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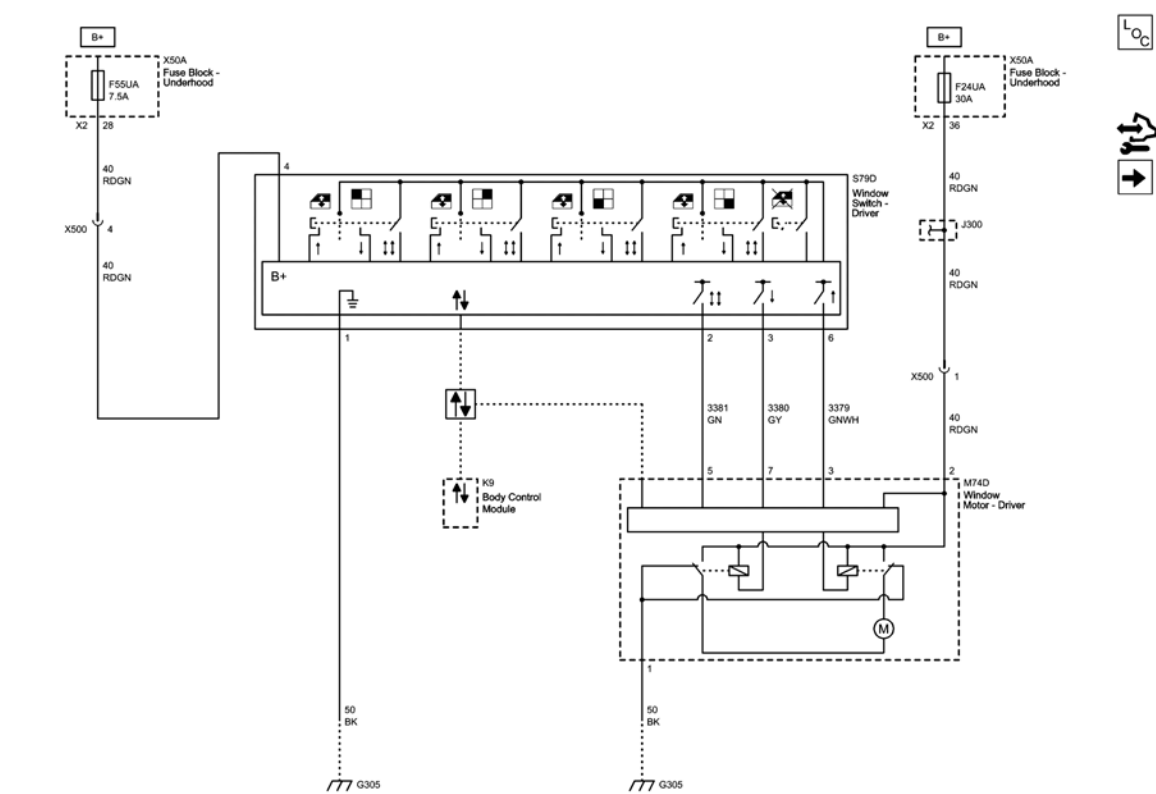
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-  [Defogger Schematics](#)
-  [Window System Component Views](#)
-  [Windshield Replacement](#)
-  [Front Side Door Window Adjustment](#)
-  [Front Side Door Window Replacement](#)
-  [Rear Side Door Window Adjustment](#)
-  [Rear Side Door Window Replacement](#)
-  [Rear Side Door Stationary Window Replacement](#)
-  [Rear Window Replacement](#)
-  [Front Side Door Window Switch Replacement - Right Side](#)
-  [Front Side Door Window Switch Replacement - Left Side](#)
-  [Rear Side Door Window Switch Replacement](#)
-  [Front Side Door Window Regulator Replacement](#)
-  [Front Side Door Window Regulator Motor Replacement](#)
-  [Rear Side Door Window Regulator Replacement](#)
-  [Rear Side Door Window Regulator Motor Replacement](#)
-  [Rear Side Door Window Regulator Handle Replacement](#)
-  [Front Side Door Window Outer Sealing Strip Replacement](#)
-  [Rear Side Door Window Outer Sealing Strip Replacement](#)
-  [Front Side Door Window Weatherstrip Replacement](#)
-  [Rear Side Door Window Weatherstrip Replacement](#)
-  [Adhesive Service Kit Description](#)
-  [Power Windows Description and Operation](#)
-  [Rear Window Defogger Description and Operation](#)
-  [Stationary Window Description](#)
-  [Special Tools and Equipment](#)

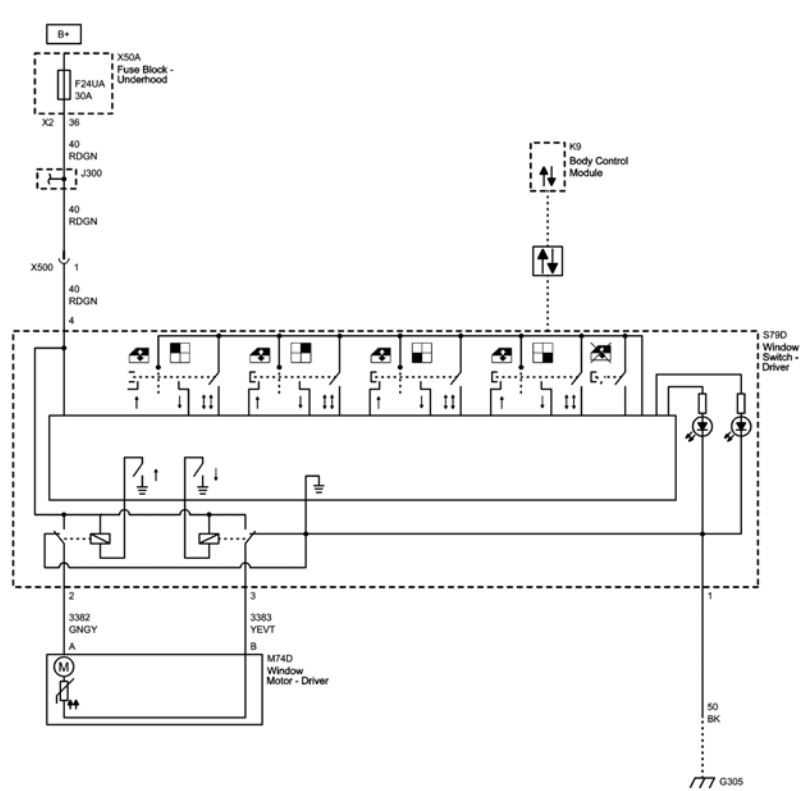
Fastener Tightening Specifications

Application	Specification	
	Metric	English
Front Side Door Window Regulator Bolt	9 N·m	80 lb in
Front Side Door Window Regulator Motor Bolt	6 N·m	53 lb in
Front Side Door Window Regulator Sash Nut	9 N·m	80 lb in
Rear Side Door Stationary Window Divider Channel Belt Support Bolt	8 N·m	71 lb in
Rear Side Door Window Regulator Bolt	9 N·m	80 lb in
Rear Side Door Window Regulator Motor Bolt	6 N·m	53 lb in
Rear Side Door Window Regulator Sash Nut	9 N·m	80 lb in
Rear Side Door Stationary Window Bolt	8 N·m	71 lb in

Power Windows, Driver Door (AXG)



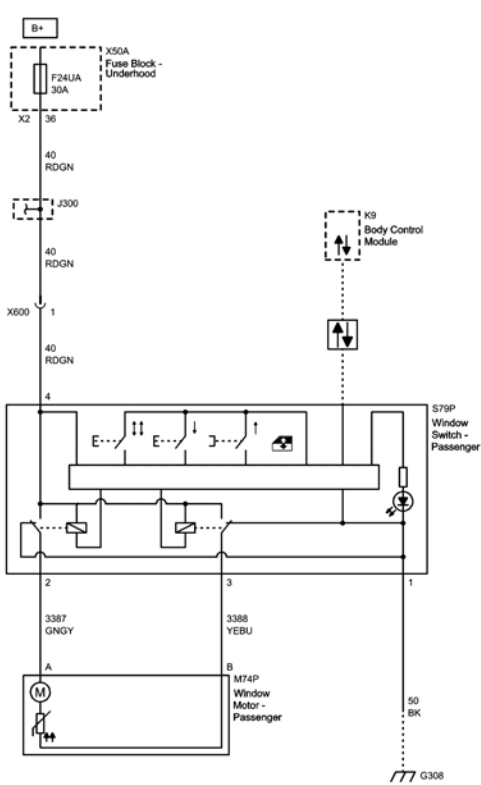
Power Windows, Driver Door (AEC)



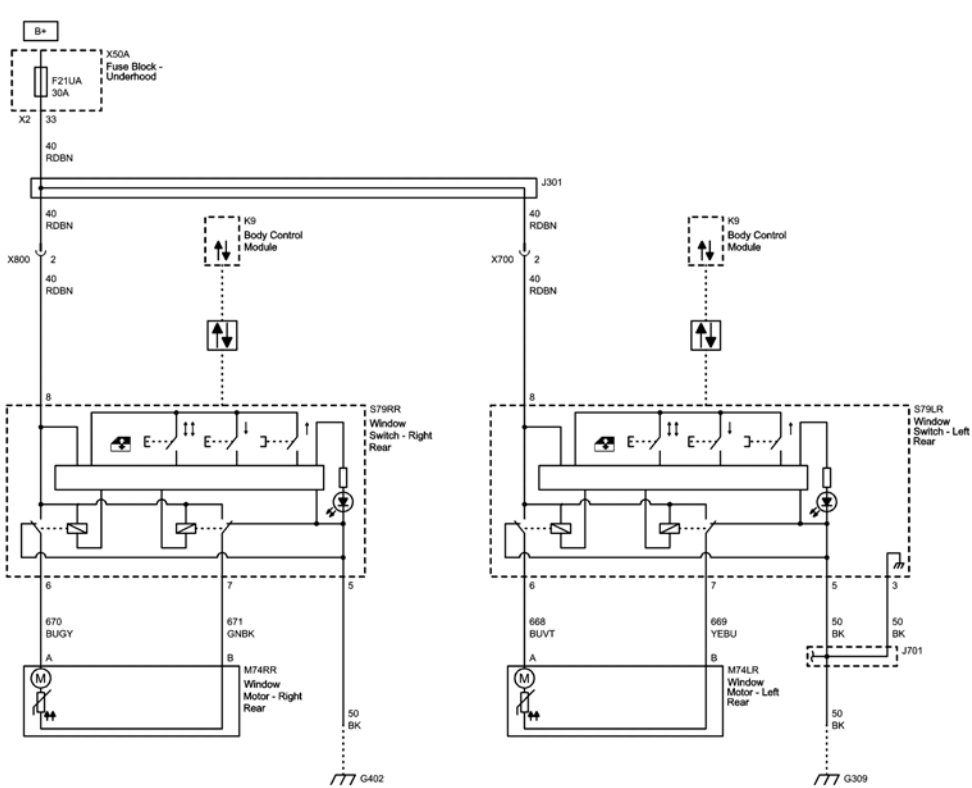
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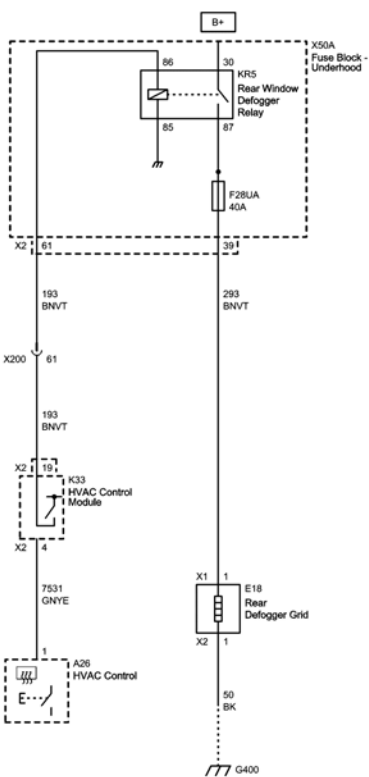
Power Windows, Passenger Door



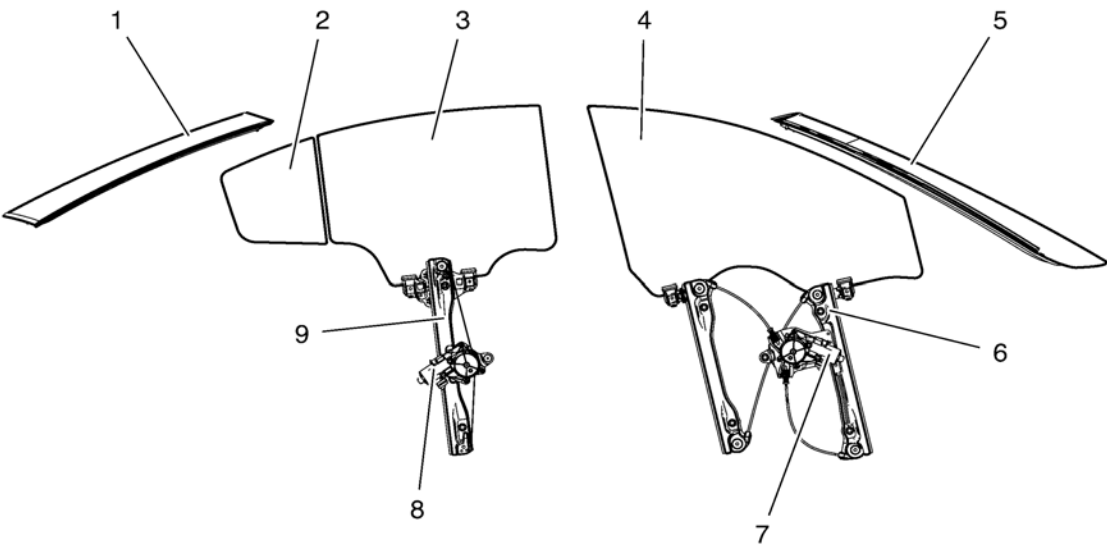
Power Windows, Rear Doors (AEQ)



Defogger Schematics



Window Systems Component Views



Window Systems Component Views

Number	Description	Procedure
1	Rear Window	Rear Window Replacement
2	Rear Side Door Stationary Window	Rear Side Door Stationary Window Replacement
3	Rear Side Door Window	Rear Side Door Window Replacement
4	Front Side Door Window	Front Side Door Window Replacement
5	Windshield	Windshield Replacement
6	Front Side Door Window Regulator	Front Side Door Window Regulator Replacement
7	Front Side Door Window Regulator Motor	Front Side Door Window Regulator Motor Replacement
8	Rear Side Door Window Regulator Motor	Rear Side Door Window Regulator Motor Replacement
9	Rear Side Door Window Regulator	Rear Side Door Window Regulator Replacement

Windshield Replacement

Special Tools

- *BO-46974* Glass Removal System
- *BO-641* Suction Holder

For equivalent regional tools, refer to [Special Tools](#).

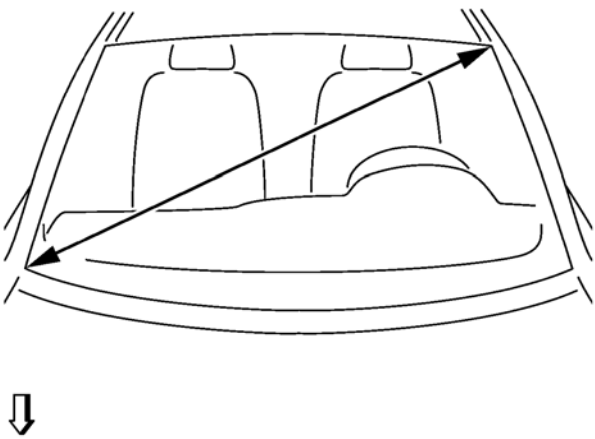
Removal Procedure

Warning: Refer to [Cracked Window Warning](#) in the Preface section.

Warning: Refer to [Glass and Sheet Metal Handling Warning](#) in the Preface section.

Note: Position the vehicle on level ground and move the front wheels to the straight-ahead position.

1. Disconnect battery.
2. Remove air inlet grille panel. Refer to [Air Inlet Grille Panel Replacement](#).
3. Remove windshield garnish molding. Refer to [Windshield Garnish Molding Replacement](#).
4. Remove inside rearview mirror. Refer to [Inside Rearview Mirror Replacement](#).

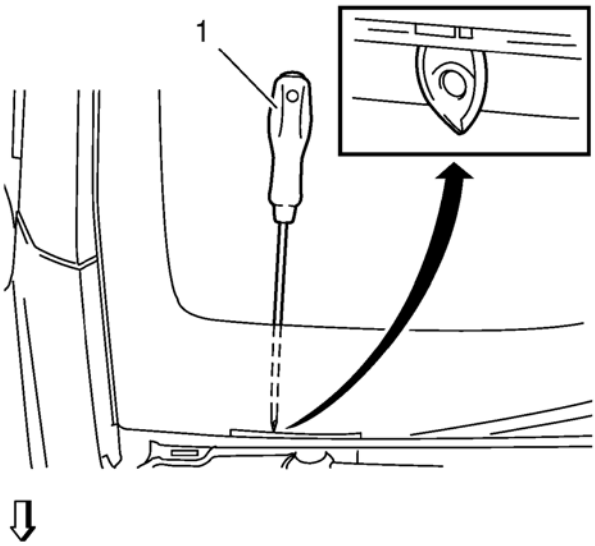


5. Use *BO-46974* system to remove the windshield.

Warning: Refer to [Defroster Outlet Warning](#) in the Preface section.

6. Take the diagonal measurement of the windshield.
7. Cut cutting wire into four times lengths.

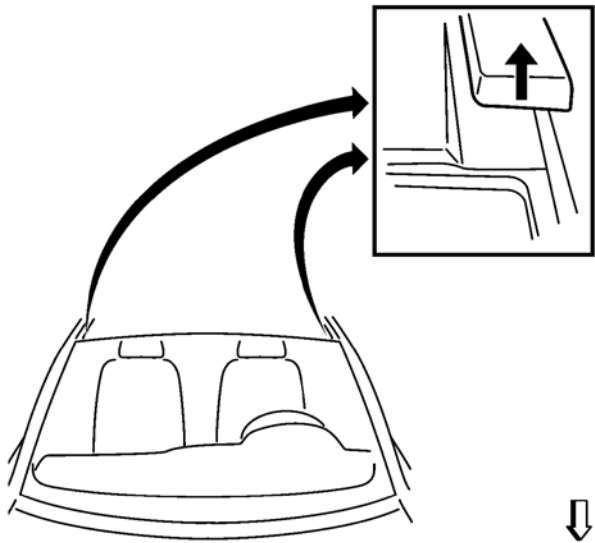
Ca. 6200 mm (244.093 in), the circumference of the corresponding roll of wire is approximately 1000 mm (39.369 in).



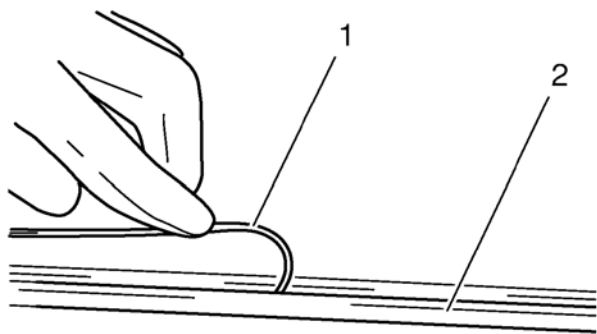
8. Heat the awl with a suitable tool.
9. Stick the awl (1) with adhesive bed in the area of the front wall.

Ensure that the windshield is not damaged in the process, otherwise stress cracks in the windshield may occur.

10. Pull the wire through.
 - Thread the cutting wire into the hole of the awl and bend it over.
 - Pull the cutting wire with the awl to the middle of the steering wheel in the interior.

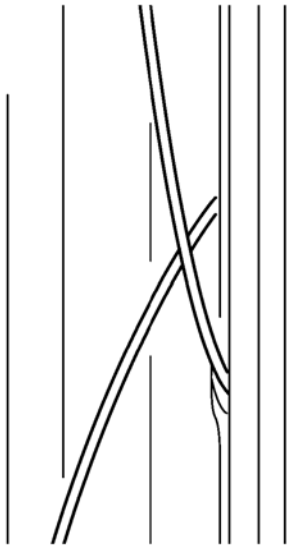


11. Release the roof rail front right and left.



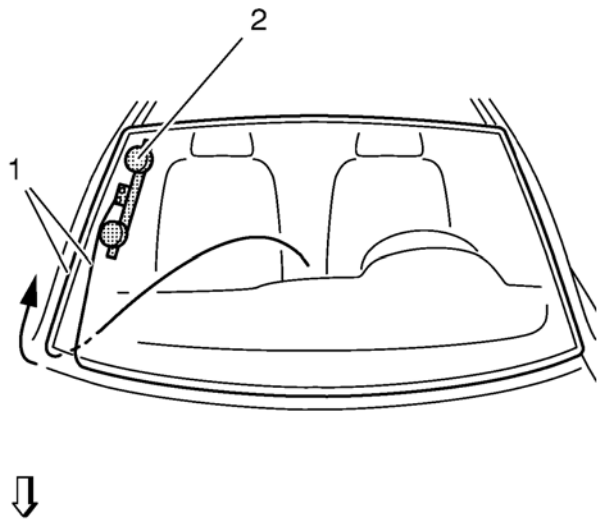
12. Lay the wire under the windshield all the way round.

The cutting wire (1) should be rolled in beneath the rubber window seal (2) at the windscreen.



13. Pull the second wire end through.

- Stick awl approx. 10 mm (0.393 in) overlapping the first entry place with adhesive bed.
- Thread the cutting wire into the hole of the awl and bend it over.
- Pull the rest of the wire into the interior with the awl.

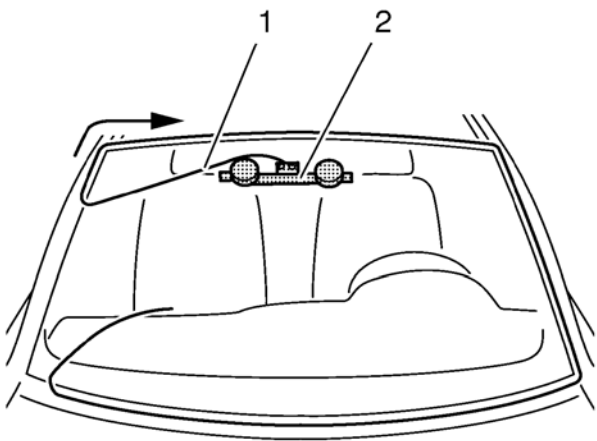


Note: Ensure that the cutting wire is fitted correctly to the winch deflection roller.

14. Place the winch with two winding heads (2) in the vehicle.
- Position winch in right-hand area of the windshield.
 - Attach the cutting wire to the winch.
 - Insert transfer ratchet and pre-tension cutting wire.

Note: In the area of the A-pillar/front wall, increased cutting effort must be made.

15. Cut out windshield.
- Use the plastic sheet for the protection of the armature board.
 - Arrow shows the path taken by the cutting wire (1).
 - Cut out the windshield until the cutting wire is level with the winch.

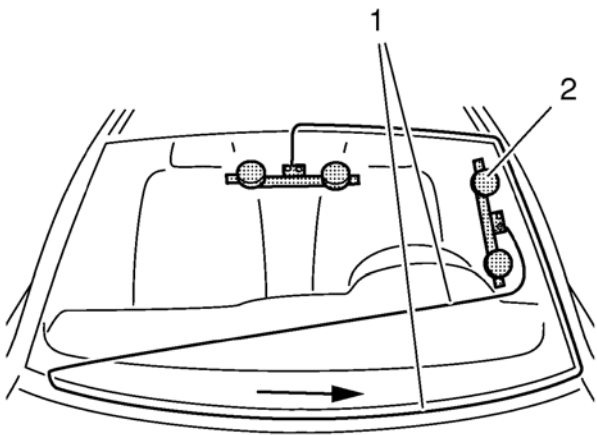


Note: Ensure that the cutting wire is fitted correctly to the winch deflection roller.

16. Place the winch with two winding heads (2) in the vehicle.
- Position the winch near to the interior rear view mirror.
 - Insert transfer ratchet and pre-tension cutting wire.

Note: In the area of the A-pillar/roof frame, increased cutting effort must be made.

17. Cut out windshield.
- Use the hold-down positioner and the plastic sheet to protect the sunroof.
 - Arrow shows the path taken by the cutting wire (1).
 - Cut out the windshield until the cutting wire is level with the winch.

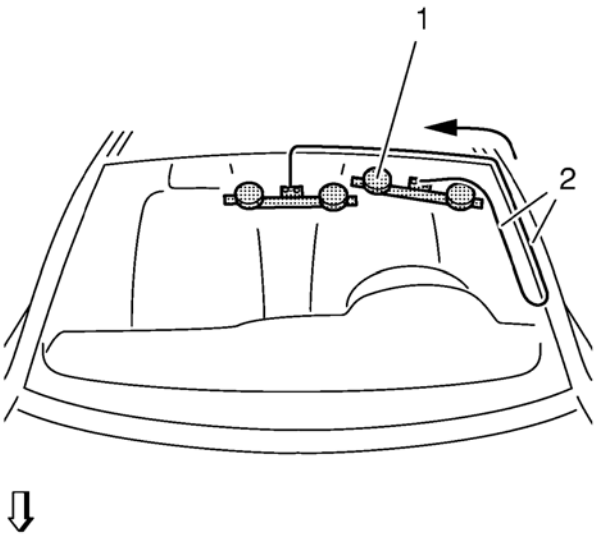


Note: Ensure that the cutting wire is fitted correctly to the winch deflection roller.

18. Place the winch with one winding head in the vehicle.
- Position the winch with one winding head on the A-pillar on the driver's side (2).
 - Attach the cutting wire (1) to the winch.
 - Insert transfer ratchet and pre-tension cutting wire.

Note: Use lubricant on the winch deflection roller. More pulling force is required to cut the area around the A-pillar/bulkhead.

19. Cut out windshield.
- Arrow shows the path taken by the cutting wire.
 - Cut out the windshield until the cutting wire is level with the winch.
 - Use the plastic sheet for the protection of the armature board.

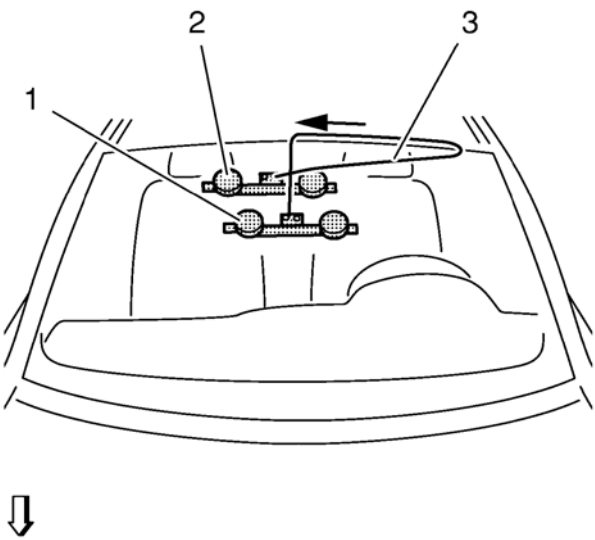


Note: Ensure that the cutting wire is fitted correctly to the winch deflection roller.

20. Place the winch with one winding head in the vehicle.
- Position the winch with one winding head in the area of the roof frame (1).
 - Insert transfer ratchet and pre-tension cutting wire (2).

Note: Use lubricant on the winch deflection roller. More pulling force is required to cut the area around the A-pillar/roof frame.

21. Cut out windshield.
- Arrow shows the path taken by the cutting wire.
 - Cut out the windshield until the cutting wire is level with the winch.
 - Use the plastic sheet for the protection of the ceiling.



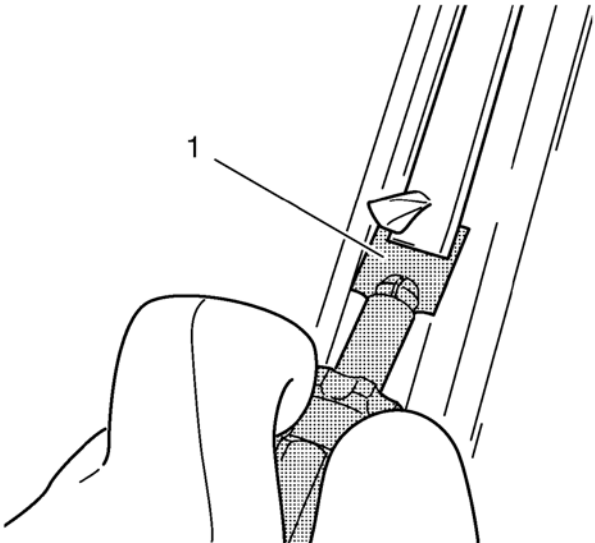
22. Position both cutting tools.
- Shift winch with two winding heads downwards (1).
 - Shift the winch with one winding head (2) in the ceiling area so that the cutting wire (3) is crossed.
 - Insert transfer ratchet and pre-tension cutting wire.

23. Cut out windshield.
- Use the plastic sheet for the protection of the ceiling.
 - Cut out windscreen until the cutting wire has cut through the adhesive bed completely.
 - Arrow shows the path taken by the cutting wire.

24. Remove glass removal system.
25. Fit *BO-641* holder .

Note: Second mechanic required.

26. Remove windshield.



27. Cut out the adhesive tape with the knife provided (1) to within 1 mm (0.039 in).
28. Repair any paint damage.

Using a touch-up pen to match the color of the vehicle, repair any paint damage.

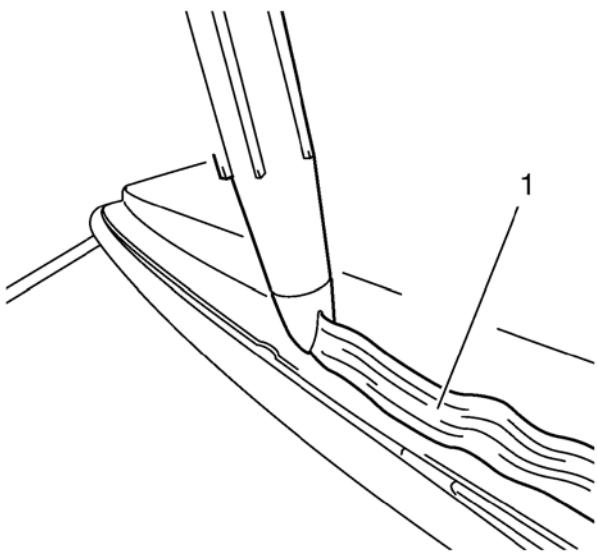
29. Cut off the adhesive bead on the glass pane.

Cut out the adhesive tape with the knife provided (1) to within 1 mm (0.039 in).

Installation Procedure

1. Remove all mounds or loose pieces of urethane adhesive from the pinch-weld area.
2. Inspect for any of the following problems in order to help prevent future breakage of the window:
 - High weld
 - Solder spots
 - Hardened sealer
 - Any other obstruction or irregularity in the pinch-weld flange
3. After repairing the opening as indicated, perform the following steps:

Remove all traces of broken glass from the outer cowl panel, seats, floor, and defroster ducts.

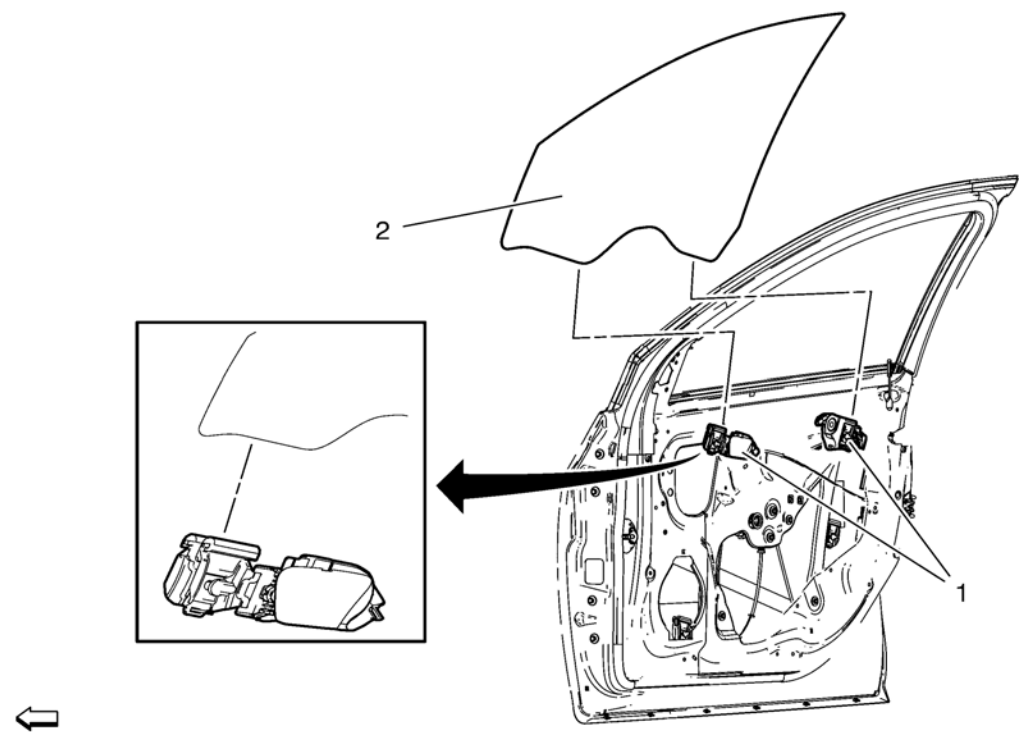


4. Apply adhesive bead (1).

Cut into the tip of the cartridge in such a way that a bead of adhesive approx. 13 mm (0.511 in) thick is produced.

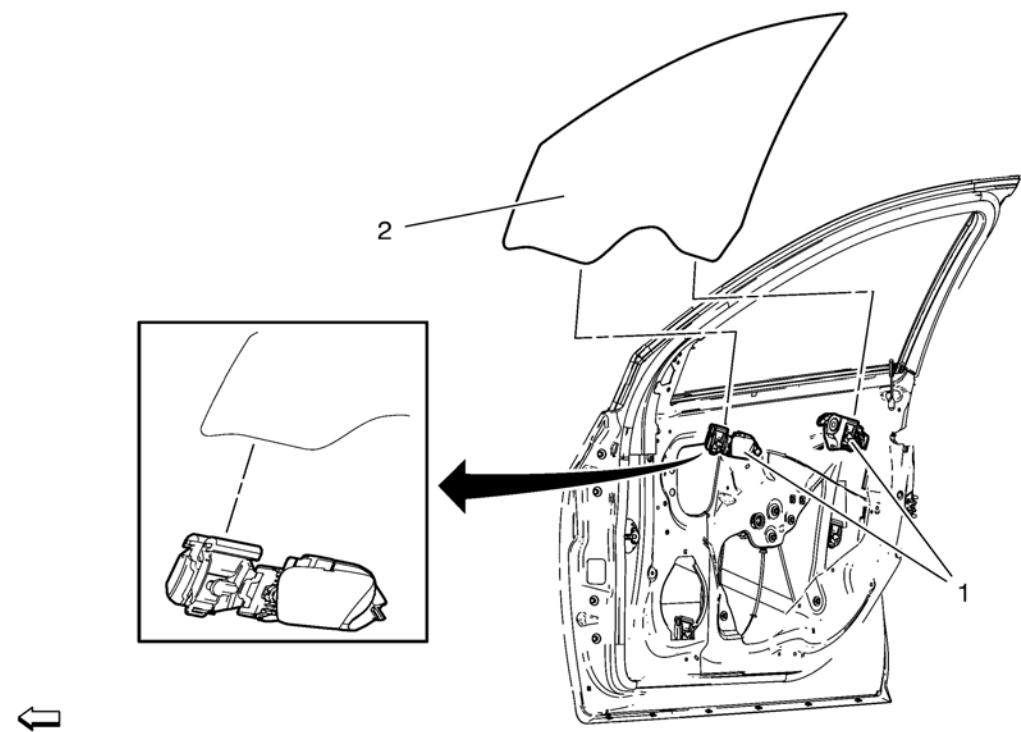
5. Insert windshield.
 - Place the windshield on the roof frames and lower down.
 - Insert windshield with *BO-641* holder .
6. Secure windshield in position with fabric tape.
7. Second mechanic required.
8. Clean any excess urethane adhesive from the body.
9. Use a soft spray of warm water in order to immediately water test the window.
10. Inspect the window for leaks.
11. If any leaks are found, use a plastic paddle in order to apply extra urethane adhesive at the leak point.
12. Retest the window for leaks.
13. Maintain the following conditions in order to properly cure the urethane adhesive:
 - Partially lower a door window in order to prevent pressure buildups when closing doors before the urethane adhesive cures.
 - Do not drive the vehicle until the urethane adhesive is cured. Refer to the above curing times.
 - Do not use compressed air in order to dry the urethane adhesive.
14. Install the roof rail front right and left.
15. Install inside rearview mirror. Refer to [Inside Rearview Mirror Replacement](#).
16. Install windshield garnish molding. Refer to [Windshield Garnish Molding Replacement](#).
17. Install air inlet grille panel. Refer to [Air Inlet Grille Panel Replacement](#).
18. Connect battery.

Front Side Door Window Adjustment



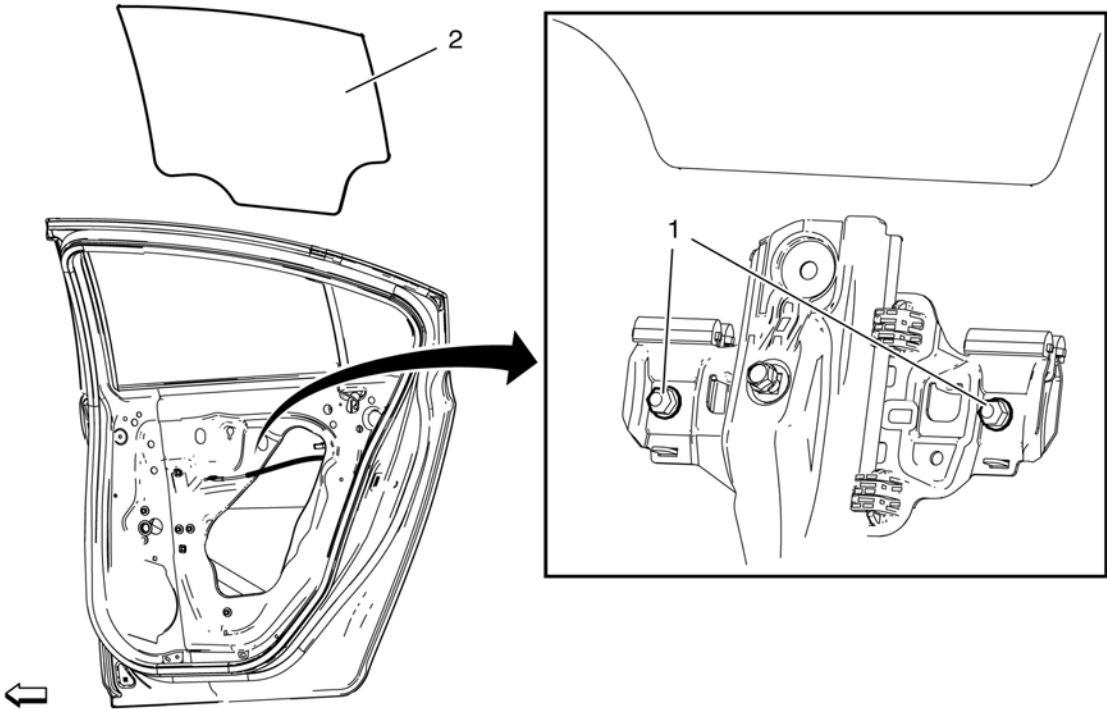
Callout	Component Name
Warning: Refer to Glass and Sheet Metal Handling Warning in the Preface section. Warning: Refer to Express Window Down Warning in the Preface section. Preliminary Procedure - Remove the front side door trim. Refer to Front Side Door Trim Replacement. - Remove the water deflector. Refer to Front Side Door Water Deflector Replacement.	
1	Front Side Door Window Regulator Sash Nut (Qty: 2) Caution: Refer to Fastener Caution in the Preface section. Tighten 10 N·m (89 lb in)
2	Front Side Door Window Procedure - Loosen the window regulator sash nuts. - Connect the door trim panel wire connector. Note: Start the vehicle to ensure maximum power to the window motor. This is required in order to fully seat the window for adjustment. - Start the vehicle. - Using the power window switch, raise the window to the full up position. - Tighten the front side door window regulator sash nuts. - Inspect for proper window operation and a tight seal. - Shut off the vehicle.

Front Side Door Window Replacement



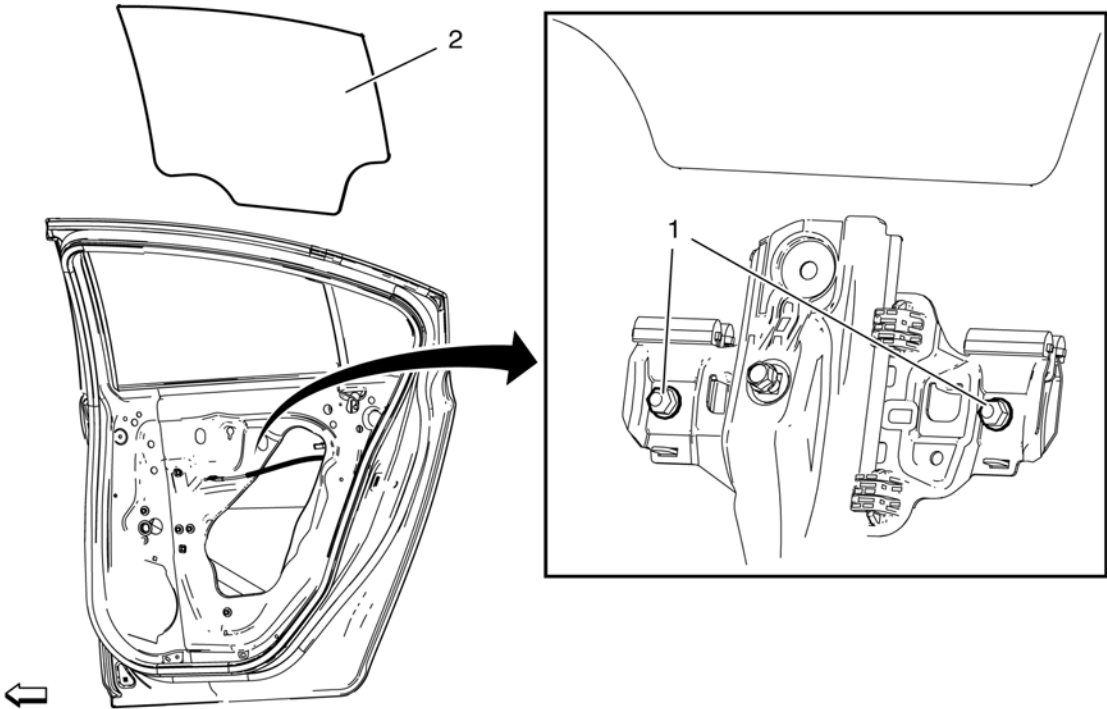
Callout	Component Name
Preliminary Procedure - Position the window approximately half way down in the door. - Remove the water deflector. Refer to Front Side Door Water Deflector Replacement. - Remove the outer sealing strip. Refer to Front Side Door Window Outer Sealing Strip Replacement.	
1	Front Side Door Window Regulator Sash Nut (Qty: 2) Caution: Refer to Fastener Caution in the Preface section. Tighten 9 N·m (80 lb in)
2	Front Side Door Window Procedure - Loosen the window regulator sash nuts, pull upward to release the window from the sash. - Rotate the front door window as necessary to remove it from the door.

Rear Side Door Window Adjustment



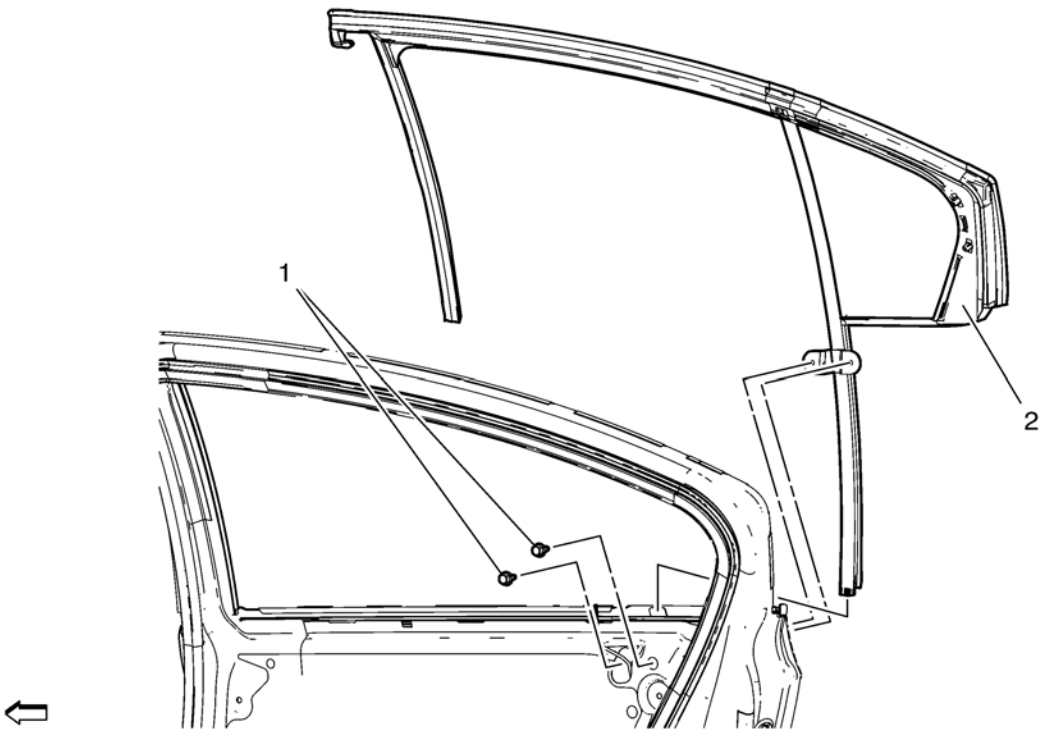
Callout	Component Name
Warning: Refer to Glass and Sheet Metal Handling Warning in the Preface section. Warning: Refer to Express Window Down Warning in the Preface section. Preliminary Procedures 1. Remove the rear side door trim. Refer to Rear Side Door Trim Replacement. 2. Remove the water deflector. Refer to Rear Side Door Water Deflector Replacement.	
1	Rear Side Door Window Regulator Sash Nut (Qty: 2) Caution: Refer to Fastener Caution in the Preface section. Tighten 10 N·m (89 lb in)
2	Rear Side Door Window Procedure 1. Loosen the window regulator sash nuts. 2. Connect the door trim panel wire connector. Note: Start the vehicle to ensure maximum power to the window motor. This is required in order to fully seat the window for adjustment. 3. Start the vehicle. 4. Using the power window switch, raise the window to the full up position. 5. Tighten the rear side door window regulator sash nuts. 6. Inspect for proper window operation and a tight seal. 7. Shut off the vehicle.

