Component Procedures: Lighting and Horns

Table of Contents

Component Procedures: Lighting and Horns

Parts and Labor (itype_189)

Labor

Operation	Qualifier Path	Skill	Std Hrs	Wty Hrs
Remove & Replace	Bulbs > Exterior Bulbs, R&R > Back-Up Lamp	C	0.9	0.4
Remove & Replace	Bulbs > Exterior Bulbs, R&R > Daytime Lamp > ?	C	0.9	0.0
Remove & Replace	Bulbs > Exterior Bulbs, R&R > Daytime Lamp > ?	C	0.9	0.0
Remove & Replace	Bulbs > Exterior Bulbs, R&R > Daytime Lamp > ?	C	0.5	0.0
Remove & Replace	Bulbs > Exterior Bulbs, R&R > Daytime Lamp > ?	C	0.3	0.0
Remove & Replace	Bulbs > Exterior Bulbs, R&R > Front Side Mark?	C	0.5	0.4
Remove & Replace	Bulbs > Exterior Bulbs, R&R > License Lamp > ?	C	0.2	0.2
Remove & Replace	Bulbs > Exterior Bulbs, R&R > Parking/Turn > ?	C	0.5	0.0
Remove & Replace	Bulbs > Exterior Bulbs, R&R > Parking/Turn > ?	C	0.3	0.3
Remove & Replace	Bulbs > Exterior Bulbs, R&R > Rear Side Marke?	C	0.3	0.3
Remove & Replace	Bulbs > Exterior Bulbs, R&R > Rear Stop/Turn	C	0.4	0.0
Remove & Replace	Bulbs > Fog Lamp Bulb, R&R > One Side	C	0.6	0.4
Remove & Replace	Bulbs > Headlamp Bulb, R&R > One Side	B	0.3	0.2
Remove & Replace	Bulbs > Interior Bulb, R&R	C	0.2	0.0
Remove & Replace	Headlamps > Composite Assembly, R&R > One Side	C	1.5	1.1
Remove & Replace	Headlamps > Composite Assembly, R&R > Both Si?	C	1.6	0.0
Remove & Replace	Headlamps > HID Headlamp Components, R&R > Ba?	B	1.5	1.1
Remove & Replace	Headlamps > HID Headlamp Components, R&R > Ba?	B	1.6	0.0
Remove & Replace	Headlamps > Sentinel Sensor, R&R	B	0.3	0.0
Remove & Replace	Horn > Horn, R&R > One Or Both	B	0.8	0.4
Remove & Replace	Switches > Back-Up Switch, R&R	B	0.4	0.0
Remove & Replace	Switches > Fog Lamp Switch, R&R	B	0.3	0.0
Remove & Replace	Switches > Hazard Switch, R&R	B	0.8	0.0
Remove & Replace	Switches > Headlamp Switch, R&R	B	0.7	0.0
Remove & Replace	Switches > Stoplamp Switch, R&R	B	0.6	0.0
Align	Headlamps > Headlamp, Align > Two	B	0.4	0.0

Exterior Lighting Systems (Article 10298)

Exterior Lamps

The exterior lighting system consists of the following lamps:

- Daytime running lamps
- Backup lamp s
- Front fog lamps
- Hazard lamps
- Headlamps
- Park, tail, and marker lamp s
- Stop lamps
- Turn signal lamps

Headlamps

The headlamps may be turned ON in 2 different ways. First, when the driver places the headlamp switch in the HEADLAMP position, for normal operation. Second, with the headlamp switch placed in the AUTO position, for automatic lamp control.

Headlamp ON/OFF control is determined by the body control module (BCM) by a signal on the headlamp switch on input circuit when the headlamp switch is in the HEAD position. When the headlamp switch is in the AUTO position, the BCM determines headlamps ON/OFF by the voltage from the ambient light sensor .

If the headlight switch is left in the ON position, the inadvertent power control feature will turn OFF the headlights approximately 10 seconds after the ignition switch is turned to the OFF position. If the driver places the headlight switch in the ON position after the ignition switch has been turned OFF, or if the ignition switch is in the ACCY position, the headlights will remain ON until turned OFF or the battery runs flat.

The high beam indicator is illuminated when the instrument cluster receives a GMLAN serial data message from the BCM that the high beams are illuminated.

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

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

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

High Beams

The high beam headlamps receive voltage from the headlamp high relay located in the underhood fuse block. The BCM controls the relay on the headlamp high beam relay control circuit. High beam control is determined by a signal on the headlamp dimmer switch high beam signal circuit from the turn signal multifunction switch . When the headlamp dimmer switch signal circuit is grounded, the BCM grounds the headlamp high beam relay control circuit, illuminating the high beam headlamps. The right and left high beam circuits are independent and are fused independently in the underhood fuse block.

Low Beams – Standard

The low beam headlamps receive voltage from the headlamp low beam relay located in the underhood fuse block. The BCM controls the relay on the headlamp low beam relay control circuit. Low beam control is activated when the headlamp switch is placed in the headlamp ON position grounding the headlamp switch headlamps on signal circuit to the BCM. The right and left low beam circuits are independent are fused independently in the underhood fuse block.

Fog Lamp s

With both the ignition switch in the RUN position, and the park lamp s ON, the fog light s will illuminate when the driver depresses the fog lamp switch . The BCM receives the park lamp ON signal from the interior park lamps supply voltage signal circuit. With the headlamp switch in either the park or headlamp position, and the fog lamp switch is in the ON position, the BCM will ground the fog lamp relay control circuit causing the relay to energize. The current flows from the fog lamp relay to both front fog lamps. The state of the fog lamps will remain the same until the fog lamp switch position is changed, or the ignition switch is cycled OFF and ON. Fog lamp operation will be cancelled whenever the park lamps are turned OFF or the high beam headlights have been selected.

Park, Tail and Marker Lamps

The park, tail and marker lamps, including the license lamps , are turned ON when the headlamp switch is placed in the PARK or HEAD position or anytime the headlights are requested. The underhood fuse block supplies battery positive voltage to both the park lamp relay switch contacts and the park lamp coil circuit. The BCM provides a ground or control circuit to the park lamp relay coil circuit. When the park lamps are turned ON, the BCM energizes the park lamp relay. If the headlight switch is left in the ON position, the inadvertent power control feature will turn OFF the park, tail and marker lamps approximately 10 seconds after the ignition switch is turned to the OFF position. If the driver places the headlight switch in the ON position after the ignition switch has been turned OFF, or if the ignition switch is in the ACCY position, the park, tail and marker lamps will remain ON until turned OFF or the battery runs flat.

Turn Signal/Hazard Lamps

When the turn signal multifunction switch is placed in either the left or right position, a ground signal is completed from the turn signal switch to the BCM. The BCM then sends an ON-OFF voltage signal through the fuses to the appropriate turn signal and side repeater lamp s or to all of the turn signal fuses for hazard operation. An audio chime is also activated when the turn signals are ON. The instrument panel receives the signals to activate the turn signal indicators over the GMLAN serial data system. The hazard flashers may be activated in any power mode. The hazard switch signal circuit is momentarily grounded when the hazard sw itch is pressed. The BCM supplies battery voltage to all turn signal lamp s 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.

Stop Lamp s

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 .

Backup Lamps

The backup lamp request signal is sent from the ECM to the BCM on the GMLAN serial data system. This signal is based on the park neutral position (PNP) switch signal. The BCM supplies voltage to the backup relay and to

the automatic day/night mirror when the vehicle is in reverse. The backup relay supplies a voltage on the backup lamp supply voltage circuit to the backup lamps.

Cargo Lamp s

The cargo lamp is controlled by the trunk ajar control circuit. There is not a separate switch to turn the cargo lamps ON and OFF.

Electrical Connections

Overloading the vehicles electrical system may damage the vehicles accessories. Do not overload the vehicles system by having unnecessary accessories at the same time.

High Intensity Discharge (HID) Low Beam Headlamps (Uplevel)

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

Battery voltage is applied at all times to the coil and switched side of the low beam relay. Ground is applied at all times to the headlamp switch. When the headlamp switch is placed in the HEAD position, ground is applied from the headlamp switch through the headlamps ON signal circuit to the body control module (BCM). The BCM applies ground to the headlamp low beam relay control circuit. This energizes the low beam relay coil, closing the switch side contacts, and applies battery voltage to the LEFT and RIGHT LOW BEAM fuses. Battery voltage is then applied from the fuses, through the low beam voltage supply circuits to the left and right headlamp ballast located in each headlamp assembly . When battery voltage is applied to the headlamp ballast through the low beam voltage supply circuits, the ballast charge the starter to start the lamp. High intensity discharge (HID) headlamps do not have filaments like traditional bulbs, instead the starter uses a high voltage transformer to convert the input voltage into a higher voltage. This increased voltage is used in order to create an arc between the electrodes in the bulb.

Run Up Of The Lamp

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

When To Change The HID Bulb

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

The following symptoms are noticeable signs of bulb failure:

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

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

Bulb failures are often sporadic at first, and difficult to repeat. Technicians can identify bulb failure by observing if the problem gets progressively worse over the next 100 hours of operation.

Light Color

White light has a different color rating than regular headlamps. The range of white light that is acceptable is broad when compared to halogens. Therefore, some variation in headlight coloring between the right and left headlamp will be normal. One high intensity discharge (HID) at the end of the normal range may appear considerably different in color from one at the other end of the range. Difference in color is normal. Replace

the arc tube only if the arc tube is determined to be at the bulb failure stage.

Daytime Running Lamp s – without HID

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

- The ignition is in the RUN or CRANK position.
- The shift lever is out of the PARK position.
- The high and low beam headlamps are OFF.

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. 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 by applying ground to the left and right daytime running lamp relays via separate left and right daytime running lamp relay control circuits. When the BCM applies ground to the relay control circuits, the left and right daytime running lamp relay coils energize causing both relay switch contacts to close. With the left and right daytime running lamp relay switch contacts closed, battery voltage flows through the left and right daytime running lamp fuses to the left and right daytime running lamps or low beam headlamps depending on the vehicles option content. Any function or condition that turns on the headlamps will cancel daytime running lamps operation.

Daytime Running Lamps – with HID

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

When a left or right turn signal is activated, the daytime running lamp on the side the turn signal is active will turn OFF. The daytime running lamp will remain off until the turn signal is deactivated. The daytime running lamp on the opposite side of the turn signal that is active will remain illuminated.

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. 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 by applying ground to the left and right daytime running lamp relays via separate left and right daytime running lamp relay control circuits. When the BCM applies ground to the relay control circuits, the left and right daytime running lamp relay coils energize causing both relay switch contacts to close. With the left and right daytime running lamp relay switch contacts closed, battery voltage flows through the left and right daytime running lamp fuses to the left and right daytime running lamps. Any function or condition that turns on the headlamps will cancel daytime running lamps operation.

Automatic Headlamp Leveling

The Automatic Headlamp Leveling Systems consist of the following components:

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

Each headlamp assembly contains a headlamp leveling actuator that is controlled by the headlamp leveling control module. The front and rear suspension height sensors provide the headlamp leveling control module with suspension position information. Each sensor receives a 5 V reference, signal, and low reference circuits from the headlamp leveling 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 height sensor arms. This causes the signal output of the sensors to change. The headlamp leveling control module compares the information from both suspension height sensors and adjusts the headlamp leveling as needed. The headlamp leveling control module is wired to each headlamp leveling actuator with 4 directional motor control circuits.

Interior Lighting Systems (Article 10299)

Interior Lamp s

The interior lighting consists of 3 groups. The first group includes lamps that may not be dimmed.

- Courtesy/ illuminated entry lamps
- Accent lamps
- Dome lamp s

Courtesy/Illuminated Entry Lamps

The courtesy/illuminated entry lamps, may be manually turned ON or OFF by placing the interior lamp switch in the ON or OFF position. If an outside door handle is lifted and a door is opened, the courtesy/illuminated

entry lamps illuminate. After all the doors have been closed the courtesy/illuminated entry lamps will remain illuminated approximately 15 seconds. The body control module (BCM) will then turn them OFF through the theater dimming feature. The courtesy/illuminated entry lamps will also turn ON prior to any door being opened, and remain illuminated approximately 40 seconds when the driver removes the ignition key. When the driver places the dome lamp defeat switch in the OFF position, the courtesy/illuminated entry lamps will be disabled.

The BCM, the door switches communicate through the GMLAN serial data circuit for the lamp illumination commands of the doors and luggage compartment open/ajar switch signals. For all vehicles, the left and right rear door latch switches are both on one circuit that is also an input to the BCM.

The left and right front door courtesy lamp s receive voltage and ground from the driver door switch and the passenger door switch respectively. The remaining courtesy lamps are controlled and receive voltage from the BCM. Voltage for the courtesy lamp supply voltage circuit is from the INT LTS fuse in the instrument panel fuse block.

Keyless Entry Interior Illumination

When the driver uses the door key in order to unlock the doors, the body control module (BCM) receives a door unlock signal. The BCM must have inputs or serial data messages that indicate that the ignition switch is OFF, the courtesy lamp switch is OFF and all the doors are closed. The BCM will then activate the interior lamps. The courtesy lamps will remain ON, approximately 15 seconds after the door is closed. The BCM will then turn them OFF through the theater dimming feature. If the door locks are activated to the LOCK position, or if the ignition switch is turned to either the RUN or CRANK position the courtesy lamps will turn OFF immediately. When the driver uses the remote function actuator transmitter to unlock the doors, trunk or presses the panic button, the BCM will keep the courtesy lamps ON approximately 40 seconds. When the driver uses the remote function actuator transmitter to lock the doors, the BCM will keep the courtesy lamps on approximately 2 seconds. If the ignition switch is turned to either the RUN or CRANK position the courtesy lamps will turn OFF immediately.

