than 0.2V.
5.
 - If less than the specified range, test the signal circuit terminal 1 for a short to ground. If the circuit tests normal, replace the K20 ECM.
6. Install a 3A fused jumper wire between the signal circuit terminal 1 and the low reference circuit terminal 2. Verify the scan tool Fuel Level Sensor parameter is less than 4.85V.
7.
 - If greater 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 K20 ECM.
8. If all circuits test normal, test or replace the B46 Fuel Level Sensor.

Component Testing

1. Ignition OFF, remove the G12 fuel pump and verify there are no obstructions interfering with the fuel level sender.
2.
 - If any interference is present, repair the fuel sender interference.
3. Ignition OFF, disconnect the harness connector at the B46 Fuel Level Sensor.
4. Sweep the sensor through the entire range while testing for 30â€“270â„¸ between the signal terminal 4 and the low reference circuit terminal 3.
5.
 - If not within the specified range or is erratic, replace the B46 Fuel Level Sensor.

Repair Instructions

Perform the [Diagnostic Repair Verification](#) after completing the diagnostic procedure.

- [Fuel Tank Fuel Pump Module Replacement](#) for 1.0L diesel engine
- [Fuel Tank Fuel Pump Module Replacement](#) for 1.0L, 1.19L, or 1.2L gasoline engines
- [Control Module References](#) for engine control module replacement, setup, and programming

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DTC P0461-P0463 (without LCP)

Symptoms

Diagnostic Trouble Codes - 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 Descriptors

DTC P0461

Fuel Level Sensor Circuit Performance

DTC P0462

Fuel Level Sensor Circuit Low Voltage

DTC P0463

Fuel Level Sensor Circuit High Voltage

Diagnostic Fault Information

Circuit	Short to Ground	High Resistance	Open	Short to Voltage	Signal Performance
Fuel Level Sensor Signal	P0462	1	P0463	P0463	P0461
Low Reference	â€”	1	P0463	P0463	P0461
1. Fuel gauge 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 information to the instrument panel cluster (IPC) in order to display the fuel level.

Conditions for Running the DTC

P0462 or P0463 (Without FX3)

- The ignition is ON.
- The DTC runs continuously when the above conditions are met.

P0461, P0462, or P0463 (FX3)

- DTC P0462, P0463, P0502, P0562, or P0563 is not set.
- The engine is running.
- The ignition voltage is greater than 11V.
- The DTC runs continuously when the above conditions are met.

Conditions for Setting the DTC

P0461 (FX3)

The ECM detects that the change in fuel level sensor signal is less than 0.015%.

P0462 (Without FX3)

The ECM detects that the fuel level sensor signal voltage is less than 0.2004V.

P0462 (FX3)

The ECM detects that the fuel level sensor output is less than 0.05%.

P0463 (Without FX3)

The ECM detects that the fuel level sensor signal voltage is greater than 4.8485V.

P0463 (FX3)

The ECM detects that the in fuel level sensor output is greater than 0.85%.

Action Taken When the DTC Sets

DTC P0462 and P0463 are Type E DTCs.

Conditions for Clearing the DTC

DTC P0462 and P0463 are Type E DTCs.

Reference Information

Schematic Reference

[Instrument Cluster Schematics](#)

Connector End View Reference

[Master Electrical Component List](#)

Description and Operation

[Instrument Cluster Description and Operation](#)

Electrical Information Reference

- [Circuit Testing](#)
- [Testing for Intermittent Conditions and Poor Connections](#)
- [Wiring Repairs](#)
- [Connector Repairs](#)

DTC Type Reference

[Powertrain Diagnostic Trouble Code \(DTC\) Type Definitions](#)

Scan Tool Reference

[Control Module References](#) for scan tool information

Circuit/System Verification

Ignition ON, verify that the scan tool ECM "Fuel Level Sensor" parameter is between 0.5–2.5V and varies with fuel level.

Circuit/System Testing

Note:

Circuit/System Verification must be performed before proceeding with Circuit/System Testing.

1. Ignition OFF, disconnect the harness connector at the B46 Fuel Level Sensor.
2. Ignition OFF, test for less than 1 Ω between the low reference circuit terminal 3 and ground.
3.
 - If greater than the specified range, test the low reference circuit for an open/high resistance. If the circuit tests normal, replace the K20 ECM.
4. Ignition ON, verify the scan tool Fuel Level Sensor parameter is greater than 0.2V.
5.
 - If less than the specified range, test the signal circuit terminal 4 for a short to ground. If the circuit tests normal, replace the K20 ECM.
6. Install a 3A fused jumper wire between the signal circuit terminal 4 and the low reference circuit terminal 3. Verify the scan tool Fuel Level Sensor parameter is less than 4.85V.
7.
 - If greater 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 K20 ECM.
8. If all circuits test normal, test or replace the B46 fuel level sensor.

