

2010 Cadillac SRX

2010 ACCESSORIES & EQUIPMENT Wipers and Washers - SRX

2010 ACCESSORIES & EQUIPMENT

Wipers and Washers - SRX

SECTIONS

FASTER TIGHTENING SPECIFICATIONS

Application	Specification	
	Metric	English
Headlamp Washer No. 10 Screw	2.5 N.m	22 lb in
Rear Window Wiper Arm Nut to Pivot Shaft	10 N.m	89 lb in
Windshield Washer Solvent Container Bolts	6 N.m	53 lb in
Windshield Washer Container Filler Tube Bolt	6 N.m	53 lb in
Windshield Wiper Arm Retaining Nut	27 N.m	20 lb ft
Rear Window Wiper Motor Bolts	9 N.m	80 lb in
Windshield Wiper Motor to Windshield Wiper Transmission Frame Bolts	8 N.m	71 lb in
Windshield Wiper Transmission Frame Bolts	9 N.m	80 lb in

SECTION RO T N R S

WIPER/WASHER SCHEMATICS

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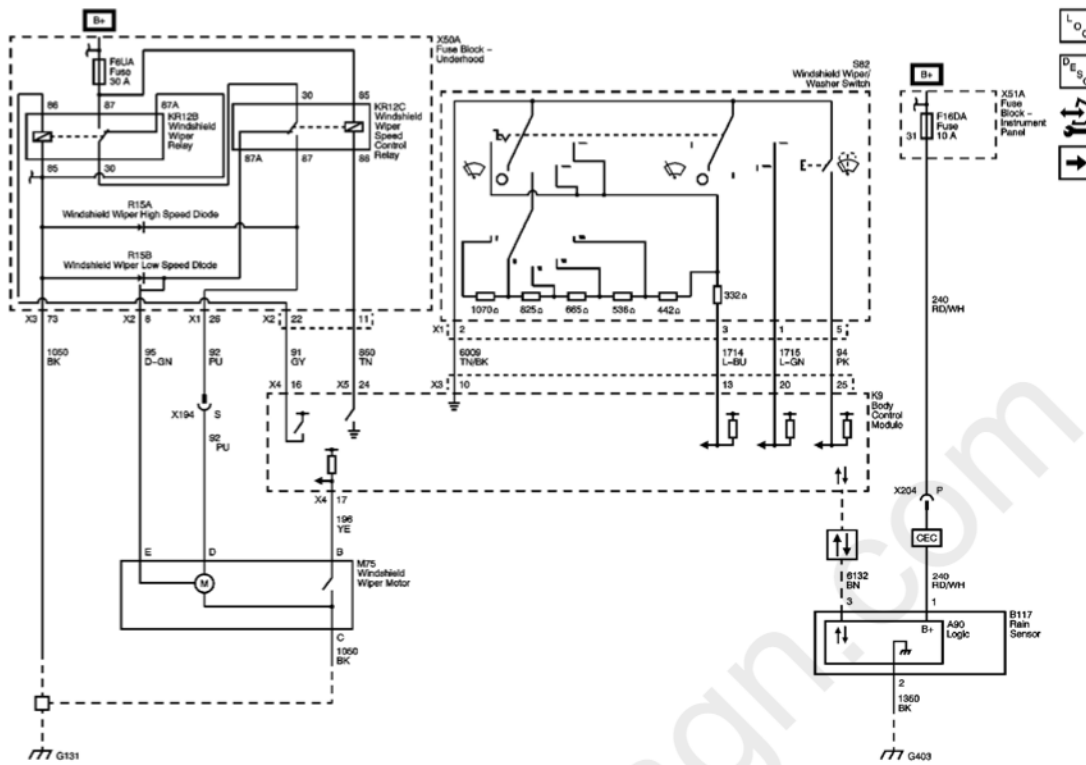


Fig 1 Front Wipers Circuit Schematic
 Courtesy of GE ERA MOTORS CORP

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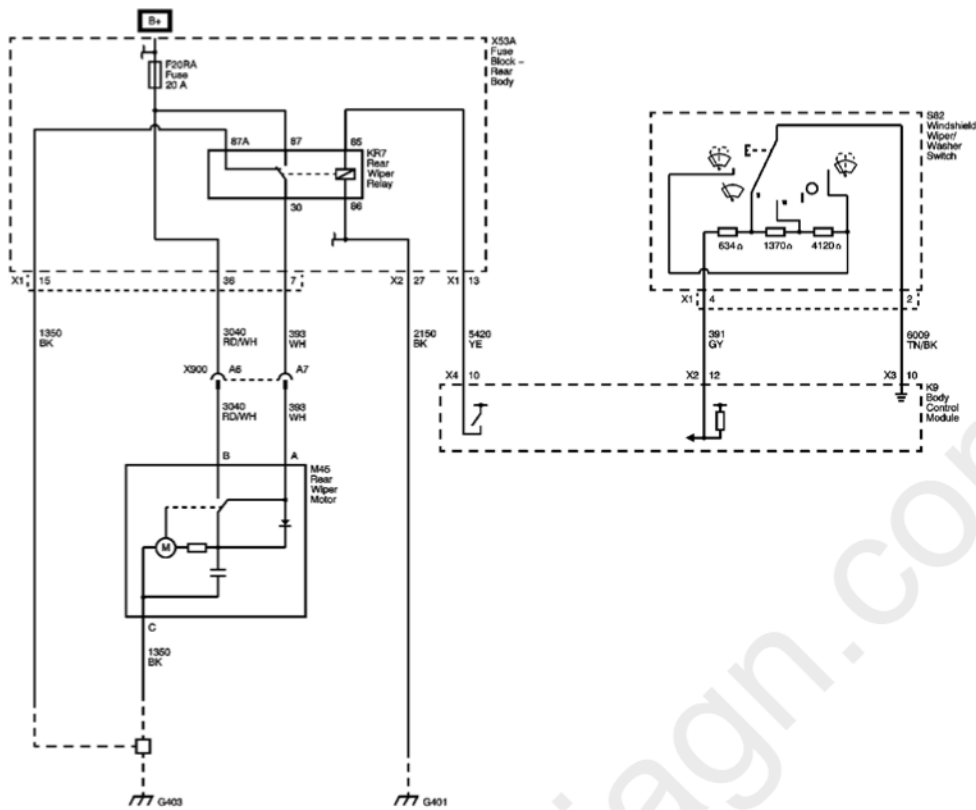


Fig 2 Rear Wipers Circuit Schematic
 Courtesy of GE ERA MOTORS CORP

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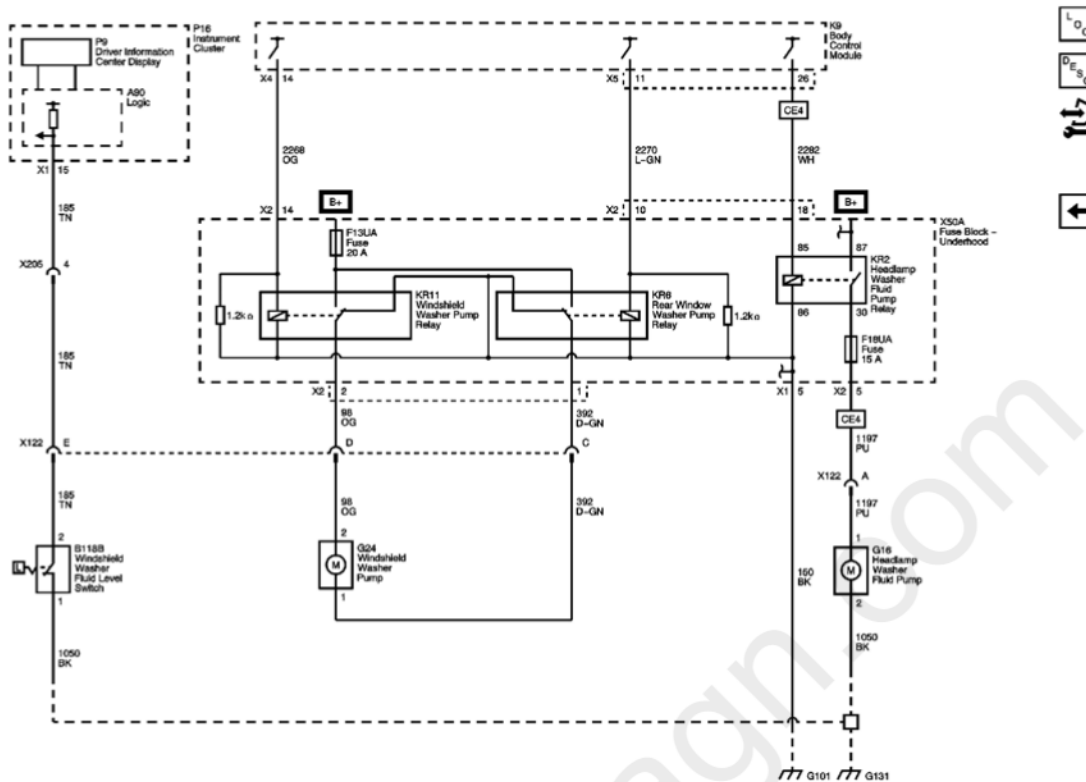


Fig 3 Windshield Headlamp Washers Circuit Schematic

Courtesy of GE ERA MOTORS CORP

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DTC	Description
DTC B370A	B370A 39: Rain Sensor Internal Malfunction
DTC B370B	B370B 02: Rear Wiper Function Control Circuit Short to Ground
DTC B3715 or B3875	B3715 02: Windshield Wiper Relay Circuit Short to Ground B3875 01: Windshield Wiper High Speed Relay Circuit Short to Battery B3875 02: Windshield Wiper High Speed Relay Circuit Short to Ground B3875 04: Windshield Wiper High Speed Relay Circuit Open
DTC B3810	B3810 02: Headlamp Washer Relay Circuit Short to Ground
DTC B3811	B3811 02: Rear Washer Relay Circuit Short to Ground
DTC B3873	B3873 02: Front Washer Relay Circuit Short to Ground

DTC B370A

Diagnostic Instructions

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

DTC Descriptor

DTC B370A 3

Rain Sensor Internal Malfunction

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Rain Sensor B+	1	1	-	-
Rain Sensor Signal	B370A 39	B370A 39	B370A 39	B370A 39
Rain Sensor Ground	-	1	1	-
1. Windshield Outside Moisture Sensor Malfunction				

Circuit/System Description

B+ voltage is supplied to the windshield outside moisture sensor. Whenever the ignition is ON, or in accessory positions, the body control module (BCM), sends the wiper/washer switch status by using a pulse width modulated (PWM) signal. When a wipe cycle is needed, the windshield outside moisture sensor sends a PWM voltage signal to the BCM, initiating the wiper operation. The BCM commands the windshield wiper motor wipe cycles. If a fault occurs at any time between the windshield outside moisture sensor and BCM, the BCM will use the inputs from the turn signal/multifunction switch in the delay positions to operate the windshield wiper motor at continuous variable delay intervals.

Conditions for Running the DTC

- Ignition ON.
- The system voltage is between 9-16 V.

Conditions for Setting the DTC

The BCM receives an invalid signal from the windshield outside moisture sensor.

Action Taken When the DTC Sets

- If the BCM loses communication with the windshield outside moisture sensor while the windshield outside moisture sensor was requesting single wipes, it shall fail soft the wipers operation to front wiper manual-intermittent with a fixed dwell time of 4 seconds.
- If the BCM loses communication with the windshield outside moisture sensor while the windshield outside moisture sensor was continuously requesting low, it shall fail soft the wipers operation to front wiper manual-low.

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- If the BCM loses communication with the windshield outside moisture sensor while the windshield outside moisture sensor was continuously requesting high, it shall fail soft the wipers operation to front wiper manual-high.

Conditions for Clearing the DTC

A current DTC clears when the diagnostic runs and passes.

Reference Information

Schematic Reference

Wiper/Washer Schematics

Connector End View Reference

Component Connector End Views

Description and Operation

Wiper/Washer System Description and Operation

Electrical Information Reference

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

Scan Tool Reference

Control Module References for scan tool information

Circuit/System Verification

If this DTC is set, replace the B117 rain sensor.

Repair Procedures

Perform the Diagnostic Repair Verification after completing the diagnostic procedure.

- Windshield Outside Moisture Sensor Replacement
- Control Module References for BCM replacement, setup, and programming

DTC B370B

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Diagnostic Instructions

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

DTC Descriptor

DTC B370B 02

Rear Wiper Function Control Circuit Short to Ground

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Rear Wiper Switch Signal	2	1	1	-
Rear Window Wiper Control	1	1	2	-
Rear Window Wiper Relay Control	B370B 02	1	2	-
Rear Window Wiper Ground	-	1	1	-
1. Washer Inoperative 2. Washer Always ON				

Circuit/System Description

The body control module (BCM) controls the single speed rear wiper motor by its active high output to the external rear wiper motor relay. When the BCM activates its output and applies battery to the coil of the relay, the relay energizes, allowing battery voltage from the fuse to be applied through the switched contacts of the rear wiper motor relay to the control input of the rear wiper motor. The motor then operates continuously at low speed.

Conditions for Running the DTC

- Ignition ON.
- The system voltage is between 9-16 V.

Conditions for Setting the DTC

A short to ground is detected in the rear window wiper relay control circuit.

Action Taken When the DTC Sets

Rear wiper operation is suspended.

Conditions for Clearing the DTC

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A current DTC clears when the diagnostic runs and passes.

Reference Information

Schematic Reference

Wiper/Washer Schematics

Connector End View Reference

Component Connector End Views

Description and Operation

Wiper/Washer System Description and Operation

Electrical Information Reference

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

Scan Tool Reference

Control Module References for scan tool information

Circuit/System Verification

Operate the rear wiper by using the S82 Windshield Wiper/Washer Switch in the continuous and the intermittent position. Verify the M45 Rear Wiper Motor activates.

Circuit/System Testing

1. Ignition OFF, disconnect the KR7 Rear Wiper Relay.
2. Test for less than 5 ohms between the ground circuit terminal 86 and ground.
 - If greater than the specified range, test the ground circuit for an open/high resistance. If the circuit tests normal, test or replace the 50A Fuse Block - underhood.
3. Connect a test lamp between the control circuit terminal 85 and ground.
4. Ignition ON, command the rear washer relay ON and OFF using the wiper switch. The test lamp should turn ON and OFF when changing between the commanded states.
 - If the test lamp is always ON, test the control circuit for a short to voltage. If the circuit tests normal, replace the K9 Body Control Module.
 - If the test lamp is always OFF, test the control circuit for a short to ground or an open/high resistance. If the circuit tests normal, test or replace the K9 Body Control Module.

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5. If all circuits test normal, test or replace the KR7 Rear Wiper Relay.

Component Testing

Relay Test

1. Ignition OFF, connect the KR7 Rear Window Wiper Relay.
2. Test for 60-200 ohms between terminals 85 and 86.
 - If the resistance is not within the specified range, replace the relay.
3. Test for infinite resistance between the following terminals:
 - 30 and 86
 - 30 and 87
 - 30 and 85
 - 85 and 87
 - If not the specified value, replace the relay.
4. Test for less than 5 ohms between terminals 30 and 87A.
 - If greater than the specified range, replace the relay.
5. Install a 10 A fused jumper wire between relay terminal 85 and 12 V. Install a jumper wire between relay terminal 86 and ground. Test for less than 5 ohms between terminals 30 and 87.
 - If greater than the specified range, replace the KR7 Rear Window Wiper Relay.

Repair Procedures

Perform the **Diagnostic Repair Verification** after completing the diagnostic procedure.

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

DTC B3715 OR B3875

Diagnostic Instructions

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

DTC Descriptors

DTC B3715 02

Windshield Wiper Relay Circuit Short to Ground

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Windshield Wiper High Speed Relay Circuit Short to Battery

DTC B3875 02

Windshield Wiper High Speed Relay Circuit Short to Ground

DTC B3875 04

Windshield Wiper High Speed Relay Circuit Open

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Windshield Wiper High Speed Relay B+	1, 2	1, 2	-	-
Windshield Wiper Switch Low Signal	1	1	1	-
Windshield Wiper Switch High Signal	4	2	2	-
Windshield Wiper Motor Park Switch Signal	3	3	-	-
Front Wiper Relay Control	B3715 02	1, 2	4	-
Windshield Wiper High Speed Relay Control	B3875 02	2	B3875 01	-
Windshield Wiper High Speed Relay Control	2	2	4	-
Front Wiper Motor Low Speed Control	1	1	4	-
Windshield Wiper Switch Low Reference	-	1, 2	1, 2	-
Windshield Wiper Motor Ground	-	1, 2, 3	-	-
Front Wiper Relay Ground	-	1	-	-
1. Delay or Low Speed Wipers Inoperative 2. High Speed Wipers Inoperative 3. Wipers Do Not Park 4. Wipers Always ON				

Circuit/System Description

The body control module (BCM) controls the windshield wiper motor based on input from the windshield wiper/washer switch. The BCM monitors the wiper/washer switch through two separate signal circuits and a ground circuit. The windshield wiper switch high signal circuit is used to determine high speed wiper operation, the windshield wiper switch low signal is used to determine low speed, intermittent, and mist operation through the use of a resistor ladder, and windshield washer switch signal circuit is used to determine washer operation.

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The BCM controls the windshield wiper motor through two output controls, controlling two relays which determine the desired wiper speed, high or low.

Conditions for Running the DTC

- The DTC runs only when a wiper output is actively being requested by the BCM.
- The system voltage is between 9-16 V.

Conditions for Setting the DTC

- A short to ground is detected in the Front Wiper Relay control circuit or in the High Speed Relay control circuit.
- A short to voltage or an open/high resistance is detected in the High Speed Relay control circuit.

Action Taken When the DTC Sets

The BCM will not activate the wiper output.

Conditions for Clearing the DTC

- A current DTC will clear when the condition for setting the fault is no longer present.
- A history DTC will clear after 50 consecutive ignition cycles without a fault present.

Reference Information

Schematic Reference

Wiper/Washer Schematics

Connector End View Reference

Component Connector End Views

Description and Operation

Wiper/Washer System Description and Operation

Electrical Information Reference

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

Scan Tool Reference

Control Module References for scan tool information**Circuit/System Testing****DTC B3715**

1. Ignition OFF, disconnect the KR12B windshield wiper relay.
2. Test for less than 5 ohms between the ground circuit terminal 85 and ground.
 - If greater than the specified range, test the ground circuit for an open/high resistance.
3. Connect a test lamp between the control circuit terminal 86 and ground.
4. Ignition ON, command the low speed wipers ON and OFF using the S82 windshield wiper/washer switch. The test lamp should turn ON and OFF when changing between the commanded states.
 - If the test lamp is always ON, test the control circuit for a short to voltage. If the circuit tests normal, replace the K9 BCM.
 - If the test lamp is always OFF, test the control circuit for a short to ground or an open/high resistance. If the circuit tests normal, replace the K9 BCM.
5. If all circuits test normal, test or replace the KR12B windshield wiper relay.

