

2013 ACCESSORIES & EQUIPMENT

Lighting - Malibu

SPECIFICATIONS

FASTENER TIGHTENING SPECIFICATIONS

Fastener Tightening Specifications

Application	Specification	
	Metric	English
Front Fog Lamp Bolt	3 N.m	26 lb in
Headlamp Bolt	2.5 N.m	22 lb in
Headlamp Bracket Screw	2.5 N.m	22 lb in
Headlamp Leveling Front Suspension Height Sensor Bolt	9 N.m	80 lb in
Headlamp Leveling Rear Suspension Height Sensor Bolt	9 N.m	80 lb in
High Mount Stop Lamp Nut	2.5 N.m	22 lb in
Tail Lamp Inboard Nut	3 N.m	17 lb in

SCHEMATIC WIRING DIAGRAMS

HEADLIGHTS/DAYTIME RUNNING LIGHTS (DRL) WIRING SCHEMATICS

Controls and Indicators Wiring Schematics

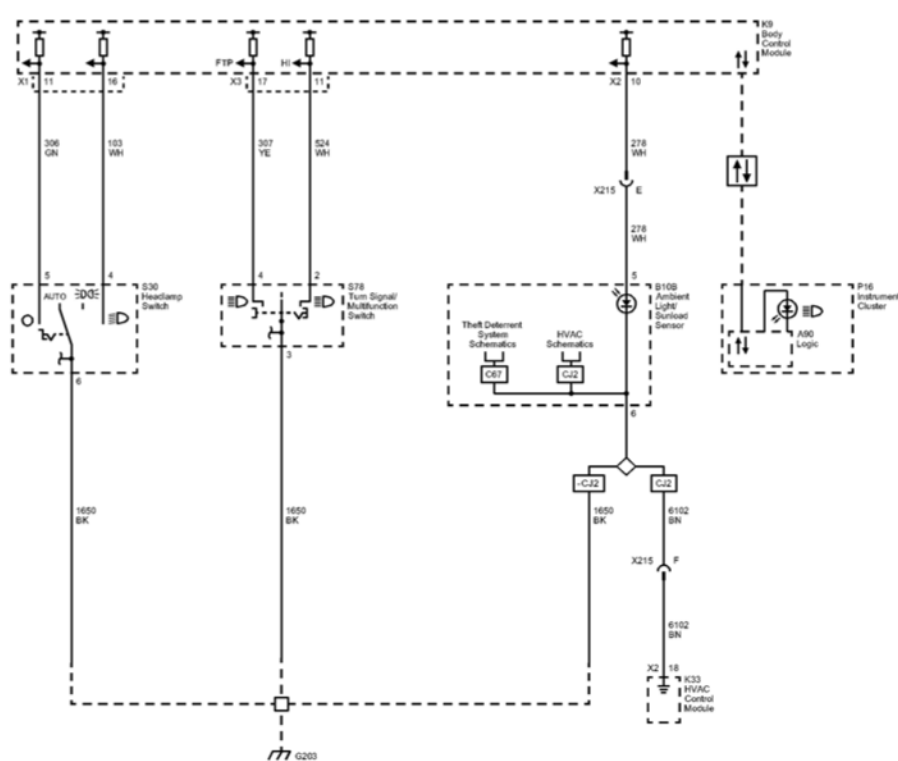


Fig. 1: Controls and Indicators Wiring Schematics
 Courtesy of GENERAL MOTORS COMPANY

Halogen (T4A) Wiring Schematics

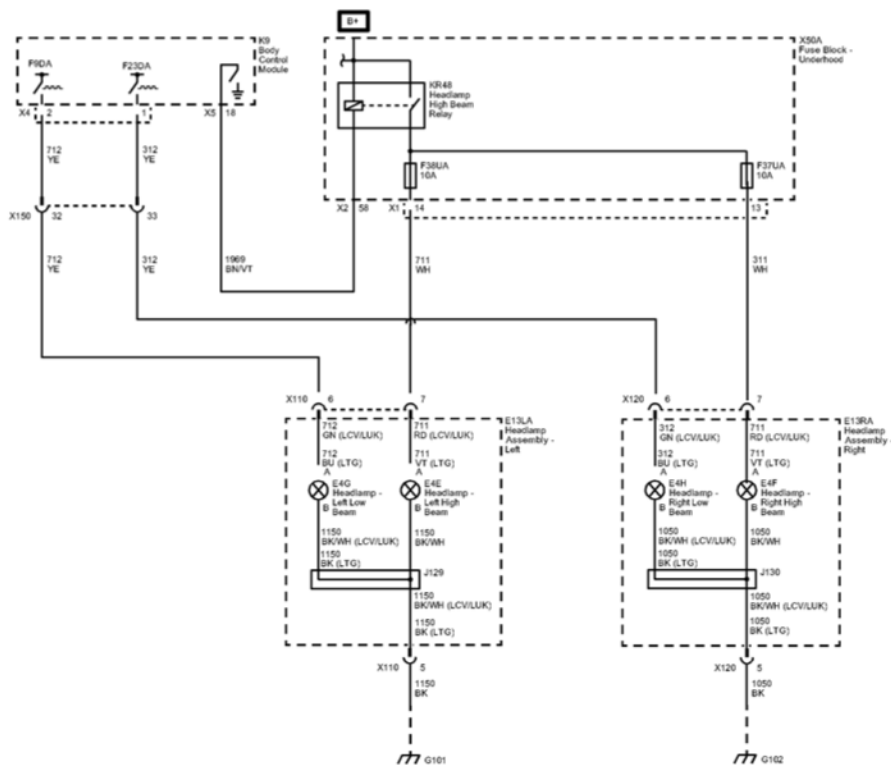


Fig. 2: Halogen (T4A) Wiring Schematics
 Courtesy of GENERAL MOTORS COMPANY

High Intensity Discharge (T4F) Wiring Schematics

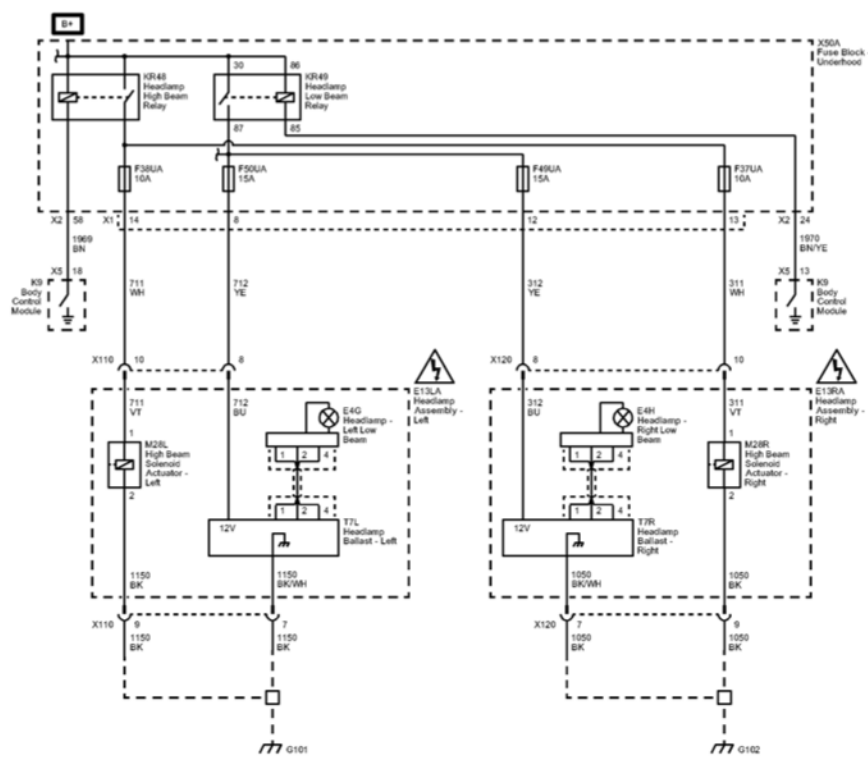


Fig. 3: High Intensity Discharge (T4F) Wiring Schematics
 Courtesy of GENERAL MOTORS COMPANY

High Intensity Discharge (T4F) DRL Wiring Schematics

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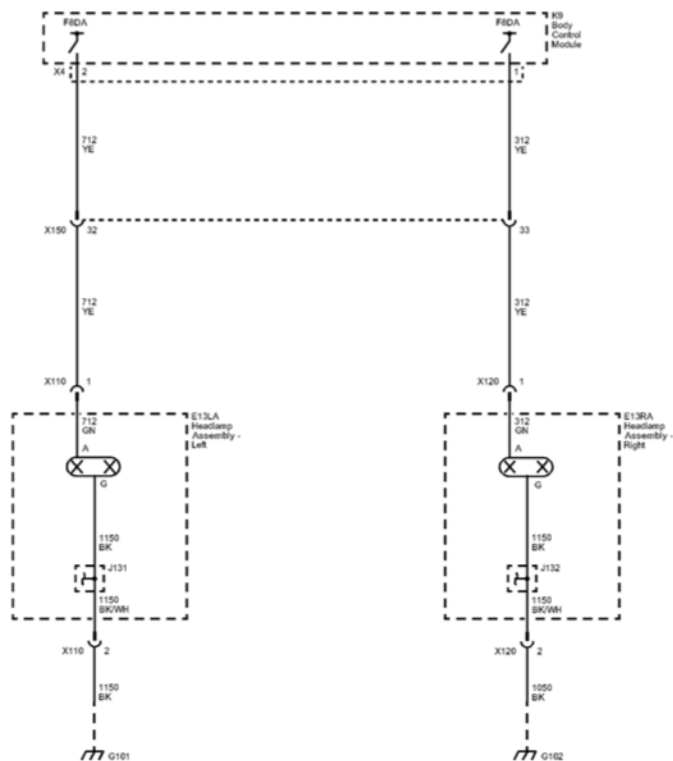


Fig. 4: High Intensity Discharge (T4F) DRL Wiring Schematics
 Courtesy of GENERAL MOTORS COMPANY

FOG LIGHTS WIRING SCHEMATICS

T3U Wiring Schematics

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Fig. 5: Fog Lights (T3U) Wiring Schematics
Courtesy of GENERAL MOTORS COMPANY

EXTERIOR LIGHTS WIRING SCHEMATICS

Controls and Indicators Wiring Schematics

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Fig. 8: Right Park Lamps Wiring Schematics
Courtesy of GENERAL MOTORS COMPANY

Left Turn Signal Lamps Wiring Schematics

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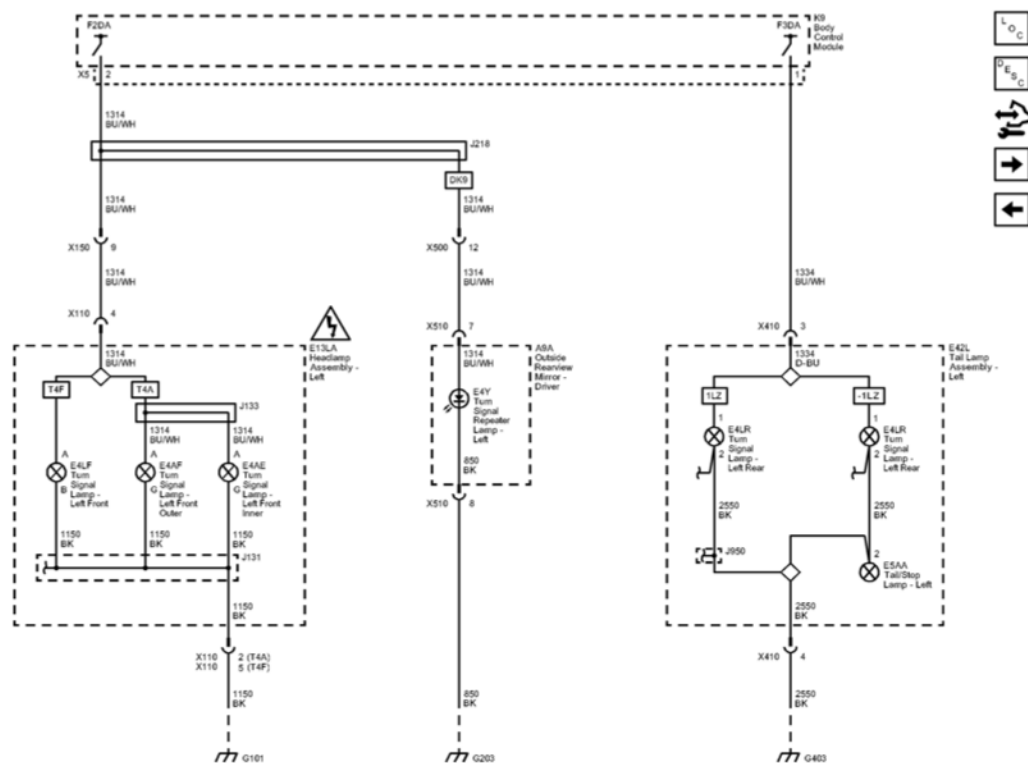


Fig. 9: Left Turn Signal Lamps Wiring Schematics
 Courtesy of GENERAL MOTORS COMPANY

Right Turn Signal Lamps Wiring Schematics

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Fig. 10: Right Turn Signal Lamps Wiring Schematics
Courtesy of GENERAL MOTORS COMPANY

Stop Lamps Wiring Schematics

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Fig. 11: Stop Lamps Wiring Schematics
Courtesy of GENERAL MOTORS COMPANY

Backup and License Lamps Wiring Schematics

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Fig. 12: Backup and License Lamps Wiring Schematics
Courtesy of GENERAL MOTORS COMPANY

INTERIOR LIGHTS WIRING SCHEMATICS

Controls and Rear Compartment Courtesy Lamp Wiring Schematics

Fig. 13: Controls and Rear Compartment Courtesy Lamp Wiring Schematics
Courtesy of GENERAL MOTORS COMPANY

Instrument Panel Compartment and Overhead Lamps

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Fig. 14: Instrument Panel Compartment and Overhead Lamps
Courtesy of GENERAL MOTORS COMPANY

Accent and Flood Lamps - Doors Wiring Schematics

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Fig. 15: Accent and Flood Lamps - Doors Wiring Schematics
Courtesy of GENERAL MOTORS COMPANY

Accent Lamps - Instrument Panel and Floor Console

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Fig. 16: Accent Lamps - Instrument Panel and Floor Console
Courtesy of GENERAL MOTORS COMPANY

INTERIOR LIGHTS DIMMING WIRING SCHEMATICS

Controls and Doors Lamps Wiring Schematics

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Fig. 17: Controls and Doors Lamps Wiring Schematics
Courtesy of GENERAL MOTORS COMPANY

Overhead Lamps Wiring Schematics

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Fig. 18: Overhead Lamps Wiring Schematics
Courtesy of GENERAL MOTORS COMPANY

Instrument Panel and Floor Console Lamps Wiring Schematics

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Fig. 19: Instrument Panel and Floor Console Lamps Wiring Schematics
Courtesy of GENERAL MOTORS COMPANY

Indicator Lamps Wiring Schematics

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Fig. 20: Indicator Lamps Wiring Schematics
Courtesy of GENERAL MOTORS COMPANY

DIAGNOSTIC INFORMATION AND PROCEDURES

DIAGNOSTIC CODE INDEX

DIAGNOSTIC CODE INDEX

DTC	Description
<u>DTC B2530</u>	DTC B2530 01 Front Fog Lamps Control Circuit Short to Battery DTC B2530 02 Front Fog Lamps Control Circuit Short to Ground DTC B2530 04 Front Fog Lamps Control Circuit Open
<u>DTC B2545</u>	DTC B2545 01 Backup Lamps Circuit Short to Battery DTC B2545 02 Backup Lamps Circuit Short to Ground DTC B2545 04 Backup Lamps Circuit Open
	DTC B2575 01 Headlamps Control Circuit Short to Battery DTC B2575 02 Headlamps Control Circuit Short to

<u>DTC B2575 or B2699</u>	Ground DTC B2575 04 Headlamps Control Circuit Open DTC B2699 01 Right Headlamp Control Circuit Short to Battery DTC B2699 02 Right Headlamp Control Circuit Short to Ground DTC B2699 04 Right Headlamp Control Circuit Open
<u>DTC B257A</u>	DTC B257A 00 Headlamp Switch Input Signals Correlation Malfunction
<u>DTC B257B</u>	DTC B257B 03 Lighting Control Switch Signal Low Voltage DTC B257B 07 Lighting Control Switch Signal High Voltage
<u>DTC B2585 or B3867</u>	DTC B2585 01 Left Park Lamps Control Circuit Short to Battery DTC B2585 02 Left Park Lamps Control Circuit Short to Ground DTC B2585 04 Left Park Lamps Control Circuit Open DTC B3867 01 Right Park Lamps Control Circuit Short to Battery DTC B3867 02 Right Park Lamps Control Circuit Short to Ground DTC B3867 04 Right Park Lamps Control Circuit Open
<u>DTC B258A</u>	DTC B258A 01 Low Beam Control Circuit Short to Battery DTC B258A 02 Low Beam Control Circuit Short to Ground DTC B258A 04 Low Beam Control Circuit Open
<u>DTC B2645</u>	DTC B2645 03 Ambient Light Sensor Circuit Low Voltage DTC B2645 07 Ambient Light Sensor Circuit High Voltage
<u>DTC B2740</u>	DTC B2740 00 Front Fog Lamp Switch Circuit Malfunction
<u>DTC B3596</u>	DTC B3596 00 Hazard Lamps Request Circuit Malfunction
<u>DTC C0277 or C0890</u>	DTC C0277 06 Brake Pedal Position Sensor Circuit Low Voltage/Open DTC C0277 07 Brake Pedal Position Sensor Circuit High Voltage DTC C0277 09 Brake Pedal Position Sensor Circuit Too Fast Transitions DTC C0277 4B Brake Pedal Position Sensor Circuit Calibration Not Learned

	DTC C0890 03 Control Module Voltage Reference Output 3 Circuit Low Voltage DTC C0890 07 Control Module Voltage Reference Output 3 Circuit High Voltage
DTC C0297	DTC C0297 02 Brake Applied Output Circuit Short to Ground

DTC B2530

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 B2530 01

Front Fog Lamps Control Circuit Short to Battery

DTC B2530 02

Front Fog Lamps Control Circuit Short to Ground

DTC B2530 04

Front Fog Lamps Control Circuit Open

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Front Fog Lamp and I/P Dimmer Switch B+	B257B 03, B1405 03, B1529 03	B257B 03	-	-
Front Fog Lamp and I/P Dimmer Switch Signal	B257B 03	B257B 03	1	-
Front Fog Lamp Relay Control	B2530 02	B2530 04	B2530 01	-
Front Fog Lamp Control	1	1	1	-
Front Fog Lamp Ground - Left	-	1	-	-
Front Fog Lamp Ground - Right	-	1	-	-

1. Front Fog Lamps Malfunction

Circuit/System Description

The front fog lamp switch is an input to the body control module (BCM) and is contained in the headlamp switch assembly. The BCM supplies voltage to the front fog lamp switch via the front fog lamp and I/P dimmer switch B+ circuit. When the front fog lamp switch is pressed, voltage from the B+ circuit is pulled down through the front fog lamp switch resistor. The front fog lamp resistor is part of the resistor ladder that also provides the dimming signals for the I/P dimmer switches. The BCM receives the voltage signal through the front fog lamp and I/P dimmer switch signal circuit.

The front fog lamp relay is supplied with battery voltage at all times. The front fog lamp switch signal circuit is grounded momentarily by pressing the front fog lamp switch. The body control module (BCM) energizes the front fog lamp relay by applying ground to the front fog lamp relay control circuit. When the front fog lamp relay is energized, the relay switch contacts close and battery voltage is applied through the F48UA fuse to the front fog lamp control circuit which illuminates the front fog lamps.

Conditions for Running the DTC

- Battery voltage must be between 9-16 V.
- Front fog lamps ON.

Conditions for Setting the DTC

DTC B2530 01

The BCM detects a short to voltage in the front fog lamp relay control circuit for 5 seconds or greater.

DTC B2530 02

The BCM detects a short to ground in the front fog lamp relay control circuit.

DTC B2530 04

The BCM detects an open in the front fog lamp relay control circuit.

Actions Taken When the DTC Sets

The front fog lamps will not operate when the park lamps are ON and the front fog lamp switch is active.

Conditions for Clearing the DTC

- The condition responsible for setting the DTC no longer exists.
- A history DTC will clear once 100 consecutive malfunction-free ignition cycles have occurred.

Reference Information

Schematic Reference

Fog Lights Schematics

Connector End View Reference

Component Connector End Views

Description and Operation

Exterior Lighting Systems 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 X5 harness connector at the K9 body control module, ignition ON.
2. Verify a test lamp illuminates between the control circuit terminal 10 and ground.
 - **If the test lamp does not illuminate**
 1. Ignition OFF, disconnect the X2 harness connector at the X50A fuse block - underhood.
 2. Test for infinite resistance between the control circuit terminal and ground.
 - If less than infinite resistance, repair the short to ground on the circuit.
 - If infinite resistance
 3. Test for less than 2 ohms in the control circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, replace the X50A fuse block - underhood.
 - **If the test lamp illuminates**
3. Ignition OFF, connect a 3 A fused jumper between the control circuit terminal 10 and ground.
4. Remove the F48UA fuse at the X50A fuse block - underhood, ignition ON.
5. Verify a test lamp illuminates between the F48UA fuse B+ switch control terminal and ground.
 - **If the test lamp does not illuminate**
 1. Ignition OFF, disconnect the X2 harness connector at the X50A fuse block - underhood, ignition ON.

2. Test for less than 1 V between the control circuit terminal 10 and ground.

- If 1 V or greater, repair the short to voltage on the circuit.
- If less than 1 V, replace the X50A fuse block - underhood.

○ **If the test lamp illuminates**

6. Test or replace the K9 body control module.

Repair Instructions

Perform the **Diagnostic Repair Verification** after completing the repair.

- **Front Compartment Fuse Block Replacement**
- **Control Module References** for BCM replacement, programming, and setup

DTC B2545

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 B2545 01

Backup Lamps Circuit Short to Battery

DTC B2545 02

Backup Lamps Circuit Short to Ground

DTC B2545 04

Backup Lamps Circuit Open

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
F32UA (BCM 6) Fuse B+	1	1	-	-
Backup Lamps Control	B2545 02	B2545 01, B2545 04	1	-
Backup Lamp Ground - Left	-	1	-	-
Backup Lamp Ground - Right	-	1	-	-

1. Backup Lamps Malfunction

Circuit/System Description

With the engine running and the transmission in the reverse position, the transmission control module (TCM) sends a serial data message to the body control module (BCM). The message indicates that the gear selector is in the reverse position. The BCM applies battery voltage to the backup lamps control circuit illuminating the backup lamps. Once the driver moves the gear selector out of the reverse position, a message is sent by the TCM via serial data requesting the BCM to remove battery voltage from the backup lamps control circuit. The engine must be running for the backup lamps to operate.

Conditions for Running the DTC

- Battery voltage must be between 9-16 V.
- Engine RUNNING.
- Transmission placed in REVERSE gear.

Conditions for Setting the DTC

DTC B2545 01 and B2545 04

The BCM detects an open/high resistance in the backup lamps control circuit.

DTC B2545 02

The BCM detects a short to ground in the backup lamps control circuit.

Actions Taken When the DTC Sets

The backup lamps will not operate.

Conditions for Clearing the DTC

- The condition responsible for setting the DTC no longer exists.
- A history DTC will clear once 100 consecutive malfunction-free ignition cycles have occurred.

Diagnostic Aids

When testing at the backup lamp bulb socket, make sure all measurements and test lamp connections are in the correct terminal location and do not come in contact with each other during testing.

Reference Information

Schematic Reference

- Exterior Lights Schematics
- Body Control System Schematics

Connector End View Reference

Component Connector End Views

Description and Operation

Exterior Lighting Systems 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 X5 harness connector at the K9 body control module, ignition ON.
2. Verify a test lamp illuminates between the B+ circuit terminal 4 and ground.
 - **If the test lamp does not illuminate and the circuit fuse is good**
 1. Ignition OFF, disconnect the X2 harness connector at the X50A fuse block - underhood.
 2. Test for less than 2 ohms in the B+ circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, verify the fuse is not open and there is voltage at the fuse.
 - **If the test lamp does not illuminate and the circuit fuse is open**
 1. Ignition OFF, disconnect the X2 harness connector at the X50A fuse block - underhood.
 2. Test for infinite resistance between the B+ circuit and ground.
 - If less than infinite resistance, repair the short to ground on the circuit.
 - If infinite resistance, replace the K9 body control module.
 - **If the test lamp illuminates**
3. Ignition OFF, connect the X5 harness connector at the K9 body control module.
4. Ignition OFF, exterior lamps OFF, remove the appropriate E5 backup lamp bulb.
5. Test for less than 15 ohms between the ground circuit terminal B and ground.
 - **If 15 ohms or greater**
 1. Ignition OFF.
 2. Test for less than 2 ohms in the ground circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.

- If less than 2 ohms, repair the open/high resistance in the ground connection.
- **If less than 15 ohms**
- 6. Connect a test lamp between the control circuit terminal A and ground, ignition ON.
- 7. Verify the test lamp turns ON and OFF when commanding the Backup Lamps ON and OFF with a scan tool.
 - **If the test lamp is always OFF**
 1. Ignition OFF, disconnect the X7 harness connector at the K9 body control module.
 2. Test for infinite resistance between the control circuit and ground.
 - If less than infinite resistance, repair the short to ground on the circuit.
 - If infinite resistance
 3. Test for less than 2 ohms in the control circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, replace the K9 body control module.
 - **If the test lamp is always ON**
 1. Ignition OFF, disconnect the X7 harness connector at the K9 body control module, ignition ON.
 2. Test for less than 1 V between the control circuit terminal and ground.
 - If 1 V or greater, repair the short to voltage on the circuit.
 - If less than 1 V, replace the K9 body control module.
 - **If the test lamp turns ON and OFF**
- 8. Test or replace the appropriate E5 backup lamp.

Repair Instructions

Perform the **Diagnostic Repair Verification** after completing the repair.

- **Backup Lamp Bulb Replacement**
- **Control Module References** for BCM replacement, programming, and setup

DTC B2575 OR B2699

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 B2575 01

Headlamps Control Circuit Short to Battery

DTC B2575 02

Headlamps Control Circuit Short to Ground

DTC B2575 04

Headlamps Control Circuit Open

DTC B2699 01

Right Headlamp Control Circuit Short to Battery

DTC B2699 02

Right Headlamp Control Circuit Short to Ground

DTC B2699 04

Right Headlamp Control Circuit Open

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
F9DA Fuse B+	B2575 01, B2575 04	B2575 01, B2575 04	-	-
F23DA Fuse B+	B2699 01, B2699 04	B2699 01, B2699 04	-	-
Low Beam Headlamp Control - Left	B2575 02	B2575 01, B2575 04	1	-
Low Beam Headlamp Control - Right	B2699 02	B2699 01, B2699 04	1	-
Headlamp Ground - Left	-	1	-	-
Headlamp Ground - Right	-	1	-	-
1. Headlamps Malfunction				

Circuit/System Description

With the headlamp switch in the ON position, the headlamp switch headlamp ON signal circuit is grounded through the headlamp switch. The body control module (BCM) responds by applying battery positive voltage to the left and right low beam headlamp control circuits illuminating the low beam headlamps.

Conditions for Running the DTC

- Battery voltage must be between 9-16 V.
- Low beam headlamps ON.

Conditions for Setting the DTC

DTC B2575 01 and B2575 04

- The BCM detects an open/high resistance in the left low beam headlamp control circuit.
- The BCM detects a short to ground or an open/high resistance in the F9DA fuse B+ circuit.

DTC B2575 02

The BCM detects a short to ground in the left low beam headlamp control circuit.

DTC B2699 01 and B2699 04

- The BCM detects an open/high resistance in the right low beam headlamp control circuit.
- The BCM detects a short to ground or an open/high resistance in the F23DA fuse B+ circuit.

DTC B2699 02

The BCM detects a short to ground in the right low beam headlamp control circuit.

Actions Taken When the DTC Sets

- When DTC B2575 sets, the left low beam headlamp will be inoperative.
- When DTC B2699 sets, the right low beam headlamp will be inoperative.

Conditions for Clearing the DTC

- The condition responsible for setting the DTC no longer exists.
- A history DTC will clear once 100 consecutive malfunction-free ignition cycles have occurred.

Reference Information

Schematic Reference

- Headlights/Daytime Running Lights (DRL) Schematics
- Body Control System Schematics

Connector End View Reference

Component Connector End Views

Description and Operation

Exterior Lighting Systems 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

DTC B2575

1. Ignition OFF, disconnect the X1 harness connector at the K9 Body Control Module, ignition ON.
2. Verify a test lamp illuminates between the B+ circuit terminal 2 and ground.
 - **If the test lamp does not illuminate and the circuit fuse is good**
 1. Ignition OFF, remove the F9DA fuse at the X51A Fuse Block - Instrument Panel.
 2. Test for less than 2 ohms in the B+ circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, verify the fuse is not open and there is voltage at the fuse.
 - **If the test lamp does not illuminate and the circuit fuse is open**
 1. Ignition OFF, remove the F9DA fuse at the X51A Fuse Block - Instrument Panel.
 2. Test for infinite resistance between the B+ circuit and ground.
 - If less than infinite resistance, repair the short to ground on the circuit.
 - If infinite resistance, replace the K9 Body Control Module.
 - **If the test lamp illuminates**
3. Ignition OFF, connect the X1 harness connector at the K9 Body Control Module.
4. Ignition OFF, exterior lamps OFF, disconnect the harness connector at the E4G Headlamp - Left Low Beam.
5. Test for less than 10 ohms between the ground circuit terminal B and ground.
 - **If 10 ohms or greater**
 1. Ignition OFF.
 2. Test for less than 2 ohms in the ground circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, repair the open/high resistance in the ground connection.
 - **If less than 10 ohms**
6. Connect a test lamp between the control circuit terminal A and ground, ignition ON.
7. Verify the test lamp turns ON and OFF when commanding the Left Headlamp Low Beam ON and OFF with a scan tool.
 - **If the test lamp is always OFF**

1. Ignition OFF, disconnect the X4 harness connector at the K9 Body Control Module.
2. Test for infinite resistance between the control circuit and ground.
 - o If less than infinite resistance, repair the short to ground on the circuit.
 - o If infinite resistance
3. Test for less than 2 ohms in the control circuit end to end.
 - o If 2 ohms or greater, repair the open/high resistance in the circuit.
 - o If less than 2 ohms, replace the K9 Body Control Module.
- o **If the test lamp is always ON**
 1. Ignition OFF, disconnect the X4 harness connector at the K9 Body Control Module, ignition ON.
 2. Test for less than 1 V between the control circuit terminal and ground.
 - o If 1 V or greater, repair the short to voltage on the circuit.
 - o If less than 1 V, replace the K9 Body Control Module.
- o **If the test lamp turns ON and OFF**
8. Test or replace the E4G Headlamp - Left Low Beam.

DTC B2699

1. Ignition OFF, disconnect the X1 harness connector at the K9 Body Control Module, ignition ON.
2. Verify a test lamp illuminates between the B+ circuit terminal 3 and ground.
 - o **If the test lamp does not illuminate and the circuit fuse is good**
 1. Ignition OFF, remove the F23DA fuse at the X51A Fuse Block - Instrument Panel.
 2. Test for less than 2 ohms in the B+ circuit end to end.
 - o If 2 ohms or greater, repair the open/high resistance in the circuit.
 - o If less than 2 ohms, verify the fuse is not open and there is voltage at the fuse.
 - o **If the test lamp does not illuminate and the circuit fuse is open**
 1. Ignition OFF, remove the F23DA fuse at the X51A Fuse Block - Instrument Panel.
 2. Test for infinite resistance between the B+ circuit and ground.
 - o If less than infinite resistance, repair the short to ground on the circuit.
 - o If infinite resistance, replace the K9 Body Control Module.
 - o **If the test lamp illuminates**
3. Ignition OFF, connect the X1 harness connector at the K9 Body Control Module.
4. Ignition OFF, exterior lamps OFF, disconnect the harness connector at the E4H Headlamp - Right Low Beam.
5. Test for less than 10 ohms between the ground circuit terminal B and ground.
 - o **If 10 ohms or greater**
 1. Ignition OFF.
 2. Test for less than 2 ohms in the ground circuit end to end.
 - o If 2 ohms or greater, repair the open/high resistance in the circuit.
 - o If less than 2 ohms, repair the open/high resistance in the ground connection.

- **If less than 10 ohms**

6. Connect a test lamp between the control circuit terminal A and ground, ignition ON.
7. Verify the test lamp turns ON and OFF when commanding the Right Headlamp Low Beam ON and OFF with a scan tool.

- **If the test lamp is always OFF**

1. Ignition OFF, disconnect the X4 harness connector at the K9 Body Control Module.
2. Test for infinite resistance between the control circuit and ground.
 - If less than infinite resistance, repair the short to ground on the circuit.
 - If infinite resistance
3. Test for less than 2 ohms in the control circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, replace the K9 Body Control Module.

- **If the test lamp is always ON**

1. Ignition OFF, disconnect the X4 harness connector at the K9 Body Control Module, ignition ON.
2. Test for less than 1 V between the control circuit terminal and ground.
 - If 1 V or greater, repair the short to voltage on the circuit.
 - If less than 1 V, replace the K9 Body Control Module.

- **If the test lamp turns ON and OFF**

8. Test or replace the E4H Headlamp - Right Low Beam.

Repair Instructions

Perform the **Diagnostic Repair Verification** after completing the repair.

- **Headlamp Bulb Replacement (Base)**, **Headlamp Bulb Replacement (HID)**
- **Control Module References** for BCM replacement, programming, and setup

DTC B257A

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 B257A 00

Headlamp Switch Input Signals Correlation Malfunction

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Headlamp Switch Park Lamps ON Signal	2	B257A 00	2	-
Headlamp Switch Headlamps OFF Signal	B257A 00	1	1	-
Headlamp Switch Headlamps ON Signal	B257A 00	1	1	-
Headlamp Switch Ground	-	1	-	-
1. Headlamps Malfunction 2. Park, License, and/or Tail Lamps Malfunction				

Circuit/System Description

For headlamp operation, the body control module (BCM) monitors three signal circuits from the headlamp switch. When the headlamp switch is in the AUTO position, the three signal circuits are unaffected and the BCM relies on the ambient light sensor input to turn the headlamps and daytime running lamps (DRLs) ON and OFF. When the headlamp switch is placed in the OFF position, the headlamp switch headlamps OFF signal circuit is grounded, indicating to the BCM that the exterior lamps should be turned OFF. With the headlamp switch in the PARK LAMPS position, the headlamp switch park lamps ON signal circuit is grounded, indicating that the park lamps have been requested. When the headlamp switch is in the HEADLAMP position, both the headlamp switch park lamps ON signal circuit and the headlamp switch headlamps ON signal circuit are grounded. The BCM responds by commanding the park lamps and headlamps ON.

Conditions for Running the DTC

Battery voltage must be between 9-16 V.

Conditions for Setting the DTC

- The BCM detects an open/high resistance in the headlamp switch park lamps ON signal circuit.
- The BCM detects a short to ground in the headlamp switch headlamps ON signal circuit.
- The BCM detects a short to ground in the headlamp switch headlamps OFF signal circuit.

Actions Taken When the DTC Sets

- When DTC B257A 00 is present on the headlamp switch headlamps OFF signal circuit, the low beam headlamps are always ON in the AUTO position. The headlamp switch operates in all positions other than AUTO. The AUTO headlamp defeat is inoperative.
- When DTC B257A 00 is present on the headlamp switch headlamps ON signal circuit, the low beam headlamps are always ON. The BCM disregards all headlamp switch inputs.
- When DTC B257A 00 is present on the headlamp switch park lamps ON signal circuit, the park lamps and low beam headlamps are inoperative in the PARK and HEAD positions. Headlamps and park lamps operate in AUTO position.

Conditions for Clearing the DTC

- The condition responsible for setting the DTC no longer exists.
- A history DTC will clear once 100 consecutive malfunction-free ignition cycles have occurred.

Reference Information

Schematic Reference

Headlights/Daytime Running Lights (DRL) Schematics

Connector End View Reference

Component Connector End Views

Description and Operation

Exterior Lighting Systems 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, scan tool disconnected, all doors closed, all accessories OFF, disconnect the harness connector at the S30 headlamp switch. It may take up to 2 minutes for all vehicle systems to power down.
2. Test for less than 10 ohms between the ground circuit terminal 6 and ground.
 - **If 10 ohms or greater**
 1. Ignition OFF.
 2. Test for less than 2 ohms in the ground circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, repair the open/high resistance in the ground connection.
 - **If less than 10 ohms**
3. Ignition ON.
4. Verify the scan tool Automatic Headlamps Disable Switch parameter is Inactive.
 - **If not Inactive**
 1. Ignition OFF, disconnect the X1 harness connector at the K9 body control module.

2. Test for infinite resistance between the signal circuit terminal 5 and ground.
 - If less than infinite resistance, repair the short to ground on the circuit.
 - If infinite resistance, replace the K9 body control module.
- **If Inactive**
5. Install a 3 A fused jumper wire between the signal circuit terminal 5 and the ground circuit terminal 6.
6. Verify the scan tool Automatic Headlamps Disable Switch parameter is Active.
 - **If not Active**
 1. Ignition OFF, disconnect the X1 harness connector at the K9 body control module, ignition ON.
 2. Test for less than 1 V between the signal circuit terminal 5 and ground.
 - If 1 V or greater, repair the short to voltage on the circuit.
 - If less than 1 V
 3. Test for less than 2 ohms in the signal circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, replace the K9 body control module.
 - **If Active**
7. Verify the scan tool Park Lamps Switch parameter is Inactive.
 - **If not Inactive**
 1. Ignition OFF, disconnect the X1 harness connector at the K9 body control module.
 2. Test for infinite resistance between the signal circuit terminal 3 and ground.
 - If less than infinite resistance, repair the short to ground on the circuit.
 - If infinite resistance, replace the K9 body control module.
 - **If Inactive**
8. Install a 3 A fused jumper wire between the signal circuit terminal 3 and the ground circuit terminal 6.
9. Verify the scan tool Park Lamps Switch parameter is Active.
 - **If not Active**
 1. Ignition OFF, disconnect the X1 harness connector at the K9 body control module, ignition ON.
 2. Test for less than 1 V between the signal circuit terminal 3 and ground.
 - If 1 V or greater, repair the short to voltage on the circuit.
 - If less than 1 V
 3. Test for less than 2 ohms in the signal circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, replace the K9 body control module.
 - **If Active**
10. Verify the scan tool Headlamps On Switch parameter is Inactive.
 - **If not Inactive**
 1. Ignition OFF, disconnect the X1 harness connector at the K9 body control module.
 2. Test for infinite resistance between the signal circuit terminal 4 and ground.
 - If less than infinite resistance, repair the short to ground on the circuit.

- If infinite resistance, replace the K9 body control module.
- **If Inactive**
- 11. Install a 3 A fused jumper wire between the signal circuit terminal 4 and the ground circuit terminal 6.
- 12. Verify the scan tool Headlamps On Switch parameter is Active.
 - **If not Active**
 1. Ignition OFF, disconnect the X1 harness connector at the K9 body control module, ignition ON.
 2. Test for less than 1 V between the signal circuit terminal 4 and ground.
 - If 1 V or greater, repair the short to voltage on the circuit.
 - If less than 1 V
 3. Test for less than 2 ohms in the signal circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, replace the K9 body control module.
 - **If Active**
- 13. Test or replace the S30 headlamp switch.

Repair Instructions

Perform the **Diagnostic Repair Verification** after completing the repair.

- **Headlamp Switch Replacement**
- **Control Module References** for BCM replacement, programming, and setup

DTC B257B

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 B257B 03

Lighting Control Switch Signal Low Voltage

DTC B257B 07

Lighting Control Switch Signal High Voltage

Diagnostic Fault Information

	Short to	Open/High	Short to	
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Circuit	Ground	Resistance	Voltage	Signal Performance
Instrument Panel Dimmer Switch B+	B257B 03, B1405 03, B1529 03	B257B 03	-	-
Instrument Panel Dimmer Switch Signal	B257B 03	B257B 03	B257B 07	-
LED Backlight Dimming Control Terminal 8 X2	1	1	1	-
LED Backlight Dimming Control Terminal 9 X7	1	1	1	-
1. Interior Backlighting Malfunction				

Circuit/System Description

The instrument panel dimmer switch is used to increase and decrease the brightness of the interior backlighting components. The instrument panel dimmer switch provides a voltage signal to the body control module (BCM) that will increase as the brightness of the lights are increased and decrease as the brightness of the lights are decreased. The BCM provides B+ and a low reference signal to the instrument panel dimmer switch. When the instrument panel dimmer switch is placed in the desired position, the dimmed voltage setting is applied from the instrument panel dimmer switch through the instrument panel dimmer switch signal circuit to the BCM. The BCM interprets the signal and applies a pulse width modulated (PWM) voltage through the LED dimming control circuits illuminating the interior backlighting to the requested level of brightness.

Conditions for Running the DTC

- Battery voltage must be between 9-16 V.
- Park Lamps ON.

Conditions for Setting the DTC

DTC B257B 03

- The BCM detects a short to ground or an open/high resistance in the instrument panel dimmer switch B+ circuit.
- The BCM detects a short to ground or an open/high resistance in the instrument panel dimmer switch signal circuit.

DTC B257B 07

The BCM detects a short to voltage in the instrument panel dimmer switch signal circuit.

Actions Taken When the DTC Sets

The BCM will not dim any interior backlighting. All interior backlighting will default to the level selected prior to the fault being present.

Conditions for Clearing the DTC

- The condition responsible for setting the DTC no longer exists.
- A history DTC will clear once 100 consecutive malfunction-free ignition cycles have occurred.

Reference Information

Schematic Reference

- **Interior Lights Dimming Schematics**
- **Fog Lights Schematics**

Connector End View Reference

Component Connector End Views

Description and Operation

Interior Lighting Systems 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 and all vehicle systems OFF, disconnect the harness connector at the S30 Headlamp Switch, ignition ON.
2. Test for B+ between the B+ circuit terminal 1 and ground.
 - **If less than B+**
 1. Ignition OFF, disconnect the X3 harness connector at the K9 Body Control Module.
 2. Test for infinite resistance between the B+ circuit and ground.
 - If less than infinite resistance, repair the short to ground on the circuit.
 - If infinite resistance
 3. Test for less than 2 ohms in the B+ circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, replace the K9 Body Control Module.
 - **If B+**

3. Verify a test lamp does not illuminate between the B+ circuit terminal 1 and the signal circuit terminal 12.
 - **If the test lamp illuminates**
 1. Ignition OFF, disconnect the X1 harness connector at the K9 Body Control Module.
 2. Test for infinite resistance between the signal circuit and ground.
 - If less than infinite resistance, repair the short to ground on the circuit.
 - If infinite resistance, replace the K9 Body Control Module.
 - **If the test lamp does not illuminate**
4. Test for B+ between the B+ circuit terminal 1 and the signal circuit terminal 12.
 - **If less than B+**
 1. Ignition OFF, disconnect the X1 harness connector at the K9 Body Control Module, ignition ON.
 2. Test for less than 1 V between the signal circuit terminal 12 and ground.
 - If 1 V or greater, repair the short to voltage on the circuit.
 - If less than 1 V
 3. Test for less than 2 ohms in the signal circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, replace the K9 Body Control Module.
 - **If B+**
5. Test or replace the S30 Headlamp Switch.

