

## 2017 ACCESSORIES & EQUIPMENT

### Lighting - Description and Operation - CT6

## DESCRIPTION AND OPERATION

### EXTERIOR LIGHTING SYSTEMS DESCRIPTION AND OPERATION

The exterior lighting system consist of the following lamps:

- Adaptive forward lighting
- Automatic headlamp leveling
- Automatic high beam assist
- Backup lamps
- Daytime running lamps
- Hazard warning lamps
- Headlamps
- Park, tail, license and marker lamps
- Stop lamps
- Turn signal lamps

#### Low Beam Headlamps

The headlamps may be turned ON in 3 different ways:

- When the turn signal/multifunction switch is placed in the ON position, for normal operation
- When the turn signal/multifunction switch is placed in the AUTO position, for automatic lamp control
- When the turn signal/multifunction switch is placed in the AUTO position, with the windshield wipers ON in daylight conditions, after a 6 second delay

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

- Turn signal/multifunction switch in the AUTO position
- Windshield wipers ON
- Vehicle in any gear but PARK

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

The body control module (BCM) monitors three signal circuits from the turn signal/multifunction switch. When the turn signal/multifunction 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 turn signal/multifunction switch is placed in the OFF position, the turn signal/multifunction switch headlamps OFF signal circuit is grounded, indicating to the BCM that the exterior lamps should be turned OFF. With the turn signal/multifunction switch in the PARK position, the turn signal/multifunction switch park lamps ON signal circuit is grounded, indicating that the park lamps have been requested. When the turn signal/multifunction switch is placed in the HEADLAMP position, both the turn signal/multifunction switch park lamps ON signal circuit and the turn signal/multifunction 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.

### High Beam Headlamps

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 headlamp high beam relay control circuit which energizes the headlamp high beam relay. With the headlamp high beam relay energized, the switch contacts close allowing battery voltage to flow through the 3 pin high beam fuse to the high beam control circuits and on to the left and right high beam solenoid actuators located in each headlamp assembly. Once the high beam solenoid actuators are active, the high beam 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.

### Automatic High Beam Assist

The automatic high beam assist system operates the high beam headlamps ON and OFF automatically when the system is activated and certain conditions are met. The automatic high beam assist system consists of a front camera module that detects light and is able to identify approaching vehicles on an even, straight road at a distance of greater than 0.4 km (0.25 mi). The front camera module analyzes light color, intensity and movement. The automatic high beam assist system will turn OFF the high beam headlamps when approaching vehicle headlamps or preceding vehicle taillights are detected by the front camera module. Automatic high beam assist can be deactivated when the headlamp dimmer switch is moved from the neutral position to the high beam or flash to pass positions. Automatic high beam assist can be reactivated by operating the high beam select switch from the neutral position to the high beam position twice within 2 seconds or by pressing the automatic high beam assist ON/OFF switch located on the turn signal/multifunction switch.

#### Automatic High Beam Assist System Activation

- Vehicle ON
- Turn signal/multifunction switch placed in the AUTO position
- Turn signal/multifunction switch high beam dimmer switch must be in the neutral position
- Outside lighting conditions must be dark
- Vehicle speed greater than 22 mph (35 km/h)

#### Automatic High Beam Assist System Operation

The following are conditions that the automatic high beam assist system will turn the high beam headlamps off during operation:

- Ambient light level too high due to towns or twilight situations
- The vehicle's speed drops below 22 mph (35 km/h)
- Delay

The following are conditions that the automatic high beam assist system will deactivate individual high beam LEDs while the remaining LEDs will stay active:

- The system detects approaching traffic headlamps
- The system detects preceding traffic tail lamps

**NOTE:**        **Automatic High Beam Assist may not operate properly if any of the following conditions exist:**

- Approaching and preceding vehicles lamps are undetectable due to dirt, snow, road spray, smoke, fog or any other airborne conditions.
- The front camera module is covered with ice, dirt, snow, haze or is obstructed.
- The vehicle is being driven on winding or hilly road conditions which would make any on coming vehicle headlamps undetectable by the automatic high beam assist.



#### Automatic High Beam Assist System Deactivation

- Manually operating the turn signal/multifunction switch high beam dimmer switch from neutral to high beam position
- Manually operating the automatic high beam assist switch located on the turn signal/multifunction switch to the OFF position
- Automatic high beam assist is deactivated automatically when the front or rear fog lamps are turned ON

#### Automatic High Beam Assist System Indicator

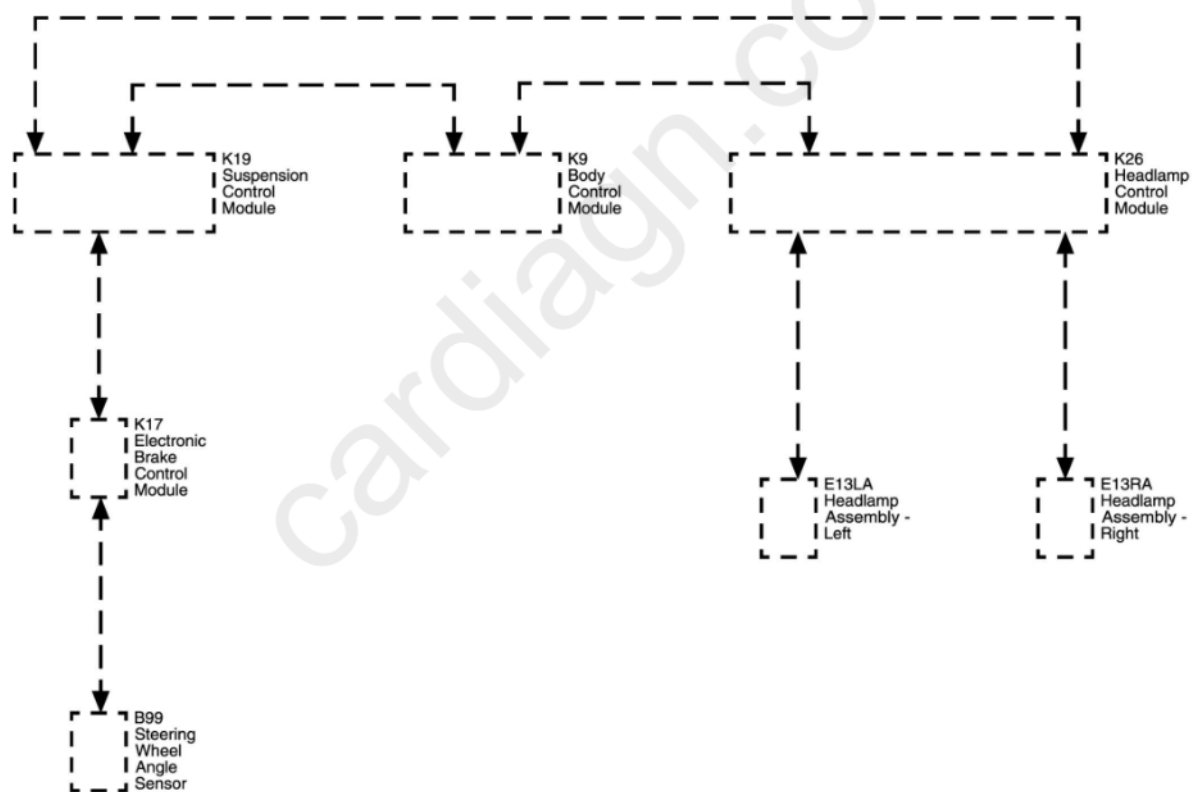
The status of the automatic high beam assist system is shown by a green indicator located on the instrument cluster. When automatic high beam assist is active, the indicator will be illuminated continuously. If the operator deactivates the automatic high beam assist system, the indicator will turn off.

#### Adaptive Forward Lighting

The AFL consist of the following components:

- Headlamp control module
- Headlamp actuator - left
- Headlamp actuator - right

#### Headlamp Leveling/Adaptive Forward Lighting Control Block Diagram



**Fig. 1: Headlamp Leveling/Adaptive Forward Lighting Control Block Diagram**

Courtesy of GENERAL MOTORS COMPANY

| Callout | Component Name                      |
|---------|-------------------------------------|
| K19     | K19 Suspension Control Module       |
| K9      | K9 Body Control Module              |
| K26     | K26 Headlamp Control Module         |
| K17     | K17 Electronic Brake Control Module |
| B99     | B99 Steering Wheel Angle Sensor     |
| E13LA   | E13LA Headlamp Assembly - Left      |
| E13RA   | E13RA Headlamp Assembly - Right     |

Battery positive voltage is applied to the headlamp control module at all times. The headlamp control module has an operational voltage range of about 10.5-16 volts and is only fully functional when the ignition switch is in the RUN position and the headlamps are ON. When the headlamps are turned ON, the BCM responds to the headlamp request by applying ground to the headlamp relay control circuit which energizes the headlamp relay. With the headlamp relay energized, the switch contacts close allowing battery voltage to flow through the 3 pin headlamp leveling fuse to the control circuits and on to the left and right headlamp control modules located in each headlamp assembly. The headlamp control module receives serial data messages from the engine control module (ECM), transmission control module (TCM), electronic brake control module (EBCM) and body control module (BCM) with regards to power mode, speed, steering angle, transmission gear selection, and headlamp switch status. The headlamp control module calculates the headlamp angle and sends commands to the left and right headlamp actuators. The headlamp actuators drive the headlamps to the position commanded by the headlamp control module. The headlamp control module monitors the headlamp actuator motor control circuits for proper circuit continuity and for shorts to ground or voltage. If a malfunction is detected, a DTC will be stored in memory and the driver will be notified with a message displayed over the driver information center located on the instrument panel.

The headlamp control module controls the left headlamp movement by 15 degrees to the left and 5 degrees to the right, and the right headlamp movement by 5 degrees to the left and 15 degrees to the right. The direction the headlamps move is controlled by the steering wheel angle and is limited by steering angles of approximately  $\pm 90$  degrees. The AFL will not operate with the transmission in reverse or at vehicle speeds less than 2 mph. Movement of the headlamps is restricted at low vehicle speeds and full movement of the lamps is not allowed until vehicle speed is greater than approximately 30 mph. The following conditions must be met before the adaptive forward lighting will operate:

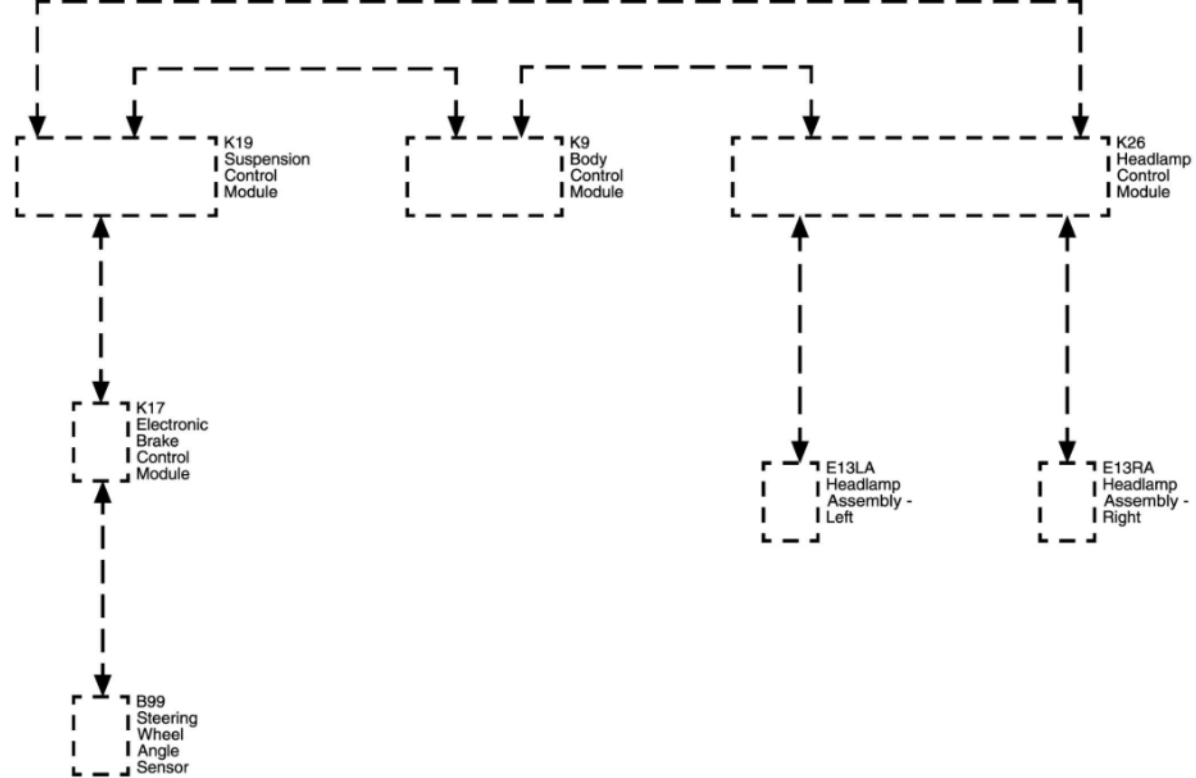
- Turn signal/multifunction switch in the AUTO position and high or low beam headlamps must be active
- Steering angle position must be received from the EBCM with the steering signal validity bit set
- Vehicle speed must be received from the ECM with the steering signal validity bit set
- Transmission gear position must be received from the TCM with the transmission gear position validity bit set

### **Automatic Headlamp Leveling**

The Automatic Headlamp Leveling Systems consist of the following components:

- Headlamp control module
- Headlamp leveling actuator - left
- Headlamp leveling actuator - right
- Suspension position sensor - front
- Suspension position sensor - rear

### **Headlamp Leveling/Adaptive Forward Lighting Control Block Diagram**



**Fig. 2: Headlamp Leveling/Adaptive Forward Lighting Control Block Diagram**  
 Courtesy of GENERAL MOTORS COMPANY

| Callout | Component Name                      |
|---------|-------------------------------------|
| K19     | K19 Suspension Control Module       |
| K9      | K9 Body Control Module              |
| K26     | K26 Headlamp Control Module         |
| K17     | K17 Electronic Brake Control Module |
| B99     | B99 Steering Wheel Angle Sensor     |
| E13LA   | E13LA Headlamp Assembly - Left      |
| E13RA   | E13RA Headlamp Assembly - Right     |

### Automatic Headlamp Leveling (without Electronic Suspension Control)

The automatic headlamp leveling system automatically maintains the vertical alignment of the headlamps when the vehicle load and driving conditions change. Each headlamp assembly contains a headlamp leveling motor that is controlled by the headlamp control module. The front and rear suspension position sensors provide the headlamp control module with suspension position information. Each sensor receives a 5 V reference, signal and low reference circuits from the headlamp control module. The sensors are connected to the control arms of the front and rear suspension. As the vehicle travels, the suspension compresses and rebounds moving the suspension position sensor arms. This causes the signal output of the sensor to change. The headlamp control module compares the information from both suspension position sensors and adjusts the headlamp leveling as needed.

### Automatic Headlamp Leveling (with Electronic Suspension Control)

Each headlamp assembly contains a headlamp leveling actuator that is controlled by the headlamp control module. The front and rear suspension position sensors provide the suspension control module with suspension position information. Each sensor receives a 5 V reference, signal, and low reference circuits from the suspension control module. The suspension position sensors are connected to each control arm of the front and rear suspensions. As the vehicle travels, the suspension compresses and rebounds moving the suspension position sensor arms. This causes the signal output of the sensor to change. The suspension control module compares the information from all four suspension position sensors and adjusts the suspension as needed. The suspension control module communicates with the headlamp control module via serial data. The headlamp control module uses the suspension position sensor information received from the suspension control module to adjust the headlamp leveling as needed. The headlamp control module communicates with the left and right headlamp leveling actuators via the LIN serial data circuit.



## Daytime Running Lamps

The daytime running lamps 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

## UTU/UTV

The rain sensor is used to monitor outside lighting conditions. The rain sensor provides a serial data message to the BCM based on outside lighting conditions to determine if outside lighting conditions are correct for either daytime running lamps or automatic lamp control when the headlamp switch is in the AUTO position. In daylight conditions the BCM will command the designated daytime running lamps 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 daytime running lamps operation.

## HP9

The ambient light/sunload sensor and battery state of charge indicator is used to monitor outside lighting conditions. The ambient light/sunload sensor and battery state of charge indicator provides a serial data message to the BCM based on outside lighting conditions to determine if outside lighting conditions are correct for either daytime running lamps or automatic lamp control when the headlamp switch is in the AUTO position. In daylight conditions the BCM will command the designated daytime running lamps 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 daytime running lamps operation.

## KL9

The ambient light/sunload sensor is used to monitor outside lighting conditions. The ambient light/sunload sensor provides a voltage signal that will vary between 0.2 and 4.9 V depending on outside lighting conditions. The body control module (BCM) provides a 5 V 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 lamps or automatic lamp control when the headlamp switch is in the AUTO position. In daylight conditions the BCM will command the designated daytime running lamps 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 daytime running lamps operation.

## Flash to Pass

When the turn signal/multifunction switch is momentarily placed in the flash to pass position, ground is applied to the turn signal/multifunction switch. The turn signal/multifunction switch applies ground to the body control module (BCM) through the flash to pass switch signal circuit. The BCM responds to the flash to pass request by applying 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 3 pin high beam fuse. Battery voltage is applied from the high beam fuse through the high beam control circuit 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.

## 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 requesting both turn signal indicators to be cycled ON and OFF.

The instrument panel dimmer switch controls 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 voltage to the hazard switch light emitting diode backlighting control circuit illuminating the LED to the desired level of brightness.

### **Park, Tail and License Lamps**

When the turn signal/multifunction switch is placed in the HEAD or PARK position, ground is applied to the turn signal/multifunction switch 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**

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 stop lamps/center high mount stop lamp control circuit illuminating the left and right stop lamps and the center high mounted stop lamp.

### **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 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 turn signal/multifunction switch. If the turn signal/multifunction switch is placed in the park or headlamp positions 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 minute timer. At the end of the 10 minutes, the BCM will turn off the control power output to the park lamp controls as well as the headlamp controls, 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
- Instrument panel 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/courtesy lamps will remain illuminated until the switch is placed in either the DOOR or OFF position. When in the DOOR position, the dome/courtesy lamps operation is controlled by the body control module (BCM). The BCM applies battery voltage to the interior courtesy lamps through the dome/courtesy lamps control circuits at terminal 1 X7 and terminal 5 X2. When any door is opened, the jam switch contacts close and the BCM receives a door-ajar input. If the BCM receives a door lock or unlock input or a rear hatch open input, the BCM responds by applying battery voltage to the interior courtesy lamps through the dome/courtesy lamps control circuits at terminal 1 X7 and terminal 5 X2. After all doors have been closed, the dome lamps 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/courtesy lamps will be disabled and an amber indicator will illuminate to inform the driver that the dome lamp switch is in the OFF position. In the event that any of the dome/courtesy lamps were to remain illuminated for more than 10 minutes with the ignition switch in the OFF position, the BCM will deactivate the dome/courtesy lamp control circuits to prevent total battery discharge. The dome lamps will turn OFF using the theater dimming feature when controlled by the BCM.

### **Instrument Panel Compartment Lamp**

The inadvertent power supply voltage circuit from the BCM provides battery voltage to the instrument panel compartment (glove box) lamp. When the instrument panel compartment is opened, the instrument panel compartment lamp switch contacts close providing a path to ground and the instrument panel compartment lamp illuminates. If the operator inadvertently leaves the instrument panel compartment door open with the instrument panel 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.

### **Reading Lamps**

The inadvertent power supply voltage circuit from the BCM provides battery positive voltage to each reading lamp. When a 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.

### **Rear Compartment Courtesy Lamps**

The body control module (BCM) applies battery voltage to the rear compartment courtesy lamps through the rear compartment courtesy lamps 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 courtesy lamps control circuit illuminating the rear compartment courtesy lamps. In the event that the rear compartment courtesy lamps were to remain illuminated for more than 10 minutes with the ignition switch in the OFF position, the BCM will deactivate the rear compartment courtesy lamps control circuit to prevent total battery discharge.

### **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.

### **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 illumination.

- Dome/reading lamps - left front
- Dome/reading lamps - left rear
- Dome/reading lamps - right front
- Dome/reading lamps - right rear
- Door lock switch - driver
- Door lock switch - passenger
- Garage door opener
- Headlamp switch
- Head - up display switch
- HVAC control head assembly
- Ignition mode switch
- Multifunction switch - center console
- Multifunction switch - overhead console
- Multifunction switch 1 - instrument panel
- Multifunction switch 2 - instrument panel
- Outside rearview mirror switch
- Park brake control switch
- Infotainment control touchpad
- Rear compartment lid unlatch switch - interior
- Seat adjuster switches
- Seat memory switches
- Steering wheel control switch - left
- Steering wheel control switch - right
- Sunshade switches
- Window switch - left rear
- Window switch - passenger
- Window switch - right rear

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 dimmer switch. The instrument panel instrument panel dimmer switch is a momentary type switch and utilizes a resistor ladder to increase and decrease the brightness of the interior backlighting components. The instrument panel 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 instrument panel dimmer switch. When the instrument panel dimmer switch is held 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 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.

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## 2017 ACCESSORIES & EQUIPMENT

### Lighting - Diagnostic Information and Procedures - CT6

## DIAGNOSTIC INFORMATION AND PROCEDURES

### DTC B093F: DOME LAMP SWITCH INDICATOR CIRCUIT

#### 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 B093F 01

Dome Lamp Switch Indicator Circuit Short to Voltage

#### Diagnostic Fault Information

| Circuit                                        | Short to Ground | Open/High Resistance | Short to Voltage | Signal Performance |
|------------------------------------------------|-----------------|----------------------|------------------|--------------------|
| Dome Lamp Cancel Switch Indicator Control      | 1               | 1                    | B093F 01         | -                  |
| Multifunction Switch - Overhead Console Ground | -               | 1                    | -                | -                  |
| 1. Dome Lamps 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/courtesy lamps will remain illuminated until the switch is placed in either the DOOR or OFF position. When in the DOOR position, the dome/courtesy lamps operation is controlled by the body control module (BCM). The BCM applies battery voltage to the interior courtesy lamps through the dome/courtesy lamps control circuits at terminal 1 X7 and terminal 5 X2. When any door is opened, the jam switch contacts close and the BCM receives a door-ajar input. If the BCM receives a door lock or unlock input or a rear hatch open input, the BCM responds by applying battery voltage to the interior courtesy lamps through the dome/courtesy lamps control circuits at terminal 1 X7 and terminal 5 X2. After all doors have been closed, the dome lamps 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/courtesy lamps will be disabled and an amber indicator will illuminate to inform the driver that the dome lamp switch is in the OFF position. In the event that any of the dome/courtesy lamps were to remain illuminated for more than 10 minutes with the ignition switch in the OFF position, the BCM will deactivate the dome/courtesy lamp control circuits to prevent total battery discharge.

#### Conditions for Running the DTC

- Battery voltage must be between 9-16 V.
- Dome lamp switch in OFF position.

#### Conditions for Setting the DTC

The BCM detects a short to voltage in the dome lamp switch OFF indicator control circuit.

#### Actions Taken When the DTC Sets



The dome lamp switch OFF indicator is 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

### **Interior Lights Dimming Schematics**

Connector End View Reference

### **COMPONENT CONNECTOR END VIEWS - INDEX**

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 harness connector at the S48B Multifunction Switch - Overhead Console.
2. Connect a test lamp between the control circuit terminal 5 and ground, ignition ON.
3. Verify the test lamp turns ON and OFF when commanding the Indicator Dimming 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  $\Omega$  in the control circuit end to end.
      - If 2  $\Omega$  or greater, repair the open/high resistance in the circuit.
      - If less than 2  $\Omega$ , 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**
4. Ignition OFF, connect the harness connector at the S48B Multifunction Switch - Overhead Console.
5. Disconnect the X5 harness connector at the K9 Body Control Module, ignition ON.

6. Verify the dome lamp cancel switch amber indicator does not illuminate.

- **If the dome lamp cancel switch amber indicator illuminates**

1. Ignition OFF, disconnect the harness connector at the S48B Multifunction Switch - Overhead Console.

2. Test for infinite resistance between the control circuit terminal 13 and ground.

- If less than infinite resistance, repair the short to ground on the circuit.
- If infinite resistance, replace the S48B Multifunction Switch - Overhead Console.

- **If the dome lamp cancel switch amber indicator does not illuminate**

7. Install a 3 A fused jumper wire between the control circuit terminal 13 and ground.

8. Verify the dome lamp cancel switch amber indicator illuminates.

- **If the dome lamp cancel switch amber indicator does not illuminate**

1. Ignition OFF, disconnect the harness connector at the S48B Multifunction Switch - Overhead Console, 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

3. Test for less than 2  $\Omega$  in the control circuit end to end.

- If 2  $\Omega$  or greater, repair the open/high resistance in the circuit.
- If less than 2  $\Omega$ , replace the S48B Multifunction Switch - Overhead Console.

- **If the dome lamp cancel switch amber indicator illuminates**

9. Replace the K9 Body Control Module.

### Repair Instructions

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

- [Interior Lamp Switch Replacement](#)
- [Control Module References](#) for BCM replacement, programming and setup.

## DTC B1395: CONTROL MODULE VOLTAGE REFERENCE OUTPUT 1 CIRCUIT

### 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 B1395 03

Control Module Voltage Reference Output 1 Circuit Low Voltage

#### DTC B1395 07

Control Module Voltage Reference Output 1 Circuit High Voltage

### Diagnostic Fault Information

| Circuit                                     | Short to Ground    | Open/High Resistance | Short to Voltage   | Signal Performance |
|---------------------------------------------|--------------------|----------------------|--------------------|--------------------|
| Instrument Panel Dimmer Switch B+ Reference | B1395 03, B3600 03 | B1395 03, B3600 03   | B1395 07, B3600 07 | -                  |
| Instrument Panel Dimmer Switch Signal       | B1395 03, B3600 03 | B1395 03, B3600 03   | B1395 07, B3600 07 | -                  |

| Circuit                                      | Short to Ground | Open/High Resistance | Short to Voltage | Signal Performance |
|----------------------------------------------|-----------------|----------------------|------------------|--------------------|
| Instrument Panel Dimmer Switch Low Reference | 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 a low reference, signal and B+ voltage reference 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 voltage through the LED dimming 1 and dimming 2 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 B1395 03

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

#### DTC B1395 07

- The BCM detects a short to voltage in the instrument panel dimmer switch B+ reference circuit.
- 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 FULL bright.

### Conditions for Clearing the DTC

- The condition responsible for setting the DTC no longer exists.
- Disconnect the negative battery cable for 30 s.
- A history DTC will clear once 100 consecutive malfunction-free ignition cycles have occurred.

### Diagnostic Aids

When a short to ground condition exists, the BCM goes into safe mode. The DTC will clear in most cases without removing the negative battery cable, but in order to restore the BCM to normal operating conditions the negative battery cable must be removed. The B+ reference circuit under normal operating conditions will illuminate a test lamp. When the BCM is in safe mode, a test lamp will no longer illuminate but the DTC will clear and the backlighting will dim normally.

### Reference Information

Schematic Reference

### Interior Lights Dimming Schematics



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

Scan Tool Reference

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

### Circuit/System Testing

1. Ignition OFF and all vehicle systems OFF, disconnect the harness connector at the S36 Instrument Panel Dimmer Switch, ignition ON.
2. Test for B+ between the B+ circuit terminal 6 and ground.
  - **If less than B+**
    1. Ignition OFF, disconnect the X1 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  $\Omega$  in the B+ circuit end to end.
      - If 2  $\Omega$  or greater, repair the open/high resistance in the circuit.
      - If less than 2  $\Omega$ , replace the K9 Body Control Module.
  - **If B+**
3. Verify a test lamp illuminates between the B+ circuit terminal 6 and the low reference circuit terminal 1.
  - **If the test lamp does not illuminate**
    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 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  $\Omega$  in the low reference circuit end to end.
      - If 2  $\Omega$  or greater, repair the open/high resistance in the circuit.
      - If less than 2  $\Omega$ , replace the K9 Body Control Module.
  - **If the test lamp illuminates**
4. Verify a test lamp does not illuminate between the B+ circuit terminal 6 and the signal circuit terminal 2.
  - **If the test lamp illuminates**
    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, replace the K9 Body Control Module.
  - **If the test lamp does not illuminate**
5. Test for B+ between the B+ circuit terminal 6 and the signal circuit terminal 2.

- **If less than B+**

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 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  $\Omega$  in the signal circuit end to end.
  - If 2  $\Omega$  or greater, repair the open/high resistance in the circuit.
  - If less than 2  $\Omega$ , replace the K9 Body Control Module.

- **If B+**

6. Test or replace the S36 Instrument Panel Dimmer Switch.

### Repair Instructions

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

- [Dimmer Switch Replacement](#)
- [Control Module References](#) for BCM replacement, programming and setup.

## DTC B1480: BATTERY RUNDOWN PROTECTION CIRCUIT

### 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 B1480 02

Battery Rundown Protection Circuit Short to Ground

### Diagnostic Fault Information

| Circuit                                  | Short to Ground | Open/High Resistance | Short to Voltage | Signal Performance |
|------------------------------------------|-----------------|----------------------|------------------|--------------------|
| F31RA (BCM 6) Fuse B+                    | 1               | 1                    | -                | -                  |
| Courtesy Lamps Control - Terminal 3 X7   | B1480 02        | 1                    | 1                | -                  |
| Instrument Panel Compartment Lamp Ground | -               | 1                    | -                | -                  |
| Dome/Reading Lamps - Left Front Ground   | -               | 1                    | -                | -                  |
| Dome/Reading Lamps - Right Front Ground  | -               | 1                    | -                | -                  |
| Dome/Reading Lamps - Left Rear Ground    | -               | 1                    | -                | -                  |
| Dome/Reading Lamps - Right Rear Ground   | -               | 1                    | -                | -                  |
| Sunshade Mirror Lamp - Left Ground       | -               | 1                    | -                | -                  |
| Sunshade Mirror Lamp - Right Ground      | -               | 1                    | -                | -                  |
| 1. Courtesy Lamps Malfunction            |                 |                      |                  |                    |

### Circuit/System Description

The body control module (BCM) supplies battery voltage to the front and rear reading lamps, left and right sunshade lamps, center console compartment lamp and instrument panel compartment lamp via the courtesy lamp control circuit. When the instrument panel compartment, center console armrest or a sunshade mirror is opened, the switch contacts close allowing battery voltage to flow illuminating the respective lamps. The front and rear reading lamps are controlled by individual switches that are activated by the occupants 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, the BCM will deactivate the courtesy lamp control circuit to prevent total battery discharge.

### **Conditions for Running the DTC**

Battery voltage must be between 9-16 V.

### **Conditions for Setting the DTC**

The BCM detects a short to ground in the courtesy lamps control circuit terminal 3 X7.

### **Actions Taken When the DTC Sets**

The BCM will disable the circuit and all lamps controlled by the courtesy lamps control circuit will be inoperative.

### **Conditions for Clearing the DTC**

- The condition responsible for setting the DTC no longer exists.
- Disconnect the negative battery cable for 30 s.
- A history DTC will clear once 100 consecutive malfunction-free ignition cycles have occurred.

### **Reference Information**

Schematic Reference

### **Interior Lights Schematics**

Connector End View Reference

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

Scan Tool Reference

**Control Module References** for scan tool information

### **Circuit/System Testing**

1. Ignition OFF/Vehicle OFF, disconnect the harness connectors at the components listed below.
  - E27 Instrument Panel Compartment Lamp
  - E31L Sunshade Mirror Lamp - Left
  - E31R Sunshade Mirror Lamp - Right
  - E37LF Dome/Reading Lamps - Left Front
  - E37LR Dome/Reading Lamps - Left Rear
  - E37RF Dome/Reading Lamps - Right Front



- E37RR Dome/Reading Lamps - Right Rear
2. Connect a test lamp between the appropriate control circuit terminal listed below and ground, ignition ON/vehicle in Service Mode.
    - E27 Instrument Panel Compartment Lamp terminal 1
    - E31L Sunshade Mirror Lamp - Left terminal A
    - E31R Sunshade Mirror Lamp - Right terminal A
    - E37LF Dome/Reading Lamps - Left Front terminal 4
    - E37LR Dome/Reading Lamps - Left Rear terminal 1
    - E37RF Dome/Reading Lamps - Right Front terminal 4
    - E37RR Dome/Reading Lamps - Right Rear terminal 1
  3. 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/Vehicle 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  $\Omega$  in the control circuit end to end.
        - If 2  $\Omega$  or greater, repair the open/high resistance in the circuit.
        - If less than 2  $\Omega$ , replace the K9 Body Control Module.
    - **If the test lamp is always ON**
      1. Ignition OFF/Vehicle OFF, disconnect the X7 harness connector at the K9 Body Control Module, ignition ON/vehicle in Service Mode.
      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**
  4. Test or replace the appropriate courtesy lamp.

### Repair Instructions

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

- [Sunshade Illuminated Mirror Lamp Bulb Replacement](#)
- [Instrument Panel Compartment Lamp Replacement](#)
- [Center Reading and Courtesy Lamp Replacement](#)
- [Control Module References](#) for BCM replacement, programming and setup

## DTC B2540: REAR FOG LAMPS CONTROL CIRCUIT

### 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 B2540 02

Rear Fog Lamps Control Circuit Short to Ground

#### DTC B2540 04

**Diagnostic Fault Information**

| <b>Circuit</b>                          | <b>Short to Ground</b> | <b>Open/High Resistance</b> | <b>Short to Voltage</b> | <b>Signal Performance</b> |
|-----------------------------------------|------------------------|-----------------------------|-------------------------|---------------------------|
| Rear Fog Lamp Switch Signal             | B3588 00               | 1                           | 1                       | -                         |
| Rear Fog Lamp Control                   | B2540 02               | B2540 04                    | 1                       | -                         |
| Rear Fog Lamp Ground                    | -                      | 1                           | -                       | -                         |
| Turn Signal/Multifunction Switch Ground | -                      | 1                           | -                       | -                         |
| 1. Rear Fog Lamp Malfunction            |                        |                             |                         |                           |

**Circuit/System Description**

The rear fog lamp switch signal circuit is grounded momentarily by pressing the rear fog lamp switch. The body control module (BCM) responds to the rear fog lamp request by applying voltage to the rear fog lamp control circuit which illuminates the rear fog lamp.

**Conditions for Running the DTC**

- Battery voltage must be between 9-16 V.
- Rear fog lamp ON.

**Conditions for Setting the DTC****DTC B2540 02**

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

**DTC B2540 04**

The BCM detects an open/high resistance in the rear fog lamp control circuit.

**Actions Taken When the DTC Sets**

The rear fog lamp will not operate when the park lamps are ON and the rear 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

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

- [Wiring Repairs](#)

Scan Tool Reference

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

### Circuit/System Testing

1. Ignition OFF/Vehicle OFF, exterior lamps OFF, disconnect the harness connector at the E29R Fog Lamp - Rear. It may take up to 2 min for all vehicle systems to power down.
2. Test for less than 5  $\Omega$  between the ground circuit terminal 2 and ground.
  - **If 5  $\Omega$  or greater**
    1. Ignition OFF/Vehicle OFF.
    2. Test for less than 2  $\Omega$  in the ground circuit end to end.
      - If 2  $\Omega$  or greater, repair the open/high resistance in the circuit.
      - If less than 2  $\Omega$ , repair the open/high resistance in the ground connection.
  - **If less than 5  $\Omega$**
3. Connect a test lamp between the control circuit terminal 1 and ground, ignition ON/vehicle in Service Mode.
4. Verify the test lamp turns ON and OFF when commanding the Rear Fog Lamp ON and OFF with a scan tool.
  - **If the test lamp is always OFF**
    1. Ignition OFF/Vehicle 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  $\Omega$  in the control circuit end to end.
      - If 2  $\Omega$  or greater, repair the open/high resistance in the circuit.
      - If less than 2  $\Omega$ , replace the K9 Body Control Module.
  - **If the test lamp is always ON**
    1. Ignition OFF/Vehicle OFF, disconnect the X4 harness connector at the K9 Body Control Module, ignition ON/vehicle in Service Mode.
    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 E29R Fog Lamp - Rear.

### Repair Instructions

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

[Control Module References](#) for BCM replacement, programming and setup.

## DTC B2545: BACKUP LAMPS CIRCUIT

### 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 02**

**DTC B2545 04**

Backup Lamps Circuit Open

**Diagnostic Fault Information**

| Circuit                     | Short to Ground    | Open/High Resistance | Short to Voltage | Signal Performance |
|-----------------------------|--------------------|----------------------|------------------|--------------------|
| Backup Lamps Control        | B127B 2B, B2545 02 | B127B 2B, B2545 04   | 1                | -                  |
| Backup Lamp Ground          | -                  | 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 02**

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

**DTC B2545 04**

The BCM detects an open/high resistance 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.

**Reference Information**

Schematic Reference

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

Connector End View Reference

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- [Wiring Repairs](#)

### Scan Tool Reference

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

### [Circuit/System Testing](#)

1. Ignition OFF/Vehicle OFF, exterior lamps OFF, disconnect the harness connector at the appropriate E5 Backup Lamp. It may take up to 2 min for all vehicle systems to power down.
2. Test for less than 5  $\Omega$  between the appropriate ground circuit terminal listed below and ground.
  - E5 Backup Lamp - socket terminal (without T79)
  - E5 Backup Lamp - terminal B (with T79)
  - **If 5  $\Omega$  or greater**
    1. Ignition OFF/Vehicle OFF.
    2. Test for less than 2  $\Omega$  in the ground circuit end to end.
      - If 2  $\Omega$  or greater, repair the open/high resistance in the circuit.
      - If less than 2  $\Omega$ , repair the open/high resistance in the ground connection.
  - **If less than 5  $\Omega$**
3. Connect a test lamp between the appropriate control circuit terminal listed below and ground, ignition ON/vehicle in Service Mode.
  - E5 Backup Lamp - socket terminal (without T79)
  - E5 Backup Lamp - terminal A (with T79)
4. 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/Vehicle OFF, disconnect the appropriate harness connector listed below at the K9 Body Control Module.
      - X6 (with T79)
      - X7 (without T79)
    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  $\Omega$  in the control circuit end to end.
      - If 2  $\Omega$  or greater, repair the open/high resistance in the circuit.
      - If less than 2  $\Omega$ , replace the K9 Body Control Module.
    - **If the test lamp is always ON**
      1. Ignition OFF/Vehicle OFF, disconnect the appropriate harness connector listed below at the K9 Body Control Module, ignition ON/vehicle in Service Mode.
        - X6 (with T79)
        - X7 (without T79)
      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.
5. Test or replace the E5 Backup Lamp.

## Repair Instructions

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

- [Rear Body Structure Stop Lamp Replacement](#)
- [Control Module References](#) for BCM replacement, programming and setup.

## DTC B255D: PASSENGER COMPARTMENT LAMP CONTROL 2 CIRCUIT

### 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 B255D 01

Passenger Compartment Lamp Control 2 Circuit Short to Battery

#### DTC B255D 02

Passenger Compartment Lamp Control 2 Circuit Short to Ground

#### DTC B255D 04

Passenger Compartment Lamp Control 2 Circuit Open

### Diagnostic Fault Information

| Circuit                                        | Short to Ground | Open/High Resistance | Short to Voltage | Signal Performance |
|------------------------------------------------|-----------------|----------------------|------------------|--------------------|
| Accent Lamps Control 2 - Terminal 23 X1        | B255D 02        | B255D 04             | B255D 01         | -                  |
| Accent Lamp - Left Instrument Panel Ground     | -               | 1                    | -                | -                  |
| Accent Lamp - Right Instrument Panel Ground    | -               | 1                    | -                | -                  |
| Center Console Compartment Lamp Ground         | -               | 1                    | -                | -                  |
| Dome/Reading Lamps - Left Rear Ground          | -               | 1                    | -                | -                  |
| Dome/Reading Lamps - Right Rear Ground         | -               | 1                    | -                | -                  |
| Floor Courtesy Lamp - Left Front Outer Ground  | -               | 1                    | -                | -                  |
| Floor Courtesy Lamp - Left Front Inner Ground  | -               | 1                    | -                | -                  |
| Floor Courtesy Lamp - Right Front Outer Ground | -               | 1                    | -                | -                  |
| Floor Courtesy Lamp - Right Front Inner Ground | -               | 1                    | -                | -                  |

| Circuit                                        | Short to Ground | Open/High Resistance | Short to Voltage | Signal Performance |
|------------------------------------------------|-----------------|----------------------|------------------|--------------------|
| Multifunction Switch - Overhead Console Ground | -               | 1                    | -                | -                  |
| 1. Interior Accent Lighting Malfunction        |                 |                      |                  |                    |

### Circuit/System Description

The body control module (BCM) supplies battery voltage to accent 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/vehicle ON.

### Conditions for Running the DTC

Battery voltage must be between 9-16 V.

### Conditions for Setting the DTC

#### DTC B255D 01

The BCM detects a short to voltage in the accent lamps control circuit terminal 23 X1.

#### DTC B255D 02

The BCM detects a short to ground in the accent lamps control circuit terminal 23 X1.

#### DTC B255D 04

The BCM detects an open/high resistance in the accent lamps control circuit terminal 23 X1.

### Actions Taken When the DTC Sets

The BCM will disable the accent lamps control circuit terminal 23 X1.

### Conditions for Clearing the DTC

- The condition responsible for setting the DTC no longer exists.
- Turn ignition OFF, open and close drivers door, wait 1 min.
- A history DTC will clear once 100 consecutive malfunction-free ignition cycles have occurred.

### Reference Information

Schematic Reference

### Interior Lights Schematics

Connector End View Reference

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**Control Module References** for scan tool information

**Circuit/System Testing**

1. Ignition OFF/Vehicle OFF, scan tool disconnected, all doors closed, all accessories OFF, open and close drivers door, disconnect the harness connector at the inoperative accent lamp. It may take up to 2 min for all vehicle systems to power down.

**NOTE:** Each component may need to be disconnected to isolate a short to voltage, short to ground or an open/high resistance. Use the schematics to identify the following:

- Courtesy lamps the vehicle is equipped with
  - Each component's control and ground circuit terminals
  - Component locations on the exterior courtesy lamps control circuit
2. Test for less than 10  $\Omega$  between the appropriate ground circuit terminal and ground.
    - **If 10  $\Omega$  or greater**
      1. Ignition OFF/Vehicle OFF.
      2. Test for less than 2  $\Omega$  in the ground circuit end to end.
        - If 2  $\Omega$  or greater, repair the open/high resistance in the circuit.
        - If less than 2  $\Omega$ , repair the open/high resistance in the ground connection.
    - **If less than 10  $\Omega$**
  3. Connect a test lamp between the appropriate control circuit terminal and ground, ignition ON/vehicle in Service Mode.
  4. Verify the test lamp turns ON and OFF when commanding the Accent Lighting 2 ON and OFF with a scan tool.
    - **If the test lamp is always OFF**
      1. Ignition OFF/Vehicle 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  $\Omega$  in the control circuit end to end.
        - If 2  $\Omega$  or greater, repair the open/high resistance in the circuit.
        - If less than 2  $\Omega$ , replace the K9 Body Control Module.
    - **If the test lamp is always ON**
      1. Ignition OFF/Vehicle OFF, disconnect the X1 harness connector at the K9 Body Control Module, ignition ON/vehicle in Service Mode.
      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 accent lamp.

**Repair Instructions**

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

- **Instrument Panel Light Conductor Lamp Replacement (Left Side)** **Instrument Panel Light Conductor Lamp Replacement (Right Side)**
- **Front Floor Console Compartment Lamp Replacement**



- [Front Floor Courtesy Lamp Replacement \(Left Side\)](#) [Front Floor Courtesy Lamp Replacement \(Right Side\)](#)
- [Control Module References](#) for BCM replacement, programming and setup.

## DTC B255F: INTERIOR DOOR HANDLE BACKLIGHT CIRCUIT

### 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 B255F 02

Interior Door Handle Backlight Circuit Short to Ground

#### DTC B255F 04

Interior Door Handle Backlight Circuit Open

### Diagnostic Fault Information

| Circuit                                        | Short to Ground | Open/High Resistance | Short to Voltage | Signal Performance |
|------------------------------------------------|-----------------|----------------------|------------------|--------------------|
| Accent Lamps Control 1 - Terminal 22 X7        | B255F 02        | B255F 04             | 1                | -                  |
| Accent Lamp - Driver Door Armrest Ground       | -               | 1                    | -                | -                  |
| Accent Lamp - Passenger Door Armrest Ground    | -               | 1                    | -                | -                  |
| Accent Lamp - Left Rear Door Armrest Ground    | -               | 1                    | -                | -                  |
| Accent Lamp - Right Rear Door Armrest Ground   | -               | 1                    | -                | -                  |
| Flood Lamp - Driver Door Handle Ground         | -               | 1                    | -                | -                  |
| Flood Lamp - Driver Door Pull Handle Ground    | -               | 1                    | -                | -                  |
| Flood Lamp - Passenger Door Handle Ground      | -               | 1                    | -                | -                  |
| Flood Lamp - Passenger Door Pull Handle Ground | -               | 1                    | -                | -                  |
| Flood Lamp - Left Rear Door Handle Ground      | -               | 1                    | -                | -                  |
| Flood Lamp - Left Rear Door Pull Handle Ground | -               | 1                    | -                | -                  |

| Circuit                                         | Short to Ground | Open/High Resistance | Short to Voltage | Signal Performance |
|-------------------------------------------------|-----------------|----------------------|------------------|--------------------|
| Flood Lamp - Right Rear Door Handle Ground      | -               | 1                    | -                | -                  |
| Flood Lamp - Right Rear Door Pull Handle Ground | -               | 1                    | -                | -                  |
| Floor Courtesy Lamp - Left Rear Ground          | -               | 1                    | -                | -                  |
| Floor Courtesy Lamp - Right Rear Ground         | -               | 1                    | -                | -                  |
| 1. Interior Accent Lighting Malfunction         |                 |                      |                  |                    |

### Circuit/System Description

The body control module (BCM) supplies battery voltage to accent 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/vehicle ON.

### Conditions for Running the DTC

Battery voltage must be between 9-16 V.

### Conditions for Setting the DTC

#### DTC B255F 02

The BCM detects a short to ground in the accent lamp control circuit terminal 22 X7

#### DTC B255F 04

The BCM detects an open/high resistance in the accent lamp control circuit terminal 22 X7

### Actions Taken When the DTC Sets

The BCM will disable the accent lamp control circuit.

### Conditions for Clearing the DTC

- The condition responsible for setting the DTC no longer exists.
- Turn ignition OFF, open and close drivers door, wait 1 min.
- A history DTC will clear once 100 consecutive malfunction-free ignition cycles have occurred.

### Reference Information

Schematic Reference

### Interior Lights Schematics

Connector End View Reference

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### Interior Lighting Systems Description and Operation

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- [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/Vehicle OFF, scan tool disconnected, all doors closed, all accessories OFF, open and close drivers door, disconnect the harness connector at the inoperative accent/flood lamp. It may take up to 2 min for all vehicle systems to power down.

**NOTE:** Each component may need to be disconnected to isolate a short to voltage, short to ground or an open/high resistance. Use the schematics to identify the following:

- Courtesy lamps the vehicle is equipped with
  - Each component's control and ground circuit terminals
  - Component locations on the exterior courtesy lamps control circuit
2. Test for less than 10  $\Omega$  between the appropriate ground circuit terminal and ground.
    - **If 10  $\Omega$  or greater**
      1. Ignition OFF/Vehicle OFF.
      2. Test for less than 2  $\Omega$  in the ground circuit end to end.
        - If 2  $\Omega$  or greater, repair the open/high resistance in the circuit.
        - If less than 2  $\Omega$ , repair the open/high resistance in the ground connection.
    - **If less than 10  $\Omega$**
  3. Connect a test lamp between the appropriate control circuit terminal and ground, ignition ON/vehicle in Service Mode.
  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/Vehicle 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  $\Omega$  in the control circuit end to end.
        - If 2  $\Omega$  or greater, repair the open/high resistance in the circuit.
        - If less than 2  $\Omega$ , replace the K9 Body Control Module.
    - **If the test lamp is always ON**
      1. Ignition OFF/Vehicle OFF, disconnect the X7 harness connector at the K9 Body Control Module, ignition ON/vehicle in Service Mode.
      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 accent/flood lamp.

### Repair Instructions

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

- [Front Side Door Inside Handle Illumination Lamp Replacement](#)
- [Rear Side Door Inside Handle Illumination Lamp Replacement](#)
- [Rear Floor Flood Lamp Replacement](#)
- [Control Module References](#) for BCM replacement, programming and setup

## **DTC B2570: TRUNK LAMP CONTROL CIRCUIT**

### **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 B2570 02**

Trunk Lamp Control Circuit Short to Ground

#### **DTC B2570 04**

Trunk Lamp Control Circuit Open

### **Diagnostic Fault Information**

| <b>Circuit</b>                                | <b>Short to Ground</b> | <b>Open/High Resistance</b> | <b>Short to Voltage</b> | <b>Signal Performance</b> |
|-----------------------------------------------|------------------------|-----------------------------|-------------------------|---------------------------|
| Rear Compartment Courtesy Lamps Control       | B2570 02               | B2570 04                    | B2570 04                | -                         |
| Rear Compartment Courtesy Lamp - Left Ground  | -                      | 1                           | -                       | -                         |
| Rear Compartment Courtesy Lamp - Right Ground | -                      | 1                           | -                       | -                         |
| 1. Rear Compartment Lamp Malfunction          |                        |                             |                         |                           |

### **Circuit/System Description**

The body control module (BCM) applies battery voltage to the rear compartment courtesy lamps through the rear compartment courtesy lamps 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 courtesy lamps control circuit illuminating the rear compartment courtesy lamps. In the event that the rear compartment courtesy lamps were to remain illuminated for more than 10 minutes with the ignition OFF/vehicle OFF, the BCM will deactivate the rear compartment courtesy lamps control circuit to prevent total battery discharge.

### **Conditions for Running the DTC**

- Battery voltage must be between 9-16 V.
- Rear compartment OPEN.

### **Conditions for Setting the DTC**

#### **DTC B2570 02**

The BCM detects a short to ground in the rear compartment courtesy lamps control circuit.

#### **DTC B2570 04**



The BCM detects a short to voltage or an open/high resistance in the rear compartment courtesy lamps control circuit.

### **Actions Taken When the DTC Sets**

The rear compartment courtesy 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

### **Interior Lights Schematics**

Connector End View Reference

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

Scan Tool Reference

**Control Module References** for scan tool information

### **Circuit/System Testing**

1. Ignition OFF/Vehicle OFF, exterior lamps OFF, disconnect the harness connectors at both E8 Rear Compartment Courtesy Lamps. It may take up to 2 min for all vehicle systems to power down.
2. Test for less than 5  $\Omega$  between the ground circuit terminal 2 and ground.
  - **If 5  $\Omega$  or greater**
    1. Ignition OFF/Vehicle OFF.
    2. Test for less than 2  $\Omega$  in the ground circuit end to end.
      - If 2  $\Omega$  or greater, repair the open/high resistance in the circuit.
      - If less than 2  $\Omega$ , repair the open/high resistance in the ground connection.
  - **If less than 5  $\Omega$**
3. Connect a test lamp between the control circuit terminal 1 and ground, ignition ON/vehicle in Service Mode.
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/Vehicle 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  $\Omega$  in the control circuit end to end.

- If 2  $\Omega$  or greater, repair the open/high resistance in the circuit.
- If less than 2  $\Omega$ , replace the K9 Body Control Module.
- **If the test lamp is always ON**
  1. Ignition OFF/Vehicle OFF, disconnect the X7 harness connector at the K9 Body Control Module, ignition ON/vehicle in Service Mode.
  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 E8 Rear Compartment Courtesy Lamp.

### Repair Instructions

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

- [Rear Compartment Cargo Courtesy Lamp Replacement \(Left Side\)](#) [Rear Compartment Cargo Courtesy Lamp Replacement \(Right Side\)](#)
- [Control Module References](#) for BCM replacement, programming and setup

## DTC B2575 OR B2699: HEADLAMP CONTROL CIRCUIT

### 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 |
|-----------------------|--------------------|----------------------|------------------|--------------------|
| F11DA (BCM 4) Fuse B+ | B2575 01, B2575 04 | B2575 01, B2575 04   | -                | -                  |
| F10DA (BCM 3) Fuse B+ | B2699 01, B2699 04 | B2699 01, B2699 04   | -                | -                  |

| Circuit                                         | Short to Ground | Open/High Resistance | Short to Voltage | Signal Performance |
|-------------------------------------------------|-----------------|----------------------|------------------|--------------------|
| Low Beam Headlamp Control - Left (without T4F)  | B2575 02        | B2575 01, B2575 04   | 1                | -                  |
| Low Beam Headlamp Control - Right (without T4F) | B2699 02        | B2699 01, B2699 04   | 1                | -                  |
| Headlamp Assembly - Left Ground                 | -               | 1                    | -                | -                  |
| Headlamp Assembly - Right Ground                | -               | 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 F11DA (BCM 3) 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 F10DA (BCM 4) 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

Connector End View Reference

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- [Wiring Repairs](#)

Scan Tool Reference

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

## [Circuit/System Testing](#)

### **DTC B2575**

1. Ignition OFF/Vehicle OFF, disconnect the X1 harness connector at the K9 Body Control Module, ignition ON/vehicle in Service Mode.
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. Ignition OFF/Vehicle OFF, disconnect the X1 harness connector at the X51A Fuse Block - Instrument Panel.
    2. Test for less than 2  $\Omega$  in the B+ circuit end to end.
      - If 2  $\Omega$  or greater, repair the open/high resistance in the circuit.
      - If less than 2  $\Omega$ , 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/Vehicle OFF, disconnect the X1 harness connector 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 X51A Fuse Block - Instrument Panel.
  - **If the test lamp illuminates**
3. Ignition OFF/Vehicle OFF, connect the X1 harness connector at the K9 Body Control Module.
4. Disconnect the harness connector at the E13LA Headlamp Assembly - Left. It may take up to 2 min for all vehicle systems to power down.
5. Test for less than 15  $\Omega$  between each ground circuit at terminal 1 and terminal 4 and ground.
  - **If 15  $\Omega$  or greater**
    1. Ignition OFF/Vehicle OFF.
    2. Test for less than 2  $\Omega$  in the ground circuit end to end.
      - If 2  $\Omega$  or greater, repair the open/high resistance in the circuit.
      - If less than 2  $\Omega$ , repair the open/high resistance in the ground connection.
  - **If less than 15  $\Omega$**
6. Connect a test lamp between the control circuit terminal 2 and ground, ignition ON/vehicle in Service Mode.
7. Verify the test lamp turns ON and OFF when commanding the Left Low Beam Headlamp ON and OFF with a scan tool.
  - **If the test lamp is always OFF**



1. Ignition OFF/Vehicle 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  $\Omega$  in the control circuit end to end.
  - If 2  $\Omega$  or greater, repair the open/high resistance in the circuit.
  - If less than 2  $\Omega$ , replace the K9 Body Control Module.
- **If the test lamp is always ON**
  1. Ignition OFF/Vehicle OFF, disconnect the X4 harness connector at the K9 Body Control Module, ignition ON/vehicle in Service Mode.
  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 E13LA Headlamp Assembly - Left.

## DTC B2699

1. Ignition OFF/Vehicle OFF, disconnect the X1 harness connector at the K9 Body Control Module, ignition ON/vehicle in Service Mode.
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/Vehicle OFF, disconnect the X1 harness connector at the X51A Fuse Block - Instrument Panel.
    2. Test for less than 2  $\Omega$  in the B+ circuit end to end.
      - If 2  $\Omega$  or greater, repair the open/high resistance in the circuit.
      - If less than 2  $\Omega$ , 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/Vehicle OFF, disconnect the X1 harness connector 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 X51A Fuse Block - Instrument Panel.
  - **If the test lamp illuminates**
3. Ignition OFF/Vehicle OFF, connect the X1 harness connector at the K9 Body Control Module.
4. Disconnect the harness connector at the E13RA Headlamp Assembly - Right. It may take up to 2 min for all vehicle systems to power down.
5. Test for less than 15  $\Omega$  between each ground circuit at terminal 1 and terminal 4 and ground.
  - **If 15  $\Omega$  or greater**
    1. Ignition OFF/Vehicle OFF.
    2. Test for less than 2  $\Omega$  in the ground circuit end to end.
      - If 2  $\Omega$  or greater, repair the open/high resistance in the circuit.
      - If less than 2  $\Omega$ , repair the open/high resistance in the ground connection.
  - **If less than 15  $\Omega$**
6. Connect a test lamp between the control circuit terminal 2 and ground, ignition ON/vehicle in Service Mode.
7. Verify the test lamp turns ON and OFF when commanding the Right Low Beam Headlamp ON and OFF with a scan tool.
  - **If the test lamp is always OFF**
    1. Ignition OFF/Vehicle 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  $\Omega$  in the control circuit end to end.
  - If 2  $\Omega$  or greater, repair the open/high resistance in the circuit.
  - If less than 2  $\Omega$ , replace the K9 Body Control Module.
- **If the test lamp is always ON**
  1. Ignition OFF/Vehicle OFF, disconnect the X4 harness connector at the K9 Body Control Module, ignition ON/vehicle in Service Mode.
  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 E13LA Headlamp Assembly - Right.

### Repair Instructions

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

- [Headlamp Replacement](#)
- [Instrument Panel Wiring Harness Junction Block Replacement](#)
- [Control Module References](#) for BCM replacement, programming and setup.

## DTC B257A: HEADLAMP SWITCH INPUT SIGNALS CORRELATION 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.

### 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 |
|----------------------------------------------------------------------------|-----------------|----------------------|------------------|--------------------|
| Turn Signal/Multifunction Switch Park Lamps ON Signal                      | 2               | B257A 00             | 2                | -                  |
| Turn Signal/Multifunction Switch Headlamps OFF Signal                      | B257A 00        | 1                    | 1                | -                  |
| Turn Signal/Multifunction Switch Headlamps ON Signal                       | B257A 00        | 1                    | 1                | -                  |
| Turn Signal/Multifunction Switch Ground                                    | -               | 1, 2                 | -                | -                  |
| 1. Headlamps Malfunction<br>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 turn signal/multifunction switch. When the turn signal/multifunction 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 ON and OFF. When the turn signal/multifunction switch is placed in the OFF position, the turn signal/multifunction switch headlamps OFF signal circuit is grounded, indicating to the BCM that the exterior lamps should be turned OFF. With the turn signal/multifunction switch in the PARK LAMPS position, the turn signal/multifunction switch park lamps ON signal circuit is grounded, indicating that the park lamps have been requested. When the turn signal/multifunction switch is in the HEADLAMP position, both the turn signal/multifunction switch park lamps ON signal circuit and the turn signal/multifunction 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 turn signal/multifunction switch park lamps ON signal circuit.
- The BCM detects a short to ground in the turn signal/multifunction switch headlamps ON signal circuit.
- The BCM detects a short to ground in the turn signal/multifunction switch headlamps OFF signal circuit.

### **Actions Taken When the DTC Sets**

- When DTC B257A 00 is present on the turn signal/multifunction switch headlamps OFF signal circuit, the park lamps and daytime running lamps are always ON in the AUTO and ON positions.
- When DTC B257A 00 is present on the turn signal/multifunction switch headlamps ON signal circuit, the low beam headlamps are always ON in the PARK position. The Park lamps are always ON in all switch positions. The BCM disregards all turn signal/multifunction switch inputs.

### **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

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- **Wiring Repairs**

Scan Tool Reference

**Control Module References** for scan tool information

1. Ignition OFF/Vehicle OFF, scan tool disconnected, all doors closed, all accessories OFF, open and close drivers door, disconnect the harness connector at the S78 Turn Signal/Multifunction Switch. It may take up to 2 min for all vehicle systems to power down.
2. Test for less than 10  $\Omega$  between the ground circuit terminal 3 and ground.
  - **If 10  $\Omega$  or greater**
    1. Ignition OFF/Vehicle OFF.
    2. Test for less than 2  $\Omega$  in the ground circuit end to end.
      - If 2  $\Omega$  or greater, repair the open/high resistance in the circuit.
      - If less than 2  $\Omega$ , repair the open/high resistance in the ground connection.
  - **If less than 10  $\Omega$**
3. Ignition ON/vehicle in Service Mode.
4. Verify the scan tool Automatic Headlamps Disable Switch parameter is Inactive.
  - **If not Inactive**
    1. Ignition OFF/Vehicle 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**
5. Install a 3 A fused jumper wire between the signal circuit terminal 4 and ground.
6. Verify the scan tool Automatic Headlamps Disable Switch parameter is Active.
  - **If not Active**
    1. Ignition OFF/Vehicle OFF, disconnect the X1 harness connector at the K9 Body Control Module, ignition ON/vehicle in Service Mode.
    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  $\Omega$  in the signal circuit end to end.
      - If 2  $\Omega$  or greater, repair the open/high resistance in the circuit.
      - If less than 2  $\Omega$ , 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/Vehicle 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**
8. Install a 3 A fused jumper wire between the signal circuit terminal 5 and ground.
9. Verify the scan tool Park Lamps Switch parameter is Active.
  - **If not Active**
    1. Ignition OFF/Vehicle OFF, disconnect the X1 harness connector at the K9 Body Control Module, ignition ON/vehicle in Service Mode.
    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  $\Omega$  in the signal circuit end to end.



- If 2  $\Omega$  or greater, repair the open/high resistance in the circuit.
  - If less than 2  $\Omega$ , 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/Vehicle OFF, disconnect the X1 harness connector at the K9 Body Control Module.
    2. Test for infinite resistance between the signal circuit terminal 9 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 9 and ground.
12. Verify the scan tool Headlamps On Switch parameter is Active.
- **If not Active**
    1. Ignition OFF/Vehicle OFF, disconnect the X1 harness connector at the K9 Body Control Module, ignition ON/vehicle in Service Mode.
    2. Test for less than 1 V between the signal circuit terminal 9 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  $\Omega$  in the signal circuit end to end.
      - If 2  $\Omega$  or greater, repair the open/high resistance in the circuit.
      - If less than 2  $\Omega$ , replace the K9 Body Control Module.
  - **If Active**
13. Test or replace the S78 Turn Signal/Multifunction Switch.

### Repair Instructions

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

- [Turn Signal Switch Replacement](#)
- [Control Module References](#) for BCM replacement, programming and setup.

## DTC B2580: HIGH BEAM CONTROL CIRCUIT

### 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 B2580 01

High Beam Control Circuit Short to Battery

#### DTC B2580 02

High Beam Control Circuit Short to Ground

#### DTC B2580 04

High Beam Control Circuit Open

### Diagnostic Fault Information

|  |  |
|--|--|
|  |  |
|--|--|

| <b>Circuit</b>                     | <b>Short to Ground</b> | <b>Open/High Resistance</b> | <b>Short to Voltage</b> | <b>Signal Performance</b> |
|------------------------------------|------------------------|-----------------------------|-------------------------|---------------------------|
| Headlamp High Beam Relay Control   | B2580 02, B2580 04     | B2580 02, B2580 04          | B2580 01                | -                         |
| High Beam Headlamp Control - Left  | 1                      | 1                           | 1                       | -                         |
| High Beam Headlamp Control - Right | 1                      | 1                           | 1                       | -                         |
| Headlamp Ground - Left             | -                      | 1                           | -                       | -                         |
| Headlamp Ground - Right            | -                      | 1                           | -                       | -                         |
| 1. Headlamps Malfunction           |                        |                             |                         |                           |

### Circuit/System Description

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 fuse 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.

### Conditions for Running the DTC

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

### Conditions for Setting the DTC

#### DTC B2580 01

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

#### DTC B2580 02 and B2580 04

The BCM detects a short to ground or an open/high resistance in the headlamp high beam relay control circuit.

### Actions Taken When the DTC Sets

The high beam headlamps and flash to pass 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

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- [Wiring Repairs](#)

### Scan Tool Reference

### Control Module References for scan tool information

### Circuit/System Testing

1. Ignition OFF/Vehicle OFF, disconnect the KR48 Headlamp High Beam Relay.
2. Verify a test lamp illuminates between the B+ circuit terminal 86 and ground.
  - **If the test lamp does not illuminate**  
Replace the X50A Fuse Block - Underhood.
  - **If the test lamp illuminates**
3. Verify a test lamp illuminates between the B+ circuit terminal 30 and ground.
  - **If the test lamp does not illuminate**  
Replace the X50A Fuse Block - Underhood.
  - **If the test lamp illuminates**
4. Connect a test lamp between the control circuit terminal 85 and B+, ignition ON/vehicle in Service Mode.
5. 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/Vehicle OFF, disconnect the X5 harness connector at the K9 Body Control Module, ignition ON/vehicle in Service Mode.
    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/Vehicle OFF.
    4. Test for less than 2  $\Omega$  in the control circuit end to end.
      - If 2  $\Omega$  or greater, repair the open/high resistance in the circuit.
      - If less than 2  $\Omega$ , replace the K9 Body Control Module.
    - **If the test lamp is always ON**
      1. Ignition OFF/Vehicle 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**
6. Test or replace the KR48 Headlamp High Beam Relay.

### Repair Instructions

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

- [Relay Replacement \(Attached to Wire Harness\) Relay Replacement \(Within an Electrical Center\)](#)
- [Control Module References](#) for BCM replacement, programming and setup.

## **DTC B2585 OR B3867: LEFT/RIGHT PARK LAMPS CONTROL CIRCUIT**

### **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**

| <b>Circuit</b>                                 | <b>Short to Ground</b> | <b>Open/High Resistance</b> | <b>Short to Voltage</b> | <b>Signal Performance</b> |
|------------------------------------------------|------------------------|-----------------------------|-------------------------|---------------------------|
| Park Lamps Control - Left Front                | B2585 02               | B2585 01, B2585 04          | B2585 01, B2585 04      | -                         |
| Park Lamps Control - Right Front               | B3867 02               | B3867 01, B3867 04          | B3867 01, B3867 04      | -                         |
| Headlamp Assembly Ground - Left                | -                      | 1                           | -                       | -                         |
| Headlamp Assembly Ground - Right               | -                      | 1                           | -                       | -                         |
| 1. Park, License and/or Tail 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.

### **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

The appropriate park/side marker lamps 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

#### Exterior Lights Schematics

Connector End View Reference

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- [Wiring Repairs](#)

Scan Tool Reference

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

### Circuit/System Testing

#### DTC B2585

1. Ignition OFF/Vehicle OFF, exterior lamps OFF, disconnect the harness connector at the E13LA Headlamp Assembly - Left. It may take up to 2 min for all vehicle systems to power down.
2. Test for less than 5  $\Omega$  between the ground circuit terminal 4 and ground.
  - **If 5  $\Omega$  or greater**

1. Ignition OFF/Vehicle OFF.
2. Test for less than 2  $\Omega$  in the ground circuit end to end.
  - If 2  $\Omega$  or greater, repair the open/high resistance in the circuit.
  - If less than 2  $\Omega$ , repair the open/high resistance in the ground connection.
- **If less than 5  $\Omega$**
3. Connect a test lamp between the control circuit terminal 7 and ground, ignition ON/vehicle in Service Mode.
4. Verify the test lamp turns ON and OFF when commanding the Left Park Lamp ON and OFF with a scan tool.
  - **If the test lamp is always OFF**
    1. Ignition OFF/Vehicle 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  $\Omega$  in the control circuit end to end.
      - If 2  $\Omega$  or greater, repair the open/high resistance in the circuit.
      - If less than 2  $\Omega$ , replace the K9 Body Control Module.
  - **If the test lamp is always ON**
    1. Ignition OFF/Vehicle OFF, disconnect the X4 harness connector at the K9 Body Control Module, ignition ON/vehicle in Service Mode.
    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 K166L Multifunction LED Control Module - Left Headlamp.

#### **DTC B3867**

1. Ignition OFF/Vehicle OFF, exterior lamps OFF, disconnect the harness connector at the E13RA Headlamp Assembly - Right. It may take up to 2 min for all vehicle systems to power down.
2. Test for less than 5  $\Omega$  between the ground circuit terminal 4 and ground.
  - **If 5  $\Omega$  or greater**
    1. Ignition OFF/Vehicle OFF.
    2. Test for less than 2  $\Omega$  in the ground circuit end to end.
      - If 2  $\Omega$  or greater, repair the open/high resistance in the circuit.
      - If less than 2  $\Omega$ , repair the open/high resistance in the ground connection.
  - **If less than 5  $\Omega$**
3. Connect a test lamp between the control circuit terminal 7 and ground, ignition ON/vehicle in Service Mode.
4. Verify the test lamp turns ON and OFF when commanding the Right Park Lamp ON and OFF with a scan tool.
  - **If the test lamp is always OFF**
    1. Ignition OFF/Vehicle 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  $\Omega$  in the control circuit end to end.
      - If 2  $\Omega$  or greater, repair the open/high resistance in the circuit.
      - If less than 2  $\Omega$ , replace the K9 Body Control Module.

