

2017 ACCESSORIES & EQUIPMENT

Wipers and Washers - Bolt EV

SPECIFICATIONS

FASTENER SPECIFICATIONS

Reusable Threaded Fastener Tightening Specifications

Application	Specification
	Metric (English)
NOTE: <i>All fasteners listed in this table can be reused after removal.</i>	
Air Inlet Grille Panel Bolt	4.5 N.m (40 lb in)
Rear Window Wiper Arm Nut	10 N.m (89 lb in)
Rear Window Wiper Motor Bolt	9 N.m (80 lb in)
Windshield Washer Solvent Container Nut	5 N.m (44 lb in)
Windshield Wiper Arm Nut	30 N.m (22 lb ft)
Windshield Wiper System Module Bolt	9 N.m (80 lb in)

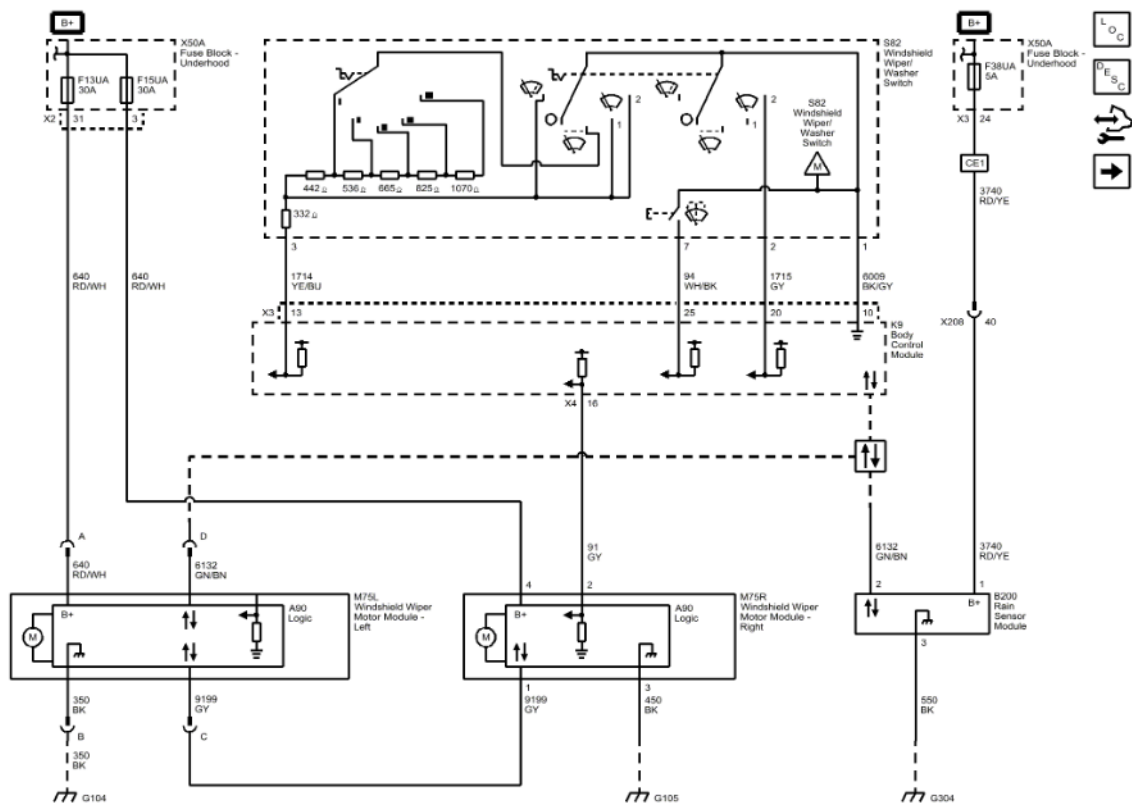
APPROXIMATE FLUID CAPACITIES

Application	Specification	
	Metric	US English
Washer Solvent Container	3.8 liter	1.0 gallon

SCHEMATIC WIRING DIAGRAMS

WIPER/WASHER WIRING SCHEMATICS

Front Wiper/Washer Control



Rear Wiper/Washer Control

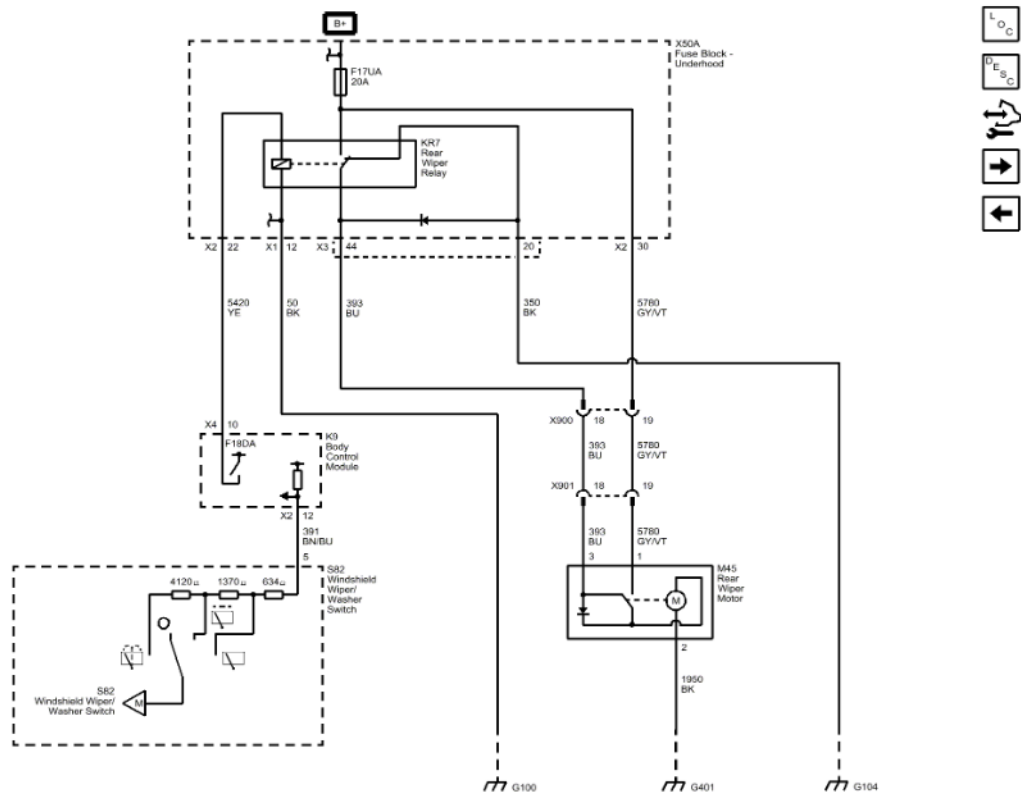


Fig. 2: Rear Wiper/Washer Control
 Courtesy of GENERAL MOTORS COMPANY

Front and Rear Washers

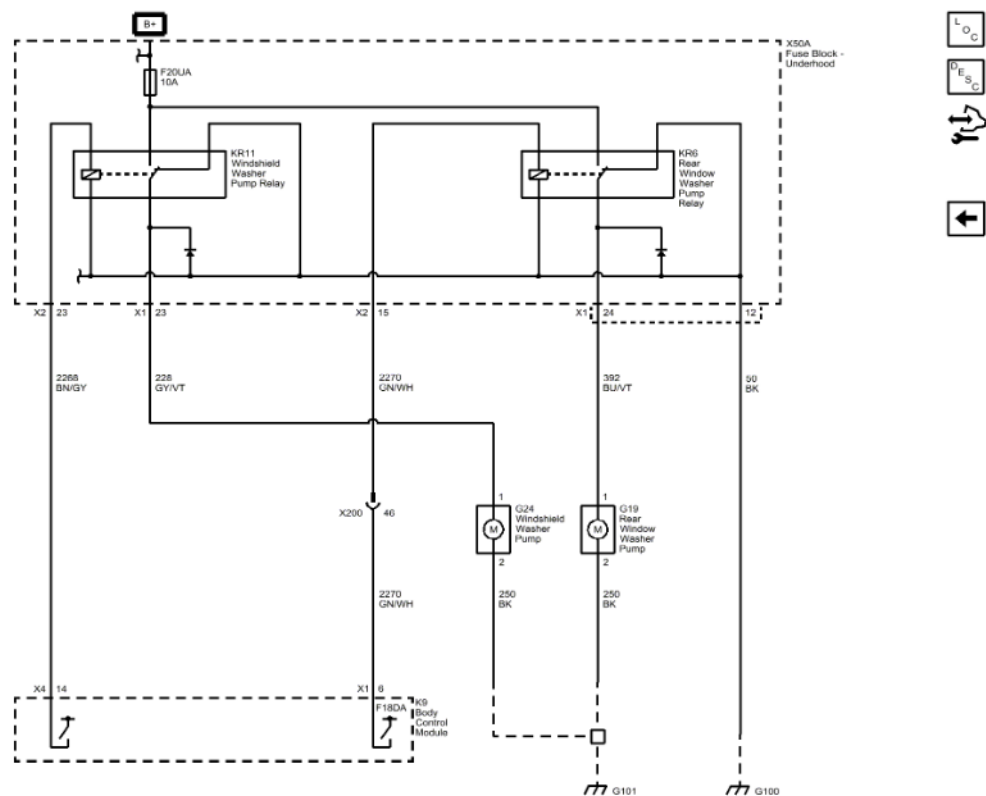


Fig. 3: Front and Rear Washers
 Courtesy of GENERAL MOTORS COMPANY

DIAGNOSTIC INFORMATION AND PROCEDURES

DTC B370A: RAIN SENSOR

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 B370A

Rain Sensor

For symptom byte information, refer to [Symptom Byte List](#).

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
B+	U151A	U151A	-	-
Serial Data	U151A	U151A	U151A	-
Ground	-	U151A	-	-

Circuit/System Description

B+ and ground is supplied at all times to the rain sensor. The rain sensor communicates with the body control module (BCM) via serial data. When the ignition is in the ON or ACCESSORY position and the windshield wiper/washer switch is in the intermittent delay position, the BCM monitors the rain sensor data to determine the rain build up on the windshield. As rain builds up on the windshield, the BCM will command the wipers to activate. The sensitivity of the wiper frequency is controlled by the intermittent delay of the windshield wiper/washer switch. As the sensitivity is increased, the BCM will command more frequent wiper activation based on rain build up on the windshield.

Conditions for Running the DTC

- Vehicle ON or in Service Mode
- The system voltage is between 9 - 16 V.

Conditions for Setting the DTC

Communication between the BCM and the rain sensor is interrupted.

Action Taken When the DTC Sets

- If the BCM loses communication with the rain sensor while operating under manual 1X control, the windshield wiper operation will default to intermittent operation with a fixed dwell time of 4 s.
- If the BCM loses communication with the rain sensor while operating at low speed, the windshield wiper operation will default to low speed.
- If the BCM loses communication with the rain sensor while operating at high speed, the windshield wiper operation will default to high speed.

Conditions for Clearing the DTC

The DTC will clear when communication is established between the BCM and rain sensor.

Reference Information

Schematic Reference

Wiper/Washer Schematics

Connector End View Reference

COMPONENT CONNECTOR END VIEWS -INDEX

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. Vehicle in Service Mode.
2. Verify DTC U151A is not set.
 - **If the DTC is set**

Please Refer to [DTC U1500-U15FF](#)
 - **If the DTC is not set**
3. Place the S82 Windshield Wiper/Washer Switch in the intermittent delay setting and spray the outside of the windshield in the area of the B177 Rain/Ambient Light Sensor Module with a water bottle. It may be necessary to increase the sensitivity of the intermittent delay to achieve windshield wiper operation.
4. Verify the windshield wipers operate at low speed.
 - **If the windshield wipers are not operating at low speed**

Refer to Circuit/System Testing.