Component Testing

1. Ignition OFF, remove the G12 fuel pump and verify there are no obstructions interfering with the fuel level sender.
2.
 - If any interference is present, repair the fuel sender interference.
3. Ignition OFF, disconnect the harness connector at the B46 Fuel Level Sensor.
4. Sweep the sensor through the entire range while testing for 30 Ω –270 Ω between the signal terminal 4 and the low reference circuit terminal 3.
5.
 - If not within the specified range or is erratic, replace the B46 fuel level sensor.

Repair Instructions

Perform the [Diagnostic Repair Verification](#) after completing the diagnostic procedure.

- [Fuel Tank Fuel Pump Module Replacement](#) for 1.0L diesel engine
- [Fuel Tank Fuel Pump Module Replacement](#) for 1.0L, 1.19L, or 1.2L gasoline engines
- [Control Module References](#) for engine control module replacement, setup, and programming

Related Part Information

Part Name	Catalog Name	Part Code
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DTC P0656

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 P0656

Fuel Level Output Circuit

Circuit/System Description

The engine control module (ECM) creates the fuel gauge output signal by pulsing the circuit to ground. The ECM monitors the voltage on the fuel gauge output circuit. If the ECM determines that the voltage is out of the normal operating range, a DTC sets.

Conditions for Running the DTC

- The ignition is ON.
- The DTC runs continuously when the above conditions are met.

Conditions for Setting the DTC

The ECM detects a short to voltage, a short to ground, or an open/high resistance on the fuel level output circuit.

Action Taken When the DTC Sets

DTC P0656 is a Type C DTC.

Conditions for Clearing the DTC

DTC P0656 is a Type C DTC.

Reference Information

Schematic Reference

[Instrument Cluster Schematics](#)

Connector End View Reference

[Master Electrical Component List](#)

Electrical Information Reference

- [Circuit Testing](#)
- [Testing for Intermittent Conditions and Poor Connections](#)
- [Wiring Repairs](#)
- [Connector Repairs](#)

DTC Type Reference

[Powertrain Diagnostic Trouble Code \(DTC\) Type Definitions](#)

Circuit/System Verification

1. Ignition ON, verify that DTCs related to the P16 Instrument Panel Cluster (IPC) are not set.
2.
 - If any of the DTCs are set, refer to [Diagnostic Trouble Code \(DTC\) List - Vehicle](#).
3. Operate the vehicle within the Conditions for Running the DTC to verify the DTC does not reset. You may also operate the vehicle within the conditions that you observed from the Freeze Frame/Failure Records data.

Circuit/System Testing

1. Ignition OFF, disconnect the harness connector at the K20 ECM.
2. Ignition ON, test for 4.8–5.2 V between the fuel level output circuit terminal 40 and ground.
3.
 - If less than the specified range, test the fuel level output circuit for a short to ground or open/high resistance. If the circuit tests normal, replace the P16 IPC.
 - If greater than the specified range, test the fuel level output circuit for a short to voltage. If the circuit tests normal, replace the P16 IPC.
4. If all circuits test normal, replace the K20 ECM.

Repair Instructions

Perform the [Diagnostic Repair Verification](#) after completing the diagnostic procedure.

- [Instrument Cluster Replacement](#)
- [Control Module References](#) for engine control module replacement, setup, and programming

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DTC P0656 (LKY)

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 P0656

Fuel Level Output Circuit

Circuit/System Description

The engine control module (ECM) creates the fuel gauge output signal by pulsing the circuit to ground. The ECM monitors the voltage on the fuel gauge output circuit. If the ECM determines that the voltage is out of the normal operating range, a DTC sets.

Conditions for Running the DTC

- The ignition is ON.
- The battery voltage is between 10 and 16 V.
- The DTC runs continuously when the above conditions are met.

Conditions for Setting the DTC

The ECM detects a short to voltage, a short to ground, or an open/high resistance on the fuel level output circuit.

Action Taken When the DTC Sets

DTC P0656 is a Type C DTC.

Conditions for Clearing the DTC

DTC P0656 is a Type C DTC.

Reference Information

Schematic Reference

[Instrument Cluster Schematics](#)

Connector End View Reference

[Master Electrical Component List](#)

Electrical Information Reference

- [Circuit Testing](#)
- [Testing for Intermittent Conditions and Poor Connections](#)
- [Wiring Repairs](#)
- [Connector Repairs](#)

DTC Type Reference

Circuit/System Verification

1. Ignition ON, verify that DTCs related to the P16 Instrument Panel Cluster (IPC) are not set.
2.
 - If any of the DTCs are set, refer to [Diagnostic Trouble Code \(DTC\) List - Vehicle](#).
3. Operate the vehicle within the Conditions for Running the DTC to verify the DTC does not reset. You may also operate the vehicle within the conditions that you observed from the Freeze Frame/Failure Records data.