DTC B3875

1. Ignition OFF, disconnect the KR12C windshield wiper speed control relay.
2. Ignition ON, verify a test lamp illuminates between B+ circuit terminal 85 and ground.
 - If the test lamp does not illuminate, test or replace the underhood fuse block.
3. Connect a test lamp between the control circuit terminal 86 and B+.
4. Command the high speed wipers ON and OFF using the S82 windshield wiper/washer switch. The test lamp should turn ON and OFF when changing between the commanded states.
 - If the test lamp is always ON, test the control circuit for a short to ground. If the circuit tests normal, replace the K9 BCM.
 - If the test lamp is always OFF, test the control circuit for a short to voltage or an open/high resistance. If the circuit tests normal, replace the K9 BCM.
5. If all circuits test normal, test or replace the KR12C windshield wiper speed control relay.

Component Testing**Relay Test**

1. Ignition OFF, disconnect the appropriate relay.
2. Test for 60-200 ohms between terminals 85 and 86.
 - If the resistance is not within the specified range, replace the relay.
3. Test for infinite resistance between the following terminals:
 - 30 and 86
 - 30 and 87
 - 30 and 85

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- 85 and 87
 - If not the specified value, replace the relay.
- 4. Test for less than 5 ohms between terminals 30 and 87A.
 - If greater than the specified value, replace the relay.
- 5. Install a 10 A fused jumper wire between relay terminal 85 and 12 V. Install a jumper wire between relay terminal 86 and ground. Test for less than 5 ohms between terminals 30 and 87.
 - If greater than the specified range, replace the relay.

Repair Procedures

Perform the **Diagnostic Repair Verification** after completing the diagnostic procedure.

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

DTC B3810

Diagnostic Instructions

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

DTC Descriptor

DTC B3810 02

Headlamp Washer Relay Circuit Short to Ground

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Headlamp Washer Fluid Pump Control	1	1	2	-
Headlamp Washer Relay Control	B3810 02	1	2	-
Headlamp Washer Fluid Pump Ground	-	1	1	-
1. Headlamp Washer Inoperative 2. Headlamp Washers Always ON				

Circuit/System Description

Headlamp Washer

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The Body Control Module (BCM) controls the washer motor based on an input from the windshield wiper washer switch. The BCM monitors the washer switch through the windshield washer switch signal circuit. When the WASH switch is closed, ground is supplied to the front washer switch signal circuit. When this is seen, the BCM will command the front washer fluid pump and the low speed wipers on. When Headlamp Wash Equipped, the headlamps shall be sprayed with wash fluid as a result of an extended Windshield Wash Switch Activation. In order to preserve wash fluid, the feature shall only be allowed to activate if the Low or High Beam Headlamps are active. In addition, after the initial Headlamp Wash operation has been performed, additional headlamp washes shall not be performed for the next 4 Windshield Wash activations or for 48 hours whichever comes first.

Conditions for Running the DTC

- Ignition ON.
- The system voltage is between 9-16 V.

Conditions for Setting the DTC

A short to ground is detected in the headlamp washer relay control circuit.

Action Taken When the DTC Sets

Washer operation is suspended.

Conditions for Clearing the DTC

- A current DTC clears when the diagnostic runs and passes.
- A history DTC will clear after 50 consecutive ignition cycles without a fault present.

Diagnostic Aids

The headlamp wash feature shall only be allowed to be activated if the low or high beam headlamps are active too.

Reference Information

Schematic Reference

Wiper/Washer Schematics

Connector End View Reference

Component Connector End Views

Description and Operation

Wiper/Washer System Description and Operation

Electrical Information Reference

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

Scan Tool Reference

Control Module References for diagnostic tester information

Circuit/System Verification

Operate the headlamp washer using the S80 Window Wiper/Washer Switch. Verify the G16 Headlamp Washer Fluid Pump activates. The low or high beam headlamps are ON.

Circuit/System Testing

1. Ignition OFF, disconnect the KR2 Headlamp Washer Fluid Pump Relay.
2. Test for less than 5 ohms between the ground circuit terminal 85 and ground
 - If greater than the specified range, test the ground circuit for an open/high resistance
3. Connect a test lamp between the control circuit terminal 86 and ground.
4. Ignition ON, command the headlamp washer ON and OFF using the wiper switch. The test lamp should turn ON and OFF when changing between the commanded states.
 - If the test lamp is always ON, test the control circuit for a short to voltage. If the circuit tests normal, test or replace the K9 Body Control Module.
 - If the test lamp is always OFF, test for a short to ground or an open/high resistance on the control circuit. If the circuit tests normal, test or replace the K9 Body Control Module.
5. If all circuits test normal, test or replace the KR2 Headlamp Washer Fluid Pump Relay.

Component Testing**Relay Test**

1. Ignition OFF, connect the KR2 Headlamp Washer Fluid Pump Relay.
2. Test for 60-200 ohms between terminals 85 and 86.
 - If the resistance is not within the specified range, replace the relay.
3. Test for infinite resistance between the following terminals:
 - 30 and 86
 - 30 and 87
 - 30 and 85
 - 85 and 87
 - If not the specified value, replace the relay.

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4. Test for less than 5 ohms between terminals 30 and 87A.
 - If greater than the specified range, replace the relay.
5. Install a 10 A fused jumper wire between relay terminal 85 and 12 volts. Install a jumper wire between relay terminal 86 and ground. Test for less than 5 ohms between terminals 30 and 87.
 - If greater than the specified range, replace the relay.

Repair Procedures

Perform the **Diagnostic Repair Verification** after completing the diagnostic procedure.

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

DTC B3811

Diagnostic Instructions

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

DTC Descriptor

DTC B3811 02

Rear Washer Relay Circuit Short to Ground

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Rear Washer Switch Control	2	1	1	-
Rear Washer Relay Control	B3811 02	1	2	-
Rear Washer Fluid Pump Control	1	1	2	-
Rear Washer Fluid Pump Ground	-	1	1, 2	-
1. Rear Washer Inoperative 2. Rear Washer Always ON				

Circuit/System Description

Rear Washer

When the Body Control Module detects that the Rear wiper/wash switch has activated the momentary Wash switch, it activates a High Side Drive output which supplies Battery to the coil of the Rear Washer Pump Relay.

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This energizes the Relay, which switches Battery Power to the Washer Pump Motor. The BCM will also activate continuous Low Speed Windshield Wipers as described above. This Washer and Wiper operation shall be continued so long as the switch remains active. Upon termination the Rear Wash Motor will be deactivated and the Wiper shall move to its Park Position and deactivate.

Conditions for Running the DTC

- Ignition ON.
- The system voltage is between 9-16 V.

Conditions for Setting the DTC

A short to ground is detected in the rear washer relay control circuit.

Action Taken When the DTC Sets

Washer operation is suspended.

Conditions for Clearing the DTC

- A current DTC clears when the diagnostic runs and passes.
- A history DTC will clear after 50 consecutive ignition cycles without a fault present.

Reference Information

Schematic Reference

Wiper/Washer Schematics

Connector End View Reference

Component Connector End Views

Description and Operation

Wiper/Washer System Description and Operation

Electrical Information Reference

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

Scan Tool Reference

Control Module References for diagnostic tester information**Circuit/System Verification**

Operate the rear washers using the S80 Window Wiper/Washer Switch. Verify the G24 Windshield Washer Pump activates.

Circuit/System Testing

1. Ignition OFF, disconnect the harness connector at the 50A Fuse Block - underhood.
2. Disconnect the harness connector 5 at the K9 Body Control Module.
3. Test for less than 5 ohms between the control circuit terminal 10 at the 50A Fuse Block - underhood and the control circuit terminal 11 5 at the K9 Body Control Module.
 - If the value is not within the specified range, test the control circuit for a short to voltage or an open/high resistance.
 - If the circuit tests normal, test or replace the K9 Body Control Module.
4. Test for infinite resistance between the control circuit terminal 10 at the 50A Fuse Block - underhood and ground.
 - If the value is not within the specified range, test the control circuit for a short to ground.
5. If all circuits test normal, test or replace the 50A Fuse Block - underhood.

Component Testing**Relay Test**

1. Ignition OFF, disconnect the harness connector 5 at the K9 Body Control Module.
2. Test for 60-200 ohms between control circuit terminal 11 5 at the K9 Body Control Module and ground.
 - If the value is not within the specified range, test the control circuit for a short to ground, short to voltage or an open.
 - If all circuits test normal, test or replace the 50A Fuse Block - underhood.

Output Control Test

Connect all harness connectors, ignition ON, Command the Rear Washer Relay Command On and OFF with a scan tool. Observe the KR6 Rear Window Washer Pump Relay clicks and the G24 Windshield Washer Pump runs.

- If the KR6 Rear Window Washer Pump Relay does not work, replace the 50A Fuse Block - underhood.
- If the KR6 Rear Window Washer Pump Relay does work, but the G24 Windshield Washer Pump does not run, test the G24 Windshield Washer Pump ground and control circuit.
- If all circuits test normal, replace the G24 Windshield Washer Pump.

Repair Procedures

Perform the **Diagnostic Repair Verification** after completing the diagnostic procedure.

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

DTC B3873

Diagnostic Instructions

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

DTC Descriptor

DTC B3873 02

Front Washer Relay Circuit Short to Ground

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Windshield Washer Switch Signal	2	1	1	-
Windshield Washer Fluid Pump Control	1	1	2	-
Windshield Washer Relay Control	B3873 02	1	2	-
Windshield Washer Fluid Pump Ground	-	1	1	-
1. Front Washer Inoperative 2. Front Washer Always ON				

Circuit/System Description

The body control module (BCM) controls the windshield washer fluid pump based on an input from the turn signal/multifunction switch. The BCM monitors the washer switch through the windshield washer switch signal circuit. When the wash switch is closed, ground is supplied to the front washer switch signal circuit. When this is the case, the BCM will command the windshield washer fluid pump and the low speed wipers on.

Conditions for Running the DTC

- Ignition ON.
- The system voltage is between 9-16 V.

Conditions for Setting the DTC

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A short to ground is detected in the windshield washer relay control circuit.

Action Taken When the DTC Sets

Washer operation is suspended.

Conditions for Clearing the DTC

A current DTC clears when the diagnostic runs and passes.

Reference Information

Schematic Reference

Wiper/Washer Schematics

Connector End View Reference

Component Connector End Views

Description and Operation

Wiper/Washer System Description and Operation

Electrical Information Reference

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

Scan Tool Reference

Control Module References for diagnostic tester information

Circuit/System Verification

Operate the front washer by using the S80 Window Wiper/Washer Switch. Verify the G24 Windshield Washer Pump activates.

Circuit/System Testing

1. Ignition OFF, disconnect the harness connector at the 50A Fuse Block - underhood.
2. Disconnect the harness connector 4 at the K9 Body Control Module.
3. Test for less than 5 ohms between the control circuit terminal 14 at the 50A Fuse Block - underhood and the control circuit terminal 14 4 at the K9 Body Control Module.

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- If the value is not within the specified range, test the control circuit for a short to voltage or an open/high resistance.
- If the circuit tests normal, test or replace the K9 Body Control Module.
- 4. Test for infinite resistance between the control circuit terminal 14 at the 50A Fuse Block - underhood and ground.
 - If the value is not within the specified range, test the control circuit for a short to ground.
- 5. If all circuits test normal, test or replace the 50A Fuse Block - underhood.

Component Testing

Relay Test

1. Ignition OFF, disconnect the harness connector 5 at the K9 Body Control Module.
2. Test for 60-200 ohms between control circuit terminal 14 4 at the K9 Body Control Module and ground.
 - If the value is not within the specified range, test the control circuit for a short to ground, short to voltage or an open.
 - If all circuits test normal, test or replace the 50A Fuse Block - underhood.

Output Control Tests

Ignition ON, command the Windshield Washer Relay Command ON and OFF with a scan tool. Observe that the KR11 Windshield Washer Pump Relay clicks and the G24 Windshield Washer Pump runs.

- If the KR11 Windshield Washer Pump Relay does not work, replace the 50A Fuse Block - underhood.
- If the KR11 Windshield Washer Pump Relay works, but the G24 Windshield Washer Pump does not run, test the washer fluid pump control circuit and the washer fluid pump ground circuit.
- If all circuits test normal, replace the G24 Windshield Washer Pump.

Repair Procedures

Perform the **Diagnostic Repair Verification** after completing the diagnostic procedure.

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

S YMPTOMS WIPER WASHER S YSTEMS

NOTE: The following steps must be completed before using the symptom tables:

1. Perform **Diagnostic System Check - Vehicle**, in order to verify that all of the following conditions are true:
 - No DTCs are set.
 - The control modules can communicate via the serial data link.

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2. Refer to **Wiper Washer System Description and Operation** in order to familiarize yourself with the system functions.

Visual Physical Inspection

- Inspect for aftermarket devices which may affect the operation of the windshield wiper/washer system. Refer to **Checking Aftermarket Accessories**.
- Inspect the easily accessible or visible system components for obvious damage or conditions which may cause the symptom.
- Inspect the washer fluid reservoir for the proper fluid level.

Intermittent

Faulty electrical connections or wiring may be the cause of intermittent conditions. Refer to **Testing for Intermittent Conditions and Poor Connections**.

Symptom List

Refer to a symptom diagnostic procedure from the following list in order to diagnose the symptom:

- **Windshield Wiper System Malfunction**
- **Washer Malfunction**
- **Rain Sensor Malfunction**
- **Rear Wiper System Malfunction**
- **Headlamp Washer Malfunction**

WINDSHIELD WIPER SYSTEM MALFUNCTION

Diagnostic Instructions

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

Diagnostic Fault Information

Circuit	Short to Ground	Open High Resistance	Short to Voltage	Signal Performance
Windshield Wiper High Speed Relay B+	1, 2	1, 2	-	-
Windshield Wiper Switch Low Signal	1	1	1	-
Windshield Wiper Switch High Signal	4	2	2	-
Windshield Wiper Motor Park Switch Signal	3	3	-	-
Front Wiper Relay Control	B3715 02	1, 2	4	-

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Windshield Wiper High Speed Relay Control	B3875 02	2	B3875 01	-
Windshield Wiper High Speed Relay Control	2	2	4	-
Front Wiper Motor Low Speed Control	1	1	4	-
Windshield Wiper Switch Low Reference	-	1, 2	1, 2	-
Windshield Wiper Motor Ground	-	1, 2, 3	-	-
Front Wiper Relay Ground	-	1	-	-
1. Delay or Low Speed Wipers Inoperative 2. High Speed Wipers Inoperative 3. Wipers Do Not Park 4. Wipers Always ON				

Circuit System Description

The body control module (BCM) controls the wiper motor based on input from the windshield wiper/washer switch. The BCM monitors the wiper/washer switch through two separate signal circuits and a ground circuit. The windshield wiper switch high signal circuit is used to determine high speed wiper operation, the windshield wiper switch low signal is used to determine low speed, intermittent, and mist operation through the use of a resistor ladder, and the windshield washer switch signal circuit is used to determine washer operation.

The BCM controls the windshield wiper motor through two output controls, controlling two relays which determine the desired wiper speed, high or low.

Reference Information**Schematic Reference****Wiper Washer Schematics****Connector End View Reference****Component Connector End Views****Description and Operation****Wiper Washer System Description and Operation****Electrical Information Reference**

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

Scan Tool Reference

Control Module References for scan tool information

Circuit System Verification

1. Ignition ON, windshield wiper/washer switch in the OFF position, verify the scan tool Windshield Washer Switch parameter is Inactive.
 - If not the specified value, refer to **Washer Malfunction**.
2. Wiper switch in the OFF position, verify the scan tool Windshield Wiper Switch parameter is Off.
 - If not the specified value, refer to the **Windshield Wiper Washer Switch Circuit Test**.
3. Wiper switch in the OFF position, verify the scan tool Windshield Wiper High Speed Switch parameter is Inactive.
 - If not the specified value, refer to the **Windshield Wiper Washer Switch Circuit Test**.
4. Wiper switch in the LO position, verify the scan tool Windshield Wiper Switch parameter is Low.
 - If not the specified value, refer to the **Windshield Wiper Washer Switch Circuit Test**.
5. Wiper switch in the HIGH position, verify the scan tool Windshield Wiper High Speed Switch parameter is Active.
 - If not the specified value, refer to the **Windshield Wiper Washer Switch Circuit Test**.
6. Wiper switch in the INT position, observe the scan tool Windshield Wiper Switch parameter while cycling the delay adjustment switch from long delay to short delay. The parameter should cycle between D1 and D5 as each delay position is selected.
 - If not the specified value, test or replace the windshield wiper/washer switch.
7. Wiper switch in the LO position, verify the windshield wipers are cycling at the low speed.
 - If the wipers are not operating at low speed, refer to the **Windshield Wiper Motor Circuit Test**.
8. Wiper switch in the HIGH position, verify the windshield wipers are cycling at high speed.
 - If the wipers are not operating at high speed, refer to the **Windshield Wiper Motor Circuit Test**.
9. Observe the scan tool BCM Wiper Park Switch parameter. The reading should display Active when the wipers are parked and Inactive with the wipers ON or out of the park position.
 - If the Wiper Park Switch parameter is always Active or Inactive or the wipers do not park, refer to the **Wiper Par Circuit Test**.

Circuit System Testing

Windshield Wiper Washer Switch Circuit Test

1. Ignition OFF, disconnect the 1 harness connector at the S82 windshield wiper/washer switch.
2. Verify a test lamp illuminates between the low reference circuit terminal 2 and B+.
 - If the test lamp does not illuminate, test the low reference circuit for an open/high resistance. If the circuit tests normal, replace the K9 BCM.
3. Ignition ON, test for B+ between the signal circuit terminal 1 and ground.
 - If less than the specified value, test the signal circuit for a short to ground or an open/high

resistance. If the circuit tests normal, replace the K9 BCM.

4. Ignition ON, test for B+ between the signal circuit terminal 3 and ground.
 - If less than the specified value, test the signal circuit for a short to ground or an open/high resistance. If the circuit tests normal, replace the K9 BCM.
5. Ignition On, test for 10 V between the signal circuit terminal 5 and ground.
 - If less than the specified value, test the signal circuit for a short to ground or an open/high resistance. If the circuit tests normal, replace the K9 BCM.
 - If greater than the specified value, test the signal circuit for a short to voltage. If the circuit tests normal, replace the K9 BCM.
6. If all circuits test normal, test or replace the S82 windshield wiper/washer switch.