- If the windshield wipers are operating at low speed

5. All OK.

Circuit/System Testing

1. Vehicle OFF and all vehicle systems OFF, disconnect the harness connector at the B117 Rain Sensor. It may take up to 2 min for all vehicle systems to power down.
2. Test for less than 10 Ω between the ground circuit terminal 3 and ground.
 - **If 10 Ω or greater**
 1. Vehicle OFF.
 2. Test for less than 2 Ω in the ground circuit end to end.
 - If 2 Ω or greater, repair the open/high resistance in the circuit.
 - If less than 2 Ω , repair the open/high resistance in the ground connection.
 - **If less than 10 Ω**
3. Vehicle in Service Mode.
4. Verify a test lamp illuminates between the B+ circuit terminal 1 and ground.
 - **If the test lamp does not illuminate and the circuit fuse is good**
 1. Vehicle OFF, remove the test lamp.
 2. Test for less than 2 Ω in the B+ circuit end to end.
 - If 2 Ω or greater, repair the open/high resistance in the circuit.
 - If less than 2 Ω , verify the fuse is not open and there is voltage at the fuse.
 - **If the test lamp does not illuminate and the circuit fuse is open**
 1. Vehicle OFF, remove the test lamp.
 2. Test for infinite resistance between the B+ circuit and ground.
 - If less than infinite resistance, repair the short to ground on the circuit.
 - If infinite resistance, replace the B117 Rain Sensor.
 - **If the test lamp illuminates**
5. Test for 5.0 - 10.0 V between the serial data circuit terminal 2 and ground.
 - **If less than 5.0 V**
 1. Vehicle OFF, disconnect the harness connector at the K9 Body Control Module and the harness connector at the M75L Windshield Wiper Motor Module-Left.
 2. Test for infinite resistance between the serial data circuit and ground.
 - If less than infinite resistance, repair the short to ground on the circuit.
 - If infinite resistance
 3. Test for less than 2 Ω in the serial data circuit end to end.
 - If 2 Ω or greater, repair the open/high resistance in the circuit.
 - If less than 2 Ω , replace the K9 Body Control Module.
 - **If greater than 10.0 V**
 1. Vehicle OFF, disconnect the harness connector at the K9 Body Control Module, Vehicle in Service Mode.
 2. Test for less than 1 V between the serial data circuit and ground.
 - If 1 V or greater, repair the short to voltage on the circuit.
 - If less than 1 V, replace the K9 Body Control Module.
 - **If between 5.0 - 10.0 V**
6. Test or replace the B117 Rain Sensor.

Repair Instructions

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

- [Inside Air Moisture and Windshield Temperature Sensor Replacement \(With Front View Camera\)](#)
- [Inside Air Moisture and Windshield Temperature Sensor Replacement \(Without Front View Camera\)](#)
- [Control Module References](#) for body control module replacement, programming and setup.

DTC B370B: REAR WIPER FUNCTION CONTROL CIRCUIT

Diagnostic Instructions

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

DTC Descriptor

DTC B370B

Rear Wiper Function Control Circuit

For symptom byte information, refer to [Symptom Byte List](#) .

Diagnostic Fault Information

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

Circuit/System Description

The rear wiper motor is controlled by the body control module (BCM) via a printed circuit board (PCB) relay. The BCM will respond by commanding the specific rear wiper function based on an input from the rear wiper switch, which is part of the windshield wiper/washer switch. The rear wiper switch uses a resistor ladder to determine low speed, intermittent, and rear washer operation. A constant B+ and ground are supplied to the rear wiper motor. When the rear wiper switch is placed in the low speed, intermittent, or rear washer position, the voltage is pulled down through a different resistor in the resistor ladder, reducing the voltage seen at the BCM.

The BCM monitors the liftgate ajar signal circuit, and the BCM will disable the function of the rear wiper motor if the liftgate or liftglass is ajar or open

Conditions for Running the DTC

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

Conditions for Setting the DTC

The BCM detects a short to ground in the rear window wiper control circuit.

Action Taken When the DTC Sets

Rear wiper operation is suspended.

Conditions for Clearing the DTC

A current DTC clears when the diagnostic runs and passes.

Diagnostic Aids

The rear liftgate must be closed in order for the rear wiper to work. The liftgate ajar switch signal circuit provides information to the rear window wiper module about the status of the liftgate. If the liftgate or liftglass is open the rear wiper operation is not performed.

Reference Information

Schematic Reference

[Wiper/Washer Schematics](#)

COMPONENT CONNECTOR END VIEWS -INDEX

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.
2. Verify the scan tool Rear Closure Ajar Switch parameter changes between Inactive and Active when opening and closing the liftgate.
 - **If the parameter does not change**
Refer to **Liftgate Ajar Indicator Malfunction**
 - **If the parameter changes**
3. Verify the rear wiper turns ON and OFF when commanding the Rear Wiper Active and Inactive with a scan tool.
 - **If the rear wiper does not turn ON and OFF**
Refer to Circuit/System Testing
 - **If the rear wiper turns ON and OFF**
4. All OK.

Circuit/System Testing

1. Ignition OFF, disconnect the X4 harness connector at the K9 Body Control Module, ignition ON.
2. Verify the M45 Rear Wiper Motor is not activated.
 - **If the M45 Rear Wiper Motor is activated**
 1. Ignition OFF, disconnect the X2 harness connector at the X50A Fuse Block - Underhood, ignition ON.
 2. Test for less than 1 V between the control circuit terminal 22 and ground.
 - If 1 V or greater, repair the short to voltage on the circuit.
 - If less than 1 V, replace the X50A Fuse Block - Underhood.
 - **If the M45 Rear Wiper Motor is not activated**
3. Connect a 10 A fused jumper wire between the control circuit terminal 10 and B+.
4. Verify the M45 Rear Wiper Motor activates.
 - **If the M45 Rear Wiper Motor does not activate**
 1. Ignition OFF, remove the jumper wire, disconnect the X2 harness connector at the X50A Fuse Block - Underhood.
 2. Test for infinite resistance between the control circuit terminal 22 and ground.
 - If less than infinite resistance, repair the short to ground on the circuit.
 - If infinite resistance
 3. Test for less than 2 Ω in the control circuit end to end.
 - If 2 Ω or greater, repair the open/high resistance in the circuit.

- If less than 2 Ω , test or replace the X50A Fuse Block - Underhood.

- **If the M45 Rear Wiper Motor activates**

5. Test or replace the K9 Body Control Module.

Repair Instructions

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

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

DTC B371A: WINDSHIELD WIPER MOTOR INTERNAL MALFUNCTION

Diagnostic Instructions

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

DTC Descriptor

DTC B371A 39

Windshield Wiper Motor Internal Malfunction

Circuit/System Description

B+ voltage and ground are supplied to the windshield wiper motor. Whenever the vehicle is ON or in Service Mode, the body control module (BCM) sends the wiper/washer switch status through the LIN communication bus. If a fault occurs at any time in the windshield wiper motor, the BCM will set the DTC.

Conditions for Running the DTC

The BCM runs the diagnostic to detect an internal fault when power up is commanded. The only requirements are voltage and ground. This diagnostic runs even if the voltage is out of the valid operating range.

Conditions for Setting the DTC

The BCM receives an invalid signal from the windshield wiper motor.

Action Taken When the DTC Sets

The BCM ignores all additional inputs.

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 -INDEX](#)

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. Vehicle in Service Mode.
2. Verify that there is no communications DTC set.
 - **If there is a communications DTC set**

Refer to [Diagnostic Trouble Code \(DTC\) List - Vehicle](#) .

- **If there is no communications DTC set**
3. Verify that DTC B371A is not set.
 - **If DTC B371A is set**

Replace the M75 Windshield Wiper Motor.

- **If DTC B371A is not set**
4. All OK.

Repair Instructions

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

- [Windshield Wiper System Module Replacement](#)

DTC B371C: FRONT WIPER MOTOR 2

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 B371C

Front Wiper Motor 2

For symptom byte information, refer to [Symptom Byte List](#) .

Circuit/System Description

B+ voltage and ground are supplied to the windshield wiper motor. Whenever the vehicle is ON or in Service Mode, the body control module (BCM) sends the wiper/washer switch status through the LIN communication bus. If a fault occurs at any time in the windshield wiper motor, the BCM will set the DTC.

Conditions for Running the DTC

The BCM runs the diagnostic to detect an internal fault when power up is commanded. The only requirements are voltage and ground. This diagnostic runs even if the voltage is out of the valid operating range.

Conditions for Setting the DTC

The BCM receives an invalid signal from the windshield wiper motor.

Action Taken When the DTC Sets

The BCM ignores all additional inputs.

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 -INDEX

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. Vehicle ON.
2. Verify that there is no communications DTC set.
 - **If there is a communications DTC set**

Refer to **Diagnostic Trouble Code (DTC) List - Vehicle** .
 - **If there is no communications DTC set**
3. Verify that DTC B371C is not set.
 - **If DTC B371C is set**

Replace the M75R Windshield Wiper Motor Module - Right..
 - **If DTC B371C is not set**
4. All OK.

Repair Instructions

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

- **Windshield Wiper System Module Replacement**

DTC B3811: REAR WASHER RELAY CIRCUIT

Diagnostic Instructions

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

DTC Descriptor

DTC B3811

For symptom byte information, refer to [Symptom Byte List](#) .

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Control	B3811 02	B3811 04	2	-
Ground	-	B3811 04	-	-
1. Rear Washer Inoperative 2. Rear Washer Always ON				

Circuit/System Description

The rear windshield washer pump is controlled by the body control module (BCM) via a printed circuit board (PCB) relay. The BCM monitors the rear windshield wiper/washer switch signal circuit and when rear washer activation is requested, the BCM applies voltage through the rear window washer pump relay control circuit. With the relay energized, fused battery voltage is applied through the switch contacts of the relay and the windshield washer pump control circuit to activate the windshield washer pump.

Conditions for Running the DTC

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

Conditions for Setting the DTC

B3811 01

The body control module detects a short to B+ in the rear windshield washer pump relay control circuit

B3811 02

The body control module detects a short to ground in the rear windshield washer pump relay control circuit

B3811 04

The body control module detects an open or high resistance in the rear windshield washer pump relay control circuit or the ground 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

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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.
2. Verify the rear window washer turns ON and OFF when commanding the Rear Washer Relay Active and Inactive with a scan tool.

- **If the rear window washer does not turn ON and OFF**

Refer to Circuit/System Testing

- **If the rear window washer turns ON and OFF**

3. All OK.

Circuit/System Testing

1. Ignition OFF and all vehicle systems OFF, disconnect the X1 harness connector at the X50A Fuse Block - Underhood. It may take up to 2 min for all vehicle systems to power down.
2. Test for less than 10 Ω between the X50A Fuse Block - Underhood ground circuit terminal 12 and ground.

- **If 10 Ω or greater**

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

- **If less than 10 Ω**

3. Connect the X1 harness connector at the X50A Fuse Block - Underhood and disconnect the X1 harness connector at the K9 Body Control Module, ignition ON.
4. Verify the G19 Rear Window Washer Pump is not activated.

- **If the G19 Rear Window Washer Pump is activated**

1. Ignition OFF, disconnect the X2 harness connector at the X50A Fuse Block - Underhood, ignition ON.
2. Test for less than 1 V between the X50A Fuse Block - Underhood control circuit terminal 15 and ground.
 - If 1 V or greater, repair the short to voltage on the circuit.
 - If less than 1 V, test or replace the X50A Fuse Block - Underhood.

- **If the G19 Rear Window Washer Pump is not activated**

5. Connect a 10 A fused jumper wire between the control circuit terminal 6 X1 and B+.
6. Verify the G19 Rear Window Washer Pump activates.