Circuit/System Testing

1. Ignition OFF, disconnect the harness connector at the K20 ECM.
2. Ignition ON, test for 4.8–5.2 V between the fuel level output circuit terminal 45X1 and ground.
3.
 - If less than the specified range, test the fuel level output circuit for a short to ground or open/high resistance. If the circuit tests normal, replace the P16 IPC.
 - If greater than the specified range, test the fuel level output circuit for a short to voltage. If the circuit tests normal, replace the P16 IPC.
4. If all circuits test normal, replace the K20 ECM.

Repair Instructions

Perform the [Diagnostic Repair Verification](#) after completing the diagnostic procedure.

- [Instrument Cluster Replacement](#)
- [Control Module References](#) for engine control module replacement, setup, and programming

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Symptoms - Displays and Gauges

Note:

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

1. Before using the symptom diagnostic tables, perform the [Diagnostic System Check - Vehicle](#).
2. Review the system operation in order to understand the system functions. Refer to the following description and operations:
3.
 - [Instrument Cluster Description and Operation](#)
 - [Indicator/Warning Message Description and Operation](#)
 - [Audible Warnings Description and Operation](#)

Visual/Physical Inspection

- Inspect for aftermarket devices which can affect the operation of the instrument panel cluster or the audible warning systems. Refer to [Checking Aftermarket Accessories](#).
- Inspect the accessible system components or the visible system components for obvious damage or for obvious conditions which can cause the symptom.
- Inspect for the proper fluid levels.

Intermittent

Faulty electrical connections or wiring may be the cause of intermittent conditions. Refer to [Testing for Intermittent Conditions and Poor Connections](#).

Symptom List

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

Gauges and Odometer

- [Instrument Cluster Gauges Inoperative](#)
- [Fuel Gauge Inaccurate or Inoperative](#)
- [Odometer Trip/Reset Switch Inoperative](#)
- [Charge Indicator Malfunction](#)

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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 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 cluster.

Reference Information

Schematic Reference

[Instrument Cluster Schematics](#)

Connector End View Reference

[Master Electrical Component List](#)

Description and Operation

[Indicator/Warning Message Description and Operation](#)

Electrical Information Reference

- [Circuit Testing](#)
- [Testing for Intermittent Conditions and Poor Connections](#)
- [Wiring Repairs](#)
- [Connector Repairs](#)

Scan Tool Reference

[Inflatable Restraint Sensing and Diagnostic Module Scan Tool Information](#)

Circuit/System Verification

1. Ignition ON, engine running, verify the scan tool Battery Voltage parameter is between 12.5â€“15.5â€“V.
2.
 - If not within the specified range, refer to [Charging System Test](#)
3. Command the All Indicators test ON and OFF with the scan tool, verify that the charge indicator turns ON and OFF.
4.
 - If the charge indicator always stays on or always off, replace the P16â€“Instrument Cluster.

Repair Instructions

Perform the [Diagnostic Repair Verification](#) after completing the diagnostic procedure.

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1. DRIVER INFORMATION AND ENTERTAINMENT
2. DISPLAYS AND GAUGES
3. DIAGNOSTIC INFORMATION AND PROCEDURES
- 4.

Fuel Gauge 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 cluster displays the fuel level based on the information from the engine control module (ECM). The ECM converts the data from the fuel level sensors to a fuel level signal. The ECM sends the fuel level signal via a serial data circuit to the cluster. If the fuel level falls below 11 percent the instrument cluster switches the low fuel level indicator on.

Reference Information

Schematic Reference

[Instrument Cluster Schematics](#)

Connector End View Reference

[Master Electrical Component List](#)

Description and Operation

[Instrument Cluster Description and Operation](#)

Electrical Information Reference

- [Circuit Testing](#)
- [Testing for Intermittent Conditions and Poor Connections](#)
- [Wiring Repairs](#)
- [Connector Repairs](#)

Scan Tool Reference

[Inflatable Restraint Sensing and Diagnostic Module Scan Tool Information](#)

Circuit/System Verification

1. Ignition ON, perform the Instrument Cluster Gauge Sweep test with the scan tool, verify that the fuel level gauge sweeps from its low to high position.
2.
 - If the fuel level gauge does not sweep, replace the Instrument Cluster.
3. Command the All Indicators test ON and OFF with the scan tool, verify that the low fuel level indicator turns ON and OFF.
4.
 - If the low fuel level indicator always stays on or always off, replace the Instrument Cluster.
5. If the fuel level gauge does sweep and the low fuel level indicator changes between ON and OFF, replace the Engine Control Module (ECM).

Repair Instructions

Perform the [Diagnostic Repair Verification](#) after completing the diagnostic procedure.

[Control Module References](#)

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3. DIAGNOSTIC INFORMATION AND PROCEDURES
- 4.

Instrument Cluster Gauges 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 cluster displays the engine coolant temperature, vehicle speed and the engine speed based on the information from the engine control module (ECM). The ECM sends appropriate information via a serial data circuit to the cluster. The cluster displays the engine coolant temperature, the engine speed, the vehicle speed and the distance travelled, either in kilometers or miles, based on the vehicle requirements.