Windshield Wiper Motor Circuit Test

1. Ignition OFF, disconnect KR12B windshield wiper relay.
2. Test for less than 5 ohms between the ground circuit terminal 85 and ground.
 - If greater than the specified range, test the ground circuit for an open/high resistance.
3. Test for less than 5 ohms between the ground circuit terminal 87A and ground.
 - If greater than the specified range, test or replace the 50A underhood fuse block.
4. Ignition ON, verify a test lamp illuminates between the B+ circuit terminal 87 and ground.
 - If the test lamp does not illuminate, test or replace the 50A underhood fuse block.
5. Install a test lamp between the control circuit terminal 86 and ground.
6. Command the LOW speed wipers ON and OFF using the S82 windshield wiper/washer switch. The test lamp should turn ON and OFF when changing between the commanded states.
 - If the test lamp is always ON, test the control circuit for a short to voltage. If the circuit tests normal, replace the K9 BCM.
 - If the test lamp is always OFF, test the control circuit for a short to ground or an open/high resistance. If the circuit tests normal, replace the K9 BCM.
7. Ignition OFF, disconnect the KR12C windshield wiper speed control relay.
8. Test for less than 5 ohms between the control circuit terminal 30 of the KR12B windshield wiper relay and control circuit terminal 30 of the KR12C windshield wiper speed control relay.
 - If greater than the specified range, test or replace the 50A underhood fuse block.
9. Connect the KR12B windshield wiper relay.
10. Test for less than 5 ohms between the control circuit terminal 30 of the KR12C windshield wiper speed control relay and ground.
 - If greater than the specified range, test or replace the KR12B windshield wiper relay.
11. Ignition ON, verify a test lamp illuminates between the B+ circuit terminal 85 of the KR12C windshield wiper speed control relay and ground.
 - If the test lamp does not illuminate, test or replace the 50A underhood fuse block.
12. Install a test lamp between the control circuit terminal 30 of the KR12C windshield wiper speed control relay and ground.
13. Command the LOW speed wipers ON using the S82 windshield wiper/washer switch. The test lamp

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- should illuminate when commanding the W speed wipers N.
- If the test lamp does not illuminate, replace the R12B windshield wiper relay.
14. Connect a test lamp between control circuit terminal 86 of the R12C windshield wiper speed control relay and B .
 15. Command the H GH speed wipers N and using the S82 windshield wiper washer switch. The test lamp should turn N and when changing between the commanded states.
 - If the test lamp is always N, test the control circuit for a short to ground. If the circuit tests normal, replace the 9 BCM.
 - If the test lamp is always , test the control circuit for a short to voltage or an open high resistance. If the circuit tests normal, replace the 9 BCM.
 16. Ignition , connect the R12C windshield wiper speed control relay and disconnect the 1 harness connector at the M75 windshield wiper motor.
 17. Test for less than 5 ohms between the ground circuit terminal C and ground.
 - If greater than the specified range, test the ground circuit for an open high resistance.
 18. Connect a test lamp between control circuit terminal E and ground.
 19. Ignition N, command the W speed wipers N and using the S82 windshield wiper washer switch. The test lamp should turn N and when changing between the commanded states.
 - If the test lamp is always N, test the control circuit for a short to voltage. If the circuit tests normal, test or replace the R12C windshield wiper speed control relay.
 - If the test lamp is always , test the control circuit for a short to ground or an open high resistance. If the circuit tests normal, test or replace the R12C windshield wiper speed control relay.
 20. Connect a test lamp between control circuit terminal D and ground.
 21. Command the H GH speed wipers N and using the S82 windshield wiper washer switch. The test lamp should turn N and when changing between the commanded states.
 - If the test lamp is always N, test the control circuit for a short to voltage. If the circuit tests normal, test or replace the R12C windshield wiper speed control relay.
 - If the test lamp is always , test the control circuit for a short to ground or an open high resistance. If the circuit tests normal, test or replace the R12C windshield wiper speed control relay.
 22. If all circuits test normal, test or replace the M7 windshield wiper motor.

Wiper Par Circuit Test

1. Ignition , disconnect the harness connector at the windshield wiper motor.
2. Ignition N, test for B between signal circuit terminal B and ground.
 - If not the specified value, test the signal circuit for a short to ground or open high resistance. If the circuit tests normal, test or replace the 9 BCM.
3. If the circuit tests normal, test or replace the windshield wiper motor.

Component Testing

Windshield Wiper Washer Switch

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1. Disconnect the harness connector at the S82 windshield wiper washer switch.
2. With the S82 windshield wiper washer switch in the H GH position, test for less than 5 ohms between the low reference terminal 2 and the signal terminal 1.
 - If greater than the specified value, replace the S82 windshield wiper washer switch.
3. While cycling the S82 windshield wiper washer switch through each delay and speed position, test for the specified resistance between the low reference terminal 2 and the signal terminal 3.

NOTE: If the switch tests open in any switch position other than OFF test the signal circuits for a short to voltage before replacing the switch.

Wiper Switch Values

Switch Position	Resistance
Off	Infinite
Mist	3 -364 ohms
Delay 1	3.7 -4.1 kohms
Delay 2	2.6 -3.2 kohms
Delay 3	1.8 -2.2 kohms
Delay 4	1.1 -1.5 kohms
Delay 5	65 -1 ohms
Low	3 -364 ohms
High	3 -364 ohms

- If any switch position is not within the specified range, replace the S82 windshield wiper washer switch.

Windshield Wiper Motor

1. Ignition On, disconnect the harness connector at the M75 windshield wiper motor.
2. Install a 25 A fused jumper wire between the control terminal E and 12V. Install a jumper wire between the ground terminal C and ground.
3. Verify the M75 windshield wiper motor is operating in the low speed mode.
 - If the M75 windshield wiper motor is not in the low speed mode, replace the M75 windshield wiper motor.
4. Install a 25 A fused jumper wire between the control terminal D and 12V. Install a jumper wire between the ground terminal C and ground.
5. Verify the M75 windshield wiper motor is operating in the high speed mode.
 - If the M75 windshield wiper motor is not in the high speed mode, replace the M75 windshield wiper motor.

Repair Procedures

Perform the **Diagnostic Repair Verification** after completing the diagnostic procedure.

- **Windshield Wiper Motor Replacement**

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- Relay Replacement Attached to Wire Harness or Relay Replacement Within an Electrical Center
- Windshield Wiper and Washer Switch Replacement
- Control Module References for BCM replacement, setup, and programming

WASHER MALFUNCTION

Diagnostic Instructions

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

Diagnostic Fault Information

Circuit	Short to Ground	Open High Resistance	Short to Voltage	Signal Performance
Rear Washer Switch Control	5	4	4	-
Rear Washer Relay Control	B3811 2	4	5	-
Rear Washer Fluid Pump Control	4	4	5	-
Rear Washer Fluid Pump Ground	-	4	4, 5	-
Windshield Washer Switch Signal	2	1	1	-
Washer Fluid Level Switch Signal	3	3	3	-
Windshield Washer Fluid Pump Control	1	1	2	-
Windshield Washer Relay Control	B3873 2	1	2	-
Windshield Washer Fluid Pump Ground	-	1	-	-
Washer Fluid Level Switch Ground	3	3	3	-
1. Front Washer Inoperative 2. Front Washer Always ON 3. Washer Fluid Level Inoperative 4. Rear Washer Inoperative 5. Rear Washer Always ON				

Circuit System Description

The body control module (BCM) controls the windshield washer fluid pump based on an input from the wiper washer switch. The BCM monitors the washer switch through the windshield washer switch signal circuit. When the wash switch is closed, ground is supplied to the windshield washer switch signal circuit. When this is the case, the BCM will command the windshield washer fluid pump and the low speed wipers on.

In some vehicles warning information (wash fluid low and heated wash ON) will be conveyed via the GM CAN to the controls and displays subsystem (responsible for display). This subsystem will provide visual feedback to the customer while in the RUN power mode.

When the BCM detects that the rear wiper wash switch has activated the momentary wash switch, it activates a high side drive output which supplies battery to the coil of the rear washer pump relay. This energizes the relay, which switches battery power to the washer pump motor. The BCM will also activate continuous low speed windshield wipers as described above. This washer and wiper operation shall be continued so long as the switch remains active. Upon termination the rear wash motor will be deactivated and the wiper shall move to its park position and deactivate.

Reference Information

Schematic Reference

Wiper Washer Schematics

Connector End View Reference

Component Connector End Views

Description and Operation

Wiper Washer System Description and Operation

Electrical Information Reference

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

Scan Tool Reference

Control Module References for scan tool information

Circuit System Verification

1. Ignition ON, observe the scan tool Windshield Washer Switch parameter while pressing and releasing the washer switch. The reading should change between NACT E and ACT E.
 - If the reading does not change between NACT E and ACT E, refer to **Windshield Washer Switch Circuit Test**.
2. Command the Windshield Washer Relay Command ON and OFF with a scan tool. The windshield washers should turn ON and OFF when changing between the commanded states.
 - If windshield washers do not turn ON and OFF, refer to the **Washer Pump Circuit Test**.
3. Command the Rear Washer Relay Command ON and OFF with a scan tool. The rear washer should turn ON and OFF when changing between the commanded states.
 - If the rear washer does not turn ON and OFF, refer to the **Washer Pump Circuit Test**.
 - If the rear washer turns ON and OFF, refer to **Rear Washer Switch Circuit Test**.

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4. Command the Headlamp Washer Relay Command **ON** and **OFF** with a scan tool. The headlamp washers should turn **ON** and **OFF** when changing between the commanded states.
 - If the headlamp washers do not turn **ON** and **OFF**, refer to **Headlamp Washer Malfunction**.
5. Verify the windshield washer fluid level is above the minimum level.
 - If not above the minimum level, fill the reservoir and inspect for leaks. If the low washer fluid indicator is still **ON**, refer to **Low Washer Fluid Indicator Test**.

Circuit System Testing

Windshield Washer Switch Circuit Test

1. Ignition **OFF**, disconnect the **S82** harness connector at the S82 windshield wiper washer switch.
2. Verify that a test lamp illuminates between the low reference terminal 2 and B **+**.
 - If the test lamp does not illuminate, test the low reference circuit for an open high resistance. If the circuit tests normal, replace the **9 BCM**.
3. Ignition **ON**, verify the scan tool Windshield Washer Switch parameter is **NACT** **OFF**.
 - If not the specified value, test the signal circuit terminal 5 for a short to ground. If the circuit tests normal, replace the **9 BCM**.
4. Install a 3 A fused jumper wire between the signal circuit terminal 5 and the ground circuit terminal 2. Verify the scan tool Windshield Washer Switch parameter is **ACT** **OFF**.
 - If not the specified value, test the signal circuit for a short to voltage or an open high resistance. If the circuit tests normal, replace the **9 BCM**.
5. If all circuits test normal, test or replace the S82 windshield wiper washer switch.

Rear Washer Switch Circuit Test

1. Ignition **OFF**, disconnect the **S82** harness connector at the S82 windshield wiper washer switch.
2. Verify that a test lamp illuminates between the low reference terminal 2 and B **+**.
 - If the test lamp does not illuminate, test the low reference circuit for an open high resistance. If the circuit tests normal, replace the **9 BCM**.
3. Ignition **ON**, verify the rear washer is **OFF**.
 - If not the specified value, test the signal circuit terminal 4 for a short to ground. If the circuit tests normal, replace the **9 BCM**.
4. Install a 3 A fused jumper wire between the signal circuit terminal 4 and the ground circuit terminal 2. Verify the rear washer turns **ON**.
 - If the rear washer does not turn on, test the signal circuit for a short to voltage or an open high resistance. If the circuit tests normal, replace the **9 BCM**.
5. If all circuits test normal, test or replace the S82 windshield wiper washer switch.

Washer Pump Circuit Test

1. Ignition **OFF**, disconnect the **S2** harness connector at the **5 A** underhood fuse block.
2. Connect a test lamp between the control circuit terminal 14 and ground.

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3. Ignition ON, command the Windshield Washer Relay Command ON and OFF with a scan tool. The test lamp should turn ON and OFF when changing between the commanded states.
 - If the test lamp is always ON, test the control circuit for a short to voltage. If the circuit tests normal, replace the K9 BCM.
 - If the test lamp is always OFF, test the control circuit for a short to ground or an open/high resistance. If the circuit tests normal, replace the K9 BCM.
4. Connect a test lamp between the control circuit terminal 10 and ground.
5. Command the Rear Washer Relay Command ON and OFF with a scan tool. The test lamp should turn ON and OFF when changing between the commanded states.
 - If the test lamp is always ON, test the control circuit for a short to voltage. If the circuit tests normal, replace the K9 BCM.
 - If the test lamp is always OFF, test the control circuit for a short to ground or an open/high resistance. If the circuit tests normal, replace the K9 BCM.
6. Ignition OFF, connect the 2 harness connector at the 50A underhood fuse block and disconnect the harness connector at the G24 windshield washer pump.
7. Connect a test lamp between control circuit terminal 2 and ground.
8. Ignition ON, command the Windshield Washer Relay Command ON and OFF with a scan tool. The test lamp should turn ON and OFF when changing between the commanded states.
 - If the test lamp is always ON, test the control circuit for a short to voltage. If the circuit tests normal, replace the 50A underhood fuse block.
 - If the test lamp is always OFF, test the control circuit for a short to ground or an open/high resistance. If the circuit tests normal, replace the 50A underhood fuse block.
9. Connect a test lamp between control circuit terminal 1 and ground.
10. Command the Rear Washer Relay Command ON and OFF with a scan tool. The test lamp should turn ON and OFF when changing between the commanded states.
 - If the test lamp is always ON, test the control circuit for a short to voltage. If the circuit tests normal, replace the 50A underhood fuse block.
 - If the test lamp is always OFF, test the control circuit for a short to ground or an open/high resistance. If the circuit tests normal, replace the 50A underhood fuse block.
11. If all circuits test normal, test or replace the G24 windshield washer pump.

Low Washer Fluid Indicator Test

1. Verify the washer fluid reservoir is filled up.
2. Ignition OFF, disconnect the harness connector at the B118B windshield washer fluid level switch.
3. Test for less than 5 ohms between the ground terminal 1 and ground.
 - If greater than the specified range, test the ground circuit for an open/high resistance.
4. Ignition OFF, disconnect the 1 harness connector at the P16 instrument cluster.
5. Test for less than 5 ohms between the signal circuit terminal 2 at the B118B Windshield Washer Fluid Level Switch harness connector and signal terminal 15 at the P16 instrument cluster harness connector.
 - If greater than the specified range, test the signal circuit for a short to voltage or an open/high resistance.

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6. Reconnect all harness connectors.
7. Ignition ON, command the Driver Information Center Segment test ON and OFF with the scan tool, verify that the low washer fluid indicator display reacts to ON and OFF positions.
 - If the low washer fluid indicator display is always ON or always OFF, replace the P16 instrument cluster.
8. If the low washer fluid indicator display changes between ON and OFF, test or replace the B118B windshield washer fluid level switch.

Component Testing

Washer Switch Test

1. Disconnect the 1 harness connector at the S82 windshield wiper/washer switch.
2. Test for less than 5 ohms between signal circuit terminal 5 and ground.
 - If not the specified range, replace the S82 windshield wiper/washer switch.
3. Test for less than 5 ohms between signal circuit terminal 4 and ground.
 - If not the specified range, replace the S82 windshield wiper/washer switch.

Washer Pump Test

1. Ignition OFF, disconnect the harness connector at the G24 windshield washer pump.
2. Install a 10 A fused jumper wire between the control terminal 2 and 12 V. Install a jumper wire between the ground terminal 1 and ground.
3. Verify the G24 windshield washer pump is activated.
 - If the G24 windshield washer pump does not activate, replace the G24 windshield washer pump.

Low Washer Fluid Indicator Test

1. Ignition OFF, remove the B118B windshield washer fluid level switch.
2. Install a wire at terminal 1 and terminal 2. Observe the resistance while moving the level switch.
3. The resistance should be changing between less than 5 ohms infinite resistance while moving the level switch.
 - If not the specified range, replace the B118B windshield washer fluid level switch.

Repair Procedures

Perform the **Diagnostic Repair Verification** after completing the diagnostic procedure.

- **Windshield Wiper and Washer Switch Replacement**
- **Control Module References** for BCM replacement, setup, and programming

RAIN SENSOR MALFUNCTION

Diagnostic Instructions

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

Diagnostic Fault Information

Circuit	Short to Ground	Open High Resistance	Short to Voltage	Signal Performance
Rain Sensor B+	1	1	-	-
Rain Sensor Signal	B370A 39	B370A 39	B370A 39	B370A 39
Rain Sensor Ground	-	1	-	-
1. Rain Sensor Malfunction				

Circuit System Description

B+ voltage is supplied to the windshield outside moisture sensor. Whenever the ignition is ON, or in accessory positions, the body control module (BCM), sends the windshield wiper/washer switch status by using a pulse width modulated (PWM) signal. When a wipe cycle is needed, the windshield outside moisture sensor sends a PWM voltage signal to the BCM, requesting the wiper operation. The BCM commands the windshield wiper motor wipe cycles. If at anytime a fault occurs between the windshield outside moisture sensor and BCM, the BCM will use the inputs from the windshield wiper/washer switch in the delay positions to operate the windshield wiper motor at continuous variable delay intervals.

Reference Information

Schematic Reference

Wiper Washer Schematics

Connector End View Reference

Component Connector End Views

Description and Operation

Wiper Washer System Description and Operation

Electrical Information Reference

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

Scan Tool Reference

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Control Module References for scan tool information

Circuit System Verification

Ignition ON, S802 windshield wiper/washer switch in the low position. Spray water on the windshield. The windshield wipers should operate at low speed.

If the windshield wipers do not operate, refer to **Windshield Wiper System Malfunction**.

Circuit System Testing

Rain Sensor Malfunction

1. Ignition OFF, disconnect the harness connector at the B117 rain sensor.
2. Test for less than 5 ohms between the ground circuit terminal 2 and ground.
 - o If greater than the specified value, test the ground circuit for an open/high resistance.
3. Ignition ON, verify that a test lamp illuminates between B+ voltage circuit terminal 1 and ground.
 - o If the test lamp does not illuminate, test the B+ voltage circuit for a short to ground or an open/high resistance.
4. If all circuits test normal, replace the B117 rain sensor.

Repair Procedures

Perform the **Diagnostic Repair Verification** after completing the diagnostic procedure.