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

1. Ignition OFF/Vehicle OFF, disconnect the X4 harness connector at the K9 Body Control Module, ignition ON/vehicle in Service Mode.
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 K166R Multifunction LED Control Module - Right Headlamp.

### Repair Instructions

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

- [Headlamp Replacement](#)
- [Control Module References](#) for BCM replacement, programming and setup

## DTC B2590 OR B2595: LEFT/RIGHT CORNERING LAMP CIRCUIT

### 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 B2590 01

Left Cornering Lamp Circuit Short to Battery

#### DTC B2590 02

Left Cornering Lamp Circuit Short to Ground

#### DTC B2590 04

Left Cornering Lamp Circuit Open

#### DTC B2595 01

Right Cornering Lamp Circuit Short to Battery

#### DTC B2595 02

Right Cornering Lamp Circuit Short to Ground

#### DTC B2595 04

Right Cornering Lamp Circuit Open

### Diagnostic Fault Information

| Circuit                              | Short to Ground | Open/High Resistance | Short to Voltage   | Signal Performance |
|--------------------------------------|-----------------|----------------------|--------------------|--------------------|
| Cornering Lamp Relay - Left Control  | B2590 02        | B2590 01, B2590 04   | B2590 01, B2590 04 | -                  |
| Cornering Lamp Relay - Right Control | B2595 02        | B2595 01, B2595 04   | B2595 01, B2595 04 | -                  |
| Cornering Lamp - Left Control        | 1               | 1                    | 1                  | -                  |

| Circuit                        | Short to Ground | Open/High Resistance | Short to Voltage | Signal Performance |
|--------------------------------|-----------------|----------------------|------------------|--------------------|
| Cornering Lamp - Right Control | 1               | 1                    | 1                | -                  |
| Cornering Lamp - Left Ground   | -               | 1                    | -                | -                  |
| Cornering Lamp - Right Ground  | -               | 1                    | -                | -                  |
| 1. Cornering Lamps Malfunction |                 |                      |                  |                    |

### Circuit/System Description

The cornering lamps are activated automatically at vehicle speeds below 25 MPH (40 km/h) when the headlamps are ON, the turn signal/multifunction switch is placed in either the left or right turn positions and/or when the steering angle is changed from the straight-ahead position towards the side the vehicle is turning. When the body control module (BCM) detects that one of these operations has occurred, the BCM responds to the cornering lamp request by applying ground to the appropriate cornering lamp relay control circuit which energizes the cornering lamp relay. With the cornering lamp relay energized, the switch contacts close allowing battery voltage to flow through the cornering lamp fuse to the cornering lamp control circuit illuminating the appropriate cornering lamp in the area that the vehicle is turning. The cornering lamps are deactivated automatically when the turn signal/multifunction switch is placed in the neutral position and/or the steering angle has returned in the straight-ahead position. The cornering lamps will not operate at vehicle speeds above 25 MPH (40 km/h).

### Conditions for Running the DTC

- Battery voltage must be between 9-16 V.
- Headlamps ON.
- Cornering lamp ON.

### Conditions for Setting the DTC

#### DTC B2590 01

The BCM detects a short to voltage in the left cornering lamp relay control circuit.

#### DTC B2590 02

The BCM detects a short to ground in the left cornering lamp relay control circuit.

#### DTC B2590 04

The BCM detects an open/high resistance in the left cornering lamp relay control circuit.

#### DTC B2595 01

The BCM detects a short to voltage in the right cornering lamp relay control circuit.

#### DTC B2595 02

The BCM detects a short to ground in the right cornering lamp relay control circuit.

#### DTC B2595 04

The BCM detects an open/high resistance in the right cornering lamp relay control circuit.

### Actions Taken When the DTC Sets

The BCM will not illuminate the affected cornering lamp.

### 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

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Scan Tool Reference

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

## Circuit/System Testing

### DTC B2590

1. Ignition OFF/vehicle OFF, disconnect the X5 harness connector at the K9 Body Control Module, ignition ON/vehicle in Service Mode.
2. Verify a test lamp illuminates between the control circuit terminal 10 and ground.
  - **If the test lamp does not illuminate**
    1. Ignition OFF/vehicle OFF, disconnect the X1 harness connector at the X50A Fuse Block - Underhood.
    2. Test for infinite resistance between the control circuit terminal 10 and ground.
      - If less than infinite resistance, repair the short to ground on the circuit.
      - If infinite resistance
    3. Test for less than 2  $\Omega$  in the control circuit end to end.
      - If 2  $\Omega$  or greater, repair the open/high resistance in the circuit.
      - If less than 2  $\Omega$ , replace the X50A Fuse Block - Underhood.
  - **If the test lamp illuminates**
3. Ignition OFF/vehicle OFF, connect a 3 A fused jumper between the control circuit terminal 10 and ground, ignition ON/vehicle in Service Mode, low beams ON.
4. Verify the E4A Cornering Lamp - Left illuminates.
  - **If the E4A Cornering Lamp - Left does not illuminate**
    1. Ignition OFF/vehicle OFF, disconnect the X1 harness connector at the X50A Fuse Block - Underhood, ignition ON/vehicle in Service Mode.
    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 E4A Cornering Lamp - Left illuminates**
5. Replace the K9 Body Control Module.

### DTC B2595

1. Ignition OFF/vehicle OFF, disconnect the X5 harness connector at the K9 Body Control Module, ignition ON/vehicle in Service Mode.
2. Verify a test lamp illuminates between the control circuit terminal 23 and ground.
  - **If the test lamp does not illuminate**
    1. Ignition OFF/vehicle OFF, disconnect the X1 harness connector at the X50A Fuse Block - Underhood.
    2. Test for infinite resistance between the control circuit terminal 23 and ground.
      - If less than infinite resistance, repair the short to ground on the circuit.
      - If infinite resistance
    3. Test for less than 2  $\Omega$  in the control circuit end to end.
      - If 2  $\Omega$  or greater, repair the open/high resistance in the circuit.
      - If less than 2  $\Omega$ , replace the X50A Fuse Block - Underhood.
  - **If the test lamp illuminates**
3. Ignition OFF/vehicle OFF, connect a 3 A fused jumper between the control circuit terminal 23 and ground, ignition ON/vehicle in Service Mode, low beams ON.
4. Verify the E4B Cornering Lamp - Right illuminates.
  - **If the E4B Cornering Lamp - Right does not illuminate**
    1. Ignition OFF/vehicle OFF, disconnect the X1 harness connector at the X50A Fuse Block - Underhood, ignition ON/vehicle in Service Mode.
    2. Test for less than 1 V between the control circuit terminal 23 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 E4B Cornering Lamp - Right illuminates**
5. Replace the K9 Body Control Module.

### Repair Instructions

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

- [Relay Replacement \(Attached to Wire Harness\)](#) [Relay Replacement \(Within an Electrical Center\)](#)
- [Control Module References](#) for BCM replacement, programming and setup.

## DTC B25F8 OR B25F9: AUXILIARY DAYTIME RUNNING LAMPS RELAY CONTROL CIRCUIT

### 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 B25F8 01

Auxiliary Daytime Running Lamps Relay Control Circuit Short to Battery

#### DTC B25F8 02

Auxiliary Daytime Running Lamps Relay Control Circuit Short to Ground

#### DTC B25F8 04

Auxiliary Daytime Running Lamps Relay Control Circuit Open

### Diagnostic Fault Information

| Circuit                              | Short to Ground | Open/High Resistance | Short to Voltage   | Signal Performance |
|--------------------------------------|-----------------|----------------------|--------------------|--------------------|
| Daytime Running Lamps Relay Control  | B25F8 02        | B25F8 01, B25F8 04   | B25F8 01, B25F8 04 | -                  |
| Daytime Running Lamp Control - Left  | 1               | 1                    | 1                  | -                  |
| Daytime Running Lamp Control - Right | 1               | 1                    | 1                  | -                  |
| Headlamp Ground - Left               | -               | 1                    | -                  | -                  |
| Headlamp Ground - Right              | -               | 1                    | -                  | -                  |
| 1. Headlamp Leveling Malfunction     |                 |                      |                    |                    |

### Circuit/System Description

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 V depending on outside lighting conditions. The body control module (BCM) provides a 5 V 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 lamps or automatic lamp control when the headlamp switch is in the AUTO position. In daylight conditions the BCM responds to the daytime running lamps request by applying ground to the headlamp relay control circuit which energizes the headlamp relay. With the headlamp relay energized, the switch contacts close allowing battery voltage to flow through the 3 PIN headlamp fuse to the left and right headlamp control modules located in each headlamp assembly.

### Conditions for Running the DTC

- Battery voltage must be between 9-16 V.
- Headlamps ON.

### Conditions for Setting the DTC

#### DTC B25F8 01

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

#### DTC B25F8 02

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

#### DTC B25F8 04

The BCM detects an open/high resistance in the headlamp relay control circuit.

### Actions Taken When the DTC Sets

The daytime running 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

### Headlights/Daytime Running Lights (DRL) Schematics

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- [Wiring Repairs](#)

Scan Tool Reference

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

### Circuit/System Testing

1. Ignition OFF/Vehicle OFF, disconnect the KR50 Headlamp Relay.
2. Connect a test lamp between the control circuit terminal 85 and B+, ignition ON/vehicle in Service Mode.
3. Verify the test lamp turns ON and OFF when commanding the Headlamp Relay Control ON and OFF with a scan tool.
  - **If the test lamp is always OFF**
    1. Ignition OFF/Vehicle OFF, disconnect the X5 harness connector at the K9 Body Control Module, ignition ON/vehicle in Service Mode.
    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/Vehicle OFF.
    4. Test for less than 2  $\Omega$  in the control circuit end to end.
      - If 2  $\Omega$  or greater, repair the open/high resistance in the circuit.
      - If less than 2  $\Omega$ , replace the K9 Body Control Module.
  - **If the test lamp is always ON**
    1. Ignition OFF/Vehicle 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 KR50 Headlamp Relay.

### Repair Instructions

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

- [Relay Replacement \(Attached to Wire Harness\)](#) [Relay Replacement \(Within an Electrical Center\)](#)
- [Control Module References](#) for BCM replacement, programming and setup.

## **DTC B260D OR B260E: LEFT/RIGHT DAYTIME RUNNING LAMP AND FRONT PARK LAMP CONTROL CIRCUIT**

### 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 B260D 02

Left Daytime Running Lamp and Front Park Lamp Control Circuit Short to Ground

### DTC B260E 02

Right Daytime Running Lamp and Front Park Lamp Control Circuit Short to Ground

## Diagnostic Fault Information

| Circuit                                        | Short to Ground | Open/High Resistance | Short to Voltage | Signal Performance |
|------------------------------------------------|-----------------|----------------------|------------------|--------------------|
| Daytime Running Lamp/Park Lamp Control - Left  | B260D 02        | 1                    | 1                | -                  |
| Daytime Running Lamp/Park Lamp Control - Right | B260E 02        | 1                    | 1                | -                  |
| Headlamp Assembly Ground - Left                | -               | 1                    | -                | -                  |
| Headlamp Assembly Ground - Right               | -               | 1                    | -                | -                  |
| 1. Daytime Running Lamps Malfunction           |                 |                      |                  |                    |

## Circuit/System Description

### With CE1

The rain/ambient light sensor module is used to monitor outside lighting conditions. The rain/ambient light sensor module provides a serial data message to the body control module (BCM) based on outside lighting conditions to determine if outside lighting conditions are correct for either daytime running lights or automatic lamp control when the headlamp switch is in the AUTO position. In daylight conditions the BCM will command the designated daytime running lights 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 daytime running lights operation.

### Without CE1

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 V depending on outside lighting conditions. The body control module (BCM) provides a 5 V 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 or automatic lamp control when the headlamp switch is in the AUTO position. In daylight conditions the BCM will command the designated daytime running lights 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 daytime running lights operation.

## Conditions for Running the DTC

Battery voltage must be between 9-16 V.

## Conditions for Setting the DTC

### DTC B260D 02

The BCM detects a short to ground in the left daytime running lamp control circuit.

## **DTC B260E 02**

The BCM detects a short to ground in the right daytime running lamp control circuit.

### **Actions Taken When the DTC Sets**

## **DTC B260D 02**

The left daytime running lamp is inoperative.

## **DTC B260E 02**

The right daytime running lamp is 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

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- [Wiring Repairs](#)

Scan Tool Reference

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

### **Circuit/System Testing**

1. Ignition OFF/Vehicle OFF, exterior lamps OFF, disconnect the harness connector at the appropriate E13 Headlamp Assembly. It may take up to 2 min for all vehicle systems to power down.
2. Test for less than 15  $\Omega$  between each ground circuit at terminal 1 and terminal 4 and ground.
  - **If 15  $\Omega$  or greater**
    1. Ignition OFF/Vehicle OFF.
    2. Test for less than 2  $\Omega$  in the ground circuit end to end.
      - If 2  $\Omega$  or greater, repair the open/high resistance in the circuit.
      - If less than 2  $\Omega$ , repair the open/high resistance in the ground connection.
  - **If less than 15  $\Omega$**
3. Connect a test lamp between the control circuit terminal 7 and ground, ignition ON/vehicle in Service Mode.
4. Verify the test lamp turns ON and OFF when commanding the appropriate Front Park Lamp/Daytime Running Lamp ON and OFF with a scan tool.

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

1. Ignition OFF/Vehicle OFF, disconnect the appropriate harness connector listed below at the K9 Body Control Module.
  - X4 - left daytime running lamp
  - X5 - right daytime running 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  $\Omega$  in the control circuit end to end.
  - If 2  $\Omega$  or greater, repair the open/high resistance in the circuit.
  - If less than 2  $\Omega$ , replace the K9 Body Control Module.

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

1. Ignition OFF/Vehicle OFF, disconnect the appropriate harness connector listed below at the K9 Body Control Module, ignition ON/vehicle in Service Mode.
  - X4 - left daytime running lamp
  - X5 - right daytime running 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 E13 Headlamp Assembly.

### Repair Instructions

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

- [Headlamp Replacement](#)
- [Control Module References](#) for BCM replacement, programming and setup.

## DTC B2610: PASSENGER COMPARTMENT DIMMING 1 CIRCUIT

### 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 B2610 02

Passenger Compartment Dimming 1 Circuit Short to Ground

#### DTC B2610 04

Passenger Compartment Dimming 1 Circuit Open

### Diagnostic Fault Information

| Circuit                                     | Short to Ground | Open/High Resistance | Short to Voltage | Signal Performance |
|---------------------------------------------|-----------------|----------------------|------------------|--------------------|
| LED Backlight Dimming Control Terminal 8 X2 | B2610 02        | B2610 04             | B2610 04         | -                  |
| LED Backlight Dimming Control Terminal 9 X7 | B2610 02        | B2610 04             | B2610 04         | -                  |

| Circuit                                               | Short to Ground | Open/High Resistance | Short to Voltage | Signal Performance |
|-------------------------------------------------------|-----------------|----------------------|------------------|--------------------|
| Cigarette Light Receptacle - Rear Ground              | -               | 1                    | -                | -                  |
| Dome/Reading Lamps - Left Front Ground                | -               | 1                    | -                | -                  |
| Dome/Reading Lamps - Left Rear Ground                 | -               | 1                    | -                | -                  |
| Dome/Reading Lamps - Right Front Ground               | -               | 1                    | -                | -                  |
| Dome/Reading Lamps - Right Rear Ground                | -               | 1                    | -                | -                  |
| Door Lock Switch - Driver Ground                      | -               | 1                    | -                | -                  |
| Door Lock Switch - Passenger Ground                   | -               | 1                    | -                | -                  |
| Garage Door Opener Ground                             | -               | 1                    | -                | -                  |
| Head - Up Display Switch Ground                       | -               | 1                    | -                | -                  |
| Ignition Mode Switch Ground                           | -               | 1                    | -                | -                  |
| Infotainment Control Touchpad Ground                  | -               | 1                    | -                | -                  |
| Instrument Panel Dimmer Switch Ground                 | -               | 1                    | -                | -                  |
| Liftgate Unlatch Switch - Ground                      | -               | 1                    | -                | -                  |
| Multifunction Switch - Center Console Ground          | -               | 1                    | -                | -                  |
| Multifunction Switch - Overhead Console Ground        | -               | 1                    | -                | -                  |
| Park Brake Control Switch Ground                      | -               | 1                    | -                | -                  |
| Rear Compartment Lid Unlatch Switch - Interior Ground | -               | 1                    | -                | -                  |
| Seat Adjuster Switch - Driver Ground                  | -               | 1                    | -                | -                  |
| Seat Adjuster Switch - Passenger Ground               | -               | 1                    | -                | -                  |
| Seat Adjuster Switch - Left Rear Ground               | -               | 1                    | -                | -                  |
| Seat Adjuster Switch - Right Rear Ground              | -               | 1                    | -                | -                  |
| Seat Memory Switch - Driver Ground                    | -               | 1                    | -                | -                  |
| Seat Memory Switch - Passenger Ground                 | -               | 1                    | -                | -                  |



| Circuit                              | Short to Ground | Open/High Resistance | Short to Voltage | Signal Performance |
|--------------------------------------|-----------------|----------------------|------------------|--------------------|
| Sunshade Switch - Left Rear Ground   | -               | 1                    | -                | -                  |
| Sunshade Switch - Right Rear Ground  | -               | 1                    | -                | -                  |
| Window Switch - Passenger Ground     | -               | 1                    | -                | -                  |
| Window Switch - Left Rear Ground     | -               | 1                    | -                | -                  |
| Window Switch - Right Rear Ground    | -               | 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 a low reference, signal and B+ voltage reference 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 voltage through the LED dimming 1 and dimming 2 control circuits illuminating the interior backlighting to the requested level of brightness. The BCM also sends a serial data message to the following components requesting there backlighting be adjusted to the level selected by the instrument panel dimmer switch:

- Info Display Module
- Instrument Cluster
- Mirror Control Module
- Steering Wheel Controls Switch - Right
- Steering Wheel Controls Switch - Left
- Transmission Shift Lever Position Indicator
- Window Switch - Driver

### Conditions for Running the DTC

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

### Conditions for Setting the DTC

#### DTC B2610 02

The BCM detects a short to ground in the LED backlight dimming control 1 circuit terminal 8 X2 or LED backlight dimming control 2 circuit terminal 9 X7.

#### DTC B2610 04

The BCM detects a short to voltage or an open/high resistance in the LED backlight dimming control 1 circuit terminal 8 X2 or LED backlight dimming control 2 circuit terminal 9 X7.

### Actions Taken When the DTC Sets

The BCM will disable the LED backlight dimming control circuits.

### Conditions for Clearing the DTC

- The condition responsible for setting the DTC no longer exists.

- Turn ignition OFF, open and close drivers door, wait 1 min.
- A history DTC will clear once 100 consecutive malfunction-free ignition cycles have occurred.

## Reference Information

Schematic Reference

## Interior Lights Dimming Schematics

Connector End View Reference

## COMPONENT CONNECTOR END VIEWS - INDEX

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/Vehicle OFF, scan tool disconnected, all doors closed, all accessories OFF, open and close drivers door, disconnect the harness connector at the component with inoperative backlighting. It may take up to 2 min for all vehicle systems to power down.

**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
2. Test for less than 10  $\Omega$  between the appropriate ground circuit terminal and ground.
    - **If 10  $\Omega$  or greater**
      1. Ignition OFF/Vehicle OFF.
      2. Test for less than 2  $\Omega$  in the ground circuit end to end.
        - If 2  $\Omega$  or greater, repair the open/high resistance in the circuit.
        - If less than 2  $\Omega$ , repair the open/high resistance in the ground connection.
    - **If less than 10  $\Omega$**
  3. Connect a test lamp between the appropriate control circuit terminal and ground, ignition ON/vehicle in Service Mode.
  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/Vehicle OFF, disconnect the appropriate harness connector listed below at the K9 Body Control Module.
        - X2 terminal 8
        - X7 terminal 9

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  $\Omega$  in the control circuit end to end.
  - If 2  $\Omega$  or greater, repair the open/high resistance in the circuit.
  - If less than 2  $\Omega$ , replace the K9 Body Control Module.
- **If the test lamp is always ON**
  1. Ignition OFF/Vehicle OFF, disconnect the appropriate harness connector listed below at the K9 Body Control Module, ignition ON/vehicle in Service Mode.
    - X2 terminal 8
    - X7 terminal 9
  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.

- **Interior Lamp Switch Replacement**
- **Dimmer Switch Replacement**
- **Roof Rail Rear Seat Position Reading and Courtesy Lamp Replacement**
- **Door Lock Switch Replacement - Driver Side**
- **Door Lock Switch Replacement - Passenger Front**
- **Outside Rearview Mirror Remote Control Switch Replacement**
- **Ignition and Start Switch Replacement**
- **Steering Wheel Spoke Cover Replacement**
- **Control Module References** for BCM replacement, programming and setup

## DTC B2615: PASSENGER COMPARTMENT DIMMING 2 CIRCUIT

### 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 B2615 02

Passenger Compartment Dimming 2 Circuit Short to Ground

### Diagnostic Fault Information

| Circuit                                   | Short to Ground | Open/High Resistance | Short to Voltage | Signal Performance |
|-------------------------------------------|-----------------|----------------------|------------------|--------------------|
| Dome/Courtesy Lamps Control Terminal 1 X7 | B2615 02        | 1                    | 1                | -                  |
| Dome/Courtesy Lamps Control Terminal 5 X2 | B2615 02        | 1                    | 1                | -                  |
| Dome/Reading Lamps - Left Front Ground    | -               | 1                    | -                | -                  |

| Circuit                                        | Short to Ground | Open/High Resistance | Short to Voltage | Signal Performance |
|------------------------------------------------|-----------------|----------------------|------------------|--------------------|
| Dome/Reading Lamps - Left Rear Ground          | -               | 1                    | -                | -                  |
| Dome/Reading Lamps - Right Front Ground        | -               | 1                    | -                | -                  |
| Dome/Reading Lamps - Right Rear Ground         | -               | 1                    | -                | -                  |
| Door Courtesy Lamp - Driver Ground             | -               | 1                    | -                | -                  |
| Door Courtesy Lamp - Passenger Ground          | -               | 1                    | -                | -                  |
| Door Courtesy Lamp - Left Rear Ground          | -               | 1                    | -                | -                  |
| Door Courtesy Lamp - Right Rear Ground         | -               | 1                    | -                | -                  |
| Door Sill Plate Lamp - Driver Ground           | -               | 1                    | -                | -                  |
| Door Sill Plate Lamp - Passenger Ground        | -               | 1                    | -                | -                  |
| Door Sill Plate Lamp - Left Rear Ground        | -               | 1                    | -                | -                  |
| Door Sill Plate Lamp - Right Rear Ground       | -               | 1                    | -                | -                  |
| Floor Courtesy Lamp - Left Front Inner Ground  | -               | 1                    | -                | -                  |
| Floor Courtesy Lamp - Right Front Inner Ground | -               | 1                    | -                | -                  |
| Floor Courtesy Lamp - Left Front Outer Ground  | -               | 1                    | -                | -                  |
| Floor Courtesy Lamp - Left Rear Ground         | -               | 1                    | -                | -                  |
| Floor Courtesy Lamp - Right Rear Ground        | -               | 1                    | -                | -                  |
| 1. Dome Lamps Malfunction                      |                 |                      |                  |                    |

### Circuit/System Description

The body control module (BCM) applies battery voltage to the interior courtesy lamps through the dome/courtesy lamps control circuits at terminal 1 X7 and terminal 5 X2. When any door is opened, the jam switch contacts close and the BCM receives a door-ajar input. If the BCM receives a door lock or unlock input or a rear hatch open input, the BCM will activate the dome/courtesy lamps control circuit terminal 1 X7 and terminal 5 X2, providing battery voltage to all courtesy lamps supplied by the circuits. 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, the BCM will deactivate the courtesy lamp control circuits to prevent total battery discharge.

### Conditions for Running the DTC

Battery voltage must be between 9-16 V.

### Conditions for Setting the DTC

The BCM detects a short to ground in the dome/courtesy lamps control circuit terminal 1 X7 or terminal 5 X2.

### Actions Taken When the DTC Sets



The BCM will disable the dome lamps control circuits terminal 1 X7 and terminal 5 X2.

### **Conditions for Clearing the DTC**

- The condition responsible for setting the DTC no longer exists.
- Disconnect the negative battery cable for 30 s.
- A history DTC will clear once 100 consecutive malfunction-free ignition cycles have occurred.

### **Reference Information**

Schematic Reference

### **Interior Lights Schematics**

Connector End View Reference

### **COMPONENT CONNECTOR END VIEWS - INDEX**

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/Vehicle OFF, scan tool disconnected, all doors closed, all accessories OFF, open and close drivers door, disconnect the harness connector at the component with inoperative dome/courtesy lamp. It may take up to 2 min for all vehicle systems to power down.

**NOTE:** Each lighting component may need to be disconnected to isolate a short to ground. Use the schematics to identify the following:

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

2. Test for less than 10  $\Omega$  between the appropriate ground circuit terminal listed below and ground.

- E8A Door Sill Plate Lamp - Driver terminal 2 (with B7G)
- E8B Door Sill Plate Lamp - Passenger terminal 2 (with B7G)
- E8D Door Courtesy Lamp - Driver terminal 2
- E8P Door Courtesy Lamp - Passenger terminal 2
- E8Q Door Sill Plate Lamp - Left Rear terminal 2 (with B7G)
- E8R Door Sill Plate Lamp - Right Rear terminal 2 (with B7G)
- E8LR Door Courtesy Lamp - Left Rear terminal 2
- E8RR Door Courtesy Lamp - Right Rear terminal 2
- E8VB Floor Courtesy Lamp - Left Rear terminal 2
- E8VD Floor Courtesy Lamp - Right Rear terminal 2
- E8 Floor Courtesy Lamp - Left Front Outer terminal 2
- E8 Floor Courtesy Lamp - Left Front Inner terminal 2

- E8 Floor Courtesy Lamp - Right Front Outer terminal 2
- E8 Floor Courtesy Lamp - Right Front Inner terminal 2
- E37LF Dome/Reading Lamps - Left Front terminal 1
- E37RF Dome/Reading Lamps - Right Front terminal 1
- E37LR Dome/Reading Lamps - Left Rear terminal 6
- E37RR Dome/Reading Lamps - Right Rear terminal 6
- **If 10  $\Omega$  or greater**

1. Ignition OFF/Vehicle OFF.

2. Test for less than 2  $\Omega$  in the ground circuit end to end.

- If 2  $\Omega$  or greater, repair the open/high resistance in the circuit.
- If less than 2  $\Omega$ , repair the open/high resistance in the ground connection.

- **If less than 10  $\Omega$**

3. Connect a test lamp between the appropriate control circuit terminal listed below and ground, ignition ON/vehicle in Service Mode.

- E8A Door Sill Plate Lamp - Driver terminal 1 (with B7G)
- E8B Door Sill Plate Lamp - Passenger terminal 1 (with B7G)
- E8D Door Courtesy Lamp - Driver terminal 1 (with B7G)
- E8P Door Courtesy Lamp - Passenger terminal 1 (with B7G)
- E8Q Door Sill Plate Lamp - Left Rear terminal 1 (with B7G)
- E8R Door Sill Plate Lamp - Right Rear terminal 1 (with B7G)
- E8LR Door Courtesy Lamp - Left Rear terminal 1
- E8RR Door Courtesy Lamp - Right Rear terminal 1
- E8VB Floor Courtesy Lamp - Left Rear terminal 1
- E8VD Floor Courtesy Lamp - Right Rear terminal 1
- E8 Floor Courtesy Lamp - Left Front Outer terminal 1
- E8 Floor Courtesy Lamp - Left Front Inner terminal 1
- E8 Floor Courtesy Lamp - Right Front Outer terminal 1
- E8 Floor Courtesy Lamp - Right Front Inner terminal 1
- E37LF Dome/Reading Lamps - Left Front terminal 3
- E37RF Dome/Reading Lamps - Right Front terminal 3
- E37LR Dome/Reading Lamps - Left Rear terminal 2
- E37RR Dome/Reading Lamps - Right Rear terminal 2

4. 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/Vehicle OFF, disconnect the appropriate harness connector listed below at the K9 Body Control Module.

- X2
- X7

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  $\Omega$  in the control circuit end to end.

- If 2  $\Omega$  or greater, repair the open/high resistance in the circuit.
- If less than 2  $\Omega$ , replace the K9 Body Control Module.

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

1. Ignition OFF/Vehicle OFF, disconnect the appropriate harness connector listed below at the K9 Body Control Module, ignition ON/vehicle in Service Mode.

- X2

- X7
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 dome/courtesy lamp.

### Repair Instructions

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

- [Front Side Door Courtesy Lamp Replacement](#)
- [Roof Rail Rear Seat Position Reading and Courtesy Lamp Replacement](#)
- [Center Reading and Courtesy Lamp Replacement](#)
- [Front Floor Courtesy Lamp Replacement \(Left Side\) Front Floor Courtesy Lamp Replacement \(Right Side\)](#)
- [Control Module References](#) for BCM replacement, programming and setup.

## DTC B2625: DISPLAY DIMMING PULSE WIDTH MODULATION OUTPUT CIRCUIT

### 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 B2625 01

Display Dimming Pulse Width Modulation Output Circuit Short to Battery

#### DTC B2625 02

Display Dimming Pulse Width Modulation Output Circuit Short to Ground

#### DTC B2625 04

Display Dimming Pulse Width Modulation Output Circuit Open

### Diagnostic Fault Information

| Circuit                                                      | Short to Ground | Open/High Resistance | Short to Voltage   | Signal Performance |
|--------------------------------------------------------------|-----------------|----------------------|--------------------|--------------------|
| Switch Indicator LED Backlight Dimming Control Terminal 5 X1 | B2625 02        | B2625 04             | B2625 01           | -                  |
| Lane Departure Switch Amber Indicator Control                | 1               | B0987 06, B0987 0B   | B0987 06, B0987 0B | -                  |
| Park Assist Switch Amber Indicator Control                   | B0968 06        | B0968 06, B0968 0B   | B0968 06, B0968 0B | -                  |
| Multifunction Switch 1 - Instrument Panel Ground             | -               | 1                    | -                  | -                  |
| Multifunction Switch 2 - Instrument Panel Ground             | -               | 2                    | -                  | -                  |

| Circuit                                                                                       | Short to Ground | Open/High Resistance | Short to Voltage | Signal Performance |
|-----------------------------------------------------------------------------------------------|-----------------|----------------------|------------------|--------------------|
| 1. Lane Departure Switch Indicator Malfunction<br>2. Park Assist Switch Indicator 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 a low reference, signal and B+ voltage reference 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 voltage through the LED dimming 1 and dimming 2 control circuits illuminating the interior backlighting to the requested level of brightness. The backlighting for the switch indicators listed below are controlled by the Switch Indicator LED Backlight Dimming Control Terminal 5 X1.

- Dome Lamp Defeat Switch Indicator
- Lane Departure Switch
- Park Assist Switch

### Conditions for Running the DTC

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

### Conditions for Setting the DTC

#### DTC B2625 01

The BCM detects a short to voltage in the switch indicator LED backlight dimming control circuit terminal 5 X1.

#### DTC B2625 02

The BCM detects a short to ground in the switch indicator LED backlight dimming control circuit terminal 5 X1.

#### DTC B2625 04

The BCM detects an open/high resistance in the switch indicator LED backlight dimming control circuit terminal 5 X1.

### Actions Taken When the DTC Sets

The switch indicator LED backlight dimming control circuit driver is shut down.

### Conditions for Clearing the DTC

- The condition responsible for setting the DTC no longer exists.
- Disconnect the negative battery cable for 30 s.
- A history DTC will clear once 100 consecutive malfunction-free ignition cycles have occurred.

### Reference Information

Schematic Reference

### Interior Lights Dimming Schematics

Connector End View Reference



### 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/Vehicle OFF, disconnect the harness connectors at the components listed below.
  - S48B Multifunction Switch - Overhead Console
  - S48C Multifunction Switch 1 - Instrument Panel
  - S48D Multifunction Switch 2 - Instrument Panel
2. Ignition ON/vehicle in Service Mode, place the S36 Instrument Panel Dimmer Switch in the HIGH position for high backlighting intensity.
3. Verify a test lamp illuminates between each control circuit terminal listed below and ground.

**NOTE:**      **The test lamp in the following step will illuminate at LOW intensity. This is normal circuit operation and does not indicate a circuit malfunction.**

- S48B Multifunction Switch - Overhead Console terminal 5
  - S48C Multifunction Switch 1 - Instrument Panel terminal 2
  - S48D Multifunction Switch 2 - Instrument Panel terminal 8
  - **If the test lamp does not illuminate**
    1. Ignition OFF/Vehicle 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  $\Omega$  in the control circuit end to end.
      - If 2  $\Omega$  or greater, repair the open/high resistance in the circuit.
      - If less than 2  $\Omega$ , replace the K9 Body Control Module.
  - **If the test lamp illuminates**
4. Place the S36 Instrument Panel Dimmer Switch in the LOW position for low backlighting intensity.
  5. Verify a test lamp does not illuminate at FULL intensity between each control circuit terminal listed below and ground.
    - S48B Multifunction Switch - Overhead Console terminal 5
    - S48C Multifunction Switch - Instrument Panel terminal 2
    - S48D Multifunction Switch 2 - Instrument Panel terminal 8
  - **If the test lamp illuminates at full intensity**
    1. Ignition OFF/Vehicle OFF, disconnect the X1 harness connector at the K9 Body Control Module, ignition ON/vehicle in Service Mode.
    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 does not illuminate at full intensity**
6. Test or replace the appropriate S48 Multifunction Switch.

### Repair Instructions

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

- [Interior Lamp Switch Replacement](#)
- [Control Module References](#) for BCM replacement, programming and setup

## DTC B263A: EXTERIOR ILLUMINATION LAMP CIRCUIT

### 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 B263A 02

Exterior Illumination Lamp Circuit Short to Ground

#### DTC B263A 04

Exterior Illumination Lamp Circuit Open

### Diagnostic Fault Information

| Circuit                                           | Short to Ground | Open/High Resistance | Short to Voltage | Signal Performance |
|---------------------------------------------------|-----------------|----------------------|------------------|--------------------|
| Exterior Courtesy Lamps Control - Terminal 7 X3   | B263A 02        | B263A 04             | 1                | -                  |
| Door Handle Assembly - Driver Exterior Ground     | -               | 1                    | -                | -                  |
| Door Handle Assembly - Left Rear Exterior Ground  | -               | 1                    | -                | -                  |
| Door Handle Assembly - Passenger Exterior Ground  | -               | 1                    | -                | -                  |
| Door Handle Assembly - Right Rear Exterior Ground | -               | 1                    | -                | -                  |
| Outside Rearview Mirror - Driver Ground           | -               | 1                    | -                | -                  |
| Outside Rearview Mirror - Passenger Ground        | -               | 1                    | -                | -                  |
| 1. Exterior Courtesy Lamps Malfunction            |                 |                      |                  |                    |

### Circuit/System Description

The body control module (BCM) supplies battery voltage to each exterior door handle LED backlighting and the LED lighting located under each outside rearview mirror for approach lighting. When the

keyless entry transmitter is operated to the lock/unlock functions the exterior door handle LED's and the LED lighting located under each outside rearview mirror for approach lighting are commanded ON.

### Conditions for Running the DTC

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

### Conditions for Setting the DTC

#### DTC B263A 02

The BCM detects a short to ground in the exterior courtesy lamps control circuit terminal 7 X3.

#### DTC B263A 04

The BCM detects an open/high resistance in the exterior courtesy lamps control circuit terminal 7 X3.

### Actions Taken When the DTC Sets

The BCM will disable the exterior courtesy lamps control circuit.

### 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 - INDEX

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/Vehicle OFF, scan tool disconnected, all doors closed, all accessories OFF, open and close drivers door, disconnect the harness connector at the inoperative exterior courtesy lamp listed below. It may take up to 2 min for all vehicle systems to power down.

**NOTE:** Each component may need to be disconnected to isolate a short to voltage, short to ground or an open/high resistance. Use the schematics to identify the following:

- Exterior courtesy lamps the vehicle is equipped with
- Each component's control and ground circuit terminals

- **Component locations on the exterior courtesy lamps control circuit**

- A9A Outside Rearview Mirror - Driver
  - A9B Outside Rearview Mirror - Passenger
  - A24D Door Handle Assembly - Driver Exterior
  - A24P Door Handle Assembly - Passenger Exterior
  - A24LR Door Handle Assembly - Left Rear Exterior
  - A24RR Door Handle Assembly - Right Rear Exterior
2. Test for less than 10  $\Omega$  between the appropriate ground circuit terminal listed below and ground.
    - A9A Outside Rearview Mirror - Driver terminal 8
    - A9B Outside Rearview Mirror - Passenger terminal 8
    - A24D Door Handle Assembly - Driver Exterior terminal 5
    - A24P Door Handle Assembly - Passenger Exterior terminal 5
    - A24LR Door Handle Assembly - Left Rear Exterior terminal 5
    - A24RR Door Handle Assembly - Right Rear Exterior terminal 5
    - **If 10  $\Omega$  or greater**
      1. Ignition OFF/Vehicle OFF.
      2. Test for less than 2  $\Omega$  in the ground circuit end to end.
        - If 2  $\Omega$  or greater, repair the open/high resistance in the circuit.
        - If less than 2  $\Omega$ , repair the open/high resistance in the ground connection.
      - **If less than 10  $\Omega$**
  3. Connect a test lamp between the appropriate control circuit terminal listed below and ground, ignition ON/vehicle in Service Mode.
    - A9A Outside Rearview Mirror - Driver terminal 1
    - A9B Outside Rearview Mirror - Passenger terminal 1
    - A24D Door Handle Assembly - Driver Exterior terminal 3
    - A24P Door Handle Assembly - Passenger Exterior terminal 3
    - A24LR Door Handle Assembly - Left Rear Exterior terminal 3
    - A24RR Door Handle Assembly - Right Rear Exterior terminal 3
  4. Verify the test lamp turns ON and OFF when commanding the Outside Rear View Mirror Courtesy Lamp ON and OFF with a scan tool.
    - **If the test lamp is always OFF**
      1. Ignition OFF/Vehicle OFF, disconnect the X3 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  $\Omega$  in the control circuit end to end.
        - If 2  $\Omega$  or greater, repair the open/high resistance in the circuit.
        - If less than 2  $\Omega$ , replace the K9 Body Control Module.
      - **If the test lamp is always ON**
        1. Ignition OFF/Vehicle OFF, disconnect the X3 harness connector at the K9 Body Control Module, ignition ON/vehicle in Service Mode.
        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 exterior courtesy lamp.



## Repair Instructions

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

- [Exterior Flood Lamp Replacement](#)
- [Control Module References](#) for BCM replacement, programming and setup

## DTC B2645: AMBIENT LIGHT SENSOR CIRCUIT

### 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 |
|--------------------------------------|-----------------|-------------------------------|------------------|--------------------|
| Ambient Light Sensor Signal          | B2645 03        | B2645 07                      | B2645 07         | -                  |
| Ambient Light Sensor Low Reference   | 1               | B2645 07, B0163 05, B0183 05, | 1                | -                  |
| 1. Daytime Running Lamps Malfunction |                 |                               |                  |                    |

### Circuit/System Description

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 V depending on outside lighting conditions. The body control module (BCM) provides a 5 V 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 lamps or automatic lamp control when the headlamp switch is in the AUTO position. In daylight conditions the BCM will command the daytime running lamps 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 daytime running lamps 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 - INDEX**

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/Vehicle OFF, scan tool disconnected, all doors closed, all accessories OFF, open and close drivers door, disconnect the harness connector at the B10B Ambient Light/Sunload Sensor. It may take up to 10 min for all vehicle systems to power down.
2. Test for less than 10  $\Omega$  between the low reference circuit terminal 6 and ground.
  - **If 10  $\Omega$  or greater**
    1. Ignition OFF/Vehicle OFF, disconnect the X2 harness connector at the K33 HVAC Control Module.
    2. Test for less than 2  $\Omega$  in the low reference circuit end to end.
      - If 2  $\Omega$  or greater, repair the open/high resistance in the circuit.
      - If less than 2  $\Omega$ , replace the K33 HVAC control module.
  - **If less than 10  $\Omega$**
3. Ignition ON/vehicle in Service Mode.
4. Verify the scan tool Ambient Light Sensor parameter is greater than 4.65 V.
  - **If 4.65 V or less**
    1. Ignition OFF/Vehicle OFF, disconnect the X2 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 greater than 4.65 V**

5. Install a 3 A fused jumper wire between the signal circuit terminal 3 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/Vehicle OFF, disconnect the X2 harness connector at the K9 Body Control Module, ignition ON/vehicle in Service Mode.
    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  $\Omega$  in the signal circuit end to end.
      - If 2  $\Omega$  or greater, repair the open/high resistance in the circuit.
      - If less than 2  $\Omega$ , 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, Ambient Light and Charge Indicator Sensor Replacement](#)
- [Control Module References](#) for BCM or HVAC Control Module replacement, programming and setup

## DTC B3410 OR B3420: HEADLAMP LEVELING CONTROL MODULE FRONT AXLE SENSOR SIGNAL CIRCUIT

### 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 B3410 02

Headlamp Leveling Control Module Front Axle Sensor Signal Circuit Short to Ground

#### DTC B3410 05

Headlamp Leveling Control Module Front Axle Sensor Signal Circuit High Voltage/Open

#### DTC B3410 05A

Headlamp Leveling Control Module Front Axle Sensor Signal Circuit Not Plausible

#### DTC B3410 08

Headlamp Leveling Control Module Front Axle Sensor Signal Circuit Performance - Signal Invalid

#### DTC B3420 02

Headlamp Leveling Control Module Rear Axle Sensor Signal Circuit Short to Ground

#### DTC B3420 05

Headlamp Leveling Control Module Rear Axle Sensor Signal Circuit High Voltage/Open

#### DTC B3420 05A

**DTC B3420 08**

Headlamp Leveling Control Module Rear Axle Sensor Signal Circuit Performance - Signal Invalid

**Diagnostic Fault Information**

| <b>Circuit</b>                                        | <b>Short to Ground</b>                           | <b>Open/High Resistance</b>                      | <b>Short to Voltage</b>                          | <b>Signal Performance</b> |
|-------------------------------------------------------|--------------------------------------------------|--------------------------------------------------|--------------------------------------------------|---------------------------|
| LIN Serial Data - Left Headlamp Leveling Actuator     | U1513 00, U1514 00, U1523 00, U1524 00, B3843 05 | U1513 00, U1514 00, U1523 00, U1524 00, B3843 05 | U1513 00, U1514 00, U1523 00, U1524 00, B3843 05 | -                         |
| LIN Serial Data - Right Headlamp Leveling Actuator    | U1513 00, U1514 00, U1523 00, U1524 00, B3843 05 | U1513 00, U1514 00, U1523 00, U1524 00, B3843 05 | U1513 00, U1514 00, U1523 00, U1524 00, B3843 05 | -                         |
| Headlamp Control Module B+ Fuse (F62 UA)              | U0181 00                                         | U0181 00                                         | -                                                | -                         |
| Headlamp Leveling Actuator - Left B+ Fuse             | U1513 00, U1514 00, U1523 00, U1524 00, B3843 05 | U1513 00, U1514 00, U1523 00, U1524 00, B3843 05 | -                                                | -                         |
| Headlamp Leveling Actuator - Right B+ Fuse            | U1513 00, U1514 00, U1523 00, U1524 00, B3843 05 | U1513 00, U1514 00, U1523 00, U1524 00, B3843 05 | -                                                | -                         |
| Suspension Position Sensor 5 V Reference - Left Front | B3415 02                                         | 1                                                | B3415 01                                         | -                         |
| Suspension Position Sensor 5 V Reference - Left Rear  | B3415 02                                         | 1                                                | B3415 01                                         | -                         |
| Suspension Position Sensor Signal - Left Front        | B3410 06                                         | B3410 06                                         | B3410 01                                         | B3410 08                  |
| Suspension Position Sensor Signal - Left Rear         | B3420 06                                         | B3420 06                                         | B3420 01                                         | B3420 08                  |
| Suspension Position Sensor Low Reference - Left Front | -                                                | 1                                                | -                                                | -                         |
| Suspension Position Sensor Low Reference - Left Rear  | -                                                | 1                                                | -                                                | -                         |
| Headlamp Control Module Ground                        | -                                                | 1                                                | -                                                | -                         |



| Circuit                          | Short to Ground | Open/High Resistance | Short to Voltage | Signal Performance |
|----------------------------------|-----------------|----------------------|------------------|--------------------|
| Headlamp Assembly - Left Ground  | -               | 1                    | -                | -                  |
| Headlamp Assembly - Right Ground | -               | 1                    | -                | -                  |
| 1. Headlamp Leveling Malfunction |                 |                      |                  |                    |

### Circuit/System Description

Each headlamp assembly contains a headlamp leveling motor that is controlled by the headlamp control module. The front and rear suspension position sensors provide the headlamp control module with suspension position information. Each sensor receives a 5 V reference, signal and low reference circuits from the headlamp control module. The sensors are connected to the control arms of the front and rear suspension. As the vehicle travels, the suspension compresses and rebounds moving the suspension position sensor arms. This causes the signal output of the sensor to change. The headlamp control module compares the information from both suspension position sensors and adjusts the headlamp leveling as needed.

### Conditions for Running the DTC

- Battery voltage must be between 9-16 V.
- Engine RUNNING.
- Headlamps ON.

### DTC B3410 02

The headlamp control module detects a short to ground in the front suspension position sensor signal circuit.

### DTC B3410 05

The headlamp control module detects a short to voltage or an open/high resistance in the front suspension position sensor signal circuit.

### DTC B3410 05A

The headlamp control module receives a signal from the front suspension position sensor signal circuit that is missing or not within the normal operating range.

### DTC B3410 08

The headlamp control module receives a signal from the front suspension position sensor signal circuit that is not within the normal operating range.

### DTC B3420 02

The headlamp control module detects a short to ground in the rear suspension position sensor signal circuit.

### DTC B3420 05

The headlamp control module detects a short to voltage or an open/high resistance in the rear suspension position sensor signal circuit.

### DTC B3420 05A

The headlamp control module receives a signal from the rear suspension position sensor signal circuit that is missing or not within the normal operating range.

### DTC B3420 08

The headlamp control module receives a signal from the rear suspension position sensor signal circuit that is not within the normal operating range.

### **Actions Taken When the DTC Sets**

- The headlamp control module disables the headlamp leveling system.
- The driver information center will display "Adaptive Forward Lighting" and "Headlamp Leveling Malfunction".
- On vehicles equipped with both AFL and headlamp leveling, the AFL system will remain active.

### **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.

### **Reference Information**

Schematic Reference

### **Headlights/Daytime Running Lights (DRL) Schematics**

Connector End View Reference

### **COMPONENT CONNECTOR END VIEWS - INDEX**

Description and Operation

### **Exterior Lighting Systems Description and Operation**

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- **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/Vehicle OFF, disconnect the harness connector at the appropriate B51 Suspension Position Sensor, ignition ON/vehicle in Service Mode.
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 harness connector at the K26 Headlamp Control Module.
    2. Test for less than 2  $\Omega$  in the low reference circuit end to end.
      - If 2  $\Omega$  or greater, repair the open/high resistance in the circuit.
      - If less than 2  $\Omega$ , replace the K26 Headlamp 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 1 and ground.
  - **If less than 4.8 V**
    1. Ignition OFF, disconnect the harness connector at the K26 Headlamp 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  $\Omega$  in the 5 V reference circuit end to end.
  - If 2  $\Omega$  or greater, repair the open/high resistance in the circuit.
  - If less than 2  $\Omega$ , replace the K26 Headlamp Control Module.
- **If greater than 5.2 V**
  1. Ignition OFF, disconnect the harness connector at the K26 Headlamp 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 K26 Headlamp Control Module.
- **If between 4.8-5.2 V**
  5. Test for less than 1 V between the signal circuit terminal 2 and ground.
    - **If 1 V or greater**
      1. Ignition OFF, disconnect the harness connector at the K26 Headlamp 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, replace the K26 Headlamp Control Module.
    - **If less than 1 V**
  6. Ignition OFF, disconnect the harness connector at the K26 Headlamp Control Module.
  7. 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**
  8. Test for less than 2  $\Omega$  between the B51 Suspension Height Sensor signal circuit terminal 2 and the appropriate K26 Headlamp Control Module signal circuit terminal.
    - **If 2  $\Omega$  or greater**

Repair the open or high resistance in the circuit.
    - **If less than 2  $\Omega$**
  9. Test or replace the appropriate B51 Suspension Height Sensor.
  10. Verify the DTC does not set while operating the vehicle within the Conditions for Running the DTC.
    - **If the DTC sets**

Replace the K26 Headlamp Control Module.
    - **If the DTC does not set**
  11. All OK.

### Repair Instructions

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

- [Front Suspension Automatic Forward Lighting Position Sensor Replacement](#)
- [Rear Suspension Automatic Forward Lighting Leveling Position Sensor Replacement](#)
- [Control Module References](#) for Headlamp Control Module replacement, programming and setup

## DTC B3415: HEADLAMP LEVELING CONTROL MODULE AXLE SENSOR SUPPLY CIRCUIT

### 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 B3415 01

Headlamp Leveling Control Module Axle Sensor Supply Circuit Short to Battery

### DTC B3415 02

Headlamp Leveling Control Module Axle Sensor Supply Circuit Short to Ground

## Diagnostic Fault Information

| Circuit                                               | Short to Ground                                              | Open/High Resistance                                | Short to Voltage                                             | Signal Performance |
|-------------------------------------------------------|--------------------------------------------------------------|-----------------------------------------------------|--------------------------------------------------------------|--------------------|
| LIN Serial Data - Left Headlamp Leveling Actuator     | U1513 00,<br>U1514 00,<br>U1523 00,<br>U1524 00,<br>B3843 05 | U1513 00, U1514 00, U1523 00,<br>U1524 00, B3843 05 | U1513 00,<br>U1514 00,<br>U1523 00,<br>U1524 00,<br>B3843 05 | -                  |
| LIN Serial Data - Right Headlamp Leveling Actuator    | U1513 00,<br>U1514 00,<br>U1523 00,<br>U1524 00,<br>B3843 05 | U1513 00, U1514 00, U1523 00,<br>U1524 00, B3843 05 | U1513 00,<br>U1514 00,<br>U1523 00,<br>U1524 00,<br>B3843 05 | -                  |
| Headlamp Control Module B+ Fuse (F62 UA)              | U0181 00                                                     | U0181 00                                            | -                                                            | -                  |
| Headlamp Leveling Actuator - Left B+ Fuse             | U1513 00,<br>U1514 00,<br>U1523 00,<br>U1524 00,<br>B3843 05 | U1513 00, U1514 00, U1523 00,<br>U1524 00, B3843 05 | -                                                            | -                  |
| Headlamp Leveling Actuator - Right B+ Fuse            | U1513 00,<br>U1514 00,<br>U1523 00,<br>U1524 00,<br>B3843 05 | U1513 00, U1514 00, U1523 00,<br>U1524 00, B3843 05 | -                                                            | -                  |
| Suspension Position Sensor 5 V Reference - Left Front | B3415 02                                                     | 1                                                   | B3415 01                                                     | -                  |
| Suspension Position Sensor 5 V Reference - Left Rear  | B3415 02                                                     | 1                                                   | B3415 01                                                     | -                  |
| Suspension Position Sensor Signal - Left Front        | B3410 06                                                     | B3410 06                                            | B3410 01                                                     | B3410 08           |
| Suspension Position Sensor Signal - Left Rear         | B3420 06                                                     | B3420 06                                            | B3420 01                                                     | B3420 08           |
| Suspension Position Sensor Low Reference - Left Front | -                                                            | 1                                                   | -                                                            | -                  |



| Circuit                                              | Short to Ground | Open/High Resistance | Short to Voltage | Signal Performance |
|------------------------------------------------------|-----------------|----------------------|------------------|--------------------|
| Suspension Position Sensor Low Reference - Left Rear | -               | 1                    | -                | -                  |
| Headlamp Control Module Ground                       | -               | 1                    | -                | -                  |
| Headlamp Assembly - Left Ground                      | -               | 1                    | -                | -                  |
| Headlamp Assembly - Right Ground                     | -               | 1                    | -                | -                  |
| 1. Headlamp Leveling Malfunction                     |                 |                      |                  |                    |

### Circuit/System Description

Each headlamp assembly contains a headlamp leveling motor that is controlled by the headlamp control module. The front and rear suspension position sensors provide the headlamp control module with suspension position information. Each sensor receives a 5 V reference, signal and low reference circuits from the headlamp control module. The sensors are connected to the control arms of the front and rear suspension. As the vehicle travels, the suspension compresses and rebounds moving the suspension position sensor arms. This causes the signal output of the sensor to change. The headlamp control module compares the information from both suspension position sensors and adjusts the headlamp leveling as needed.

### Conditions for Running the DTC

- Battery voltage must be between 9-16 V.
- Engine RUNNING.
- Headlamps ON.

### Conditions for Setting the DTC

#### DTC B3415 01

The headlamp control module detects a short to voltage in the suspension position sensor 5 V reference circuit.

#### DTC B3415 02

The headlamp control module detects a short to ground or an open/high resistance in the suspension position sensor 5 V reference circuit.

### Actions Taken When the DTC Sets

- The headlamp control module disables the headlamp leveling system.
- The driver information center will display "Adaptive Forward Lighting" and "Headlamp Leveling Malfunction".
- On vehicles equipped with both AFL and headlamp leveling, the AFL system will remain active.

### 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.

### Reference Information

Schematic Reference

### Headlights/Daytime Running Lights (DRL) Schematics

## COMPONENT CONNECTOR END VIEWS - INDEX

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/Vehicle OFF, disconnect the harness connector at the appropriate B152L Suspension Position Sensor, ignition ON/vehicle in Service Mode.
2. Verify a test lamp illuminates between the low reference circuit terminal 2 and B+.
  - **If the test lamp does not illuminate**
    1. Ignition OFF/Vehicle OFF, disconnect the harness connector at the K26 Headlamp Control Module.
    2. Test for less than 2  $\Omega$  in the low reference circuit end to end.
      - If 2  $\Omega$  or greater, repair the open/high resistance in the circuit.
      - If less than 2  $\Omega$ , replace the K26 Headlamp Control Module.
  - **If the test lamp illuminates**
3. Ignition ON/vehicle in Service Mode.
4. Test for 4.8-5.2 V between the 5 V reference circuit terminal 1 and ground.
  - **If less than 4.8 V**
    1. Ignition OFF/Vehicle OFF, disconnect the harness connector at the K26 Headlamp 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  $\Omega$  in the 5 V reference circuit end to end.
      - If 2  $\Omega$  or greater, repair the open/high resistance in the circuit.
      - If less than 2  $\Omega$ , replace the K26 Headlamp Control Module.
  - **If greater than 5.2 V**
    1. Ignition OFF/Vehicle OFF, disconnect the harness connector at the K26 Headlamp Control Module, ignition ON/vehicle in Service Mode.
    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 K26 Headlamp Control Module.
  - **If between 4.8-5.2 V**
5. Verify the appropriate scan tool Leveling Position Sensor Signal parameter is less than 5%.
  - **If 5% or greater**
    1. Ignition OFF/Vehicle OFF, disconnect the harness connector at the K26 Headlamp Control Module, ignition ON/vehicle in Service Mode.
    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 K26 Headlamp Control Module.
  - **If less than 5%**
6. Install a 3 A fused jumper wire between the 5 V reference circuit terminal 1 and the signal circuit terminal 3.
  7. Engine RUNNING/vehicle ON, verify the appropriate scan tool Leveling Position Sensor Signal parameter is greater than 90%.
    - **If less than 90%**
      1. Ignition OFF/Vehicle OFF, disconnect the harness connector at the K26 Headlamp 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  $\Omega$  in the signal circuit end to end.
        - If 2  $\Omega$  or greater, repair the open/high resistance in the circuit.
        - If less than 2  $\Omega$ , replace the K26 Headlamp Control Module.
    - **If 90% or greater**
  8. Test or replace the B152L Suspension Position Sensor.

### Repair Instructions

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

- [Front Suspension Automatic Forward Lighting Position Sensor Replacement](#)
- [Rear Suspension Automatic Forward Lighting Leveling Position Sensor Replacement](#)
- [Control Module References](#) for Headlamp Control Module replacement, programming and setup.

## DTC B3435 OR B3440: HEADLAMP LEVELING CONTROL MODULE LEFT/RIGHT SERVO DRIVER 1 OR 2 CIRCUIT

### 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 B3435 00

Headlamp Leveling Control Module Left Servo Driver 1 or 2 Circuit Malfunction

#### DTC B3440 00

Headlamp Leveling Control Module Right Servo Driver 1 or 2 Circuit Malfunction

### Diagnostic Fault Information

| Circuit                                           | Short to Ground                                              | Open/High Resistance                                | Short to Voltage                                             | Signal Performance |
|---------------------------------------------------|--------------------------------------------------------------|-----------------------------------------------------|--------------------------------------------------------------|--------------------|
| LIN Serial Data - Left Headlamp Leveling Actuator | U1513 00,<br>U1514 00,<br>U1523 00,<br>U1524 00,<br>B3843 05 | U1513 00, U1514 00, U1523 00,<br>U1524 00, B3843 05 | U1513 00,<br>U1514 00,<br>U1523 00,<br>U1524 00,<br>B3843 05 | -                  |
|                                                   |                                                              |                                                     |                                                              |                    |

| Circuit                                               | Short to Ground                                  | Open/High Resistance                             | Short to Voltage                                 | Signal Performance |
|-------------------------------------------------------|--------------------------------------------------|--------------------------------------------------|--------------------------------------------------|--------------------|
| LIN Serial Data - Right Headlamp Leveling Actuator    | U1513 00, U1514 00, U1523 00, U1524 00, B3843 05 | U1513 00, U1514 00, U1523 00, U1524 00, B3843 05 | U1513 00, U1514 00, U1523 00, U1524 00, B3843 05 | -                  |
| Headlamp Control Module B+ Fuse (F62 UA)              | U0181 00                                         | U0181 00                                         | -                                                | -                  |
| Headlamp Leveling Actuator - Right B+                 | U1513 00, U1514 00, U1523 00, U1524 00, B3843 05 | U1513 00, U1514 00, U1523 00, U1524 00, B3843 05 | -                                                | -                  |
| Headlamp Leveling Actuator - Right B+                 | U1513 00, U1514 00, U1523 00, U1524 00, B3843 05 | U1513 00, U1514 00, U1523 00, U1524 00, B3843 05 | -                                                | -                  |
| Headlamp Leveling Relay Control                       | 1                                                | 1                                                | 1                                                | -                  |
| Suspension Position Sensor 5 V Reference - Left Front | B3415 02                                         | 1                                                | B3415 01                                         | -                  |
| Suspension Position Sensor 5 V Reference - Left Rear  | B3415 02                                         | 1                                                | B3415 01                                         | -                  |
| Suspension Position Sensor Signal - Left Front        | B3410 06                                         | B3410 06                                         | B3410 01                                         | B3410 08           |
| Suspension Position Sensor Signal - Left Rear         | B3420 06                                         | B3420 06                                         | B3420 01                                         | B3420 08           |
| Suspension Position Sensor Low Reference - Left Front | -                                                | 1                                                | -                                                | -                  |
| Suspension Position Sensor Low Reference - Left Rear  | -                                                | 1                                                | -                                                | -                  |
| Headlamp Control Module Ground                        | -                                                | 1                                                | -                                                | -                  |
| Headlamp Assembly - Left Ground                       | -                                                | 1                                                | -                                                | -                  |
| Headlamp Assembly - Right Ground                      | -                                                | 1                                                | -                                                | -                  |
| 1. Headlamp Leveling Malfunction                      |                                                  |                                                  |                                                  |                    |

### Circuit/System Description

Each headlamp assembly contains a headlamp leveling actuator that is controlled by the headlamp control module. The front and rear suspension position sensors provide the headlamp control module with suspension position information. Each sensor receives a 5 V reference, signal and low reference circuits from the headlamp control module. The sensors are connected to the control arms of the front and rear suspension. As the vehicle travels, the suspension compresses and rebounds moving the



suspension position sensor arms. This causes the signal output of the sensor to change. The headlamp control module compares the information from both suspension position sensors and adjusts the headlamp leveling as needed. The headlamp control module communicates with the left and right headlamp leveling actuators via the LIN serial data circuit.

### **Conditions for Running the DTC**

- Battery voltage must be between 9-16 V.
- Ignition ON.
- Headlamps ON.

### **Conditions for Setting the DTC**

#### **DTC B3435 00**

- The headlamp control module detects a short to ground or an open/high resistance in the left headlamp leveling actuator LIN bus circuit.
- The headlamp control module detects an open/high resistance in the left headlamp leveling actuator ground circuit.

#### **DTC B3440 00**

- The headlamp control module detects a short to ground or an open/high resistance in the right headlamp leveling actuator LIN bus circuit.
- The headlamp control module detects an open/high resistance in the right headlamp leveling actuator ground circuit.

### **Actions Taken When the DTC Sets**

- The headlamp control module disables the headlamp leveling system.
- The driver information center will display "Adaptive Forward Lighting" and "Headlamp Leveling Malfunction".
- On vehicles equipped with both AFL and headlamp leveling, the AFL system will remain active.

### **Conditions for Clearing the DTC**

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

### **Reference Information**

Schematic Reference

### **Headlights/Daytime Running Lights (DRL) Schematics**

Connector End View Reference

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- **Wiring Repairs**

Scan Tool Reference

## Circuit/System Testing

1. Ignition OFF/Vehicle OFF, disconnect the KR50 Headlamp Relay.
2. Verify a test lamp illuminates between the B+ circuit terminal 86 and ground.
  - **If the test lamp does not illuminate**  
Replace the X50A Fuse Block - Underhood.
  - **If the test lamp illuminates**
3. Verify a test lamp illuminates between the B+ circuit terminal 30 and ground.
  - **If the test lamp does not illuminate**  
Replace the X50A Fuse Block - Underhood.
  - **If the test lamp illuminates**
4. Connect a test lamp between the control circuit terminal 85 and B+, ignition ON/vehicle in Service Mode.
5. Verify the test lamp turns ON and OFF while turning the low beam headlamps ON and OFF with the S78 Turn Signal/Multifunction Switch.
  - **If the test lamp is always OFF**
    1. Ignition OFF/Vehicle OFF, disconnect the X5 harness connector at the K9 Body Control Module, ignition ON/vehicle in Service Mode.
    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/Vehicle OFF.
    4. Test for less than 2  $\Omega$  in the control circuit end to end.
      - If 2  $\Omega$  or greater, repair the open/high resistance in the circuit.
      - If less than 2  $\Omega$ , replace the K9 Body Control Module.
    - **If the test lamp is always ON**
      1. Ignition OFF/Vehicle 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**
  - 6. Ignition OFF/Vehicle OFF, exterior lamps OFF, connect the KR50 Headlamp Relay.
  - 7. Disconnect the harness connector at the appropriate E13 Headlamp Assembly. It may take up to 2 min for all vehicle systems to power down.
  - 8. Test for less than 15  $\Omega$  between the ground circuit terminal 9 and ground.
    - **If 15  $\Omega$  or greater**
      1. Ignition OFF/Vehicle OFF.
      2. Test for less than 2  $\Omega$  in the ground circuit end to end.
        - If 2  $\Omega$  or greater, repair the open/high resistance in the circuit.
        - If less than 2  $\Omega$ , repair the open/high resistance in the ground connection.
      - **If less than 15  $\Omega$**
  - 9. Ignition ON/vehicle in Service Mode.
  - 10. Verify a test lamp illuminates between the B+ circuit terminal 10 and ground.
    - **If the test lamp does not illuminate**
      1. Ignition OFF/Vehicle OFF, disconnect the X5 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

3. Test for less than 2  $\Omega$  in the control circuit end to end.

- If 2  $\Omega$  or greater, repair the open/high resistance in the circuit.
- If less than 2  $\Omega$ , replace the KR50 Headlamp Relay.

- **If the test lamp illuminates**

11. Test or replace the K26 Headlamp Control Module.

12. Ignition ON/vehicle in Service Mode.

13. Verify the appropriate headlamp operates to the UP and DOWN positions when commanding the appropriate Headlamp Vertical Motor UP and DOWN with a scan tool.

- **If the headlamp does not operate UP and DOWN**

Test or replace the E13 Headlamp Assembly.

- **If the headlamp operates UP and DOWN**

14. All OK.

### Repair Instructions

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

- [Headlamp Replacement](#)
- [Relay Replacement \(Attached to Wire Harness\)](#) [Relay Replacement \(Within an Electrical Center\)](#)
- [Control Module References](#) for BCM or Headlamp Control Module replacement, programming and setup

## DTC B3588: REAR FOG LAMP SWITCH CIRCUIT

### 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 B3588 00

Rear Fog Lamp Switch Circuit Malfunction

### Diagnostic Fault Information

| Circuit                                 | Short to Ground | Open/High Resistance | Short to Voltage | Signal Performance |
|-----------------------------------------|-----------------|----------------------|------------------|--------------------|
| Rear Fog Lamp Switch Signal             | B3588 00        | 1                    | 1                | -                  |
| Rear Fog Lamp Control                   | B2540 02        | B2540 04             | 1                | -                  |
| Rear Fog Lamp Ground                    | -               | 1                    | -                | -                  |
| Turn Signal/Multifunction Switch Ground | -               | 1                    | -                | -                  |
| 1. Rear Fog Lamp Malfunction            |                 |                      |                  |                    |

### Circuit/System Description

The rear fog lamp switch signal circuit is grounded momentarily by activating the rear fog lamp switch. The body control module (BCM) responds to the rear fog lamp request by applying voltage to the rear fog lamp control circuit which illuminates the rear fog lamp.

### Conditions for Running the DTC

Battery voltage must be between 9-16 V.

### Conditions for Setting the DTC

The BCM detects a short to ground in the turn signal/multifunction switch rear fog lamp signal circuit.

### Actions Taken When the DTC Sets

The rear fog lamp indicator on the instrument cluster is always 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

### Fog Lights Schematics

Connector End View Reference

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- [Wiring Repairs](#)

Scan Tool Reference

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

### Circuit/System Testing

1. Ignition OFF/Vehicle OFF, scan tool disconnected, all doors closed, all accessories OFF, open and close drivers door, disconnect the harness connector at the S78 Turn Signal/Multifunction Switch. It may take up to 2 min for all vehicle systems to power down.
2. Test for less than 10  $\Omega$  between the ground circuit terminal 3 and ground.
  - **If 10  $\Omega$  or greater**
    1. Ignition OFF/Vehicle OFF.
    2. Test for less than 2  $\Omega$  in the ground circuit end to end.
      - If 2  $\Omega$  or greater, repair the open/high resistance in the circuit.
      - If less than 2  $\Omega$ , repair the open/high resistance in the ground connection.
  - **If less than 10  $\Omega$**
3. Ignition ON/vehicle in Service Mode.
4. Verify the scan tool Rear Fog Lamp Switch parameter is Inactive.
  - **If not Inactive**
    1. Ignition OFF/Vehicle OFF, disconnect the X1 harness connector at the K9 Body Control Module.
    2. Test for infinite resistance between the signal circuit terminal 8 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 8 and ground.
  6. Verify the scan tool Rear Fog Lamp Switch parameter is Active.
    - **If not Active**
      1. Ignition OFF/Vehicle OFF, disconnect the X1 harness connector at the K9 Body Control Module, ignition ON/vehicle in Service Mode.
      2. Test for less than 1 V between the signal circuit terminal 8 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  $\Omega$  in the signal circuit end to end.
        - If 2  $\Omega$  or greater, repair the open/high resistance in the circuit.
        - If less than 2  $\Omega$ , replace the K9 Body Control Module.
    - **If Active**
  7. Test or replace the S78 Turn Signal/Multifunction Switch.

### Repair Instructions

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

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

## DTC B3596: HAZARD LAMPS REQUEST CIRCUIT

### 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 B+     | 1               | 1                    | -                | -                  |
| Hazard Warning Switch Signal | B3596 00        | 1                    | 1                | B3596 00           |
| Hazard Warning Switch Ground | -               | 1                    | -                | -                  |
| 1. Hazard Lamps 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 s.

### 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

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- [Wiring Repairs](#)

Scan Tool Reference

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

### Circuit/System Testing

1. Ignition OFF/Vehicle OFF, scan tool disconnected, all doors closed, all accessories OFF, open and close drivers door, disconnect the harness connector at the S48D Multifunction Switch 2 - Instrument Panel. It may take up to 2 min for all vehicle systems to power down.
2. Test for less than 10  $\Omega$  between the ground circuit terminal 3 and ground.
  - **If 10  $\Omega$  or greater**
    1. Ignition OFF/Vehicle OFF.
    2. Test for less than 2  $\Omega$  in the ground circuit end to end.
      - If 2  $\Omega$  or greater, repair the open/high resistance in the circuit.
      - If less than 2  $\Omega$ , repair the open/high resistance in the ground connection.
  - **If less than 10  $\Omega$**
3. Ignition ON/vehicle in Service Mode.
4. Verify the scan tool Hazard Lamps Switch parameter is Inactive.
  - **If not Inactive**
    1. Ignition OFF/Vehicle 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 ground.