Repair Instructions

Perform the **Diagnostic Repair Verification** after completing the repair.

- **Headlamp Switch Replacement**
- **Control Module References** for BCM replacement, programming, and setup

DTC B2585 OR B3867

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 B2585 01

Left Park Lamps Control Circuit Short to Battery

DTC B2585 02

Left Park Lamps Control Circuit Short to Ground

DTC B2585 04

Left Park Lamps Control Circuit Open

DTC B3867 01

Right Park Lamps Control Circuit Short to Battery

DTC B3867 02

Right Park Lamps Control Circuit Short to Ground

DTC B3867 04

Right Park Lamps Control Circuit Open

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Headlamp Switch Park Lamps ON Signal	2	B257A 00	2	-
License Plate Lamp Control	1	1	1	-
Park Lamps Control - Left	1	1	1	-
Park Lamps Control - Right	1	1	1	-
Headlamp Switch Ground	-	2	-	-
License Plate Lamp Ground - Left	-	1	-	-
License Plate Lamp Ground - Right	-	1	-	-
Park Lamp Ground - Left Front	-	1	-	-
Park Lamp Ground - Right Front	-	1	-	-
Side Marker Lamp Ground - Left Front	-	1	-	-
Side Marker Lamp Ground - Right Front	-	1	-	-
Tail Lamp Ground - Left	-	1	-	-
Tail Lamp Ground - Right	-	1	-	-
Tail/Stop Lamps Ground - Left	-	1	-	-
Tail/Stop Lamps Ground - Right	-	1	-	-
1. Park, License, and/or Tail Lamps Malfunction 2. Park Lamps Switch Malfunction				

Circuit/System Description

When the headlamp switch is placed in the HEAD or PARK position, ground is applied to the park lamp switch ON signal circuit to the body control module (BCM). The BCM responds by applying voltage to the park lamps, tail lamps, and license lamps control circuits illuminating the park, tail, and license lamps.

Conditions for Running the DTC

- Battery voltage must be between 9-16 V.
- Park lamps ON.

Conditions for Setting the DTC

DTC B2585 01 and B2585 04

The BCM detects a short to voltage or an open/high resistance in the left park lamps control circuit.

DTC B2585 02

The BCM detects a short to ground in the left park lamps control circuit.

DTC B3867 01 and B3867 04

The BCM detects a short to voltage or an open/high resistance in the right park lamps control circuit.

DTC B3867 02

The BCM detects a short to ground in the right park lamps control circuit.

Actions Taken When the DTC Sets

DTC B2585 01

The left park lamps are always ON.

DTC B2585 02 and B2585 04

The left park lamps are always OFF.

DTC B3867 01

The right park lamps are always ON.

DTC B3867 02 and B3867 04

The right park lamps are always OFF.

Conditions for Clearing the DTC

- The condition responsible for setting the DTC no longer exists.
- A history DTC will clear once 100 consecutive malfunction-free ignition cycles have occurred.

Reference Information

Schematic Reference

- Exterior Lights Schematics
- Body Control System Schematics

Connector End View Reference

Component Connector End Views

Description and Operation

Exterior Lighting Systems 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

DTC B2585

1. Ignition OFF, exterior lamps OFF, disconnect the harness connector at the appropriate left park lamp.
2. Test for less than 15 ohms between the appropriate ground circuit terminal listed below and ground.
 - E4N left front park lamp - terminal B
 - E2LF left front side marker lamp - terminal B
 - E5AA left tail/stop lamp - terminal 2
 - E5E left tail lamp - terminal 2
 - E2LR left rear side marker lamp - terminal B
 - **If 15 ohms or greater**
 1. Ignition OFF.
 2. Test for less than 2 ohms in the ground circuit end to end.

- If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, repair the open/high resistance in the ground connection.
 - **If less than 15 ohms**
3. Connect a test lamp between the appropriate control circuit terminal listed below and ground, ignition ON.
 - E4N left front park lamp - terminal A
 - E2LF left front side marker lamp - terminal A
 - E5AA left tail/stop lamp - terminal 1
 - E5E left tail lamp - terminal 1
 - E2LR left rear side marker lamp - terminal A
 4. Verify the test lamp turns ON and OFF when commanding the Left Park Lamps ON and OFF with a scan tool.
 - **If the test lamp is always OFF**
 1. Ignition OFF, disconnect the X4 harness connector at the K9 body control module.
 2. Test for infinite resistance between the control circuit and ground.
 - If less than infinite resistance, repair the short to ground on the circuit.
 - If infinite resistance
 3. Test for less than 2 ohms in the control circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, replace the K9 body control module.
 - **If the test lamp is always ON**
 1. Ignition OFF, disconnect the X4 harness connector at the K9 body control module, ignition ON.
 2. Test for less than 1 V between the control circuit terminal and ground.
 - If 1 V or greater, repair the short to voltage on the circuit.
 - If less than 1 V, replace the K9 body control module.
 - **If the test lamp turns ON and OFF**
 5. Test or replace the appropriate left park lamp.

DTC B3867

1. Ignition OFF, exterior lamps OFF, disconnect the harness connector at the appropriate right park lamp.
2. Test for less than 15 ohms between the appropriate ground circuit terminal listed below and ground.
 - E4P right front park lamp - terminal B
 - E2RF right front side marker lamp - terminal B
 - E5AB right tail/stop lamp - terminal 2
 - E5F right tail lamp - terminal 2
 - E2RR right rear side marker lamp - terminal B
 - **If 15 ohms or greater**
 1. Ignition OFF.

2. Test for less than 2 ohms in the ground circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, repair the open/high resistance in the ground connection.
 - **If less than 15 ohms**
3. Connect a test lamp between the appropriate control circuit terminal listed below and ground, ignition ON.
 - E4P right front park lamp - terminal A
 - E2RF right front side marker lamp - terminal A
 - E5AB right tail/stop lamp - terminal 1
 - E5F right tail lamp - terminal 1
 - E2RR right rear side marker lamp - terminal A
4. Verify the test lamp turns ON and OFF when commanding the Right Park Lamps ON and OFF with a scan tool.
 - **If the test lamp is always OFF**
 1. Ignition OFF, disconnect the X4 harness connector at the K9 body control module.
 2. Test for infinite resistance between the control circuit and ground.
 - If less than infinite resistance, repair the short to ground on the circuit.
 - If infinite resistance
 3. Test for less than 2 ohms in the control circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, replace the K9 body control module.
 - **If the test lamp is always ON**
 1. Ignition OFF, disconnect the X4 harness connector at the K9 body control module, ignition ON.
 2. Test for less than 1 V between the control circuit terminal and ground.
 - If 1 V or greater, repair the short to voltage on the circuit.
 - If less than 1 V, replace the K9 body control module.
 - **If the test lamp turns ON and OFF**
5. Test or replace the appropriate right park lamp.

Repair Instructions

Perform the **Diagnostic Repair Verification** after completing the repair.

- **Front Turn Signal Lamp Bulb Replacement (Base), Front Turn Signal Lamp Bulb Replacement (HID)**
- **Tail Lamp Replacement - Inboard**
- **Stop and Tail Lamp Bulb Replacement**
- **Control Module References** for BCM replacement, programming, and setup

DTC B258A

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 B258A 01

Low Beam Control Circuit Short to Battery

DTC B258A 02

Low Beam Control Circuit Short to Ground

DTC B258A 04

Low Beam Control Circuit Open

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Headlamp Low Beam Relay Control (with T4F)	B258A 02, B258A 04	B258A 02, B258A 04	B258A 01	-
Low Beam Headlamp Control - Left (with T4F)	1	1	1	-
Low Beam Headlamp Control - Right (with T4F)	1	1	1	-
Headlamp Ground - Left	-	1	-	-
Headlamp Ground - Right	-	1	-	-
1. Headlamps Malfunction				

Circuit/System Description

With the headlamp switch in the ON position, the headlamp switch headlamp ON signal circuit is grounded through the headlamp switch. The body control module (BCM) responds by applying ground to the low beam relay control circuit which energizes the low beam relay. With the low beam relay energized, the switch contacts close allowing battery voltage to flow through the low beam fuses to the low beam control circuits illuminating the low beam headlamps.

Conditions for Running the DTC

- Battery voltage must be between 9-16 V.
- Low beam headlamps ON.

Conditions for Setting the DTC

DTC B258A 01

The BCM detects a short to voltage in the headlamp low beam relay control circuit.

DTC B258A 02

The BCM detects a short to ground in the headlamp low beam relay control circuit.

DTC B258A 04

The BCM detects an open in the headlamp low beam relay control circuit.

Actions Taken When the DTC Sets

The low beam headlamps will not operate.

Conditions for Clearing the DTC

- The condition responsible for setting the DTC no longer exists.
- A history DTC will clear once 100 consecutive malfunction-free ignition cycles have occurred.

Reference Information

Schematic Reference

Headlights/Daytime Running Lights (DRL) Schematics

Connector End View Reference

Component Connector End Views

Description and Operation

Exterior Lighting Systems 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 KR49 headlamp low beam relay.
2. Connect a test lamp between the control circuit terminal 85 and B+, ignition ON.
3. Verify the test lamp turns ON and OFF when commanding the Low Beams ON and OFF with a scan tool.
 - **If the test lamp is always OFF**
 1. Ignition OFF, disconnect the X5 harness connector at the K9 body control module, ignition ON.
 2. Test for less than 1 V between the control circuit terminal and ground.
 - If 1 V or greater, repair the short to voltage on the circuit.
 - If less than 1 V
 3. Ignition OFF.
 4. Test for less than 2 ohms in the control circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, replace the K9 body control module.
 - **If the test lamp is always ON**
 1. Ignition OFF, disconnect the X5 harness connector at the K9 body control module.
 2. Test for infinite resistance between the control circuit terminal and ground.
 - If less than infinite resistance, repair the short to ground on the circuit.
 - If infinite resistance, replace the K9 body control module.
 - **If the test lamp turns ON and OFF**
4. Test or replace the KR49 headlamp low beam relay.

Repair Instructions

Perform the **Diagnostic Repair Verification** after completing the repair.

- **Relay Replacement (Within an Electrical Center)** , **Relay Replacement (Attached to Wire Harness)**
- **Control Module References** for BCM replacement, programming, and setup

DTC B2645

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 B2645 03

Ambient Light Sensor Circuit Low Voltage

DTC B2645 07

Ambient Light Sensor Circuit High Voltage

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
F8DA (BCM 3) Fuse B+	B2575 01, B2575 04	B2575 01, B2575 04	-	-
F9DA (BCM 4) Fuse B+	B2699 01, B2699 04	B2699 01, B2699 04	-	-
Ambient Light Sensor Signal	B2645 03	B2645 07	B2645 07	-
Low Beam Headlamp Control - Left (T4A)	B2575 02	B2575 01, B2575 04	1	-
Low Beam Headlamp Control - Right (T4A)	B2699 02	B2699 01, B2699 04	1	-
Park/Daytime Running Lamp - Left (T4F)	2	2	2	-
Park/Daytime Running Lamp - Right (T4F)	2	2	2	-
Ambient Light Sensor Low Reference (CJ2/C68)	2	B2645 07, B0163 05, B0183 05	2	-
Ambient Light Sensor Ground (C67)	-	B2645 07	-	-
Headlamp Ground - Left	-	1	-	-
Headlamp Ground - Right	-	1	-	-
1. Headlamps Malfunction 2. Daytime Running Lamps Malfunction				

Circuit/System Description

With Manual HVAC

The ambient light sensor is used to monitor outside lighting conditions. The ambient light sensor provides a voltage signal that will vary between 0.2 and 4.9 volts depending on outside lighting conditions. The body control module (BCM) provides a 5-volt reference signal to the ambient light sensor which is permanently grounded at G203. The BCM monitors the ambient light sensor signal circuit to determine if outside lighting conditions are correct for either daytime running lights (DRL) or automatic lamp control (ALC) when the headlamp switch is in the AUTO position. In daylight conditions the BCM will command the DRLs ON. During low light conditions the BCM will command the low beam headlamps ON. Any function or condition that turns on the headlamps will cancel DRL operation.

With Automatic HVAC

The ambient light sensor is used to monitor outside lighting conditions. The ambient light sensor provides a voltage signal that will vary between 0.2 and 4.9 volts depending on outside lighting conditions. The body control module (BCM) provides a 5-volt reference signal to the ambient light sensor and the HVAC control module provides a low reference ground. The BCM monitors the ambient light sensor signal circuit to determine if outside lighting conditions are correct for either daytime running lights (DRL) or automatic lamp control (ALC) when the headlamp switch is in the AUTO position. In daylight conditions the BCM will command the DRLs ON. During low light conditions the BCM will command the low beam headlamps ON. Any function or condition that turns on the headlamps will cancel DRL operation.

Conditions for Running the DTC

Battery voltage must be between 9-16 V.

Conditions for Setting the DTC

DTC B2645 03

The BCM detects a short to ground in the ambient light sensor signal circuit.

DTC B2645 07

- The BCM detects a short to voltage or an open/high resistance in the ambient light sensor signal circuit.
- The BCM detects an open/high resistance in the ambient light sensor low reference circuit.

Actions Taken When the DTC Sets

- Automatic headlamp system and daytime running lamps are inoperative.
- The BCM defaults to low light status and commands the low beam headlamps ON.

Conditions for Clearing the DTC

- The condition responsible for setting the DTC no longer exists.
- A history DTC will clear once 100 consecutive malfunction-free ignition cycles have occurred.

Reference Information

Schematic Reference

Headlights/Daytime Running Lights (DRL) Schematics

Connector End View Reference

Component Connector End Views

Description and Operation

Exterior Lighting Systems 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

With C67

1. Ignition OFF, scan tool disconnected, all doors closed, all accessories OFF, disconnect the harness connector at the B10B ambient light/sunload sensor. It may take up to 2 minutes for all vehicle systems to power down.
2. Test for less than 10 ohms between the ground circuit terminal 6 and ground.
 - **If 10 ohms or greater**
 1. Ignition OFF.
 2. Test for less than 2 ohms in the ground circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, repair the open/high resistance in the ground connection.
 - **If less than 10 ohms**
3. Ignition ON.
4. Verify the scan tool Ambient Light Sensor parameter is greater than 4.65 V.
 - **If 4.65 V or less**
 1. Ignition OFF, disconnect the X2 harness connector at the K9 body control module.
 2. Test for infinite resistance between the signal circuit terminal 5 and ground.
 - If less than infinite resistance, repair the short to ground on the circuit.
 - If infinite resistance, replace the K9 body control module.
 - **If greater than 4.65 V**
5. Install a 3 A fused jumper wire between the signal circuit terminal 5 and the low reference circuit terminal 6.
6. Verify the scan tool Ambient Light Sensor parameter is less than 0.196 V.
 - **If 0.196 V or greater**
 1. Ignition OFF, disconnect the X2 harness connector at the K9 body control module, ignition ON.
 2. Test for less than 1 V between the signal circuit terminal 5 and ground.
 - If 1 V or greater, repair the short to voltage on the circuit.
 - If less than 1 V

3. Test for less than 2 ohms in the signal circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, replace the K9 body control module.

- **If less than 0.196 V**

7. Test or replace the B10B ambient light/sunload sensor.

With CJ2/C68

1. Ignition OFF, scan tool disconnected, all doors closed, all accessories OFF, disconnect the harness connector at the B10B ambient light/sunload sensor. It may take up to 2 minutes for all vehicle systems to power down.
2. Test for less than 25 ohms between the low reference circuit terminal 6 and ground.
 - **If 25 ohms or greater**
 1. Ignition OFF, disconnect the X2 harness connector at the K33 HVAC control module.
 2. Test for less than 2 ohms in the low reference circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, replace the K33 HVAC control module.
 - **If less than 25 ohms**
3. Ignition ON.
4. Verify the scan tool Ambient Light Sensor parameter is greater than 4.65 V.
 - **If 4.65 V or less**
 1. Ignition OFF, disconnect the X2 harness connector at the K9 body control module.
 2. Test for infinite resistance between the signal circuit terminal 5 and ground.
 - If less than infinite resistance, repair the short to ground on the circuit.
 - If infinite resistance, replace the K9 body control module.
 - **If greater than 4.65 V**
5. Install a 3 A fused jumper wire between the signal circuit terminal 5 and the low reference circuit terminal 6.
6. Verify the scan tool Ambient Light Sensor parameter is less than 0.196 V.
 - **If 0.196 V or greater**
 1. Ignition OFF, disconnect the X2 harness connector at the K9 body control module, ignition ON.
 2. Test for less than 1 V between the signal circuit terminal 5 and ground.
 - If 1 V or greater, repair the short to voltage on the circuit.
 - If less than 1 V
 3. Test for less than 2 ohms in the signal circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, replace the K9 body control module.
 - **If less than 0.196 V**
7. Test or replace the B10B ambient light/sunload sensor.

Repair Instructions

Perform the **Diagnostic Repair Verification** after completing the repair.

- **Sun Load Temperature Sensor Replacement**
- **Control Module References** for BCM or HVAC Control Module replacement, programming, and setup

DTC B2740

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 B2740 00

Front Fog Lamp Switch Circuit Malfunction

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Front Fog Lamp and I/P Dimmer Switch B+	B257B 03, B1405 03, B1529 03	B257B 03	-	-
Front Fog Lamp and I/P Dimmer Switch Signal	B257B 03	B257B 03	1	B2740 00
Front Fog Lamp Relay Control	B2530 02	B2530 04	B2530 01	-
Front Fog Lamp Control	1	1	1	-
Front Fog Lamp Ground - Left	-	1	-	-
Front Fog Lamp Ground - Right	-	1	-	-
1. Front Fog Lamps Malfunction				

Circuit/System Description

The front fog lamp switch is an input to the body control module (BCM) and is contained in the headlamp switch assembly. The BCM supplies voltage to the front fog lamp switch via the front fog lamp and I/P dimmer switch B+ reference circuit. When the front fog lamp switch is pressed, voltage from the B+ reference circuit is pulled down through the front fog lamp switch resistor. The front fog lamp resistor is part of the resistor ladder that also provides the dimming signals for the I/P dimmer switches. The BCM receives the voltage signal

through the front fog lamp and I/P dimmer switch signal circuit.

The front fog lamp relay is supplied with battery voltage at all times. The front fog lamp switch signal circuit is grounded momentarily by pressing the front fog lamp switch. The body control module (BCM) energizes the front fog lamp relay by applying ground to the front fog lamp relay control circuit. When the front fog lamp relay is energized, the relay switch contacts close and battery voltage is applied through the F48UA fuse to the front fog lamp control circuit which illuminates the front fog lamps.

Conditions for Running the DTC

- Battery voltage must be between 9-16 V.
- Front fog lamps ON.

Conditions for Setting the DTC

The BCM detects a constant voltage on the front fog lamp and I/P dimmer switch signal circuit.

Action Taken When the DTC Sets

The front fog lamps will not operate.

Conditions for Clearing the DTC

- The condition responsible for setting the DTC no longer exists.
- A history DTC will clear once 100 consecutive malfunction-free ignition cycles have occurred.

Reference Information

Schematic Reference

Fog Lights Schematics

Connector End View Reference

Component Connector End Views

Description and Operation

Exterior Lighting Systems 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 and all vehicle systems OFF, disconnect the harness connector at the S30 headlamp switch, ignition ON.
2. Test for B+ between the B+ reference circuit terminal 1 and ground.
 - **If less than B+**
 1. Ignition OFF, disconnect the X3 harness connector at the K9 body control module.
 2. Test for infinite resistance between the B+ reference circuit and ground.
 - If less than infinite resistance, repair the short to ground on the circuit.
 - If infinite resistance
 3. Test for less than 2 ohms in the B+ reference circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, replace the K9 body control module.
 - **If B+**
3. Verify the scan tool LED Backlight Dimming Command parameter is greater than 40%.
 - **If 40% or less**
 1. Ignition OFF, disconnect the X1 harness connector at the K9 body control module, ignition ON.
 2. Test for less than 1 V between the signal circuit terminal 12 and ground.
 - If 1 V or greater, repair the short to voltage on the circuit.
 - If less than 1 V, replace the K9 body control module.
 - **If greater than 40%**
4. Install a 3 A fused jumper wire between the signal circuit terminal 12 and the B+ reference circuit terminal 1.
5. Verify the scan tool LED Backlight Dimming Command parameter is less than 30%.
 - **If 30% or greater**
 1. Ignition OFF, disconnect the X1 harness connector at the K9 body control module.
 2. Test for infinite resistance between the signal circuit and ground.
 - If less than infinite resistance, repair the short to ground on the circuit.
 - If infinite resistance
 3. Test for less than 2 ohms in the signal circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, replace the K9 body control module.
 - **If less than 30%**
6. Test or replace the S30 headlamp switch.

Repair Instructions

Perform the **Diagnostic Repair Verification** after completing the repair.

- **Headlamp Switch Replacement**
- **Control Module References** for BCM replacement, programming, and setup

DTC B3596

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 B3596 00

Hazard Lamps Request Circuit Malfunction

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Hazard Warning Switch Signal	1	1	1	B3596 00
Hazard Warning Switch LED Backlighting Control	2	2	2	-
Hazard Warning Switch Ground	-	1	-	-
1. Hazard Lamps Malfunction 2. Hazard Warning Switch Backlighting Malfunction				

Circuit/System Description

The hazard flashers may be activated in any power mode. The hazard warning switch signal circuit is momentarily grounded when the hazard warning switch is pressed. The body control module (BCM) responds to the hazard warning switch signal input by supplying battery voltage to all four turn signal lamps in an ON and OFF duty cycle. When the hazard warning switch is activated, the BCM sends a serial data message to the instrument cluster requesting both turn signal indicators to be cycled ON and OFF.

Conditions for Running the DTC

- Battery voltage must be between 9-16 V.
- Hazard lamps ON.

Conditions for Setting the DTC

The hazard warning switch input is Active for longer than 60 seconds.

Actions Taken When the DTC Sets

The hazard lamps are inoperative.

Conditions for Clearing the DTC

- The condition responsible for setting the DTC no longer exists.
- A history DTC will clear once 100 consecutive malfunction-free ignition cycles have occurred.

Reference Information

Schematic Reference

Exterior Lights Schematics

Connector End View Reference

Component Connector End Views

Description and Operation

Exterior Lighting Systems 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, scan tool disconnected, all doors closed, all accessories OFF, disconnect the harness connector at the S48C multifunction switch 1 - instrument panel. It may take up to 2 minutes for all vehicle systems to power down.
2. Test for less than 10 ohms between the ground circuit terminal 7 and ground.
 - **If 10 ohms or greater**
 1. Ignition OFF.
 2. Test for less than 2 ohms in the ground circuit end to end.

- If 2 ohms or greater, repair the open/high resistance in the circuit.
- If less than 2 ohms, repair the open/high resistance in the ground connection.
- **If less than 10 ohms**
- 3. Ignition ON.
- 4. Verify the scan tool Hazard Lamps Switch parameter is Inactive.
 - **If not Inactive**
 1. Ignition OFF, disconnect the X2 harness connector at the K9 body control module.
 2. Test for infinite resistance between the signal circuit terminal 10 and ground.
 - If less than infinite resistance, repair the short to ground on the circuit.
 - If infinite resistance, replace the K9 body control module.
 - **If Inactive**
- 5. Install a 3 A fused jumper wire between the signal circuit terminal 10 and the ground circuit terminal 7.
- 6. Verify the scan tool Hazard Lamps Switch parameter is Active.
 - **If not Active**
 1. Ignition OFF, disconnect the X2 harness connector at the K9 body control module, ignition ON.
 2. Test for less than 1 V between the signal circuit terminal 10 and ground.
 - If 1 V or greater, repair the short to voltage on the circuit.
 - If less than 1 V
 3. Test for less than 2 ohms in the signal circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, replace the K9 body control module.
 - **If Active**
- 7. Test or replace the S48C multifunction switch 1 - instrument panel.

Repair Instructions

Perform the **Diagnostic Repair Verification** after completing the repair.

- **Hazard Warning and Accessory Switch Replacement**
- **Control Module References** for BCM replacement, programming, and setup

DTC C0277 OR C0890

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 C0277 06

Brake Pedal Position Sensor Circuit Low Voltage/Open

DTC C0277 07

Brake Pedal Position Sensor Circuit High Voltage

DTC C0277 09

Brake Pedal Position Sensor Circuit Too Fast Transitions

DTC C0277 4B

Brake Pedal Position Sensor Circuit Calibration Not Learned

DTC C0890 03

Control Module Voltage Reference Output 3 Circuit Low Voltage

DTC C0890 07

Control Module Voltage Reference Output 3 Circuit High Voltage

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
F8DA Fuse B+	C0890 03, B101E 43, B1517 07, B1529 03, U0121 00	C0890 03, B101E 43, B1517 07, B1529 03, U0121 00	-	-
Brake Pedal Position Sensor 5 V Reference	C0277 06, C0890 03, C0561 71, U0422 71	C0277 06, C0561 71, U0422 71	C0890 07, C0561 71, U0422 71	-
Brake Pedal Position Sensor Signal	C0277 06, C0561 71, U0422 71	C0277 06, C0561 71, U0422 71	C0277 07, C0561 71, U0422 71	C0277 09
Center High Mounted Stop Lamp Control	2	2	2	-
Stop Lamp Control - Left	1	1	1	-
Stop Lamp Control - Right	1	1	1	-
Brake Pedal Position Sensor Low Reference	-	C0277 07, C0561 71, U0422 71	1	-

Center High Mounted Stop Lamp Ground	-	2	-	-
Tail/Stop Lamp Ground - Left	-	1	-	-
Tail/Stop Lamp Ground - Right	-	1	-	-
1. Stop Lamps Malfunction 2. Center High Mounted Stop Lamp Malfunction				

Circuit/System Description

The brake pedal position (BPP) sensor is used to sense the action of the driver application of the brake pedal. The BPP sensor provides an analog voltage signal that will increase as the brake pedal is applied. The body control module (BCM) provides a low reference signal and a 5-volt reference voltage to the BPP sensor. When the variable signal reaches a voltage threshold indicating the brakes have been applied, the BCM will apply battery voltage to the left and right stop lamp control circuits as well as the center high mounted stop lamp (CHMSL) control circuit illuminating the left and right stop lamps and the CHMSL.

Conditions for Running the DTC

- Battery voltage must be between 9-16 V.
- Brakes APPLIED.

Conditions for Setting the DTC

DTC C0277 06

- The BCM detects a short to ground or an open/high resistance in the BPP sensor 5 V reference circuit.
- The BCM detects a short to ground or an open/high resistance in the BPP sensor signal circuit.

DTC C0277 07

- The BCM detects a short to voltage in the BPP sensor 5 V reference circuit.
- The BCM detects a short to voltage in the BPP sensor signal circuit.
- The BCM detects an open/high resistance in the BPP sensor low reference circuit.

DTC C0277 09

The BCM detects the BPP sensor signal is changing faster than possible under normal operating conditions.

DTC C0277 4B

The DTC will set when the BPP sensor home position is not learned.

DTC C0890 03

- The BCM detects a short to ground in the BPP sensor 5 V reference circuit.
- The BCM detects a short to ground or an open/high resistance in the F8DA fuse B+ circuit.

DTC C0890 07

- The BCM detects a short to voltage in the BPP sensor 5 V reference circuit.
- The BCM detects a short to voltage in the BPP sensor low reference circuit.

Actions Taken When the DTC Sets

- The Traction Control indicator is commanded ON.
- For DTC C0277 4B, the stop lamps may not activate at the expected brake pedal positions.

Conditions for Clearing the DTC

- The condition responsible for setting the DTC no longer exists.
- For DTC C0277 07 the ignition must be cycled before the code can be cleared.
- For DTC C0277 4B a successful brake pedal position sensor calibration has been performed.
- A history DTC will clear once 50 malfunction-free ignition cycles have occurred.
- A DTC will not clear the current status until the next ignition cycle.

Reference Information

Schematic Reference

Exterior Lights Schematics

Connector End View Reference

Component Connector End Views

Description and Operation

Exterior Lighting Systems 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

DTC C0277 06, C0277 07, C0890 03, and C0890 07

1. Ignition OFF, disconnect the harness connector at the B22 brake pedal position sensor, ignition ON.
2. Verify a test lamp illuminates between the low reference circuit terminal 1 and B+.
 - **If the test lamp does not illuminate**
 1. Ignition OFF, disconnect the X1 harness connector at the K9 body control module.
 2. Test for less than 2 ohms in the low reference circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, replace the K9 body control module.
 - **If the test lamp illuminates**
3. Ignition ON.
4. Test for 4.8-5.2 V between the 5 V reference circuit terminal 2 and ground.
 - **If less than 4.8 V**
 1. Ignition OFF, disconnect the X2 harness connector at the K9 body control module.
 2. Test for infinite resistance between the 5 V reference circuit and ground.
 - If less than infinite resistance, repair the short to ground on the circuit.
 - If infinite resistance
 3. Test for less than 2 ohms in the 5 V reference circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, replace the K9 body control module.
 - **If greater than 5.2 V**
 1. Ignition OFF, disconnect the X2 harness connector at the K9 body control module, ignition ON.
 2. Test for less than 1 V between the 5 V reference circuit and ground.
 - If 1 V or greater, repair the short to voltage on the circuit.
 - If less than 1 V, replace the K9 body control module.
 - **If between 4.8-5.2 V**
5. Verify the scan tool Brake Pedal Applied parameter is Inactive.
 - **If not Inactive**
 1. Ignition OFF, disconnect the X2 harness connector at the K9 body control module, ignition ON.
 2. Test for less than 1 V between the signal circuit terminal 3 and ground.
 - If 1 V or greater, repair the short to voltage on the circuit.
 - If less than 1 V, replace the K9 body control module.
 - **If Inactive**
6. Install a 3 A fused jumper wire between the 5-volt reference circuit terminal 2 and the signal circuit terminal 3.
7. Verify the scan tool Brake Pedal Applied parameter is Active.
 - **If not Active**

1. Ignition OFF, disconnect the X2 harness connector at the K9 body control module.
2. Test for infinite resistance between the signal circuit and ground.
 - If less than infinite resistance, repair the short to ground on the circuit.
 - If infinite resistance
3. Test for less than 2 ohms in the signal circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, replace the K9 body control module.

- **If Active**

8. Test or replace the B22 brake pedal position sensor.

DTC C0277 4B

1. Verify DTC C0277 4B is not set.
 - **If DTC C0277 4B is set**
 1. Ignition ON
 2. Perform the BPP sensor recalibration procedure for the K9 body control module. Refer to **Brake Pedal Position Sensor Calibration**.
 3. Verify the DTC does not reset while operating the vehicle under the conditions for running the DTC.
 - If the DTC resets, replace the B22 brake pedal position sensor.
 - If the DTC does not reset
 4. All OK.
 - **If DTC C0277 4B is not set**
2. All OK.

DTC C0277 09

1. Verify DTC C0277 09 is not set.
 - **If DTC C0277 09 is set**
 1. Replace the B22 brake pedal position sensor.
 2. Perform the BPP sensor recalibration procedure for the K9 body control module. Refer to **Brake Pedal Position Sensor Calibration**.
 3. Verify the DTC does not reset while operating the vehicle under the conditions for running the DTC.
 - If the DTC resets, replace the K9 body control module.
 - If the DTC does not reset
 4. All OK.
 - **If DTC C0277 09 is not set**
2. All OK.

Repair Instructions

Perform the **Diagnostic Repair Verification** after completing the repair.

- **Brake Pedal Position Sensor Calibration**
- **Brake Pedal Position Sensor Replacement**
- **Control Module References** for BCM replacement, programming, and setup

DTC C0297

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 C0297 02

Brake Applied Output Circuit Short to Ground

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Brake Applied Signal	C0297 02	1	1	-
1. Cruise Control Malfunction				

Circuit/System Description

The brake pedal position sensor is used to sense the action of the driver application of the brake pedal. The brake pedal position sensor provides an analog voltage signal that will increase as the brake pedal is applied. The body control module (BCM) provides a low reference signal and a 5 V reference voltage to the brake pedal position sensor. When the variable signal reaches a voltage threshold indicating the brakes have been applied, the BCM will apply battery voltage to the right and left stop lamp control circuits, engine control module (ECM), and center high mounted stop lamp control circuit.

Conditions for Running the DTC

- Battery voltage must be between 9-16 V.
- Brakes APPLIED.

Conditions for Setting the DTC

The BCM detects a short to ground in the brake applied signal circuit.

Actions Taken When the DTC Sets

The cruise control system is disabled.

Conditions for Clearing the DTC

- The condition responsible for setting the DTC no longer exists.
- A history DTC will clear once 50 consecutive malfunction-free ignition cycles have occurred.

Diagnostic Aids

Verify that the brake pedal position sensor is properly calibrated.

Reference Information

Schematic Reference

- **Body Control System Schematics**
- **Cruise Control Schematics**

Connector End View Reference

Component Connector End Views

Description and Operation

Exterior Lighting Systems 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 X1 harness connector at the K20 engine control module.
2. Connect a test lamp between the signal circuit terminal 57 and ground, ignition ON.
3. Verify the test lamp turns ON and OFF while pressing and releasing the brake pedal.
 - **If the test lamp is always OFF**
 1. Ignition OFF, disconnect the X5 harness connector at the K9 body control module.
 2. Test for infinite resistance between the signal circuit and ground.

- If less than infinite resistance, repair the short to ground on the circuit.
- If infinite resistance
- 3. Test for less than 2 ohms in the signal circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, replace the K9 body control module.
 - **If the test lamp is always ON**
 1. Ignition OFF, disconnect the X5 harness connector at the K9 body control module, ignition ON.
 2. Test for less than 1 V between the signal circuit terminal and ground.
 - If 1 V or greater, repair the short to voltage on the circuit.
 - If less than 1 V, replace the K9 body control module.
 - **If the test lamp turns ON and OFF**
- 4. Replace the K20 engine control module.

Repair Instructions

Perform the **Diagnostic Repair Verification** after completing the repair.

- **Brake Pedal Position Sensor Calibration**
- **Control Module References** for BCM or ECM replacement, programming, and setup

SYMPTOMS - LIGHTING

NOTE: **The following steps must be completed before using a symptom table.**

- Perform the **Diagnostic System Check - Vehicle** before using a symptom table in order to verify that all of the following conditions are true:
 - There are no DTCs set.
 - The control modules can communicate via the serial data link.
- Review the system description and operation in order to familiarize yourself with the system functions. Refer to the following:
 - **Exterior Lighting Systems Description and Operation**
 - **Interior Lighting Systems Description and Operation**

Visual/Physical Inspection

- Inspect for aftermarket devices which could affect the operation of the lighting system. Refer to **Checking Aftermarket Accessories**.
- Inspect the easily accessible or visible system components for obvious damage or conditions which could cause the symptom.

Intermittent

Thoroughly inspect the wiring and connectors. An incomplete inspection of the wiring and connectors may result in misdiagnosis causing part replacement with the reappearance of the malfunction. If an intermittent malfunction exists, 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:

- **Backup Lamps Malfunction**
- **Courtesy Lamps Malfunction**
- **Daytime Running Lamps Malfunction (with T4A), Daytime Running Lamps Malfunction (with T4F)**
- **Dome Lamps Malfunction**
- **Front Fog Lamps Malfunction**
- **Hazard Lamps Malfunction**
- **Headlamps Malfunction**
- **Interior Accent Lighting Malfunction**
- **Interior Backlighting Malfunction**
- **Park, License, and/or Tail Lamps Malfunction**
- **Rear Compartment Lamp Malfunction**
- **Stop Lamps Malfunction**
- **Turn Signal Lamps and/or Indicators Malfunction**

BACKUP LAMPS 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
F32UA (BCM 6) Fuse B+	1	1	-	-
Backup Lamps Control	B2545 02	B2545 01, B2545 04	1	-
Backup Lamp Ground - Left	-	1	-	-
Backup Lamp Ground - Right	-	1	-	-
1. Backup Lamps Malfunction				

Circuit/System Description

With the engine running and the transmission in the reverse position, the transmission control module (TCM) sends a serial data message to the body control module (BCM). The message indicates that the gear selector is in the reverse position. The BCM applies battery voltage to the backup lamps control circuit illuminating the backup lamps. Once the driver moves the gear selector out of the reverse position, a message is sent by the TCM via serial data requesting the BCM to remove battery voltage from the backup lamps control circuit. The engine must be running for the backup lamps to operate.

Diagnostic Aids

When testing at the backup lamp bulb socket, make sure all measurements and test lamp connections are in the correct terminal location and do not come in contact with each other during testing.

Reference Information

Schematic Reference

- Exterior Lights Schematics
- Body Control System Schematics

Connector End View Reference

Component Connector End Views

Description and Operation

Exterior Lighting Systems 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 X5 harness connector at the K9 body control module, ignition ON.
2. Verify a test lamp illuminates between the B+ circuit terminal 4 and ground.
 - **If the test lamp does not illuminate and the circuit fuse is good**
 1. Ignition OFF, disconnect the X2 harness connector at the X50A fuse block - underhood.

2. Test for less than 2 ohms in the B+ circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, verify the fuse is not open and there is voltage at the fuse.
 - **If the test lamp does not illuminate and the circuit fuse is open**
1. Ignition OFF, disconnect the X2 harness connector at the X50A fuse block - underhood.
2. Test for infinite resistance between the B+ circuit and ground.
 - If less than infinite resistance, repair the short to ground on the circuit.
 - If infinite resistance, replace the K9 body control module.
 - **If the test lamp illuminates**
3. Ignition OFF, connect the X5 harness connector at the K9 body control module.
4. Ignition OFF, exterior lamps OFF, remove the appropriate E5 backup lamp bulb.
5. Test for less than 15 ohms between the ground circuit terminal B and ground.
 - **If 15 ohms or greater**
 - 1. Ignition OFF.
 - 2. Test for less than 2 ohms in the ground circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, repair the open/high resistance in the ground connection.
 - **If less than 15 ohms**
6. Connect a test lamp between the control circuit terminal A and ground, ignition ON.
7. Verify the test lamp turns ON and OFF when commanding the Backup Lamps ON and OFF with a scan tool.
 - **If the test lamp is always OFF**
 - 1. Ignition OFF, disconnect the X7 harness connector at the K9 body control module.
 - 2. Test for infinite resistance between the control circuit and ground.
 - If less than infinite resistance, repair the short to ground on the circuit.
 - If infinite resistance
 - 3. Test for less than 2 ohms in the control circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, replace the K9 body control module.
 - **If the test lamp is always ON**
 - 1. Ignition OFF, disconnect the X7 harness connector at the K9 body control module, ignition ON.
 - 2. Test for less than 1 V between the control circuit terminal and ground.
 - If 1 V or greater, repair the short to voltage on the circuit.
 - If less than 1 V, replace the K9 body control module.
 - **If the test lamp turns ON and OFF**
8. Test or replace the appropriate E5 backup lamp.

Repair Instructions

Perform the **Diagnostic Repair Verification** after completing the repair.

- **Backup Lamp Bulb Replacement**
- **Control Module References** for BCM replacement, programming, and setup

COURTESY LAMPS 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
F32UA (BCM 6) Fuse B+	1	1	-	-
Courtesy Lamp Control - Terminal 2 X7	1	1	1	-
Dome/Reading Lamps - Front Overhead Console Left Ground	-	1	-	-
Dome/Reading Lamps - Front Overhead Console Right Ground	-	1	-	-
Dome/Reading Lamps - Rear Ground	-	1	-	-
Instrument Panel Compartment Lamp Ground	-	1	-	-
Sunshade - Left Ground	-	1	-	-
Sunshade - Right Ground	-	1	-	-
1. Courtesy Lamps Malfunction				

Circuit/System Description

The body control module (BCM) supplies battery voltage to the dome/reading lamps, left and right sunshade lamps, and instrument panel compartment lamp via the courtesy lamp control circuit. When the instrument panel compartment or a sunshade mirror is opened, the switch contact close allowing battery voltage to flow illuminating the respective lamps. The front reading lamps are controlled by individual switches that are activated by the operator when additional cabin lighting is required. In the event that any of these courtesy lamps were to remain illuminated for more than 10 minutes with the ignition switch in the OFF position and no doors opened, the BCM will deactivate the courtesy lamp control circuit to prevent total battery discharge.

Reference Information

Schematic Reference

- **Interior Lights Schematics**
- **Body Control System Schematics**

Connector End View Reference

Component Connector End Views

Description and Operation

Interior Lighting Systems 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 X5 harness connector at the K9 body control module, ignition ON.
2. Verify a test lamp illuminates between the B+ circuit terminal 4 and ground.
 - **If the test lamp does not illuminate and the circuit fuse is good**
 1. Ignition OFF, disconnect the X2 harness connector at the X50A fuse block - underhood.
 2. Test for less than 2 ohms in the B+ circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, verify the fuse is not open and there is voltage at the fuse.
 - **If the test lamp does not illuminate and the circuit fuse is open**
 1. Ignition OFF, disconnect the X2 harness connector at the X50A fuse block - underhood.
 2. Test for infinite resistance between the B+ circuit and ground.
 - If less than infinite resistance, repair the short to ground on the circuit.
 - If infinite resistance, replace the K9 body control module.
 - **If the test lamp illuminates**
3. Ignition OFF, connect the X5 harness connector at the K9 body control module.
4. Ignition OFF, scan tool disconnected, all doors closed, all accessories OFF, disconnect the harness connector at the inoperative courtesy lamp. It may take up to 2 minutes for all vehicle systems to power down.
5. Test for less than 15 ohms between the appropriate ground circuit terminal listed below and ground.

- E37EL dome/reading lamps - front overhead console left - terminal B
 - E37ER dome/reading lamps - front overhead console right - terminal B
 - E37R dome/reading lamps - rear - terminal 6
 - E27 instrument panel compartment lamp - terminal 2
 - A3L sunshade - left - terminal B
 - A3R sunshade - right - terminal B
 - **If 15 ohms or greater**
1. Ignition OFF.
 2. Test for less than 2 ohms in the ground circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, repair the open/high resistance in the ground connection.
 - **If less than 15 ohms**
6. Connect a test lamp between the appropriate control circuit terminal listed below and ground.
 - E37EL dome/reading lamps - front overhead console left - terminal A
 - E37ER dome/reading lamps - front overhead console right - terminal A
 - E37R dome/reading lamps - rear - terminal 1
 - E27 instrument panel compartment lamp - terminal 1
 - A3L sunshade - left - terminal A
 - A3R sunshade - right - terminal A
 7. Verify the test lamp turns ON and OFF when commanding the Inadvertent Load ON and OFF with a scan tool.
 - **If the test lamp is always OFF**
 1. Ignition OFF, disconnect the X7 harness connector at the K9 body control module.
 2. Test for infinite resistance between the control circuit and ground.
 - If less than infinite resistance, repair the short to ground on the circuit.
 - If infinite resistance
 3. Test for less than 2 ohms in the control circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, replace the K9 body control module.
 - **If the test lamp is always ON**
 1. Ignition OFF, disconnect the X7 harness connector at the K9 body control module, ignition ON.
 2. Test for less than 1 V between the control circuit terminal and ground.
 - If 1 V or greater, repair the short to voltage on the circuit.
 - If less than 1 V, replace the K9 body control module.
 - **If the test lamp turns ON and OFF**
 8. Test or replace the appropriate courtesy lamp.