Reference Information

Schematic Reference

[Instrument Cluster Schematics](#)

Connector End View Reference

[Master Electrical Component List](#)

Description and Operation

[Instrument Cluster Description and Operation](#)

Electrical Information Reference

- [Circuit Testing](#)
- [Testing for Intermittent Conditions and Poor Connections](#)
- [Wiring Repairs](#)
- [Connector Repairs](#)

Scan Tool Reference

[Inflatable Restraint Sensing and Diagnostic Module Scan Tool Information](#)

Circuit/System Verification

1. Ignition ON, perform the Instrument Cluster Gauge Sweep test for speedometer, tachometer, fuel gauge with the scan tool, verify that all gauges sweep from their low to high position.
2.
 - If any gauge does not sweep, replace the Instrument Cluster.
3. Drive the vehicle, verify the odometer and the trip odometer display, the displayed distance counts up while driving.
4.
 - If any odometer display does not count up, replace the Instrument Cluster.
5. If all gauges do sweep and the odometer displays counts up, replace the Engine Control Module.

Repair Instructions

Perform the [Diagnostic Repair Verification](#) after completing the diagnostic procedure.

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1. DRIVER INFORMATION AND ENTERTAINMENT
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Odometer Trip/Reset Switch 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 cluster displays the travelled distance based on the information from the engine control module (ECM). The ECM converts the data from the vehicle speed sensor to a distance signal. The ECM sends the distance information via a serial data circuit to the cluster. The cluster displays the vehicle odometer and trip odometer. The instrument cluster detects the activation of the trip reset switch and a press and hold of the trip reset switch resets the trip odometer information to zero.

Reference Information

Schematic Reference

[Instrument Cluster Schematics](#)

Connector End View Reference

[Master Electrical Component List](#)

Description and Operation

[Instrument Cluster Description and Operation](#)

Electrical Information Reference

- [Circuit Testing](#)
- [Testing for Intermittent Conditions and Poor Connections](#)
- [Wiring Repairs](#)
- [Connector Repairs](#)

Scan Tool Reference

[Inflatable Restraint Sensing and Diagnostic Module Scan Tool Information](#)

Circuit/System Verification

Ignition ON, verify the odometer trip reset switch resets the trip odometer display when the switch is pressed.

- If the odometer trip reset switch does not reset the trip odometer, replace the Instrument Cluster.

Repair Instructions

Perform the [Diagnostic Repair Verification](#) after completing the diagnostic procedure.

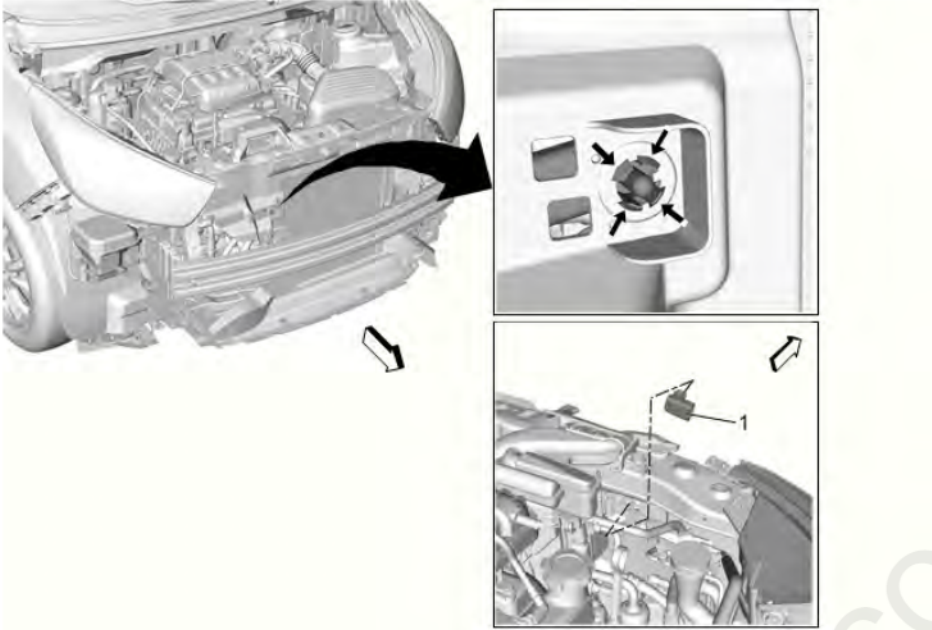
[Control Module References](#)

Repair Instructions

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- 1. DRIVER INFORMATION AND ENTERTAINMENT
- 2. DISPLAYS AND GAUGES
- 3. REPAIR INSTRUCTIONS
- 4.