6. Verify the scan tool Hazard Lamps Switch parameter is Active.

- **If not Active**

1. Ignition OFF/Vehicle OFF, disconnect the X2 harness connector at the K9 Body Control Module, ignition ON/vehicle in Service Mode.

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  $\Omega$  in the signal circuit end to end.

- If 2  $\Omega$  or greater, repair the open/high resistance in the circuit.
- If less than 2  $\Omega$ , replace the K9 Body Control Module.

- **If Active**

7. Test or replace the S48D Multifunction Switch 2 - Instrument Panel.

### Repair Instructions

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

[Control Module References](#) for BCM replacement, programming and setup.

## DTC B3600: PASSENGER COMPARTMENT DIMMING REQUEST SIGNAL CIRCUIT

### 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 B3600 03

Passenger Compartment Dimming Request Signal Circuit Low Voltage

#### DTC B3600 07

Passenger Compartment Dimming Request Signal Circuit High Voltage

### Diagnostic Fault Information

| Circuit                                      | Short to Ground    | Open/High Resistance | Short to Voltage   | Signal Performance |
|----------------------------------------------|--------------------|----------------------|--------------------|--------------------|
| Instrument Panel Dimmer Switch B+ Reference  | B1395 03, B3600 03 | B1395 03, B3600 03   | B1395 07, B3600 07 | -                  |
| Instrument Panel Dimmer Switch Signal        | B1395 03, B3600 03 | B1395 03, B3600 03   | B1395 07, B3600 07 | -                  |
| Instrument Panel Dimmer Switch Low Reference | 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 a low reference, signal and B+ voltage reference 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 voltage through the LED dimming 1 and dimming 2 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 B3600 03

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

#### DTC B3600 07

- The BCM detects a short to voltage in the instrument panel dimmer switch B+ reference circuit.
- 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 FULL bright.

### Conditions for Clearing the DTC

- The condition responsible for setting the DTC no longer exists.
- Disconnect the negative battery cable for 30 s.
- A history DTC will clear once 100 consecutive malfunction-free ignition cycles have occurred.

### Diagnostic Aids

When a short to ground condition exists, the BCM goes into safe mode. The DTC will clear in most cases without removing the negative battery cable, but in order to restore the BCM to normal operating conditions the negative battery cable must be removed. The B+ reference circuit under normal operating conditions will illuminate a test lamp. When the BCM is in safe mode, a test lamp will no longer illuminate but the DTC will clear and the backlighting will dim normally.

### Reference Information

Schematic Reference

### Interior Lights Dimming Schematics

Connector End View Reference

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- [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 S36 Instrument Panel Dimmer Switch, ignition ON.
2. Test for B+ between the B+ circuit terminal 6 and ground.
  - **If less than B+**
    1. Ignition OFF, disconnect the X1 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  $\Omega$  in the B+ circuit end to end.
      - If 2  $\Omega$  or greater, repair the open/high resistance in the circuit.
      - If less than 2  $\Omega$ , replace the K9 Body Control Module.
  - **If B+**
3. Verify a test lamp illuminates between the B+ circuit terminal 6 and the low reference circuit terminal 1.
  - **If the test lamp does not illuminate**
    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 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  $\Omega$  in the low reference circuit end to end.
      - If 2  $\Omega$  or greater, repair the open/high resistance in the circuit.
      - If less than 2  $\Omega$ , replace the K9 Body Control Module.
  - **If the test lamp illuminates**
4. Verify a test lamp does not illuminate between the B+ circuit terminal 6 and the signal circuit terminal 2.
  - **If the test lamp illuminates**
    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, replace the K9 Body Control Module.
  - **If the test lamp does not illuminate**
5. Test for B+ between the B+ circuit terminal 6 and the signal circuit terminal 2.
  - **If less than B+**
    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 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  $\Omega$  in the signal circuit end to end.
      - If 2  $\Omega$  or greater, repair the open/high resistance in the circuit.

- If less than 2  $\Omega$ , replace the K9 Body Control Module.

- **If B+**

6. Test or replace the S36 Instrument Panel Dimmer Switch.

### Repair Instructions

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

- [Dimmer Switch Replacement](#)
- [Control Module References](#) for BCM replacement, programming and setup.

## DTC B3650: HIGH BEAM REQUEST SIGNAL CIRCUIT

### 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 B3650 08

High Beam Request Signal Circuit Performance - Signal Invalid

### Diagnostic Fault Information

| Circuit                                                                    | Short to Ground | Open/High Resistance | Short to Voltage | Signal Performance |
|----------------------------------------------------------------------------|-----------------|----------------------|------------------|--------------------|
| Turn Signal/Multifunction Switch Headlamps OFF Signal                      | B257A 00        | 1                    | 1                | -                  |
| Turn Signal/Multifunction Switch Headlamps ON Signal                       | B257A 00        | 1                    | 1                | -                  |
| Turn Signal/Multifunction Switch Park Lamps ON Signal                      | 2               | B257A 00             | 2                | -                  |
| Turn Signal/Multifunction Switch Flash To Pass Signal                      | B3806 00        | 1                    | 1                | -                  |
| Turn Signal/Multifunction Switch High Beam Signal                          | B3650 08        | 1                    | 1                | -                  |
| Turn Signal/Multifunction Switch Ground                                    | -               | 1                    | -                | -                  |
| 1. Headlamps Malfunction<br>2. Park, License and/or Tail Lamps Malfunction |                 |                      |                  |                    |

### Circuit/System Description

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 body control module (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.

### Conditions for Running the DTC

Battery voltage must be between 9-16 V.

### Conditions for Setting the DTC

The BCM detects a short to ground in the turn signal/multifunction switch high beam signal circuit.

### **Actions Taken When the DTC Sets**

The high 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

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- **Wiring Repairs**

Scan Tool Reference

**Control Module References** for scan tool information

### **Circuit/System Testing**

1. Ignition OFF/Vehicle OFF, scan tool disconnected, all doors closed, all accessories OFF, open and close the drivers door, disconnect the harness connector at the S78 Turn Signal/Multifunction Switch. It may take up to 2 min for all vehicle systems to power down.
2. Test for less than 10  $\Omega$  between the ground circuit terminal 3 and ground.
  - **If 10  $\Omega$  or greater**
    1. Ignition OFF/Vehicle OFF.
    2. Test for less than 2  $\Omega$  in the ground circuit end to end.
      - If 2  $\Omega$  or greater, repair the open/high resistance in the circuit.
      - If less than 2  $\Omega$ , repair the open/high resistance in the ground connection.
  - **If less than 10  $\Omega$**
3. Ignition ON/vehicle in Service Mode.
4. Verify the scan tool High Beam Select Switch parameter is Inactive.
  - **If not Inactive**
    1. Ignition OFF/Vehicle 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**
5. Install a 3 A fused jumper wire between the signal circuit terminal 7 and ground.

6. Verify the scan tool High Beam Select Switch parameter is Active.

- **If not Active**

1. Ignition OFF/Vehicle OFF, disconnect the X3 harness connector at the K9 Body Control Module, ignition ON/vehicle in Service Mode.
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  $\Omega$  in the signal circuit end to end.
  - If 2  $\Omega$  or greater, repair the open/high resistance in the circuit.
  - If less than 2  $\Omega$ , replace the K9 Body Control Module.

- **If Active**

7. Test or replace the S78 Turn Signal/Multifunction Switch.

### Repair Instructions

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

- [Turn Signal Switch Replacement](#)
- [Control Module References](#) for BCM replacement, programming and setup

## DTC B3806: HIGH BEAM AND HEADLAMP FLASH SELECT CIRCUIT

### 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 B3806 00

High Beam and Headlamp Flash Select Circuit Malfunction

### Diagnostic Fault Information

| Circuit                                                                    | Short to Ground | Open/High Resistance | Short to Voltage | Signal Performance |
|----------------------------------------------------------------------------|-----------------|----------------------|------------------|--------------------|
| Turn Signal/Multifunction Switch Headlamps OFF Signal                      | B257A 00        | 1                    | 1                | -                  |
| Turn Signal/Multifunction Switch Headlamps ON Signal                       | B257A 00        | 1                    | 1                | -                  |
| Turn Signal/Multifunction Switch Park Lamps ON Signal                      | 2               | B257A 00             | 2                | -                  |
| Turn Signal/Multifunction Switch Flash To Pass Signal                      | B3806 00        | 1                    | 1                | -                  |
| Turn Signal/Multifunction Switch High Beam Signal                          | B3650 08        | 1                    | 1                | -                  |
| Turn Signal/Multifunction Switch Ground                                    | -               | 1                    | -                | -                  |
| 1. Headlamps Malfunction<br>2. Park, License and/or Tail Lamps Malfunction |                 |                      |                  |                    |

### Circuit/System Description



When the turn signal/multifunction switch is momentarily placed in the flash to pass position, ground is applied to the body control module (BCM) through the flash to pass signal circuit. The BCM responds to the flash to pass 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. The high beam headlamps will only illuminate for as long as the flash to pass switch is activated.

### **Conditions for Running the DTC**

Battery voltage must be between 9-16 V.

### **Conditions for Setting the DTC**

The BCM detects a short to ground in the turn signal/multifunction switch flash to pass signal circuit.

### **Actions Taken When the DTC Sets**

The high beam lamps and the high beam indicator on the instrument cluster are always 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

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- **Wiring Repairs**

Scan Tool Reference

**Control Module References** for scan tool information

### **Circuit/System Testing**

1. Ignition OFF/Vehicle OFF, scan tool disconnected, all doors closed, all accessories OFF, open and close drivers door, disconnect the harness connector at the S78 Turn Signal/Multifunction Switch. It may take up to 2 min for all vehicle systems to power down.
2. Test for less than 10  $\Omega$  between the ground circuit terminal 3 and ground.
  - **If 10  $\Omega$  or greater**
    1. Ignition OFF/Vehicle OFF.
    2. Test for less than 2  $\Omega$  in the ground circuit end to end.
      - If 2  $\Omega$  or greater, repair the open/high resistance in the circuit.
      - If less than 2  $\Omega$ , repair the open/high resistance in the ground connection.
  - **If less than 10  $\Omega$**

3. Ignition ON/vehicle in Service Mode.

4. Verify the scan tool Headlamps Flash Switch parameter is Inactive.

- **If not Inactive**

1. Ignition OFF/Vehicle OFF, disconnect the X3 harness connector at the K9 Body Control Module.

2. Test for infinite resistance between the signal circuit terminal 6 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 6 and ground.

6. Verify the scan tool Headlamps Flash Switch parameter is Active.

- **If not Active**

1. Ignition OFF/Vehicle OFF, disconnect the X3 harness connector at the K9 Body Control Module, ignition ON/vehicle in Service Mode.

2. Test for less than 1 V between the signal circuit terminal 6 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  $\Omega$  in the signal circuit end to end.

- If 2  $\Omega$  or greater, repair the open/high resistance in the circuit.
- If less than 2  $\Omega$ , replace the K9 Body Control Module.

- **If Active**

7. Test or replace the S78 Turn Signal/Multifunction Switch.

### Repair Instructions

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

- [Turn Signal Switch Replacement](#)
- [Control Module References](#) for BCM replacement, programming and setup.

## DTC B380A OR B380B: PASSENGER COMPARTMENT LAMP ON/OFF-DEFEAT SWITCH CIRCUIT

### 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 B380A 01

Passenger Compartment Lamp On/Off Switch Circuit Short to Battery

#### DTC B380B 02

Passenger Compartment Lamp Defeat Switch Circuit Short to Ground

### Diagnostic Fault Information

| Circuit                        | Short to Ground | Open/High Resistance | Short to Voltage | Signal Performance |
|--------------------------------|-----------------|----------------------|------------------|--------------------|
| Dome Lamp Switch Cancel Signal | B380B 02        | 1                    | 1                | -                  |
| Dome Lamp Switch ON Signal     | 1               | B380A 01             | B380A 01         | -                  |

| Circuit                                        | Short to Ground | Open/High Resistance | Short to Voltage | Signal Performance |
|------------------------------------------------|-----------------|----------------------|------------------|--------------------|
| Multifunction Switch - Overhead Console Ground | -               | 1                    | -                | -                  |
| 1. Dome Lamps 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/courtesy lamps will remain illuminated until the switch is placed in either the DOOR or OFF position. When in the DOOR position, the dome/courtesy lamps operation is controlled by the body control module (BCM). The BCM applies battery voltage to the interior courtesy lamps through the dome/courtesy lamps control circuits at terminal 1 X7 and terminal 5 X2. When any door is opened, the jam switch contacts close and the BCM receives a door-ajar input. If the BCM receives a door lock or unlock input or a rear hatch open input, the BCM responds by applying battery voltage to the interior courtesy lamps through the dome/courtesy lamps control circuits at terminal 1 X7 and terminal 5 X2. After all doors have been closed, the dome lamps 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/courtesy lamps will be disabled and an amber indicator will illuminate to inform the driver that the dome lamp switch is in the OFF position. In the event that any of the dome/courtesy lamps were to remain illuminated for more than 10 minutes with the ignition switch in the OFF position, the BCM will deactivate the dome/courtesy lamp control circuits to prevent total battery discharge.

### Conditions for Running the DTC

Battery voltage must be between 9-16 V.

### Conditions for Setting the DTC

#### DTC B380A 01

The BCM detects a short to voltage in the dome lamp switch On/Off signal circuit.

#### DTC B380B 02

The BCM detects a short to ground in the dome lamp switch Cancel signal circuit.

### Actions Taken When the DTC Sets

The dome/courtesy 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

### Interior Lights Schematics

Connector End View Reference

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

Scan Tool Reference

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

### Circuit/System Testing

1. Ignition OFF/Vehicle OFF, scan tool disconnected, all doors closed, all accessories OFF, open and close drivers door, disconnect the harness connector at the S48B Multifunction Switch - Overhead Console. It may take up to 2 min for all vehicle systems to power down.
2. Test for less than 10  $\Omega$  between the ground circuit terminal 14 and ground.
  - **If 10  $\Omega$  or greater**
    1. Ignition OFF/Vehicle OFF.
    2. Test for less than 2  $\Omega$  in the ground circuit end to end.
      - If 2  $\Omega$  or greater, repair the open/high resistance in the circuit.
      - If less than 2  $\Omega$ , repair the open/high resistance in the ground connection.
  - **If less than 10  $\Omega$**
3. Ignition ON/vehicle in Service Mode.
4. Verify the scan tool Interior/Courtesy Lighting Master Switch parameter is Door.
  - **If Cancel**
    1. Ignition OFF/Vehicle 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 On**
    1. Ignition OFF/Vehicle OFF, disconnect the X7 harness connector at the K9 Body Control Module.
    2. Test for infinite resistance between the signal circuit terminal 12 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 4 and ground.
6. Verify the scan tool Interior/Courtesy Lighting Master Switch parameter is Cancel.
  - **If not Cancel**
    1. Ignition OFF/Vehicle OFF, disconnect the X1 harness connector at the K9 Body Control Module, ignition ON/vehicle in Service Mode.
    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  $\Omega$  in the signal circuit end to end.
      - If 2  $\Omega$  or greater, repair the open/high resistance in the circuit.
      - If less than 2  $\Omega$ , replace the K9 Body Control Module.
  - **If Cancel**
7. Install a 3 A fused jumper wire between the signal circuit terminal 12 and ground.
8. Verify the scan tool Interior/Courtesy Lighting Master Switch parameter is On.
  - **If not On**
    1. Ignition OFF/Vehicle OFF, disconnect the X7 harness connector at the K9 Body Control Module, ignition ON/vehicle in Service Mode.



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  $\Omega$  in the signal circuit end to end.
  - If 2  $\Omega$  or greater, repair the open/high resistance in the circuit.
  - If less than 2  $\Omega$ , replace the K9 Body Control Module.
- **If On**
9. Test or replace the S48B Multifunction Switch - Overhead Console.

### Repair Instructions

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

- [Interior Lamp Switch Replacement](#)
- [Control Module References](#) for BCM replacement, programming and setup.

## DTC B3881 OR B3882: TAIL LAMP CIRCUIT

### 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 B3881 02

Tail Lamp Circuit Short to Ground

#### DTC B3882 02

Right Tail Lamp Circuit Short to Ground

### Diagnostic Fault Information

| Circuit                                          | Short to Ground | Open/High Resistance | Short to Voltage | Signal Performance |
|--------------------------------------------------|-----------------|----------------------|------------------|--------------------|
| Park Lamps Control - Left Rear                   | B3881 02        | 1                    | 1                | -                  |
| Park Lamps Control - Right Rear                  | B3882 02        | 1                    | 1                | -                  |
| Side Marker Lamp - Left Front Ground (with TUJ)  | -               | 1                    | -                | -                  |
| Side Marker Lamp - Right Front Ground (with TUJ) | -               | 1                    | -                | -                  |
| Tail Lamp Assembly - Left Ground                 | -               | 1                    | -                | -                  |
| Tail Lamp Assembly - Right Ground                | -               | 1                    | -                | -                  |
| 1. Park, License and/or Tail 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.

### Conditions for Running the DTC

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

### Conditions for Setting the DTC

#### DTC B3881 02

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

#### DTC B3882 02

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

### Actions Taken When the DTC Sets

The appropriate park/side marker lamps 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

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### Exterior Lights Schematics

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

Scan Tool Reference

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

### Circuit/System Testing

#### DTC B3881

1. Ignition OFF/Vehicle OFF, exterior lamps OFF, disconnect the harness connector at the appropriate component listed below. It may take up to 2 min for all vehicle systems to power down.
  - E2LF Side Marker Lamp - Left Front (with TUJ)
  - E42L Tail Lamp Assembly - Left
2. Test for less than 5  $\Omega$  between the appropriate ground circuit terminal listed below and ground.
  - E2LF Side Marker Lamp - Left Front terminal B (with TUJ)
  - E42L Tail Lamp Assembly - Left terminal 1
  - **If 5  $\Omega$  or greater**

1. Ignition OFF/Vehicle OFF.
2. Test for less than 2  $\Omega$  in the ground circuit end to end.
  - If 2  $\Omega$  or greater, repair the open/high resistance in the circuit.
  - If less than 2  $\Omega$ , repair the open/high resistance in the ground connection.
  - **If less than 5  $\Omega$**
3. Connect a test lamp between the appropriate control circuit terminal listed below and ground, ignition ON/vehicle in Service Mode.
  - E2LF Side Marker Lamp - Left Front terminal A (with TUJ)
  - E42L Tail Lamp Assembly - Left terminal 4
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/Vehicle 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  $\Omega$  in the control circuit end to end.
      - If 2  $\Omega$  or greater, repair the open/high resistance in the circuit.
      - If less than 2  $\Omega$ , replace the K9 Body Control Module.
    - **If the test lamp is always ON**
      1. Ignition OFF/Vehicle OFF, disconnect the X4 harness connector at the K9 Body Control Module, ignition ON/vehicle in Service Mode.
      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 park/side marker lamp - left.

## DTC B3882

1. Ignition OFF/Vehicle OFF, exterior lamps OFF, disconnect the harness connector at the appropriate component listed below. It may take up to 2 min for all vehicle systems to power down.
  - E2RF Side Marker Lamp - Right Front (with TUJ)
  - E42R Tail Lamp Assembly - Right
2. Test for less than 5  $\Omega$  between the appropriate ground circuit terminal listed below and ground.
  - E2RF Side Marker Lamp - Right Front terminal B (with TUJ)
  - E42R Tail Lamp Assembly - Right terminal 1
  - **If 5  $\Omega$  or greater**
    1. Ignition OFF/Vehicle OFF.
    2. Test for less than 2  $\Omega$  in the ground circuit end to end.
      - If 2  $\Omega$  or greater, repair the open/high resistance in the circuit.
      - If less than 2  $\Omega$ , repair the open/high resistance in the ground connection.
    - **If less than 5  $\Omega$**
3. Connect a test lamp between the appropriate control circuit terminal listed below and ground, ignition ON/vehicle in Service Mode.
  - E2RF Side Marker Lamp - Right Front terminal A (with TUJ)
  - E42R Tail Lamp Assembly - Right terminal 4
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/Vehicle 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  $\Omega$  in the control circuit end to end.
  - If 2  $\Omega$  or greater, repair the open/high resistance in the circuit.
  - If less than 2  $\Omega$ , replace the K9 Body Control Module.

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

1. Ignition OFF/Vehicle OFF, disconnect the X4 harness connector at the K9 Body Control Module, ignition ON/vehicle in Service Mode.
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 park/side marker lamp - right.

### Repair Instructions

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

- [Rear Body Structure Stop Lamp Replacement](#)
- [Control Module References](#) for BCM replacement, programming and setup

## DTC B3883: LICENSE PLATE LAMP CIRCUIT

### 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 B3883 01

License Plate Lamp Circuit Short to Battery

#### DTC B3883 02

License Plate Lamp Circuit Short to Ground

#### DTC B3883 04

License Plate Lamp Circuit Open

### Diagnostic Fault Information

| Circuit                    | Short to Ground                                                                | Open/High Resistance                                                           | Short to Voltage   | Signal Performance |
|----------------------------|--------------------------------------------------------------------------------|--------------------------------------------------------------------------------|--------------------|--------------------|
| F49RA (BCM 1)<br>Fuse B+   | B1325 03, B3265 01, B3265 04, B3873 01, B3873 04, B3883 01, B3883 04, C0297 01 | B1325 03, B3265 01, B3265 04, B3873 01, B3873 04, B3883 01, B3883 04, C0297 01 | -                  | -                  |
| License Plate Lamp Control | B3883 02                                                                       | B3883 01, B3883 04                                                             | B3883 01, B3883 04 | -                  |



| Circuit                                        | Short to Ground | Open/High Resistance | Short to Voltage | Signal Performance |
|------------------------------------------------|-----------------|----------------------|------------------|--------------------|
| License Plate Lamp Ground - Right              | -               | 1                    | -                | -                  |
| License Plate Lamp Ground - Left               | -               | 1                    | -                | -                  |
| 1. Park, License and/or Tail Lamps Malfunction |                 |                      |                  |                    |

### Circuit/System Description

When the turn signal/multifunction 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.

#### DTC B3883 01

Turn signal/multifunction switch in OFF position.

#### DTC B3883 02 or B3883 04

Turn signal/multifunction switch in AUTO, PARK or ON positions.

### Conditions for Setting the DTC

#### DTC B3883 01 and DTC B3883 04

- The BCM detects a short to voltage or an open/high resistance in the license lamps control circuit.
- The BCM detects a short to ground or an open/high resistance in the F49RA (BCM 1) fuse B+ circuit.

#### DTC B3883 02

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

### Actions Taken When the DTC Sets

#### DTC B3883 01

License lamps always ON.

#### DTC B3883 02 or B3883 04

License lamps 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](#)
- [Body Control System Schematics](#)

Connector End View Reference

### Description and Operation

### Exterior Lighting Systems Description and Operation

### Electrical Information Reference

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

### Scan Tool Reference

### Control Module References for scan tool information

### Circuit/System Testing

1. Ignition OFF/Vehicle OFF, exterior lamps OFF, remove both E7 License Plate Lamp bulbs. It may take up to 2 min for all vehicle systems to power down.
2. Test for less than 5  $\Omega$  between each ground circuit terminal 2 and ground.
  - **If 5  $\Omega$  or greater**
    1. Ignition OFF/Vehicle OFF.
    2. Test for less than 2  $\Omega$  in the ground circuit end to end.
      - If 2  $\Omega$  or greater, repair the open/high resistance in the circuit.
      - If less than 2  $\Omega$ , repair the open/high resistance in the ground connection.
  - **If less than 5  $\Omega$**
3. Connect a test lamp between the E7L License Plate Lamp - Left control circuit terminal 1 and ground, ignition ON/vehicle in Service Mode.
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/Vehicle 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  $\Omega$  in the control circuit end to end.
      - If 2  $\Omega$  or greater, repair the open/high resistance in the circuit.
      - If less than 2  $\Omega$ , replace the K9 Body Control Module.
  - **If the test lamp is always ON**
    1. Ignition OFF/Vehicle OFF, disconnect the X4 harness connector at the K9 Body Control Module, ignition ON/vehicle in Service Mode.
    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. Ignition OFF/Vehicle OFF.
6. Connect a test lamp between the E7R License Plate Lamp - Right control circuit terminal 1 and ground, ignition ON/vehicle in Service Mode.
7. 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/Vehicle 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  $\Omega$  in the control circuit end to end.
  - If 2  $\Omega$  or greater, repair the open/high resistance in the circuit.
- **If the test lamp turns ON and OFF**
8. Test or replace the E7 License Plate Lamp bulb.

### Repair Instructions

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

- [Rear License Plate Lamp Replacement](#)
- [Control Module References](#) for BCM replacement, programming and setup.

## DTC B3884: CENTER HIGH MOUNTED STOP LAMP CIRCUIT

### 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 B3884 01

Center High Mounted Stop Lamp Circuit Short to Battery

#### DTC B3884 02

Center High Mounted Stop Lamp Circuit Short to Ground

#### DTC B3884 04

Center High Mounted Stop Lamp Circuit Open

### Diagnostic Fault Information

| Circuit                               | Short to Ground | Open/High Resistance | Short to Voltage   | Signal Performance |
|---------------------------------------|-----------------|----------------------|--------------------|--------------------|
| Center High Mounted Stop Lamp Control | B3884 02        | B3884 01, B3884 04   | B3884 01, B3884 04 | -                  |
| Center High Mounted Stop Lamp Ground  | -               | 1                    | -                  | -                  |
| 1. Stop Lamps 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 center high mounted stop lamp control circuit illuminating the center high mounted stop lamp.

### Conditions for Running the DTC

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

### Conditions for Setting the DTC

#### DTC B3884 01 and B3884 04

The BCM detects a short to voltage or an open/high resistance in the center high mounted stop lamp control circuit.

#### DTC B3884 02

The BCM detects a short to ground in the center high mounted stop lamp control circuit.

### Actions Taken When the DTC Sets

The BCM will not illuminate the center high mounted stop lamp.

### Conditions for Clearing the DTC

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

### Reference Information

Schematic Reference

#### Exterior Lights Schematics

Connector End View Reference

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- Wiring Repairs

Scan Tool Reference

Control Module References for scan tool information

### Circuit/System Testing

1. Ignition OFF/Vehicle OFF, exterior lamps OFF, disconnect the harness connector at the E6 Center High Mounted Stop Lamp. It may take up to 2 min for all vehicle systems to power down.
2. Test for less than 5  $\Omega$  between the ground circuit terminal 1 and ground.
  - **If 5  $\Omega$  or greater**
    1. Ignition OFF/Vehicle OFF.
    2. Test for less than 2  $\Omega$  in the ground circuit end to end.
      - If 2  $\Omega$  or greater, repair the open/high resistance in the circuit.
      - If less than 2  $\Omega$ , repair the open/high resistance in the ground connection.
  - **If less than 5  $\Omega$**
3. Connect a test lamp between the control circuit terminal 2 and ground, ignition ON/vehicle in Service Mode.



4. Verify the test lamp turns ON and OFF when commanding the Center Stop Lamp ON and OFF with a scan tool.

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

1. Ignition OFF/Vehicle 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  $\Omega$  in the control circuit end to end.
  - If 2  $\Omega$  or greater, repair the open/high resistance in the circuit.
  - If less than 2  $\Omega$ , replace the K9 Body Control Module.

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

1. Ignition OFF/Vehicle OFF, disconnect the X4 harness connector at the K9 Body Control Module, ignition ON/vehicle in Service Mode.
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](#)
- [Control Module References](#) for BCM replacement, programming and setup.

## DTC B3948 OR B3949: LEFT/RIGHT FRONT TURN SIGNAL CIRCUIT

### 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 B3948 01

Left Front Turn Signal Circuit Short to Battery

#### DTC B3948 02

Left Front Turn Signal Circuit Short to Ground

#### DTC B3948 04

Left Front Turn Signal Circuit Open

#### DTC B3949 01

Right Front Turn Signal Circuit Short to Battery

#### DTC B3949 02

Right Front Turn Signal Circuit Short to Ground

#### DTC B3949 04

**Diagnostic Fault Information**

| <b>Circuit</b>                                           | <b>Short to Ground</b> | <b>Open/High Resistance</b> | <b>Short to Voltage</b> | <b>Signal Performance</b> |
|----------------------------------------------------------|------------------------|-----------------------------|-------------------------|---------------------------|
| Turn Signal Switch Signal - Left                         | 1                      | 1                           | 1                       | -                         |
| Turn Signal Switch Signal - Right                        | 1                      | 1                           | 1                       | -                         |
| Turn Signal Lamp Outage Detection Signal - Left Front    | 1                      | 1                           | 1                       | -                         |
| Turn Signal Lamp Outage Detection Signal - Left Rear     | 1                      | 1                           | 1                       | -                         |
| Turn Signal Lamp Outage Detection Signal - Right Front   | 1                      | 1                           | 1                       | -                         |
| Turn Signal Lamp Outage Detection Signal - Right Rear    | 1                      | 1                           | 1                       | -                         |
| Turn Signal Control - Left Front                         | B3948 02               | B3948 01, B3948 04          | 1                       | -                         |
| Turn Signal Control - Left Rear (with TVN)               | B3950 02               | B3950 01, B3950 04          | 1                       | -                         |
| Turn Signal/Stop Lamp Control - Left Rear (without TVN)  | B3950 02               | B3950 01, B3950 04          | 1                       | -                         |
| Turn Signal Control - Right Front                        | B3949 02               | B3949 01, B3949 04          | 1                       | -                         |
| Turn Signal Control - Right Rear (with TVN)              | B3951 02               | B3951 01, B3951 04          | 1                       | -                         |
| Turn Signal/Stop Lamp Control - Right Rear (without TVN) | B3951 02               | B3951 01, B3951 04          | 1                       | -                         |
| Outside Rearview Mirror - Driver Ground                  | -                      | 1                           | -                       | -                         |
| Outside Rearview Mirror - Passenger Ground               | -                      | 1                           | -                       | -                         |
| Tail Lamp Assembly - Left Rear Ground                    | -                      | 1                           | -                       | -                         |
| Tail Lamp Assembly - Right Rear Ground                   | -                      | 1                           | -                       | -                         |
| Turn Signal/Multifunction Switch Ground                  | -                      | 1                           | -                       | -                         |
| 1. Turn Signal Lamps and/or Indicators 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.

**Conditions for Running the DTC**

Battery voltage must be between 9-16 V.

### Conditions for Setting the DTC

#### DTC B3948 01 and B3948 04

The BCM detects an open/high resistance in the left front turn signal control circuit.

#### DTC B3948 02

The BCM detects a short to ground in the left front turn signal control circuit.

#### DTC B3949 01 and B3949 04

The BCM detects an open/high resistance in the right front turn signal control circuit.

#### DTC B3949 02

The BCM detects a short to ground in the right front turn signal control circuit.

### Actions Taken When the DTC Sets

#### DTC B3948

- The left front turn signal is inoperative.
- The left turn signal indicator on the instrument cluster flashes rapidly.
- The driver information center displays "Left Front Turn Indicator Failure".

#### DTC B3949

- The right front turn signal is inoperative.
- The right turn signal indicator on the instrument cluster flashes rapidly.
- The driver information center displays "Right Front Turn Indicator Failure".

### 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

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Scan Tool Reference

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

[Circuit/System Testing](#)

## DTC B3948

1. Ignition OFF/Vehicle OFF, exterior lamps OFF, disconnect the harness connector at the appropriate turn signal lamp - left front. It may take up to 2 min for all vehicle systems to power down.
2. Test for less than 15  $\Omega$  between the appropriate ground circuit terminal listed below and ground.
  - A9A Outside Rearview - Driver terminal 8
  - E13LA Headlamp Assembly - Left terminal 4
  - **If 15  $\Omega$  or greater**
    1. Ignition OFF/Vehicle OFF.
    2. Test for less than 2  $\Omega$  in the ground circuit end to end.
      - If 2  $\Omega$  or greater, repair the open/high resistance in the circuit.
      - If less than 2  $\Omega$ , repair the open/high resistance in the ground connection.
  - **If less than 15  $\Omega$**
3. Connect a test lamp between the appropriate control circuit terminal listed below and ground, ignition ON/vehicle in Service Mode.
  - A9A Outside Rearview - Driver terminal 17
  - E13LA Headlamp Assembly - Left terminal 6
4. Verify the test lamp turns ON and OFF when commanding the Left Front Turn Signal Lamp ON and OFF with a scan tool.
  - **If the test lamp is always OFF**
    1. Ignition OFF/Vehicle OFF, disconnect the X5 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  $\Omega$  in the control circuit end to end.
      - If 2  $\Omega$  or greater, repair the open/high resistance in the circuit.
      - If less than 2  $\Omega$ , replace the K9 Body Control Module.
  - **If the test lamp is always ON**
    1. Ignition OFF/Vehicle OFF, disconnect the X5 harness connector at the K9 Body Control Module, ignition ON/vehicle in Service Mode.
    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 turn signal lamp - left front.

## DTC B3949

1. Ignition OFF/Vehicle OFF, exterior lamps OFF, disconnect the harness connector at the appropriate turn signal lamp - right front. It may take up to 2 min for all vehicle systems to power down.
2. Test for less than 15  $\Omega$  between the appropriate ground circuit terminal listed below and ground.
  - A9B Outside Rearview - Passenger terminal 8
  - E13RA Headlamp Assembly - Right terminal 4
  - **If 15  $\Omega$  or greater**
    1. Ignition OFF/Vehicle OFF.
    2. Test for less than 2  $\Omega$  in the ground circuit end to end.
      - If 2  $\Omega$  or greater, repair the open/high resistance in the circuit.
      - If less than 2  $\Omega$ , repair the open/high resistance in the ground connection.
  - **If less than 15  $\Omega$**



3. Connect a test lamp between the appropriate control circuit terminal listed below and ground, ignition ON/vehicle in Service Mode.
  - A9B Outside Rearview - Passenger terminal 17
  - E13RA Headlamp Assembly - Right terminal 6
4. Verify the test lamp turns ON and OFF when commanding the Right Front Turn Signal Lamp ON and OFF with a scan tool.
  - **If the test lamp is always OFF**
    1. Ignition OFF/Vehicle 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  $\Omega$  in the control circuit end to end.
      - If 2  $\Omega$  or greater, repair the open/high resistance in the circuit.
      - If less than 2  $\Omega$ , replace the K9 Body Control Module.
  - **If the test lamp is always ON**
    1. Ignition OFF/Vehicle OFF, disconnect the X4 harness connector at the K9 Body Control Module, ignition ON/vehicle in Service Mode.
    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 turn signal lamp - right front.

### Repair Instructions

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

- [Headlamp Replacement](#)
- [Outside Rearview Mirror Turn Signal Lamp Replacement](#)
- [Control Module References](#) for BCM replacement, programming and setup.

## DTC B3950 OR B3951: LEFT/RIGHT REAR TURN SIGNAL CIRCUIT

### 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 B3950 01

Left Rear Turn Signal Circuit Short to Battery

#### DTC B3950 02

Left Rear Turn Signal Circuit Short to Ground

#### DTC B3950 04

Left Rear Turn Signal Circuit Open

#### DTC B3951 01

Right Rear Turn Signal Circuit Short to Battery

**DTC B3951 02**

Right Rear Turn Signal Circuit Short to Ground

**DTC B3951 04**

Right Rear Turn Signal Circuit Open

**Diagnostic Fault Information**

| <b>Circuit</b>                                           | <b>Short to Ground</b> | <b>Open/High Resistance</b> | <b>Short to Voltage</b> | <b>Signal Performance</b> |
|----------------------------------------------------------|------------------------|-----------------------------|-------------------------|---------------------------|
| Turn Signal Switch Signal - Left                         | 1                      | 1                           | 1                       | -                         |
| Turn Signal Switch Signal - Right                        | 1                      | 1                           | 1                       | -                         |
| Turn Signal Lamp Outage Detection Signal - Left Front    | 1                      | 1                           | 1                       | -                         |
| Turn Signal Lamp Outage Detection Signal - Left Rear     | 1                      | 1                           | 1                       | -                         |
| Turn Signal Lamp Outage Detection Signal - Right Front   | 1                      | 1                           | 1                       | -                         |
| Turn Signal Lamp Outage Detection Signal - Right Rear    | 1                      | 1                           | 1                       | -                         |
| Turn Signal Control - Left Front                         | B3948 02               | B3948 01, B3948 04          | 1                       | -                         |
| Turn Signal Control - Left Rear (with TVN)               | B3950 02               | B3950 01, B3950 04          | 1                       | -                         |
| Turn Signal/Stop Lamp Control - Left Rear (without TVN)  | B3950 02               | B3950 01, B3950 04          | 1                       | -                         |
| Turn Signal Control - Right Front                        | B3949 02               | B3949 01, B3949 04          | 1                       | -                         |
| Turn Signal Control - Right Rear (with TVN)              | B3951 02               | B3951 01, B3951 04          | 1                       | -                         |
| Turn Signal/Stop Lamp Control - Right Rear (without TVN) | B3951 02               | B3951 01, B3951 04          | 1                       | -                         |
| Outside Rearview Mirror - Driver Ground                  | -                      | 1                           | -                       | -                         |
| Outside Rearview Mirror - Passenger Ground               | -                      | 1                           | -                       | -                         |
| Tail Lamp Assembly - Left Rear Ground                    | -                      | 1                           | -                       | -                         |
| Tail Lamp Assembly - Right Rear Ground                   | -                      | 1                           | -                       | -                         |
| Turn Signal/Multifunction Switch Ground                  | -                      | 1                           | -                       | -                         |
| 1. Turn Signal Lamps and/or Indicators 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.

### **Conditions for Running the DTC**

Battery voltage must be between 9-16 V.

### **Conditions for Setting the DTC**

#### **DTC B3950 01 and B3950 04**

The BCM detects an open/high resistance in the left rear turn signal control circuit.

#### **DTC B3950 02**

The BCM detects a short to ground in the left rear turn signal control circuit.

#### **DTC B3951 01 and B3951 04**

The BCM detects an open/high resistance in the right rear turn signal control circuit.

#### **DTC B3951 02**

The BCM detects a short to ground in the right rear turn signal control circuit.

### **Actions Taken When the DTC Sets**

#### **DTC B3950**

- The left rear turn signal is inoperative.
- The left turn signal indicator on the instrument cluster flashes rapidly.
- The driver information center displays "Left Rear Turn Indicator Failure".

#### **DTC B3951**

- The right rear turn signal is inoperative.
- The right turn signal indicator on the instrument cluster flashes rapidly.
- The driver information center displays "Right Rear Turn Indicator Failure".

### **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**

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- [Wiring Repairs](#)

Scan Tool Reference

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

### Circuit/System Testing

#### DTC B3950

1. Ignition OFF/Vehicle OFF, exterior lamps OFF, disconnect the harness connector at the E42L Tail Lamp Assembly - Left. It may take up to 2 min for all vehicle systems to power down.
2. Test for less than 10  $\Omega$  between the ground circuit terminal 1 and ground.
  - **If 10  $\Omega$  or greater**
    1. Ignition OFF/Vehicle OFF.
    2. Test for less than 2  $\Omega$  in the ground circuit end to end.
      - If 2  $\Omega$  or greater, repair the open/high resistance in the circuit.
      - If less than 2  $\Omega$ , repair the open/high resistance in the ground connection.
  - **If less than 10  $\Omega$**
3. Connect a test lamp between the control circuit terminal 5 and ground, ignition ON/vehicle in Service Mode.
4. Verify the test lamp turns ON and OFF when commanding the Left Rear Turn Signal/Stop Lamp ON and OFF with a scan tool.
  - **If the test lamp is always OFF**
    1. Ignition OFF/Vehicle OFF, disconnect the X5 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  $\Omega$  in the control circuit end to end.
      - If 2  $\Omega$  or greater, repair the open/high resistance in the circuit.
      - If less than 2  $\Omega$ , replace the K9 Body Control Module.
  - **If the test lamp is always ON**
    1. Ignition OFF/Vehicle OFF, disconnect the X5 harness connector at the K9 Body Control Module, ignition ON/vehicle in Service Mode.
    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 E42L Tail Lamp Assembly - Left.

#### DTC B3951

1. Ignition OFF/Vehicle OFF, exterior lamps OFF, disconnect the harness connector at the E42R Tail Lamp Assembly - Right. It may take up to 2 min for all vehicle systems to power down.
2. Test for less than 10  $\Omega$  between the ground circuit terminal 1 and ground.
  - **If 10  $\Omega$  or greater**
    1. Ignition OFF/Vehicle OFF.
    2. Test for less than 2  $\Omega$  in the ground circuit end to end.
      - If 2  $\Omega$  or greater, repair the open/high resistance in the circuit.
      - If less than 2  $\Omega$ , repair the open/high resistance in the ground connection.
  - **If less than 10  $\Omega$**
3. Connect a test lamp between the control circuit terminal 5 and ground, ignition ON/vehicle in Service Mode.



4. Verify the test lamp turns ON and OFF when commanding the Right Rear Turn Signal/Stop Lamp ON and OFF with a scan tool.

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

1. Ignition OFF/Vehicle 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  $\Omega$  in the control circuit end to end.
  - If 2  $\Omega$  or greater, repair the open/high resistance in the circuit.
  - If less than 2  $\Omega$ , replace the K9 Body Control Module.

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

1. Ignition OFF/Vehicle OFF, disconnect the X4 harness connector at the K9 Body Control Module, ignition ON/vehicle in Service Mode.
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 E42R Tail Lamp Assembly - Right.

### Repair Instructions

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

- [Rear Body Structure Stop Lamp Replacement](#)
- [Control Module References](#) for BCM replacement, programming and setup

## DTC C0277 OR C0890: BRAKE PEDAL POSITION SENSOR CIRCUIT

### 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 12

Brake Pedal Position Sensor Circuit Low Input

#### DTC C0277 4B

Brake Pedal Position Sensor Circuit Calibration Not Learned

#### DTC C0890 03

**DTC C0890 07**

## Control Module Voltage Reference Output 3 Circuit High Voltage

**Diagnostic Fault Information**

| <b>Circuit</b>                                                                  | <b>Short to Ground</b>                 | <b>Open/High Resistance</b>  | <b>Short to Voltage</b>                | <b>Signal Performance</b> |
|---------------------------------------------------------------------------------|----------------------------------------|------------------------------|----------------------------------------|---------------------------|
| Brake Pedal Position Sensor 5 V Reference                                       | C0277 06, C0890 03, U0422 00, U0422 71 | C0277 06, U0422 00, U0422 71 | C0277 07, C0890 07, U0422 00, U0422 71 | -                         |
| Brake Pedal Position Sensor Signal                                              | C0277 06, U0422 00, U0422 71           | C0277 06, U0422 00, U0422 71 | C0277 07, C0890 07, U0422 00, U0422 71 | C0277 09                  |
| Center High Mounted Stop Lamp Control                                           | B3884 02                               | B3884 04                     | B3884 04                               | -                         |
| Stop Lamp Control - Left (with TVN)                                             | 1                                      | 1                            | 1                                      | -                         |
| Stop Lamp Control - Right (with TVN)                                            | 1                                      | 1                            | 1                                      | -                         |
| Turn Signal/Stop Lamp Control - Left (without TVN)                              | 2                                      | B3950 02                     | 2                                      | -                         |
| Turn Signal/Stop Lamp Control - Right (without TVN)                             | 2                                      | B3951 02                     | 2                                      | -                         |
| Brake Pedal Position Sensor Low Reference                                       | -                                      | C0277 07, U0422 00, U0422 71 | 1                                      | -                         |
| Center High Mounted Stop Lamp Ground                                            | -                                      | 1                            | -                                      | -                         |
| Tail Lamp Assembly - Left Rear Ground                                           | -                                      | 1                            | -                                      | -                         |
| Tail Lamp Assembly - Right Rear Ground                                          | -                                      | 1                            | -                                      | -                         |
| 1. Stop Lamps Malfunction<br>2. Turn Signal Lamps and/or Indicators 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 left and right stop lamp control circuits as well as the center high mounted stop lamp control circuit illuminating the left and right stop lamps and the center high mounted stop lamp.

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

#### **DTC C0277 07**

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

#### **DTC C0277 09**

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

#### **DTC C0277 4B**

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

#### **DTC C0890 03**

The BCM detects a short to ground in the brake pedal position sensor 5 V reference circuit.

#### **DTC C0890 07**

The BCM detects a short to voltage in the brake pedal position sensor 5 V reference circuit.

#### **Actions Taken When the DTC Sets**

- The "Park Assist Temporarily Unavailable" message is displayed on the driver information center.
- 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.
- Disconnect the negative battery cable for 30 s.
- 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**

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- [Wiring Repairs](#)

Scan Tool Reference

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

### Circuit/System Testing

#### DTC C0277 06, C0277 07, C0277 12, C0890 03 and C0890 07

1. Ignition OFF/Vehicle OFF, disconnect the harness connector at the B22 Brake Pedal Position Sensor, ignition ON/vehicle in Service Mode.
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/Vehicle OFF, disconnect the X1 harness connector at the K9 Body Control Module.
    2. Test for less than 2  $\Omega$  in the low reference circuit end to end.
      - If 2  $\Omega$  or greater, repair the open/high resistance in the circuit.
      - If less than 2  $\Omega$ , replace the K9 Body Control Module.
  - **If the test lamp illuminates**
3. Ignition ON/vehicle in Service Mode.
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/Vehicle 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  $\Omega$  in the 5 V reference circuit end to end.
      - If 2  $\Omega$  or greater, repair the open/high resistance in the circuit.
      - If less than 2  $\Omega$ , replace the K9 Body Control Module.
  - **If greater than 5.2 V**
    1. Ignition OFF/Vehicle OFF, disconnect the X2 harness connector at the K9 Body Control Module, ignition ON/vehicle in Service Mode.
    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. Test for less than 1 V between the signal circuit terminal 3 and ground.
  - **If 1 V or greater**
    1. Ignition OFF/Vehicle OFF, disconnect the X2 harness connector at the K9 Body Control Module, ignition ON/vehicle in Service Mode.
    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 less than 1 V**
6. Install a 3 A fused jumper wire between the 5 V reference circuit terminal 2 and the signal circuit terminal 3.

**NOTE:** The scan tool Brake Pedal Applied parameter will change to Active for 3 s as the 3 A fused jumper wire is connected between the 5 V reference circuit and the signal circuit and then default to Inactive. This is normal operation.



7. Verify the scan tool Brake Pedal Applied parameter is Active for 3 s before defaulting to Inactive.

- **If not Active**

1. Ignition OFF/Vehicle 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  $\Omega$  in the signal circuit end to end.
  - If 2  $\Omega$  or greater, repair the open/high resistance in the circuit.
  - If less than 2  $\Omega$ , 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/vehicle in Service Mode.
2. Perform the brake pedal position sensor learn 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 brake pedal position sensor learn 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: BRAKE APPLIED OUTPUT CIRCUIT**

### **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 C0297 01

Brake Applied Output Circuit Short to Battery

### 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 |
|-------------------------------|--------------------------------------------------------------------------------|--------------------------------------------------------------------------------|------------------|--------------------|
| F49RA (BCM 1)<br>Fuse B+      | B1325 03, B3265 01, B3265 04, B3873 01, B3873 04, B3883 01, B3883 04, C0297 01 | B1325 03, B3265 01, B3265 04, B3873 01, B3873 04, B3883 01, B3883 04, C0297 01 | -                | -                  |
| Brake Applied Signal          | C0297 02                                                                       | 1                                                                              | C0297 01         | -                  |
| 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

### DTC C0297 01

- The BCM detects a short to voltage or an open/high resistance in the brake applied signal circuit.
- The BCM detects a short to ground or an open/high resistance in the F49RA (BCM 1) fuse B+ circuit.

### DTC C0297 02

The BCM detects a short to ground or an open/high resistance 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

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

Connector End View Reference

## **COMPONENT CONNECTOR END VIEWS - INDEX**

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/Vehicle OFF, disconnect the X1 harness connector at the K20 Engine Control Module.
2. Connect a test lamp between the appropriate signal circuit terminal listed below and ground, ignition ON/vehicle in Service Mode.
  - Terminal 13 - with LGW/LGX
  - Terminal 50 - with LTG
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/Vehicle 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  $\Omega$  in the signal circuit end to end.
      - If 2  $\Omega$  or greater, repair the open/high resistance in the circuit.
      - If less than 2  $\Omega$ , replace the K9 Body Control Module.
  - **If the test lamp is always ON**
    1. Ignition OFF/Vehicle OFF, disconnect the X5 harness connector at the K9 Body Control Module, ignition ON/vehicle in Service Mode.
    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.
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:

- [Adaptive Forward Lighting Malfunction](#)
- [Backup Lamps Malfunction](#)
- [Cornering Lamps Malfunction](#)
- [Courtesy Lamps Malfunction](#)
- [Daytime Running Lamps Malfunction](#)
- [Dome Lamps Malfunction](#)
- [Exterior Courtesy Lamps Malfunction](#)
- [Rear Fog Lamps Malfunction](#)
- [Hazard Lamps Malfunction](#)
- [Headlamps Malfunction](#)
- [Headlamp Leveling 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](#)

## **ADAPTIVE FORWARD 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 |
|----------------------------------------------------|--------------------------------------------------------------|--------------------------------------------------------|--------------------------------------------------------------|--------------------|
| LIN Serial Data - Left Headlamp Leveling Actuator  | U1513 00,<br>U1514 00,<br>U1523 00,<br>U1524 00,<br>B3843 05 | U1513 00, U1514 00,<br>U1523 00, U1524 00,<br>B3843 05 | U1513 00,<br>U1514 00,<br>U1523 00,<br>U1524 00,<br>B3843 05 | -                  |
| LIN Serial Data - Right Headlamp Leveling Actuator | U1513 00,<br>U1514 00,<br>U1523 00,<br>U1524 00,<br>B3843 05 | U1513 00, U1514 00,<br>U1523 00, U1524 00,<br>B3843 05 | U1513 00,<br>U1514 00,<br>U1523 00,<br>U1524 00,<br>B3843 05 | -                  |
| Headlamp Control Module B+ Fuse (F62 UA)           | U0181 00                                                     | U0181 00                                               | -                                                            | -                  |
| Headlamp Leveling Actuator - Left B+ Fuse          | U1513 00,<br>U1514 00,<br>U1523 00,<br>U1524 00,<br>B3843 05 | U1513 00, U1514 00,<br>U1523 00, U1524 00,<br>B3843 05 | -                                                            | -                  |
| Headlamp Leveling Actuator - Right B+ Fuse         | U1513 00,<br>U1514 00,<br>U1523 00,<br>U1524 00,<br>B3843 05 | U1513 00, U1514 00,<br>U1523 00, U1524 00,<br>B3843 05 | -                                                            | -                  |
| Headlamp Control Module Ground                     | -                                                            | 1                                                      | -                                                            | -                  |
| Headlamp Assembly - Left Ground                    | -                                                            | 1                                                      | -                                                            | -                  |
| Headlamp Assembly - Right Ground                   | -                                                            | 1                                                      | -                                                            | -                  |
| 1. Adaptive Forward Lighting Malfunction           |                                                              |                                                        |                                                              |                    |

### Circuit/System Description

Battery voltage is applied to the headlamp control module at all times. The headlamp control module has a normal operational voltage range of about 12.5-16 V and is only fully functional with the ignition switch is in the RUN position and the headlamp switch in the AUTOMATIC LIGHT position. The communications enable signal from the body control module (BCM) wakes the headlamp control module microprocessor. The headlamp control module receives serial data messages from the engine control module (ECM), transmission control module (TCM), electronic brake control module (EBCM) and BCM with information regarding power mode, speed, steering angle, transmission gear selection and headlamp switch status. The headlamp control module calculates the headlamp angle and sends commands to the left and right adaptive forward lighting system headlamp actuators. The headlamp actuators drive the headlamps to the position commanded by the headlamp control module. The headlamp control module monitors the headlamp actuator motor control circuits for proper circuit continuity and for shorts to ground or voltage. If a malfunction is detected, a DTC will be stored in memory and the driver will be notified with a message displayed over the driver information center located on the instrument cluster.

### Reference Information

## Headlights/Daytime Running Lights (DRL) Schematics

Connector End View Reference

## COMPONENT CONNECTOR END VIEWS - INDEX

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/Vehicle OFF, exterior lamps OFF, disconnect the harness connector at the appropriate E13 Headlamp Assembly. It may take up to 2 min for all vehicle systems to power down.
2. Test for less than 15  $\Omega$  between the ground circuit terminal 9 and ground.
  - **If 15  $\Omega$  or greater**
    1. Ignition OFF/Vehicle OFF.
    2. Test for less than 2  $\Omega$  in the ground circuit end to end.
      - If 2  $\Omega$  or greater, repair the open/high resistance in the circuit.
      - If less than 2  $\Omega$ , repair the open/high resistance in the ground connection.
  - **If less than 15  $\Omega$**
3. Ignition ON/vehicle in Service Mode.
4. Verify a test lamp illuminates between the B+ circuit terminal and ground.
  - **If the test lamp does not illuminate**
    1. Ignition OFF/Vehicle OFF, disconnect the X1 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
    3. Test for less than 2  $\Omega$  in the control circuit end to end.
      - If 2  $\Omega$  or greater, repair the open/high resistance in the circuit.
      - If less than 2  $\Omega$ , replace the X50A Fuse Block - Underhood.
  - **If the test lamp illuminates**
5. Test or replace the K26 Headlamp Control Module.
6. Ignition ON/vehicle in Service Mode.
7. Verify the appropriate headlamp operates to the LEFT and RIGHT positions when commanding the appropriate Headlamp Horizontal Motor LEFT and RIGHT with a scan tool.
  - **If the headlamp does not operate LEFT and RIGHT**

Test or replace the E13 Headlamp Assembly.
  - **If the headlamp operates LEFT and RIGHT**

8. All OK.

### Repair Instructions

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

- [Headlamp Replacement](#)
- [Engine Wiring Harness Junction Block Replacement](#)
- [Control Module References](#) for Headlamp Control Module replacement, programming and setup.

## 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 |
|-----------------------------|--------------------|----------------------|------------------|--------------------|
| Backup Lamps Control        | B127B 2B, B2545 02 | B127B 2B, 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.

### Reference Information

Schematic Reference

### Exterior Lights Schematics

Connector End View Reference

## COMPONENT CONNECTOR END VIEWS - INDEX

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

## Circuit/System Testing

1. Ignition OFF/Vehicle OFF, exterior lamps OFF, disconnect the harness connector at the appropriate E5 Backup Lamp. It may take up to 2 min for all vehicle systems to power down.
2. Test for less than 5  $\Omega$  between the appropriate ground circuit terminal listed below and ground.
  - E5 Backup Lamp - socket terminal (without T79)
  - E5 Backup Lamp - terminal B (with T79)
  - **If 5  $\Omega$  or greater**
    1. Ignition OFF/Vehicle OFF.
    2. Test for less than 2  $\Omega$  in the ground circuit end to end.
      - If 2  $\Omega$  or greater, repair the open/high resistance in the circuit.
      - If less than 2  $\Omega$ , repair the open/high resistance in the ground connection.
  - **If less than 5  $\Omega$**
3. Connect a test lamp between the appropriate control circuit terminal listed below and ground, ignition ON/vehicle in Service Mode.
  - E5 Backup Lamp - socket terminal (without T79)
  - E5 Backup Lamp - terminal A (with T79)
4. 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/Vehicle OFF, disconnect the appropriate harness connector listed below at the K9 Body Control Module.
      - X6 (with T79)
      - X7 (without T79)
    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  $\Omega$  in the control circuit end to end.
      - If 2  $\Omega$  or greater, repair the open/high resistance in the circuit.
      - If less than 2  $\Omega$ , replace the K9 Body Control Module.
  - **If the test lamp is always ON**
    1. Ignition OFF/Vehicle OFF, disconnect the appropriate harness connector listed below at the K9 Body Control Module, ignition ON/vehicle in Service Mode.
      - X6 (with T79)
      - X7 (without T79)
    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 E5 Backup Lamp.

## Repair Instructions

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

- [Rear Body Structure Stop Lamp Replacement](#)
- [Control Module References](#) for BCM replacement, programming and setup

## CORNERING 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 |
|--------------------------------------|-----------------|----------------------|--------------------|--------------------|
| Cornering Lamp Relay - Left Control  | B2590 02        | B2590 01, B2590 04   | B2590 01, B2590 04 | -                  |
| Cornering Lamp Relay - Right Control | B2595 02        | B2595 01, B2595 04   | B2595 01, B2595 04 | -                  |
| Cornering Lamp - Left Control        | 1               | 1                    | 1                  | -                  |
| Cornering Lamp - Right Control       | 1               | 1                    | 1                  | -                  |
| Cornering Lamp - Left Ground         | -               | 1                    | -                  | -                  |
| Cornering Lamp - Right Ground        | -               | 1                    | -                  | -                  |
| 1. Cornering Lamps Malfunction       |                 |                      |                    |                    |

## Circuit/System Description

The cornering lamps are activated automatically at vehicle speeds below 25 MPH (40 km/h) when the headlamps are ON, the turn signal/multifunction switch is placed in either the left or right turn positions and/or when the steering angle is changed from the straight-ahead position towards the side the vehicle is turning. When the body control module (BCM) detects that one of these operations has occurred, the BCM responds to the cornering lamp request by applying ground to the appropriate cornering lamp relay control circuit which energizes the cornering lamp relay. With the cornering lamp relay energized, the switch contacts close allowing battery voltage to flow through the cornering lamp fuse to the cornering lamp control circuit illuminating the appropriate cornering lamp in the area that the vehicle is turning. The cornering lamps are deactivated automatically when the turn signal/multifunction switch is placed in the neutral position and/or the steering angle has returned in the straight-ahead position. The cornering lamps will not operate at vehicle speeds above 25 MPH (40 km/h).

## Reference Information

Schematic Reference

## Exterior Lights Schematics

Connector End View Reference

## COMPONENT CONNECTOR END VIEWS - INDEX

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

## Circuit/System Testing

1. Ignition OFF/vehicle OFF, disconnect the X5 harness connector at the K9 Body Control Module, ignition ON/vehicle in Service Mode.
2. Verify a test lamp illuminates between the appropriate control circuit terminal listed below and ground.
  - Terminal 10 - left cornering lamp
  - Terminal 23 - right cornering lamp
  - **If the test lamp does not illuminate**
    1. Ignition OFF/vehicle OFF, disconnect the X1 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  $\Omega$  in the control circuit end to end.
      - If 2  $\Omega$  or greater, repair the open/high resistance in the circuit.
      - If less than 2  $\Omega$ , replace the X50A Fuse Block - Underhood.
    - **If the test lamp illuminates**
3. Ignition OFF/vehicle OFF, connect a 3 A fused jumper between the appropriate control circuit terminal listed below and ground.
  - Terminal 10 - left cornering lamp
  - Terminal 23 - right cornering lamp
4. Remove the appropriate cornering lamp fuse listed below at the X50A Fuse Block - Underhood, ignition ON/vehicle in Service Mode, low beams ON.
  - F18UA - right cornering lamp
  - F47UA - left cornering lamp
5. Verify a test lamp illuminates between the appropriate cornering lamp fuse B+ switch control terminal and ground.
  - **If the test lamp does not illuminate**
    1. Ignition OFF/vehicle OFF, disconnect the X1 harness connector at the X50A Fuse Block - Underhood, ignition ON/vehicle in Service Mode.
    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 X50A Fuse Block - Underhood.
    - **If the test lamp illuminates**
6. Ignition OFF/vehicle OFF, connect the X5 harness connector at the K9 Body Control Module.
7. Install the cornering lamp fuse at the X50A Fuse Block - Underhood.
8. Ignition OFF/vehicle OFF, disconnect the harness connector at the appropriate E4 Cornering Lamp. It may take up to 2 min for all vehicle systems to power down.
9. Test for less than 15  $\Omega$  between the ground circuit terminal 1 and ground.
  - **If 15  $\Omega$  or greater**
    1. Ignition OFF/Vehicle OFF.
    2. Test for less than 2  $\Omega$  in the ground circuit end to end.
      - If 2  $\Omega$  or greater, repair the open/high resistance in the circuit.
      - If less than 2  $\Omega$ , repair the open/high resistance in the ground connection.
    - **If less than 15  $\Omega$**
10. Connect a test lamp between the control circuit terminal 2 and ground, ignition ON/vehicle in Service Mode.
11. Verify the test lamp turns ON and OFF when commanding the appropriate Cornering Lamp ON and OFF with a scan tool.

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

1. Ignition OFF/Vehicle OFF, disconnect the X5 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  $\Omega$  in the control circuit end to end.
  - If 2  $\Omega$  or greater, repair the open/high resistance in the circuit.
  - If less than 2  $\Omega$ , replace the appropriate K9 Body Control Module.

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

1. Ignition OFF/Vehicle OFF, disconnect the X5 harness connector at the X50A Fuse Block - Underhood, ignition ON/vehicle in Service Mode.
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 E4 Cornering Lamp.

### Repair Instructions

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

- [Relay Replacement \(Attached to Wire Harness\)](#) [Relay Replacement \(Within an Electrical Center\)](#)
- [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 |
|------------------------------------------|-----------------|----------------------|------------------|--------------------|
| F31RA (BCM 6) Fuse B+                    | 1               | 1                    | -                | -                  |
| Courtesy Lamps Control - Terminal 3 X7   | B1480 02        | 1                    | 1                | -                  |
| Instrument Panel Compartment Lamp Ground | -               | 1                    | -                | -                  |
| Dome/Reading Lamps - Left Front Ground   | -               | 1                    | -                | -                  |
| Dome/Reading Lamps - Right Front Ground  | -               | 1                    | -                | -                  |
| Dome/Reading Lamps - Left Rear Ground    | -               | 1                    | -                | -                  |
| Dome/Reading Lamps - Right Rear Ground   | -               | 1                    | -                | -                  |
| Sunshade Mirror Lamp - Left Ground       | -               | 1                    | -                | -                  |
| Sunshade Mirror Lamp - Right Ground      | -               | 1                    | -                | -                  |
| 1. Courtesy Lamps Malfunction            |                 |                      |                  |                    |

## **Circuit/System Description**

The body control module (BCM) supplies battery voltage to the front and rear reading lamps, left and right sunshade lamps, center console compartment lamp and instrument panel compartment lamp via the courtesy lamp control circuit. When the instrument panel compartment, center console armrest or a sunshade mirror is opened, the switch contacts close allowing battery voltage to flow illuminating the respective lamps. The front and rear reading lamps are controlled by individual switches that are activated by the occupants 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, the BCM will deactivate the courtesy lamp control circuit to prevent total battery discharge.

## **Reference Information**

Schematic Reference

## **Interior Lights Schematics**

Connector End View Reference

## **COMPONENT CONNECTOR END VIEWS - INDEX**

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/Vehicle OFF, scan tool disconnected, all doors closed, all accessories OFF, open and close drivers door, disconnect the harness connector at the inoperative courtesy lamp. It may take up to 2 min for all vehicle systems to power down.
2. Test for less than 10  $\Omega$  between the appropriate ground circuit terminal listed below and ground.
  - E27 Instrument Panel Compartment Lamp terminal 2
  - E31L Sunshade Mirror Lamp - Left terminal B
  - E31R Sunshade Mirror Lamp - Right terminal B
  - E37LF Dome/Reading Lamps - Left Front terminal 1
  - E37LR Dome/Reading Lamps - Left Rear terminal 6
  - E37RF Dome/Reading Lamps - Right Front terminal 1
  - E37RR Dome/Reading Lamps - Right Rear terminal 6
  - **If 10  $\Omega$  or greater**
    1. Ignition OFF/Vehicle OFF.
    2. Test for less than 2  $\Omega$  in the ground circuit end to end.
      - If 2  $\Omega$  or greater, repair the open/high resistance in the circuit.
      - If less than 2  $\Omega$ , repair the open/high resistance in the ground connection.
  - **If less than 10  $\Omega$**
3. Connect a test lamp between the appropriate control circuit terminal listed below and ground, ignition ON/vehicle in Service Mode.
  - E27 Instrument Panel Compartment Lamp terminal 1



- E31L Sunshade Mirror Lamp - Left terminal A
  - E31R Sunshade Mirror Lamp - Right terminal A
  - E37LF Dome/Reading Lamps - Left Front terminal 4
  - E37LR Dome/Reading Lamps - Left Rear terminal 1
  - E37RF Dome/Reading Lamps - Right Front terminal 4
  - E37RR Dome/Reading Lamps - Right Rear terminal 1
4. 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/Vehicle 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  $\Omega$  in the control circuit end to end.
      - If 2  $\Omega$  or greater, repair the open/high resistance in the circuit.
      - If less than 2  $\Omega$ , replace the K9 Body Control Module.
  - **If the test lamp is always ON**
    1. Ignition OFF/Vehicle OFF, disconnect the X7 harness connector at the K9 Body Control Module, ignition ON/vehicle in Service Mode.
    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 courtesy lamp.

### Repair Instructions

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

- [Sunshade Illuminated Mirror Lamp Bulb Replacement](#)
- [Instrument Panel Compartment Lamp Replacement](#)
- [Center Reading and Courtesy Lamp Replacement](#)
- [Control Module References](#) for BCM replacement, programming and setup.

## DAYTIME RUNNING 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 |
|-----------------------------------------------------------------------------|-----------------|----------------------|------------------|--------------------|
| Ambient Light/Sunload Sensor and Battery State of Charge Indicator B+ (HP9) | U135B 00        | U135B 00             | U135B 00         | -                  |
| Rain Sensor B+ (UTU/UTV)                                                    | U151A 00        | U151A 00             | U151A 00         | -                  |
| Ambient Light/Sunload Sensor Signal (KL9)                                   | B2645 03        | B2645 07             | B2645 07         | -                  |

| Circuit                                                                         | Short to Ground | Open/High Resistance          | Short to Voltage | Signal Performance |
|---------------------------------------------------------------------------------|-----------------|-------------------------------|------------------|--------------------|
| Daytime Running Lamp/Park Lamp Control - Left                                   | B260D 02        | 1                             | 1                | -                  |
| Daytime Running Lamp/Park Lamp Control - Right                                  | B260E 02        | 1                             | 1                | -                  |
| Ambient Light/Sunload Sensor Low Reference (KL9)                                | 1               | B2645 07, B0163 05, B0183 05, | 1                | -                  |
| Ambient Light/Sunload Sensor and Battery State of Charge Indicator Ground (HP9) | -               | U135B 00                      | -                | -                  |
| Headlamp Assembly Ground - Left                                                 | -               | 1                             | -                | -                  |
| Headlamp Assembly Ground - Right                                                | -               | 1                             | -                | -                  |
| Rain Sensor Ground (UTU/UTV)                                                    | -               | U151A 00                      | -                | -                  |
| 1. Daytime Running Lamps Malfunction                                            |                 |                               |                  |                    |

### Circuit/System Description

#### UTU/UTV

The rain sensor is used to monitor outside lighting conditions. The rain sensor provides a serial data message to the BCM based on outside lighting conditions to determine if outside lighting conditions are correct for either daytime running lamps or automatic lamp control when the headlamp switch is in the AUTO position. In daylight conditions the BCM will command the designated daytime running lamps 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 daytime running lamps operation.

#### HP9

The ambient light/sunload sensor and battery state of charge indicator is used to monitor outside lighting conditions. The ambient light/sunload sensor and battery state of charge indicator provides a serial data message to the BCM based on outside lighting conditions to determine if outside lighting conditions are correct for either daytime running lamps or automatic lamp control when the headlamp switch is in the AUTO position. In daylight conditions the BCM will command the designated daytime running lamps 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 daytime running lamps operation.

#### KL9

The ambient light/sunload sensor is used to monitor outside lighting conditions. The ambient light/sunload sensor provides a voltage signal that will vary between 0.2 and 4.9 V depending on outside lighting conditions. The body control module (BCM) provides a 5 V 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 lamps or automatic lamp control when the headlamp switch is in the AUTO position. In daylight conditions the BCM will command the designated daytime running lamps 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 daytime running lamps operation.