Repair Instructions

Perform the **Diagnostic Repair Verification** after completing the repair.

- **Instrument Panel Compartment Lamp Replacement**
- **Sunshade Replacement**
- **Dome and Reading Lamp Replacement**
- **Control Module References** for BCM replacement, programming, and setup

DAYTIME RUNNING LAMPS MALFUNCTION (WITH T4A)

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
F8DA (BCM 3) Fuse B+	B2575 01, B2575 04	B2575 01, B2575 04	-	-
F9DA (BCM 4) Fuse B+	B2699 01, B2699 04	B2699 01, B2699 04	-	-
Ambient Light Sensor Signal	B2645 03	B2645 07	B2645 07	-
Low Beam Headlamp Control - Left (T4A)	B2575 02	B2575 01, B2575 04	1	-
Low Beam Headlamp Control - Right (T4A)	B2699 02	B2699 01, B2699 04	1	-
Park/Daytime Running Lamp Control - Left (T4F)	2	2	2	-
Park/Daytime Running Lamp Control - Right (T4F)	2	2	2	-
Ambient Light Sensor Low Reference (CJ2/C68)	2	B2645 07, B0163 05, B0183 05	2	-
Ambient Light Sensor Ground (C67)	-	B2645 07	-	-
Headlamp Ground - Left	-	1	-	-
Headlamp Ground - Right	-	1	-	-
1. Headlamps Malfunction 2. Daytime Running Lamps Malfunction				

Circuit/System Description

With Manual HVAC

The ambient light sensor is used to monitor outside lighting conditions. The ambient light sensor provides a voltage signal that will vary between 0.2 and 4.9 volts depending on outside lighting conditions. The body control module (BCM) provides a 5-volt reference signal to the ambient light sensor which is permanently grounded at G203. The BCM monitors the ambient light sensor signal circuit to determine if outside lighting conditions are correct for either daytime running lights (DRL) or automatic lamp control (ALC) when the headlamp switch is in the AUTO position. In daylight conditions the BCM will command the DRLs ON. During low light conditions the BCM will command the low beam headlamps ON. Any function or condition that turns on the headlamps will cancel DRL operation.

With Automatic HVAC

The ambient light sensor is used to monitor outside lighting conditions. The ambient light sensor provides a voltage signal that will vary between 0.2 and 4.9 volts depending on outside lighting conditions. The body control module (BCM) provides a 5-volt reference signal to the ambient light sensor and the HVAC control module provides a low reference ground. The BCM monitors the ambient light sensor signal circuit to determine if outside lighting conditions are correct for either daytime running lights (DRL) or automatic lamp control (ALC) when the headlamp switch is in the AUTO position. In daylight conditions the BCM will command the DRLs ON. During low light conditions the BCM will command the low beam headlamps ON. Any function or condition that turns on the headlamps will cancel DRL operation.

Reference Information

Schematic Reference

Headlights/Daytime Running Lights (DRL) Schematics

Connector End View Reference

Component Connector End Views

Description and Operation

Exterior Lighting Systems 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.
2. Verify the low beam headlamps turn ON & OFF when commanding the Low Beam Headlamps ON and OFF with a scan tool.

- **If the low beam headlamps do not turn ON and OFF**

Refer to **Headlamps Malfunction**.

- **If the low beam headlamps turn ON and OFF**

3. Ignition ON, park brake released.
4. Verify the scan tool BCM Park Brake Status parameter displays Released.

- **If the park brake status parameter does not display Released**

Refer to **Brake Warning Indicator Malfunction** .

- **If the parameter displays Released**

5. Refer to Circuit/System Testing below.

Circuit/System Testing

With C67

1. Ignition OFF, scan tool disconnected, all doors closed, all accessories OFF, disconnect the harness connector at the B10B ambient light/sunload sensor. It may take up to 2 minutes for all vehicle systems to power down.
2. Test for less than 5 ohms between the ground circuit terminal 6 and ground.
 - **If 5 ohms or greater**
 1. Ignition OFF.
 2. Test for less than 2 ohms in the ground circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, repair the open/high resistance in the ground connection.
 - **If less than 5 ohms**
3. Ignition ON.
4. Verify the scan tool Ambient Light Sensor parameter is greater than 4.65 V.
 - **If 4.65 V or less**
 1. Ignition OFF, disconnect the X2 harness connector at the K9 body control module.
 2. Test for infinite resistance between the signal circuit terminal 5 and ground.
 - If less than infinite resistance, repair the short to ground on the circuit.
 - If infinite resistance, replace the K9 body control module.
 - **If greater than 4.65 V**
5. Install a 3 A fused jumper wire between the signal circuit terminal 5 and the low reference circuit

terminal 6.

6. Verify the scan tool Ambient Light Sensor parameter is less than 0.196 V.
 - **If 0.196 V or greater**
 1. Ignition OFF, disconnect the X2 harness connector at the K9 body control module, ignition ON.
 2. Test for less than 1 V between the signal circuit terminal 5 and ground.
 - If 1 V or greater, repair the short to voltage on the circuit.
 - If less than 1 V
 3. Test for less than 2 ohms in the signal circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, replace the K9 body control module.
 - **If less than 0.196 V**
7. Test or replace the B10B ambient light/sunload sensor.

With CJ2/C68

1. Ignition OFF, scan tool disconnected, all doors closed, all accessories OFF, disconnect the harness connector at the B10B ambient light/sunload sensor. It may take up to 2 minutes for all vehicle systems to power down.
2. Test for less than 25 ohms between the low reference circuit terminal 6 and ground.
 - **If 25 ohms or greater**
 1. Ignition OFF, disconnect the X1 harness connector at the K33 HVAC control module.
 2. Test for less than 2 ohms in the low reference circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, replace the K33 HVAC control module.
 - **If less than 25 ohms**
3. Ignition ON.
4. Verify the scan tool Ambient Light Sensor parameter is greater than 4.65 V.
 - **If 4.65 V or less**
 1. Ignition OFF, disconnect the X2 harness connector at the K9 body control module.
 2. Test for infinite resistance between the signal circuit terminal 5 and ground.
 - If less than infinite resistance, repair the short to ground on the circuit.
 - If infinite resistance, replace the K9 body control module.
 - **If greater than 4.65 V**
5. Install a 3 A fused jumper wire between the signal circuit terminal 5 and the low reference circuit terminal 6.
6. Verify the scan tool Ambient Light Sensor parameter is less than 0.196 V.
 - **If 0.196 V or greater**
 1. Ignition OFF, disconnect the X2 harness connector at the K9 body control module, ignition ON.
 2. Test for less than 1 V between the signal circuit terminal 5 and ground.

- If 1 V or greater, repair the short to voltage on the circuit.
- If less than 1 V
- 3. Test for less than 2 ohms in the signal circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, replace the K9 body control module.
- **If less than 0.196 V**
- 7. Test or replace the B10B ambient light/sunload sensor.

Repair Instructions

Perform the **Diagnostic Repair Verification** after completing the repair.

- **Sun Load Temperature Sensor Replacement**
- **Control Module References** for BCM or HVAC Control Module replacement, programming, and setup

DAYTIME RUNNING LAMPS MALFUNCTION (WITH T4F)

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
F8DA (BCM 3) Fuse B+	B2575 01, B2575 04	B2575 01, B2575 04	-	-
F9DA (BCM 4) Fuse B+	B2699 01, B2699 04	B2699 01, B2699 04	-	-
Ambient Light Sensor Signal	B2645 03	B2645 07	B2645 07	-
Low Beam Headlamp Control - Left (T4A)	B2575 02	B2575 01, B2575 04	1	-
Low Beam Headlamp Control - Right (T4A)	B2699 02	B2699 01, B2699 04	1	-
Park/Daytime Running Lamp Control - Left (T4F)	2	2	2	-
Park/Daytime Running Lamp Control - Right (T4F)	2	2	2	-
Ambient Light Sensor Low Reference (CJ2/C68)	2	B2645 07, B0163 05, B0183 05	2	-

Ambient Light Sensor Ground (C67)	-	B2645 07	-	-
Headlamp Ground - Left	-	1	-	-
Headlamp Ground - Right	-	1	-	-
1. Headlamps Malfunction 2. Daytime Running Lamps Malfunction				

Circuit/System Description

With Manual HVAC

The ambient light sensor is used to monitor outside lighting conditions. The ambient light sensor provides a voltage signal that will vary between 0.2 and 4.9 volts depending on outside lighting conditions. The body control module (BCM) provides a 5-volt reference signal to the ambient light sensor which is permanently grounded at G203. The BCM monitors the ambient light sensor signal circuit to determine if outside lighting conditions are correct for either daytime running lights (DRL) or automatic lamp control (ALC) when the headlamp switch is in the AUTO position. In daylight conditions the BCM will command the DRLs ON. During low light conditions the BCM will command the low beam headlamps ON. Any function or condition that turns on the headlamps will cancel DRL operation.

With Automatic HVAC

The ambient light sensor is used to monitor outside lighting conditions. The ambient light sensor provides a voltage signal that will vary between 0.2 and 4.9 volts depending on outside lighting conditions. The body control module (BCM) provides a 5-volt reference signal to the ambient light sensor and the HVAC control module provides a low reference ground. The BCM monitors the ambient light sensor signal circuit to determine if outside lighting conditions are correct for either daytime running lights (DRL) or automatic lamp control (ALC) when the headlamp switch is in the AUTO position. In daylight conditions the BCM will command the DRLs ON. During low light conditions the BCM will command the low beam headlamps ON. Any function or condition that turns on the headlamps will cancel DRL operation.

Reference Information

Schematic Reference

Headlights/Daytime Running Lights (DRL) Schematics

Connector End View Reference

Component Connector End Views

Description and Operation

Exterior Lighting Systems 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.
2. Verify the left park/daytime running lamp turns ON & OFF when commanding the Left Park Lamps ON and OFF with a scan tool.
 - **If the left park/daytime running lamp does not turn ON and OFF**
Refer to Daytime Running Lamps Malfunction below.
 - **If the left park/daytime running lamp turns ON and OFF**
3. Verify the right park/daytime running lamp turns ON & OFF when commanding the Right Park Lamps ON and OFF with a scan tool.
 - **If the right park/daytime running lamp does not turn ON and OFF**
Refer to Daytime Running Lamps Malfunction below.
 - **If the right park/daytime running lamp turns ON and OFF**
4. Ignition ON, park brake released.
5. Verify the scan tool BCM Park Brake Status parameter displays Released.
 - **If the park brake status parameter does not display Released**
Refer to Brake Warning Indicator Malfunction .
 - **If the parameter displays Released**
6. Refer to Ambient Light Sensor Malfunction below.

Circuit/System Testing

Daytime Running Lamps Malfunction

1. Ignition OFF, exterior lamps OFF, remove the appropriate E4A park/daytime running lamp bulb.
2. Test for less than 15 ohms between the appropriate ground circuit terminal listed below and ground.
 - E4AC park/daytime running lamp - left terminal B
 - E4AD park/daytime running lamp - right terminal B

- **If 15 ohms or greater**
 1. Ignition OFF.
 2. Test for less than 2 ohms in the ground circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, repair the open/high resistance in the ground connection.
- **If less than 15 ohms**
- 3. Connect a test lamp between the appropriate control circuit terminal listed below and ground, ignition ON.
 - E4AC park/daytime running lamp - left terminal A
 - E4AD park/daytime running lamp - right terminal A
- 4. Verify the test lamp turns ON and OFF when commanding the appropriate Park Lamps ON and OFF with a scan tool.
 - **If the test lamp is always OFF**
 1. Ignition OFF, disconnect the X4 harness connector at the K9 body control module.
 2. Test for infinite resistance between the control circuit and ground.
 - If less than infinite resistance, repair the short to ground on the circuit.
 - If infinite resistance
 3. Test for less than 2 ohms in the control circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, replace the K9 body control module.
 - **If the test lamp is always ON**
 1. Ignition OFF, disconnect the X4 harness connector at the K9 body control module, ignition ON.
 2. Test for less than 1 V between the control circuit terminal and ground.
 - If 1 V or greater, repair the short to voltage on the circuit.
 - If less than 1 V, replace the K9 body control module.
 - **If the test lamp turns ON and OFF**
- 5. Test or replace the E4A park/daytime running lamp bulb.

Ambient Light Sensor Malfunction - with C67

1. Ignition OFF, scan tool disconnected, all doors closed, all accessories OFF, disconnect the harness connector at the B10B ambient light/sunload sensor. It may take up to 2 minutes for all vehicle systems to power down.
2. Test for less than 5 ohms between the ground circuit terminal 6 and ground.
 - **If 5 ohms or greater**
 1. Ignition OFF.
 2. Test for less than 2 ohms in the ground circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, repair the open/high resistance in the ground connection.

- **If less than 5 ohms**
- 3. Ignition ON.
- 4. Verify the scan tool Ambient Light Sensor parameter is greater than 4.65 V.
 - **If 4.65 V or less**
 1. Ignition OFF, disconnect the X2 harness connector at the K9 body control module.
 2. Test for infinite resistance between the signal circuit terminal 5 and ground.
 - If less than infinite resistance, repair the short to ground on the circuit.
 - If infinite resistance, replace the K9 body control module.
 - **If greater than 4.65 V**
- 5. Install a 3 A fused jumper wire between the signal circuit terminal 5 and the low reference circuit terminal 6.
- 6. Verify the scan tool Ambient Light Sensor parameter is less than 0.196 V.
 - **If 0.196 V or greater**
 1. Ignition OFF, disconnect the X2 harness connector at the K9 body control module, ignition ON.
 2. Test for less than 1 V between the signal circuit terminal 5 and ground.
 - If 1 V or greater, repair the short to voltage on the circuit.
 - If less than 1 V
 3. Test for less than 2 ohms in the signal circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, replace the K9 body control module.
 - **If less than 0.196 V**
- 7. Test or replace the B10B ambient light/sunload sensor.

Ambient Light Sensor Malfunction - with CJ2/C68

1. Ignition OFF, scan tool disconnected, all doors closed, all accessories OFF, disconnect the harness connector at the B10B ambient light/sunload sensor. It may take up to 2 minutes for all vehicle systems to power down.
2. Test for less than 25 ohms between the low reference circuit terminal 6 and ground.
 - **If 25 ohms or greater**
 1. Ignition OFF, disconnect the X1 harness connector at the K33 HVAC control module.
 2. Test for less than 2 ohms in the low reference circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, replace the K33 HVAC control module.
 - **If less than 25 ohms**
3. Ignition ON.
4. Verify the scan tool Ambient Light Sensor parameter is greater than 4.65 V.
 - **If 4.65 V or less**
 1. Ignition OFF, disconnect the X2 harness connector at the K9 body control module.

2. Test for infinite resistance between the signal circuit terminal 5 and ground.
 - If less than infinite resistance, repair the short to ground on the circuit.
 - If infinite resistance, replace the K9 body control module.
 - **If greater than 4.65 V**
5. Install a 3 A fused jumper wire between the signal circuit terminal 5 and the low reference circuit terminal 6.
6. Verify the scan tool Ambient Light Sensor parameter is less than 0.196 V.
 - **If 0.196 V or greater**
 1. Ignition OFF, disconnect the X2 harness connector at the K9 body control module, ignition ON.
 2. Test for less than 1 V between the signal circuit terminal 5 and ground.
 - If 1 V or greater, repair the short to voltage on the circuit.
 - If less than 1 V
 3. Test for less than 2 ohms in the signal circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, replace the K9 body control module.
 - **If less than 0.196 V**
7. Test or replace the B10B ambient light/sunload sensor.

Repair Instructions

Perform the **Diagnostic Repair Verification** after completing the repair.

- **Sun Load Temperature Sensor Replacement**
- **Daytime Running Lamp Bulb Replacement (Base), Daytime Running Lamp Bulb Replacement (HID)**
- **Control Module References** for BCM or HVAC Control Module replacement, programming, and setup

DOME LAMPS 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
F32UA (BCM 6) Fuse B+	1	1	-	-
Dome Lamps Control - Terminal 1 X7	1	1	1	-

Dome Lamp Switch Cancel Signal	2	2	2	-
Dome Lamp Switch ON Signal	2	2	2	-
Dome Lamp Switch Ground	-	1, 2	-	-
1. Dome Lamps Malfunction 2. Dome Lamp Switch Malfunction				

Circuit/System Description

The dome lamp switch has 3 positions: DOOR, OFF, and ON. The ON position provides a ground for continuous operation and the dome lamp will remain illuminated until the switch is placed in either the DOOR or OFF position. When in the DOOR position, the dome lamp operation is controlled by the body control module (BCM). When any door is opened, the door ajar switch contacts close and the BCM receives a door-open input. The BCM illuminates the dome lamp when any door is opened or a door lock/unlock request is activated with the key fob. After all doors have been closed, the dome lamp will remain illuminated approximately 3 seconds after the last door closes. When the driver places the dome lamp switch in the OFF position, the dome lamp will be disabled. In the event that the dome lamp were to remain illuminated for more than 10 minutes with the ignition switch in the OFF position and no doors opened, the BCM will deactivate the dome lamp control circuit to prevent total battery discharge.

Reference Information

Schematic Reference

- Interior Lights Schematics
- Body Control System Schematics

Connector End View Reference

Component Connector End Views

Description and Operation

Interior Lighting Systems 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.
2. Verify the scan tool Door Ajar Sw. parameter changes between Active and Inactive while opening and closing each vehicle door.

- **If the parameter does not change**

Refer to **Door Ajar Indicator Malfunction** .

- **If the parameter changes**

3. Verify the scan tool Interior/Courtesy Lighting Master Switch parameter changes between Door, On, and Cancel while placing the dome lamp switch in the Door, On, and Cancel positions.

- **If the parameter does not change**

Refer to Dome Lamp Switch Malfunction below.

- **If the parameter changes**

4. Verify all front and rear reading lamps, sunshade lamps, and glove box lamp turn ON and OFF while commanding the Inadvertent Load ON and OFF with a scan tool.

- **If the front and rear reading lamps, sunshade lamps, and glove box lamp do not turn ON and OFF**

Refer to **Courtesy Lamps Malfunction**.

- **If the front and rear reading lamps, sunshade lamps, and glove box lamp turn ON and OFF**

5. Verify the dome lamps turn ON and OFF while commanding the Courtesy Lamps ON and OFF with a scan tool.

- **If the dome lamps do not turn ON and OFF**

Refer to Dome Lamps Malfunction below.

- **If the dome lamps turn ON and OFF**

6. All OK.

Circuit/System Testing

Dome Lamp Switch Malfunction

1. Ignition OFF, exterior lamps OFF, disconnect the harness connector at the S12 dome lamp switch. It may take up to 2 minutes for all vehicle systems to power down.
2. Test for less than 15 ohms between the ground circuit terminal 1 and ground.
 - **If 15 ohms or greater**

1. Ignition OFF.
2. Test for less than 2 ohms in the ground circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, repair the open/high resistance in the ground connection.
 - **If less than 15 ohms**
3. Ignition ON.
4. Verify the scan tool Interior/Courtesy Lighting Master Switch parameter is Door.
 - **If Cancel**
 1. Ignition OFF, disconnect the X1 harness connector at the K9 body control module.
 2. Test for infinite resistance between the signal circuit terminal 2 and ground.
 - If less than infinite resistance, repair the short to ground on the circuit.
 - If infinite resistance, replace the K9 body control module.
 - **If On**
 1. Ignition OFF, disconnect the X7 harness connector at the K9 body control module.
 2. Test for infinite resistance between the signal circuit terminal 3 and ground.
 - If less than infinite resistance, repair the short to ground on the circuit.
 - If infinite resistance, replace the K9 body control module.
 - **If Door**
5. Install a 3 A fused jumper wire between the signal circuit terminal 2 and the ground circuit terminal 1.
6. Verify the scan tool Interior/Courtesy Lighting Master Switch parameter is Cancel.
 - **If not Cancel**
 1. Ignition OFF, disconnect the X1 harness connector at the K9 body control module, ignition ON.
 2. Test for less than 1 V between the signal circuit terminal 2 and ground.
 - If 1 V or greater, repair the short to voltage on the circuit.
 - If less than 1 V
 3. Test for less than 2 ohms in the signal circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, replace the K9 body control module.
 - **If Cancel**
7. Install a 3 A fused jumper wire between the signal circuit terminal 3 and the ground circuit terminal 1.
8. Verify the scan tool Interior/Courtesy Lighting Master Switch parameter is On.
 - **If not On**
 1. Ignition OFF, disconnect the X7 harness connector at the K9 body control module, ignition ON.
 2. Test for less than 1 V between the signal circuit terminal 3 and ground.
 - If 1 V or greater, repair the short to voltage on the circuit.
 - If less than 1 V
 3. Test for less than 2 ohms in the signal circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.

- If less than 2 ohms, replace the K9 body control module.
 - **If On**
9. Test or replace the S12 dome lamp switch.

Dome Lamps Malfunction

1. Ignition OFF, disconnect the X5 harness connector at the K9 body control module, ignition ON.
2. Verify a test lamp illuminates between the B+ circuit terminal 4 and ground.
 - **If the test lamp does not illuminate and the circuit fuse is good**
 1. Ignition OFF, disconnect the X2 harness connector at the X50A fuse block - underhood.
 2. Test for less than 2 ohms in the B+ circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, verify the fuse is not open and there is voltage at the fuse.
 - **If the test lamp does not illuminate and the circuit fuse is open**
 1. Ignition OFF, disconnect the X2 harness connector at the X50A fuse block - underhood.
 2. Test for infinite resistance between the B+ circuit and ground.
 - If less than infinite resistance, repair the short to ground on the circuit.
 - If infinite resistance, replace the K9 body control module.
 - **If the test lamp illuminates**
3. Ignition OFF, connect the X5 harness connector at the K9 body control module.
4. Ignition OFF, scan tool disconnected, all doors closed, all accessories OFF, disconnect the harness connector at the inoperative E37 dome/reading lamps. It may take up to 2 minutes for all vehicle systems to power down.
5. Test for less than 15 ohms between the appropriate ground circuit terminal listed below and ground.
 - E37EL dome/reading lamps - front overhead console left - terminal B
 - E37ER dome/reading lamps - front overhead console right - terminal B
 - E37R dome/reading lamps - rear - terminal 6
 - **If 15 ohms or greater**
 1. Ignition OFF.
 2. Test for less than 2 ohms in the ground circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, repair the open/high resistance in the ground connection.
 - **If less than 15 ohms**
6. Connect a test lamp between the appropriate control circuit terminal listed below and ground.
 - E37EL dome/reading lamps - front overhead console left - terminal C
 - E37ER dome/reading lamps - front overhead console right - terminal C
 - E37R dome/reading lamps - rear - terminal 2
7. Verify the test lamp turns ON and OFF when commanding the Courtesy Lamps ON and OFF with a scan tool.

○ **If the test lamp is always OFF**

1. Ignition OFF, disconnect the X7 harness connector at the K9 body control module.
2. Test for infinite resistance between the control circuit and ground.
 - If less than infinite resistance, repair the short to ground on the circuit.
 - If infinite resistance
3. Test for less than 2 ohms in the control circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, replace the K9 body control module.

○ **If the test lamp is always ON**

1. Ignition OFF, disconnect the X7 harness connector at the K9 body control module, ignition ON.
2. Test for less than 1 V between the control circuit terminal and ground.
 - If 1 V or greater, repair the short to voltage on the circuit.
 - If less than 1 V, replace the K9 body control module.

○ **If the test lamp turns ON and OFF**

8. Test or replace the inoperative E37 dome/reading lamp.

Repair Instructions

Perform the **Diagnostic Repair Verification** after completing the repair.

- **Dome and Reading Lamp Replacement**
- **Dome and Reading Lamp Bulb Replacement**
- **Control Module References** for BCM replacement, programming, and setup

FRONT FOG LAMPS 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
Front Fog Lamp and I/P Dimmer Switch B+	B257B 03, B1405 03, B1529 03	B257B 03	2	-
Front Fog Lamp and I/P Dimmer Switch Signal	B257B 03	B257B 03	2	-
Front Fog Lamp Relay	B2530 02	B2530 04	B2530 01	-

Control				
Front Fog Lamp Control	1	1	1	-
Front Fog Lamp Ground - Left	-	1	-	-
Front Fog Lamp Ground - Right	-	1	-	-
1. Front Fog Lamps Malfunction 2. Front Fog Lamp Switch Malfunction				

Circuit/System Description

The front fog lamp switch is an input to the body control module (BCM) and is contained in the headlamp switch assembly. The BCM supplies voltage to the front fog lamp switch via the front fog lamp and I/P dimmer switch B+ circuit. When the front fog lamp switch is pressed, voltage from the B+ circuit is pulled down through the front fog lamp switch resistor. The front fog lamp resistor is part of the resistor ladder that also provides the dimming signals for the I/P dimmer switches. The BCM receives the voltage signal through the front fog lamp and I/P dimmer switch signal circuit.

The front fog lamp relay is supplied with battery voltage at all times. The front fog lamp switch signal circuit is grounded momentarily by pressing the front fog lamp switch. The body control module (BCM) energizes the front fog lamp relay by applying ground to the front fog lamp relay control circuit. When the front fog lamp relay is energized, the relay switch contacts close and battery voltage is applied through the front fog lamp fuse to the front fog lamp control circuit which illuminates the front fog lamps.

Reference Information

Schematic Reference

Fog Lights Schematics

Connector End View Reference

Component Connector End Views

Description and Operation

Exterior Lighting Systems 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, headlamps ON.
2. Verify the scan tool Front Fog Lamps Switch parameter changes between Active and Inactive while commanding the front fog lamps ON and OFF with the front fog lamp switch.

- **If the parameter does not change**

Refer to Front Fog Lamp Switch Malfunction below.

- **If the parameter changes**

3. Verify the front fog lamps turn ON and OFF when commanding the Front Fog Lamps ON and OFF with a scan tool.

- **If the front fog lamps do not turn ON and OFF**

Refer to Front Fog Lamps Malfunction below.

- **If the front fog lamps turn ON and OFF**

4. Verify the front fog lamp indicator on the instrument cluster turns ON and OFF while commanding the front fog lamps ON and OFF with the front fog lamp switch.

- **If the front fog lamp indicator does not turn ON and OFF**

Refer to Front Fog Lamp Indicator Malfunction below.

- **If the front fog lamp indicator turns ON and OFF**

5. All OK.

Circuit/System Testing

Front Fog Lamp Switch Malfunction

1. Ignition OFF and all vehicle systems OFF, disconnect the harness connector at the S30 Headlamp Switch, ignition ON.
2. Test for B+ between the B+ circuit terminal 1 and ground.
 - **If less than B+**
 1. Ignition OFF, disconnect the X3 harness connector at the K9 Body Control Module.
 2. Test for infinite resistance between the B+ circuit and ground.
 - If less than infinite resistance, repair the short to ground on the circuit.
 - If infinite resistance
 3. Test for less than 2 ohms in the B+ circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, replace the K9 Body Control Module.

- **If B+**
- 3. Verify a test lamp does not illuminate between the B+ circuit terminal 1 and the signal circuit terminal 12.
 - **If the test lamp illuminates**
 1. Ignition OFF, disconnect the X1 harness connector at the K9 Body Control Module.
 2. Test for infinite resistance between the signal circuit and ground.
 - If less than infinite resistance, repair the short to ground on the circuit.
 - If infinite resistance, replace the K9 Body Control Module.
 - **If the test lamp does not illuminate**
- 4. Test for B+ between the B+ circuit terminal 1 and the signal circuit terminal 12.
 - **If less than B+**
 1. Ignition OFF, disconnect the X1 harness connector at the K9 Body Control Module, ignition ON.
 2. Test for less than 1 V between the signal circuit terminal 12 and ground.
 - If 1 V or greater, repair the short to voltage on the circuit.
 - If less than 1 V
 3. Test for less than 2 ohms in the signal circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, replace the K9 Body Control Module.
 - **If B+**
- 5. Test or replace the S30 Headlamp Switch.

Front Fog Lamps Malfunction

1. Ignition OFF, disconnect the X5 harness connector at the K9 Body Control Module, ignition ON.
2. Verify a test lamp illuminates between the control circuit terminal 10 and ground.
 - **If the test lamp does not illuminate**
 1. Ignition OFF, disconnect the X2 harness connector at the X50A Fuse Block - Underhood.
 2. Test for infinite resistance between the control circuit terminal and ground.
 - If less than infinite resistance, repair the short to ground on the circuit.
 - If infinite resistance
 3. Test for less than 2 ohms in the control circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, replace the X50A Fuse Block - Underhood.
 - **If the test lamp illuminates**
3. Ignition OFF, remove the front fog lamp at the X50A Fuse Block - Underhood.
4. Connect a 3 A fused jumper between the control circuit terminal 10 and ground, ignition ON.
5. Verify a test lamp illuminates between the front fog lamp B+ switch control terminal and ground.
 - **If the test lamp does not illuminate**
 1. Ignition OFF, disconnect the X2 harness connector at the X50A Fuse Block - Underhood, ignition ON.

2. Test for less than 1 V between the control circuit terminal 10 and ground.
 - If 1 V or greater, repair the short to voltage on the circuit.
 - If less than 1 V, replace the X50A Fuse Block - Underhood.
 - **If the test lamp illuminates**
6. Ignition OFF, connect the X5 harness connector at the K9 Body Control Module.
7. Install the front fog lamp at the X50A Fuse Block - Underhood.
8. Ignition OFF, exterior lamps OFF, disconnect the harness connector at the appropriate E29 Fog Lamp.
9. Test for less than 10 ohms between the ground circuit terminal 2 and ground.
 - **If 10 ohms or greater**
 - 1. Ignition OFF.
 - 2. Test for less than 2 ohms in the ground circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, repair the open/high resistance in the ground connection.
 - **If less than 10 ohms**
10. Connect a test lamp between the control circuit terminal 1 and ground, ignition ON.
11. Verify the test lamp turns ON and OFF when commanding the Front Fog Lamps ON and OFF with a scan tool.
 - **If the test lamp is always OFF**
 - 1. Ignition OFF, disconnect the X1 harness connector at the X50A Fuse Block - Underhood.
 - 2. Test for infinite resistance between the control circuit and ground.
 - If less than infinite resistance, repair the short to ground on the circuit.
 - If infinite resistance
 - 3. Test for less than 2 ohms in the control circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, replace the K9 Body Control Module.
 - **If the test lamp is always ON**
 - 1. Ignition OFF, disconnect the X1 harness connector at the X50A Fuse Block - Underhood, ignition ON.
 - 2. Test for less than 1 V between the control circuit terminal and ground.
 - If 1 V or greater, repair the short to voltage on the circuit.
 - If less than 1 V, replace the K9 Body Control Module.
 - **If the test lamp turns ON and OFF**
12. Test or replace the appropriate E29 Fog Lamp.

Front Fog Lamp Indicator Malfunction

1. Ignition ON.
2. Verify the front fog lamp indicator turns ON and OFF when commanding the Instrument Cluster All Indicators Test ON and OFF with a scan tool.

- If the front fog lamp indicator is always OFF or remains ON

Replace the P16 Instrument Cluster.

- If the front fog lamp indicator turns ON and OFF

3. Replace the K9 Body Control Module.

Repair Instructions

Perform the **Diagnostic Repair Verification** after completing the repair.

- **Headlamp Switch Replacement**
- **Front Fog Lamp Bulb Replacement**
- **Front Compartment Fuse Block Replacement**
- **Control Module References** for BCM or Instrument Cluster replacement, programming, and setup

HAZARD LAMPS 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
Hazard Warning Switch Signal	1	1	1	B3596 00
Hazard Warning Switch LED Backlighting Control	2	2	2	-
Hazard Warning Switch Ground	-	1	-	-
1. Hazard Lamps Malfunction 2. Hazard Warning Switch Backlighting Malfunction				

Circuit/System Description

The hazard flashers may be activated in any power mode. The hazard warning switch signal circuit is momentarily grounded when the hazard warning switch is pressed. The body control module (BCM) responds to the hazard warning switch signal input by supplying battery voltage to all four turn signal lamps in an ON and OFF duty cycle. When the hazard warning switch is activated, the BCM sends a serial data message to the instrument cluster requesting both turn signal indicators to be cycled ON and OFF.

The instrument panel dimmer switch controls are located on the headlamp switch assembly and are used to increase and decrease the brightness of the interior backlighting components. When the instrument panel dimmer switch is placed in a desired brightness position, the body control module (BCM) receives a signal from the instrument panel dimmer switch and responds by applying a pulse width modulated (PWM) voltage to the hazard switch LED backlighting control circuit illuminating the LED to the desired level of brightness.

Reference Information

Schematic Reference

Exterior Lights Schematics

Connector End View Reference

Component Connector End Views

Description and Operation

Exterior Lighting Systems 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.
2. Verify the scan tool Hazard Lamps Switch parameter changes between Active and Inactive while commanding the hazard lamps ON and OFF with the hazard warning switch.
 - **If the parameter does not change**

Refer to Hazard Warning Switch Malfunction below.
 - **If the parameter changes**
3. Verify all left and right turn signal lamps turn ON and OFF while commanding the hazard lamps ON and OFF with the hazard warning switch.
 - **If all turn signal lamps do not turn ON and OFF**

Refer to Turn Signal Lamps and/or Indicators Malfunction

- **If all turn signal lamps turn ON and OFF**
- 4. Verify the hazard warning switch backlighting turns ON and OFF while commanding the Hazard Lamps Switch Backlight ON and OFF with a scan tool.

- **If the hazard warning switch backlighting does not turn ON and OFF**

Refer to Hazard Warning Switch Backlighting Malfunction below.

- **If the hazard warning switch backlighting turns ON and OFF**
5. All OK.

Circuit/System Testing

Hazard Warning Switch Malfunction

1. Ignition OFF, scan tool disconnected, all doors closed, all accessories OFF, disconnect the harness connector at the S48C multifunction switch 1 - instrument panel. It may take up to 2 minutes for all vehicle systems to power down.
2. Test for less than 10 ohms between the ground circuit terminal 7 and ground.
 - **If 10 ohms or greater**
 1. Ignition OFF.
 2. Test for less than 2 ohms in the ground circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, repair the open/high resistance in the ground connection.
 - **If less than 10 ohms**
3. Ignition ON.
4. Verify the scan tool Hazard Lamps Switch parameter is Inactive.
 - **If not Inactive**
 1. Ignition OFF, disconnect the X2 harness connector at the K9 body control module.
 2. Test for infinite resistance between the signal circuit terminal 10 and ground.
 - If less than infinite resistance, repair the short to ground on the circuit.
 - If infinite resistance, replace the K9 body control module.
 - **If Inactive**
5. Install a 3 A fused jumper wire between the signal circuit terminal 10 and the ground circuit terminal 7.
6. Verify the scan tool Hazard Lamps Switch parameter is Active.
 - **If not Active**
 1. Ignition OFF, disconnect the X2 harness connector at the K9 body control module, ignition ON.
 2. Test for less than 1 V between the signal circuit terminal 10 and ground.
 - If 1 V or greater, repair the short to voltage on the circuit.
 - If less than 1 V
 3. Test for less than 2 ohms in the signal circuit end to end.

- If 2 ohms or greater, repair the open/high resistance in the circuit.
- If less than 2 ohms, replace the K9 body control module.

- **If Active**

7. Test or replace the S48C multifunction switch 1 - instrument panel.

Hazard Warning Switch Backlighting Malfunction

1. Ignition OFF, scan tool disconnected, all doors closed, all accessories OFF, disconnect the harness connector at the S48C multifunction switch 1 - instrument panel. It may take up to 2 minutes for all vehicle systems to power down.
2. Test for less than 10 ohms between the ground circuit terminal 7 and ground.
 - **If 10 ohms or greater**
 1. Ignition OFF.
 2. Test for less than 2 ohms in the ground circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, repair the open/high resistance in the ground connection.
 - **If less than 10 ohms**
3. Connect a test lamp between the control circuit terminal 5 and ground, ignition ON.
4. Verify the test lamp turns ON and OFF when commanding the Hazard Lamps Switch Backlight ON and OFF with a scan tool.
 - **If the test lamp is always OFF**
 1. Ignition OFF, disconnect the X1 harness connector at the K9 body control module.
 2. Test for infinite resistance between the control circuit and ground.
 - If less than infinite resistance, repair the short to ground on the circuit.
 - If infinite resistance
 3. Test for less than 2 ohms in the control circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, replace the K9 body control module.
 - **If the test lamp is always ON**
 1. Ignition OFF, disconnect the X1 harness connector at the K9 body control module, ignition ON.
 2. Test for less than 1 V between the control circuit terminal and ground.
 - If 1 V or greater, repair the short to voltage on the circuit.
 - If less than 1 V, replace the K9 body control module.
 - **If the test lamp turns ON and OFF**
5. Test or replace the S48C multifunction switch 1 - instrument panel.

Repair Instructions

Perform the **Diagnostic Repair Verification** after completing the repair.

- **Hazard Warning and Accessory Switch Replacement**
- **Control Module References** for BCM replacement, programming, and setup

HEADLAMPS 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
F9DA Fuse B+	B2575 01, B2575 04	B2575 01, B2575 04	-	-
F23DA Fuse B+	B2699 01, B2699 04	B2699 01, B2699 04	-	-
Headlamp High Beam Relay Control	2	2	2	-
Headlamp Low Beam Relay Control (with T4F)	B258A 02, B258A 04	B258A 02, B258A 04	B258A 01	-
Low Beam Headlamp Control - Left (with T4A)	B2575 02	B2575 01, B2575 04	1	-
Low Beam Headlamp Control - Left (with T4F)	1	1	1	-
Low Beam Headlamp Control - Right (with T4A)	B2699 02	B2699 01, B2699 04	1	-
Low Beam Headlamp Control - Right (with T4F)	1	1	1	-
High Beam Headlamp Control - Left	2	2	2	-
High Beam Headlamp Control - Right	2	2	2	-
Headlamp Switch Headlamps OFF Signal	B257A 00	3	3	-
Headlamp Switch Headlamps ON Signal	B257A 00	3	3	-
Turn Signal/Multifunction Switch Flash To Pass Signal	4	4	4	-
Turn Signal/Multifunction Switch High Beam Signal	4	4	4	-
Headlamp Ground - Left	-	1	-	-

Headlamp Ground - Right	-	1	-	-
Headlamp Switch Ground	-	3	-	-
Turn Signal/Multifunction Switch Ground	-	4	-	-
1. Headlamps Malfunction - Low Beam 2. Headlamps Malfunction - High Beam 3. Headlamp Switch Malfunction 4. Turn Signal/Multifunction Switch Malfunction				

Circuit/System Description

Low Beams - with T4A

The body control module (BCM) monitors three signal circuits from the headlamp switch. When the headlamp switch is in the AUTO position, all three signal circuits are open. When placed in the AUTO position, the BCM monitors inputs from the ambient light sensor to determine if headlamps are required or if daytime running lamps will be activated based on outside lighting conditions. When the headlamp switch is placed in the OFF position, the headlamp switch headlamps OFF signal circuit is grounded, indicating to the BCM that the exterior lamps should be turned OFF. With the headlamp switch in the PARK position, the headlamp switch park lamps ON signal circuit is grounded, indicating that the park lamps have been requested. When the headlamp switch is placed in the HEADLAMP position, both the headlamp switch park lamps ON signal circuit and the headlamp switch headlamps ON signal circuit are grounded. The BCM responds to the inputs by illuminating the park lamps and headlamps. When the low beam headlamps are requested, the BCM applies B+ to both low beam headlamp control circuits illuminating the low beam headlamps.

Low Beams - with T4F

The body control module (BCM) monitors three signal circuits from the headlamp switch. When the headlamp switch is in the AUTO position, all three signal circuits are open. When placed in the AUTO position, the BCM monitors inputs from the ambient light sensor to determine if headlamps are required or if daytime running lamps will be activated based on outside lighting conditions. When the headlamp switch is placed in the OFF position, the headlamp switch headlamps OFF signal circuit is grounded, indicating to the BCM that the exterior lamps should be turned OFF. With the headlamp switch in the PARK position, the headlamp switch park lamps ON signal circuit is grounded, indicating that the park lamps have been requested. When the headlamp switch is placed in the HEADLAMP position, both the headlamp switch park lamps ON signal circuit and the headlamp switch headlamps ON signal circuit are grounded. The BCM responds to the low beam request by applying ground to the low beam relay control circuit which energizes the low beam relay. With the low beam relay energized, the switch contacts close allowing battery voltage to flow through the low beam fuses to the low beam control circuits illuminating the low beam headlamps.

The high beam and flash to pass functions are contained within the turn signal/multifunction switch. The BCM provides the turn signal/multifunction switch with two signal circuits, the high beam signal circuit and the flash to pass signal circuit. When the low beam headlamps are ON and the turn signal/multifunction switch is placed in the high beam position, ground is applied to the BCM through the high beam signal circuit. The BCM responds to the high beam request by applying ground to the high beam relay control circuit which energizes the high beam relay. With the high beam relay energized, the switch contacts close allowing battery voltage to flow through the high beam fuses to the high beam control circuits illuminating the high beam headlamps.

When the turn signal/multifunction switch is momentarily placed in the flash to pass position, ground is applied to the BCM through the flash to pass signal circuit. The BCM responds by applying ground to the high beam relay control circuit which energizes the high beam relay illuminating the high beams for a brief moment or until the flash to pass switch is released.

Reference Information

Schematic Reference

Headlights/Daytime Running Lights (DRL) Schematics

Connector End View Reference

Component Connector End Views

Description and Operation

Exterior Lighting Systems 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.
2. Verify the scan tool Headlamps On Switch parameter changes between Active and Inactive while commanding the headlamp ON and OFF with the headlamp switch.
 - **If the parameter does not change**

Refer to Headlamp Switch Malfunction below.
 - **If the parameter changes**
3. Verify the scan tool Automatic Headlamps Disable Switch parameter changes between Active and Inactive while commanding the automatic lamp control ON and OFF with the headlamp switch.
 - **If the parameter does not change**

Refer to Headlamp Switch Malfunction below.

- **If the parameter changes**

4. Verify the scan tool Headlamps Flash Switch parameter changes between Active and Inactive while commanding the flash to pass ON and OFF with the turn signal/multifunction switch.

- **If the parameter does not change**

Refer to Turn Signal/Multifunction Switch Malfunction below.

- **If the parameter changes**

5. Verify the scan tool High Beam Select Switch parameter changes between Active and Inactive while commanding the high beams ON and OFF with the turn signal/multifunction switch.

- **If the parameter does not change**

Refer to Turn Signal/Multifunction Switch Malfunction below

- **If the parameter changes**

6. Verify the left low beam headlamp turns ON and OFF when commanding the Left Headlamp Low Beam ON and OFF with a scan tool.

- **If the left low beam headlamp does not turn ON and OFF**

Refer to Headlamps Malfunction below- Low Beam.

- **If the left low beam headlamp turns ON and OFF**

7. Verify the right low beam headlamp turns ON and OFF when commanding the Right Headlamp Low Beam ON and OFF with a scan tool.