Battery Rundown Protection/Inadvertent Power

The body control module (BCM) inadvertent power supply voltage circuit provides battery positive voltage to all of the courtesy lamps and cargo lamp s if equipped. In the event that any of these lamps were to remain illuminated for a period of more than 10 seconds with the ignition switch in the OFF position, the BCM will deactivate the inadvertent power supply voltage circuit to prevent a total battery discharge condition.

Interior Lamps Dimming

The second interior light ing group includes lamps which may be dimmed. This group may use a combination of LED illumination and incandescent lamps.

When the ignition switch is turned to the RUN position, the radio VF display turns ON at maximum brightness. When the park lamp s are ON, all incandescent and LED back lighting turn ON at the dimming level indicated by the instrument panel (I/P) dimmer switch . At the same time all VF displays dim to match the indicated dimming level. The panel dimmer switch potentiometer is an input to the body control module (BCM). When the driver selects a dimming setting by moving the I/P dimming switch potentiometer, all incandescent back lighting lamps are provided with a specific voltage. When the I/P dimmer switch is moved from MIN to MAX, all VF displays, as well as all incandescent back lighting respond from minimum intensity to maximum brightness in response to the I/P dimmer switch.

The following components and switches contain backlighting that is active when the park lamps are ON:

- The instrument panel cluster (IPC)
- Window and heated seat switches
- Sunroof switch
- Accent lighting
- Accessory switches
- Fog lamp switch es
- Rear parking assist (RPA) disable switches
- PRNDL lamps
- Traction control switch
- Steering wheel control switches

The left and right front door switch illumination is controlled, receives voltage, and ground from the driver door switch and passenger switch respectively. The radio is also a GMLAN module and has full control of its illumination. The BCM, door switches, and radio communicate through GMLAN serial data for the lamp illumination commands.

The various switches, HVAC control assembly, and the PRNDL lamps receive voltage and are controlled by the BCM on the I/P lamps dimming control circuit.

The following indicators receive voltage from the BCM and are controlled by ground from a switch or from various modules:

- Radio
- HVAC control assembly
- Instrument panel cluster (IPC)
- Driver information center (DIC)
- Headlamp and panel dimmer switch

The indicators receive voltage from the BCM on the LED dimming circuit. Control for the indicators is from the various modules or switches. Voltage for the LED dimming supply circuit, instrument panel lamps dimming control circuit and the instrument panel lamps dimming supply circuit is from the BCM.

Headlights/Daytime Running Lights (DRL) Schematics (Article 10429)

Figure 1: Headlamp and Daytime Running Lamp Switches
Figure 2: Headlamps and Daytime Running Lamps (T4F)
Figure 3: Headlamps (T4A)
Figure 4: Headlamp Leveling (TR7)

Fog Lights Schematics (Article 10428)

Figure 1: Front (T3U) and Rear (T79)

Exterior Lights Schematics (Article 10427)

Figure 1: Stop Lamps Control
Figure 2: Exterior Lamps Controls
Figure 3: Park and Turn Signal Lamps
Figure 4: Tail/Stop and Turn Signal Lamps (without T90)
Figure 5: Tail Lamp Assemblies (T90)
Figure 6: Backup, Center High Mounted Stop Lamp and License Lamps (without T90)
Figure 7: Backup, Center High Mounted Stop Lamp and License Lamps (T90)

Interior Lights Schematics (Article 10431)

Figure 1: Interior Lamps Controls

Interior Lights Dimming Schematics (Article 10430)

Figure 1: Interior Lamps Dimming
Figure 2: Serial Data Controlled Dimming

Exterior Lights - Backup Lamps Circuit (Article 10103)

Exterior Lights - Backup Lamp s Circuit
Page 1 of 1

Exterior Lights - Exterior Lamps Circuit (Article 10150)

Exterior Lights - Exterior Lamps Circuit
Page 1 of 2
Page 2 of 2

Interior Lights - Courtesy Lamps Circuit (Article 11098)

Interior Lights - Courtesy Lamps Circuit
Page 1 of 1

Interior Lights - Instrument Illumination Circuit (Article 11084)

Interior Lights - Instrument Illumination Circuit
Page 1 of 1

Halogen Bulb Warning (Article 13059)

- Turn off the lamp switch and allow the bulb to cool before changing the bulb.
- Leave the lamp switch OFF until the bulb change is complete.
- Always wear eye protection when changing a halogen bulb.
- Handle the bulb only by its base. Avoid touching the glass.
- Keep dirt and moisture off the bulb.
- Properly dispose of the used bulb.

- Keep halogen bulbs out of the reach of children.

Lighting - Fastener Specifications (Article 10432)

Application Specification
Metric English
Brake Pedal Position Sensor Bolt 9 Nm 80 lb in
Headlamp Capsule Bolt 2.5 Nm 22 lb in
Overhead Console Reading Lamp Screw 2 Nm 18 lb in
Tail Lamp to the Body Panel Nut 2.5 Nm 22 lb in

All Technical Service Bulletins (itype_100)

Tsbs
- Campaign - Rear Bumper Facia Is Melting From License Plate Lamp (15030, 2015/09/21)
- Lighting - Fog Lamp Information (PIC5287D, 2014/05/08)
- Lighting - Door/IP Accent Lighting Inop/Loses Intensity (09-08-42-005E, 2015/02/13)
- Information On Upgrading To RPO T4F High Intensity Discharge (HID) Headlamps Or Additional Concerns After Adding After-Market Lighting (PIC5196E, 2016/01/07)
- Lighting - Exterior Lighting Components Tinted or Smoked (15-08-42-001A, 2016/05/08)

Customer Interest Bulletins (itype_109)

Tsbs
- Lighting - Door/IP Accent Lighting Inop/Loses Intensity (09-08-42-005E, 2015/02/13)

Repair Tips (itype_110)

Tsbs
- Lighting - Fog Lamp Information (PIC5287D, 2014/05/08)

Headlamp Control Module Scan Tool Information (Article 10780)

Parameter Expected Value Definition
Operating Conditions: Ignition ON/Headlamps ON
Left Headlamp Horizontal Motor Varies This displays Counts. This is the position state of the left headlamp motor.
Right Headlamp Horizontal Motor Varies This displays Counts. This is the position state of the right headlamp motor.
Front Leveling Position Sensor Signal Varies This displays Voltage. This represents the voltage that is received by the headlamp leveling control module from the front suspension position sensor. The voltage will change as the sensor moves up or down with the suspension.
Rear Leveling Position Sensor Signal Varies This displays Voltage. This represents the voltage that is received by the headlamp leveling control module from the rear suspension position sensor. The voltage will change as the sensor moves up or down with the suspension.
Front Suspension Height Reference Position Varies This displays Voltage. This represents the position of the front suspension position sensor. The voltage will change as the sensor moves up or down with the suspension.
Rear Suspension Height Reference Position Varies This displays Voltage. This represents the position of the rear suspension position sensor. The voltage will change as the sensor moves up or down with the suspension.
Front Suspension Height Sensor Supply Voltage 5 Volts This displays Voltage. This is the reference voltage that is supplied to the front suspension position sensor.
Rear Suspension Height Sensor Supply Voltage 5 Volts This displays Voltage. This is the reference voltage that is supplied to the rear suspension position sensor.
Headlamp Light Distribution Varies The scan tool displays Off, Active, Hold, Homing, Default, Powerup Pattern or Disable. This is the current state of the headlamp control module.
Scan Tool Output Control Description
Left Headlamp Vertical Motor This output control will command the left headlamp vertical motor to the full up and down positions.
Right Headlamp Vertical Motor This output control will command the right headlamp vertical motor to the full up and down positions.

Symptoms - Lighting (Article 10370)

- Perform the Diagnostic System Check - Vehicle before using a symptom table in order to verify that all of the following conditions are true:

- There are no DTCs set.
- The control modules can communicate via the serial data link.
- Review the system description and operation in order to familiarize yourself with the system functions.
Refer to the following:
- Exterior Lighting Systems Description and Operation
- Interior Lighting Systems Description and Operation
Visual/Physical Inspection
- Inspect for aftermarket devices which could affect the operation of the lighting system. Refer to Checking Aftermarket Accessories .
- Inspect the easily accessible or visible system components for obvious damage or conditions which could cause the symptom.
Intermittent
Thoroughly inspect the wiring and connectors. An incomplete inspection of the wiring and connectors may result in misdiagnosis causing part replacement with the reappearance of the malfunction. If an intermittent malfunction exists, refer to Testing for Intermittent Conditions and Poor Connections .
Symptom List
Refer to a symptom diagnostic procedure from the following list in order to diagnose the symptom:
- Backup Lamps Malfunction
- Courtesy Lamps Malfunction
- Daytime Running Lamps Malfunction
- Dome Lamps Malfunction
- Front Fog 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

Backup Lamps Malfunction (Automatic Transmission) (Article 10300)

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
F33UA Fuse B+ B2545 01, B2545 04 B2545 01, B2545 04 — —
Backup Lamp s Control B2545 02 B2545 01, B2545 04 1 —
Backup Lamp Ground - Left — 1 — —
Backup Lamp Ground - Right — 1 — —
1. Backup Lamps Malfunction
Circuit/System Description
With the engine running and the transmission in the reverse position, the transmission control module (TCM) sends a serial data message to the body control module (BCM). The message indicates that the gear selector is in the reverse position. The BCM applies battery voltage to the backup lamps control circuit illuminating the backup lamps. Once the driver moves the gear selector out of the reverse position, a message is sent by the TCM via serial data requesting the BCM to remove battery voltage from the backup lamps control circuit. The engine must be running for the backup lamps to operate.
Reference Information
Schematic Reference
Exterior Lights Schematics
Connector End View Reference
Component Connector End Views
Description and Operation
Exterior Lighting Systems Description and Operation
Electrical Information Reference

- Circuit Testing
- Connector Repairs
- Testing for Intermittent Conditions and Poor Connections
- Wiring Repairs
Scan Tool Reference
Control Module References for scan tool information
Circuit/System Testing
- Ignition OFF, disconnect the X5 harness connector at the K9 body control module, ignition ON.
- Verify a test lamp illuminates between the B+ circuit terminal 4 and ground.
- If the test lamp does not illuminate and the circuit fuse is good
- Ignition OFF, disconnect the X2 harness connector at the X50A fuse block – underhood.
- Test for less than 2 Ω in the B+ circuit end to end.
- If 2 Ω or greater, repair the open/high resistance in the circuit.
- If less than 2 Ω, 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
- Test for infinite resistance between the B+ circuit and ground.
- If less than infinite resistance, repair the short to ground on the circuit.
- If infinite resistance, replace the K9 body control module.
- If the test lamp illuminates
- Ignition OFF, connect the X5 harness connector at the K9 body control module.
- Ignition OFF, exterior lamps OFF, disconnect the harness connector at the appropriate E5 backup lamp.
- Test for less than 5 Ω between the ground circuit terminal 2 and ground.
- If 5 Ω or greater
- Ignition OFF.
- Test for less than 2 Ω in the ground circuit end to end.
- If less than 2 Ω, repair the open/high resistance in the ground connection.
- If less than 5 Ω
- Connect a test lamp between the control circuit terminal 1 and ground, ignition ON.
- 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
- Ignition OFF, disconnect the X7 harness connector at the K9 body control module.
- Test for infinite resistance between the control circuit and ground.
- If infinite resistance
- Test for less than 2 Ω in the control circuit end to end.
- If less than 2 Ω, replace the K9 body control module.
- If the test lamp is always ON
- Ignition OFF, disconnect the X7 harness connector at the K9 body control module, ignition ON.
- 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
- Test or replace the appropriate E5 backup lamp.
Repair Instructions
Perform the Diagnostic Repair Verification after completing the repair.
- Backup Lamp Replacement
- Control Module References for BCM replacement, programming, and setup

Backup Lamps Malfunction (Manual Transmission) (Article 10302)

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
F33UA Fuse B+ B2545 01, B2545 04 B2545 01, B2545 04 — —
Backup Lamp Switch Signal 1 1 1 —
Backup Lamp s Control B2545 02 B2545 01, B2545 04 1 —
Backup Lamp Switch Ground — 1 — —
Backup Lamp Ground - Left — 1 — —
Backup Lamp Ground - Right — 1 — —

1. Backup Lamps Malfunction

Circuit/System Description

The engine control module (ECM) provides a signal circuit to the backup lamp switch which is permanently grounded. With the engine running and the transmission in the reverse position, the backup lamp switch signal circuit is pulled low and the ECM responds by sending 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 ECM 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

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

- Engine ON.
- Verify the scan tool Reverse Position Switch parameter changes between ON and OFF while shifting the vehicle between the neutral and reverse gears.
- If the parameter does not change Refer to Backup Lamp Switch Malfunction.
- If the parameter changes
- Verify the backup lamps turn ON and OFF when commanding the Backup Lamps ON and OFF with a scan tool.
- If the backup lamps do not turn ON and OFF Refer to Backup Lamps Malfunction.
- If the backup lamps turn ON and OFF
- All OK.