Ambient Air Temperature Gauge Sensor Replacement



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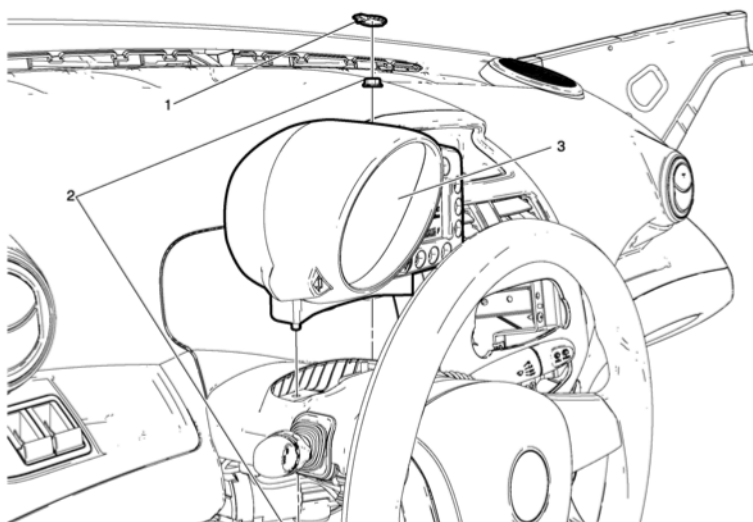
Callout	Component Name
Preliminary Procedure	
Front Bumper Fascia Replacement	
1>	Ambient Air Temperature Sensor
	Procedure
	1. Disconnect the electrical connectors. 2. Unlock the retaining tabs.

Related Part Information

Part Name	Catalog Name	Part Code
Ambient Air Temperature Gauge Sensor	SENSOR,AMB AIR TEMP GA	7850A
Ambient Air Temperature Gauge Sensor	SENSOR,AMB AIR TEMP GA	7850B
Ambient Air Temperature Gauge Sensor	SENSOR,AMB AIR TEMP GA (W/ BRKT)	7850C

1. DRIVER INFORMATION AND ENTERTAINMENT
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Instrument Cluster Replacement





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Callout	Component Name
Preliminary Procedures	
1. If the vehicle is not equipped with the body control module, perform an SPS programming for the odometer setup before the old cluster removal.	
2. Remove steering column lower trim cover. Steering Column Lower Trim Cover Replacement .	
1	Instrument Cluster Nut Cover
2	Instrument Cluster Screw (Qty:â€%2)
	Caution:
	Refer to Fastener Caution .
	Tighten
10â€%N-m (89â€%lbâ€%in)	

Callout	Component Name
3	Instrument Cluster Assembly Procedure 1. Remove the cluster rear cover. 2. Disconnect electrical components. 3. After repairs, refer to Control Module References.

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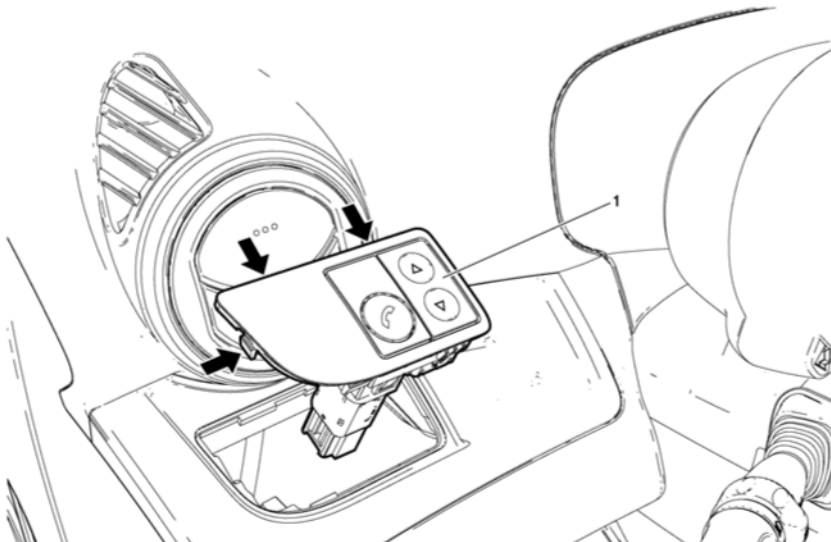
1. DRIVER INFORMATION AND ENTERTAINMENT

2. DISPLAYS AND GAUGES

3. REPAIR INSTRUCTIONS

4.

Instrument Panel Multifunction Switch Replacement





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Callout	Component Name
1	Instrument Panel Multifunction Switch Assembly Procedure 1. Disconnect the tabs (the arrows in the illustration) carefully to prevent the damage for the switch and molding. 2. Disconnect the electrical connector.