Rear Side Door Window Replacement



Callout	Component Name
Preliminary Procedures 1. Position the window approximately half way down in the door. 2. Remove the water deflector. Refer to Rear Side Door Water Deflector Replacement. 3. Remove the outer sealing strip. Refer to Rear Side Door Window Outer Sealing Strip Replacement.	
1	Rear Side Door Window Regulator Sash Nut (Qty: 2) Caution: Refer to Fastener Caution in the Preface section. Tighten 9 N·m (80 lb in)
2	Rear Side Door Window Procedure 1. Loosen the window regulator sash nuts, pull upward to release the window from the sash. 2. Rotate the rear door window as necessary to remove it from the door.

Rear Side Door Stationary Window Replacement



Callout	Component Name
Preliminary Procedures 1. Remove the rear side door trim panel. Refer to Rear Side Door Trim Replacement. 2. Remove the rear side water deflector. Refer to Rear Side Door Water Deflector Replacement. 3. Remove the rear door window outer sealing strip. Refer to Rear Side Door Window Outer Sealing Strip Replacement. 4. Remove the rear side door window. Refer to Rear Side Door Window Replacement.	
1	Rear Side Door Stationary Window Bolt (Qty: 2) Caution: Refer to Fastener Caution in the Preface section. Tighten 8 N·m (71 lb in)
2	Rear Door Stationary Window Tip: Pull the bulb straight from the lamp harness socket.

Rear Window Replacement

Special Tools

- *BO-46974* Glass removal system
- *BO-641* Suction Holder

For equivalent regional tools, refer to [Special Tools](#).

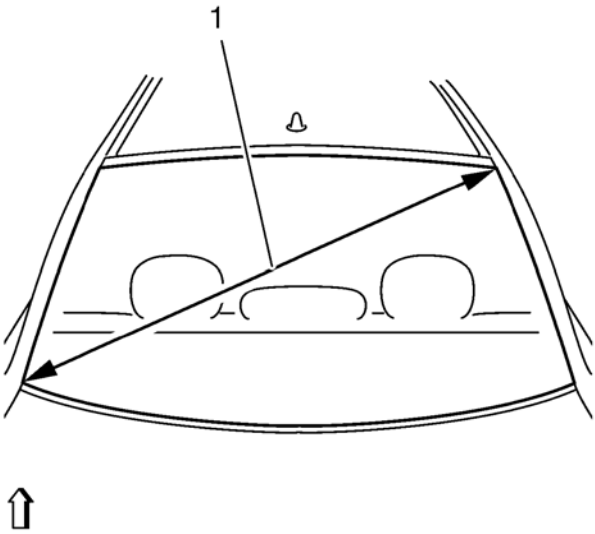
Removal Procedure

Warning: Refer to [Cracked Window Warning](#) in the Preface section.

Warning: Refer to [Glass and Sheet Metal Handling Warning](#) in the Preface section.

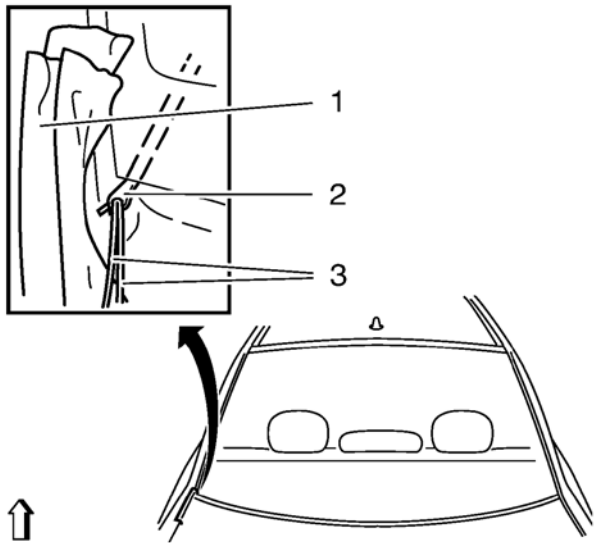
Note: Position the vehicle on level ground and move the front wheels to the straight-ahead position.

1. Disconnect battery.
2. Remove quarter window garnish molding. Refer to [Windshield Garnish Molding Replacement](#).
3. Disconnect the rear window radio antenna connector.
4. Disconnect the electrical connectors from the rear window defogger bus bars.
5. Cover the following parts to protect from the broken glass:
 - Upper dash pad
 - Seats and carpeting



6. Use *BO-46974* system to remove the rear window.
7. Take the diagonal measurement (1) of the rear window.
8. Cut cutting wire into four times lengths.

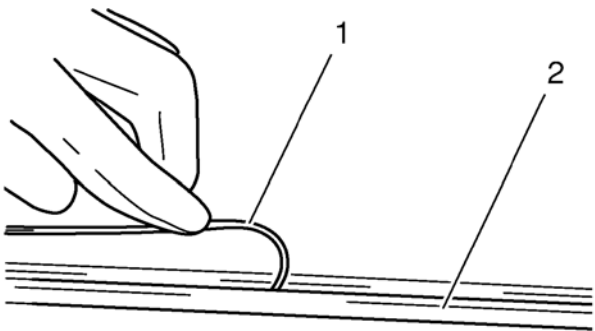
Approximately 5400 mm (212.597 in), the circumference of the corresponding roll of wire is approximately 1000 mm (39.369 in).



9. Heat the awl with a suitable tool.
10. Stick the awl through the adhesive bed in the area of the lower C-pillar (1).

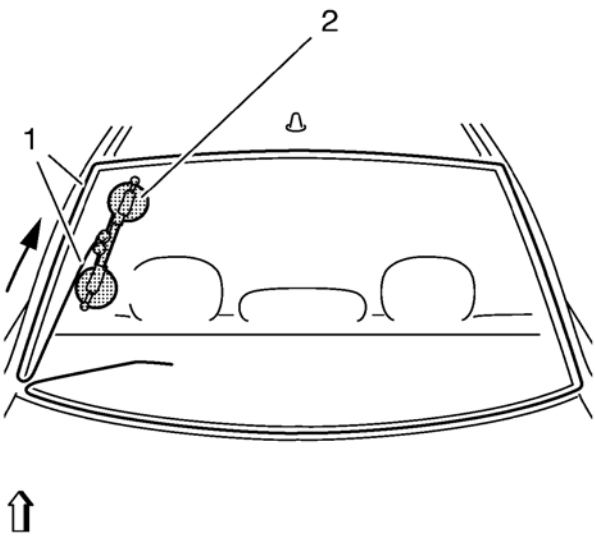
Note: Ensure that the rear window is not damaged in the process. Otherwise, stress cracks could form in the rear window. Mask off the area with fabric tape (1).

11. Pull the wire through.
 - Thread both ends of the cutting wire (3) in the bores of the piercing awl (2) and bend them.
 - Use the piercing awl to pull the cutting wire to the center of the rear window.



12. Lay the wire under the rear window all the way round.
Pull the remaining wire into the interior.

Note: The cutting wire (1) should be rolled in beneath the rubber window seal (2) at the rear window.

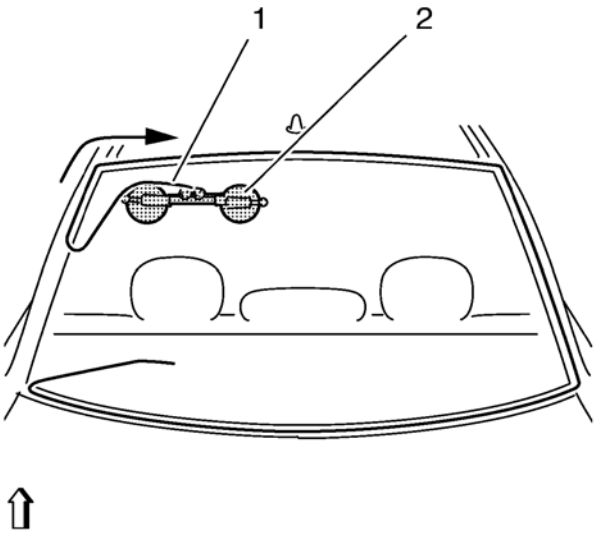


13. Place the winch with two winding heads in the vehicle.

Note: Ensure that the cutting wire is fitted correctly to the winch deflection roller.

- Position the winch vertically at the same height as the C-pillar (2).
- Attach the cutting wire to the winch (1).
- Insert transfer ratchet and pre-tension cutting wire.

14. Cut out rear window.
- Cut out the rear window until the cutting wire is level with the winch.
 - Arrow shows the path taken by the cutting wire.



15. Place the winch with two winding heads in the vehicle.

Note: Ensure that the cutting wire is fitted correctly to the winch deflection roller.

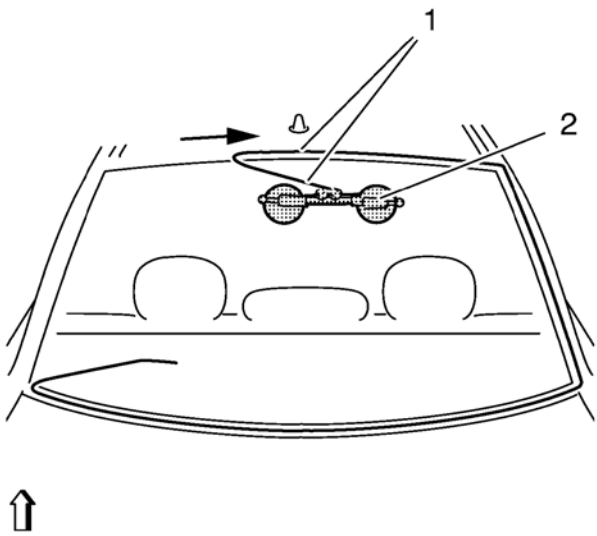
- Position the winch (2) in the area of the roof frame.
- Insert transfer ratchet and pre-tension cutting wire (1).

16. Cut out rear window.

Note: Increased cutting effort is required in the area of the rear window radius.

- Cut out the rear window until the cutting wire is level with the winch.

- Arrow shows the path taken by the cutting wire.
- Cut out the rear window until the cutting wire is level with the winch.



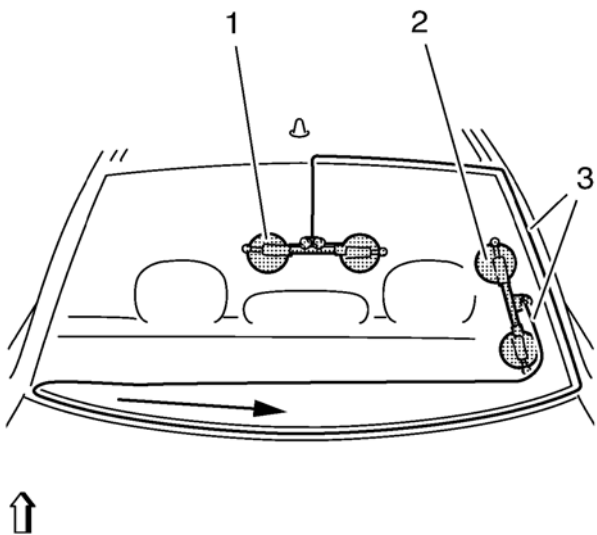
17. Place the winch with two winding heads in the vehicle.

Note: Ensure Check that the cutting wire is laid correctly to the winch deflection roller.

- Position winch in the middle area of rear window (2).
- Insert transfer ratchet and pre-tension cutting wire (1).

18. Cut out rear window.

- Cut out the rear window until the cutting wire is level with the winch.
- Arrow shows the path taken by the cutting wire.



19. Position the winch with one winding head in the vehicle.

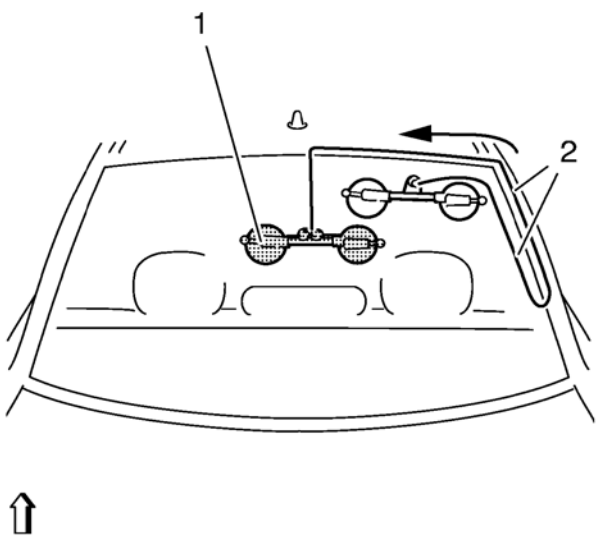
Note: Ensure that the cutting wire is fitted correctly to the winch deflection roller.

- The winch with 2 winding heads (1) stays in the position.
- Position winch with one winding head (2) in the area of the lower C-pillar.
- Thread the second end of the wire (3).
- Insert transfer ratchet and pre-tension cutting wire.

20. Cut out rear window.

Note: Increased cutting effort is required in the area of the rear window radius.

- Cut out the rear window until the cutting wire is level with the winch.
- Arrow shows the path taken by the cutting wire.



21. Position the winch with one winding head in the vehicle.

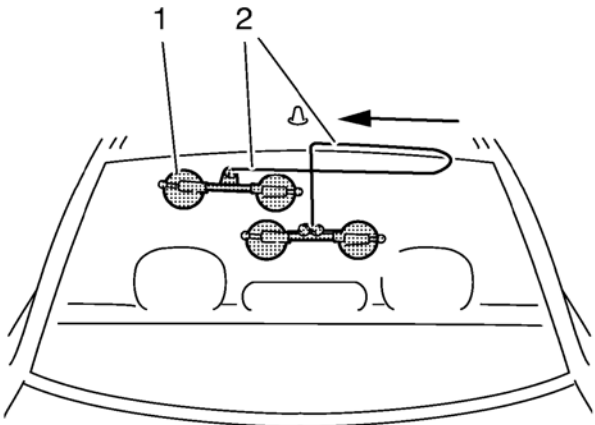
Note: Check that the cutting wire is laid correctly at the winch deflection roller.

- Position the winch with one winding head (1) in the upper area of the rear window.
- Insert transfer ratchet and pre-tension cutting wire (2).

22. Cut out rear window.

Note: Increased cutting effort is required in the area of the rear window radius.

- Cut out the rear window until the cutting wire is level with the winch.
- Arrow shows the path taken by the cutting wire.



23. Position the winch with one winding head in the vehicle.

Note: Increase that the cutting wire is laid correctly to the winch deflection roller.

- Position winch with one winding head (1) next to winch with two winding heads so that the cutting wire crosses (2).
- Insert transfer ratchet and pre-tension cutting wire.

24. Cut out rear window.

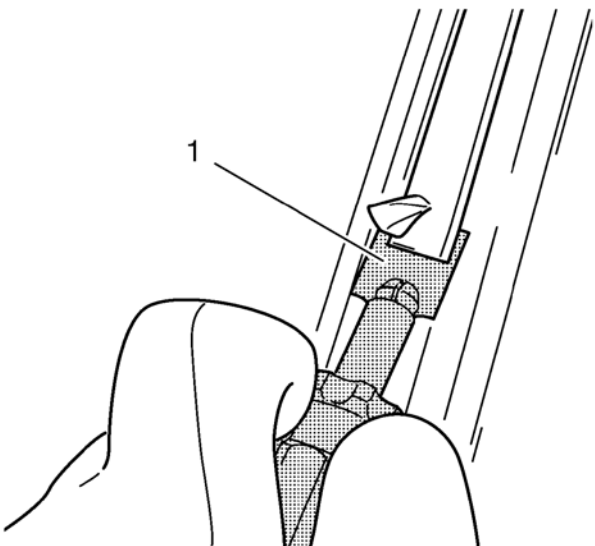
- Cut out the rear window until the cutting wire (2) has cut through the adhesive bed completely.
- Arrow shows the path taken by the cutting wire.

25. Remove glass removal system.

26. Fit BO-641 holder

27. Remove windshield.

Note: Second mechanic required.



28. Cut out the adhesive tape with the knife provided (1) to within 1 mm (0.039 in).

29. Repair any paint damage.

Using a touch-up pen to match the color of the vehicle, repair any paint damage.

30. If the rear window rubber is damaged, replace with a new one.

31. Cut off the adhesive bead on the glass pane.

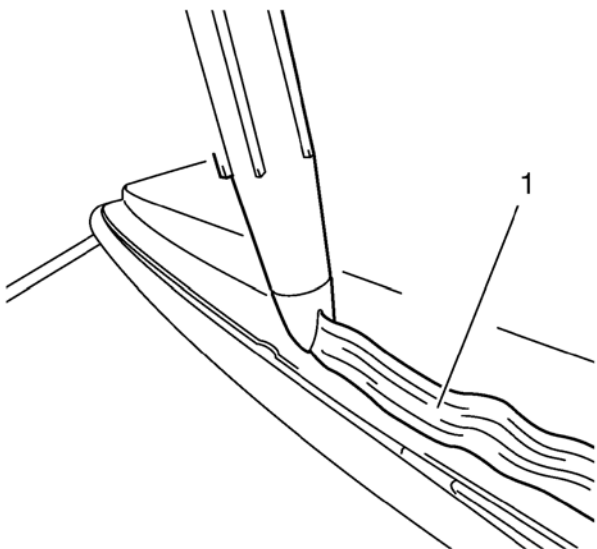
Cut out the adhesive tape with the knife provided (1) to within 1 mm (0.039 in).

Installation Procedure

1. Remove all mounds or loose pieces of urethane adhesive from the pinch-weld area.
2. Inspect for any of the following problems in order to help prevent future breakage of the window:
 - High weld
 - Solder spots
 - Hardened sealer

- Any other obstruction or irregularity in the pinch-weld flange
3. After repairing the opening as indicated, perform the following steps:

Remove all traces of broken glass from the outer cowl panel, seats and floor.



4. Apply adhesive bead (1).

Cut into the tip of the cartridge in such a way that a bead of adhesive approx. 13 mm (0.511 in) thick is produced.

5. Insert rear window.
- Place the rear window at the upper area and lower down.
 - Insert rear window with *BO-641* holder .
 - Second mechanic required.

6. Secure windshield in position with fabric tape.
7. Clean any excess urethane adhesive from the body.
8. Use a soft spray of warm water in order to immediately water test the window.
9. Inspect the window for leaks.

10. If any leaks are found, use a plastic paddle in order to apply extra urethane adhesive at the leak point.

11. Retest the window for leaks.

12. Maintain the following conditions in order to properly cure the urethane adhesive:
- Partially lower a door window in order to prevent pressure buildups when closing doors before the urethane adhesive cures.
 - Do not drive the vehicle until the urethane adhesive is cured. Refer to the above curing times.
 - Do not use compressed air in order to dry the urethane adhesive.

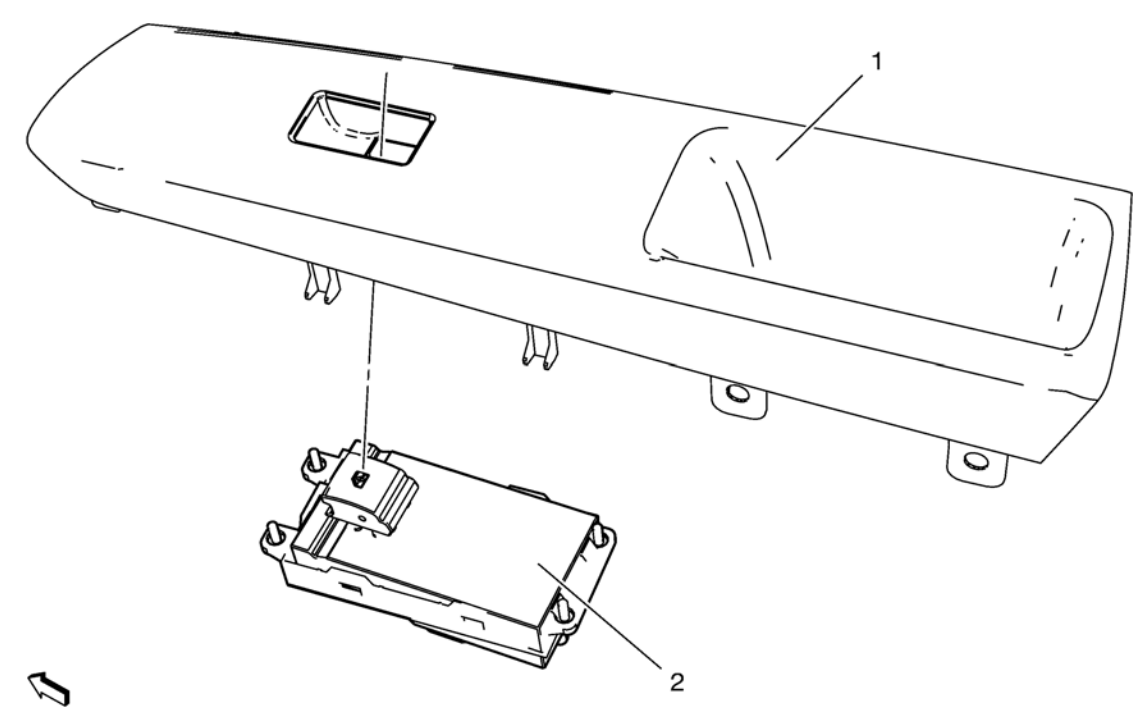
13. Connect the electrical connectors from the rear window defogger bus bars.

14. Connect the rear window radio antenna connector.

15. Install quarter window garnish molding. Refer to [Windshield Garnish Molding Replacement](#)

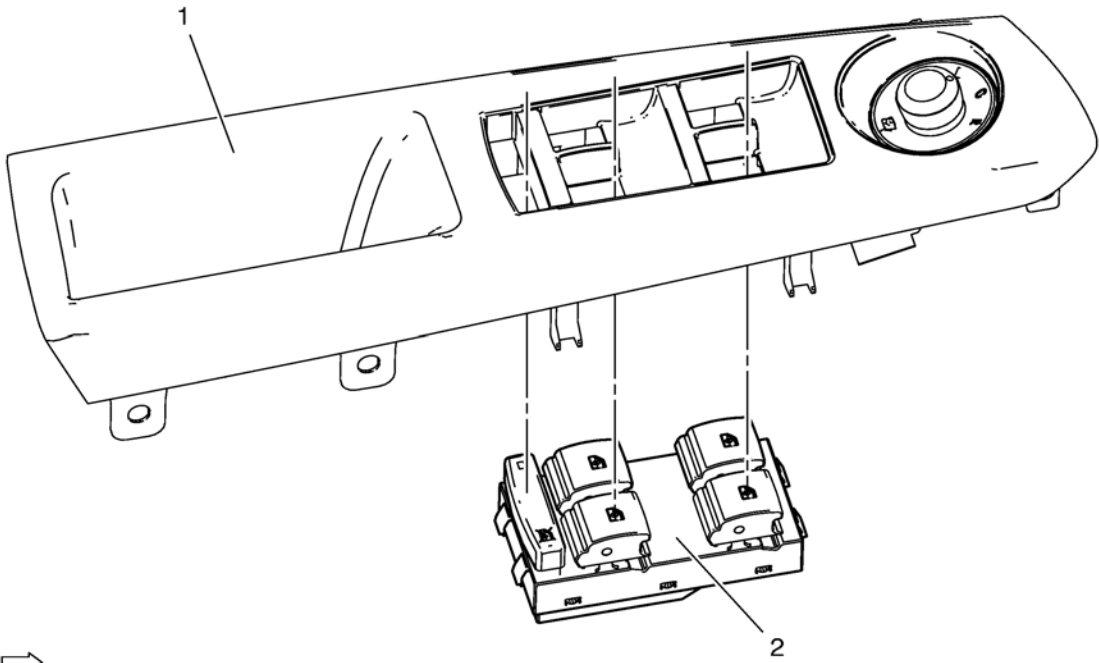
16. Connect battery.

Front Side Door Window Switch Replacement - Right Side



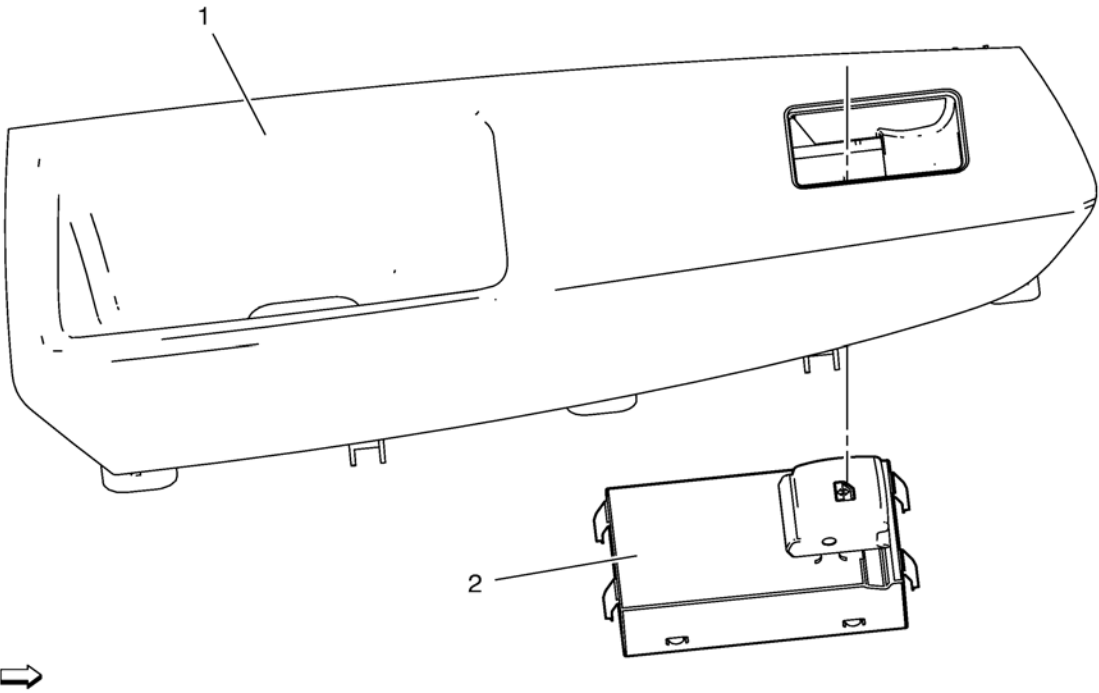
Callout	Component Name
1	Front Side Door Window Switch Bezel Refer to Front Side Door Window Switch Bezel Replacement .
2	Front Side Door Window Switch Assembly Procedure Disconnect electrical connector.

Front Side Door Window Switch Replacement - Left Side



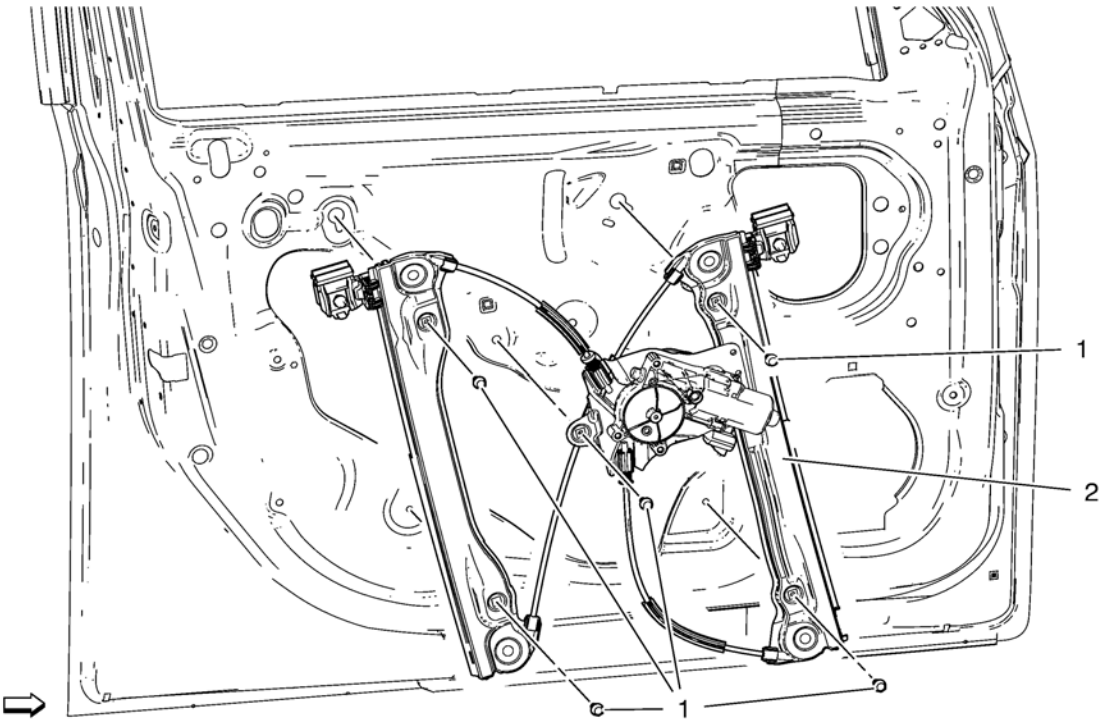
Callout	Component Name
1	Front Side Door Window Switch Bezel Refer to Front Side Door Window Switch Bezel Replacement .
2	Front and Rear Side Door Window Switch Assembly Procedure Disconnect electrical connector.

Rear Side Door Window Switch Replacement



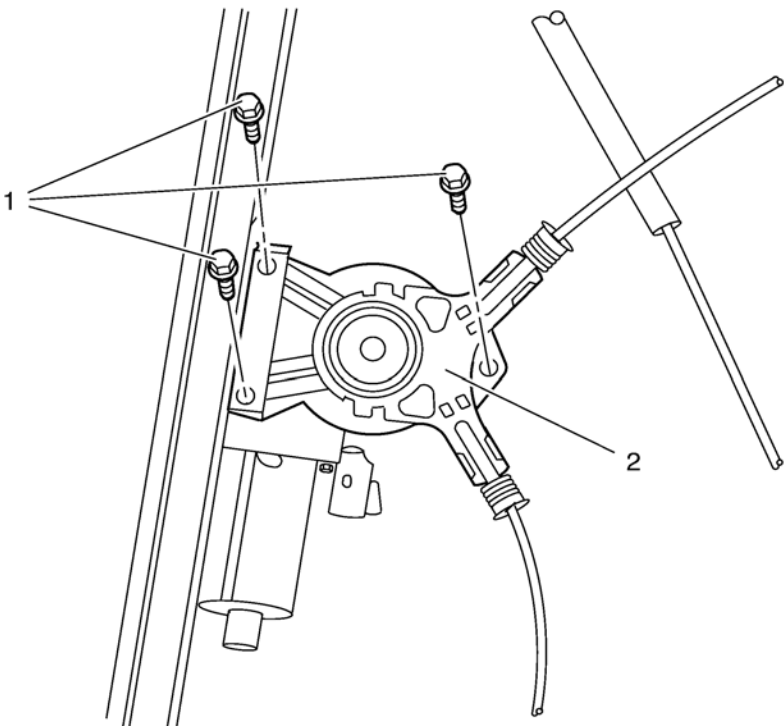
Callout	Component Name
1	Rear Side Door Window Switch Bezel Refer to Rear Side Door Window Switch Bezel Replacement .
2	Rear Side Door Window Switch Assembly Procedure Disconnect electrical connector.

Front Side Door Window Regulator Replacement



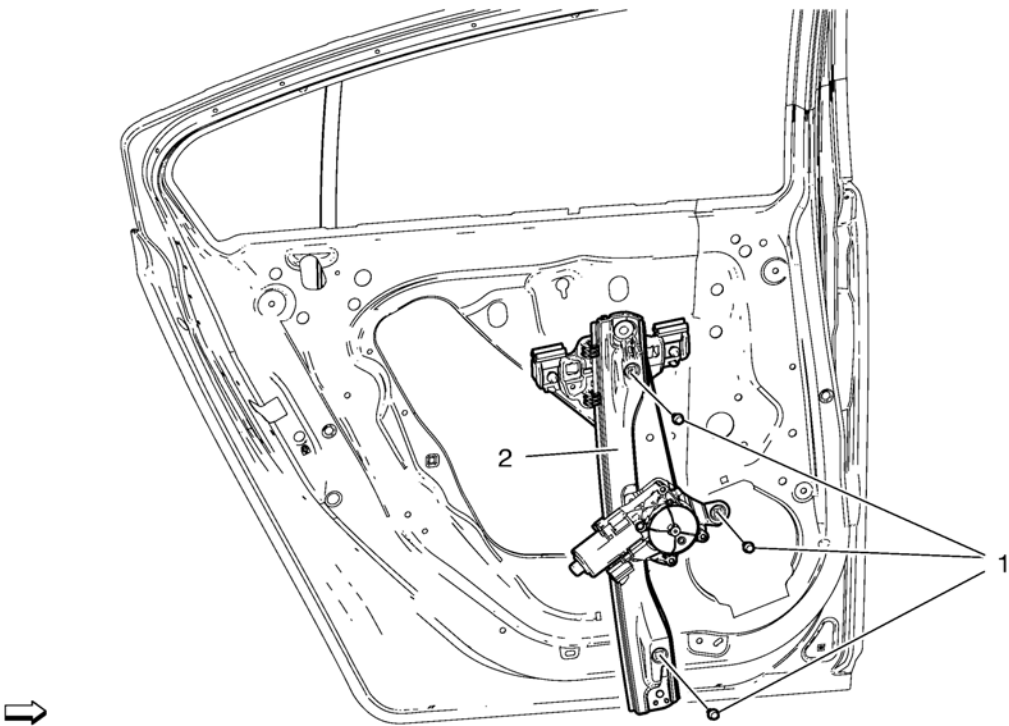
Callout	Component Name
Preliminary Procedure Remove the front side door window. Refer to Front Side Door Window Replacement .	
1	Front Side Door Window Regulator Screw (Qty: 5) Caution: Refer to Fastener Caution in the Preface section. Tighten 9 N·m (80 lb in)
2	Front Side Door Window Regulator Assembly

Front Side Door Window Regulator Motor Replacement



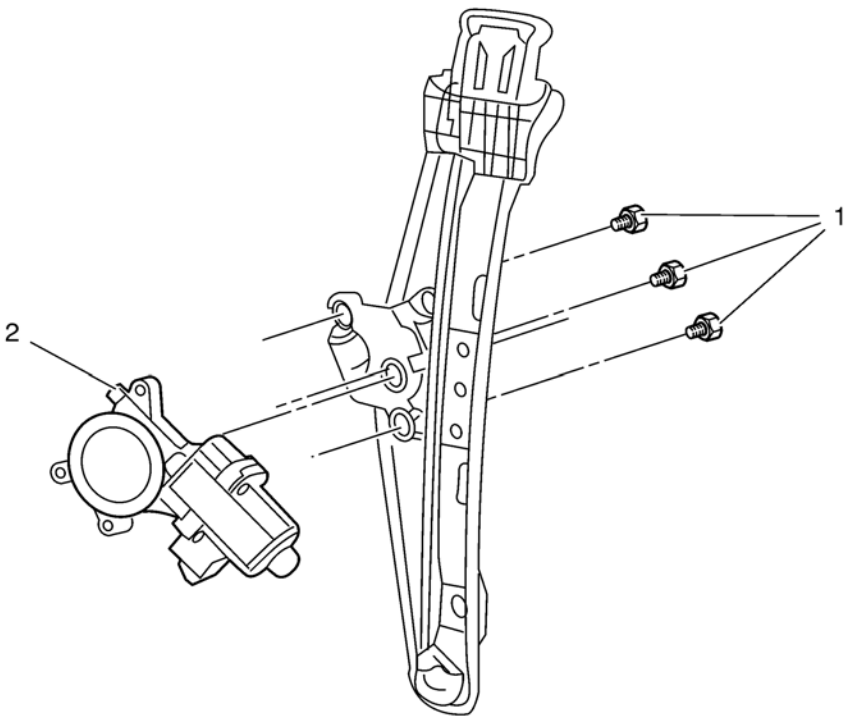
Callout	Component Name
Preliminary Procedure Remove the front side door window regulator. Refer to Front Side Door Window Regulator Replacement .	
1	Front Side Door Window Regulator Motor Screw (Qty: 3) Caution: Refer to Fastener Caution in the Preface section. Tighten 9 N·m (80 lb in)
2	Front Side Door Window Regulator Motor Assembly

Rear Side Door Window Regulator Replacement



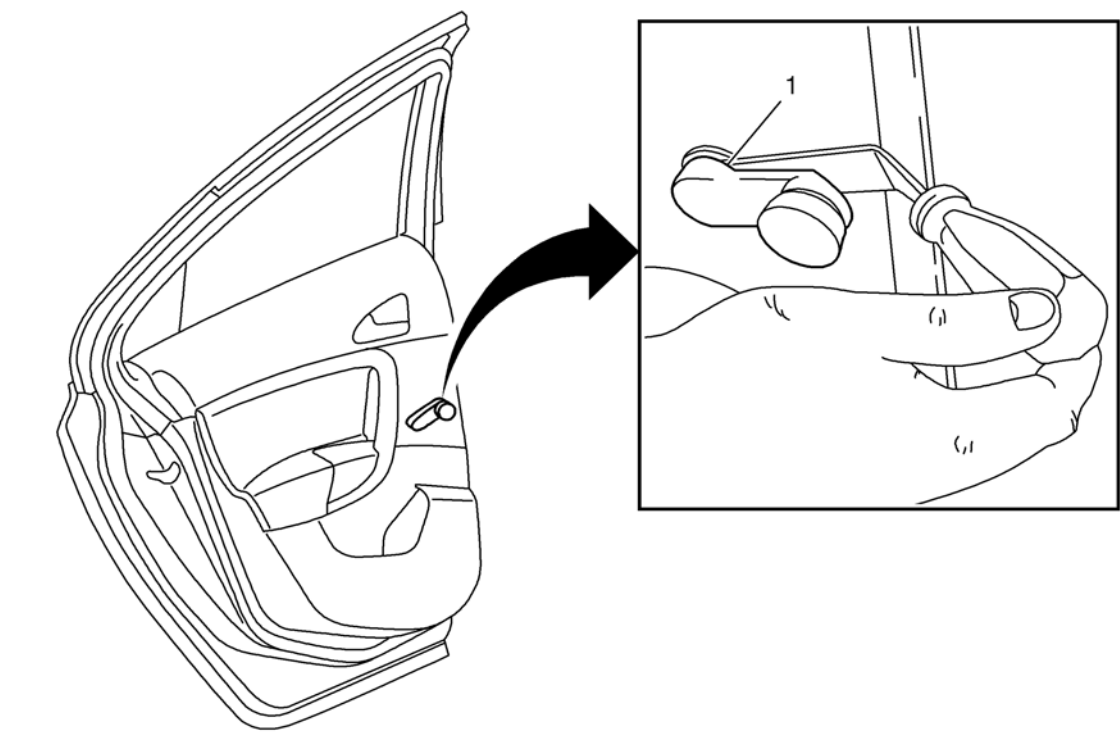
Callout	Component Name
Preliminary Procedure Remove the rear side door window. Refer to Rear Side Door Window Replacement .	
1	Rear Side Door Window Regulator Screw (Qty: 3) Caution: Refer to Fastener Caution in the Preface section. Tighten 9 N·m (80 lb in).
2	Rear Side Door Window Regulator Assembly

Rear Side Door Window Regulator Motor Replacement



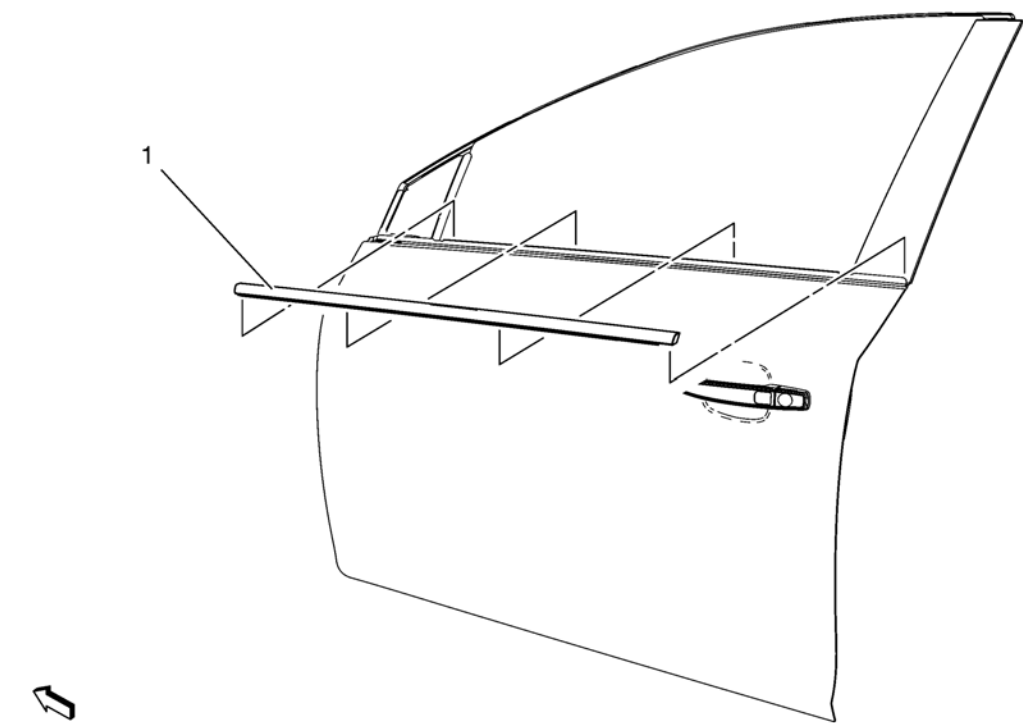
Callout	Component Name
Preliminary Procedure Remove the rear side door window regulator. Refer to Rear Side Door Window Regulator Replacement .	
1	Rear Side Door Window Regulator Motor Screw (Qty: 3) Caution: Refer to Fastener Caution in the Preface section. Tighten 9 N·m (80 lb in)
2	Rear Side Door Window Regulator Motor Assembly

Rear Side Door Window Regulator Handle Replacement



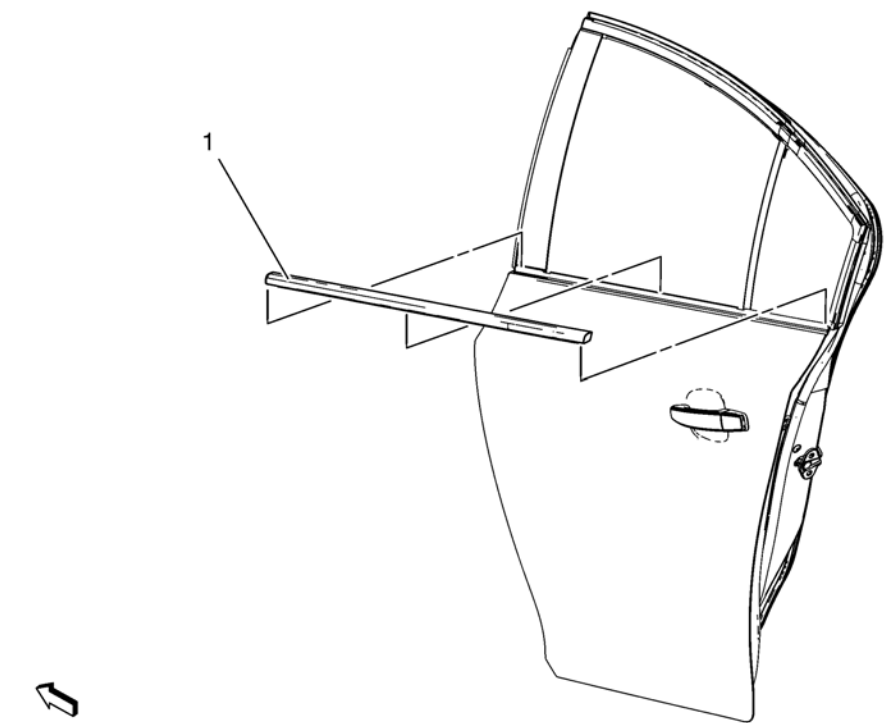
Callout	Component Name
1	Rear Side Door Crank Clamp Procedure Use a <i>BO-317-B</i> remover aid in the removal of the rear side door crank. Special Tools <i>BO-317-B</i> Remover For equivalent regional tools, refer to Special Tools.