### Reference Information

#### Schematic Reference

- [Headlights/Daytime Running Lights \(DRL\) Schematics](#)

- [Wiper/Washer Schematics](#)
- [Body Control System Schematics](#)

Connector End View Reference

## [COMPONENT CONNECTOR END VIEWS - INDEX](#)

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/vehicle in Service Mode.
2. Verify the left daytime running lamp turns ON and OFF while commanding the Left Front Park Lamp/Daytime Running Lamp ON and OFF with a scan tool.
  - **If the left daytime running lamp does not turn ON and OFF**  
Refer to Daytime Running Lamps Malfunction.
  - **If the left daytime running lamp turns ON and OFF**
3. Verify the right daytime running lamp turns ON and OFF while commanding the Right Front Park Lamp/Daytime Running Lamp ON and OFF with a scan tool.
  - **If the right daytime running lamp does not turn ON and OFF**  
Refer to Daytime Running Lamps Malfunction.
  - **If the right daytime running lamp turns ON and OFF**
4. Refer to the appropriate malfunction listed below
  - Ambient Light/Sunload Sensor Malfunction (KL9)
  - Rain Sensor Malfunction (UTU/UTV)
  - [DTC U1340-U135F](#) for Ambient Light/Sunload Sensor and Battery State of Charge Indicator (HP9)

## [Circuit/System Testing](#)

### [Daytime Running Lamps Malfunction](#)

1. Ignition OFF/Vehicle OFF, exterior lamps OFF, disconnect the harness connector at the appropriate E13 Headlamp Assembly. It may take up to 2 min for all vehicle systems to power down.
2. Test for less than 15  $\Omega$  between each ground circuit at terminal 1 and terminal 4 and ground.
  - **If 15  $\Omega$  or greater**
    1. Ignition OFF/Vehicle OFF.
    2. Test for less than 2  $\Omega$  in the ground circuit end to end.
      - If 2  $\Omega$  or greater, repair the open/high resistance in the circuit.
      - If less than 2  $\Omega$ , repair the open/high resistance in the ground connection.
  - **If less than 15  $\Omega$**

3. Connect a test lamp between the control circuit terminal 7 and ground, ignition ON/vehicle in Service Mode.
4. Verify the test lamp turns ON and OFF when commanding the appropriate Front Park Lamp/Daytime Running Lamp ON and OFF with a scan tool.
  - **If the test lamp is always OFF**
    1. Ignition OFF/Vehicle OFF, disconnect the appropriate harness connector listed below at the K9 Body Control Module.
      - X4 - left daytime running lamp
      - X5 - right daytime running 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  $\Omega$  in the control circuit end to end.
      - If 2  $\Omega$  or greater, repair the open/high resistance in the circuit.
      - If less than 2  $\Omega$ , replace the K9 Body Control Module.
  - **If the test lamp is always ON**
    1. Ignition OFF/Vehicle OFF, disconnect the appropriate harness connector listed below at the K9 Body Control Module, ignition ON/vehicle in Service Mode.
      - X4 - left daytime running lamp
      - X5 - right daytime running 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 E13 Headlamp Assembly.

#### Ambient Light/Sunload Sensor Malfunction (KL9)

1. Ignition OFF/Vehicle OFF, scan tool disconnected, all doors closed, all accessories OFF, open and close drivers door, disconnect the harness connector at the B10B Ambient Light/Sunload Sensor. It may take up to 10 min for all vehicle systems to power down.
2. Test for less than 10  $\Omega$  between the low reference circuit terminal 6 and ground.
  - **If 10  $\Omega$  or greater**
    1. Ignition OFF/Vehicle OFF, disconnect the X2 harness connector at the K33 HVAC Control Module.
    2. Test for less than 2  $\Omega$  in the low reference circuit end to end.
      - If 2  $\Omega$  or greater, repair the open/high resistance in the circuit.
      - If less than 2  $\Omega$ , replace the K33 HVAC Control Module.
  - **If less than 10  $\Omega$**
3. Ignition ON/vehicle in Service Mode.
4. Verify the scan tool Ambient Light Sensor parameter is greater than 4.65 V.
  - **If 4.65 V or less**
    1. Ignition OFF/Vehicle OFF, disconnect the X2 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 greater than 4.65 V**
5. Install a 3 A fused jumper wire between the signal circuit terminal 3 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/Vehicle OFF, disconnect the X2 harness connector at the K9 Body Control Module, ignition ON/vehicle in Service Mode.
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  $\Omega$  in the signal circuit end to end.
  - If 2  $\Omega$  or greater, repair the open/high resistance in the circuit.
  - If less than 2  $\Omega$ , replace the K9 Body Control Module.
- **If less than 0.196 V**
7. Test or replace the B10B Ambient Light/Sunload Sensor.

#### Rain Sensor Malfunction (UTU/UTV)

1. Ignition OFF/Vehicle OFF, scan tool disconnected, all doors closed, all accessories OFF, disconnect the harness connector at the B117 Rain Sensor. It may take up to 2 min for all vehicle systems to power down.
2. Test for less than 15  $\Omega$  between the ground circuit terminal 3 and ground.
  - **If 15  $\Omega$  or greater**
    1. Ignition OFF/Vehicle OFF.
    2. Test for less than 2  $\Omega$  in the ground circuit end to end.
      - If 2  $\Omega$  or greater, repair the open/high resistance in the circuit.
      - If less than 2  $\Omega$ , repair the open/high resistance in the ground connection.
  - **If less than 15  $\Omega$**
3. Ignition ON/vehicle in Service Mode.
4. Verify a test lamp illuminates between the B+ circuit terminal 1 and ground.
  - **If the test lamp does not illuminate and the circuit fuse is good**
    1. Ignition OFF/Vehicle OFF, disconnect the X1 harness connector at the X53A Fuse Block - Rear Body.
    2. Test for less than 2  $\Omega$  in the B+ circuit end to end.
      - If 2  $\Omega$  or greater, repair the open/high resistance in the circuit.
      - If less than 2  $\Omega$ , 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/Vehicle OFF, disconnect the X1 harness connector at the X53A Fuse Block - Rear Body.
    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 X53A Fuse Block - Rear Body.
  - **If the test lamp illuminates**
5. Test or replace the B117 Rain Sensor.

#### Repair Instructions

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

- [Headlamp Replacement](#)
- [Windshield Outside Moisture/Ambient Light and Humidity Sensor Replacement](#)
- [Sun Load, Ambient Light and Charge Indicator Sensor Replacement](#)
- [Control Module References](#) for BCM or HVAC control module replacement, programming and setup

## DOMELAMPS 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 |
|------------------------------------------------------------------------------------------------------------------|-----------------|----------------------|------------------|--------------------|
| Dome/Courtesy Lamps Control Terminal 1 X7                                                                        | B2615 02        | 1                    | 1                | -                  |
| Dome/Courtesy Lamps Control Terminal 5 X2                                                                        | B2615 02        | 1                    | 1                | -                  |
| Dome Lamp Cancel Switch Indicator Control                                                                        | 3               | 3                    | B093F 01         | -                  |
| Dome Lamp Switch Cancel Signal                                                                                   | B380B 02        | 2                    | 2                | -                  |
| Dome Lamp Switch ON Signal                                                                                       | 2               | B380A 01             | B380A 01         | -                  |
| Dome/Reading Lamps - Left Front Ground                                                                           | -               | 1                    | -                | -                  |
| Dome/Reading Lamps - Left Rear Ground                                                                            | -               | 1                    | -                | -                  |
| Dome/Reading Lamps - Right Front Ground                                                                          | -               | 1                    | -                | -                  |
| Dome/Reading Lamps - Right Rear Ground                                                                           | -               | 1                    | -                | -                  |
| Door Courtesy Lamp - Driver Ground                                                                               | -               | 1                    | -                | -                  |
| Door Courtesy Lamp - Passenger Ground                                                                            | -               | 1                    | -                | -                  |
| Door Courtesy Lamp - Left Rear Ground                                                                            | -               | 1                    | -                | -                  |
| Door Courtesy Lamp - Right Rear Ground                                                                           | -               | 1                    | -                | -                  |
| Door Sill Plate Lamp - Driver Ground                                                                             | -               | 1                    | -                | -                  |
| Door Sill Plate Lamp - Passenger Ground                                                                          | -               | 1                    | -                | -                  |
| Door Sill Plate Lamp - Left Rear Ground                                                                          | -               | 1                    | -                | -                  |
| Door Sill Plate Lamp - Right Rear Ground                                                                         | -               | 1                    | -                | -                  |
| Floor Courtesy Lamp - Left Front Inner Ground                                                                    | -               | 1                    | -                | -                  |
| Floor Courtesy Lamp - Right Front Inner Ground                                                                   | -               | 1                    | -                | -                  |
| Floor Courtesy Lamp - Left Front Outer Ground                                                                    | -               | 1                    | -                | -                  |
| Floor Courtesy Lamp - Left Rear Ground                                                                           | -               | 1                    | -                | -                  |
| Floor Courtesy Lamp - Right Rear Ground                                                                          | -               | 1                    | -                | -                  |
| Multifunction Switch - Overhead Console Ground                                                                   | -               | 2, 3                 | -                | -                  |
| 1. Dome Lamps Malfunction<br>2. Dome Lamp Switch Malfunction<br>3. Dome Lamp Switch Cancel Indicator 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/courtesy lamps will remain illuminated until the switch is placed in either the DOOR or OFF position. When in the DOOR position, the dome/courtesy lamps operation is controlled by the body control module (BCM). The BCM applies battery voltage to the interior courtesy lamps through the dome/courtesy lamps control circuits at terminal 1 X7 and terminal 5 X2. When any door is opened, the jam switch contacts close and the BCM receives a door-ajar input. If the BCM receives a door lock or unlock input or a rear hatch open input, the BCM responds by applying battery voltage to the interior courtesy lamps through the dome/courtesy lamps control circuits at terminal 1 X7 and terminal 5 X2. After all doors have been closed, the dome lamps 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/courtesy lamps will be disabled and an amber indicator will illuminate to inform the driver that the dome lamp switch is in the OFF position. In the event that any of the dome/courtesy lamps were to remain illuminated for more than 10 minutes with the ignition switch in the OFF position, the BCM will deactivate the dome/courtesy lamp control circuits to prevent total battery discharge.

## **Reference Information**

Schematic Reference

## **Interior Lights Schematics**

Connector End View Reference

## **COMPONENT CONNECTOR END VIEWS - INDEX**

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/vehicle in Service Mode.
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.
  - **If the parameter changes**
4. Verify all dome/courtesy lamps controlled by the dome/courtesy lamps control circuits at terminal 1 X7 and terminal 5 X2 turn ON and OFF while commanding the Courtesy Lamps ON and OFF with a scan tool.

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

Refer to Dome/Courtesy Lamps Malfunction.

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

5. Verify the dome lamp cancel switch amber indicator illuminates ON and OFF while activating the dome lamp cancel switch between the ON and OFF positions.

- **If the dome lamp cancel switch amber indicator does not illuminate**

Refer to Dome Lamp Cancel Switch Indicator Malfunction.

- **If the dome lamp cancel switch amber indicator illuminates**

6. All OK.

## Circuit/System Testing

### Dome Lamp Switch Malfunction

1. Ignition OFF/Vehicle OFF, scan tool disconnected, all doors closed, all accessories OFF, open and close drivers door, disconnect the harness connector at the S48B Multifunction Switch - Overhead Console. It may take up to 2 min for all vehicle systems to power down.

2. Test for less than 10  $\Omega$  between the ground circuit terminal 14 and ground.

- **If 10  $\Omega$  or greater**

1. Ignition OFF/Vehicle OFF.

2. Test for less than 2  $\Omega$  in the ground circuit end to end.

- If 2  $\Omega$  or greater, repair the open/high resistance in the circuit.
- If less than 2  $\Omega$ , repair the open/high resistance in the ground connection.

- **If less than 10  $\Omega$**

3. Ignition ON/vehicle in Service Mode.

4. Verify the scan tool Interior/Courtesy Lighting Master Switch parameter is Door.

- **If Cancel**

1. Ignition OFF/Vehicle 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 On**

1. Ignition OFF/Vehicle OFF, disconnect the X7 harness connector at the K9 Body Control Module.

2. Test for infinite resistance between the signal circuit terminal 12 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 4 and ground.

6. Verify the scan tool Interior/Courtesy Lighting Master Switch parameter is Cancel.

- **If not Cancel**

1. Ignition OFF/Vehicle OFF, disconnect the X1 harness connector at the K9 Body Control Module, ignition ON/vehicle in Service Mode.

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  $\Omega$  in the signal circuit end to end.

- If 2  $\Omega$  or greater, repair the open/high resistance in the circuit.
- If less than 2  $\Omega$ , replace the K9 Body Control Module.



- **If Cancel**

7. Install a 3A fused jumper wire between the signal circuit terminal 12 and ground.

8. Verify the scan tool Interior/Courtesy Lighting Master Switch parameter is On.

- **If not On**

1. Ignition OFF/Vehicle OFF, disconnect the X7 harness connector at the K9 Body Control Module, ignition ON/vehicle in Service Mode.

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  $\Omega$  in the signal circuit end to end.

- If 2  $\Omega$  or greater, repair the open/high resistance in the circuit.
- If less than 2  $\Omega$ , replace the K9 Body Control Module.

- **If On**

9. Test or replace the S48B Multifunction Switch - Overhead Console.

### Dome/Courtesy Lamps Malfunction

1. Ignition OFF/Vehicle OFF, scan tool disconnected, all doors closed, all accessories OFF, open and close drivers door, disconnect the harness connector at the component with inoperative dome/courtesy lamp. It may take up to 2 min for all vehicle systems to power down.

**NOTE:** Each lighting component may need to be disconnected to isolate a short to ground. Use the schematics to identify the following:

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

2. Test for less than 10  $\Omega$  between the appropriate ground circuit terminal listed below and ground.

- E8A Door Sill Plate Lamp - Driver terminal 2 (with B7G)
- E8B Door Sill Plate Lamp - Passenger terminal 2 (with B7G)
- E8D Door Courtesy Lamp - Driver terminal 2
- E8P Door Courtesy Lamp - Passenger terminal 2
- E8Q Door Sill Plate Lamp - Left Rear terminal 2 (with B7G)
- E8R Door Sill Plate Lamp - Right Rear terminal 2 (with B7G)
- E8LR Door Courtesy Lamp - Left Rear terminal 2
- E8RR Door Courtesy Lamp - Right Rear terminal 2
- E8VB Floor Courtesy Lamp - Left Rear terminal 2
- E8VD Floor Courtesy Lamp - Right Rear terminal 2
- E80L0 Floor Courtesy Lamp - Left Front Outer terminal 2
- E80LI Floor Courtesy Lamp - Left Front Inner terminal 2
- E80R0 Floor Courtesy Lamp - Right Front Outer terminal 2
- E80RI Floor Courtesy Lamp - Right Front Inner terminal 2
- E37LF Dome/Reading Lamps - Left Front terminal 1
- E37RF Dome/Reading Lamps - Right Front terminal 1
- E37LR Dome/Reading Lamps - Left Rear terminal 6
- E37RR Dome/Reading Lamps - Right Rear terminal 6

- **If 10  $\Omega$  or greater**

1. Ignition OFF/Vehicle OFF.

2. Test for less than 2  $\Omega$  in the ground circuit end to end.

- If 2  $\Omega$  or greater, repair the open/high resistance in the circuit.
- If less than 2  $\Omega$ , repair the open/high resistance in the ground connection.

- **If less than 10  $\Omega$**
3. Connect a test lamp between the appropriate control circuit terminal listed below and ground, ignition ON/vehicle in Service Mode.
    - E8A Door Sill Plate Lamp - Driver terminal 1 (with B7G)
    - E8B Door Sill Plate Lamp - Passenger terminal 1 (with B7G)
    - E8D Door Courtesy Lamp - Driver terminal 1 (with B7G)
    - E8P Door Courtesy Lamp - Passenger terminal 1 (with B7G)
    - E8Q Door Sill Plate Lamp - Left Rear terminal 1 (with B7G)
    - E8R Door Sill Plate Lamp - Right Rear terminal 1 (with B7G)
    - E8LR Door Courtesy Lamp - Left Rear terminal 1
    - E8RR Door Courtesy Lamp - Right Rear terminal 1
    - E8VB Floor Courtesy Lamp - Left Rear terminal 1
    - E8VD Floor Courtesy Lamp - Right Rear terminal 1
    - E8 Floor Courtesy Lamp - Left Front Outer terminal 1
    - E8 Floor Courtesy Lamp - Left Front Inner terminal 1
    - E8 Floor Courtesy Lamp - Right Front Outer terminal 1
    - E8 Floor Courtesy Lamp - Right Front Inner terminal 1
    - E37LF Dome/Reading Lamps - Left Front terminal 3
    - E37RF Dome/Reading Lamps - Right Front terminal 3
    - E37LR Dome/Reading Lamps - Left Rear terminal 2
    - E37RR Dome/Reading Lamps - Right Rear terminal 2
  4. 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/Vehicle OFF, disconnect the appropriate harness connector listed below at the K9 Body Control Module.
        - X2
        - X7
      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  $\Omega$  in the control circuit end to end.
        - If 2  $\Omega$  or greater, repair the open/high resistance in the circuit.
        - If less than 2  $\Omega$ , replace the K9 Body Control Module.
    - **If the test lamp is always ON**
      1. Ignition OFF/Vehicle OFF, disconnect the appropriate harness connector listed below at the K9 Body Control Module, ignition ON/vehicle in Service Mode.
        - X2
        - X7
      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 dome/courtesy lamp.

#### **Dome Lamp Cancel Switch Indicator Malfunction**

1. Ignition OFF, disconnect the harness connector at the S48B Multifunction Switch - Overhead Console.
2. Connect a test lamp between the control circuit terminal 5 and ground, ignition ON.

3. Verify the test lamp turns ON and OFF when commanding the Indicator Dimming 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  $\Omega$  in the control circuit end to end.
  - If 2  $\Omega$  or greater, repair the open/high resistance in the circuit.
  - If less than 2  $\Omega$ , 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**

4. Ignition OFF, connect the harness connector at the S48B Multifunction Switch - Overhead Console.
5. Disconnect the X5 harness connector at the K9 Body Control Module, ignition ON.
6. Verify the dome lamp cancel switch amber indicator does not illuminate.

- **If the dome lamp cancel switch amber indicator illuminates**

1. Ignition OFF, disconnect the harness connector at the S48B Multifunction Switch - Overhead Console.
2. Test for infinite resistance between the control circuit terminal 13 and ground.
  - If less than infinite resistance, repair the short to ground on the circuit.
  - If infinite resistance, replace the S48B Multifunction Switch - Overhead Console.

- **If the dome lamp cancel switch amber indicator does not illuminate**

7. Install a 3 A fused jumper wire between the control circuit terminal 13 and ground.
8. Verify the dome lamp cancel switch amber indicator illuminates.

- **If the dome lamp cancel switch amber indicator does not illuminate**

1. Ignition OFF, disconnect the harness connector at the S48B Multifunction Switch - Overhead Console, 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
3. Test for less than 2  $\Omega$  in the control circuit end to end.
  - If 2  $\Omega$  or greater, repair the open/high resistance in the circuit.
  - If less than 2  $\Omega$ , replace the S48B Multifunction Switch - Overhead Console.

- **If the dome lamp cancel switch amber indicator illuminates**

9. Replace the K9 Body Control Module.

## Repair Instructions

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

- [Interior Lamp Switch Replacement](#)
- [Front Side Door Courtesy Lamp Replacement](#)
- [Roof Rail Rear Seat Position Reading and Courtesy Lamp Replacement](#)
- [Center Reading and Courtesy Lamp Replacement](#)

- [Front Floor Courtesy Lamp Replacement \(Left Side\)](#) [Front Floor Courtesy Lamp Replacement \(Right Side\)](#)
- [Control Module References](#) for BCM replacement, programming and setup

## EXTERIOR 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 |
|---------------------------------------------------|-----------------|----------------------|------------------|--------------------|
| Exterior Courtesy Lamps Control - Terminal 7 X3   | B263A 02        | B263A 04             | 1                | -                  |
| Door Handle Assembly - Driver Exterior Ground     | -               | 1                    | -                | -                  |
| Door Handle Assembly - Left Rear Exterior Ground  | -               | 1                    | -                | -                  |
| Door Handle Assembly - Passenger Exterior Ground  | -               | 1                    | -                | -                  |
| Door Handle Assembly - Right Rear Exterior Ground | -               | 1                    | -                | -                  |
| Outside Rearview Mirror - Driver Ground           | -               | 1                    | -                | -                  |
| Outside Rearview Mirror - Passenger Ground        | -               | 1                    | -                | -                  |
| 1. Exterior Courtesy Lamps Malfunction            |                 |                      |                  |                    |

### Circuit/System Description

The body control module (BCM) supplies battery voltage to each exterior door handles LED backlighting and the LED lighting located under each outside rearview mirror for approach lighting. When the keyless entry transmitter is operated to the lock/unlock functions the exterior door handles LED's and the LED lighting located under each outside rearview mirror for approach lighting are commanded ON.

### Reference Information

Schematic Reference

### [Exterior Lights Schematics](#)

Connector End View Reference

## [COMPONENT CONNECTOR END VIEWS - INDEX](#)

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### 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/Vehicle OFF, scan tool disconnected, all doors closed, all accessories OFF, open and close drivers door, disconnect the harness connector at the inoperative exterior courtesy lamp. It may take up to 2 min for all vehicle systems to power down.

**NOTE:** Each component may need to be disconnected to isolate a short to voltage, short to ground or an open/high resistance. Use the schematics to identify the following:

- Exterior courtesy lamps the vehicle is equipped with
  - Each component's control and ground circuit terminals
  - Component locations on the exterior courtesy lamps control circuit
2. Test for less than 10  $\Omega$  between the appropriate ground circuit terminal listed below and ground.
    - A9A Outside Rearview Mirror - Driver terminal 8
    - A9B Outside Rearview Mirror - Passenger terminal 8
    - A24D Door Handle Assembly - Driver Exterior terminal 4
    - A24P Door Handle Assembly - Passenger Exterior terminal 4
    - A24LR Door Handle Assembly - Left Rear Exterior terminal 4
    - A24RR Door Handle Assembly - Right Rear Exterior terminal 4
    - **If 10  $\Omega$  or greater**
      1. Ignition OFF/Vehicle OFF.
      2. Test for less than 2  $\Omega$  in the ground circuit end to end.
        - If 2  $\Omega$  or greater, repair the open/high resistance in the circuit.
        - If less than 2  $\Omega$ , repair the open/high resistance in the ground connection.
    - **If less than 10  $\Omega$**
  3. Connect a test lamp between the appropriate control circuit terminal listed below and ground, ignition ON/vehicle in Service Mode.
    - A9A Outside Rearview Mirror - Driver terminal 1
    - A9B Outside Rearview Mirror - Passenger terminal 1
    - A24D Door Handle Assembly - Driver Exterior terminal 5
    - A24P Door Handle Assembly - Passenger Exterior terminal 5
    - A24LR Door Handle Assembly - Left Rear Exterior terminal 5
    - A24RR Door Handle Assembly - Right Rear Exterior terminal 5
  4. Verify the test lamp turns ON and OFF when commanding the Outside Rear View Mirror Courtesy Lamp ON and OFF with a scan tool.
    - **If the test lamp is always OFF**
      1. Ignition OFF/Vehicle 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  $\Omega$  in the control circuit end to end.
    - If 2  $\Omega$  or greater, repair the open/high resistance in the circuit.
    - If less than 2  $\Omega$ , replace the K9 Body Control Module.
  - **If the test lamp is always ON**
    1. Ignition OFF/Vehicle OFF, disconnect the X4 harness connector at the K9 Body Control Module, ignition ON/vehicle in Service Mode.
    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 courtesy lamp.

### Repair Instructions

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

- [Exterior Flood Lamp Replacement](#)
- [Control Module References](#) for BCM replacement, programming and setup.

## REAR 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 |
|---------------------------------------------------------------------|-----------------|----------------------|------------------|--------------------|
| Rear Fog Lamp Switch Signal                                         | B3588 00        | 2                    | 2                | -                  |
| Rear Fog Lamp Control                                               | B2540 02        | B2540 04             | 1                | -                  |
| Rear Fog Lamp Ground                                                | -               | 1                    | -                | -                  |
| Turn Signal/Multifunction Switch Ground                             | -               | 2                    | -                | -                  |
| 1. Rear Fog Lamp Malfunction<br>2. Rear Fog Lamp Switch Malfunction |                 |                      |                  |                    |

### Circuit/System Description

The rear fog lamp switch signal circuit is grounded momentarily by activating the rear fog lamp switch. The body control module (BCM) responds to the rear fog lamp request by applying voltage to the rear fog lamp control circuit which illuminates the rear fog lamp.

### Reference Information

Schematic Reference

### [Fog Lights Schematics](#)

Connector End View Reference

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### 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/vehicle in Service Mode, headlamps ON.
2. Verify the scan tool Rear Fog Lamps Switch parameter changes between Active and Inactive while commanding the rear fog lamp ON and OFF with the rear fog lamp switch.
  - **If the parameter does not change**  
  
Refer to Rear Fog Lamp Switch Malfunction.
  - **If the parameter changes**
3. Verify the rear fog lamp turns ON and OFF when commanding the Rear Fog Lamps ON and OFF with a scan tool.
  - **If the rear fog lamp does not turn ON and OFF**  
  
Refer to Rear Fog Lamp Malfunction.
  - **If the rear fog lamp turns ON and OFF**
4. All OK.

### Circuit/System Testing

#### Rear Fog Lamp Switch Malfunction

1. Ignition OFF/Vehicle OFF, scan tool disconnected, all doors closed, all accessories OFF, open and close drivers door, disconnect the harness connector at the S78 Turn Signal/Multifunction Switch. It may take up to 2 min for all vehicle systems to power down.
2. Test for less than 10  $\Omega$  between the ground circuit terminal 3 and ground.
  - **If 10  $\Omega$  or greater**
    1. Ignition OFF/Vehicle OFF.
    2. Test for less than 2  $\Omega$  in the ground circuit end to end.
      - If 2  $\Omega$  or greater, repair the open/high resistance in the circuit.
      - If less than 2  $\Omega$ , repair the open/high resistance in the ground connection.
  - **If less than 10  $\Omega$**
3. Ignition ON/vehicle in Service Mode.
4. Verify the scan tool Rear Fog Lamp Switch parameter is Inactive.
  - **If not Inactive**
    1. Ignition OFF/Vehicle OFF, disconnect the X1 harness connector at the K9 Body Control Module.
    2. Test for infinite resistance between the signal circuit terminal 8 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 8 and ground.
6. Verify the scan tool Rear Fog Lamp Switch parameter is Active.

- **If not Active**

1. Ignition OFF/Vehicle OFF, disconnect the X1 harness connector at the K9 Body Control Module, ignition ON/vehicle in Service Mode.
2. Test for less than 1 V between the signal circuit terminal 8 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  $\Omega$  in the signal circuit end to end.
  - If 2  $\Omega$  or greater, repair the open/high resistance in the circuit.
  - If less than 2  $\Omega$ , replace the K9 Body Control Module.

- **If Active**

7. Test or replace the S78 Turn Signal/Multifunction Switch.

### Rear Fog Lamp Malfunction

1. Ignition OFF/Vehicle OFF, exterior lamps OFF, disconnect the harness connector at the E29R Fog Lamp - Rear. It may take up to 2 min for all vehicle systems to power down.
2. Test for less than 5  $\Omega$  between the ground circuit terminal 2 and ground.

- **If 5  $\Omega$  or greater**

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

- **If less than 5  $\Omega$**

3. Connect a test lamp between the control circuit terminal 1 and ground, ignition ON/vehicle in Service Mode.
4. Verify the test lamp turns ON and OFF when commanding the Rear Fog Lamp ON and OFF with a scan tool.

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

1. Ignition OFF/Vehicle 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  $\Omega$  in the control circuit end to end.
  - If 2  $\Omega$  or greater, repair the open/high resistance in the circuit.
  - If less than 2  $\Omega$ , replace the K9 Body Control Module.

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

1. Ignition OFF/Vehicle OFF, disconnect the X4 harness connector at the K9 Body Control Module, ignition ON/vehicle in Service Mode.
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 E29R Fog Lamp - Rear.

### Repair Instructions

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

- [Turn Signal Switch Replacement](#)
- [Control Module References](#) for BCM and 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 B+     | 1               | 1                    | -                | -                  |
| Hazard Warning Switch Signal | B3596 00        | 1                    | 1                | B3596 00           |
| Hazard Warning Switch Ground | -               | 1                    | -                | -                  |
| 1. Hazard Lamps 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.

## Reference Information

Schematic Reference

## Exterior Lights Schematics

Connector End View Reference

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## 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/vehicle in Service Mode.
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.

- **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. All OK.

## Circuit/System Testing

### Hazard Warning Switch Malfunction

1. Ignition OFF/Vehicle OFF, scan tool disconnected, all doors closed, all accessories OFF, open and close drivers door, disconnect the harness connector at the S48D Multifunction Switch 2 - Instrument Panel. It may take up to 2 min for all vehicle systems to power down.

2. Test for less than 10  $\Omega$  between the ground circuit terminal 3 and ground.

- **If 10  $\Omega$  or greater**

1. Ignition OFF/Vehicle OFF.

2. Test for less than 2  $\Omega$  in the ground circuit end to end.

- If 2  $\Omega$  or greater, repair the open/high resistance in the circuit.
- If less than 2  $\Omega$ , repair the open/high resistance in the ground connection.

- **If less than 10  $\Omega$**

3. Ignition ON/vehicle in Service Mode.

4. Verify a test lamp illuminates between the B+ circuit terminal 5 and ground.

- **If the test lamp does not illuminate**

1. Ignition OFF/Vehicle OFF, remove the F16DA 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

3. Test for less than 2  $\Omega$  in the B+ circuit end to end.

- If 2  $\Omega$  or greater, repair the open/high resistance in the circuit.
- If less than 2  $\Omega$ , replace the X51A Fuse Block - Instrument Panel.

- **If the test lamp illuminates**

5. Verify the scan tool Hazard Lamps Switch parameter is Inactive.

- **If not Inactive**

1. Ignition OFF/Vehicle 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**

6. Install a 3 A fused jumper wire between the signal circuit terminal 10 and ground.

7. Verify the scan tool Hazard Lamps Switch parameter is Active.

- **If not Active**

1. Ignition OFF/Vehicle OFF, disconnect the X2 harness connector at the K9 Body Control Module, ignition ON/vehicle in Service Mode.

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  $\Omega$  in the signal circuit end to end.

- If 2  $\Omega$  or greater, repair the open/high resistance in the circuit.
- If less than 2  $\Omega$ , replace the K9 Body Control Module.

- **If Active**

8. Test or replace the S48D Multifunction Switch 2 - Instrument Panel.

### Repair Instructions

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

[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 |
|--------------------------------------------------------------------------|--------------------|----------------------|------------------|--------------------|
| F10DA (BCM 3) Fuse B+                                                    | B2575 01, B2575 04 | B2575 01, B2575 04   | -                | -                  |
| F11DA (BCM 4) Fuse B+                                                    | B2699 01, B2699 04 | B2699 01, B2699 04   | -                | -                  |
| Headlamp Relay Control                                                   | 4                  | 4                    | 4                | -                  |
| Headlamp High Beam Relay Control                                         | B2580 02, B2580 04 | B2580 02, B2580 04   | B2580 01         | -                  |
| Low Beam Headlamp Control - Left                                         | B2575 02           | B2575 01, B2575 04   | 1                | -                  |
| Low Beam Headlamp Control - Right                                        | B2699 02           | B2699 01, B2699 04   | 1                | -                  |
| High Beam Headlamp Control - Left                                        | 2                  | 2                    | 2                | -                  |
| High Beam Headlamp Control - Right                                       | 2                  | 2                    | 2                | -                  |
| Turn Signal/Multifunction Switch Park Lamps ON Signal                    | 3                  | B257A 00             | 3                | -                  |
| Turn Signal/Multifunction Switch Headlamps OFF Signal                    | B257A 00           | 3                    | 3                | -                  |
| Turn Signal/Multifunction Switch Headlamps ON Signal                     | B257A 00           | 3                    | 3                | -                  |
| Turn Signal/Multifunction Switch Flash To Pass Signal                    | B3806 00           | 3                    | 3                | -                  |
| Turn Signal/Multifunction Switch High Beam Signal                        | B3650 08           | 3                    | 3                | -                  |
| Turn Signal/Multifunction Switch Auto High Beam Select Signal (with TQ5) | 5                  | 5                    | 5                | -                  |
| Headlamp Assembly - Left Ground                                          | -                  | 1                    | -                | -                  |
| Headlamp Assembly - Right Ground                                         | -                  | 1                    | -                | -                  |

| Circuit                                                                                                                                                                                                                | Short to Ground | Open/High Resistance | Short to Voltage | Signal Performance |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|----------------------|------------------|--------------------|
| Turn Signal/Multifunction Switch Ground                                                                                                                                                                                | -               | 3                    | -                | -                  |
| 1. Headlamps Malfunction - Low Beam<br>2. Headlamps Malfunction - High Beam<br>3. Turn Signal/Multifunction Switch Malfunction<br>4. Headlamp Leveling Malfunction<br>5. Automatic High Beam Select Switch Malfunction |                 |                      |                  |                    |

### Circuit/System Description

#### Low Beam Headlamps

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

#### High 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 3 pin high beam fuse to the high beam control circuits actuating the left and right high beam solenoid actuators opening the right and left high beam shutters exposing the full headlamps for high beam operation.

#### Flash to Pass

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

#### Connector End View Reference

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### Exterior Lighting Systems Description and Operation



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- [Wiring Repairs](#)

Scan Tool Reference

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

### [Circuit/System Verification](#)

1. Ignition ON/vehicle in Service Mode.
2. Verify the scan tool Headlamps On Switch parameter changes between Active and Inactive while commanding the headlamp ON and OFF with the turn signal/multifunction switch.
  - **If the parameter does not change**  
  
Refer to Circuit/System Testing - Turn Signal/Multifunction Switch Malfunction.
  - **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 turn signal/multifunction switch.
  - **If the parameter does not change**  
  
Refer to Circuit/System Testing - Turn Signal/Multifunction Switch Malfunction.
  - **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 Circuit/System Testing - Turn Signal/Multifunction Switch Malfunction.
  - **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 Circuit/System Testing - Turn Signal/Multifunction Switch Malfunction.
  - **If the parameter changes**
6. Verify the left low beam headlamp turns ON and OFF when commanding the appropriate Low Beam Lamp ON and OFF with a scan tool.
  - **If the left low beam headlamp does not turn ON and OFF**  
  
Refer to Circuit/System Testing - Headlamps Malfunction - 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 appropriate Low Beam Lamp ON and OFF with a scan tool.
  - **If the right low beam headlamp does not turn ON and OFF**  
  
Refer to Circuit/System Testing - Headlamps Malfunction - 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 Circuit/System Testing - Headlamps Malfunction - High Beam.

9. (TQ5 only), verify the automatic high beam control indicator on the instrument cluster turns ON and OFF while commanding the automatic high beam control ON and OFF with the automatic high beam control switch located on the Turn Signal/Multifunction switch.

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

Refer to Automatic High Beam Select Switch Malfunction.

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

10. All OK.

## Circuit/System Testing

### Turn Signal/Multifunction Switch Malfunction

1. Ignition OFF/Vehicle OFF, scan tool disconnected, all doors closed, all accessories OFF, open and close drivers door, disconnect the harness connector at the S78 Turn Signal/Multifunction Switch. It may take up to 2 min for all vehicle systems to power down.
2. Test for less than 10  $\Omega$  between the ground circuit terminal 3 and ground.
  - **If 10  $\Omega$  or greater**
    1. Ignition OFF.
    2. Test for less than 2  $\Omega$  in the ground circuit end to end.
      - If 2  $\Omega$  or greater, repair the open/high resistance in the circuit.
      - If less than 2  $\Omega$ , repair the open/high resistance in the ground connection.
  - **If less than 10  $\Omega$**
3. Ignition ON/vehicle in Service Mode.
4. Verify the scan tool Automatic Headlamps Disable Switch parameter is Inactive.
  - **If not Inactive**
    1. Ignition OFF/Vehicle 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**
5. Install a 3 A fused jumper wire between the signal circuit terminal 4 and ground.
6. Verify the scan tool Automatic Headlamps Disable Switch parameter is Active.
  - **If not Active**
    1. Ignition OFF/Vehicle OFF, disconnect the X1 harness connector at the K9 Body Control Module, ignition ON/vehicle in Service Mode.
    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  $\Omega$  in the signal circuit end to end.
      - If 2  $\Omega$  or greater, repair the open/high resistance in the circuit.
      - If less than 2  $\Omega$ , 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/Vehicle 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**

8. Install a 3 A fused jumper wire between the signal circuit terminal 5 and ground.

9. Verify the scan tool Park Lamps Switch parameter is Active.

- **If not Active**

1. Ignition OFF/Vehicle OFF, disconnect the X1 harness connector at the K9 Body Control Module, ignition ON/vehicle in Service Mode.

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  $\Omega$  in the signal circuit end to end.

- If 2  $\Omega$  or greater, repair the open/high resistance in the circuit.
- If less than 2  $\Omega$ , 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/Vehicle OFF, disconnect the X1 harness connector at the K9 Body Control Module.

2. Test for infinite resistance between the signal circuit terminal 9 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 9 and ground.

12. Verify the scan tool Headlamps On Switch parameter is Active.

- **If not Active**

1. Ignition OFF/Vehicle OFF, disconnect the X1 harness connector at the K9 Body Control Module, ignition ON/vehicle in Service Mode.

2. Test for less than 1 V between the signal circuit terminal 9 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  $\Omega$  in the signal circuit end to end.

- If 2  $\Omega$  or greater, repair the open/high resistance in the circuit.
- If less than 2  $\Omega$ , replace the K9 Body Control Module.

- **If Active**

13. Verify the scan tool High Beam Select Switch parameter is Inactive.

- **If not Inactive**

1. Ignition OFF/Vehicle 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**

14. Install a 3 A fused jumper wire between the signal circuit terminal 7 and ground.

15. Verify the scan tool High Beam Select Switch parameter is Active.

- **If not Active**

1. Ignition OFF/Vehicle OFF, disconnect the X3 harness connector at the K9 Body Control Module, ignition ON/vehicle in Service Mode.

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  $\Omega$  in the signal circuit end to end.
    - If 2  $\Omega$  or greater, repair the open/high resistance in the circuit.
    - If less than 2  $\Omega$ , replace the K9 Body Control Module.
  - **If Active**
16. Verify the scan tool Headlamps Flash Switch parameter is Inactive.
- **If not Inactive**
    1. Ignition OFF/Vehicle OFF, disconnect the X3 harness connector at the K9 Body Control Module.
    2. Test for infinite resistance between the signal circuit terminal 6 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**
17. Install a 3 A fused jumper wire between the signal circuit terminal 6 and ground.
18. Verify the scan tool Headlamps Flash Switch parameter is Active.
- **If not Active**
    1. Ignition OFF/Vehicle OFF, disconnect the X3 harness connector at the K9 Body Control Module, ignition ON/vehicle in Service Mode.
    2. Test for less than 1 V between the signal circuit terminal 6 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  $\Omega$  in the signal circuit end to end.
      - If 2  $\Omega$  or greater, repair the open/high resistance in the circuit.
      - If less than 2  $\Omega$ , replace the K9 Body Control Module.
  - **If Active**
19. Test or replace the S78 Turn Signal/Multifunction Switch.

#### Automatic High Beam Select Switch Malfunction (with TQ5)

1. Ignition OFF, scan tool disconnected, all doors closed, all accessories OFF, open and close drivers door, disconnect the harness connector at the S78 Turn Signal/Multifunction Switch. It may take up to 2 min for all vehicle systems to power down.
2. Test for less than 10  $\Omega$  between the ground circuit terminal 3 and ground.
  - **If 10  $\Omega$  or greater**
    1. Ignition OFF.
    2. Test for less than 2  $\Omega$  in the ground circuit end to end.
      - If 2  $\Omega$  or greater, repair the open/high resistance in the circuit.
      - If less than 2  $\Omega$ , repair the open/high resistance in the ground connection.
  - **If less than 10  $\Omega$**
3. Ignition ON.
4. Verify the automatic high beam control indicator on the instrument cluster is Inactive.
  - **If not Inactive**
    1. Ignition OFF, disconnect the X7 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 ground.
6. Verify the automatic high beam control indicator on the instrument cluster is Active.
  - **If not Active**



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 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  $\Omega$  in the signal circuit end to end.
  - If 2  $\Omega$  or greater, repair the open/high resistance in the circuit.
  - If less than 2  $\Omega$ , replace the K9 Body Control Module.
- **If Active**
7. Test or replace the S78 Turn Signal/Multifunction Switch.

#### Headlamps Malfunction - Low Beam

1. Ignition OFF/Vehicle OFF, exterior lamps OFF, disconnect the harness connector at the appropriate E13 Headlamp Assembly. It may take up to 2 min for all vehicle systems to power down.
2. Test for less than 15  $\Omega$  between each ground circuit at terminal 1 and terminal 4 and ground.
  - **If 15  $\Omega$  or greater**
    1. Ignition OFF/Vehicle OFF.
    2. Test for less than 2  $\Omega$  in the ground circuit end to end.
      - If 2  $\Omega$  or greater, repair the open/high resistance in the circuit.
      - If less than 2  $\Omega$ , repair the open/high resistance in the ground connection.
  - **If less than 15  $\Omega$**
3. Connect a test lamp between the control circuit terminal 2 and ground, ignition ON/vehicle in Service Mode.
4. Verify the test lamp turns ON and OFF when commanding the appropriate Low Beam Headlamp ON and OFF with a scan tool.
  - **If the test lamp is always OFF**
    1. Ignition OFF/Vehicle 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  $\Omega$  in the control circuit end to end.
      - If 2  $\Omega$  or greater, repair the open/high resistance in the circuit.
      - If less than 2  $\Omega$ , replace the K9 Body Control Module.
  - **If the test lamp is always ON**
    1. Ignition OFF/Vehicle OFF, disconnect the X4 harness connector at the K9 Body Control Module, ignition ON/vehicle in Service Mode.
    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 E13 Headlamp Assembly.

#### Headlamps Malfunction - High Beam

1. Ignition OFF/Vehicle OFF, disconnect the KR48 Headlamp High Beam Relay.
2. Verify a test lamp illuminates between the B+ circuit terminal 86 and ground.
  - **If the test lamp does not illuminate**

Replace the X50A Fuse Block - Underhood.

- **If the test lamp illuminates**
3. Verify a test lamp illuminates between the B+ circuit terminal 30 and ground.
    - **If the test lamp does not illuminate**  
  
Replace the X50A Fuse Block - Underhood.
    - **If the test lamp illuminates**
  4. Connect a test lamp between the control circuit terminal 85 and B+, ignition ON/vehicle in Service Mode.
  5. 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/Vehicle OFF, disconnect the X5 harness connector at the K9 Body Control Module, ignition ON/vehicle in Service Mode.
      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/Vehicle OFF.
      4. Test for less than 2  $\Omega$  in the control circuit end to end.
        - If 2  $\Omega$  or greater, repair the open/high resistance in the circuit.
        - If less than 2  $\Omega$ , replace the K9 Body Control Module.
    - **If the test lamp is always ON**
      1. Ignition OFF/Vehicle 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**
  6. Ignition OFF/Vehicle OFF, exterior lamps OFF, connect the KR48 Headlamp High Beam Relay.
  7. Disconnect the harness connector at the appropriate E13 Headlamp Assembly.
  8. Test for less than 15  $\Omega$  between each ground circuit at terminal 1 and terminal 4 and ground.
    - **If 15  $\Omega$  or greater**
      1. Ignition OFF/Vehicle OFF.
      2. Test for less than 2  $\Omega$  in the ground circuit end to end.
        - If 2  $\Omega$  or greater, repair the open/high resistance in the circuit.
        - If less than 2  $\Omega$ , repair the open/high resistance in the ground connection.
    - **If less than 15  $\Omega$**
  9. Connect a test lamp between the control circuit terminal 3 and ground, ignition ON/vehicle in Service Mode.
  10. 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/Vehicle OFF, disconnect the X5 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  $\Omega$  in the control circuit end to end.
        - If 2  $\Omega$  or greater, repair the open/high resistance in the circuit.
        - If less than 2  $\Omega$ , replace the X50A Fuse Block - Underhood.
    - **If the test lamp is always ON**

1. Ignition OFF/Vehicle OFF, disconnect the X5 harness connector at the X50A Fuse Block - Underhood, ignition ON/vehicle in Service Mode.
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 X50A Fuse Block - Underhood.
- **If the test lamp turns ON and OFF**
11. Test or replace the E13 Headlamp Assembly.

### Repair Instructions

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

- [Headlamp Replacement](#)
- [Relay Replacement \(Attached to Wire Harness\)](#) [Relay Replacement \(Within an Electrical Center\)](#)
- [Turn Signal Switch Replacement](#)
- [Engine Wiring Harness Junction Block Replacement](#)
- [Control Module References](#) for BCM replacement, programming and setup

## HEADLAMP LEVELING 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 |
|----------------------------------------------------|--------------------------------------------------------------|-----------------------------------------------------|--------------------------------------------------------------|--------------------|
| LIN Serial Data - Left Headlamp Leveling Actuator  | U1513 00,<br>U1514 00,<br>U1523 00,<br>U1524 00,<br>B3843 05 | U1513 00, U1514 00, U1523 00,<br>U1524 00, B3843 05 | U1513 00,<br>U1514 00,<br>U1523 00,<br>U1524 00,<br>B3843 05 | -                  |
| LIN Serial Data - Right Headlamp Leveling Actuator | U1513 00,<br>U1514 00,<br>U1523 00,<br>U1524 00,<br>B3843 05 | U1513 00, U1514 00, U1523 00,<br>U1524 00, B3843 05 | U1513 00,<br>U1514 00,<br>U1523 00,<br>U1524 00,<br>B3843 05 | -                  |
| Headlamp Control Module B+ Fuse (F62 UA)           | U0181 00                                                     | U0181 00                                            | -                                                            | -                  |
| Headlamp Leveling Actuator - Right B+              | U1513 00,<br>U1514 00,<br>U1523 00,<br>U1524 00,<br>B3843 05 | U1513 00, U1514 00, U1523 00,<br>U1524 00, B3843 05 | -                                                            | -                  |
| Headlamp Leveling Actuator - Right B+              | U1513 00,<br>U1514 00,<br>U1523 00,<br>U1524 00,<br>B3843 05 | U1513 00, U1514 00, U1523 00,<br>U1524 00, B3843 05 | -                                                            | -                  |
| Headlamp Leveling Relay Control                    | 1                                                            | 1                                                   | 1                                                            | -                  |

| Circuit                                               | Short to Ground | Open/High Resistance | Short to Voltage | Signal Performance |
|-------------------------------------------------------|-----------------|----------------------|------------------|--------------------|
| Suspension Position Sensor 5 V Reference - Left Front | B3415 02        | 1                    | B3415 01         | -                  |
| Suspension Position Sensor 5 V Reference - Left Rear  | B3415 02        | 1                    | B3415 01         | -                  |
| Suspension Position Sensor Signal - Left Front        | B3410 06        | B3410 06             | B3410 01         | B3410 08           |
| Suspension Position Sensor Signal - Left Rear         | B3420 06        | B3420 06             | B3420 01         | B3420 08           |
| Suspension Position Sensor Low Reference - Left Front | -               | 1                    | -                | -                  |
| Suspension Position Sensor Low Reference - Left Rear  | -               | 1                    | -                | -                  |
| Headlamp Control Module Ground                        | -               | 1                    | -                | -                  |
| Headlamp Assembly - Left Ground                       | -               | 1                    | -                | -                  |
| Headlamp Assembly - Right Ground                      | -               | 1                    | -                | -                  |
| 1. Headlamp Leveling Malfunction                      |                 |                      |                  |                    |

### Circuit/System Description

#### Headlamp Leveling without Electronic Suspension Control

The automatic headlamp leveling system automatically maintains the vertical alignment of the headlamps when the vehicle load and driving conditions change. Each headlamp assembly contains a headlamp leveling motor that is controlled by the headlamp control module. The front and rear suspension position sensors provide the headlamp control module with suspension position information. Each sensor receives a 5 V reference, signal and low reference circuits from the headlamp control module. The sensors are connected to the control arms of the front and rear suspension. As the vehicle travels, the suspension compresses and rebounds moving the suspension position sensor arms. This causes the signal output of the sensor to change. The headlamp control module compares the information from both suspension position sensors and adjusts the headlamp leveling as needed.

#### Headlamp Leveling with Electronic Suspension Control

Each headlamp assembly contains a headlamp leveling actuator that is controlled by the headlamp control module. The front and rear suspension position sensors provide the suspension control module with suspension position information. Each sensor receives a 5 V reference, signal and low reference circuits from the suspension control module. The suspension position sensors are connected to each control arm of the front and rear suspensions. As the vehicle travels, the suspension compresses and rebounds moving the suspension position sensor arms. This causes the signal output of the sensor to change. The suspension control module compares the information from all four suspension position sensors and adjusts the suspension as needed. The suspension control module communicates with the headlamp control module via serial data. The headlamp control module uses the suspension position sensor information received from the suspension control module to adjust the headlamp leveling as



needed. The headlamp control module communicates with the left and right headlamp leveling actuators via the LIN serial data circuit.

## Reference Information

Schematic Reference

## Headlights/Daytime Running Lights (DRL) Schematics

Connector End View Reference

## COMPONENT CONNECTOR END VIEWS - INDEX

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/vehicle in Service Mode.
2. Verify the scan tool Front Leveling Position Sensor Signal parameter is between 5 and 90%.
  - **If the parameter is not between 5 and 90%**  
Refer to Headlamp Leveling Sensor Malfunction.
  - **If the parameter is between 5 and 90%**
3. Verify the scan tool Rear Leveling Position Sensor Signal parameter is between 5 and 90%.
  - **If the parameter is not between 5 and 90%**  
Refer to Headlamp Leveling Sensor Malfunction.
  - **If the parameter is between 5 and 90%**
4. Verify the left headlamp operates to the UP and DOWN positions when commanding the Left Headlamp Vertical Motor UP and DOWN with a scan tool.
  - **If the left headlamp does not operate UP and DOWN**  
Refer to Headlamp Leveling Actuator Malfunction
  - **If the left headlamp operates UP and DOWN**
5. Verify the right headlamp operates to the UP and DOWN positions when commanding the Right Headlamp Vertical Motor UP and DOWN with a scan tool.
  - **If the right headlamp does not operate UP and DOWN**  
Refer to Headlamp Leveling Actuator Malfunction
  - **If the right headlamp operates UP and DOWN**
6. All OK.

## Circuit/System Testing

### Headlamp Leveling Actuator Malfunction

1. Ignition OFF/Vehicle OFF, disconnect the KR50 Headlamp Relay.
2. Verify a test lamp illuminates between the B+ circuit terminal 86 and ground.
  - **If the test lamp does not illuminate**  
Replace the X50A Fuse Block - Underhood.
  - **If the test lamp illuminates**
3. Verify a test lamp illuminates between the B+ circuit terminal 30 and ground.
  - **If the test lamp does not illuminate**  
Replace the X50A Fuse Block - Underhood.
  - **If the test lamp illuminates**
4. Connect a test lamp between the control circuit terminal 85 and B+, ignition ON/vehicle in Service Mode.
5. Verify the test lamp turns ON and OFF when commanding the Headlamp Relay Control ON and OFF with a scan tool.
  - **If the test lamp is always OFF**
    1. Ignition OFF/Vehicle OFF, disconnect the X5 harness connector at the K9 Body Control Module, ignition ON/vehicle in Service Mode.
    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/Vehicle OFF.
    4. Test for less than 2  $\Omega$  in the control circuit end to end.
      - If 2  $\Omega$  or greater, repair the open/high resistance in the circuit.
      - If less than 2  $\Omega$ , replace the K9 Body Control Module.
  - **If the test lamp is always ON**
    1. Ignition OFF/Vehicle 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**
6. Ignition OFF/Vehicle OFF, exterior lamps OFF, connect the KR50 Headlamp Relay.
7. Disconnect the harness connector at the appropriate E13 Headlamp Assembly. It may take up to 2 min for all vehicle systems to power down.
8. Test for less than 15  $\Omega$  between the ground circuit terminal 9 and ground.
  - **If 15  $\Omega$  or greater**
    1. Ignition OFF/Vehicle OFF.
    2. Test for less than 2  $\Omega$  in the ground circuit end to end.
      - If 2  $\Omega$  or greater, repair the open/high resistance in the circuit.
      - If less than 2  $\Omega$ , repair the open/high resistance in the ground connection.
  - **If less than 15  $\Omega$**
9. Ignition ON/vehicle in Service Mode.
10. Verify a test lamp illuminates between the B+ circuit terminal 10 and ground.
  - **If the test lamp does not illuminate**
    1. Ignition OFF/Vehicle OFF, disconnect the X5 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

3. Test for less than 2  $\Omega$  in the control circuit end to end.
  - If 2  $\Omega$  or greater, repair the open/high resistance in the circuit.
  - If less than 2  $\Omega$ , replace the KR50 Headlamp Relay.
- **If the test lamp illuminates**
11. Test or replace the K26 Headlamp Control Module.
12. Ignition ON/vehicle in Service Mode.
13. Verify the appropriate headlamp operates to the UP and DOWN positions when commanding the appropriate Headlamp Vertical Motor UP and DOWN with a scan tool.
  - **If the headlamp does not operate UP and DOWN**
  - Test or replace the E13 Headlamp Assembly.
  - **If the headlamp operates UP and DOWN**
14. All OK.

#### Headlamp Leveling Sensor Malfunction

1. Ignition OFF/Vehicle OFF, disconnect the harness connector at the appropriate B152L Suspension Position Sensor, ignition ON/vehicle in Service Mode.
2. Verify a test lamp illuminates between the low reference circuit terminal 2 and B+.
  - **If the test lamp does not illuminate**
    1. Ignition OFF/Vehicle OFF, disconnect the harness connector at the K26 Headlamp Control Module.
    2. Test for less than 2  $\Omega$  in the low reference circuit end to end.
      - If 2  $\Omega$  or greater, repair the open/high resistance in the circuit.
      - If less than 2  $\Omega$ , replace the K26 Headlamp Control Module.
  - **If the test lamp illuminates**
3. Ignition ON/vehicle in Service Mode.
4. Test for 4.8-5.2 V between the 5 V reference circuit terminal 1 and ground.
  - **If less than 4.8 V**
    1. Ignition OFF/Vehicle OFF, disconnect the harness connector at the K26 Headlamp 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  $\Omega$  in the 5 V reference circuit end to end.
      - If 2  $\Omega$  or greater, repair the open/high resistance in the circuit.
      - If less than 2  $\Omega$ , replace the K26 Headlamp Control Module.
  - **If greater than 5.2 V**
    1. Ignition OFF/Vehicle OFF, disconnect the harness connector at the K26 Headlamp Control Module, ignition ON/vehicle in Service Mode.
    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 K26 Headlamp Control Module.
  - **If between 4.8-5.2 V**
5. Verify the appropriate scan tool Leveling Position Sensor Signal parameter is less than 5%.
  - **If 5% or greater**
    1. Ignition OFF/Vehicle OFF, disconnect the harness connector at the K26 Headlamp Control Module, ignition ON/vehicle in Service Mode.
    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 K26 Headlamp Control Module.
  - **If less than 5%**

6. Install a 3A fused jumper wire between the 5 V reference circuit terminal 1 and the signal circuit terminal 3.
7. Engine RUNNING/vehicle ON, verify the appropriate scan tool Leveling Position Sensor Signal parameter is greater than 90%.
  - **If less than 90%**
    1. Ignition OFF/Vehicle OFF, disconnect the harness connector at the K26 Headlamp 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  $\Omega$  in the signal circuit end to end.
      - If 2  $\Omega$  or greater, repair the open/high resistance in the circuit.
      - If less than 2  $\Omega$ , replace the K26 Headlamp Control Module.
  - **If 90% or greater**
8. Test or replace the B152L Suspension Position Sensor.

### Repair Instructions

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

- [Headlamp Replacement](#)
- [Relay Replacement \(Attached to Wire Harness\)](#) [Relay Replacement \(Within an Electrical Center\)](#)
- [Front Suspension Automatic Forward Lighting Position Sensor Replacement](#)
- [Rear Suspension Automatic Forward Lighting Leveling Position Sensor Replacement](#)
- [Control Module References](#) for BCM or Headlamp Control Module 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 Lamps Control 2 - Terminal 23 X1      | B255D 02        | B255D 04             | B255D 01         | -                  |
| Accent Lamps Control 1 - Terminal 22 X7      | B255F 02        | B255F 04             | 1                | -                  |
| Accent Lamp - Driver Door Armrest Ground     | -               | 1                    | -                | -                  |
| Accent Lamp - Passenger Door Armrest Ground  | -               | 1                    | -                | -                  |
| Accent Lamp - Left Rear Door Armrest Ground  | -               | 1                    | -                | -                  |
| Accent Lamp - Right Rear Door Armrest Ground | -               | 1                    | -                | -                  |



| Circuit                                         | Short to Ground | Open/High Resistance | Short to Voltage | Signal Performance |
|-------------------------------------------------|-----------------|----------------------|------------------|--------------------|
| Accent Lamp - Left Instrument Panel Ground      | -               | 1                    | -                | -                  |
| Accent Lamp - Right Instrument Panel Ground     | -               | 1                    | -                | -                  |
| Center Console Compartment Lamp Ground          | -               | 1                    | -                | -                  |
| Dome/Reading Lamps - Left Rear Ground           | -               | 1                    | -                | -                  |
| Dome/Reading Lamps - Right Rear Ground          | -               | 1                    | -                | -                  |
| Flood Lamp - Driver Door Handle Ground          | -               | 1                    | -                | -                  |
| Flood Lamp - Driver Door Pull Handle Ground     | -               | 1                    | -                | -                  |
| Flood Lamp - Passenger Door Handle Ground       | -               | 1                    | -                | -                  |
| Flood Lamp - Passenger Door Pull Handle Ground  | -               | 1                    | -                | -                  |
| Flood Lamp - Left Rear Door Handle Ground       | -               | 1                    | -                | -                  |
| Flood Lamp - Left Rear Door Pull Handle Ground  | -               | 1                    | -                | -                  |
| Flood Lamp - Right Rear Door Handle Ground      | -               | 1                    | -                | -                  |
| Flood Lamp - Right Rear Door Pull Handle Ground | -               | 1                    | -                | -                  |
| Floor Courtesy Lamp - Left Rear Ground          | -               | 1                    | -                | -                  |
| Floor Courtesy Lamp - Right Rear Ground         | -               | 1                    | -                | -                  |
| Floor Courtesy Lamp - Left Front Outer Ground   | -               | 1                    | -                | -                  |
| Floor Courtesy Lamp - Left Front Inner Ground   | -               | 1                    | -                | -                  |
| Floor Courtesy Lamp - Right Front Outer Ground  | -               | 1                    | -                | -                  |
| Floor Courtesy Lamp - Right Front Inner Ground  | -               | 1                    | -                | -                  |
| Multifunction Switch - Overhead Console 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 - INDEX**

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/Vehicle OFF, scan tool disconnected, all doors closed, all accessories OFF, open and close drivers door, disconnect the harness connector at the inoperative accent/flood/floor lamp. It may take up to 2 min for all vehicle systems to power down.

**NOTE:** Each component may need to be disconnected to isolate a short to voltage, short to ground or an open/high resistance. Use the schematics to identify the following:

- Courtesy lamps the vehicle is equipped with
  - Each component's control and ground circuit terminals
  - Component locations on the exterior courtesy lamps control circuit
2. Test for less than 10  $\Omega$  between the appropriate ground circuit terminal and ground.
    - **If 10  $\Omega$  or greater**
      1. Ignition OFF/Vehicle OFF.
      2. Test for less than 2  $\Omega$  in the ground circuit end to end.
        - If 2  $\Omega$  or greater, repair the open/high resistance in the circuit.
        - If less than 2  $\Omega$ , repair the open/high resistance in the ground connection.
    - **If less than 10  $\Omega$**
  3. Connect a test lamp between the appropriate control circuit terminal and ground, ignition ON/vehicle in Service Mode.
  4. Verify the test lamp turns ON and OFF when commanding the appropriate accent lighting command listed below ON and OFF with a scan tool.
    - Accent Lighting 1 - terminal 22 X7
    - Accent Lighting 2 - terminal 23 X1
    - **If the test lamp is always OFF**

1. Ignition OFF/Vehicle OFF, disconnect the appropriate harness connector listed below at the K9 Body Control Module.
  - X1 terminal 23
  - X7 terminal 22
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  $\Omega$  in the control circuit end to end.
  - If 2  $\Omega$  or greater, repair the open/high resistance in the circuit.
  - If less than 2  $\Omega$ , replace the K9 Body Control Module.
- **If the test lamp is always ON**
  1. Ignition OFF/Vehicle OFF, disconnect the appropriate harness connector listed below at the K9 Body Control Module, ignition ON/vehicle in Service Mode.
    - X1 terminal 23
    - X7 terminal 22
  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 accent/flood lamp.

### Repair Instructions

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

- [Instrument Panel Light Conductor Lamp Replacement \(Left Side\)](#) [Instrument Panel Light Conductor Lamp Replacement \(Right Side\)](#)
- [Front Floor Console Compartment Lamp Replacement](#)
- [Front Floor Courtesy Lamp Replacement \(Left Side\)](#) [Front Floor Courtesy Lamp Replacement \(Right Side\)](#)
- [Front Side Door Inside Handle Illumination Lamp Replacement](#)
- [Rear Side Door Inside Handle Illumination Lamp Replacement](#)
- [Rear Floor Flood Lamp 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 |
|---------------------------------------------|--------------------|----------------------|--------------------|--------------------|
| Instrument Panel Dimmer Switch B+           | B1395 03, B3600 03 | B1395 03, B3600 03   | B1395 07, B3600 07 | -                  |
| Instrument Panel Dimmer Switch Signal       | B1395 03, B3600 03 | B1395 03, B3600 03   | B1395 07, B3600 07 | -                  |
| LED Backlight Dimming Control Terminal 8 X2 | B2610 02           | B2610 04             | B2610 04           | -                  |

| Circuit                                                      | Short to Ground | Open/High Resistance | Short to Voltage   | Signal Performance |
|--------------------------------------------------------------|-----------------|----------------------|--------------------|--------------------|
| LED Backlight Dimming Control Terminal 9 X7                  | B2610 02        | B2610 04             | B2610 04           | -                  |
| Switch Indicator LED Backlight Dimming Control Terminal 5 X1 | B2625 02        | B2625 04             | B2625 01           | -                  |
| Lane Departure Switch Amber Indicator Control                | 5               | B0987 06, B0987 0B   | B0987 06, B0987 0B | -                  |
| Park Assist Switch Amber Indicator Control                   | 6               | B0968 06, B0968 0B   | B0968 06, B0968 0B | -                  |
| Passenger Air Bag Disable Indicator Backlighting Control     | 4               | 4                    | 4                  | -                  |
| Instrument Panel Dimmer Switch Low Reference                 | 1               | 1                    | 1                  | -                  |
| Cigarette Light Receptacle - Rear Ground                     | -               | 2                    | -                  | -                  |
| Dome/Reading Lamps - Left Front Ground                       | -               | 2                    | -                  | -                  |
| Dome/Reading Lamps - Left Rear Ground                        | -               | 2                    | -                  | -                  |
| Dome/Reading Lamps - Right Front Ground                      | -               | 2                    | -                  | -                  |
| Dome/Reading Lamps - Right Rear Ground                       | -               | 2                    | -                  | -                  |
| Door Lock Switch - Driver Ground                             | -               | 2                    | -                  | -                  |
| Door Lock Switch - Passenger Ground                          | -               | 2                    | -                  | -                  |
| Garage Door Opener Ground                                    | -               | 2                    | -                  | -                  |
| Head - Up Display Switch Ground                              | -               | 2                    | -                  | -                  |
| Ignition Mode Switch Ground                                  | -               | 2                    | -                  | -                  |
| Infotainment Control Touchpad Ground                         | -               | 2                    | -                  | -                  |
| Instrument Panel Dimmer Switch Ground                        | -               | 2                    | -                  | -                  |
| Liftgate Unlatch Switch - Ground                             | -               | 2                    | -                  | -                  |
| Multifunction Switch - Center Console Ground                 | -               | 2                    | -                  | -                  |
| Multifunction Switch 1 - Instrument Panel Ground             | -               | 3                    | -                  | -                  |
| Multifunction Switch 2 - Instrument Panel Ground             | -               | 3                    | -                  | -                  |



| <b>Circuit</b>                                                                                                                                                                                                                                                                               | <b>Short to Ground</b> | <b>Open/High Resistance</b> | <b>Short to Voltage</b> | <b>Signal Performance</b> |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|-----------------------------|-------------------------|---------------------------|
| Multifunction Switch - Overhead Console Ground                                                                                                                                                                                                                                               | -                      | 2                           | -                       | -                         |
| Park Brake Control Switch Ground                                                                                                                                                                                                                                                             | -                      | 2                           | -                       | -                         |
| Passenger Air Bag Disable Indicator Backlighting Ground                                                                                                                                                                                                                                      | -                      | 4                           | -                       | -                         |
| Rear Compartment Lid Unlatch Switch - Interior Ground                                                                                                                                                                                                                                        | -                      | 2                           | -                       | -                         |
| Seat Adjuster Switch - Driver Ground                                                                                                                                                                                                                                                         | -                      | 2                           | -                       | -                         |
| Seat Adjuster Switch - Passenger Ground                                                                                                                                                                                                                                                      | -                      | 2                           | -                       | -                         |
| Seat Adjuster Switch - Left Rear Ground                                                                                                                                                                                                                                                      | -                      | 2                           | -                       | -                         |
| Seat Adjuster Switch - Right Rear Ground                                                                                                                                                                                                                                                     | -                      | 2                           | -                       | -                         |
| Seat Memory Switch - Driver Ground                                                                                                                                                                                                                                                           | -                      | 2                           | -                       | -                         |
| Seat Memory Switch - Passenger Ground                                                                                                                                                                                                                                                        | -                      | 2                           | -                       | -                         |
| Sunshade Switch - Left Rear Ground                                                                                                                                                                                                                                                           | -                      | 2                           | -                       | -                         |
| Sunshade Switch - Right Rear Ground                                                                                                                                                                                                                                                          | -                      | 2                           | -                       | -                         |
| Window Switch - Passenger Ground                                                                                                                                                                                                                                                             | -                      | 2                           | -                       | -                         |
| Window Switch - Left Rear Ground                                                                                                                                                                                                                                                             | -                      | 2                           | -                       | -                         |
| Window Switch - Right Rear Ground                                                                                                                                                                                                                                                            | -                      | 2                           | -                       | -                         |
| 1. Dimmer Switch Malfunction<br>2. Interior Backlighting Malfunction<br>3. Switch Indicator LED Backlighting Malfunction<br>4. Passenger Air Bag Disable Indicator Backlighting Malfunction<br>5. Lane Departure Switch Indicator Malfunction<br>6. Park Assist Switch Indicator 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 a low reference, signal and B+ voltage reference 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 voltage through the LED dimming 1 and dimming 2 control circuits illuminating the interior backlighting to the requested level of brightness. The BCM also sends a serial data message to the following components requesting there backlighting be adjusted to the level selected by the instrument panel dimmer switch:

- Info Display Module
- Instrument Cluster
- Mirror Control Module

- Steering Wheel Controls Switch - Right
- Steering Wheel Controls Switch - Left
- Transmission Shift Lever Position Indicator
- Window Switch - Driver

The backlighting for the switch indicators listed below are controlled by the Switch Indicator LED Backlight Dimming Control Terminal 5 X1.

- Dome Lamp Defeat Switch Indicator
- Lane Departure Switch
- Park Assist Switch

### Diagnostic Aids

When a fault is present in the Switch Indicator LED Backlight Dimming Control Terminal 5 X1 circuit, it is necessary to remove the negative battery cable for 30 seconds after the fault has been repaired.

### Reference Information

Schematic Reference

- [Interior Lights Dimming Schematics](#)
- [SIR Schematics](#)
- [Object Detection Schematics](#)

Connector End View Reference

### COMPONENT CONNECTOR END VIEWS - INDEX

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/vehicle in Service Mode.
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.
  - **If the parameter changes**
3. Verify the switch backlighting/amber indicators for the components listed below dim from LOW to HIGH while operating the dimmer switch from LOW to HIGH.
  - Dome Lamp Defeat Switch Indicator
  - Lane Departure Switch
  - Park Assist Switch
  - **If the switch backlighting/amber indicators do not dim from LOW to HIGH**

Refer to Switch Indicator LED Backlighting Malfunction.

- **If the switch backlighting/amber indicators dim from LOW to HIGH**

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

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

Refer to Interior Backlighting Malfunction.

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

5. Verify the phrase PASSENGER AIR BAG is illuminated on the Passenger Air Bag Disable Indicator.

- **If the phrase PASSENGER AIR BAG is not illuminated**

Refer to Passenger Air Bag Disable Indicator Backlighting Malfunction.

- **If the phrase PASSENGER AIR BAG is illuminated**

6. All OK.

### Circuit/System Testing

#### Dimmer Switch Malfunction

1. Ignition OFF/Vehicle OFF and all vehicle systems OFF, disconnect the harness connector at the S36 Instrument Panel Dimmer Switch, ignition ON/vehicle in Service Mode.

2. Test for B+ between the B+ circuit terminal 6 and ground.

- **If less than B+**

1. Ignition OFF/Vehicle OFF, disconnect the X1 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  $\Omega$  in the B+ circuit end to end.

- If 2  $\Omega$  or greater, repair the open/high resistance in the circuit.
- If less than 2  $\Omega$ , replace the K9 Body Control Module.