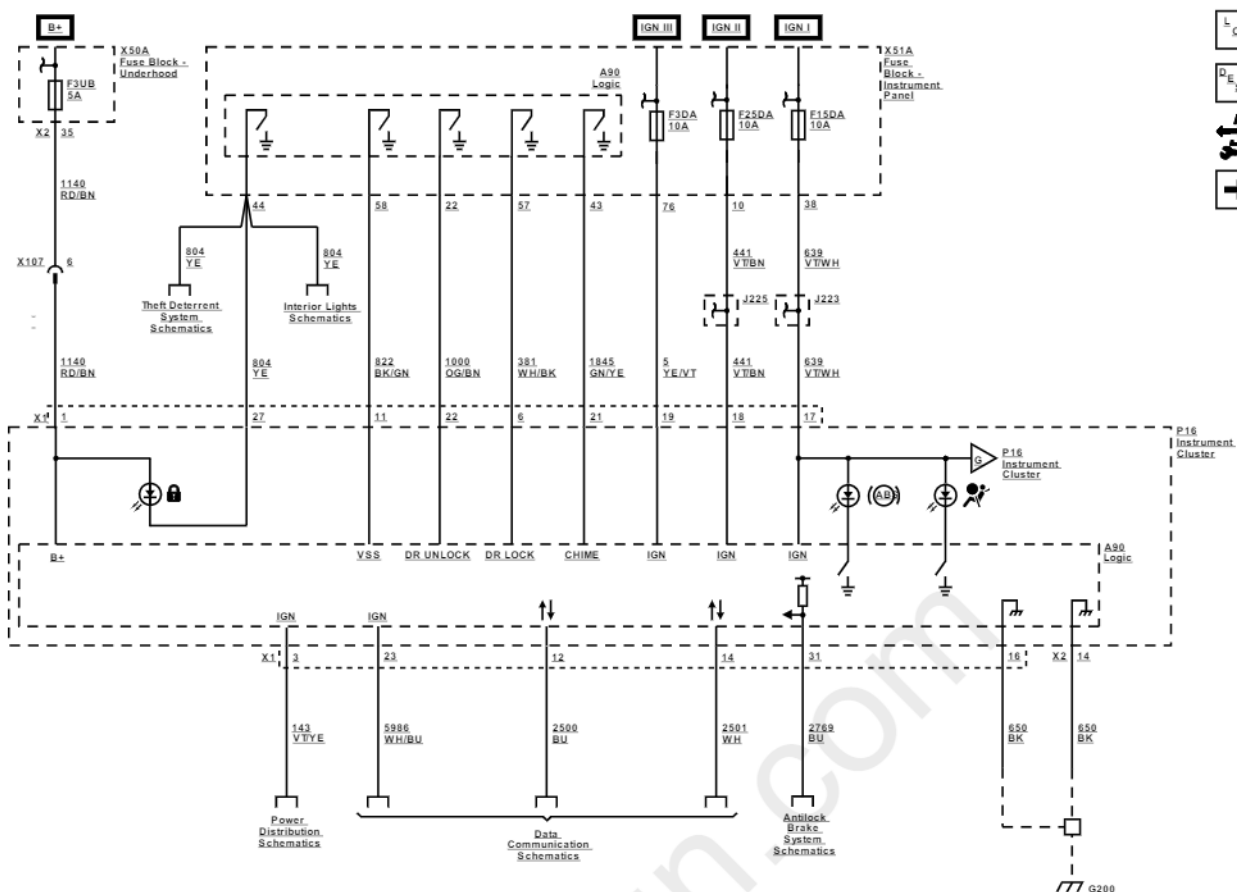
Schematic and Routing Diagrams

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Instrument Cluster Schematics

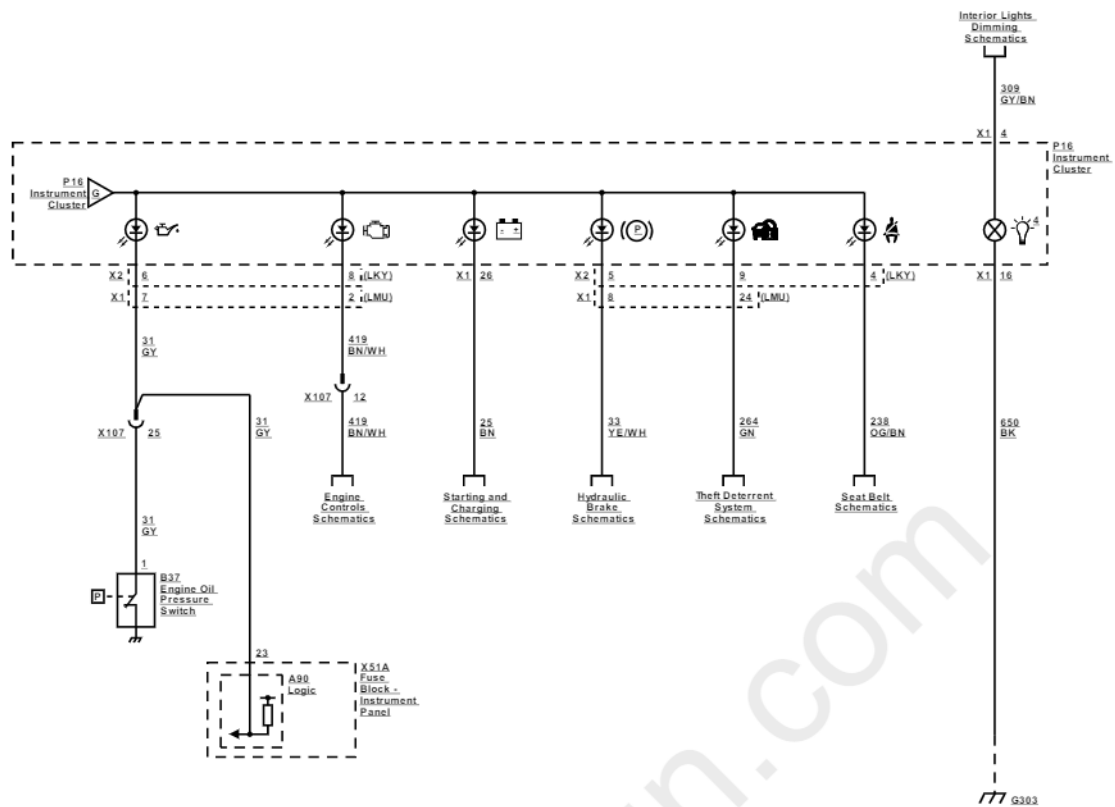
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Module Power, Ground, Data Communication, and MIL