- **If the G19 Rear Window Washer Pump does not activate**

1. Ignition OFF, remove the jumper wire, disconnect the X2 harness connector at the X50A Fuse Block - Underhood.
2. Test for infinite resistance between the X50A Fuse Block - Underhood control circuit terminal 15 X2 and ground.
 - If less than infinite resistance, repair the short to ground on the circuit.
 - If infinite resistance

3. Test for less than 2 Ω in the control circuit end to end.
 - If 2 Ω or greater, repair the open/high resistance in the circuit.
 - If less than 2 Ω , replace the X50A Fuse Block - Underhood.

- **If the G19 Rear Window Washer Pump activates**

7. Replace the K9 Body Control Module.

Repair Instructions

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

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

DTC B3873: FRONT WASHER RELAY CIRCUIT

Diagnostic Instructions

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

DTC Descriptors

DTC B3873

Front Washer Relay Circuit

For symptom byte information, refer to [Symptom Byte List](#) .

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Control	B3873 02	B3873 04	B3873 01	-

Circuit/System Description

The windshield washer pump is controlled by the body control module (BCM) via a printed circuit board (PCB) relay. When the washer switch is depressed, the BCM's internally pulled high resistor is pulled low by the washer request circuit. The BCM then applies voltage through a control circuit to the PCB windshield washer pump relay. With the relay energized, fused battery voltage is applied through the switch contacts of the relay and the control circuit to activate the windshield washer fluid pump.

Conditions for Running the DTC

- Vehicle ON or in Service Mode
- The system voltage is between 9 - 16 V.

Conditions for Setting the DTC

B3873 01

The body control module detects a short to B+ in the windshield washer pump relay control circuit

B3873 02

The body control module detects a short to ground in the windshield washer pump relay control circuit

B3873 04

The body control module detects an open or high resistance in the windshield washer pump 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.

Schematic Reference

Wiper/Washer Schematics

Connector End View Reference

COMPONENT CONNECTOR END VIEWS -INDEX

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. Vehicle in Service Mode.
2. Verify the G24 Windshield Washer Pump activates when commanding the Windshield Washer Relay On and Off with a scan tool.
 - **If the G24 Windshield Washer Pump does not activate**
Refer to Circuit/System Testing
 - **If the G24 Windshield Washer Pump activates**
3. All OK.

Circuit/System Testing

1. Vehicle OFF, disconnect the X4 harness connector at the K9 Body Control Module, vehicle in Service Mode.
2. Verify the G24 Windshield Washer Pump is not activated.
 - **If the G24 Windshield Washer Pump is activated**
 1. Vehicle OFF, disconnect the X2 harness connector at the X50A Fuse Block - Underhood, vehicle in Service Mode.
 2. Test for less than 1 V between the K9 Body Control Module control circuit terminal 14 X4 and ground.
 - If 1 V or greater, repair the short to voltage on the circuit.
 - If less than 1 V, replace the X50A Fuse Block - Underhood.
 - **If the G24 Windshield Washer Pump is not activated**
3. Connect a 10 A fused jumper wire between the control circuit terminal 14 and B+.
4. Verify the G24 Windshield Washer Pump activates.
 - **If the G24 Windshield Washer Pump does not activate**
 1. Vehicle OFF, remove the jumper wire, disconnect the X2 harness connector at the X50A Fuse Block - Underhood.
 2. Test for infinite resistance between the control circuit terminal 23 and ground.
 - If less than infinite resistance, repair the short to ground on the circuit.
 - If less than infinite resistance
 3. Test for less than 2 Ω in the control circuit end to end.
 - If 2 Ω or greater, repair the open/high resistance in the circuit.
 - If less than 2 Ω , test or replace the X50A Fuse Block - Underhood.

- If the G24 Windshield Washer Pump activates

5. Replace the K9 Body Control Module.

Repair Instructions

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

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

SYMPTOMS - WIPER/WASHER SYSTEMS

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.
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](#)

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 Motor - Left B+	1	U1515 00	U1515 00	-
Windshield Wiper Motor - Right B+	1	U1515 00	-	-
Rain/Ambient Light Sensor Module B+	U151A	U151A	-	-
Windshield Wiper/Washer Switch Control Terminal 3	4	3	3	cardiagn.com

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Windshield Wiper/Washer Switch Signal Terminal 2	4	2	2	-
Windshield Wiper/Washer Switch Low Reference Terminal 1	-	1	1	-
Windshield Wiper Motor - Right Serial Data Terminal 1	1	5	5	-
Windshield Wiper Motor - Left Serial Data Terminal C	1	6	6	-
Windshield Wiper Motor Relay Coil Supply Voltage	-	-	-	-
Rain/Ambient Light Sensor Module Ground	-	U151A	-	-
Windshield Wiper Motor - Right Ground	-	5	-	-
Windshield Wiper Motor - Left Ground	-	6	-	-
1. Windshield Wipers Inoperative 2. Windshield Wipers High Speed Inoperative 3. Windshield Wipers Intermediate Speeds Inoperative 4. Windshield Wipers Always ON 5. Windshield Wiper Motor - Right, Always Inoperative 6. Windshield Wiper Motor - Left, Always Inoperative				

Circuit/System Description

The body control module (BCM) controls the windshield wiper motor based on inputs from the windshield wiper/washer switch, and when intermittent mode is selected, the rain/ambient light sensor module. The BCM monitors the windshield wiper/washer switch through two separate signal circuits and a low reference circuit. The windshield wiper/washer switch utilizes resistive multiplexing to signal a low speed and intermittent operation request to the BCM while a separate discrete signal circuit is used to indicate a high speed wiper request. When the wiper switch is placed in the low speed or intermittent position, the BCM monitors the voltage drop, which changes dependent upon switch position, over an internal pulled high resistor. The BCM will respond by commanding on the low speed or intermittent wipers. With the windshield wiper/washer switch in the high speed position, the BCM's high speed signal circuit is pulled low. The BCM will respond by commanding the windshield wiper motor to operate at high speed via serial data.

Diagnostic Aids

M75L Windshield Wiper Motor Module - Left, and M75R Windshield Wiper Motor Module - Right are identical, however, they should NOT be swapped from one side to another. Swapping Wiper motors will causes both wipers to be inoperative.

Reference Information

Schematic Reference

- [Wiper/Washer Schematics](#)
- [Steering Wheel Secondary/Configurable Control Schematics](#)

Connector End View Reference

COMPONENT CONNECTOR END VIEWS -INDEX

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 Verification

1. Vehicle ON.
2. Verify DTC U151A is not set.
 - **If DTC U151A is set**
Please Refer to [DTC U1500-U15FF](#)
 - **If DTC U151A is not set**
3. Verify the scan tool Windshield Wiper High Speed Switch parameter changes between Active and Inactive when cycling the S82 Windshield Wiper/Washer Switch between Off and High.
 - **If the parameter does not change**
Refer to Circuit/System Testing - Windshield Wiper/Washer Switch Malfunction.
 - **If the parameter changes**
4. Verify the scan tool Windshield Wiper Switch parameter changes between Off and Low when cycling the S82 Windshield Wiper/Washer Switch between Off and Low.
 - **If the parameter does not change**
Refer to Circuit/System Testing - Windshield Wiper/Washer Switch Malfunction.
 - **If the parameter changes**
5. Verify the scan tool Windshield Wiper Switch parameter changes between Delay 1 and Delay 5 when cycling the S82 Windshield Wiper/Washer Switch intermittent speed positions.
 - **If the parameter does not change**
Test or replace the S82 Windsheild Wiper/Washer Switch.
 - **If the parameter changes**
6. Verify the M75L Windshield Wiper Motor Module - Left and M75R Windshield Wiper Motor Module-Right change between Off, Low, and High when commanding the Windshield Wiper Motor Relay from Off to Low to High.
 - **If the M75L Windshield Wiper Motor Module - Left and M75R Windshield Wiper Motor Module-Right does not cycle between Off, Low, and High**
Refer to Circuit/System Testing - Windshield Wiper Motor Malfunction
 - **If the M75L Windshield Wiper Motor Module - Left and M75R Windshield Wiper Motor Module-Right cycle between Off, Low, and High**
7. All OK.

Circuit/System Testing

Windshield Wiper/Washer Switch Malfunction

1. Vehicle OFF and all vehicle systems OFF, disconnect the harness connector at the S82 Windshield Wiper/Washer Switch. It may take up to 11 min for all vehicle systems to power down.
2. Test for less than 10 Ω between the low reference circuit terminal 1 and ground.
 - **If 10 Ω or greater**
 1. Vehicle OFF, disconnect the harness connector at the K9 Body Control Module. cardiagn.com
 2. Test for less than 2 Ω in the low reference circuit end to end.

- If 2 Ω or greater, repair the open/high resistance in the circuit.
 - If less than 2 Ω , replace the K9 Body Control Module.
 - **If less than 10 Ω**
3. Vehicle ON.
 4. Verify the scan tool Windshield Wiper High Speed Switch parameter is Inactive.
 - **If not Inactive**
 1. Vehicle OFF, disconnect the harness connector at the K9 Body Control Module.
 2. Test for infinite resistance between the signal circuit terminal 2 and ground.
 - If less than infinite resistance, repair the short to ground on the circuit.
 - If infinite resistance, replace the K9 Body Control Module.
 - **If Inactive**
 5. Install a 3 A fused jumper wire between the signal circuit terminal 2 and the low reference circuit terminal 1.
 6. Verify the scan tool Windshield Wiper High Speed Switch parameter is Active.
 - **If not Active**
 1. Ignition OFF, remove the jumper wire, disconnect the harness connector at the K9 Body Control Module, ignition ON.
 2. Test for less than 1 V between the signal circuit and ground.
 - If 1 V or greater, repair the short to voltage on the circuit.
 - If less than 1 V
 3. Test for less than 2 Ω in the signal circuit end to end.
 - If 2 Ω or greater, repair the open/high resistance in the circuit.
 - If less than 2 Ω , replace the K9 Body Control Module.
 - **If Active**
 7. Test for greater than 8 V between the signal circuit terminal 3 and ground.
 - **If less than 8 V**
 1. Vehicle OFF, disconnect the harness connector at the K9 Body Control Module.
 2. Test for infinite resistance between the signal circuit and ground
 - If less than infinite resistance, repair the short to ground on the circuit.
 - If infinite resistance
 3. Test for less than 2 Ω in the signal circuit end to end.
 - If 2 Ω or greater, repair the open/high resistance in the circuit.
 - If less than 2 Ω , replace the K9 Body Control Module.
 - **If 8 V or greater**
 8. Vehicle OFF, disconnect the X3 harness connector at the K9 Body Control Module, vehicle ON.
 9. Test for less than 1 V between the S82 Windshield Wiper/Washer Switch signal circuit terminal 3 and ground.
 - **If 1 V or greater**

Repair the short to voltage on the circuit.
 - **If less than 1 V**
 10. Test or replace the S82 Windshield Wiper/Washer Switch.
 11. Verify the symptom does not occur while operating the wipers.
 - **If the symptom is not corrected**

replace the K9 Body Control Module.
 - **If the symptom is corrected**
 12. All OK.

Windshield Wiper Motor Malfunction

1. Vehicle OFF and all vehicle systems OFF, disconnect the harness connector at the M75L Windshield Wiper Motor Module-Left. It may take up to 2 min for all vehicle systems to power down.