- **If B+**

3. Verify a test lamp illuminates between the B+ circuit terminal 6 and the low reference circuit terminal 1.

- **If the test lamp does not illuminate**

1. Ignition OFF/Vehicle OFF, disconnect the X1 harness connector at the K9 Body Control Module, ignition ON/vehicle in Service Mode.

2. Test for less than 1 V between the low reference 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  $\Omega$  in the low reference circuit end to end.

- If 2  $\Omega$  or greater, repair the open/high resistance in the circuit.
- If less than 2  $\Omega$ , replace the K9 Body Control Module.

- **If the test lamp illuminates**

4. Verify a test lamp does not illuminate between the B+ circuit terminal 6 and the signal circuit terminal 2.

- **If the test lamp illuminates**

1. Ignition OFF/Vehicle 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, replace the K9 Body Control Module.
  - **If the test lamp does not illuminate**
5. Test for B+ between the B+ circuit terminal 6 and the signal circuit terminal 2.
    - **If less than B+**
      1. Ignition OFF/Vehicle OFF, disconnect the X2 harness connector at the K9 Body Control Module, ignition ON/vehicle in Service Mode.
      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  $\Omega$  in the signal circuit end to end.
        - If 2  $\Omega$  or greater, repair the open/high resistance in the circuit.
        - If less than 2  $\Omega$ , replace the K9 Body Control Module.
    - **If B+**
  6. Test or replace the S36 Instrument Panel Dimmer Switch.

### Interior Backlighting Malfunction

1. Ignition OFF/Vehicle OFF, scan tool disconnected, all doors closed, all accessories OFF, open and close drivers door, disconnect the harness connector at the component with inoperative backlighting. It may take up to 2 min for all vehicle systems to power down.

**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
2. Test for less than 10  $\Omega$  between the appropriate ground circuit terminal and ground.
    - **If 10  $\Omega$  or greater**
      1. Ignition OFF/Vehicle OFF.
      2. Test for less than 2  $\Omega$  in the ground circuit end to end.
        - If 2  $\Omega$  or greater, repair the open/high resistance in the circuit.
        - If less than 2  $\Omega$ , repair the open/high resistance in the ground connection.
    - **If less than 10  $\Omega$**
  3. Connect a test lamp between the appropriate control circuit terminal and ground, ignition ON/vehicle in Service Mode.
  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/Vehicle OFF, disconnect the appropriate harness connector listed below at the K9 Body Control Module.
        - X2 terminal 8
        - X7 terminal 9
      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  $\Omega$  in the control circuit end to end.
        - If 2  $\Omega$  or greater, repair the open/high resistance in the circuit.
        - If less than 2  $\Omega$ , replace the K9 Body Control Module.
    - **If the test lamp is always ON**



1. Ignition OFF/Vehicle OFF, disconnect the appropriate harness connector listed below at the K9 Body Control Module, ignition ON/vehicle in Service Mode.

- X2 terminal 8
- X7 terminal 9

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.

**Switch Indicator LED Backlighting Malfunction**

1. Ignition OFF/Vehicle OFF, disconnect the harness connectors at the components listed below.

- S48B Multifunction Switch - Overhead Console
- S48C Multifunction Switch 1 - Instrument Panel
- S48D Multifunction Switch 2 - Instrument Panel

2. Ignition ON/vehicle in Service Mode, place the S36 Instrument Panel Dimmer Switch in the HIGH position for high backlighting intensity.

3. Verify a test lamp illuminates between each control circuit terminal listed below and ground.

**NOTE:**      **The test lamp in the following step will illuminate at LOW intensity. This is normal circuit operation and does not indicate a circuit malfunction.**

- S48B Multifunction Switch - Overhead Console terminal 5
- S48C Multifunction Switch 1 - Instrument Panel terminal 2
- S48D Multifunction Switch 2 - Instrument Panel terminal 8

• **If the test lamp does not illuminate**

1. Ignition OFF/Vehicle 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  $\Omega$  in the control circuit end to end.

- If 2  $\Omega$  or greater, repair the open/high resistance in the circuit.
- If less than 2  $\Omega$ , replace the K9 Body Control Module.

• **If the test lamp illuminates**

4. Place the S36 Instrument Panel Dimmer Switch in the LOW position for low backlighting intensity.

5. Verify a test lamp does not illuminate at FULL intensity between each control circuit terminal listed below and ground.

- S48B Multifunction Switch - Overhead Console terminal 5
- S48C Multifunction Switch 1 - Instrument Panel terminal 2
- S48D Multifunction Switch 2 - Instrument Panel terminal 8

• **If the test lamp illuminates at full intensity**

1. Ignition OFF/Vehicle OFF, disconnect the X1 harness connector at the K9 Body Control Module, ignition ON/vehicle in Service Mode.

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 does not illuminate at full intensity**

6. Test or replace the appropriate S48 Multifunction Switch.

1. Ignition OFF/Vehicle OFF, scan tool disconnected, all doors closed, all accessories OFF, open and close drivers door, disconnect the harness connector at the P14 Passenger Air Bag Disable Indicator. It may take up to 2 min for all vehicle systems to power down.
2. Test for less than 10  $\Omega$  between the ground circuit terminal 2 and ground.
  - **If 10  $\Omega$  or greater**
    1. Ignition OFF/Vehicle OFF.
    2. Test for less than 2  $\Omega$  in the ground circuit end to end.
      - If 2  $\Omega$  or greater, repair the open/high resistance in the circuit.
      - If less than 2  $\Omega$ , repair the open/high resistance in the ground connection.
  - **If less than 10  $\Omega$**
3. Connect a test lamp between the control circuit terminal 4 and ground.
4. Verify the test lamp turns ON and OFF while turning the ignition switch ON and OFF.
  - **If the test lamp is always OFF**
    1. Ignition OFF/Vehicle 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  $\Omega$  in the control circuit end to end.
      - If 2  $\Omega$  or greater, repair the open/high resistance in the circuit.
      - If less than 2  $\Omega$ , replace the X50A Fuse Block - Underhood.
  - **If the test lamp is always ON**
    1. Ignition OFF/Vehicle OFF, disconnect the X1 harness connector at the X50A Fuse Block - Underhood, ignition ON/vehicle in Service Mode.
    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 X50A Fuse Block - Underhood.
  - **If the test lamp turns ON and OFF**
5. Test or replace the P14 Passenger Air Bag Disable Indicator.

### Repair Instructions

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

- [Interior Lamp Switch Replacement](#)
- [Dimmer Switch Replacement](#)
- [Roof Rail Rear Seat Position Reading and Courtesy Lamp Replacement](#)
- [Door Lock Switch Replacement - Driver Side](#)
- [Door Lock Switch Replacement - Passenger Front](#)
- [Outside Rearview Mirror Remote Control Switch Replacement](#)
- [Ignition and Start Switch Replacement](#)
- [Steering Wheel Spoke Cover 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 |
|---------------------------------------------------------------------------------------------------|-----------------|----------------------|--------------------|--------------------|
| Turn Signal/Multifunction Switch Park Lamps ON Signal                                             | 2               | B257A 00             | 2                  | -                  |
| Daytime Running Lamp/Park Lamp Control - Left                                                     | B260D 02        | 1                    | 1                  | -                  |
| Daytime Running Lamp/Park Lamp Control - Right                                                    | B260E 02        | 1                    | 1                  | -                  |
| License Plate Lamps Control                                                                       | B3883 02        | B3883 01, B3883 04   | B3883 01, B3883 04 | -                  |
| Park Lamps Control - Left Front                                                                   | B2585 02        | B2585 01, B2585 04   | B2585 01, B2585 04 | -                  |
| Park Lamps Control - Right Front                                                                  | B3867 02        | B3867 01, B3867 04   | B3867 01, B3867 04 | -                  |
| Park Lamp Control - Left Rear                                                                     | B3881 02        | 1                    | 1                  | -                  |
| Park Lamp Control - Right Rear                                                                    | B3882 02        | 1                    | 1                  | -                  |
| Headlamp Assembly Ground - Left                                                                   | -               | 1                    | -                  | -                  |
| Headlamp Assembly Ground - Right                                                                  | -               | 1                    | -                  | -                  |
| License Plate Lamp Ground - Left                                                                  | -               | 1                    | -                  | -                  |
| License Plate Lamp Ground - Right                                                                 | -               | 1                    | -                  | -                  |
| Side Marker Lamp - Left Front Ground (with TUV)                                                   | -               | 1                    | -                  | -                  |
| Side Marker Lamp - Right Front Ground (with TUV)                                                  | -               | 1                    | -                  | -                  |
| Tail Lamp Assembly - Left Ground                                                                  | -               | 1                    | -                  | -                  |
| Tail Lamp Assembly - Right Ground                                                                 | -               | 1                    | -                  | -                  |
| Turn Signal/Multifunction Switch Ground                                                           | -               | 2                    | -                  | -                  |
| 1. Park, License and/or Tail Lamps Malfunction<br>2. Turn Signal/Multifunction 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.

## Reference Information

Schematic Reference

## Exterior Lights Schematics

Connector End View Reference

## COMPONENT CONNECTOR END VIEWS - INDEX

## 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/vehicle in Service Mode.
2. Verify the scan tool Park Lamps Switch parameter changes between Active and Inactive while commanding the park lamps ON and OFF with the turn signal/multifunction switch.
  - **If the parameter does not change**  
Refer to Turn Signal/Multifunction Switch Malfunction.
  - **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.
  - **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.
  - **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.
  - **If the license plate lamps turn ON and OFF**
6. All OK.

### Circuit/System Testing

#### Turn Signal/Multifunction Switch Malfunction

1. Ignition OFF/Vehicle OFF, scan tool disconnected, all doors closed, all accessories OFF, open and close drivers door, disconnect the harness connector at the S78 Turn Signal/Multifunction Switch. It may take up to 2 min for all vehicle systems to power down.
2. Test for less than 10  $\Omega$  between the ground circuit terminal 3 and ground.
  - **If 10  $\Omega$  or greater**
    1. Ignition OFF/Vehicle OFF.
    2. Test for less than 2  $\Omega$  in the ground circuit end to end.
      - If 2  $\Omega$  or greater, repair the open/high resistance in the circuit.



- If less than 2  $\Omega$ , repair the open/high resistance in the ground connection.
  - **If less than 10  $\Omega$**
3. Ignition ON/vehicle in Service Mode.
  4. Verify the scan tool Park Lamps Switch parameter is Inactive.
    - **If not Inactive**
      1. Ignition OFF/Vehicle 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 ground.
  6. Verify the scan tool Park Lamps Switch parameter is Active.
    - **If not Active**
      1. Ignition OFF/Vehicle OFF, disconnect the X1 harness connector at the K9 Body Control Module, ignition ON/vehicle in Service Mode.
      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  $\Omega$  in the signal circuit end to end.
        - If 2  $\Omega$  or greater, repair the open/high resistance in the circuit.
        - If less than 2  $\Omega$ , replace the K9 Body Control Module.
    - **If Active**
  7. Test or replace the S78 Turn Signal/Multifunction Switch.

#### Park Lamps Malfunction

1. Ignition OFF/Vehicle OFF, exterior lamps OFF, disconnect the harness connector at the appropriate component listed below. It may take up to 2 min for all vehicle systems to power down.
  - E2LF Side Marker Lamp - Left Front (with TUJ)
  - E2RF Side Marker Lamp - Right Front (with TUJ)
  - E13LA Headlamp Assembly - Left
  - E13RA Headlamp Assembly - Right
  - E42L Tail Lamp Assembly - Left
  - E42R Tail Lamp Assembly - Right
2. Test for less than 10  $\Omega$  between the appropriate ground circuit terminal listed below and ground.
  - E2LF Side Marker Lamp - Left Front terminal B (with TUJ)
  - E2RF Side Marker Lamp - Right Front terminal B (with TUJ)
  - E13LA Headlamp Assembly - Left terminal 1 and terminal 4
  - E13RA Headlamp Assembly - Right terminal 1 and terminal 4
  - E42L Tail Lamp Assembly - Left terminal 1
  - E42R Tail Lamp Assembly - Right terminal 1
  - **If 10  $\Omega$  or greater**
    1. Ignition OFF/Vehicle OFF.
    2. Test for less than 2  $\Omega$  in the ground circuit end to end.
      - If 2  $\Omega$  or greater, repair the open/high resistance in the circuit.
      - If less than 2  $\Omega$ , repair the open/high resistance in the ground connection.
  - **If less than 10  $\Omega$**
3. Connect a test lamp between the appropriate control circuit terminal listed below and ground, ignition ON/vehicle in Service Mode.

- E2LF Side Marker Lamp - Left Front terminal A (with TUJ)
  - E2RF Side Marker Lamp - Right Front terminal A (with TUJ)
  - E13LA Headlamp Assembly - Left terminal 7
  - E13RA Headlamp Assembly - Right terminal 7
  - E42L Tail Lamp Assembly - Left terminal 4
  - E42R Tail Lamp Assembly - Right terminal 4
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/Vehicle OFF, disconnect the appropriate harness connector listed below at the K9 Body Control Module.
      - X4 - all park lamps except right front daytime running lamp/park lamp
      - X5 - right front daytime running lamp/park 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  $\Omega$  in the control circuit end to end.
      - If 2  $\Omega$  or greater, repair the open/high resistance in the circuit.
      - If less than 2  $\Omega$ , replace the K9 Body Control Module.
  - **If the test lamp is always ON**
    1. Ignition OFF/Vehicle OFF, disconnect the appropriate harness connector listed below at the K9 Body Control Module, ignition ON/vehicle in Service Mode.
      - X4 - all park lamps except right front daytime running lamp/park lamp
      - X5 - right front daytime running lamp/park 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 park/side marker lamp.

#### License Plate Lamps Malfunction

1. Ignition OFF/Vehicle OFF, exterior lamps OFF, remove both E7 License Plate Lamps. It may take up to 2 min for all vehicle systems to power down.
2. Test for less than 5  $\Omega$  between the ground circuit terminal 2 and ground.
  - **If 5  $\Omega$  or greater**
    1. Ignition OFF/Vehicle OFF.
    2. Test for less than 2  $\Omega$  in the ground circuit end to end.
      - If 2  $\Omega$  or greater, repair the open/high resistance in the circuit.
      - If less than 2  $\Omega$ , repair the open/high resistance in the ground connection.
  - **If less than 5  $\Omega$**
3. Connect a test lamp between the E7L License Plate Lamp - Left control circuit terminal 1 and ground, ignition ON/vehicle in Service Mode.
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/Vehicle 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  $\Omega$  in the control circuit end to end.
  - If 2  $\Omega$  or greater, repair the open/high resistance in the circuit.
  - If less than 2  $\Omega$ , replace the K9 Body Control Module.
- **If the test lamp is always ON**
  1. Ignition OFF/Vehicle OFF, disconnect the X4 harness connector at the K9 Body Control Module, ignition ON/vehicle in Service Mode.
  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 E7R License Plate Lamp - Right control circuit terminal 1 and ground, ignition ON/vehicle in Service Mode.
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/Vehicle 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  $\Omega$  in the control circuit end to end.
      - If 2  $\Omega$  or greater, repair the open/high resistance in the circuit.
      - If less than 2  $\Omega$ , replace the K9 Body Control Module.
  - **If the test lamp turns ON and OFF**
7. Test or replace the E7 License Plate Lamp.

### Repair Instructions

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

- [Headlamp Replacement](#)
- [Rear License Plate Lamp Replacement](#)
- [Turn Signal Switch Replacement](#)
- [Rear Body Structure Stop Lamp Replacement](#)
- [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 |
|----------------------------------------------|-----------------|----------------------|------------------|--------------------|
| Rear Compartment Courtesy Lamps Control      | B2570 02        | B2570 04             | B2570 04         | -                  |
| Rear Compartment Courtesy Lamp - Left Ground | -               | 1                    | -                | -                  |
|                                              |                 |                      |                  |                    |

| Circuit                                       | Short to Ground | Open/High Resistance | Short to Voltage | Signal Performance |
|-----------------------------------------------|-----------------|----------------------|------------------|--------------------|
| Rear Compartment Courtesy Lamp - Right Ground | -               | 1                    | -                | -                  |
| 1. Rear Compartment Lamp Malfunction          |                 |                      |                  |                    |

### Circuit/System Description

The body control module (BCM) applies battery voltage to the rear compartment courtesy lamps through the rear compartment courtesy lamps 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 courtesy lamps control circuit illuminating the rear compartment courtesy lamps. In the event that the rear compartment courtesy lamps were to remain illuminated for more than 10 minutes with the ignition switch in the OFF position, the BCM will deactivate the rear compartment courtesy lamps control circuit to prevent total battery discharge.

### Reference Information

Schematic Reference

### Interior Lights Schematics

Connector End View Reference

### COMPONENT CONNECTOR END VIEWS - INDEX

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/Vehicle OFF, exterior lamps OFF, disconnect the harness connectors at both E8 Rear Compartment Courtesy Lamps. It may take up to 2 min for all vehicle systems to power down.
2. Test for less than 5  $\Omega$  between the ground circuit terminal 2 and ground.
  - **If 5  $\Omega$  or greater**
    1. Ignition OFF/Vehicle OFF.
    2. Test for less than 2  $\Omega$  in the ground circuit end to end.
      - If 2  $\Omega$  or greater, repair the open/high resistance in the circuit.
      - If less than 2  $\Omega$ , repair the open/high resistance in the ground connection.
  - **If less than 5  $\Omega$**
3. Connect a test lamp between the control circuit terminal 1 and ground, ignition ON/vehicle in Service Mode.
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/Vehicle 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  $\Omega$  in the control circuit end to end.
  - If 2  $\Omega$  or greater, repair the open/high resistance in the circuit.
  - If less than 2  $\Omega$ , replace the K9 Body Control Module.
- **If the test lamp is always ON**
  1. Ignition OFF/Vehicle OFF, disconnect the X7 harness connector at the K9 Body Control Module, ignition ON/vehicle in Service Mode.
  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 E8 Rear Compartment Courtesy Lamp.

### Repair Instructions

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

- [Rear Compartment Cargo Courtesy Lamp Replacement \(Left Side\)](#) [Rear Compartment Cargo Courtesy Lamp Replacement \(Right Side\)](#)
- [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

| Circuit                                   | Short to Ground                        | Open/High Resistance         | Short to Voltage                       | Signal Performance |
|-------------------------------------------|----------------------------------------|------------------------------|----------------------------------------|--------------------|
| Brake Pedal Position Sensor 5 V Reference | C0277 06, C0890 03, U0422 00, U0422 71 | C0277 06, U0422 00, U0422 71 | C0277 07, C0890 07, U0422 00, U0422 71 | -                  |
| Brake Pedal Position Sensor Signal        | C0277 06, U0422 00, U0422 71           | C0277 06, U0422 00, U0422 71 | C0277 07, C0890 07, U0422 00, U0422 71 | C0277 09           |
| Center High Mounted Stop Lamp Control     | B3884 02                               | B3884 04                     | B3884 04                               | -                  |
| Stop Lamp Control - Left (with TVN)       | 1                                      | 1                            | 1                                      | -                  |
| Stop Lamp Control - Right (with TVN)      | 1                                      | 1                            | 1                                      | -                  |

| <b>Circuit</b>                                                                                                                  | <b>Short to Ground</b> | <b>Open/High Resistance</b>  | <b>Short to Voltage</b> | <b>Signal Performance</b> |
|---------------------------------------------------------------------------------------------------------------------------------|------------------------|------------------------------|-------------------------|---------------------------|
| Turn Signal/Stop Lamp Control - Left (without TVN)                                                                              | 3                      | B3950 02                     | 3                       | -                         |
| Turn Signal/Stop Lamp Control - Right (without TVN)                                                                             | 3                      | B3951 02                     | 3                       | -                         |
| Brake Pedal Position Sensor Low Reference                                                                                       | -                      | C0277 07, U0422 00, U0422 71 | 1                       | -                         |
| Center High Mounted Stop Lamp Ground                                                                                            | -                      | 2                            | -                       | -                         |
| Tail Lamp Assembly - Left Rear Ground                                                                                           | -                      | 1                            | -                       | -                         |
| Tail Lamp Assembly - Right Rear Ground                                                                                          | -                      | 1                            | -                       | -                         |
| 1. Stop Lamps Malfunction<br>2. Center High Mounted Stop Lamp Malfunction<br>3. Turn Signal Lamps and/or Indicators Malfunction |                        |                              |                         |                           |

### **Circuit/System Description**

#### **Stop Lamps (with TVN)**

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 left and right dedicated stop lamp control circuits as well as the center high mounted stop lamp control circuit illuminating the left and right stop lamps and the center high mounted stop lamp.

#### **Stop Lamps (without TVN)**

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 left and right stop lamp control circuits as well as the center high mounted stop lamp control circuit illuminating the left and right stop lamps and the center high mounted stop lamp. Vehicles without option code TVN have two additional control circuits that are turn signal/stop lamp controls combined. These circuits set individual turn signal system related DTC's and will be diagnosed within those DTC's as well as the Turn Signal Lamps and/or Indicators Malfunction diagnostic. The center high mounted stop lamp control circuit mentioned above will be diagnosed in Stop Lamps Malfunction.

### **Reference Information**

Schematic Reference

### **Exterior Lights Schematics**

Connector End View Reference

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### 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/vehicle in Service Mode.
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.
  - **If the parameter changes**
3. Verify the left stop lamp turns ON and OFF when commanding the Left Stop Lamp ON and OFF with a scan tool.
  - **If the left stop lamp does not turn ON and OFF**  
Refer to Stop Lamps Malfunction.
  - **If the left stop lamp turns ON and OFF**
4. Verify the right stop lamp turns ON and OFF when commanding the Right Stop Lamp ON and OFF with a scan tool.
  - **If the right stop lamp does not turn ON and OFF**  
Refer to Stop Lamps Malfunction.
  - **If the right stop lamp turns ON and OFF**
5. Verify the center high mounted stop lamp turns ON and OFF when commanding the Center Stop Lamp ON and OFF with a scan tool.
  - **If the center high mounted stop does not turn ON and OFF**  
Refer to Center High Mounted Stop Lamp Malfunction.
  - **If the center high mounted stop turns ON and OFF**
6. All OK.

### Circuit/System Testing

#### Brake Pedal Position Sensor Malfunction

1. Ignition OFF/Vehicle OFF, disconnect the harness connector at the B22 Brake Pedal Position Sensor, ignition ON/vehicle in Service Mode.
2. Test for less than 1 V between the low reference circuit terminal 1 and ground.
  - **If 1 V or greater**
    1. Ignition OFF/Vehicle OFF, disconnect the X1 harness connector at the K9 Body Control Module, ignition ON/vehicle in Service Mode.
    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/Vehicle OFF, exterior lamps OFF, disconnect the harness connector at the appropriate E42 Tail Lamp Assembly. It may take up to 2 min for all vehicle systems to power down.

2. Test for less than 10  $\Omega$  between the ground circuit terminal 1 and ground.

- **If 10  $\Omega$  or greater**

1. Ignition OFF/Vehicle OFF.

2. Test for less than 2  $\Omega$  in the ground circuit end to end.

- If 2  $\Omega$  or greater, repair the open/high resistance in the circuit.
- If less than 2  $\Omega$ , repair the open/high resistance in the ground connection.

- **If less than 10  $\Omega$**

3. Connect a test lamp between the control circuit terminal 2 and ground, ignition ON/vehicle in Service Mode.

4. Verify the test lamp turns ON and OFF when commanding the appropriate Stop Lamp ON and OFF with a scan tool.

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

1. Ignition OFF/Vehicle OFF, disconnect the appropriate harness connector listed below at the K9 Body Control Module.

- X5 - left stop lamps
- X7 - right stop lamps

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  $\Omega$  in the control circuit end to end.

- If 2  $\Omega$  or greater, repair the open/high resistance in the circuit.
- If less than 2  $\Omega$ , replace the K9 Body Control Module.

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

1. Ignition OFF/Vehicle OFF, disconnect the appropriate harness connector listed below at the K9 Body Control Module, ignition ON/vehicle in Service Mode.

- X5 - left stop lamps
- X7 - right stop lamps

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 E42 Tail Lamp Assembly.

### Center High Mounted Stop Lamp Malfunction

1. Ignition OFF/Vehicle OFF, exterior lamps OFF, disconnect the harness connector at the E6 Center High Mounted Stop Lamp. It may take up to 2 min for all vehicle systems to power down.

2. Test for less than 5  $\Omega$  between the ground circuit terminal 1 and ground.

- **If 5  $\Omega$  or greater**

1. Ignition OFF/Vehicle OFF.

2. Test for less than 2  $\Omega$  in the ground circuit end to end.

- If 2  $\Omega$  or greater, repair the open/high resistance in the circuit.
- If less than 2  $\Omega$ , repair the open/high resistance in the ground connection.



- **If less than 5  $\Omega$**
3. Connect a test lamp between the control circuit terminal 2 and ground, ignition ON/vehicle in Service Mode.
  4. Verify the test lamp turns ON and OFF when commanding the Center Stop Lamp ON and OFF with a scan tool.
    - **If the test lamp is always OFF**
      1. Ignition OFF/Vehicle 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  $\Omega$  in the control circuit end to end.
        - If 2  $\Omega$  or greater, repair the open/high resistance in the circuit.
        - If less than 2  $\Omega$ , replace the K9 Body Control Module.
    - **If the test lamp is always ON**
      1. Ignition OFF/Vehicle OFF, disconnect the X4 harness connector at the K9 Body Control Module, ignition ON/vehicle in Service Mode.
      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](#)
- [Rear Body Structure Stop Lamp Replacement](#)
- [Brake Pedal Position Sensor Replacement](#)
- [Brake Pedal Position Sensor Calibration](#)
- [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 |
|--------------------------------------------------------|-----------------|----------------------|------------------|--------------------|
| Turn Signal Switch Signal - Left                       | 2               | 2                    | 2                | -                  |
| Turn Signal Switch Signal - Right                      | 2               | 2                    | 2                | -                  |
| Turn Signal Lamp Outage Detection Signal - Left Front  | 3               | 3                    | 3                | -                  |
| Turn Signal Lamp Outage Detection Signal - Left Rear   | 3               | 3                    | 3                | -                  |
| Turn Signal Lamp Outage Detection Signal - Right Front | 3               | 3                    | 3                | -                  |

| Circuit                                                                                                                                                   | Short to Ground | Open/High Resistance | Short to Voltage | Signal Performance |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|----------------------|------------------|--------------------|
| Turn Signal Lamp Outage Detection Signal - Right Rear                                                                                                     | 3               | 3                    | 3                | -                  |
| Turn Signal Control - Left Front                                                                                                                          | B3948 02        | B3948 01, B3948 04   | 1                | -                  |
| Turn Signal Control - Left Rear (with TVN)                                                                                                                | B3950 02        | B3950 01, B3950 04   | 1                | -                  |
| Turn Signal/Stop Lamp Control - Left Rear (without TVN)                                                                                                   | B3950 02        | B3950 01, B3950 04   | 1                | -                  |
| Turn Signal Control - Right Front                                                                                                                         | B3949 02        | B3949 01, B3949 04   | 1                | -                  |
| Turn Signal Control - Right Rear (with TVN)                                                                                                               | B3951 02        | B3951 01, B3951 04   | 1                | -                  |
| Turn Signal/Stop Lamp Control - Right Rear (without TVN)                                                                                                  | B3951 02        | B3951 01, B3951 04   | 1                | -                  |
| Outside Rearview Mirror - Driver Ground                                                                                                                   | -               | 1                    | -                | -                  |
| Outside Rearview Mirror - Passenger Ground                                                                                                                | -               | 1                    | -                | -                  |
| Tail Lamp Assembly - Left Rear Ground                                                                                                                     | -               | 1                    | -                | -                  |
| Tail Lamp Assembly - Right Rear Ground                                                                                                                    | -               | 1                    | -                | -                  |
| Turn Signal/Multifunction Switch Ground                                                                                                                   | -               | 2                    | -                | -                  |
| 1. Turn Signal Lamps and/or Indicators Malfunction<br>2. Turn Signal/Multifunction Switch Malfunction<br>3. Turn Signal Lamp Outage Detection 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.

### Reference Information

Schematic Reference

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

Connector End View Reference

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

Scan Tool Reference

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

### Circuit/System Verification

1. Ignition ON/vehicle in Service Mode.
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.
  - **If the parameters change**
3. Verify the left front turn signal and turn signal repeater 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 and/or turn signal repeater lamps do not turn ON and OFF**  
Refer to Turn Signal Lamps Malfunction.
  - **If the left front turn signal and turn signal repeater lamps turn ON and OFF**
4. Verify the right front turn signal and turn signal repeater 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 and/or turn signal repeater lamps do not turn ON and OFF**  
Refer to Turn Signal Lamps Malfunction.
  - **If the right front turn signal and turn signal repeater lamps turn ON and OFF**
5. Verify the left rear turn signal lamp turns ON and OFF while commanding the Left Rear Turn Signal/Stop Lamp ON and OFF with a scan tool.
  - **If the left rear turn signal lamp does not turn ON and OFF**  
Refer to Turn Signal Lamps Malfunction.
  - **If the left rear turn signal lamp turns ON and OFF**
6. Verify the right rear turn signal lamp turns ON and OFF while commanding the Right Rear Turn Signal/Stop Lamp ON and OFF with a scan tool.
  - **If the right rear turn signal lamp does not turn ON and OFF**  
Refer to Turn Signal Lamps Malfunction.
  - **If the right rear turn signal lamp turns ON and OFF**
7. Observe the left and right turn signal lamps and turn signal indicators on the instrument cluster while activating the left and right turn signals. The left and right turn signal lamps and indicators should illuminate and flash at a normal rate when turned ON.
  - **If the left and right turn signal lamps and indicators illuminate but flash in a rapid manner**  
Refer to Turn Signal Lamp Outage Detection Malfunction.
  - **If the left and right turn signal lamps and indicators operate normally**
8. All OK.

### Circuit/System Testing

1. Ignition OFF/Vehicle OFF, scan tool disconnected, all doors closed, all accessories OFF, open and close drivers door, disconnect the harness connector at the S78 Turn Signal/Multifunction Switch. It may take up to 2 min for all vehicle systems to power down.
2. Test for less than 10  $\Omega$  between the ground circuit terminal 3 and ground.
  - **If 10  $\Omega$  or greater**
    1. Ignition OFF/Vehicle OFF.
    2. Test for less than 2  $\Omega$  in the ground circuit end to end.
      - If 2  $\Omega$  or greater, repair the open/high resistance in the circuit.
      - If less than 2  $\Omega$ , repair the open/high resistance in the ground connection.
  - **If less than 10  $\Omega$**
3. Ignition ON/vehicle in Service Mode.
4. Verify the scan tool Left Turn Signal Switch parameter is Inactive.
  - **If not Inactive**
    1. Ignition OFF/Vehicle 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 ground.
6. Verify the scan tool Left Turn Signal Switch parameter is Active.
  - **If not Active**
    1. Ignition OFF/Vehicle OFF, disconnect the X3 harness connector at the K9 Body Control Module, ignition ON/vehicle in Service Mode.
    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  $\Omega$  in the signal circuit end to end.
      - If 2  $\Omega$  or greater, repair the open/high resistance in the circuit.
      - If less than 2  $\Omega$ , 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/Vehicle 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**
8. Install a 3 A fused jumper wire between the signal circuit terminal 2 and ground.
9. Verify the scan tool Right Turn Signal Switch parameter is Active.
  - **If not Active**
    1. Ignition OFF/Vehicle OFF, disconnect the X3 harness connector at the K9 Body Control Module, ignition ON/vehicle in Service Mode.
    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  $\Omega$  in the signal circuit end to end.



- If 2  $\Omega$  or greater, repair the open/high resistance in the circuit.
- If less than 2  $\Omega$ , 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/Vehicle OFF, exterior lamps OFF, disconnect the harness connector at the appropriate turn signal lamp. It may take up to 2 min for all vehicle systems to power down.
2. Test for less than 15  $\Omega$  between the appropriate ground circuit terminal listed below and ground.
  - A9A Outside Rearview - Driver terminal 8
  - A9B Outside Rearview - Passenger terminal 8
  - E13LA Headlamp Assembly - Left terminal 4
  - E13RA Headlamp Assembly - Right terminal 4
  - E42L Tail Lamp Assembly - Left terminal 1
  - E42R Tail Lamp Assembly - Right terminal 1
- **If 15  $\Omega$  or greater**
  1. Ignition OFF/Vehicle OFF.
  2. Test for less than 2  $\Omega$  in the ground circuit end to end.
    - If 2  $\Omega$  or greater, repair the open/high resistance in the circuit.
    - If less than 2  $\Omega$ , repair the open/high resistance in the ground connection.
- **If less than 15  $\Omega$**
3. Connect a test lamp between the appropriate control circuit terminal listed below and ground, ignition ON/vehicle in Service Mode.
  - A9A Outside Rearview - Driver terminal 17
  - A9B Outside Rearview - Passenger terminal 17
  - E13LA Headlamp Assembly - Left terminal 6
  - E13RA Headlamp Assembly - Right terminal 6
  - E42L Tail Lamp Assembly - Left terminal 5
  - E42R Tail Lamp Assembly - Right terminal 5
4. 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/Vehicle 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  $\Omega$  in the control circuit end to end.
      - If 2  $\Omega$  or greater, repair the open/high resistance in the circuit.
      - If less than 2  $\Omega$ , replace the K9 Body Control Module.
  - **If the test lamp is always ON**
    1. Ignition OFF/Vehicle OFF, disconnect the appropriate harness connector listed below at the K9 Body Control Module, ignition ON/vehicle in Service Mode.
      - 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**

5. Test or replace the turn signal lamp.

#### Turn Signal Lamp Outage Detection Malfunction

1. Ignition OFF/Vehicle OFF, disconnect the harness connector at the appropriate component listed below, ignition ON/vehicle in Service Mode.

- A9A Outside Rearview - Driver
- A9B Outside Rearview - Passenger
- E13LA Headlamp Assembly - Left
- E13RA Headlamp Assembly - Right
- E42L Tail Lamp Assembly - Left
- E42R Tail Lamp Assembly - Right

2. Test for B+ between the appropriate signal circuit terminal listed below and ground.

- E13LA Headlamp Assembly - Left terminal 8
- E13RA Headlamp Assembly - Right terminal 8
- E42L Tail Lamp Assembly - Left terminal 6
- E42R Tail Lamp Assembly - Right terminal 6

- **If not B+**

1. Ignition OFF/Vehicle OFF, disconnect the appropriate harness connector listed below at the K9 Body Control Module.

- X4 front turn signals
- X6 left rear turn signal
- X7 right rear turn signal

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  $\Omega$  in the signal circuit end to end.

- If 2  $\Omega$  or greater, repair the open/high resistance in the circuit.
- If less than 2  $\Omega$ , replace the K9 Body Control Module.

- **If B+**

3. Verify a test lamp does not illuminate between the appropriate signal circuit terminal listed below and ground.

- E13LA Headlamp Assembly - Left terminal 8
- E13RA Headlamp Assembly - Right terminal 8
- E42L Tail Lamp Assembly - Left terminal 6
- E42R Tail Lamp Assembly - Right terminal 6

- **If the test lamp illuminates**

1. Ignition OFF/Vehicle OFF, disconnect the appropriate harness connector listed below at the K9 Body Control Module, ignition ON/vehicle in Service Mode.

- X4 front turn signals
- X6 left rear turn signal
- X7 right rear turn signal

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 does not illuminate**

4. Test or replace the turn signal lamp.

#### Repair Instructions

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

- [Headlamp Replacement](#)
  - [Turn Signal Switch Replacement](#)
  - [Outside Rearview Mirror Turn Signal Lamp Replacement](#)
  - [Rear Body Structure Stop Lamp Replacement](#)
  - [Control Module References](#) for BCM replacement, programming and setup
- 

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## 2017 ACCESSORIES & EQUIPMENT

### Lighting - Repair Instructions - CT6

## REPAIR INSTRUCTIONS

### WIRE TO WIRE REPAIR - LIGHTING

#### Special Tools

- **EL-38125-10** Splice Sleeve Crimping Tool (non GMNA)
- **J-38125-5A** Ultra Torch Special Tool
- **J-38125-8** Splice Sleeve Crimping Tool (GMNA)

For equivalent regional tools, refer to [Special Tools](#) .

**WARNING:** In order to reduce the risk of personal injury, loss of high voltage isolation to ground and higher system impedance, do not attempt to repair any HV wiring, connector or terminal that is damaged. High voltage coaxial type cables are not repairable. Never attempt to repair a coaxial type cable. The entire cable/harness or component must be replaced. In order to maintain system integrity and personal safety, never attempt to repair any high voltage wiring, cables or terminals. Performing this procedure on high voltage circuits may result in serious injury or death.

**NOTE:** If the wiring harness internal to the transmission is damaged, the wiring harness must be replaced. The use of splice sleeves in an attempt to repair the internal transmission wires, connectors or terminals could result in performance issues.

**NOTE:** Do not splice wires in Door Harness Grommets.

**NOTE:** The DuraSeal splice sleeves have the following 2 critical features:

- A special heat shrink sleeve environmentally seals the splice. The heat shrink sleeve contains a sealing adhesive inside.
- A cross hatched (knurled) core crimp provides the necessary low resistance contact integrity for these sensitive, low energy circuits.

Use only DuraSeal splice sleeves to form a one-to-one splice on all types of insulation except high voltage and specialty cables. Use DuraSeal splice sleeves where there are special requirements such as moisture sealing. Follow the instructions below in order to splice copper wire using DuraSeal splice sleeves.

#### Splice Sleeve Selection

| Splice Sleeve Color              | Crimp Tool Nest Color    |               | Wire Gauge mm <sup>2</sup> / (AWG) |
|----------------------------------|--------------------------|---------------|------------------------------------|
|                                  | 3 Crimp Nests            | 4 Crimp Nests |                                    |
| Salmon (Yellow-Pink)<br>19300089 | Red (1) or Red/Green (1) | Red (2)       | 0.22-0.8/(18-26)                   |
| Blue<br>19168447                 | Blue (2)                 | Blue (3)      | 1.0-2.0/(14-16)                    |
| Yellow<br>19168448               | Yellow (3)               | Yellow (4)    | 3.0-5.0/(10-12)                    |

1. Open the harness by removing any tape:



**NOTE:**

**You must perform the following procedures in the listed order. Repeat the procedure if any wire strands are damaged. You must obtain a clean strip with all of the wire strands intact.**

- Use a sewing seam ripper, available from sewing supply stores, in order to cut open the harness in order to avoid wire insulation damage.
- Use the DuraSeal splice sleeves on all types of insulation except Tefzel and coaxial.
- Do not use the crimp and DuraSeal splice sleeve to form a splice with more than 2 wires coming together.

2. Cut as little wire off the harness as possible. You may need the extra length of wire in order to change the location of a splice.

Adjust splice locations so that each splice is at least 40 mm (1.5 in) away from the other splices, harness branches or connectors.

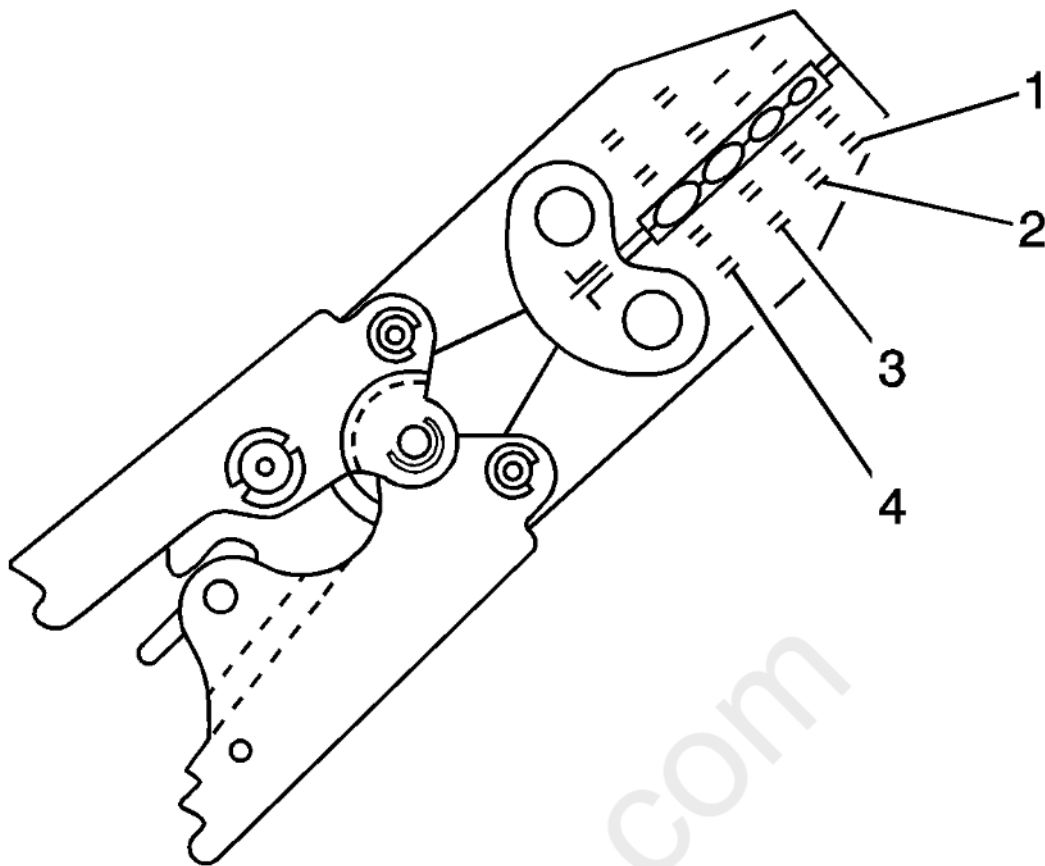
3. Strip the insulation:

- When adding a length of wire to the existing harness, use the same size wire as the original wire.
- Perform one of the following items in order to find the correct wire size:
  - Find the wire on the schematic and convert to regional wiring gauge size.
  - If you are unsure of the wire size, begin with the largest opening in the wire stripper and work down until achieving a clean strip of the insulation.
- Strip approximately 5.0 mm (0.20 in) of insulation from each wire to be spliced.
- Do not nick or cut any of the strands. Inspect the stripped wire for nicks or cut strands.
- If the wire is damaged, repeat this procedure after removing the damaged section.

4. For high temperature wiring, slide a section of high temperature SCT1 shrink tubing down the length of wire to be spliced. Ensure that the shrink tubing will not interfere with the splice procedure.

5. Select the proper DuraSeal splice sleeve according to the wire size. Refer to the above table at the beginning of the repair procedure for the color coding of the DuraSeal splice sleeves and the crimp tool nests.

6. The **EL-38125-10** splice sleeve crimping tool has four crimp nests. The largest crimp nest (4) is used for crimping 10 and 12 gauge wires. The second largest crimp nest (3) is used for crimping 14 and 16 gauge wires. The third largest crimp nest (2) is used for crimping 18 and 20 gauge wires. The smallest crimp nest (1) is used for crimping 22 to 26 gauge wires. The crimp nests are referenced in the table (farther above) under the crimp tool nest color.



**Fig. 1: Crimping Tool**

Courtesy of GENERAL MOTORS COMPANY

7. The **J-38125-8** splice sleeve crimping tool has three crimp nests. The largest crimp nest (3) is used for crimping 10 and 12 gauge wires. The second largest crimp nest (2) is used for crimping 14 and 16 gauge wires. The smallest crimp nest (1) is used for crimping 18 to 20 gauge wires. The crimp nests are referenced in the table (farther above) under the crimp tool nest color.
8. Use the splice sleeve crimp tool in order to position the DuraSeal splice sleeve in the proper color nest of the splice sleeve crimp tool. For the four crimp nest tool, use the three largest crimp nests to crimp the splice sleeves. For the three crimp nest tool, use all three crimp nests to crimp the splice sleeves. Use the four and three crimp tool diagrams (above) and the table (farther above) to match the splice sleeve with the correct crimp nest. The crimp tool diagram callout numbers match the numbers in the table (under crimp tool nest color).
9. Place the DuraSeal splice sleeve in the nest. Ensure that the crimp falls midway between the end of the barrel and the stop. The sleeve has a stop (3) in the middle of the barrel (2) in order to prevent the wire (1) from going further. Close the hand crimper handles slightly in order to firmly hold the DuraSeal splice sleeve in the proper nest.
10. Insert the wire into the splice sleeve barrel until the wire hits the barrel stop. Refer to **Folded-Over Wire Repair** for splicing wires of 0.35 mm or less (22, 24, 26 gauge sizes) and for splicing wires of different gauges.



**Fig. 2: Crimped Duraseal Splice Sleeve**

**Courtesy of GENERAL MOTORS COMPANY**

11. Tightly close the handles of the crimp tool until the crimper handles open when released.

The crimper handles will not open until you apply the proper amount of pressure to the DuraSeal splice sleeve. Repeat steps 4 and 6 for the opposite end of the splice.

12. Using the heat torch, apply heat to the crimped area of the barrel.



**Fig. 3: Crimped Duraseal Splice Sleeve**

Courtesy of GENERAL MOTORS COMPANY

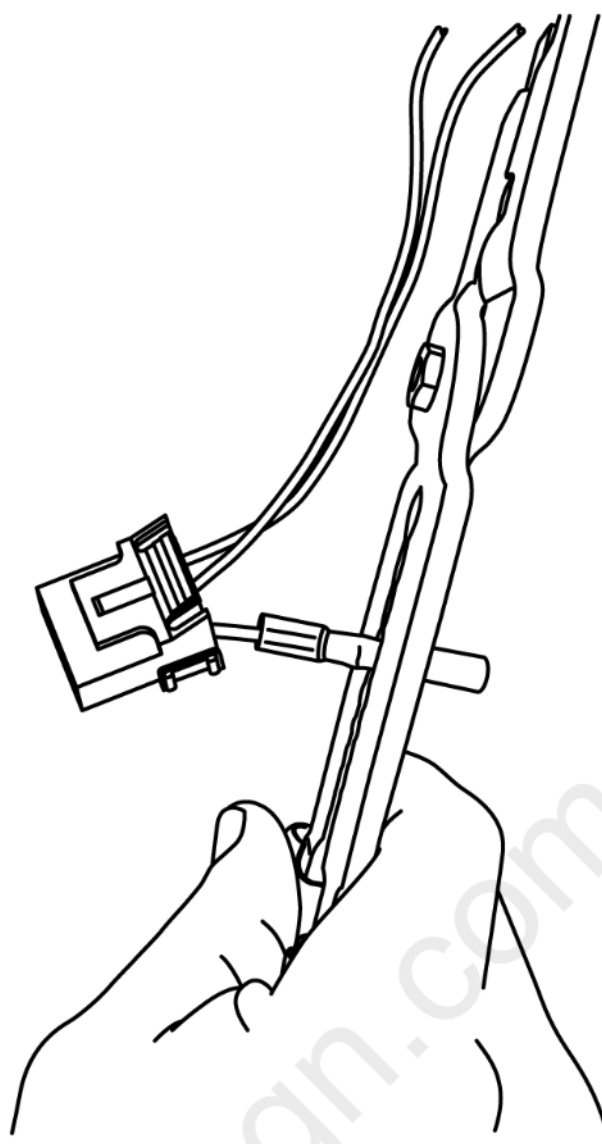
13. Start in the middle and gradually move the heat barrel to the open ends of the tubing:
  - The tubing will shrink completely as the heat is moved along the insulation.
  - A small amount of sealant will come out of the end of the tubing when sufficient shrinkage is achieved.

#### **Weatherpack™ Wiring Repair**

**NOTE:** Some replacement pigtail connectors may be delivered without the terminated leads installed into the connector. For Weatherpack™ connectors, all terminated leads included in the package should to be installed into the connector. If the connector end view shows that a terminal is not occupied, the extra terminated lead(s) need to be installed and the end(s) sealed using a DuraSeal splice sleeve and taped back into the harness.

1. Insert the wire into the splice sleeve barrel until the wire hits the barrel stop. Refer to **Folded-Over Wire Repair** for splicing wires of 0.35 mm or less (22, 24, 26 gauge sizes) and for splicing wires of different gauges.





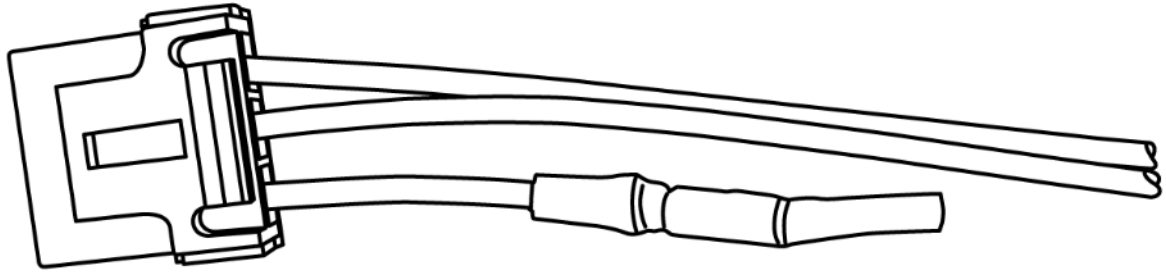
**Fig. 4: Tightly Close Handles Of Crimp Tool**

**Courtesy of GENERAL MOTORS COMPANY**

2. Tightly close the handles of the crimp tool until the crimper handles open when released.

The crimper handles will not open until you apply the proper amount of pressure to the DuraSeal splice sleeve. Holding the DuraSEAL with one hand gently tug on the wire to ensure it is crimped in the DuraSeal.

3. Using the heat torch, apply heat to the crimped area of the barrel.
4. Start in the middle and gradually move the heat barrel to the open ends of the tubing:



**Fig. 5: Heat To Crimped Area Of Barrel**

**Courtesy of GENERAL MOTORS COMPANY**

- The tubing will shrink completely as the heat is moved along the insulation.
- A small amount of sealant will come out of the end of the tubing when sufficient shrinkage is achieved.

5. Tape the extra terminated lead(s) back into the harness.



**Fig. 6: Taping Extra Terminated Leads Back Into Harness**  
Courtesy of GENERAL MOTORS COMPANY

### High Temperature Wiring Repairs

Use the following procedures to perform high temperature wiring repairs:

1. Center the high temperature SCT1 shrink tube over the DuraSeal splice sleeve.
2. Using the heat torch, apply heat to the high temperature heat shrink tubing.
3. Gradually move the heat from the center to the open end of the tubing:
  - The tubing will shrink completely as the heat is moved along the insulation.
  - A small amount of sealant will come out of the end of the tubing when sufficient shrinkage is achieved.
4. Replace any reflective tape and clips that may have been removed during the repair.

## CONNECTOR RECONNECTION - LIGHTING

### Special Tools

**EL-35616** Terminal Test Probe Kit

For equivalent regional tools, refer to [Special Tools](#) .

When the condition is not currently present, but is indicated in DTC history, the cause may be intermittent. An intermittent may also be the cause when there is a customer complaint, but the symptom cannot be duplicated. Refer to the Symptom Table of the system that is suspect of causing the condition before trying to locate an intermittent condition.

Most intermittent conditions are caused by faulty electrical connections or wiring. Inspect for the following items:

- Loose, corroded or painted terminal stud/fastener
- Wiring broken inside the insulation
- Poor connection between the male and female terminal at a connector
- A terminal not seated all the way into the connector body
- Poor terminal to wire connection - Some conditions which fall under this description are poor crimps, poor solder joints, crimping over the wire insulation rather than the wire itself and corrosion in the wire to terminal contact area, etc.
- Pierced or damaged insulation can allow moisture to enter the wiring causing corrosion. The conductor can corrode inside the insulation, with little visible evidence. Look for swollen and stiff sections of wire in the suspect circuits.
- Wiring which has been pinched, cut or its insulation rubbed through may cause an intermittent open or short as the bare area touches other wiring or parts of the vehicle.
- Wiring that comes in contact with hot or exhaust components
- Refer to [\*\*Inducing Intermittent Fault Conditions\*\*](#) in order to duplicate the conditions required, in order to verify the customer concern.
- Refer to [\*\*Testing for Electrical Intermittents\*\*](#) for test procedures to detect intermittent open, high resistance, short to ground and short to voltage conditions.
- Refer to [\*\*Scan Tool Snapshot Procedure\*\*](#) for advanced intermittent diagnosis and Vehicle Data Recorder operation.

### Testing for Terminal Fretting

Some intermittent conditions can be caused by wire terminal fretting corrosion. Fretting corrosion is a build-up of insulating, oxidized wear debris that can form when there is a small motion between electrical contacts. The oxidized wear debris can pile up enough at the electrical contact spots that the electrical resistance across the connection increases. Movement between the contacting surfaces as small as 10 to 100 microns can cause fretting. To put this in perspective, a sheet of paper is about 100 microns thick, so fretting motion is small and hard to see. Vibration and thermal expansion/contraction are the main sources that create fretting motion. Since vehicles vibrate and can experience large temperature swings, they are a good source for fretting motion. Tin, copper, nickel and iron surfaces are all susceptible to fretting corrosion. Fretting corrosion can be difficult to see but it looks like small, dark smudges on the terminals contact surface.

To correct a fretting condition disconnect the suspect connector and add dielectric grease/lubricant (Nyogel 760G or equivalent, meeting GM specification 9986087) to both sides of the connector terminals. Then reconnect the connector and wipe away any excess lubricant. This will correct the additional terminal contact resistance due to the terminal fretting corrosion.

### Testing for Proper Terminal Contact

It is important to test terminal contact at the component and any inline connectors before replacing a suspect component. Mating terminals must be inspected to ensure good terminal contact. A poor connection between the male and female terminal at a connector may be the result of contamination or deformation.

Contamination may be caused by the connector halves being improperly connected. A missing or damaged connector seal, damage to the connector itself or exposing the terminals to moisture and dirt can also cause contamination. Contamination, usually in the underhood or underbody connectors, leads to terminal corrosion, causing an open circuit or intermittently open circuit.

Deformation is caused by probing the mating side of a connector terminal without the proper adapter. Always use the **EL-35616** kit when probing connectors. Other causes of terminal deformation are improperly joining the connector halves or repeatedly separating and joining the connector halves. Deformation, usually to the female terminal contact tang, can result in poor terminal contact causing an open or intermittently open circuit.

### Testing for Proper Terminal Contact in Bussed Electrical Centers



It is very important to use the correct test adapter when testing for proper terminal contact of fuses and relays in a bussed electrical center. Use the **EL-35616** kit to test for proper terminal contact. Failure to use the **EL-35616** kit can result in improper diagnosis of the bussed electrical center.

Follow the procedure below in order to test terminal contact:

1. Separate the connector halves.
2. Visually inspect the connector halves for contamination. Contamination may result in a white or green build-up within the connector body or between terminals. This causes high terminal resistance, intermittent contact or an open circuit. An underhood or underbody connector that shows signs of contamination should be replaced in its entirety: terminals, seals and connector body.
3. Using an equivalent male terminal/terminated lead, verify that the retention force is significantly different between a known good terminal and the suspect terminal. Replace the female terminal in question.

#### **Flat Wire Connectors**

There are no serviceable parts for flat wire connectors on the harness side or the component side.

Follow the procedure below in order to test terminal contact:

1. Remove the component in question.
2. Visually inspect each side of the connector for signs of contamination. Avoid touching either side of the connector as oil from your skin may be a source of contamination as well.
3. Visually inspect the terminal bearing surfaces of the flat wire circuits for splits, cracks or other imperfections that could cause poor terminal contact. Visually inspect the component side connector to ensure that all of the terminals are uniform and free of damage or deformation.
4. Insert the appropriate adapter into the flat wire harness connector in order to test the circuit in question.

#### **Control Module/Component Voltage and Grounds**

Poor voltage or ground connections can cause widely varying symptoms.

- Test all control module voltage supply circuits. Many vehicles have multiple circuits supplying voltage to a control module. Other components in the system may have separate voltage supply circuits that may also need to be tested. Inspect connections at the module/component connectors, fuses and any intermediate connections between the voltage source and the module/component. A test lamp or a DMM may indicate that voltage is present, but neither tests the ability of the circuit to carry sufficient current. Operate the component to test the ability of the circuit to carry sufficient current. Refer to [Circuit Testing](#) and [Power Distribution Schematics](#).
- Test all control module ground and system ground circuits. The control module may have multiple ground circuits. Other components in the system may have separate grounds that may also need to be tested. Inspect grounds for clean and tight connections at the grounding point (screw or stud). Inspect the connections at the component and in splice packs, where applicable. Operate the component to test the ability of the circuit to carry sufficient current. Refer to [Circuit Testing](#) and [Ground Distribution Schematics](#).

#### **Temperature Sensitivity**

- An intermittent condition may occur when a component/connection reaches normal operating temperature. The condition may occur only when the component/connection is cold or only when the component/connection is hot.
- Freeze Frame, Failure Records, Snapshot or Vehicle Data Recorder data may help with this type of intermittent condition, where applicable.
- If the intermittent is related to heat, review the data for a relationship with the following:
  - High ambient temperatures
  - Underhood/engine generated heat
  - Circuit generated heat due to a poor connection or high electrical load

- Higher than normal load conditions, towing, etc.
- If the intermittent is related to cold, review the data for the following:
  - Low ambient temperatures - In extremely low temperatures, ice may form in a connection or component. Inspect for water intrusion.
  - The condition only occurs on a cold start.
  - The condition goes away when the vehicle warms up.
- Information from the customer may help to determine if the trouble follows a pattern that is temperature related.
- If temperature is suspected of causing an intermittent fault condition, attempt to duplicate the condition. Refer to [Inducing Intermittent Fault Conditions](#) in order to duplicate the conditions required.

### Electromagnetic Interference and Electrical Noise

Some electrical components/circuits are sensitive to electromagnetic interference or other types of electrical noise. Inspect for the following conditions:

- A mis-routed harness that is too close to high voltage/high current devices such as secondary ignition components, motors, generator etc. - These components may induce electrical noise on a circuit that could interfere with normal circuit operation.
- Electrical system interference caused by a malfunctioning relay or a control module driven solenoid or switch - These conditions can cause a sharp electrical surge. Normally, the condition will occur when the malfunctioning component is operating.
- Installation of non-factory or aftermarket add on accessories such as lights, 2-way radios, amplifiers, electric motors, remote starters, alarm systems, cell phones, etc. - These accessories may create interference in other circuits while operating and the interference would disappear when the accessory is not operating. Refer to [Checking Aftermarket Accessories](#).
- Test for an open diode across the A/C compressor clutch and for other open diodes. Some relays may contain a clamping diode.
- The generator may be allowing AC noise into the electrical system.

### Incorrect Control Module

- There are only a few situations where reprogramming a control module is appropriate:
  - A new service control module is installed.
  - A control module from another vehicle is installed.
  - Revised software/calibration files have been released for this vehicle.
- Verify that the control module contains the correct software/calibration. If incorrect programming is found, reprogram the control module with the most current software/calibration. Refer to [Control Module References](#) for replacement, setup and programming.

**NOTE:** DO NOT re-program the control module with the SAME software/calibration files that are already present in the control module. This is not an effective repair for any type of concern.

## BRAKE PEDAL POSITION SENSOR CALIBRATION

### Calibration Criteria

**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.

**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), engine control module (ECM) or hybrid powertrain control module have been serviced. The calibration procedure will set the brake pedal position sensor home value. This value is used by the BCM and ECM/HPCM 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

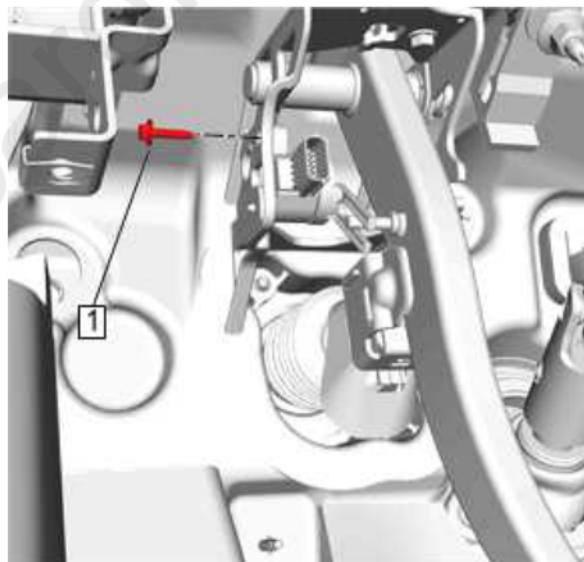
1. Apply the parking brake.
2. Ignition ON, engine OFF, place the transmission in the PARK position for automatic transmission or NEUTRAL position for manual transmission.
3. Install a scan tool.
4. Clear all DTCs before proceeding.
5. Navigate to the Configuration/Reset Functions menu of the BCM.
6. 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/HPCM.
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.