Front Side Door Window Outer Sealing Strip Replacement



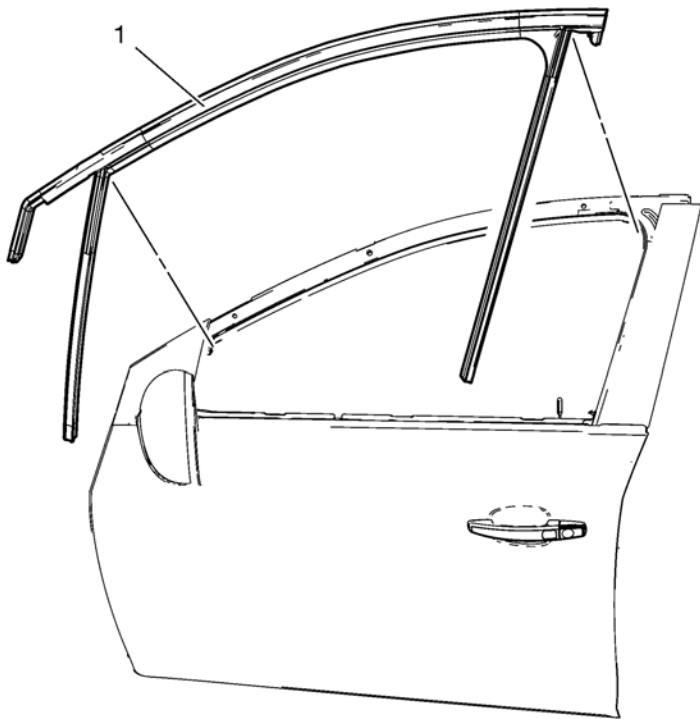
Callout	Component Name
1	Front Side Door Window Outer Sealing Strip Assembly

Rear Side Door Window Outer Sealing Strip Replacement



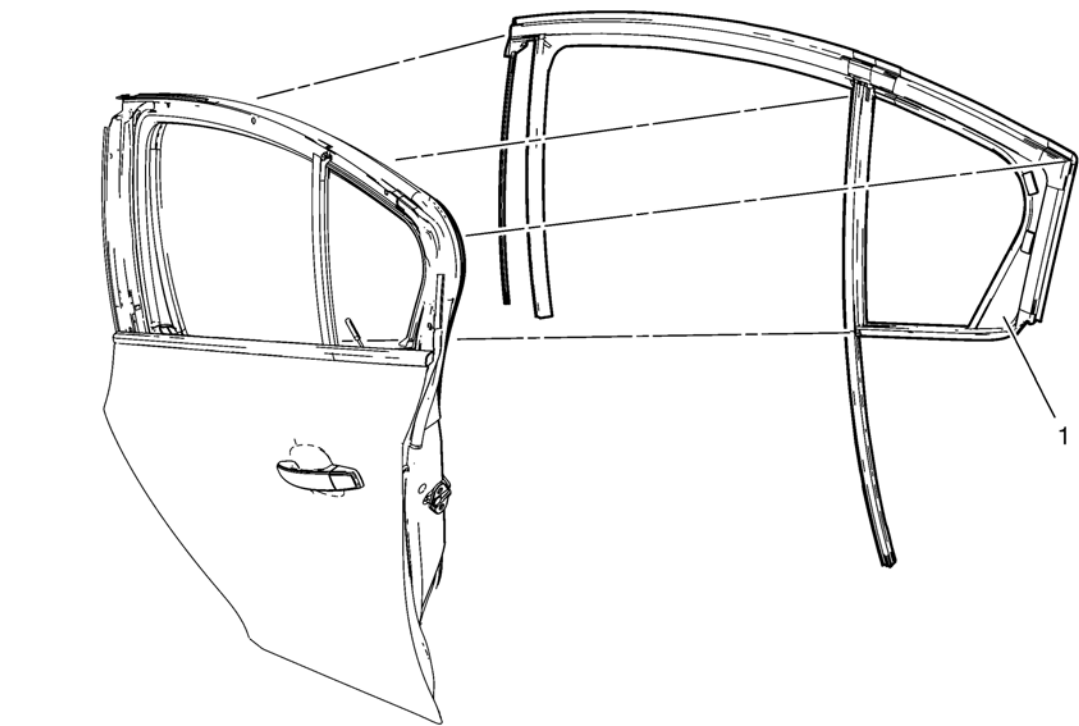
Callout	Component Name
1	Rear Side Door Window Outer Sealing Strip Assembly

Front Side Door Window Weatherstrip Replacement



Callout	Component Name
Preliminary Procedure 1. Remove the outside rearview mirror. Refer to Outside Rearview Mirror Replacement . 2. Remove the front side door window frame rear cover. Refer to Front Side Door Window Frame Rear Cover Replacement .	
1	Front Side Door Window Weatherstrip Procedure Pull the front side door window weatherstrip away from the outer window flange to remove.

Rear Side Door Window Weatherstrip Replacement



Callout	Component Name
Preliminary Procedure 1. Remove the rear side door stationary window. Refer to Rear Side Door Stationary Window Replacement. 2. Remove the rear side door window frame front cover. Refer to Rear Side Door Window Frame Front Cover Replacement.	
1	Rear Side Door Window Weatherstrip Procedure Pull the rear side door window weatherstrip away from the outer window flange to remove.

Adhesive Service Kit Description

Use the urethane adhesive for replacement of any urethane adhesive-installed windows.

Use these materials based on specific manufacturer.

Do NOT intermix primers or adhesives from one manufacturer to another.

Always follow the system manufacturer's instructions for application, handling, and curing.

Power Windows Description and Operation

Power Windows System Components

The power window system consists of the following components:

- Driver window switch
- Passenger window switch
- Left rear window switch
- Right rear window switch
- Window motors in each of the doors
- F24UA 30A Fuse
- F55UA 7.5A Fuse
- F21UA 7.5A Fuse
- Body control module (BCM)

Power Window System

This vehicle can be configured as follows:

- Driver and passenger express up and express down power windows and manual crank rear windows.
- Driver express up and express down power window motor and passenger, left rear, right rear express down window motors
- All doors with express up and express down window motors

Driver and Passenger Express Up and Express Down Power Windows With Manual Crank Rear Windows

The driver and passenger doors contain smart motors that will detect excessive resistance while performing the express up function and automatically reverse direction to prevent injury to any occupants that may become trapped between the closing window and the door frame. The automatic reverse safety feature can be overridden by pulling and holding the window switch.

The logic circuit within the window motors monitor the up, down and express signal circuits which are normally equal to B+ voltage. When a switch is used on the driver or passenger switch, the contacts close causing a voltage drop within the appropriate signal circuit. The window motor will detect the voltage drop and will command the window to move in the direction requested.

Driver Express Up and Express Down Power Window Motor and Passenger, Left Rear, Right Rear Express Down Window Motors

The driver door contains a window motor is smart motor that will detect excessive resistance while performing the express up function and automatically reverse direction to prevent injury to any occupants that may become trapped between the closing window and the door frame. The automatic reverse safety feature can be overridden by pulling and holding the window switch.

The logic circuit within the driver window motor monitors the up, down and express signal circuits which are normally equal to B+ voltage. When a switch is used on the driver window switch, the contacts close causing a voltage drop within the appropriate signal circuit. The window motor will detect the voltage drop and will command the window to move in the direction requested.

For the passenger, right rear and left rear doors, when their window switch is pressed in the down position, battery positive voltage is applied to their respective window motor control circuit and ground to the other window motor control circuit causing that window to open. When the individual window switch is pulled in the up position, voltage and ground is applied to the window motor in the opposite direction causing that window to close. The return path to ground is supplied through the inactive control circuit being normally grounded through the window switch.

Each window switch communicates to the BCM by a serial data circuit. When the driver wishes to control the passenger, left rear or right rear window, the driver will use the appropriate switch on the driver window switch. When this switch is used, a serial data message is sent to the BCM requesting a window motor command, the BCM will then send a serial data message to the appropriate door window switch which will then command that window to move in the direction requested.

All Doors with Express Up and Express Down Window Motors

The driver and passenger, left rear and right rear doors contain smart motors that will detect excessive resistance while performing the express up function and automatically reverse direction to prevent injury to any occupants that may become trapped between the closing window and the door frame. The automatic reverse safety feature can be overridden by pulling and holding the window switch.

The logic circuit within the window motors monitor the up, down and express signal circuits which are normally equal to B+ voltage. When a switch is used on the driver, passenger, left rear or right rear window switch, the contacts close causing a voltage drop within the appropriate signal circuit. The window motor will detect the voltage drop and will command the window to move in the direction requested.

Each window motor communicates to the body control module (BCM) by a serial data circuit. When the driver wishes to control the passenger, left rear or right rear window, the driver will use the appropriate switch on the driver window switch. When this switch is used, a serial data message is sent to the BCM requesting a window motor command, the BCM will then send a serial data message to the appropriate window motor which will then move in the direction requested.

Lockout Switch Feature

The driver power window switch contains a window lockout switch, when the driver presses the window lockout switch, a serial data message is sent to the BCM which will send a disable command to the rear window switches, deactivating them. The rear windows will still function normally from the switches on the driver window switch.

Rear Window Defogger Description and Operation

Rear Window Defogger System Components

The rear window defogger system consists of the following components:

- HVAC Control Module
- HVAC Control Head
- Rear Window Defogger Relay
- Rear Defogger Grid
- F28UA 40A Fuse

Rear Window Defogger Operation

The rear defog control system utilizes a single zone backlight design, driven with a single relay configuration. Additionally, up to two outside rear view mirrors can be heated if required. A switch for the customer to control the system is provided within the HVAC control head. Also included in the HVAC control head is an indicator to inform the customer with the current state of the system. The system is only operational when engine is running or during remote start.

Pressing the heated rear window switch on the HVAC control face plate causes the HVAC control head to send a serial data message to the HVAC control module requesting rear window defog operation. The HVAC control module upon receipt of the serial data message will provide voltage to the coil side of the rear window defogger relay, this will energize the relay causing the relay switch contacts to close allowing B+ voltage to flow through the rear defogger grid control circuit to the rear defogger grid.

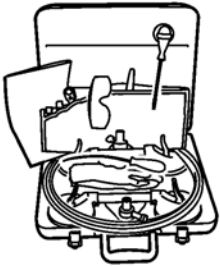
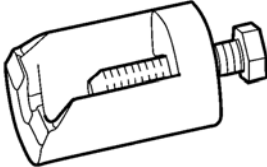
When the rear heated window switch is pressed and the engine is running, the rear defog control system will remain active for 10 minutes. After the initial cycle has lapsed, pressing the switch again will continue rear window defogger operation, but the cycle will only last 5 minutes. The rear defog control system will function continuously if the vehicle speed is greater than 70 kilometers per hour (45 mph).

Stationary Window Description

Most stationary windows, specifically windshields, are retained to the body with urethane adhesive which adheres the window to the body. This increases structural integrity. The reinstallation of windows with urethane adhesive requires complete replacement of the urethane adhesive bead:

The extended method (also known as long method, full strip or full cut) is the only recommended procedure for General Motors Vehicle.

Special Tools

Illustration	Tool Number / Description
	BO-569-A KM-569-A Plug Lifter
	BO-641 MKM-641 30 14 107 Suction Holder
	BO-46974 82 93 714 Glass Removal System
	BO-6626 KM-6626 Wiper Arm Puller
	DT-6459-B MKM-J-6459-B Torque Wrench
	GE-604-D MKM-604-D Torx Bit and Socket Set



Select a Document:

-  [Specifications](#)
-  [Schematic and Routing Diagrams](#)
-  [Horn Replacement](#)
-  [Steering Wheel Horn Contact Replacement](#)
-  [Horn System Description and Operation](#)

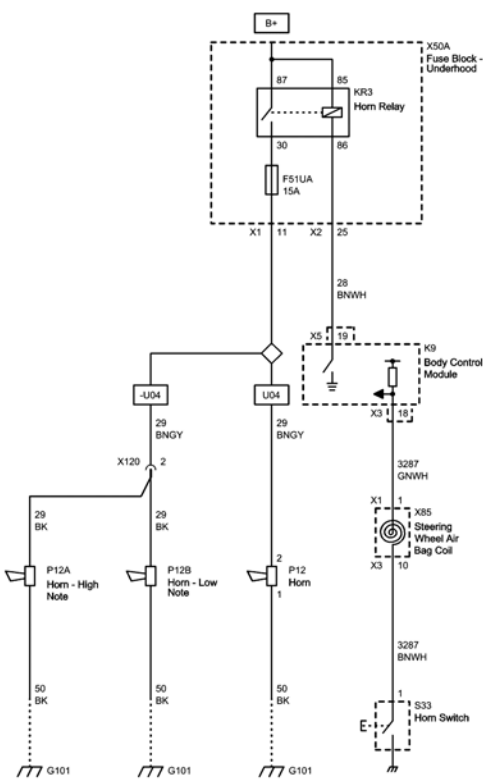


Fastener Tightening Specifications

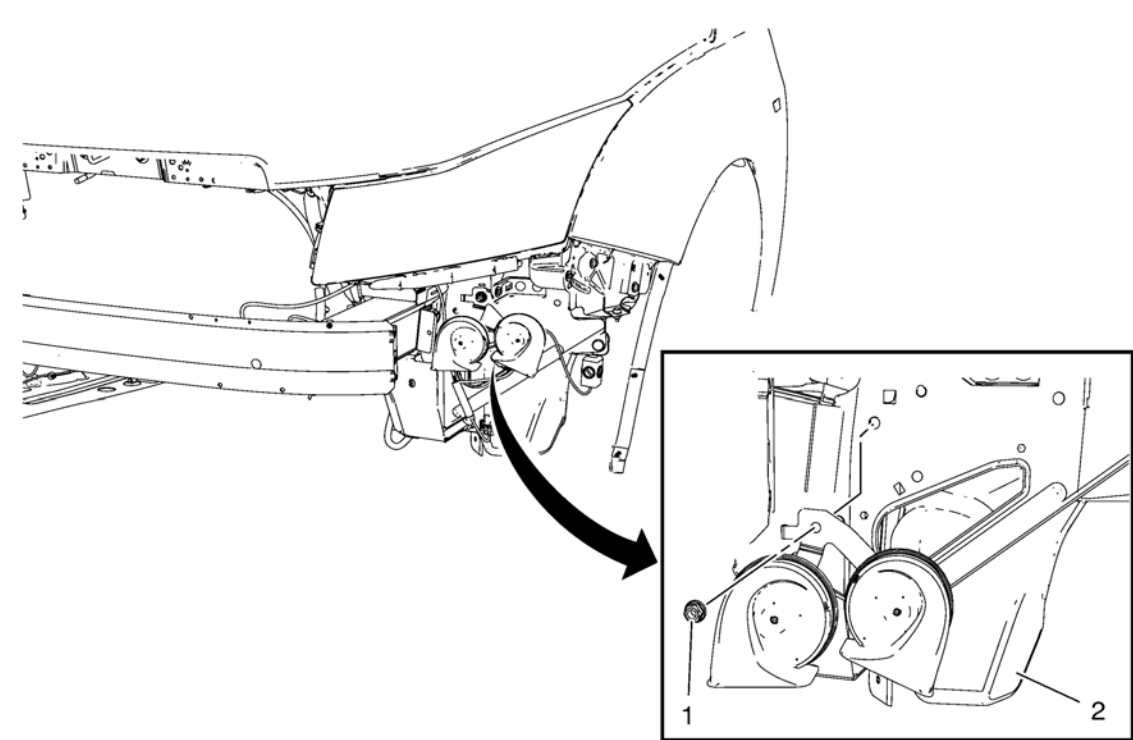
Application	Specification	
	Metric	English
Horn Nut	17 N·m	13 lb ft
Steering Wheel Horn Contact Bolt	5.5 N·m	49 lb in

Horn Schematics

Horn

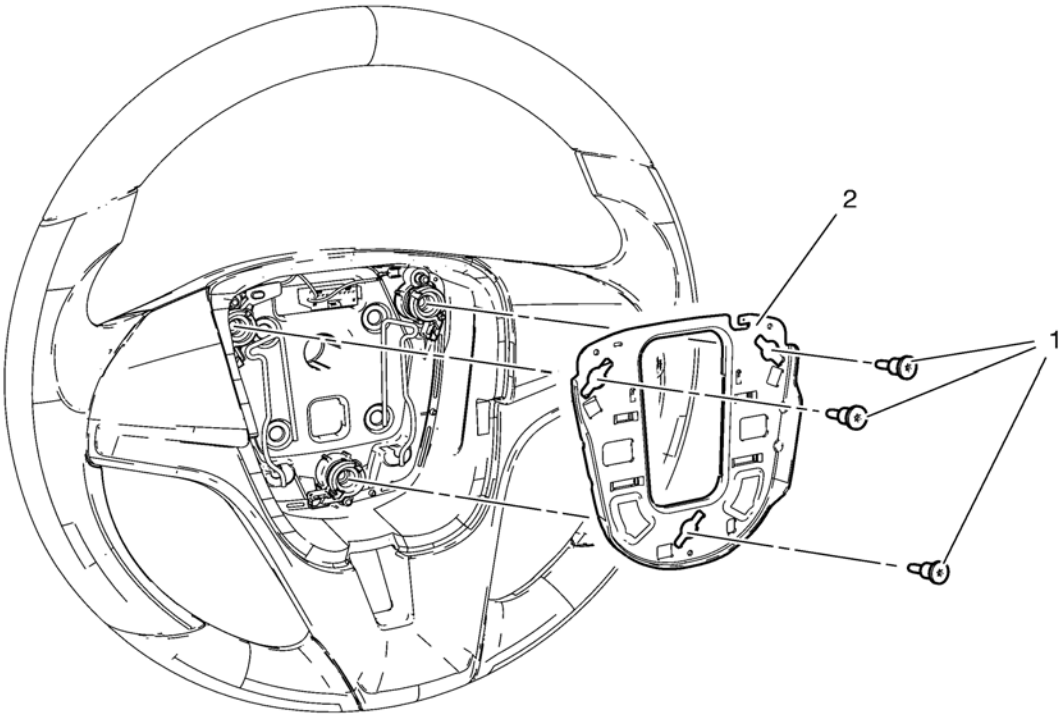


Horn Replacement



Callout	Component Name
Preliminary Procedure Remove the front bumper fascia. Refer to Front Bumper Fascia Replacement .	
1	Horn Nut Caution: Refer to Fastener Caution in the Preface section. Tighten 17 N·m (13 lb ft)
2	Horn Tip Disconnect electrical connectors.

Steering Wheel Horn Contact Replacement



Callout	Component Name
Preliminary Procedure Remove inflatable restraint steering wheel module. Refer to Steering Wheel Inflatable Restraint Module Replacement .	
1	Steering Wheel Horn Contact Bolt (Qty: 3) Caution: Refer to Fastener Caution in the Preface section. Tighten 5.5 N·m (49 lb in)
2	Steering Wheel Horn Contact Tip Disconnect the electrical connector.

Horns System Description and Operation

System Description

The horn system consists of the following components:

- F51UA 15A fuse
- Underhood fuse block (contains a non-serviceable PCB Horn relay)
- Horn switch
- Horn
- Body control module (BCM)

System Operation

- The vehicle horn is activated whenever the horn switch is depressed.
- The BCM commands the horns ON under any of the following conditions:
 - When the content theft deterrent system detects a vehicle intrusion--For further information refer to [Content Theft Deterrent \(CTD\) Description and Operation](#).
 - When the keyless entry system is used to lock the vehicle, a horn chirp may sound to notify the driver that the vehicle has been locked. The notification feature may be enabled or disabled through personalization. For further information refer to [Keyless Entry System Description and Operation](#).

Circuit Operation

The BCM controls the horn operation, when the horn switch is pressed, it closes a switch pulling the horn signal circuit low. When the BCM detects the drop in voltage in the horn switch signal circuit, it energizes the PCB Horn relay which provides B+ voltage to the horn control circuit, sounding the horn.

When the vehicle is in the Off Power Mode the BCM will attempt to detect a stuck or continuously activated horn switch. When enabled, activation of the horn will be limited to 10 seconds to protect the horn from excessive use.

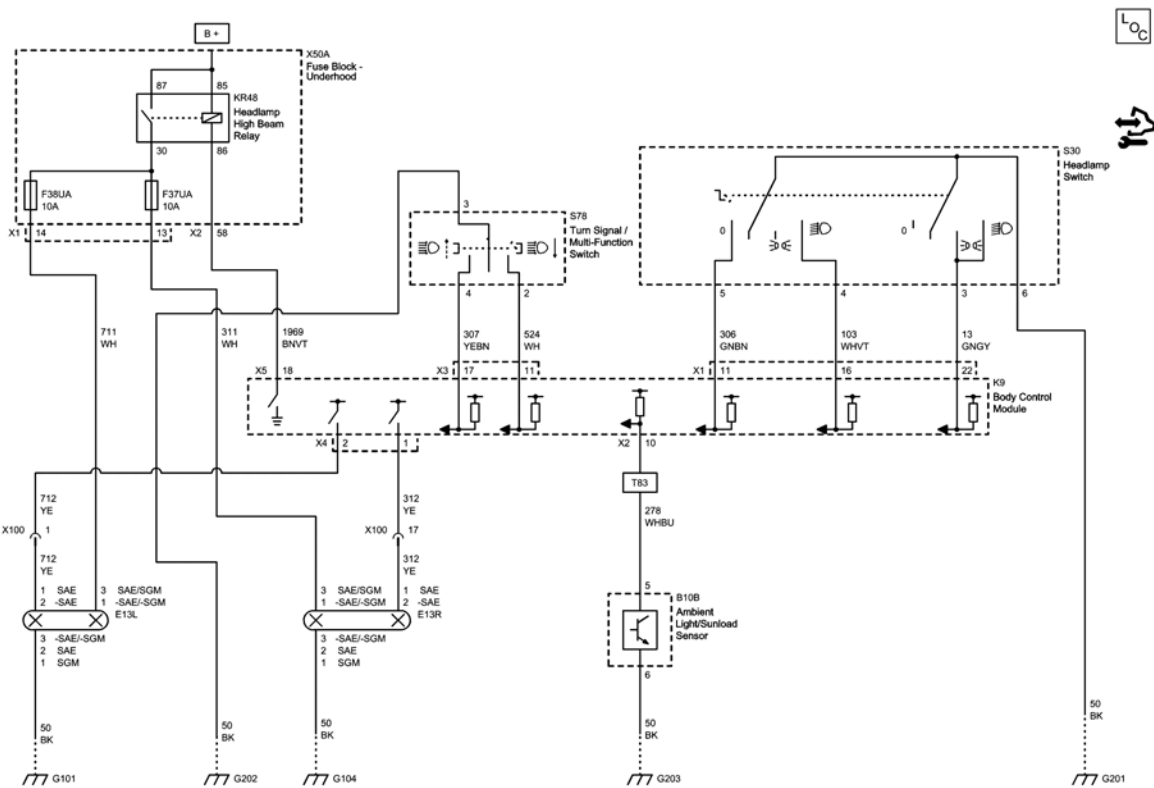
Select a Document:

-  [Specifications](#)
-  [Headlights/Daytime Running Lights \(DRL\) Schematics](#)
-  [Fog Lights Schematics](#)
-  [Exterior Lights Schematics](#)
-  [Interior Lights Schematics](#)
-  [Brake Pedal Position Sensor Calibration](#)
-  [Brake Pedal Position Sensor Replacement](#)
-  [Headlamp Switch Replacement \(Right Hand Drive\)](#)
-  [Fog Lamp Switch Replacement \(Right Hand Drive\)](#)
-  [Hazard Warning Switch Replacement](#)
-  [Instrument Panel Lamp Dimmer Switch Replacement \(Right Hand Drive\)](#)
-  [Reading Lamp Bulb Replacement](#)
-  [Dome and Reading Lamp Lens Replacement](#)
-  [Dome Lamp Replacement](#)
-  [Dome Lamp Bulb Replacement](#)
-  [Headlamp Replacement](#)
-  [Headlamp Bulb Replacement](#)
-  [Headlamp Aiming](#)
-  [Front Fog Lamp Replacement](#)
-  [Front Fog Lamp Bulb Replacement](#)
-  [Fog Lamp Aiming](#)
-  [Front Side Turn Signal Lamp Replacement](#)
-  [Front Side Turn Signal Lamp Bulb Replacement](#)
-  [High Mount Stop Lamp Replacement](#)
-  [Backup Lamp Replacement](#)
-  [Backup Lamp Bulb Replacement](#)
-  [Forward Lamp Wiring Harness Replacement](#)
-  [Rear License Plate Lamp Replacement](#)
-  [Tail Lamp Replacement](#)
-  [Tail Lamp Bulb Replacement](#)
-  [Exterior Lighting Systems Description and Operation](#)
-  [Interior Lighting Systems Description and Operation](#)
-  [Special Tools and Equipment](#)

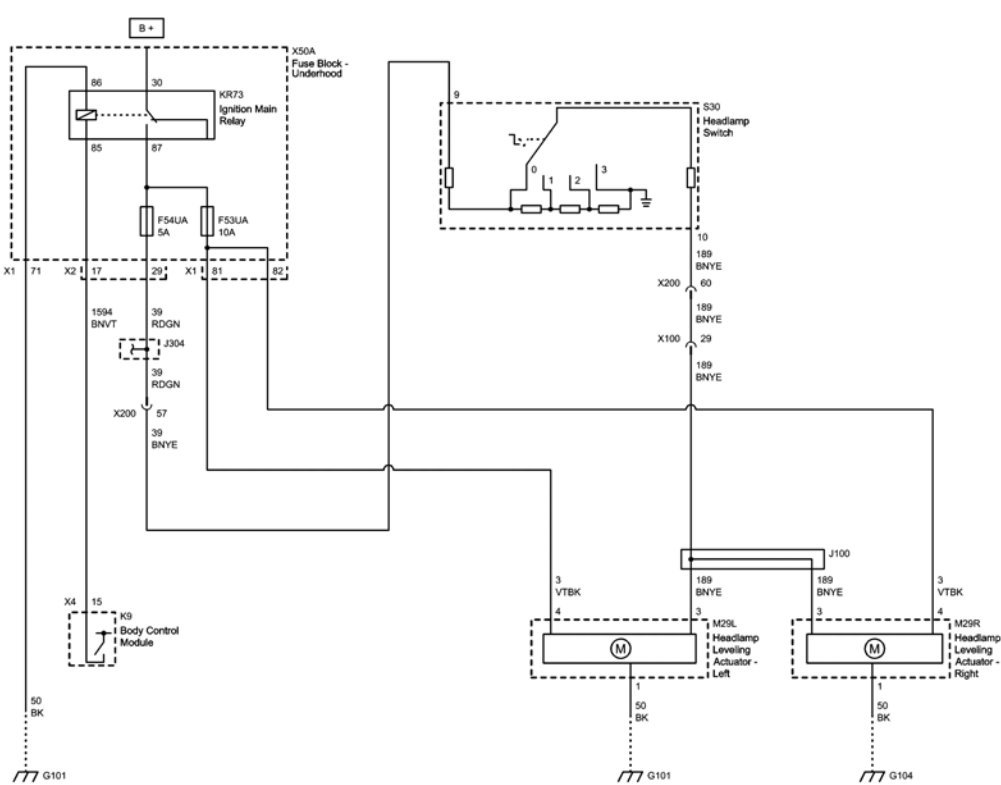
Fastener Tightening Specifications

Application	Specification	
	Metric	English
Brake Pedal Position Sensor Bolt	2 N·m	18 lb in
Front Fog Lamp Bolt	2.5 N·m	22 lb in
Headlamp Bolt	2.5 N·m	22 lb in
Rear License Plate Lamp Screws	3 N·m	27 lb in
Tail Lamp Bolt	2.5 N·m	22 lb in
Tail Lamp Nut	5 N·m	44 lb in

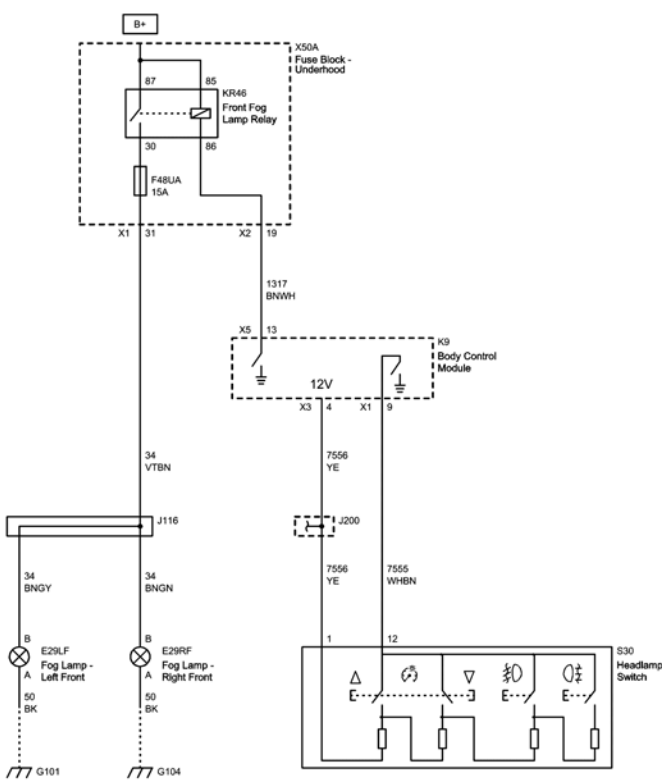
Headlights



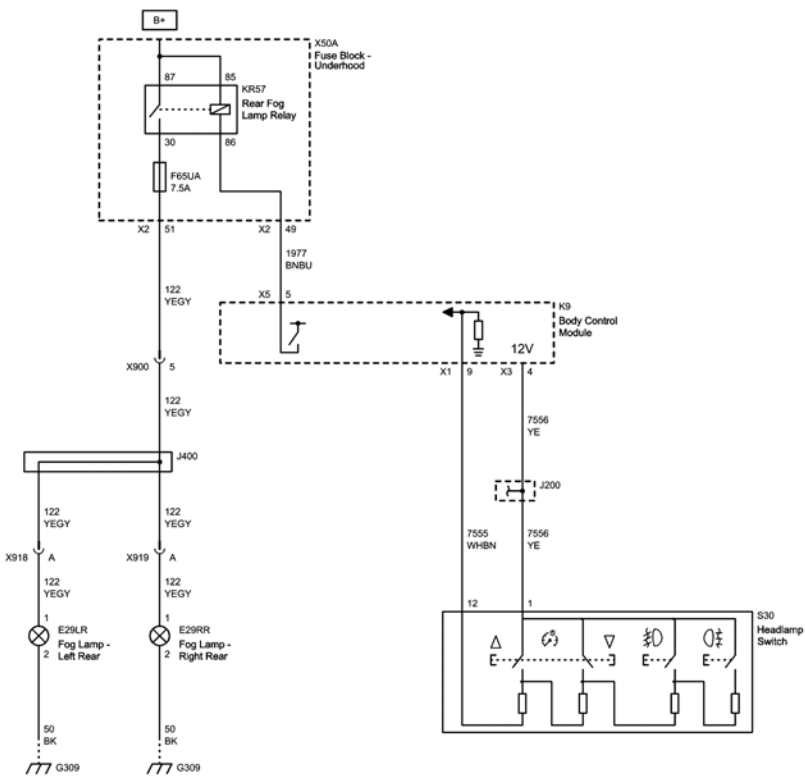
Headlight Leveling



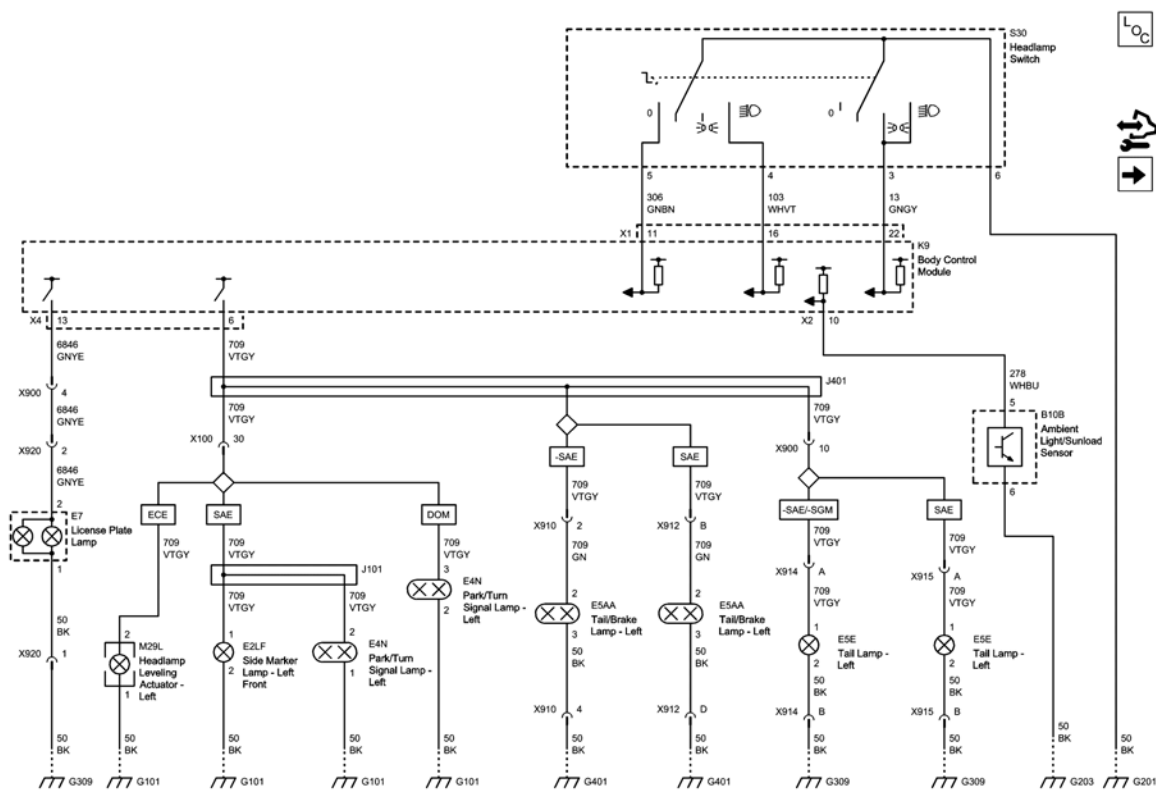
Front Fog Lamps



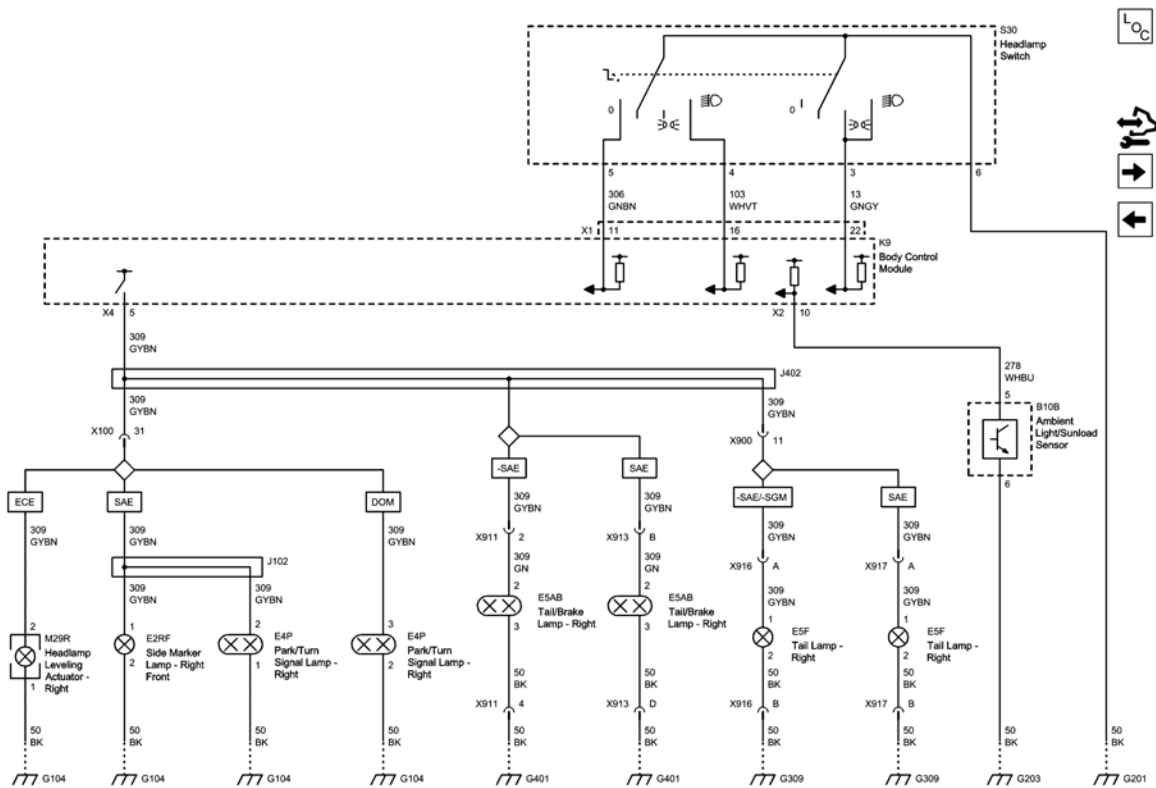
Rear Fog Lamps



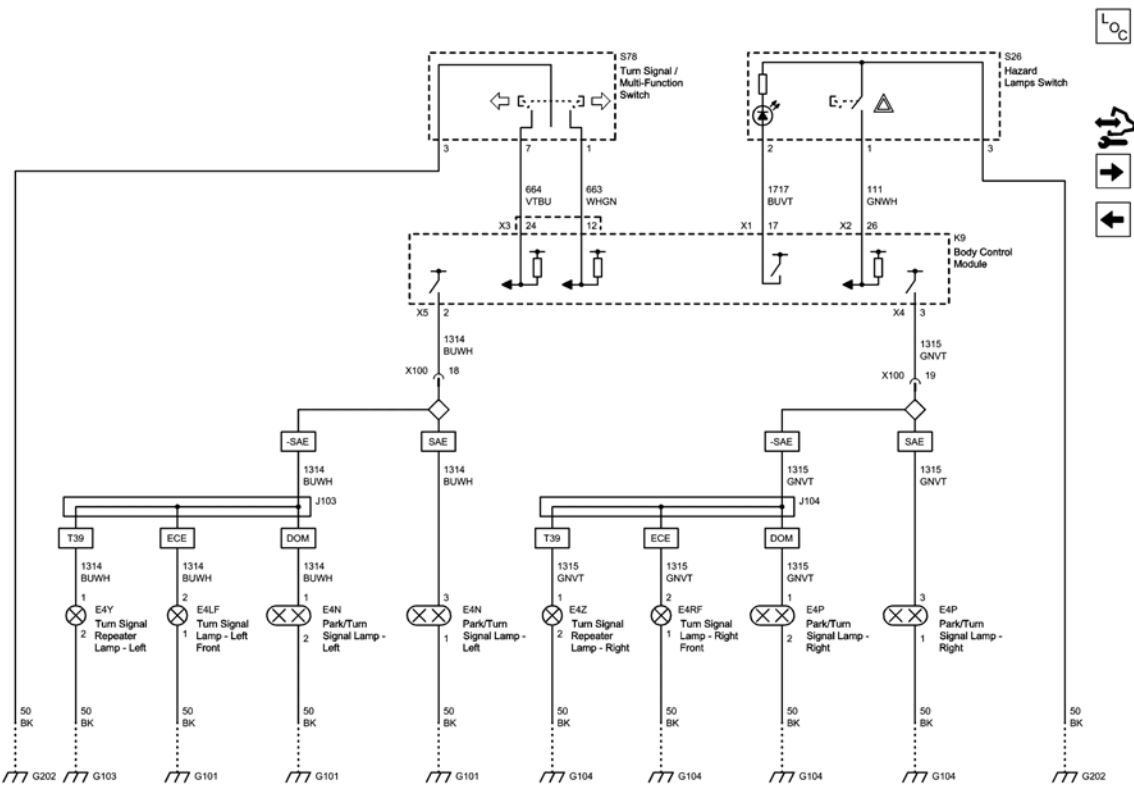
Park Lamps (1 of 2)



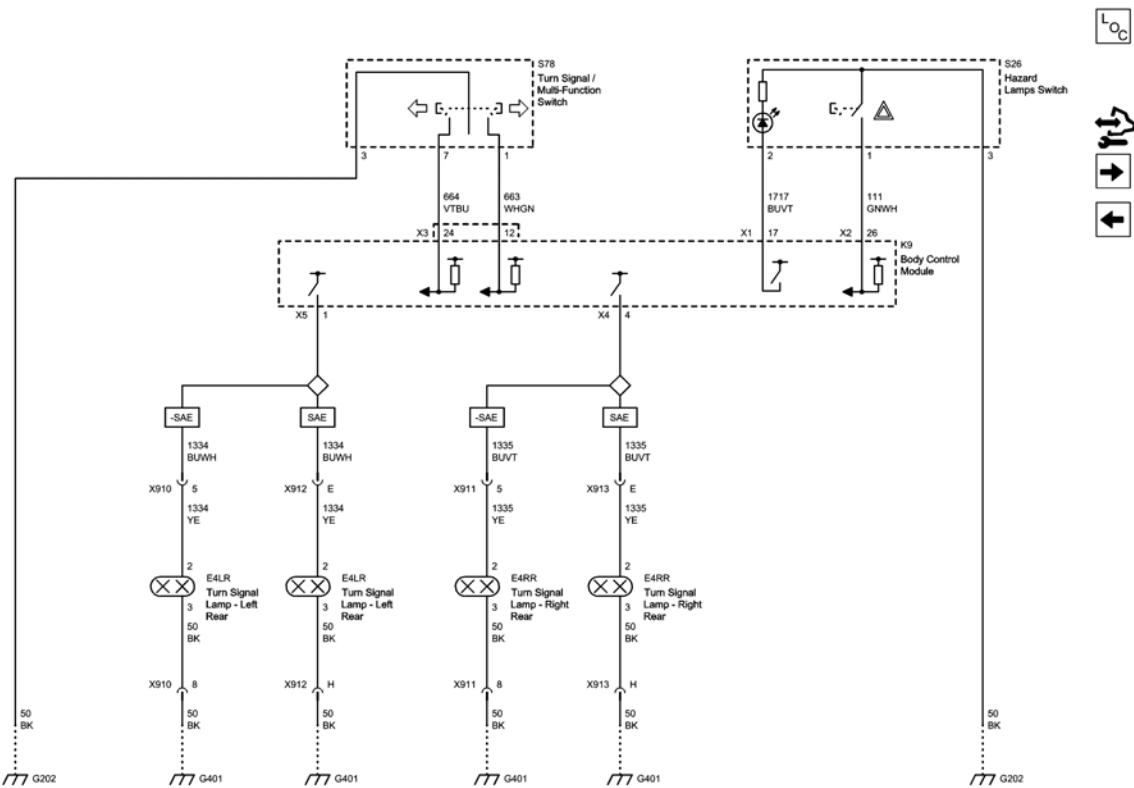
Park Lamps (2 of 2)



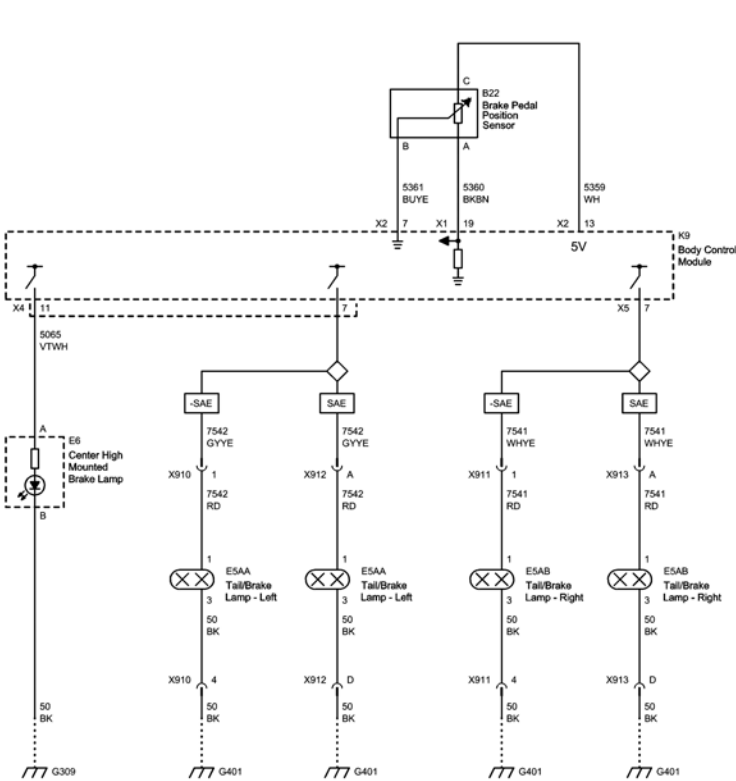
Turn Signal Lamps (1 of 2)



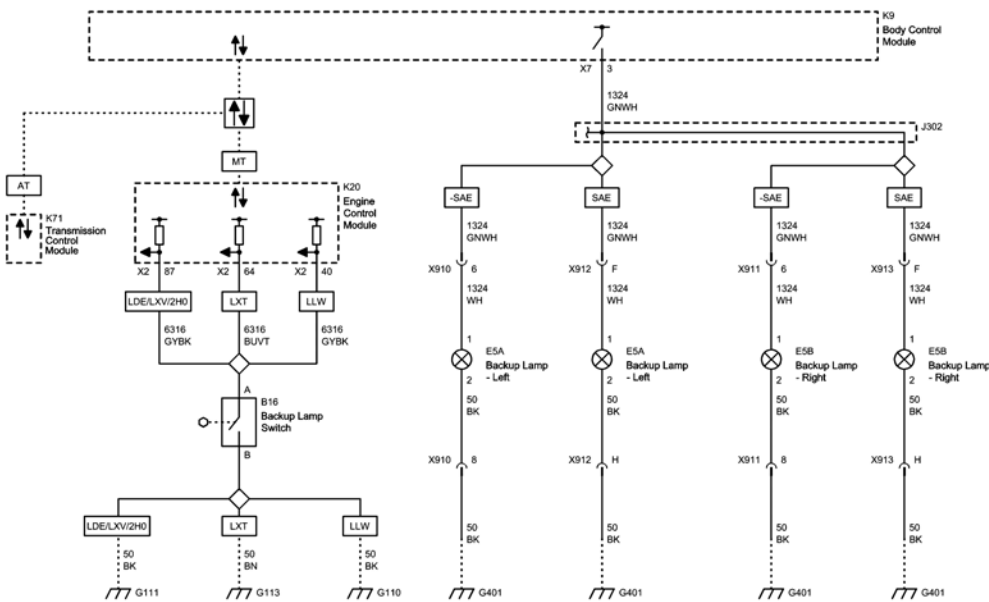
Turn Signal Lamps (2 of 2)