2. Test for less than 10 Ω between the ground circuit terminal B and ground.
 - **If 10 Ω or greater**
 1. Vehicle OFF.
 2. Test for less than 2 Ω in the ground circuit end to end.
 - If 2 Ω or greater, repair the open/high resistance in the circuit.
 - If less than 2 Ω , repair the open/high resistance in the ground connection.
 - **If less than 10 Ω**
3. Vehicle ON.
4. Verify a test lamp illuminates between the B+ circuit terminal A and ground.
 - **If the test lamp does not illuminate and the circuit fuse is good**
 1. Vehicle OFF.
 2. Test for less than 2 Ω in the B+ circuit end to end.
 - If 2 Ω or greater, repair the open/high resistance in the circuit.
 - If less than 2 Ω , verify the fuse is OK and there is voltage at the fuse.
 - **If the test lamp does not illuminate and the circuit fuse is open**
 1. Vehicle OFF, remove the test lamp.
 2. Test for infinite resistance between the B+ circuit and ground.
 - If less than infinite resistance, repair the short to ground on the circuit.
 - If infinite resistance, replace the M75L Windshield Wiper Motor Module-Left.
 - **If the test lamp illuminates**
5. Test for 5 - 10 V between the serial data circuit terminal D and ground:
 - **If less than 5 V**
 1. Vehicle OFF, disconnect the X6 harness connector at the K9 Body Control Module and the B177 Rain Sensor.
 2. Test for infinite resistance between the serial data circuit and ground.
 - If less than infinite resistance, repair the short to ground on the circuit.
 - If infinite resistance
 3. Test for less than 2 Ω in the serial data circuit end to end.
 - If 2 Ω or greater, repair the open/high resistance in the circuit.
 - If less than 2 Ω , replace the K9 Body Control Module.
 - **If greater than 10 V**
 1. Ignition OFF, disconnect the X6 harness connector at the K9 Body Control Module, vehicle ON.
 2. Test for less than 1 V between the serial data circuit and ground.
 - If 1 V or greater, repair the short to voltage on the circuit.
 - If less than 1 V or greater, replace the K9 Body Control Module.
 - **If 5 - 10 V**
6. Vehicle OFF, disconnect the harness connector at the M75R Windshield Wiper Motor Module-Right, vehicle ON.
7. Test for less than 4 V between the M75L Windshield Wiper Motor Module-Left data communications circuit terminal C and ground.
 - **If 4 V or greater**

Repair the short to voltage in the circuit.
 - **If less than 4 V**
8. Vehicle OFF.
9. Test for infinite resistance between the M75L Windshield Wiper Motor Module-Left data communications circuit terminal C and ground.
 - **If less than infinite resistance**

Repair the short to ground on the circuit.
 - **If infinite resistance**

10. Test for less than 2 Ω in the M75L Windshield Wiper Motor Module-Left data communications circuit end to end.
 - **If 2 Ω or greater**

Repair the open/high resistance in the circuit.
 - **If less than 2 Ω**
11. Vehicle OFF, connect the harness connector at the M75L Windshield Wiper Motor Module-Left, vehicle ON.
12. Test for less than 10 Ω between the ground circuit terminal 3 and ground.
 - **If 10 Ω or greater**
 1. Vehicle OFF.
 2. Test for less than 2 Ω in the ground circuit end to end.
 - If 2 Ω or greater, repair the open/high resistance in the circuit.
 - If less than 2 Ω , repair the open/high resistance in the ground connection.
 - **If less than 10 Ω**
13. Vehicle ON.
14. Verify a test lamp illuminates between the B+ circuit terminal 4 and ground.
 - **If the test lamp does not illuminate and the circuit fuse is good**
 1. Vehicle OFF.
 2. Test for less than 2 Ω in the B+ circuit end to end.
 - If 2 Ω or greater, repair the open/high resistance in the circuit.
 - If less than 2 Ω , verify the fuse is OK and there is voltage at the fuse.
 - **If the test lamp does not illuminate and the circuit fuse is open**
 1. Vehicle OFF, remove the test lamp.
 2. Test for infinite resistance between the B+ circuit and ground.
 - If less than infinite resistance, repair the short to ground on the circuit.
 - If infinite resistance, replace the M75R Windshield Wiper Motor Module-Right.
 - **If the test lamp illuminates**
15. Connect a test lamp between the B+ circuit terminal 4 and ground.
16. Verify the test lamp turns ON and OFF when commanding the high speed wipers ON and OFF with the wiper high speed switch.
 - **If the test lamp is always OFF**
 1. Vehicle OFF, remove the test lamp, disconnect the X4 harness connector at the K9 Body Control Module.
 2. Test for infinite resistance between the control circuit and ground.
 - If less than infinite resistance, repair the short to ground on the circuit.
 - If infinite resistance
 3. Test for less than 2 Ω in the control circuit end to end.
 - If 2 Ω or greater, repair the open/high resistance in the circuit.
 - If less than 2 Ω , replace the K9 Body Control Module.
 - **If the test lamp is always ON**
 1. Vehicle OFF, remove the test lamp, disconnect the X4 harness connector at the K9 Body Control Module, vehicle ON.
 2. Test for less than 1 V between the control circuit terminal 2 and ground.
 - If 1 V or greater, repair the short to voltage on the circuit.
 - If less than 1 V, replace the K9 Body Control Module.
 - **If the test lamp turns ON and OFF**
17. Vehicle OFF, disconnect the X4 harness connector at the K9 Body Control Module. Connect harness connector at the M75R Windshield Wiper Motor Module-Right, vehicle ON.
18. Verify the M75R Windshield Wiper Motor Module-Right is NOT activated.
 - **If the M75R Windshield Wiper Motor Module-Right is activated**

1. Vehicle OFF, disconnect the harness connector at the M75R Windshield Wiper Motor Module-Right, vehicle ON.
2. Test for less than 1 V between the control circuit terminal 2 and ground.
 - If 1 V or greater, repair the short to voltage on the circuit.
 - If less than 1 V, replace the M75R Windshield Wiper Motor Module-Right.
- **If the M75R Windshield Wiper Motor Module-Right is not activated**
19. Connect a 20 A fused jumper wire between the control circuit terminal 16 and B+.
20. Verify the M75R Windshield Wiper Motor Module-Right activates.
 - **If the M75R Windshield Wiper Motor Module-Right does not activate**
 1. Vehicle OFF, remove the jumper wire, disconnect the harness connector at the M75R Windshield Wiper Motor Module-Right, vehicle ON.
 2. Test for infinite resistance between the control circuit and ground.
 - If less than Infinite resistance, repair the short to ground on the circuit.
 - If infinite resistance
 3. Test for less than 2 Ω in the control circuit end to end.
 - If 2 Ω or greater, repair the open/high resistance in the circuit.
 - If less than 2 Ω , test or replace the M75R Windshield Wiper Motor Module-Right.
 - **If the M75R Windshield Wiper Motor Module-Right activates**
21. Test or replace the M75L Windshield Wiper Motor Module-Left.

Component Testing

Windshield Wiper/Washer Switch

1. Ignition OFF, disconnect the harness connector at the S82 Windshield Wiper/Washer Switch.
2. Test for infinite resistance between the signal terminal 2 and the low reference terminal 1 with the high speed switch in the open position.
 - **If less than infinite resistance**
Replace the S82 Windshield Wiper/Washer Switch.
 - **If infinite resistance**
3. Test for less than 2 Ω between the signal circuit terminal 2 and the low reference circuit terminal 1 with the high speed switch in the closed position.
 - **If 2 Ω or greater**
Replace the S82 Windshield Wiper/Washer Switch.
 - **If less than 2 Ω**
4. Test for infinite resistance between the signal terminal 3 and the low reference terminal 1 with the low speed switch in the open position.
 - **If less than infinite resistance**
Replace the S82 Windshield Wiper/Washer Switch.
 - **If infinite resistance**
5. Position the S82 Windshield Wiper/Washer Switch to INT.
6. Verify the resistance readings are within the specified range listed below between the signal circuit terminal 3 and the low reference circuit terminal 1 by pushing the switch in the listed positions below.
 - Delay 1 : 3.74-4.00k Ω
 - Delay 2 : 2.75-2.85k Ω
 - Delay 3 : 1.95-2.05k Ω
 - Delay 4 : 1.25-1.35k Ω
 - Delay 5 : 765-775 Ω
 - **If not within the specified range**

Replace the S82 Windshield Wiper/Washer Switch.

- **If within the specified range**

7. All OK

Repair Instructions

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

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

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
B+	-	3	-	-
Windshield Washer Switch Signal	1, 2	1	1	-
Windshield Washer Pump Control	3	3	2	-
Windshield Washer Pump Relay Control	B3873 02	B3873 04	B3873 01	-
Underhood Fuse Block Ground	-	3	-	-
Windshield Washer Pump Ground	-	3	-	-
1. Windshield Washer Switch Malfunction 2. Windshield Washer Pump Always ON 3. Windshield Washer Pump Inoperative				

Circuit/System Description

The windshield washer pump is controlled by the body control module (BCM) via a printed circuit board (PCB) relay. When the washer switch is depressed, the BCM's internally pulled high resistor is pulled low by the washer request circuit. The BCM then applies voltage through a control circuit to the PCB windshield washer pump relay. With the relay energized, fused battery voltage is applied through the switch contacts of the relay and the control circuit to activate the windshield washer fluid pump.

Reference Information

Schematic Reference

[Wiper/Washer Schematics](#)

Connector End View Reference

[COMPONENT CONNECTOR END VIEWS -INDEX](#)

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. Vehicle in Service Mode.
2. Verify the scan tool Windshield Washer Switch parameter changes between Active and Inactive when pressing the windshield washer switch.
 - **If the parameter does not change**
Refer to Circuit/System Testing - Windshield Wiper/Washer Switch Malfunction.
 - **If the parameter changes**
3. Verify the G24 Windshield Washer Pump activates and deactivates when commanding the Windshield Washer Relay Active and Inactive with a scan tool.
 - **If the G24 Windshield Washer Pump does not activate or does not deactivate**
Refer to Circuit/System Testing - Windshield Washer Pump Malfunction
 - **If the G24 Windshield Washer Pump activates and deactivates**
4. All OK.

Circuit/System Testing

Windshield Wiper/Washer Switch Malfunction

1. Vehicle OFF and all vehicle systems OFF, disconnect the harness connector at the S82 Windshield Wiper/Washer Switch. It may take up to 11 min for all vehicle systems to power down.
2. Test for less than 10 Ω between the low reference circuit terminal 1 and ground.
 - **If 10 Ω or greater**
 1. Vehicle OFF.
 2. Test for less than 2 Ω in the low reference circuit end to end.
 - If 2 Ω or greater, repair the open/high resistance in the circuit.
 - If less than 2 Ω , replace the K9 Body Control Module.
 - **If less than 10 Ω**
3. Vehicle in Service Mode.
4. Verify the scan tool Windshield Washer Switch parameter is Inactive.
 - **If not Inactive**
 1. Vehicle OFF, disconnect the harness connector at the K9 Body Control Module.
 2. Test for infinite resistance between the signal circuit terminal 7 and ground.
 - If less than infinite resistance, repair the short to ground on the circuit.
 - If infinite resistance, replace the K9 Body Control Module.
 - **If Inactive**
5. Install a 3 A fused jumper wire between the signal circuit terminal 7 and the low reference circuit terminal 1.
6. Verify the scan tool Windshield Washer Switch parameter is Active.
 - **If not Active**
 1. Vehicle OFF, remove the jumper wire, disconnect the harness connector at the K9 Body Control Module, vehicle in Service Mode.
 2. Test for less than 1 V between the signal circuit and ground.
 - If 1 V or greater, repair the short to voltage on the circuit.
 - If less than 1 V
 3. Test for less than 2 Ω in the signal circuit end to end.
 - If 2 Ω or greater, repair the open/high resistance in the circuit.

- If less than 2 Ω , replace the K9 Body Control Module.