- **If the right low beam headlamp does not turn ON and OFF**

Refer to Headlamps Malfunction below - Low Beam.

- **If the right low beam headlamp turns ON and OFF**

8. Verify the high beams turn ON and OFF when commanding the High Beams ON and OFF with a scan tool.

- **If the high beams do not turn ON and OFF**

Refer to Headlamps Malfunction below- High Beam.

- **If the high beams turn ON and OFF**

9. Verify the high beam indicator on the instrument cluster turns ON and OFF while commanding the All Indicators Test ON and OFF with a scan tool.

- **If the high beam indicator does not turn ON and OFF**

Refer to High Beam Indicator Malfunction below.

- **If the high beam indicator turns ON and OFF**

10. All OK.

Circuit/System Testing

Headlamp Switch Malfunction

1. Ignition OFF, scan tool disconnected, all doors closed, all accessories OFF, disconnect the harness connector at the S30 headlamp switch. It may take up to 2 minutes for all vehicle systems to power down.
2. Test for less than 10 ohms between the ground circuit terminal 6 and ground.
 - **If 10 ohms or greater**
 1. Ignition OFF.
 2. Test for less than 2 ohms in the ground circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, repair the open/high resistance in the ground connection.
 - **If less than 10 ohms**
3. Ignition ON.
4. Verify the scan tool Automatic Headlamps Disable Switch parameter is Inactive.
 - **If not Inactive**
 1. Ignition OFF, disconnect the X1 harness connector at the K9 body control module.
 2. Test for infinite resistance between the signal circuit terminal 5 and ground.
 - If less than infinite resistance, repair the short to ground on the circuit.
 - If infinite resistance, replace the K9 body control module.
 - **If Inactive**
5. Install a 3 A fused jumper wire between the signal circuit terminal 5 and the ground circuit terminal 6.
6. Verify the scan tool Automatic Headlamps Disable Switch parameter is Active.
 - **If not Active**
 1. Ignition OFF, disconnect the X1 harness connector at the K9 body control module, ignition ON.
 2. Test for less than 1 V between the signal circuit terminal 5 and ground.
 - If 1 V or greater, repair the short to voltage on the circuit.
 - If less than 1 V
 3. Test for less than 2 ohms in the signal circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, replace the K9 body control module.
 - **If Active**
7. Verify the scan tool Park Lamps Switch parameter is Inactive.
 - **If not Inactive**
 1. Ignition OFF, disconnect the X1 harness connector at the K9 body control module.
 2. Test for infinite resistance between the signal circuit terminal 3 and ground.
 - If less than infinite resistance, repair the short to ground on the circuit.
 - If infinite resistance, replace the K9 body control module.
 - **If Inactive**

8. Install a 3 A fused jumper wire between the signal circuit terminal 3 and the ground circuit terminal 6.
9. Verify the scan tool Park Lamps Switch parameter is Active.
 - **If not Active**
 1. Ignition OFF, disconnect the X1 harness connector at the K9 body control module, ignition ON.
 2. Test for less than 1 V between the signal circuit terminal 3 and ground.
 - If 1 V or greater, repair the short to voltage on the circuit.
 - If less than 1 V
 3. Test for less than 2 ohms in the signal circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, replace the K9 body control module.
 - **If Active**
10. Verify the scan tool Headlamps On Switch parameter is Inactive.
 - **If not Inactive**
 1. Ignition OFF, disconnect the X1 harness connector at the K9 body control module.
 2. Test for infinite resistance between the signal circuit terminal 4 and ground.
 - If less than infinite resistance, repair the short to ground on the circuit.
 - If infinite resistance, replace the K9 body control module.
 - **If Inactive**
11. Install a 3 A fused jumper wire between the signal circuit terminal 4 and the ground circuit terminal 6.
12. Verify the scan tool Headlamps On Switch parameter is Active.
 - **If not Active**
 1. Ignition OFF, disconnect the X1 harness connector at the K9 body control module, ignition ON.
 2. Test for less than 1 V between the signal circuit terminal 4 and ground.
 - If 1 V or greater, repair the short to voltage on the circuit.
 - If less than 1 V
 3. Test for less than 2 ohms in the signal circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, replace the K9 body control module.
 - **If Active**
13. Test or replace the S30 headlamp switch.

Turn Signal/Multifunction Switch Malfunction

1. Ignition OFF, scan tool disconnected, all doors closed, all accessories OFF, disconnect the harness connector at the S78 turn signal/multifunction switch. It may take up to 2 minutes for all vehicle systems to power down.
2. Test for less than 10 ohms between the ground circuit terminal 3 and ground.
 - **If 10 ohms or greater**
 1. Ignition OFF.

2. Test for less than 2 ohms in the ground circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, repair the open/high resistance in the ground connection.
 - **If less than 10 ohms**
3. Ignition ON.
4. Verify the scan tool High Beam Select Switch parameter is Inactive.
 - **If not Inactive**
 1. Ignition OFF, disconnect the X3 harness connector at the K9 body control module.
 2. Test for infinite resistance between the signal circuit terminal 2 and ground.
 - If less than infinite resistance, repair the short to ground on the circuit.
 - If infinite resistance, replace the K9 body control module.
 - **If Inactive**
5. Install a 3 A fused jumper wire between the signal circuit terminal 2 and the ground circuit terminal 3.
6. Verify the scan tool High Beam Select Switch parameter is Active.
 - **If not Active**
 1. Ignition OFF, disconnect the X3 harness connector at the K9 body control module, ignition ON.
 2. Test for less than 1 V between the signal circuit terminal 2 and ground.
 - If 1 V or greater, repair the short to voltage on the circuit.
 - If less than 1 V
 3. Test for less than 2 ohms in the signal circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, replace the K9 body control module.
 - **If Active**
7. Verify the scan tool Headlamps Flash Switch parameter is Inactive.
 - **If not Inactive**
 1. Ignition OFF, disconnect the X3 harness connector at the K9 body control module.
 2. Test for infinite resistance between the signal circuit terminal 4 and ground.
 - If less than infinite resistance, repair the short to ground on the circuit.
 - If infinite resistance, replace the K9 body control module.
 - **If Inactive**
8. Install a 3 A fused jumper wire between the signal circuit terminal 4 and the ground circuit terminal 3.
9. Verify the scan tool Headlamps Flash Switch parameter is Active.
 - **If not Active**
 1. Ignition OFF, disconnect the X3 harness connector at the K9 body control module, ignition ON.
 2. Test for less than 1 V between the signal circuit terminal 4 and ground.
 - If 1 V or greater, repair the short to voltage on the circuit.
 - If less than 1 V
 3. Test for less than 2 ohms in the signal circuit end to end.

- If 2 ohms or greater, repair the open/high resistance in the circuit.
- If less than 2 ohms, replace the K9 body control module.

- **If Active**

10. Test or replace the S78 turn signal/multifunction switch.

Headlamps Malfunction - Low Beam (with T4A)

1. Ignition OFF, exterior lamps OFF, disconnect the harness connector at the appropriate E4 headlamp - low beam.
2. Test for less than 10 ohms between the ground circuit terminal B and ground.
 - **If 10 ohms or greater**
 1. Ignition OFF.
 2. Test for less than 2 ohms in the ground circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, repair the open/high resistance in the ground connection.
 - **If less than 10 ohms**
3. Connect a test lamp between the control circuit terminal A and ground, ignition ON.
4. Verify the test lamp turns ON and OFF when commanding the appropriate Headlamp Low Beam ON and OFF with a scan tool.
 - **If the test lamp is always OFF**
 1. Ignition OFF, disconnect the X4 harness connector at the K9 body control module.
 2. Test for infinite resistance between the control circuit and ground.
 - If less than infinite resistance, repair the short to ground on the circuit.
 - If infinite resistance
 3. Test for less than 2 ohms in the control circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, replace the K9 body control module.
 - **If the test lamp is always ON**
 1. Ignition OFF, disconnect the X4 harness connector at the K9 body control module, ignition ON.
 2. Test for less than 1 V between the control circuit terminal and ground.
 - If 1 V or greater, repair the short to voltage on the circuit.
 - If less than 1 V, replace the K9 body control module.
 - **If the test lamp turns ON and OFF**
5. Test or replace the appropriate E4 headlamp - low beam.

Headlamps Malfunction - Low Beam (with T4F)

1. Ignition OFF, disconnect the X5 harness connector at the K9 body control module, ignition ON.
2. Verify a test lamp illuminates between the control circuit terminal 13 and ground.
 - **If the test lamp does not illuminate**

1. Ignition OFF, disconnect the X2 harness connector at the X50A fuse block - underhood.
2. Test for infinite resistance between the control circuit terminal and ground.
 - If less than infinite resistance, repair the short to ground on the circuit.
 - If infinite resistance
3. Test for less than 2 ohms in the control circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, replace the X50A fuse block - underhood.
- **If the test lamp illuminates**
3. Ignition OFF, connect a 3 A fused jumper between the control circuit terminal 13 and ground.
4. Remove the F50UA fuse at the X50A fuse block - underhood, ignition ON.
5. Verify a test lamp illuminates between the F50UA fuse B+ switch control terminal and ground.
 - **If the test lamp does not illuminate**
 - 1. Ignition OFF, disconnect the X2 harness connector at the X50A fuse block - underhood, ignition ON.
 - 2. Test for less than 1 V between the control circuit terminal 13 and ground.
 - If 1 V or greater, repair the short to voltage on the circuit.
 - If less than 1 V, replace the X50A fuse block - underhood.
 - **If the test lamp illuminates**
 - 6. Ignition OFF, connect the X5 harness connector at the K9 body control module.
 - 7. Install the F50UA fuse at the X50A fuse block - underhood.
 - 8. Disconnect the harness connector at the appropriate E13 headlamp.
 - 9. Test for less than 10 ohms between the ground circuit terminal 8 and ground.
 - **If 10 ohms or greater**
 - 1. Ignition OFF.
 - 2. Test for less than 2 ohms in the ground circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, repair the open/high resistance in the ground connection.
 - **If less than 10 ohms**
 - 10. Connect a test lamp between the control circuit terminal 9 and ground, ignition ON.
 - 11. Verify the test lamp turns ON and OFF when commanding the Low Beam Lamps ON and OFF with a scan tool.
 - **If the test lamp is always OFF**
 - 1. Ignition OFF, disconnect the X1 harness connector at the X50A fuse block - underhood.
 - 2. Test for infinite resistance between the control circuit and ground.
 - If less than infinite resistance, repair the short to ground on the circuit.
 - If infinite resistance
 - 3. Test for less than 2 ohms in the control circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.

- If less than 2 ohms, replace the K9 body control module.
- **If the test lamp is always ON**
- 1. Ignition OFF, disconnect the X1 harness connector at the X50A fuse block - underhood, ignition ON.
- 2. Test for less than 1 V between the control circuit terminal and ground.
 - If 1 V or greater, repair the short to voltage on the circuit.
 - If less than 1 V, replace the K9 body control module.
- **If the test lamp turns ON and OFF**
- 12. Test or replace the appropriate E13 headlamp.

Headlamps Malfunction - High Beam

1. Ignition OFF, disconnect the X5 harness connector at the K9 body control module, ignition ON.
2. Verify a test lamp illuminates between the control circuit terminal 18 and ground.
 - **If the test lamp does not illuminate**
 - 1. Ignition OFF, disconnect the X2 harness connector at the X50A fuse block - underhood.
 - 2. Test for infinite resistance between the control circuit terminal and ground.
 - If less than infinite resistance, repair the short to ground on the circuit.
 - If infinite resistance
 - 3. Test for less than 2 ohms in the control circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, replace the X50A fuse block - underhood.
 - **If the test lamp illuminates**
 - 3. Ignition OFF, connect a 3 A fused jumper between the control circuit terminal 18 and ground.
 - 4. Remove the F38UA fuse at the X50A fuse block - underhood, ignition ON.
 - 5. Verify a test lamp illuminates between the F38UA fuse B+ switch control terminal and ground.
 - **If the test lamp does not illuminate**
 - 1. Ignition OFF, disconnect the X2 harness connector at the X50A fuse block - underhood, ignition ON.
 - 2. Test for less than 1 V between the control circuit terminal 18 and ground.
 - If 1 V or greater, repair the short to voltage on the circuit.
 - If less than 1 V, replace the X50A fuse block - underhood.
 - **If the test lamp illuminates**
 - 6. Ignition OFF, connect the X5 harness connector at the K9 body control module.
 - 7. Install the F38UA fuse at the X50A fuse block - underhood.
 - 8. Disconnect the harness connector at the appropriate high beam headlamp.
 - 9. Test for less than 10 ohms between the appropriate ground circuit terminal listed below and ground.
 - E4E headlamp - left high beam terminal B (with T4A)
 - E4F headlamp - right high beam terminal B (with T4A)

- E13LA headlamp assembly - left terminal 10 (with T4F)
- E13RA headlamp assembly - right terminal 10 (with T4F)
- **If 10 ohms or greater**
- 1. Ignition OFF.
- 2. Test for less than 2 ohms in the ground circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, repair the open/high resistance in the ground connection.
- **If less than 10 ohms**
- 10. Connect a test lamp between the appropriate control circuit terminal listed below and ground, ignition ON.
 - E4E headlamp - left high beam terminal A (with T4A)
 - E4F headlamp - right high beam terminal A (with T4A)
 - E13LA headlamp assembly - left terminal 11 (with T4F)
 - E13RA headlamp assembly - right terminal 11 (with T4F)
- 11. Verify the test lamp turns ON and OFF when commanding the High Beams ON and OFF with a scan tool.
 - **If the test lamp is always OFF**
 - 1. Ignition OFF, disconnect the X1 harness connector at the X50A fuse block - underhood.
 - 2. Test for infinite resistance between the control circuit and ground.
 - If less than infinite resistance, repair the short to ground on the circuit.
 - If infinite resistance
 - 3. Test for less than 2 ohms in the control circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, replace the K9 body control module.
 - **If the test lamp is always ON**
 - 1. Ignition OFF, disconnect the X1 harness connector at the X50A fuse block - underhood, ignition ON.
 - 2. Test for less than 1 V between the control circuit terminal and ground.
 - If 1 V or greater, repair the short to voltage on the circuit.
 - If less than 1 V, replace the K9 body control module.
 - **If the test lamp turns ON and OFF**
- 12. Test or replace the appropriate high beam headlamp.

High Beam Indicator Malfunction

1. Ignition ON.
2. Verify the high beam indicator turns ON and OFF when commanding the Instrument Cluster All Indicators Test ON and OFF with a scan tool.
 - **If the high beam indicator is always OFF or remains ON**

Replace the P16 instrument cluster.

- If the high beam indicator turns ON and OFF

3. Replace the K9 body control module.

Repair Instructions

Perform the Diagnostic Repair Verification after completing the repair.

- Front Compartment Fuse Block Replacement
- Headlamp Bulb Replacement (Base), Headlamp Bulb Replacement (HID)
- Headlamp Switch Replacement
- Headlamp Replacement (Left Side), Headlamp Replacement (Right Side)
- Headlamp Ballast Replacement
- Turn Signal Multifunction Switch Replacement
- Control Module References for BCM or Instrument Cluster replacement, programming, and setup

INTERIOR ACCENT LIGHTING 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
Accent Lamp Control - Terminal 7 X6	1	1	1	-
Accent Lamp - Center Console Left Ground	-	1	-	-
Accent Lamp - Center Console Right Ground	-	1	-	-
Accent Lamp - Driver Door Ground	-	1	-	-
Accent Lamp - Driver Door Handle Ground	-	1	-	-
Accent Lamp - Passenger Door Ground	-	1	-	-
Accent Lamp - Passenger Door Handle Ground	-	1	-	-
Accent Lamp - Instrument				

Panel Ground	-	1	-	-
Accent Lamp - Left Instrument Panel Ground	-	1	-	-
Flood Lamp - Driver Door Pocket Ground	-	1	-	-
Flood Lamp - Passenger Door Pocket Ground	-	1	-	-
1. Interior Accent Lighting Malfunction				

Circuit/System Description

The body control module (BCM) supplies battery voltage to accent lighting lamps via the accent lamp control circuit. When a door is opened the BCM applies battery voltage to the accent lamp control circuit illuminating all of the accent lighting. The accent lighting will remain illuminated until all doors are closed and the ignition is OFF. The accent lighting remains illuminated with the ignition ON.

Reference Information

Schematic Reference

Interior Lights Schematics

Connector End View Reference

Component Connector End Views

Description and Operation

Interior Lighting Systems 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, scan tool disconnected, all doors closed, all accessories OFF, disconnect the harness connector at the inoperative accent/flood lamp. It may take up to 2 minutes for all vehicle systems to power down.

2. Test for less than 10 ohms between the ground circuit terminal 2 and ground.
 - **If 10 ohms or greater**
 1. Ignition OFF.
 2. Test for less than 2 ohms in the ground circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, repair the open/high resistance in the ground connection.
 - **If less than 10 ohms**
3. Connect a test lamp between the control circuit terminal 1 and ground.
4. Verify the test lamp turns ON and OFF when commanding the Accent Lighting 1 ON and OFF with a scan tool.
 - **If the test lamp is always OFF**
 1. Ignition OFF, disconnect the X6 harness connector at the K9 body control module.
 2. Test for infinite resistance between the control circuit and ground.
 - If less than infinite resistance, repair the short to ground on the circuit.
 - If infinite resistance
 3. Test for less than 2 ohms in the control circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, replace the K9 body control module.
 - **If the test lamp is always ON**
 1. Ignition OFF, disconnect the X6 harness connector at the K9 body control module, ignition ON.
 2. Test for less than 1 V between the control circuit terminal and ground.
 - If 1 V or greater, repair the short to voltage on the circuit.
 - If less than 1 V, replace the K9 body control module.
 - **If the test lamp turns ON and OFF**
5. Test or replace the appropriate accent/flood lamp.

Repair Instructions

Perform the **Diagnostic Repair Verification** after completing the repair.

- **Roof Console Courtesy Lamp Replacement**
- **Front Side Door Warning Lamp Replacement**
- **Front Side Door Inside Handle Illumination Lamp Replacement**
- **Instrument Panel Flexible Light Tube Replacement**
- **Front Floor Console Extension Flexible Light Tube Replacement**
- **Control Module References** for BCM replacement, programming, and setup

INTERIOR BACKLIGHTING 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
F3DA Fuse B+	3	3	-	-
F24DA Fuse B+	B270A 01	B270A 01	-	-
I/P Dimmer Switch B+	B257B 03, B1405 03, B1529 03	B257B 03	-	-
I/P Dimmer Switch Signal	B257B 03	B257B 03	B257B 07	-
LED Backlight Dimming Control Terminal 8 X2	2	2	2	-
LED Backlight Dimming Control Terminal 9 X7	2	2	2	-
Transmission Shift Lever Position Indicator B+	2	2	2	-
Door Lock Switch - Driver Ground	-	2	-	-
Headlamp Switch Ground	1	1	1	-
Outside Rearview Mirror Switch Ground	-	U1538 00	-	-
Steering Wheel Controls Switch - Left Ground	-	2	-	-
Steering Wheel Controls Switch - Right Ground	-	2	-	-
Sunroof Switch Ground	-	2	-	-
Sunroof Tilt Switch Ground	-	2	-	-
Traction Control Switch Ground	-	2	-	-
Transmission Shift Lever Position Indicator Ground	-	2	-	-
Window Switch - Driver Ground	-	U1538 00	-	-
Window Switch - Passenger Ground	-	U153A 00	-	-
Window Switch - Left Rear Ground	-	U1548 00	-	-
Window Switch - Right Rear Ground	-	U154A 00	-	-

1. Dimmer Switch Malfunction
2. Interior Backlighting Malfunction
3. Turn Signal Lamps and/or Indicators Malfunction

Circuit/System Description

The instrument panel (I/P) dimmer switch is used to increase and decrease the brightness of the interior backlighting components. The I/P dimmer switch provides a voltage signal to the body control module (BCM) that will increase as the brightness of the lights are increased and decrease as the brightness of the lights are decreased. The BCM provides a low reference signal and a B+ circuit to the I/P dimmer switch. When the I/P dimmer switch is placed in the desired position, the dimmed voltage setting is applied from the I/P dimmer switch through the I/P dimmer switch signal circuit to the BCM. The BCM interprets the signal and applies a pulse width modulated (PWM) voltage through the light emitting diode (LED) dimming 1 and dimming 2 control circuits illuminating the interior backlighting to the requested level of brightness.

Reference Information

Schematic Reference

- [Interior Lights Dimming Schematics](#)
- [Automatic Transmission Controls Schematics](#)

Connector End View Reference

Component Connector End Views

Description and Operation

Interior Lighting Systems 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.
2. Verify the scan tool LED Backlight Dimming Command parameter changes between a high percentage to a low percentage while operating the dimmer switch from high to low.

- **If the parameter does not change**

Refer to Dimmer Switch Malfunction below.

- **If the parameter changes**

3. Verify the backlighting components turn ON and OFF while commanding the LED Backlight Dimming ON and OFF with a scan tool.

- **If the backlighting components do not turn ON and OFF**

Refer to Interior Backlighting Malfunction below.

- **If the backlighting components turn ON and OFF**

4. All OK.

Circuit/System Testing

Dimmer Switch Malfunction

1. Ignition OFF and all vehicle systems OFF, disconnect the harness connector at the S30 Headlamp Switch, ignition ON.
2. Test for B+ between the B+ circuit terminal 1 and ground.
 - **If less than B+**
 1. Ignition OFF, disconnect the X3 harness connector at the K9 Body Control Module.
 2. Test for infinite resistance between the B+ circuit and ground.
 - If less than infinite resistance, repair the short to ground on the circuit.
 - If infinite resistance
 3. Test for less than 2 ohms in the B+ circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, replace the K9 Body Control Module.
 - **If B+**
3. Verify a test lamp does not illuminate between the B+ circuit terminal 1 and the signal circuit terminal 12.
 - **If the test lamp illuminates**
 1. Ignition OFF, disconnect the X1 harness connector at the K9 Body Control Module.
 2. Test for infinite resistance between the signal circuit and ground.
 - If less than infinite resistance, repair the short to ground on the circuit.
 - If infinite resistance, replace the K9 Body Control Module.
 - **If the test lamp does not illuminate**
4. Test for B+ between the B+ circuit terminal 1 and the signal circuit terminal 12.
 - **If less than B+**
 1. Ignition OFF, disconnect the X1 harness connector at the K9 Body Control Module, ignition ON.
 2. Test for less than 1 V between the signal circuit terminal 12 and ground.

- If 1 V or greater, repair the short to voltage on the circuit.
- If less than 1 V
- 3. Test for less than 2 ohms in the signal circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, replace the K9 Body Control Module.
- **If B+**
- 5. Test or replace the S30 Headlamp Switch.

Interior Backlighting Malfunction

NOTE: Each component with backlighting may need to be disconnected to isolate a short to voltage or short to ground. Use the schematics to identify the following:

- Backlighting components the vehicle is equipped with
- Each component's control and ground circuit terminals
- Component locations on the backlighting control circuit

1. Ignition OFF, scan tool disconnected, all doors closed, all accessories OFF, disconnect the harness connector at the component with inoperative backlighting. It may take up to 2 minutes for all vehicle systems to power down.
2. Test for less than 15 ohms between the appropriate ground circuit terminal and ground.
 - **If 15 ohms or greater**
 1. Ignition OFF.
 2. Test for less than 2 ohms in the ground circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, repair the open/high resistance in the ground connection.
 - **If less than 15 ohms**
3. Connect a test lamp between the appropriate control circuit terminal and ground.
4. Verify the test lamp turns ON and OFF when commanding the LED Backlight Dimming ON and OFF with a scan tool.
 - **If the test lamp is always OFF**
 1. Ignition OFF, disconnect the appropriate harness connector at the K9 Body Control Module.
 2. Test for infinite resistance between the control circuit and ground.
 - If less than infinite resistance, repair the short to ground on the circuit.
 - If infinite resistance
 3. Test for less than 2 ohms in the control circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, replace the K9 Body Control Module.
 - **If the test lamp is always ON**

1. Ignition OFF, disconnect the appropriate harness connector at the K9 Body Control Module, ignition ON.
2. Test for less than 1 V between the control circuit terminal and ground.
 - If 1 V or greater, repair the short to voltage on the circuit.
 - If less than 1 V, replace the K9 Body Control Module.
- **If the test lamp turns ON and OFF**
5. Test or replace the component with inoperative backlighting.

Repair Instructions

Perform the **Diagnostic Repair Verification** after completing the repair.

- **Headlamp Switch Replacement**
- **Dome and Reading Lamp Switch Replacement**
- **Instrument Panel Multifunction Switch Replacement**
- **Control Module References** for BCM replacement, programming, and setup

PARK, LICENSE, AND/OR TAIL LAMPS 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
F8DA Fuse B+	B101E 43, B1517 07, B1529 03, C0890 03, U0121 00	B101E 43, B1517 07, B1529 03, C0890 03, U0121 00	-	-
Headlamp Switch Park Lamps ON Signal	2	B257A 00	2	-
License Plate Lamp Control	3	3	3	-
Park Lamps Control - Left	1	1	1	-
Park Lamps Control - Right	1	1	1	-
Headlamp Switch Ground	-	2	-	-
License Plate Lamp Ground - Left	-	3	-	-
License Plate Lamp Ground - Right	-	3	-	-
Park Lamp Ground - Left Front	-	1	-	-

Park Lamp Ground - Right Front	-	1	-	-
Side Marker Lamp Ground - Left Front	-	1	-	-
Side Marker Lamp Ground - Right Front	-	1	-	-
Tail Lamp Ground - Left	-	1	-	-
Tail Lamp Ground - Right	-	1	-	-
Tail/Stop Lamps Ground - Left	-	1	-	-
Tail/Stop Lamps Ground - Right	-	1	-	-
1. Park, License, and/or Tail Lamps Malfunction 2. Park Lamps Switch Malfunction 3. License Plate Lamps Malfunction				

Circuit/System Description

When the headlamp switch is placed in the HEAD or PARK position, ground is applied to the park lamp switch ON signal circuit to the body control module (BCM). The BCM responds by applying voltage to the park lamps, tail lamps, and license lamps control circuits illuminating the park, tail, and license lamps.

Reference Information

Schematic Reference

Exterior Lights Schematics

Connector End View Reference

Component Connector End Views

Description and Operation

Exterior Lighting Systems 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.
2. Verify the scan tool Park Lamp Switch parameter changes between Active and Inactive while commanding the park lamps ON and OFF with the headlamp switch.
 - **If the parameter does not change**

Refer to Park Lamp Switch Malfunction below.
 - **If the parameter changes**
3. Verify the left park lamps turn ON and OFF when commanding the Left Park Lamps ON and OFF with a scan tool.
 - **If the left park lamps do not turn ON and OFF**

Refer to Park Lamps Malfunction below.
 - **If the left park lamps turn ON and OFF**
4. Verify the right park lamps turn ON and OFF when commanding the Right Park Lamps ON and OFF with a scan tool.
 - **If the right park lamps do not turn ON and OFF**

Refer to Park Lamps Malfunction below.
 - **If the right park lamps turn ON and OFF**
5. Verify the license plate lamps turn ON and OFF when commanding the License Plate Lamps ON and OFF with a scan tool.
 - **If the license plate lamps do not turn ON and OFF**

Refer to License Plate Lamps Malfunction below.
 - **If the license plate lamps turn ON and OFF**
6. All OK.

Circuit/System Testing

Park Lamp Switch Malfunction

1. Ignition OFF, scan tool disconnected, all doors closed, all accessories OFF, disconnect the harness connector at the S30 headlamp switch. It may take up to 2 minutes for all vehicle systems to power down.
2. Test for less than 10 ohms between the ground circuit terminal 6 and ground.
 - **If 10 ohms or greater**
 1. Ignition OFF.
 2. Test for less than 2 ohms in the ground circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, repair the open/high resistance in the ground connection.

- **If less than 10 ohms**
- 3. Ignition ON.
- 4. Verify the scan tool Park Lamps Switch parameter is Inactive.
 - **If not Inactive**
 1. Ignition OFF, disconnect the X1 harness connector at the K9 body control module.
 2. Test for infinite resistance between the signal circuit terminal 3 and ground.
 - If less than infinite resistance, repair the short to ground on the circuit.
 - If infinite resistance, replace the K9 body control module.
 - **If Inactive**
- 5. Install a 3 A fused jumper wire between the signal circuit terminal 3 and the ground circuit terminal 6.
- 6. Verify the scan tool Park Lamps Switch parameter is Active.
 - **If not Active**
 1. Ignition OFF, disconnect the X1 harness connector at the K9 body control module, ignition ON.
 2. Test for less than 1 V between the signal circuit terminal 3 and ground.
 - If 1 V or greater, repair the short to voltage on the circuit.
 - If less than 1 V
 3. Test for less than 2 ohms in the signal circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, replace the K9 body control module.
 - **If Active**
- 7. Test or replace the S30 headlamp switch.

Park Lamps Malfunction

1. Ignition OFF, exterior lamps OFF, disconnect the harness connector at the inoperative park/tail lamp.
2. Test for less than 15 ohms between the appropriate ground circuit terminal and ground.
 - **If 15 ohms or greater**
 1. Ignition OFF.
 2. Test for less than 2 ohms in the ground circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, repair the open/high resistance in the ground connection.
 - **If less than 15 ohms**
3. Connect a test lamp between the appropriate control circuit terminal and ground, ignition ON.
4. Verify the test lamp turns ON and OFF when commanding the appropriate Park Lamps ON and OFF with a scan tool.
 - **If the test lamp is always OFF**
 1. Ignition OFF, disconnect the X4 harness connector at the K9 body control module.
 2. Test for infinite resistance between the control circuit and ground.
 - If less than infinite resistance, repair the short to ground on the circuit.

- If infinite resistance
- 3. Test for less than 2 ohms in the control circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, replace the K9 body control module.
- **If the test lamp is always ON**
 1. Ignition OFF, disconnect the X4 harness connector at the K9 body control module, ignition ON.
 2. Test for less than 1 V between the control circuit terminal and ground.
 - If 1 V or greater, repair the short to voltage on the circuit.
 - If less than 1 V, replace the K9 body control module.
- **If the test lamp turns ON and OFF**
- 5. Test or replace the appropriate park lamp.

License Plate Lamps Malfunction

1. Ignition OFF, exterior lamps OFF, disconnect the harness connectors at both E7 license plate lamps.
2. Test for less than 15 ohms between the ground circuit terminal 2 and ground.
 - **If 15 ohms or greater**
 1. Ignition OFF.
 2. Test for less than 2 ohms in the ground circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, repair the open/high resistance in the ground connection.
 - **If less than 15 ohms**
3. Connect a test lamp between the license plate lamp - left control circuit terminal 1 and ground, ignition ON.
4. Verify the test lamp turns ON and OFF when commanding the License Plate Lamps ON and OFF with a scan tool.
 - **If the test lamp is always OFF**
 1. Ignition OFF, disconnect the X4 harness connector at the K9 body control module.
 2. Test for infinite resistance between the control circuit and ground.
 - If less than infinite resistance, repair the short to ground on the circuit.
 - If infinite resistance
 3. Test for less than 2 ohms in the control circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, replace the K9 body control module.
 - **If the test lamp is always ON**
 1. Ignition OFF, disconnect the X4 harness connector at the K9 body control module, ignition ON.
 2. Test for less than 1 V between the control circuit terminal and ground.
 - If 1 V or greater, repair the short to voltage on the circuit.
 - If less than 1 V, replace the K9 body control module.

- **If the test lamp turns ON and OFF**
- 5. Connect a test lamp between the license plate lamp - right control circuit terminal 1 and ground, ignition ON.
- 6. Verify the test lamp turns ON and OFF when commanding the License Plate Lamps ON and OFF with a scan tool.
 - **If the test lamp is always OFF**
 1. Ignition OFF, disconnect the X4 harness connector at the K9 body control module.
 2. Test for infinite resistance between the control circuit and ground.
 - If less than infinite resistance, repair the short to ground on the circuit.
 - If infinite resistance
 3. Test for less than 2 ohms in the control circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, replace the K9 body control module.
 - **If the test lamp turns ON and OFF**
- 7. Test or replace the appropriate E7 license plate lamp.

Repair Instructions

Perform the **Diagnostic Repair Verification** after completing the repair.

- **Headlamp Switch Replacement**
- **Rear License Plate Lamp Replacement**
- **Stop and Tail Lamp Bulb Replacement**
- **Front Turn Signal Lamp Bulb Replacement (Base), Front Turn Signal Lamp Bulb Replacement (HID)**
- **Control Module References** for BCM replacement, programming, and setup

REAR COMPARTMENT LAMP 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
F24DA Fuse B+	B270A 01	B270A 01	-	-
Rear Compartment Courtesy Lamp Control	1	1	1	-

Rear Compartment Courtesy Lamp Ground	-	1	-	-
1. Rear Compartment Lamp Malfunction				

Circuit/System Description

The body control module (BCM) applies battery voltage to the rear compartment courtesy lamp through the rear compartment lamp control circuit. When the BCM receives a rear compartment lid open input from the rear compartment lid latch, the BCM applies battery voltage to the rear compartment lamp control circuit illuminating the rear compartment courtesy lamp. In the event that the rear compartment lamp were to remain illuminated for more than 10 minutes with the ignition switch in the OFF position and no doors opened, the BCM will deactivate the rear compartment lamp control circuit to prevent total battery discharge.

Reference Information

Schematic Reference

Interior Lights Schematics

Connector End View Reference

Component Connector End Views

Description and Operation

Interior Lighting Systems 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, exterior lamps OFF, disconnect the harness connector at the E8S rear compartment courtesy lamp.
2. Test for less than 15 ohms between the ground circuit terminal 2 and ground.
 - **If 15 ohms or greater**
 1. Ignition OFF.

2. Test for less than 2 ohms in the ground circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, repair the open/high resistance in the ground connection.
 - **If less than 15 ohms**
3. Connect a test lamp between the control circuit terminal 1 and ground, ignition ON.
4. Verify the test lamp turns ON and OFF when commanding the Trunk Lamp ON and OFF with a scan tool.
 - **If the test lamp is always OFF**
 1. Ignition OFF, disconnect the X7 harness connector at the K9 body control module.
 2. Test for infinite resistance between the control circuit and ground.
 - If less than infinite resistance, repair the short to ground on the circuit.
 - If infinite resistance
 3. Test for less than 2 ohms in the control circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, replace the K9 body control module.
 - **If the test lamp is always ON**
 1. Ignition OFF, disconnect the X7 harness connector at the K9 body control module, ignition ON.
 2. Test for less than 1 V between the control circuit terminal and ground.
 - If 1 V or greater, repair the short to voltage on the circuit.
 - If less than 1 V, replace the K9 body control module.
 - **If the test lamp turns ON and OFF**
5. Test or replace the appropriate E8S rear compartment courtesy lamp.

Repair Instructions

Perform the **Diagnostic Repair Verification** after completing the repair.

- **Rear Compartment Courtesy Lamp Replacement**
- **Control Module References** for BCM replacement, programming, and setup

STOP LAMPS 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

	Short to	Open/High	Short to	
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Circuit	Ground	Resistance	Voltage	Signal Performance
F8DA Fuse B+	C0890 03, B101E 43, B1517 07, B1529 03, U0121 00	C0890 03, B101E 43, B1517 07, B1529 03, U0121 00	-	-
Brake Pedal Position Sensor 5 V Reference	C0277 06, C0890 03, C0561 71, U0422 71	C0277 06, C0561 71, U0422 71	C0890 07, C0561 71, U0422 71	-
Brake Pedal Position Sensor Signal	C0277 06, C0561 71, U0422 71	C0277 06, C0561 71, U0422 71	C0277 07, C0561 71, U0422 71	C0277 09
Center High Mounted Stop Lamp Control	2	2	2	-
Stop Lamp Control - Left	1	1	1	-
Stop Lamp Control - Right	1	1	1	-
Brake Pedal Position Sensor Low Reference	-	C0277 07, C0561 71, U0422 71	1	-
Center High Mounted Stop Lamp Ground	-	2	-	-
Tail/Stop Lamp Ground - Left	-	1	-	-
Tail/Stop Lamp Ground - Right	-	1	-	-
1. Stop Lamps Malfunction 2. Center High Mounted Stop Lamp Malfunction				

Circuit/System Description

The brake pedal position (BPP) sensor is used to sense the action of the driver application of the brake pedal. The BPP sensor provides an analog voltage signal that will increase as the brake pedal is applied. The body control module (BCM) provides a low reference signal and a 5-volt reference voltage to the BPP sensor. When the variable signal reaches a voltage threshold indicating the brakes have been applied, the BCM will apply battery voltage to the left and right stop lamp control circuits as well as the center high mounted stop lamp (CHMSL) control circuit illuminating the left and right stop lamps and the CHMSL.

Reference Information

Schematic Reference

Exterior Lights Schematics

Connector End View Reference

Component Connector End Views

Description and Operation

Exterior Lighting Systems 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.
2. Verify the scan tool Brake Pedal Applied parameter changes between Active and Inactive while pressing and releasing the brake pedal.
 - **If the parameter does not change**

Refer to Brake Pedal Position Sensor Malfunction below.

- **If the parameter changes**
3. Verify the left brake lamp turns ON and OFF when commanding the Left Brake Lamp ON and OFF with a scan tool.
 - **If the left brake lamp does not turn ON and OFF**

Refer to Stop Lamps Malfunction below.

- **If the left brake lamp turns ON and OFF**
4. Verify the right brake lamp turns ON and OFF when commanding the Right Brake Lamp ON and OFF with a scan tool.
 - **If the right brake lamp does not turn ON and OFF**

Refer to Stop Lamps Malfunction below.

- **If the right brake lamp turns ON and OFF**
5. Verify the center high mounted stop lamp turns ON and OFF when commanding the Center Brake Lamp ON and OFF with a scan tool.
 - **If the center high mounted stop does not turn ON and OFF**

Refer to Center High Mount Stop Lamp Malfunction below.

- **If the center high mounted stop turns ON and OFF**
- 6. All OK.

Circuit/System Testing

Brake Pedal Position Sensor Malfunction

1. Ignition OFF, disconnect the harness connector at the B22 brake pedal position sensor, ignition ON.
2. Test for less than 1 V between the low reference circuit terminal 1 and ground.
 - **If 1 V or greater**
 1. Ignition OFF, disconnect the X1 harness connector at the K9 body control module, ignition ON.
 2. Test for less than 1 V between the low reference circuit and ground.
 - If 1 V or greater, repair the short to voltage on the circuit.
 - If less than 1 V, replace the K9 body control module.
 - **If less than 1 V**
3. Test or replace the B22 brake pedal position sensor.

Stop Lamps Malfunction

1. Ignition OFF, exterior lamps OFF, disconnect the harness connector at the appropriate E5 tail/stop lamp.
2. Test for less than 15 ohms between the appropriate ground circuit terminal listed below and ground.
 - E5 stop lamp - terminal B (standard)
 - E5 stop lamp - terminal 4 (LED)
 - **If 15 ohms or greater**
 1. Ignition OFF.
 2. Test for less than 2 ohms in the ground circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, repair the open/high resistance in the ground connection.
 - **If less than 15 ohms**
3. Connect a test lamp between the appropriate control circuit terminal listed below and ground, ignition ON.
 - E5 stop lamp - terminal A (standard)
 - E5 stop lamp - terminal 1 (LED)
4. Verify the test lamp turns ON and OFF when commanding the appropriate Brake Lamp ON and OFF with a scan tool.
 - **If the test lamp is always OFF**
 1. Ignition OFF, disconnect the appropriate harness connector listed below at the K9 body control module.
 - X4 left stop lamp
 - X5 right stop lamp

2. Test for infinite resistance between the control circuit and ground.
 - If less than infinite resistance, repair the short to ground on the circuit.
 - If infinite resistance
3. Test for less than 2 ohms in the control circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, replace the K9 body control module.
 - **If the test lamp is always ON**
1. Ignition OFF, disconnect the appropriate harness connector listed below at the K9 body control module, ignition ON.
 - X4 left stop lamp
 - X5 right stop lamp
2. Test for less than 1 V between the control circuit terminal and ground.
 - If 1 V or greater, repair the short to voltage on the circuit.
 - If less than 1 V, replace the K9 body control module.
 - **If the test lamp turns ON and OFF**
5. Test or replace the appropriate E5 stop lamp.

Center High Mount Stop Lamp Malfunction

1. Ignition OFF, exterior lamps OFF, disconnect the harness connector at the E6 center high mounted stop lamp.
2. Test for less than 15 ohms between the ground circuit terminal 1 and ground.
 - **If 15 ohms or greater**
 - 1. Ignition OFF.
 - 2. Test for less than 2 ohms in the ground circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, repair the open/high resistance in the ground connection.
 - **If less than 15 ohms**
3. Connect a test lamp between the control circuit terminal 2 and ground, ignition ON.
4. Verify the test lamp turns ON and OFF when commanding the Center Brake Lamp ON and OFF with a scan tool.
 - **If the test lamp is always OFF**
 - 1. Ignition OFF, disconnect the X4 harness connector at the K9 body control module.
 - 2. Test for infinite resistance between the control circuit and ground.
 - If less than infinite resistance, repair the short to ground on the circuit.
 - If infinite resistance
 - 3. Test for less than 2 ohms in the control circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, replace the K9 body control module.

○ **If the test lamp is always ON**

1. Ignition OFF, disconnect the X4 harness connector at the K9 body control module, ignition ON.
2. Test for less than 1 V between the control circuit terminal and ground.
 - If 1 V or greater, repair the short to voltage on the circuit.
 - If less than 1 V, replace the K9 body control module.

○ **If the test lamp turns ON and OFF**

5. Test or replace the E6 center high mounted stop lamp.

Repair Instructions

Perform the **Diagnostic Repair Verification** after completing the repair.

- **High Mount Stop Lamp Replacement**
- **Brake Pedal Position Sensor Calibration**
- **Brake Pedal Position Sensor Replacement**
- **Stop and Tail Lamp Bulb Replacement**
- **Control Module References** for BCM replacement, programming, and setup

TURN SIGNAL LAMPS AND/OR INDICATORS 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
F2DA Fuse B+	1	1	-	-
F3DA Fuse B+	1	1	-	-
Turn Signal Switch Signal - Left	2	2	2	-
Turn Signal Switch Signal - Right	2	2	2	-
Turn Signal Control - Left Front	1	1	1	-
Turn Signal Control - Left Rear	1	1	1	-
Turn Signal Control - Right Front	1	1	1	-
Turn Signal Control - Right Rear	1	1	1	-
Outside Rearview Mirror - Driver Ground	-	1	-	-
Outside Rearview Mirror - Passenger Ground	-	1	-	-

Park/Turn Signal Lamp Ground - Left Front	-	1	-	-
Park/Turn Signal Lamp Ground - Right Front	-	1	-	-
Tail/Stop Lamp Ground - Left	-	1	-	-
Tail/Stop Lamp Ground - Right	-	1	-	-
Turn Signal/Multifunction Switch Ground	-	2	-	-
1. Turn Signal Lamps and/or Indicators Malfunction 2. Turn Signal/Multifunction Switch Malfunction				

Circuit/System Description

Ground is applied at all times to the turn signal/multifunction switch. The turn signal lamps may only be activated with the ignition switch in the ON or START positions. When the turn signal/multifunction switch is placed in either the turn right or turn left position, ground is applied to the body control module (BCM) through either the right turn or left turn signal switch signal circuit. The BCM responds to the turn signal switch input by applying a pulsating voltage to the front and rear turn signal lamps through their respective control circuits. When a turn signal request is received by the BCM, a serial data message is sent to the instrument cluster requesting the respective turn signal indicator be pulsed ON and OFF.