Stop Lamps

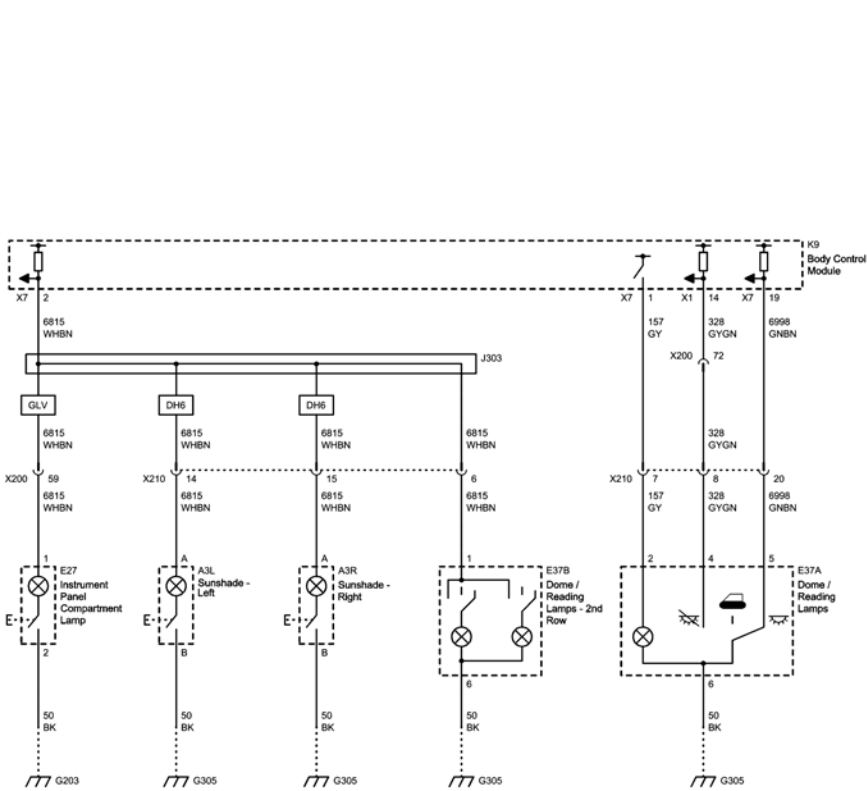


Backup Lamps

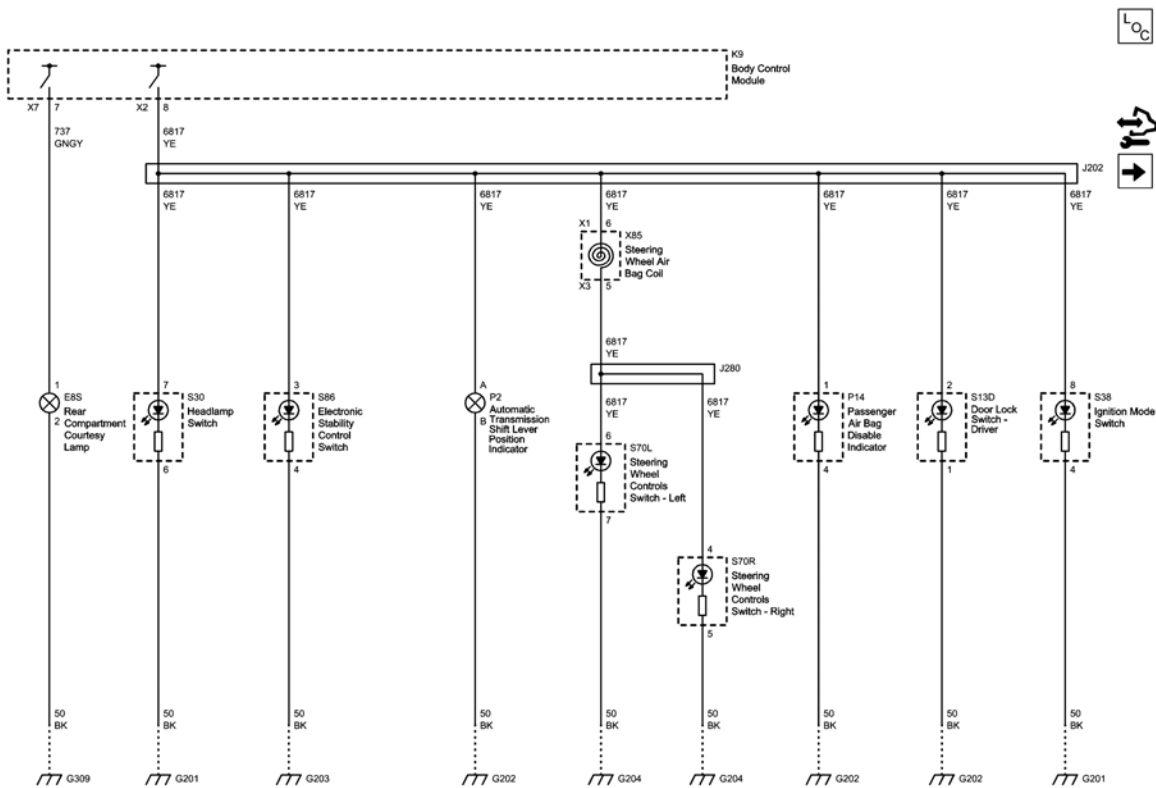


Interior Lights Schematics

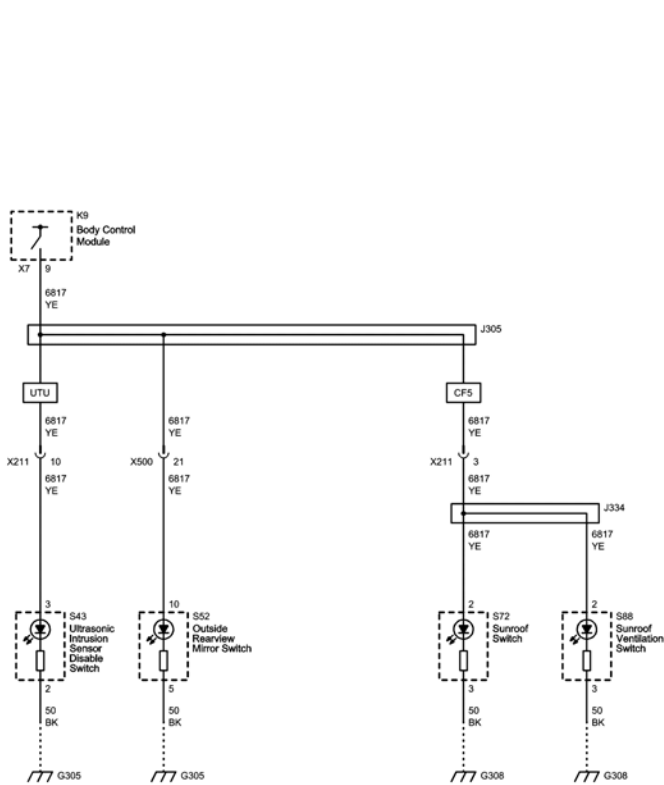
Dome and Reading, Sunshade and Glovebox Lamps



Illumination Lights Body (1 of 2)



Illumination Lights Body (2 of 2)



Brake Pedal Position Sensor Calibration

Calibration Criteria

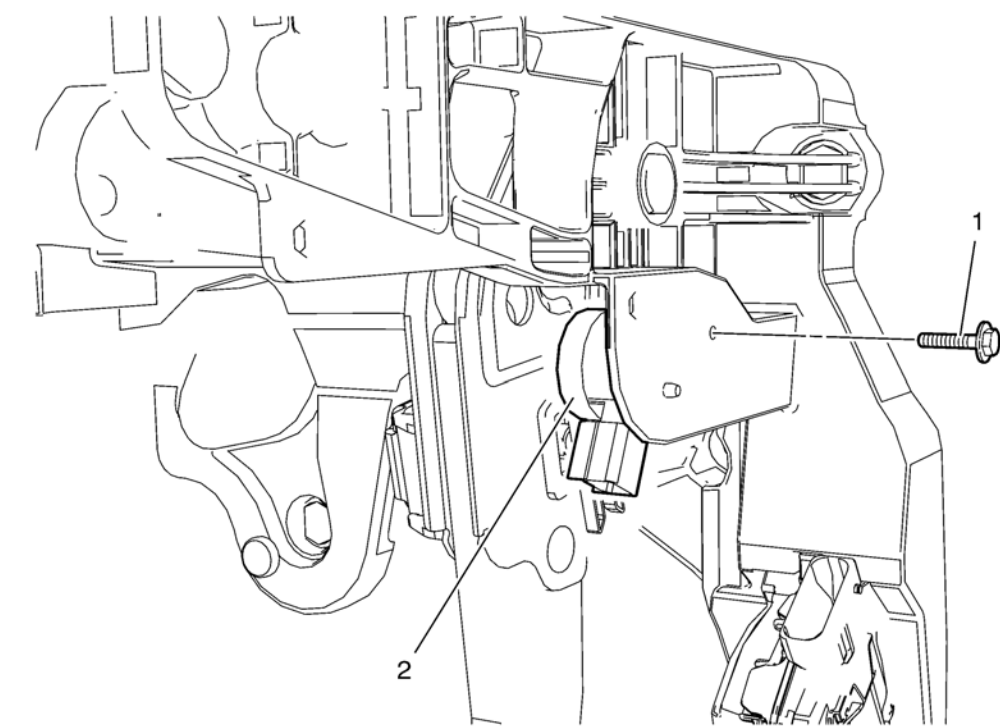
Note: Do not apply the brake pedal during the brake pedal position (BPP) sensor calibration procedure. Any movement of the brake pedal during this procedure will cause the calibration procedure to fail. If this occurs, the sensor calibration must be repeated.

Brake pedal position (BPP) sensor calibration must be performed after the sensor or body control module (BCM) have been serviced. The calibration procedure will set the sensor home value. This value is used by the BCM to determine the action of the driver applying the brake system and to provide this information to the vehicle subsystems via serial data.

Calibration Procedure

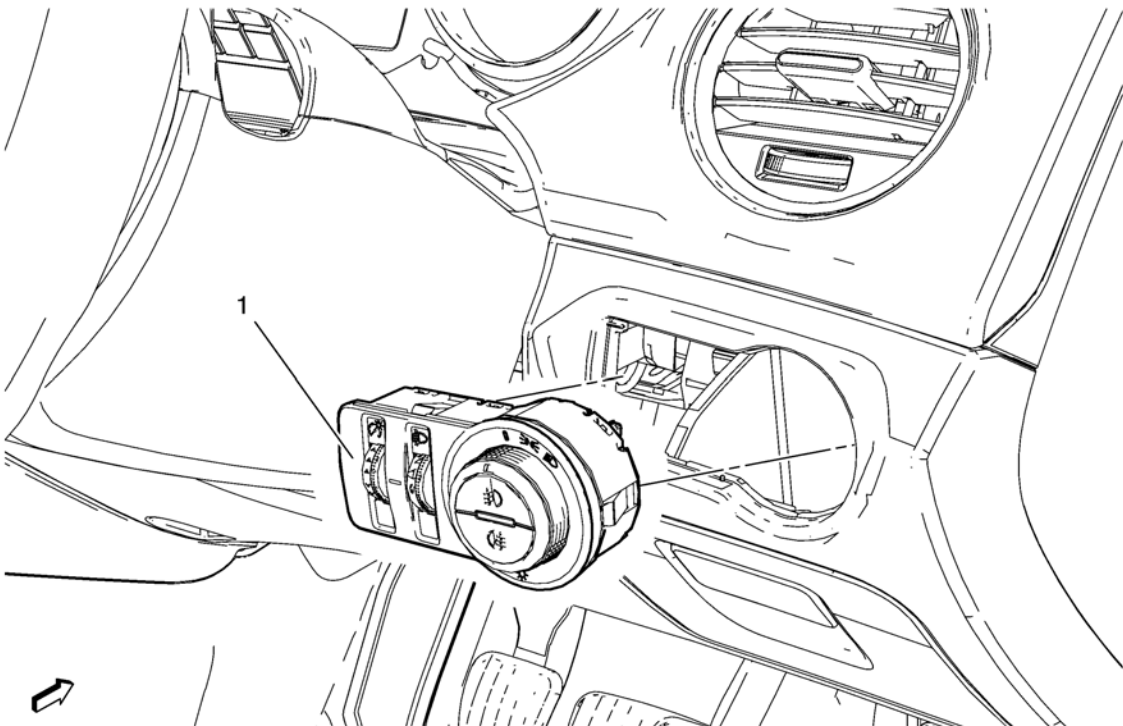
1. Apply the parking brake.
2. Place the transmission in the PARK position.
3. Install a scan tool.
4. Clear all BCM DTCs before proceeding.
5. Navigate to the Vehicle Control Systems menu.
6. Select Module Setup menu item.
7. Select BCM menu item.
8. Select the BPP Sensor Calibration procedure and follow the directions displayed on the screen.

Brake Pedal Position Sensor Replacement



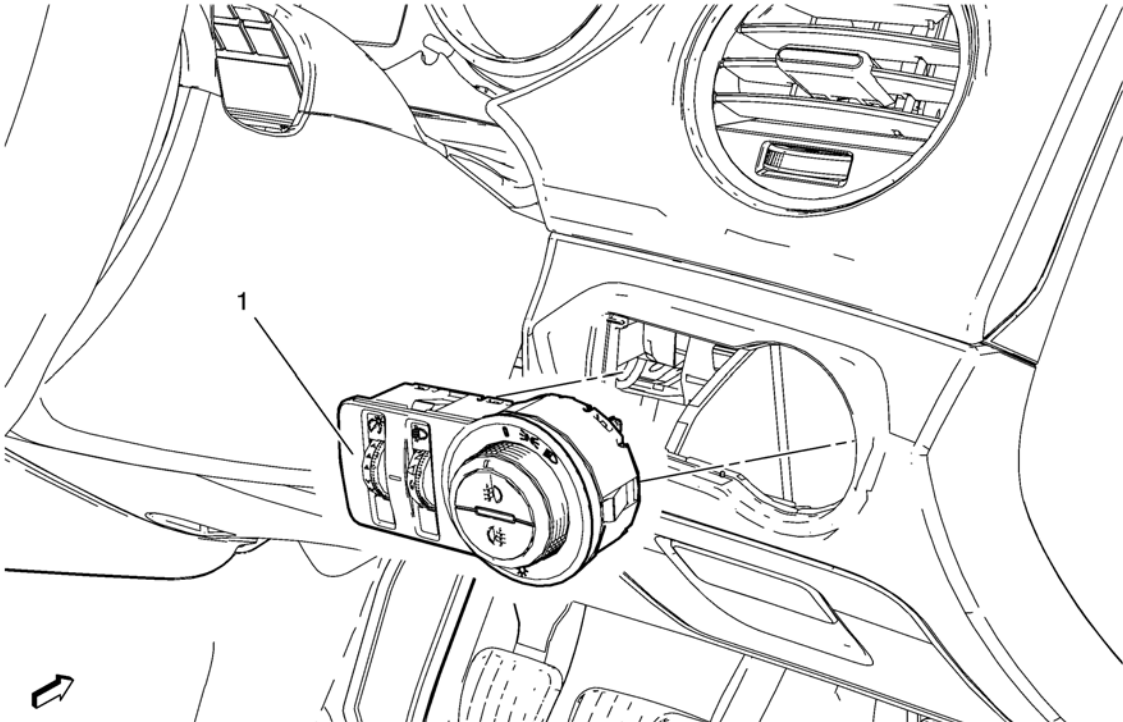
Callout	Component Name
Preliminary Procedure Remove the instrument panel lower trim pad cover. Refer to Instrument Panel Lower Trim Pad Cover Replacement .	
1	Brake Pedal Position Sensor Bolt Caution: Refer to Fastener Caution in the Preface section. Tighten 2 N·m (18 lb in)
2	Brake Pedal Position Sensor Procedure 1. Disconnect the electrical connector. 2. Calibrate the brake pedal position sensor. Refer to Brake Pedal Position Sensor Calibration .

Headlamp Switch Replacement (Right Hand Drive)



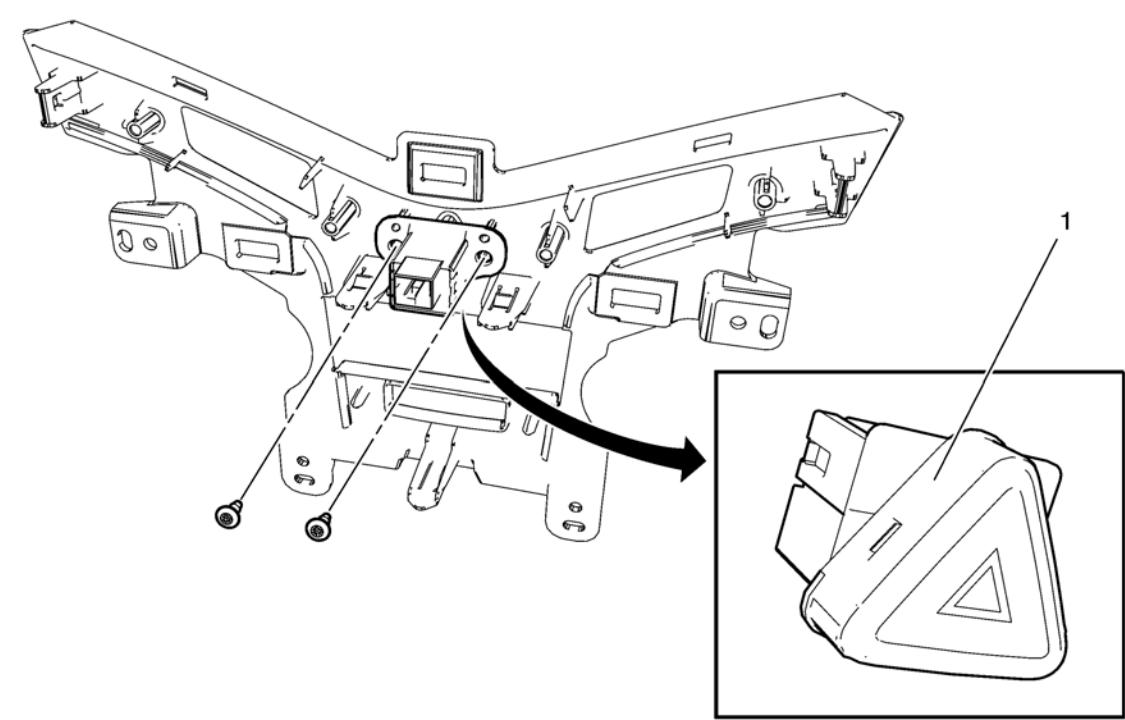
Callout	Component Name
1	Headlamp Switch Assembly Procedure 1. Open the compartment to remove the headlamp switch. 2. Disconnect the electrical connection.

Fog Lamp Switch Replacement (Right Hand Drive)



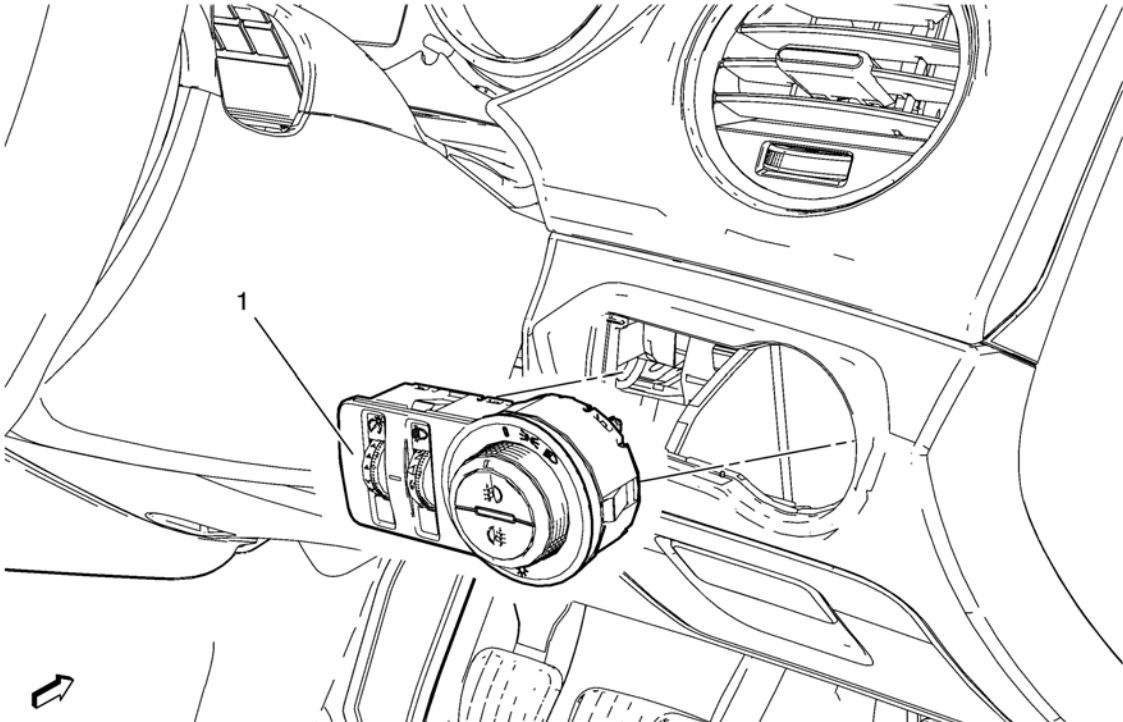
Callout	Component Name
1	Fog Lamp Switch Procedure 1. Disconnect the electrical connection. 2. Squeeze tabs on switch to unsnap from housing bracket.

Hazard Warning Switch Replacement



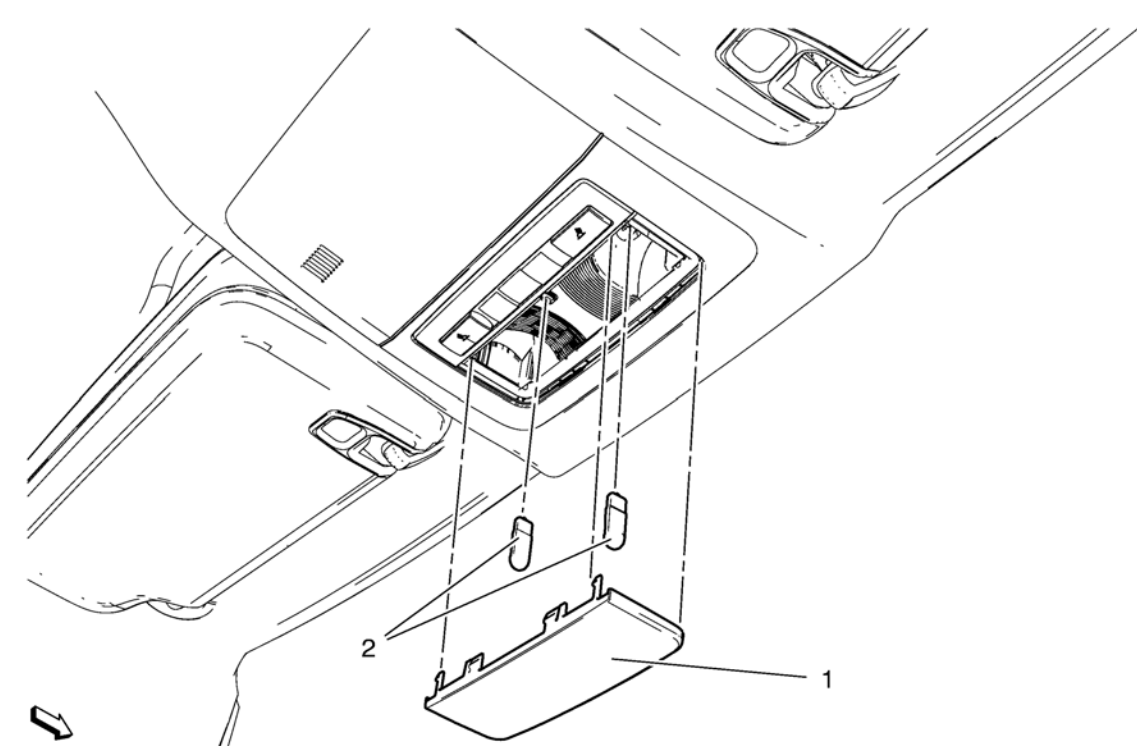
Callout	Component Name
Preliminary Procedure Remove instrument panel accessory bezel. Refer to Instrument Panel Accessory Bezel Replacement .	
1	Hazard Warning Switch Procedure 1. Disconnect the electrical connection. 2. Unsnap switch from instrument panel accessory bezel.

Instrument Panel Lamp Dimmer Switch Replacement (Right Hand Drive)



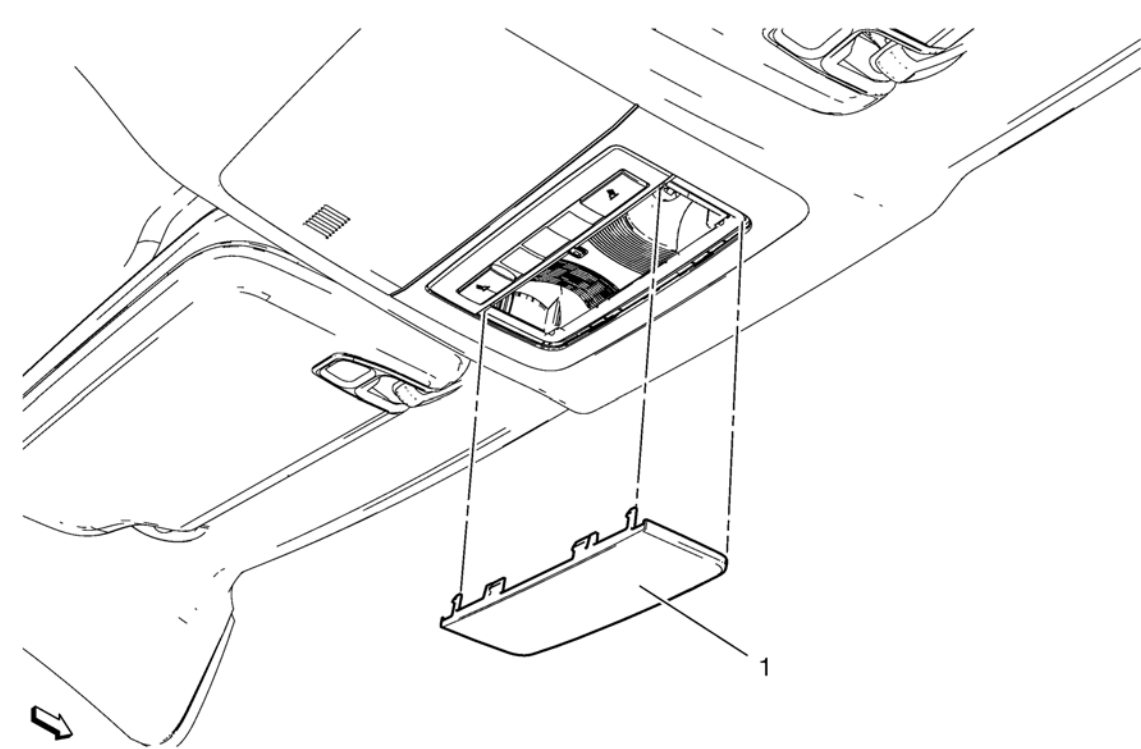
Callout	Component Name
1	Instrument Panel Lamp Dimmer Switch Procedure 1. Disconnect electrical connector. 2. Squeeze tabs on switch to unsnap from housing bracket.

Reading Lamp Bulb Replacement



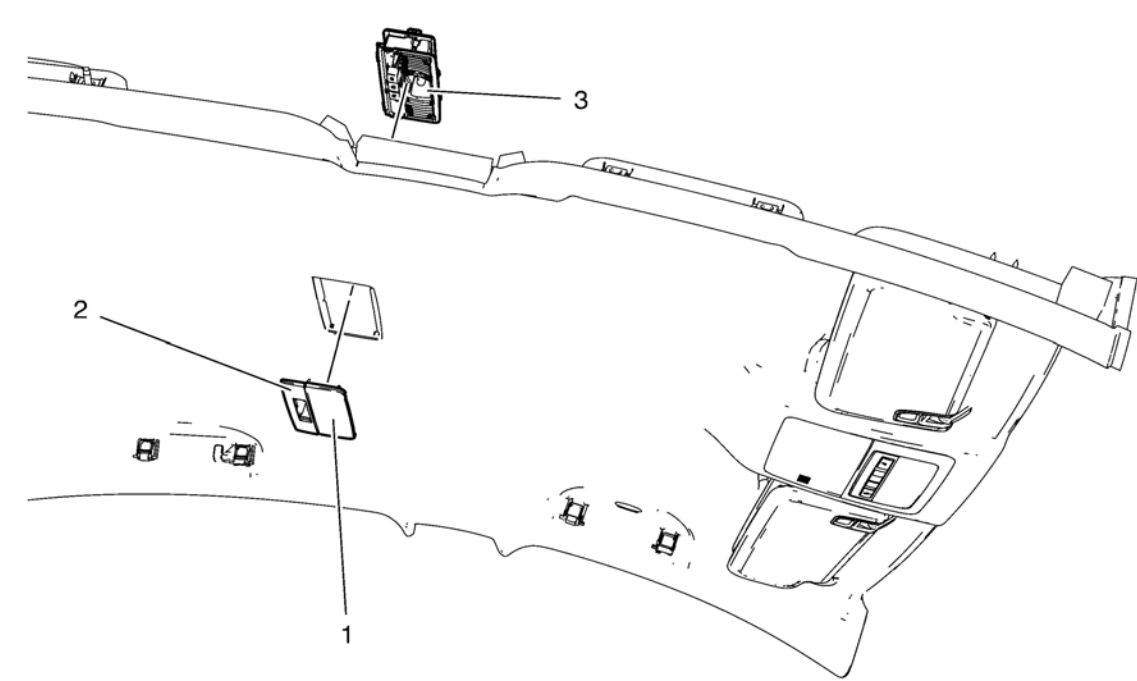
Callout	Component Name
1	Dome and Reading Lamp Lens
2	Reading Lamp Bulb (Qty: 2)

Dome and Reading Lamp Lens Replacement



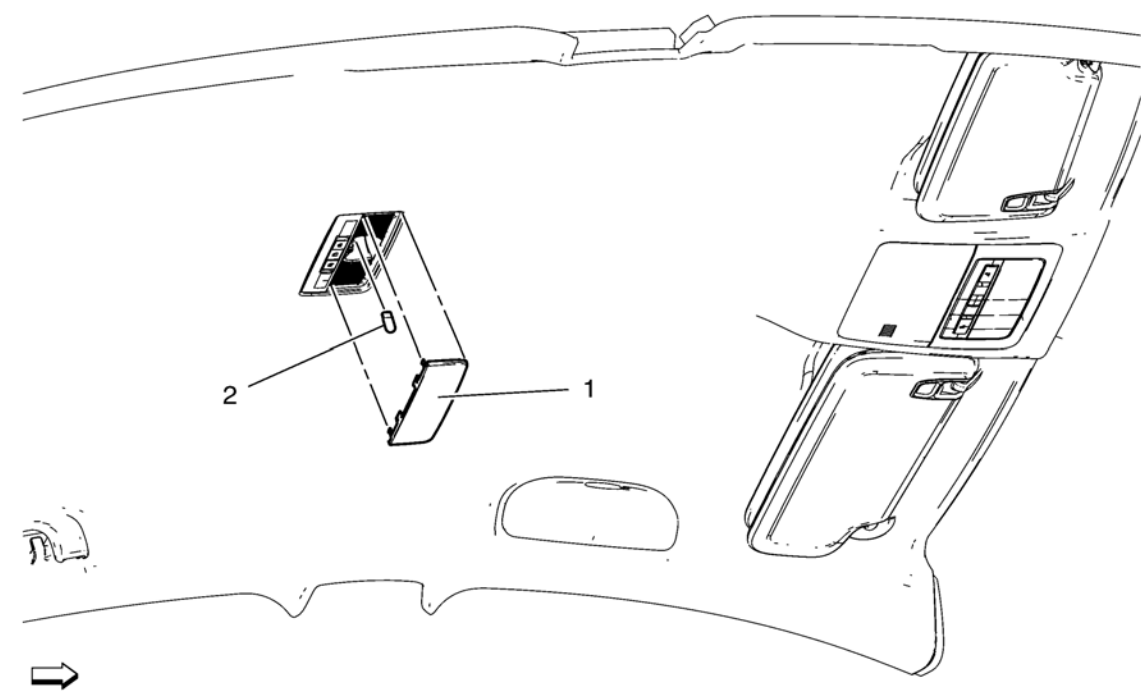
Callout	Component Name
1	Dome and Reading Lamp Lens

Dome Lamp Replacement



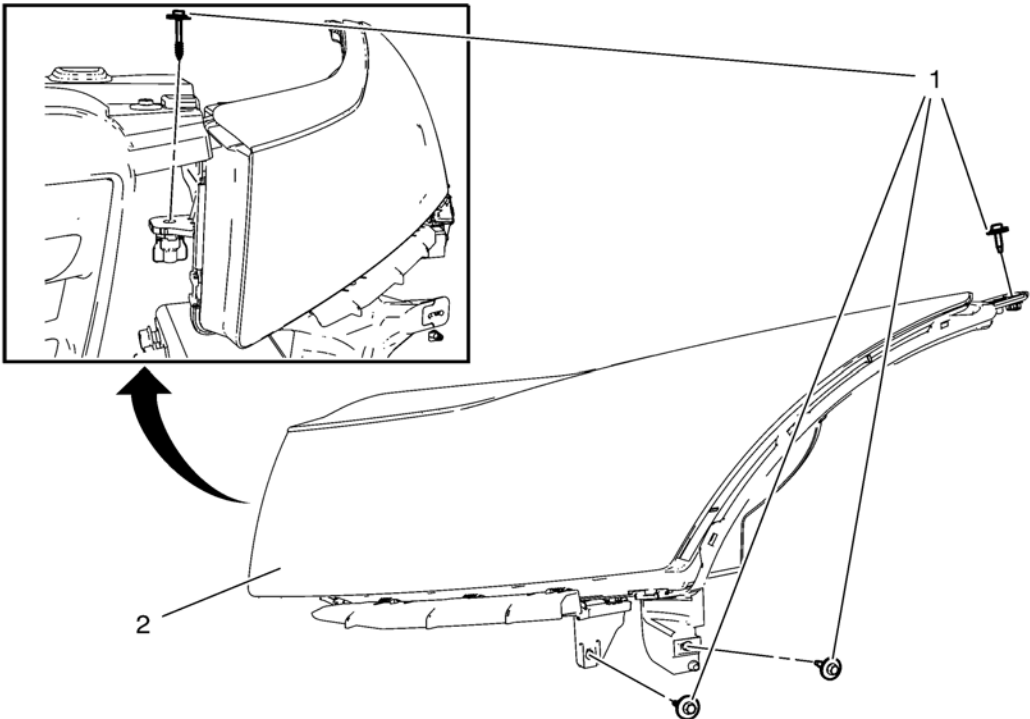
Callout	Component Name
Preliminary Procedure Lower the headliner enough to gain access to the dome lamp housing. Refer to Headlining Trim Panel Replacement .	
1	Dome Lamp Lens
2	Dome Lamp Switch Bezel
3	Dome Lamp Housing Assembly Procedure 1. Carefully use a flat-bladed tool, and release the tabs retaining the dome lamp to the headliner. 2. Disconnect the electrical connector.

Dome Lamp Bulb Replacement



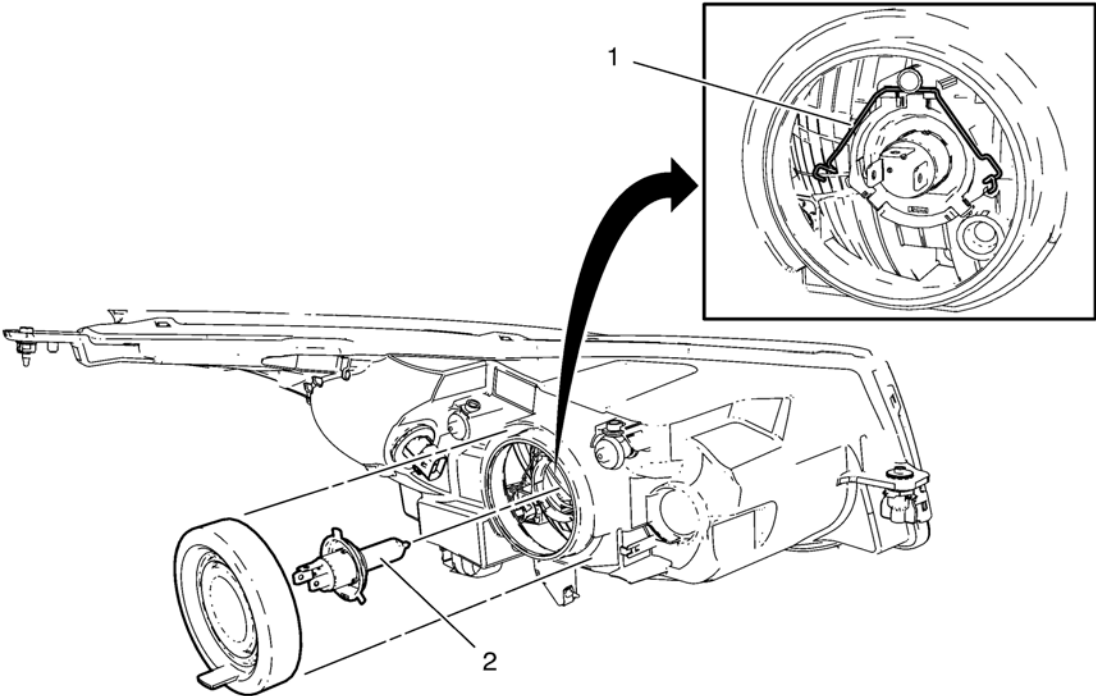
Callout	Component Name
1	Dome and Reading Lamp Lens
2	Dome Lamp Bulb

Headlamp Replacement



Callout	Component Name
Preliminary Procedure Remove the front bumper fascia upper bracket. Refer to Front Bumper Fascia Replacement .	
1	Headlamp Screw (Qty: 4) Caution: Refer to Fastener Caution in the Preface section. Tip Secure the headlamp fasteners in sequence, as indicated. Tighten 2.5 N·m (22 lb in)
2	Headlamp Assembly Procedure 1. Pull forward on the outside edge of the headlamp in order to release the up and down locator tabs on the backside of the headlamp. 2. Pull forward on the top inside edge of the headlamp to release the inboard up/down locator. 3. Pull the headlamp assembly down. 4. Pull the headlamp assembly forward far enough to access the electrical connection. 5. Disconnect the headlamp electrical connector from the forward lamp harness connector. 6. Remove the headlamp assembly. 7. Aim the headlamps after installation. Refer to Headlamp Aiming.

Headlamp Bulb Replacement



Callout	Component Name
Preliminary Procedure Remove the headlamp bulb dust cover.	
1	Headlamp Bulb Socket Bracket Tip Disconnect electrical connector.
2	Headlamp Bulb Warning: Refer to Halogen Bulb Warning in the Preface section. Procedure Remove the bulb from the lamp socket.

Headlamp Aiming

Visual Aiming Preparation Procedure

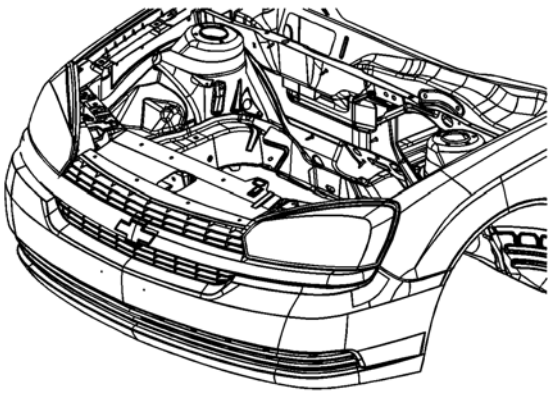
Important: Some state and local laws specify requirements for headlamp aim. Comply with all of these laws when performing any headlamp aiming operations.

Headlamp aim should be checked:

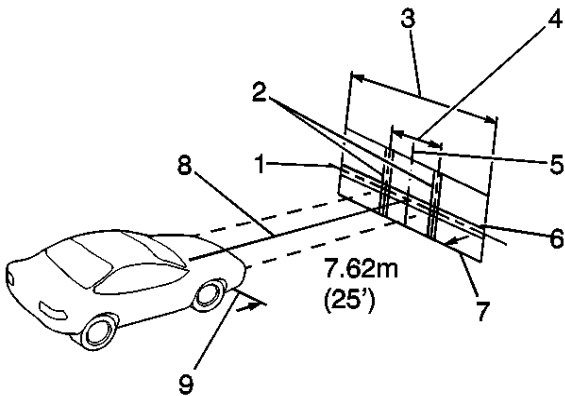
- When a new headlamp capsule is installed.
- If service or repairs to the front end area have, or may have, disturbed the headlamps or their mounting.

The aiming screen should meet the following criteria:

-



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

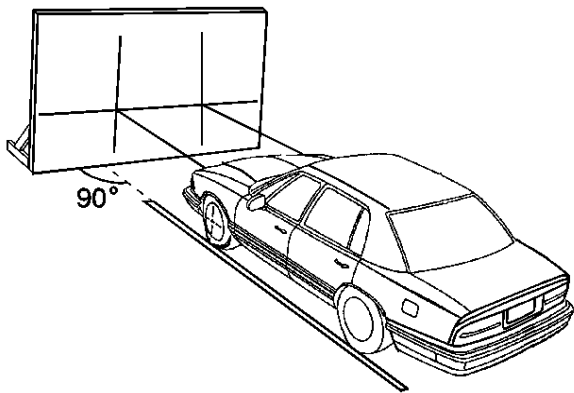


- After the aiming screen has been set up in a permanent location, paint a reference line on the floor directly under the lens of the lamps to indicate the proper location of the headlamps when they are being aimed:
- Distance between headlamps (1)
- Center line of screen (2)
- Adjustable vertical pointer (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 axis (8)
- Adjustable vertical pointer
- Horizontal center line of lamps
- Vertical center line ahead of left headlamp

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

1. Remove any snow, ice or mud from the vehicle.

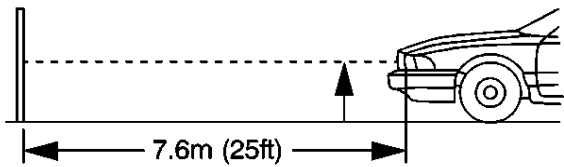
- The vehicle must have a full tank of gas.
- Stop all other work on the vehicle.
- If any service has been performed on the vehicle, make sure that all of the components are back in their original place.
- The vehicle must be on a level surface.



- The vehicle left tires must be aligned with the reference line extending from the screen with the headlamps aligned with the reference line.
- Do not load any cargo in the vehicle.
- The vehicle must contain approximately 75 kg (165 lb) on the driver 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.

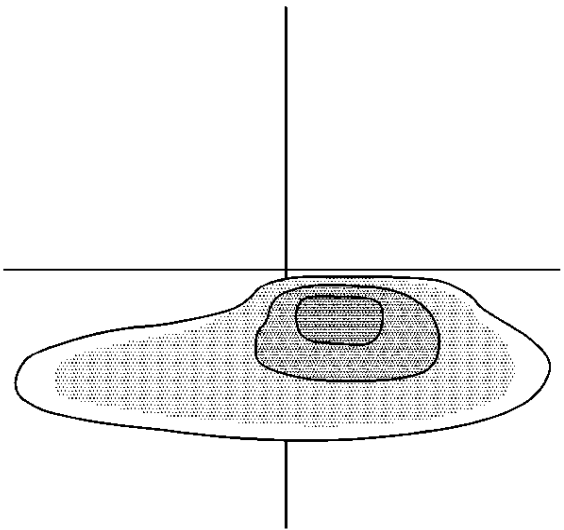
Headlamp Aiming Procedure

- Open the hood.