Circuit/System Testing

Backup Lamp Switch Malfunction

- Ignition OFF, exterior lamps OFF, all doors closed, disconnect the harness connector at the B16 backup lamp switch. It may take up to 2 minutes for all vehicle systems to power down.
- Test for less than 5 Ω between the appropriate ground circuit terminal listed below and ground.
- Terminal B – with M10
- Terminal 2 – with MV5
- If 5 Ω or greater
- Ignition OFF.
- Test for less than 2 Ω in the ground circuit end to end.
- If 2 Ω or greater, repair the open/high resistance in the circuit.
- If less than 2 Ω, repair the open/high resistance in the ground connection.
- If less than 5 Ω
- Ignition ON.
- Verify the scan tool Reverse Position Switch parameter is Off.
- If not Off
- Ignition OFF, disconnect the appropriate harness connector listed below at the K20 engine control module.
- X1 – with M10
- X2 – with MV5
- Test for infinite resistance between the appropriate signal circuit terminal listed below and ground.
- Terminal A – with M10
- Terminal 1 – with MV5
- If less than infinite resistance, repair the short to ground on the circuit.
- If infinite resistance, replace the K20 engine control module.
- If Off
- Install a 3 A fused jumper wire between the appropriate signal circuit terminal listed below and ground.
- Verify the scan tool Reverse Position Switch parameter is On.

- If not On
- Test for less than 1 V between the appropriate signal circuit terminal listed below and ground.
- If 1 V or greater, repair the short to voltage on the circuit.
- If less than 1 V
- Test for less than 2 Ω in the signal circuit end to end.
- If less than 2 Ω, replace the K20 engine control module.
- If On
- Test or replace the B16 backup lamp switch.

Backup Lamps Malfunction
- Ignition OFF, disconnect the X5 harness connector at the K9 body control module, ignition ON.
- Verify a test lamp illuminates between the B+ circuit terminal 4 and ground.
- If the test lamp does not illuminate and the circuit fuse is good
- Ignition OFF, disconnect the X2 harness connector at the X50A fuse block – underhood.
- Test for less than 2 Ω in the B+ circuit end to end.
- If less than 2 Ω, 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
- Test for infinite resistance between the B+ circuit and ground.
- If infinite resistance, replace the K9 body control module.
- If the test lamp illuminates
- Ignition OFF, connect the X5 harness connector at the K9 body control module.
- Ignition OFF, exterior lamps OFF, disconnect the harness connector at the appropriate E5 backup lamp.
- Test for less than 5 Ω between the ground circuit terminal 2 and ground.
- Connect a test lamp between the control circuit terminal 1 and ground, ignition ON.
- 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
- Ignition OFF, disconnect the X7 harness connector at the K9 body control module.
- Test for infinite resistance between the control circuit and ground.
- If infinite resistance
- Test for less than 2 Ω in the control circuit end to end.
- If less than 2 Ω, replace the K9 body control module.
- If the test lamp is always ON
- Ignition OFF, disconnect the X7 harness connector at the K9 body control module, ignition ON.
- Test for less than 1 V between the control circuit terminal and ground.
- If less than 1 V, replace the K9 body control module.
- If the test lamp turns ON and OFF
- Test or replace the appropriate E5 backup lamp.

Repair Instructions

Perform the Diagnostic Repair Verification after completing the repair.
- Backup Lamp Replacement
- Backup Lamp Switch Replacement
- Control Module References for BCM or ECM replacement, programming, and setup

Courtesy Lamps Malfunction (Article 10304)

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 Lamp Control B2615 02 2 2 —
Reading Lamp Control 1 1 1 —
Dome Lamp Defeat Signal 2 2 2 —
Dome/Reading Lamps Ground — 1, 2 — —
Dome/Reading Lamps - Rear Ground — 1, 2 — —
1. Courtesy Lamps Malfunction 2. Dome Lamps Malfunction

Circuit/System Description

The body control module (BCM) supplies battery voltage to the dome/reading lamp via the dome lamp control circuit. The reading lamp is controlled by an individual switch that is activated by the operator when additional cabin lighting is required. In the event that the reading lamp were to remain illuminated for more than 10 minutes with the ignition switch in the OFF position and no doors opened, the BCM will deactivate the

dome lamp control circuit to prevent total battery discharge.

Reference Information

Schematic Reference

Interior Lights Schematics

Connector End View Reference

Component Connector End Views

Description and Operation

Interior Lighting Systems Description and Operation

Electrical Information Reference

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

Scan Tool Reference

Control Module References for scan tool information

Circuit/System Testing

- Ignition OFF, all doors closed, all accessories OFF, disconnect the harness connector at the E37A dome/reading lamps. It may take up to 2 minutes for all vehicle systems to power down.
- Test for less than 10 Ω between the ground circuit terminal 6 and ground.
- If 10 Ω or greater
- Ignition OFF.
- Test for less than 2 Ω in the ground circuit end to end.
- If 2 Ω or greater, repair the open/high resistance in the circuit.
- If less than 2 Ω, repair the open/high resistance in the ground connection.
- If less than 10 Ω
- Connect a test lamp between the control circuit terminal 2 and ground.
- Verify the test lamp turns ON and OFF when commanding the Courtesy Lamp s Duty Cycle Command ON and OFF with a scan tool.
- If the test lamp is always OFF
- Ignition OFF, disconnect the X7 harness connector at the K9 body control module.
- 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
- Test for less than 2 Ω in the control circuit end to end.
- If less than 2 Ω, replace the K9 body control module.
- If the test lamp is always ON
- Ignition OFF, disconnect the X7 harness connector at the K9 body control module, ignition ON.
- 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
- Verify the scan tool Dome Lamp Switch parameter is Inactive.
- If Active
- Test for infinite resistance between the signal circuit terminal 5 and ground.
- If infinite resistance, replace the K9 body control module.
- If Inactive
- Install a 3 A fused jumper wire between the signal circuit terminal 5 and the ground circuit terminal 6.
- Verify the scan tool Dome Lamp Switch parameter is Active.
- If not Active
- Test for less than 1 V between the signal circuit and ground.
- If less than 1 V
- Test for less than 2 Ω in the signal circuit end to end.
- Test or replace the inoperative E37A dome/reading lamps.

Repair Instructions

Perform the Diagnostic Repair Verification after completing the repair.

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

Daytime Running Lamps Malfunction (Article 10306)

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 Sensor Signal B2645 03 B2645 07 B2645 07 —
Daytime Running Lamp Control - Left (T4F) B2600 02 B2600 04 B2600 01 —
Daytime Running Lamp Control - Right (T4F) B2605 02 B2605 04 B2605 01 —
Daytime Running Lamp Control (T4A) 1 1 1 —
Ambient Light Sensor Ground — B2645 07 1 —
Daytime Running Lamp Ground - Left (T4F) — 1 — —
Daytime Running Lamp Ground - Right (T4F) — 1 — —
Daytime Running Lamp Ground (T4A) — 1 — —

1. Daytime Running Lamps Malfunction

Circuit/System Description

Daytime Running Lamps (T4A)

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 which is permanently grounded. The BCM monitors the ambient light sensor signal circuit to determine if outside lighting conditions are correct for either daytime running light s (DRL) or automatic headlamp system control when the headlamp switch is in the AUTO position. In daylight conditions the BCM will command the DRL's ON by applying voltage to the DRL control circuit illuminating the DRL's. Any function or condition that turns on the headlamps will cancel DRL operation.

Daytime Running Lamps (T4F)

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 which is permanently grounded. The BCM monitors the ambient light sensor signal circuit to determine if outside lighting conditions are correct for either daytime running lights (DRL) or automatic headlamp system control when the headlamp switch is in the AUTO position. In daylight conditions, the BCM will command the DRLs ON by applying a pulse width modulated (PWM) voltage to the left and right DRL control circuits illuminating the DRLs. Any function or condition that turns on the headlamps will cancel DRL operation.

Reference Information

Schematic Reference
Headlights/Daytime Running Lights (DRL) Schematics
Connector End View Reference
Component Connector End Views
Description and Operation
Exterior Lighting Systems Description and Operation
Electrical Information Reference

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

Scan Tool Reference
Control Module References for scan tool information

Circuit/System Testing

Daytime Running Lamp Malfunction – with T4F

- Ignition OFF, exterior lamps OFF, disconnect the harness connector at the appropriate E4 daytime running lamp.
- Test for less than 5 Ω between the ground circuit terminal 2 and ground.
- If 5 Ω or greater
- Ignition OFF.
- Test for less than 2 Ω in the ground circuit end to end.
- If 2 Ω or greater, repair the open/high resistance in the circuit.
- If less than 2 Ω, repair the open/high resistance in the ground connection.

- If less than 5 Ω
- Connect a test lamp between the control circuit terminal 1 and ground, ignition ON.
- Verify the test lamp turns ON and OFF when commanding the Dedicated Daytime Running Lamp Command ON and OFF with a scan tool.
- If the test lamp is always OFF
- Ignition OFF, disconnect the X4 harness connector at the K9 body control module.
- 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
- Test for less than 2 Ω in the control circuit end to end.
- If less than 2 Ω, replace the K9 body control module.
- If the test lamp is always ON
- Ignition OFF, disconnect the X4 harness connector at the K9 body control module, ignition ON.
- 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
- Test or replace the appropriate E4 daytime running lamp.

Daytime Running Lamp Malfunction – with T4A
- Ignition OFF, disconnect the X2 harness connector at the X50A fuse block – underhood.
- Connect a test lamp between the control circuit terminal 19 and B+, ignition ON.
- Verify the test lamp turns ON and OFF when commanding the Front Fog Lamps ON and OFF with a scan tool.
- Ignition OFF, disconnect the X5 harness connector at the K9 body control module, ignition ON.
- If less than 1 V
- Test for infinite resistance between the control circuit terminal and ground.
- If infinite resistance, replace the K9 body control module.
- Ignition OFF, connect the X2 harness connector at the X50A fuse block – underhood.
- Ignition OFF, exterior lamps OFF, disconnect the harness connector at the E4C daytime running lamp – left.
- Verify the test lamp turns ON and OFF when commanding the Front Fog Lamp s ON and OFF with a scan tool.
- Ignition OFF, disconnect the X1 harness connector at the X50A fuse block – underhood.
- If less than 2 Ω, replace the X50A fuse block – underhood.
- Ignition OFF, disconnect the X1 harness connector at the X50A fuse block – underhood, ignition ON.
- Test for less than 1 V between the control circuit and ground.
- If less than 1 V, replace the X50A fuse block – underhood.

Repair Instructions

Perform the Diagnostic Repair Verification after completing the repair.
- Daytime Running Lamp Replacement
- Daytime Running Lamp Bulb Replacement
- Control Module References for BCM replacement, programming, and setup

Dome Lamps Malfunction (Article 10308)

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 Lamp Control B2615 02 2 2 —
Reading Lamp Control 1 1 1 —
Dome Lamp Defeat Signal 2 2 2 —
Dome/Reading Lamps Ground — 1, 2 — —
Dome/Reading Lamps - Rear Ground — 1, 2 — —
1. Courtesy Lamps Malfunction 2. Dome Lamps Malfunction

Circuit/System Description

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

Reference Information
Schematic Reference
Interior Lights Schematics
Connector End View Reference
Component Connector End Views
Description and Operation
Interior Lighting Systems Description and Operation
Electrical Information Reference
- Circuit Testing
- Connector Repairs
- Testing for Intermittent Conditions and Poor Connections
- Wiring Repairs
Scan Tool Reference
Control Module References for scan tool information
Circuit/System Verification
- Ignition ON.
- Verify the scan tool Door Ajar Switch 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
- Verify the scan tool Interior/ Courtesy Light ing Master Switch parameter changes between Active and Inactive while turning the dome lamp defeat switch ON and OFF.
- If the parameter does not change Refer to Dome Lamp Switch Malfunction.
- Verify the dome lamp turns ON and OFF while commanding the Courtesy Lamp s Duty Cycle Command ON and OFF with a scan tool.
- If the dome lamp does not turn ON and OFF Refer to Dome Lamp Malfunction.
- If the dome lamp turns ON and OFF
- All OK.
Circuit/System Testing
Dome Lamp Switch Malfunction
- Ignition OFF, scan tool disconnected, all doors closed, all accessories OFF, disconnect the harness connector at the E37A dome/reading lamps. It may take up to 2 minutes for all vehicle systems to power down.
- Test for less than 10 Ω between the ground circuit terminal 6 and ground.
- If 10 Ω or greater
- Ignition OFF.
- Test for less than 2 Ω in the ground circuit end to end.
- If 2 Ω or greater, repair the open/high resistance in the circuit.
- If less than 2 Ω, repair the open/high resistance in the ground connection.
- If less than 10 Ω
- Verify the scan tool Interior/Courtesy Lighting Master Switch parameter is Inactive.
- If Active
- Ignition OFF, disconnect the X1 harness connector at the K9 body control module.
- 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
- Install a 3 A fused jumper wire between the signal circuit terminal 4 and the ground circuit terminal 6.
- Verify the scan tool Interior/Courtesy Lighting Master Switch parameter is Active.
- If not Active
- Ignition OFF, disconnect the X1 harness connector at the K9 body control module, ignition ON.
- Test for less than 1 V between the signal circuit and ground.
- If 1 V or greater, repair the short to voltage on the circuit.
- If less than 1 V
- Test for less than 2 Ω in the signal circuit end to end.
- If less than 2 Ω, replace the K9 body control module.
- Test or replace the E37A dome/reading lamps.
Dome Lamp Malfunction
- Ignition OFF, all doors closed, all accessories OFF, disconnect the harness connector at the E37A dome/reading lamps. It may take up to 2 minutes for all vehicle systems to power down.
- Connect a test lamp between the control circuit terminal 2 and ground.