- **Windshield Outside Moisture Sensor Replacement**
- **Control Module References** for BCM or the Instrument Panel Cluster replacement, setup, and programming

REAR WIPER SYSTEM MALFUNCTION

Diagnostic Instructions

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

Diagnostic Fault Information

Circuit	Short to Ground	Open High Resistance	Short to Voltage	Signal Performance
Rear Wiper Switch Signal	2	1	1	-
Rear Window Wiper Control	1	1	2	-
Rear Window Wiper Relay Control	B370B 02	1	2	-
Rear Window Wiper Ground	-	1	1	-

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1. Wiper Inoperative
2. Wiper Always ON

Circuit System Description

The body control module (BCM) controls the dual speed rear wiper motor by its active high output to the external rear wiper motor relay. When the BCM activates its output and applies battery to the coil of the relay, the relay energizes, allowing battery voltage from the fuse to be applied through the switched contacts of the rear wiper motor relay to the control input of the rear wiper motor. The motor operates continuously at low speed when the rear wiper switch is set to the continuous or delay setting. The rear motor internally controls if the rear wipers are in the low or delay setting.

Reference Information

Schematic Reference

Wiper Washer Schematics

Connector End View Reference

Component Connector End Views

Description and Operation

Wiper Washer System Description and Operation

Electrical Information Reference

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

Scan Tool Reference

Control Module References for diagnostic tester information.

Circuit System Verification

Verify the Rear Wiper Command parameter is active when operating the rear wipers.

- If the parameter is not active, refer to the Rear Wiper Washer Switch Circuit Malfunction.
- If the parameter is active, refer to the Rear Wiper Motor Circuit Malfunction.

Circuit System Testing

Rear Wiper Washer Switch Circuit Malfunction

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1. Ignition OFF, disconnect the 1 harness connector at the S82 windshield wiper/washer switch.
2. Verify a test lamp illuminates between the low reference terminal 2 and B+.
 - If the test lamp does not illuminate, test the low reference circuit for an open/high resistance. If the circuit tests normal, replace the K9 BCM.
3. Test for 10 V between the signal circuit terminal 4 and ground.
 - If less than the specified value, test the signal circuit for a short to ground or an open/high resistance. If the circuit tests normal, replace the K9 BCM.
4. If all circuits test normal, replace the S82 windshield wiper/washer switch.

Rear Wiper Motor Circuit Malfunction

1. Ignition OFF, disconnect the KR7 rear wiper relay.
2. Test for less than 5 ohms between the ground circuit terminal 86 and ground.
 - If greater than the specified range, test the ground circuit for an open/high resistance.
3. Test for less than 5 ohms between the ground circuit terminal 87A and ground.
 - If greater than the specified range, test the ground circuit for an open/high resistance.
4. Ignition ON, verify a test lamp illuminates between the B+ circuit terminal 87 and ground.
 - If the test lamp does not illuminate, test the rear wiper fuse for an open. If the fuse is open, test the control circuit terminal 30 for a short to ground.
5. Verify that a test lamp does not illuminate between the control circuit terminal 30 and ground.
 - If the test lamp illuminates, test the control circuit for a short to voltage.
6. Connect a test lamp between the control circuit terminal 85 and ground.
7. Command the rear wiper ON and OFF with a scan tool. The test lamp should turn ON and OFF when changing between the commanded states.
 - If the test lamp is always ON, test the control circuit for a short to voltage. If the circuit tests normal, replace the K9 BCM.
 - If the test lamp is always OFF, test the control circuit for a short to ground or an open/high resistance. If the circuit tests normal, test or replace the K9 BCM.
8. Ignition OFF, disconnect the connector at the M45 rear wiper motor.
9. Test for less than 5 ohms between the ground circuit terminal C and ground.
 - If greater than the specified range, test the ground circuit for an open/high resistance.
10. Ignition ON, verify a test lamp illuminates between B+ circuit terminal B and ground.
 - If the test lamp does not illuminate, test the B+ circuit for a short to ground or an open/high resistance.
11. Connect the harness connector at the M45 rear wiper motor.
12. Connect a 3 A fused jumper wire between the control circuit terminal 30 and B+. Verify the rear wiper motor is activated.
 - If the rear wiper motor does not activate, test the control circuit for a short to ground or an open/high resistance. If the circuit tests normal, test or replace the M45 rear wiper motor.
13. If all circuits test normal, test or replace the KR7 rear wiper relay.

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Component Testing

Relay Test

1. Ignition OFF, connect the KR7 rear wiper relay.
2. Test for 60-200 ohms between terminals 85 and 86.
 - If the resistance is not within the specified range, replace the KR7 rear wiper relay.
3. Test for infinite resistance between the following terminals:
 - 30 and 86
 - 30 and 87
 - 30 and 85
 - 85 and 87
 - If not the specified value, replace the KR7 rear wiper relay.
4. Test for less than 5 ohms between terminals 30 and 87A.
 - If greater than the specified range, replace the KR7 rear wiper relay.
5. Install a 10 A fused jumper wire between relay terminal 85 and B+. Install a jumper wire between relay terminal 86 and ground. Test for less than 5 ohms between terminals 30 and 87.
 - If greater than the specified range, replace the KR7 rear wiper relay.

Rear Wiper Motor Test

1. Ignition OFF, disconnect the harness connector at the M45 rear wiper motor.
2. Install a 25 A fused jumper wire between the B+ terminal A and 12 V. Install a jumper wire between the ground terminal C and ground.
3. Verify the M45 rear wiper motor is operating.
 - If the M45 rear wiper motor is not operating, replace the M45 rear wiper motor.

Repair Procedures

Perform the **Diagnostic Repair Verification** after completing the diagnostic procedure.

- **Control Module References** for BCM replacement, setup, and programming.
- **Relay Replacement Attached to Wire Harness** or **Relay Replacement Within an Electrical Center**
- **Rear Window Wiper Motor Replacement**
- **Windshield Wiper and Washer Switch Replacement**

HEADLAMP WASHER MALFUNCTION

Diagnostic Instructions

- Perform the **Diagnostic System Check - Vehicle** prior to using this diagnostic procedure.
- Review **Strategy Based Diagnosis** for an overview of the diagnostic approach.

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- **Diagnostic Procedure Instructions** provides an overview of each diagnostic category.

Diagnostic Fault Information

Circuit	Short to Ground	Open High Resistance	Short to Voltage	Signal Performance
Headlamp Washer Fluid Pump Control	1	1	2	-
Headlamp Washer Relay Control	B3810 02	1	2	-
Headlamp Washer Fluid Pump Ground	-	1	1	-
1. Headlamp Washer Inoperative 2. Headlamp Washers Always ON				

Circuit System Description

The body control module (BCM) controls the washer motor based on an input from the windshield wiper washer switch. The BCM monitors the washer switch through the windshield washer switch signal circuit. When the WASH switch is closed, ground is supplied to the front washer switch signal circuit. When this is seen, the BCM will command the front washer fluid pump and the low speed wipers on. When headlamp wash is equipped, the headlamps shall be sprayed with wash fluid as a result of an extended windshield wash switch activation. In order to preserve wash fluid, the feature shall only be allowed to activate if the Low or High Beam Headlamps are active. In addition, after the initial Headlamp Wash operation has been performed, additional headlamp washes shall not be performed for the next 4 Windshield Wash activations or for 48 hours, whichever occurs first.

Diagnostic Aids

The headlamp wash feature shall only be allowed to be activated, if the low or high beam headlamps are active as well.

Reference Information

Schematic Reference

Wiper Washer Schematics

Connector End View Reference

Component Connector End Views

Description and Operation

Wiper Washer System Description and Operation

Electrical Information Reference

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

Scan Tool Reference

Control Module References for scan tool information

Circuit System Testing

1. Ignition OFF, disconnect the KR2 headlamp washer fluid pump relay in the 50A underhood fuse block.
2. Test for less than 5 ohms between ground circuit terminal 85 and ground.
 - If greater than the specified value, test the ground circuit for an open/high resistance.
3. Ignition ON, install a test lamp between the control circuit terminal 86 and ground.
4. Using the scan tool, control the headlamp washers ON and OFF. Verify the test lamp turns on and off.
 - If the test lamp is always OFF, test the control circuit for a short to ground or an open/high resistance. If the circuit tests normal, replace the K9 BCM.
 - If the test lamp is always ON, test the control circuit for a short to voltage. If the circuit tests normal, replace the K9 BCM.
5. Ignition OFF, disconnect the harness connector at the G16 headlamp washer fluid pump.
6. Test for less than 5 ohms between the G16 headlamp washer fluid pump ground circuit terminal 2 and ground.
 - If greater than the specified value, test the ground circuit for an open/high resistance.
7. Ignition ON, connect a test lamp between the control circuit terminal 1 and ground. Momentarily connect a 5 A fused jumper wire between the relay circuits 87 and 30. Verify the test lamp illuminates momentarily.
 - If the test lamp does not illuminate momentarily, test the control circuit for an open/high resistance or a short to ground. If the circuit tests normal, test or replace the G16 headlamp washer fluid pump.
 - If the test lamp is always ON, test the control circuit for a short to voltage.
8. If all circuits tests normal, replace the KR2 headlamp washer fluid pump relay.

Component Testing

Window Wiper Washer Switch

Washer Pump

Static Test

1. Ignition OFF, disconnect the harness connector at the S82 windshield wiper/washer switch.
2. Test for less than 5 ohms between windshield wiper/washer switch terminal 2 and terminal 5 while

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activating the S82 windshield wiper/washer switch.

- If greater than the specified range, replace the S82 windshield wiper/washer switch.

Dynamic Test

1. Ignition OFF, disconnect the KR2 headlamp washer fluid pump relay.
2. Install a 30 A fused jumper wire between the relay terminals 86, 87 and 12 V. Install a jumper wire between the relay terminal 85 and ground.
3. Connect a test lamp between relay terminal 30 and ground.
4. Observe the test lamp turns ON and OFF by grounding the relay terminal 85 briefly several times.
 - If the function does not perform as specified, replace the KR2 headlamp washer fluid pump relay.

Relay Test

1. Ignition OFF, disconnect the KR2 headlamp washer fluid pump relay.
2. Test for 60-200 ohms between terminals 85 and 86.
 - If the resistance is not within the specified range, replace the KR2 headlamp washer fluid pump relay.
3. Test for infinite resistance between the following terminals:
 - 30 and 86
 - 30 and 87
 - 30 and 85
 - 85 and 87
 - If not the specified value, replace the KR2 headlamp washer fluid pump relay.
4. Install a 10 A fused jumper wire between relay terminal 85 and 12 V. Install a jumper wire between relay terminal 86 and ground. Test for less than 5 ohms between terminals 30 and 87.
 - If greater than the specified range, replace the KR2 headlamp washer fluid pump relay.

Dynamic Test

1. Ignition OFF, disconnect the harness connector at the G16 headlamp washer fluid pump.
2. Install a 10 A fused jumper wire between the control terminal 1 and 12 V. Install a jumper wire between the ground terminal 2 and ground.
3. Verify the G16 headlamp washer fluid pump is activated.
 - If the G16 Headlamp Washer Fluid Pump does not activate, replace the G16 headlamp washer fluid pump.

Repair Procedures

Perform the **Diagnostic Repair Verification** after completing the diagnostic procedure.

- **Relay Replacement Attached to Wire Harness** or **Relay Replacement Within an Electrical Center**

- [Headlamp Washer Pump Replacement](#)
- [Windshield Wiper and Washer Switch Replacement](#)
- [Control Module References](#) for BCM replacement, setup, and programming

REPAIR INSTRUCTIONS

WINDSHIELD WIPER AND WASHER SWITCH REPLACEMENT

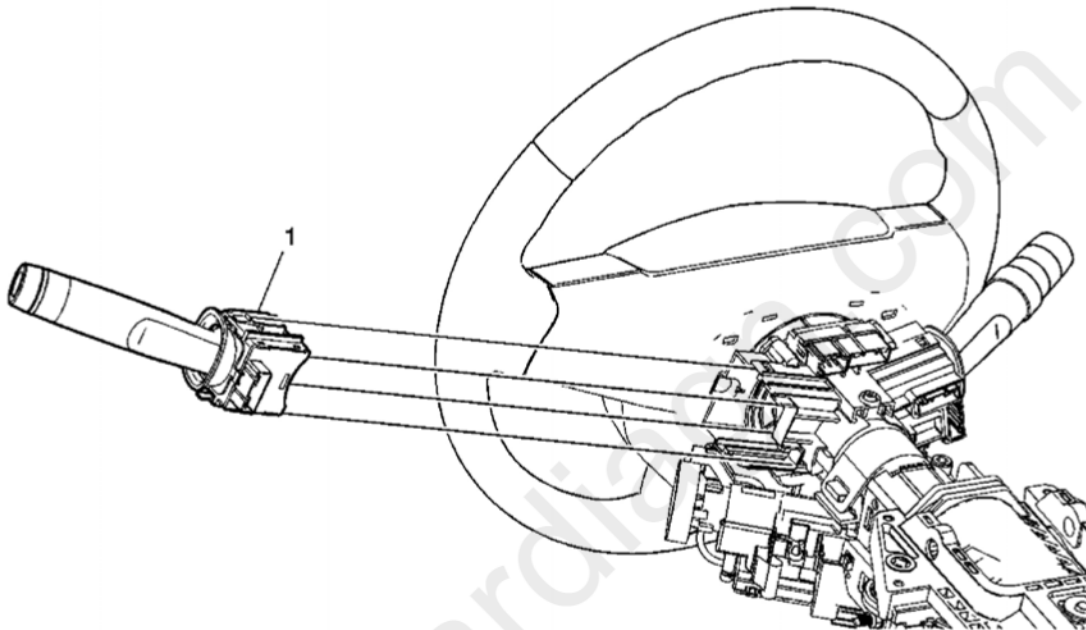


Fig. 4: Identifying Windshield Wiper & Washer Switch
Courtesy of GENERAL MOTORS CORP.

Callout	Component Name
Preliminary Procedure: Remove the steering column shroud. Refer to Steering Column Shroud Replacement .	
1	Windshield Wiper and Washer Switch Procedure 1. Disconnect any electrical connectors as needed. 2. Release the plastic retaining tabs and remove the windshield wiper and washer switch from the turn signal switch bracket.

WINDSHIELD WASHER NOZZLE HOSE REPLACEMENT

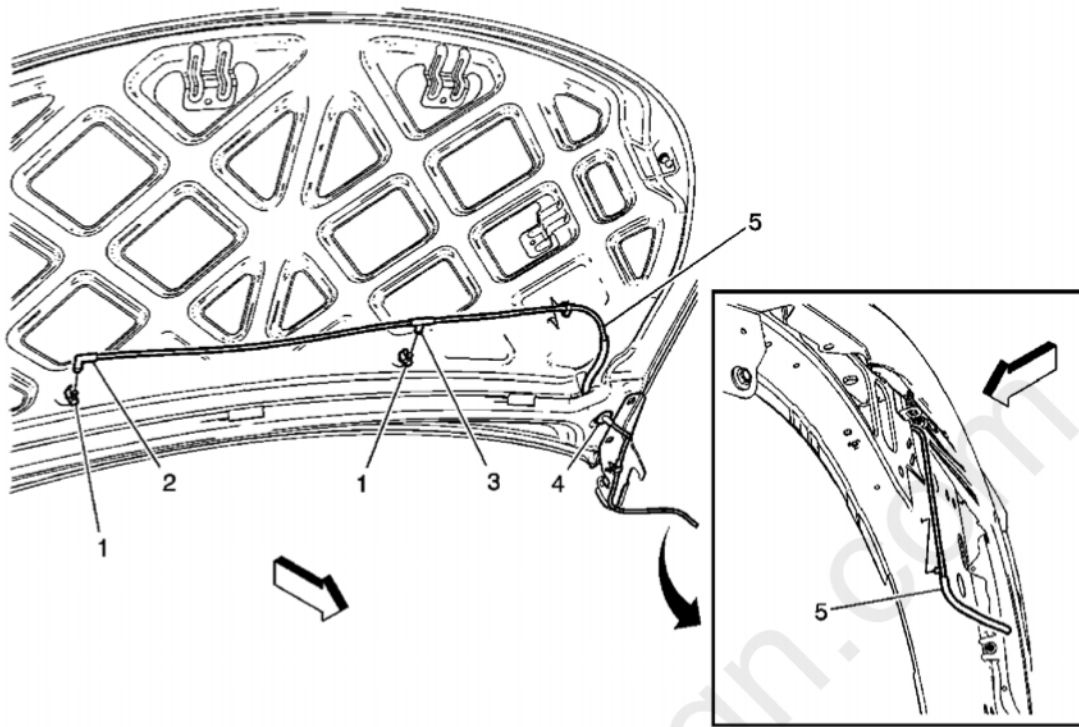


Fig. 5: Identifying Windshield Washer Nozzle Hose
 Courtesy of GENERAL MOTORS CORP.

Callout	Component Name
Preliminary Procedures	
1. Remove the windshield washer solvent container. Refer to <u>Windshield Washer Solvent Container Replacement</u> . 2. Remove the hood insulator. Refer to <u>Hood Insulator Replacement</u> .	
1	Windshield Washer Nozzle Procedure: Disconnect the washer hose.
2	Windshield Washer Nozzle Hose Assembly Elbow
3	Windshield Washer Nozzle Hose Assembly Tee
4	Windshield Washer Nozzle Hose Grommet Procedure: Disconnect the windshield washer nozzle hose grommet from the hood.
5	Windshield Washer Nozzle Hose Assembly Procedure 1. Disconnect the integral clip from the driver side hood hinge in order to release the hose from the hinge.

2. Disconnect the integral clip from the drivers side front wheelhouse panel in order to release the windshield washer nozzle hose from the wheelhouse panel.