- **If Active**

7. Test or replace the S82 Windshield Wiper/Washer Switch.

Windshield Washer Pump Malfunction

1. Vehicle OFF, and all vehicle systems OFF. Disconnect the harness connector at the G24 Windshield Washer Pump. It may take up to 2 min for all vehicle systems to power down.
2. Test for less than 10 Ω between the ground circuit terminal 2 and ground.

- **If 10 Ω or greater**

1. Test for less than 2 Ω in the ground circuit end to end.
 - If 2 Ω or greater, repair the open/high resistance in the circuit.
 - If less than 2 Ω , repair the open/high resistance in the ground connection.

- **If less than 10 Ω**

3. Connect a test lamp between the control circuit terminal 1 and the ground circuit terminal 2, vehicle in Service Mode.
4. Verify the test lamp turn ON and OFF when commanding the Windshield Washer Relay Active and Inactive with a scan tool.

- **If the test lamp turns ON and OFF**

Test or replace the G24 Windshield Washer Pump.

- **If the test lamp does not turn ON and OFF**

5. Vehicle OFF, connect the harness connector at the G24 Windshield Washer Pump. Disconnect the X1 harness connector at the X50A Fuse Block - Underhood. It may take up to 2 min for all vehicle systems to power down.
6. Test for less than 10 Ω between the ground circuit terminal 12 and ground.

- **If 10 Ω or greater**

1. Test for less than 2 Ω in the ground circuit end to end.
 - If 2 Ω or greater, repair the open/high resistance in the circuit.
 - If less than 2 Ω , repair the open/high resistance in the ground connection.

- **If less than 10 Ω**

7. Vehicle in Service Mode.
8. Verify the G24 Windshield Washer Pump is not activated.

- **If the G24 Windshield Washer Pump is activated**

1. Vehicle OFF, disconnect the harness connector at the G24 Windshield Washer Pump, vehicle in Service Mode.
2. Test for less than 1 V between the control circuit terminal 1 and ground.
 - If 1 V or greater, repair the short to voltage on the circuit.
 - If less than 1 V, replace the G24 Windshield Washer Pump.

- **If the G24 Windshield Washer Pump is not activated**

9. Connect a 20 A fused jumper wire between the control circuit terminal 14 and B+.

10. Verify the G24 Windshield Washer Pump activates.

- **If the G24 Windshield Washer Pump does not activate**

1. Vehicle OFF, remove the jumper wire, disconnect the harness connector at the G24 Windshield Washer Pump.
2. Test for infinite resistance between the control circuit and ground.
 - If less than Infinite resistance, repair the short to ground on the circuit.
 - If infinite resistance
3. Test for less than 2 Ω in the control circuit end to end.
 - If 2 Ω or greater, repair the open/high resistance in the circuit.
 - If less than 2 Ω , replace the G24 Windshield Washer Pump.

- **If the G24 Windshield Washer Pump activates**

11. Vehicle OFF, connect the X1 harness connector at the X50A Fuse Block - Underhood. Disconnect the X4 harness connector at the K9 Body Control Module, vehicle in Service Mode.
12. Verify the G24 Windshield Washer Pump is not activated.
 - **If the G24 Windshield Washer Pump is activated**
 1. Vehicle OFF, disconnect the X2 harness connector at the X50A Fuse Block - Underhood, vehicle in Service Mode.
 2. Test for less than 1 V between the K9 Body Control Module control circuit terminal 14 X4 and ground, vehicle in Service Mode.
 - If 1 V or greater, repair the short to voltage on the circuit.
 - If less than 1 V, replace the X50A Fuse Block - Underhood.
 - **If the G24 Windshield Washer Pump is not activated**
13. Connect a 10 A fused jumper wire between the control circuit terminal 14 and B+.
14. Verify the G24 Windshield Washer Pump activates.
 - **If the G24 Windshield Washer Pump does not activate**
 1. Vehicle OFF, remove the jumper wire, disconnect the X2 harness connector at the X50A Fuse Block - Underhood.
 2. Test for infinite resistance between the control circuit terminal 23 and ground.
 - If less than infinite resistance, repair the short to ground on the circuit.
 - If less than infinite resistance
 3. Test for less than 2 Ω in the control circuit end to end.
 - If 2 Ω or greater, repair the open/high resistance in the circuit.
 - If less than 2 Ω , test or replace the X50A Fuse Block - Underhood.
 - **If the G24 Windshield Washer Pump activates**
15. Replace the K9 Body Control Module.

Component Testing

Windshield Wiper/Washer Switch

1. Vehicle OFF, disconnect the harness connector at the S82 Windshield Wiper/Washer Switch.
2. Test for infinite resistance between the signal terminal 7 and the low reference terminal 1 with the switch in the open position.
 - **If less than infinite resistance**

Replace the S82 Windshield Wiper/Washer Switch.
 - **If infinite resistance**
3. Test for less than 2 Ω between the signal circuit terminal 7 and the low reference circuit terminal 1 with the switch in the closed position.
 - **If 2 Ω or greater**

Replace the S82 Windshield Wiper/Washer Switch.
 - **If less than 2 Ω**
4. All OK

Repair Instructions

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

- [Windshield Washer Pump Replacement](#)
- [Windshield Wiper and Washer Switch Replacement](#)
- [Engine Wiring Harness Junction Block Replacement](#)
- [Control Module References](#) for body control module replacement, programming and setup.

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 B370A

Rain Sensor

For symptom byte information, refer to [Symptom Byte List](#) .

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
B+	U151A	U151A	-	-
Serial Data	U151A	U151A	U151A	-
Ground	-	U151A	-	-

Circuit/System Description

B+ and ground is supplied at all times to the rain sensor. The rain sensor communicates with the body control module (BCM) via serial data. When the ignition is in the ON or ACCESSORY position and the windshield wiper/washer switch is in the intermittent delay position, the BCM monitors the rain sensor data to determine the rain build up on the windshield. As rain builds up on the windshield, the BCM will command the wipers to activate. The sensitivity of the wiper frequency is controlled by the intermittent delay of the windshield wiper/washer switch. As the sensitivity is increased, the BCM will command more frequent wiper activation based on rain build up on the windshield.

Conditions for Running the DTC

- Vehicle ON or in Service Mode
- The system voltage is between 9 - 16 V.

Conditions for Setting the DTC

Communication between the BCM and the rain sensor is interrupted.

Action Taken When the DTC Sets

- If the BCM loses communication with the rain sensor while operating under manual 1X control, the windshield wiper operation will default to intermittent operation with a fixed dwell time of 4 s.
- If the BCM loses communication with the rain sensor while operating at low speed, the windshield wiper operation will default to low speed.
- If the BCM loses communication with the rain sensor while operating at high speed, the windshield wiper operation will default to high speed.

Conditions for Clearing the DTC

The DTC will clear when communication is established between the BCM and rain sensor.

Reference Information

Schematic Reference

Wiper/Washer Schematics

Connector End View Reference

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- [Wiring Repairs](#)

Scan Tool Reference

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

Circuit/System Verification

1. Vehicle in Service Mode.
2. Verify DTC U151A is not set.
 - **If the DTC is set**

Please Refer to [DTC U1500-U15FF](#)
 - **If the DTC is not set**
3. Place the S82 Windshield Wiper/Washer Switch in the intermittent delay setting and spray the outside of the windshield in the area of the B177 Rain/Ambient Light Sensor Module with a water bottle. It may be necessary to increase the sensitivity of the intermittent delay to achieve windshield wiper operation.
4. Verify the windshield wipers operate at low speed.
 - **If the windshield wipers are not operating at low speed**

Refer to Circuit/System Testing.
 - **If the windshield wipers are operating at low speed**
5. All OK.

Circuit/System Testing

1. Vehicle OFF and all vehicle systems OFF, disconnect the harness connector at the B117 Rain Sensor. It may take up to 2 min for all vehicle systems to power down.
2. Test for less than 10 Ω between the ground circuit terminal 3 and ground.
 - **If 10 Ω or greater**
 1. Vehicle OFF.
 2. Test for less than 2 Ω in the ground circuit end to end.
 - If 2 Ω or greater, repair the open/high resistance in the circuit.
 - If less than 2 Ω , repair the open/high resistance in the ground connection.
 - **If less than 10 Ω**
3. Vehicle in Service Mode.
4. Verify a test lamp illuminates between the B+ circuit terminal 1 and ground.
 - **If the test lamp does not illuminate and the circuit fuse is good**
 1. Vehicle OFF, remove the test lamp.
 2. Test for less than 2 Ω in the B+ circuit end to end.
 - If 2 Ω or greater, repair the open/high resistance in the circuit.
 - If less than 2 Ω , verify the fuse is not open and there is voltage at the fuse.
 - **If the test lamp does not illuminate and the circuit fuse is open**
 1. Vehicle OFF, remove the test lamp.
 2. Test for infinite resistance between the B+ circuit and ground.
 - If less than infinite resistance, repair the short to ground on the circuit.
 - If infinite resistance, replace the B117 Rain Sensor.
 - **If the test lamp illuminates**

5. Test for 5.0 - 10.0 V between the serial data circuit terminal 2 and ground.

- **If less than 5.0 V**

1. Vehicle OFF, disconnect the harness connector at the K9 Body Control Module and the harness connector at the M75L Windshield Wiper Motor Module-Left.
2. Test for infinite resistance between the serial data circuit and ground.
 - If less than infinite resistance, repair the short to ground on the circuit.
 - If infinite resistance
3. Test for less than 2 Ω in the serial data circuit end to end.
 - If 2 Ω or greater, repair the open/high resistance in the circuit.
 - If less than 2 Ω , replace the K9 Body Control Module.

- **If greater than 10.0 V**

1. Vehicle OFF, disconnect the harness connector at the K9 Body Control Module, Vehicle in Service Mode.
2. Test for less than 1 V between the serial data circuit and ground.
 - If 1 V or greater, repair the short to voltage on the circuit.
 - If less than 1 V, replace the K9 Body Control Module.

- **If between 5.0 - 10.0 V**

6. Test or replace the B117 Rain Sensor.

Repair Instructions

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

- [Inside Air Moisture and Windshield Temperature Sensor Replacement \(With Front View Camera\)](#)
- [Inside Air Moisture and Windshield Temperature Sensor Replacement \(Without Front View Camera\)](#)
- [Control Module References](#) for body control module replacement, programming and setup.

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
B+	1	1	-	-
B+ Ignition Relay	1	1	-	-
Rear Window Wiper Switch Signal	1	1	2	-
Rear Window Wiper Motor Control	1	1	2	-
Rear Window Wiper Relay Control	B370B 02	B370B 04	B370B 01	-
Windshield Wiper/Washer Switch Low Reference	-	1	-	-
Rear Window Wiper Motor Ground	-	1	-	-
Underhood Fuse Block Ground Terminal 18 X1	-	1	-	-
1. Rear Wiper Inoperative. 2. Rear Wiper Always ON.				

Circuit/System Description

The rear wiper motor is controlled by the body control module (BCM) via a printed circuit board (PCB) relay. The BCM will respond by commanding the specific rear wiper function based on an input from the rear wiper switch, which is part of the windshield wiper/washer switch. The rear wiper switch uses a resistor ladder to determine low speed, intermittent, and rear washer operation. A constant B+ and ground are supplied to the rear wiper motor. When

the rear wiper switch is placed in the low speed, intermittent, or rear washer position, the voltage is pulled down through a different resistor in the resistor ladder, reducing the voltage seen at the BCM.

The BCM monitors the liftgate ajar signal circuit, and the BCM will disable the function of the rear wiper motor if the liftgate or liftglass is ajar or open

Diagnostic Aids

The rear liftgate must be closed in order for the rear wiper to work. The liftgate ajar switch signal circuit provides information to the rear window wiper module about the status of the liftgate. If the liftgate or liftglass is open the rear wiper operation is not performed.