- Verify the test lamp turns ON and OFF when commanding the Courtesy Lamps Duty Cycle Command ON and OFF with a scan tool.
- If the test lamp is always OFF
- Ignition OFF, disconnect the X7 harness connector at the K9 body control module.
- Test for infinite resistance between the control circuit and ground.
- If infinite resistance
- Test for less than 2 Ω in the control circuit end to end.
- If the test lamp is always ON
- Ignition OFF, disconnect the X7 harness connector at the K9 body control module, ignition ON.
- Test for less than 1 V between the control circuit terminal and ground.
- If less than 1 V, replace the K9 body control module.
- If the test lamp turns ON and OFF
- Test or replace the inoperative E37A dome/reading lamps.

Repair Instructions

Perform the Diagnostic Repair Verification after completing the repair.
- Dome Lamp Bulb Replacement
- Courtesy Lamp Replacement
- Control Module References for BCM replacement, programming, and setup

Front Fog Lamps Malfunction (Article 10348)

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
Headlamp Switch B+ B1405 03, B1529 03, B257B 03 B257B 03 — —
Headlamp Switch Signal B257B 03 B257B 03 B257B 07 —
Front Fog Lamp Relay Control B2530 02 B2530 04 B2530 01 —
Front Fog Lamp Control 1 1 1 —
Front Fog Lamp Ground – Left — 1 — —
Front Fog Lamp Ground – Right — 1 — —
1. Front Fog Lamps Malfunction

Circuit/System Description

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

Reference Information

Schematic Reference
Fog Lights Schematics
Connector End View Reference
Component Connector End Views
Description and Operation
Exterior Lighting Systems Description and Operation
Electrical Information Reference
- Circuit Testing
- Connector Repairs
- Testing for Intermittent Conditions and Poor Connections
- Wiring Repairs

Scan Tool Reference
Control Module References for scan tool information

Circuit/System Verification
- Ignition ON, headlamps ON.
- Verify the scan tool Front Fog Lamps Switch parameter changes between Active and Inactive while commanding the front fog lamps ON and OFF with the front fog lamp switch.
- If the parameter does not change Refer to Front Fog Lamp Switch Malfunction.
- If the parameter changes
- Verify the front fog lamps turn ON and OFF when commanding the Front Fog Lamps ON and OFF with a scan tool.

- If the front fog lamps do not turn ON and OFF Refer to Front Fog Lamps Malfunction.
- If the front fog lamps turn ON and OFF
- Verify the front fog lamp indicator on the instrument cluster turns ON and OFF while commanding the front fog lamps ON and OFF with the front fog lamp switch.
- If the front fog lamp indicator does not turn ON and OFF Refer to Front Fog Lamp Indicator Malfunction.
- If the front fog lamp indicator turns ON and OFF
- All OK.

Circuit/System Testing

Front Fog Lamp Switch Malfunction

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

Front Fog Lamps Malfunction

- Ignition OFF, disconnect the X2 harness connector at the X50A fuse block – underhood.
- Connect a test lamp between the control circuit terminal 19 and B+, ignition ON.
- Verify the test lamp turns ON and OFF when commanding the Front Fog Lamps ON and OFF with a scan tool.
- If the test lamp is always OFF
- Ignition OFF, disconnect the appropriate harness connector listed below at the K9 body control module, ignition ON.
- X3 – without T3U
- X5 – with T3U
- Test for less than 1 V between the control circuit terminal and ground.
- If less than 1 V
- Ignition OFF.
- Test for less than 2 Ω in the control circuit end to end.
- If the test lamp is always ON
- Test for infinite resistance between the control circuit terminal and ground.
- If infinite resistance, replace the K9 body control module.
- If the test lamp turns ON and OFF
- Ignition OFF, connect the X2 harness connector at the X50A fuse block – underhood.
- Ignition OFF, exterior lamps OFF, disconnect the harness connector at the appropriate E29 fog lamp.
- Test for less than 5 Ω between the ground circuit terminal A and ground.
- If 5 Ω or greater
- Test for less than 2 Ω in the ground circuit end to end.
- If less than 2 Ω, repair the open/high resistance in the ground connection.
- If less than 5 Ω

- Connect a test lamp between the control circuit terminal B and ground, ignition ON.
- Ignition OFF, disconnect the X1 harness connector at the X50A fuse block – underhood.
- Test for infinite resistance between the control circuit and ground.
- If less than 2 Ω, replace the X50A fuse block – underhood.
- Ignition OFF, disconnect the X1 harness connector at the X50A fuse block – underhood, ignition ON.
- Test for less than 1 V between the control circuit and ground.
- If less than 1 V, replace the X50A fuse block – underhood.
- Test or replace the appropriate E29 fog lamp.

Front Fog Lamp Indicator Malfunction
- Ignition ON.
- Verify the front fog lamp indicator turns ON and OFF when commanding the Instrument Cluster All Indicators Test ON and OFF with a scan tool.
- If the front fog lamp indicator is always OFF or remains ON Replace the P16 instrument cluster.
- Replace the K9 body control module.

Repair Instructions

Perform the Diagnostic Repair Verification after completing the repair.
- Front Fog Lamp Replacement
- Accessory Wiring Junction Block Replacement
- Headlamp, Instrument Panel Lamp Dimmer, and Fog Lamp Switch Replacement
- Control Module References for BCM and instrument cluster replacement, programming, and setup

Rear Fog Lamps Malfunction (Article 10367)

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
Headlamp Switch B+ B1405 03, B1529 03, B257B 03 B257B 03 — —
Headlamp Switch Signal B257B 03 B257B 03 B257B 07 —
Rear Fog Lamps Control B2540 02 B2540 04 B2540 01 —
Rear Fog Lamp Switch Indicator Control 1 1 1 —
Headlamp Switch Ground — 1 — —
Rear Fog Lamp Ground – Left — 1 — —
Rear Fog Lamp Ground – Right — 1 — —

1. Rear Fog Lamps 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 lamps control circuit which illuminates the rear fog lamps.

Reference Information

Schematic Reference
Fog Lights Schematics
Connector End View Reference
Component Connector End Views
Description and Operation
Exterior Lighting Systems Description and Operation
Electrical Information Reference
- Circuit Testing
- Connector Repairs
- Testing for Intermittent Conditions and Poor Connections
- Wiring Repairs

Scan Tool Reference
Control Module References for scan tool information

Circuit/System Verification
- Ignition ON, park lamp s ON.
- Verify the scan tool Rear Fog Lamp 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

- Verify the rear fog lamps turn ON and OFF when commanding the Rear Fog Lamp ON and OFF with a scan tool.
- If the rear fog lamps do not turn ON and OFF Refer to Rear Fog Lamp Malfunction.
- If the rear fog lamps turn ON and OFF
- Verify the rear fog lamp indicator on the headlamp switch turns ON and OFF while commanding the rear fog lamp ON and OFF with the rear fog lamp switch.
- If the rear fog lamp indicator does not turn ON and OFF Refer to Rear Fog Lamp Indicator Malfunction.
- If the rear fog lamp indicator turns ON and OFF
- All OK.

Circuit/System Testing

Rear Fog Lamp Switch Malfunction

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

Rear Fog Lamps Malfunction

- Ignition OFF, exterior lamps OFF, disconnect the harness connector at the appropriate component listed below.
- E29LR fog lamp – left rear with CZ2
- E42LR tail lamp assembly – left without CZ2
- E42RR tail lamp assembly – right without CZ2
- Test for less than 5 Ω between the appropriate ground circuit terminal listed below and ground.
- E29LR fog lamp – left rear terminal 2
- E42LR tail lamp assembly – left terminal 1
- E42RR tail lamp assembly – right terminal 1
- If 5 Ω or greater
- Ignition OFF.
- Test for less than 2 Ω in the ground circuit end to end.
- If less than 2 Ω, repair the open/high resistance in the ground connection.
- If less than 5 Ω
- Connect a test lamp between the appropriate control circuit terminal listed below and ground, ignition ON.
- E29LR fog lamp – left rear terminal 1
- E42LR tail lamp assembly – left terminal 5
- E42RR tail lamp assembly – right terminal 7
- Verify the test lamp turns ON and OFF when commanding the Rear Fog Lamps ON and OFF with a scan tool.
- If the test lamp is always OFF
- Ignition OFF, disconnect the X5 harness connector at the K9 body control module.
- Test for infinite resistance between the control circuit and ground.

- Test for less than 2 Ω in the control circuit end to end.
- If the test lamp is always ON
- Ignition OFF, disconnect the X5 harness connector at the K9 body control module, ignition ON.
- Test for less than 1 V between the control circuit terminal and ground.
- If the test lamp turns ON and OFF
- Test or replace the appropriate E29 fog lamp - rear.
Rear Fog Lamp Indicator Malfunction
- Ignition OFF, all doors closed, all accessories OFF, disconnect the harness connector at the S30 headlamp switch. It may take up to 2 minutes for all vehicle systems to power down.
- Test for less than 15 Ω between the ground circuit terminal 6 and ground.
- If 15 Ω or greater
- If less than 15 Ω
- Connect a test lamp between the control circuit terminal 2 and ground, ignition ON.
Repair Instructions
Perform the Diagnostic Repair Verification after completing the repair.
- Tail Lamp Bulb Replacement
- Tail Lamp Replacement - Outboard
- Headlamp, Instrument Panel Lamp Dimmer, and Fog Lamp Switch Replacement
- Control Module References for BCM replacement, programming, and setup

Hazard Lamps Malfunction (Article 10350)

Diagnostic Instructions
- Perform the Diagnostic System Check - Vehicle prior to using this diagnostic procedure.
- Review Strategy Based Diagnosis for an overview of the diagnostic approach.
- Diagnostic Procedure Instructions provides an overview of each diagnostic category.
Diagnostic Fault Information
Circuit Short to Ground Open/High Resistance Short to Voltage Signal Performance
Hazard Warning Switch Signal 1 1 1 B3596 00
Hazard Warning Switch 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
Component Connector End Views
Description and Operation
Exterior Lighting Systems Description and Operation
Electrical Information Reference
- Circuit Testing
- Connector Repairs
- Testing for Intermittent Conditions and Poor Connections
- Wiring Repairs
Scan Tool Reference
Control Module References for scan tool information
Circuit/System Verification
- Ignition ON.
- 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 Circuit/System Testing.
- If the parameter changes
- Verify all left and right turn signal lamp s 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

- All OK.
Circuit/System Testing
- Ignition OFF, scan tool disconnected, all doors closed, all accessories OFF, disconnect the harness connector at the A20 radio/HVAC controls. It may take up to 2 minutes for all vehicle systems to power down.
- Test for less than 5 Ω between the ground circuit terminal 17 and ground.
- If 5 Ω or greater
- Ignition OFF.
- Test for less than 2 Ω in the ground circuit end to end.
- If 2 Ω or greater, repair the open/high resistance in the circuit.
- If less than 2 Ω, repair the open/high resistance in the ground connection.
- If less than 5 Ω
- Verify the scan tool Hazard Lamps Switch parameter is Inactive.
- If not Inactive
- Ignition OFF, disconnect the X2 harness connector at the K9 body control module.
- Test for infinite resistance between the signal circuit terminal 16 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
- Install a 3 A fused jumper wire between the signal circuit terminal 16 and ground.
- Verify the scan tool Hazard Lamps Switch parameter is Active.
- If not Active
- Ignition OFF, disconnect the X2 harness connector at the K9 body control module, ignition ON.
- 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
- Test for less than 2 Ω in the signal circuit end to end.
- If less than 2 Ω, replace the K9 body control module.
- If Active
- Test or replace the A20 radio/HVAC controls.
Repair Instructions
Perform the Diagnostic Repair Verification after completing the repair.
- Radio Control Assembly Replacement
- Control Module References for BCM replacement, programming, and setup

Headlamps Malfunction (w/ T4A) (Article 10354)

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
Flash to Pass Switch Signal B3806 00 4 4 —
Turn Signal / Multifunction Switch High Beam Signal B3650 08 4 4 —
Headlamp Switch Headlamps ON Signal B257A 00 3 3 —
Headlamp Switch Headlamps OFF Signal B257A 00 3 3 —
Headlamp High Beam Relay Control B2580 02, B2580 04 B2580 02, B2580 04 B2580 01 —
High Beam Headlamp Control – Left 2 2 2 —
High Beam Headlamp Control – Right 2 2 2 —
Low Beam Headlamp Control – Left (T4A) B2575 02 B2575 01, B2575 04 B2575 01 —
Low Beam Headlamp Control – Right (T4A) B2699 02 B2699 01, B2699 04 B2699 01 —
Low Beam Headlamp Control – Left (T4F) 1 1 1 —
Low Beam Headlamp Control – Right (T4F) 1 1 1 —
Headlamp Ground – Left (T4A) — B2575 04 — —
Headlamp Ground – Right (T4A) — B2699 04 — —
Headlamp Ground – Left (T4F) — 1,2 — —
Headlamp Ground – Right (T4F) — 1,2 — —
Headlamp Switch Ground — 3 — —
Turn Signal/Multifunction Switch Ground — 4 — —
1. Headlamps Malfunction – Low Beam 2. Headlamps Malfunction – High Beam 3. Headlamp Switch Malfunction 4. Turn Signal/Multifunction Switch Malfunction

Circuit/System Description

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

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

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

Reference Information

Schematic Reference

Headlights/Daytime Running Lights (DRL) Schematics

Connector End View Reference

Component Connector End Views

Description and Operation

Exterior Lighting Systems Description and Operation

Electrical Information Reference

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

Scan Tool Reference

Control Module References for scan tool information

Circuit/System Verification

- Ignition ON.
- Verify the scan tool Headlamps On Switch parameter changes between Active and Inactive while commanding the headlamp ON and OFF with the headlamp switch.
- If the parameter does not change Refer to Headlamp Switch Malfunction.
- If the parameter changes
- Verify the scan tool Automatic Headlamps Disable Switch parameter changes between Active and Inactive while commanding the automatic lamp control ON and OFF with the headlamp switch.
- Verify the scan tool Headlamps Flash Switch parameter changes between Active and Inactive while commanding the flash to pass ON and OFF with the turn signal/multifunction switch.
- If the parameter does not change Refer to Turn Signal/Multifunction Switch Malfunction.
- 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.
- Verify the low beam headlamps turn ON and OFF when commanding the Headlamp Low Beam Command ON and OFF with a scan tool.
- If the low beams do not turn ON and OFF Refer to Headlamps Malfunction – Low Beam.
- If the low beams turn ON and OFF
- Verify the high beams turn ON and OFF when commanding the High Beams ON and OFF with a scan tool.
- If the high beams do not turn ON and OFF Refer to Headlamps Malfunction – High Beam.
- If the high beams turn ON and OFF
- Verify the high beam indicator on the instrument cluster turns ON and OFF while commanding the All Indicators Test ON and OFF with a scan tool.
- If the high beam indicator does not turn ON and OFF Refer to High Beam Indicator Malfunction.