WINDSHIELD WASHER NOZZLE REPLACEMENT

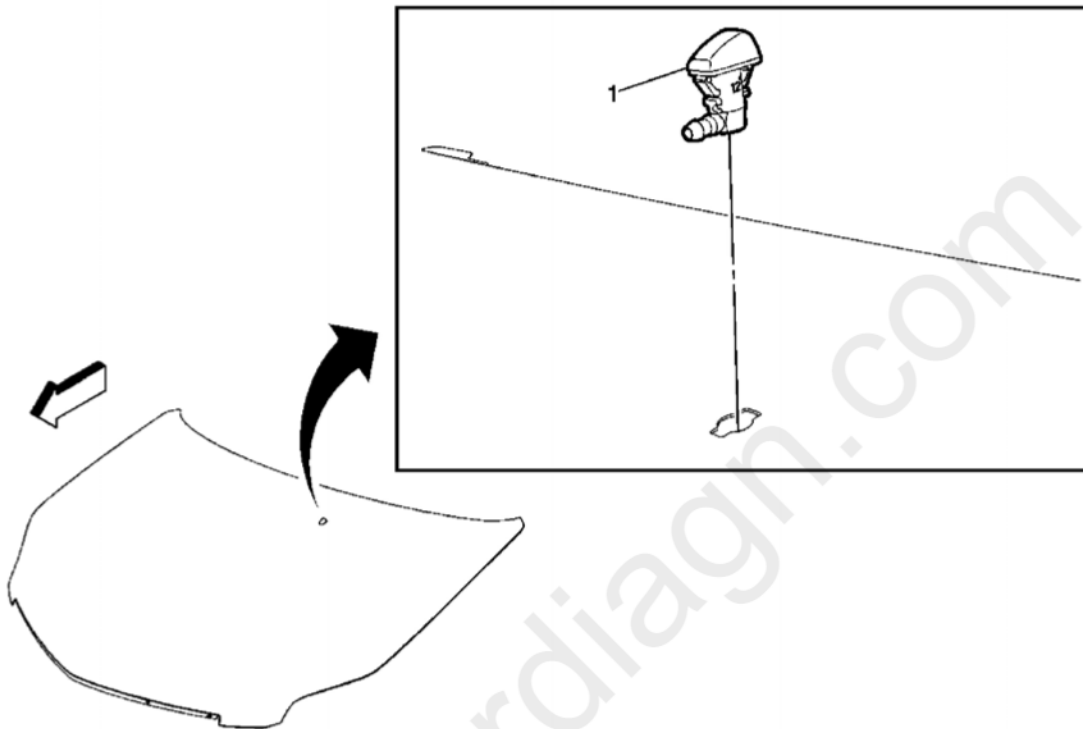


Fig. 6: Identifying Windshield Washer Nozzle
Courtesy of GENERAL MOTORS CORP.

Callout	Component Name
Preliminary Procedures	
1. Remove the hood insulator. Refer to Hood Insulator Replacement. 2. Disconnect the windshield washer hose from the washer nozzles.	
1	Windshield Washer Nozzle (Qty: 2) Procedure 1. Pinch the rear retainer on the washer nozzle first followed by the front retainer. 2. Push the nozzles outward from the hood in order to remove.

REAR WINDOW WASHER NOZZLE REPLACEMENT

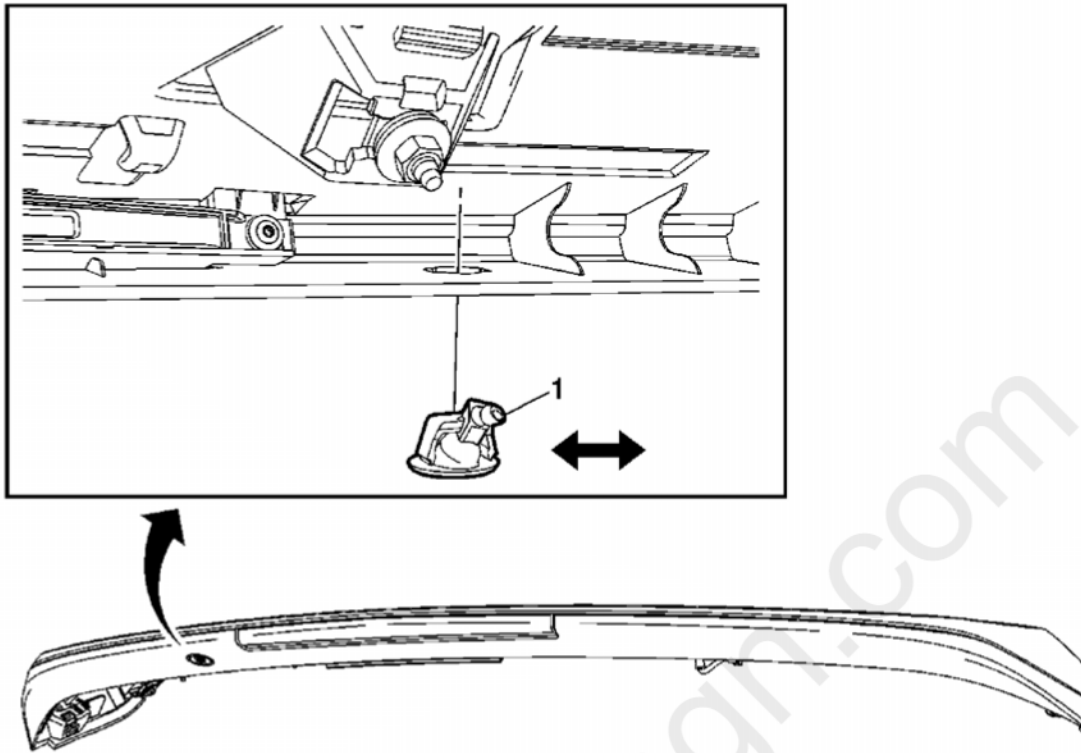


Fig. 7: View Of Rear Window Washer Nozzle
Courtesy of GENERAL MOTORS CORP.

Callout	Component Name
Preliminary Procedure: Remove the rear end spoiler. Refer to <u>Rear End Spoiler Replacement</u> .	
1	Rear Window Washer Nozzle
	Procedure
	1. Squeeze the outer tabs on the nozzle in order to remove the nozzle from the rear spoiler.
	2. Disconnect the rear window washer nozzle hose from the rear window washer nozzle.
	3. Remove the rear window washer nozzle.
	4. Check the rear window washer nozzle adjustment. Refer to <u>Rear Window Washer Nozzle Adjustment</u> .

REAR WINDOW WASHER NOZZLE ADJUSTMENT

Spray Pattern Adjustment

NOTE: All adjustments must be completed with the liftgate assembly in the FULL closed position.

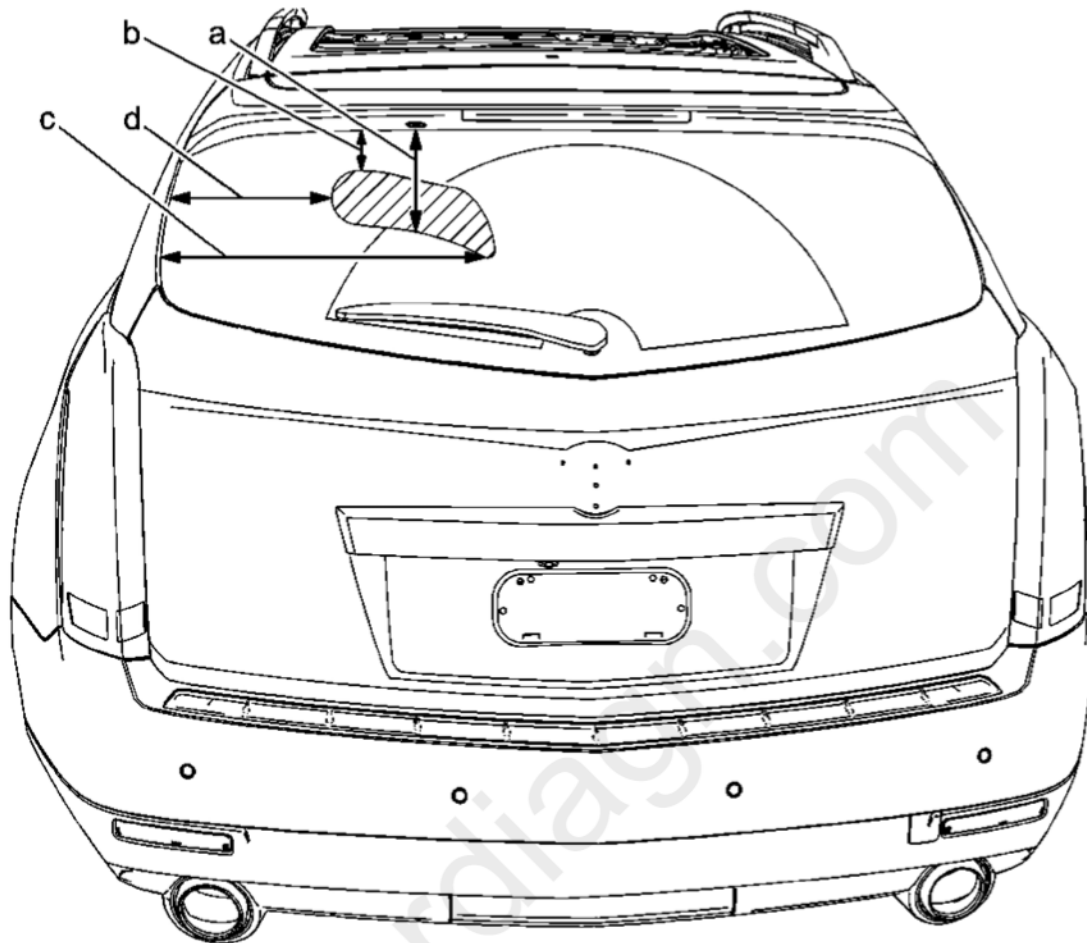


Fig. 8: Identifying Rear Window Washer Nozzle Location & Measurements
 Courtesy of GENERAL MOTORS CORP.

1. The first measurement (a) is from the centerline of the rear window washer nozzle, downward in a vertical line.
2. Measure from the bottom edge of the rear end spoiler (a) in an downward vertical line between 124-192 mm (4.8-7.5") to have the location for the top edge of the spray pattern.
3. Make a small mark with a wax-pencil to use as a reference point when the rear washer spray pattern is tested.
4. Measure from the bottom edge of the rear end spoiler (b) in a downward vertical line between 87-116 mm (3.4-4.5") to have the location for the top outer edge of the upper spray pattern.
5. Make a small mark with a wax-pencil to use as a reference point when the rear washer spray pattern is tested.
6. Measure from the outer left side edge of the liftgate glass (c) in a horizontal line between 491-495 mm (19.3-19.4") to have the location for the inner edge of the lower spray pattern.
7. Make a small mark with a wax-pencil to use as a reference point when the rear washer spray pattern is tested.

8. Measure from the outer left side edge of the liftgate glass (d) in a horizontal line between 365-381 mm (14.3-15.0 in) to have the location for the outer edge of the lower spray pattern.
9. Make a small mark with a wax-pencil to use as a reference point when the rear washer spray pattern is tested.
10. Operate the rear washer system and notice the spray contact patterns as the washer nozzle sprays.
11. Turn off the rear wiper washer system and make any needed adjustment to the rear window washer nozzle.
12. Use a small flat-bladed tool in order to move and adjust the ball socket within the rear window washer nozzle.
13. After every adjustment, re-check the spray pattern contact location, (as shown) of the rear window washer solvent contact to the liftgate glass surface.
14. Clean the liftgate glass, removing the wax-pencil marks made previously from the spray pattern reference points.
15. Fill the windshield washer solvent container to full capacity.

HEADLAMP WASHER NOZZLE REPLACEMENT

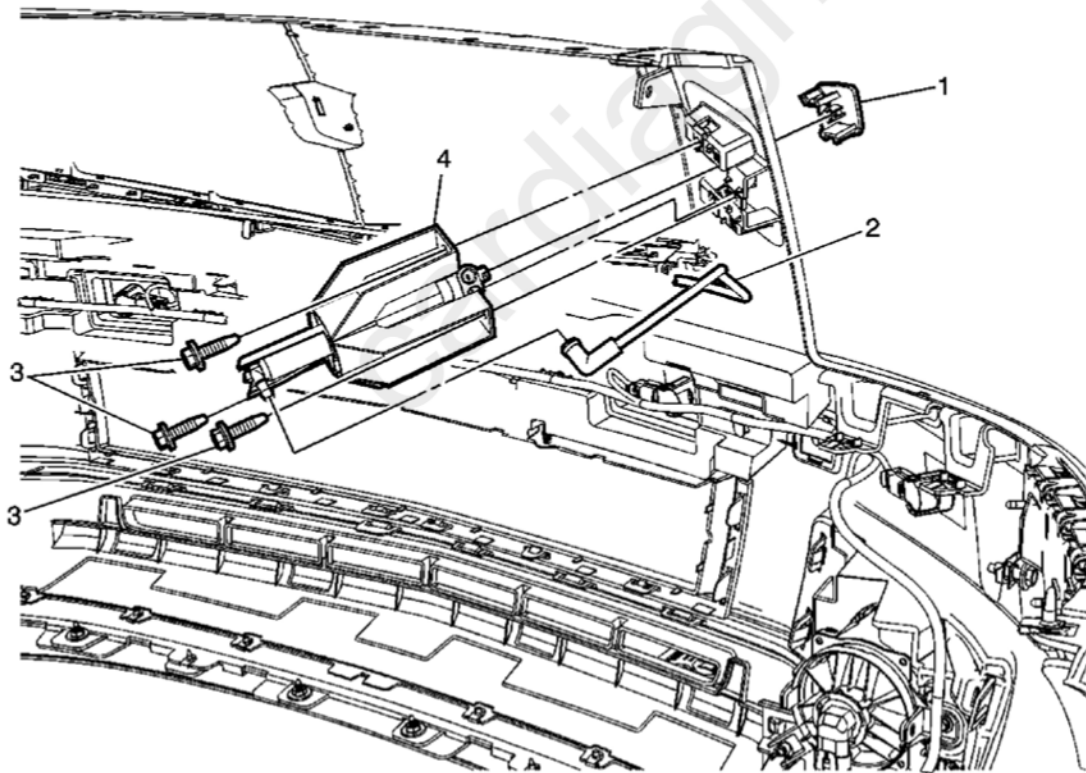


Fig. : Identifying Headlamp Washer Nozzle
Courtesy of GENERAL MOTORS CORP.

Callout	Component Name

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

1	Headlamp Washer Nozzle Hole Cover Procedure 1. Pull and hold the nozzle shaft in the outward position. 2. Use a suitable small flat-bladed tool to release the nozzle hole cover from the nozzle shaft.
2	Headlamp Washer Hose Assembly
3	Headlamp Washer Nozzle Screw (Qty: 3) CAUTION R a Ca i Tighten: 2.5 N.m (22 lb in)
4	Headlamp Washer Nozzle Assembly Tip: Insure to prime the headlamp washer system after the installation of the new nozzle assembly.

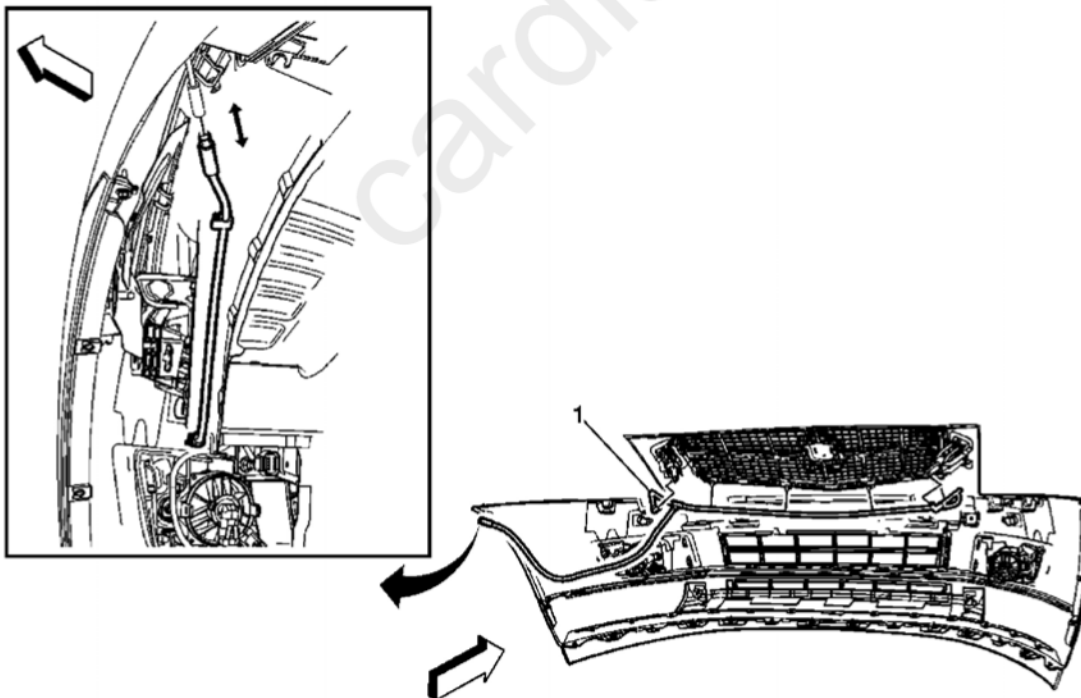
HEADLAMP WASHER HOSE REPLACEMENT

Fig. 1 : Identifying Headlamp Washer Hose
 Courtesy of GENERAL MOTORS CORP.

Preliminary Procedures

1. Remove the windshield washer solvent container. Refer to **Windshield Washer Solvent Container Replacement**.
2. Drain the windshield washer solvent into a clean suitable container.
3. Disconnect the headlamp washer pump hose from the headlamp washer hose.
4. Disengage the rear portion of the headlamp washer hose from the two clips securing the headlamp washer hose to the left inner wheelhouse panel.
5. Remove the front bumper upper fascia. Refer to **Front Bumper Upper Fascia Replacement**.

Headlamp Washer Hose**Procedure**

1

1. Disconnect the headlamp washer hose from both headlamp washer nozzles.
2. Disconnect the four retainer clips securing the headlamp washer hose across the front upper grille assembly tabs.
3. Remove the headlamp washer hose.
4. Ensure to prime the headlamp washer system after any connection is disassembled for service.

WINDSHIELD WASHER SOLVENT CONTAINER FILLER TUBE REPLACEMENT

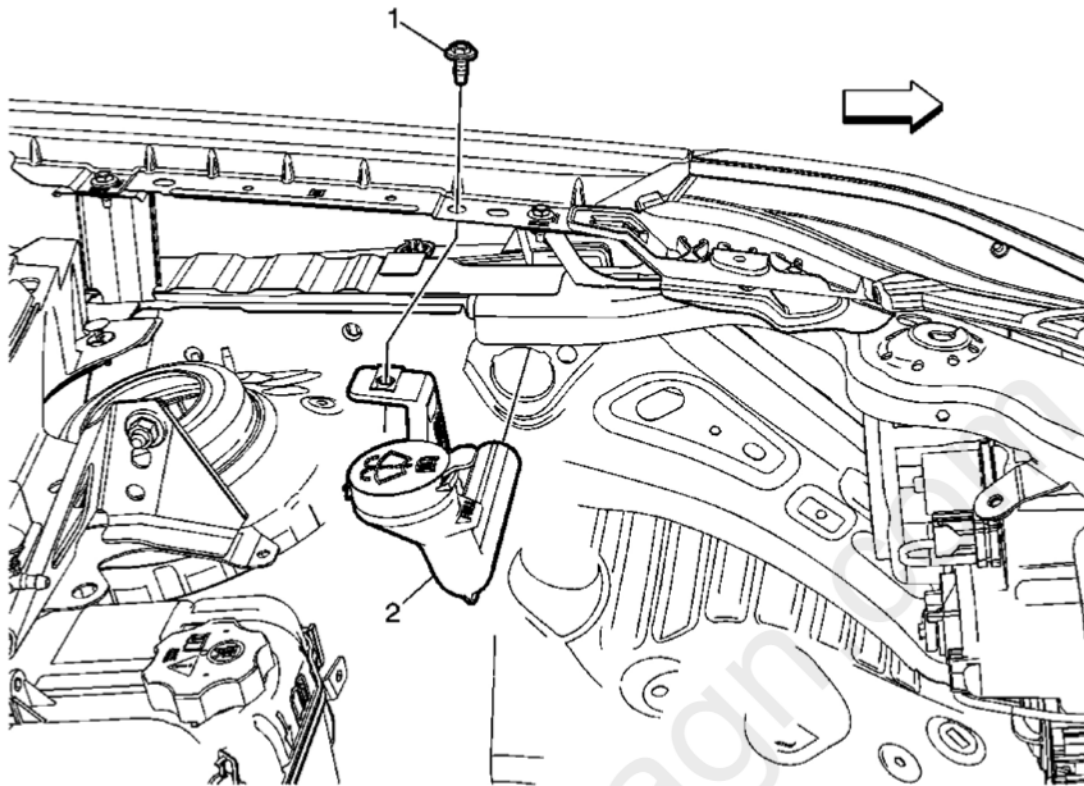


Fig. 11: Identifying Windshield Washer Solvent Container Filler Tube Retainer
 Courtesy of GENERAL MOTORS CORP.