Reference Information

Schematic Reference

Wiper/Washer Schematics

Connector End View Reference

COMPONENT CONNECTOR END VIEWS -INDEX

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.
2. Verify the scan tool Rear Closure Ajar Switch parameter changes between Inactive and Active when opening and closing the liftgate.
 - **If the parameter does not change**

Refer to **Liftgate Ajar Indicator Malfunction**
 - **If the parameter changes**
3. Verify the scan tool Rear Wiper Switch parameter changes between Off and On when turning the rear wipers ON and OFF.
 - **If the parameter does not change**

Refer to Circuit/System Testing - Rear Wiper/Washer Switch Malfunction.
 - **If the parameter changes**
4. Verify the M45 Rear Wiper Motor turns On when commanding the Rear Wiper Active and Inactive with a scan tool.
 - **If the Rear Wiper Motor does not turn ON**

Refer to Circuit/System Testing - Rear Wiper Motor Malfunction
 - **If the Rear Wiper Motor turns ON**
5. Verify the Rear Wiper finishes the wiping cycle and will park at the end of the rear window when cycling the S82 Rear Wiper/Washer Switch Malfunction from Rear Wiper to Off.

- **If the Rear Wiper does not park at the end of the rear window**

Refer to Circuit/System Testing - Wiper Park Feature Malfunction

- **If the Rear Wiper park at the end of the rear window**

6. All OK.

Circuit/System Testing

Rear Wiper/Washer Switch Malfunction

1. Ignition OFF and all vehicle systems OFF, disconnect the harness connector at the S82 Windshield Wiper/Washer Switch. It may take up to 11 min for all vehicle systems to power down.
2. Test for less than 10 Ω between the low reference circuit terminal 1 and ground.
 - **If 10 Ω or greater**
 1. Ignition OFF.
 2. Test for less than 2 Ω in the low reference circuit end to end.
 - If 2 Ω or greater, repair the open/high resistance in the circuit.
 - If less than 2 Ω , replace the K9 Body Control Module.
 - **If less than 10 Ω**
3. Ignition ON.
4. Test for greater than 8 V between the signal circuit terminal 5 and ground.
 - **If less than 8 V**
 1. Ignition OFF, disconnect the harness connector at the K9 Body Control Module.
 2. Test for infinite resistance between the signal circuit and ground
 - If less than infinite resistance, repair the short to ground on the circuit.
 - If infinite resistance
 3. Test for less than 2 Ω in the signal circuit end to end.
 - If 2 Ω or greater, repair the open/high resistance in the circuit.
 - If less than 2 Ω , replace the K9 Body Control Module.
 - **If 8 V or greater**
5. Ignition OFF, disconnect the X2 harness connector at the K9 Body Control Module, ignition ON.
6. Test for less than 1 V between the S82 Windshield Wiper/Washer Switch signal circuit terminal 5 and ground.
 - **If 1 V or greater**

Repair the short to voltage on the circuit.
 - **If less than 1 V**
7. Test or replace the S82 Windshield Wiper/Washer Switch.

Rear Wiper Motor Malfunction

1. Ignition OFF, and all vehicle systems OFF. Disconnect the harness connector at the M45 Rear Wiper Motor. It may take up to 2 min for all vehicle systems to power down.
2. Test for less than 10 Ω between the ground circuit terminal 2 and ground.
 - **If 10 Ω or greater**
 1. Test for less than 2 Ω in the ground circuit end to end.
 - If 2 Ω or greater, repair the open/high resistance in the circuit.
 - If less than 2 Ω , repair the open/high resistance in the ground connection.
 - **If less than 10 Ω**
3. Ignition ON.
4. Verify a test lamp illuminates between the B+ circuit terminal 1 and the ground circuit terminal 2.
 - **If the test lamp does not illuminate**
 1. Ignition OFF, remove the test lamp. Disconnect the X2 harness connector at the X50A Fuse Block - Underhood.

2. Test for less than 2 Ω in the control circuit terminal 30 X2 end to end.
 - If 2 Ω or greater, repair the open/high resistance in the circuit.
 - If less than 2 Ω , replace the X50A Fuse Block - Underhood.
- **If the test lamp illuminates**
5. Connect a test lamp between the ignition circuit terminal 3 and the ground circuit terminal 2.
6. Verify the test lamp turn ON and OFF when commanding the Rear Wiper On and Off with a scan tool.
 - **If the test lamp does not turn On and the circuit fuse is OK**
 1. Ignition/Vehicle OFF.
 2. Test for less than 2 Ω in the B+ circuit end to end.
 - If 2 Ω or greater, repair the open/high resistance in the circuit.
 - If less than 2 Ω , verify the fuse is not open and there is voltage at the fuse.
 - **If the test lamp does not turn On and the circuit fuse is open**
7. Ignition/Vehicle OFF.
8. Test for infinite resistance between the ignition circuit and ground.
 - If less than infinite resistance, repair the short to ground on the circuit.
 - If infinite resistance, test or replace the M45 Rear Wiper Motor
 - **the test lamp turns On and OFF**
9. Ignition OFF, connect the harness connector at the M45 Rear Wiper Motor. Connect the X2 harness connector at the X50A Fuse Block - Underhood, disconnect the X1 harness connector at the X50A Fuse Block - Underhood, It may take up to 2 min for all vehicle systems to power down.
10. Test for less than 10 Ω between the ground circuit terminal 12 and ground.
 - **If 10 Ω or greater**
 1. Test for less than 2 Ω in the ground circuit end to end.
 - If 2 Ω or greater, repair the open/high resistance in the circuit.
 - If less than 2 Ω , repair the open/high resistance in the ground connection.
 - **If less than 10 Ω**
11. Ignition ON.
12. Verify the M45 Rear Wiper Motor is NOT activated.
 - **If the M45 Rear Wiper Motor is activated**
 1. Ignition OFF, disconnect the harness connector at the M45 Rear Wiper Motor, ignition ON.
 2. Test for less than 1 V between the control circuit terminal 3 and ground.
 - If 1 V or greater, repair the short to voltage on the circuit.
 - If less than 1 V, replace the M45 Rear Wiper Motor.
 - **If the M45 Rear Wiper Motor is not activated**
13. Connect a 20 A fused jumper wire between the control circuit listed below and B+:
 - Terminal 30
 - Terminal 44
14. Verify the M45 Rear Wiper Motor activates.
 - **If the M45 Rear Wiper Motor does not activate**
 1. Ignition OFF, remove the jumper wire, disconnect the harness connector at the M45 Rear Wiper Motor, ignition ON.
 2. Test for infinite resistance between the control circuit and ground.
 - If less than Infinite resistance, repair the short to ground on the circuit.
 - If infinite resistance
 3. Test for less than 2 Ω in the control circuit end to end.
 - If 2 Ω or greater, repair the open/high resistance in the circuit.
 - If less than 2 Ω , replace the M45 Rear Wiper Motor.
 - **If the M45 Rear Wiper Motor activates**
15. Ignition OFF, connect the X1 harness connectors at the X50A Fuse Block - Underhood. Disconnect the X4 harness connector at the K9 Body Control Module, ignition ON.

16. Verify the M45 Rear Wiper Motor is not activated.
 - **If the M45 Rear Wiper Motor is activated**
 1. Ignition OFF, disconnect the X2 harness connector at the X50A Fuse Block - Underhood, ignition ON.
 2. Test for less than 1 V between the control circuit terminal 22 and ground.
 - If 1 V or greater, repair the short to voltage on the circuit.
 - If less than 1 V, replace the X50A Fuse Block - Underhood.
 - **If the M45 Rear Wiper Motor is not activated**
17. Connect a 10 A fused jumper wire between the control circuit terminal 10 and B+.
18. Verify the M45 Rear Wiper Motor activates.
 - **If the M45 Rear Wiper Motor does not activate**
 1. Ignition OFF, remove the jumper wire, disconnect the X2 harness connector at the X50A Fuse Block - Underhood.
 2. Test for infinite resistance between the control circuit terminal 22 and ground.
 - If less than infinite resistance, repair the short to ground on the circuit.
 - If less than infinite resistance
 3. Test for less than 2 Ω in the control circuit end to end.
 - If 2 Ω or greater, repair the open/high resistance in the circuit.
 - If less than 2 Ω , test or replace the X50A Fuse Block - Underhood.
 - **If the M45 Rear Wiper Motor activates**
19. Test or replace the M45 Rear Wiper Motor.

Wiper Park Feature Malfunction

1. Ignition OFF, disconnect the harness connector at the M45 Rear Wiper Motor. Ignition ON
2. Verify a test lamp illuminates between the B+ circuit terminal 1 and ground.
 - **If the test lamp does not illuminate**
 1. Ignition OFF, remove the test lamp.
 2. Test for less than 2 Ω in the B+ circuit end to end.
 - If 2 Ω or greater, repair the open/high resistance in the circuit.
 - **If the test lamp illuminates**
3. Test or replace the M45 Rear Wiper Motor.

Component Testing

Windshield Wiper/Washer Switch

1. Ignition OFF, disconnect the harness connector at the S82 Windshield Wiper/Washer Switch.
2. Test for infinite resistance between the signal terminal 5 and the low reference terminal 1 with the rear window washer switch in the open position.
 - **If less than infinite resistance**

Replace the S82 Windshield Wiper/Washer Switch.
 - **If infinite resistance**
3. Verify the resistance reading is within the range specified below between the signal circuit terminal 5 and the low reference circuit terminal 1 by cycling the switch between Rear Wiper position and Rear Washers position.
 - Rear Wiper : 624-644 Ω
 - Rear Wiper Sweep : 1.99-2.01k Ω
 - Rear Washer : 6.11-6.13k Ω
 - **If not within range specified**

Replace the S82 Windshield Wiper/Washer Switch.
 - **If within range specified**

Repair Instructions

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

- [Engine Wiring Harness Junction Block Replacement](#)
- [Rear Window Wiper Motor Replacement](#)
- [Windshield Wiper and Washer Switch Replacement](#)
- [Control Module References](#) or BCM replacement, programming and setup

REAR WASHER 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
B+	1	1	-	-
Rear Washer Switch Signal	1	1	-	-
Rear Window Washer Pump Relay Control	1	B3811 04	B3811 01	-
Rear Windshield Washer Pump Control	1	1	2	-
Rear Windshield Washer Pump Ground	-	1	-	-
Underhood Fuse Block Ground Terminal 12 X1	-	1	-	-
1. Rear Washer Inoperative 2. Rear Washer Always ON				

Circuit/System Description

The rear windshield washer pump is controlled by the body control module (BCM) via a printed circuit board (PCB) relay. The BCM monitors the rear windshield wiper/washer switch signal circuit and when rear washer activation is requested, the BCM applies voltage through the rear window washer pump relay control circuit. With the relay energized, fused battery voltage is applied through the switch contacts of the relay and the rear windshield washer pump control circuit to activate the rear windshield washer pump.

Reference Information

Schematic Reference

[Wiper/Washer Schematics](#)

Connector End View Reference

[COMPONENT CONNECTOR END VIEWS -INDEX](#)

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.
2. Verify the scan tool Rear Washer Relay Command parameter changes between Active and Inactive when cycling the rear washer switch ON and OFF.
 - **If the parameter does not change**
Refer to Circuit/System Testing - Rear Wiper/Washer Switch Malfunction
 - **If the parameter changes**
3. Verify the G19 Rear Window Washer Pump turns on and off when commanding the Rear Washer Relay Inactive and Active with the scan tool
 - **If the G19 Rear Window Washer Pump does not turn ON and OFF**
Refer to Circuit/System Testing - Rear Washer Pump Malfunction
 - **If the G19 Rear Window Washer Pump turns ON and OFF**
4. All OK.