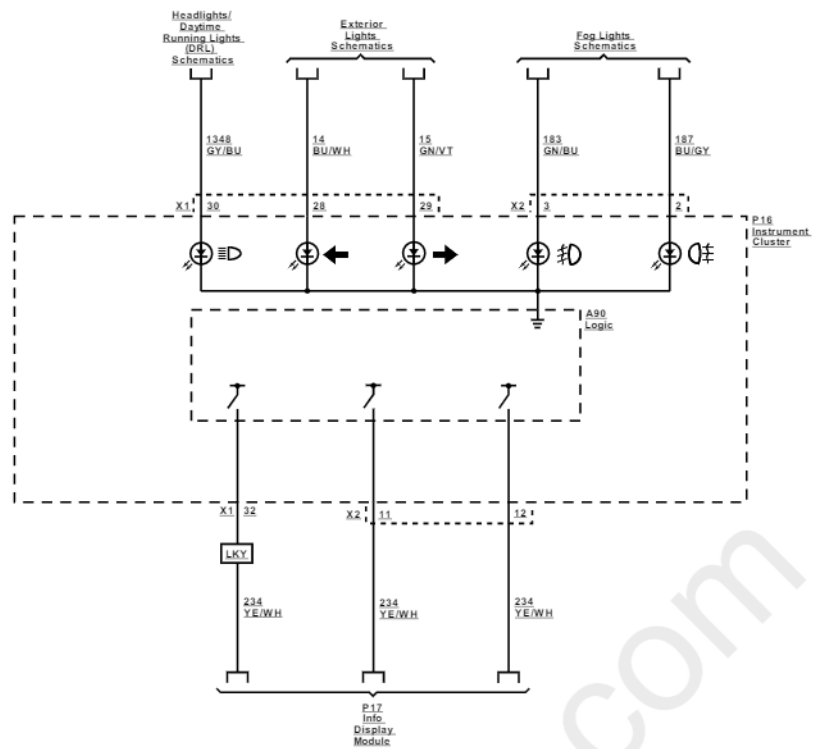
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Indicators (1 of 2)



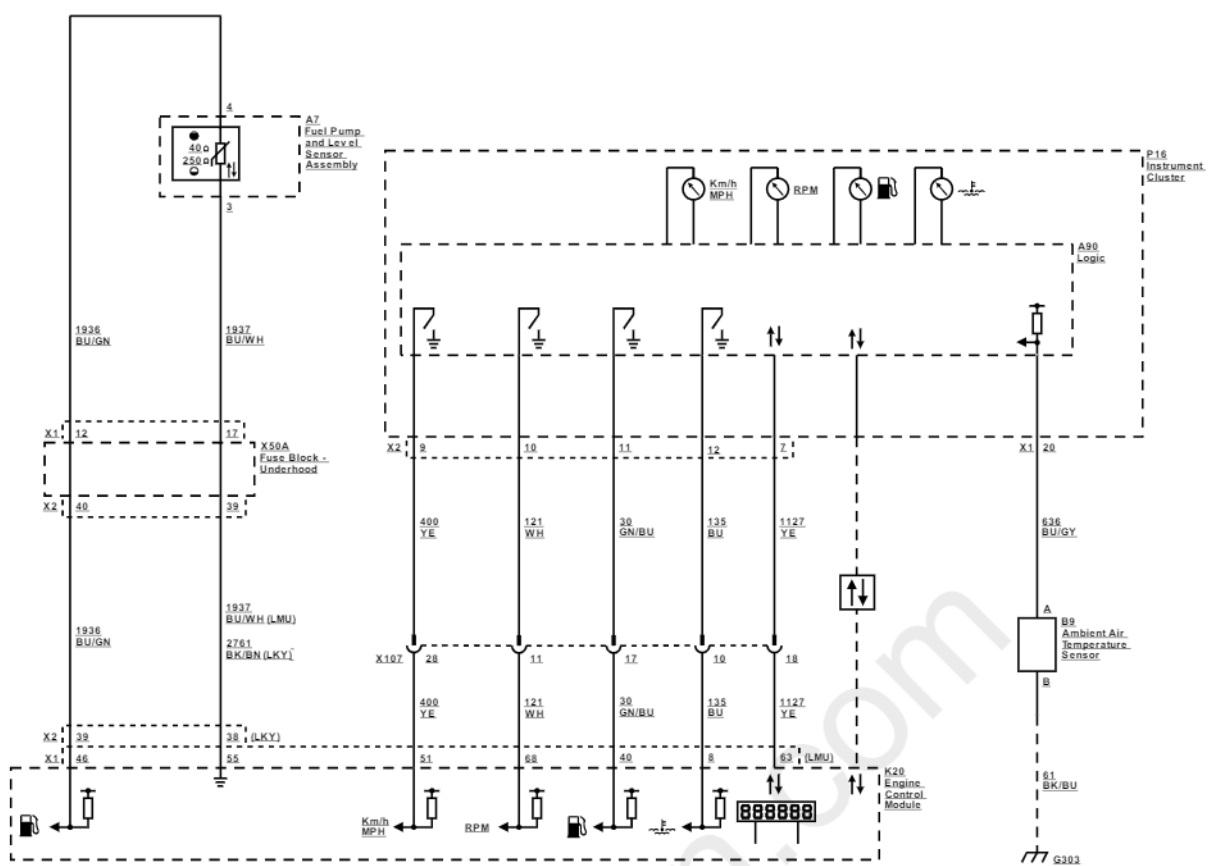
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Indicators (2 of 2)



