Component Procedures: Headlamp

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Component Procedures: Headlamp

Parts and Labor (itype_189)

Parts

Qualifier	Part #	Name	Price	Note
Composite Headlamp > Without?	22959918	Composite Headlamp	0.00	
Composite Headlamp > Without?	22959917	Composite Headlamp	0.00	
Composite Headlamp > With HI?	20981022	Composite Headlamp	0.00	
Composite Headlamp > With HI?	20981021	Composite Headlamp	0.00	

Labor

Operation	Qualifier Path	Skill	Std Hrs	Wty Hrs
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
Align	Headlamps > Headlamp, Align > Two	B	0.4	0.0

Headlights - Headlamps Circuit (W/ High Intensity Discharge) (Article 11117)

Headlights - Headlamps Circuit (W/ High Intensity Discharge)
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Headlights - Headlamps Circuit (W/O High Intensity Discharge) (Article 11100)

Headlights - Headlamps Circuit (W/O High Intensity Discharge)
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Headlights - Headlamps Leveling Circuit (Article 11101)

Headlights - Headlamps Leveling Circuit
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Front Headlamp Aiming (Article 10392)

Aiming Headlamps (Visual Aim)
Headlamp aim should be checked:
- When a new headlamp capsule is installed.
- If service or repairs to the front end area have (or may have) disturbed the headlamps or their mounting.
- Suspension components have been replaced or repaired.
- The area will consist of a level surface large enough to allow for a vehicle and an additional 7.62 m (25 ft) measured from face of lamps to the front of the aiming screen.
- The screen will be 1.52 m (5 ft) high x 3.66 m (12 ft) wide with a matte white surface well shaded from extraneous light, and properly adjusted to the floor on which the vehicle stands. Provisions may be made for moving the screen so it can be aligned parallel with the vehicle.
- The screen shall be provided with a fixed vertical centerline, 2 laterally adjustable vertical tapes, and 1 vertically adjustable horizontal tape.
- If a regular commercial aiming screen is not available, the screen may consist of a vertical wall having a clear uninterrupted area approximately 1.83 m (6 ft) high and 3.66 m (12 ft) wide. The surface should be finished with a washable non-gloss white paint.
- After the aiming screen has been set up in its permanent location, it is necessary to paint a reference line on the floor directly under the lens of the lamps to indicate the proper location of the headlamps when they are being aimed: Click for full-size image
- Distance between headlamps (1)
- Center line of screen (2)
- Adjustable vertical pointer (3)
- Adjustable horizontal tape (4)
- Diagram of light screen (5)
- Vertical center line ahead of right headlamp pointer position (6)
- 7.62 m (25 ft) (7)
- Car centerline axis (8)

Prior to aiming the headlamps, the following steps must be taken:
- Remove any snow, ice or mud from the vehicle.

- The vehicle must have a full tank of gas.
- Stop all other work on the vehicle.
- If any service has been performed on the vehicle, make sure that all of the components are back in their original place.
- The vehicle must be on a level surface.
- The vehicle left tires must be aligned with the reference line extending from the screen with the headlamps aligned with the vertical reference line (2). Click for full-size image
- Do not load any cargo in the vehicle.
- The vehicle must contain 1 person or 72.56 kg (160 lb) on the driver's seat.
- Inflate the tires to the proper pressure.
- Simulate the vehicle loads if the intended use of the vehicle is for hauling heavy loads or towing a trailer.
- Rock the vehicle in order to stabilize the suspension.
- Turn ON the headlamps to low beam and observe the left and the top edges of the high intensity zone on the screen. The edges of the high intensity zone should fall within the specifications.

Headlamp Aiming Procedure

- Open the hood.
- Measure from the floor to the center of the headlamp bulb , some headlamps have an aim dot marked on the headlamp lens. Click for full-size image
- At the screen, measure from the floor and place the horizontal tape at the measured distance.
- Measure from the reference line on the floor to the left headlamp bulb centerline.
- At the screen, measure from the reference line and place the vertical tape at the measured distance.
- Measure from the reference line on the floor to the right headlamp bulb centerline.
- Turn on the low beam headlamps and block the light from projecting onto the screen from the passenger side headlamp. Click for full-size image
- Adjust the vertical aim of the headlamps to the specifications required by the state and the local authorities, or as shown in step number 8.
- Rotate the headlamp adjuster to change the vertical aim of the headlamp.
- Repeat the aiming procedure for the passenger side headlamp while blocking the light from projecting onto the screen from the driver side headlamp.
- Close the hood.

Front Headlamp Replacement (Article 10393)

Callout Component Name

Preliminary Procedure Warning: Refer to Halogen Bulb Warning . Remove the front bumper fascia. Refer to Front Bumper Fascia Replacement .

Preliminary Procedure

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

1 Headlamp Screw (Qty: 4) Caution: Refer to Fastener Caution . Tip: Tighten the headlamp screws in the mandatory sequence as shown. Tighten 2.5 Nm (22 lb in)

2.5 Nm (22 lb in)

2 Headlamp Assembly Procedure Pull the lamp assembly forward and disconnect the forward lamp electrical harness connector from the headlamp. Transfer the headlamp bulb s, sockets and electrical harness into the new headlamp housing assembly. Upon assembly, aim both the headlamps. Refer to Front Headlamp Aiming .

Procedure

- Pull the lamp assembly forward and disconnect the forward lamp electrical harness connector from the headlamp.
- Transfer the headlamp bulb s, sockets and electrical harness into the new headlamp housing assembly.
- Upon assembly, aim both the headlamps. Refer to Front Headlamp Aiming .

Headlamp Ballast Replacement (HID) (Article 10398)

Callout Component Name

Warning: The high intensity discharge system produces high voltage and current. In order to reduce the risk of severe shocks and burns, the battery negative cable must be disconnected any time service work is being performed on or around the high intensity discharge system. Warning: The high intensity discharge system produces high voltage and current. To reduce the risk of severe shocks and burns: Never open the high intensity discharge system ballast or the arc tube assembly starter. Never probe between the high intensity discharge system ballast output connector and the arc tube assembly. Preliminary Procedure Remove the headlamp assembly . Refer to Front Headlamp Replacement .

- Never open the high intensity discharge system ballast or the arc tube assembly starter.
- Never probe between the high intensity discharge system ballast output connector and the arc tube assembly.
Preliminary Procedure
Remove the headlamp assembly . Refer to Front Headlamp Replacement .
1 Headlamp Ballast Screw (Qty: 3) Caution: Refer to Fastener Caution . Tighten Hand tighten the screws.
Hand tighten the screws.
2 Headlamp Ballast Tip: Ensure the headlamp ballast seal is in place prior to installing the ballast onto the headlamp assembly.

All Technical Service Bulletins (itype_100)

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

Headlamps Malfunction (w/ T4A) (Article 10355)

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 10357)

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 10353)

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

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)