### Removal Procedure

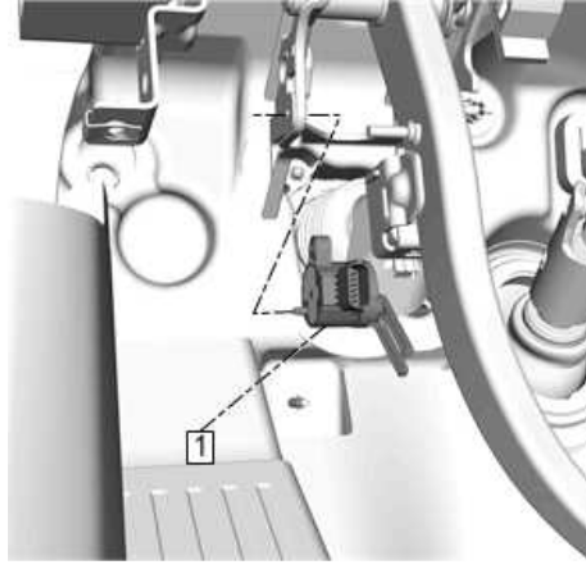
1. **Body Control Module Bracket Replacement** » Remove
2. Brake Pedal Position Sensor Electrical Connector » Disconnect
3. Brake Pedal Position Sensor Bolt (1) » Remove



**Fig. 7: Brake Pedal Position Sensor Bolt**

Courtesy of GENERAL MOTORS COMPANY

4. Brake Pedal Position Sensor (1) » Remove

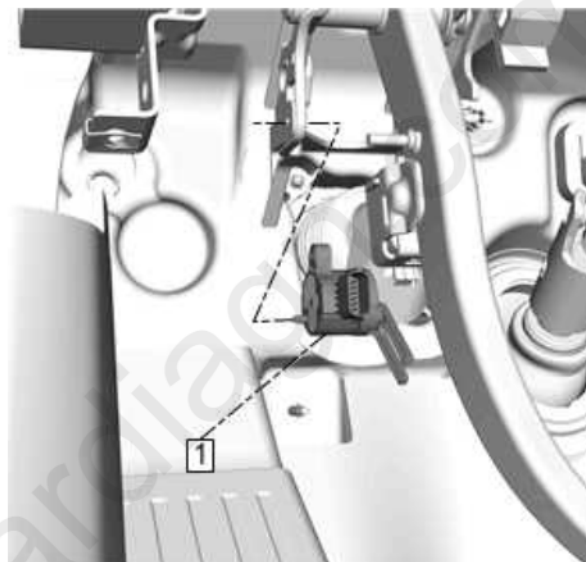


**Fig. 8: Brake Pedal Position Sensor**

Courtesy of GENERAL MOTORS COMPANY

### Installation Procedure

1. Brake Pedal Position Sensor (1)» Install



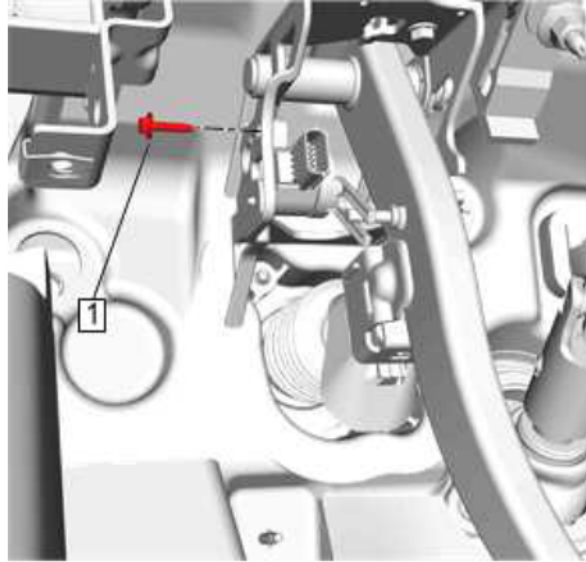
**Fig. 9: Brake Pedal Position Sensor**

Courtesy of GENERAL MOTORS COMPANY

**NOTE:** Position the fork of the brake pedal position sensor over the brake pedal arm pin.

2. Brake Pedal Position Sensor Bolt (1)» Install and tighten 2.5 N.m (22 lb in)



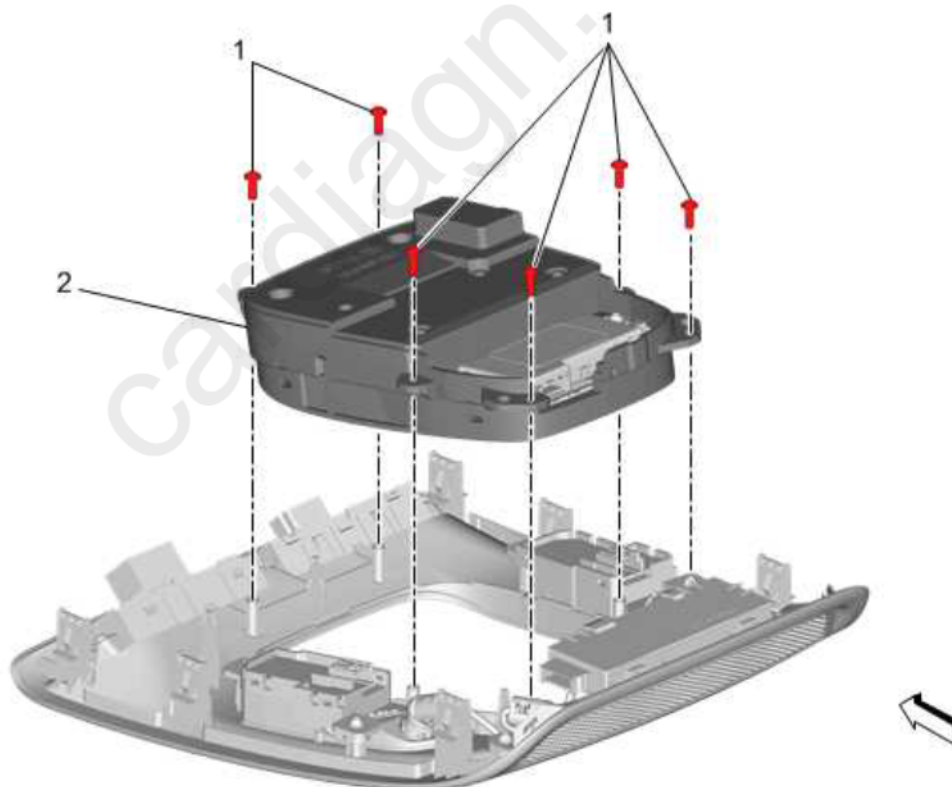


**Fig. 10: Brake Pedal Position Sensor Bolt**  
Courtesy of GENERAL MOTORS COMPANY

**CAUTION:** Fastener Caution

3. Brake Pedal Position Sensor Electrical Connector» Connect
4. Body Control Module Bracket Replacement » Install
5. Calibrate the brake pedal position sensor. Refer to Brake Pedal Position Sensor Calibration

**INTERIOR LAMP SWITCH REPLACEMENT**

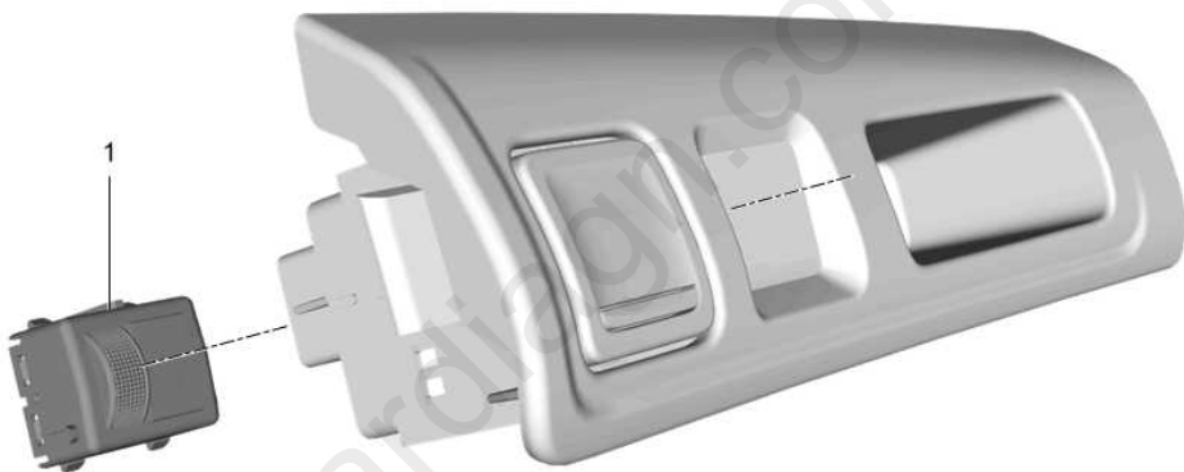


**Fig. 11: Interior Lamp Switch**  
Courtesy of GENERAL MOTORS COMPANY

| Callout                         | Component Name |
|---------------------------------|----------------|
| Preliminary Procedure           |                |
| <u>Roof Console Replacement</u> |                |
|                                 |                |
|                                 |                |

| Callout | Component Name                                                                                                                                                        |
|---------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1       | Roof Console Bolt [6x]<br><br><b>CAUTION:</b><br>Refer to <a href="#">Fastener Caution</a> .<br><br><b>Tighten</b><br>1.5 N.m (13 lb in)                              |
| 2       | Interior Lamp Switch<br><b>Procedure</b><br>Transfer components as necessary.<br><br><b>NOTE:</b><br>The sunroof sunshade switch is part of the interior lamp switch. |

## INTERIOR LAMP SWITCH REPLACEMENT - INSTRUMENT PANEL



**Fig. 12: Interior Lamp Switch - Instrument Panel**

Courtesy of GENERAL MOTORS COMPANY

| Callout                                                                                      | Component Name                                                                             |
|----------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------|
| <b>Preliminary Procedure</b><br><a href="#">Instrument Panel Accessory Bezel Replacement</a> |                                                                                            |
| 1                                                                                            | Interior Lamp Switch - Instrument Panel<br><b>Procedure</b><br>Release the retaining tabs. |

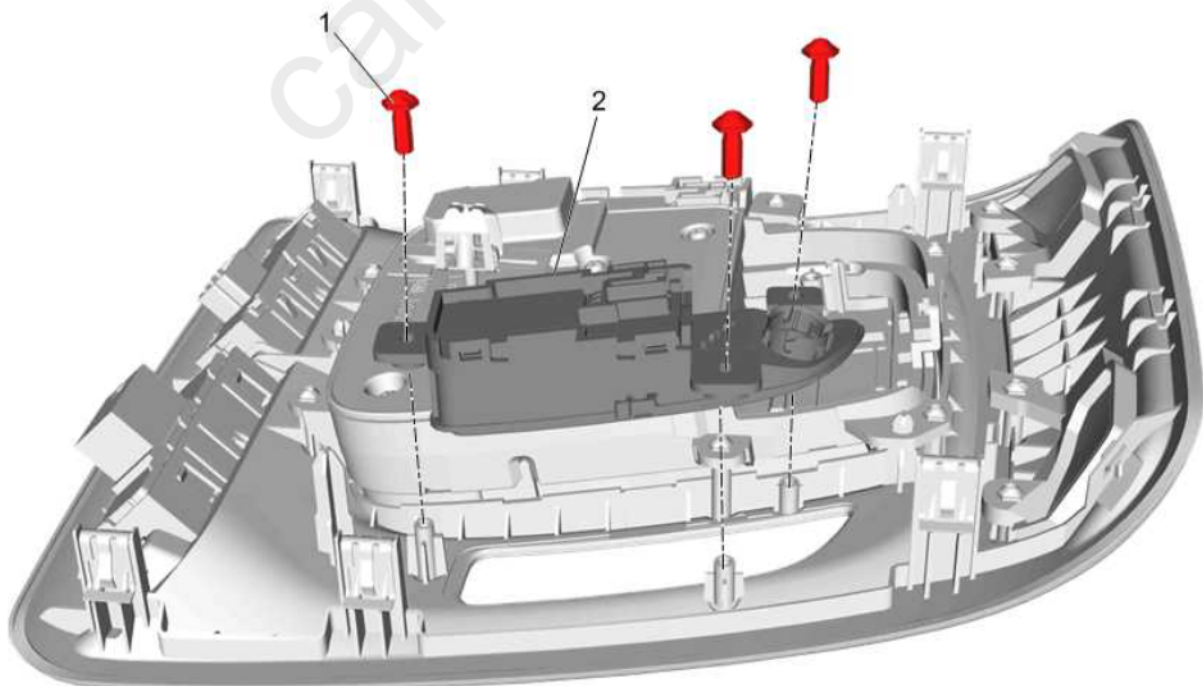
## DIMMER SWITCH REPLACEMENT



**Fig. 13: Interior Lamp Switch - Instrument Panel**  
 Courtesy of GENERAL MOTORS COMPANY

| Callout                                                                             | Component Name                                                   |
|-------------------------------------------------------------------------------------|------------------------------------------------------------------|
| Preliminary Procedure<br><b><u>Instrument Panel Accessory Bezel Replacement</u></b> |                                                                  |
| 1                                                                                   | Dimmer Switch<br><b>Procedure</b><br>Release the retaining tabs. |

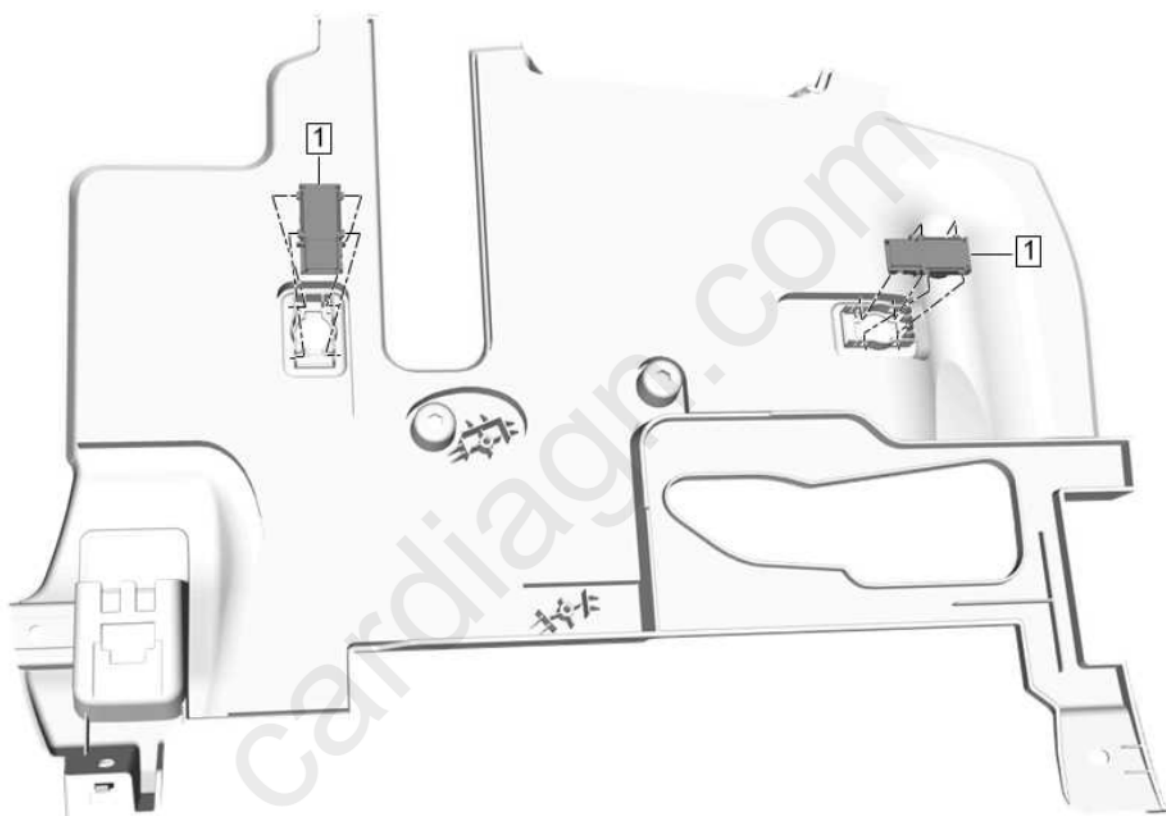
### **CENTER READING AND COURTESY LAMP REPLACEMENT**



**Fig. 14: Center Reading and Courtesy Lamp**  
 Courtesy of GENERAL MOTORS COMPANY

| Callout                                                         | Component Name                                                                                                                                              |
|-----------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Preliminary Procedure</b><br><b>Roof Console Replacement</b> |                                                                                                                                                             |
| 1                                                               | Center Reading and Courtesy Lamp Screw [3x]<br><br><b>CAUTION:</b><br><b>Refer to <u>Fastener Caution</u> .</b><br><br><b>Tighten</b><br>1.5 N.m (13 lb in) |
| 2                                                               | Center Reading and Courtesy Lamp<br><b>Procedure</b><br>{If equipped} Theft Deterrent Module» Remove - <b><u>Theft Deterrent Module Replacement</u></b>     |

### FRONT FLOOR COURTESY LAMP REPLACEMENT (LEFT SIDE)

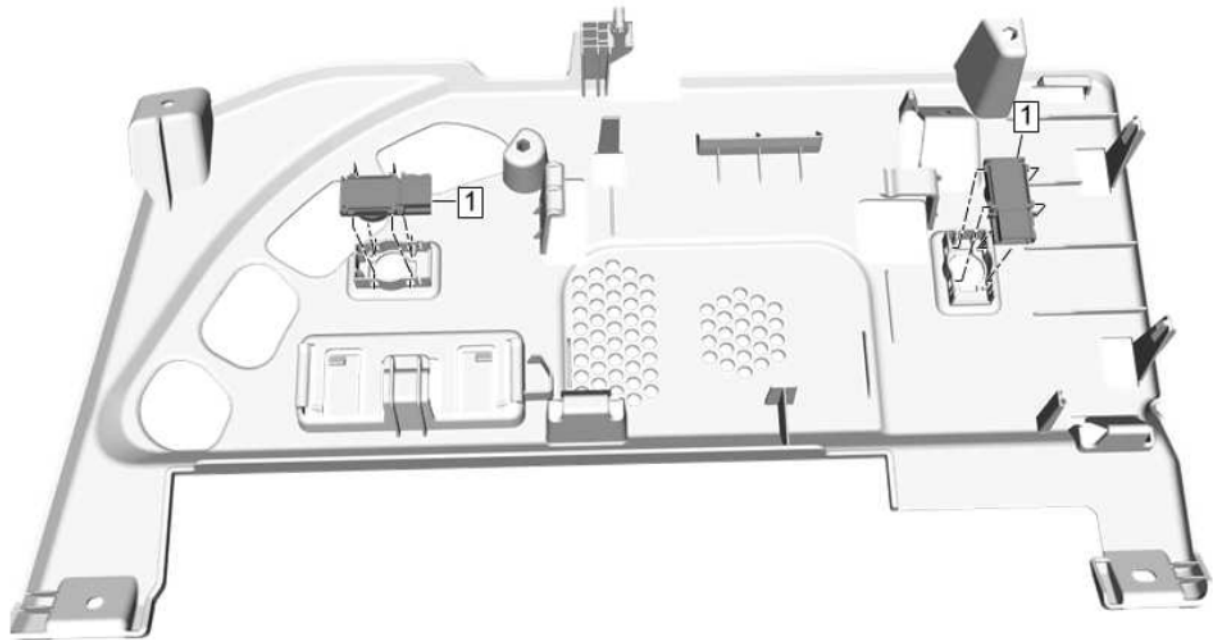


**Fig. 15: Front Floor Courtesy Lamp (Left Side)**  
Courtesy of GENERAL MOTORS COMPANY

| Callout                                                                                                    | Component Name                                                               |
|------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------|
| <b>Preliminary Procedure</b><br><b>Instrument Panel Lower Trim Panel Insulator Replacement - Left Side</b> |                                                                              |
| 1                                                                                                          | Front Floor Courtesy Lamp<br><b>Procedure</b><br>Release the retaining tabs. |

### FRONT FLOOR COURTESY LAMP REPLACEMENT (RIGHT SIDE)





**Fig. 16: Front Floor Courtesy Lamp (Right Side)**  
Courtesy of GENERAL MOTORS COMPANY

| Callout                                                                            | Component Name                                                               |
|------------------------------------------------------------------------------------|------------------------------------------------------------------------------|
| <b>Preliminary Procedure</b>                                                       |                                                                              |
| <b><u>Instrument Panel Lower Trim Panel Insulator Replacement - Right Side</u></b> |                                                                              |
| 1                                                                                  | Front Floor Courtesy Lamp<br><b>Procedure</b><br>Release the retaining tabs. |

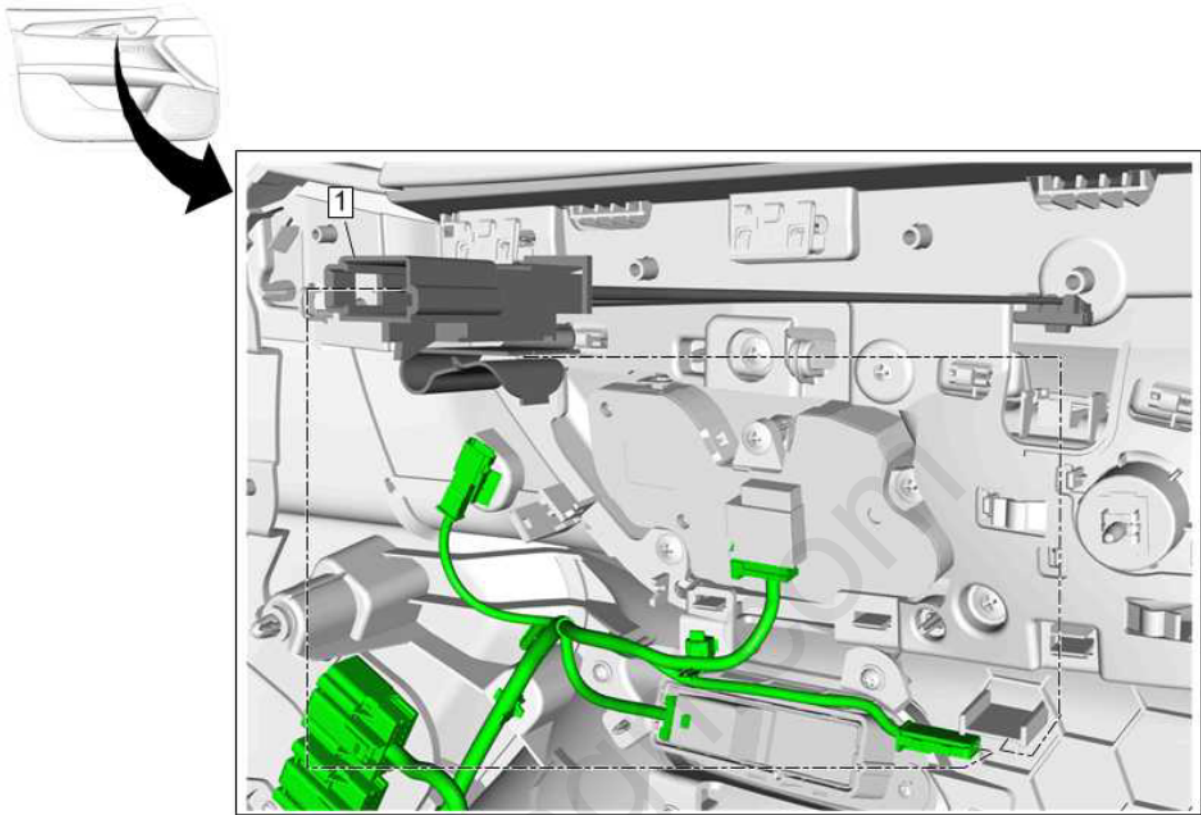
## FRONT FLOOR CONSOLE COMPARTMENT LAMP REPLACEMENT



**Fig. 17: Front Floor Console Compartment Lamp**  
Courtesy of GENERAL MOTORS COMPANY

| Callout                                                   | Component Name                                                                                         |
|-----------------------------------------------------------|--------------------------------------------------------------------------------------------------------|
| <b>Preliminary Procedure</b>                              |                                                                                                        |
| <b><u>Front Floor Console Compartment Replacement</u></b> |                                                                                                        |
| 1                                                         | Front Floor Console Compartment Lamp<br><b>Procedure</b><br>Unsnap lamp from console compartment tabs. |

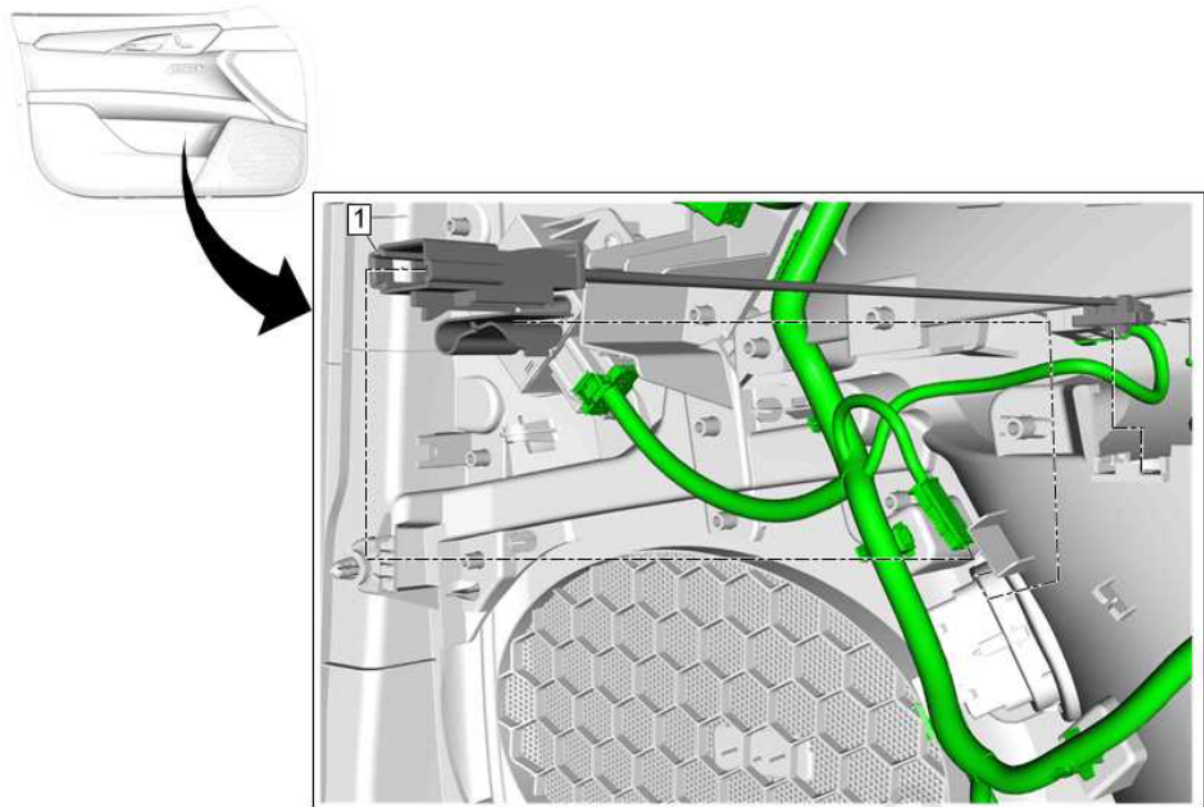
**FRONT SIDE DOOR INSIDE HANDLE ILLUMINATION LAMP REPLACEMENT**



**Fig. 18: Front Side Door Inside Handle Illumination Lamp**  
Courtesy of GENERAL MOTORS COMPANY

| Callout                                        | Component Name                                                                                                                                                                                                                                                                             |
|------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Preliminary Procedure</b>                   |                                                                                                                                                                                                                                                                                            |
| <b><u>Front Side Door Trim Replacement</u></b> |                                                                                                                                                                                                                                                                                            |
| 1                                              | Front Side Door Inside Handle Illumination Lamp<br><b>Procedure</b><br><ol style="list-style-type: none"> <li>1. Disconnect the electrical connector.</li> <li>2. Reposition the front side door trim insulator panel, if needed.</li> <li>3. Unsnap lamp from trim panel tabs.</li> </ol> |

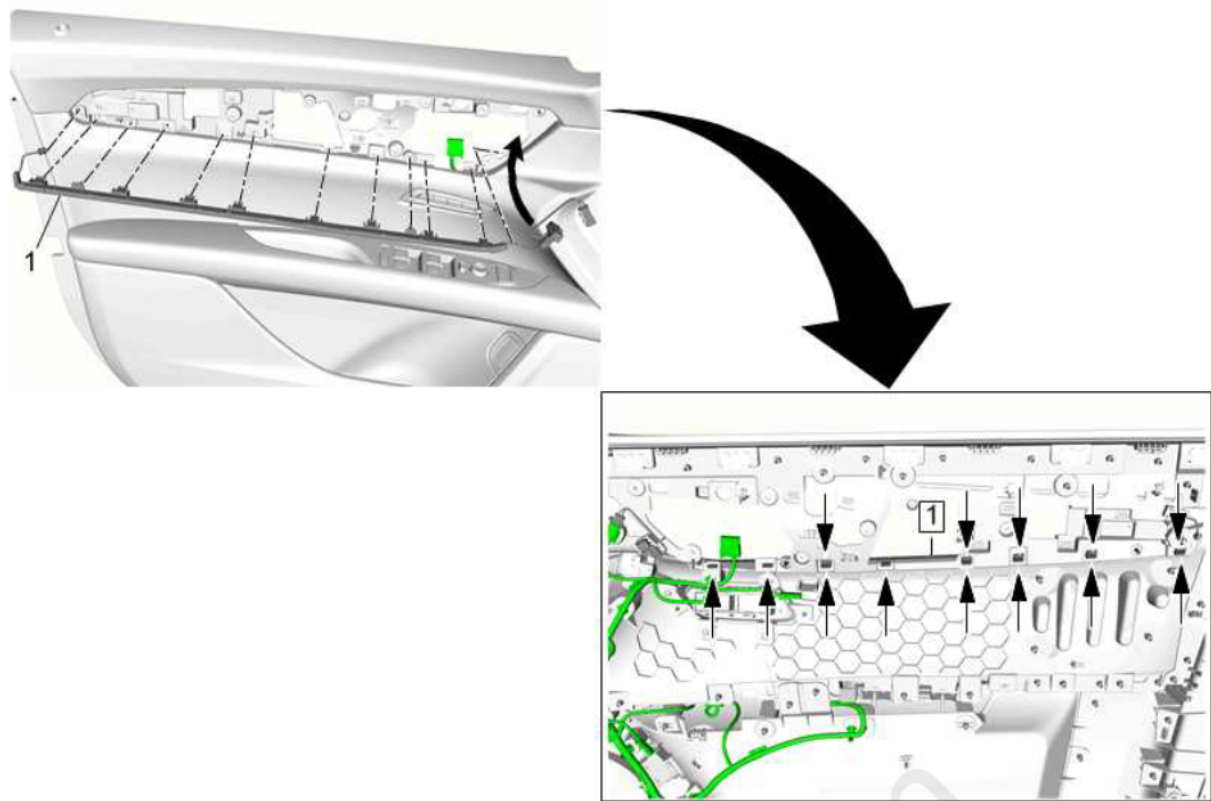
**FRONT SIDE DOOR PULL CUP ILLUMINATION LAMP REPLACEMENT**



**Fig. 19: Front Side Door Pull Cup Illumination Lamp**  
 Courtesy of GENERAL MOTORS COMPANY

| Callout                                                                 | Component Name                                                                                                                                                                                                                                                                           |
|-------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Preliminary Procedure</b><br><b>Front Side Door Trim Replacement</b> |                                                                                                                                                                                                                                                                                          |
| 1                                                                       | Front Side Door Pull Cup Illumination Lamp<br><br><b>Procedure</b> <ol style="list-style-type: none"> <li>1. Disconnect the electrical connector.</li> <li>2. Reposition the front side door trim insulator panel, if needed.</li> <li>3. Release the plastic retaining tabs.</li> </ol> |

## FRONT SIDE DOOR LIGHT CONDUCTOR LAMP REPLACEMENT

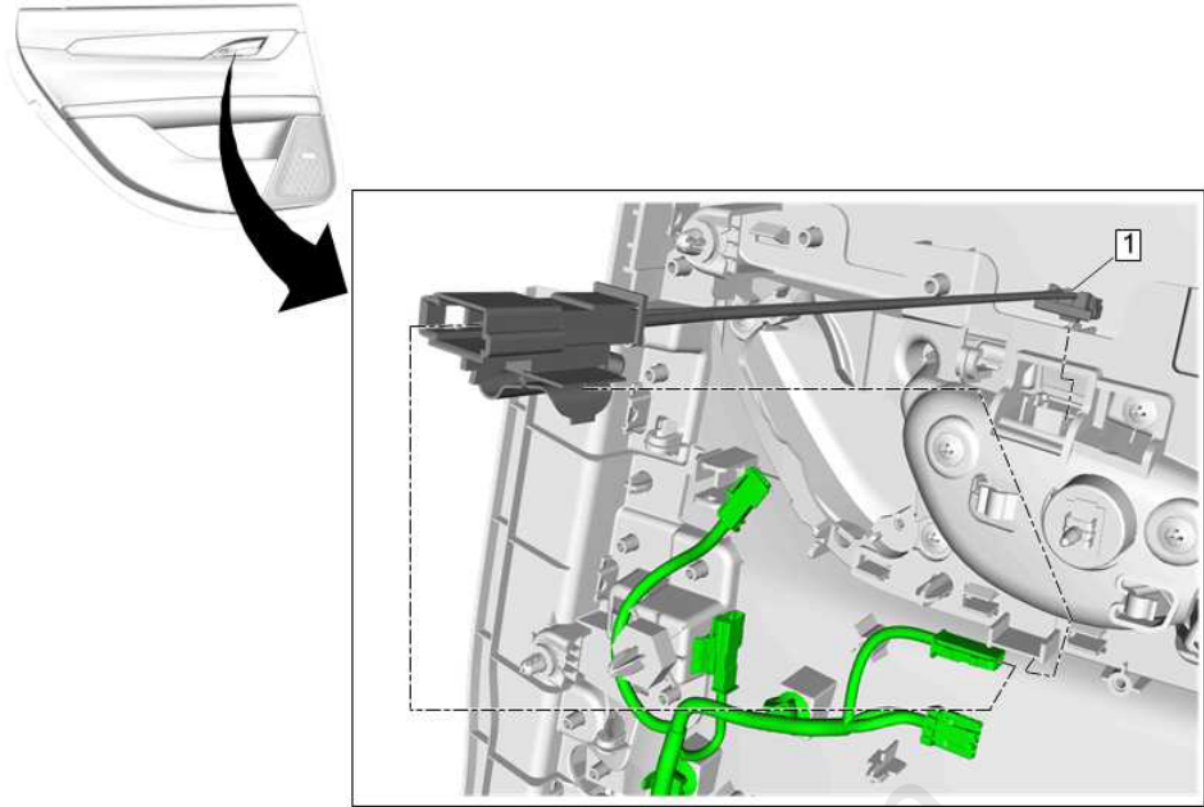


**Fig. 20: Front Side Door Light Conductor Lamp**  
 Courtesy of GENERAL MOTORS COMPANY

| Callout                                                 | Component Name                                                                                                                                                                                                                                                                     |
|---------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Preliminary Procedure</b>                            |                                                                                                                                                                                                                                                                                    |
| <b><u>Front Side Door Inside Handle Replacement</u></b> |                                                                                                                                                                                                                                                                                    |
| 1                                                       | Front Side Door Light Conductor Lamp<br><br><b>Procedure</b> <ol style="list-style-type: none"> <li>1. Disconnect the electrical connector.</li> <li>2. Reposition the front side door trim insulator panel, if needed.</li> <li>3. Release the plastic retaining tabs.</li> </ol> |

## **REAR SIDE DOOR INSIDE HANDLE ILLUMINATION LAMP REPLACEMENT**

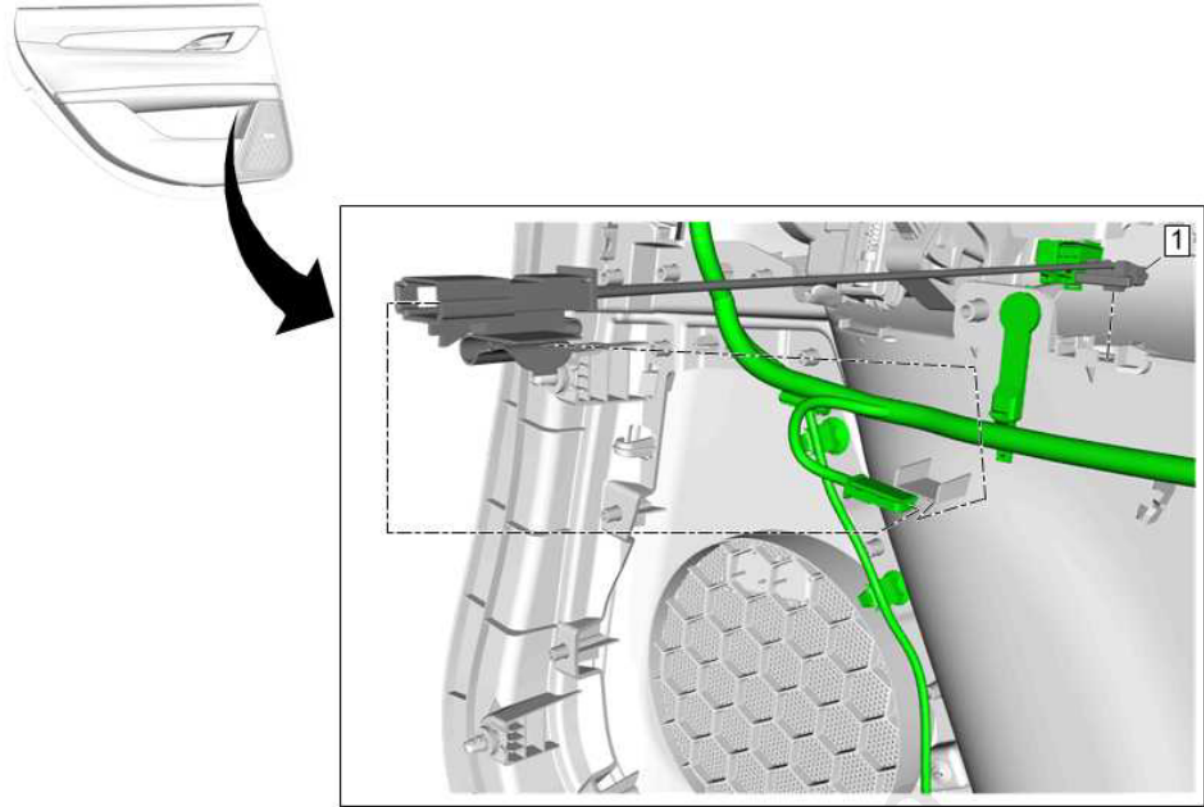




**Fig. 21: Rear Side Door Inside Handle Illumination Lamp**  
**Courtesy of GENERAL MOTORS COMPANY**

| Callout                                                                       | Component Name                                                                                                                                                                                                                                                                            |
|-------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Preliminary Procedure</b><br><b><u>Rear Side Door Trim Replacement</u></b> |                                                                                                                                                                                                                                                                                           |
| 1                                                                             | Rear Side Door Inside Handle Illumination Lamp<br><br><b>Procedure</b> <ol style="list-style-type: none"> <li>1. Disconnect the electrical connector.</li> <li>2. Reposition the rear side door trim insulator panel, if needed.</li> <li>3. Unsnap lamp from trim panel tabs.</li> </ol> |

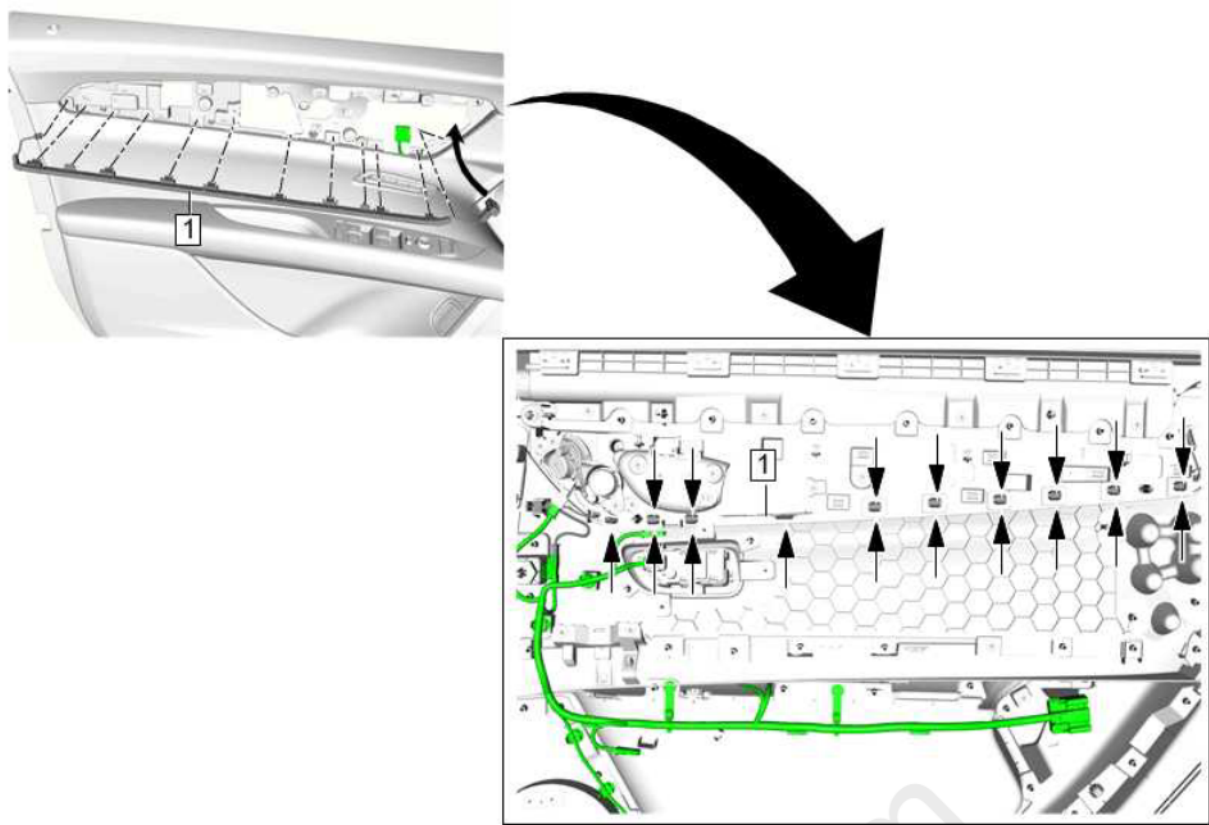
## **REAR SIDE DOOR PULL CUP ILLUMINATION LAMP REPLACEMENT**



**Fig. 22: Rear Side Door Pull Cup Illumination Lamp**  
 Courtesy of GENERAL MOTORS COMPANY

| Callout                                                                       | Component Name                                                                                                                                                                                                                                                                         |
|-------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Preliminary Procedure</b><br><b><u>Rear Side Door Trim Replacement</u></b> |                                                                                                                                                                                                                                                                                        |
| 1                                                                             | Rear Side Door Pull Cup Illumination Lamp<br><br><b>Procedure</b> <ol style="list-style-type: none"> <li>1. Disconnect the electrical connector.</li> <li>2. Reposition the rear side door trim insulator panel, if needed.</li> <li>3. Release the plastic retaining tabs.</li> </ol> |

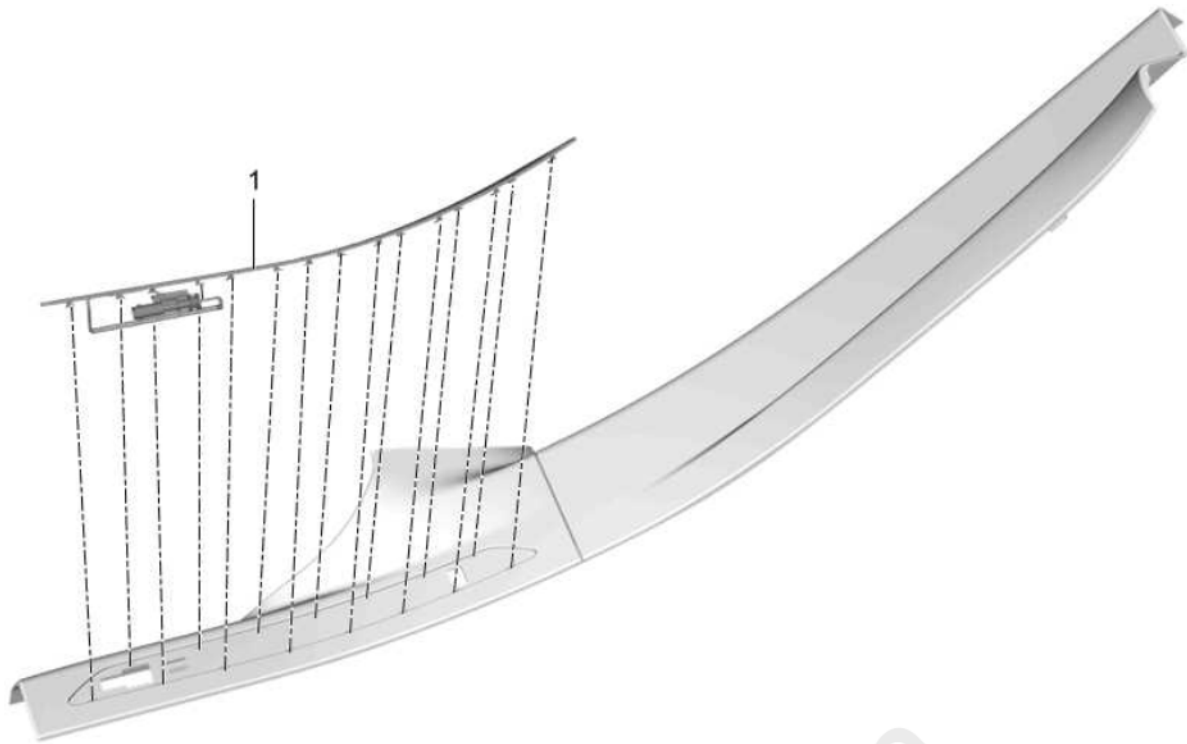
## **REAR SIDE DOOR LIGHT CONDUCTOR LAMP REPLACEMENT**



**Fig. 23: Rear Side Door Light Conductor Lamp**  
 Courtesy of GENERAL MOTORS COMPANY

| Callout                                                | Component Name                                                                                                                                                                                                                                                                   |
|--------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Preliminary Procedure</b>                           |                                                                                                                                                                                                                                                                                  |
| <b><u>Rear Side Door Inside Handle Replacement</u></b> |                                                                                                                                                                                                                                                                                  |
| 1                                                      | Rear Side Door Light Conductor Lamp<br><br><b>Procedure</b> <ol style="list-style-type: none"> <li>1. Disconnect the electrical connector.</li> <li>2. Reposition the rear side door trim insulator panel, if needed.</li> <li>3. Release the plastic retaining tabs.</li> </ol> |

## **REAR DOOR SILL PLATE ILLUMINATION LAMP REPLACEMENT**

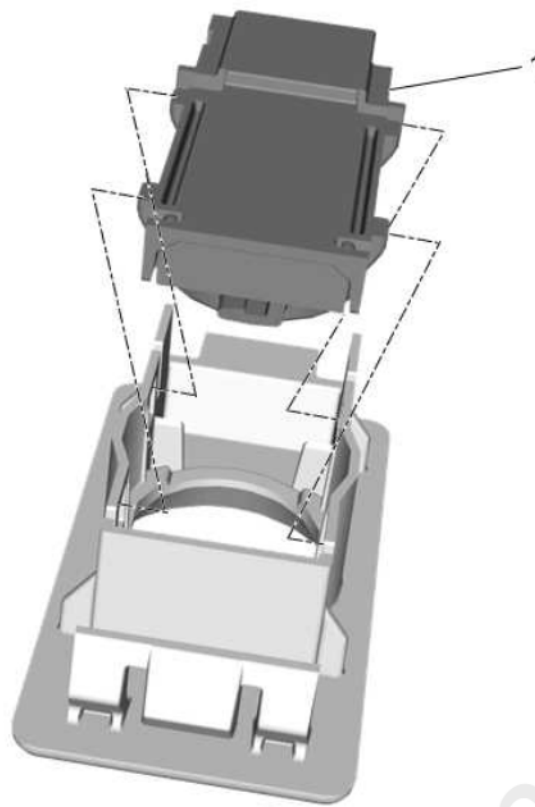


**Fig. 24: Rear Door Sill Plate Illumination Lamp**  
 Courtesy of GENERAL MOTORS COMPANY

| Callout                                                    | Component Name                                                                                                                                                                                                                    |
|------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Preliminary Procedure</b>                               |                                                                                                                                                                                                                                   |
| <b><u>Body Lock Pillar Garnish Molding Replacement</u></b> |                                                                                                                                                                                                                                   |
| 1                                                          | Rear Door Sill Plate Illumination Lamp<br><br><b>Procedure</b> <ol style="list-style-type: none"> <li>1. Release the retaining tabs.</li> <li>2. Install lamp in molding and hold in position while bending tabs down.</li> </ol> |

## **REAR SIDE DOOR COURTESY LAMP REPLACEMENT**

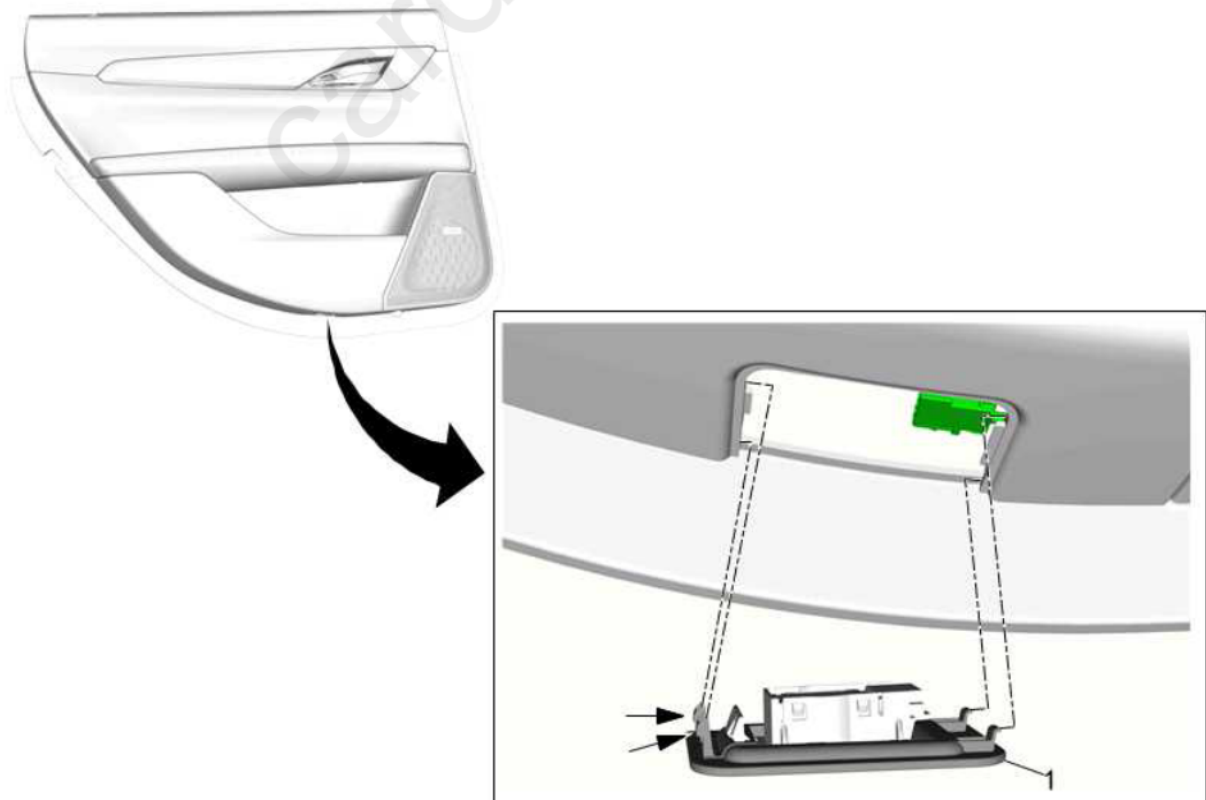




**Fig. 25: Rear Side Door Courtesy Lamp**  
Courtesy of GENERAL MOTORS COMPANY

| Callout                                                      | Component Name                                                                          |
|--------------------------------------------------------------|-----------------------------------------------------------------------------------------|
| <b>Preliminary Procedure</b>                                 |                                                                                         |
| <b><u>Rear Side Door Courtesy Lamp Bezel Replacement</u></b> |                                                                                         |
| 1                                                            | Rear Side Door Courtesy Lamp<br><b>Procedure</b><br>Release the plastic retaining tabs. |

### REAR SIDE DOOR COURTESY LAMP BEZEL REPLACEMENT



**Fig. 26: Rear Side Door Courtesy Lamp Bezel**  
Courtesy of GENERAL MOTORS COMPANY

| Callout | Component Name                                                                                                                                                                                                                                                                                                              |
|---------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1       | Rear Side Door Courtesy Lamp Bezel <div> <b>Procedure</b> <ol style="list-style-type: none"> <li>1. Release the retaining tabs.</li> <li>2. Push downward and tilt forward to remove lamp front door trim.</li> <li>3. Disconnect the electrical connector.</li> <li>4. Transfer components as necessary.</li> </ol> </div> |

**FRONT SIDE DOOR COURTESY LAMP REPLACEMENT**

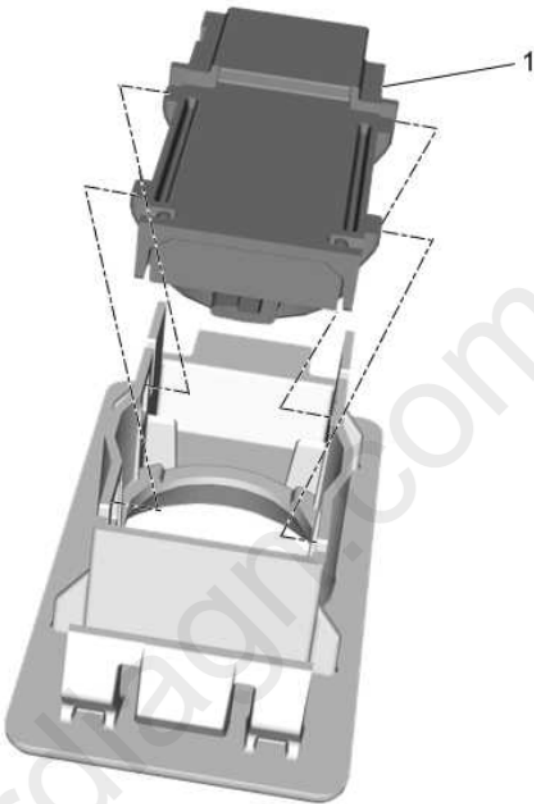
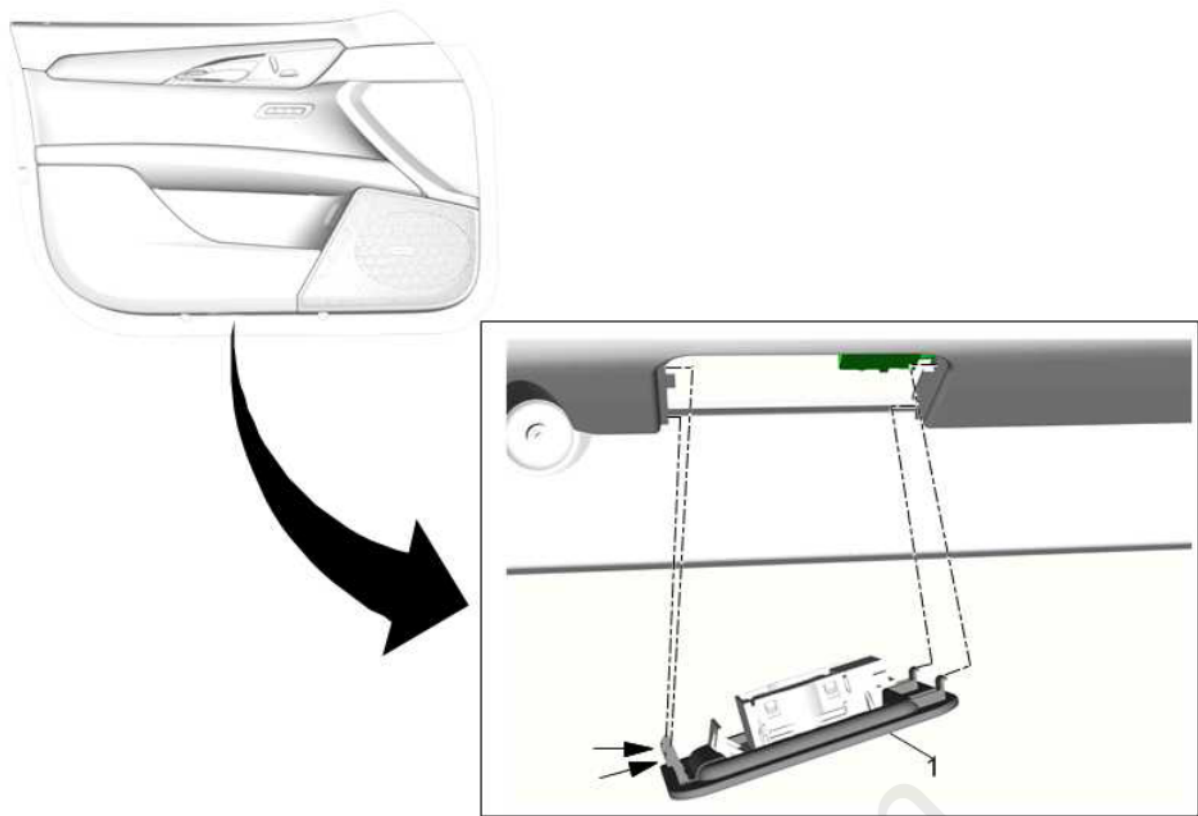


Fig. 27: Rear Side Door Courtesy Lamp  
 Courtesy of GENERAL MOTORS COMPANY

| Callout                                                                                | Component Name                                                                   |
|----------------------------------------------------------------------------------------|----------------------------------------------------------------------------------|
| <b>Preliminary Procedure</b><br><b>Front Side Door Courtesy Lamp Bezel Replacement</b> |                                                                                  |
| 1                                                                                      | Front Side Door Courtesy Lamp<br><b>Procedure</b><br>Release the retaining tabs. |

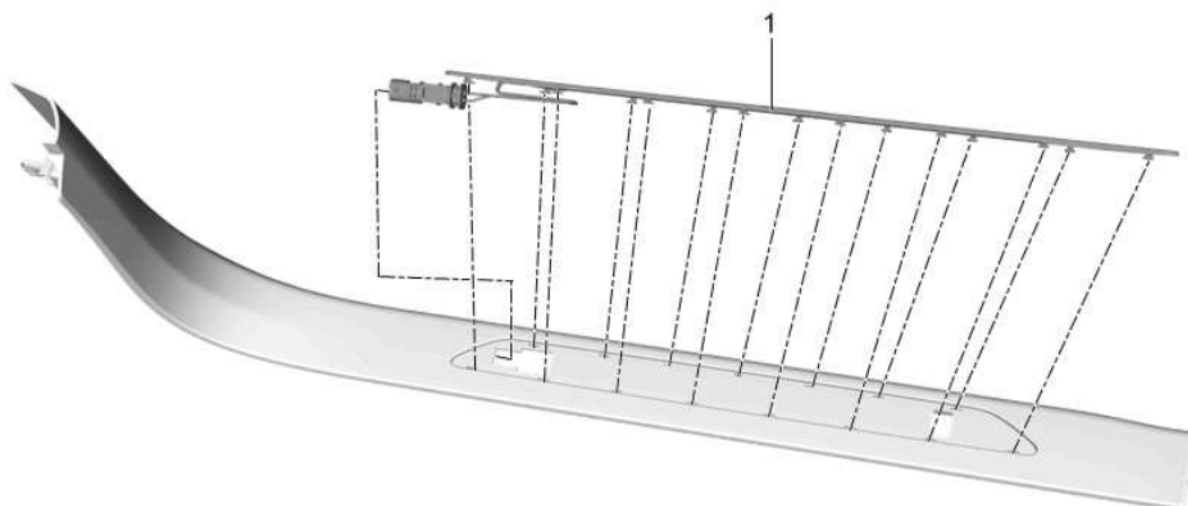
**FRONT SIDE DOOR COURTESY LAMP BEZEL REPLACEMENT**



**Fig. 28: Front Side Door Courtesy Lamp Bezel**  
Courtesy of GENERAL MOTORS COMPANY

| Callout | Component Name                                                                                                                                                                                                                                                                                                                |
|---------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1       | <p>Front Side Door Courtesy Lamp Bezel</p> <p><b>Procedure</b></p> <ol style="list-style-type: none"> <li>1. Release the retaining tabs.</li> <li>2. Push downward and tilt forward to remove lamp front door trim.</li> <li>3. Disconnect the electrical connector.</li> <li>4. Transfer components as necessary.</li> </ol> |

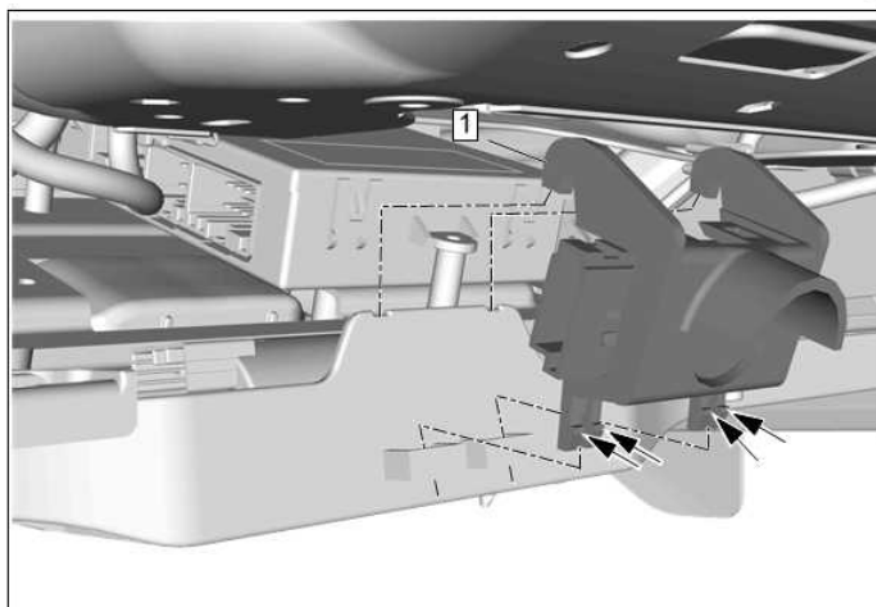
## FRONT DOOR SILL PLATE ILLUMINATION LAMP REPLACEMENT



**Fig. 29: Front Door Sill Plate Illumination Lamp**  
 Courtesy of GENERAL MOTORS COMPANY

| Callout                                                        | Component Name                                                                                                                                                                                                                            |
|----------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Preliminary Procedure</b>                                   |                                                                                                                                                                                                                                           |
| <b><u>Front Side Door Sill Garnish Molding Replacement</u></b> |                                                                                                                                                                                                                                           |
| 1                                                              | <b>Front Door Sill Plate Illumination Lamp</b><br><br><b>Procedure</b> <ol style="list-style-type: none"> <li>1. Release the retaining tabs.</li> <li>2. Install lamp in molding and hold in position while bending tabs down.</li> </ol> |

## REAR FLOOR FLOOD LAMP REPLACEMENT



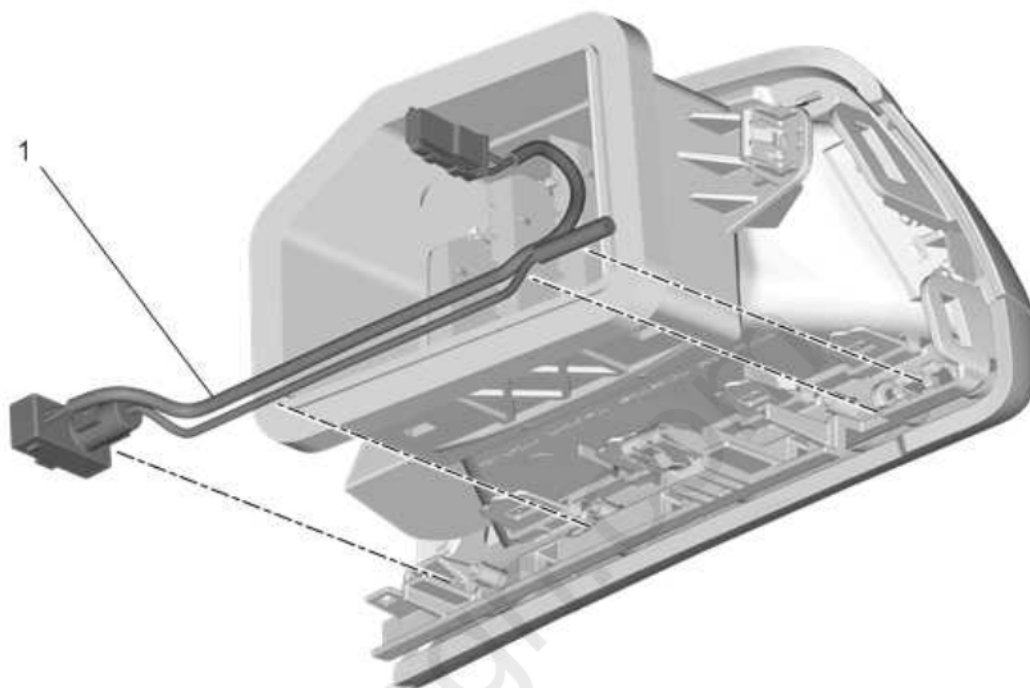


**Fig. 30: Rear Floor Flood Lamp**

Courtesy of GENERAL MOTORS COMPANY

| Callout | Component Name                                                                   |
|---------|----------------------------------------------------------------------------------|
| 1       | Rear Floor Flood Lamp<br><b>Procedure</b><br>Release the plastic retaining tabs. |

**INSTRUMENT PANEL LIGHT CONDUCTOR LAMP REPLACEMENT (LEFT SIDE)**

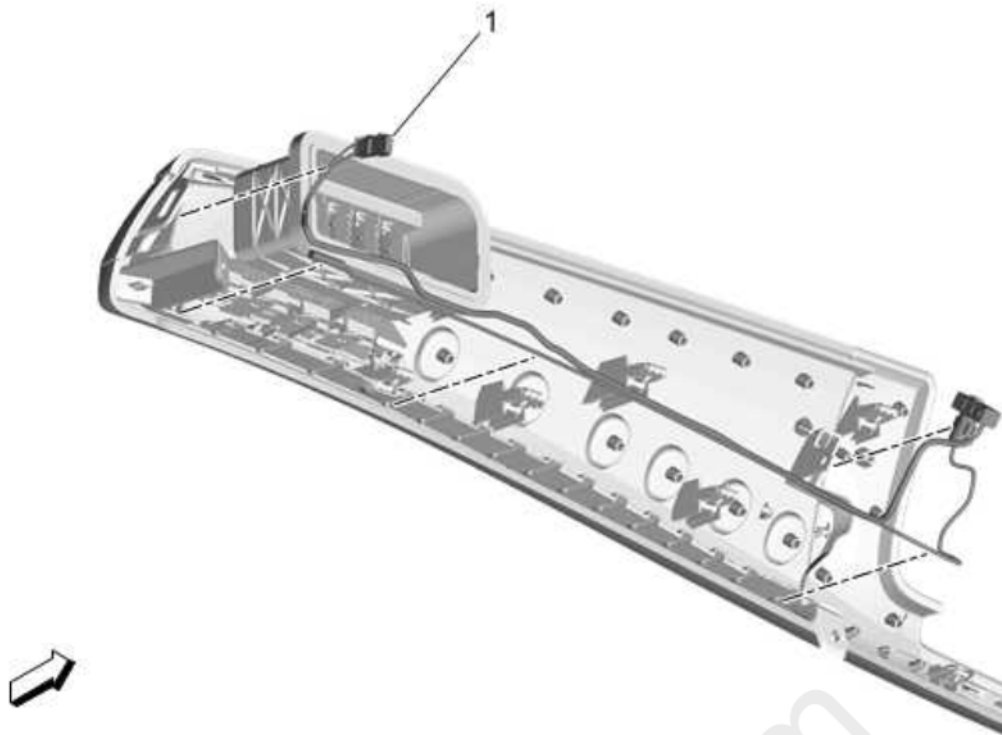


**Fig. 31: Instrument Panel Light Conductor Lamp (Left Side)**

Courtesy of GENERAL MOTORS COMPANY

| Callout                                                                                                          | Component Name                                                                                   |
|------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------|
| <b>Preliminary Procedure</b><br><b><u>Instrument Panel Lower Trim Plate Applique Replacement - Left Side</u></b> |                                                                                                  |
| 1                                                                                                                | Instrument Panel Light Conductor Lamp<br><b>Procedure</b><br>Release the plastic retaining tabs. |

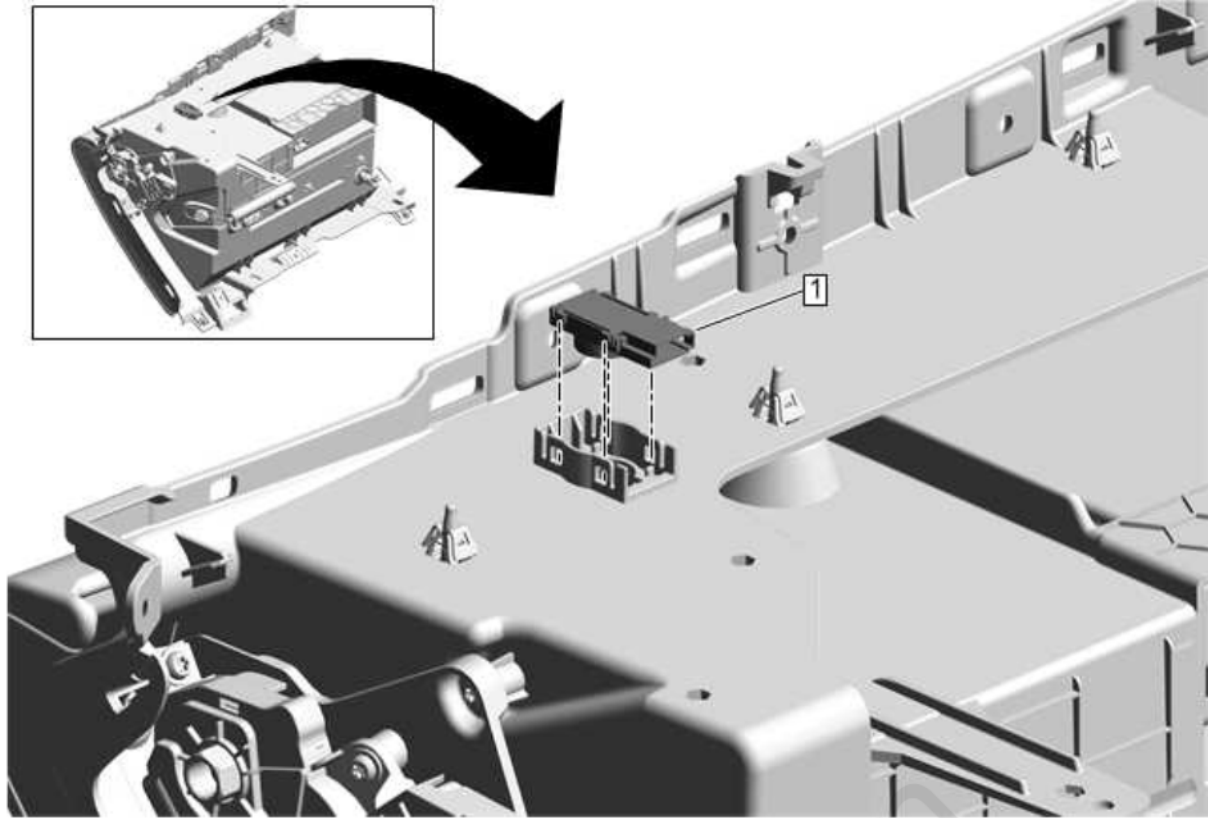
**INSTRUMENT PANEL LIGHT CONDUCTOR LAMP REPLACEMENT (RIGHT SIDE)**



**Fig. 32: Instrument Panel Light Conductor Lamp (Right Side)**  
 Courtesy of GENERAL MOTORS COMPANY

| Callout                                                                                                           | Component Name                                                                                                                                                                                                                                               |
|-------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Preliminary Procedure</b><br><b><u>Instrument Panel Lower Trim Plate Applique Replacement - Right Side</u></b> |                                                                                                                                                                                                                                                              |
| 1                                                                                                                 | Instrument Panel Light Conductor Lamp<br><br><b>Procedure</b> <ol style="list-style-type: none"> <li>1. Note the location and routing of the lamp prior to removal to ensure proper installation.</li> <li>2. Release the plastic retaining tabs.</li> </ol> |

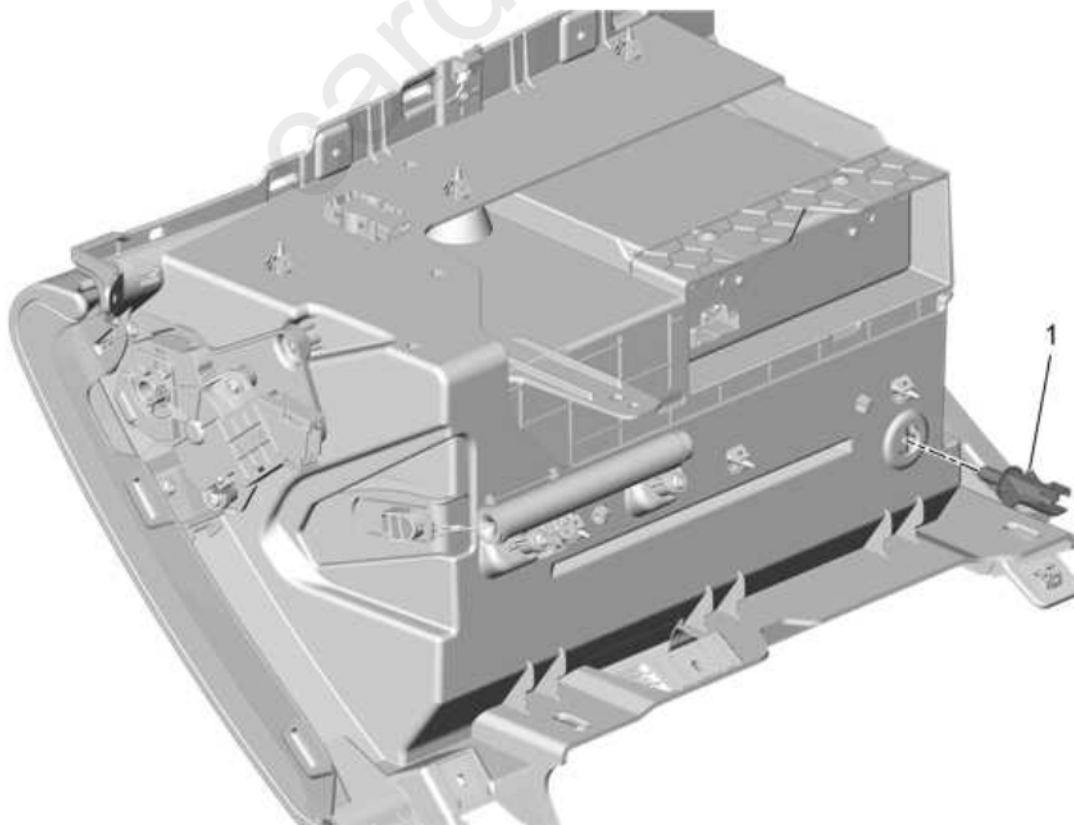
## **INSTRUMENT PANEL COMPARTMENT LAMP REPLACEMENT**



**Fig. 33: Instrument Panel Compartment Lamp**  
 Courtesy of GENERAL MOTORS COMPANY

| Callout                                                | Component Name                                                                                          |
|--------------------------------------------------------|---------------------------------------------------------------------------------------------------------|
| <b>Preliminary Procedure</b>                           |                                                                                                         |
| <b><u>Instrument Panel Compartment Replacement</u></b> |                                                                                                         |
| 1                                                      | Instrument Panel Compartment Lamp<br><b>Procedure</b><br>Depress the tabs on the lamp switch to remove. |

### **INSTRUMENT PANEL COMPARTMENT LAMP SWITCH REPLACEMENT**



**Fig. 34: Instrument Panel Compartment Lamp Switch**  
 Courtesy of GENERAL MOTORS COMPANY

| Callout                                                | Component Name                                                                                                 |
|--------------------------------------------------------|----------------------------------------------------------------------------------------------------------------|
| <b>Preliminary Procedure</b>                           |                                                                                                                |
| <b><u>Instrument Panel Compartment Replacement</u></b> |                                                                                                                |
| 1                                                      | Instrument Panel Compartment Lamp Switch<br><b>Procedure</b><br>Depress the tabs on the lamp switch to remove. |