- If the high beam indicator turns ON and OFF
- All OK.

Circuit/System Testing

Headlamp Switch Malfunction

- Ignition OFF, scan tool disconnected, all doors closed, all accessories OFF, disconnect the harness connector at the S30 headlamp switch. It may take up to 2 minutes for all vehicle systems to power down.
- Test for less than 15 Ω between the ground circuit terminal 6 and ground.
- If 15 Ω or greater
- Ignition OFF.
- Test for less than 2 Ω in the ground circuit end to end.
- If 2 Ω or greater, repair the open/high resistance in the circuit.
- If less than 2 Ω, repair the open/high resistance in the ground connection.
- If less than 15 Ω
- Verify the scan tool Automatic Headlamps Disable Switch parameter is Inactive.
- If not Inactive
- Ignition OFF, disconnect the X1 harness connector at the K9 body control module.
- 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
- Install a 3 A fused jumper wire between the signal circuit terminal 5 and the ground circuit terminal 6.
- Verify the scan tool Automatic Headlamps Disable Switch parameter is Active.
- If not Active
- Ignition OFF, disconnect the X1 harness connector at the K9 body control module, ignition ON.
- 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
- Test for less than 2 Ω in the signal circuit end to end.
- If less than 2 Ω, replace the K9 body control module.
- If Active
- Verify the scan tool Park Lamps Switch parameter is Inactive.
- Test for infinite resistance between the signal circuit terminal 3 and ground.
- Install a 3 A fused jumper wire between the signal circuit terminal 3 and the ground circuit terminal 6.
- Verify the scan tool Park Lamps Switch parameter is Active.
- Test for less than 1 V between the signal circuit terminal 3 and ground.
- Verify the scan tool Headlamps On Switch parameter is Inactive.
- Test for infinite resistance between the signal circuit terminal 4 and ground.
- Install a 3 A fused jumper wire between the signal circuit terminal 4 and the ground circuit terminal 6.
- Verify the scan tool Headlamps On Switch parameter is Active.
- Test for less than 1 V between the signal circuit terminal 4 and ground.
- Test or replace the S30 headlamp switch.

Turn Signal/Multifunction Switch Malfunction

- Ignition OFF, scan tool disconnected, all doors closed, all accessories OFF, disconnect the harness connector at the S78 turn signal/multifunction switch. It may take up to 2 minutes for all vehicle systems to power down.
- Test for less than 15 Ω between the ground circuit terminal 3 and ground.
- Verify the scan tool High Beam Select Switch parameter is Inactive.
- Ignition OFF, disconnect the X3 harness connector at the K9 body control module.
- Test for infinite resistance between the signal circuit terminal 2 and ground.
- Install a 3 A fused jumper wire between the signal circuit terminal 2 and the ground circuit terminal 3.
- Verify the scan tool High Beam Select Switch parameter is Active.
- Ignition OFF, disconnect the X3 harness connector at the K9 body control module, ignition ON.
- Test for less than 1 V between the signal circuit terminal 2 and ground.
- Verify the scan tool Headlamps Flash Switch parameter is Inactive.
- Install a 3 A fused jumper wire between the signal circuit terminal 4 and the ground circuit terminal 3.
- Verify the scan tool Headlamps Flash Switch parameter is Active.
- Test or replace the S78 turn signal/multifunction switch.

Headlamps Malfunction – Low Beam

- Verify a test lamp illuminates between the B+ circuit terminal 4 and ground.
- If the test lamp does not illuminate and the circuit fuse is good

- Test for less than 2 Ω in the B+ circuit end to end.
- If less than 2 Ω, 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
- Test for infinite resistance between the B+ circuit and ground.
- If the test lamp illuminates
- Verify a test lamp illuminates between the B+ circuit terminal 3 and ground.
- Ignition OFF, connect the X1 harness connector at the K9 body control module.
- Ignition OFF, exterior lamps OFF, disconnect the harness connector at the appropriate E13 headlamp.
- Test for less than 5 Ω between the ground circuit terminal 2 and ground.
- If 5 Ω or greater
- If less than 5 Ω
- Connect a test lamp between the control circuit terminal 1 and ground, ignition ON.
- Verify the test lamp turns ON and OFF when commanding the Headlamp Low Beam Command ON and OFF with a scan tool.
- If the test lamp is always OFF
- Ignition OFF, disconnect the X4 harness connector at the K9 body control module.
- Test for infinite resistance between the control circuit and ground.
- If infinite resistance
- Test for less than 2 Ω in the control circuit end to end.
- If the test lamp is always ON
- Ignition OFF, disconnect the X4 harness connector at the K9 body control module, ignition ON.
- Test for less than 1 V between the control circuit terminal and ground.
- If less than 1 V, replace the K9 body control module.
- If the test lamp turns ON and OFF
- Test or replace the appropriate E4 headlamp – low beam.

Headlamps Malfunction – High Beam
- Ignition OFF, disconnect the X2 harness connector at the X50A fuse block – underhood.
- Connect a test lamp between the control circuit terminal 31 and B+, ignition ON.
- Verify the test lamp turns ON and OFF when commanding the High Beams ON and OFF with a scan tool.
- Ignition OFF, disconnect the X5 harness connector at the K9 body control module, ignition ON.
- Ignition OFF, disconnect the X5 harness connector at the K9 body control module.
- Test for infinite resistance between the control circuit terminal and ground.
- Ignition OFF, exterior lamps OFF, connect the X2 harness connector at the X50A fuse block – underhood.
- Disconnect the harness connector at the appropriate E13 headlamp.
- Connect a test lamp between the control circuit terminal 3 and ground, ignition ON.
- Ignition OFF, disconnect the X1 harness connector at the X50A fuse block – underhood.
- If less than 2 Ω, replace the X50A fuse block – underhood.
- Ignition OFF, disconnect the X1 harness connector at the X50A fuse block – underhood, ignition ON.
- If less than 1 V, replace the X50A fuse block – underhood.
- Test or replace the appropriate E4 headlamp – high beam.

High Beam Indicator Malfunction
- Verify the high beam indicator turns ON and OFF when commanding the Instrument Cluster All Indicators Test ON and OFF with a scan tool.
- If the high beam indicator is always OFF or remains ON Replace the P16 instrument cluster.
- Replace the K9 body control module.

Repair Instructions

Perform the Diagnostic Repair Verification after completing the repair.
- Front Headlamp Replacement
- Headlamp Bulb Replacement
- Turn Signal Multifunction Switch Replacement
- Accessory Wiring Junction Block Replacement
- Headlamp, Instrument Panel Lamp Dimmer, and Fog Lamp Switch Replacement
- Control Module References for BCM or instrument cluster replacement, programming, and setup

Headlamps Malfunction (w/ T4F) (Article 10356)

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
Flash to Pass Switch Signal B3806 00 4 4 —
Turn Signal / Multifunction Switch High Beam Signal B3650 08 4 4 —
Headlamp Switch Headlamps ON Signal B257A 00 3 3 —
Headlamp Switch Headlamps OFF Signal B257A 00 3 3 —
Headlamp High Beam Relay Control B2580 02, B2580 04 B2580 02, B2580 04 B2580 01 —
High Beam Headlamp Control – Left 2 2 2 —
High Beam Headlamp Control – Right 2 2 2 —
Low Beam Headlamp Control – Left (T4A) B2575 02 B2575 01, B2575 04 B2575 01 —
Low Beam Headlamp Control – Right (T4A) B2699 02 B2699 01, B2699 04 B2699 01 —
Low Beam Headlamp Control – Left (T4F) 1 1 1 —
Low Beam Headlamp Control – Right (T4F) 1 1 1 —
Headlamp Ground – Left (T4A) — B2575 04 — —
Headlamp Ground – Right (T4A) — B2699 04 — —
Headlamp Ground – Left (T4F) — 1,2 — —
Headlamp Ground – Right (T4F) — 1,2 — —
Headlamp Switch Ground — 3 — —
Turn Signal/Multifunction Switch Ground — 4 — —
1. Headlamps Malfunction – Low Beam 2. Headlamps Malfunction – High Beam 3. Headlamp Switch Malfunction 4. Turn Signal/Multifunction Switch Malfunction

Circuit/System Description

With the headlamp switch in the ON position, the headlamp switch headlamp ON signal circuit is grounded through the headlamp and panel dimmer switch . In response to this input, the body control module (BCM) provides ground to either the high intensity discharge (HID) headlamp control circuit or the headlamp high beam relay control circuit. The position of the headlamp dimmer switch determines which relay coil is supplied with ground. The underhood fuse block supplies battery voltage to the relay coil and switch circuits. The HID headlamps operate when the BCM grounds the HID headlamp relay control circuit to the HID headlamp relay coil. This energizes the HID headlamp relay coil causing the switch contacts to close. With the switch contacts closed, battery voltage is applied to the left and right HID fuses through to the left and right HID headlamps. When the headlamp high beam relay coil is energized, current flows through the left and right HIGH BEAM fuses to the high beam headlamps. With the headlamp dimmer switch in the high beam position the BCM sends a serial data message to the instrument cluster requesting to illuminate the high beam indicator.

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

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

Reference Information

Schematic Reference
Headlights/Daytime Running Lights (DRL) Schematics
Connector End View Reference
Component Connector End Views
Description and Operation
Exterior Lighting Systems Description and Operation
Electrical Information Reference
- Circuit Testing
- Connector Repairs
- Testing for Intermittent Conditions and Poor Connections
- Wiring Repairs
Scan Tool Reference
Control Module References for scan tool information

Circuit/System Verification

- Ignition ON.
- Verify the scan tool Headlamps On Switch parameter changes between Active and Inactive while commanding the

headlamp ON and OFF with the headlamp switch.
- If the parameter does not change Refer to Headlamp Switch Malfunction.
- If the parameter changes
- Verify the scan tool Automatic Headlamps Disable Switch parameter changes between Active and Inactive while commanding the automatic lamp control ON and OFF with the headlamp switch.
- Verify the scan tool Headlamps Flash Switch parameter changes between Active and Inactive while commanding the flash to pass ON and OFF with the turn signal/multifunction switch.
- If the parameter does not change Refer to Turn Signal/Multifunction Switch Malfunction.
- 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.
- Verify the low beam headlamps turn ON and OFF when commanding the Headlamp Low Beam Command ON and OFF with a scan tool.
- If the low beams do not turn ON and OFF Refer to Headlamps Malfunction – Low Beam.
- If the low beams turn ON and OFF
- Verify the high beams turn ON and OFF when commanding the High Beams ON and OFF with a scan tool.
- If the high beams do not turn ON and OFF Refer to Headlamps Malfunction – High Beam.
- If the high beams turn ON and OFF
- Verify the high beam indicator on the instrument cluster turns ON and OFF while commanding the All Indicators Test ON and OFF with a scan tool.
- If the high beam indicator does not turn ON and OFF Refer to High Beam Indicator Malfunction.
- If the high beam indicator turns ON and OFF
- All OK.