Callout	Component Name
Preliminary Procedures 1. Remove the left front compartment side sight shield. Refer to <u>Front Compartment Side Sight Shield Replacement</u> 2. Drain the windshield washer solvent into a suitable clean container.	
1	Windshield Washer Solvent Container Filler Tube Assembly Bolt CAUTION Remove Carefully Tighten: 6 N.m (53 lb in)
	Windshield Washer Solvent Container Filler Tube Assembly Procedure 1. Reach into the driver side of the engine compartment at the position where the filler neck enters the windshield washer container. 2. Grasp the filler neck at the side of the front compartment underbody side rail

2

- extension where the filler tube enters the windshield washer solvent container.
3. Twist the fill tube slightly back and forth while pulling outward from the container.
 4. Remove the filler tube.
 5. Inspect and replace if the filler neck seal is damaged.
 6. Use full strength windshield washer fluid at the filler tube seal upon re-assembly of the filler neck to the windshield washer container.

WINDSHIELD WASHER SOLVENT CONTAINER REPLACEMENT

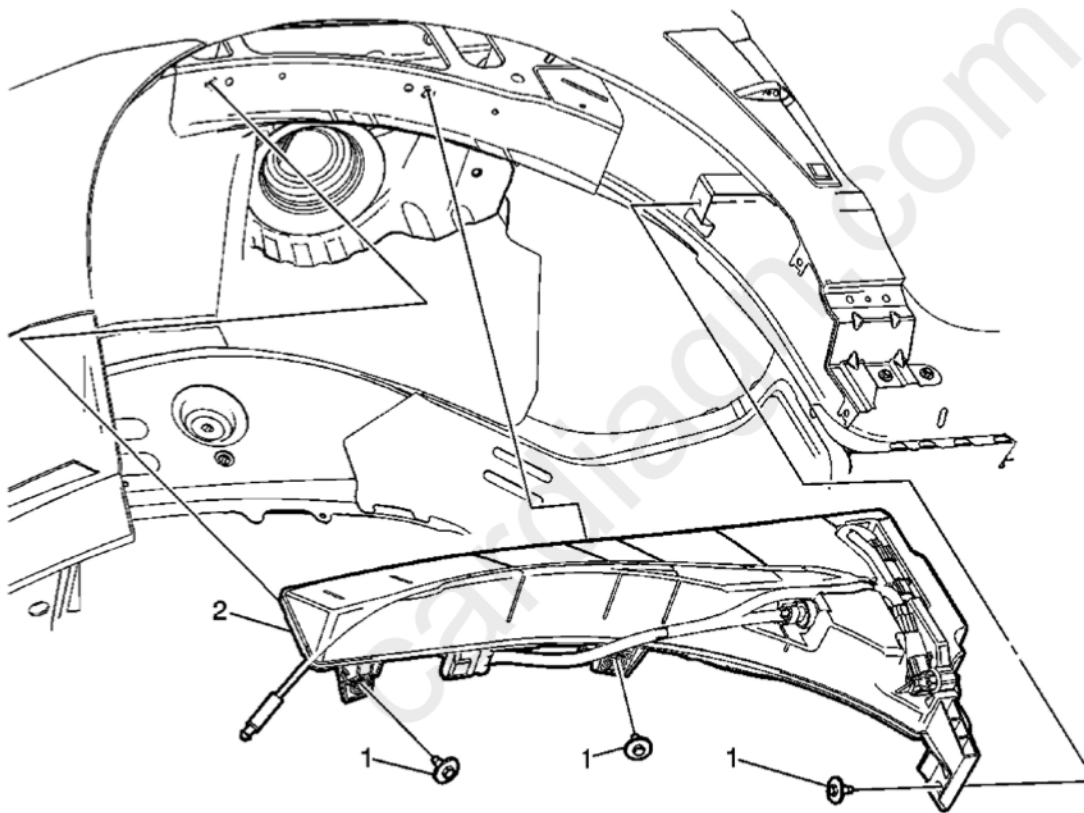


Fig. 1 : View Of Windshield Washer Solvent Container
 Courtesy of GENERAL MOTORS CORP.

Callout	Component Name
Preliminary Procedure	
1.	Remove the left front wheel house liner. Refer to <u>Front Wheelhouse Liner Replacement</u> .
2.	Remove the washer container filler tube. Refer to <u>Windshield Washer Solvent Container Filler Tube Replacement</u>
3.	Drain the windshield washer solvent into a suitable clean container.
4.	Disengage the headlamp washer nozzle hose from the headlamp washer pump hose at the front of

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the windshield washer solvent container.

5. Disconnect the main harness electrical connector at the front of the windshield washer solvent container.

1

Windshield Washer Solvent Container Bolt (Qty: 3)

CAUTION

R a **Ca i**

Tighten: 6 N.m (53 lb in)

2

Windshield Washer Solvent Container

Procedure

1. Carefully lower and remove the windshield washer solvent container from the left front inner wheelhouse panel.
2. Remove the washer pump hoses from both washer pumps.
3. Disconnect the level sensor electrical connector.
4. Disconnect both headlamp and windshield washer pump electrical connectors.
5. Remove and transfer the windshield washer solvent container level sensor. Refer to **Windshield Washer Solvent Level Switch Replacement**.
6. Remove the windshield washer pump. Refer to **Windshield Washer With Seal Pump Replacement**.
7. Remove the headlamp washer pump. Refer to **Headlamp Washer Pump Replacement**.
8. Transfer the headlamp washer pump hose.
9. Transfer the washer solvent container main harness.

HEADLAMP WASHER PUMP REPLACEMENT

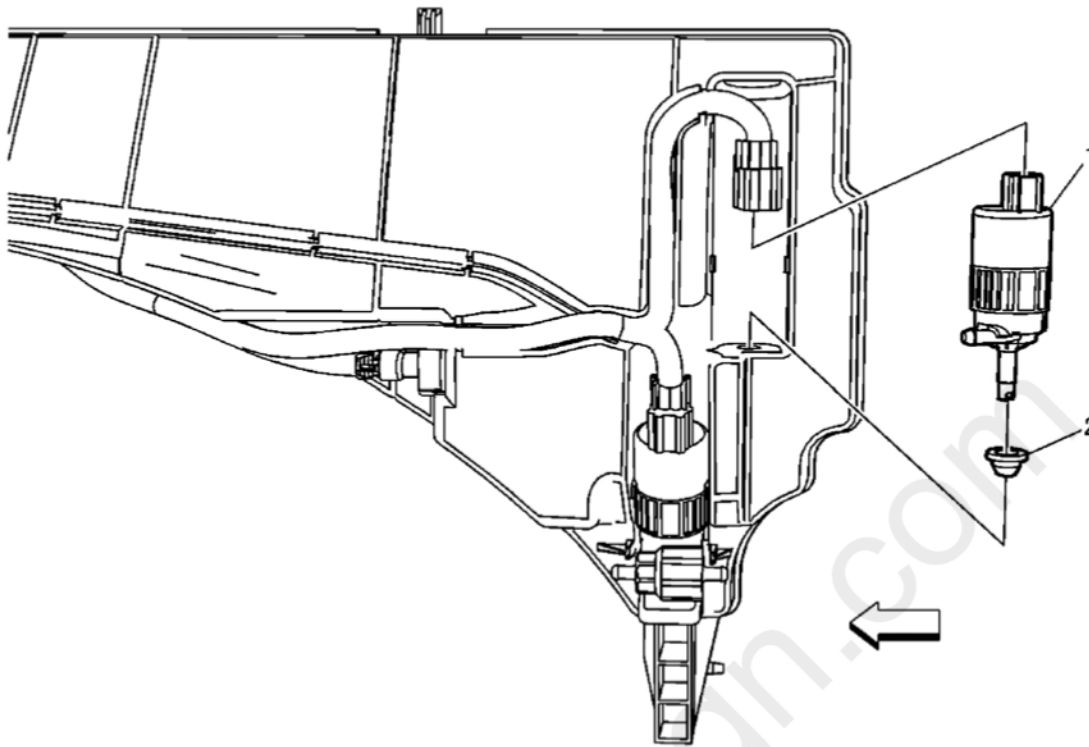
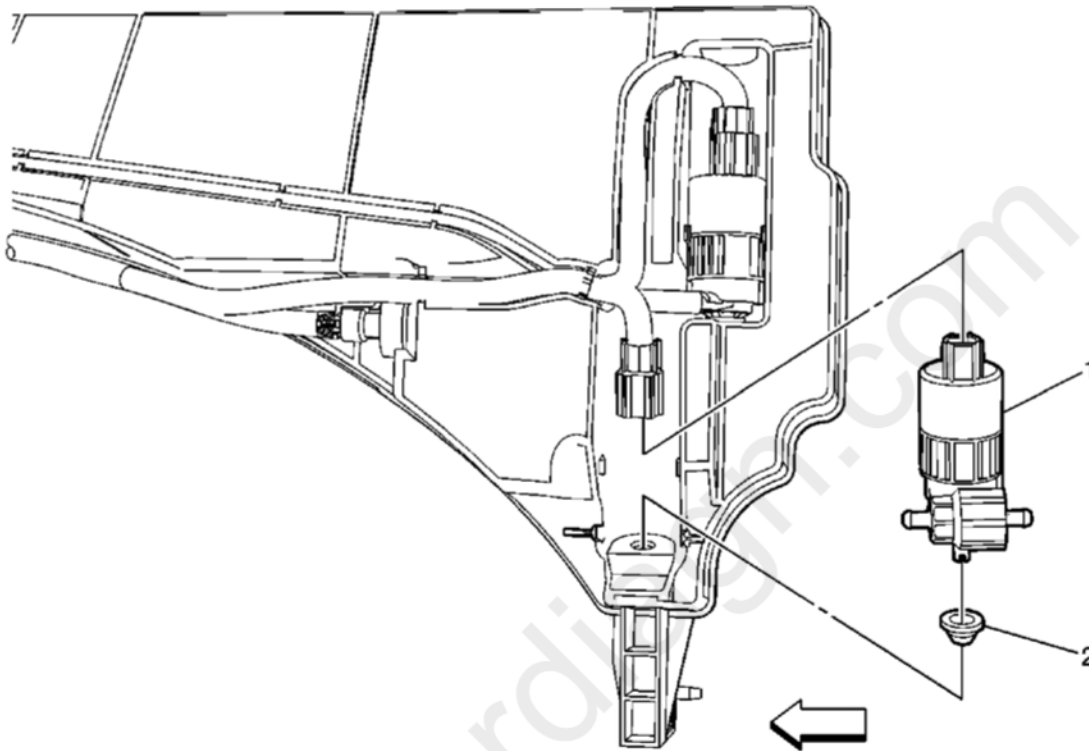


Fig. 13: Identifying Headlamp Washer Pump
Courtesy of GENERAL MOTORS CORP.

Callout	Component Name
Preliminary Procedure: Remove the windshield washer solvent container. Refer to <u>Windshield Washer Solvent Container Replacement</u> .	
1	Headlamp Washer Pump Procedure 1. Drain the windshield washer solvent into a suitable clean container. 2. Disconnect the electrical connector to the headlamp washer pump. 3. Disconnect the headlamp washer pump hose at the headlamp washer pump. 4. Using two suitable flat-bladed tools under the base of the headlamp washer pump, pry upward in order to release the headlamp washer pump from the headlamp washer pump grommet. Tip: Use full strength washer solvent on the new grommet in order to aid in the installation of the new headlamp washer pump.

2

Headlamp Washer Pump Grommet

Tip: Discard the headlamp washer pump grommet.**WINDSHIELD WASHER WITH SEAL PUMP REPLACEMENT****Fig. 14: Identifying Windshield Washer With Seal Pump**

Courtesy of GENERAL MOTORS CORP.

Callout	Component Name
Preliminary Procedures	
1. Remove the windshield washer solvent container. Refer to <u>Windshield Washer Solvent Container Replacement</u> .	
2. Disconnect the windshield washer pump electrical connector.	
3. Using 2 suitable flat-bladed tools, gently pry the windshield washer solvent pump from the front side of the washer container.	
4. Discard the old windshield washer solvent pump grommet.	
1	Windshield Washer Solvent Pump
2	Windshield Washer Solvent Pump Grommet
Tip: Discard the old grommet and use the new grommet in the kit.	

WINDSHIELD WASHER SOLVENT LEVEL SWITCH REPLACEMENT

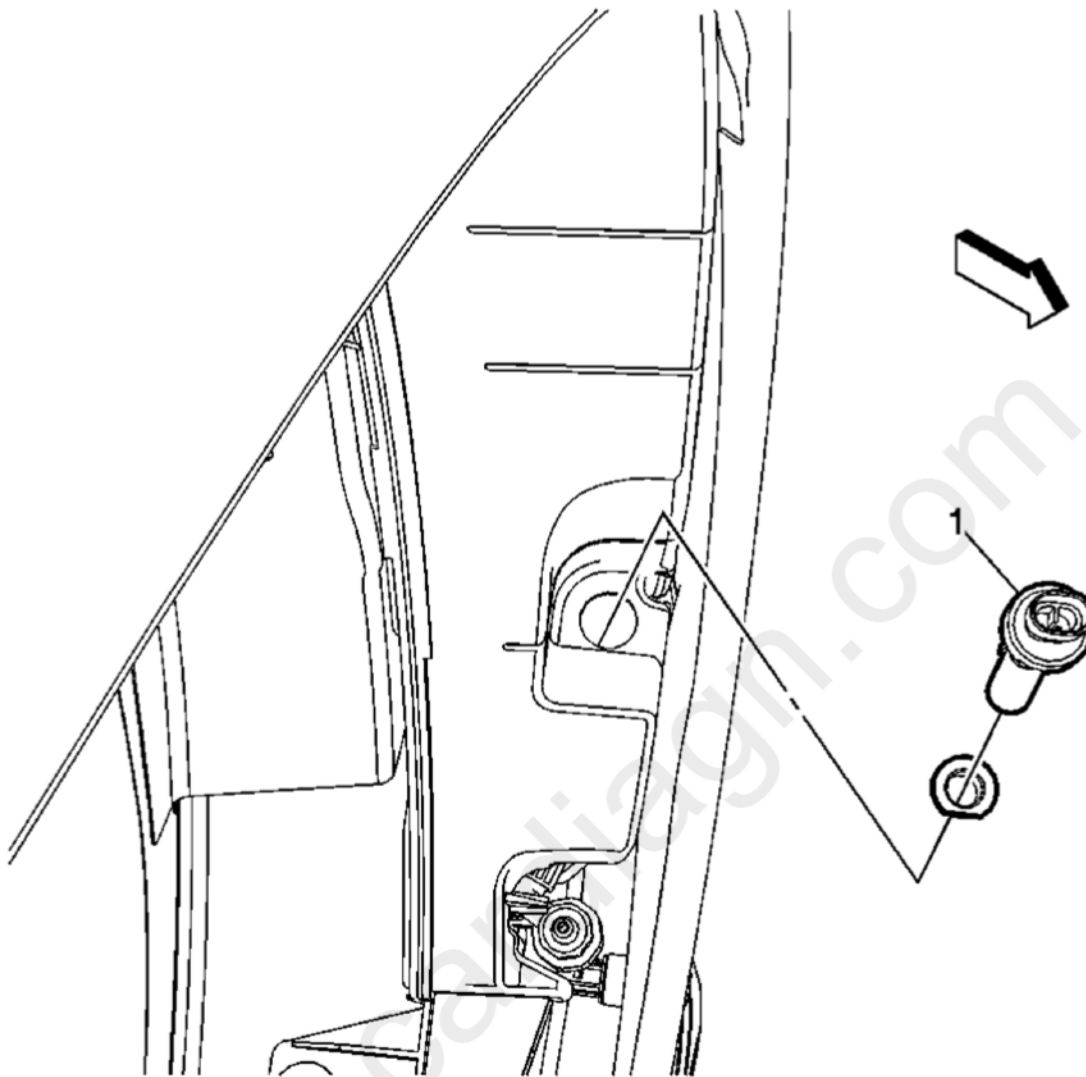


Fig. 15: Identifying Windshield Washer Solvent Level Switch
Courtesy of GENERAL MOTORS CORP.

Callout	Component Name
Preliminary Procedure: Remove the left front wheelhouse liner. Refer to <u>Front Wheelhouse Liner Replacement</u> .	
1	Windshield Washer Level Sensor Switch Procedure 1. Drain the windshield washer solvent into a suitable clean container. 2. Disconnect the electrical connector to the level sensor switch. 3. Using 2 suitable flat-bladed tools, remove the level sensor switch from the windshield washer container.