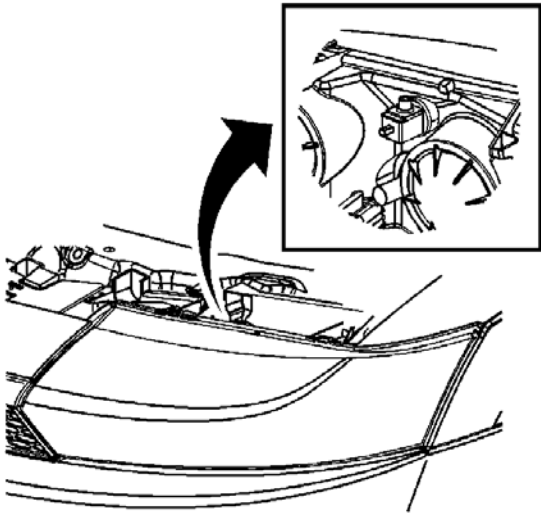


- Measure from the floor to the center of the headlamp bulb. Some headlamps have an aim dot marked on the headlamp lens.
- At the screen, measure from the floor and place the horizontal tape at the measured distance.
- Measure from the reference line on the floor to the left headlamp bulb centerline.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

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



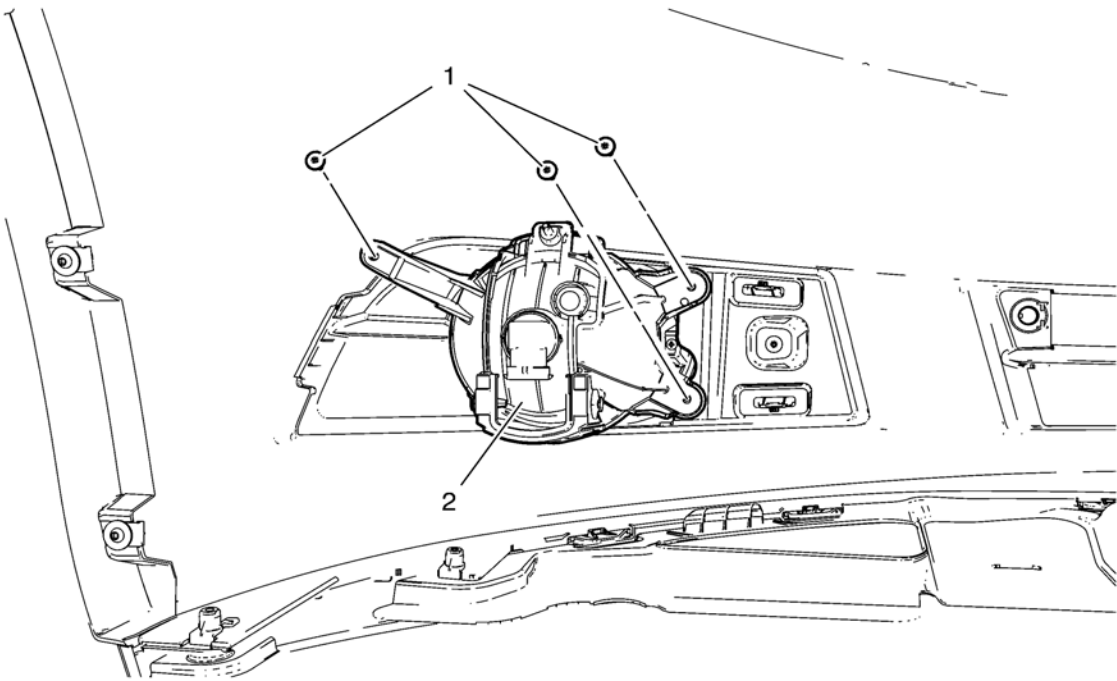
- Turn ON the low beam headlamps. Block the light from projecting onto the screen from the passenger side headlamp.



Important: The headlamps can not be adjusted horizontally.

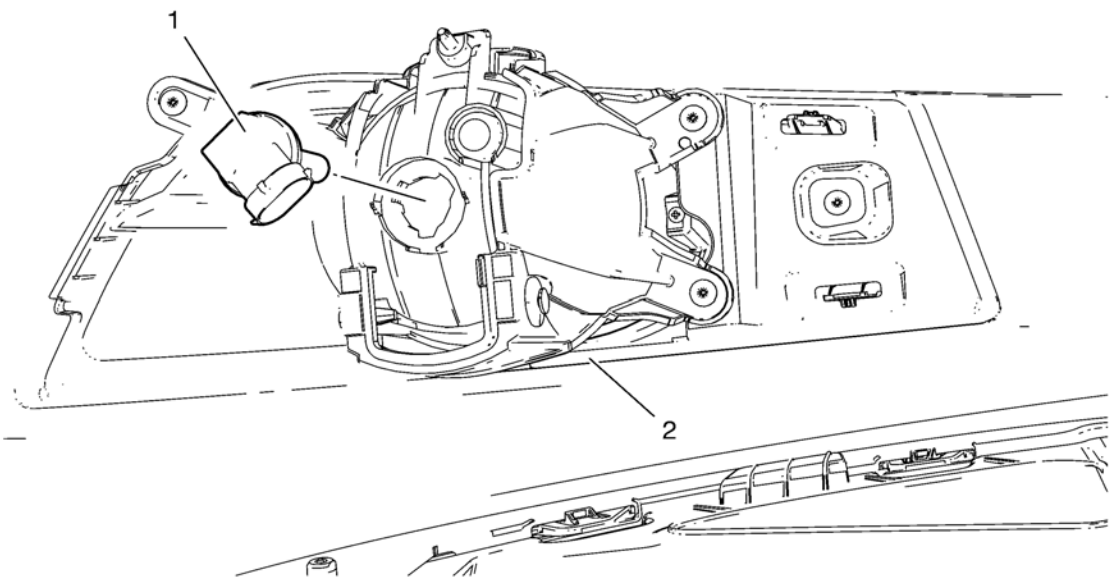
- 9. Adjust the vertical aim screw of the headlamps to the specifications required by the state and the local authorities, or as shown in step number 8.
- 10. Repeat the aiming procedure for the passenger side headlamp while blocking the light from projecting onto the screen from the driver side headlamp.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

Front Fog Lamp Replacement



Callout	Component Name
Preliminary Procedures 1. Raise and support the vehicle. Refer to Lifting and Jacking the Vehicle. 2. Remove the front bumper fascia. Refer to Front Bumper Fascia Replacement. 3. Disconnect fog lamp bulb socket electrical connector.	
1	Front Fog Lamp Screws (Qty: 3) Caution: Refer to Fastener Caution in the Preface section. Tighten 2.5 N·m (23 lb in)
2	Front Fog Lamp Assembly Procedure 1. Remove the lamp assembly from the fog lamp bracket. 2. Aim the fog lamp after installation. Refer to Fog Lamp Aiming.

Front Fog Lamp Bulb Replacement



Callout	Component Name
Preliminary Procedures 1. Raise and support the vehicle. Refer to Lifting and Jacking the Vehicle 2. Disconnect the forward lamp electrical harness connector from the fog lamp bulb socket. 3. Remove the Front Bumper Fascia Opening Lower Cover. Refer to Front Bumper Fascia Opening Lower Cover Replacement.	
1	Front Fog Lamp Projector Bulb Warning: Refer to Halogen Bulb Warning in the Preface section. Procedure Rotate the bulb socket counterclockwise to remove from the lamp housing.
2	Front Fog Lamp Assembly Procedure Remove the lamp assembly from the fog lamp bracket.

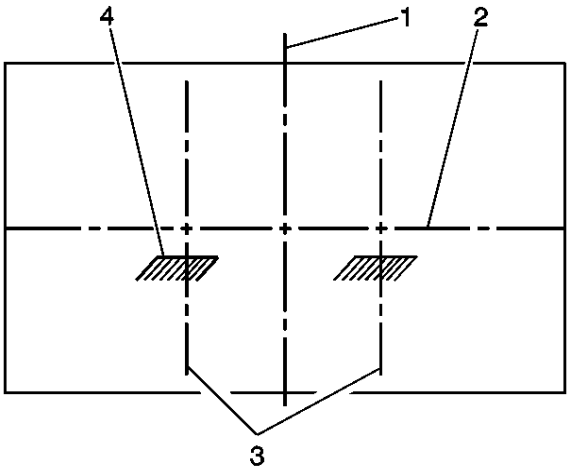
Fog Lamp Aiming

Preparation Procedure

Important: Horizontal aim is not adjustable on this vehicle. Vertical aim is done by an adjusting nut located on the rear of the fog lamp. Prior to aiming the fog lamps, perform the following steps:

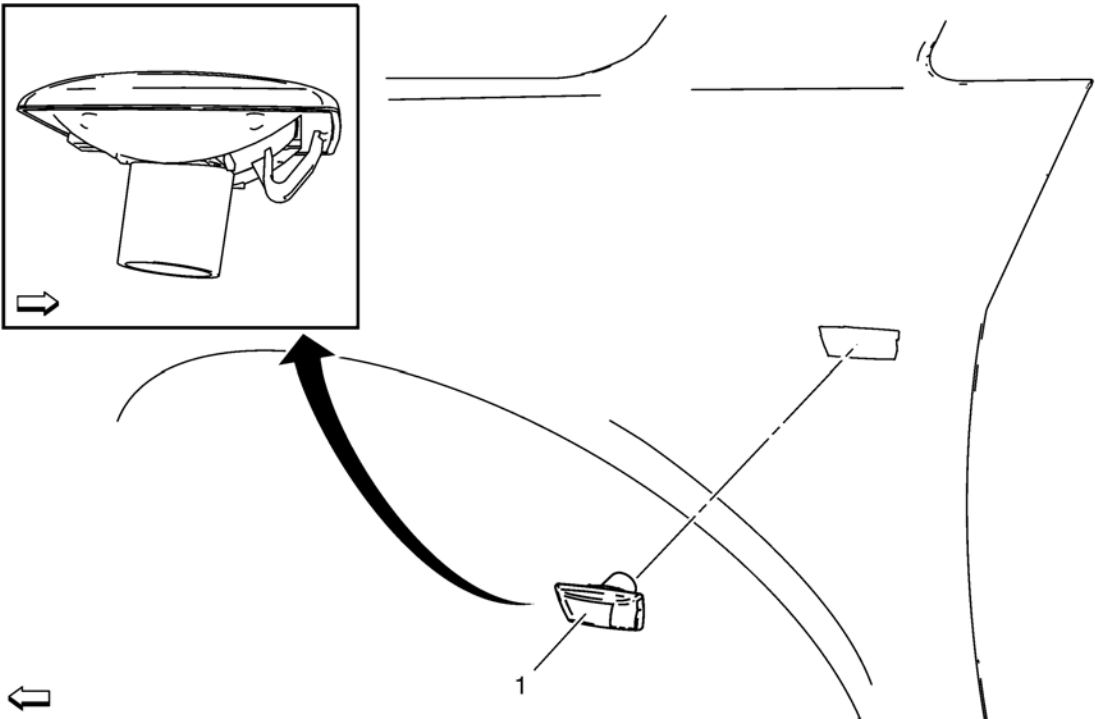
1. Completely assemble all of the components on the vehicle.
2. Place the vehicle on a level surface.
3. Stop all unnecessary operations or work that could affect the ride height of the vehicle.
4. Close the doors and verify that the luggage compartment is empty.
5. Stabilize the suspension by rocking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

Aiming Procedure



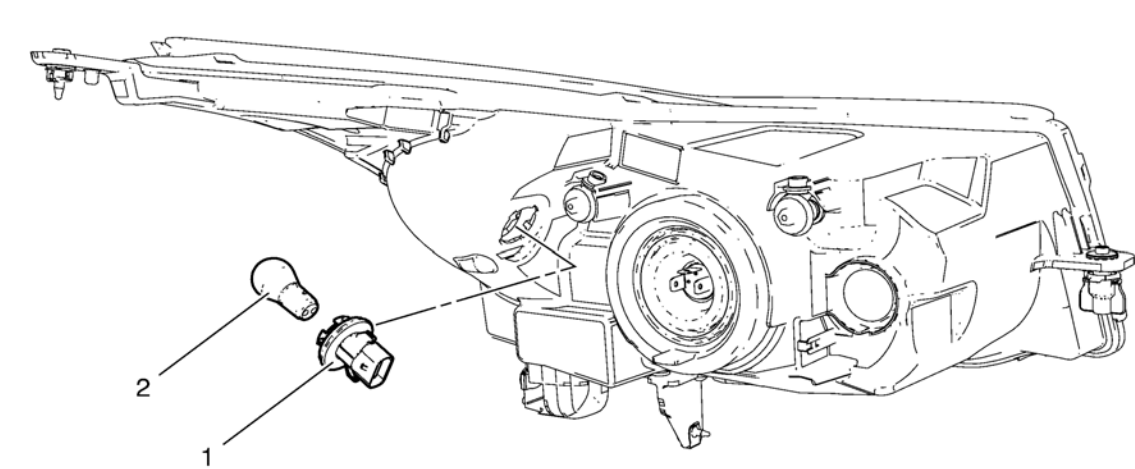
1. Park the vehicle 7.6 m (25 ft) away from the target screen.
2. Measure from the center of the fog lamp to the ground line. Using this measurement, mark the horizontal centerline (2) of the fog lamp on the target screen directly in front of the vehicle.
3. Turn ON the fog lamps. The top of the fog lamp beam image (4) on the target screen should be 102 mm (4 in) below the center of the fog lamp lens height.
4. Adjust the fog lamp as required using the adjusting screw above the projector lens on the outside of the front bumper fascia.
5. Turn OFF the fog lamps.

Front Side Turn Signal Lamp Replacement



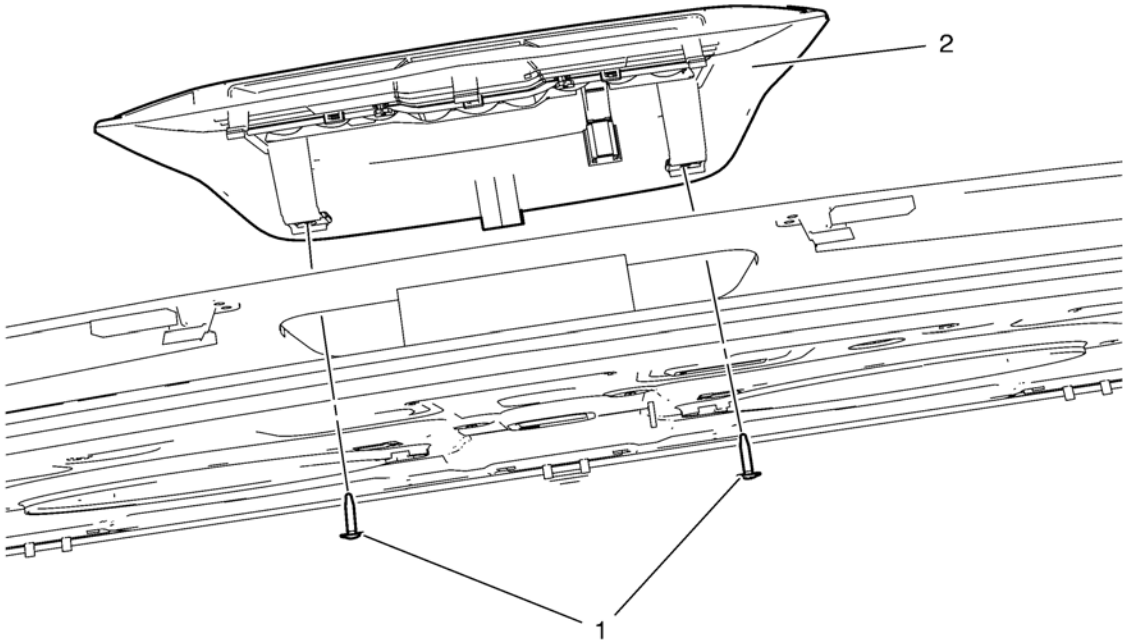
Callout	Component Name
Preliminary Procedures 1. Remove the front wheelhouse liner. Refer to Front Wheelhouse Liner Replacement. 2. Disconnect the front turn signal lamp electrical connector from the forward lamp harness assembly at the topside of the fender panel. 3. Rotate the lamp socket from the lamp housing. 4. Squeeze the lamp housing locking tab and push outward in order to remove the lamp housing from the fender panel.	
1	Front Turn Signal Lamp Assembly Procedure Replace the bulb, as needed.

Front Side Turn Signal Lamp Bulb Replacement



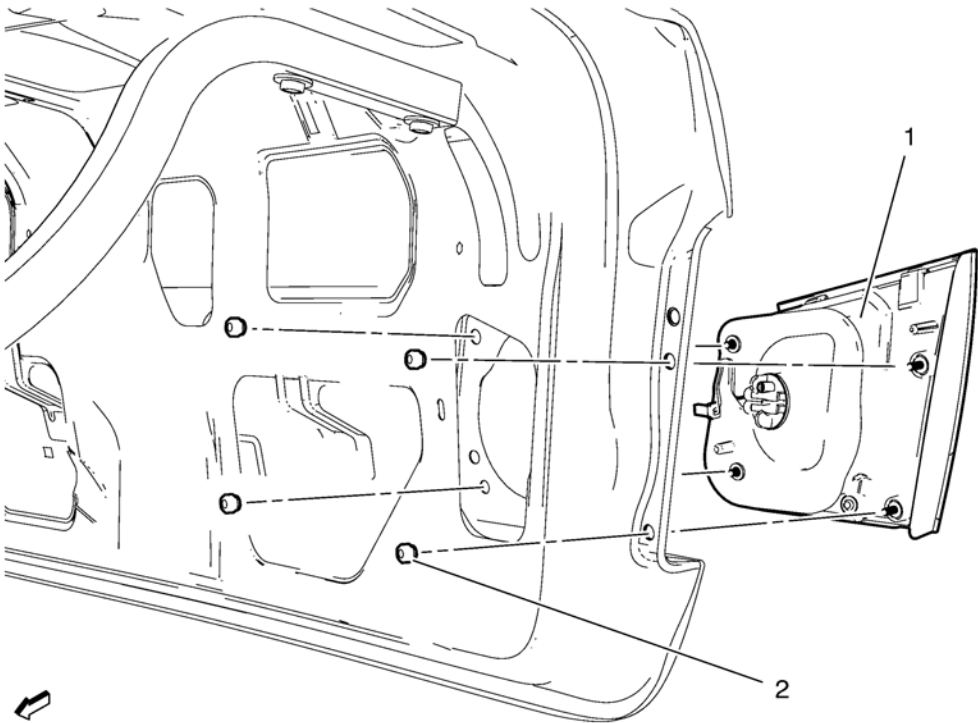
Callout	Component Name
1	Park/Turn Bulb Socket Warning: Refer to Halogen Bulb Warning in the Preface section. Tip Rotate counterclockwise and remove the socket from the headlamp assembly.
2	Park/Turn Bulb Procedure Remove the bulb from the bulb socket.

High Mount Stop Lamp Replacement



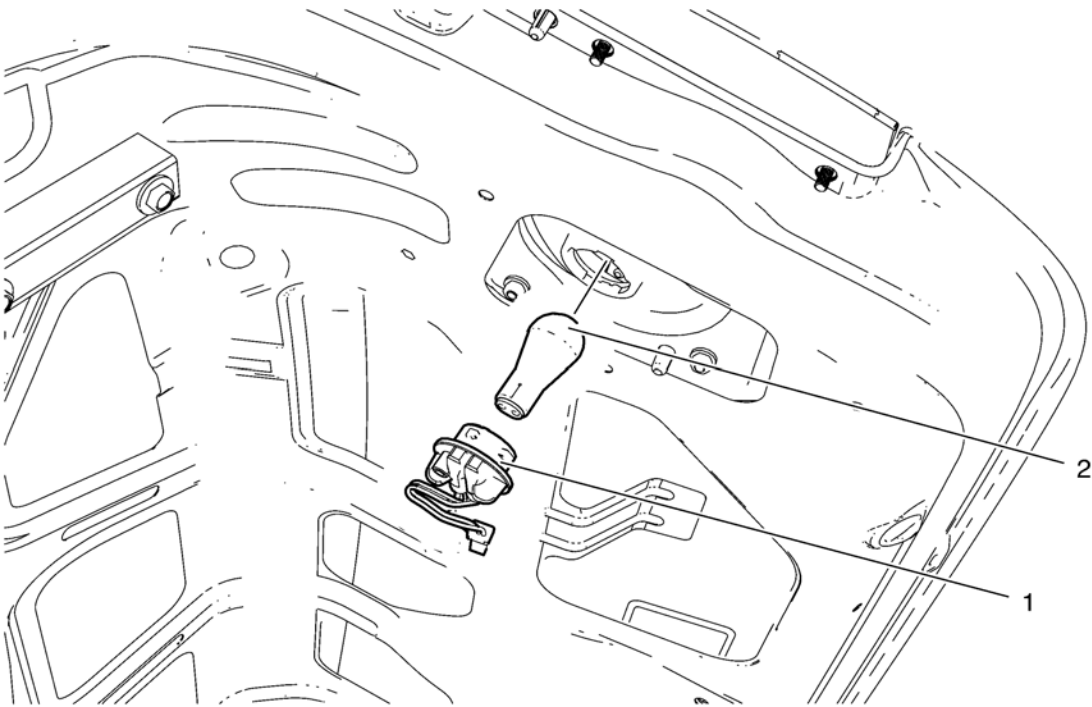
Callout	Component Name
1	High Mount Stop Lamp Screw (Qty: 2) Procedure Hand tighten only, no torque required.
2	High Mount Stop Lamp Assembly Procedure Disconnect the electrical connector at the high mount stop lamp. Tip The lamp is Light Emitting Diode (LED) and is serviced as an assembly.

Backup Lamp Replacement



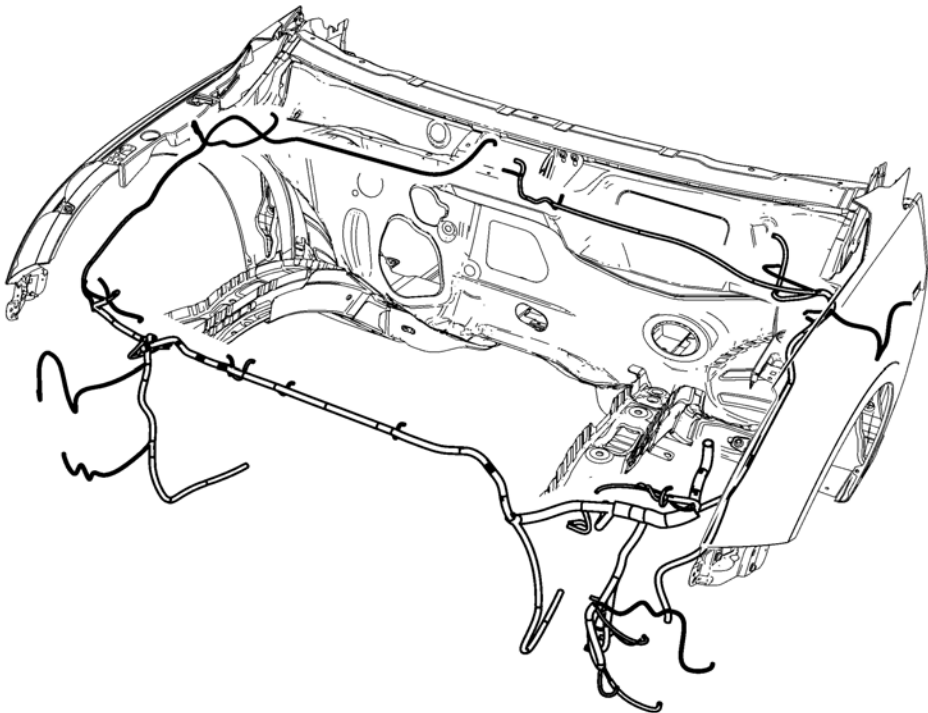
Callout	Component Name
Preliminary Procedures 1. Remove the rear compartment sill trim plate. Refer to Rear Compartment Sill Trim Plate Replacement. 2. Disconnect the electrical harness connector from the backup lamp socket.	
1	Back Up Lamp Nut (Qty: 4) Caution: Refer to Fastener Caution in the Preface section. Tighten 5 N·m (44 lb ft)
2	Back Up Lamp Assembly Warning: Refer to Glass and Sheet Metal Handling Warning in the Preface section. Warning: Refer to Halogen Bulb Warning in the Preface section. Procedure 1. Reach inside the rear compartment lid inner panel and remove the lower and upper retainer nuts securing the lamp assembly to the outer rear compartment lid panel. 2. Push the inside edge of the lamp assembly outward from the rear outer compartment lid panel. 3. Remove and transfer the bulb socket from the back up lamp assembly.

Backup Lamp Bulb Replacement



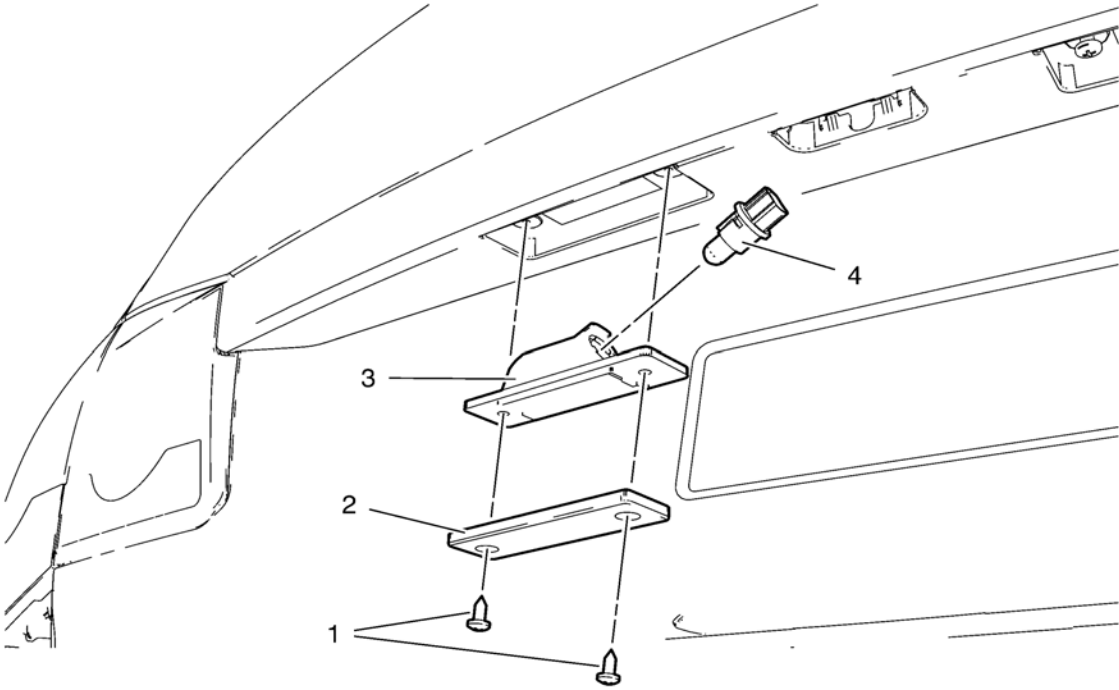
Callout	Component Name
Warning: Refer to Glass and Sheet Metal Handling Warning in the Preface section. Preliminary Procedure Remove the rear compartment sill trim plate. Refer to Rear Compartment Sill Trim Plate Replacement.	
1	Back Up Lamp Socket Tip Rotate the lamp socket counterclockwise and remove from the tail lamp housing.
2	Back Up Lamp Bulb Warning: Refer to Halogen Bulb Warning in the Preface section. Procedure Remove the bulb from the lamp socket.

Forward Lamp Wiring Harness Replacement



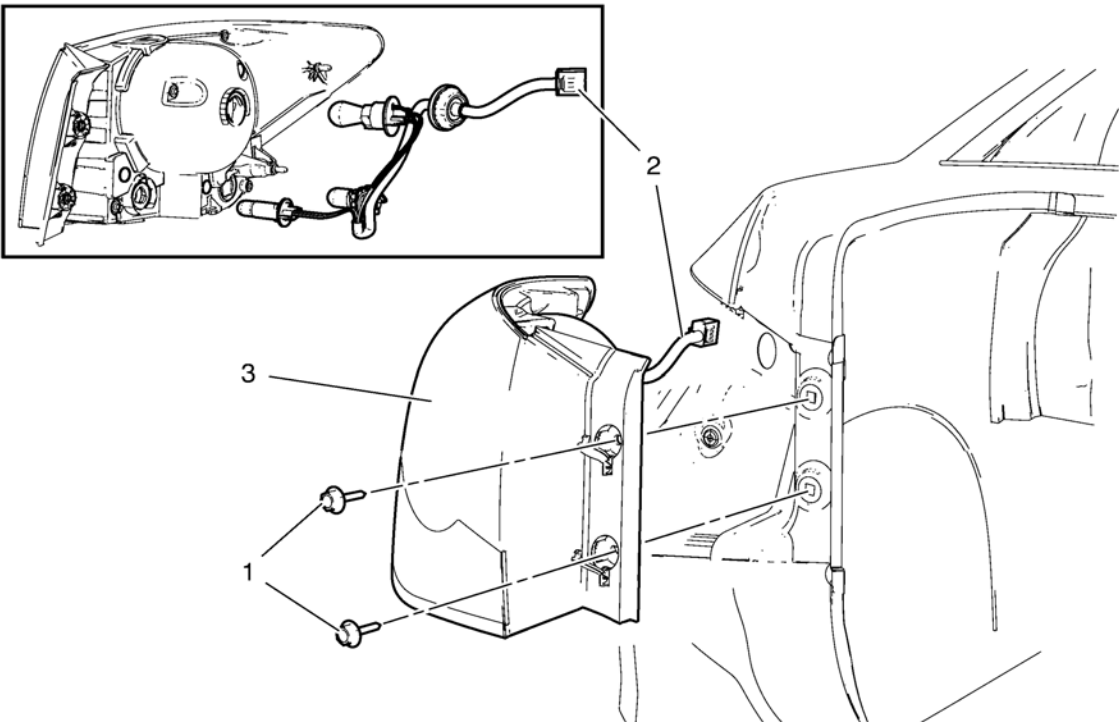
Callout	Component Name
Preliminary Procedures - Remove the front bumper. Refer to Front Bumper Fascia Replacement. - Remove the headlamp. Refer to Headlamp Replacement. - Using a scan tool, check for DTCs.	
1	Forward Lamp Wiring Harness Tip - Create a work area large enough to lay out the new and old wiring harnesses. - Use care when removing inaccessible harness retainers. Replacement retainers may not be available. - Compare the new and old wiring harnesses for the same part number, the same number of wiring harness connectors, the same pin settings, and the same harness retainers. - Follow a logical order of steps during the replacement to ensure proper installation of the harness.

Rear License Plate Lamp Replacement



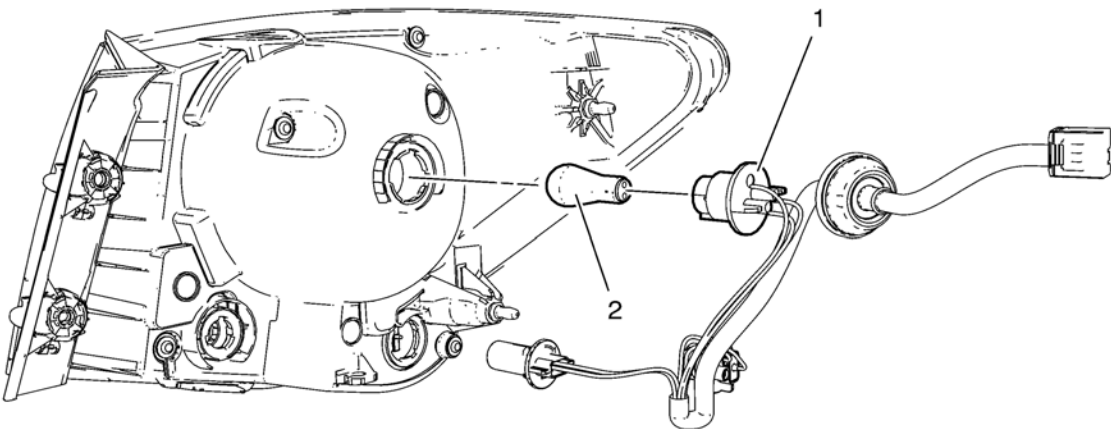
Callout	Component Name
1	Rear License Plate Lamp Screw (Qty: 2) Caution: Refer to Fastener Caution in the Preface section. Tighten 3 N·m (27 lb in)
2	Rear License Plate Lamp Tip Rotate the left corner of the lamp assembly upward and pull the right side down out from the rear bumper fascia opening.
3	Rear License Plate Lamp Socket Tip Rotate the lamp socket counterclockwise and remove.
4	Rear License Plate Lamp Bulb Tip Service the bulb, as needed.

Tail Lamp Replacement



Callout	Component Name
Preliminary Procedures 1. Open and support the rear compartment lid. 2. Remove the body side trim panel replacement in order to expose the tail lamp pocket nuts. Refer to Body Side Trim Panel Replacement - Left Side.	
1	Tail Lamp Bolt (Qty: 2) Caution: Refer to Fastener Caution in the Preface section. Tighten 2.5 N·m (22 lb ft)
2	Tail Lamp Control Module with Bulb Assembly Tip Rotate the control module with bulbs counterclockwise and remove from the tail lamp housing.
3	Tail Lamp Assembly Warning: Refer to Halogen Bulb Warning in the Preface section. Procedure 1. Using a blunt tool, tap gently on the tail lamp studs before attempting to remove the tail lamp assembly from the lamp pocket. 2. Pull the tail lamp assembly rearward. 3. Disconnect the tail lamp control module with bulbs assembly electrical connector.

Tail Lamp Bulb Replacement



Callout	Component Name
Preliminary Procedure Remove the rear tail lamp assembly. Refer to Tail Lamp Replacement .	
1	Tail Lamp Bulb Harness Socket Procedure Rotate the bulb socket from the tail lamp housing.
2	Tail Lamp Bulb Procedure Pull the bulb straight from the lamp harness socket.

Exterior Lighting Systems Description and Operation

Exterior Lamps

The exterior lighting system consists of the following lamps if equipped:

- Headlamps
- Daytime Running Lamps (DRL)
- Front fog lamps
- Rear fog lamps
- Park, tail and license lamps
- Turn signal lamps
- Hazard warning lamps
- Repeater lamps
- Stop lamps
- Backup lamps

Low Beam Headlamps RPO T83

The headlamps consist of 1 single bulb which provides low and high beam.

The headlamps may be turned ON in 3 different ways:

- When the headlamp switch is placed in the ON position, for normal operation
- When the headlamp switch is placed in the AUTOMATIC LIGHT position, for automatic lamp control
- When the headlamp switch is placed in the AUTOMATIC LIGHT position, with the windshield wipers ON in daylight conditions, after a 6 s delay

The body control module (BCM) controls the headlamps based on the inputs explained above. When a low beam request is received, the BCM supplies an B+ to the low beam headlamps, illuminating the low beam headlamps. When a high beam request is received, the BCM grounds the headlamp high beam relay control circuit.

Automatic Lamp Control RPO T83

Automatic Light is switched ON as default. It can be switched OFF by turning the light switch to OFF position. It will be switched on again by doing so again. The rain/light sensor module will send the actual ambient light state (day/night) to the BCM. If Automatic Light is enabled, BCM will react on the message received from rain/light sensor module by switching ON/OFF low beams.

Flash to Pass

When the low beam headlamps are on and the turn signal/multi-function switch is momentarily placed in the flash to pass position, ground is applied to the turn signal/multi-function switch. The turn signal/multifunction switch applies ground to the BCM through the flash to pass switch signal circuit. The BCM then applies ground to the high beam relay control circuit. This energizes the high beam relay, closing the switch side contacts of the high beam relay, applying battery voltage to the left and right high beam fuses. Battery voltage is applied from the high beam fuses through the high beam voltage supply circuit to the high beam headlamp assemblies. This causes the high beam headlamps to illuminate at full brightness momentarily or until the flash to pass switch is released.

Daytime Running Lamps RPO T3X

The daytime running lamps (DRL) function activates the low beam lamps. The DRL will operate when the following conditions are met:

1. Engine is running.
2. Headlamp switch in AUTOMATIC LIGHT position.

By turning the headlamp switch in the OFF position the automatic light function and the DRL will be deactivated.

The ambient light sensor is used to monitor outside lighting conditions. The ambient light sensor provides a voltage signal that will vary between 0.2-4.9 V depending on outside lighting conditions. The HVAC control module provides a low reference ground and 5 V reference signals to the ambient light sensor. The BCM monitors the ambient light sensor signal circuit to determine if outside lighting conditions are correct for either DRL or low beam when the headlamp switch is in the AUTOMATIC LIGHT position. In daylight conditions, the BCM will command the DRL ON by applying battery voltage to the left and right DRL lamps (low beams). Any function or condition that turns ON the headlamps will cancel DRL operation.

When the DRL function is activated by the BCM the continuously high beam functionality is disabled, the possibility to use the flash to pass function stays active.

Front Fog Lamps

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

Rear Fog Lamps RPO T79

The rear fog lamp switch signal circuit is grounded through a resistor momentarily by pressing the rear fog lamp switch. The body control module (BCM) energizes the rear fog lamp supply voltage circuit which illuminates the rear fog lamp. With the rear fog lamp switch activated the BCM sends a message via serial data to the instrument cluster requesting the instrument cluster to illuminate the rear fog indicator.

Park, Tail and License Lamps

The park lamps, tail lamps and license plate lights are turned ON when the headlamp switch is placed in the PARK LIGHT or LOW BEAM position or anytime the headlights are requested. When the BCM receives a request from the headlamp switch to turn ON the park lamps the BCM sends out a PWM signal, which illuminates the park lamps, tail lamps and license plate lights.

Turn Signal Lamps

Ground is applied at all times to the turn signal/multi-function switch. The turn signal lamps may only be activated with the ignition switch in the ON or START position. When the turn signal/multi-function switch is placed in either the TURN RIGHT or TURN LEFT position, ground is applied to the BCM through either the right turn or left turn signal switch signal circuit. The BCM then applies a pulsating voltage to the front and rear turn signal lamps through their respective voltage supply 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.

Repeater Lamps

The repeater lamps are located in the front fender. The repeater lamps are used as additional turn signal lamps, and operate as described in the Turn Signal/Hazard Flasher Lamps description.

Hazard Flasher Lamps

The hazard flashers may be activated in any power mode. The hazard switch is permanently grounded. When the hazard switch is placed in the ON position, ground is applied through the hazard switch signal circuit to the BCM. The BCM supplies battery voltage to all turn signal lamps in an ON and OFF duty cycle. When the hazard switch is activated, the BCM sends a serial data message to the instrument cluster requesting both turn signal indicators to be cycled ON and OFF.

Stop Lamps

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 BCM provides a low reference signal and a 5 V 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 and center high mounted stop lamp control circuit . When the control circuit is energized the stop lamps are illuminated.

Backup Lamps

When the transmission is placed in the reverse position, the engine control module (ECM) sends a serial data message to the BCM. The message indicates that the gear selector is in the reverse position. The BCM applies battery voltage to the backup lamps. The backup lamps are permanently grounded. 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 lamp control circuit.

Battery Run Down Protection / Inadvertent Power

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

Interior Lighting Systems Description and Operation

Interior Lamps

The interior lamps consist of 2 groups, those which can dim from the instrument panel cluster lamps dimmer switch and those that can not dim.

Courtesy / Illuminated Entry Lamps

The following lamps may be manually turned ON by placing the interior lamp switch in the ON position, or by opening a door while the switch is in the AUTO position.

- The dome lamp
- The liftgate lamps
- Courtesy lamps

The courtesy lamp supply voltage circuit of the body control module (BCM) supplies battery positive voltage to the dome lamp, the liftgate lamps and courtesy lamps. When any door is opened, the door jamb switch contacts close providing a door open input to the BCM. The BCM then provides a B+ to the interior lamps with the switch in the AUTO position. The interior lamps receive a ground when the switch is in the ON position.

Note: If the liftgate is opened after all the modules go to sleep, the dome light will not come on. The liftgate ajar switch input to the BCM will not wake up the BCM once it has gone to sleep, so the dome light will not come on. Once the BCM gets an input to wake it up, from remote keyless entry or a door handle, the dome light will turn on when the liftgate is opened.

If the driver inadvertently leaves any interior lamp ON, the BCM will turn it OFF after a 20 minute time-out.

The courtesy lamps will turn OFF immediately if the ignition switch is turned to the ON position or approximately 20 seconds after all doors are closed.

Keyless Entry Interior Illumination

When the BCM receives a door unlock command from the remote keyless entry transmitter, the BCM will flash the park lamps several times, illuminate the courtesy and park lamps, and illuminate the low beam headlamps at low intensity. The lamps will remain on until the ignition key is turned from the OFF position, a keyless entry transmitter door lock command is received, or after an approximate 20 second delay.

Interior Lamps Dimming

This group includes lamps which may dim. This group may use a combination of vacuum fluorescent illumination, LEDs and incandescent lamps.

- HVAC control module, head assembly
- Rear HVAC control module, head assembly
- Radio
- Rear seat audio
- The instrument panel cluster
- The PRNDL lamp, with the exception of the current gear select position
- Power window switches
- Various switches

When the ignition switch is turned to the ON position, the vacuum fluorescent display, radio, turns ON at maximum brightness. When the park lamps are ON, all incandescent back lighting turn ON at the dimming level indicated by the instrument panel cluster dimmer switch. At the same time all fluorescent display displays dim to match the indicated dimming level. When the headlamp switch is placed in the PARK position, the park lamp supply voltage circuit provides an input to the BCM. The BCM then supplies voltage to the instrument panel cluster dimmer switch through the dimming control circuit. The setting of the instrument panel cluster dimmer switch determines the amount of voltage that the instrument panel cluster dimmer switch supplies to the BCM through the instrument panel cluster dimming lamps low reference circuit. The BCM then sends a PWM voltage to all the interior lamps. All the fluorescent display and incandescent back lighting lamps are provided a specific voltage and are then grounded. When the headlight switch is turned to the park lamp or headlamp position, all incandescent back lighting turn ON at the dimming level indicated by the instrument panel cluster dimmer switch. When the instrument panel cluster dimmer switch is moved from MIN to MAX, all fluorescent display displays, as well as all incandescent back lighting respond from minimum intensity to maximum brightness in response to the instrument panel cluster dimmer switch.

Inadvertent Power

The BCM used in this vehicle controls the lighting system through circuits that enable the interior lamps. The BCM opens these enabling circuits shortly after the ignition switch is turned OFF with no lamp switch activity. If the ignition switch is turned to any position other than OFF, or if a lamp switch is activated during this period, the timer will reset itself.