Circuit/System Testing

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

Headlamp Switch Malfunction

- Ignition OFF, scan tool disconnected, all doors closed, all accessories OFF, disconnect the harness connector at the S30 headlamp switch. It may take up to 2 minutes for all vehicle systems to power down.
- Test for less than 15 Ω between the ground circuit terminal 6 and ground.
- If 15 Ω or greater
- Ignition OFF.
- Test for less than 2 Ω in the ground circuit end to end.
- If 2 Ω or greater, repair the open/high resistance in the circuit.
- If less than 2 Ω, repair the open/high resistance in the ground connection.
- If less than 15 Ω
- Verify the scan tool Automatic Headlamps Disable Switch parameter is Inactive.
- If not Inactive
- Ignition OFF, disconnect the X1 harness connector at the K9 body control module.
- 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
- Install a 3 A fused jumper wire between the signal circuit terminal 5 and the ground circuit terminal 6.
- Verify the scan tool Automatic Headlamps Disable Switch parameter is Active.
- If not Active
- Ignition OFF, disconnect the X1 harness connector at the K9 body control module, ignition ON.
- 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
- Test for less than 2 Ω in the signal circuit end to end.
- If less than 2 Ω, replace the K9 body control module.
- If Active
- Verify the scan tool Park Lamp s Switch parameter is Inactive.
- Test for infinite resistance between the signal circuit terminal 3 and ground.
- Install a 3 A fused jumper wire between the signal circuit terminal 3 and the ground circuit terminal 6.
- Verify the scan tool Park Lamps Switch parameter is Active.
- Test for less than 1 V between the signal circuit terminal 3 and ground.
- Verify the scan tool Headlamps On Switch parameter is Inactive.
- Test for infinite resistance between the signal circuit terminal 4 and ground.
- Install a 3 A fused jumper wire between the signal circuit terminal 4 and the ground circuit terminal 6.

- Verify the scan tool Headlamps On Switch parameter is Active.
- Test for less than 1 V between the signal circuit terminal 4 and ground.
- Test or replace the S30 headlamp switch.

Turn Signal/Multifunction Switch Malfunction

- Ignition OFF, scan tool disconnected, all doors closed, all accessories OFF, disconnect the harness connector at the S78 turn signal/multifunction switch. It may take up to 2 minutes for all vehicle systems to power down.
- Test for less than 15 Ω between the ground circuit terminal 3 and ground.
- Verify the scan tool High Beam Select Switch parameter is Inactive.
- Ignition OFF, disconnect the X3 harness connector at the K9 body control module.
- Test for infinite resistance between the signal circuit terminal 2 and ground.
- Install a 3 A fused jumper wire between the signal circuit terminal 2 and the ground circuit terminal 3.
- Verify the scan tool High Beam Select Switch parameter is Active.
- Ignition OFF, disconnect the X3 harness connector at the K9 body control module, ignition ON.
- Test for less than 1 V between the signal circuit terminal 2 and ground.
- Verify the scan tool Headlamps Flash Switch parameter is Inactive.
- Install a 3 A fused jumper wire between the signal circuit terminal 4 and the ground circuit terminal 3.
- Verify the scan tool Headlamps Flash Switch parameter is Active.
- Test or replace the S78 turn signal/multifunction switch.

Headlamps Malfunction – Low Beam

- Verify a test lamp illuminates between the B+ circuit terminal 4 and ground.
- If the test lamp does not illuminate and the circuit fuse is good
- Test for less than 2 Ω in the B+ circuit end to end.
- If less than 2 Ω, 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
- Test for infinite resistance between the B+ circuit and ground.
- If the test lamp illuminates
- Verify a test lamp illuminates between the B+ circuit terminal 3 and ground.
- Ignition OFF, connect the X1 harness connector at the K9 body control module.
- Remove the KR49 headlamp low beam relay.
- Connect a test lamp between the control circuit terminal 85 and B+, ignition ON.
- Verify the test lamp turns ON and OFF when commanding the Headlamp Low Beam Command ON and OFF with a scan tool.
- If the test lamp is always OFF
- Ignition OFF, disconnect the X5 harness connector at the K9 body control module, ignition ON.
- Test for less than 1 V between the control circuit terminal and ground.
- Test for less than 2 Ω in the control circuit end to end.
- If the test lamp is always ON
- Ignition OFF, disconnect the X5 harness connector at the K9 body control module.
- Test for infinite resistance between the control circuit terminal and ground.
- If the test lamp turns ON and OFF
- Ignition OFF, exterior lamps OFF, connect the KR49 headlamp low beam relay.
- Ignition OFF, exterior lamps OFF, disconnect the harness connector at the appropriate T7 headlamp ballast .
- Test for less than 5 Ω between the ground circuit terminal A and ground.
- If 5 Ω or greater
- If less than 5 Ω
- Connect a test lamp between the control circuit terminal B and ground, ignition ON.
- Verify the test lamp turns ON and OFF when commanding the appropriate Headlamp Low Beam Command ON and OFF with a scan tool.
- Ignition OFF, disconnect the X1 harness connector at the X50A fuse block – underhood.
- Test for infinite resistance between the control circuit and ground.
- If infinite resistance
- If less than 2 Ω, replace the KR49 headlamp low beam relay.
- Ignition OFF, disconnect the X1 harness connector at the X50A fuse block – underhood, ignition ON.
- If less than 1 V, replace the KR49 headlamp low beam relay.
- Test or replace the appropriate T7 headlamp ballast.

Headlamps Malfunction – High Beam

- Ignition OFF, disconnect the X2 harness connector at the X50A fuse block – underhood.
- Connect a test lamp between the control circuit terminal 31 and B+, ignition ON.
- Verify the test lamp turns ON and OFF when commanding the High Beams ON and OFF with a scan tool.

- Ignition OFF, exterior lamps OFF, connect the X2 harness connector at the X50A fuse block – underhood.
- Disconnect the harness connector at the appropriate M28 high beam solenoid actuator.
- Connect a test lamp between the control circuit terminal C and ground, ignition ON.
- If less than 2 Ω, replace the X50A fuse block – underhood.
- If less than 1 V, replace the X50A fuse block – underhood.
- Test or replace the appropriate M28 high beam solenoid actuator.

Repair Instructions

Perform the Diagnostic Repair Verification after completing the repair.
- Front Headlamp Replacement
- Headlamp Bulb Replacement
- Headlamp Ballast Replacement
- Accessory Wiring Junction Block Replacement
- Electrical Relay Replacement
- Turn Signal Multifunction Switch Replacement
- Headlamp, Instrument Panel Lamp Dimmer, and Fog Lamp Switch Replacement
- Control Module References for BCM or instrument cluster replacement, programming, and setup

Headlamp Leveling Malfunction (Article 10352)

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
Headlamp Leveling Actuator Control 1 – Left B3435 02 B3435 00 B3435 00 B3435 39, B3435 54
Headlamp Leveling Actuator Control 2 – Left B3435 02 B3435 00 B3435 00 B3435 39, B3435 54
Headlamp Leveling Actuator Control 3 – Left B3435 02 B3435 00 B3435 00 B3435 39, B3435 54
Headlamp Leveling Actuator Control 4 – Left B3435 02 B3435 00 B3435 00 B3435 39, B3435 54
Headlamp Leveling Actuator Control 1 – Right B3440 02 B3440 00 B3440 00 B3440 39, B3440 54
Headlamp Leveling Actuator Control 2 – Right B3440 02 B3440 00 B3440 00 B3440 39, B3440 54
Headlamp Leveling Actuator Control 3 – Right B3440 02 B3440 00 B3440 00 B3440 39, B3440 54
Headlamp Leveling Actuator Control 4 – Right B3440 02 B3440 00 B3440 00 B3440 39, B3440 54

Circuit/System Description

Each headlamp assembly contains a headlamp leveling actuator that is controlled by the headlamp leveling control module. The front and rear suspension position sensors provide the headlamp leveling control with suspension position information. Each sensor receives a 5 V reference, signal, and low reference circuits from the headlamp leveling 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 leveling control module compares the information from both suspension position sensors and adjusts the headlamp leveling as needed. The headlamp leveling control module is wired to each headlamp leveling actuator with 4 directional actuator control circuits.

Reference Information

Schematic Reference
Headlights/Daytime Running Lights (DRL) Schematics
Connector End View Reference
Component Connector End Views
Description and Operation
Exterior Lighting Systems Description and Operation
Electrical Information Reference
- Circuit Testing
- Connector Repairs
- Testing for Intermittent Conditions and Poor Connections
- Wiring Repairs

Scan Tool Reference
Control Module References for scan tool information

Circuit/System Verification
- Ignition ON, headlamps ON.
- Verify the left headlamp operates Up and Down while 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
- Verify the right headlamp operates Up and Down while 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
- Verify the Front Leveling Position Sensor Signal voltage parameter is between 0.3 and 4.9 V with a scan tool.
- If not between 0.3 and 4.9 V Refer to Headlamp Leveling Sensor Malfunction.
- If between 0.3 and 4.9 V
- Verify the Rear Leveling Position Sensor Signal voltage parameter is between 0.3 and 4.9 V with a scan tool.
- All OK.

Circuit/System Testing

Headlamp Leveling Actuator Malfunction

- Ignition OFF, exterior lamps OFF, disconnect the harness connector at the appropriate M29 headlamp leveling actuator. It may take up to 2 minutes for all vehicle systems to power down.
- Remove the F39UA 5 A fuse from the X50A fuse block – underhood.
- Test for 10 Ω –25k Ω between each control circuit terminal listed below and ground.
- M29 headlamp leveling actuator control terminal 1
- M29 headlamp leveling actuator control terminal 2
- M29 headlamp leveling actuator control terminal 3
- M29 headlamp leveling actuator control terminal 4
- If less than 10 Ω
- Ignition OFF, disconnect the harness connector at the K28 headlamp leveling control module.
- Test for infinite resistance between the appropriate control circuit and ground.
- If less than infinite resistance, repair the short to ground on the circuit.
- If infinite resistance, replace the K28 headlamp leveling control module.
- If greater than 25k Ω
- Test for less than 2 Ω in the appropriate control circuit end to end.
- If 2 Ω or greater, repair the open/high resistance in the circuit.
- If less than 2 Ω
- Ignition ON.
- Test for less than 1 V between the appropriate control circuit and ground.
- If 1 V or greater, repair the short to voltage on the circuit.
- If less than 1 V, replace the K28 headlamp leveling control module.
- If between 10 Ω –25k Ω
- Ignition OFF, install the F39UA 5 A fuse at the X50A fuse block – underhood, ignition ON, headlamps ON.
- Verify a test lamp does not illuminate between each control circuit terminal listed below and ground.
- If the test lamp illuminates
- Ignition OFF, disconnect the harness connector at the K28 headlamp leveling control module, ignition ON.
- If the test lamp does not illuminate
- Test or replace the appropriate M29 headlamp leveling actuator.

Headlamp Leveling Sensor Malfunction

- Ignition OFF, exterior lamps OFF, disconnect the harness connector at the appropriate B152 suspension position sensor. It may take up to 2 minutes for all vehicle systems to power down.
- Test for less than 10 Ω between the low reference circuit terminal 3 and ground.
- If 10 Ω or greater
- Test for less than 2 Ω in the low reference circuit end to end.
- If less than 2 Ω, replace the K28 headlamp leveling control module.
- Test for 4.8–5.2 V between the 5 V reference circuit terminal 1 and ground.
- If less than 4.8 V
- Test for infinite resistance between the 5 V reference circuit and ground.
- If infinite resistance
- Test for less than 2 Ω in the 5 V reference circuit end to end.
- If greater than 5.2 V
- Test for less than 1 V between the 5 V reference circuit and ground.
- If between 4.8–5.2 V
- Verify the appropriate scan tool Leveling Position Sensor Signal parameter is less than 0.5 V.
- If 0.5 V or greater
- Test for less than 1 V between the signal circuit terminal 2 and ground.

- If less than 0.5 V
- Install a 3 A fused jumper wire between the 5 V reference circuit terminal 1 and the signal circuit terminal 2.
- Verify the appropriate scan tool Leveling Position Sensor Signal parameter is greater than 4.8 V.
- Test for infinite resistance between the signal circuit and ground.
- Test for less than 2 Ω in the signal circuit end to end.
- If 4.8 V or greater
- Test or replace the appropriate B152 suspension position sensor.

Repair Instructions

Perform the Diagnostic Repair Verification after completing the repair.
- Front Headlamp Replacement
- Headlamp Leveling Front Suspension Height Sensor Replacement
- Headlamp Leveling Rear Suspension Height Sensor Replacement
- Control Module References for headlamp control module replacement, programming, and setup

Interior Accent Lighting Malfunction (Article 10358)

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

Diagnostic Fault Information

Circuit Short to Ground Open/High Resistance Short to Voltage Signal Performance
Accent Lamp Control B2652 02 1 1 —
Accent Lamp Ground – Driver Door — 1 — —
Accent Lamp Ground – Passenger Door — 1 — —
1. Interior Accent Lighting 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 signal and B+ voltage circuit to the instrument panel dimmer switch . When the instrument panel dimmer switch is placed in the desired position, the dimmed voltage setting is applied from the instrument panel dimmer switch through the instrument panel dimmer switch signal circuit to the BCM. The BCM interprets the signal and applies a pulse width modulated (PWM) voltage through the LED dimming control circuits illuminating the interior backlighting to the requested level of brightness.

Reference Information

Schematic Reference
Interior Lights Schematics
Connector End View Reference
Component Connector End Views
Description and Operation
Interior Lighting Systems Description and Operation
Electrical Information Reference
- Circuit Testing
- Connector Repairs
- Testing for Intermittent Conditions and Poor Connections
- Wiring Repairs

Scan Tool Reference
Control Module References for scan tool information

Circuit/System Testing
- Ignition OFF, scan tool disconnected, all doors closed, all accessories OFF, disconnect the harness connector at the inoperative E1 accent lamp. It may take up to 2 minutes for all vehicle systems to power down.
- Test for less than 15 Ω between the ground circuit terminal A and ground.
- If 15 Ω or greater
- Ignition OFF.
- Test for less than 2 Ω in the ground circuit end to end.
- If 2 Ω or greater, repair the open/high resistance in the circuit.
- If less than 2 Ω, repair the open/high resistance in the ground connection.
- If less than 15 Ω

- Connect a test lamp between the control circuit terminal B and ground.
- Verify the test lamp turns ON and OFF while turning the headlamp switch ON and OFF.
- If the test lamp is always OFF
- Ignition OFF, disconnect the X6 harness connector at the K9 body control module.
- 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
- Test for less than 2 Ω in the control circuit end to end.
- If less than 2 Ω, replace the K9 body control module.
- If the test lamp is always ON
- Ignition OFF, disconnect the X6 harness connector at the K9 body control module, ignition ON.
- 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
- Test or replace the appropriate E1 accent lamp.