Diagnostic Aids

When testing at the rear turn signal lamp bulb socket, make sure all measurements and test lamp connections are in the correct terminal location and do not come in contact with each other during testing.

Reference Information

Schematic Reference

- [Exterior Lights Schematics](#)
- [Body Control System Schematics](#)

Connector End View Reference

Component Connector End Views

Description and Operation

Exterior Lighting Systems 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.
2. Verify the scan tool Right Turn Signal Switch and Left Turn Signal Switch parameters change between Active and Inactive while cycling the turn signal switch between the right and left positions.
 - **If the parameters do not change**

Refer to Turn Signal/Multifunction Switch Malfunction below.

- **If the parameters change**
3. Verify the left front turn signal lamps turn ON and OFF while commanding the Left Front Turn Signal Lamp ON and OFF with a scan tool.
 - **If the left front turn signal lamps do not turn ON and OFF**

Refer to Turn Signal Lamps Malfunction below.

- **If the left front turn signal lamps turn ON and OFF**
4. Verify the right front turn signal lamps turn ON and OFF while commanding the Right Front Turn Signal Lamp ON and OFF with a scan tool.
 - **If the right front turn signal lamps do not turn ON and OFF**

Refer to Turn Signal Lamps Malfunction below.

- **If the right front turn signal lamps turn ON and OFF**
5. Verify the left rear turn signal lamps turn ON and OFF while commanding the Left Rear Turn Signal Lamp ON and OFF with a scan tool.
 - **If the left rear turn signal lamps do not turn ON and OFF**

Refer to Turn Signal Lamps Malfunction below.

- **If the left rear turn signal lamps turn ON and OFF**
6. Verify the right rear turn signal lamps turn ON and OFF while commanding the Right Rear Turn Signal Lamp ON and OFF with a scan tool.
 - **If the right rear turn signal lamps do not turn ON and OFF**

Refer to Turn Signal Lamps Malfunction below.

- **If the right rear turn signal lamps turn ON and OFF**

7. Verify the left and right turn signal indicators turn ON and OFF while commanding the All Indicators test ON and OFF with a scan tool.

- **If the left or right turn signal indicators do not turn ON and OFF**

Refer to Turn Signal Indicators Malfunction below.

- **If the left and right turn signal indicators turn ON and OFF**

8. All OK.

Circuit/System Testing

Turn Signal/Multifunction Switch Malfunction

1. Ignition OFF, scan tool disconnected, all doors closed, all accessories OFF, disconnect the harness connector at the S78 turn signal/multifunction switch. It may take up to 2 minutes for all vehicle systems to power down.
2. Test for less than 10 ohms between the ground circuit terminal 3 and ground.
 - **If 10 ohms or greater**
 1. Ignition OFF.
 2. Test for less than 2 ohms in the ground circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, repair the open/high resistance in the ground connection.
 - **If less than 10 ohms**
3. Ignition ON.
4. Verify the scan tool Left Turn Signal Switch parameter is Inactive.
 - **If not Inactive**
 1. Ignition OFF, disconnect the X3 harness connector at the K9 body control module.
 2. Test for infinite resistance between the signal circuit terminal 1 and ground.
 - If less than infinite resistance, repair the short to ground on the circuit.
 - If infinite resistance, replace the K9 body control module.
 - **If Inactive**
5. Install a 3 A fused jumper wire between the signal circuit terminal 1 and the ground circuit terminal 3.
6. Verify the scan tool Left Turn Signal Switch parameter is Active.
 - **If not Active**
 1. Ignition OFF, disconnect the X3 harness connector at the K9 body control module, ignition ON.
 2. Test for less than 1 V between the signal circuit terminal 1 and ground.
 - If 1 V or greater, repair the short to voltage on the circuit.
 - If less than 1 V
 3. Test for less than 2 ohms in the signal circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.

- If less than 2 ohms, replace the K9 body control module.
- **If Active**
- 7. Verify the scan tool Right Turn Signal Switch parameter is Inactive.
 - **If not Inactive**
 1. Ignition OFF, disconnect the X3 harness connector at the K9 body control module.
 2. Test for infinite resistance between the signal circuit terminal 7 and ground.
 - If less than infinite resistance, repair the short to ground on the circuit.
 - If infinite resistance, replace the K9 body control module.
 - **If Inactive**
- 8. Install a 3 A fused jumper wire between the signal circuit terminal 7 and the ground circuit terminal 3.
- 9. Verify the scan tool Right Turn Signal Switch parameter is Active.
 - **If not Active**
 1. Ignition OFF, disconnect the X3 harness connector at the K9 body control module, ignition ON.
 2. Test for less than 1 V between the signal circuit terminal 7 and ground.
 - If 1 V or greater, repair the short to voltage on the circuit.
 - If less than 1 V
 3. Test for less than 2 ohms in the signal circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, replace the K9 body control module.
 - **If Active**
- 10. Test or replace the S78 turn signal/multifunction switch.

Turn Signal Lamps Malfunction

1. Ignition OFF, disconnect the X5 harness connector at the K9 body control module, ignition ON.
2. Verify a test lamp illuminates between the B+ circuit terminal 3 and ground.
 - **If the test lamp does not illuminate and the circuit fuse is good**
 1. Test for less than 2 ohms in the B+ circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, verify the fuse is not open and there is voltage at the fuse.
 - **If the test lamp does not illuminate and the circuit fuse is open**
 1. Test for infinite resistance between the B+ circuit and ground.
 - If less than infinite resistance, repair the short to ground on the circuit.
 - If infinite resistance, replace the K9 body control module.
 - **If the test lamp illuminates**
3. Ignition OFF, connect the X5 harness connector at the K9 body control module.
4. Disconnect the X2 harness connector at the K9 body control module, ignition ON.
5. Verify a test lamp illuminates between the B+ circuit terminal 3 and ground.

○ **If the test lamp does not illuminate and the circuit fuse is good**

1. Test for less than 2 ohms in the B+ circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, verify the fuse is not open and there is voltage at the fuse.

○ **If the test lamp does not illuminate and the circuit fuse is open**

1. Test for infinite resistance between the B+ circuit and ground.
 - If less than infinite resistance, repair the short to ground on the circuit.
 - If infinite resistance, replace the K9 body control module.

○ **If the test lamp illuminates**

6. Ignition OFF, connect the X2 harness connector at the K9 body control module.
7. Ignition OFF, exterior lamps OFF, disconnect the harness connector at the appropriate turn signal lamp.
8. Test for less than 15 ohms between the appropriate ground circuit terminal and ground.

○ **If 15 ohms or greater**

1. Ignition OFF.
2. Test for less than 2 ohms in the ground circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, repair the open/high resistance in the ground connection.

○ **If less than 15 ohms**

9. Connect a test lamp between the appropriate control circuit terminal and ground.
10. Verify the test lamp turns ON and OFF when commanding the appropriate Turn Signal Lamp ON and OFF with a scan tool.

○ **If the test lamp is always OFF**

1. Ignition OFF, disconnect the appropriate harness connector listed below at the K9 body control module.
 - X4 right turn signals
 - X5 left turn signals
2. Test for infinite resistance between the control circuit and ground.
 - If less than infinite resistance, repair the short to ground on the circuit.
 - If infinite resistance
3. Test for less than 2 ohms in the control circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, replace the K9 body control module.

○ **If the test lamp is always ON**

1. Ignition OFF, disconnect the appropriate harness connector listed below at the K9 body control module, ignition ON.
 - X4 right turn signals
 - X5 left turn signals
2. Test for less than 1 V between the control circuit terminal and ground.

- If 1 V or greater, repair the short to voltage on the circuit.
- If less than 1 V, replace the K9 body control module.

- **If the test lamp turns ON and OFF**

11. Test or replace the appropriate E4 turn signal lamp.

Turn Signal Indicators Malfunction

1. Ignition ON.
2. Verify the left and right turn signal indicators turn ON and OFF while commanding the All Indicators Test ON and OFF with a scan tool.
 - **If the left or right turn signal indicators are always OFF or remain ON**

Replace the P16 instrument cluster.

- **If the left and right turn signal indicators turn ON and OFF**

3. Replace the K9 body control module.

Repair Instructions

Perform the **Diagnostic Repair Verification** after completing the repair.

- **Turn Signal Multifunction Switch Replacement**
- **Front Turn Signal Lamp Bulb Replacement (Base), Front Turn Signal Lamp Bulb Replacement (HID)**
- **Stop and Tail Lamp Bulb Replacement**
- **Control Module References** for BCM or Instrument Cluster replacement, programming, and setup

REPAIR INSTRUCTIONS

BRAKE PEDAL POSITION SENSOR CALIBRATION

NOTE: Brake system does not use a brake switch, stoplight switch or brakelight switch. System uses a Brake Pedal Position Sensor to control these functions.

Calibration Criteria

NOTE: Do not apply the brake pedal during the brake pedal position sensor calibration procedure. Any movement of the brake pedal during this procedure will cause the calibration procedure to fail. If this occurs, the brake pedal position sensor calibration must be repeated.

Brake pedal position sensor calibration must be performed after the brake pedal position sensor, body control module (BCM), or engine control module (ECM) have been serviced. The calibration procedure will set the brake pedal position sensor home value. This value is used by the BCM and ECM to determine the action of the

driver applying the brake system and to provide this information to the vehicle subsystems via serial data.

Calibration Procedure

1. Apply the parking brake.
2. Ignition ON, engine OFF, place the transmission in the PARK position for automatic transmission or NEUTRAL position for manual transmission.
3. Install a scan tool.
4. Clear all DTCs before proceeding.
5. Navigate to the Configuration/Reset Functions menu of the BCM.
6. Select the Brake Pedal Position Sensor Learn procedure and follow the directions displayed on the screen.
7. Navigate to the Configuration/Reset Functions menu of the ECM.
8. Select the Learn Functions menu.
9. Select the Brake Pedal Position Sensor Learn procedure and follow the directions displayed on the screen.

BRAKE PEDAL POSITION SENSOR REPLACEMENT

NOTE: Brake system does not use a brake switch, stoplight switch or brakelight switch. System uses a Brake Pedal Position Sensor to control these functions.

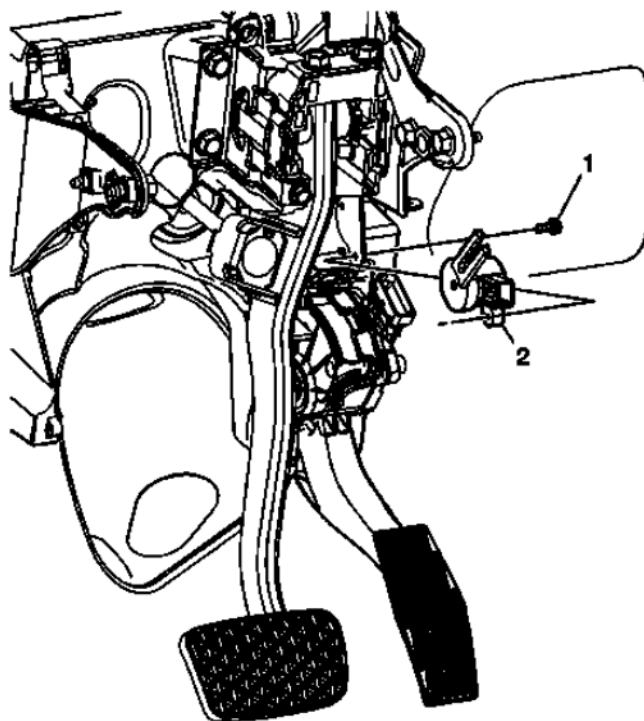


Fig. 21: Brake Pedal Position Sensor
Courtesy of GENERAL MOTORS COMPANY

Brake Pedal Position Sensor Replacement

Callout	Component Name
Preliminary Procedure Remove the left side instrument panel insulator panel. Refer to <u>Instrument Panel Insulator Replacement</u> .	
1	Brake Pedal Position Sensor Bolt
2	Brake Pedal Position Sensor Procedure 1. Disconnect the brake pedal position sensor electrical connector. 2. After the installation is complete, calibrate the brake pedal position sensor. Refer to <u>Brake Pedal Position Sensor Calibration</u>.

HEADLAMP SWITCH REPLACEMENT

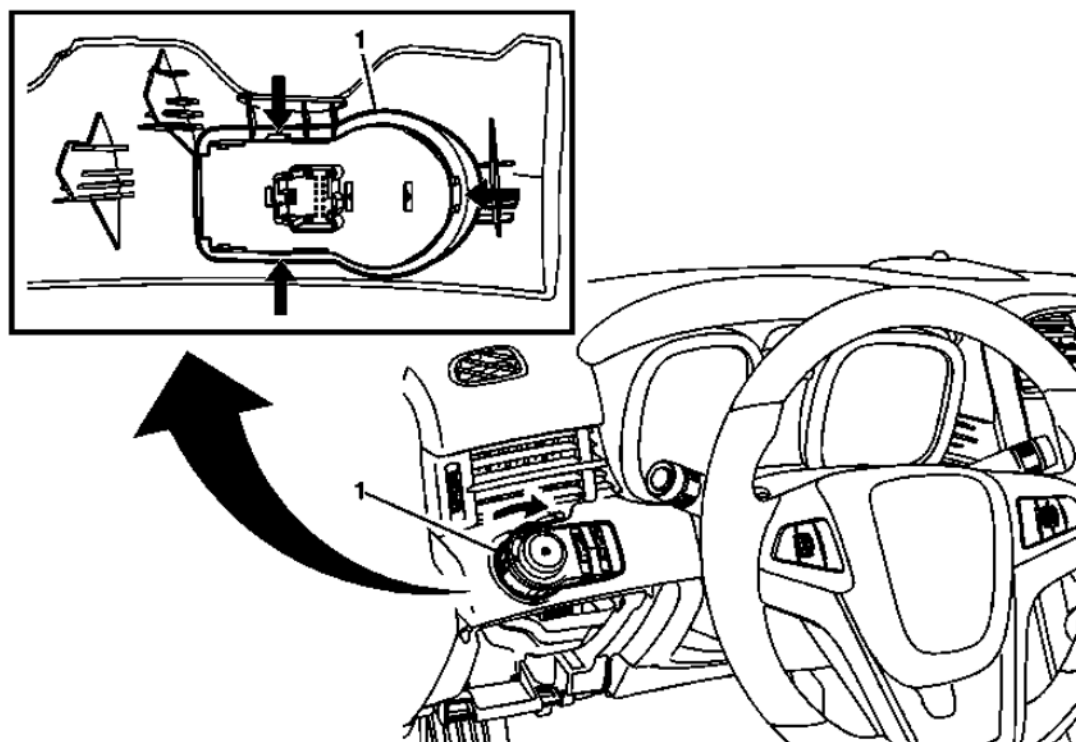


Fig. 22: Headlamp Switch
Courtesy of GENERAL MOTORS COMPANY

Headlamp Switch Replacement

Callout	Component Name
Preliminary Procedure Remove the instrument panel driver knee bolster pad. Refer to <u>Instrument Panel Driver Knee Bolster Pad Replacement</u> .	
	Headlamp Switch Assembly

1	Procedure 1. Disconnect the electrical connections. 2. Release tabs on switch to remove from the panel.
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HAZARD WARNING AND ACCESSORY SWITCH REPLACEMENT

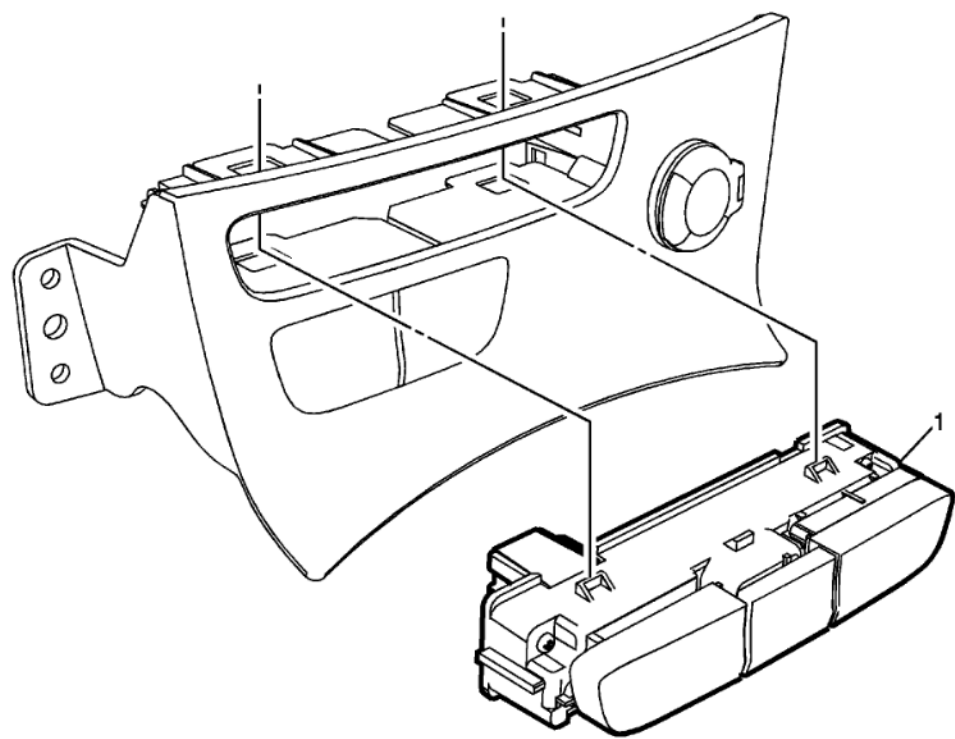


Fig. 23: Hazard Warning and Accessory Switch
Courtesy of GENERAL MOTORS COMPANY

Hazard Warning and Accessory Switch Replacement

Callout	Component Name
Preliminary Procedure Remove the instrument panel trim plate. Refer to Instrument Panel Trim Plate Replacement .	
1	Hazard Warning and Accessory Switch Procedure Release four tabs on switch to remove from trim plate.

HEADLAMP AUTOMATIC CONTROL AMBIENT LIGHT SENSOR REPLACEMENT

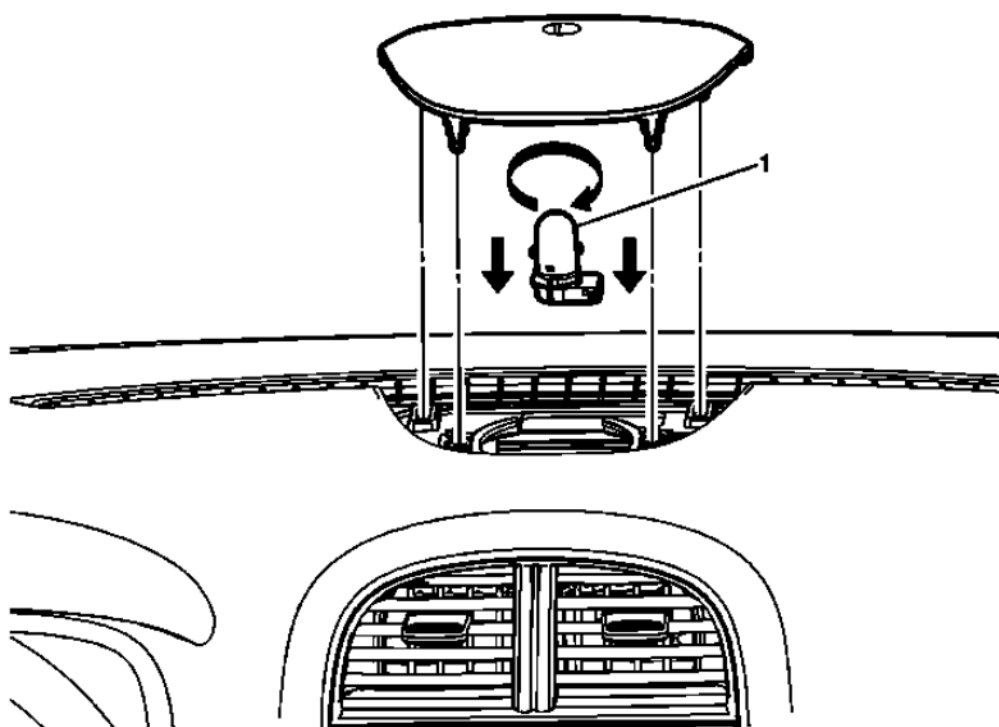


Fig. 24: Headlamp Automatic Control Ambient Light Sensor
 Courtesy of GENERAL MOTORS COMPANY

Headlamp Automatic Control Ambient Light Sensor Replacement

Callout	Component Name
Preliminary Procedure	
Remove the front radio speaker grille. Refer to Radio Front Speaker Grille Replacement .	
1	Headlamp Automatic Control Ambient Light Sensor
	Procedure
	1. Disconnect the electrical connector. 2. Twist the sensor counterclockwise to remove.

READING LAMP BULB REPLACEMENT

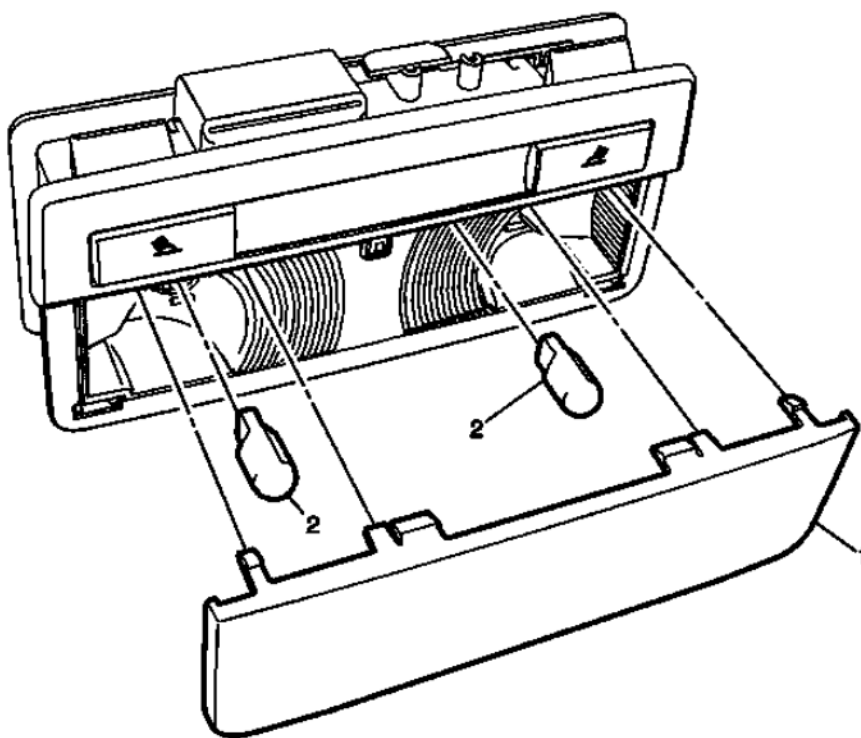


Fig. 25: Reading Lamp Bulb
 Courtesy of GENERAL MOTORS COMPANY

Reading Lamp Bulb Replacement

Callout	Component Name
1	Reading Lamp Lens Procedure Use a plastic flat-bladed tool to remove the reading lamp lens.
2	Reading Lamp Bulb (Qty: 2)

READING LAMP REPLACEMENT

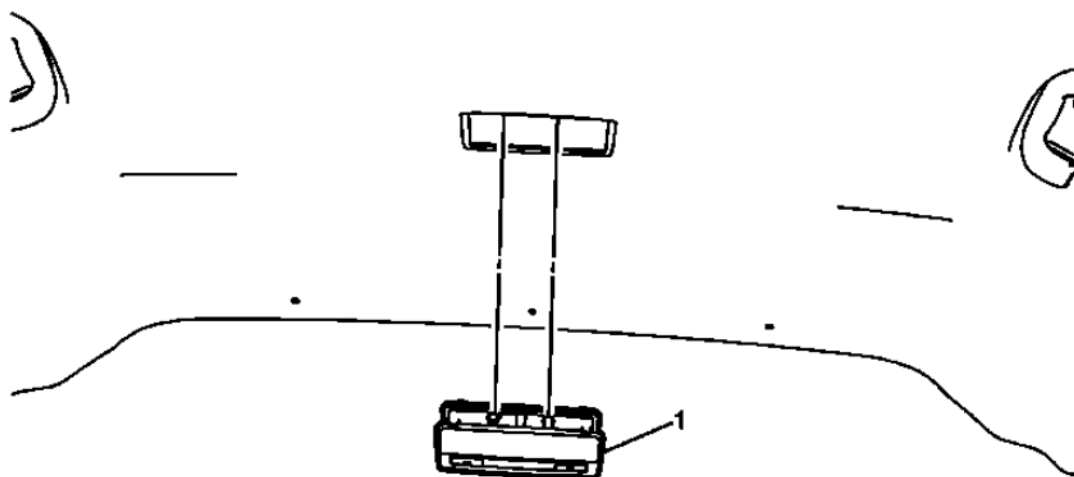


Fig. 26: Reading Lamp

Courtesy of GENERAL MOTORS COMPANY

Reading Lamp Replacement

Callout	Component Name
1	Reading Lamp Procedure 1. Use a plastic flat bladed tool to remove the reading lamp assembly. 2. Disconnect the electrical connector.

DOME AND READING LAMP REPLACEMENT

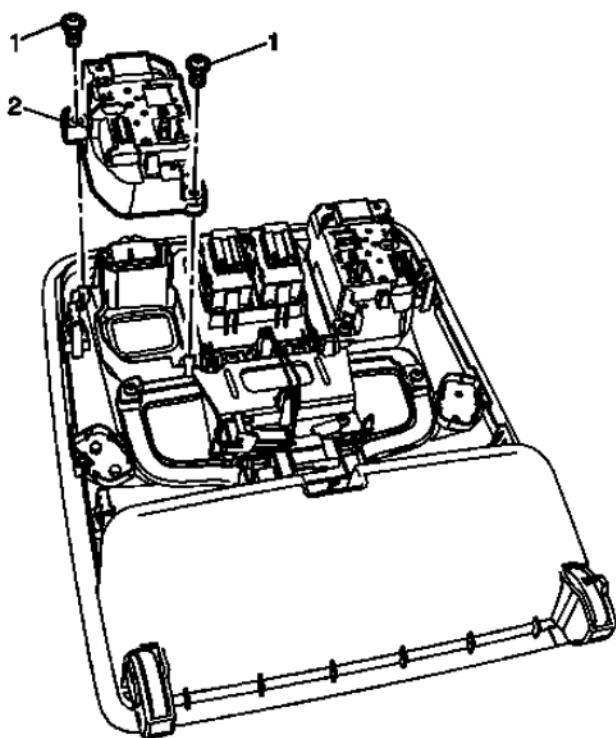


Fig. 27: Dome and Reading Lamp
 Courtesy of GENERAL MOTORS COMPANY

Dome and Reading Lamp Replacement

Callout	Component Name
Preliminary Procedure Remove the roof console. Refer to Roof Console Replacement .	
1	Dome and Reading Lamp Fasteners (Qty: 2) CAUTION: Refer to Fastener Caution .
2	Dome and Reading Lamp

DOMES AND READING LAMP SWITCH REPLACEMENT

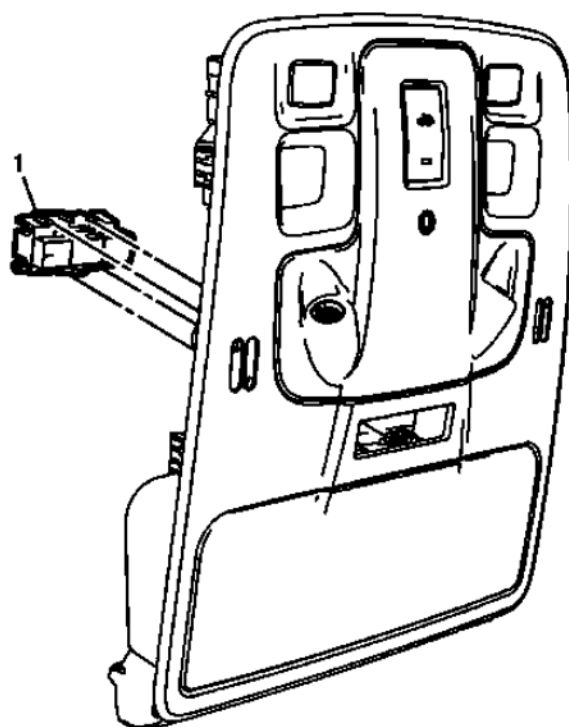


Fig. 28: Dome and Reading Lamp Switch
 Courtesy of GENERAL MOTORS COMPANY

Dome and Reading Lamp Switch Replacement

Callout	Component Name
Preliminary Procedure Remove the roof console. Refer to <u>Roof Console Replacement</u> .	
1	Dome and Reading Lamp Switch Procedure Release the tabs and remove the switch.

DOMES AND READING LAMP BULB REPLACEMENT

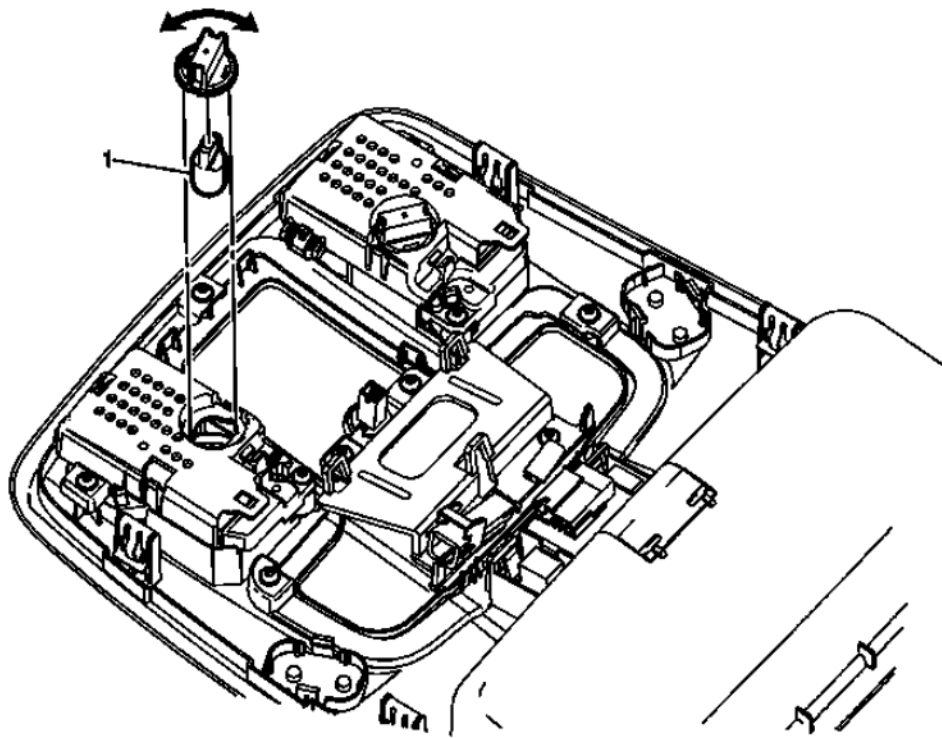


Fig. 29: Dome and Reading Lamp Bulb
 Courtesy of GENERAL MOTORS COMPANY

Dome and Reading Lamp Bulb Replacement

Callout	Component Name
Preliminary Procedure Remove the roof console. Refer to <u>Roof Console Replacement</u> .	
1	Dome and Reading Lamp Bulb Procedure Twist bulb socket and gently pull on bulb to remove.

DOMES AND READING LAMP LENS REPLACEMENT

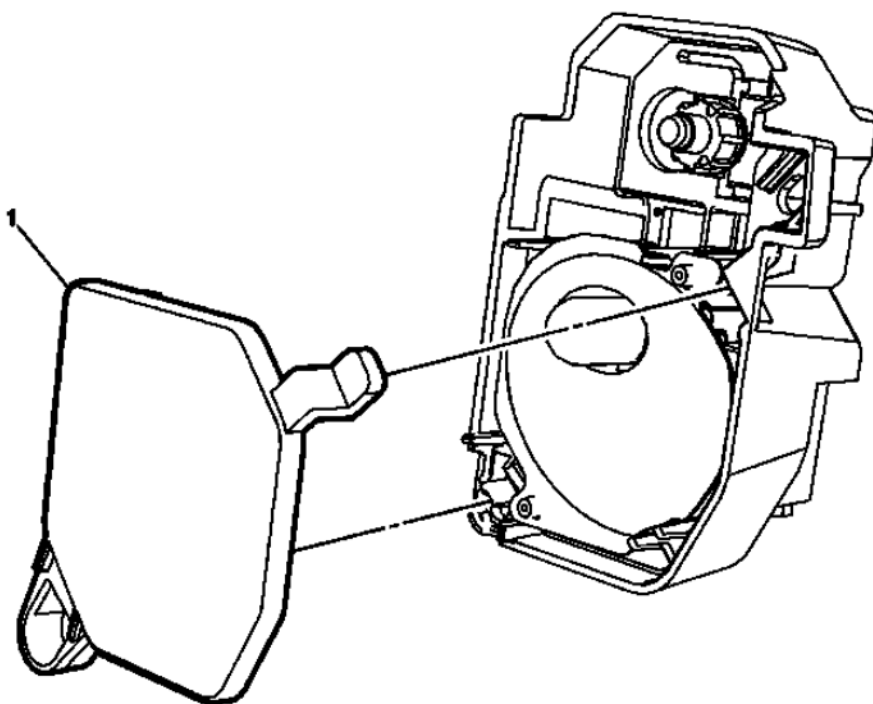


Fig. 30: Dome and Reading Lamp Lens
 Courtesy of GENERAL MOTORS COMPANY

Dome and Reading Lamp Lens Replacement

Callout	Component Name
Preliminary Procedure Remove the dome and reading lamp. Refer to Dome and Reading Lamp Replacement .	
1	Dome and Reading Lamp Lens Procedure Gently release the lens from the dome and reading lamp assembly.

FRONT FLOOR CONSOLE EXTENSION FLEXIBLE LIGHT TUBE REPLACEMENT

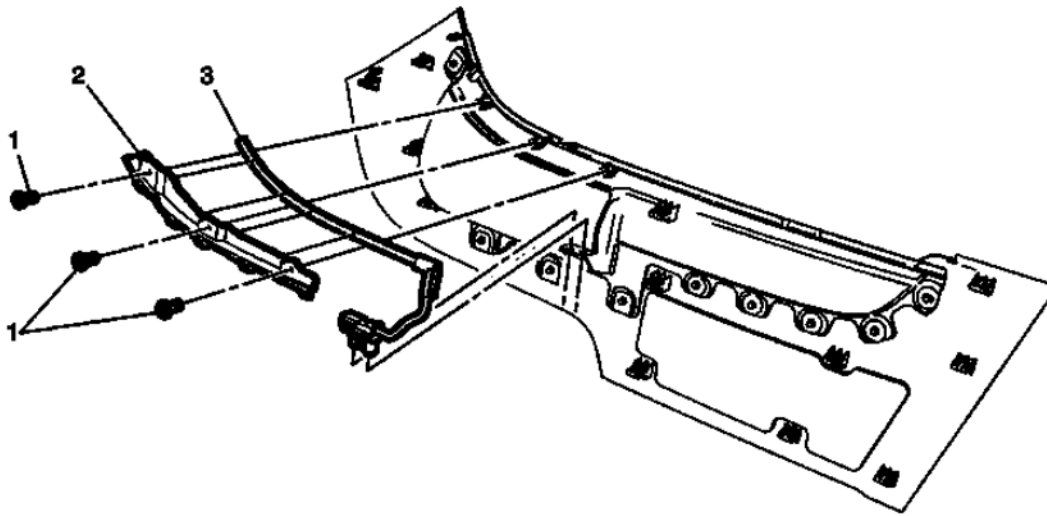


Fig. 31: Front Floor Console Extension Flexible Light Tube
 Courtesy of GENERAL MOTORS COMPANY

Front Floor Console Extension Flexible Light Tube Replacement

Callout	Component Name
Preliminary Procedure Remove the front floor console extension - right side. Refer to Front Floor Console Extension Replacement - Right Side , or the front floor extension - left side. Refer to Front Floor Console Extension Replacement - Left Side .	
1	Front Floor Console Extension Flexible Light Tube Fastener (Qty: 3) CAUTION: Refer to Fastener Caution .
2	Front Floor Console Extension Flexible Light Tube Bracket
3	Front Floor Console Extension Flexible Light Tube Procedure Disconnect light tube from the extension panel.

FRONT SIDE DOOR INSIDE HANDLE ILLUMINATION LAMP REPLACEMENT

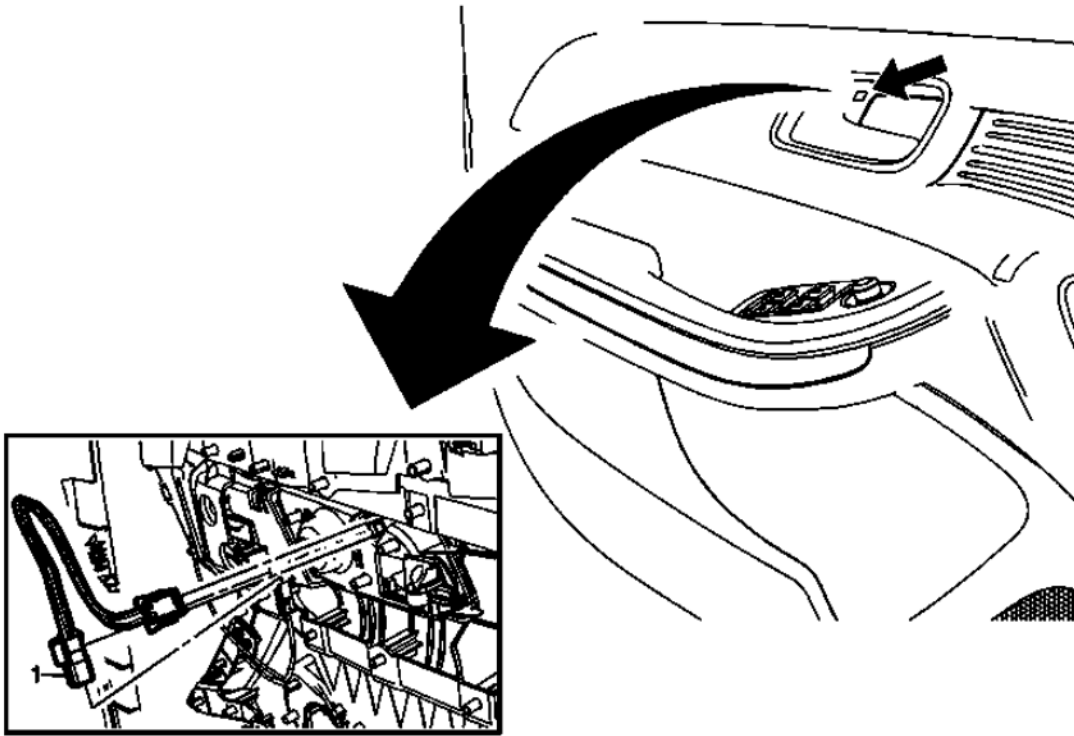


Fig. 32: Front Side Door Inside Handle Illumination Lamp
 Courtesy of GENERAL MOTORS COMPANY

Front Side Door Inside Handle Illumination Lamp Replacement

Callout	Component Name
Preliminary Procedure Remove the front side door trim panel. Refer to Front Side Door Trim Replacement .	
1	Front Side Door Inside Handle Illumination Lamp Procedure 1. Disconnect the lamp from the door trim panel. 2. Disconnect electrical connection.

FRONT SIDE DOOR WARNING LAMP REPLACEMENT

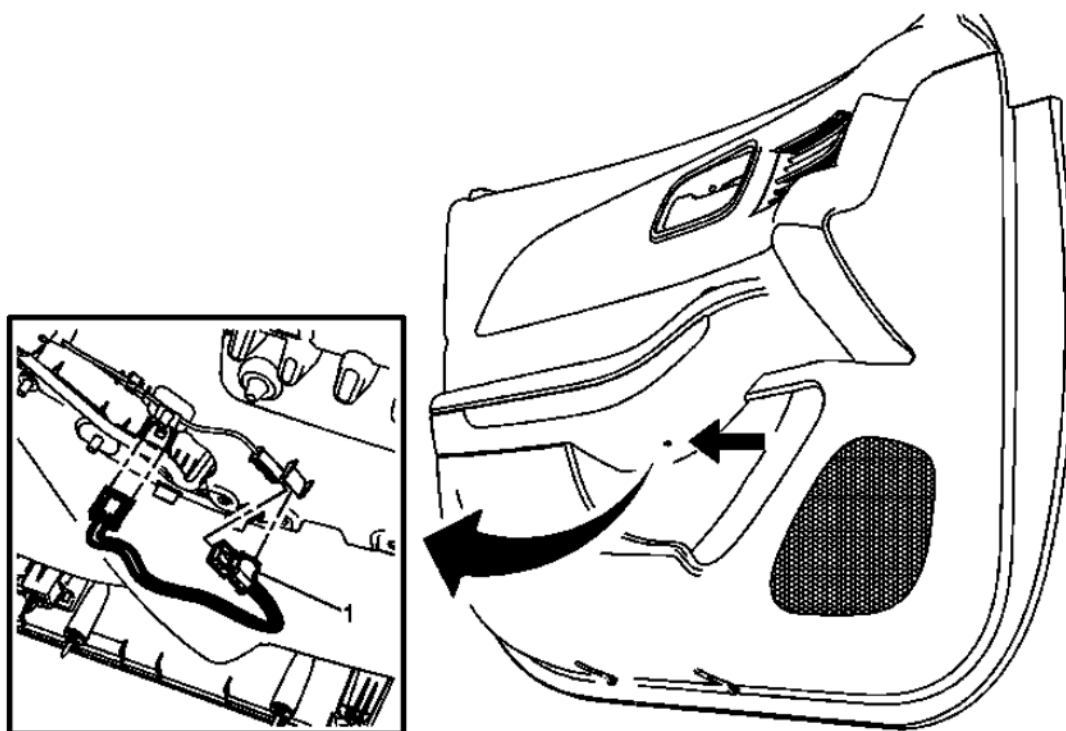


Fig. 33: Front Side Door Warning Lamp
 Courtesy of GENERAL MOTORS COMPANY

Front Side Door Warning Lamp Replacement

Callout	Component Name
Preliminary Procedure Remove the front side door trim panel. Refer to Front Side Door Trim Replacement .	
1	Front Side Door Warning Lamp Procedure 1. Disconnect the lamp from the door trim panel. 2. Unclip the rear of the lamp. 3. Slide out the lamp rearward. 4. Disconnect electrical connection.