## ROOF RAIL REAR SEAT POSITION READING AND COURTESY LAMP REPLACEMENT

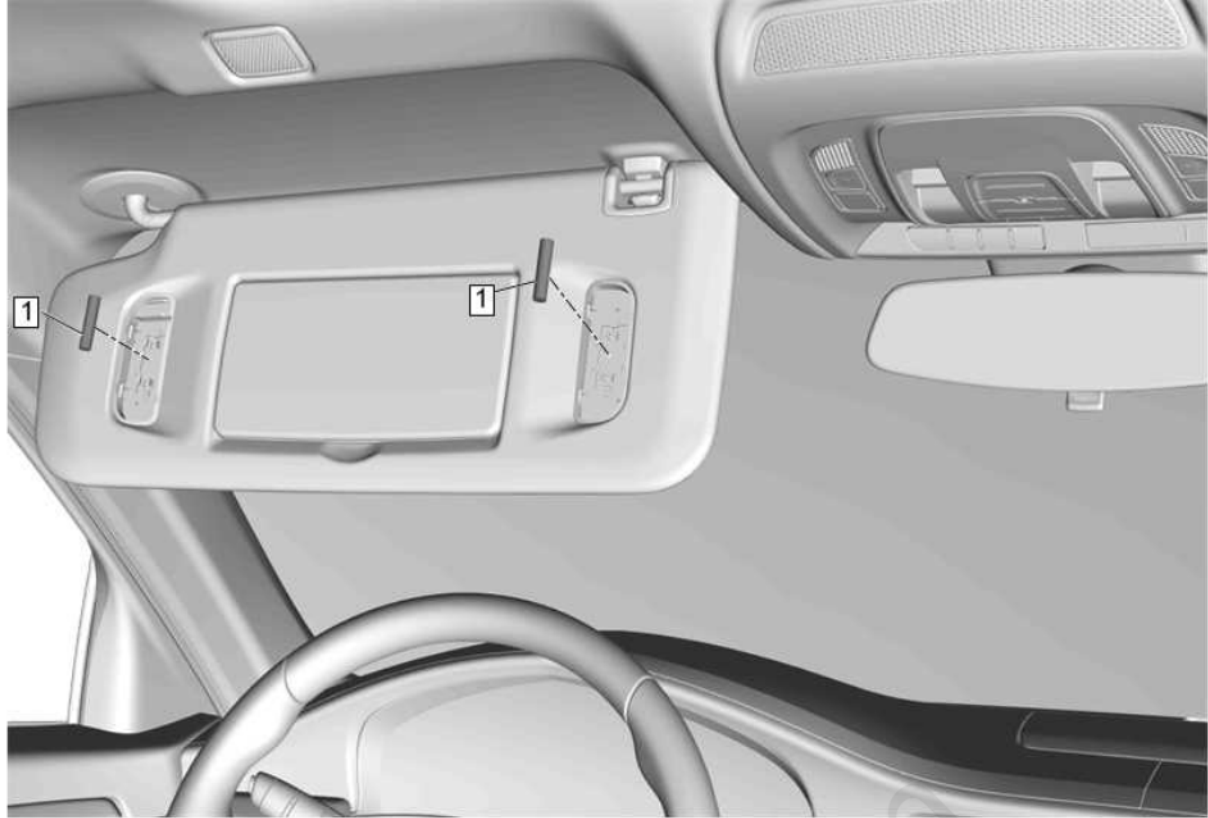


**Fig. 35: Roof Rail Rear Seat Position Reading and Courtesy Lamp**  
Courtesy of GENERAL MOTORS COMPANY

| Callout                                                                                              | Component Name                                                                                                                                                                                                                                                                              |
|------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Preliminary Procedure</b>                                                                         |                                                                                                                                                                                                                                                                                             |
| <b><u>Roof Rail Assist Handle Replacement (Front) Roof Rail Assist Handle Replacement (Rear)</u></b> |                                                                                                                                                                                                                                                                                             |
| 1                                                                                                    | Roof Rail Rear Seat Position Reading and Courtesy Lamp<br><b>Procedure</b><br><ol style="list-style-type: none"> <li>1. Release the top portion of the lamp from the headliner.</li> <li>2. Disconnect the electrical connector.</li> <li>3. Remove the lamp from the headliner.</li> </ol> |

## SUNSHADE ILLUMINATED MIRROR LAMP BULB REPLACEMENT

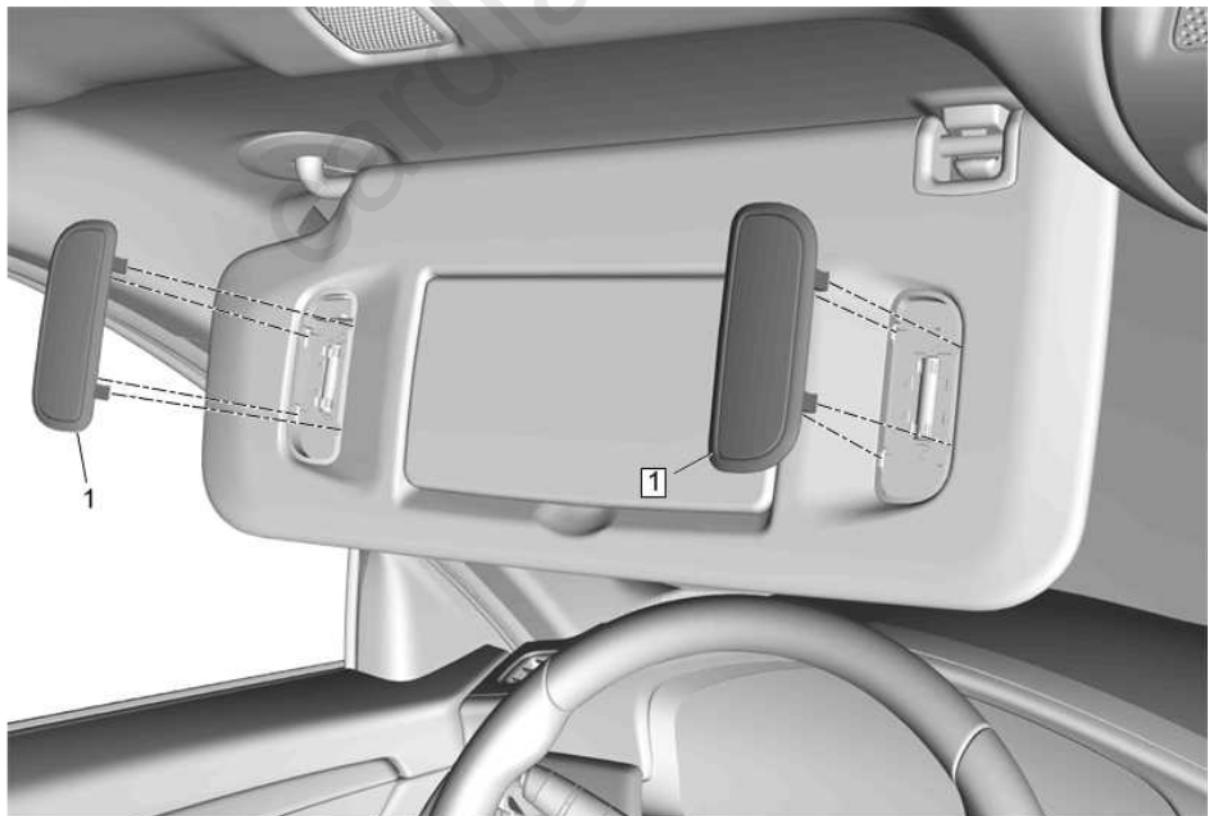




**Fig. 36: Sunshade Illuminated Mirror Lamp Bulb**  
 Courtesy of GENERAL MOTORS COMPANY

| Callout                                                                           | Component Name                        |
|-----------------------------------------------------------------------------------|---------------------------------------|
| Preliminary Procedure<br><u>Sunshade Illuminated Mirror Lamp Lens Replacement</u> |                                       |
| 1                                                                                 | Sunshade Illuminated Mirror Lamp Bulb |

### **SUNSHADE ILLUMINATED MIRROR LAMP LENS REPLACEMENT**

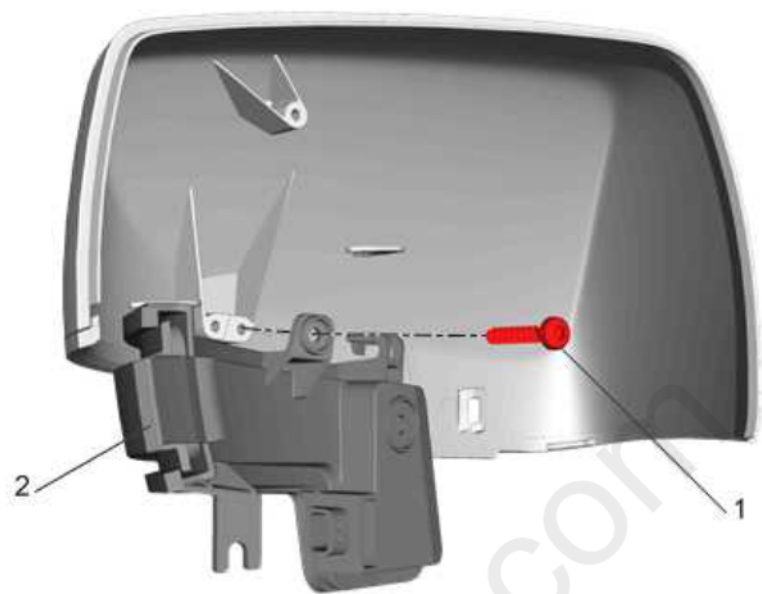


**Fig. 37: Sunshade Illuminated Mirror Lamp Lens**  
 Courtesy of GENERAL MOTORS COMPANY

| Callout | Component Name |
|---------|----------------|
|         |                |

| Callout | Component Name                                                                                         |
|---------|--------------------------------------------------------------------------------------------------------|
| 1       | Sunshade Illuminated Mirror Lamp Lens<br><b>Procedure</b><br>Use a flat bladed plastic tool to remove. |

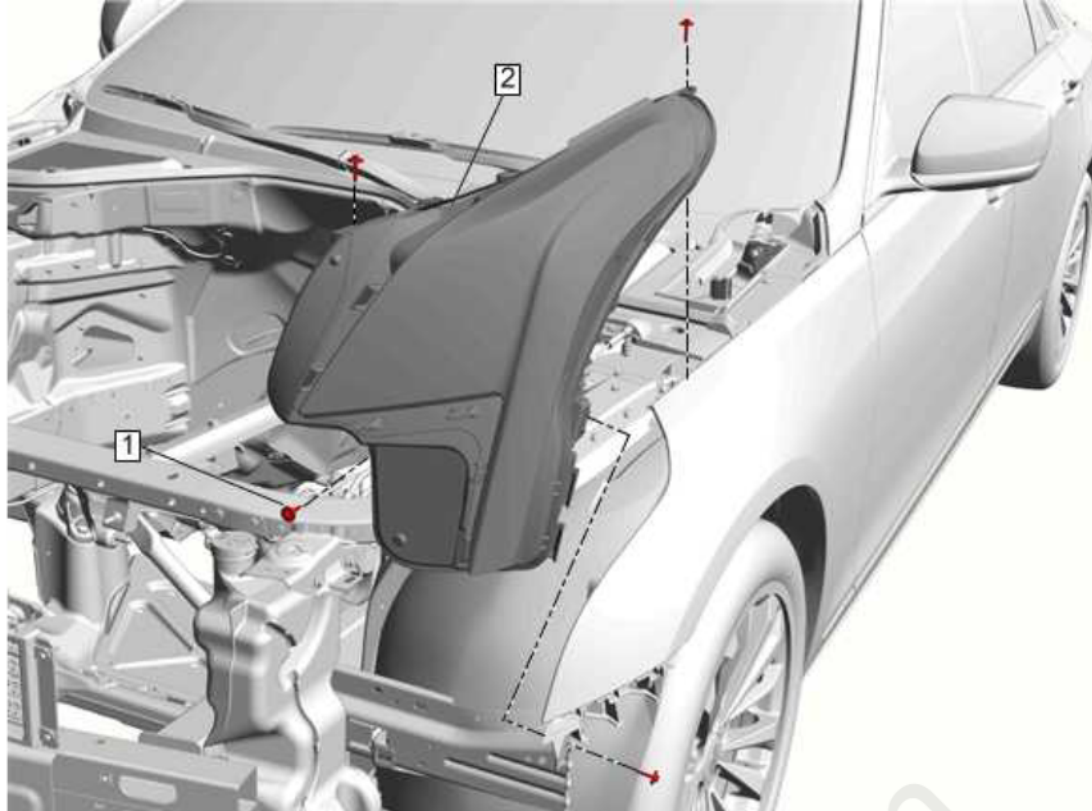
**OUTSIDE REARVIEW MIRROR TURN SIGNAL LAMP REPLACEMENT**



**Fig. 38: Outside Rearview Mirror Turn Signal Lamp**  
 Courtesy of GENERAL MOTORS COMPANY

| Callout                                                                                        | Component Name                                                                                                                                          |
|------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Preliminary Procedure</b><br><b>Outside Rearview Mirror Housing Upper Cover Replacement</b> |                                                                                                                                                         |
| 1                                                                                              | Outside Rearview Mirror Turn Signal Lamp Screw<br><br><b>CAUTION:</b><br>Refer to <b>Fastener Caution</b> .<br><br><b>Tighten</b><br>1.8 N.m (16 lb in) |
| 2                                                                                              | Outside Rearview Mirror Turn Signal Lamp                                                                                                                |

**HEADLAMP REPLACEMENT**



**Fig. 39: Headlamp**

Courtesy of GENERAL MOTORS COMPANY

| Callout                                                                                                                         | Component Name                                                                                                                                                                                                            |
|---------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Preliminary Procedure</b><br><b>Front Bumper Fascia Replacement (Without UV3) Front Bumper Fascia Replacement (With UV3)</b> |                                                                                                                                                                                                                           |
| 1                                                                                                                               | Headlamp Screw [4x]<br><br><b>CAUTION:</b><br>Refer to <b>Fastener Caution</b> .<br><br><b>Tighten</b><br>2.5 N.m (22 lb in)                                                                                              |
| 2                                                                                                                               | Headlamp<br><br><b>Procedure</b> <ol style="list-style-type: none"> <li>1. Disconnect the electrical connector.</li> <li>2. Disconnect and reposition harness as necessary.</li> <li>3. <b>Headlamp Aiming</b></li> </ol> |

## HEADLAMP AIMING

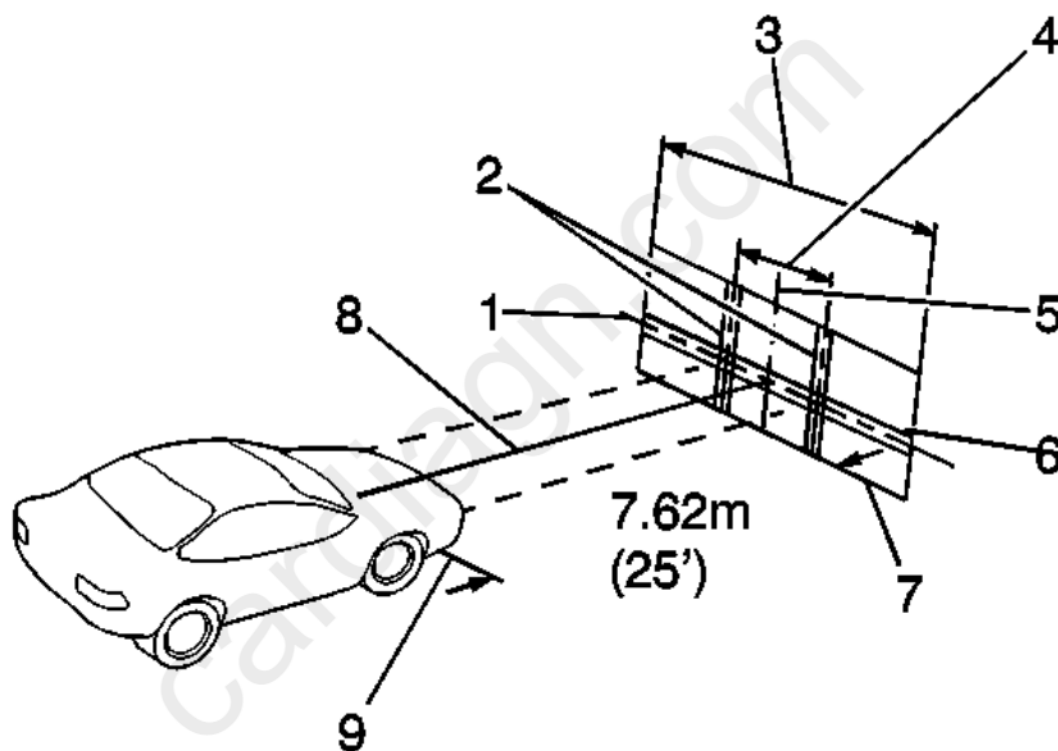
### Aiming Headlamps (Visual Aim)

**IMPORTANT:** Some state and local laws specify requirements for headlamp aim. All of these laws must be complied with 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.
- Suspension components have been replaced or repaired.

- 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 may be made for moving the screen so it can be aligned parallel with the vehicle.
- The screen shall be provided with a fixed vertical centerline, 2 laterally adjustable vertical tapes and 1 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.
- After the aiming screen has been set up in its permanent location, it is necessary to 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:



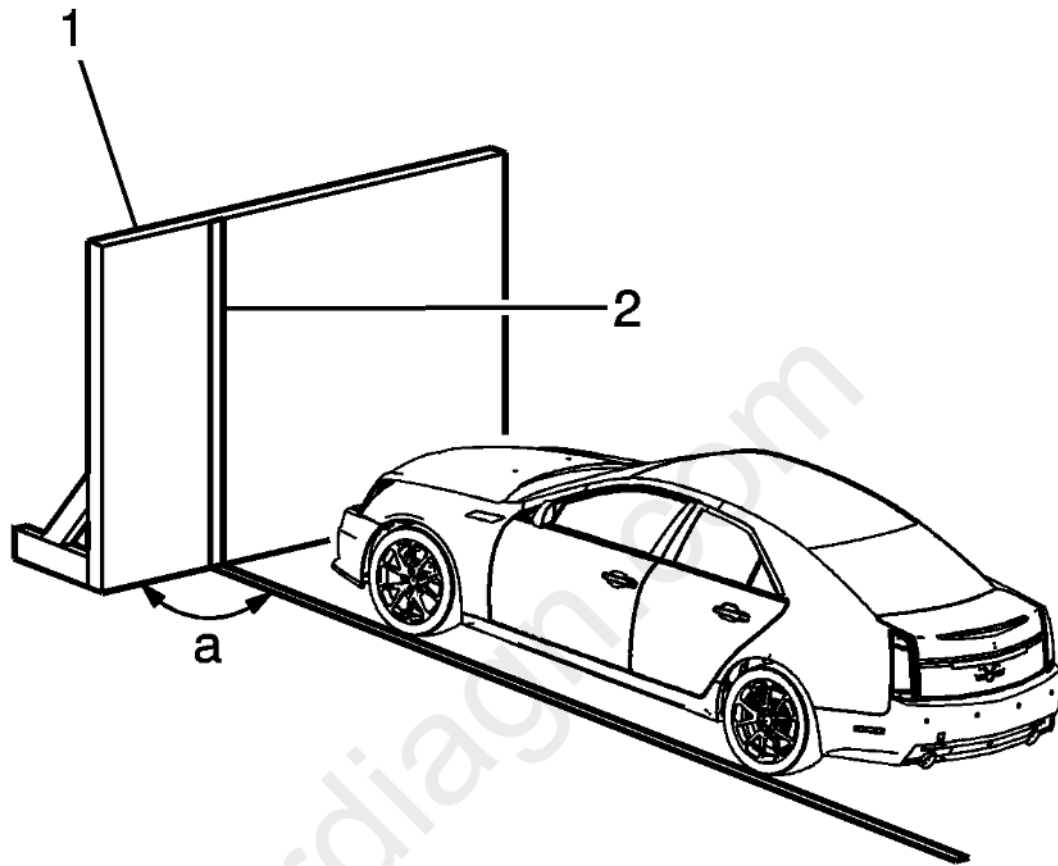
**Fig. 40: View Of Headlamp Aiming/Adjustment Procedure**

Courtesy of GENERAL MOTORS COMPANY

- Distance between headlamps (1)
- Center line of screen (2)
- Adjustable vertical pointer (3)
- Adjustable horizontal tape (4)
- Diagram of light screen (5)
- Vertical center line ahead of right headlamp pointer position (6)
- 7.62 m (25 ft) (7)
- Car centerline axis (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.
6. The vehicle left tires must be aligned with the reference line extending from the screen with the headlamps aligned with the vertical reference line (2).



**Fig. 41: View of Vertical Reference Line**

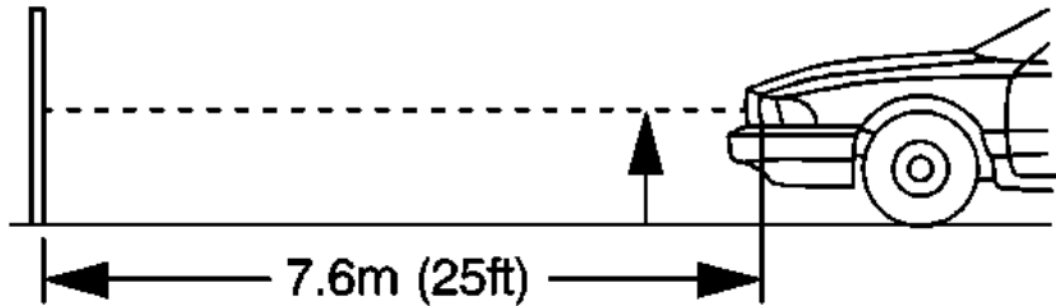
**Courtesy of GENERAL MOTORS COMPANY**

7. Do not load any cargo in the vehicle.
8. The vehicle must contain 1 person or 72.56 kg (160 lb) on the driver's 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**

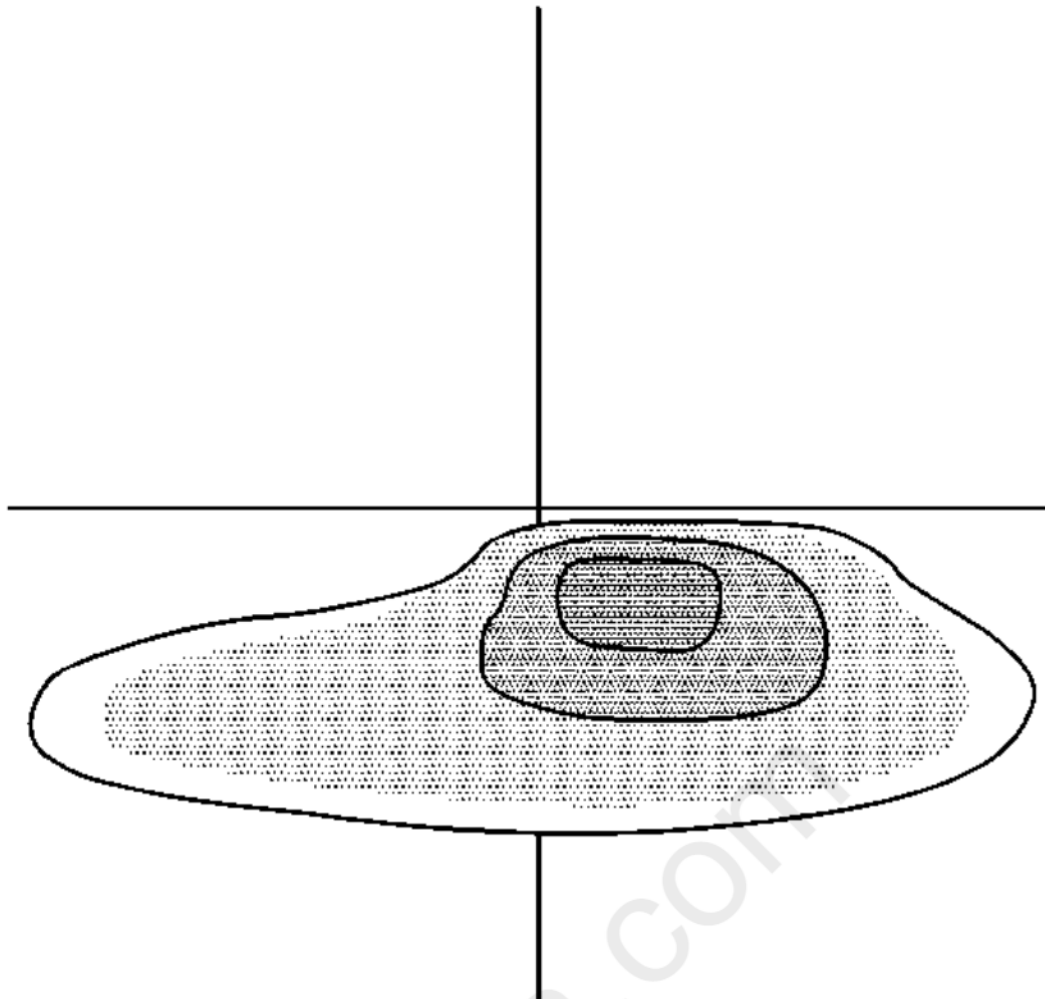
1. Open the hood.
2. Measure from the floor to the center of the headlamp bulb, some headlamps have an aim dot marked on the headlamp lens.





**Fig. 42: Measuring Distance Between Headlamps Face & Aiming Screen**  
Courtesy of GENERAL MOTORS COMPANY

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.
8. Turn on the low beam headlamps and block the light from projecting onto the screen from the passenger side headlamp.



**Fig. 43: Identifying Right Side Low Beam Proper Screen Positioning**  
Courtesy of GENERAL MOTORS COMPANY

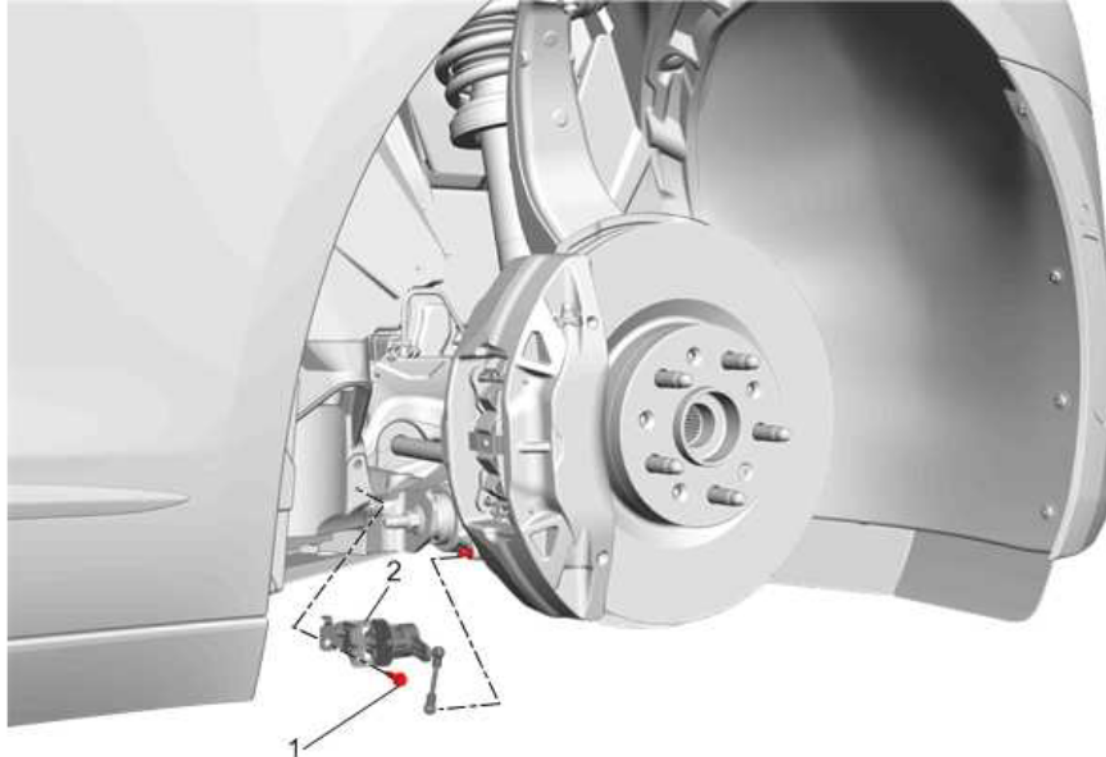
IMPORTANT: Do not cover the headlamp, this may cause excessive heat build up.

9. Adjust the vertical aim of the headlamps to the specifications required by the state and the local authorities or as shown in step number 8.

IMPORTANT: Horizontal headlamp adjustment does not exist.

10. Rotate the headlamp adjuster to change the vertical aim of the headlamp.
11. Repeat the aiming procedure for the passenger side headlamp while blocking the light from projecting onto the screen from the driver side headlamp.
12. Close the hood.

## **FRONT SUSPENSION 4 CORNER LEVELING SYSTEM POSITION SENSOR REPLACEMENT**

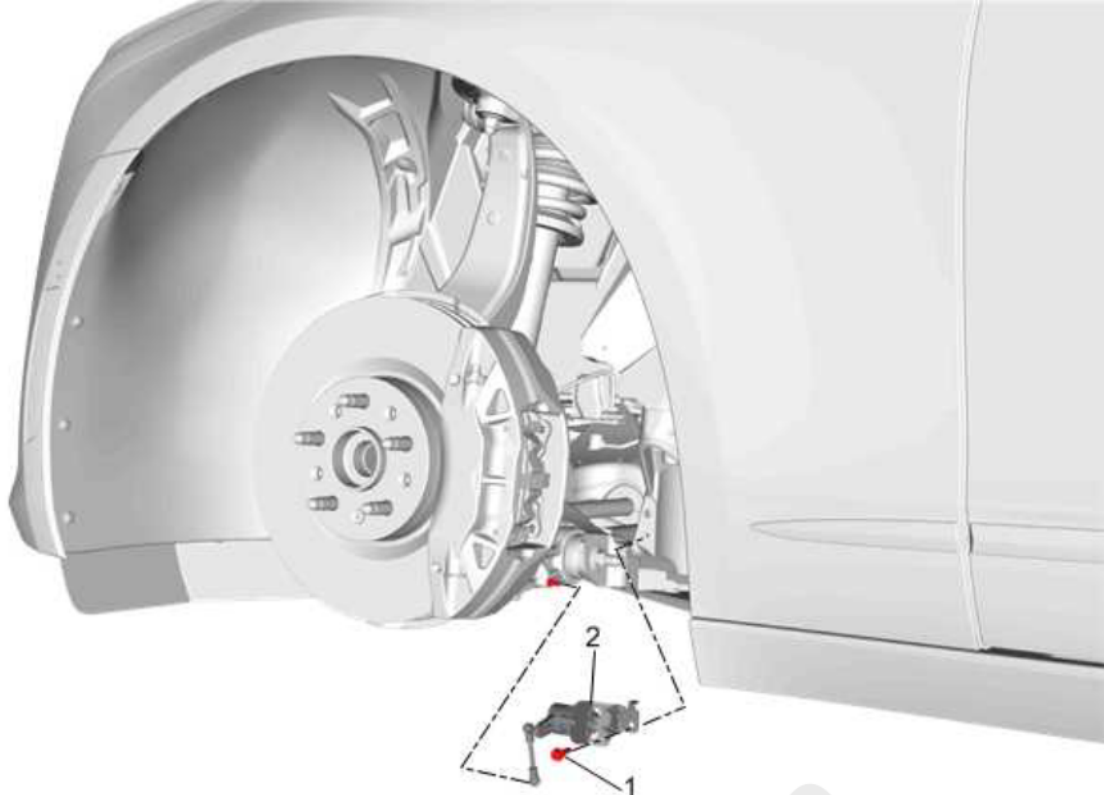


**Fig. 44: Front Suspension 4 Corner Leveling System Position Sensor**

Courtesy of GENERAL MOTORS COMPANY

| Callout                                                                          | Component Name                                                                                                                                                                                                                                   |
|----------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Preliminary Procedure</b><br><b><u>Front Wheelhouse Liner Replacement</u></b> |                                                                                                                                                                                                                                                  |
| 1                                                                                | Front Suspension 4 Corner Leveling System Position Sensor Fastener<br><br><b>CAUTION:</b><br>Refer to <b><u>Fastener Caution</u></b> .<br><br><b>Tighten</b><br>9 N.m (80 lb in)                                                                 |
| 2                                                                                | Front Suspension 4 Corner Leveling System Position Sensor<br><br><b>Procedure</b> <ol style="list-style-type: none"> <li>1. Disconnect the electrical connector.</li> <li>2. Using an appropriate tool, separate the ball and socket.</li> </ol> |

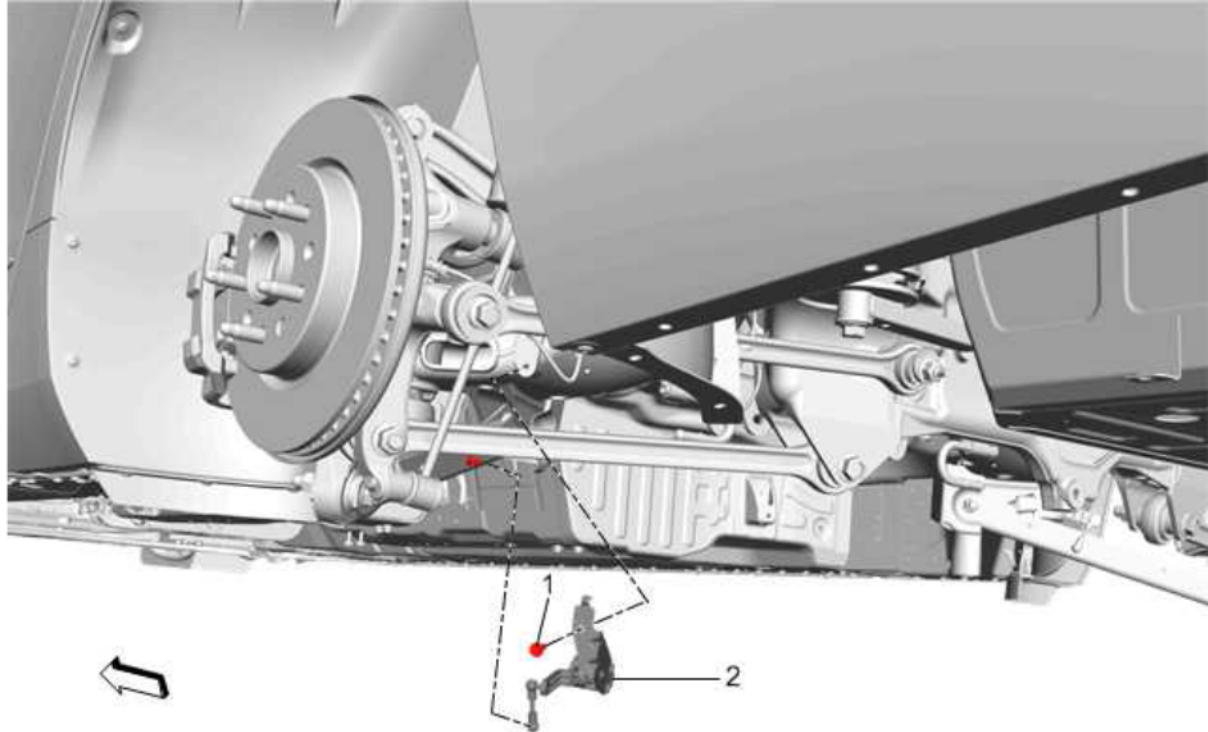
## **FRONT SUSPENSION AUTOMATIC FORWARD LIGHTING POSITION SENSOR REPLACEMENT**



**Fig. 45: Front Suspension Automatic Forward Lighting Position Sensor**  
 Courtesy of GENERAL MOTORS COMPANY

| Callout                                                                   | Component Name                                                                                                                                                                                                                                     |
|---------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Preliminary Procedure</b><br><b>Front Wheelhouse Liner Replacement</b> |                                                                                                                                                                                                                                                    |
| 1                                                                         | Front Suspension Automatic Forward Lighting Position Sensor Fastener<br><br><b>CAUTION:</b><br>Refer to <b>Fastener Caution</b> .<br><br><b>Tighten</b><br>9 N.m (80 lb in)                                                                        |
| 2                                                                         | Front Suspension Automatic Forward Lighting Position Sensor<br><br><b>Procedure</b> <ol style="list-style-type: none"> <li>1. Disconnect the electrical connector.</li> <li>2. Using an appropriate tool, separate the ball and socket.</li> </ol> |

## REAR SUSPENSION AUTOMATIC FORWARD LIGHTING LEVELING POSITION SENSOR REPLACEMENT



**Fig. 46: Rear Suspension Automatic Forward Lighting Leveling Position Sensor**  
 Courtesy of GENERAL MOTORS COMPANY

| Callout | Component Name                                                                                                                                                                                                                                             |
|---------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1       | Rear Suspension Automatic Forward Lighting Leveling Position Sensor Fastener<br><br><b>CAUTION:</b><br>Refer to <a href="#">Fastener Caution</a> .<br><br><b>Tighten</b><br>9 N.m (80 lb in)                                                               |
| 2       | Rear Suspension Automatic Forward Lighting Leveling Position Sensor<br><br><b>Procedure</b> <ol style="list-style-type: none"> <li>1. Disconnect the electrical connector.</li> <li>2. Using an appropriate tool, separate the ball and socket.</li> </ol> |

## SUSPENSION POSITION SENSOR CALIBRATION

### Calibration Criteria

**NOTE:** Remove any excess weight and do not sit in the vehicle during the headlamp leveling sensor learn procedure. Any additional weight will cause the calibration of the front and rear suspension position sensors to be inaccurate and affect the operation of the headlamp leveling system.

The headlamp leveling sensor learn procedure must be performed after a suspension position sensor has been removed/reinstalled/replaced or if the headlamp leveling control module has been serviced. The learn procedure will set the front and rear suspension position sensors home value. This value is used by the headlamp leveling control module to determine the movement of the front and rear suspension systems. The headlamp leveling control module compares the information from both suspension position sensors and adjusts the headlamp leveling as needed.

### Calibration Procedure



1. Ignition ON/vehicle in Service Mode.
2. Install a scan tool.
3. Navigate to the Configuration/Reset Functions menu of the Headlamp Control Module.
4. Select Configuration/Reset Functions.
5. Select Headlamp Leveling Sensor Learn procedure and follow the directions displayed on the screen.

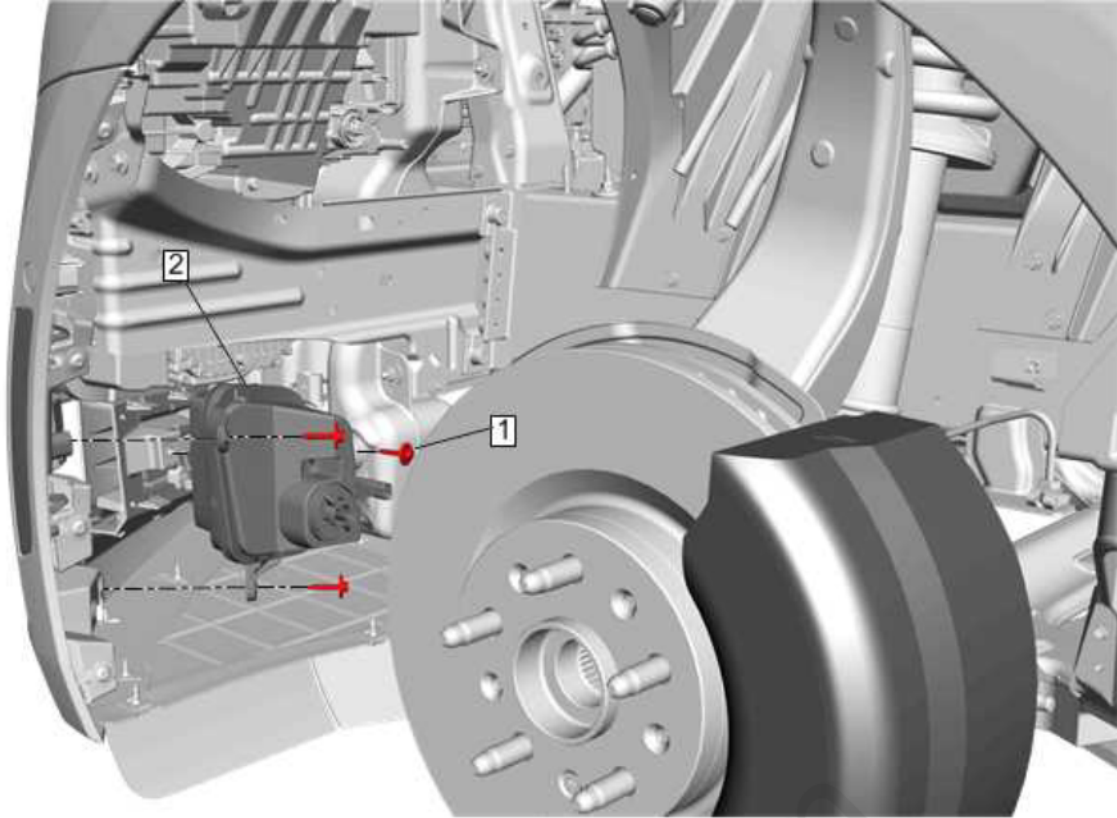
## HEADLAMP CONTROL MODULE REPLACEMENT



**Fig. 47: Headlamp Control Module**  
Courtesy of GENERAL MOTORS COMPANY

| Callout                                                        | Component Name                                                                                                                                                                                                                                                                                                             |
|----------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Preliminary Procedure</b>                                   |                                                                                                                                                                                                                                                                                                                            |
| <b><u>Front Floor Panel Carpet Replacement - Left Side</u></b> |                                                                                                                                                                                                                                                                                                                            |
| 1                                                              | Headlamp Control Module<br><br><b>Procedure</b> <ol style="list-style-type: none"> <li>1. Disconnect the electrical connectors.</li> <li>2. Push the tabs to release the headlamp control module from the bracket.</li> <li>3. <b><u>Control Module References</u></b> for programming and set up, if required.</li> </ol> |

## FRONT FOG LAMP REPLACEMENT

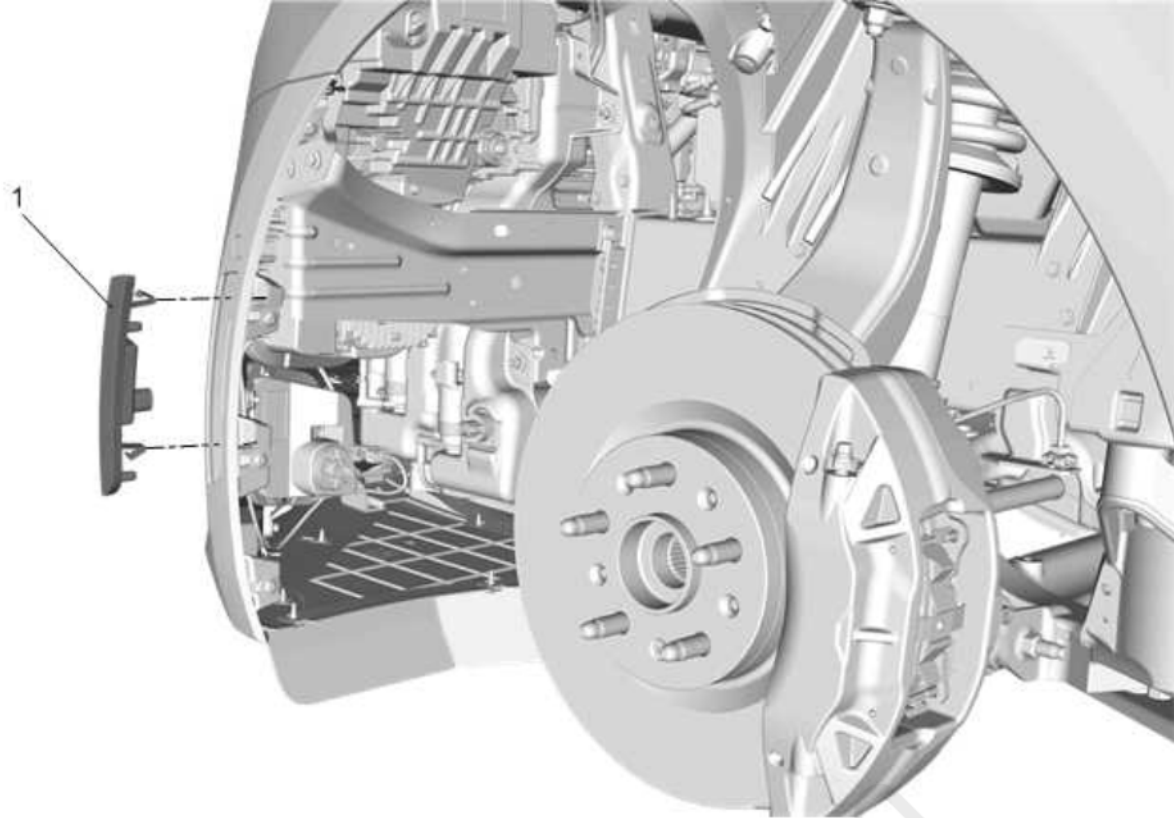


**Fig. 48: Front Fog Lamp**

Courtesy of GENERAL MOTORS COMPANY

| Callout                                                                   | Component Name                                                                                                                                                                               |
|---------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Preliminary Procedure</b><br><b>Front Wheelhouse Liner Replacement</b> |                                                                                                                                                                                              |
| 1                                                                         | Front Fog Lamp Bolt [3x]<br><br><b>CAUTION:</b><br>Refer to <b>Fastener Caution</b> .<br><br><b>Tighten</b><br>2.5 N.m (22 lb in)                                                            |
| 2                                                                         | Front Fog Lamp<br><br><b>Procedure</b> <ol style="list-style-type: none"> <li>1. Disconnect the electrical connector.</li> <li>2. Disconnect and reposition harness as necessary.</li> </ol> |

## FRONT SIDE TURN SIGNAL LAMP REPLACEMENT

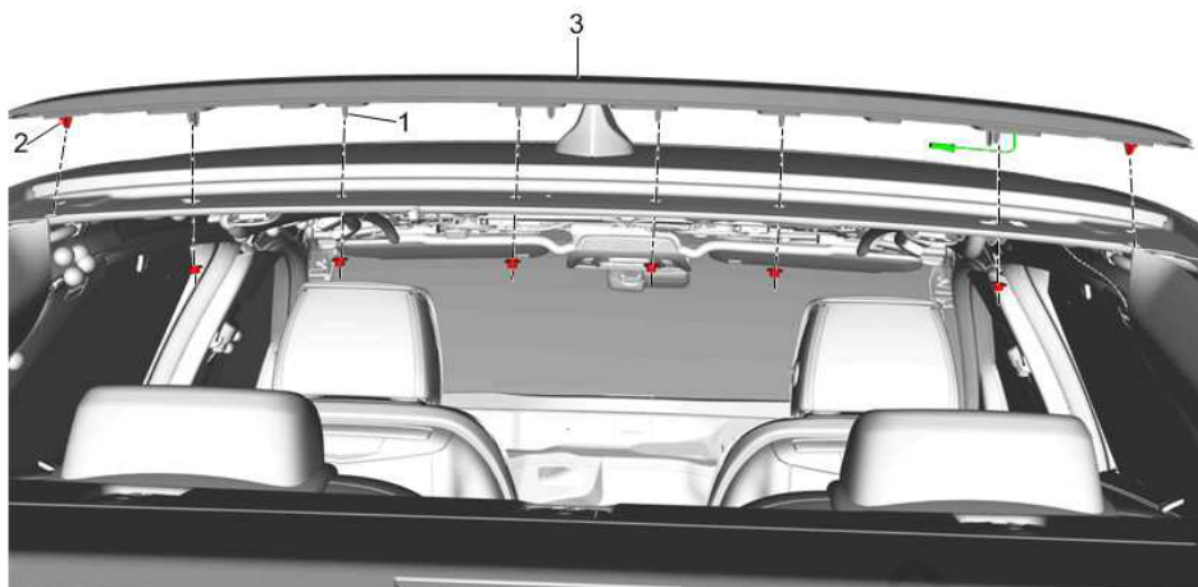


**Fig. 49: Front Side Turn Signal Lamp**

Courtesy of GENERAL MOTORS COMPANY

| Callout                                          | Component Name                                                                                                                                                                                   |
|--------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Preliminary Procedure</b>                     |                                                                                                                                                                                                  |
| <b><u>Front Wheelhouse Liner Replacement</u></b> |                                                                                                                                                                                                  |
| 1                                                | Front Side Turn Signal Lamp                                                                                                                                                                      |
|                                                  | <b>Procedure</b> <ol style="list-style-type: none"> <li>1. Disconnect the electrical connector.</li> <li>2. Compress the upper and lower clips and pull from the front bumper fascia.</li> </ol> |

## **HIGH MOUNT STOP LAMP REPLACEMENT (WITH C24)**

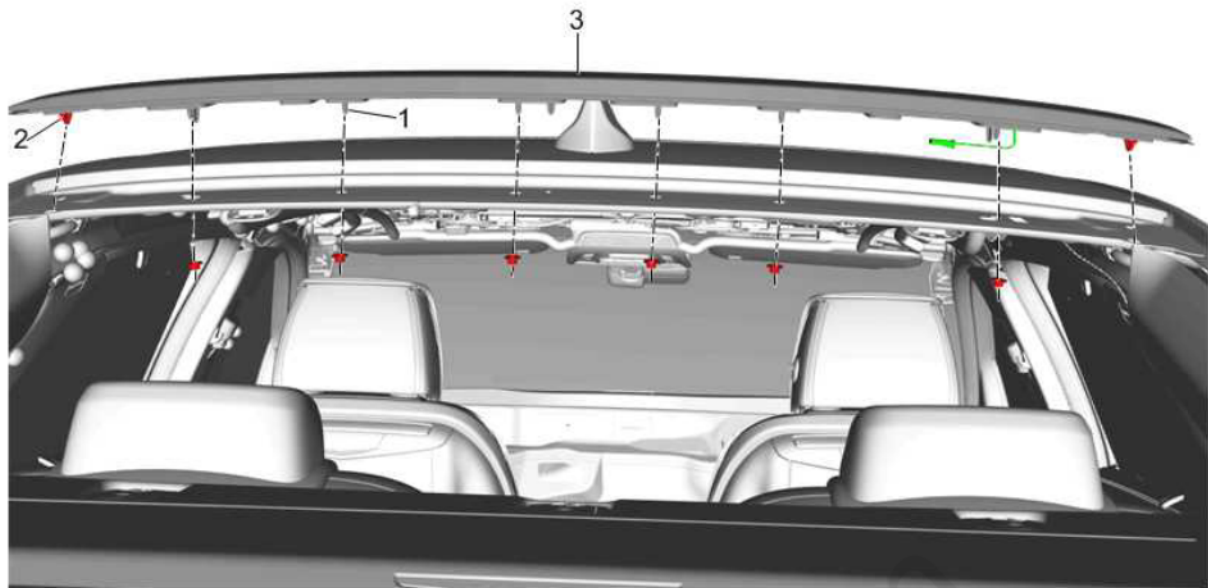


**Fig. 50: High Mount Stop Lamp**

Courtesy of GENERAL MOTORS COMPANY

| Callout                                                                                                                                                                                                                                                                                                                                                                                                                            | Component Name                                                                                                                                                                                                                                                                                    |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Preliminary Procedure</b> <ol style="list-style-type: none"> <li><u>Headlining Trim Panel Replacement (Without C3U)</u>, <u>Headlining Trim Panel Replacement (With C3U)</u></li> <li>Remove both auxiliary air conditioning air outlet ducts. Refer to <u>Auxiliary Air Conditioning Air Outlet Duct Replacement (Right Side)</u>, and/or <u>Auxiliary Air Conditioning Air Outlet Duct Replacement (Left Side)</u></li> </ol> |                                                                                                                                                                                                                                                                                                   |
| 1                                                                                                                                                                                                                                                                                                                                                                                                                                  | High Mount Stop Lamp Nut [6x]<br><br><b>CAUTION:</b><br>Refer to <u>Fastener Caution</u> .<br><br><b>Tighten</b><br>4.7 N.m (42 lb in)                                                                                                                                                            |
| 2                                                                                                                                                                                                                                                                                                                                                                                                                                  | High Mount Stop Lamp Retainer [2x]<br><b>Procedure</b><br>Release both retainers from inside vehicle to remove high mount stop lamp.                                                                                                                                                              |
| 3                                                                                                                                                                                                                                                                                                                                                                                                                                  | High Mount Stop Lamp <ol style="list-style-type: none"> <li>Disconnect the electrical connector.</li> <li>Reposition the reveal molding as necessary.</li> </ol> <b>NOTE:</b><br>Ensure that the rear glass reveal molding is not trapped below the high mount stop lamp during the installation. |

## HIGH MOUNT STOP LAMP REPLACEMENT (WITHOUT C24)



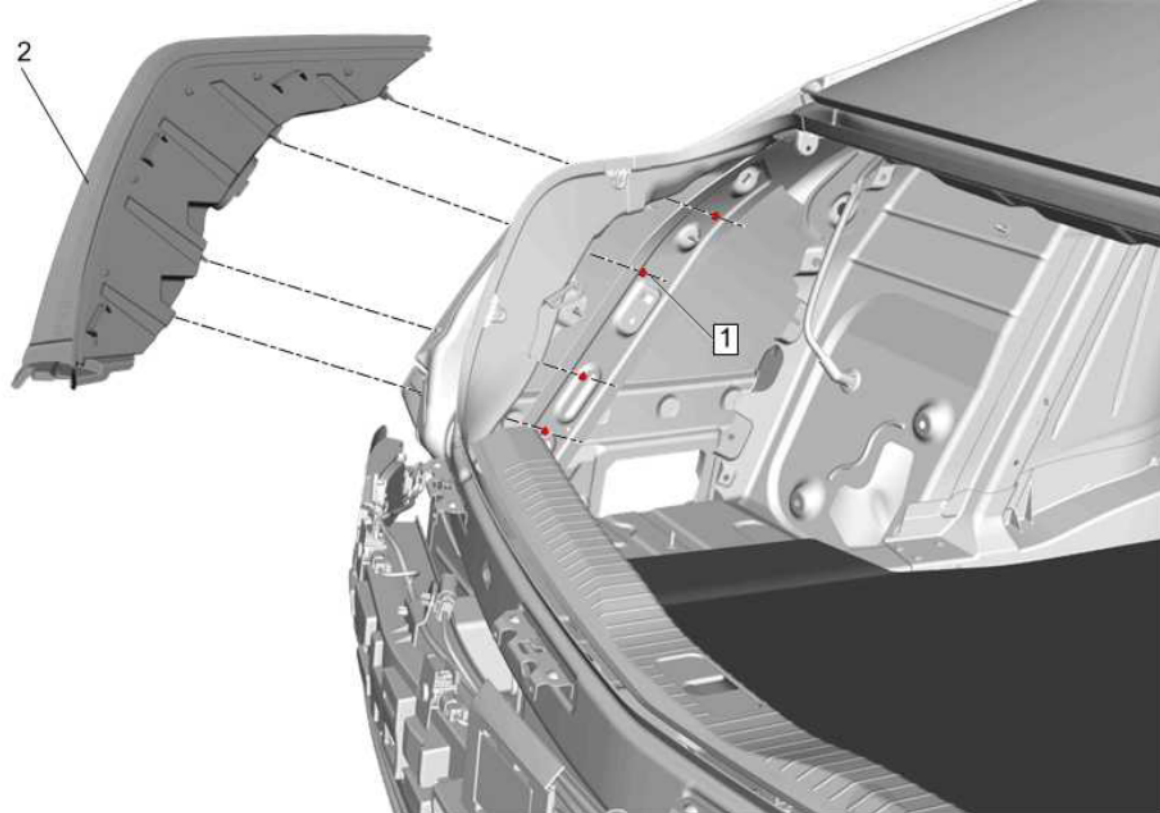
**Fig. 51: High Mount Stop Lamp**

Courtesy of GENERAL MOTORS COMPANY

| Callout                                                                                                                                    | Component Name                                                                                                                                                                                                                                                |
|--------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Preliminary Procedure</b><br><u>Headlining Trim Panel Replacement (Without C3U)</u> <u>Headlining Trim Panel Replacement (With C3U)</u> |                                                                                                                                                                                                                                                               |
| 1                                                                                                                                          | High Mount Stop Lamp Nut [6x]<br><br><b>CAUTION:</b><br>Refer to <u>Fastener Caution</u> .<br><br><b>Tighten</b><br>4.7 N.m (42 lb in)                                                                                                                        |
| 2                                                                                                                                          | High Mount Stop Lamp Retainer [2x]<br><b>Procedure</b><br>Release both retainers from inside vehicle to remove high mount stop lamp.                                                                                                                          |
| 3                                                                                                                                          | High Mount Stop Lamp<br><br>1. Disconnect the electrical connector.<br>2. Reposition the reveal molding as necessary.<br><br><b>NOTE:</b><br>Ensure that the rear glass reveal molding is not trapped below the high mount stop lamp during the installation. |

## REAR BODY STRUCTURE STOP LAMP REPLACEMENT

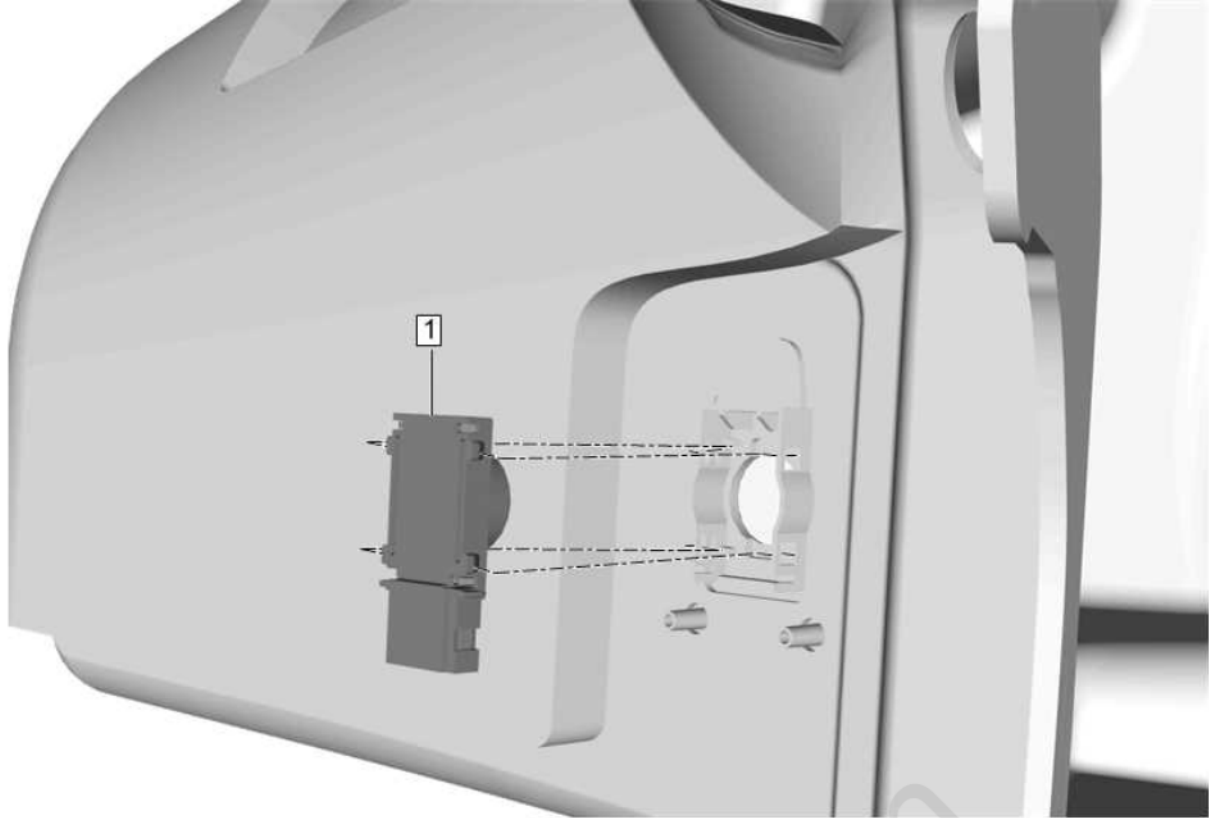




**Fig. 52: Rear Body Structure Stop Lamp**  
 Courtesy of GENERAL MOTORS COMPANY

| Callout                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Component Name                                                                                                                                                  |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Preliminary Procedures</b> <ol style="list-style-type: none"> <li><u><a href="#">Rear Compartment Side Trim Replacement - Left Side (Without HP9)</a></u>, <u><a href="#">Rear Compartment Side Trim Replacement - Left Side (With HP9)</a></u>, <u><a href="#">Rear Compartment Side Trim Replacement - Right Side (Without HP9)</a></u> or <u><a href="#">Rear Compartment Side Trim Replacement - Right Side (With HP9)</a></u></li> <li><u><a href="#">Back Body Opening Side Gutter Replacement</a></u></li> <li><u><a href="#">Rear Bumper Fascia Replacement</a></u></li> </ol> |                                                                                                                                                                 |
| 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Rear Body Structure Stop Lamp Nut [4x]<br><br><b>CAUTION:</b><br>Refer to <u><a href="#">Fastener Caution</a></u> .<br><br><b>Tighten</b><br>4.7 N.m (42 lb in) |
| 2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Rear Body Structure Stop Lamp                                                                                                                                   |

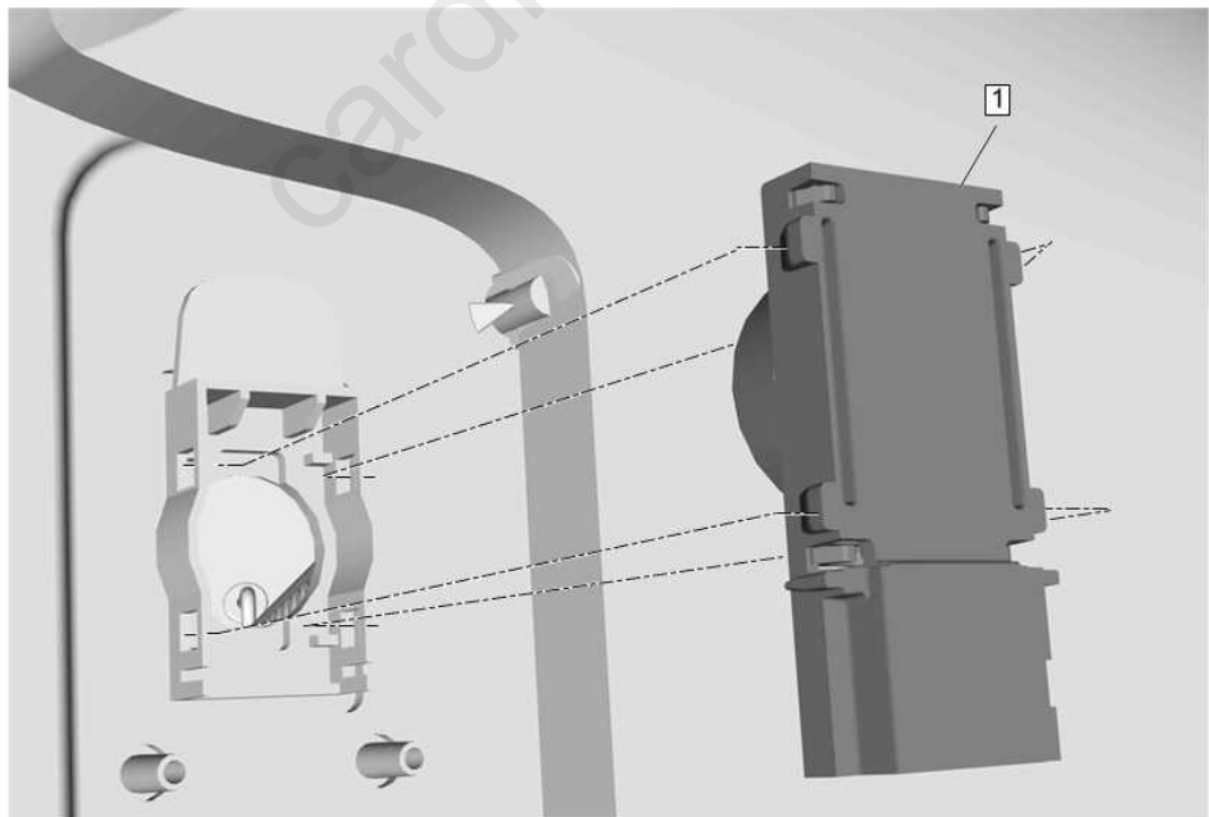
## REAR COMPARTMENT CARGO COURTESY LAMP REPLACEMENT (LEFT SIDE)



**Fig. 53: Rear Compartment Cargo Courtesy Lamp (Left Side)**  
 Courtesy of GENERAL MOTORS COMPANY

| Callout                                                                                                                                                               | Component Name                       |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| Preliminary Procedure<br><u>Rear Compartment Side Trim Replacement - Left Side (Without HP9)</u> <u>Rear Compartment Side Trim Replacement - Left Side (With HP9)</u> |                                      |
| 1                                                                                                                                                                     | Rear Compartment Cargo Courtesy Lamp |

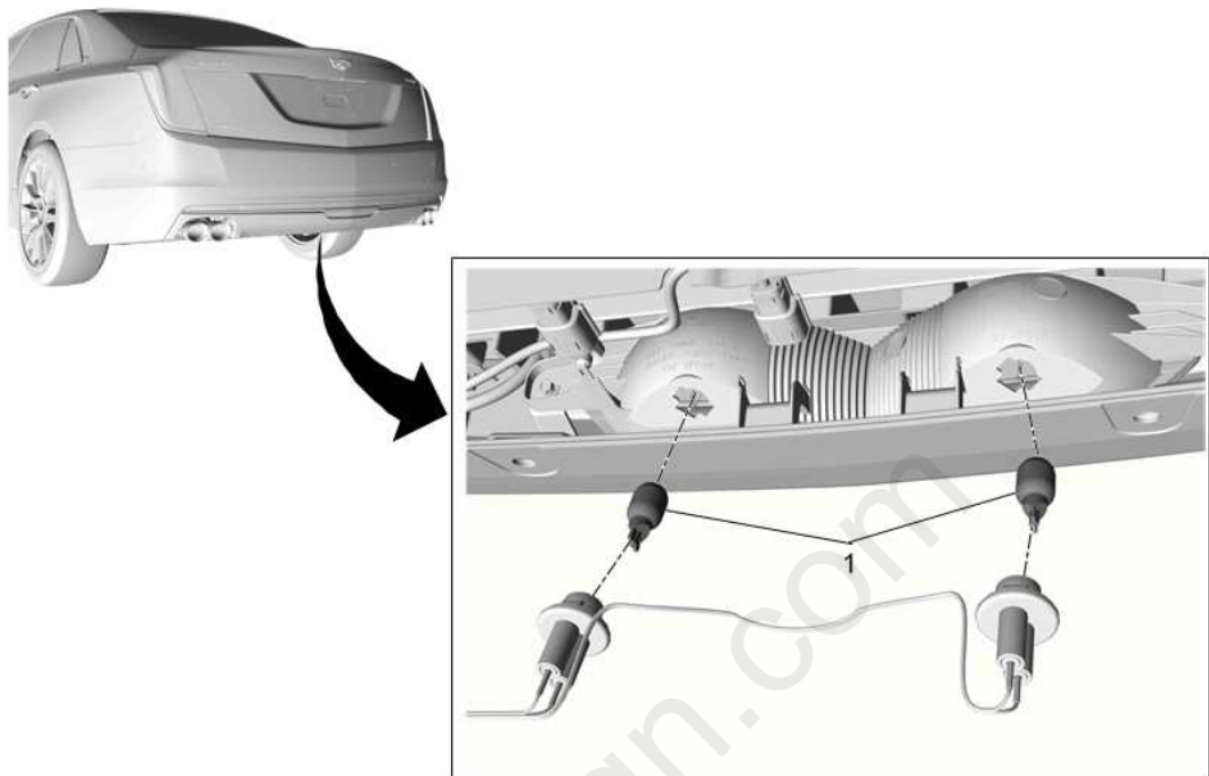
**REAR COMPARTMENT CARGO COURTESY LAMP REPLACEMENT (RIGHT SIDE)**



**Fig. 54: Rear Compartment Cargo Courtesy Lamp (Right Side)**  
 Courtesy of GENERAL MOTORS COMPANY

| Callout                                                                                                                                                                        | Component Name                       |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| <b>Preliminary Procedure</b><br><u>Rear Compartment Side Trim Replacement - Right Side (Without HP9)</u> <u>Rear Compartment Side Trim Replacement - Right Side (With HP9)</u> |                                      |
| 1                                                                                                                                                                              | Rear Compartment Cargo Courtesy Lamp |