4. Discard the level sensor grommet.

AIR INLET GRILLE PANEL REPLACEMENT

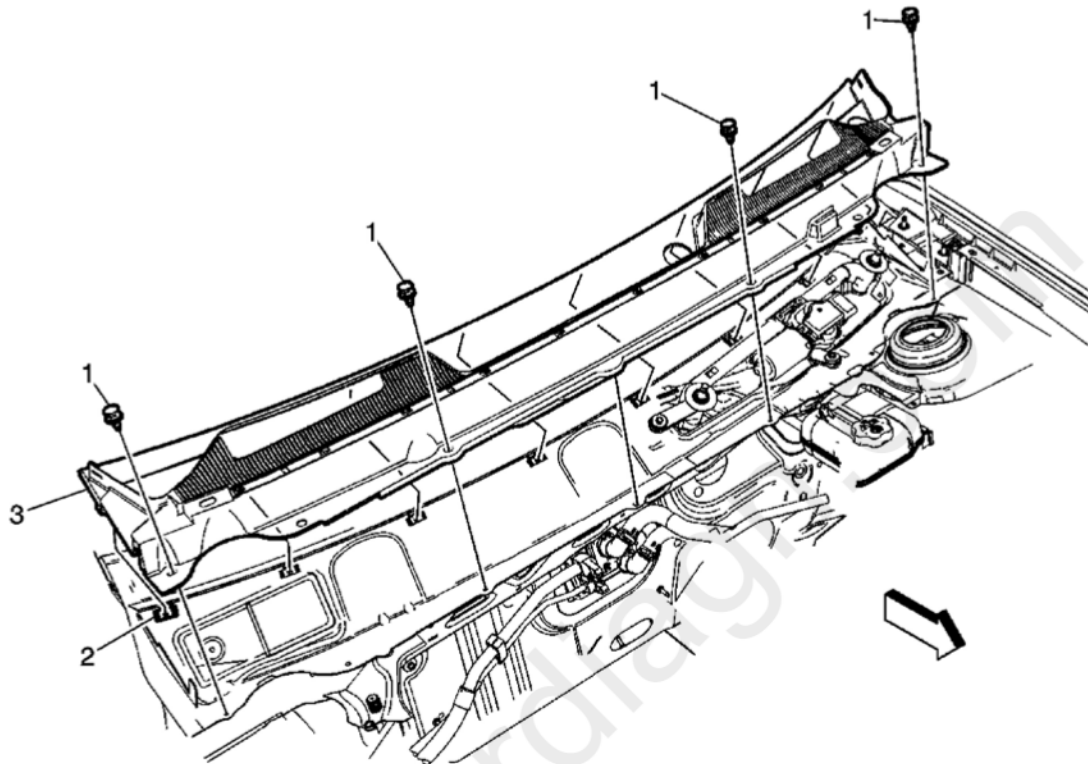


Fig. 16: View Of Air Inlet Grille Panel
Courtesy of GENERAL MOTORS CORP.

Callout	Component Name
Preliminary Procedure	
1.	Remove the front compartment side sight shields. Refer to <u>Front Compartment Side Sight Shield Replacement</u> .
2.	Remove the air inlet grille panel extension. Refer to <u>Air Inlet Grille Panel Extension Replacement</u> .
3.	Remove the windshield wiper arms. Refer to <u>Windshield Wiper Arm Replacement</u> .
4.	Remove the rear hood weather-strip. Refer to <u>Hood Rear Weatherstrip Replacement</u> .
1	Air Inlet Grille Panel Retainer (Qty: 4)
2	Air Inlet Grille Panel Clip (Qty: 8)
3	Air Inlet Grille Panel

AIR INLET GRILLE PANEL EXTENSION REPLACEMENT

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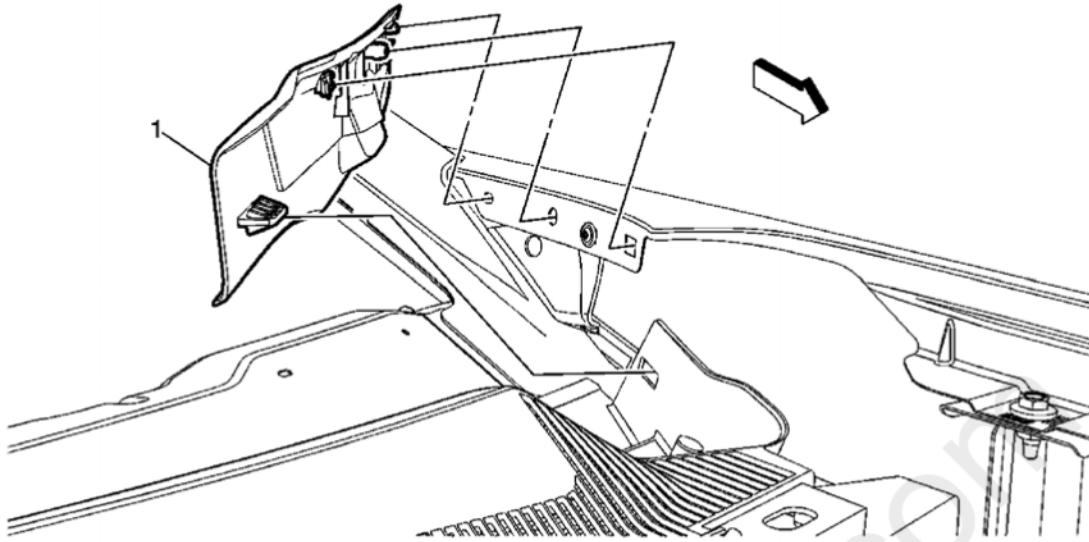


Fig. 1 : View Of Air Inlet Grille Panel Extension
Courtesy of GENERAL MOTORS CORP.

Callout	Component Name
Preliminary Procedure: Open the hood in order to access the air inlet grille panel extension.	
1	Air Inlet Grille Panel Extension Procedure: Release the tabs securing the air inlet grille panel extension to the air inlet grille panel assembly and fender.

WINDSHIELD WIPER ARM REPLACEMENT

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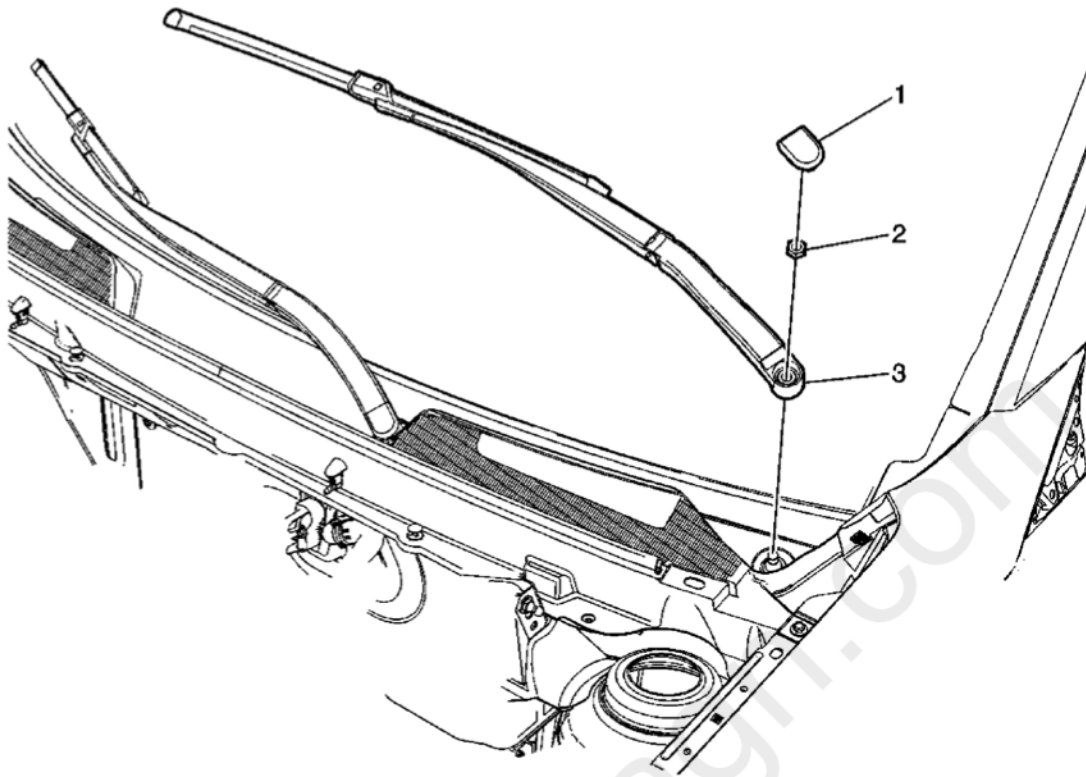


Fig. 1 : View Of Windshield Wiper Arm
Courtesy of GENERAL MOTORS CORP.

Callout	Component Name
Preliminary Procedure: Open and support the hood in order to access and remove the wiper blade assembly.	
1	Windshield Wiper Arm Nut Cover Tip: Gently pry the cap from the wiper arm nut.
2	Windshield Wiper Arm Nut CAUTION R <u> a </u> Ca i Tighten: 27 N.m (20 lb ft)
3	Windshield Wiper Arm Procedure 1. Gently rock the wiper arm side to side and remove. 2. Clean the transmission pivot shaft with a soft wire brush prior to installing the wiper arm back onto the pivot shaft. 3. Remove the wiper blade assembly from the wiper arm. Refer to Windshield Wiper

Blade Replacement.

4. Hold the driver side wiper arm blade tip to the center dot located in the windshield blackout below the dot matrix while securing the nut.
5. Hold the passenger side wiper arm blade tip to the passenger side outer dot located in the windshield blackout below the dot matrix while securing the nut.

REAR WINDOW WIPER ARM REPLACEMENT

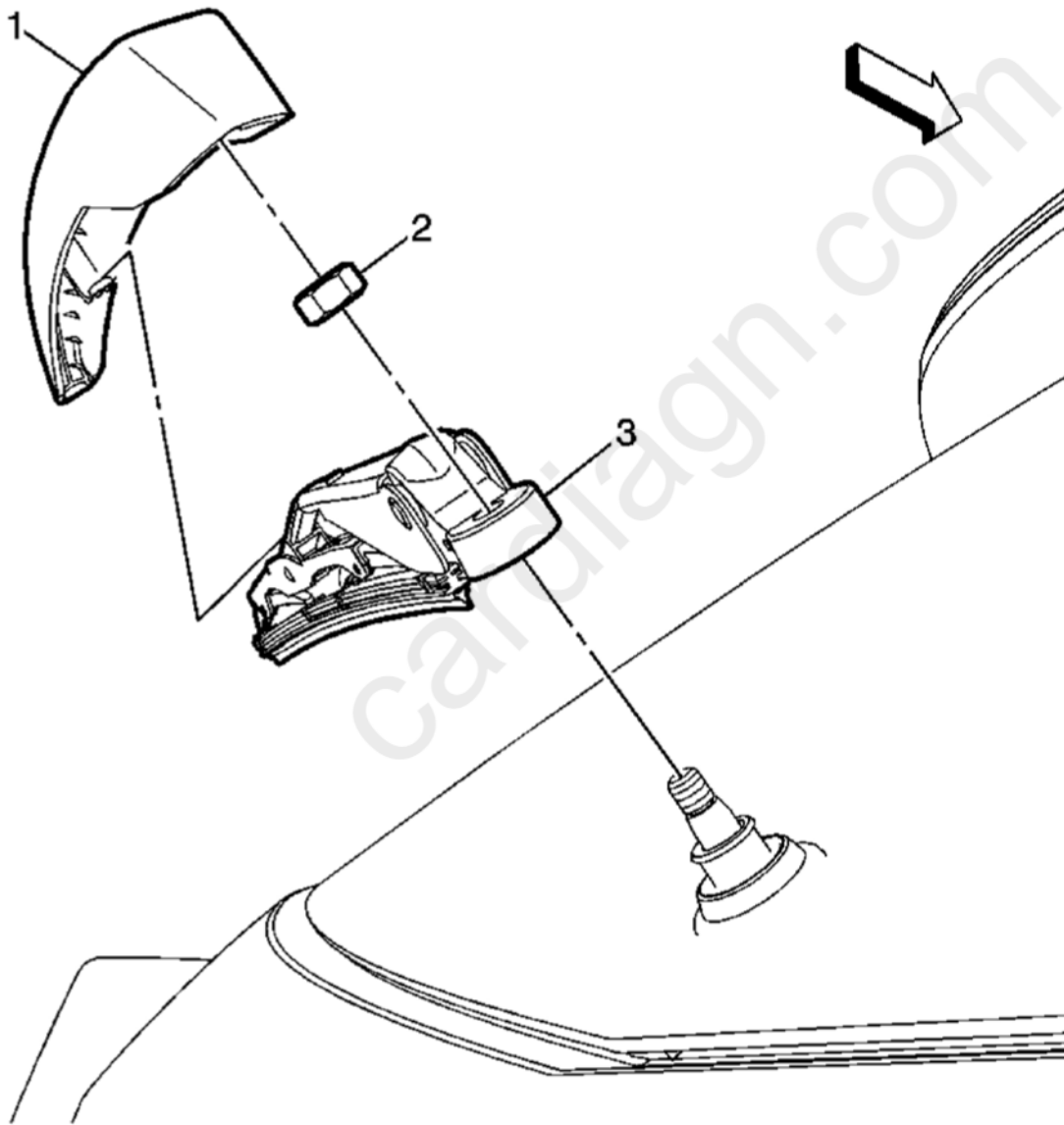


Fig. 19: View Of Rear Window Wiper Arm
 Courtesy of GENERAL MOTORS CORP.

Callout	Component Name

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1	Rear Window Wiper Arm Finish Cover Tip: Carefully release the finish cover locking tabs securing the cover to the wiper arm.
2	Rear Wiper Arm Pivot Shaft Nut CAUTION R <u> a </u> Ca i Tighten: 10 N.m (89 lb in)
3	Rear Window Wiper Arm Assembly Procedure 1. Gently rock the wiper arm in order to remove the wiper arm from the wiper motor pivot shaft. 2. Remove the rear window wiper blade assembly from the rear wiper arm. Refer to <u>Rear Window Wiper Blade Replacement</u>. 3. Cycle the rear wiper motor completely back to the park position prior to installing the rear wiper arm. 4. Align the rear wiper arm blade tip to the 2 mm black dot in the lower passenger side of the rear window. 5. Wet cycle the rear wiper arm and re-check the blade tip alignment to the 2 mm black dot. If above or below the dot, repeat above steps.

WINDSHIELD WIPER BLADE REPLACEMENT

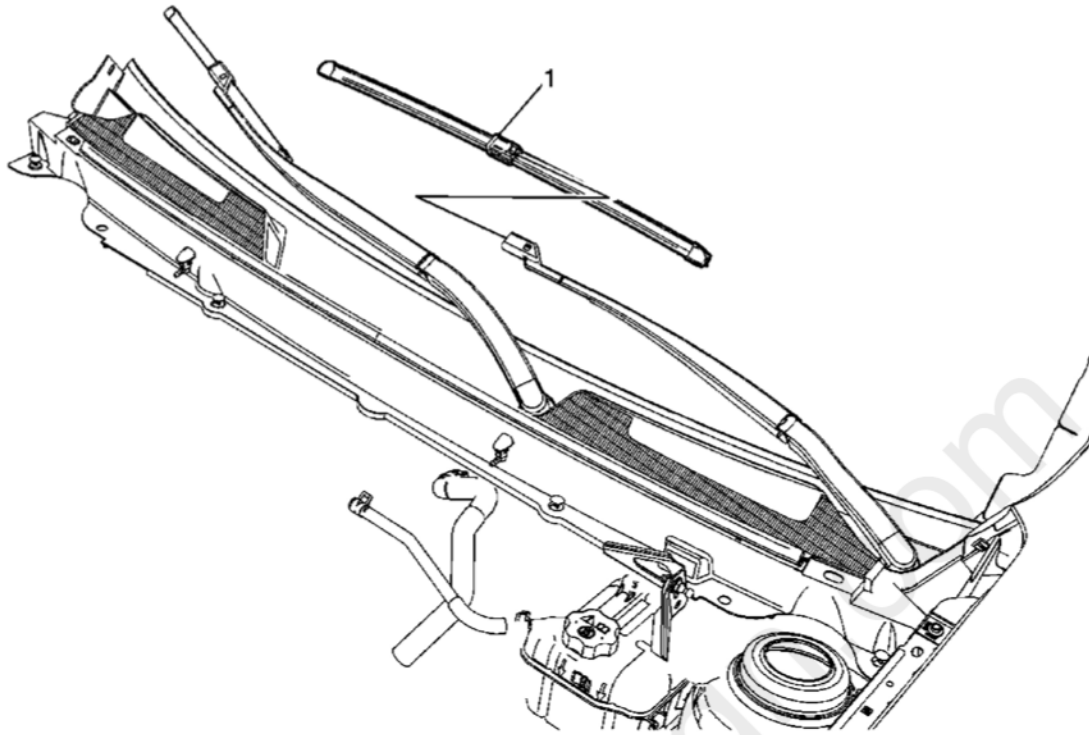


Fig. 2 : Identifying Windshield Wiper Blade
Courtesy of GENERAL MOTORS CORP.

Callout	Component Name
1	Windshield Wiper Blade Assembly Procedure 1. Lift the wiper arm from the windshield. 2. Release the retention tab securing the blade to the arm assembly. 3. Pull the blade assembly from the wiper arm. 4. Remove the wiper blade assembly.

REAR WINDOW WIPER BLADE REPLACEMENT

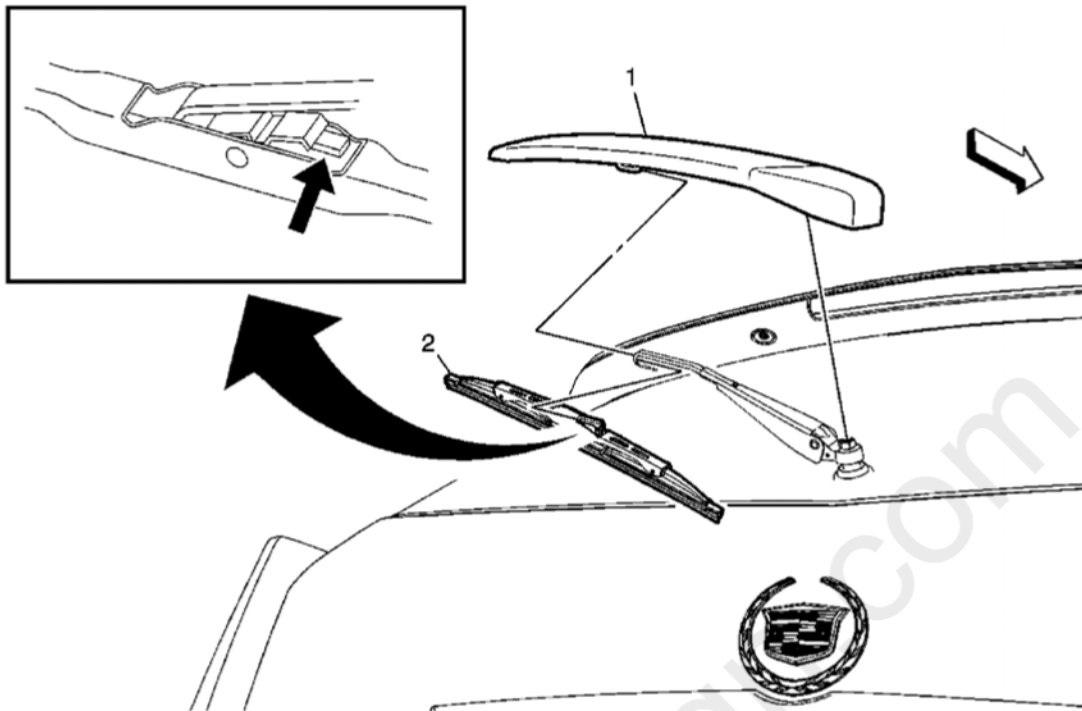


Fig. 21: View Of Rear Window Wiper Blade
Courtesy of GENERAL MOTORS CORP.