Special Tools

Illustration	Tool Number / Description
	DT-6459-B DW240-090 Torque Wrench
	GE-604-D MKM-604-D Torx Bit and Socket Set



Select a Document:

-  [Specifications](#)
-  [Inside Rearview Mirror Schematics](#)
-  [Outside Rearview Mirror Schematics](#)
-  [Outside Rearview Mirror Replacement](#)
-  [Outside Remote Control Rearview Mirror Switch Replacement](#)
-  [Outside Rearview Mirror Motor Replacement](#)
-  [Outside Rearview Mirror Glass Replacement](#)
-  [Outside Rearview Mirror Housing Replacement](#)
-  [Inside Rearview Mirror Replacement](#)



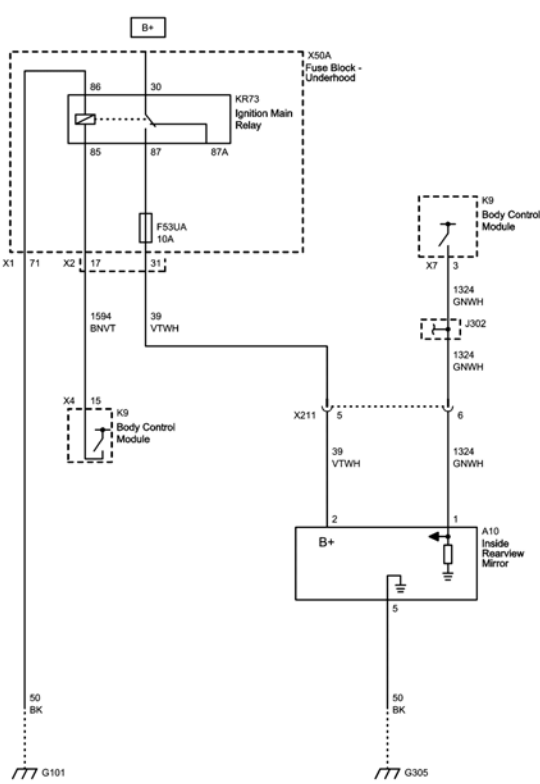


Fastener Tightening Specifications

Application	Specification	
	Metric	English
Inside Rearview Mirror	2 N·m	18 lb in
Outside Rearview Mirror	9 N·m	80 lb in

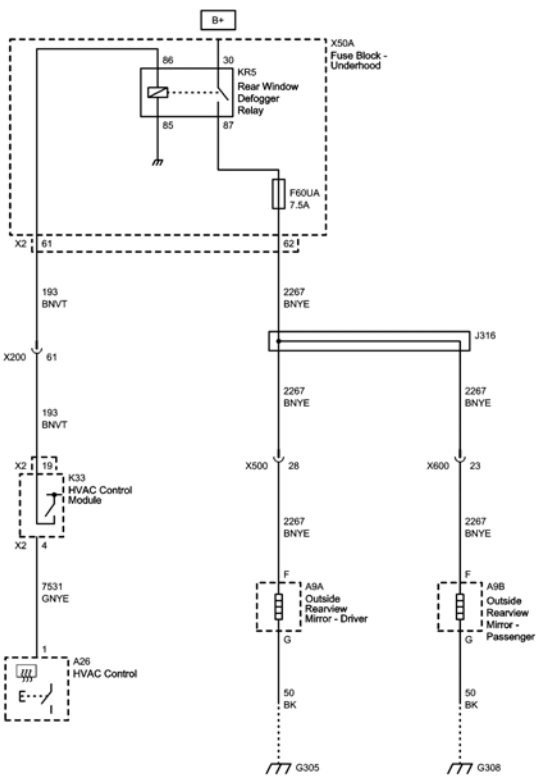


Inside Rearview Mirror Schematics

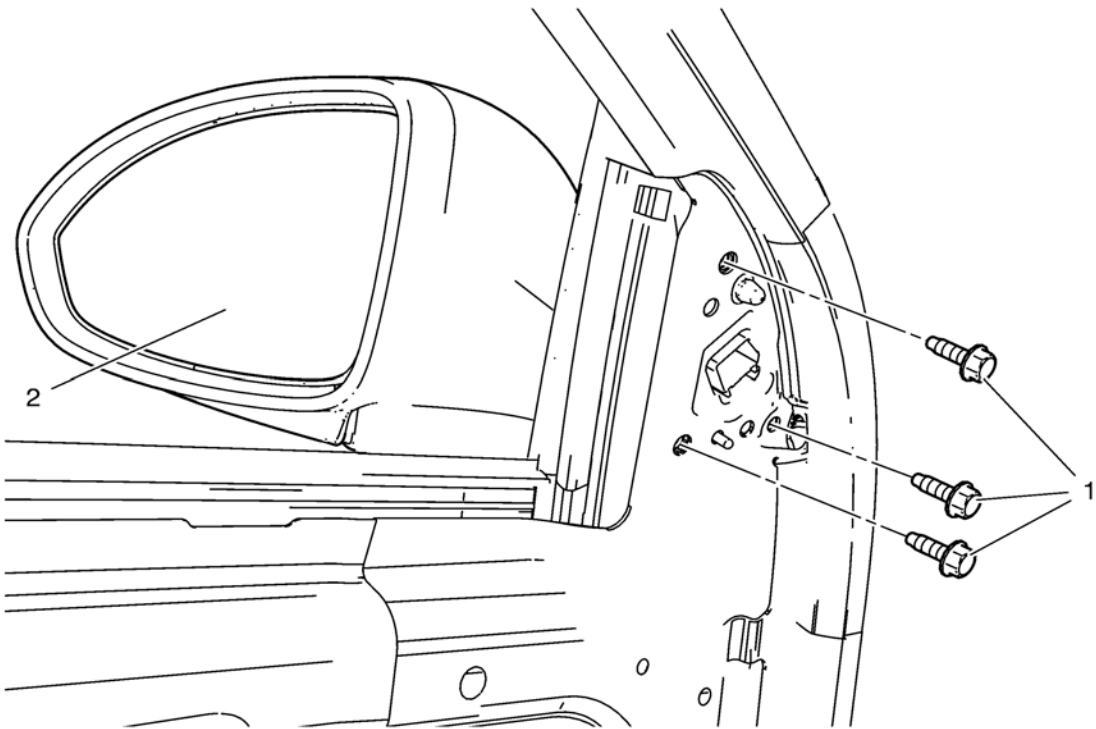


Outside Rearview Mirror Schematics

Heated Outside Mirrors

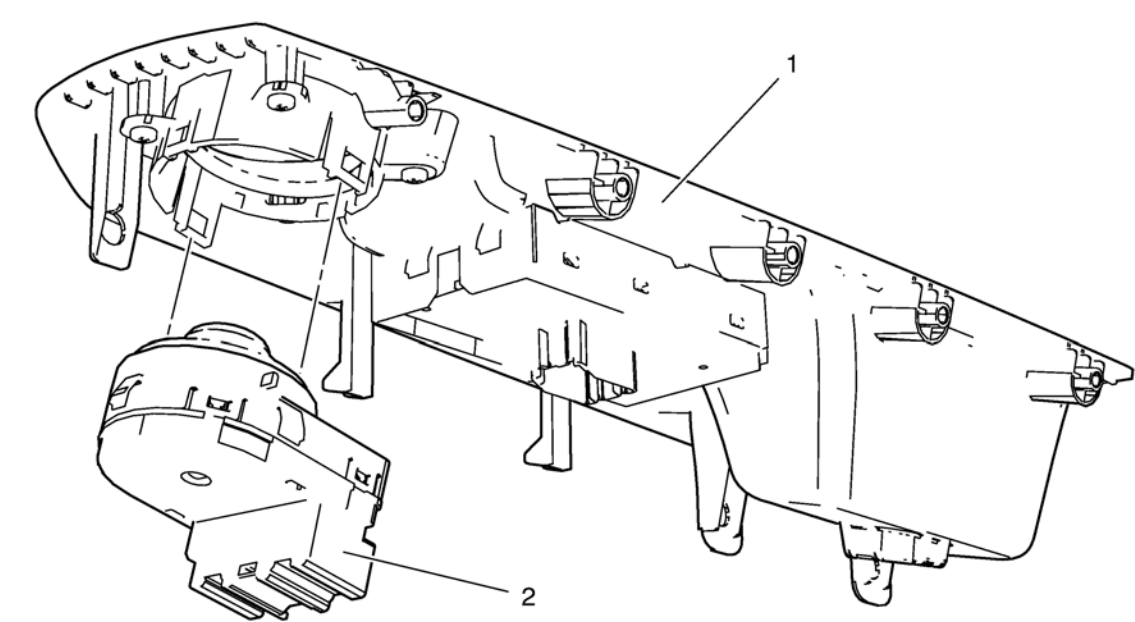


Outside Rearview Mirror Replacement



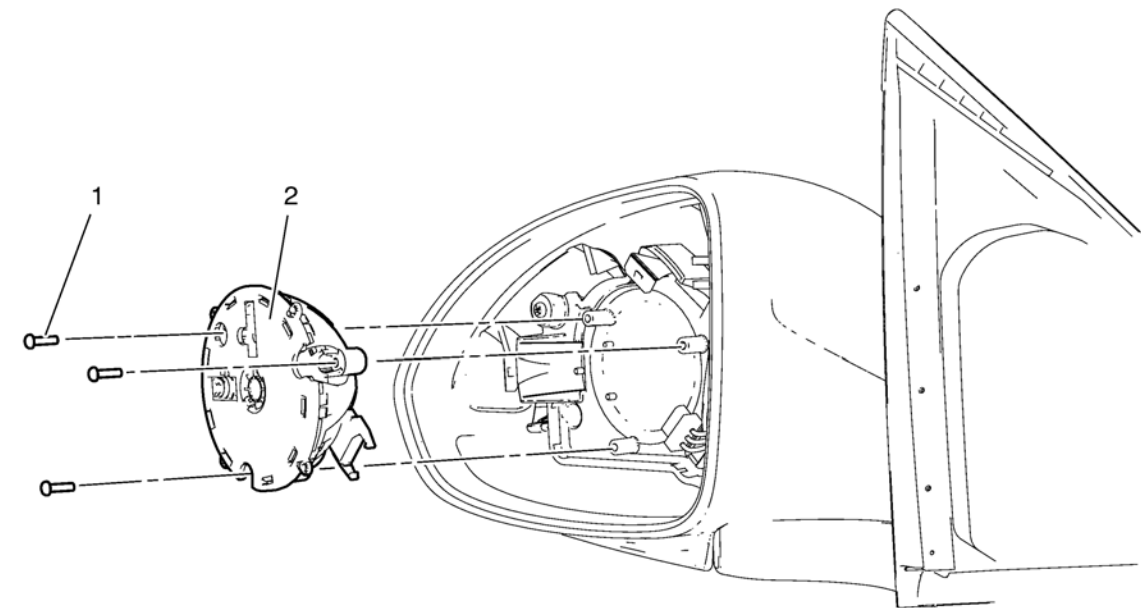
Callout	Component Name
Preliminary Procedure 1. Remove the front side door trim. Refer to Front Side Door Trim Replacement . 2. Remove the front side door upper trim cover. Refer to Front Side Door Upper Trim Cover Replacement .	
1	Outside Rearview Mirror Mount Plate Bolt (Qty: 3) Caution: Refer to Fastener Caution in the Preface section. Tighten 9 N·m (80 lb in)
2	Outside Rearview Mirror Tip Disconnect electrical connector.

Outside Remote Control Rearview Mirror Switch Replacement



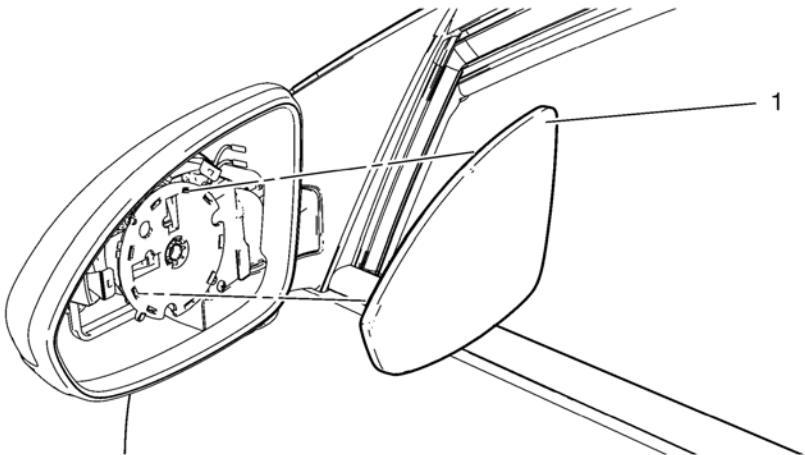
Callout	Component Name
Preliminary Procedure 1. Remove front side door trim. Refer to Front Side Door Trim Replacement . 2. Remove front side door window switch bezel. Refer to Front Side Door Window Switch Bezel Replacement .	
1	Side Window Switch Bezel
2	Power Mirror Switch Procedure 1. Using a plastic pry tool, gently pry on the sides to release the switch. 2. Disconnect the electrical connector.

Outside Rearview Mirror Motor Replacement



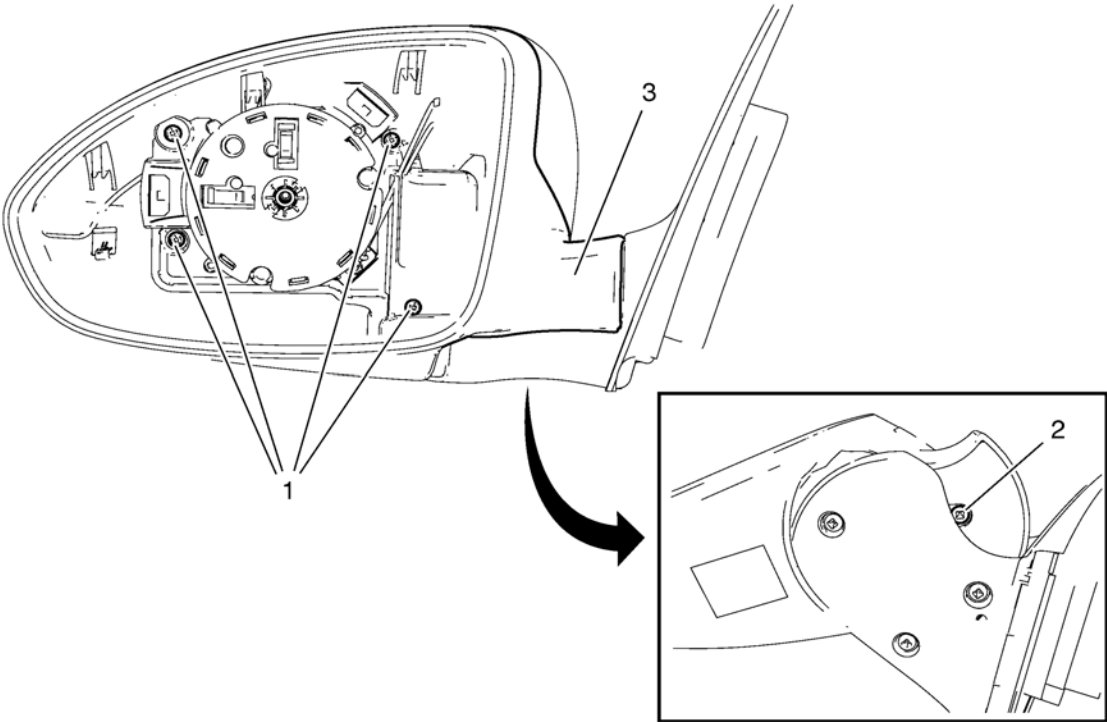
Callout	Component Name
Preliminary Procedure Remove the outside rearview mirror glass. Refer to Outside Rearview Mirror Glass Replacement .	
1	Outside Rearview Mirror Motor Bolt (Qty: 3) Caution: Refer to Fastener Caution in the Preface section. Tighten 3 N·m (27 lb in).
2	Outside Rearview Mirror Motor Tip Disconnect the electrical connector.

Outside Rearview Mirror Glass Replacement



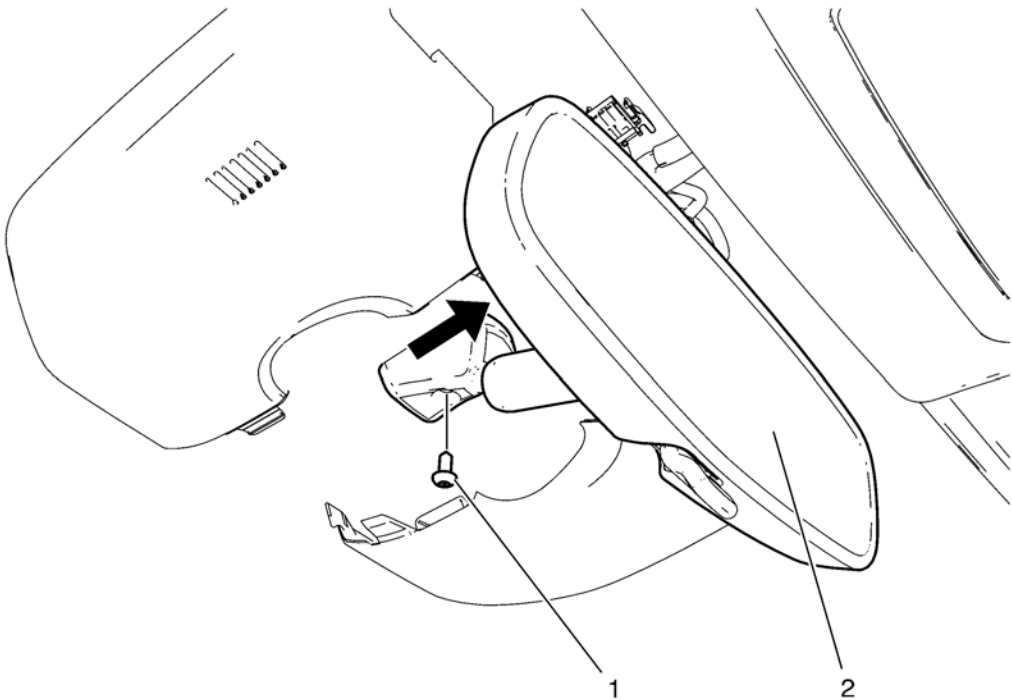
Callout	Component Name
Warning: Refer to Glass and Sheet Metal Handling Warning in the Preface section.	
1	Outside Rearview Mirror Glass Procedure Release the mirror glass backing from the mirror housing by pulling outward. Tip Disconnect the power wire harness electrical connector.

Outside Rearview Mirror Housing Replacement



Callout	Component Name
Preliminary Procedure Remove outside rearview mirror glass. Refer to Outside Rearview Mirror Glass Replacement .	
1	Outside Rearview Mirror Housing Screw (Qty: 4) Caution: Refer to Fastener Caution in the Preface section. Tighten 2.5 N·m (22 lb in)
2	Lower Outside Rearview Mirror Housing Screw Tighten 2.5 N·m (22 lb in)
3	Outside Rearview Mirror Housing Tip Disconnect electrical connector.

Inside Rearview Mirror Replacement



Callout	Component Name
Preliminary Procedure 1. Remove the outside moisture cover. Refer to Windshield Outside Moisture Sensor Cover Replacement 2. Adjust the mirror to the full upward position.	
1	Inside Rearview Mirror Bolt Caution: Refer to Fastener Caution in the Preface section. Tighten 8 N·m (80 lb in)
2	Inside Rearview Mirror Tip Slide the mirror in an upward motion in order to remove.

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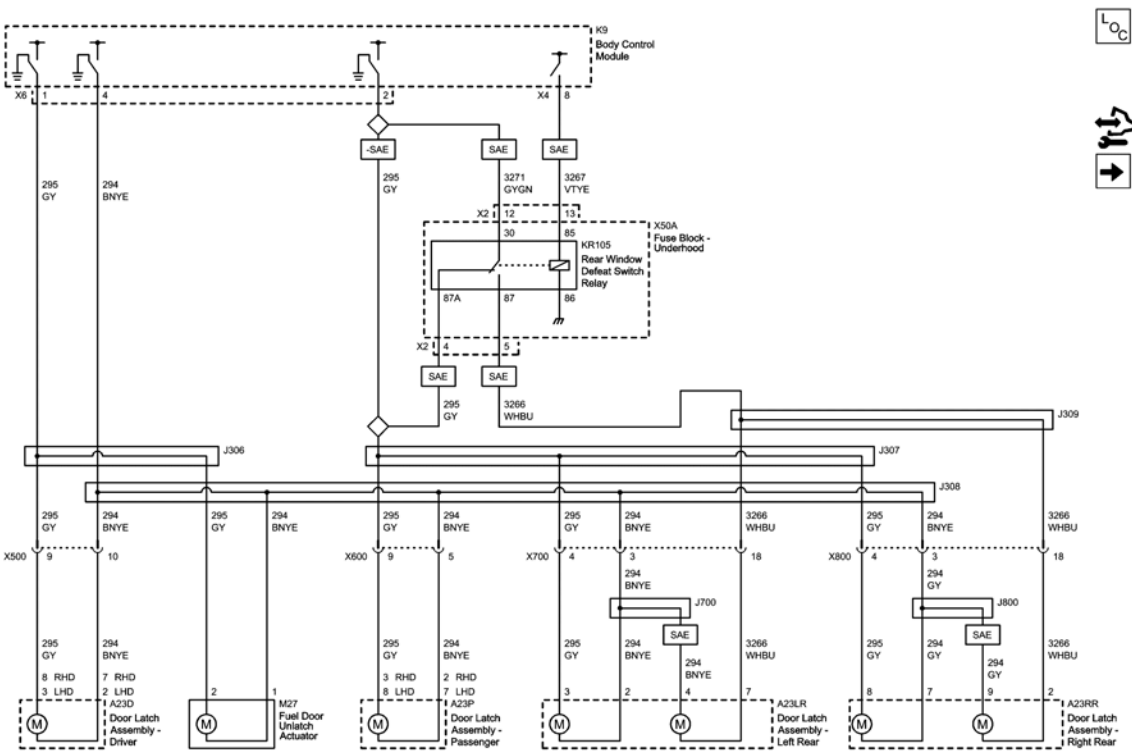
-  [Specifications](#)
-  [Door Lock/Indicator Schematics](#)
-  [Door Control Module Schematics](#)
-  [Release Systems Schematics](#)
-  [Fuel Tank Filler Door Lock Actuator Replacement](#)
-  [Front Side Door Lock Cylinder Replacement](#)
-  [Front Side Door Outside Handle Replacement](#)
-  [Rear Side Door Outside Handle Replacement](#)
-  [Rear Side Door Outside Handle Housing Replacement](#)
-  [Rear Compartment Lid Latch Replacement](#)
-  [Front Side Door Lock Replacement](#)
-  [Rear Door Lock Replacement](#)
-  [Front Side Door Outside Handle Housing Replacement](#)
-  [Front Side Door Locking Rod Replacement](#)
-  [Front Side Door Outside Handle Rod Adjustment](#)
-  [Rear Side Door Locking Rod Replacement](#)
-  [Rear Side Door Outside Handle Rod Adjustment](#)
-  [Rear Compartment Lid Latch Striker Replacement](#)
-  [Door Lock Switch Replacement](#)
-  [Door Ajar Indicator Description and Operation](#)
-  [Fuel Fill Door Description and Operation](#)
-  [Luggage Compartment Description and Operation](#)
-  [Power Door Latch Description and Operation](#)
-  [Power Door Locks Description and Operation](#)
-  [Special Tools and Equipment](#)

Fastener Tightening Specifications

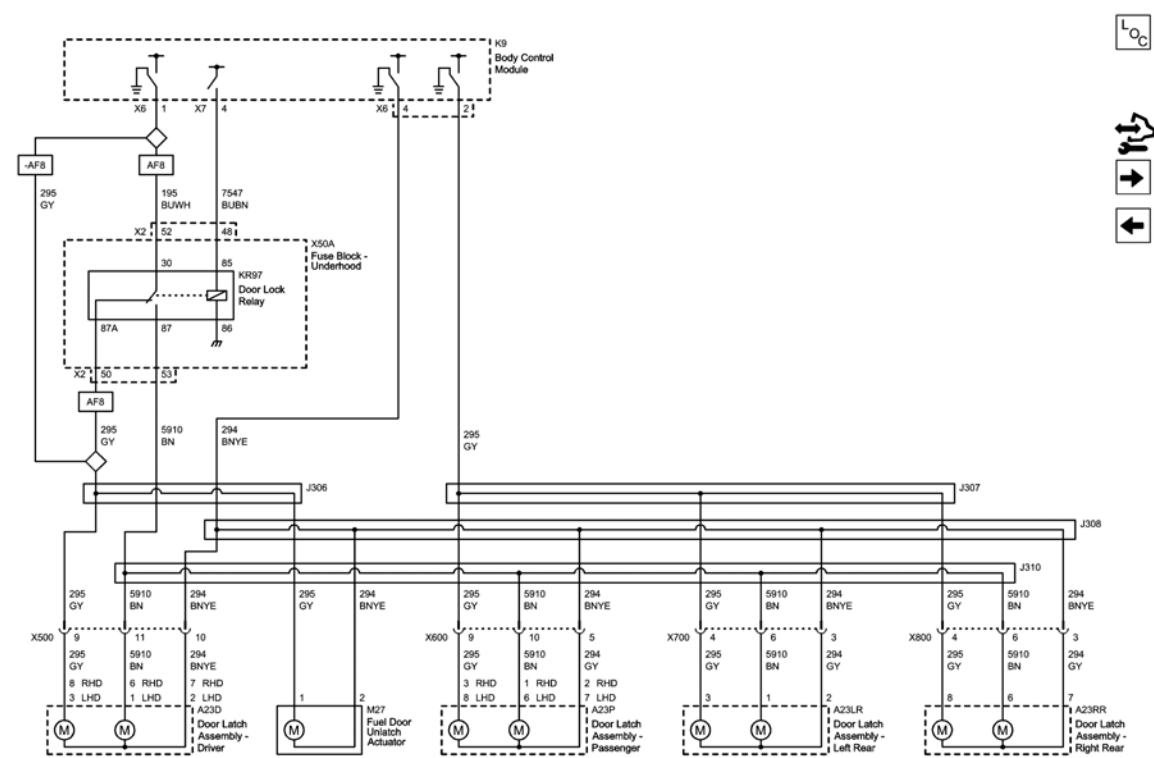
Application	Specification	
	Metric	English
Front Side Door Handle Housing Bolt	2.5 N·m	22 lb in
Front Side Door Lock Bolt	10 N·m	89 lb in
Front Side Door Outside Handle Bolt	9 N·m	80 lb in
Rear Compartment Lid Latch Bolt	9 N·m	80 lb in
Rear Compartment Lid Latch Striker Bolt	9 N·m	80 lb in
Rear Side Door Lock Bolt	10 N·m	89 lb in
Rear Side Door Outside Handle	9 N·m	80 lb in
Rear Side Door Outside Handle Housing Bolt	2.5 N·m	22 lb in

DOOR LOCK/INDICATOR SCHEMATICS

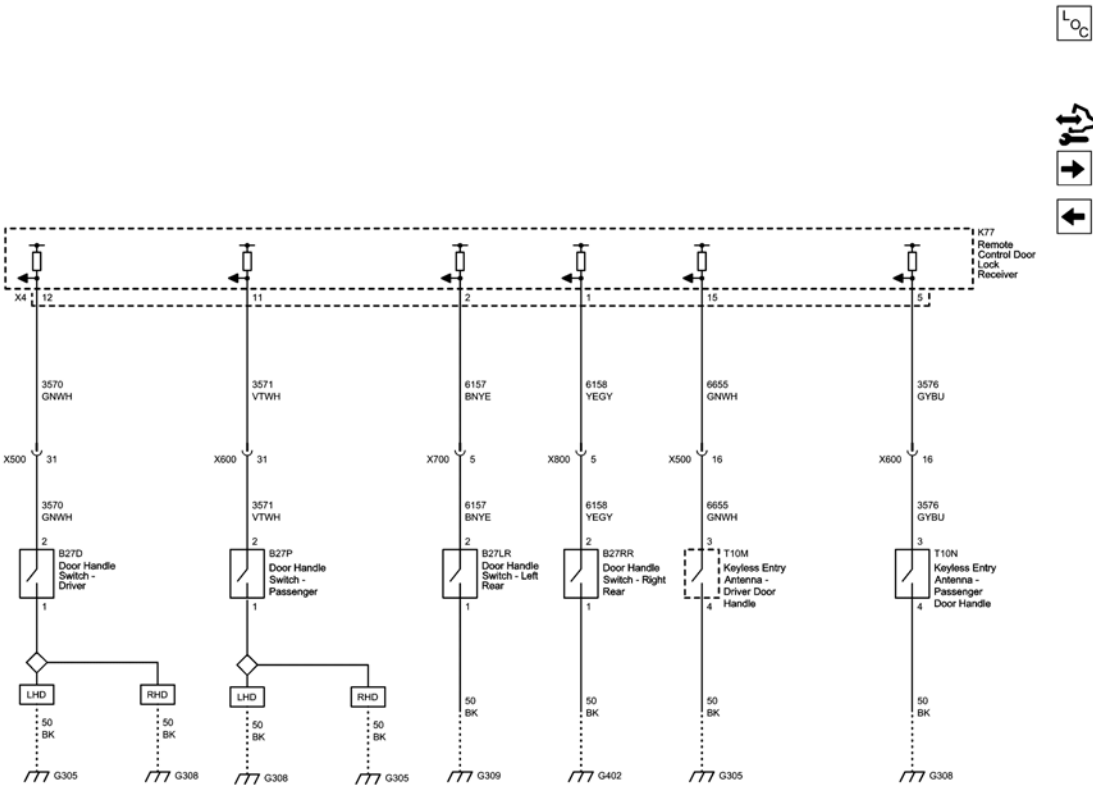
Doors and Fuel Flap Actuators (without AF8)



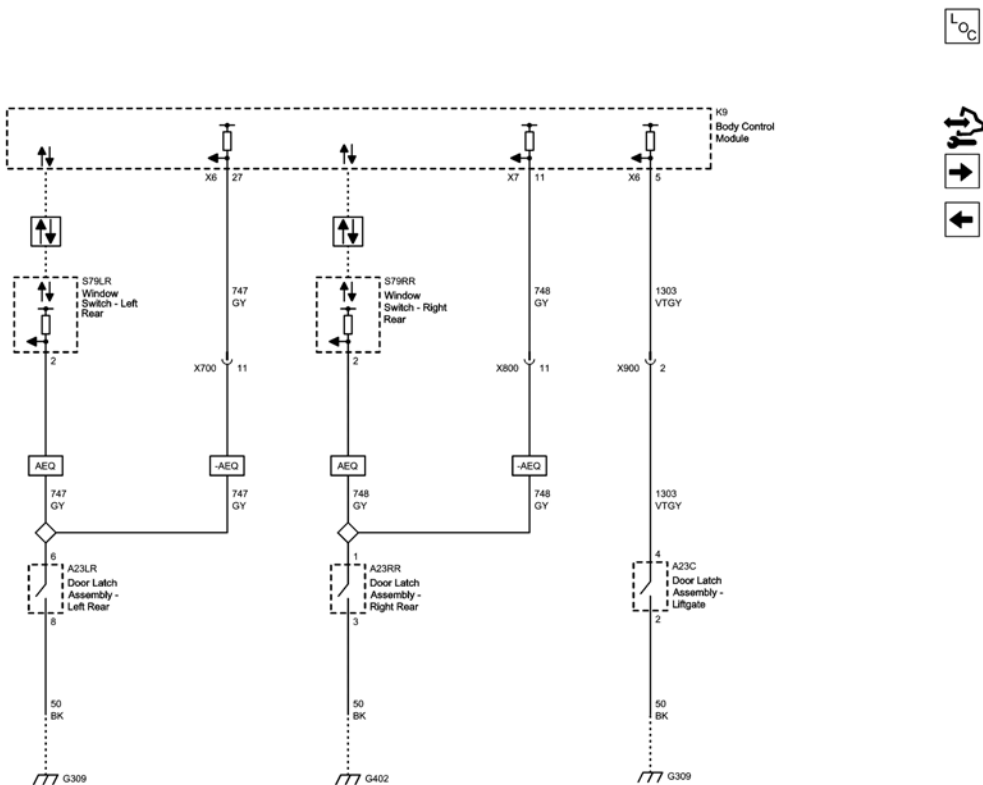
Doors and Fuel Flap Actuators (AF8 without SAE)



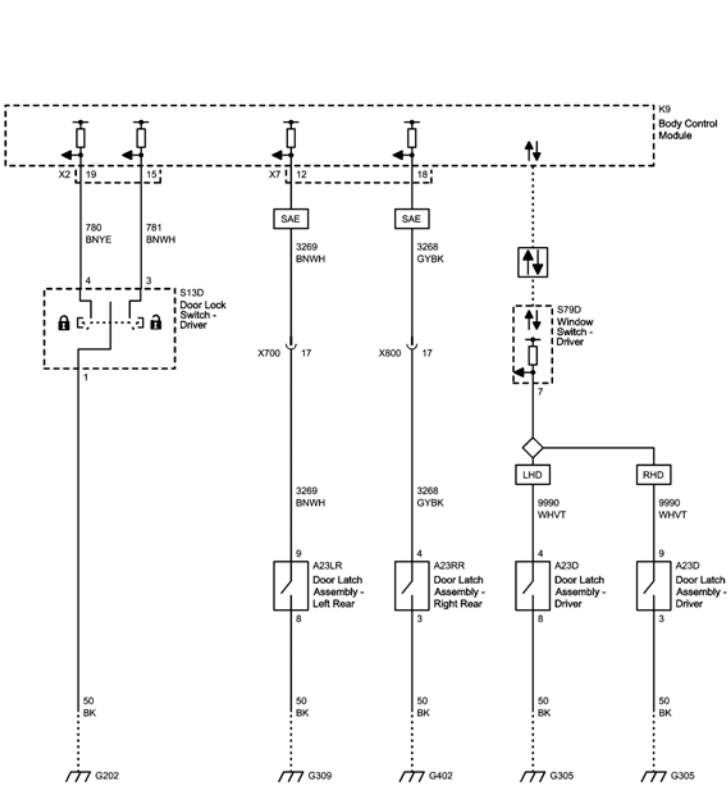
Handle Switches and Lock Switches



Door Ajar Switches Rear and Trunk

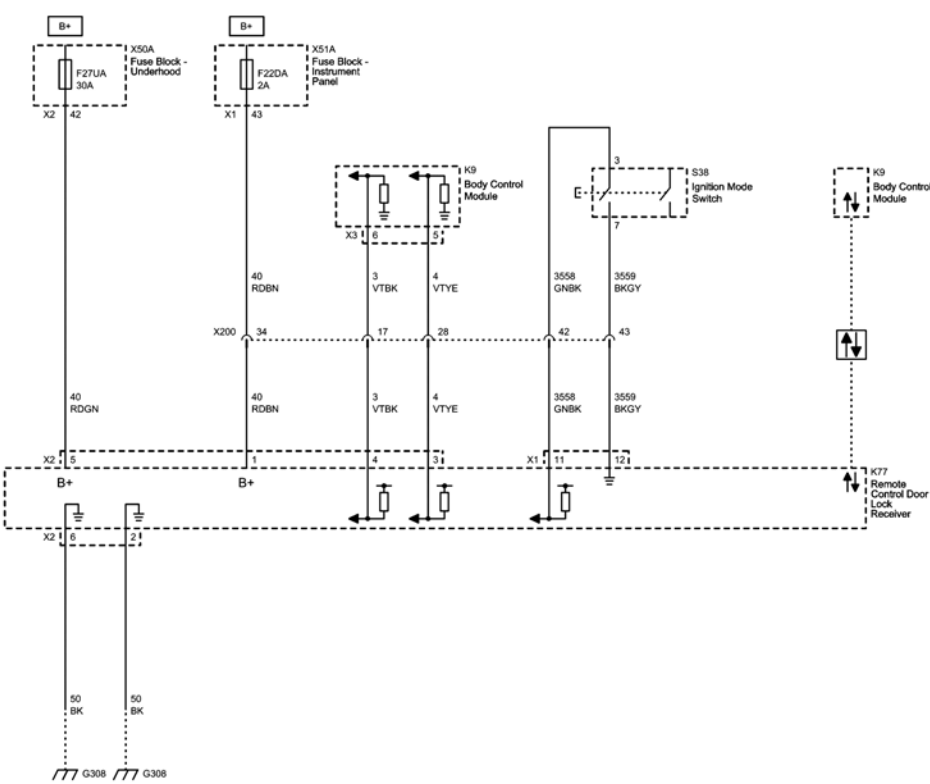


Door Latches



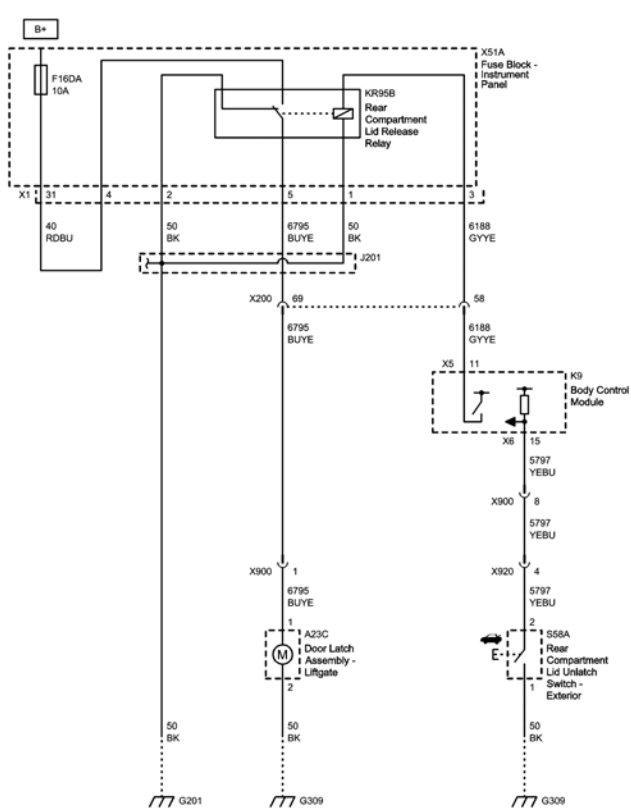
Door Control Module Schematics

Power, Ground and Serial Data (ATH)

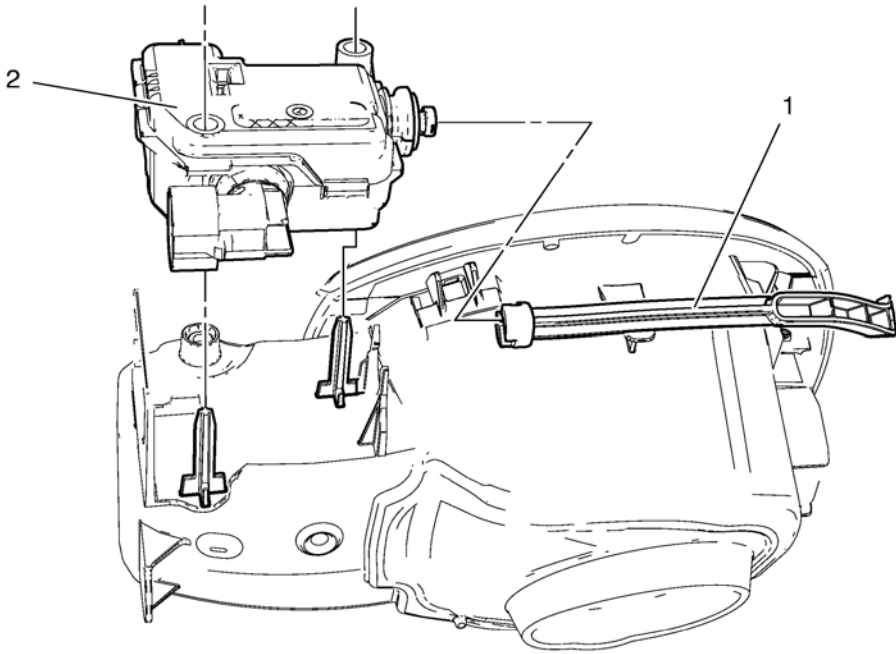


Release Systems Schematics

Trunk / Liftgate Release

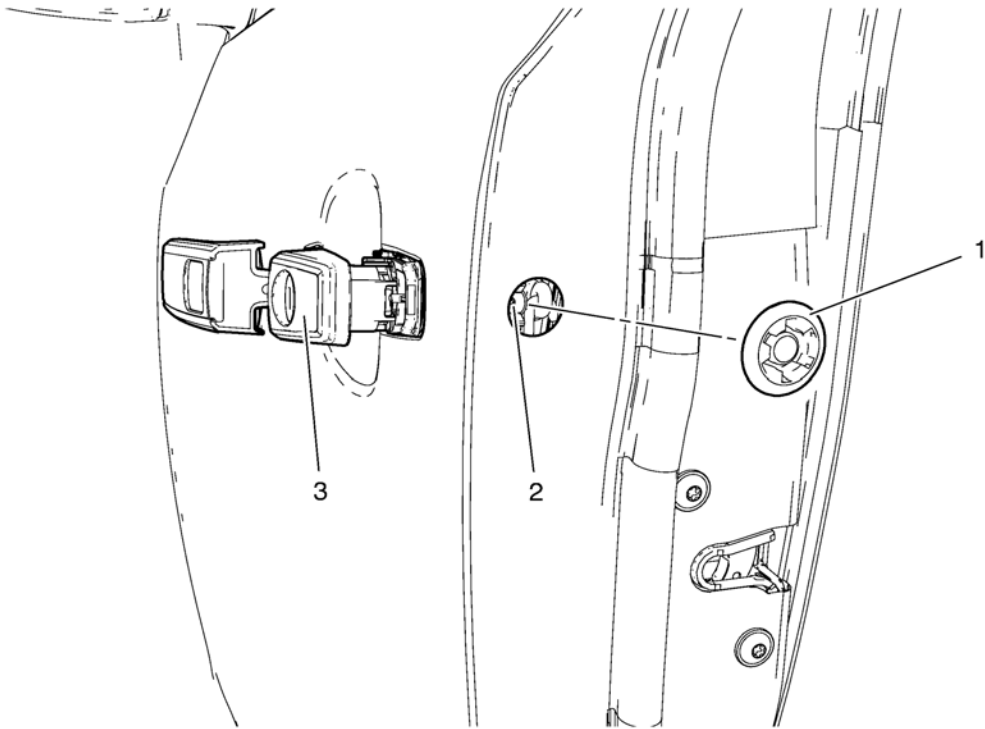


Fuel Tank Filler Door Lock Actuator Replacement



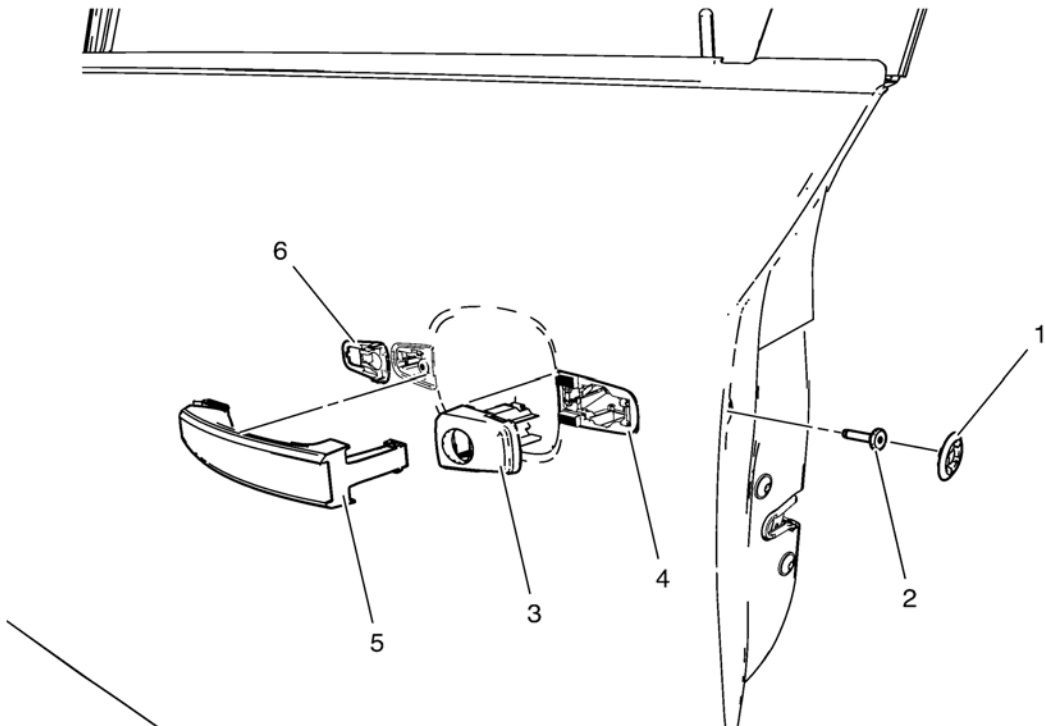
Callout	Component Name
Preliminary Procedure Remove the fuel tank filler housing. Refer to Fuel Tank Filler Pipe Housing Replacement .	
1	Fuel Tank Filler Door Lock Actuator Rod
2	Fuel Tank Filler Door Lock Actuator

Front Side Door Lock Cylinder Replacement



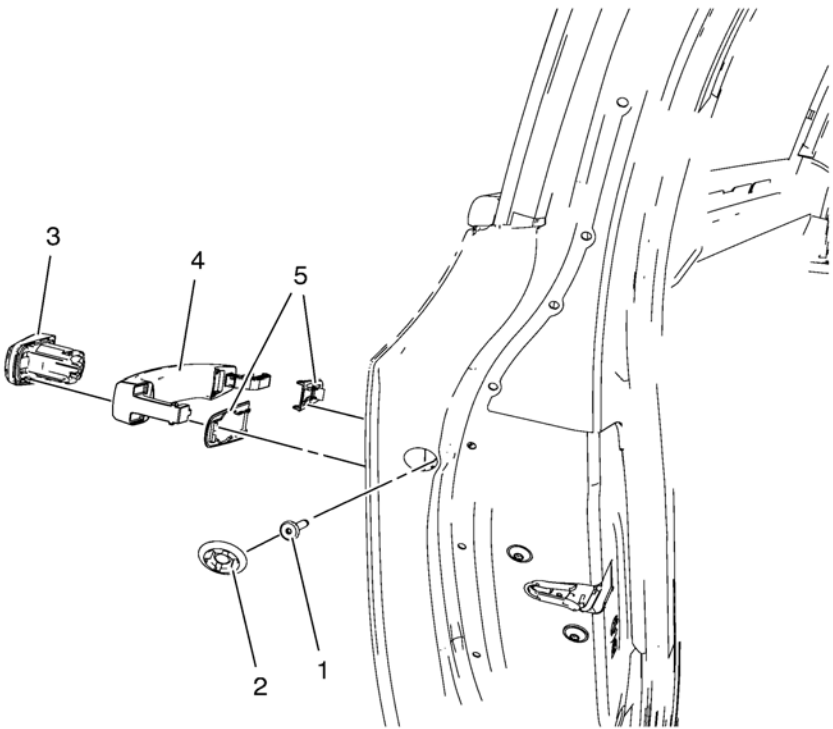
Callout	Component Name
1	Bolt Access Plug Procedure Use a plastic flat-bladed tool to remove.
2	Front Side Door Outside Handle Bolt Caution: Refer to Fastener Caution in the Preface section. Tighten 9 N·m (80 lb in)
3	Front Side Door Lock Cylinder Procedure 1. Pull the lock cylinder from the housing to remove. 2. Inspect the lock, lock cylinder and handle adjustments. Refer to Front Side Door Outside Handle Rod Adjustment. Tip Pull the front side door outside handle to unlock the door lock cylinder.

Front Side Door Outside Handle Replacement



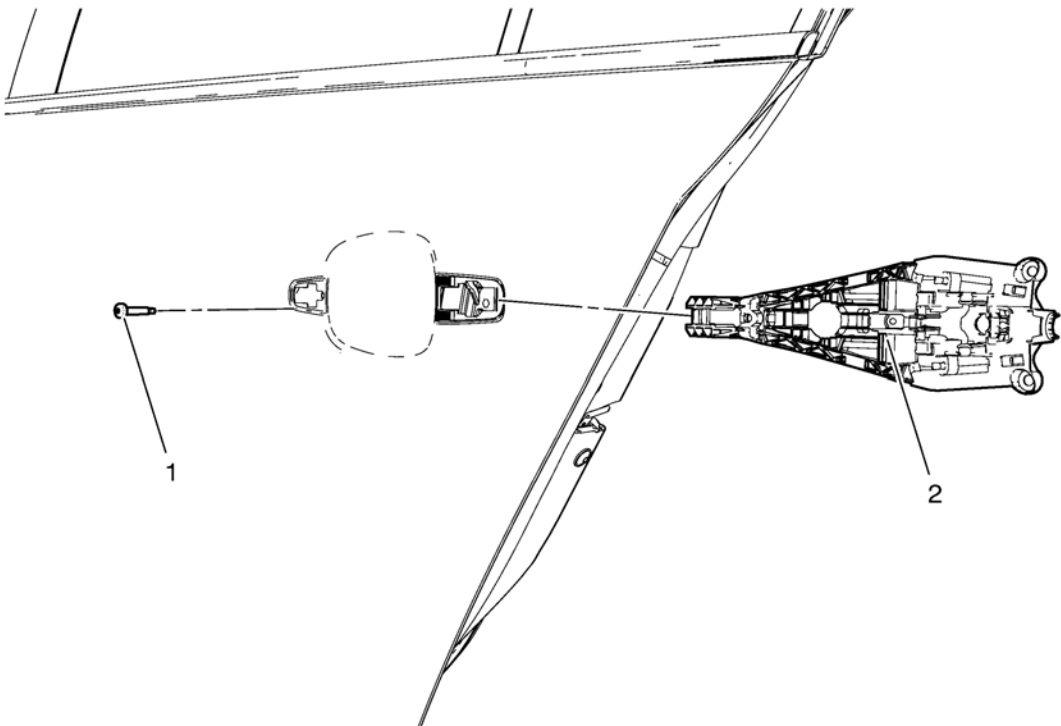
Callout	Component Name
1	Bolt Access Plug Procedure Use a plastic flat-bladed tool to remove.
2	Front Side Door Outside Handle Bolt Caution: Refer to Fastener Caution in the Preface section. Tighten 9 N·m (80 lb in)
3	Front Door Outside Handle Cap
4	Front Door Outside Handle Cap Gasket
5	Front Door Outside Handle Procedure Pull the outside handle rearward to release it from the inside handle housing.
6	Front Door Outside Handle Gasket Procedure Inspect the lock, lock cylinder and handle adjustments. Refer to Front Side Door Outside Handle Rod Adjustment.