Repair Instructions

Perform the Diagnostic Repair Verification after completing the repair.
- Front Side Door Map Pocket Illumination Lamp Replacement
- Control Module References for BCM replacement, programming, and setup

Interior Backlighting Malfunction (Article 10359)

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
Headlamp Switch B+ B1405 03, B1529 03, B257B 03 B257B 03 2 —
Headlamp Switch Signal B257B 03 B257B 03 B257B 07 —
LED Backlight Dimming Control Terminal 8 X2 B2610 02 B2610 04, 1 B2610 01 —
LED Backlight Dimming Control Terminal 9 X7 B2610 02 B2610 04, 1 B2610 01 —
Passenger Air Bag Disable Indicator Backlighting Control 3 3 3 —
Automatic Transmission Shift Lever Position Indicator Ground — 1 — —
Door Lock Switch – Driver Ground — 1 — —
Door Lock Switch – Passenger Ground — 1 — —
Folding Top Control Switch Ground — 1 — —
Head – up Display Switch Ground — 1 — —
Headlamp Switch Ground — 1 — —
Passenger Air Bag Disable Indicator Ground — 3 — —
Steering Wheel Control Switch – Left Ground — 1 — —
Steering Wheel Control Switch – Right Ground — 1 — —
Sunroof Switch Ground — 1 — —
Traction Control Switch Ground — 1 — —
1. Interior Backlighting Malfunction 2. Dimmer Switch Malfunction 3. Passenger Air Bag Disable Indicator 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 a 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 (PWM) voltage through the LED dimming control circuits illuminating the interior backlighting to the requested level of brightness.

Reference Information

Schematic Reference
Interior Lights Dimming Schematics
Connector End View Reference

Component Connector End Views
Description and Operation
Interior Lighting Systems Description and Operation
Electrical Information Reference
- Circuit Testing
- Connector Repairs
- Testing for Intermittent Conditions and Poor Connections
- Wiring Repairs
Scan Tool Reference
Control Module References for scan tool information
Circuit/System Verification
- Ignition ON.
- 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
- Verify the backlighting components turn ON and OFF while commanding the LED Dimming Duty Cycle Command ON and OFF with a scan tool.
- If the backlighting components do not turn ON and OFF Refer to Interior Backlighting Malfunction.
- If the backlighting components turn ON and OFF
- 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
- All OK.
Circuit/System Testing
Dimmer Switch Malfunction
- Ignition OFF and all vehicle systems OFF, disconnect the harness connector at the S30 Headlamp Switch, ignition ON.
- Test for B+ between the B+ circuit terminal 1 and ground.
- If less than B+
- Ignition OFF, disconnect the X3 harness connector at the K9 Body Control Module.
- 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
- Test for less than 2 Ω in the B+ circuit end to end.
- If 2 Ω or greater, repair the open/high resistance in the circuit.
- If less than 2 Ω, replace the K9 Body Control Module.
- If B+
- Verify a test lamp does not illuminate between the B+ circuit terminal 1 and the signal circuit terminal 12.
- If the test lamp illuminates
- Ignition OFF, disconnect the X1 harness connector at the K9 Body Control Module.
- Test for infinite resistance between the signal circuit and ground.
- If infinite resistance, replace the K9 Body Control Module.
- If the test lamp does not illuminate
- Test for B+ between the B+ circuit terminal 1 and the signal circuit terminal 12.
- Ignition OFF, disconnect the X1 harness connector at the K9 Body Control Module, ignition ON.
- 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
- Test for less than 2 Ω in the signal circuit end to end.
- Test or replace the S30 Headlamp Switch.
Interior Backlighting Malfunction
- Backlighting components the vehicle is equipped with
- Each component's control and ground circuit terminals
- Component locations on the backlighting control circuit
- Ignition OFF, all doors closed, all accessories OFF, disconnect the harness connector at the component with inoperative backlighting. It may take up to 2 minutes for all vehicle systems to power down.
- Test for less than 15 Ω between the ground circuit and ground.
- If 15 Ω or greater

- Ignition OFF.
- Test for less than 2 Ω in the ground circuit end to end.
- If less than 2 Ω, repair the open/high resistance in the ground connection.
- If less than 15 Ω
- Connect a test lamp between the control circuit terminal and ground.
- Verify the test lamp turns ON and OFF when commanding the LED Dimming Duty Cycle Command ON and OFF with a scan tool.
- If the test lamp is always OFF
- Ignition OFF, disconnect the X2 and X7 harness connectors at the K9 body control module.
- Test for infinite resistance between the control circuit and ground.
- Test for less than 2 Ω in the control circuit end to end.
- If less than 2 Ω, replace the K9 body control module.
- If the test lamp is always ON
- Ignition OFF, disconnect the X2 and X7 harness connectors at the K9 body control module, ignition ON.
- Test for less than 1 V between the control circuit terminal and ground.
- If less than 1 V, replace the K9 body control module.
- If the test lamp turns ON and OFF
- Test or replace the component with inoperative backlighting.

Passenger Air Bag Disable Indicator Backlighting Malfunction

- Ignition OFF, scan tool disconnected, all doors closed, all accessories OFF, disconnect the harness connector at the P14 passenger air bag disable indicator. It may take up to 2 minutes for all vehicle systems to power down.
- Test for less than 10 Ω between the ground circuit terminal 2 and ground.
- If 10 Ω or greater
- If less than 10 Ω
- Connect a test lamp between the control circuit terminal 4 and ground.
- Verify the test lamp turns ON and OFF while turning the ignition switch ON and OFF.
- Ignition OFF, remove the F18UA at the X50A fuse block – underhood, ignition ON.
- If less than 1 V, replace the X50A fuse block – underhood.
- Test or replace the P14 passenger air bag disable indicator.

Repair Instructions

Perform the Diagnostic Repair Verification after completing the repair.

- Electronic Traction Control Switch Replacement
- Cruise Control Switch Replacement
- Instrument Panel Airbag Arming Status Display Replacement
- Transmission Control Replacement
- Door Lock Switch Replacement - Driver Side
- Door Lock Switch Replacement - Passenger Front
- Head-Up Display Switch Replacement
- Headlamp, Instrument Panel Lamp Dimmer, and Fog Lamp Switch Replacement
- Control Module References for BCM replacement, programming, and setup

Park, License, and/or Tail Lamps Malfunction (Article 10360)

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
Headlamp Switch Park Lamp s ON Signal 2 B257A 00 2 —
License Plate Lamp Control B3883 02 B3883 01, B3883 04 B3883 01 —
Park Lamps Control – Left B2585 02 B2585 01, B2585 04 B2585 01, B2585 04 —
Park Lamps Control – Right B3867 02 B3867 01, B3867 04 B3867 01, B3867 04 —
Park Lamps Control – Left Rear (without T90) B3881 02 B3881 04, B3881 01 B3881 04, B3881 01 —
Park Lamps Control – Right Rear (without T90) B3882 02 B3882 04, B3882 01 B3882 04, B3882 01 —
Headlamp Switch Ground — 2 — —
License Plate Lamp Ground - Left — 1 — —
License Plate Lamp Ground - Right — 1 — —
Side Marker Lamp Ground – Left Front — 1 — —
Side Marker Lamp Ground – Right Front — 1 — —

Side Marker Lamp Ground – Left Rear — 1 — —
Side Marker Lamp Ground – Right Rear — 1 — —
Stop/Tail/ Turn Signal Lamps Ground – Left — 1 — —
Stop/Tail/ Turn Signal Lamp s Ground – Right — 1 — —
1. Park, License, and/or Tail Lamp s Malfunction 2. Park Lamp 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 lamp s.

Reference Information

Schematic Reference
Exterior Lights Schematics
Connector End View Reference
Component Connector End Views
Description and Operation
Exterior Lighting Systems Description and Operation
Electrical Information Reference
- Circuit Testing
- Connector Repairs
- Testing for Intermittent Conditions and Poor Connections
- Wiring Repairs
Scan Tool Reference
Control Module References for scan tool information

Circuit/System Verification

- Ignition ON.
- Verify the scan tool Parking Lamp Switch parameter changes between Active and Inactive while commanding the park lamps ON and OFF with the headlamp switch.
- If the parameter does not change Refer to Park Lamp Switch Malfunction.
- If the parameter changes
- 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
- 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
- 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
- All OK.

Circuit/System Testing

Park Lamp Switch Malfunction
- Ignition OFF, all doors closed, all accessories OFF, disconnect the harness connector at the S30 headlamp switch. It may take up to 2 minutes for all vehicle systems to power down.
- Test for less than 15 Ω between the ground circuit terminal 6 and ground.
- If 15 Ω or greater
- Ignition OFF.
- Test for less than 2 Ω in the ground circuit end to end.
- If 2 Ω or greater, repair the open/high resistance in the circuit.
- If less than 2 Ω, repair the open/high resistance in the ground connection.
- If less than 15 Ω
- Verify the scan tool Park Lamps Switch parameter is Inactive.
- If not Inactive
- Ignition OFF, disconnect the X1 harness connector at the K9 body control module.
- Test for infinite resistance between the signal circuit terminal 3 and ground.
- If less than infinite resistance, repair the short to ground on the circuit.
- If infinite resistance, replace the K9 body control module.
- If Inactive
- Install a 3 A fused jumper wire between the signal circuit terminal 3 and the ground circuit terminal 6.

- Verify the scan tool Park Lamps Switch parameter is Active.
- If not Active
- Ignition OFF, disconnect the X1 harness connector at the K9 body control module, ignition ON.
- 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
- Test for less than 2 Ω in the signal circuit end to end.
- If less than 2 Ω, replace the K9 body control module.
- If Active
- Test or replace the S30 headlamp switch.

Park Lamps Malfunction

- Ignition OFF, exterior lamps OFF, trunk latch latched, disconnect the harness connector at the appropriate park lamp.
- Test for less than 5 Ω between the appropriate ground circuit terminal and ground.
- If 5 Ω or greater
- If less than 5 Ω
- Connect a test lamp between the appropriate control circuit terminal and ground, ignition ON.
- 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
- Ignition OFF, disconnect the appropriate harness connector listed below at the K9 body control module.
- X4
- X5
- Test for infinite resistance between the control circuit and ground.
- If infinite resistance
- Test for less than 2 Ω in the control circuit end to end.
- If the test lamp is always ON
- Test for less than 1 V between the control circuit terminal and ground.
- If less than 1 V, replace the K9 body control module.
- If the test lamp turns ON and OFF
- Test or replace the appropriate park lamp.

License Plate Lamps Malfunction

- Ignition OFF, exterior lamps OFF, trunk latch latched, remove both E7 license plate lamp bulbs .
- Test for less than 5 Ω between each ground circuit terminal 2 and ground.
- Connect a test lamp between the E7L license plate lamp – left control circuit terminal 1 and ground, ignition ON.
- Verify the test lamp turns ON and OFF when commanding the License Plate Lamps ON and OFF with a scan tool.
- Ignition OFF, disconnect the X4 harness connector at the K9 body control module.
- Ignition OFF, disconnect the X4 harness connector at the K9 body control module, ignition ON.
- Connect a test lamp between the E7R license plate lamp – right control circuit terminal 1 and ground, ignition ON.
- Test or replace the appropriate E7 license plate lamp bulb.

Repair Instructions

Perform the Diagnostic Repair Verification after completing the repair.