Circuit/System Testing

Rear Wiper/Washer Switch Malfunction

1. Ignition OFF and all vehicle systems OFF, disconnect the X3 harness connector at the S82 Windshield Wiper/Washer Switch. It may take up to 2 min for all vehicle systems to power down.
2. Test for less than 10 Ω between the low reference circuit terminal 1 and ground.
 - **If 10 Ω or greater**
 1. Ignition OFF.
 2. Test for less than 2 Ω in the low reference circuit end to end.
 - If 2 Ω or greater, repair the open/high resistance in the circuit.
 - If less than 2 Ω , replace the K9 Body Control Module.
 - **If less than 10 Ω**
3. Ignition ON.
4. Test for greater than 8 V between the signal circuit terminal 5 and ground.
 - **If less than 8 V**
 1. Ignition OFF, disconnect the harness connector at the K9 Body Control Module.
 2. Test for infinite resistance between the signal circuit and ground
 - If less than infinite resistance, repair the short to ground on the circuit.
 - If infinite resistance
 3. Test for less than 2 Ω in the signal circuit end to end.
 - If 2 Ω or greater, repair the open/high resistance in the circuit.
 - If less than 2 Ω , replace the K9 Body Control Module.
 - **If 8 V or greater**
5. Ignition OFF, disconnect the X2 harness connector at the K9 Body Control Module, ignition ON.
6. Test for less than 1 V between the S82 Windshield Wiper/Washer Switch signal circuit terminal 5 and ground.
 - **If 1 V or greater**
Repair the short to voltage on the circuit.
 - **If less than 1 V**
7. Test or replace the S82 Windshield Wiper/Washer Switch.

Rear Washer Pump Malfunction

1. Ignition OFF and all vehicle systems OFF, disconnect the X1 harness connector at the X50A Fuse Block - Underhood. It may take up to 10 min for all vehicle systems to power down.
2. Test for less than 10 Ω between the ground circuit terminal 12 and ground.
 - **If 10 Ω or greater**
 1. Ignition OFF.
 2. Test for less than 2 Ω in the ground circuit end to end.
 - If 2 Ω or greater, repair the open/high resistance in the circuit.
 - If less than 2 Ω , repair the open/high resistance in the ground connection.
 - **If less than 10 Ω**
3. Connect the X1 harness connector at the X50A Fuse Block - Underhood, disconnect the harness connector at the G19 Rear Window Washer Pump. It may take up to 2 min for all vehicle systems to power down.
4. Test for less than 10 Ω between the ground circuit terminal 2 and ground.
 - **If 10 Ω or greater**
 1. Ignition OFF.
 2. Test for less than 2 Ω in the ground circuit end to end.
 - If 2 Ω or greater, repair the open/high resistance in the circuit.
 - If less than 2 Ω , repair the open/high resistance in the ground connection.
 - **If less than 10 Ω**
5. Connect a test lamp between the control circuit terminal 1 and ground, ignition ON.
6. Verify the test lamp does not turn ON and OFF when commanding the Rear Washer Relay Active and Inactive with a scan tool.
 - **If the test lamp turns ON and OFF**

Test or replace the G19 Rear Window Washer Pump.
 - **If the test lamp does not turn ON and OFF**
7. Ignition OFF, connect the harness connector at the G19 Rear Window Washer Pump. Disconnect the X1 harness connector at the X50A Fuse Block-Underhood, ignition ON.
8. Verify the G19 Rear Window Washer Pump is not activated.
 - **If the G19 Rear Window Washer Pump is activated**
 1. Ignition OFF, disconnect the harness connector at the G19 Rear Window Washer Pump, ignition ON.
 2. Test for less than 1 V between the control circuit terminal 24 and ground.
 - If 1 V or greater, repair the short to voltage on the circuit.
 - If less than 1 V, test or replace the G19 Rear Window Washer Pump.
 - **If the G19 Rear Window Washer Pump is not activated**
9. Connect a 15 A fused jumper wire between the control circuit terminal 24 and B+.
10. Verify the G19 Rear Window Washer Pump activates.
 - **If the G19 Rear Window Washer Pump does not activate**
 1. Ignition OFF, remove the jumper wire, disconnect the harness connector at the G19 Rear Window Washer Pump, ignition ON.
 2. Test for infinite resistance between the control circuit and ground.
 - If less than Infinite resistance, repair the short to ground on the circuit.
 - If infinite resistance
 3. Test for less than 2 Ω in the control circuit end to end.
 - If 2 Ω or greater, repair the open/high resistance in the circuit.
 - If less than 2 Ω , test or replace the G19 Rear Window Washer Pump.
 - **If the G19 Rear Window Washer Pump activates**
11. Ignition OFF, connect the X1 harness connector at the X50A Fuse Block-Underhood, disconnect X1 harness connector at the K9 Body Control Module, ignition ON.
12. Verify the G19 Rear Window Washer Pump is not activated.

- **If the G19 Rear Window Washer Pump is activated**

1. Ignition OFF, disconnect the X2 harness connector at the X50A Fuse Block-Underhood.
2. Test for less than 1 volt between the K9 Body Control Module control circuit terminal 6 X1 and ground.
 - If 1 V or greater, repair the short to voltage on the circuit.
 - If less than 1 V, test or replace the X50A Fuse Block-Underhood.
13. Connect a 3 A fused jumper wire between the control circuit terminal 6 and B+.
14. Verify the G19 Rear Window Washer Pump activates.
 - **If the G19 Rear Window Washer Pump does not activate**
 1. Ignition OFF, remove the jumper wire, disconnect the X2 harness connector at the X50A Fuse Block-Underhood, ignition ON.
 2. Test for infinite resistance between the control circuit terminal 15 and ground.
 - If less than Infinite resistance, repair the short to ground on the circuit.
 - If infinite resistance
 3. Test for less than 2 Ω in the control circuit end to end.
 - If 2 Ω or greater, repair the open/high resistance in the circuit.
 - If less than 2 Ω , test or replace the X50A Fuse Block-Underhood.
 - **If the G19 Rear Window Washer Pump activates**
15. Replace the K9 Body Control Module.

Component Testing

Rear Windshield Washer Pump

1. Install a 15 A fused jumper wire between the B+ terminal 1 and 12 V. Install a jumper wire between the ground terminal 2 and ground.
2. Verify the G19 Rear Window Washer Pump activates.
 - **If the G19 Rear Window Washer Pump does not activate.**

Replace the G19 Rear Window Washer Pump.
 - **If the G19 Rear Window Washer Pump does activate.**
3. All OK

Repair Instructions

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

- **Engine Wiring Harness Junction Block Replacement**
- **Windshield Washer Pump Replacement**
- **Windshield Wiper and Washer Switch Replacement**
- **Control Module References** for body control module replacement, programming and setup.

REPAIR INSTRUCTIONS

WINDSHIELD WIPER AND WASHER SWITCH REPLACEMENT

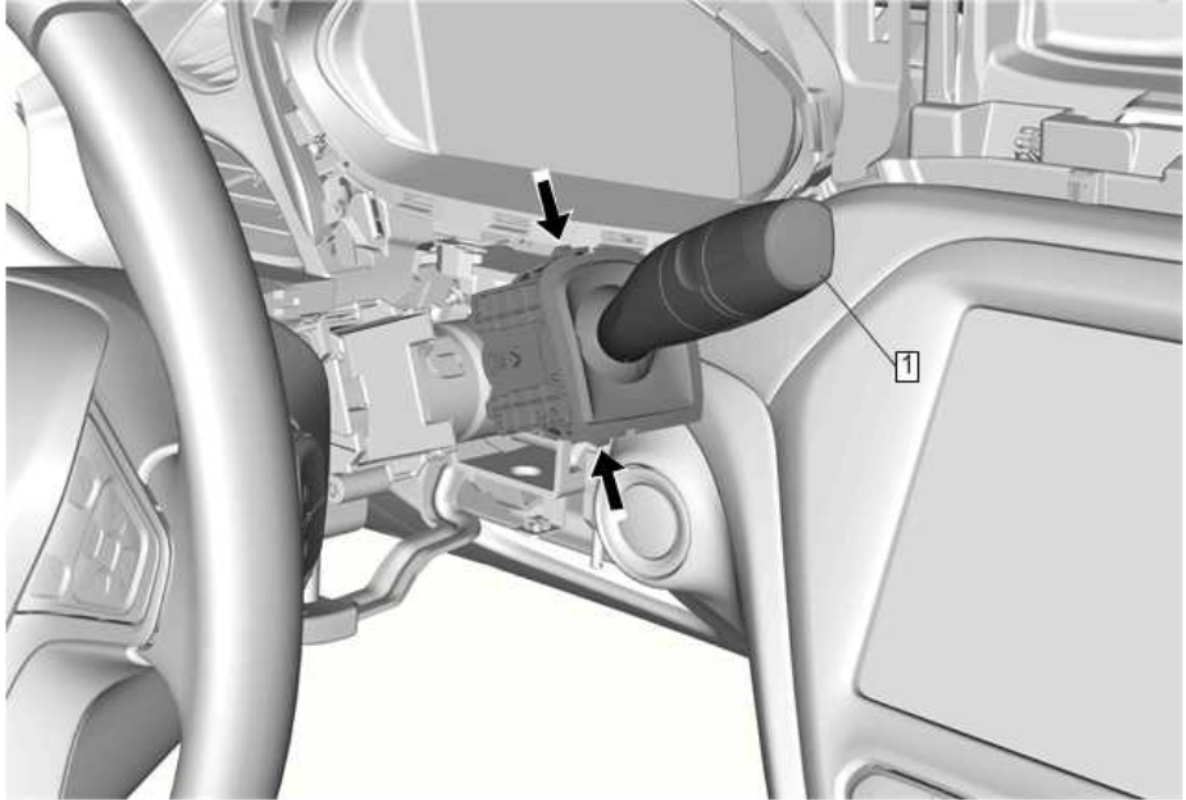


Fig. 4: Windshield Wiper and Washer Switch
 Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedure <u>Steering Column Lower Trim Cover Replacement</u>	
1	Windshield Wiper and Washer Switch Procedure 1. Release the retaining tabs and remove the windshield wiper and washer switch from the switch bracket. 2. Disconnect the electrical connector.