INSTRUMENT PANEL FLEXIBLE LIGHT TUBE REPLACEMENT

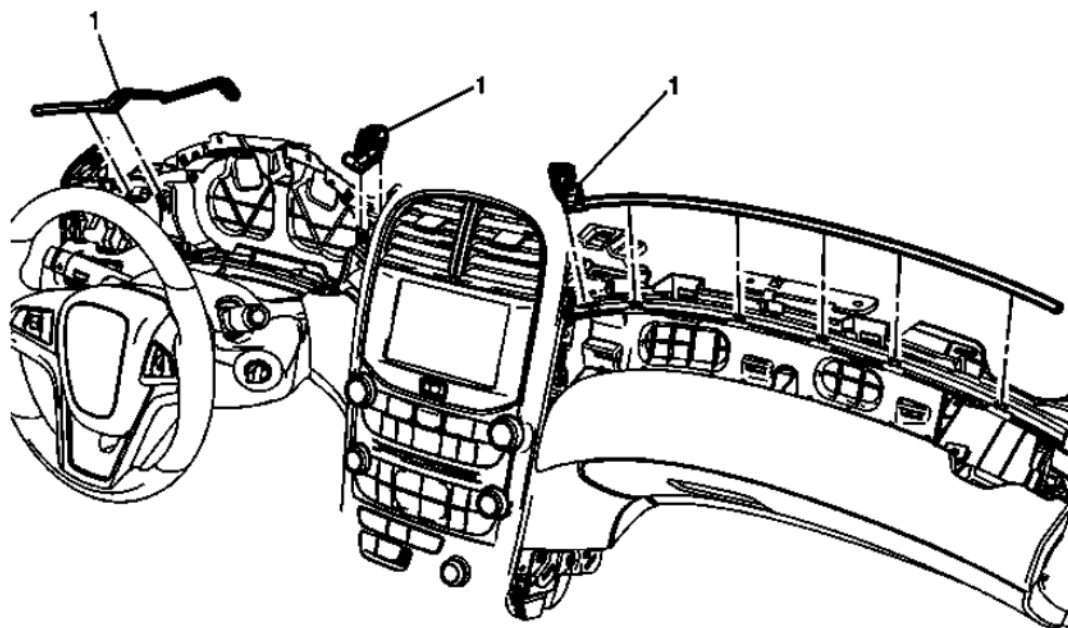


Fig. 34: Three Instrument Panel Flexible Light Tubes
 Courtesy of GENERAL MOTORS COMPANY

Instrument Panel Flexible Light Tube Replacement

Callout	Component Name
Preliminary Procedure Remove the instrument panel assembly. Refer to <u>Instrument Panel Assembly Replacement</u> .	
1	Instrument Panel Flexible Light Tube (Qty: 3) Procedure 1. Unclip electrical connector from instrument panel carrier. 2. Disconnect electrical connector. 3. Disconnect wire from integral tabs.

ROOF CONSOLE COURTESY LAMP REPLACEMENT

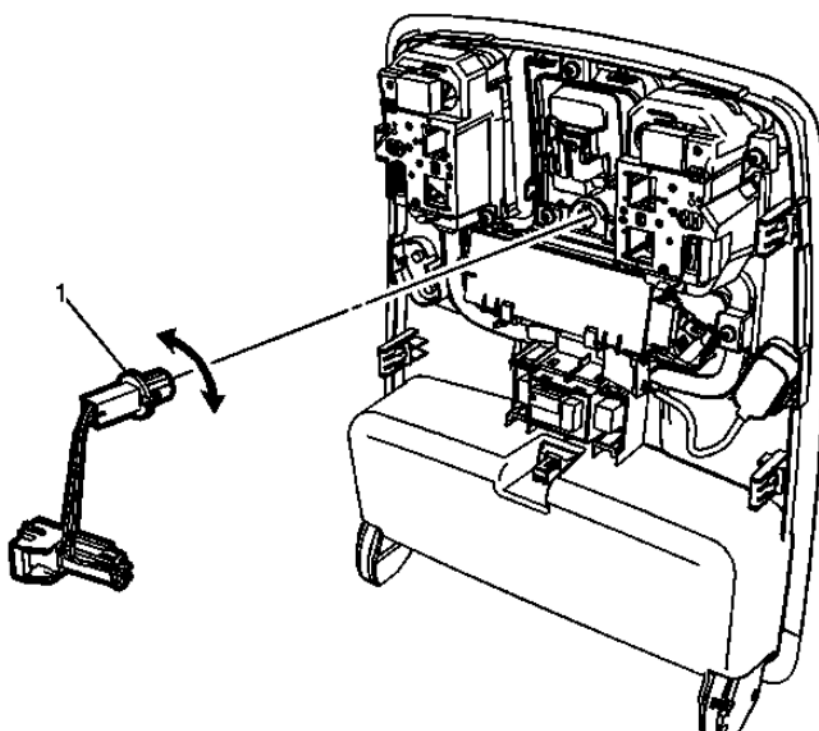


Fig. 35: Roof Console Courtesy Lamp
 Courtesy of GENERAL MOTORS COMPANY

Roof Console Courtesy Lamp Replacement

Callout	Component Name
Preliminary Procedure Remove the roof console. Refer to <u>Roof Console Replacement</u> .	
1	Roof Console Courtesy Lamp Procedure Turn lamp to release.

INSTRUMENT PANEL MULTIFUNCTION SWITCH REPLACEMENT

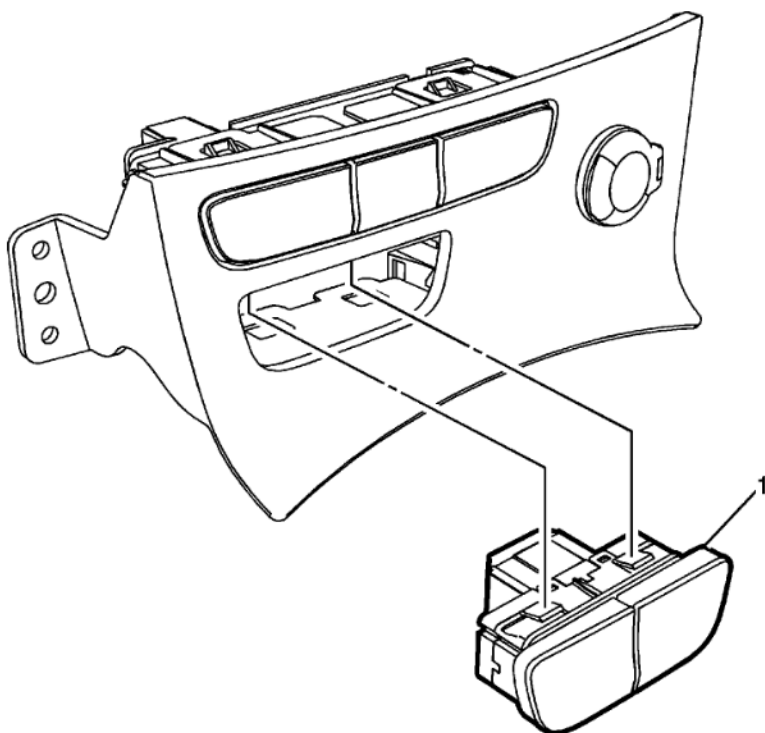


Fig. 36: Instrument Panel Multifunction Switch
 Courtesy of GENERAL MOTORS COMPANY

Instrument Panel Multifunction Switch Replacement

Callout	Component Name
Preliminary Procedure Remove the instrument panel trim plate. Refer to <u>Instrument Panel Trim Plate Replacement</u> .	
1	Instrument Panel Multifunction Switch Procedure Release four tabs on switch to remove from trim plate.

INSTRUMENT PANEL COMPARTMENT LAMP REPLACEMENT

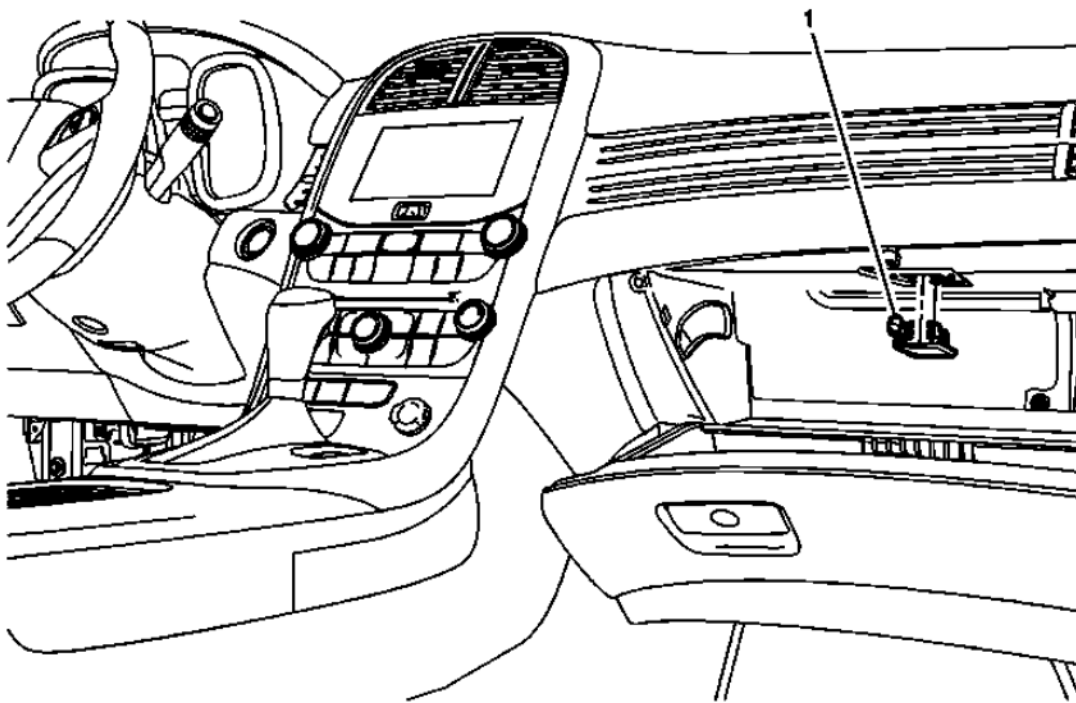


Fig. 37: Instrument Panel Compartment Lamp
 Courtesy of GENERAL MOTORS COMPANY

Instrument Panel Compartment Lamp Replacement

Callout	Component Name
1	Instrument Panel Compartment Lamp Procedure 1. Use a plastic flat bladed trim tool in order to release the lamp assembly from the instrument panel compartment housing. 2. Disconnect the electrical connection.

INSTRUMENT PANEL COMPARTMENT LAMP SWITCH REPLACEMENT

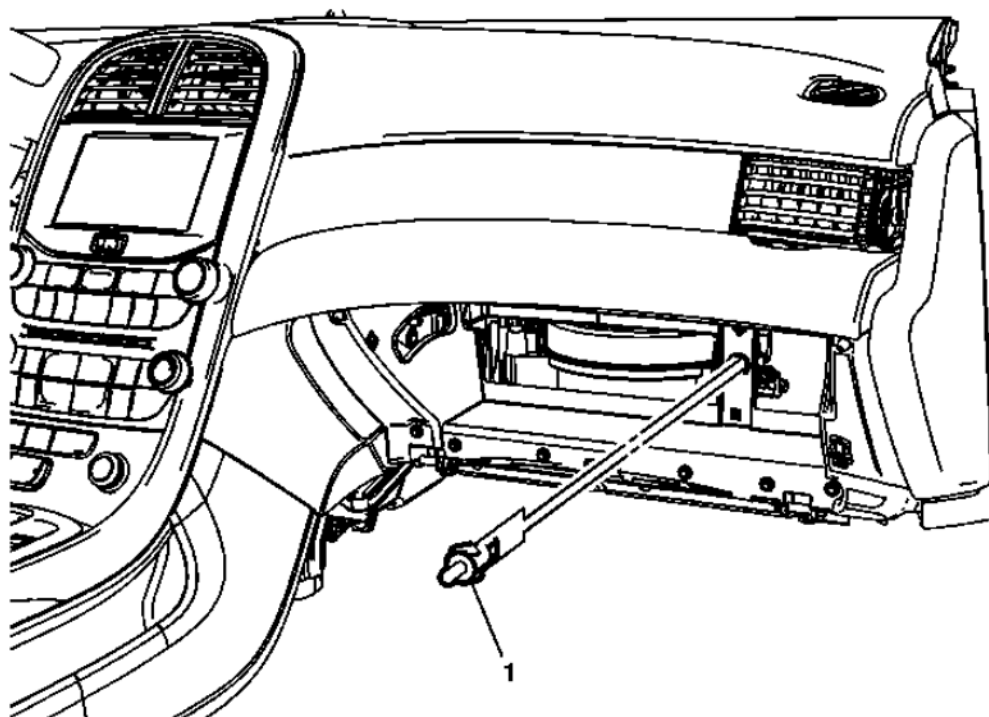


Fig. 38: Instrument Panel Compartment Lamp Switch
 Courtesy of GENERAL MOTORS COMPANY

Instrument Panel Compartment Lamp Switch Replacement

Callout	Component Name
Preliminary Procedure Remove the instrument panel compartment door. Refer to <u>Instrument Panel Compartment Door Replacement</u> .	
1	Instrument Panel Compartment Lamp Switch Procedure 1. Disconnect the electrical connector. 2. Depress tabs to remove switch from the instrument panel compartment door opening frame.

INSTRUMENT PANEL COMPARTMENT LAMP BULB REPLACEMENT

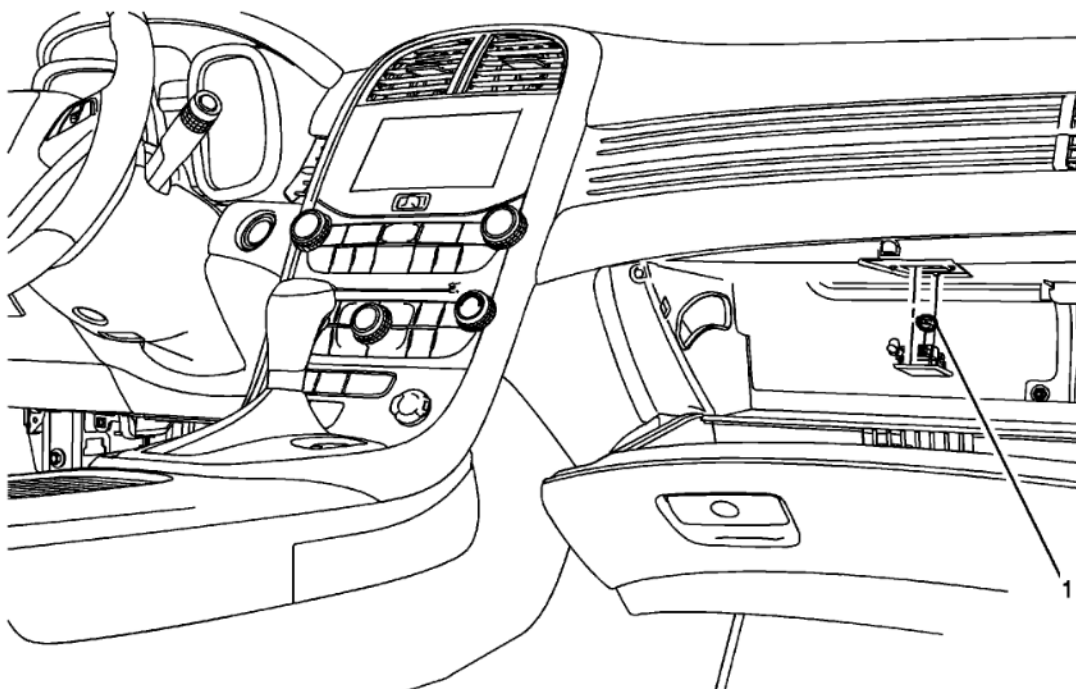


Fig. 39: Instrument Panel Compartment Lamp Bulb
 Courtesy of GENERAL MOTORS COMPANY

Instrument Panel Compartment Lamp Bulb Replacement

Callout	Component Name
Preliminary Procedure Remove the instrument panel compartment lamp. Refer to <u>Instrument Panel Compartment Lamp Replacement</u> .	
1	Instrument Panel Compartment Lamp Bulb

OUTSIDE REARVIEW MIRROR TURN SIGNAL LAMP REPLACEMENT

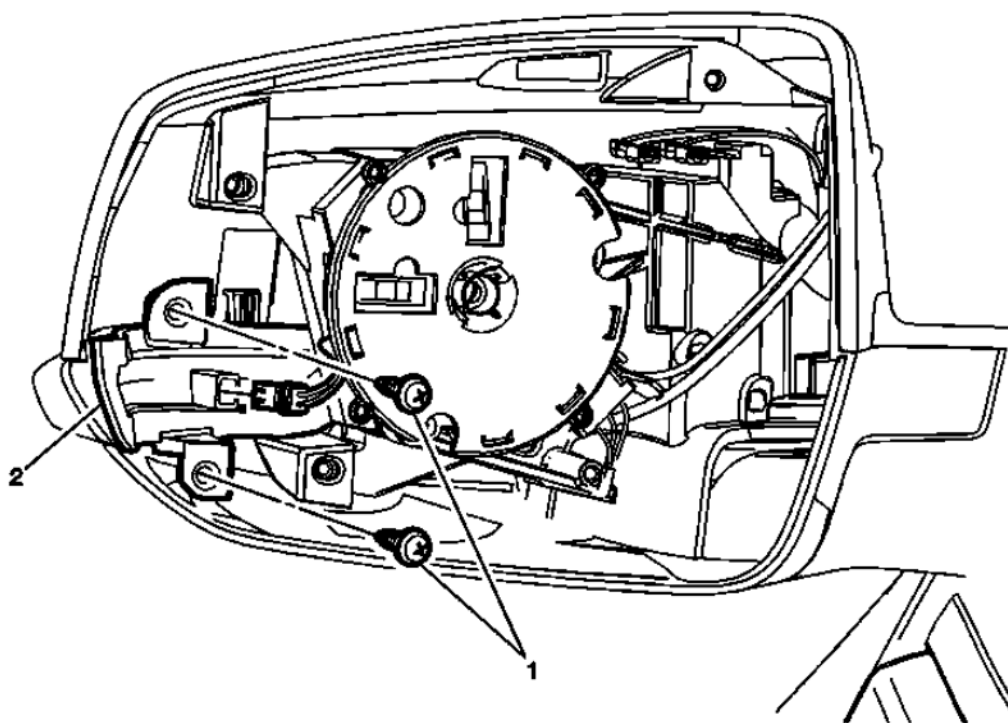


Fig. 40: Outside Rearview Mirror Turn Signal Lamp
 Courtesy of GENERAL MOTORS COMPANY

Outside Rearview Mirror Turn Signal Lamp Replacement

Callout	Component Name
Preliminary Procedure Remove the outside rearview mirror housing cover. Refer to <u>Outside Rearview Mirror Housing Cover Replacement</u> .	
1	Outside Rearview Mirror Turn Signal Lamp Screw (Qty: 2) CAUTION: Refer to <u>Fastener Caution</u> . Tighten Hand tighten the screws.
2	Outside Rearview Mirror Turn Signal Lamp Procedure 1. Disconnect the electrical connector to the turn signal lamp. 2. Rotate the turn signal lamp rearward and outward to disengage from the outside rearview mirror housing.

HEADLAMP REPLACEMENT (LEFT SIDE)

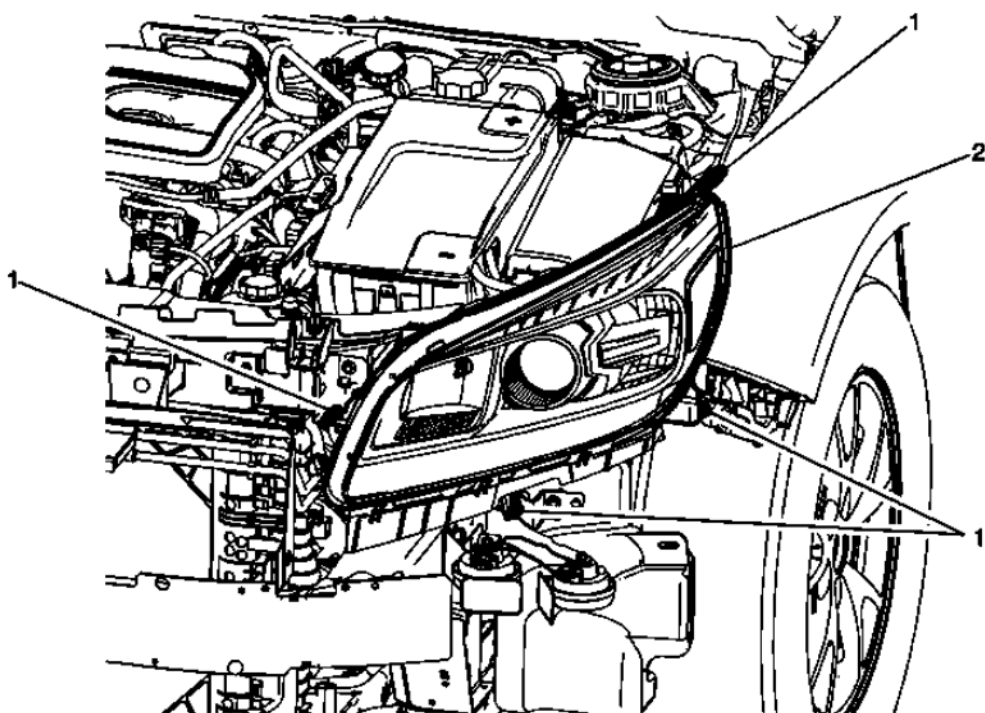


Fig. 41: Headlamp (Left Side)

Courtesy of GENERAL MOTORS COMPANY

Headlamp Replacement (Left Side)

Callout	Component Name
Preliminary Procedure Remove the front bumper fascia. Refer to Front Bumper Fascia Replacement .	
1	Headlamp Assembly Screw (Qty: 4) CAUTION: Refer to Fastener Caution . Tighten 2.5 N.m (22 lb in)
2	Headlamp Assembly Procedure 1. Disconnect the electrical connector bulb harness and remove the headlamp assembly. 2. Aim the headlamps after replacement. Refer to Headlamp Aiming.

HEADLAMP REPLACEMENT (RIGHT SIDE)

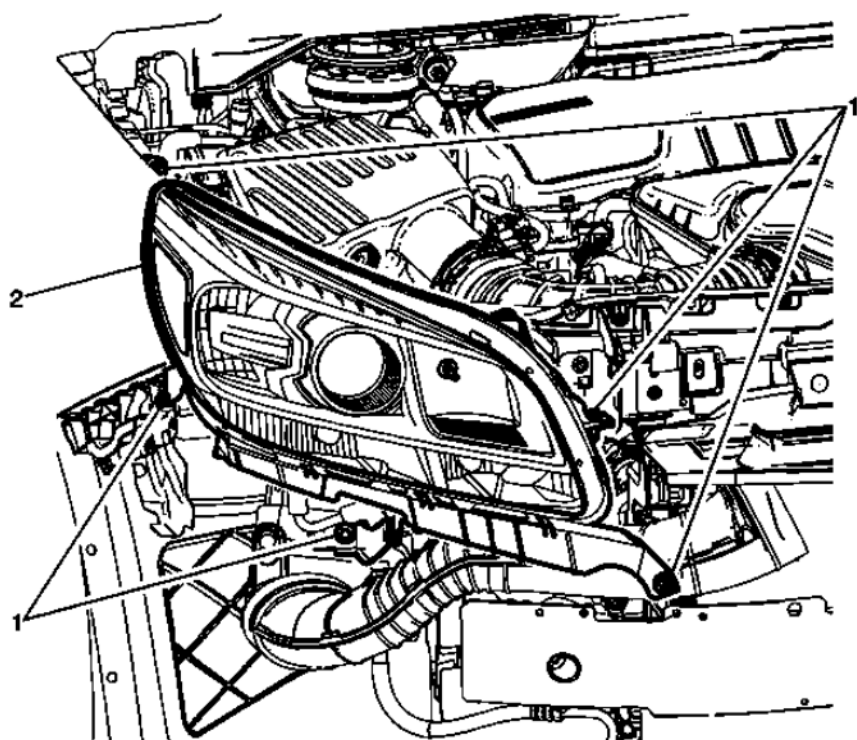


Fig. 42: Headlamp (Right Side)

Courtesy of GENERAL MOTORS COMPANY

Headlamp Replacement (Right Side)

Callout	Component Name
Preliminary Procedure Remove the front bumper fascia. Refer to Front Bumper Fascia Replacement .	
1	Headlamp Assembly Screw (Qty: 5) CAUTION: Refer to Fastener Caution . Tighten 2.5 N.m (22 lb in)
2	Headlamp Assembly Procedure 1. Disconnect the electrical connector bulb harness and remove the headlamp assembly. 2. Aim the headlamps after replacement. Refer to Headlamp Aiming.

HEADLAMP BALLAST REPLACEMENT

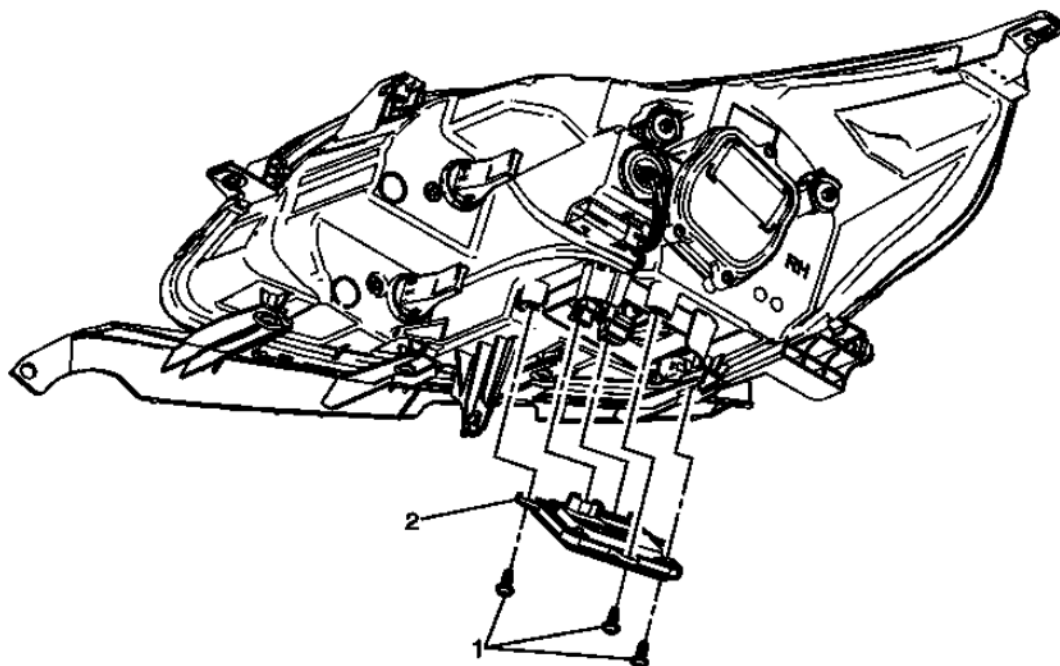


Fig. 43: Headlamp Ballast
 Courtesy of GENERAL MOTORS COMPANY

Headlamp Ballast Replacement

Callout	Component Name
WARNING: The high intensity discharge system produces high voltage and current. In order to reduce the risk of severe shocks and burns, the battery negative cable must be disconnected any time service work is being performed on or around the high intensity discharge system.	
WARNING: The high intensity discharge system produces high voltage and current. To reduce the risk of severe shocks and burns: • Never open the high intensity discharge system ballast or the arc tube assembly starter. • Never probe between the high intensity discharge system ballast output connector and the arc tube assembly.	
Preliminary Procedure Remove the headlamp capsule. Refer to Headlamp Replacement (Left Side) , Headlamp Replacement (Right Side) .	
1	Headlamp Ballast Screw (Qty: 3) CAUTION: Refer to Fastener Caution .

	Tighten Hand tighten the screws only, no torque required.
2	Headlamp Ballast Procedure 1. Disconnect the electrical connectors. 2. Remove the ballast assembly and inspect the sealing gasket prior to installing the new ballast assembly.

HEADLAMP BULB REPLACEMENT (BASE)

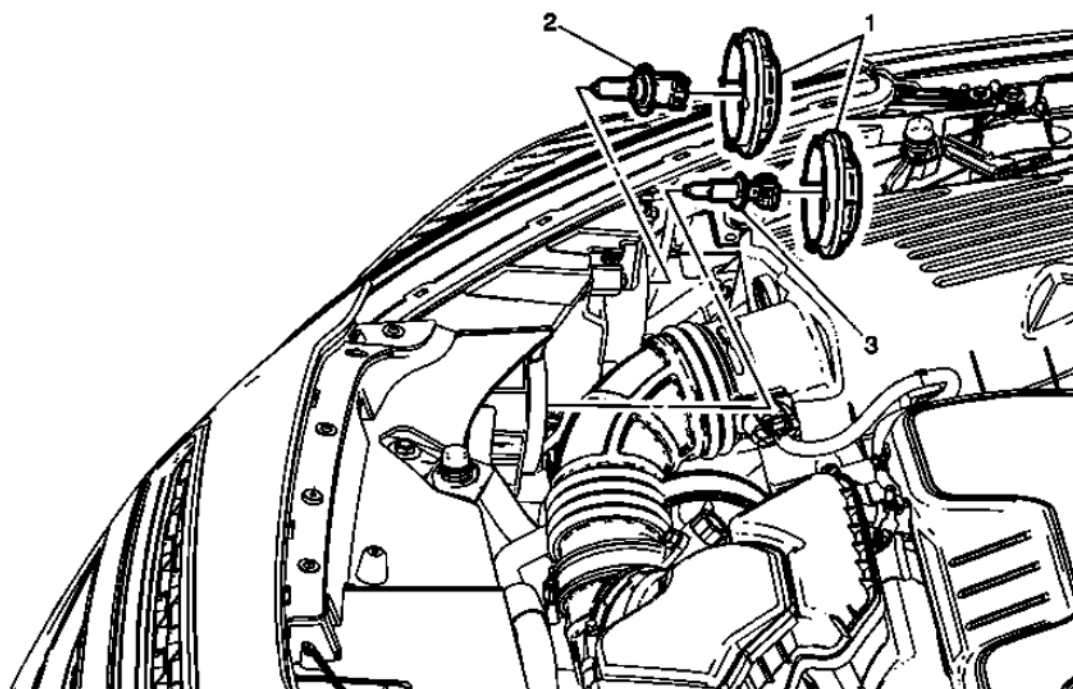


Fig. 44: Headlamp Bulb (Base)

Courtesy of GENERAL MOTORS COMPANY

Headlamp Bulb Replacement (Base)

Callout	Component Name
Preliminary Procedure Remove the windshield washer solvent container filler tube if removing the left side bulb. Refer to Windshield Washer Solvent Container Filler Tube Replacement .	
1	Accessory Bulb Cover (Qty: 2)
	Headlamp Bulb- Low Beam

2	WARNING: Refer to <u>Halogen Bulb Warning</u> . Procedure 1. Disconnect the electrical connector from the bulb socket. 2. Rotate the bulb socket and remove from the headlamp housing.
3	Headlamp Bulb- High Beam Procedure 1. Disconnect the electrical connector from the bulb socket. 2. Rotate the bulb socket a quarter turn and remove from the headlamp housing.

HEADLAMP BULB REPLACEMENT (HID)

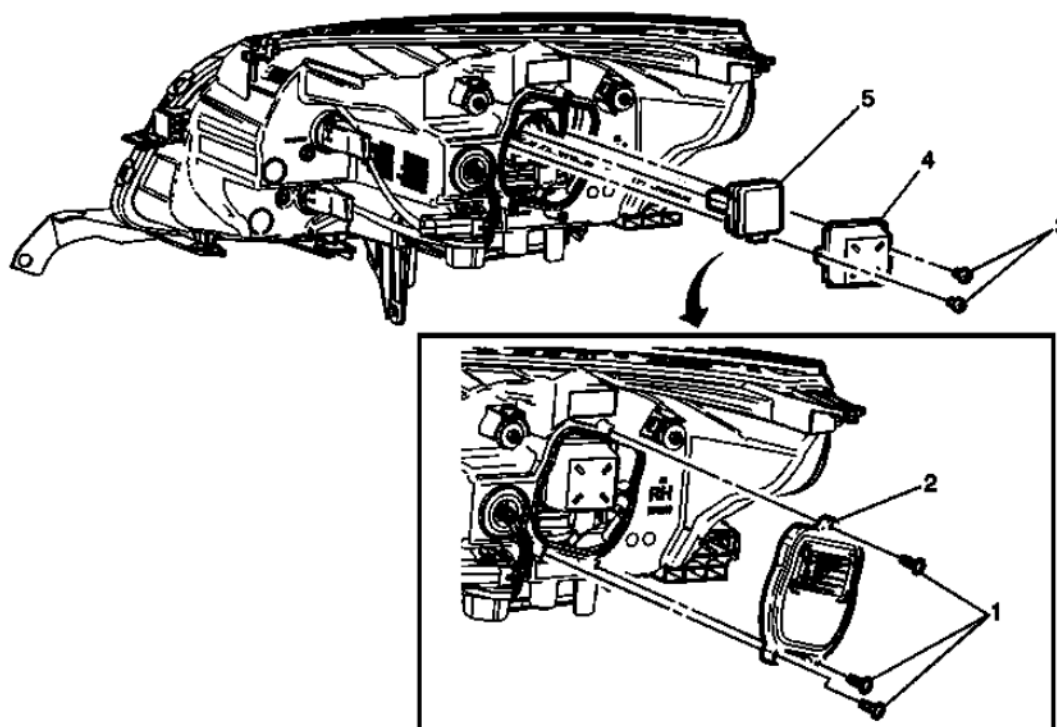


Fig. 45: Headlamp Bulb (HID)

Courtesy of GENERAL MOTORS COMPANY

Headlamp Bulb Replacement (HID)

Callout	Component Name
WARNING: The high intensity discharge system produces high voltage and current. In order to reduce the risk	

of severe shocks and burns, the battery negative cable must be disconnected any time service work is being performed on or around the high intensity discharge system.

WARNING:

The high intensity discharge system produces high voltage and current. To reduce the risk of severe shocks and burns:

- Never open the high intensity discharge system ballast or the arc tube assembly starter.
- Never probe between the high intensity discharge system ballast output connector and the arc tube assembly.

Preliminary Procedure Remove the headlamp capsule. Refer to **Headlamp Capsule Replacement (HID, Left Side)**, **Headlamp Capsule Replacement (HID, Right Side)**.

1	Headlamp Bulb Dust Cover Screw (Qty: 3)
2	Headlamp Bulb Dust Cover
3	Headlamp Bulb Access Cover Screw (Qty: 2)
4	Headlamp Bulb Access Cover
5	Headlamp Bulb Procedure 1. Pull the headlamp bulb straight out. 2. Disconnect the electrical connector from the headlamp bulb. 3. Position the notch on the bulb housing to the top to install the bulb.

HEADLAMP CAPSULE REPLACEMENT (HID, LEFT SIDE)

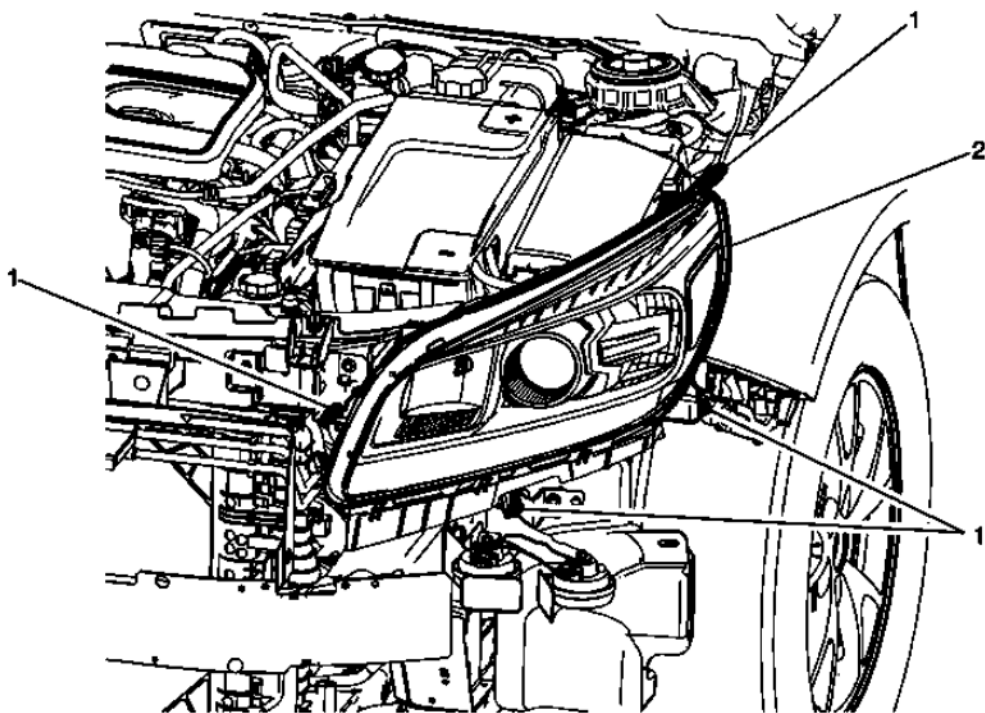


Fig. 46: Headlamp Capsule Replacement (HID, Left Side)

Courtesy of GENERAL MOTORS COMPANY

Headlamp Capsule Replacement (HID, Left Side)

Callout	Component Name
WARNING: The high intensity discharge system produces high voltage and current. In order to reduce the risk of severe shocks and burns, the battery negative cable must be disconnected any time service work is being performed on or around the high intensity discharge system.	
WARNING: The high intensity discharge system produces high voltage and current. To reduce the risk of severe shocks and burns: • Never open the high intensity discharge system ballast or the arc tube assembly starter. • Never probe between the high intensity discharge system ballast output connector and the arc tube assembly.	
Preliminary Procedure Remove the front bumper fascia. Refer to Front Bumper Fascia Replacement .	
1	Headlamp Capsule Screw (Qty: 4) CAUTION: Refer to Fastener Caution .

	Tighten 2.5 N.m (22 lb in)
2	Headlamp Capsule Procedure 1. Disconnect the electrical connector bulb harness and remove the headlamp capsule. 2. Aim the headlamp capsule after replacement. Refer to <u>Headlamp Aiming</u>.

HEADLAMP CAPSULE REPLACEMENT (HID, RIGHT SIDE)

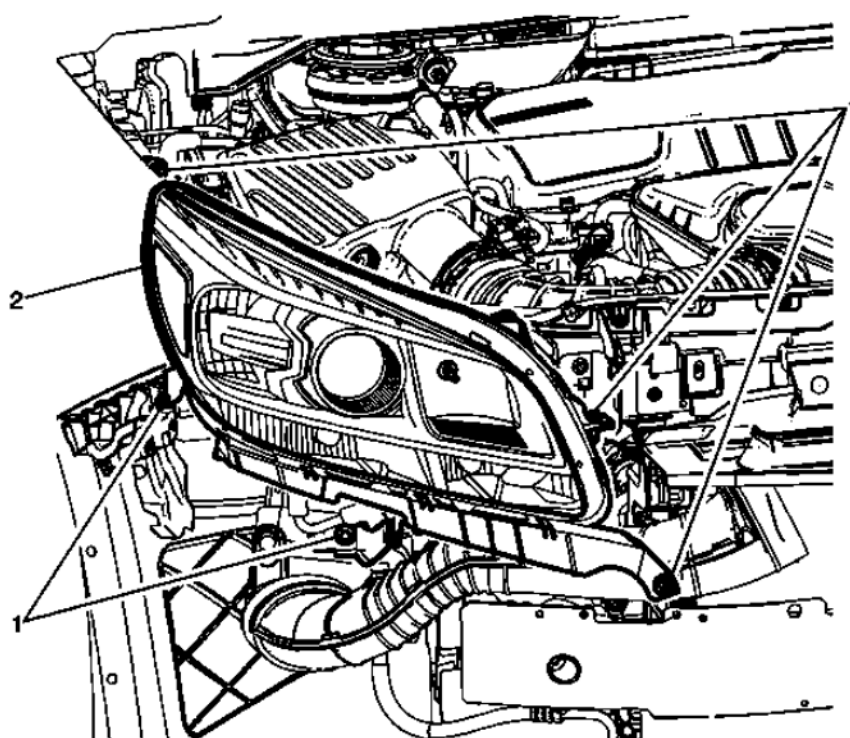


Fig. 47: Headlamp Capsule (HID, Right Side)
Courtesy of GENERAL MOTORS COMPANY

Headlamp Capsule Replacement (HID, Right Side)

Callout	Component Name
WARNING: The high intensity discharge system produces high voltage and current. In order to reduce the risk of severe shocks and burns, the battery negative cable must be disconnected any time service work is being performed on or around the high intensity discharge system.	
WARNING:	

The high intensity discharge system produces high voltage and current. To reduce the risk of severe shocks and burns:

- Never open the high intensity discharge system ballast or the arc tube assembly starter.
- Never probe between the high intensity discharge system ballast output connector and the arc tube assembly.

Preliminary Procedure Remove the front bumper fascia. Refer to **Front Bumper Fascia Replacement** .

1	Headlamp Assembly Screw (Qty: 5) CAUTION: Refer to <u>Fastener Caution</u> . Tighten 2.5 N.m (22 lb in)
2	Headlamp Assembly Procedure 1. Disconnect the electrical connector bulb harness and remove the headlamp assembly. 2. Aim the headlamps after replacement. Refer to <u>Headlamp Aiming</u> .

HEADLAMP BRACKET REPLACEMENT

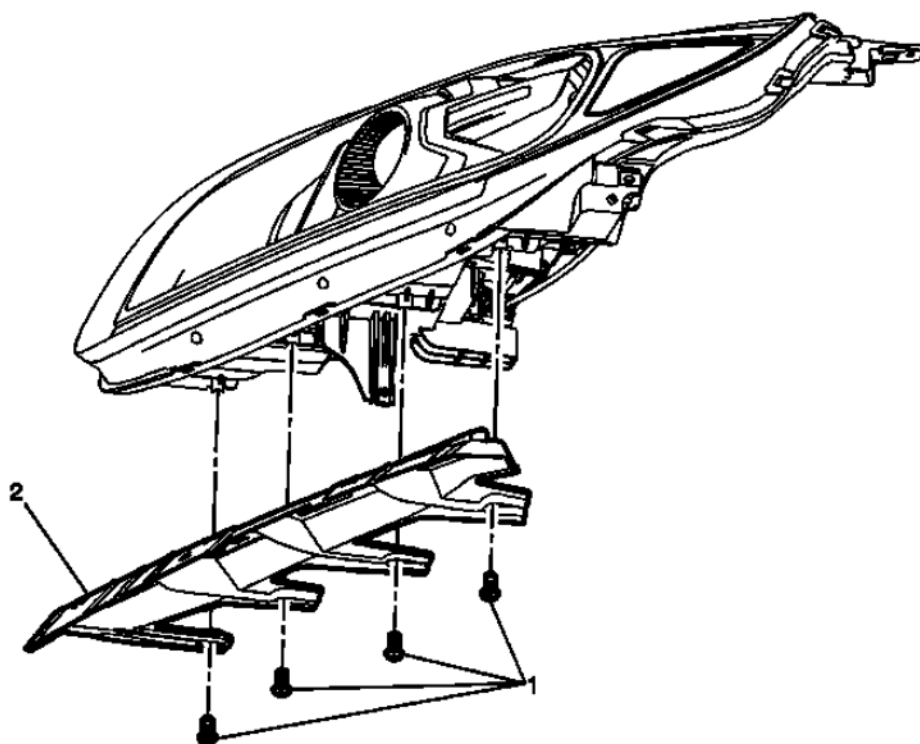


Fig. 48: Headlamp Bracket

Courtesy of GENERAL MOTORS COMPANY

Headlamp Bracket Replacement

Callout	Component Name
Preliminary Procedure Remove the front bumper fascia. Refer to Front Bumper Fascia Replacement .	
1	Headlamp Bracket Screw (Qty: 4) CAUTION: Refer to Fastener Caution . Tighten 2.5 N.m (22 lb in)
2	Headlamp Bracket

HEADLAMP AIMING

Visual Aiming Preparation Procedure

NOTE: Some local laws specify requirements for headlamp aim. Comply with all of these laws when performing any headlamp aiming operations.