- Rear License Plate Lamp Replacement
- Parking and Turn Signal Lamp Bulb Replacement
- Tail Lamp Bulb Replacement
- Front Side Marker Lamp Replacement
- Rear Side Marker Lamp Replacement
- Headlamp, Instrument Panel Lamp Dimmer, and Fog Lamp Switch Replacement
- Tail Lamp Replacement - Inboard
- Tail Lamp Replacement - Outboard
- Control Module References for BCM replacement, programming, and setup

Rear Compartment Lamp Malfunction (Article 10365)

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 Lamp Control B2570 02 B2570 04 B2570 01 —
Rear Compartment Courtesy Lamp Ground — 1 — —
1. Rear Compartment Lamp Malfunction
Circuit/System Description
The body control module (BCM) applies battery voltage to the rear compartment courtesy lamp through the rear compartment lamp control circuit. When the BCM receives a rear compartment lid open input from the rear compartment lid latch, the BCM applies battery voltage to the rear compartment lamp control circuit illuminating the rear compartment courtesy lamp. In the event that the rear compartment lamp were to remain illuminated for more than 10 minutes with the ignition switch in the OFF position and no doors opened, the BCM will deactivate the rear compartment lamp control circuit to prevent total battery discharge.
Reference Information
Schematic Reference
Interior Lights Schematics
Connector End View Reference
Component Connector End Views
Description and Operation
Interior Lighting Systems Description and Operation
Electrical Information Reference
- Circuit Testing
- Connector Repairs
- Testing for Intermittent Conditions and Poor Connections
- Wiring Repairs
Scan Tool Reference
Control Module References for scan tool information
Circuit/System Testing
- Ignition OFF, exterior lamps OFF, trunk latch latched, disconnect the harness connector at the E8S rear compartment courtesy lamp.
- Test for less than 5 Ω between the ground circuit terminal 2 and ground.
- If 5 Ω or greater
- Ignition OFF.
- Test for less than 2 Ω in the ground circuit end to end.
- If 2 Ω or greater, repair the open/high resistance in the circuit.
- If less than 2 Ω, repair the open/high resistance in the ground connection.
- If less than 5 Ω
- Connect a test lamp between the control circuit terminal 1 and ground, ignition ON.
- 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
- Ignition OFF, disconnect the X7 harness connector at the K9 body control module.
- 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
- Test for less than 2 Ω in the control circuit end to end.
- If less than 2 Ω, replace the K9 body control module.
- If the test lamp is always ON
- Ignition OFF, disconnect the X7 harness connector at the K9 body control module, ignition ON.
- 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
- Test or replace the E8S rear compartment courtesy lamp.
Repair Instructions
Perform the Diagnostic Repair Verification after completing the repair.
- Rear Compartment Courtesy Lamp Replacement
- Control Module References for BCM replacement, programming, and setup

Stop Lamps Malfunction (Article 10369)

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, C0161 00, U0418 00 C0277 06, C0161 00, U0418 00 C0277 07, C0890 07, C0161 00, U0418 00 —
Brake Pedal Position Sensor Signal C0277 06, C0161 00, U0418 00 C0277 06, C0161 00, U0418 00 C0277 07, C0890 07, C0161 00, U0418 00 C0277 09
Center High Mounted Stop Lamp Control B3884 02 2 2 —
Tail/Stop and Turn Signal Lamp Control – Left B3881 02 B3881 04 B3881 01 —
Tail/Stop and Turn Signal Lamp Control – Right B3882 02 B3882 04 B3882 01 —
Brake Pedal Position Sensor Low Reference — C0277 07, C0161 00 C0890 07 —
Center High Mounted Stop Lamp Ground — 2 — —
Tail/Stop and Turn Signal Lamp Ground – Left — 1 — —
Tail/Stop and Turn Signal Lamp Ground – Right — 1 — —
1. Stop Lamps Malfunction 2. Center High Mounted Stop Lamp Malfunction

Circuit/System Description

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

Reference Information

Schematic Reference
Exterior Lights Schematics
Connector End View Reference
Component Connector End Views
Description and Operation
Exterior Lighting Systems Description and Operation
Electrical Information Reference
- Circuit Testing
- Connector Repairs
- Testing for Intermittent Conditions and Poor Connections
- Wiring Repairs

Scan Tool Reference
Control Module References for scan tool information

Circuit/System Verification

- Ignition ON.
- Verify the scan tool Brake Applied Output Signal 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
- Verify the brake lamp s turns ON and OFF when commanding the Brake Lamp Command ON and OFF with a scan tool.
- If the brake lamps do not turn ON and OFF Refer to Stop Lamps Malfunction.
- If the brake lamps turn ON and OFF
- Verify the center high mounted stop lamp turns ON and OFF when commanding the Center Brake Lamp Command ON and OFF with a scan tool.
- If the center high mounted stop does not turn ON and OFF Refer to Center High Mount Stop Lamp Malfunction.
- If the center high mounted stop turns ON and OFF
- All OK.

Circuit/System Testing

Brake Pedal Position Sensor Malfunction
- Ignition OFF, disconnect the harness connector at the B22 brake pedal position sensor, ignition ON.
- Test for less than 1 V between the low reference circuit terminal 2 and ground.
- If 1 V or greater
- Ignition OFF, disconnect the X1 harness connector at the K9 body control module, ignition ON.
- 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
- Test or replace the B22 brake pedal position sensor.

Stop Lamps Malfunction

- Ignition OFF, exterior lamps OFF, trunk latch latched, disconnect the harness connector at the appropriate tail/stop lamp.
- Test for less than 5 Ω between the appropriate ground circuit terminal listed below and ground.
- E42L tail lamp assembly – left terminal 1
- E42R tail lamp assembly – right terminal 1
- E5W tail/stop and turn signal lamp – left outer terminal 1
- E5AE tail/stop and turn signal lamp – left inner terminal 1
- E5X tail/stop and turn signal lamp – right outer terminal 1
- E5AF tail/stop and turn signal lamp – right inner terminal 1
- If 5 Ω or greater
- Ignition OFF.
- Test for less than 2 Ω in the ground circuit end to end.
- If 2 Ω or greater, repair the open/high resistance in the circuit.
- If less than 2 Ω, repair the open/high resistance in the ground connection.
- If less than 5 Ω
- Connect a test lamp between the appropriate control circuit terminal listed below and ground, ignition ON.
- E42L tail lamp assembly – left terminal 2
- E42R tail lamp assembly – right terminal 2
- E5W tail/stop and turn signal lamp – left outer terminal 3
- E5AE tail/stop and turn signal lamp – left inner terminal 3
- E5X tail/stop and turn signal lamp – right outer terminal 3
- E5AF tail/stop and turn signal lamp – right inner terminal 3
- Verify the test lamp turns ON and OFF when commanding the Brake Lamp Command ON and OFF with a scan tool.
- If the test lamp is always OFF
- Ignition OFF, disconnect the appropriate harness connector listed below at the K9 body control module.
- X4
- X5
- 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
- Test for less than 2 Ω in the control circuit end to end.
- If less than 2 Ω, replace the K9 body control module.
- If the test lamp is always ON
- Test for less than 1 V between the control circuit terminal and ground.
- If the test lamp turns ON and OFF
- Test or replace the appropriate tail/stop lamp.

Center High Mount Stop Lamp Malfunction

- Ignition OFF, exterior lamps OFF, trunk latch latched, disconnect the harness connector at the E6 center high mounted stop lamp.
- Terminal 2 – coupe
- Terminal B – convertible
- Terminal 1 – coupe
- Terminal A – convertible
- Verify the test lamp turns ON and OFF when commanding the Center Brake Lamp ON and OFF with a scan tool.
- Ignition OFF, disconnect the X4 harness connector at the K9 body control module.
- Ignition OFF, disconnect the X4 harness connector at the K9 body control module, ignition ON.
- 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
- Tail Lamp Bulb Replacement
- Brake Pedal Position Sensor Replacement
- Tail Lamp Replacement - Inboard
- Tail Lamp Replacement - Outboard
- Control Module References for BCM replacement, programming, and setup

Turn Signal Lamps and/or Indicators Malfunction (Article 10371)

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 1 1 1 —
Turn Signal Switch Signal – Right 1 1 1 —
Turn Signal Control – Left Front B3948 02 B3948 04 B3948 01, B3948 04 —
Turn Signal Control – Left Rear B3950 02 B3950 04 B3950 01, B3950 04 —
Turn Signal Control – Right Front B3949 02 B3949 04 B3949 01, B3949 04 —
Turn Signal Control – Right Rear B3951 02 B3951 04 B3951 01, B3951 04 —
Side Marker Lamp Ground – Right Front — B3949 01, B3949 04 — —
Side Marker Lamp Ground – Left Front — B3948 01, B3948 04 — —
Turn Signal Lamp Ground – Left Front — B3948 01, B3948 04 — —
Turn Signal Lamp Ground – Right Front — B3949 01, B3949 04 — —
Turn Signal Lamp Ground – Left Rear — B3950 01, B3950 04 — —
Turn Signal Lamp Ground – Right Rear — B3951 01, B3951 04 — —
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 there 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
Connector End View Reference
Component Connector End Views
Description and Operation
Exterior Lighting Systems Description and Operation
Electrical Information Reference
- Circuit Testing
- Connector Repairs
- Testing for Intermittent Conditions and Poor Connections
- Wiring Repairs

Scan Tool Reference
Control Module References for scan tool information

Circuit/System Verification

- Ignition ON.
- 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
- Verify the left front turn signal lamp s turn ON and OFF while commanding the Left Front Turn Signal Lamp ON and OFF with a scan tool.
- If the left front turn signal lamps do not turn ON and OFF Refer to Turn Signal Lamps Malfunction.
- If the left front turn signal lamps turn ON and OFF
- Verify the right front turn signal lamp s turn ON and OFF while commanding the Right Front Turn Signal Lamp ON and OFF with a scan tool.
- If the right front turn signal lamps do not turn ON and OFF Refer to Turn Signal Lamps Malfunction.
- If the right front turn signal lamps turn ON and OFF
- Verify the left rear turn signal lamp s turn ON and OFF while commanding the Left Rear Turn Signal Lamp ON and OFF with a scan tool.

- If the left rear turn signal lamps do not turn ON and OFF Refer to Turn Signal Lamps Malfunction.
- If the left rear turn signal lamps turn ON and OFF
- Verify the right rear turn signal lamp s turn ON and OFF while commanding the Right Rear Turn Signal Lamp ON and OFF with a scan tool.
- If the right rear turn signal lamps do not turn ON and OFF Refer to Turn Signal Lamps Malfunction.
- If the right rear turn signal lamps turn ON and OFF
- Verify the left and right turn signal indicators turn ON and OFF while commanding the All Indicators Test ON and OFF with a scan tool.
- If the left or right turn signal indictors do not turn ON and OFF Refer to Turn Signal Indicators Malfunction.
- If the left and right turn signal indictors turn ON and OFF
- All OK.

Circuit/System Testing

Turn Signal/Multifunction Switch Malfunction

- Ignition OFF, scan tool disconnected, all doors closed, all accessories OFF, disconnect the harness connector at the S78 turn signal/multifunction switch. It may take up to 2 minutes for all vehicle systems to power down.
- Test for less than 15 Ω between the ground circuit terminal 3 and ground.
- If 15 Ω or greater
- Ignition OFF.
- Test for less than 2 Ω in the ground circuit end to end.
- If 2 Ω or greater, repair the open/high resistance in the circuit.
- If less than 2 Ω, repair the open/high resistance in the ground connection.
- If less than 15 Ω
- Verify the scan tool Left Turn Signal Switch parameter is Inactive.
- If not Inactive
- Ignition OFF, disconnect the X3 harness connector at the K9 body control module.
- 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
- Install a 3 A fused jumper wire between the signal circuit terminal 1 and the ground circuit terminal 3.
- Verify the scan tool Left Turn Signal Switch parameter is Active.
- If not Active
- Ignition OFF, disconnect the X3 harness connector at the K9 body control module, ignition ON.
- 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
- Test for less than 2 Ω in the signal circuit end to end.
- If less than 2 Ω, replace the K9 body control module.
- If Active
- Verify the scan tool Right Turn Signal Switch parameter is Inactive.
- Test for infinite resistance between the signal circuit terminal 7 and ground.
- Install a 3 A fused jumper wire between the signal circuit terminal 7 and the ground circuit terminal 3.
- Verify the scan tool Right Turn Signal Switch parameter is Active.
- Test for less than 1 V between the signal circuit terminal 7 and ground.
- Test or replace the S78 turn signal/multifunction switch.

Turn Signal Lamps Malfunction

- Ignition OFF, exterior lamps OFF, trunk latch latched, disconnect the harness connector at the inoperative turn signal lamp.
- Test for less than 5 Ω between the appropriate ground circuit terminal and ground.
- If 5 Ω or greater
- If less than 5 Ω
- Connect a test lamp between the appropriate control circuit terminal and ground.
- 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
- Ignition OFF, disconnect the appropriate harness connector listed below at the K9 body control module.
- X4
- X5

- Test for infinite resistance between the control circuit and ground.
- If infinite resistance
- Test for less than 2 Ω in the control circuit end to end.
- If the test lamp is always ON
- Ignition OFF, disconnect the appropriate harness connector listed below at the K9 body control module, ignition ON.
- Test for less than 1 V between the control circuit terminal and ground.
- If less than 1 V, replace the K9 body control module.
- If the test lamp turns ON and OFF
- Test or replace the appropriate turn signal lamp.

Turn Signal Indicators Malfunction

- If the left or right turn signal indictors are always OFF or remain ON Replace the P16 instrument cluster.
- Replace the K9 body control module.

Repair Instructions

Perform the Diagnostic Repair Verification after completing the repair.

- Parking and Turn Signal Lamp Bulb Replacement
- Tail Lamp Bulb Replacement
- Front Side Marker Lamp Replacement
- Rear Side Marker Lamp Replacement
- Turn Signal Multifunction Switch Replacement
- Front Side Marker Lamp Bulb Replacement
- Rear Side Marker Lamp Bulb Replacement
- Tail Lamp Replacement - Inboard
- Tail Lamp Replacement - Outboard
- Control Module References for BCM or instrument cluster replacement, programming, and setup

Erratic Operation (itype_132)

Tsbs

- Lighting - Door/IP Accent Lighting Inop/Loses Intensity (09-08-42-005E, 2015/02/13)

Inoperative (itype_148)

Tsbs

- Lighting - Door/IP Accent Lighting Inop/Loses Intensity (09-08-42-005E, 2015/02/13)

OEM Policies and Procedures (itype_120)

Tsbs

- Information On Upgrading To RPO T4F High Intensity Discharge (HID) Headlamps Or Additional Concerns After Adding After-Market Lighting (PIC5196E, 2016/01/07)

Warranty Information (itype_119)

Tsbs

- Lighting - Exterior Lighting Components Tinted or Smoked (15-08-42-001A, 2016/05/08)

Safety (itype_107)

Tsbs

- Campaign - Rear Bumper Facia Is Melting From License Plate Lamp (15030, 2015/09/21)