## BACKUP LAMP BULB REPLACEMENT



**Fig. 55: Backup Lamp Bulb**

Courtesy of GENERAL MOTORS COMPANY

| Callout                                                                                                                                                            | Component Name                                                                                                                                                                                    |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Preliminary Procedure</b><br><u>Underbody Rear Air Rear Deflector Replacement (Without HP9)</u> <u>Underbody Rear Air Rear Deflector Replacement (With HP9)</u> |                                                                                                                                                                                                   |
| 1                                                                                                                                                                  | Backup Lamp Bulb<br><br>1. Rotate the bulb socket counterclockwise to remove it from the lamp housing.<br>2. Pull the bulb straight from the lamp socket.<br>3. Transfer components as necessary. |

## REAR LICENSE PLATE LAMP REPLACEMENT

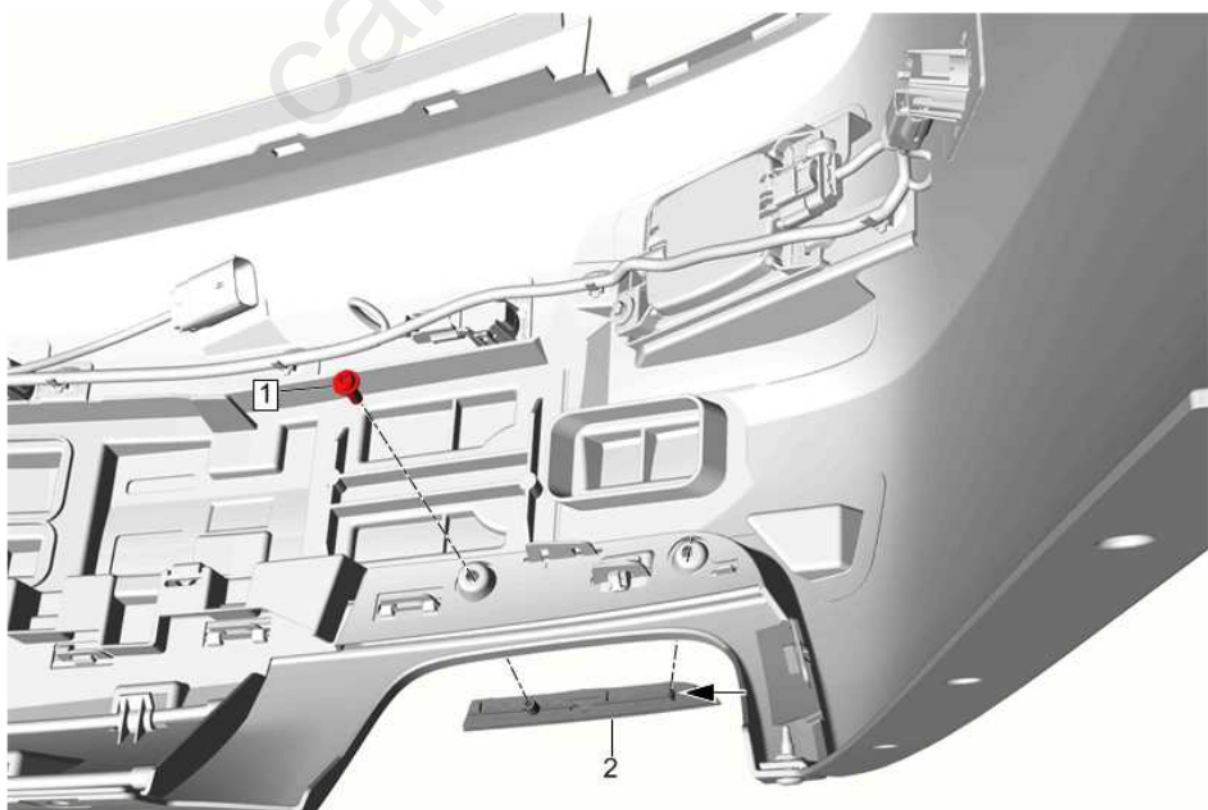


**Fig. 56: Rear License Plate Lamp**

Courtesy of GENERAL MOTORS COMPANY

| Callout                                                         | Component Name                                                                                              |
|-----------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------|
| <b>Preliminary Procedure</b>                                    |                                                                                                             |
| <b><u>Rear Compartment Lid Inner Panel Trim Replacement</u></b> |                                                                                                             |
| 1                                                               | Rear License Plate Lamp<br><br>1. Disconnect the electrical connector.<br>2. Depress the two retainer tabs. |

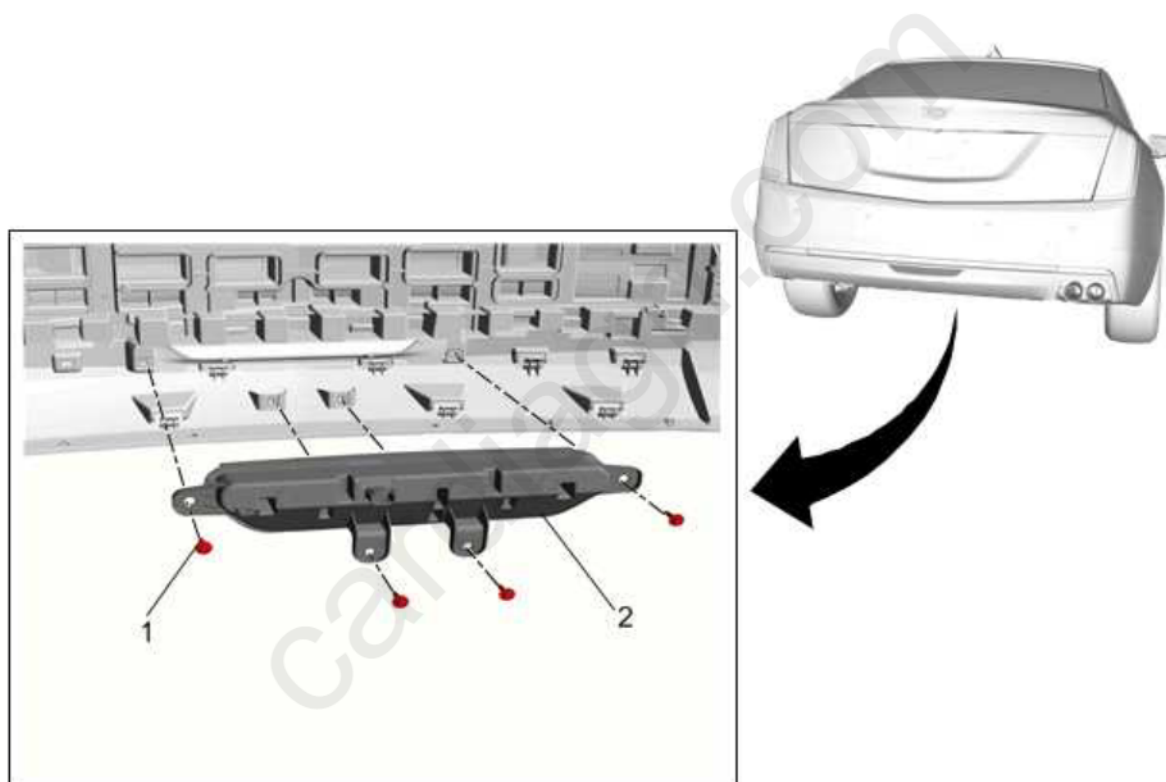
## REAR FASCIA AUXILIARY SIGNAL LAMP REPLACEMENT



**Fig. 57: Rear Fascia Auxiliary Signal Lamp**  
 Courtesy of GENERAL MOTORS COMPANY

| Callout                                                               | Component Name                                                                                                                   |
|-----------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------|
| <b>Preliminary Procedure</b><br><u>Rear Bumper Fascia Replacement</u> |                                                                                                                                  |
| 1                                                                     | Rear Bumper Fascia Bolt<br><br><b>CAUTION:</b><br>Refer to <u>Fastener Caution</u> .<br><br><b>Tighten</b><br>2.5 N.m (22 lb in) |
| 2                                                                     | Rear Fascia Auxiliary Signal Lamp<br><b>Procedure</b><br>Release the retaining tab.                                              |

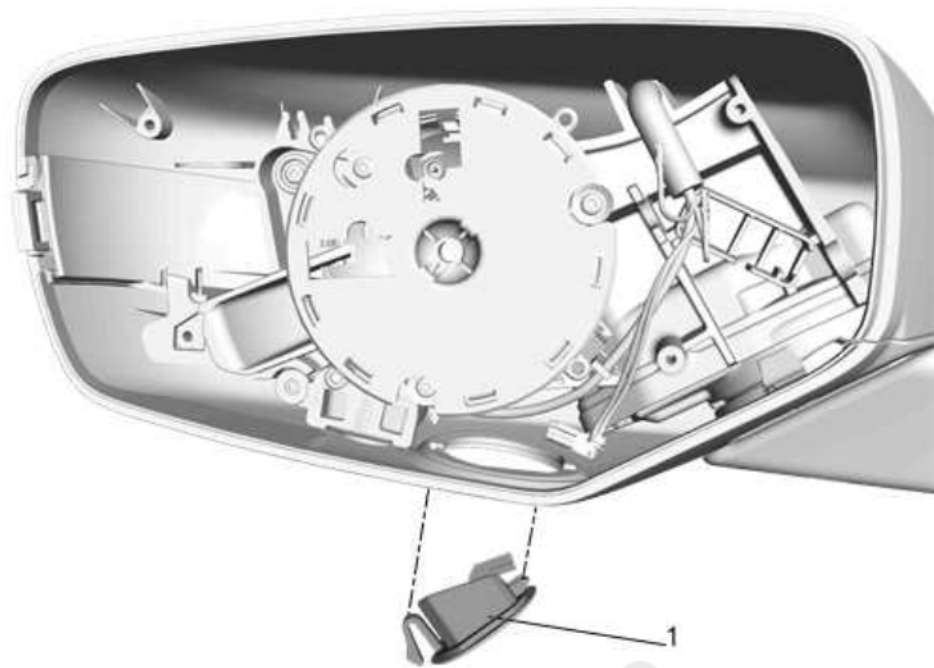
## REAR FASCIA LOWER SIGNAL LAMP REPLACEMENT



**Fig. 58: Rear Fascia Lower Signal Lamp**  
 Courtesy of GENERAL MOTORS COMPANY

| Callout                                                                                                                                                            | Component Name                                                                                                                                       |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Preliminary Procedure</b><br><u>Underbody Rear Air Rear Deflector Replacement (Without HP9)</u> <u>Underbody Rear Air Rear Deflector Replacement (With HP9)</u> |                                                                                                                                                      |
| 1                                                                                                                                                                  | Rear Fascia Lower Signal Lamp Fastener [4x]<br><br><b>CAUTION:</b><br>Refer to <u>Fastener Caution</u> .<br><br><b>Tighten</b><br>2.5 N.m (22 lb in) |
| 2                                                                                                                                                                  | Rear Fascia Lower Signal Lamp                                                                                                                        |





**Fig. 59: Exterior Flood Lamp**  
 Courtesy of GENERAL MOTORS COMPANY

| Callout                                                                                  | Component Name                                                                                                                                                                                                                               |
|------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Preliminary Procedure</b><br><b>Outside Rearview Mirror Housing Bezel Replacement</b> |                                                                                                                                                                                                                                              |
| 1                                                                                        | Exterior Flood Lamp<br><b>Procedure</b> <ol style="list-style-type: none"> <li>1. Disconnect the electrical connector.</li> <li>2. Using the appropriate tool, release the clip and tilt the flood lamp down from mirror housing.</li> </ol> |

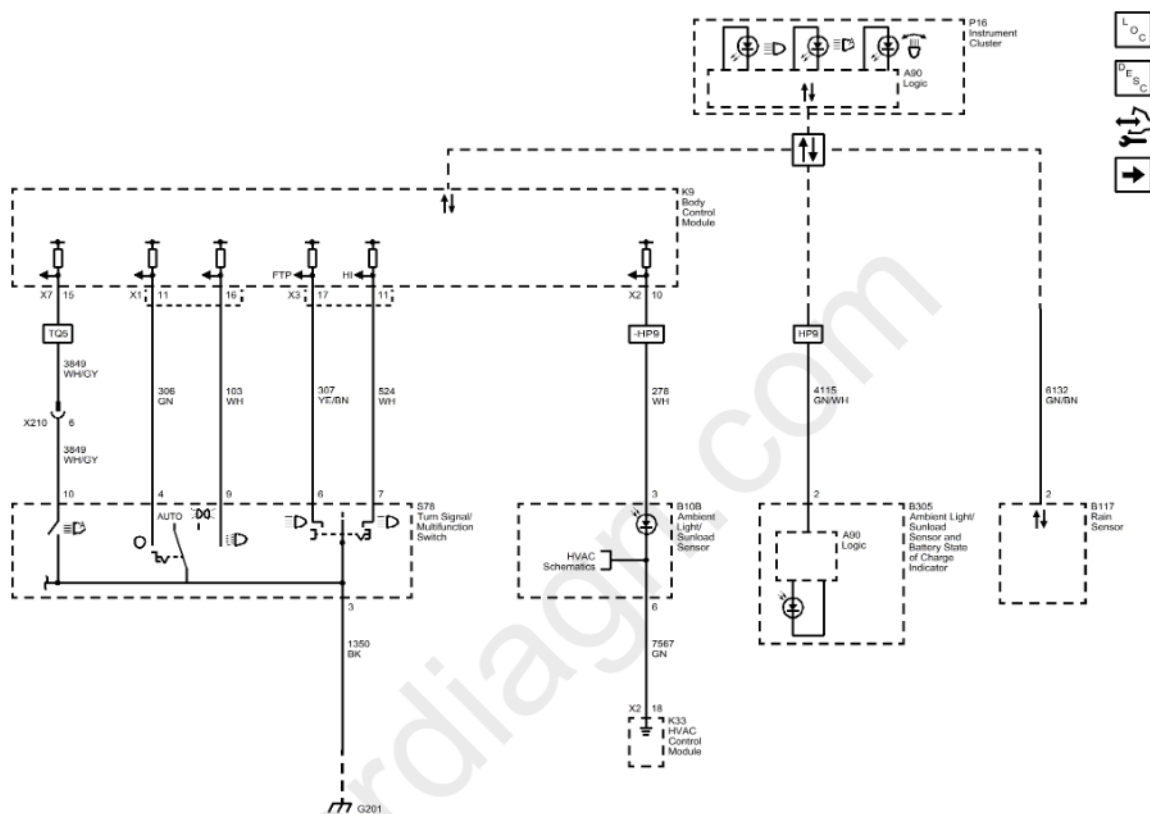
## 2017 ACCESSORIES & EQUIPMENT

### Lighting - Schematic Wiring Diagrams - CT6

## SCHEMATIC WIRING DIAGRAMS

### HEADLIGHTS/DAYTIME RUNNING LIGHTS (DRL) WIRING SCHEMATICS

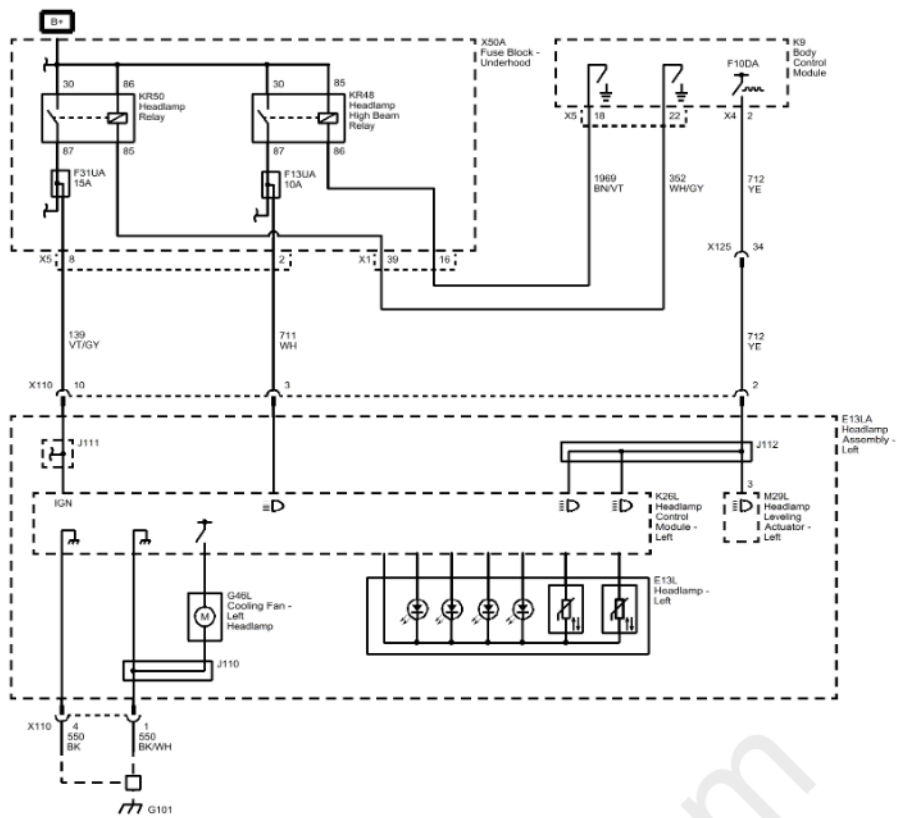
#### Controls and Indicators



**Fig. 1: Controls and Indicators**

Courtesy of GENERAL MOTORS COMPANY

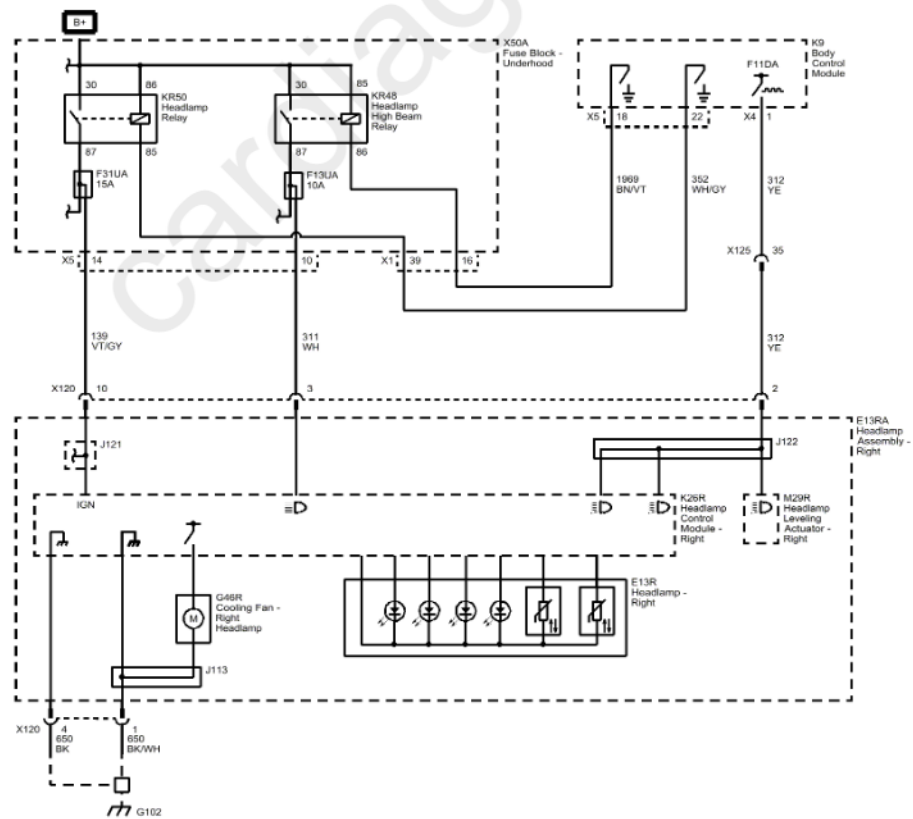
#### Lighting - Left Headlamp



**Fig. 2: Lighting - Left Headlamp**

Courtesy of GENERAL MOTORS COMPANY

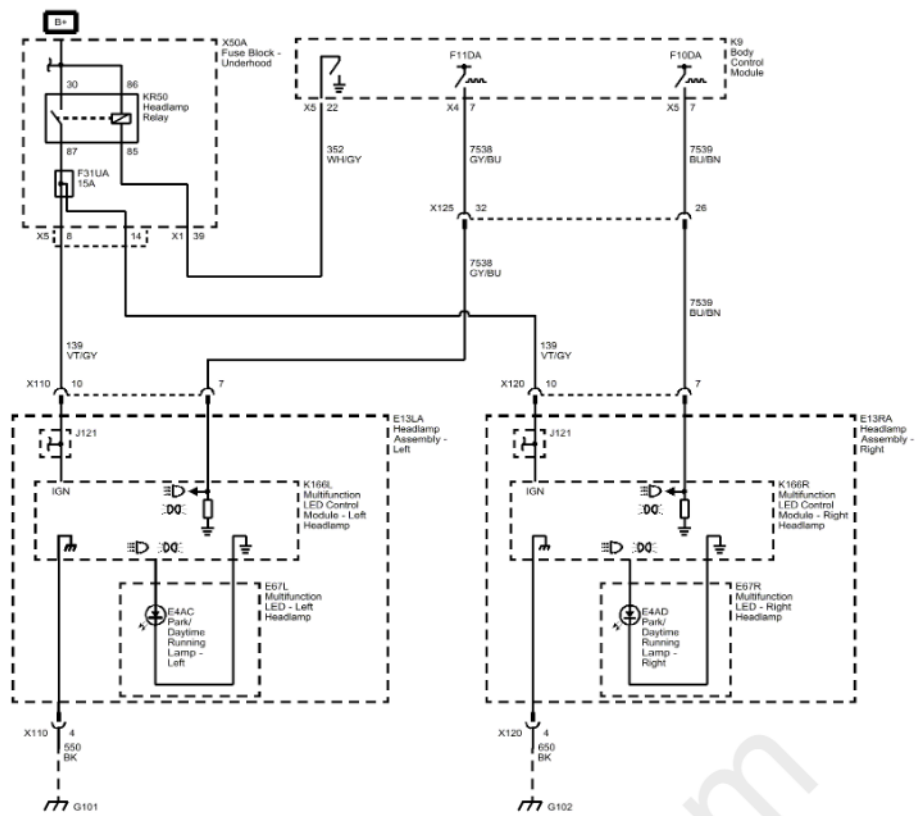
### Lighting - Right Headlamp



**Fig. 3: Lighting - Right Headlamp**

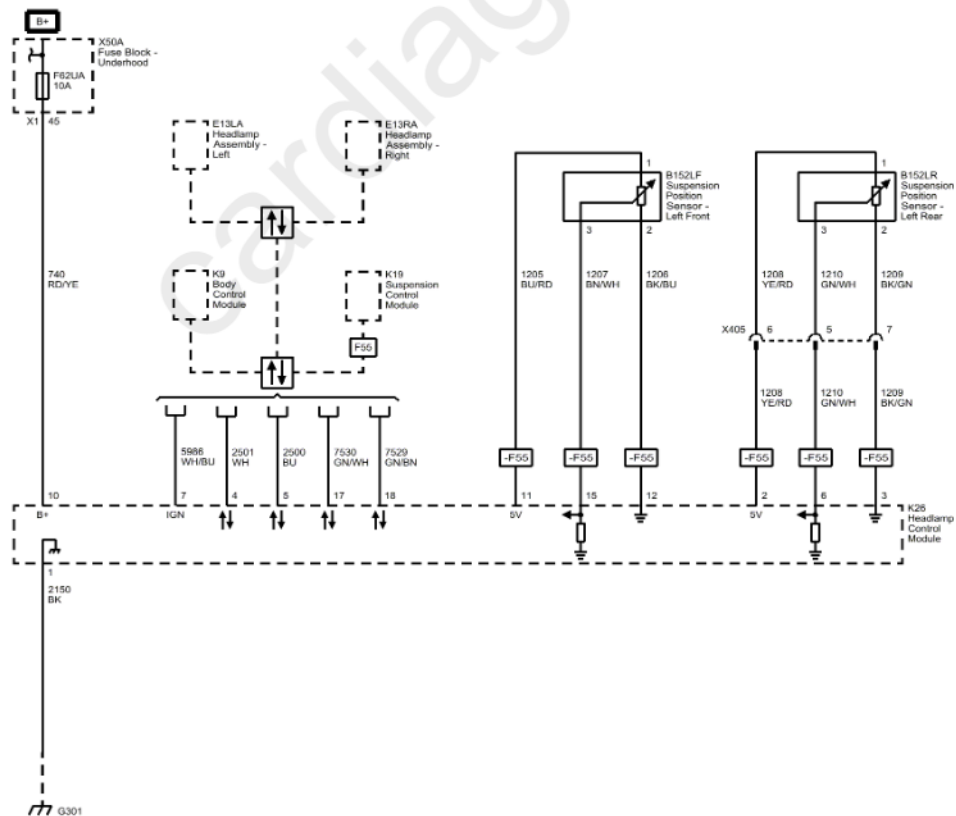
Courtesy of GENERAL MOTORS COMPANY

### Lighting - Daytime Running Lamps



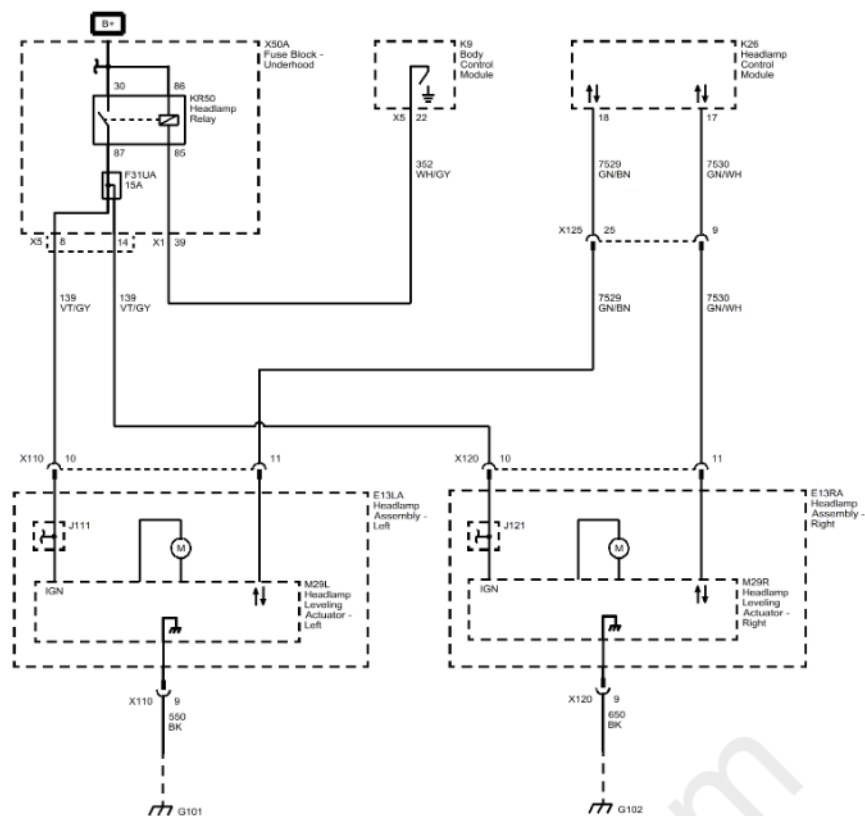
**Fig. 4: Lighting - Daytime Running Lamps**  
Courtesy of GENERAL MOTORS COMPANY

### Adaptive Forward Lighting - Power, Ground, Serial Data and Suspension Sensors (TR7)



**Fig. 5: Adaptive Forward Lighting - Power, Ground, Serial Data and Suspension Sensors (TR7)**  
Courtesy of GENERAL MOTORS COMPANY

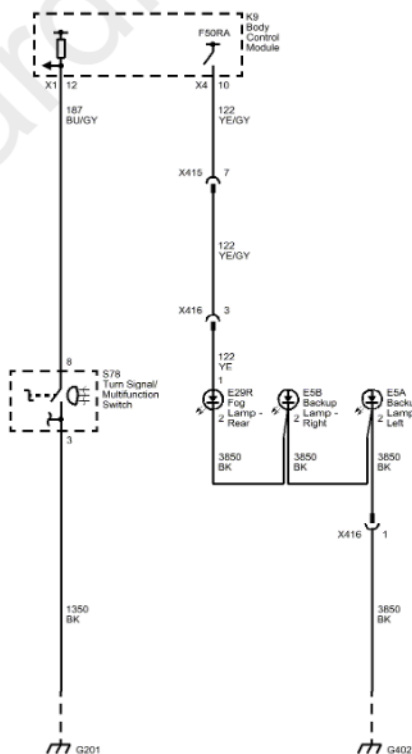
### Adaptive Forward Lighting - Headlamp Actuators (TR7)



**Fig. 6: Adaptive Forward Lighting - Headlamp Actuators (TR7)**  
Courtesy of GENERAL MOTORS COMPANY

## FOG LIGHTS WIRING SCHEMATICS

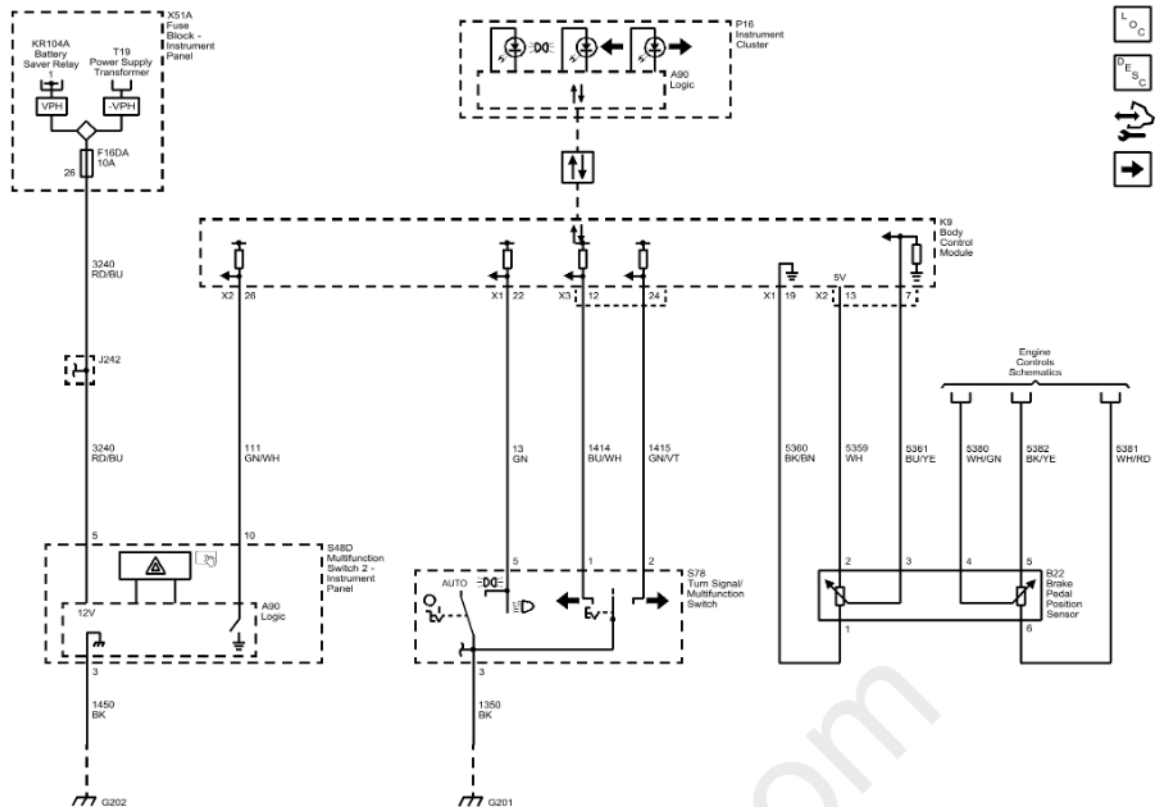
### Rear Fog Light (T79)



**Fig. 7: Rear Fog Light (T79)**  
Courtesy of GENERAL MOTORS COMPANY

## EXTERIOR LIGHTS WIRING SCHEMATICS

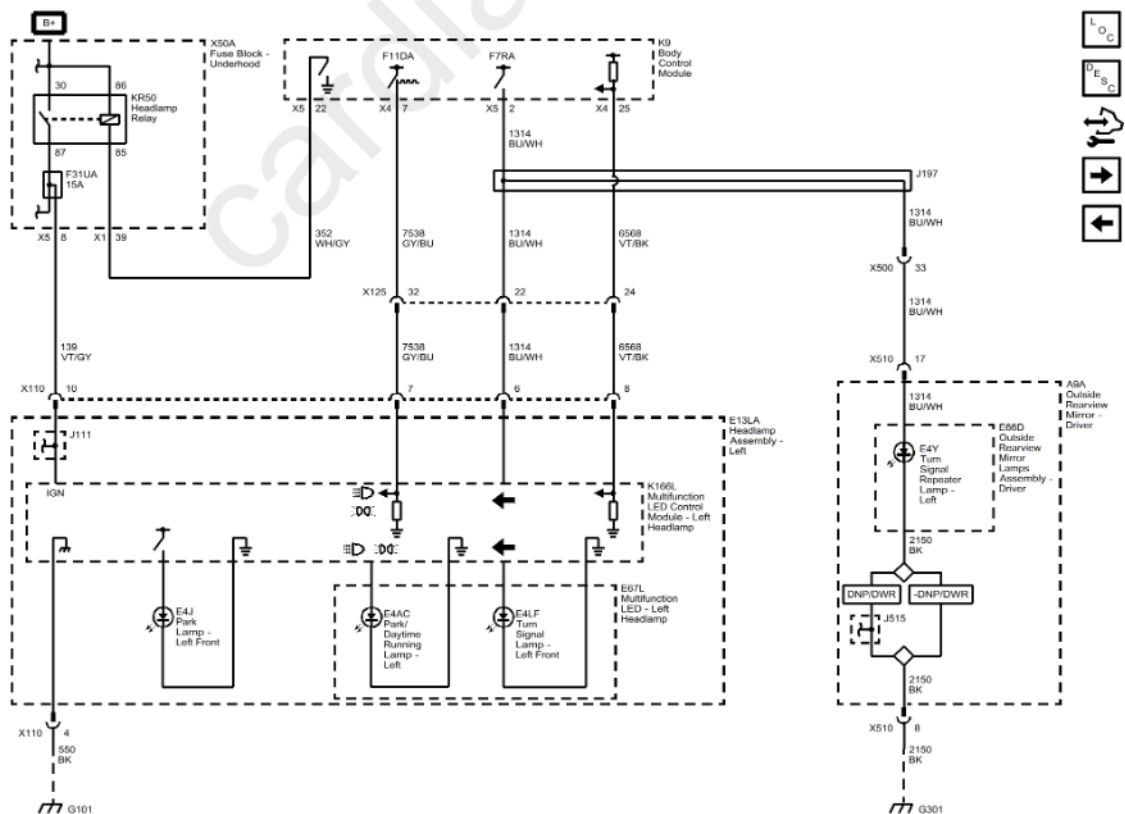




**Fig. 8: Controls and Indicators**

Courtesy of GENERAL MOTORS COMPANY

### Front Lamps and Repeater Turn Signals - Left

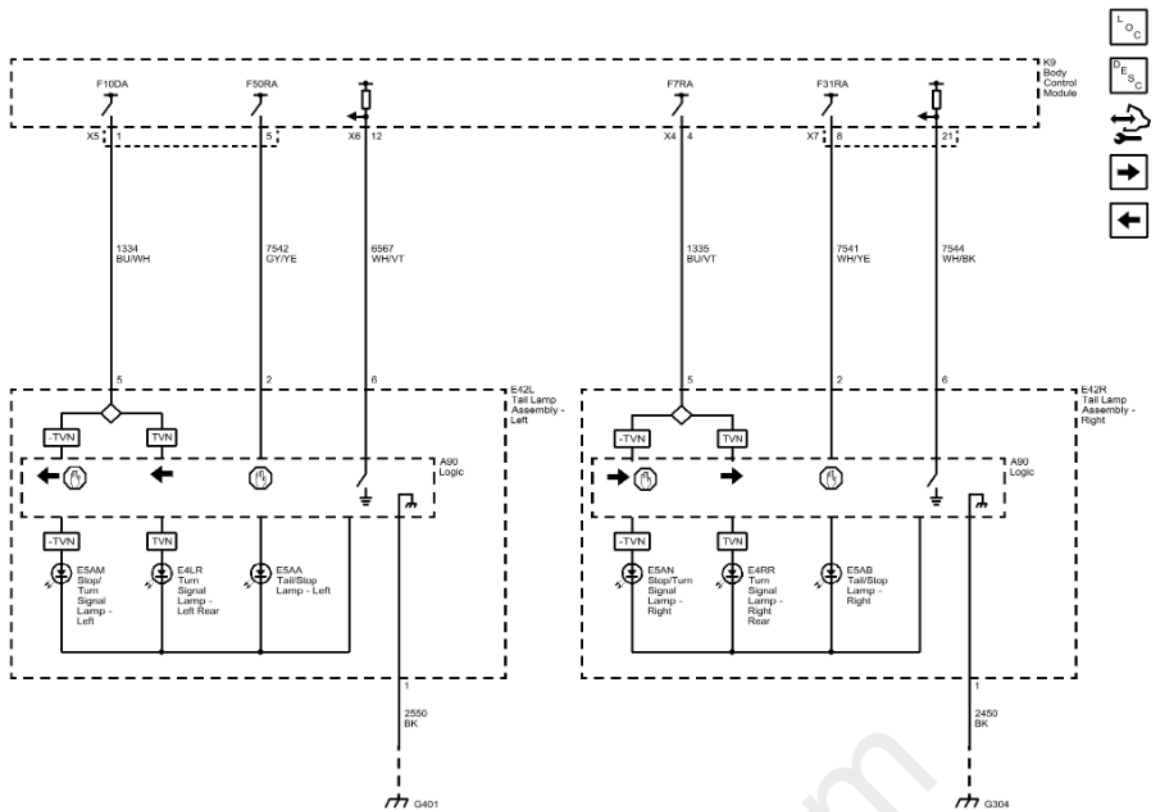


**Fig. 9: Front Lamps and Repeater Turn Signals - Left**

Courtesy of GENERAL MOTORS COMPANY

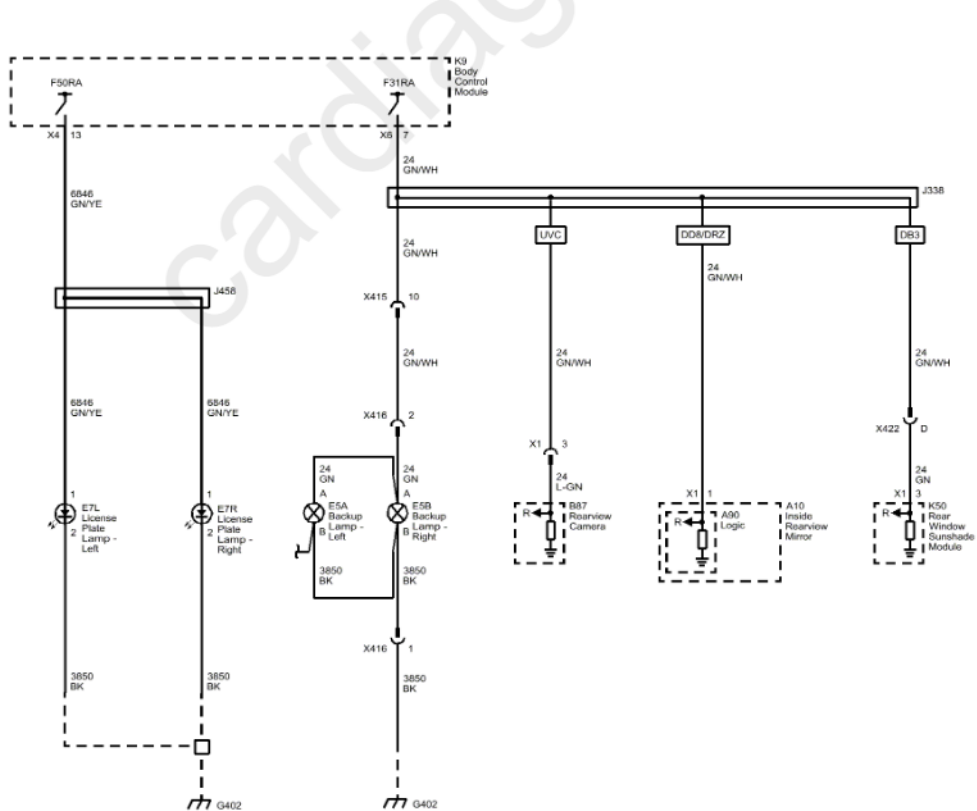
### Front Lamps and Repeater Turn Signals - Right





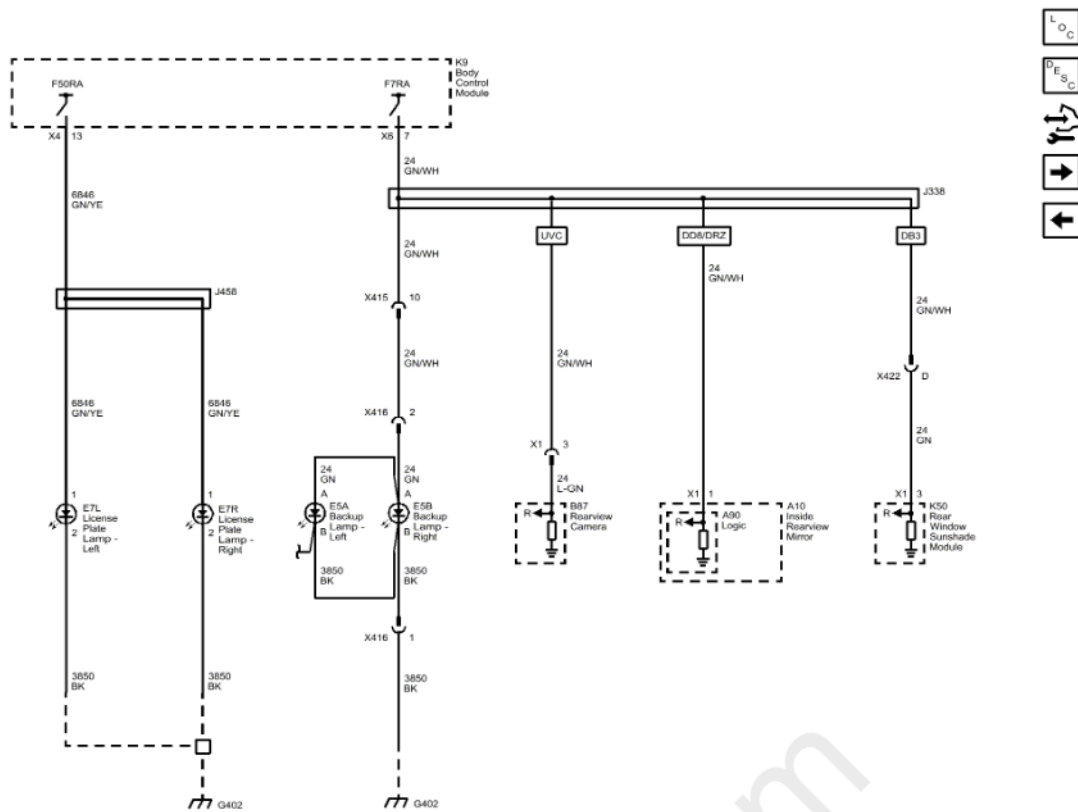
**Fig. 12: Stop/Tail Lamps and Rear Turn Signals**  
Courtesy of GENERAL MOTORS COMPANY

### Backup and License Lamps (without T79))



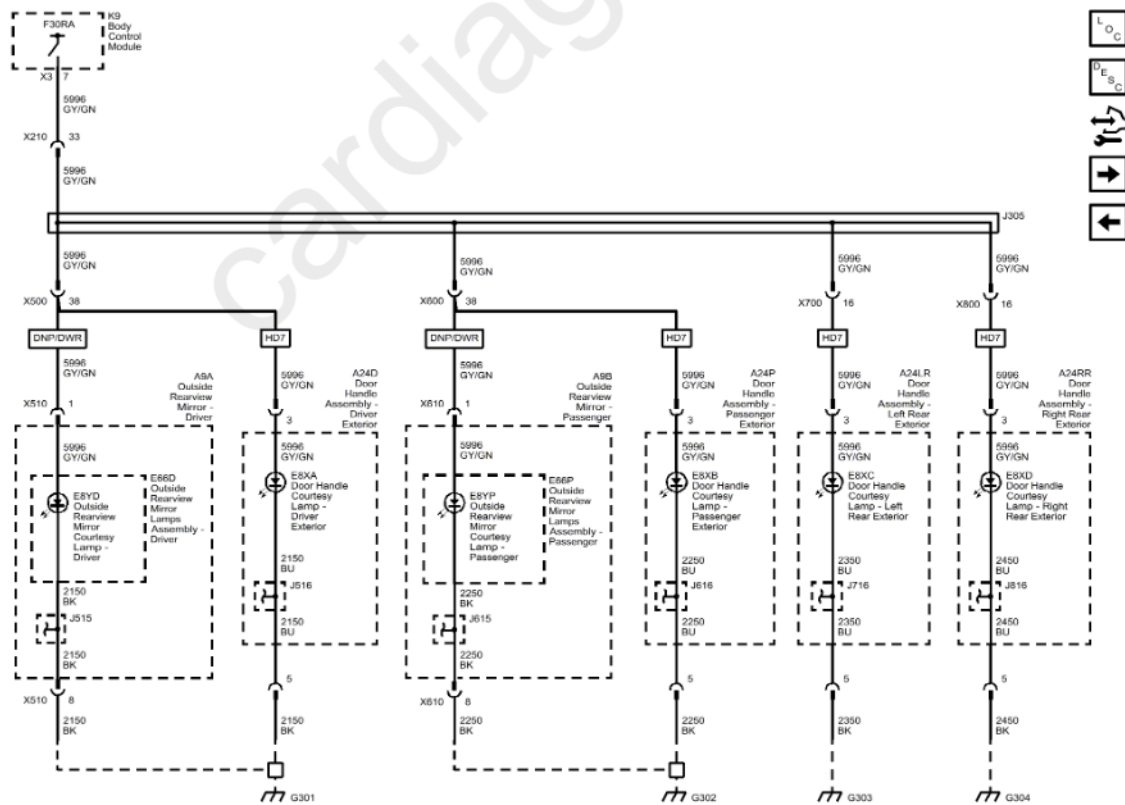
**Fig. 13: Backup and License Lamps (without T79))**  
Courtesy of GENERAL MOTORS COMPANY

### Backup and License Lamps (T79)



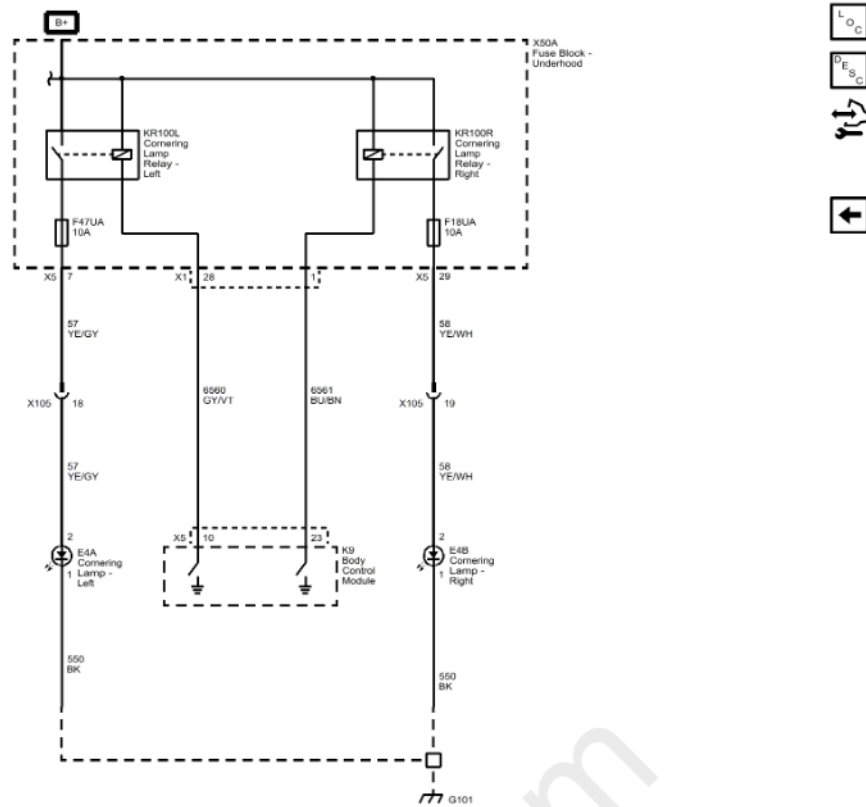
**Fig. 14: Backup and License Lamps (T79)**  
Courtesy of GENERAL MOTORS COMPANY

Courtesy Lamps (DNP, DWR and/or HD7)



**Fig. 15: Courtesy Lamps (DNP, DWR and/or HD7)**  
Courtesy of GENERAL MOTORS COMPANY

Cornering Lamps (T87)

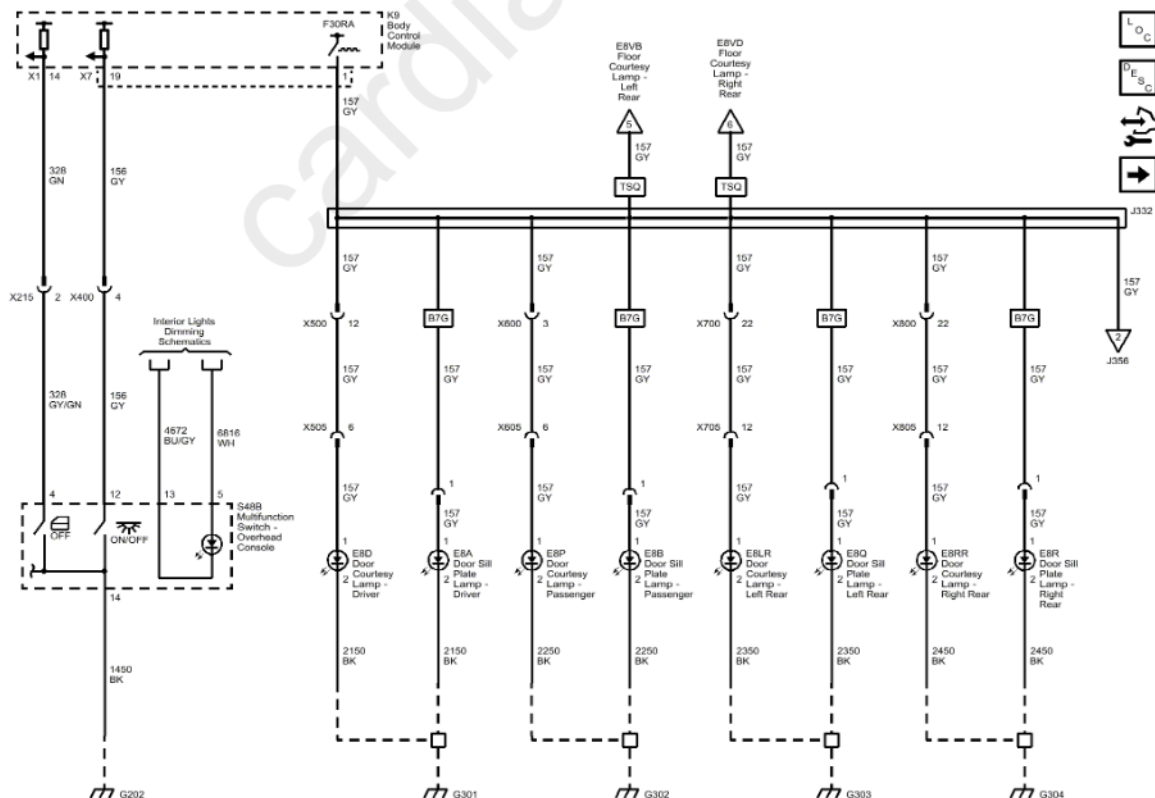


**Fig. 16: Cornering Lamps (T87)**

Courtesy of GENERAL MOTORS COMPANY

## INTERIOR LIGHTS WIRING SCHEMATICS

Controls, Door Sill Lamps (B7G) and Door Courtesy Lamps

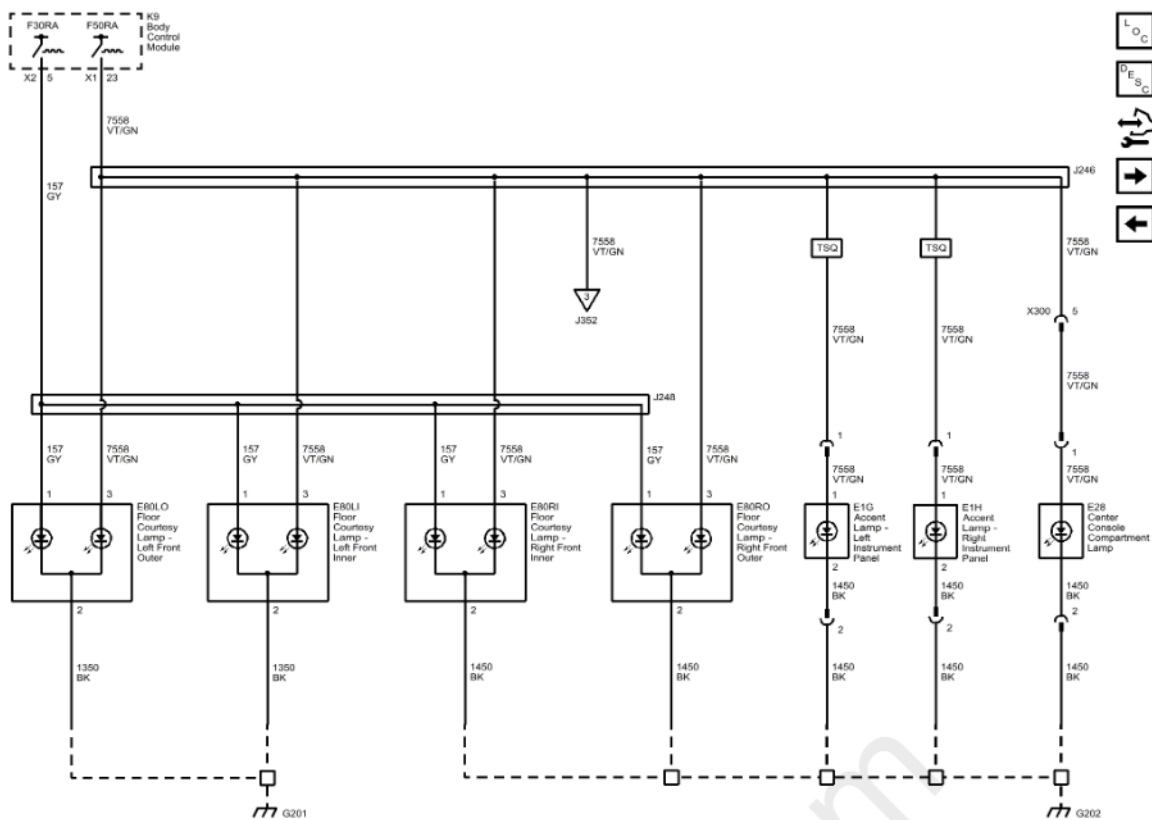


**Fig. 17: Controls, Door Sill Lamps (B7G) and Door Courtesy Lamps**

Courtesy of GENERAL MOTORS COMPANY

Center Console Compartment, Instrument Panel Accent (TSQ) and Front Floor Courtesy Lamps

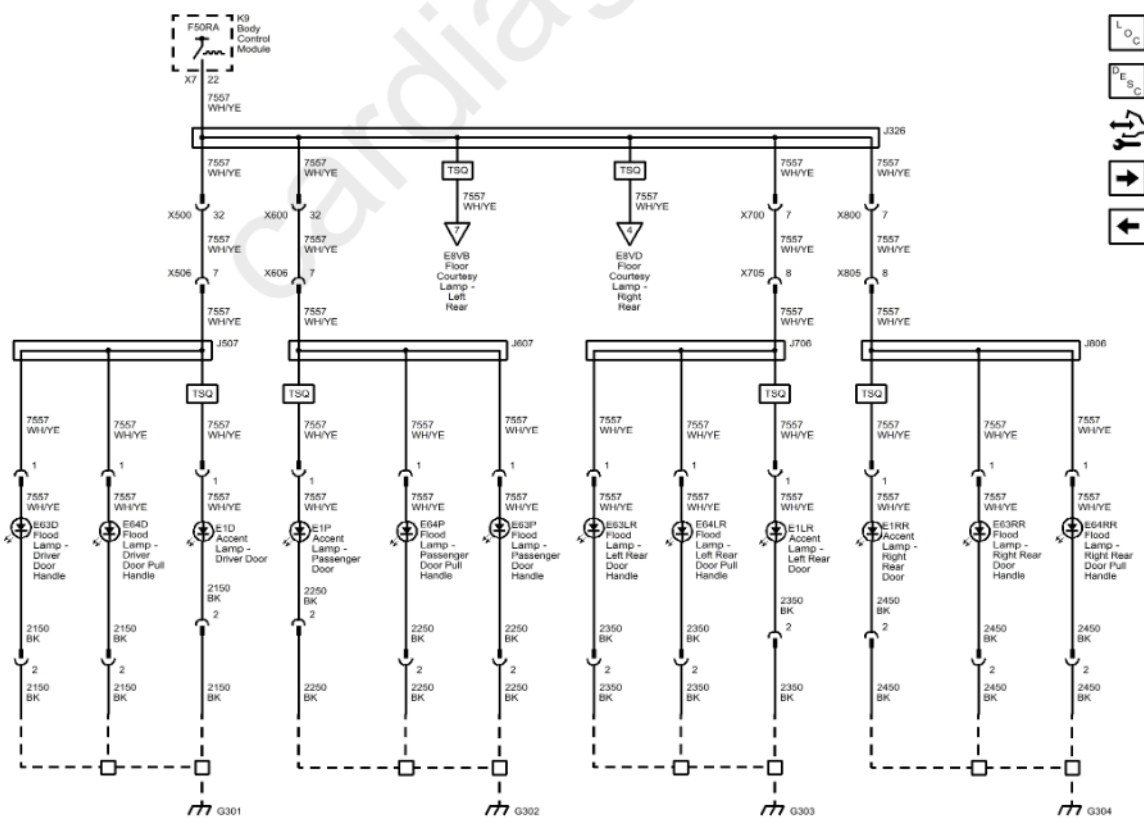




**Fig. 18: Center Console Compartment, Instrument Panel Accent (TSQ) and Front Floor Courtesy Lamps**

Courtesy of GENERAL MOTORS COMPANY

Door Armrest (TSQ), Handle and Pull Handle Lamps



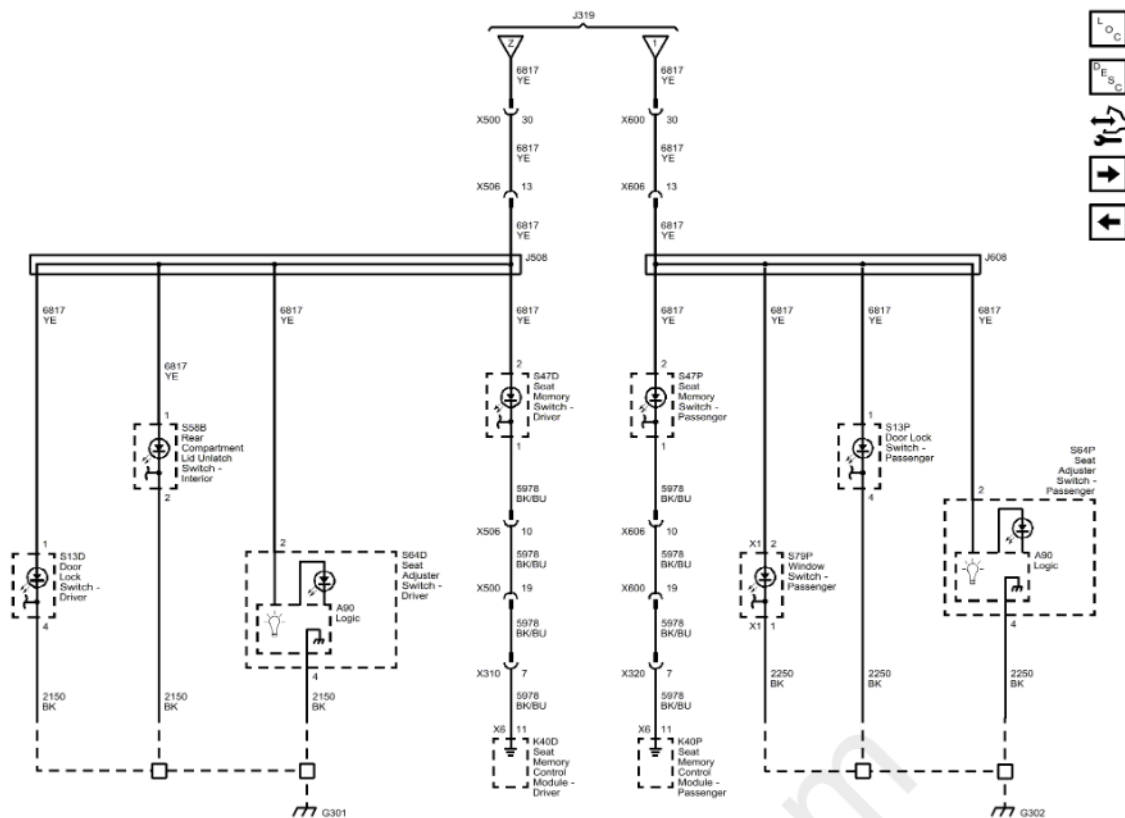
**Fig. 19: Door Armrest (TSQ), Handle and Pull Handle Lamps**

Courtesy of GENERAL MOTORS COMPANY

Instrument Panel Compartment and Overhead Lamps

## Controls, Instrument Panel Lamps and Overhead Lamps (1 of 2)

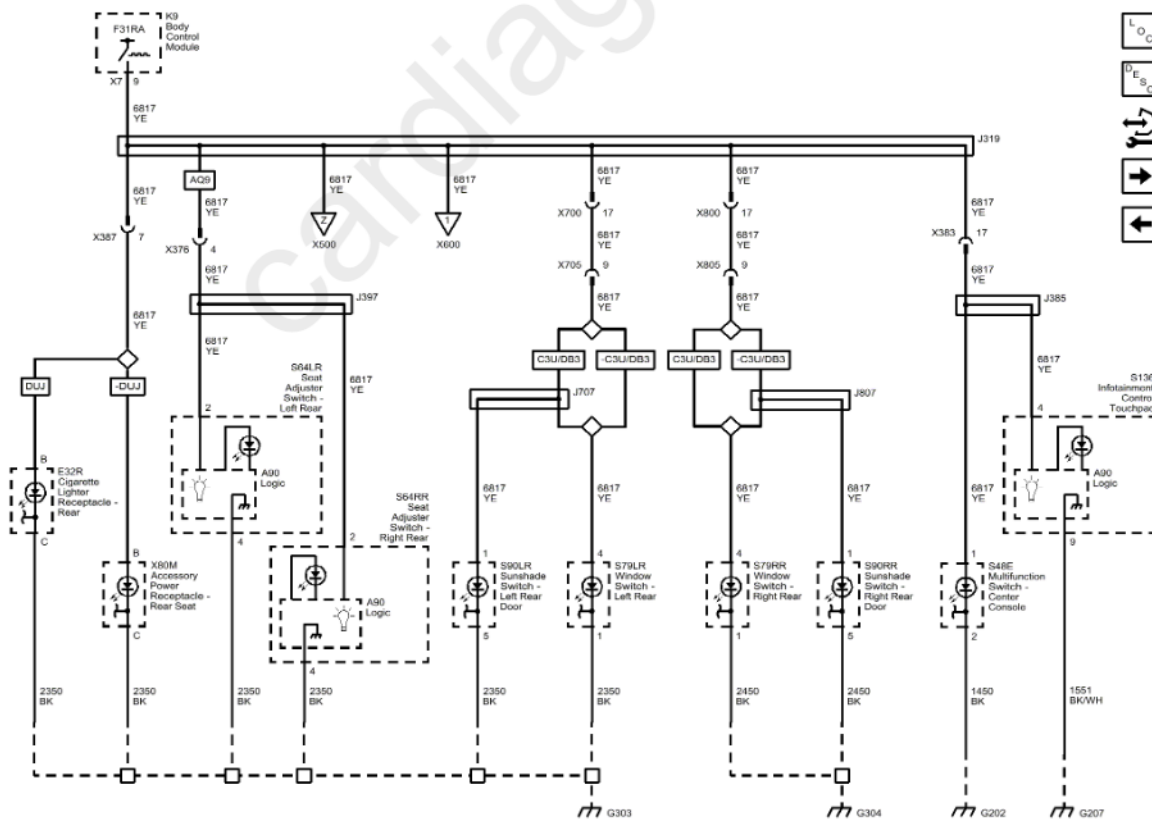
## Front Door Lamps (1 of 2)



**Fig. 24: Front Door Lamps (1 of 2)**

Courtesy of GENERAL MOTORS COMPANY

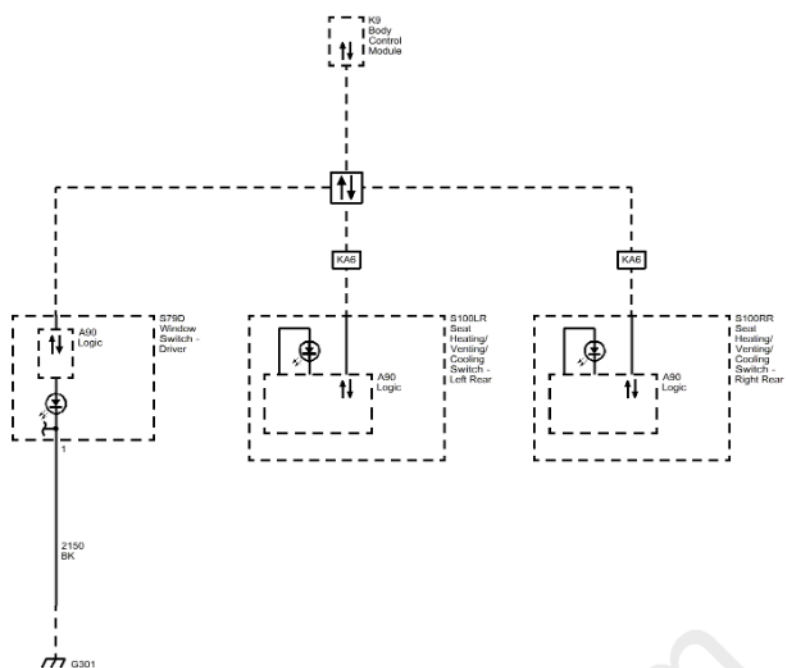
**Rear Door Lamps (1 of 2), Center Console and Rear Seat Lamps**



**Fig. 25: Rear Door Lamps (1 of 2), Center Console and Rear Seat Lamps**

Courtesy of GENERAL MOTORS COMPANY

**Front/Rear Door Lamps (2 of 2)**



**Fig. 26: Front/Rear Door Lamps (2 of 2)**  
Courtesy of GENERAL MOTORS COMPANY



**2017 ACCESSORIES & EQUIPMENT****Lighting - Specifications - Fastener Specifications - CT6****SPECIFICATIONS****FASTENER SPECIFICATIONS****Reusable Threaded Fastener Tightening Specifications****NOTE:**

*All fasteners listed in this table can be reused after removal.*

| Application                                                          | Specification      |
|----------------------------------------------------------------------|--------------------|
|                                                                      | Metric (English)   |
| Brake Pedal Position Sensor Bolt                                     | 2.5 N.m (22 lb in) |
| Center Reading and Courtesy Lamp Screw                               | 1.5 N.m (13 lb in) |
| Front Fog Lamp Bolt                                                  | 2.5 N.m (22 lb in) |
| Front Suspension Automatic Forward Lighting Position Sensor Fastener | 9 N.m (80 lb in)   |
| Front Suspension 4 Corner Leveling System Position Sensor Fastener   | 9 N.m (80 lb in)   |
| Headlamp Screw                                                       | 2.5 N.m (22 lb in) |
| High Mount Stop Lamp Nut                                             | 4.7 N.m (42 lb in) |
| Outer Rearview Mirror Turn Signal Lamp Screw                         | 1.8 N.m (16 lb in) |
| Rear Body Structure Stop Lamp Nut                                    | 4.7 N.m (42 lb in) |
| Rear Bumper Fascia Bolt                                              | 2.5 N.m (22 lb in) |
| Rear Fascia Lower Signal Lamp Fastener                               | 2.5 N.m (22 lb in) |
| Rear Suspension Automatic Forward Lighting Position Sensor Fastener  | 9 N.m (80 lb in)   |
| Roof Console Bolt                                                    | 1.5 N.m (13 lb in) |