Headlamp aim should be checked:

- When a new headlamp capsule is installed.
- If service or repairs to the front end area have, or may have, disturbed the headlamps or their mounting.

The aiming screen should meet the following criteria:

- The area will consist of a level surface large enough to allow for a vehicle and an additional 7.62 m (25 ft) measured from face of lamps to the front of the aiming screen.
- The screen will be 1.52 m (5 ft) high x 3.66 m (12 ft) wide with a matte white surface well shaded from extraneous light, and properly adjusted to the floor on which the vehicle stands. Provisions should be made to align the aiming screen parallel with the vehicle.
- The screen shall be provided with a fixed vertical centerline, two laterally adjustable vertical tapes, and one vertically adjustable horizontal tape.
- If a regular commercial aiming screen is not available, the screen may consist of a vertical wall having a clear uninterrupted area approximately 1.83 m (6 ft) high and 3.66 m (12 ft) wide. The surface should be finished with a washable non-gloss white paint.

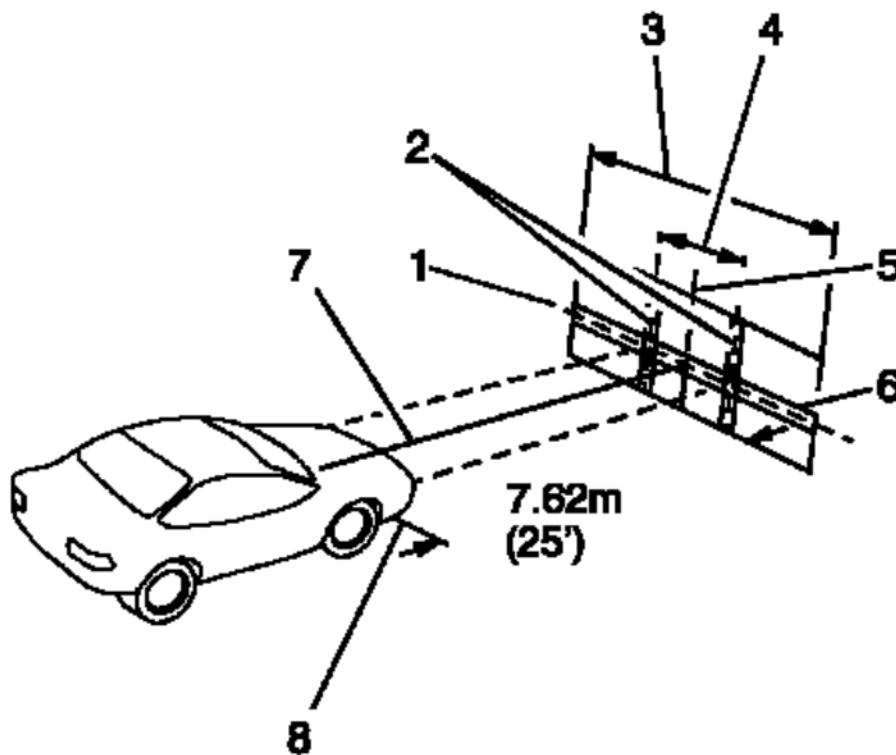


Fig. 49: Center Line Of Lamps

Courtesy of GENERAL MOTORS COMPANY

- After the aiming screen has been set up in a permanent location, paint a reference line on the floor directly under the lens of the lamps to indicate the proper location of the headlamps when they are being

aimed:

- Horizontal center line of lamps (1)
- Vertical center line ahead of left headlamp (2)
- 3.66 m (12 ft) (3)
- Distance between headlamps (4)
- Center line of screen (5)
- Adjustable horizontal tape (6)
- Car axis (7)
- 7.62 m (25 ft) (8)

Prior to aiming the headlamps, the following steps must be taken:

1. Remove any snow, ice or mud from the vehicle.
2. The vehicle must have a full tank of gas.
3. Stop all other work on the vehicle.
4. If any service has been performed on the vehicle, make sure that all of the components are back in their original place.
5. The vehicle must be on a level surface.

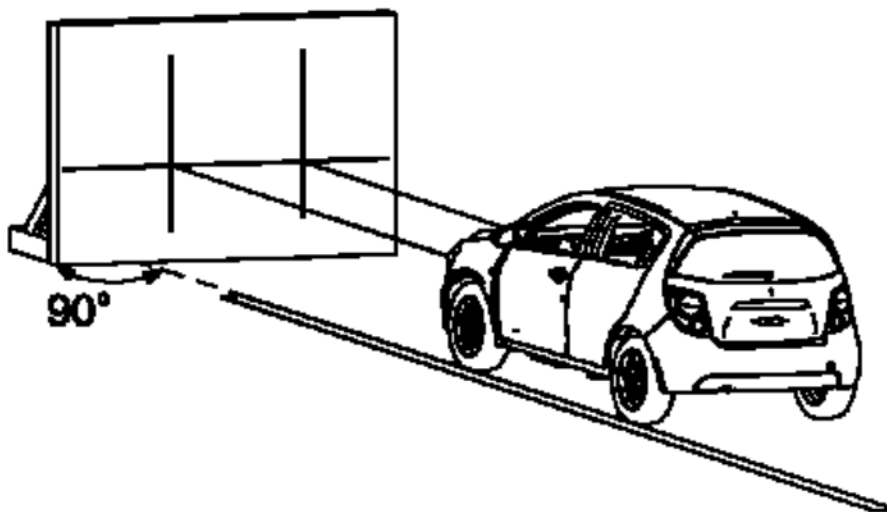


Fig. 50: Headlamp Aiming

Courtesy of GENERAL MOTORS COMPANY

6. The vehicle left tires must be aligned with the reference line extending from the screen with the headlamps aligned with the reference line.
7. Do not load any cargo in the vehicle.
8. The vehicle must contain approximately 75 kg (165 lb) on the driver seat.
9. Inflate the tires to the proper pressure.
10. Simulate the vehicle loads if the intended use of the vehicle is for hauling heavy loads or towing a trailer.
11. Rock the vehicle in order to stabilize the suspension.
12. Turn on the headlamps to low beam and observe the left and the top edges of the high intensity zone on the screen. The edges of the high intensity zone should fall within the specifications.

Headlamp Aiming Procedure

1. Open the hood.

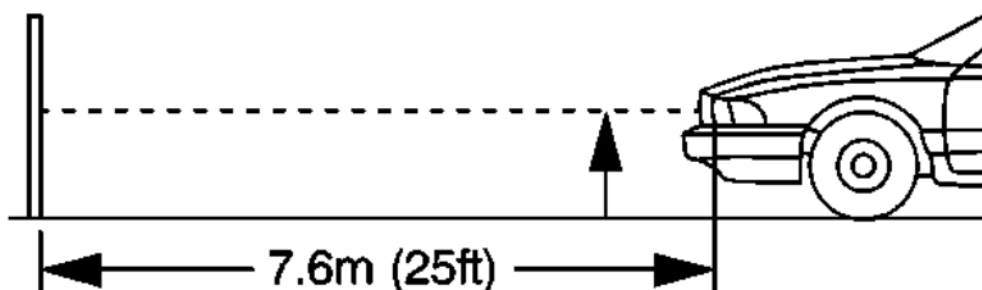


Fig. 51: Measuring Distance Between Headlamps Face & Aiming Screen
Courtesy of GENERAL MOTORS COMPANY

2. Measure from the floor to the center of the headlamp bulb. Some headlamps have an aim dot marked on the headlamp lens.
3. At the screen, measure from the floor and place the horizontal tape at the measured distance.
4. Measure from the reference line on the floor to the left headlamp bulb centerline.
5. At the screen, measure from the reference line and place the vertical tape at the measured distance.
6. Measure from the reference line on the floor to the right headlamp bulb centerline.
7. At the screen, measure from the reference line and place the vertical tape at the measured distance.

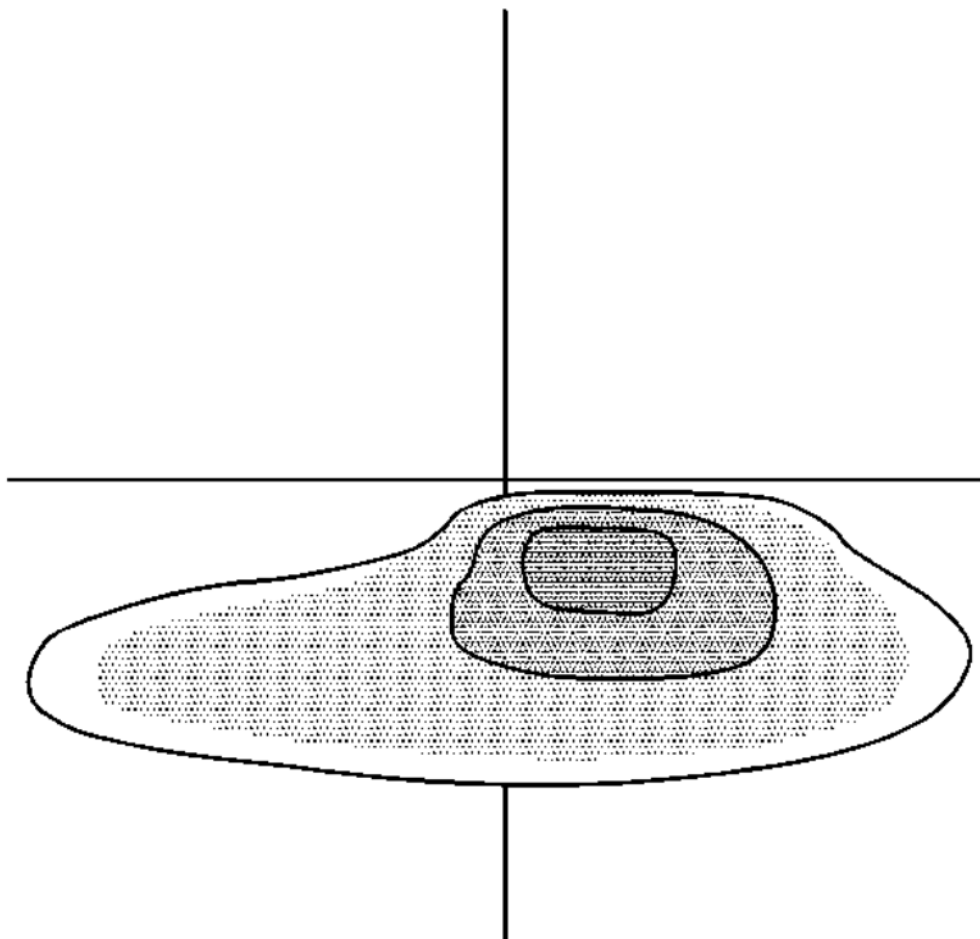


Fig. 52: Identifying Right Side Low Beam Proper Screen Positioning
Courtesy of GENERAL MOTORS COMPANY

NOTE: DO NOT cover the headlamp. This may cause excessive heat build up.

8. Turn ON the low beam headlamps. Block the light from projecting onto the screen from the passenger side headlamp.

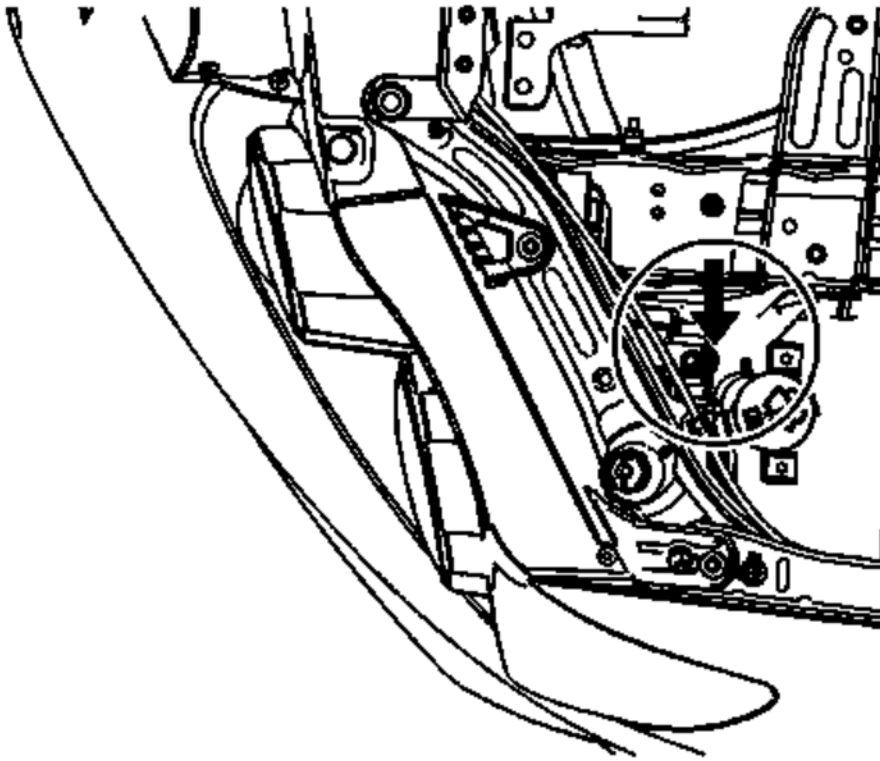


Fig. 53: Vertical Aim Screw

Courtesy of GENERAL MOTORS COMPANY

9. Adjust the vertical and horizontal aim screw (as shown by the arrow) of the headlamps to the specifications required by the state and the local authorities, or as shown in step number 8.
10. Repeat the aiming procedure for the passenger side headlamp while blocking the light from projecting onto the screen from the driver side headlamp.
11. Turn the headlamps OFF.
12. Close the hood.

HEADLAMP CONTROL MODULE REPLACEMENT

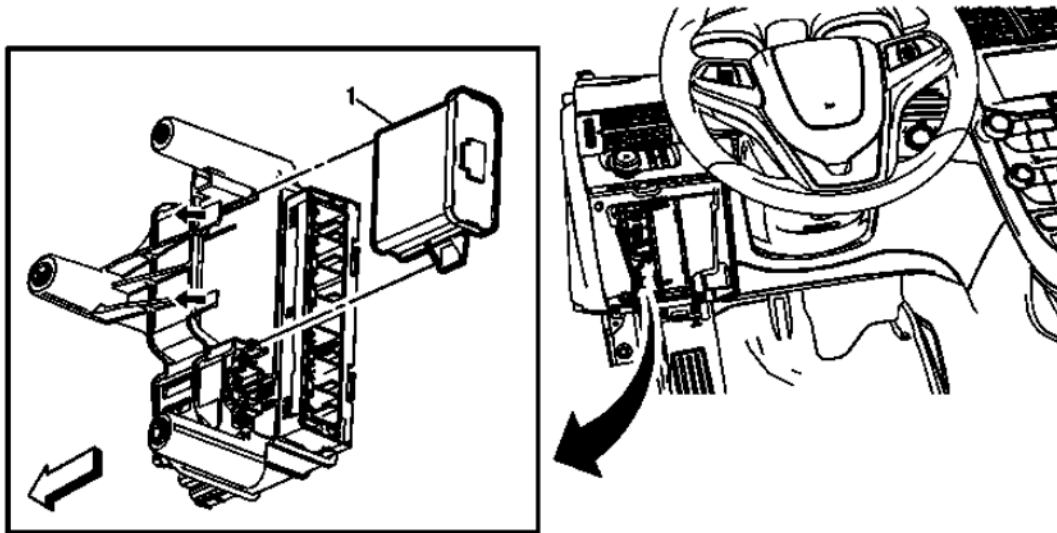


Fig. 54: Headlamp Control Module
Courtesy of GENERAL MOTORS COMPANY

Headlamp Control Module Replacement

Callout	Component Name
Preliminary Procedure Remove the instrument panel wiring harness junction block. Refer to Instrument Panel Wiring Harness Junction Block Replacement , move block to the side to gain access to the control module.	
1	Headlamp Control Module Procedure 1. Disconnect electrical connectors from the body control module. 2. Disconnect the electrical connectors. 3. Unsnap to release the module from the bracket. 4. Refer to Control Module References for programming and set up procedures.

FRONT FOG LAMP REPLACEMENT

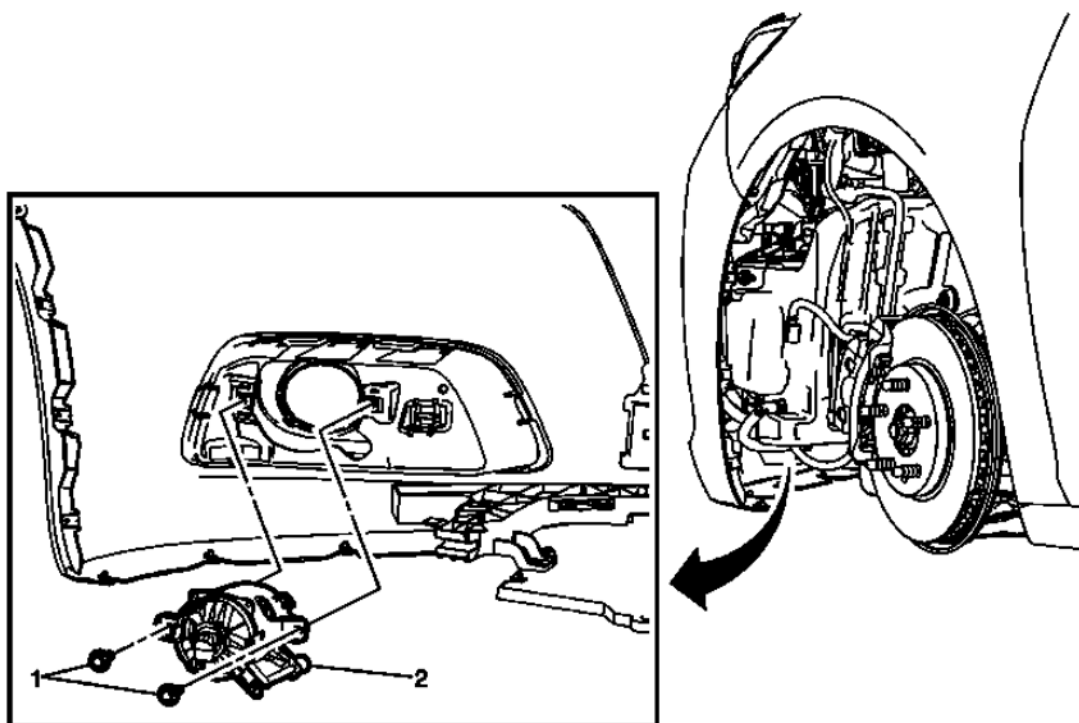


Fig. 55: Front Fog Lamp
 Courtesy of GENERAL MOTORS COMPANY

Front Fog Lamp Replacement

Callout	Component Name
Preliminary Procedure Remove the front wheelhouse front liner. Refer to Front Wheelhouse Front Liner Replacement (Left Side) , Front Wheelhouse Front Liner Replacement (Right Side) .	
1	Front Fog Lamp Bolt (Qty: 2) WARNING: Refer to Halogen Bulb Warning . CAUTION: Refer to Fastener Caution . Tighten 3 N.m (26 lb in)
2	Front Fog Lamp Procedure Disconnect the electrical connector.

FRONT FOG LAMP BULB REPLACEMENT

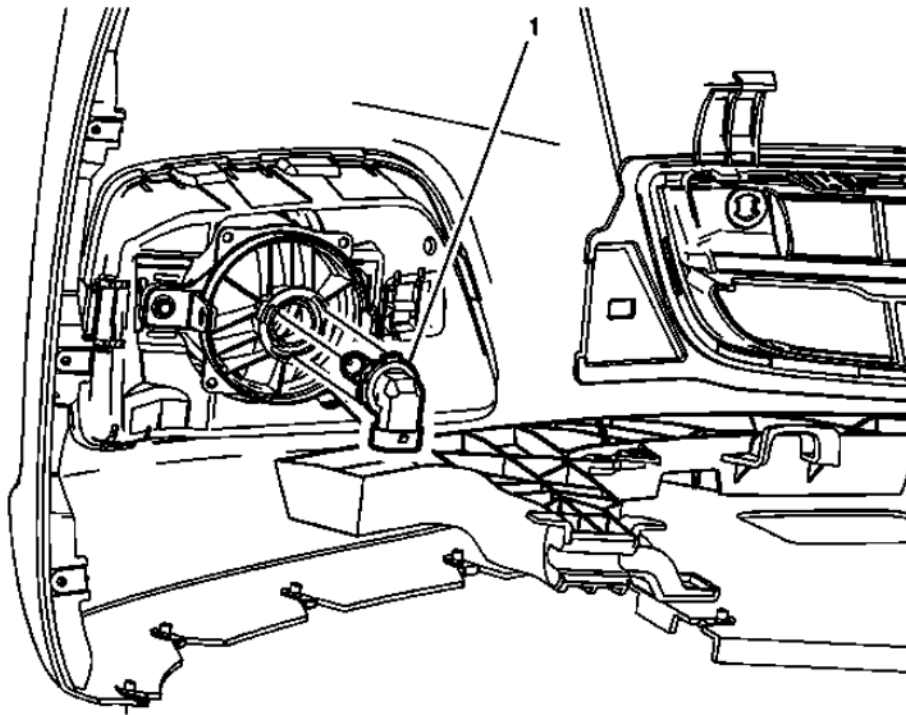


Fig. 56: Front Fog Lamp Bulb
 Courtesy of GENERAL MOTORS COMPANY

Front Fog Lamp Bulb Replacement

Callout	Component Name
WARNING: Refer to <u>Halogen Bulb Warning</u> .	
Preliminary Procedure Remove the front wheelhouse front liner to access the bulb. Refer to <u>Front Wheelhouse Front Liner Replacement (Left Side)</u> , <u>Front Wheelhouse Front Liner Replacement (Right Side)</u> .	
1	Front Fog Lamp Bulb Procedure 1. Disconnect the forward lamp electrical harness connector from the fog lamp bulb socket. 2. Twist the bulb socket counterclockwise to remove from the lamp housing.

FOG LAMP AIMING

Preparation Procedure

NOTE: Horizontal aim is not adjustable on this vehicle. Vertical aim is done by an

adjusting allen head screw located through the fog lamp bezel. Prior to aiming the fog lamps, perform the following steps:

1. Completely assemble all of the components on the vehicle.
2. Place the vehicle on a level surface.
3. Stop all unnecessary operations or work that could affect the ride height of the vehicle.
4. Close the doors and verify that the luggage compartment is empty.
5. Stabilize the suspension by rocking the vehicle sideways.
6. Ensure that the fuel level is full.
7. Ensure that the tires are inflated to the proper pressure.
8. Ensure that the driver or a similar weight, approximately 75 kg (165 lb), is in the vehicle driver seat.

Aiming Procedure

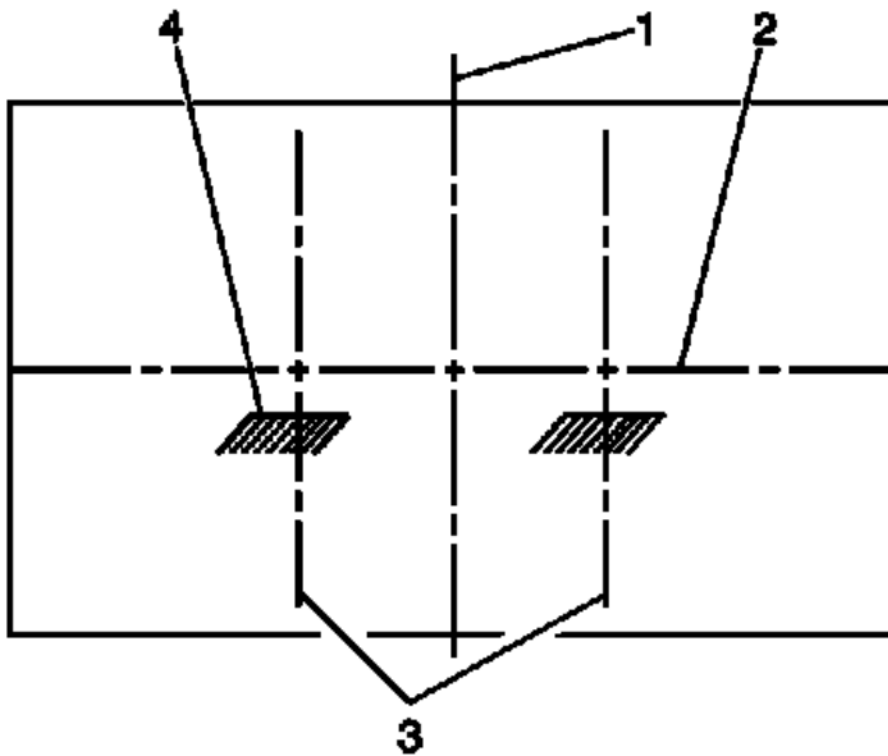


Fig. 57: Locating Alignment Points On Target Screen
Courtesy of GENERAL MOTORS COMPANY

1. Park the vehicle 7.6 m (25 ft) away from the target screen.

2. Measure from the center of the fog lamp to the ground line. Using this measurement, mark the horizontal centerline (2) of the fog lamp on the target screen directly in front of the vehicle.
3. Turn ON the fog lamps. The top of the fog lamp beam image (4) on the target screen should be 102 mm (4 in) below the center of the fog lamp lens height.

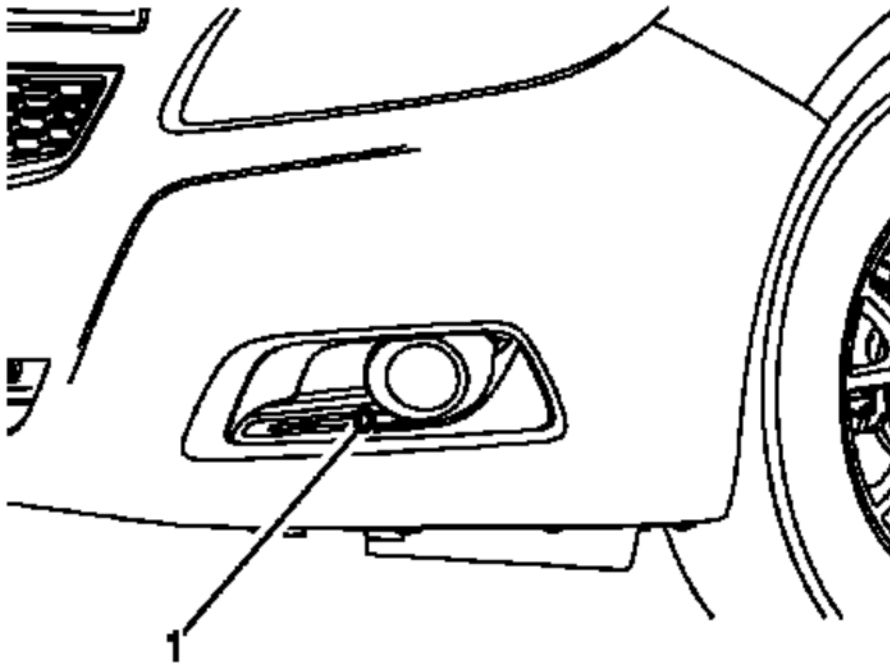


Fig. 58: Adjusting Fog Lamp As Required Using Adjusting Screw
Courtesy of GENERAL MOTORS COMPANY

4. Adjust the fog lamp as required using the adjusting screw above the projector lens on the outside of the front bumper fascia.
5. Turn OFF the fog lamps.

DAYTIME RUNNING LAMP BULB REPLACEMENT (BASE)

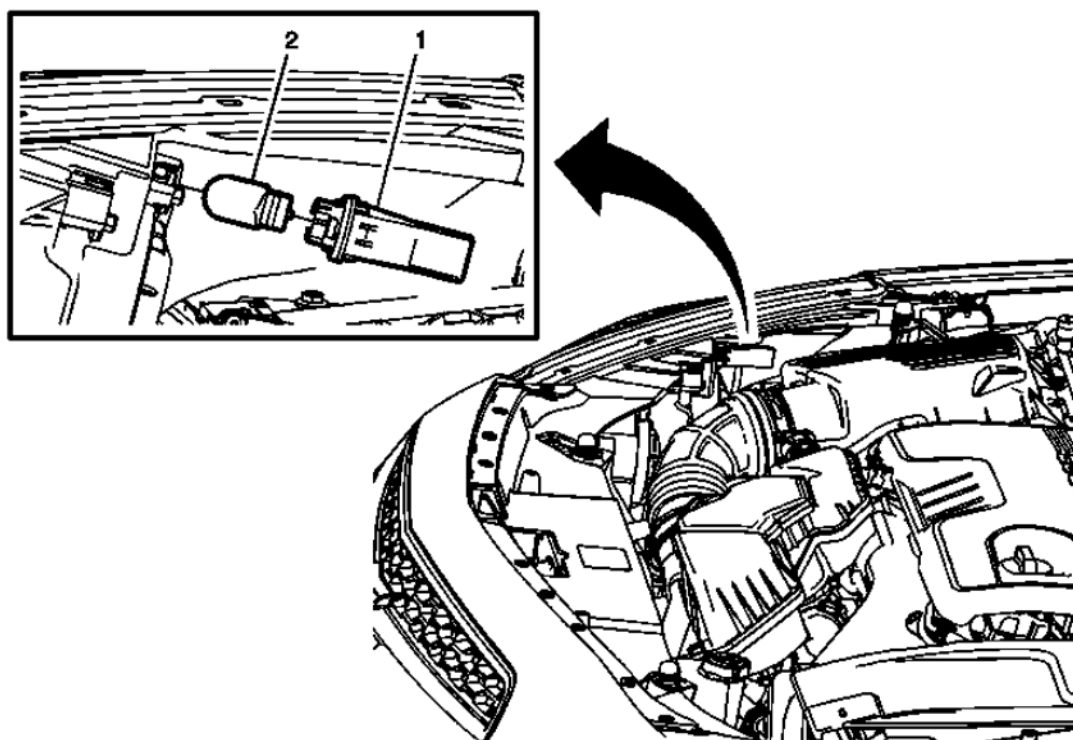


Fig. 59: Daytime Running Lamp Bulb (Base)
 Courtesy of GENERAL MOTORS COMPANY

Daytime Running Lamp Bulb Replacement (Base)

Callout	Component Name
Preliminary Procedure Remove the windshield washer solvent container filler tube if removing the left side bulb. Refer to Windshield Washer Solvent Container Filler Tube Replacement .	
1	Daytime Running Lamp Bulb Socket WARNING: Refer to Halogen Bulb Warning . Procedure Rotate the daytime running lamp bulb socket a quarter turn counterclockwise and remove from the headlamp.
2	Daytime Running Lamp Bulb Procedure Pull the daytime running lamp bulb from the socket.

DAYTIME RUNNING LAMP BULB REPLACEMENT (HID)

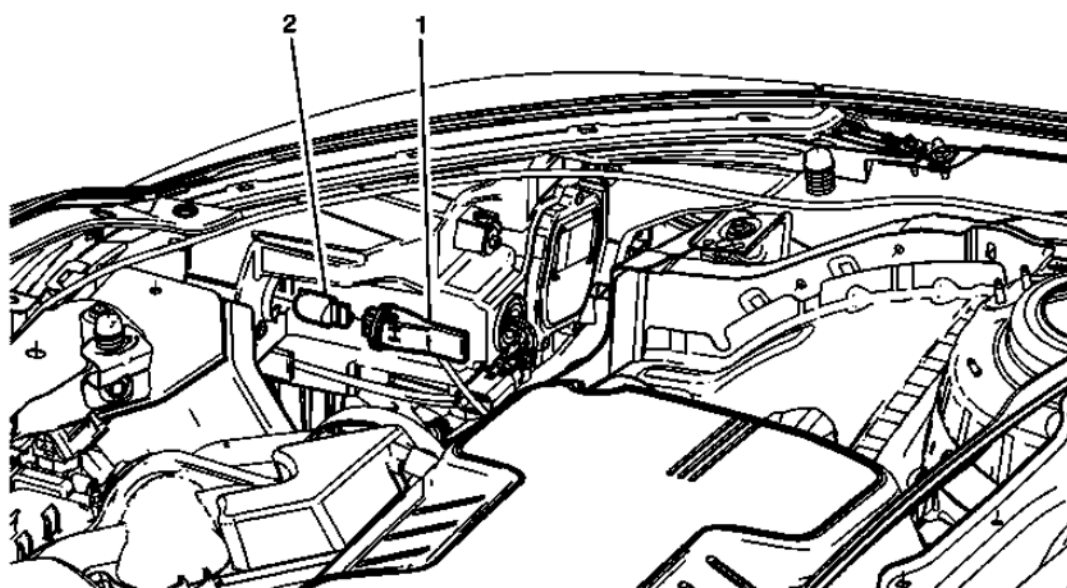


Fig. 60: Daytime Running Lamp Bulb (HID)
 Courtesy of GENERAL MOTORS COMPANY

Daytime Running Lamp Bulb Replacement (HID)

Callout	Component Name
1	Daytime Running Lamp Bulb Socket WARNING: The high intensity discharge system produces high voltage and current. To reduce the risk of severe shocks and burns: • Never open the high intensity discharge system ballast or the arc tube assembly starter. • Never probe between the high intensity discharge system ballast output connector and the arc tube assembly. WARNING: The high intensity discharge system produces high voltage and current. In order to reduce the risk of severe shocks and burns, the battery negative cable must be disconnected any time service work is being performed on or around the high intensity discharge system. WARNING: Refer to <u>Halogen Bulb Warning</u> .

	Procedure Rotate the daytime running lamp bulb socket a quarter turn counterclockwise and remove from the headlamp.
2	Daytime Running Lamp Bulb Procedure Pull the daytime running lamp bulb from the socket.

FRONT TURN SIGNAL LAMP BULB REPLACEMENT (BASE)

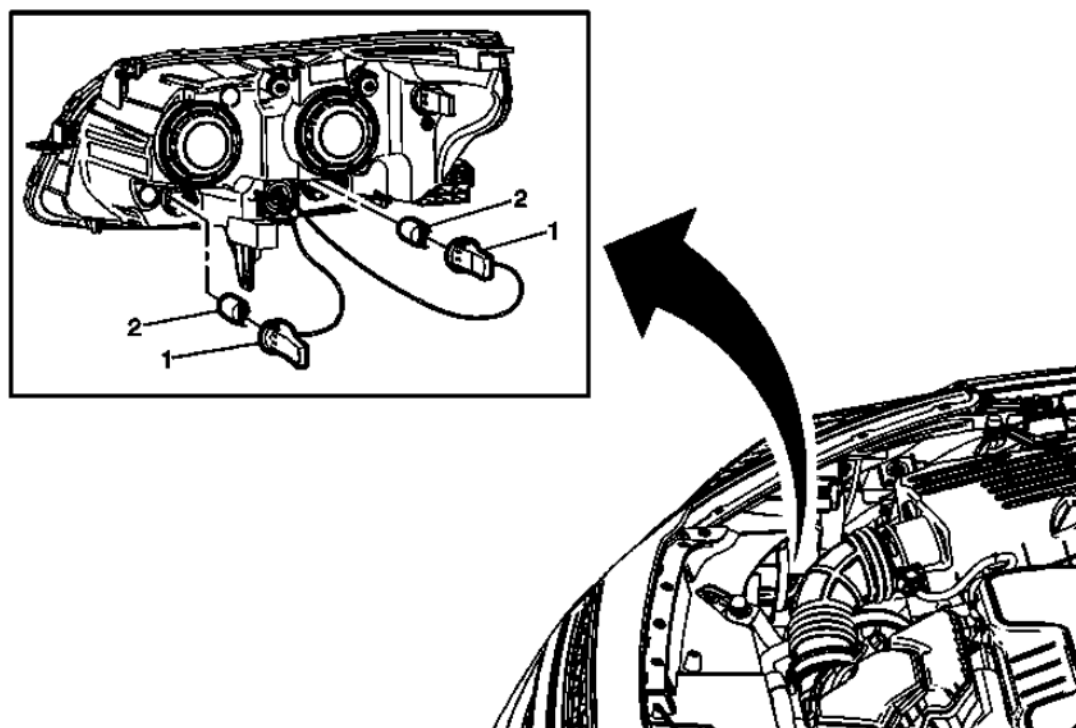


Fig. 61: Front Turn Signal Lamp Bulb (Base)
 Courtesy of GENERAL MOTORS COMPANY

Front Turn Signal Lamp Bulb Replacement (Base)

Callout	Component Name
1	Front Turn Signal Lamp Bulb Socket Procedure Rotate the bulb socket a quarter turn counterclockwise and remove from the front turn signal lamp assembly.
2	Front Turn Signal Lamp Bulb Procedure Pull the turn signal lamp bulb from the front turn signal lamp bulb socket.

FRONT TURN SIGNAL LAMP BULB REPLACEMENT (HID)

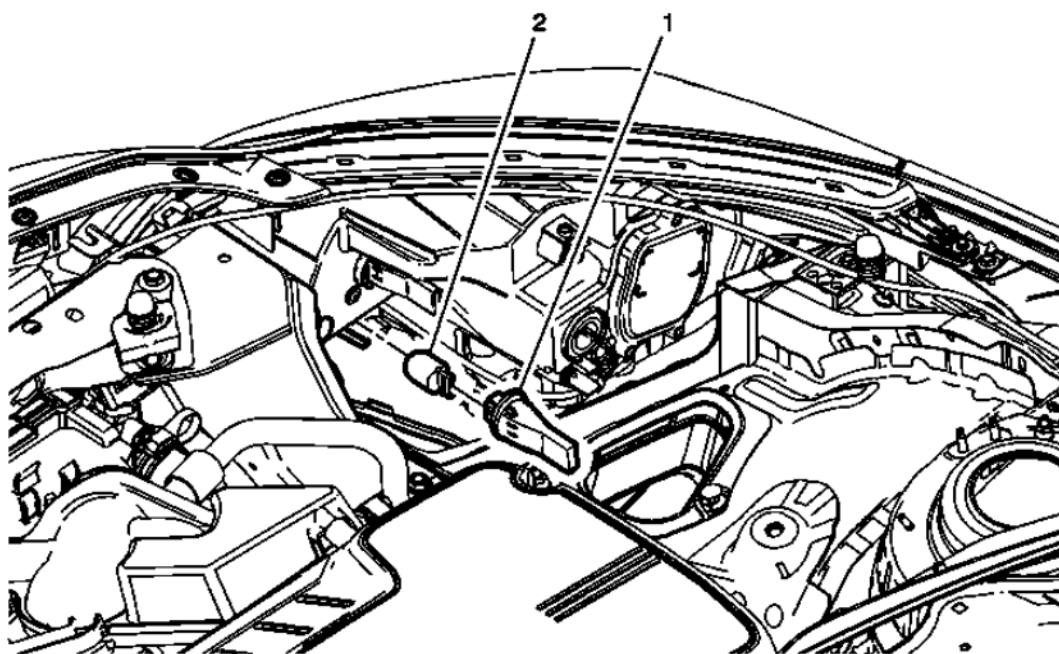


Fig. 62: Front Turn Signal Lamp Bulb (HID)
 Courtesy of GENERAL MOTORS COMPANY

Front Turn Signal Lamp Bulb Replacement (HID)

Callout	Component Name
1	Front Turn Signal Lamp Bulb Socket WARNING: The high intensity discharge system produces high voltage and current. To reduce the risk of severe shocks and burns: • Never open the high intensity discharge system ballast or the arc tube assembly starter. • Never probe between the high intensity discharge system ballast output connector and the arc tube assembly. WARNING: The high intensity discharge system produces high voltage and current. In order to reduce the risk of severe shocks and burns, the battery negative cable must be disconnected any time service work is being performed on or around the high intensity discharge system. Procedure Rotate the bulb socket a quarter turn counterclockwise and remove from

	the front turn signal lamp assembly.
2	Front Turn Signal Lamp Bulb Procedure Pull the turn signal lamp bulb from the front turn signal lamp bulb socket.