Rear Side Door Outside Handle Replacement



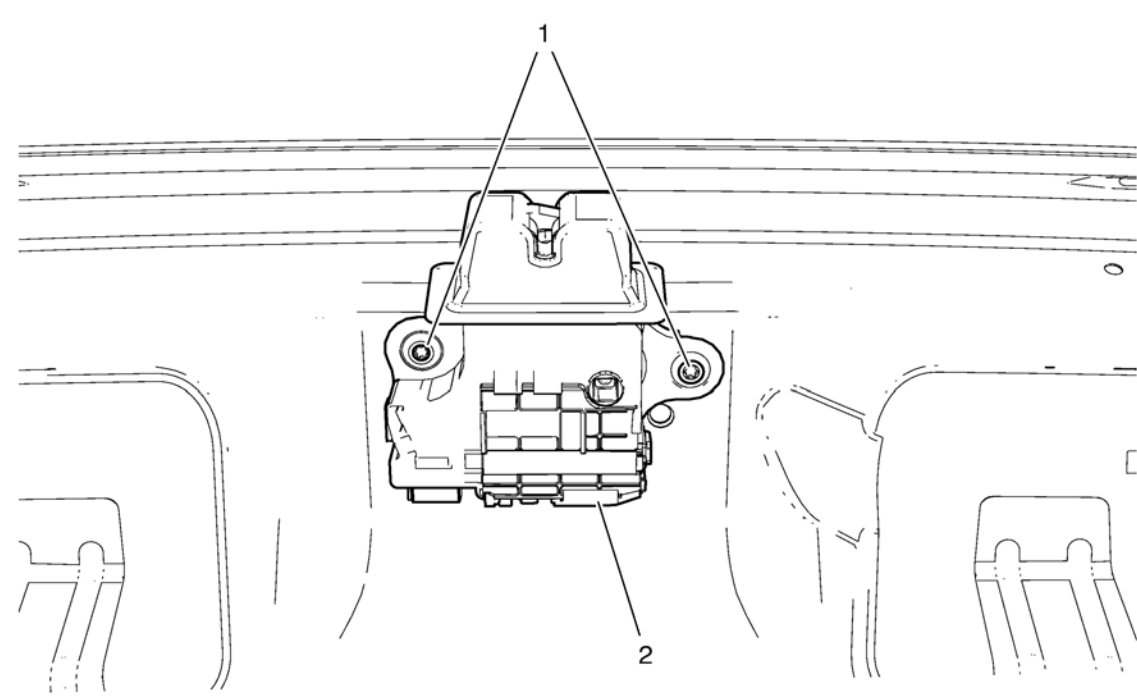
Callout	Component Name
1	Bolt Access Plug Procedure Use a plastic flat-bladed tool to remove.
2	Rear Side Door Outside Handle Cap Bolt Caution: Refer to Fastener Caution in the Preface section. Tighten 9 N·m (80 lb in)
3	Rear Door Outside Handle Cap
4	Rear Door Outside Handle Procedure Pull the outside handle rearward to release it from the handle housing.
5	Rear Door Outside Handle Gasket Procedure Inspect the lock and handle adjustments. Refer to Rear Side Door Outside Handle Rod Adjustment.

Rear Side Door Outside Handle Housing Replacement



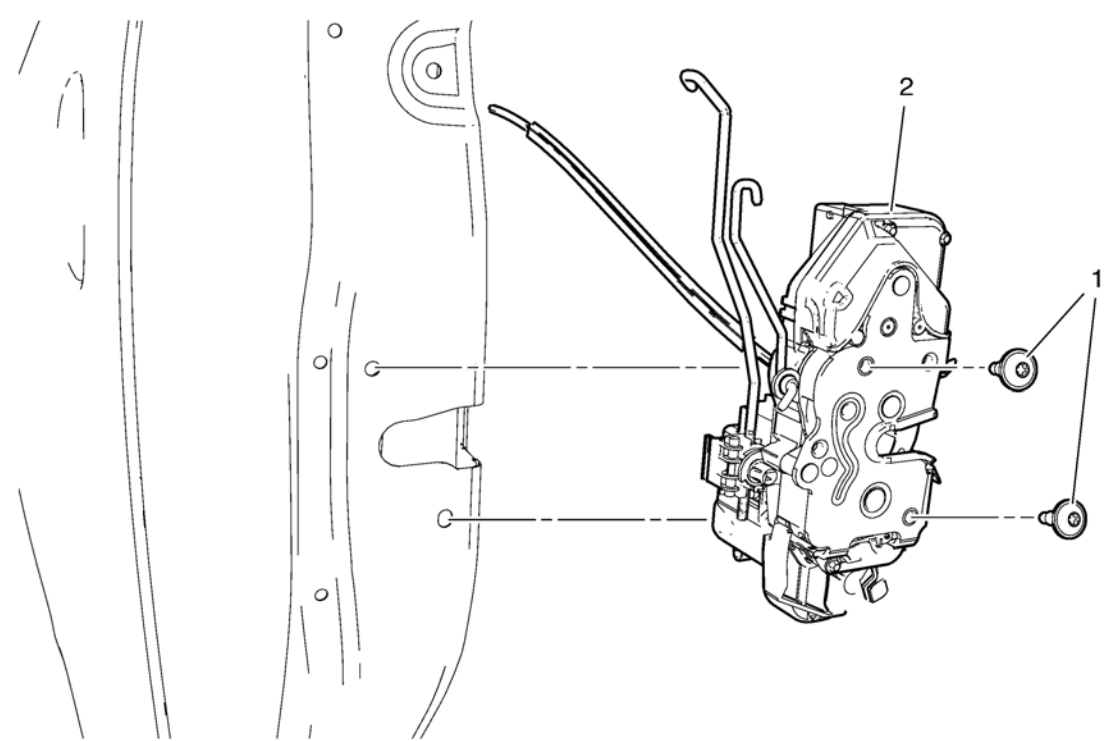
Callout	Component Name
Preliminary Procedure 1. Remove the rear side door trim. Refer to Rear Side Door Trim Replacement. 2. Remove the water deflector. Refer to Rear Side Door Water Deflector Replacement. 3. Remove the outside door handle. Refer to Rear Side Door Outside Handle Replacement.	
1	Rear Side Door Handle Housing Bolt Caution: Refer to Fastener Caution in the Preface section. Tighten 2.5 N·m (22 lb in)
2	Rear Side Door Outside Handle Housing Procedure 1. Transfer the handle and lock rods to the new outside door handle housing. 2. Inspect the lock, lock cylinder and handle adjustments. Refer to Rear Side Door Outside Handle Rod Adjustment.

Rear Compartment Lid Latch Replacement



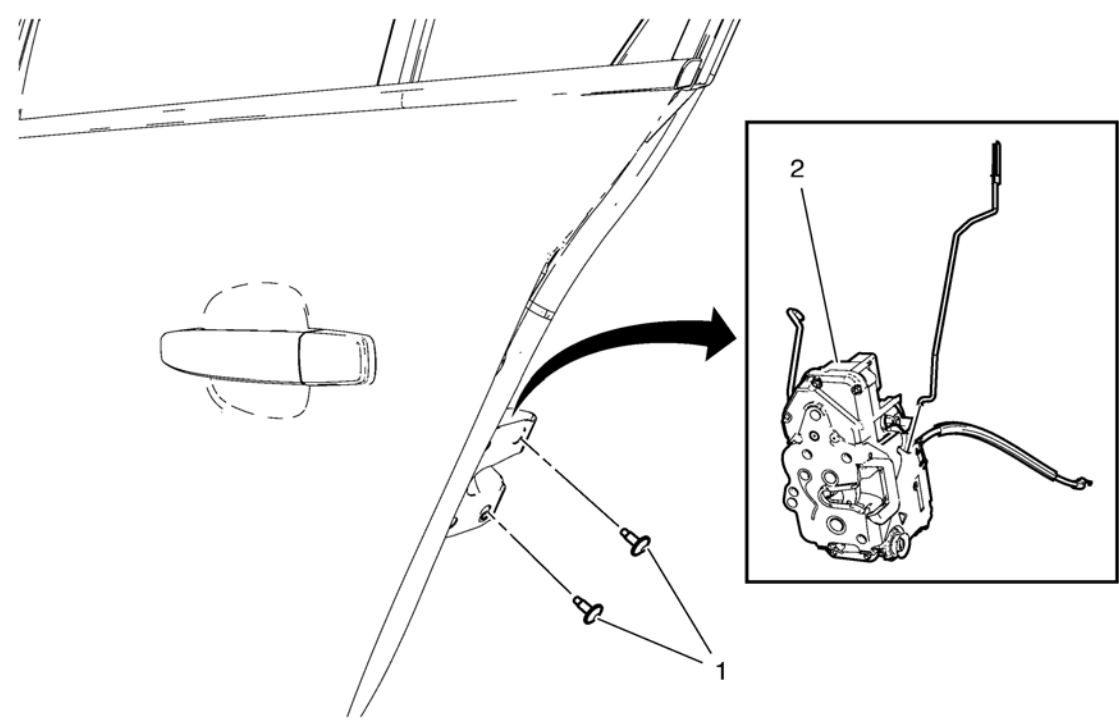
Callout	Component Name
Preliminary Procedure Remove the rear compartment lid inner panel trim. Refer to Rear Compartment Lid Inner Panel Trim Replacement .	
1	Rear Compartment Lid Latch Bolt (Qty: 2) Caution: Refer to Fastener Caution in the Preface section. Tighten 9 N·m (80 lb ft)
2	Rear Compartment Lid Latch

Front Side Door Lock Replacement



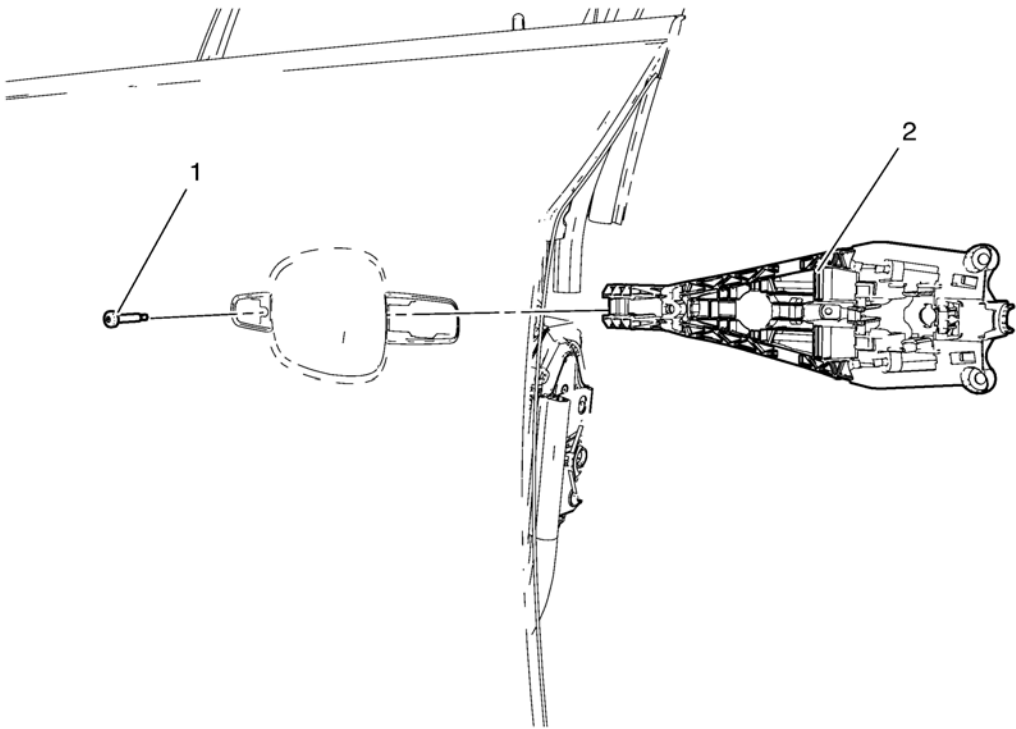
Callout	Component Name
Preliminary Procedure 1. Remove the front side door trim. Refer to Front Side Door Trim Replacement . 2. Remove the water deflector. Refer to Rear Side Door Water Deflector Replacement .	
1	Front Side Door Lock Screw (Qty: 2) Caution: Refer to Fastener Caution in the Preface section. Tighten 10 N·m (89 lb in)
2	Front Side Door Lock Assembly Procedure 1. Release the door lock cable retainers from the door. 2. Disconnect the door lock electrical connector. 3. Remove the door lock with the handle housing. 4. Remove the handle and lock rods from the lock. 5. Inspect the lock, lock cylinder and handle adjustments. Refer to Front Side Door Outside Handle Rod Adjustment .

Rear Door Lock Replacement



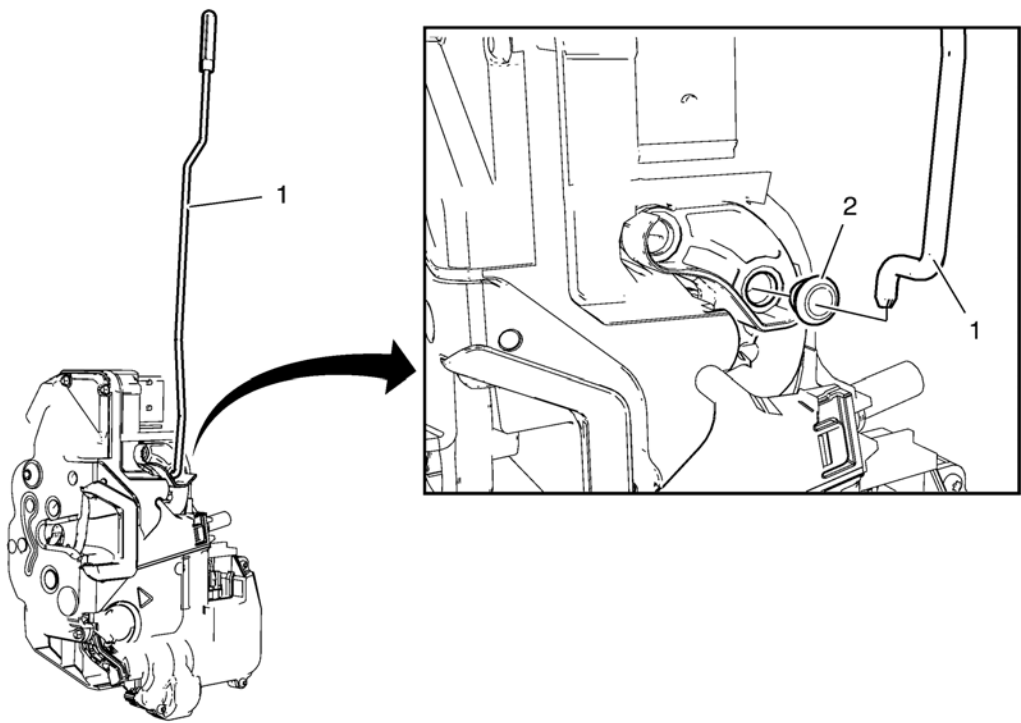
Callout	Component Name
Preliminary Procedure 1. Remove the interior trim panel. Refer to Rear Side Door Trim Replacement . 2. Remove the water deflector. Refer to Rear Side Door Water Deflector Replacement .	
1	Rear Side Door Lock Bolt (Qty: 2) Caution: Refer to Fastener Caution in the Preface section. Tighten 10 N·m (89 lb in)
2	Rear Side Door Lock Assembly Procedure 1. Release the inside handle cable retainers before removing the door lock. 2. Disconnect the door lock electrical connector. 3. Remove the door lock with the handle housing. 4. Transfer the handle and lock rods to the new door lock. 5. Inspect the lock, lock cylinder and handle adjustments. Refer to Rear Side Door Outside Handle Rod Adjustment .

Front Side Door Outside Handle Housing Replacement



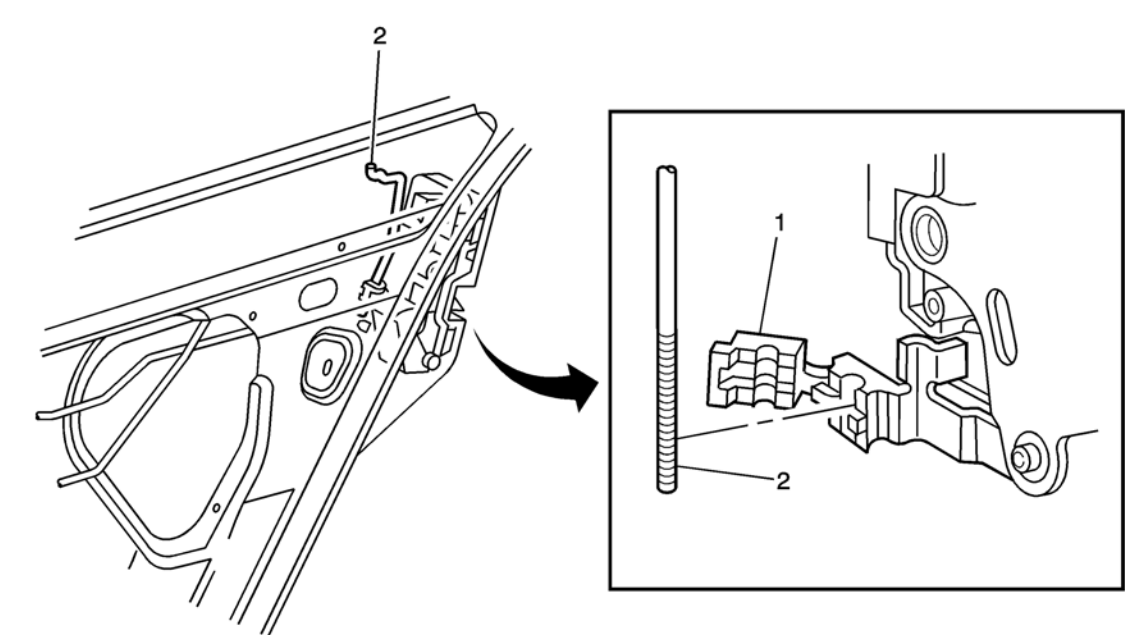
Callout	Component Name
Preliminary Procedure 1. Remove the front side door trim. Refer to Front Side Door Trim Replacement. 2. Remove the water deflector. Refer to Front Side Door Water Deflector Replacement. 3. Remove the outside door handle. Refer to Front Side Door Outside Handle Replacement.	
1	Front Side Door Handle Housing Bolt Caution: Refer to Fastener Caution in the Preface section. Tighten 2.5 N·m (22 lb in)
2	Front Door Outside Handle Housing Procedure 1. Disconnect the lock and handle rods to remove the housing. 2. Transfer the lock cylinder to the new housing. Refer to Front Side Door Lock Cylinder Replacement. 3. Inspect the lock, lock cylinder and handle adjustments. Refer to Front Side Door Outside Handle Rod Adjustment.

Front Side Door Locking Rod Replacement



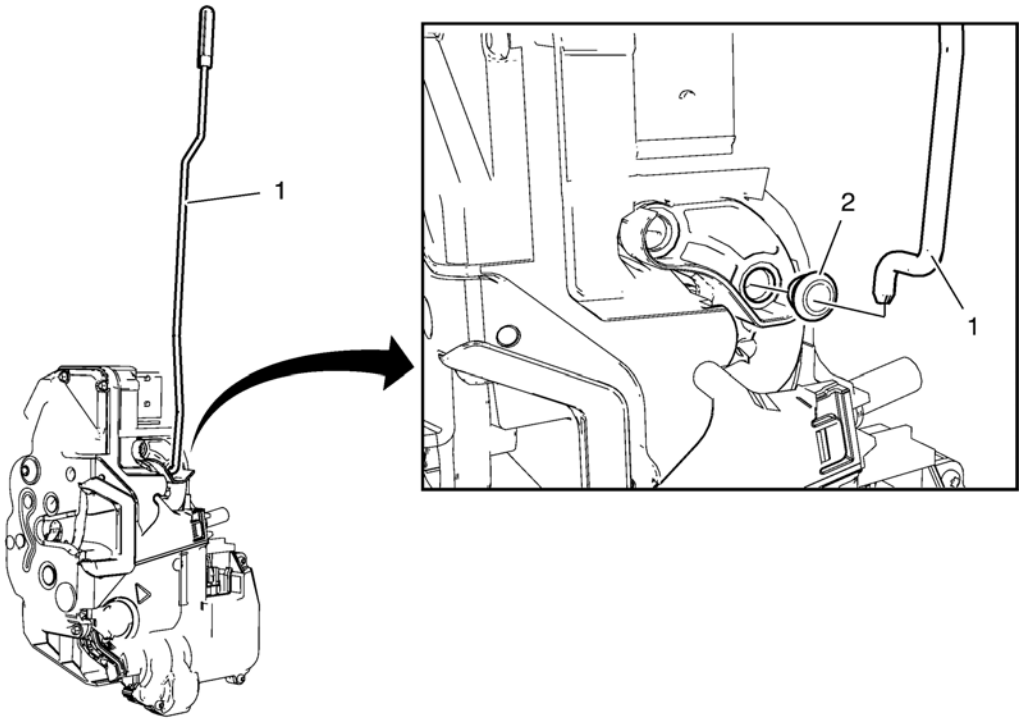
Callout	Component Name
Preliminary Procedure 1. Remove the interior trim panel. Refer to Front Side Door Trim Replacement . 2. Remove the water deflector. Refer to Front Side Door Water Deflector Replacement . 3. Remove the front side door lock. Refer to Front Side Door Lock Replacement .	
1	Front Side Door Lock Rod Procedure Inspect the lock, lock cylinder and handle adjustments. Refer to Front Side Door Outside Handle Rod Adjustment .
2	Front Side Door Locking Rod Clip

Front Side Door Outside Handle Rod Adjustment



Callout	Component Name
Preliminary Procedure Remove the water deflector. Refer to Front Side Door Water Deflector Replacement .	
1	Outside Door Handle Rod Clip Procedure Use a flat-head tool to open the clip from the threaded rod connecting the lock to the outside handle.
2	Outside Door Handle Rod Procedure 1. Position the outside door handle rod (2) in the clip (1) in order to eliminate any free play in the outside door handle. 2. Adjust the travel of the handle by removing the threaded rod in the clip. 3. Install the clip cover closed over the threaded outside door handle rod. 4. Inspect the door lock system for proper operation.

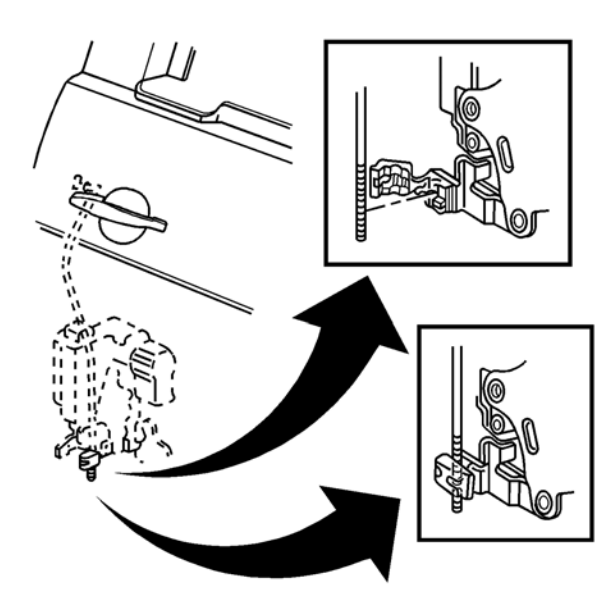
Rear Side Door Locking Rod Replacement



Callout	Component Name
Preliminary Procedure 1. Remove the rear side door trim. Refer to Rear Side Door Trim Replacement 2. Remove the water deflector. Refer to Rear Side Door Water Deflector Replacement 3. Remove the rear side door lock. Refer to Rear Door Lock Replacement	
1	Rear Side Door Lock Rod Procedure Inspect the lock, lock cylinder and handle adjustments. Refer to Rear Side Door Outside Handle Rod Adjustment
2	Rear Side Door Locking Rod Clip

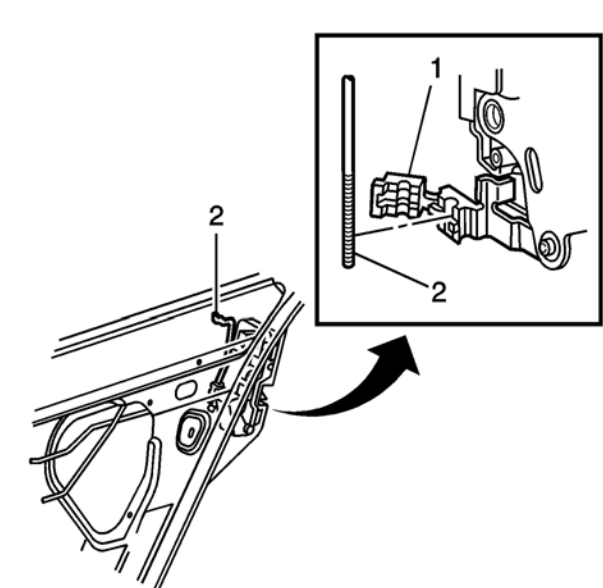
Rear Side Door Outside Handle Rod Adjustment

Removal Procedure



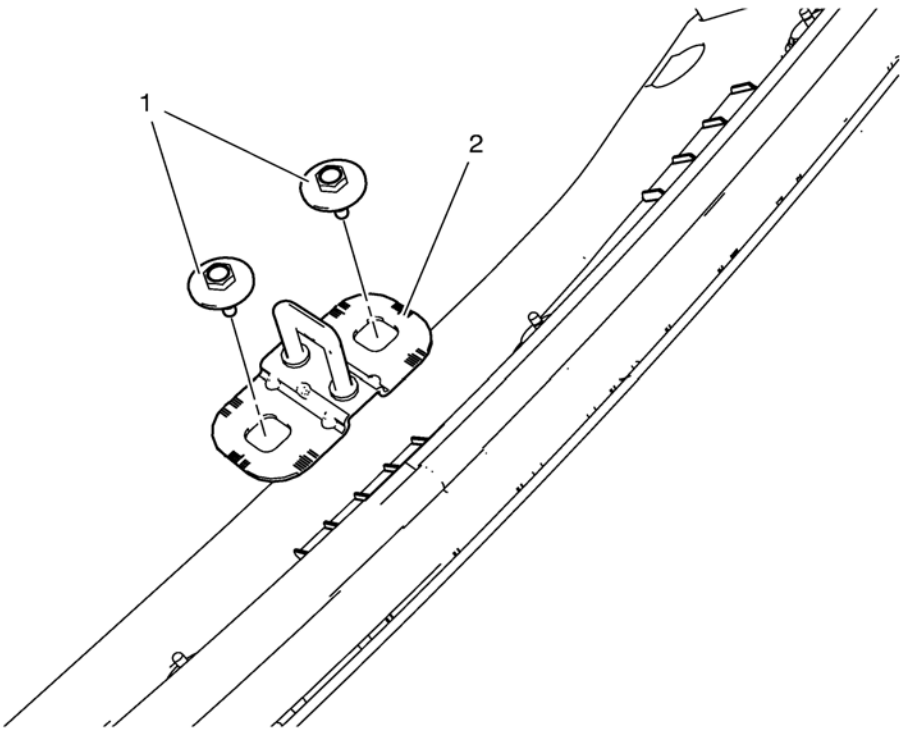
1. Remove the rear door water deflector as needed. Refer to [Rear Side Door Water Deflector Replacement](#).
2. Use a flat-head tool to open the clip from the threaded rod connecting the lock to the outside handle.
3. Adjust the travel of the handle by removing the threaded rod from the clip.

Installation Procedure



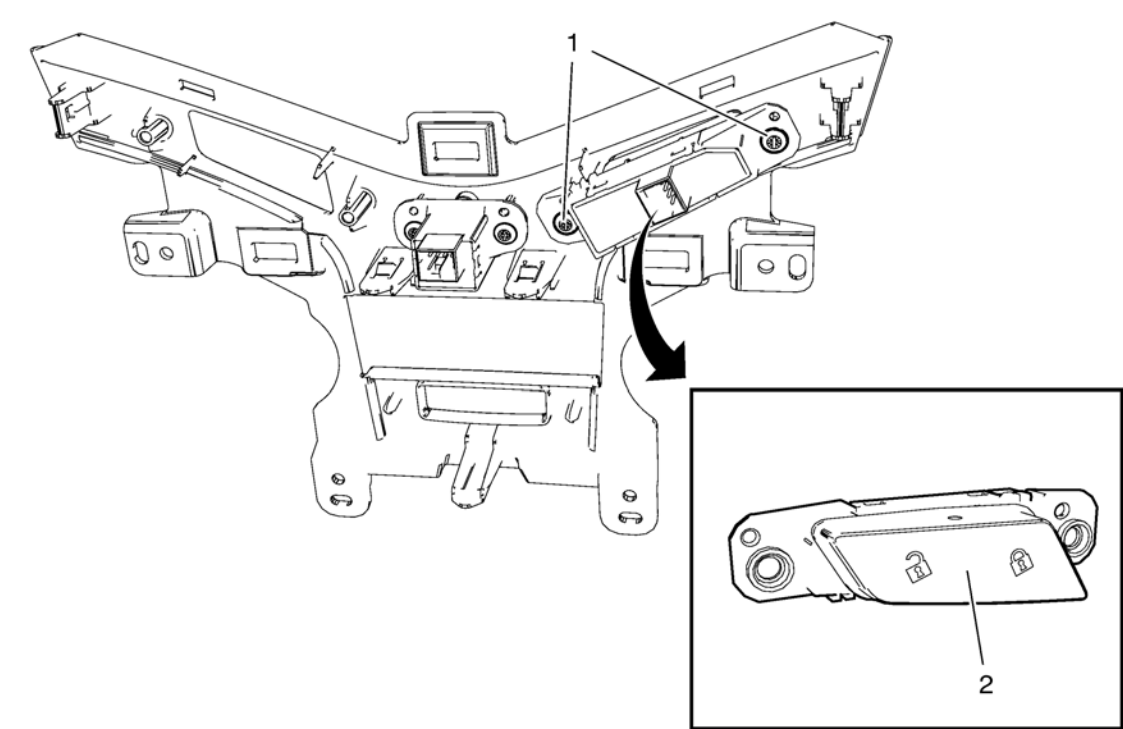
1. Position the outside door handle rod (2) in the clip (1) in order to eliminate any free play in the outside door handle.
2. Install the clip cover closed over the threaded outside door handle rod.
3. Inspect the door lock system for proper operation.
4. Install the rear door water deflector. Refer to [Rear Side Door Water Deflector Replacement](#).

Rear Compartment Lid Latch Striker Replacement



Callout	Component Name
Preliminary Procedure Remove the rear compartment sill trim plate. Refer to Rear Compartment Sill Trim Plate Replacement .	
1	Rear Compartment Lid Latch Striker Bolt (Qty: 2) Caution: Refer to Fastener Caution in the Preface section. Procedure Use a grease pencil to outline the striker before removing the bolts. Tighten 9 N·m (80 lb in)
2	Rear Compartment Lid Latch Striker Tip Adjust the rear compartment lid latch striker after replacing, if needed.

Door Lock Switch Replacement



Callout	Component Name
1	Door Lock Switch Screw (Qty: 2) Caution: Refer to Fastener Caution in the Preface section. Tighten 1.5 N·m (13 lb in)
2	Door Lock Switch Tip Disconnect electrical connector.

Door Ajar Indicator Description and Operation

Door Ajar Indicator System Components

The door ajar indicator system consists of the following components:

- Body control module (BCM)
- Instrument cluster
- Driver information center
- Driver door latch
- Passenger door latch
- Left rear door latch
- Right rear door latch
- Liftgate door latch
- Driver window motor (RPO AXG) or driver window switch (RPO AEC)
- Passenger window switch
- Left rear window switch
- Right rear window switch

Driver Door Ajar

The driver window motor (RPO AXG) or driver window switch (RPO AEC) receives a discrete input from the driver door ajar switch within the driver door latch to indicate the status of the door. The window motor or window switch then communicates this status via Local Interconnect Network (LIN) bus to the BCM. The BCM communicates this information to the instrument cluster via low speed bus. The instrument panel cluster, upon receipt of this GMLAN message, will illuminate the appropriate door ajar message in the driver information center and also send a GMLAN message to the radio to activate the door ajar audible warning when the vehicle speed is greater than 8 km/h (5 MPH).

Passenger Door Ajar

The passenger window switch receives a discrete input from the passenger door ajar switch within the passenger door latch to indicate the status of the door. The window switch then communicates this status via LIN bus to the BCM. The BCM communicates this information to the instrument cluster via low speed bus. The instrument panel cluster, upon receipt of this GMLAN message, will illuminate the appropriate door ajar message in the driver information center and also send a GMLAN message to the radio to activate the door ajar audible warning when the vehicle speed is greater than 8 km/h (5 MPH).

Left Rear Door Ajar And Right Rear Door Ajar

The body control module (BCM) (without power rear windows) or the left and right rear window switches (with power rear windows AED) receive discrete inputs from both the rear door latches and the rear compartment lid latch to indicate the status of the doors and rear compartment lid. The BCM or window switches then communicate this status to the instrument cluster via GMLAN message. The instrument panel cluster, upon receipt of this GMLAN message, will illuminate the appropriate door ajar message in the driver information center and also send a GMLAN message to the radio to activate the door ajar audible warning when the vehicle speed is greater than 8 km/h (5 MPH).

Fuel Fill Door Description and Operation

Fuel Door Release System Components

- Body control module (BCM)
- Fuel door relay

The locking and unlocking of the fuel door is a function of the power door lock system. The fuel door release actuator shares the circuit with the driver door latch. The body control module (BCM), upon receipt of a lock switch lock or unlock signal, will switch the appropriate door latch, as well as a fuel filler door release actuator control circuits to B+ voltage. The opposing side of the door latch and fuel filler door release actuator is connected to ground provided by the BCM through the other the door latch control circuits, along with the fuel filler door release actuator, will lock or unlock as commanded.

Luggage Compartment Description and Operation

Rear Compartment Lid Release System Components

- Body control module (BCM)
- Exterior rear compartment lid release switch
- Rear compartment lid release actuator
- Rear compartment lid release relay

Rear Compartment Lid Release Operation

When the exterior rear compartment lid release switch is pressed, the trunk release switch signal circuit is switched to ground. The BCM responds by applying battery voltage to the trunk release relay control circuit which energizes the rear compartment lid release relay. The rear compartment lid release relay is supplied with battery voltage at all times from an instrument panel fuse. With the relay coil energized, the relay switch contacts close allowing battery voltage to flow to the rear compartment lid release actuator causing the rear compartment lid to release. The exterior rear compartment lid release switch is permanently grounded to a fixed body ground.

When accessing the rear compartment using the key fob, a valid keyless entry transmitter is required to be within a 30 meter range of the vehicle. This allows the required keyless access communications to occur between the rear compartment antenna and the keyless entry transmitter. For more information about keyless access, refer to [Keyless Entry System Description and Operation](#).

Power Door Latch Description and Operation

Power Door Latch System Components

The power door latch system consists of the following components:

- Remote control door lock receiver
- Body control module (BCM)
- Driver door latch
- Passenger door latch
- Left rear door latch
- Right rear door latch
- Door handle assemblies

Power Door Latch System Controls

Control of the power door latches is dependent on the door lock status. If the status of the door lock system is Unlock, the power door latches will electrically release after lifting the exterior door handle. If the status of the door lock system is Lock, one of the following inputs will be required before the latch will release:

- Door unlock switch activation
- Keyless entry unlock command
- Passive keyless entry unlock command message is received by the remote control door lock receiver

Once any of the above inputs has been received, the power door latches will electrically release after lifting the exterior door handle.

For further information on the power door lock status, refer to [Power Door Locks Description and Operation](#)

Power Door Latch Unlatch Operation

When any exterior door handle is lifted, switched ground signals are sent to the remote control door lock receiver through the door handle switch signal circuits. Upon receipt of these inputs, the remote control door lock receiver will check the door lock status of the system as described above. Once the enable criteria has been met, the remote control door lock receiver will supply power and ground to door latch control circuits and the door will release.

Power Door Locks Description and Operation

Door Lock System Components

The power door lock system consists of the following components:

- Door lock switch - located in the center of the instrument panel
- Body control module (BCM)
- Driver door latch
- Passenger door latch
- Left rear door latch
- Right rear door latch

Door Lock System Controls

The power door lock system can be controlled by any of the following:

- Power door lock switch activation
- Keyless entry lock or unlock command
- A door lock cylinder switch Unlock actuation
- Delayed locking command
- Automatic door lock command

Door Lock and Unlock Operation

When a door lock switch is activated in the lock or unlock position the BCM will receive a ground signal on either the door lock switch lock or unlock signal circuits.

The BCM, upon receipt of a lock switch lock or unlock signal, will supply battery voltage to the door lock actuator lock or unlock control circuits. Since the opposite side of the lock actuator is connected to ground through the other lock actuator control circuit, the doors, fuel filler door and liftgate will then lock or unlock as commanded.

The following three circuits are used to operate the lock:

- Driver door unlock
- Passenger door unlock
- All door lock

The driver door lock actuator is isolated so it can be unlocked by itself using the keyless entry transmitter.

Automatic Door Lock Operation

This feature can be personalized to driver preference.

The BCM will automatically lock the vehicle doors if the following conditions exist:

- All vehicles doors are closed.
- The ignition is in the ON position
- The vehicle is shifted out of Park.

The BCM will then unlock the doors when vehicle is shifted back into Park.

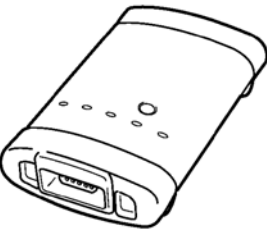
Delayed Locking Operation

With any door open and a door lock switch is activated in the lock position, the BCM will give three audible chimes. When the door is closed, the BCM will cycle the internal door lock relay to lock the doors after approximately five seconds. This feature can be overridden by activating the door lock switch a second time and the doors will lock even with a door open.

Lockout Prevention Operation

The BCM will lock all doors and unlock the driver door with a door lock switch lock activation if a vehicle door is open and the ignition key is fully inserted in the ignition. The lockout prevention feature can be overridden if a lock command is received from the keyless entry system.

Special Tools

Illustration	Tool Number / Description
	BO-569-A KM-569-A Plug Lifter
	DT-6459-B MKM-J-6459-B Torque Wrench
	GE-604-D MKM-604-D Torx Bit and Socket Set
	EL-47955 J-2534 Multi Diagnostic Interface MDI

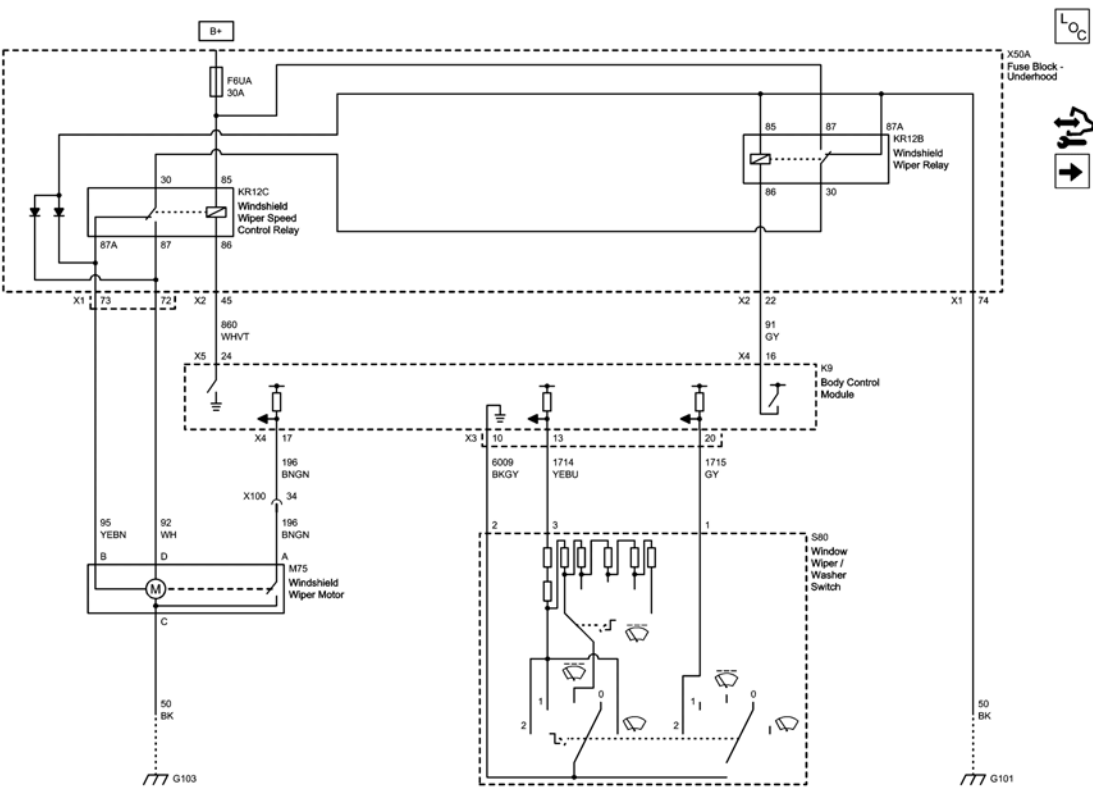
Select a Document:

-  [Specifications](#)
-  [Wiper/Washer Schematics](#)
-  [Windshield Wiper and Washer Switch Replacement](#)
-  [Windshield Washer Nozzle Hose Replacement](#)
-  [Windshield Washer Nozzle Replacement](#)
-  [Windshield Washer Solvent Container Filler Tube Replacement](#)
-  [Windshield Washer Solvent Container Grommet Replacement](#)
-  [Windshield Washer Pump Replacement](#)
-  [Windshield Washer Pump Seal Replacement](#)
-  [Air Inlet Grille Panel Replacement](#)
-  [Windshield Wiper Arm Replacement](#)
-  [Windshield Wiper Blade Replacement](#)
-  [Windshield Wiper Motor Replacement](#)
-  [Windshield Wiper Transmission Replacement \(Right Hand Drive\)](#)
-  [Windshield Outside Moisture Sensor Cover Replacement](#)
-  [Windshield Outside Moisture Sensor Replacement](#)
-  [Wiper Blade Element Cleaning](#)
-  [Windshield Wiper Arm Adjustment](#)
-  [Wiper/Washer System Description and Operation](#)
-  [Special Tools and Equipment](#)

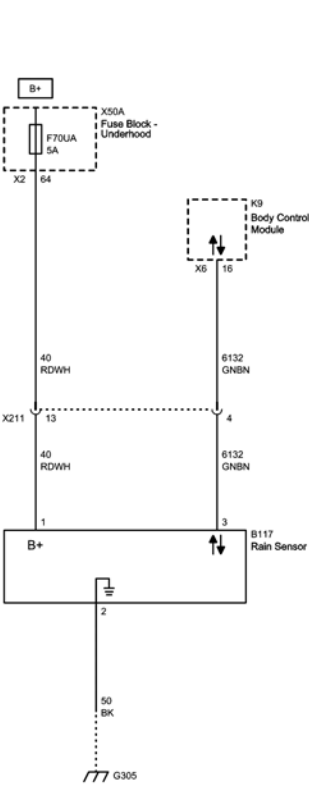
Fastener Tightening Specifications

Application	Specification	
	Metric	English
Windshield Washer Solvent Container Bolt	15 N·m	11 lb ft
Windshield Washer Solvent Container Nut	5 N·m	44 lb in
Windshield Wiper Arm Nut	24.5 N·m	18 lb ft
Windshield Wiper Motor Bolt	10 N·m	89 lb in
Windshield Wiper Motor Nut	10 N·m	89 lb in
Windshield Wiper and Windshield Washer Meter Bolt	10 N·m	89 lb in

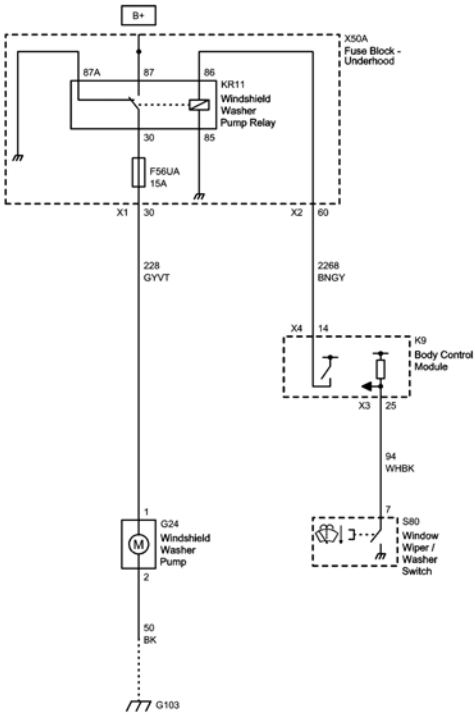
Front Wiper



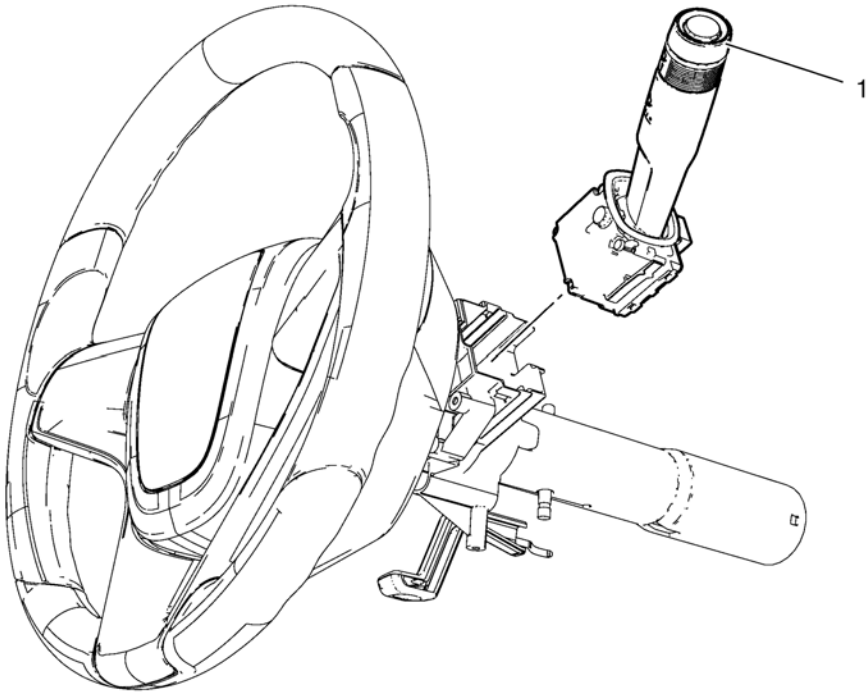
Rain Sensor



Washer System

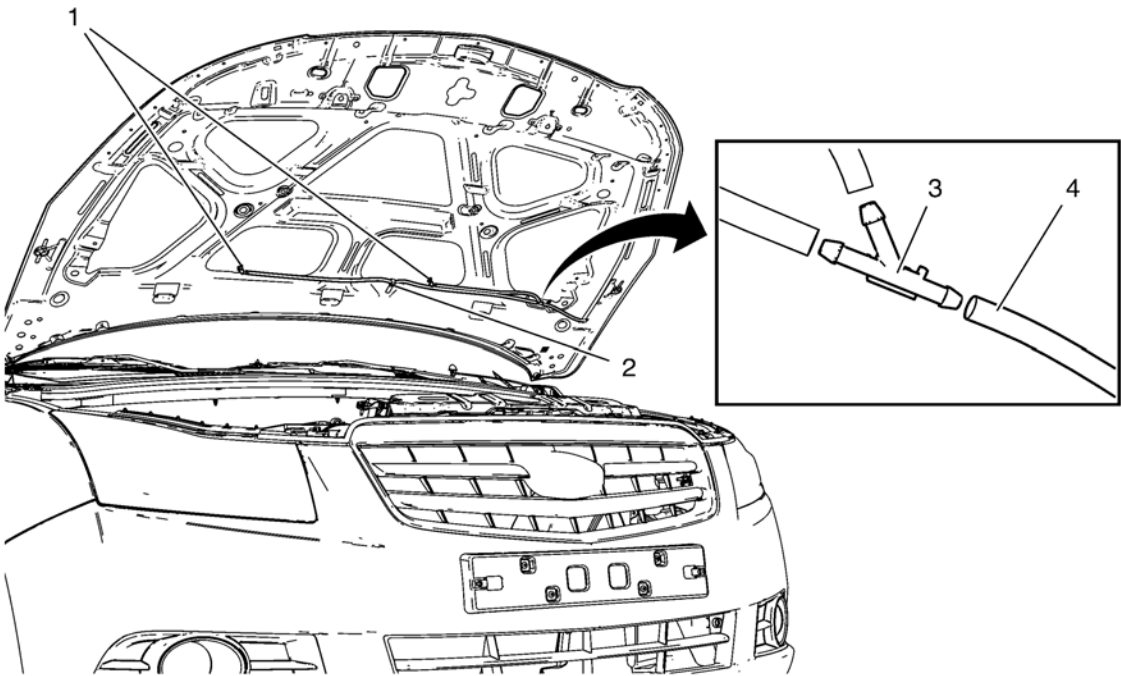


Windshield Wiper and Washer Switch Replacement



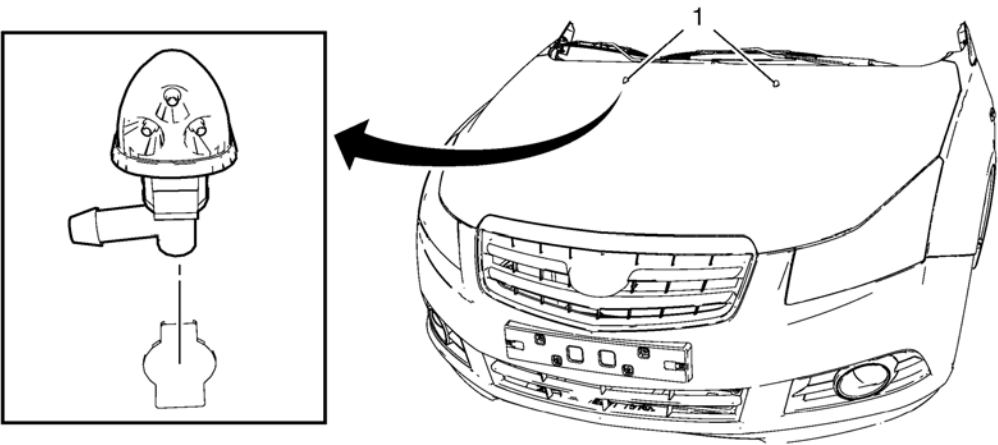
Callout	Component Name
Preliminary Procedure Remove the steering column trim covers. Refer to Steering Column Lower Trim Cover Replacement.	
1	Windshield Wiper and Washer Switch Procedure 1. Disconnect any electrical connectors as needed. 2. Release the plastic retaining tabs to remove the windshield wiper and washer switch.