Callout	Component Name
1	Rear Window Wiper Arm Finish Cover. Tip: Carefully release the finish cover locking tabs securing the finish cover to the rear wiper arm.
2	Rear Window Wiper Arm Blade Assembly Procedure 1. Lift the wiper arm away from the rear liftgate window. 2. Rotate slightly the bottom edge of the blade away from the underside of the arm. 3. Push in the bottom of the wiper blade clip and remove the wiper blade from the inside radius of the wiper arm.

WINDSHIELD WIPER MOTOR REPLACEMENT

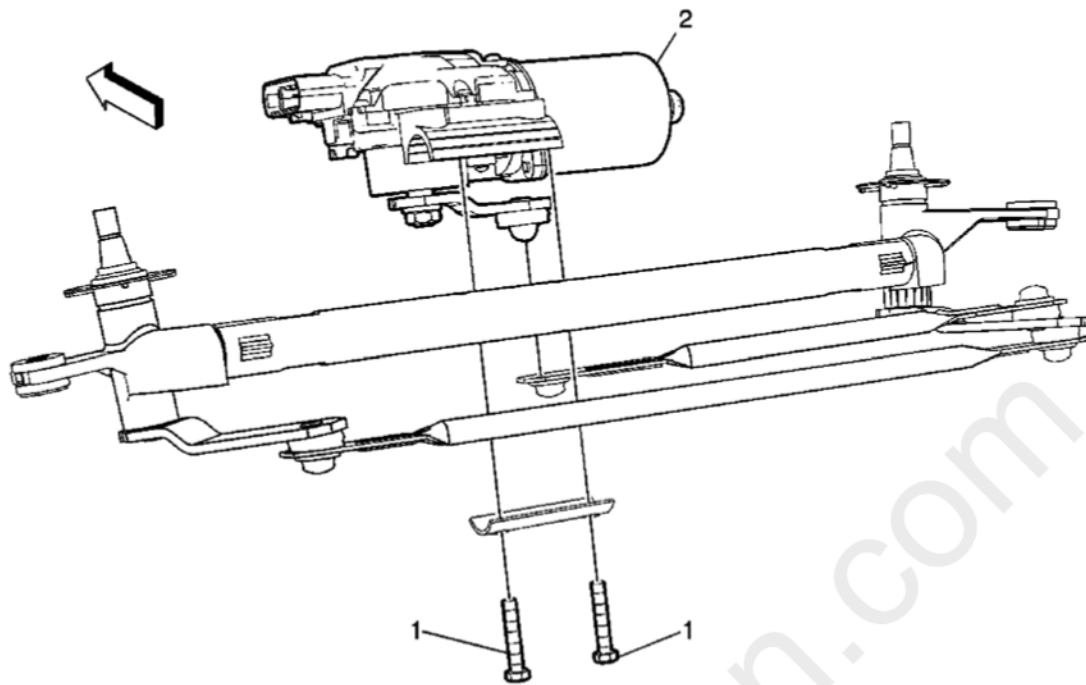


Fig. 22: View Of Windshield Wiper Motor
 Courtesy of GENERAL MOTORS CORP.

Callout	Component Name
Preliminary Procedure: Remove the windshield wiper transmission frame assembly. Refer to Windshield Wiper Transmission Replacement .	
1	Windshield Wiper Motor Bolt (Qty: 2) CAUTION R <u> a </u> Ca i Tighten: 8 N.m (1 lb in)
2	Windshield Wiper Motor Procedure - Using the J-39232: separator or similar tool, remove the transmission drive links from the wiper motor crank arm ball stud. - Using the J-39529: installer or similar tool, install the wiper transmission drive links onto the wiper motor crank arm ball stud. Tip: Apply a small amount of grease to the inner cup on the transmission links to aid in installation.

Special Tools

- **J-39232:** Wiper Linkage Separator
- **J-39529:** Wiper Linkage Installer

For equivalent regional tools, refer to **Special Tools**.

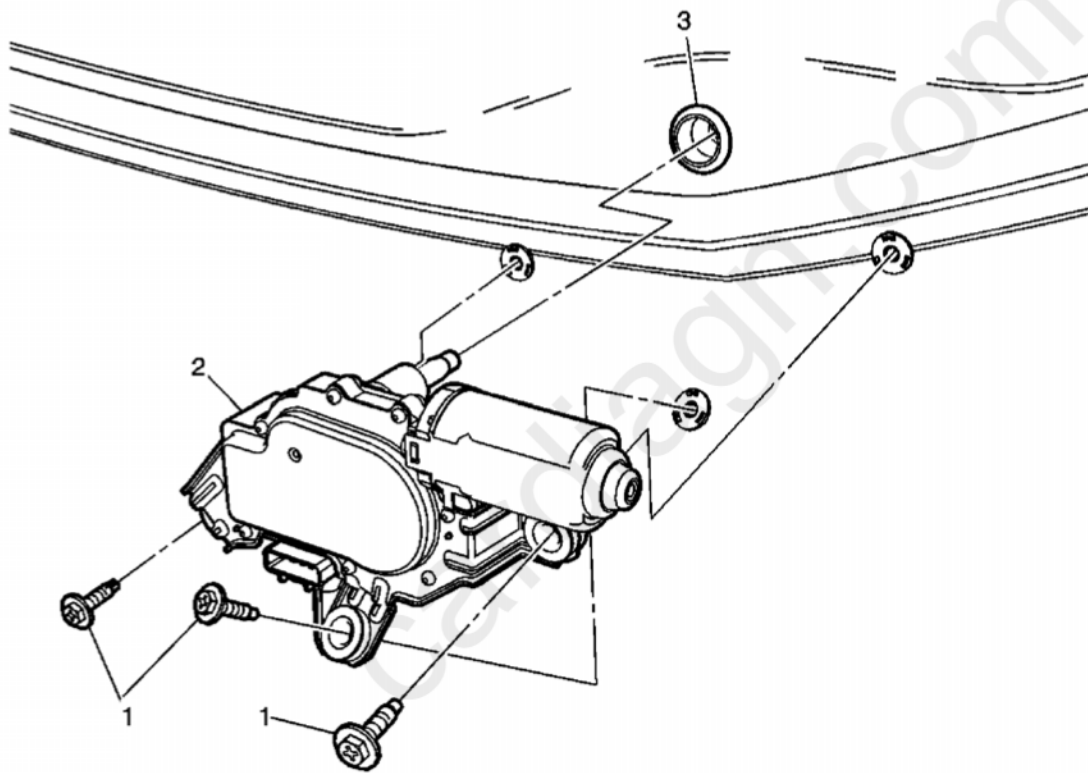
REAR WINDOW WIPER MOTOR REPLACEMENT

Fig. 23: View Of Rear Window Wiper Motor
Courtesy of GENERAL MOTORS CORP.

Callout	Component Name
Preliminary Procedure	
1. Remove the rear liftgate wiper arm assembly. Refer to Rear Window Wiper Arm Replacement .	
2. Remove the liftgate interior trim panels. Refer to Liftgate Upper Trim Finish Panel Replacement and Liftgate Lower Trim Finish Panel Replacement .	
1	Rear Window Wiper Motor Bolts (ty: 3) Tighten: 9 N.m (80 lb in)

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2	Rear Window Wiper Motor Tip: Disconnect the wiper motor electrical connectors. Tip: Lubricate the wiper motor shaft with windshield washer solvent.
3	Rear Window Wiper Motor Pivot Shaft Seal Tip: Ensure the gasket is indexed properly to the rear liftgate window.

WINDSHIELD WIPER TRANSMISSION REPLACEMENT

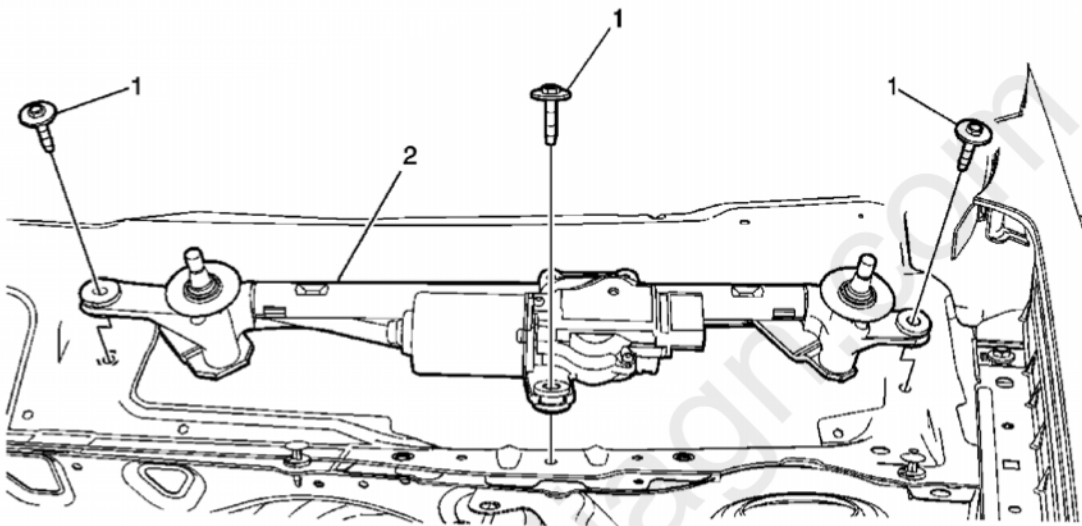


Fig. 24: Identifying Windshield Wiper Transmission & Bolts
Courtesy of GENERAL MOTORS CORP.

Callout	Component Name
Preliminary Procedure: Remove the air inlet grille panel. Refer to Air Inlet Grille Panel Replacement	
1	Windshield Wiper Transmission Frame Bolt (Qty: 3) CAUTION R <u> a </u> Ca i Tighten: 9 N.m (80 lb in)
2	Windshield Wiper Transmission Frame Assembly Procedure 1. Disconnect the windshield wiper motor electrical connector. 2. Roll the frame assembly forward in order to release the transmission frame assembly from the upper plenum supports. 3. Remove the windshield wiper motor from the wiper transmission frame assembly.

Refer to Windshield Wiper Motor Replacement.

WINDSHIELD OUTSIDE MOISTURE SENSOR REPLACEMENT

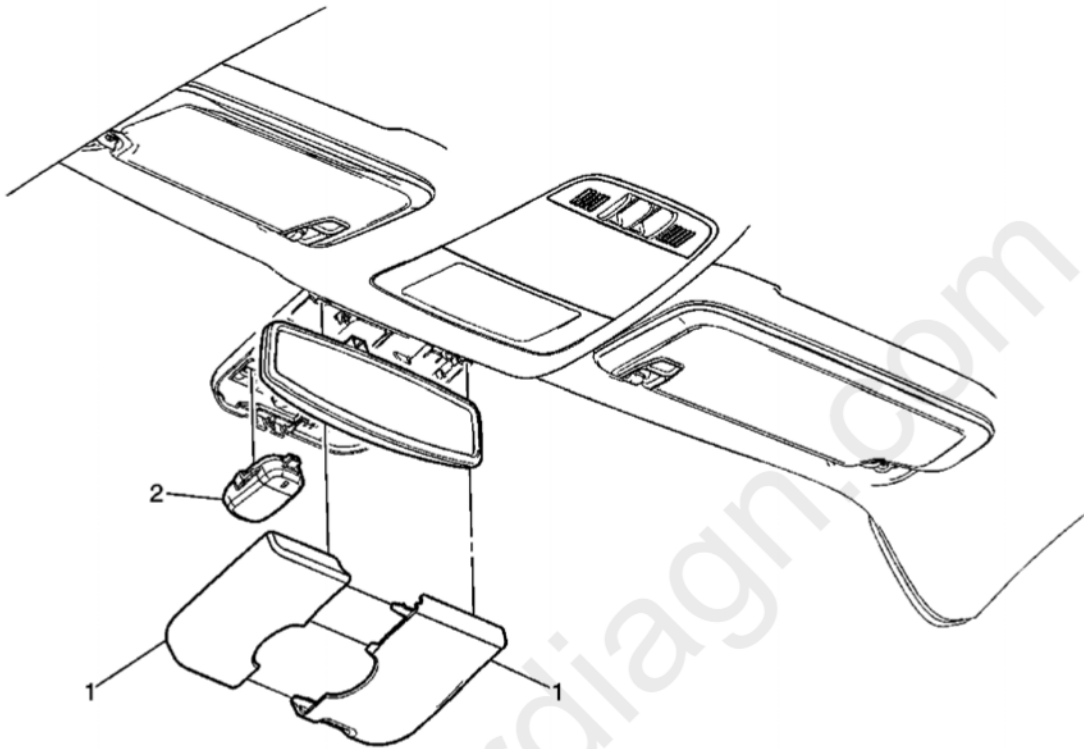


Fig. 25: Identifying Windshield Outside Moisture Sensor
Courtesy of GENERAL MOTORS CORP.

Callout	Component Name
1	Inside Rear View Mirror Mounting Plate Cover Procedure 1. Unsnap the mounting plate cover from the windshield outside moisture sensor bracket. 2. Remove the right side from the left side in order to clear the inside rear view mirror.
2	Windshield Outside Moisture Sensor Assembly Procedure 1. Squeeze the outside moisture sensor tabs in order to disengage the windshield outside moisture sensor from the outside moisture sensor bracket tabs. 2. Disengage the electrical connector from the moisture sensor. 3. Remove the windshield outside moisture sensor from the outside moisture sensor

| bracket.

DESCRIPTION AND OPERATION

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
- Windshield Outside Moisture Sensor
- Windshield Washer Fluid Pump
- Windshield Wiper Motor
- Window Wiper/Washer Switch
- Windshield Wiper Motor Fuse
- Windshield Washer Fluid Pump Fuse
- Body Control Module (BCM)
- Rear Window Wiper Motor
- Rear Window Wiper Motor Fuse
- Rear Window Wiper Relay
- Rear Window Washer Pump Relay
- Headlamp Washer Fluid Pump Relay
- Headlamp Washer Fluid Pump Fuse
- Windshield Washer Fluid Level Switch

Windshield Wiper System

The body control module (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 thru 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

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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 motor's 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.

Redundant high speed switch pass through. 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.

Parking the 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 thru 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

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 seconds.

On vehicles with the Rear Wash feature a single reversing wash motor may be utilized for both the front and rear wash operation. In this system the wash motor is operated in one direction to spray fluid on the front windshield and then operated in the reverse direction to spray fluid on the rear window. The BCM Controls the reversing wash motor through two High Side Drive outputs. One controls the Front Wiper Motor Relay and one controls the Rear Wiper Relay.

Headlamp Washer System

When Headlamp Wash Equipped, the headlamps shall be sprayed with wash fluid as a result of an extended Windshield Wash Switch Activation. In order to preserve wash fluid, the feature shall only be allowed to

activate if the Low or High Beam Headlamps are active. In addition, after the initial Headlamp Wash operation has been performed, additional headlamp washes shall not be performed for the next 4 Windshield Wash activations or for 48 hours whichever comes first. In the event that the system has detected a Stuck Front Wash Switch condition, the Headlamp Wash Feature shall be disabled.

Rain Sense Mode and Rain Sense Indicator

When this feature is activated on rain sense equipped vehicles, the wiper subsystem performs front windshield wiper according to the amount of moisture detected on the windshield. The BCM will control the wiper motor speed, as indicated above, based on wiper 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 (if calibrated) 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.

Rear Wiper System

On vehicles equipped with a Rear Wiper, the BCM determines of the Rear Wipe/Wash System Mode of Operation by monitoring the multiplexed output of the Rear Wipe/Wash Switch. The Rear Wipe Wash Switch uses a reference ground signal from the BCM. The BCM provides a switched Battery pull-up for the Rear Wiper/Washer Switch output signal it receives. All the BCM inputs are recognized as active when the Rear Wiper Switch provides a path to the referenced ground signal. The Rear Wiper/Washer signal received by the BCM is the result of 3 resistors in the Rear Wiper Switch configured as a resistor ladder network. This signal is connected to a BCM Analog to Digital Input which also provides a switched Battery pull-up for the circuit.

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Depending on the function selected (Low, Intermittent, Off, Wash), the Rear 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 Rear Wiper Motor Relay and the Rear Washer Relay.

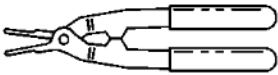
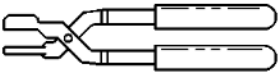
The BCM Controls the single speed Rear Wiper Motor by its Active High output to the external Rear Wiper Motor Relay. When the BCM activates its output and applies Battery to the coil of the relay, the relay energizes, allowing Battery voltage from the fuse to be applied through the switched contacts of the Rear Wiper Motor Relay to the Rear Wiper Motor's control input. The motor then operates continuously at low speed. The BCM does not control the parking of the Rear Wiper Motor, it is self parking. When the BCM deactivates its output, the contacts of the Rear Wiper Motor Relay switch back to ground which will be used by the wiper for Dynamic Braking. The Rear Wiper's internal park switch and circuitry will sustain motor operation until the wiper arm has returned to its Park position.

Rear Wash

When the Body Control Module detects that the Rear wiper/wash switch has activated the momentary Wash switch, it activates a High Side Drive output which supplies Battery to the coil of the Rear Washer Pump Relay. This energizes the Relay, which switches Battery Power to the Washer Pump Motor. The BCM will also activate continuous Low Speed Windshield Wipers as described above. The BCM software will attempt to detect a stuck Rear Wash Switch. A stuck Rear Wash Switch condition is detected if the Rear Wash Motor Relay Output has been continuously active for 10 seconds or more. Upon detecting this the BCM will fail soft the state of the Rear Wash Control to Inactive. This shall cause the System to perform as if the momentary Wash control had been released.

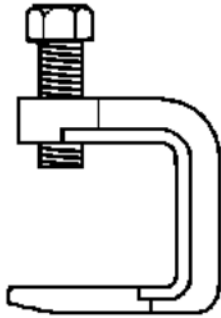
SPECIAL TOOLS AND EQUIPMENT

SPECIAL TOOLS

Illustration	Tool Number/Description
	J 39232 Wiper Linkage Separator
	J 39529 Wiper Linkage Installer

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J 39637
Wiper Arm Puller

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