[Click here for full size](#)

Air Temperature and Gauges

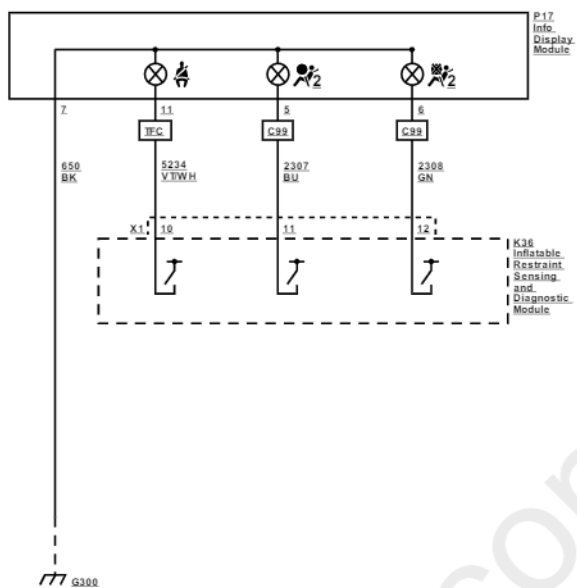


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Driver Information System Schematics

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Info Display

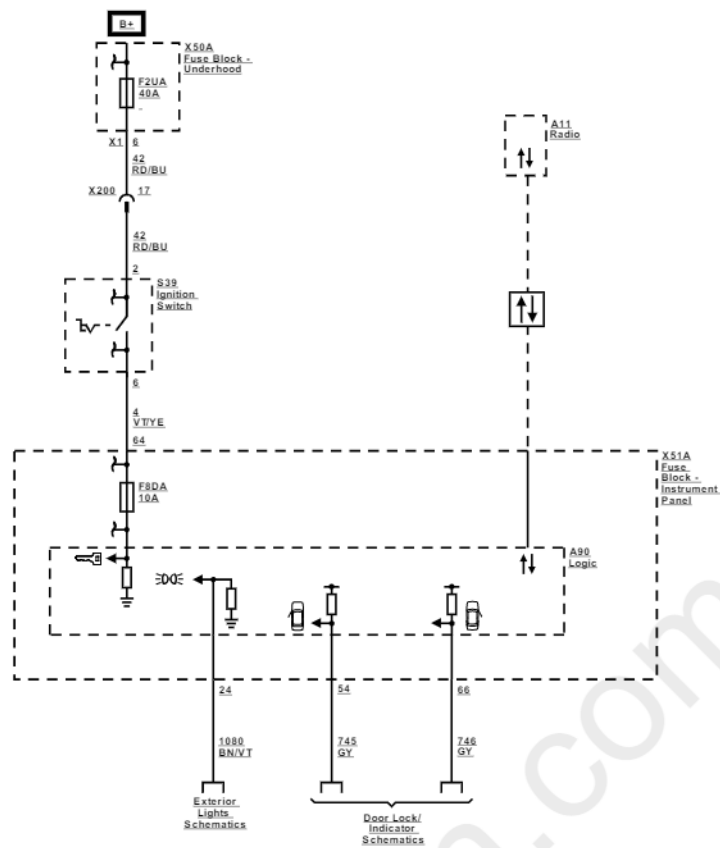


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Audible Warnings Schematics

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Audible Warnings



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