Windshield Washer Nozzle Hose Replacement



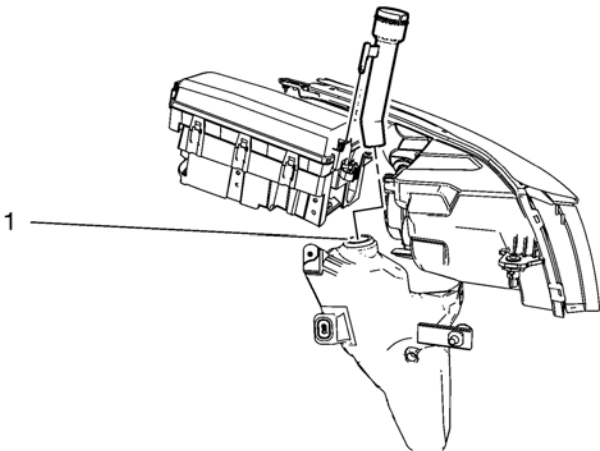
Callout	Component Name
Preliminary Procedure 1. Remove the hood insulator. Refer to Hood Insulator Replacement . 2. Place a clean container under the front driver side near where the windshield washer nozzle and windshield washer pump hose will be disconnected. 3. Recover all lost windshield washer solvent.	
1	Windshield Washer Nozzle Hose Tip Disconnect the washer hose from both hood mounted washer nozzles.
2	Windshield Washer Hose Retainer to Hood Hinge
3	Windshield Washer Nozzle Hose Integral Connector Tip Disconnect the hoses in order to remove the windshield washer nozzle hose.
4	Windshield Washer Pump Hose

Windshield Washer Nozzle Replacement



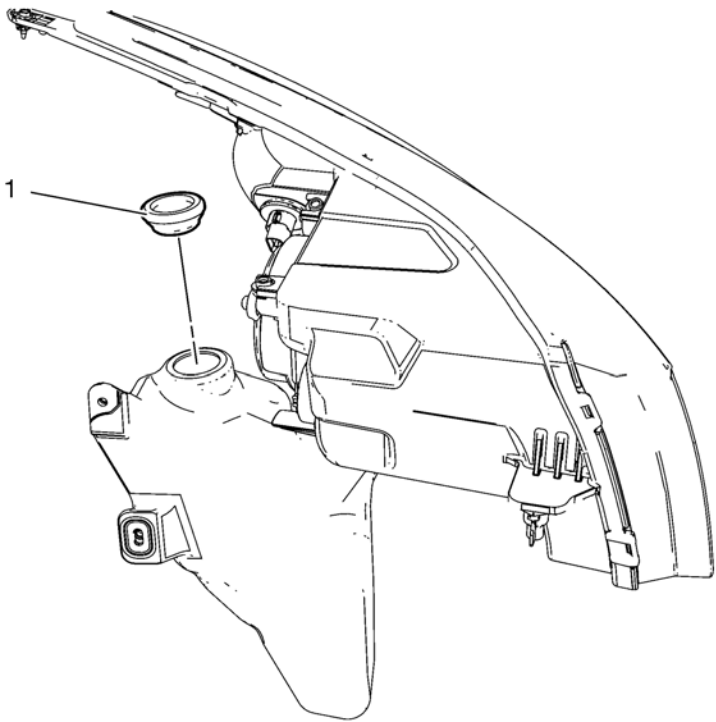
Callout	Component Name
Preliminary Procedure 1. Disconnect the washer hose from the washer nozzles. 2. Remove the hood insulator. Refer to Hood Insulator Replacement	
1	Windshield Washer Nozzle Assembly Tip Pinch the washer nozzle from the bottom side in order to release the nozzle and push the nozzle outboard from the hood to remove.

Windshield Washer Solvent Container Filler Tube Replacement



Callout	Component Name
1	Windshield Washer Solvent Container Filler Tube Assembly Procedure 1. Pull the upper tube assembly from the lower washer container and inspect the grommet (1), replace if damaged. Refer to Windshield Washer Solvent Container Grommet Replacement. 2. Insert the tube rib flush to the top seal at the lower container.

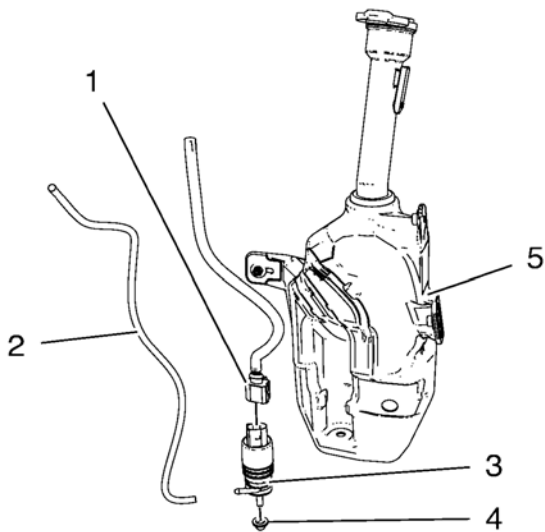
Windshield Washer Solvent Container Grommet Replacement



Callout	Component Name
Preliminary Procedure Remove the windshield washer solvent container filler tube assembly. Refer to Windshield Washer Solvent Container Filler Tube Replacement .	
1	Windshield Washer Solvent Container Grommet

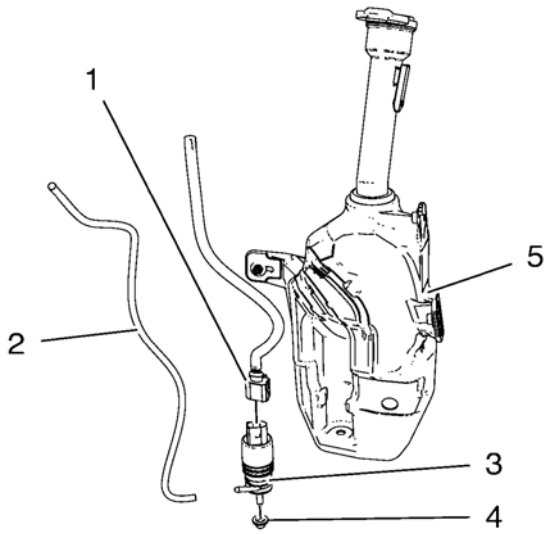
Windshield Washer Pump Replacement

Removal Procedure



1. Remove the front wheelhouse liner. Refer to [Front Wheelhouse Liner Replacement](#).
2. Disconnect the washer pump electrical connector (1).
3. Disconnect the washer pump hose (2) from the washer pump (3).
4. Using a small flat-bladed tool, remove the washer pump from the washer solvent container (5).
5. Drain the windshield washer solvent into a clean suitable container.
6. Using a small flat-bladed tool, remove the washer pump terminal seal (4) from the washer solvent container (1).

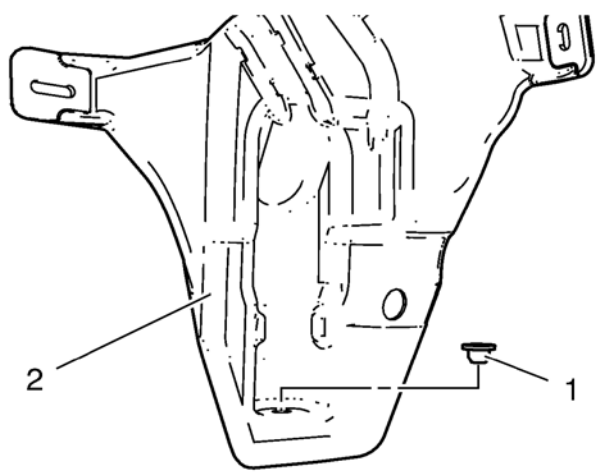
Installation Procedure



1. Position the washer pump terminal seal (4) to the washer solvent container (5), pressing in until fully seated.
2. Using full strength windshield washer solvent as a lubricant on the terminal seal, position the washer pump (3) to the washer solvent container (5) pressing in until fully seated.
3. Connect the washer pump electrical connector (1).
4. Connect the washer pump hose (2) to the washer pump (5).
5. Install the front wheelhouse panel splash shield. Refer to [Front Wheelhouse Liner Replacement](#).
6. Fill the washer solvent container with washer solvent.
7. Inspect the washer system for proper operation.

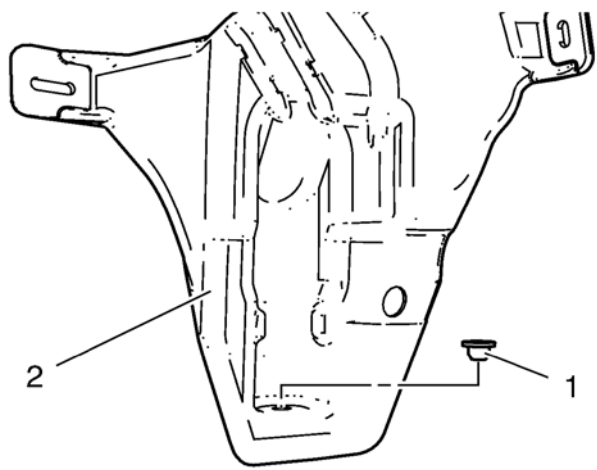
Windshield Washer Pump Seal Replacement

Removal Procedure



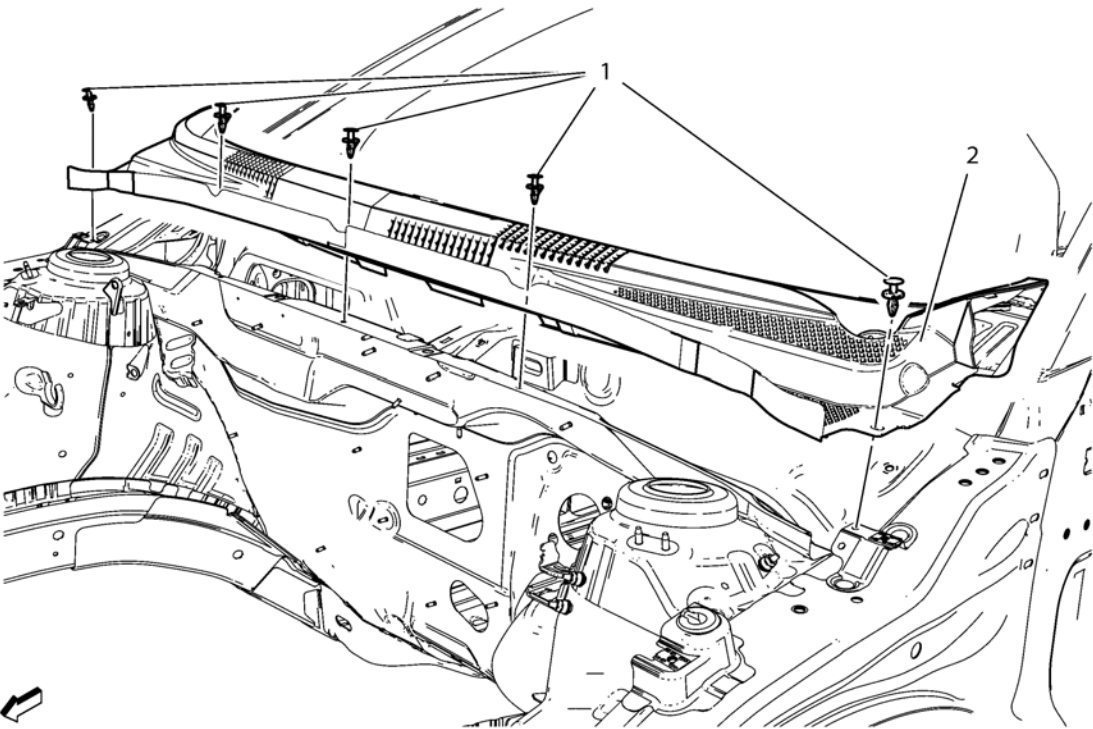
1. Open the hood.
2. Remove the windshield washer pump. Refer to [Windshield Washer Pump Replacement](#)
3. Using a small flat-bladed tool, remove the washer pump terminal seal (1) from the washer solvent container (2).

Installation Procedure



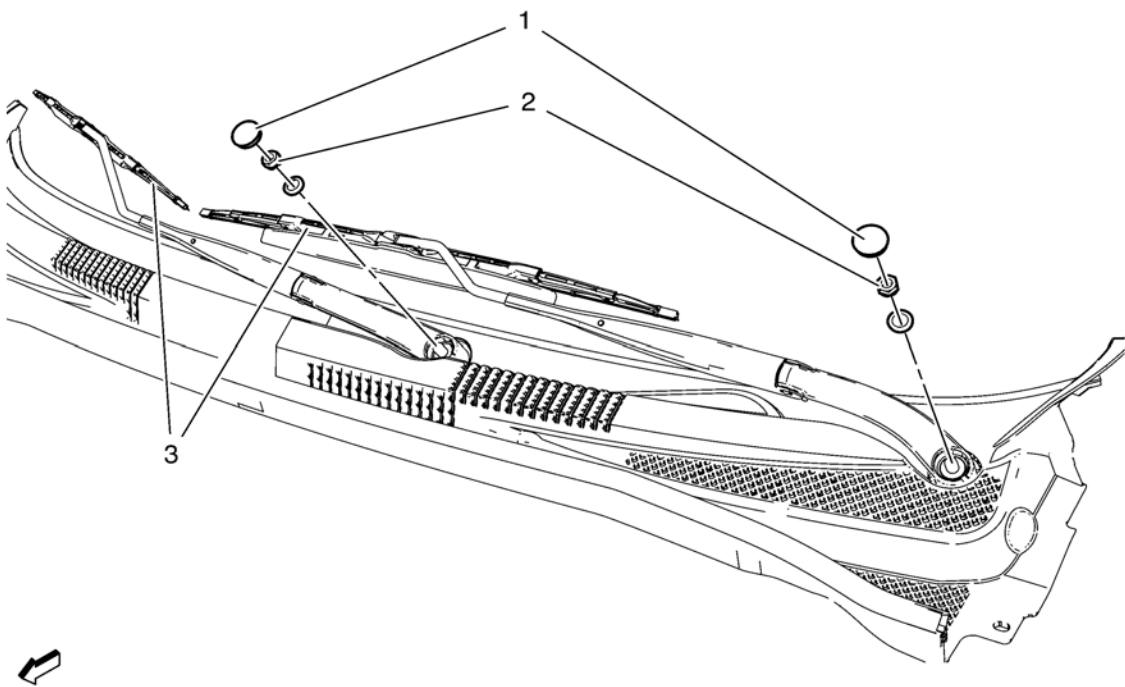
1. Position the washer pump terminal seal (1) to the washer solvent container (2), pressing in until fully seated.
2. Install the windshield washer pump. Refer to [Windshield Washer Pump Replacement](#)
3. Close the hood.

Air Inlet Grille Panel Replacement



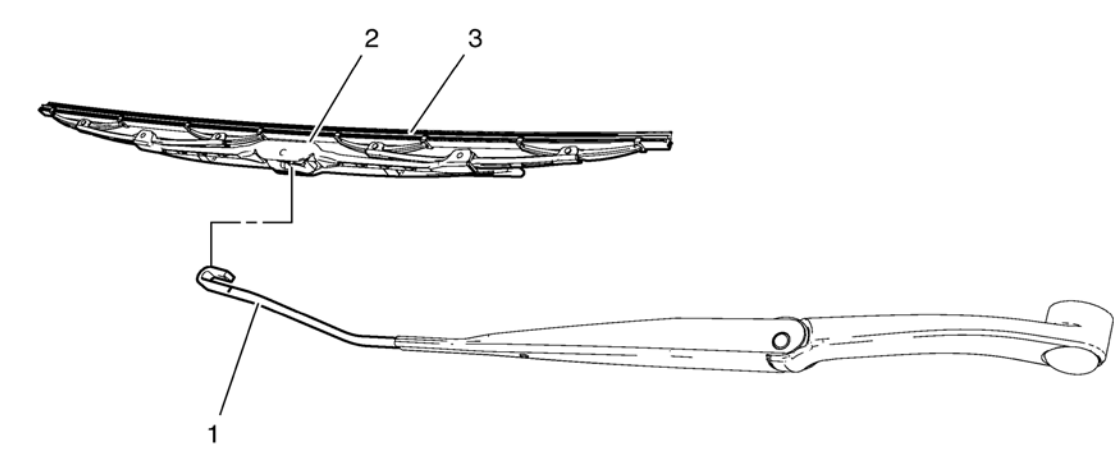
Callout	Component Name
Preliminary Procedure Remove the wiper arms. Refer to Windshield Wiper Arm Replacement .	
1	Air Inlet Grille Panel Clip (Qty: 5)
2	Air Inlet Grille Panel Assembly Procedure Remove hood rear weatherstrip.

Windshield Wiper Arm Replacement



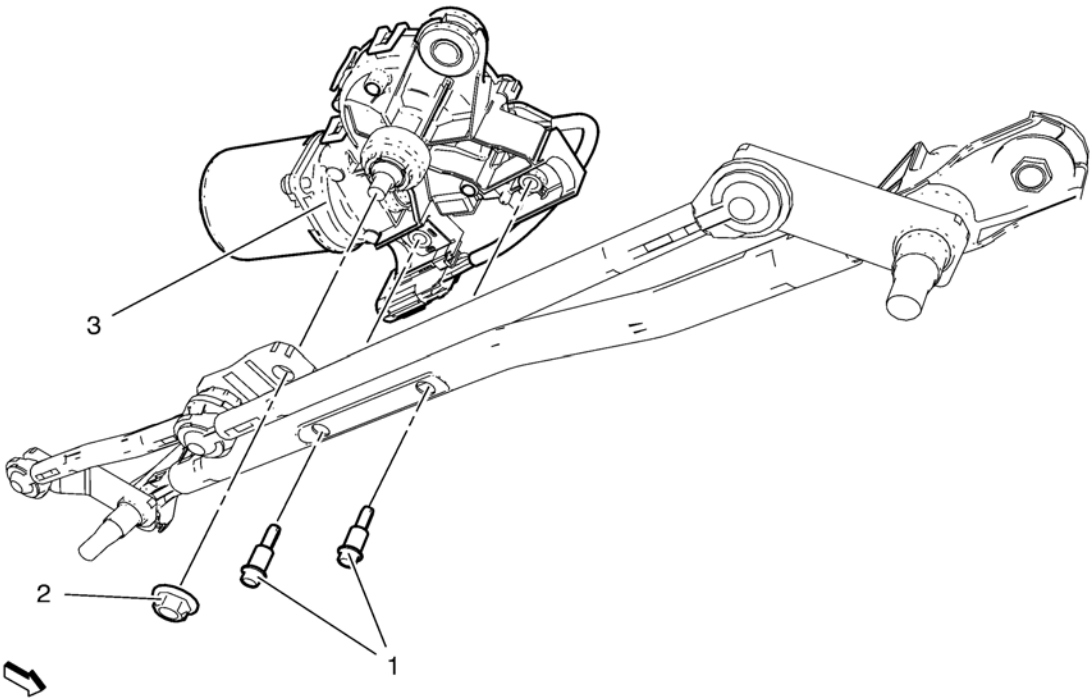
Callout	Component Name
1	Windshield Washer Arm Finish Cap Tip Use a small flat-bladed tool to remove finish cap. Special Tools BO-6626 Wiper Arm Puller For equivalent regional tools, refer to Special Tools.
2	Windshield Washer Arm Nut Caution: Refer to Fastener Caution in the Preface section. Procedure 1. Locate the transparent circle with a black dot in the center at the lower windshield blackout area. 2. Position the wiper arm to the pivot shaft so that the wiper blade is centered across the transparent circle. 3. Lift the arm blade portion while pushing down the arm onto the pivot shaft. 4. Install the wiper arm nut. 5. Hold the wiper arm stationary in position as previously stated. 6. Torque the wiper arm nut. 7. Release the wiper arm assembly. 8. Repeat the same procedure for the other wiper arm. Tighten 24.5 N·m (18 lb ft)
3	Windshield Washer Arm Assembly Tip Use the wiper arm puller if the arm fails to release from the wiper motor pivot shaft.

Windshield Wiper Blade Replacement



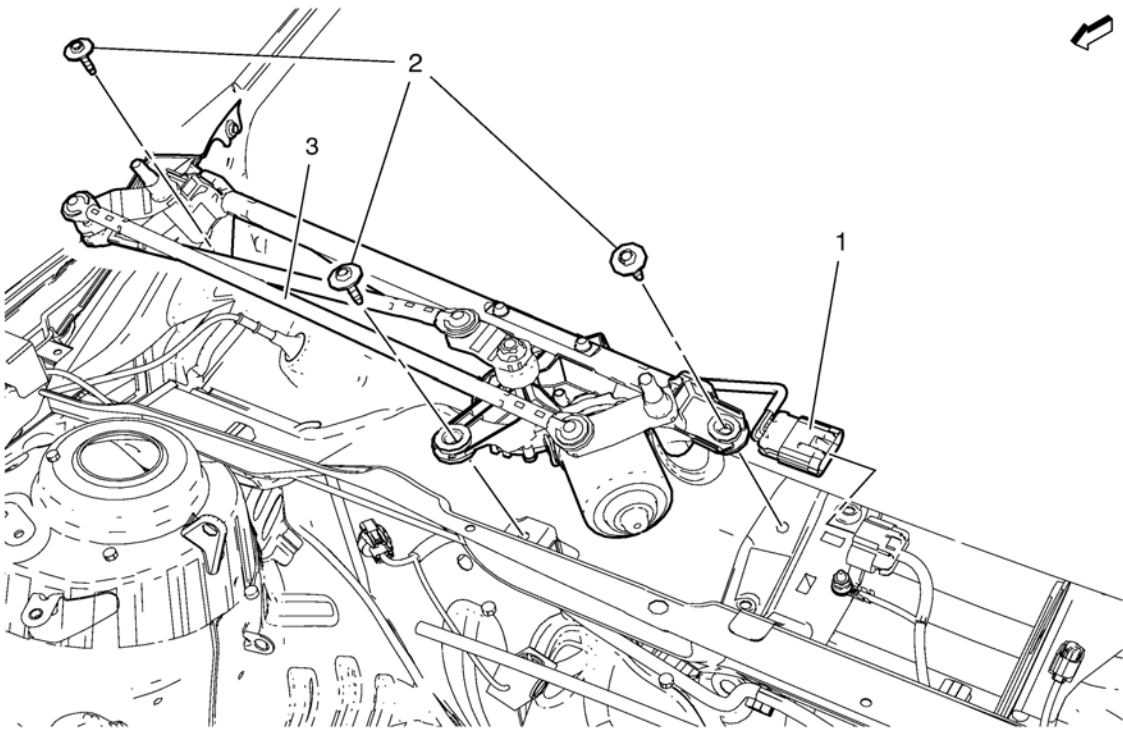
Callout	Component Name
Preliminary Procedure Raise the wiper arm up off the windshield.	
1	Windshield Washer Arm Assembly
2	Windshield Wiper Arm Blade Removal Tab Procedure 1. Push inward the square tab at the center top side of the wiper blade. 2. Rotate the wiper blade downward slightly. 3. Slide the wiper blade from the wiper arm. 4. Carefully release the wiper arm back to the windshield.
3	Windshield Washer Blade Assembly Tip Discard if rubber appears worn or does not wipe the windshield clean.

Windshield Wiper Motor Replacement



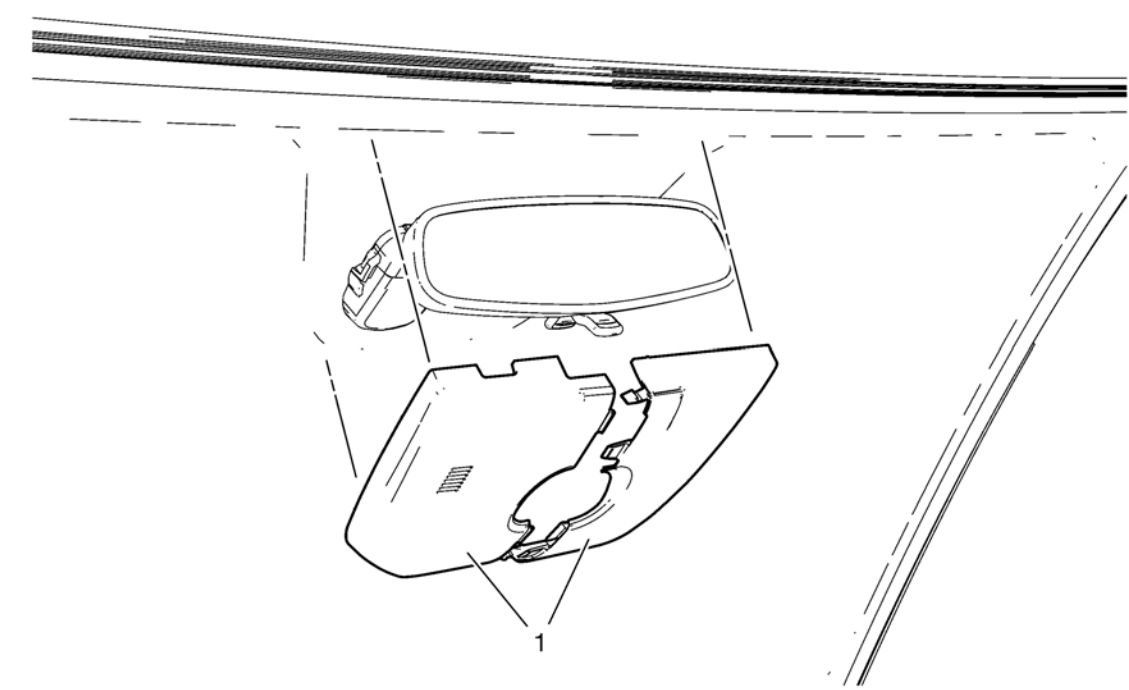
Callout	Component Name
Preliminary Procedures 1. Remove the windshield wiper arms. Refer to Windshield Wiper Arm Replacement 2. Remove the air inlet grille panel. Refer to Air Inlet Grille Panel Replacement. 3. Remove the wiper drive system module.	
1	Windshield Wiper Motor Bolts (Qty: 2) Caution: Refer to Fastener Caution in the Preface section. Tighten 10 N·m (89 lb in)
2	Windshield Wiper Motor Nut Tighten 10 N·m (89 lb in)
3	Windshield Wiper Motor Assembly

Windshield Wiper Transmission Replacement (Right Hand Drive)



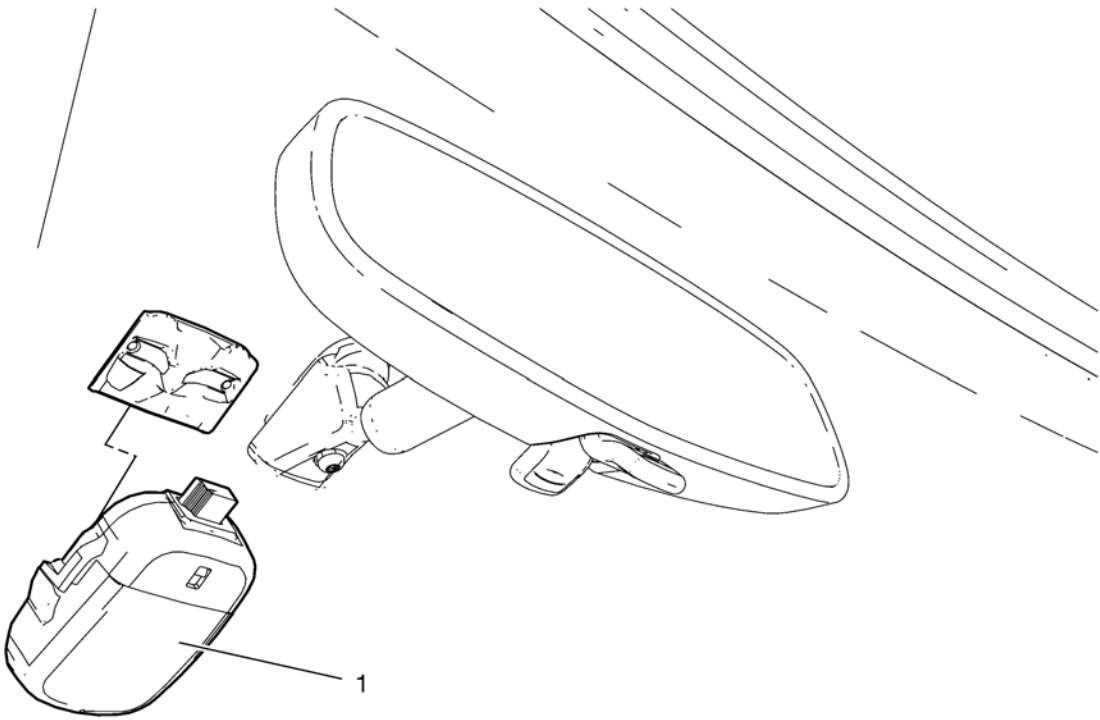
Callout	Component Name
Preliminary Procedures 1. Remove the wiper arms. Refer to Windshield Wiper Arm Replacement. 2. Remove the air inlet grille panel. Refer to Air Inlet Grille Panel Replacement.	
1	Electrical Connector
2	Windshield Wiper Transmission Bolt (Qty: 3) Caution: Refer to Fastener Caution in the Preface section. Tighten 10 N·m(89 lb in)
3	Windshield Wiper Transmission

Windshield Outside Moisture Sensor Cover Replacement



Callout	Component Name
1	Windshield Outside Moisture Sensor Cover Assembly

Windshield Outside Moisture Sensor Replacement



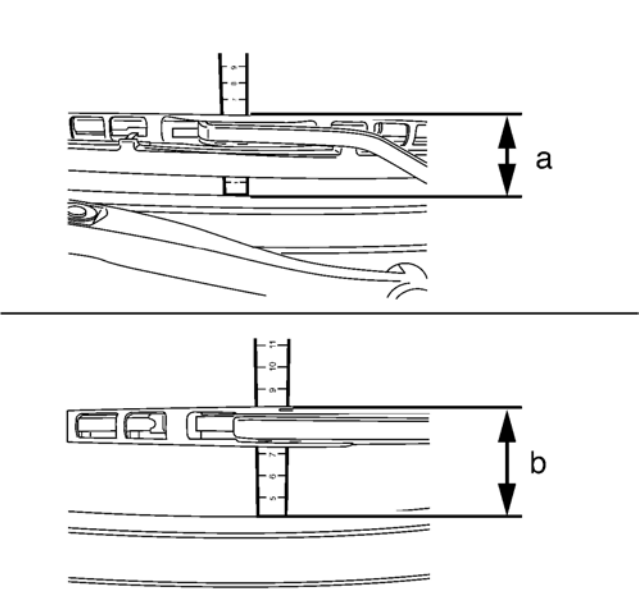
Callout	Component Name
Preliminary Procedure Remove the windshield outside moisture sensor cover. Refer to Windshield Outside Moisture Sensor Cover Replacement .	
1	Windshield Outside Moisture Sensor Tip Pull the windshield outside moisture sensor down to remove from bracket.

Wiper Blade Element Cleaning

Lift each blade assembly off of the windshield and clean the element with a cloth saturated with full strength washer solvent. Then rinse the blade assemblies with clear water.

Windshield Wiper Arm Adjustment

Measuring point for windscreen wiper arms:



Upper edge of water deflector (rubber lip) to wiper arm attachment point.

Note: Position the wiper arm to the basic setting.

1. Driver side (a) approximately 6.5 cm (2.6 in)
2. Passenger side (b) approximately 8.5 cm (3.3 in).

Wiper/Washer System Description and Operation

Wiper/Washer System Components

The wiper/washer system consists of the following electrical components:

- Windshield Wiper Relay
- Windshield Wiper Speed Control Relay
- Windshield Washer Pump Relay
- Rain Sensor (optional)
- Windshield Washer Fluid Pump
- Windshield Wiper Motor
- Window Wiper/Washer Switch
- Body Control Module (BCM)

Windshield Wiper System

The BCM determines the front wipe/wash system mode of operation by monitoring several signals from the front wipe/wash switch as indicated in the wiper switch.

The front wipe/wash switch receives a reference ground signal from the BCM. Each input of the BCM provides a switched battery pull-up for each front wiper/washer switch output signal it receives. All the BCM inputs are recognized as active when the wiper switch provides a path to the referenced ground signal. The first signal received by the BCM is the result of 6 resistors in the front wiper switch configured as a resistor ladder network. This signal is connected to a BCM analog to digital input. Depending on the function selected (High, Low, Intermittent 1 to 5, Mist, Off), the front wiper control switch connects a different set of resistors into the circuit resulting in different voltages appearing on the BCM A/D input. By monitoring this voltage, the BCM determines how to control the wiper motor On/Off Relay. It should be noted that High, Low, and Mist all have the same value on this signal circuit. The second signal received from the front wiper switch is active only when the front wiper switch is in the high speed wiper position. When the wiper switch is not in the high speed position, the switch is open and the signal circuit is pulled to battery by the BCM. When the wiper switch is in the high speed position, the switch pulls the circuit low. The BCM determines how to control the Wiper high/low speed relay from this input. The third signal received from the front wiper switch is from the momentary windshield wash control switch. When the washer switch is not active the switch is open and the signal circuit is pulled to battery by the BCM. When the washer switch is active, the switch pulls the circuit low. The BCM controls the windshield wash and windshield wash activated wiper operation based on this input.

The BCM controls front wiper motor operation through two output signals and the monitoring of one input signal. The two outputs (one high side drive, one low side drive) are used to control two external wiper motor relays: front wiper motor on/off relay: which provides the wiper motor with battery power when it is activated by the high side drive signal (switched battery) from the BCM. When left deactivated, the normally closed contacts provide a ground to the wiper motor. Wiper high/low speed relay: when activated by a low side drive signal (ground) from the BCM, it switches the power supplied by the wiper motor's on/off relay to the motors high speed input. When left deactivated, the normally closed contacts connect the power supplied by the wiper motor's on/off relay to the motor's low speed input. The input used by the BCM is from the park switch located in the wiper motor assembly. When the wiper blades are not in the park position, the wiper park switch is open and the circuit is pulled up to battery by the BCM. When the wiper blades are in the park position at the bottom of the glass, the wiper park switch closes to ground pulling the park signal circuit low.

To initiate low speed operation, the BCM only energizes the front wiper motor on/off relay. This allows battery voltage from the wiper fuse to be applied through the switched contacts of the wiper motor on/off relay, through the normally closed contacts of the wiper high/low speed relay, to the low speed control circuit of the windshield wiper motor.

The BCM provides redundant circuitry which places battery power on its wiper motor on/off relay output with activation of its low assertion high speed wiper switch input. The BCM shall be capable of doing this, even if the module has lost all microprocessor control. This redundant circuit shall supply power while in the RUN and CRANK power modes. however; while in the CRANK power mode, the pass through shall only be active if the BCM is NOT in a computer operating properly state.

To initiate high speed operation, the BCM energizes both the front wiper motor on/off relay and the wiper high/low speed relay. This allows battery voltage from the wiper fuse to be applied through the switched contacts of the wiper motor on/off relay, through the switched contacts of the wiper high/low speed relay, to the high speed control circuit of the windshield wiper motor.

In order to perform an accurate read of the park switch and to ensure the wipers will come to rest while still in the park position, parking of the wipers only occurs while in a low speed wiper mode. This requires that if the wipers are performing a high speed wiper operation at the time they are required to park, the BCM shall transition the Wipers to low speed by deactivating the wiper high/low relay before attempting to park. In order to park the wipers, the BCM monitors the park circuit until the park switch pulls the park circuit to ground. At this time, the BCM will immediately deactivate the wiper motor on/off relay. The relay contacts will switch back to their normally closed position and will apply ground to the wiper motor power inputs through the normally closed contacts of the wiper high/low relay. This deactivates and dynamically brakes the wiper motor in the park position. When the wiper switch is turned to the OFF position while the wiper motor is somewhere in mid-cycle, the BCM will continue to operate the motor until the wipers reach the park position. If the BCM is running the wiper motor and does not see a state transition of the park switch after 8 s, the wipers will stop immediately when the wiper switch is turned to OFF. If the ignition is turned OFF while the wipers are in mid-cycle, the wipers will stop immediately, regardless of position. The BCM will park the wipers next time the ignition is turned ON.

The windshield wiper system MIST operation is identical to LOW speed operation, except that the MIST switch is a press and release type switch. When the wiper switch is moved to the MIST position and released, low speed wiper motor operation is started and will continue until 1 cycle is complete. If the wiper switch is moved to the MIST position and held, the wiper motor will operate in the LOW speed mode until the switch is released.

Windshield wiper intermittent operation is a low speed wiper motor function with a variable delay interval between the wiper motor cycles. The duration of the delay is controlled by the front wiper control switch's intermittent 1 to intermittent 5 settings. The wiper operation is as follows:

1. The BCM will initiate a single wipe by activating its front wiper ON/OFF relay output.
2. At the completion of a single wipe, the BCM will park the wipers as described above.
3. The BCM will then pause the wipers in their park position for the time duration associated with intermittent delay switch setting.
4. When the delay time expires repeat Steps 1 and 3 until the system is turned off or taken out of intermittent mode. If the wiper switch is moved from a longer delay interval to a shorter delay interval, the BCM will command an immediate wipe cycle and reset the delay timer to the shorter delay interval.

Intermittent wiper operation may be vehicle speed sensitive. When enabled, the speed compensated intermittent feature causes the intermittent wiper delay intervals to become shorter as a function of increased speed. As vehicle speed is reduced the intervals will become closer to the predetermined.

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Windshield Washer System

The BCM controls the windshield wash operation and windshield wash activated wiper operation. When the BCM detects the activation of the momentary windshield wash control switch, it activates its washer pump relay drive output which supplies battery power to the coil of the washer pump relay. This energizes the relay, which switches battery power to the pump motor. The BCM will also activate continuous low speed windshield wipes as described above. Upon deactivation of the windshield wash control switch, the wiper control module (BCM) shall deactivate the wash motor and will also park the wiper motor as described above unless the drip wipe feature is enabled. On some vehicles the drip wipe feature will be enabled and cause the system to provide additional wiping of the windshield after the switch has been released and fluid is no longer being applied. The front wash feature may attempt to detect a stuck switch. When enabled, activation of the wash feature shall be limited to 10 s.

Rain Sense Mode and Rain Sense Indicator

When this feature is activated on rain sense equipped vehicles, the wiper subsystem performs front windshield wipes according to the amount of moisture detected on the windshield. The BCM will control the wiper motor speed, as indicated above, based on wipe requests that it receives from a moisture sensor (rain sense module) which is mechanically attached to the windshield through a windshield mounted optic coupler. The system uses a master/slave configuration utilizing a Local Interconnect Network (LIN) based serial data communication system. The BCM is designated as the master, while the rain sense module is designated the slave. As the system master, the BCM uses the LIN serial communication bus to enable or disable rain sense module operation, communicate wiper control switch settings, and wiper motor position information to the rain sense module. The rain sense module requests wiper motor function, and provides the BCM with system status and diagnostic information for diagnostic reporting. When this feature is present, the BCM uses the front wiper control switch's intermittent 1 thru intermittent 5 settings to activate the system and to act as the automatic wiper sensitivity control. This allows the driver to adjust the moisture level at which the rain Sensor requests the BCM to automatically wipe the windshield. The intermittent 1 setting corresponds to the lowest sensitivity and intermittent 5 the highest sensitivity.

Some vehicles (calibratable) shall display an AUTO front wiper indicator when the feature is active. This indicator shall notify the driver of the vehicle that the rain sensor is ready to perform automatic wiping of the windshield upon detection of moisture.

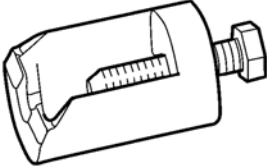
This indicator shall be requested when all of the following are true:

1. Power mode is RUN
2. If single steering column switch equipped: The front wiper switch is SENSITIVITY 1 through SENSITIVITY 5.
3. If dual steering column stalk equipped: The front wiper switch stalk angle is SENSITIVITY.

The above indicator shall be turned OFF when any of the following become true:

1. Power mode becomes OFF, CRANK or ACCESSORY.
2. Front wiper switch is changed to OFF, MIST, LOW or HIGH.

Special Tools

Illustration	Tool Number / Description
	BO-6626 KM-6626 Wiper Arm Puller