HIGH MOUNT STOP LAMP REPLACEMENT

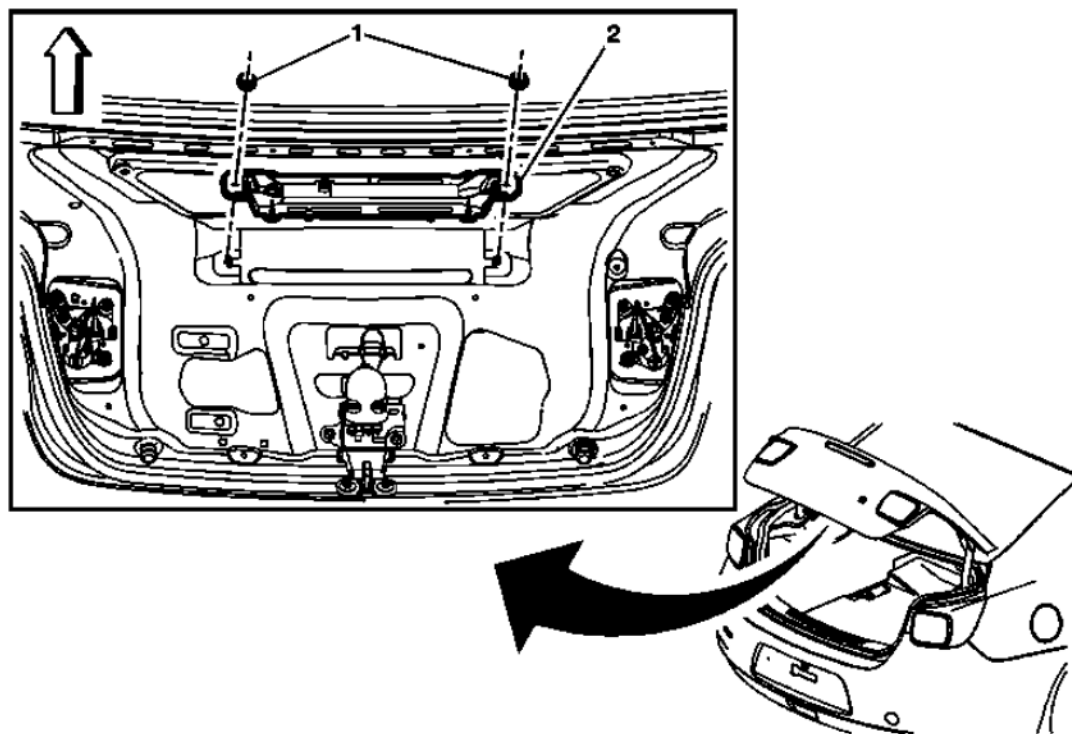


Fig. 63: High Mount Stop Lamp
Courtesy of GENERAL MOTORS COMPANY

High Mount Stop Lamp Replacement

Callout	Component Name
Preliminary Procedure Remove the rear compartment lid inner panel trim. Refer to <u>Rear Compartment Lid Inner Panel Trim Replacement</u> .	
1	High Mount Stop Lamp Nut (Qty: 2) CAUTION: Refer to <u>Fastener Caution</u> . Tighten 2.5 N.m (22 lb in) High Mount Stop Lamp Assembly

2	Procedure 1. Disconnect the electrical connector from the lamp assembly. 2. Remove the lamp assembly.
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CARGO CENTER COURTESY LAMP BULB REPLACEMENT

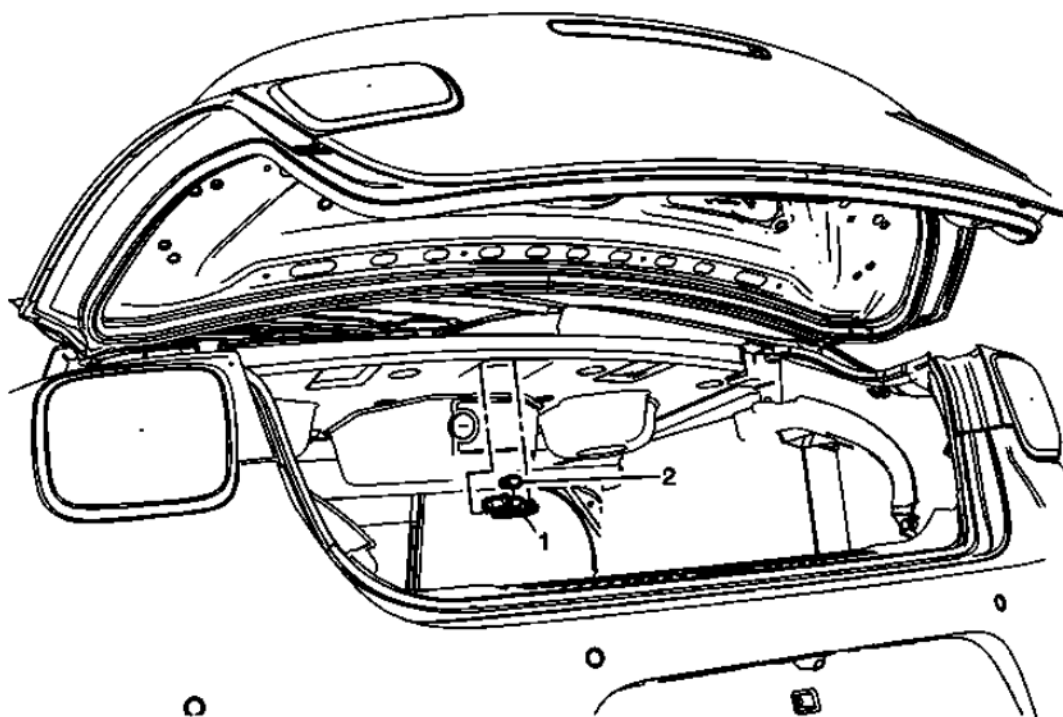


Fig. 64: Cargo Center Courtesy Lamp Bulb
Courtesy of GENERAL MOTORS COMPANY

Cargo Center Courtesy Lamp Bulb Replacement

Callout	Component Name
1	Rear Compartment Courtesy Lamp Refer to Rear Compartment Courtesy Lamp Replacement.
2	Cargo Center Courtesy Lamp Bulb

BACKUP LAMP BULB REPLACEMENT

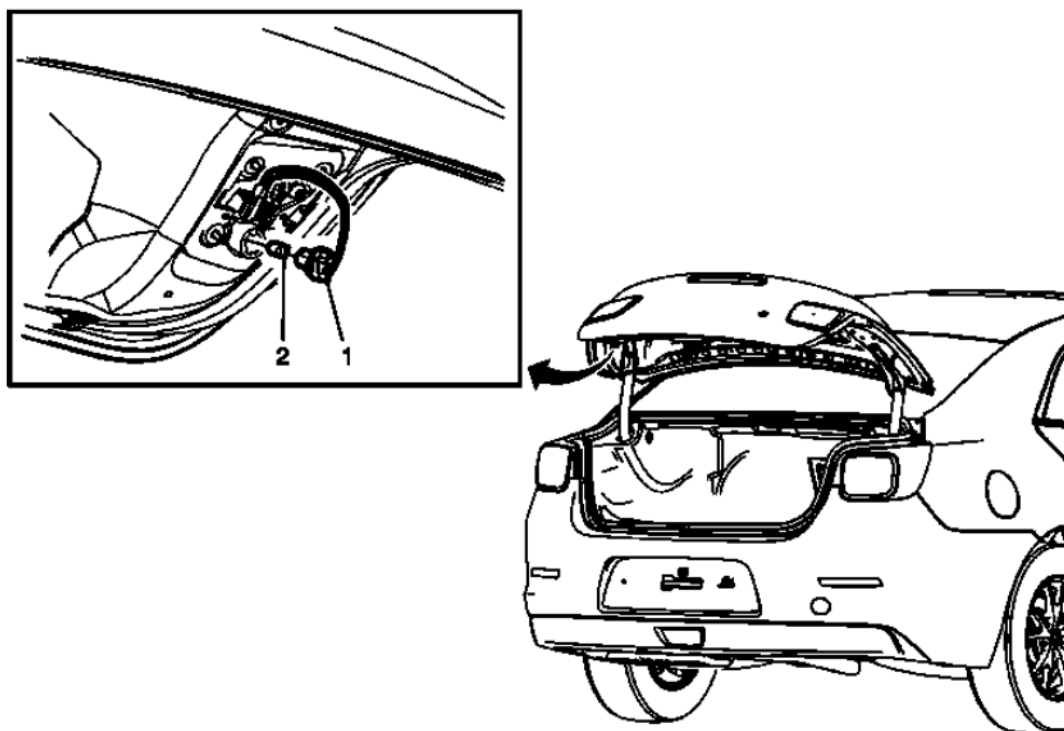


Fig. 65: Backup Lamp Bulb

Courtesy of GENERAL MOTORS COMPANY

Backup Lamp Bulb Replacement

Callout	Component Name
Preliminary Procedure Remove the rear compartment lid inner panel trim. Refer to <u>Rear Compartment Lid Inner Panel Trim Replacement</u> .	
1	Backup Lamp Bulb Socket Procedure Rotate the lamp socket counterclockwise and remove the socket from the lamp housing.
2	Backup Lamp Bulb Procedure Pull the bulb straight out to remove.

REAR LICENSE PLATE LAMP REPLACEMENT

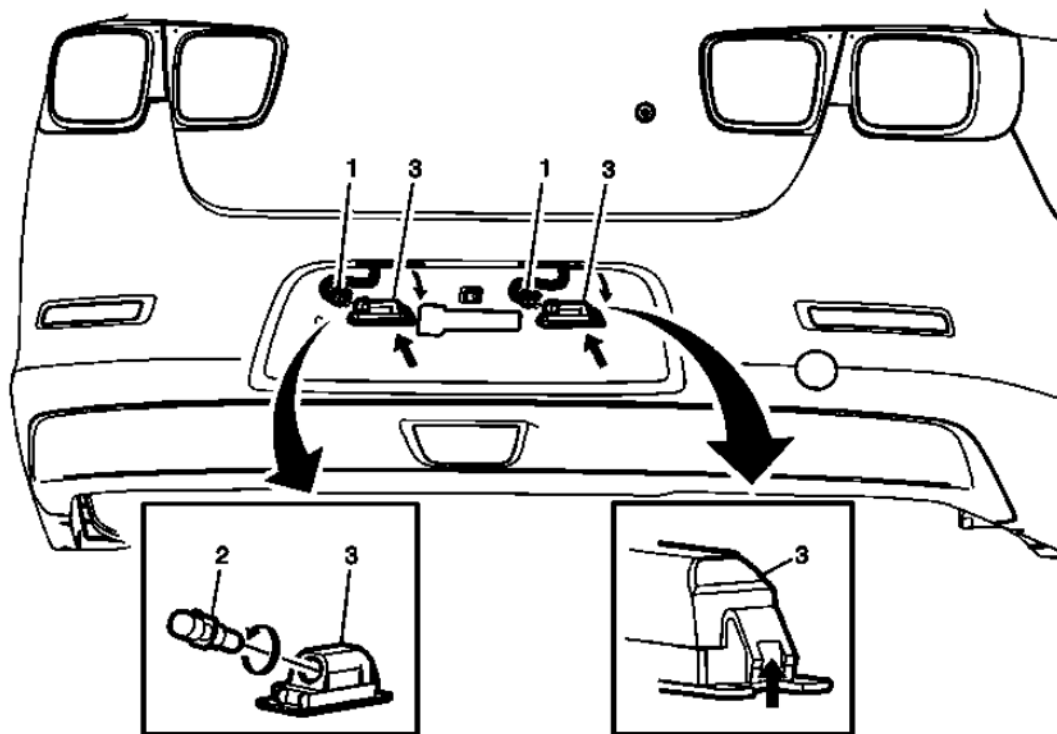


Fig. 66: Rear License Plate Lamp
 Courtesy of GENERAL MOTORS COMPANY

Rear License Plate Lamp Replacement

Callout	Component Name
Preliminary Procedures 1. Insert a small flat-blade tool at the arrow location of the lamp housing edge. 2. Push inward slightly and rotate the lamp downward. 3. Pull the lamp down far enough out to access the lamp electrical connector harness.	
1	License Plate Lamp Electrical Connector Harness Procedure Disconnect the electrical connector from the socket.
2	License Plate Lamp Socket Procedure 1. Rotate the lamp socket a half turn and remove. 2. Replace the bulb at this time if needed.
3	Rear License Plate Lamp

TAIL LAMP REPLACEMENT - INBOARD

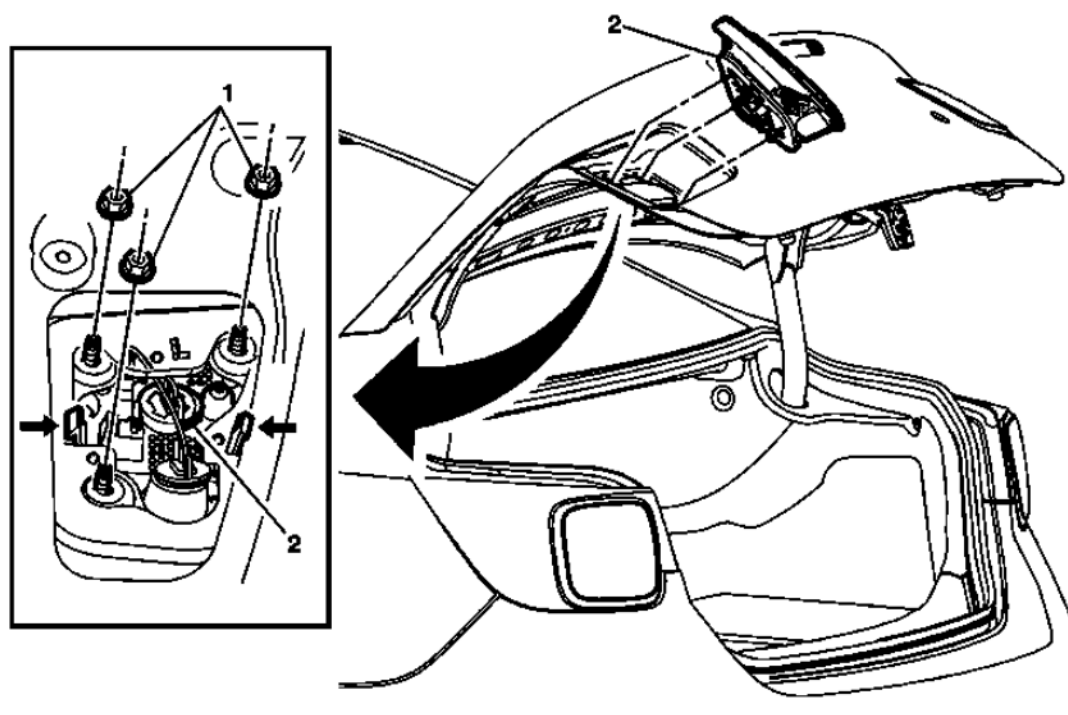


Fig. 67: Tail Lamp - Inboard

Courtesy of GENERAL MOTORS COMPANY

Tail Lamp Replacement - Inboard

Callout	Component Name
Preliminary Procedure Remove the rear compartment lid inner trim panel. Refer to <u>Rear Compartment Lid Inner Panel Trim Replacement</u> .	
1	Tail Lamp Inboard Nut (Qty: 3) CAUTION: Refer to <u>Fastener Caution</u> . Tighten 3 N.m (17 lb in)
2	Tail Lamp Inboard Procedure 1. Release the retaining tabs to remove the tail lamp. 2. Disconnect the electrical connector.

TAIL LAMP REPLACEMENT - OUTBOARD

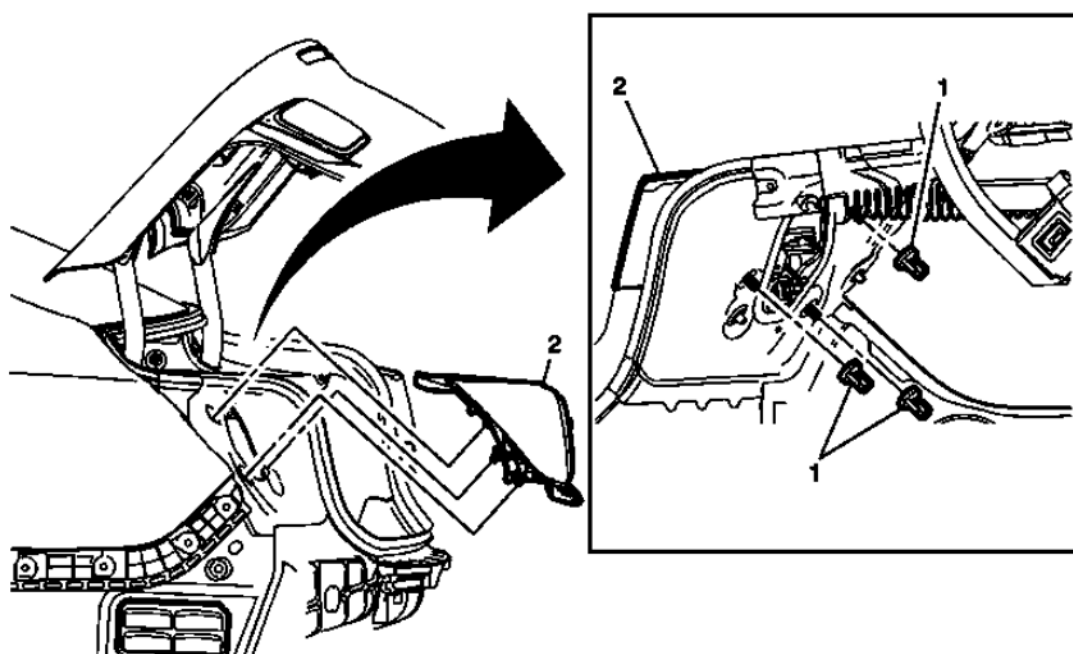


Fig. 68: Tail Lamp - Outboard
 Courtesy of GENERAL MOTORS COMPANY

Tail Lamp Replacement - Outboard

Callout	Component Name
Preliminary Procedures	
1. Remove the rear compartment trim panel. Refer to <u>Rear Compartment Side Trim Panel Replacement (without HP6)</u> , <u>Rear Compartment Side Trim Panel Replacement (HP6, Left Side)</u> , <u>Rear Compartment Side Trim Panel Replacement (HP6, Right Side)</u> . 2. Remove the rear bumper fascia. Refer to <u>Rear Bumper Fascia Replacement</u> .	
1	Tail Lamp Outboard Nut (Qty: 3) CAUTION: Refer to <u>Fastener Caution</u> . Procedure Hand tighten.
2	Tail Lamp Outboard Procedure 1. Disconnect the electrical connector.

2. Pull the tail lamp assembly outward from the panel.

STOP AND TAIL LAMP BULB REPLACEMENT

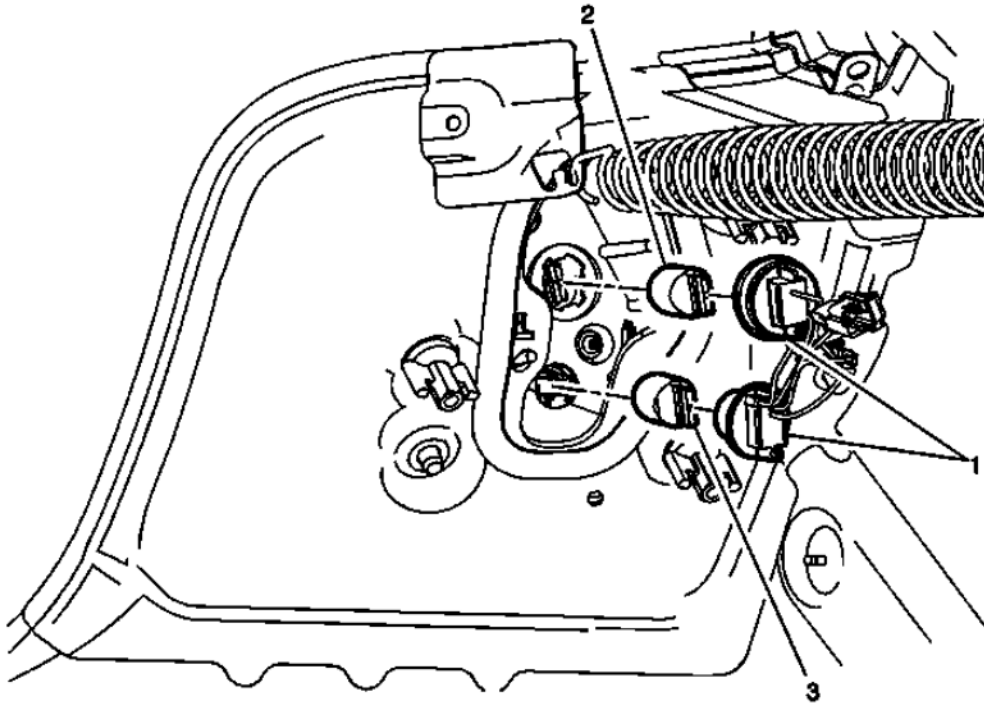


Fig. 69: Stop and Tail Lamp Bulb
Courtesy of GENERAL MOTORS COMPANY

Stop and Tail Lamp Bulb Replacement

Callout	Component Name
Preliminary Procedure Remove the rear compartment side trim panel. Refer to Rear Compartment Side Trim Panel Replacement (without HP6) , Rear Compartment Side Trim Panel Replacement (HP6, Left Side) , Rear Compartment Side Trim Panel Replacement (HP6, Right Side) .	
1	Stop and Tail Lamp Socket Procedure Rotate the lamp socket counterclockwise and remove the socket from the lamp housing.
2	Stop and Tail Lamp Bulb Procedure Pull the bulb straight out to remove.
3	Back Up Bulb

REAR COMPARTMENT COURTESY LAMP REPLACEMENT

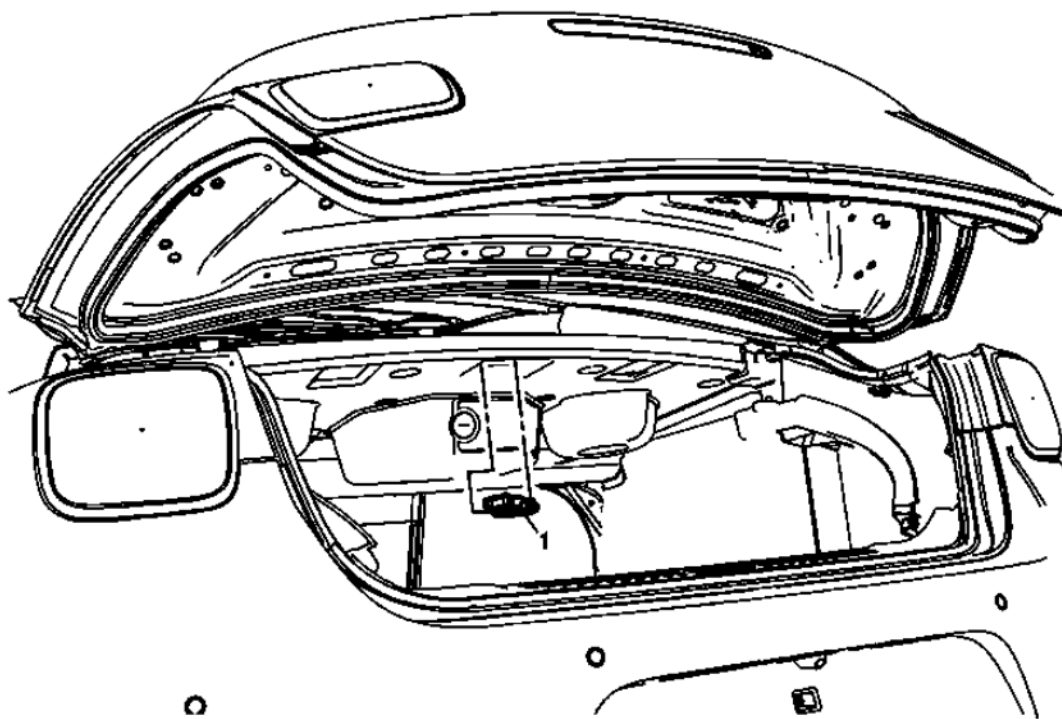


Fig. 70: Rear Compartment Courtesy Lamp
Courtesy of GENERAL MOTORS COMPANY

DESCRIPTION AND OPERATION

EXTERIOR LIGHTING SYSTEMS DESCRIPTION AND OPERATION

The exterior lighting system consist of the following lamps:

- Backup lamps
- Daytime running lamps (DRL)
- Front fog lamps
- Hazard warning lamps
- Headlamps
- Park, tail, license, and marker lamps
- Stop lamps
- Turn signal lamps

Low Beam Headlamps - without T4F

The body control module (BCM) monitors three signal circuits from the headlamp switch. When the headlamp switch is in the AUTO position, all three signal circuits are open. When placed in the AUTO position, the BCM monitors inputs from the ambient light sensor to determine if headlamps are required or if daytime running lamps will be activated based on outside lighting conditions. When the headlamp switch is placed in the OFF

position, the headlamp switch headlamps OFF signal circuit is grounded, indicating to the BCM that the exterior lamps should be turned OFF. With the headlamp switch in the PARK position, the headlamp switch park lamps ON signal circuit is grounded, indicating that the park lamps have been requested. When the headlamp switch is placed in the HEADLAMP position, both the headlamp switch park lamps ON signal circuit and the headlamp switch headlamps ON signal circuit are grounded. The BCM responds to the inputs by illuminating the park lamps and headlamps. When the low beam headlamps are requested, the BCM applies B+ to both low beam headlamp control circuits illuminating the low beam headlamps.

The BCM will also command the low beam headlamps ON during daylight conditions when the following conditions are met:

- Headlamp switch in the AUTO position
- Windshield wipers ON
- Vehicle in any gear but PARK - automatic transmission
- Vehicle in motion - manual transmission

When the BCM commands the low beam headlamps ON, the operator will notice the interior backlighting for the instrument cluster and the various other switches dim to the level of brightness selected by the instrument panel dimmer switch.

Low Beam Headlamps - with T4F

The body control module (BCM) monitors three signal circuits from the headlamp switch. When the headlamp switch is in the AUTO position, all three signal circuits are open. When placed in the AUTO position, the BCM monitors inputs from the ambient light sensor to determine if headlamps are required or if daytime running lamps will be activated based on outside lighting conditions. When the headlamp switch is placed in the OFF position, the headlamp switch headlamps OFF signal circuit is grounded, indicating to the BCM that the exterior lamps should be turned OFF. With the headlamp switch in the PARK position, the headlamp switch park lamps ON signal circuit is grounded, indicating that the park lamps have been requested. When the headlamp switch is placed in the HEADLAMP position, both the headlamp switch park lamps ON signal circuit and the headlamp switch headlamps ON signal circuit are grounded. The BCM responds to the low beam request by applying ground to the low beam relay control circuit which energizes the low beam relay. With the low beam relay energized, the switch contacts close allowing battery voltage to flow through the low beam fuses. Battery voltage is then applied from the fuses, through the low beam control circuits to the left and right headlamp ballast located in each headlamp assembly. When battery voltage is applied to the headlamp ballast through the low beam control circuits, the ballast charge the starter to start the lamp. High intensity discharge (HID) headlamps do not have filaments like traditional bulbs, instead the starter uses a high voltage transformer to convert the input voltage into a higher voltage. This increased voltage is used in order to create an arc between the electrodes in the bulb. Ground for the left headlamp is provided at G101 and the right headlamp at G102.

The BCM will also command the low beam headlamps ON during daylight conditions when the following conditions are met:

- Headlamp switch in the AUTO position
- Windshield wipers ON
- Vehicle in any gear but PARK - automatic transmission

- Vehicle in motion - manual transmission

When the BCM commands the low beam headlamps ON, the operator will notice the interior backlighting for the instrument cluster and the various other switches dim to the level of brightness selected by the instrument panel dimmer switch.

Run Up Of The Lamp

Each ballast requires higher amperage in order to ensure normal startup and run up of the lamp. Run up is the term used to describe the extra power level given to the bulb. The input current during the steady state operation is lower than the start up amperage. After the lamp receives the strike from the starter and the arc is established, the ballast uses its operating voltage in order to provide the run up power needed in order to keep the lamp on. The lamp rapidly increases in intensity from a dim glow to a very high-intensity, bright light called a steady state. Within a few seconds of the arc being established in the bulb, the majority of steady state is complete. 100 percent of the steady state is completed shortly thereafter. A high watt power level is necessary in order to bring the lamp to a steady state in such a short period of time.

When To Change The HID Bulb

Bulb failure, end of life occurs when the bulb gets old and becomes unstable. The bulb may begin shutting itself off sporadically and unpredictably at first, perhaps only once during a 24-hour period. When the bulb begins shutting itself off occasionally, the ballast will automatically turn the bulb back on again within 0.5 seconds. The ballast will re-strike the bulb so quickly that the bulb may not appear to have shut off. As the bulb ages, the bulb may begin to shut off more frequently, eventually over 30 times per minute. When the bulb begins to shut off more frequently, the ballast receives excessive, repetitive current input. Repetitive and excessive restarts or re-strikes, without time for the ballast to cool down, will permanently damage the ballast. As a safeguard, when repetitive re-strikes are detected, the ballast will not attempt to re-strike the lamp. The ballast then shuts down and the bulb goes out.

The following symptoms are noticeable signs of bulb failure:

- Flickering light, caused in the early stages of bulb failure
- Lights go out, caused when the ballast detects excessive, repetitive bulb re-strike
- Color change - the lamp may change to a dim pink glow

Input power to the ballast must be terminated in order to reset the ballast's fault circuitry. In order to terminate the input power to the ballast, turn the lights off and back on again. Turning the lights off and back on again resets all of the fault circuitry within the ballast until the next occurrence of excessive, repetitive bulb re-strikes. When excessive, repetitive bulb re-strikes occur, replace the starter/arc tube assembly. The ballast will begin the start-up process when the starter/arc tube assembly is replaced. Repeatedly resetting the input power can overheat the internal components and cause permanent damage to the ballast. Allow a few minutes of cool-down time in between reset attempts.

Light Color

White light has a different color rating than regular headlamps. The range of white light that is acceptable is broad when compared to halogens. Therefore, some variation in headlight coloring between the right and left

headlamp will be normal. One high intensity discharge (HID) at the end of the normal range may appear considerably different in color from one at the other end of the range. Difference in color is normal. Replace the arc tube only if the arc tube is determined to be at the bulb failure stage.

High Beam Headlamps - without T4F

When the low beam headlamps are ON and the turn signal/multifunction switch is placed in the high beam position, ground is applied to the BCM through the high beam signal circuit. The BCM responds to the high beam request by applying ground to the high beam relay control circuit which energizes the high beam relay. With the high beam relay energized, the switch contacts close allowing battery voltage to flow through the left and right high beam fuses to the high beam control circuits illuminating the left and right high beam headlamps. Each headlamp is permanently grounded at ground G101 for the left headlamp and ground G102 for the right headlamp.

High Beam Headlamps - with T4F

When the low beam headlamps are ON and the turn signal/multifunction switch is placed in the high beam position, ground is applied to the BCM through the high beam signal circuit. The BCM responds to the high beam request by applying ground to the high beam relay control circuit which energizes the high beam relay. With the high beam relay energized, the switch contacts close allowing battery voltage to flow through the left and right high beam fuses to the high beam control circuits and on to the left and right high beam solenoid actuators within the headlamp assemblies. Once the high beam solenoid actuators are active, the solenoid shutters open in each headlamp assembly exposing the remaining portion of the headlamp that was covered by the shutters illuminating the high beams at full intensity. Each headlamp is permanently grounded at ground G101 for the left headlamp and ground G102 for the right headlamp.

Daytime Running Lamps (DRL) - without HID

The daytime running lamps (DRL) will illuminate the right and left low beam headlamps continuously. The DRLs will operate when the following conditions are met:

- The ignition is in the RUN or CRANK position
- The shift lever is out of the PARK position for vehicles equipped with automatic transmissions or the parking brake is released for vehicles with manual transmissions
- The low and high beam headlamps are OFF

With Manual HVAC

The ambient light sensor is used to monitor outside lighting conditions. The ambient light sensor provides a voltage signal that will vary between 0.2 and 4.9 volts depending on outside lighting conditions. The body control module (BCM) provides a 5-volt reference signal to the ambient light sensor which is permanently grounded at G203. The BCM monitors the ambient light sensor signal circuit to determine if outside lighting conditions are correct for either daytime running lights (DRL) or automatic lamp control (ALC) when the headlamp switch is in the AUTO position. In daylight conditions the BCM will command the low beam headlamps ON. The low beam headlamps are the designated DRL's. During low light conditions the BCM will command the low beam headlamps ON. Any function or condition that turns on the headlamps will cancel DRL operation.

With Automatic HVAC

The ambient light sensor is used to monitor outside lighting conditions. The ambient light sensor provides a voltage signal that will vary between 0.2 and 4.9 volts depending on outside lighting conditions. The body control module (BCM) provides a 5-volt reference signal to the ambient light sensor and the HVAC control module provides a low reference ground. The BCM monitors the ambient light sensor signal circuit to determine if outside lighting conditions are correct for either daytime running lights (DRL) or automatic lamp control (ALC) when the headlamp switch is in the AUTO position. In daylight conditions the BCM will command the low beam headlamps ON. The low beam headlamps are the designated DRL's. During low light conditions the BCM will command the low beam headlamps ON. Any function or condition that turns on the headlamps will cancel DRL operation.

Daytime Running Lamps (DRL) - with HID

The daytime running lamps (DRL) will illuminate continuously when the following conditions are met:

- The ignition is in the RUN or CRANK position
- The shift lever is out of the PARK position for vehicles equipped with automatic transmissions or the parking brake is released for vehicles with manual transmissions
- The low and high beam headlamps are OFF

With Manual HVAC

The ambient light sensor is used to monitor outside lighting conditions. The ambient light sensor provides a voltage signal that will vary between 0.2 and 4.9 volts depending on outside lighting conditions. The body control module (BCM) provides a 5-volt reference signal to the ambient light sensor which is permanently grounded at G203. The BCM monitors the ambient light sensor signal circuit to determine if outside lighting conditions are correct for either daytime running lights (DRL) or automatic lamp control (ALC) when the headlamp switch is in the AUTO position. In daylight conditions the BCM will command the designated DRLs ON. During low light conditions the BCM will command the low beam headlamps ON. Any function or condition that turns on the headlamps will cancel DRL operation.

With Automatic HVAC

The ambient light sensor is used to monitor outside lighting conditions. The ambient light sensor provides a voltage signal that will vary between 0.2 and 4.9 volts depending on outside lighting conditions. The body control module (BCM) provides a 5-volt reference signal to the ambient light sensor and the HVAC control module provides a low reference ground. The BCM monitors the ambient light sensor signal circuit to determine if outside lighting conditions are correct for either daytime running lights (DRL) or automatic lamp control (ALC) when the headlamp switch is in the AUTO position. In daylight conditions the BCM will command the designated DRLs ON. During low light conditions the BCM will command the low beam headlamps ON. Any function or condition that turns on the headlamps will cancel DRL operation.

Flash to Pass (FTP)

When the turn signal/multifunction switch is momentarily placed in the flash to pass (FTP) position, ground is applied from G203 to the turn signal/multifunction switch. The turn signal/multifunction switch applies ground

to the body control module (BCM) through the FTP switch signal circuit. The BCM then applies ground to the high beam relay control circuit. This energizes the high beam relay, closing the switch side contacts of the high beam relay, applying battery voltage to the left and right high beam fuses. Battery voltage is applied from the high beam fuses through the high beam control circuit to the high beam headlamp assemblies. This causes the high beam headlamps to illuminate at full brightness momentarily.

Front Fog Lamps

The front fog lamp switch is an input to the body control module (BCM) and is contained in the headlamp switch assembly. The BCM supplies voltage to the front fog lamp switch via the front fog lamp and I/P dimmer switch B+ circuit. When the front fog lamp switch is pressed, voltage from the B+ circuit is pulled down through the front fog lamp switch resistor. The front fog lamp resistor is part of the resistor ladder that also provides the dimming signals for the I/P dimmer switches. The BCM receives the voltage signal through the front fog lamp and I/P dimmer switch signal circuit.

The front fog lamp relay is supplied with battery voltage at all times. The front fog lamp switch signal circuit is grounded momentarily by pressing the front fog lamp switch. The body control module (BCM) energizes the front fog lamp relay by applying ground to the front fog lamp relay control circuit. When the front fog lamp relay is energized, the relay switch contacts close and battery voltage is applied through the front fog lamp fuse to the front fog lamp control circuit which illuminates the front fog lamps.

Hazard Lamps

The hazard flashers may be activated in any power mode. The hazard switch signal circuit is momentarily grounded when the hazard switch is pressed. The body control module (BCM) responds to the hazard switch signal input by supplying battery voltage to all four turn signal lamps in an ON and OFF duty cycle. When the hazard switch is activated, the BCM sends a serial data message to the instrument panel cluster (IPC) requesting both turn signal indicators to be cycled ON and OFF.

The I/P dimmer switch controls are located on the headlamp switch assembly and are used to increase and decrease the brightness of the interior backlighting components. When the I/P dimmer switch is placed in a desired brightness position, the body control module (BCM) receives a signal from the I/P dimmer switch and responds by applying a pulse width modulated (PWM) voltage to the hazard switch light emitting diode (LED) backlighting control circuit illuminating the LED to the desired level of brightness.

Park, Tail, and License Lamps

When the headlamp switch is placed in the HEAD or PARK position, ground is applied to the park lamp switch ON signal circuit to the body control module (BCM). The BCM responds by applying voltage to the park lamps, tail lamps, and license lamps control circuits illuminating the park, tail, and license lamps.

Stop Lamps

NOTE: Brake system does not use a brake switch, stoplight switch or brakelight switch. System uses a Brake Pedal Position Sensor to control these functions.

The brake pedal position (BPP) sensor is used to sense the action of the driver application of the brake pedal. The BPP sensor provides an analog voltage signal that will increase as the brake pedal is applied. The body

control module (BCM) provides a low reference signal and a 5-volt reference voltage to the BPP sensor. When the variable signal reaches a voltage threshold indicating the brakes have been applied, the BCM will apply battery voltage to the left and right stop lamp control circuits as well as the center high mounted stop lamp (CHMSL) control circuit illuminating the left and right stop lamps and the CHMSL.

Turn Signal Lamps

Ground is applied at all times to the turn signal/multifunction switch. The turn signal lamps may only be activated with the ignition switch in the ON or START positions. When the turn signal/multifunction switch is placed in either the TURN RIGHT or TURN LEFT position, ground is applied to the body control module (BCM) through either the right turn or left turn signal switch signal circuit. The BCM responds to the turn signal switch input by applying a pulsating voltage to the front and rear turn signal lamps through their respective control circuits. When a turn signal request is received by the BCM, a serial data message is sent to the instrument panel cluster (IPC) requesting the respective turn signal indicator be pulsed ON and OFF.

Backup Lamps

With the engine ON and the transmission in the REVERSE position, the transmission control module (TCM) sends a serial data message to the body control module (BCM). The message indicates that the gear selector is in the REVERSE position. The BCM applies battery voltage to the backup lamps control circuit illuminating the backup lamps. Once the driver moves the gear selector out of the REVERSE position, a message is sent by the TCM via serial data requesting the BCM to remove battery voltage from the backup lamps control circuit. The engine must be ON for the backup lamps to operate.

Battery Run Down Protection/Inadvertent Power

To provide battery run down protection, the exterior lamps will be deactivated automatically under certain conditions. The BCM monitors the state of the headlamp switch. If the park or headlamp switch is ON when the ignition switch is placed in either the CRANK or RUN position and then placed in the OFF position, the BCM initiates a 10 min timer. At the end of the 10 min, the BCM will turn off the control power output to the park lamp controls as well as the headlamp relay coils, deactivating the exterior lamps. This feature will be cancelled if any power mode other than OFF becomes active. The BCM will disable battery run down protection if any of the following conditions exist. The park or headlamp switch is placed in the ON to OFF position, and back to the ON position during battery run down protection. The BCM determined that the park or headlamp switch was not active when the ignition was turned OFF.

INTERIOR LIGHTING SYSTEMS DESCRIPTION AND OPERATION

Interior Lamps

The interior lighting system consist of two groups. This first group includes lamps that may not be dimmed.

- Dome lamps
- I/P compartment lamp
- Reading lamps
- Rear compartment courtesy lamp
- Sunshade mirror lamps

Dome Lamps

The dome lamp switch has 3 positions: DOOR, OFF, and ON. The ON position provides a ground for continuous operation and the dome lamps will remain illuminated until the switch is placed in either the DOOR or OFF position. When in the DOOR position, dome lamps operation is controlled by the body control module (BCM). When any door is opened, the door ajar switch contacts close and the BCM receives a door-open input. The BCM illuminates the dome lamps when any door is opened or a door lock/unlock request is activated with the key fob. After all doors have been closed, the dome lamps will turn OFF immediately if the ignition switch is turned to the ON position or approximately 20 seconds after the last door closes. When the driver places the dome lamp switch in the OFF position, the dome lamps will be disabled. In the event that the dome lamps were to remain illuminated for more than 10 minutes with the ignition switch in the OFF position and no doors opened, the BCM will deactivate the dome lamp control circuit to prevent total battery discharge. The dome lamps will normally turn OFF using the theater dimming feature when controlled by the BCM.

Instrument Panel (I/P) Compartment Lamp

The inadvertent power supply voltage circuit from the BCM provides battery voltage to the I/P compartment (glove box) lamp. When the I/P compartment is opened, the I/P compartment lamp switch contacts close providing a path to ground and the I/P compartment lamp illuminates. If the operator inadvertently leaves the I/P compartment door open with the I/P compartment lamp ON, the BCM will turn all interior lamps OFF after 10 minutes has passed since any switch activation has been detected by the BCM. The I/P compartment lamp is permanently grounded at ground G204.

Reading Lamps

The inadvertent power supply voltage circuit from the BCM provides battery positive voltage to each reading lamp. When the reading lamp switch is activated, the switch contacts close providing a path to ground and the reading lamp illuminates. If the operator inadvertently leaves a reading lamp ON, the BCM will turn all interior lamps OFF after 10 minutes has passed since any switch activation has been detected by the BCM. The reading lamps are permanently grounded at ground G403.

Rear Compartment Courtesy Lamp

When the rear compartment is opened, the rear compartment lid latch opens providing a rear compartment open input signal to the BCM. The BCM responds by applying battery voltage to the rear compartment courtesy lamp control circuit illuminating the rear compartment courtesy lamp. The rear compartment courtesy lamp is permanently grounded at ground G403.

Sunshade Mirror Lamps

The inadvertent power supply voltage circuit from the BCM provides battery voltage to each set of sunshade mirror lamps. When the sunshade mirror cover is opened, a switch closes providing ground and the sunshade lamps illuminate. If the operator inadvertently leaves a sunshade mirror cover open with the lamps ON, the BCM will turn all interior lamps OFF after 10 minutes has passed since any switch activation has been detected by the BCM. The sunshade mirror lamps are permanently grounded at ground G403.

Keyless Entry Interior Illumination

When the operator uses the keyless entry transmitter in order to unlock the doors, the BCM receives a door-unlock signal. The BCM must receive inputs from various systems that indicate that the ignition switch is OFF, the courtesy lamp switch is OFF, and all doors are closed before the BCM will activate the interior lamps. After all doors have been closed, the courtesy lamps will turn OFF immediately if the ignition switch is turned to the ON position, the door locks are LOCKED, or approximately 20 seconds after the last door closes. The BCM will turn off the courtesy lamps through the theater dimming feature. The BCM keeps the courtesy lamps on for 40 seconds after an alarm event is completed.

Interior Lamps Dimming

The second group includes lamps which may be dimmed. This group may use a combination of light emitting diodes (LED), incandescent lamps, and pulse width modulation (PWM) illumination.

- Dome/reading lamps - front
- Dome/reading lamps - rear
- Door lock switch - driver
- Door lock switch - passenger
- Headlamp switch
- Hazard switch
- HVAC control head assembly
- Ignition mode switch
- Multifunction switch - instrument panel
- Outside rearview mirror switch
- Park brake switch
- Radio
- Rear compartment lid unlatch switch
- Steering wheel control switch - left
- Steering wheel control switch - right
- Sun roof switch
- Sun roof tilt switch
- Window switch - passenger

With the headlamp switch in the PARK or HEAD position, the park lamp switch signal circuit provides an input to the body control module (BCM). The BCM responds by applying voltage to the park lamps as well as the backlight dimming control circuits illuminating all components with interior backlighting. All interior backlighting turns ON at the dimming level indicated by the instrument panel (I/P) dimmer switch. The instrument panel (I/P) dimmer switch is a momentary type switch and utilizes a resistor ladder to increase and decrease the brightness of the interior backlighting components. The I/P dimmer switch provides a voltage signal to the BCM that will increase as the brightness of the lights are increased and decrease as the brightness of the lights are decreased. The BCM provides a low reference signal and a B+ circuit to the I/P dimmer switch. When the I/P dimmer switch is held in the desired position, the dimmed voltage setting is applied from the I/P dimmer switch through the I/P dimmer switch signal circuit to the BCM. The BCM interprets the signal and applies a pulse width modulated (PWM) voltage through the backlighting control circuits illuminating the

interior backlighting to the requested level of brightness.

Battery Rundown Protection/Inadvertent Power

The BCM inadvertent power supply voltage circuit provides battery voltage to all of the interior courtesy lamps. In the event that any of these lamps were to remain illuminated for a period of more than 10 minutes with the ignition switch in the OFF position, the BCM will deactivate the inadvertent power supply voltage circuit to prevent total battery discharge. If the ignition switch is turned to any position other than OFF, or if a lamp switch is activated during this 10 minute period, the timer resets for another 10 minutes.