WINDSHIELD WASHER NOZZLE HOSE REPLACEMENT

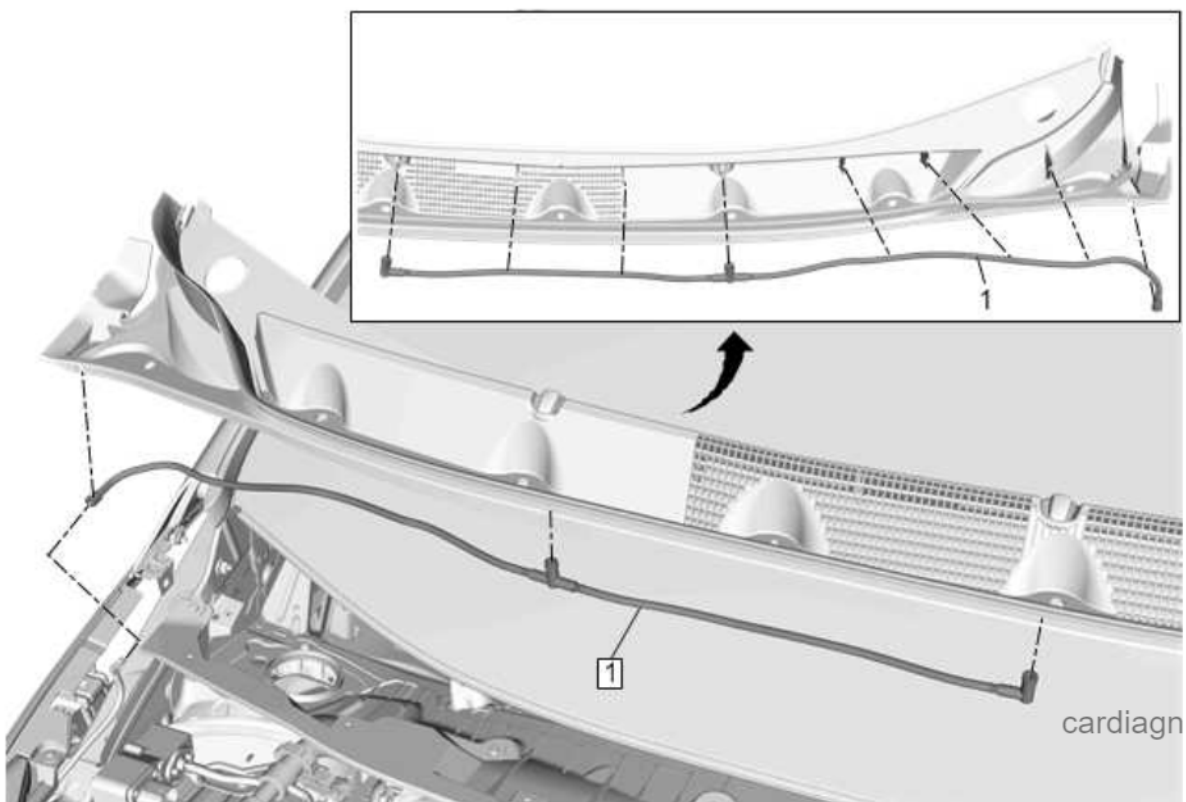


Fig. 5: Windshield Washer Nozzle Hose
 Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedures <u>Air Inlet Grille Panel Replacement</u> - Reposition air inlet grille foam seal.	
1	Windshield Washer Nozzle Hose Procedure - Disconnect Windshield Washer Nozzle Hose@Air Inlet Grille Panel - Disconnect Windshield Washer Nozzle Hose@Windshield Washer Nozzle - Remove Windshield Washer Nozzle Hose

WINDSHIELD WASHER NOZZLE REPLACEMENT

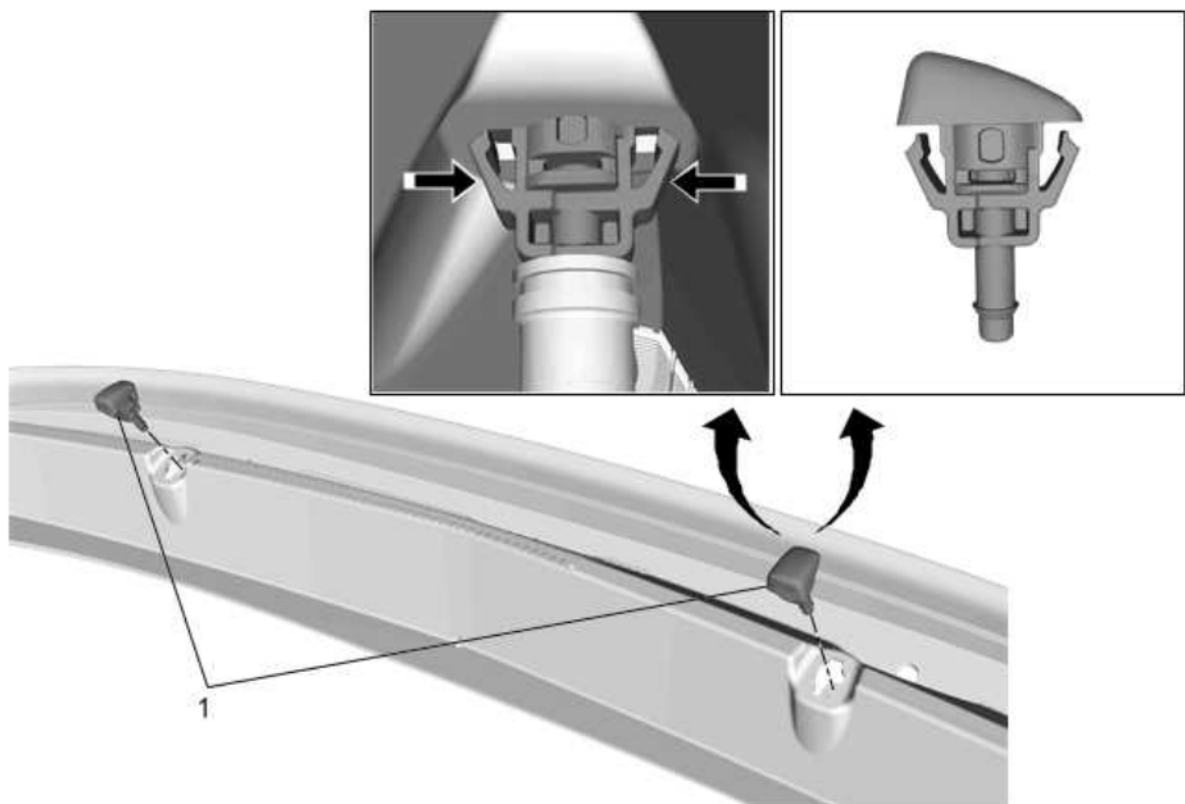


Fig. 6: Windshield Washer Nozzle
 Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedure <u>Air Inlet Grille Panel Replacement</u>	
1	Windshield Washer Nozzle Procedure - Press the retainer to unlock. - DisconnectWindshield Washer Nozzle@Windshield Washer Nozzle Hose

REAR WINDOW WASHER NOZZLE REPLACEMENT

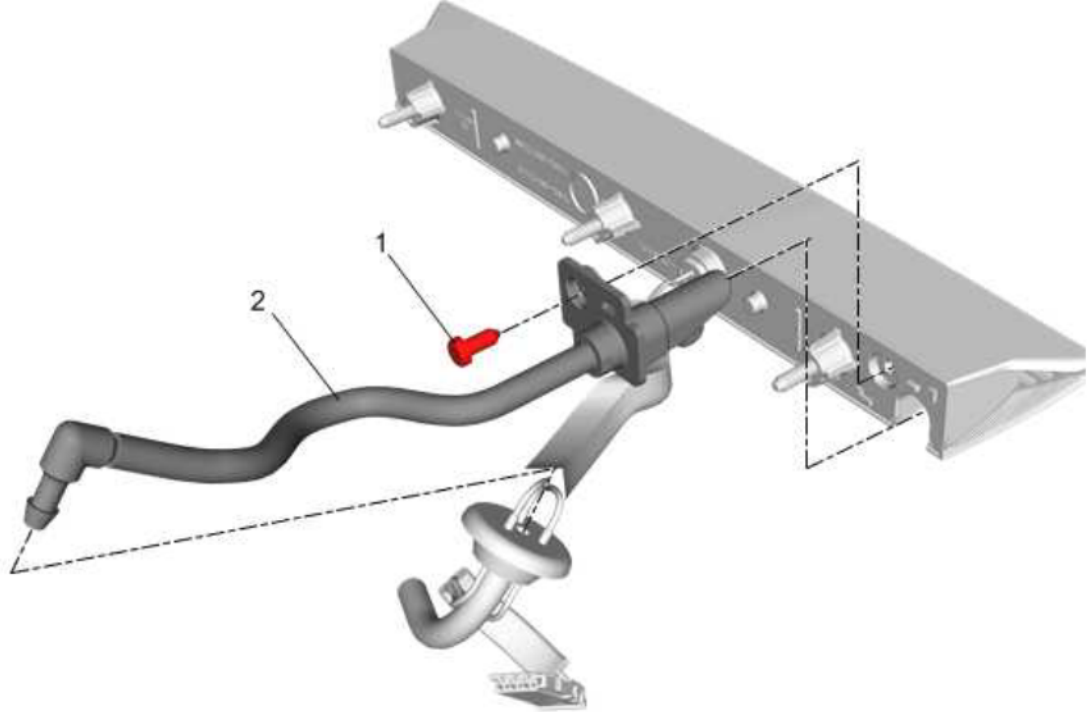


Fig. 7: Rear Window Washer Nozzle
 Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedure	
<u>High Mount Stop Lamp Replacement</u>	
1	Rear Window Washer Nozzle Retainer
2	Rear Window Washer Nozzle

WINDSHIELD WASHER SOLVENT CONTAINER FILLER TUBE REPLACEMENT

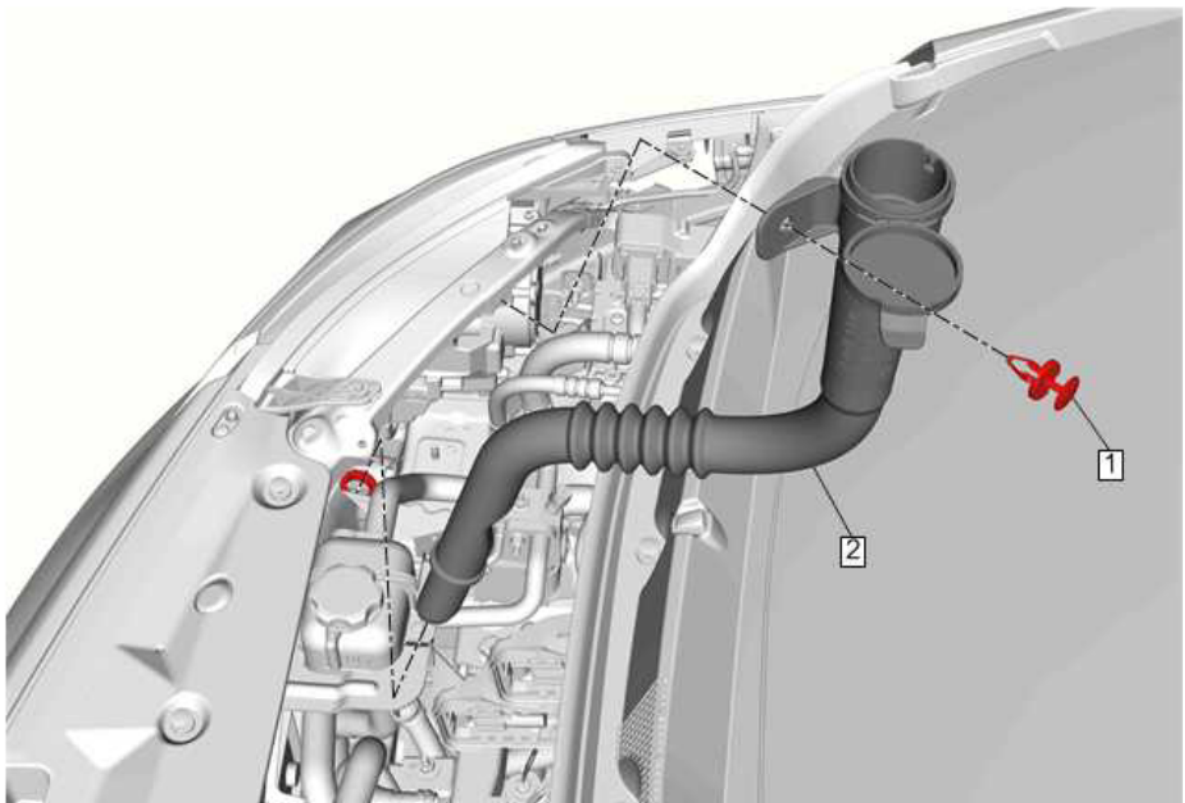


Fig. 8: Windshield Washer Solvent Container Filler Tube
 Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name

Callout	Component Name
1	Windshield Washer Solvent Container Filler Tube Retainer
2	Windshield Washer Solvent Container Filler Tube NOTE: Depending on the fluid level, fluid loss may occur when replacing the windshield washer solvent container filler tube.

WINDSHIELD WASHER SOLVENT CONTAINER REPLACEMENT

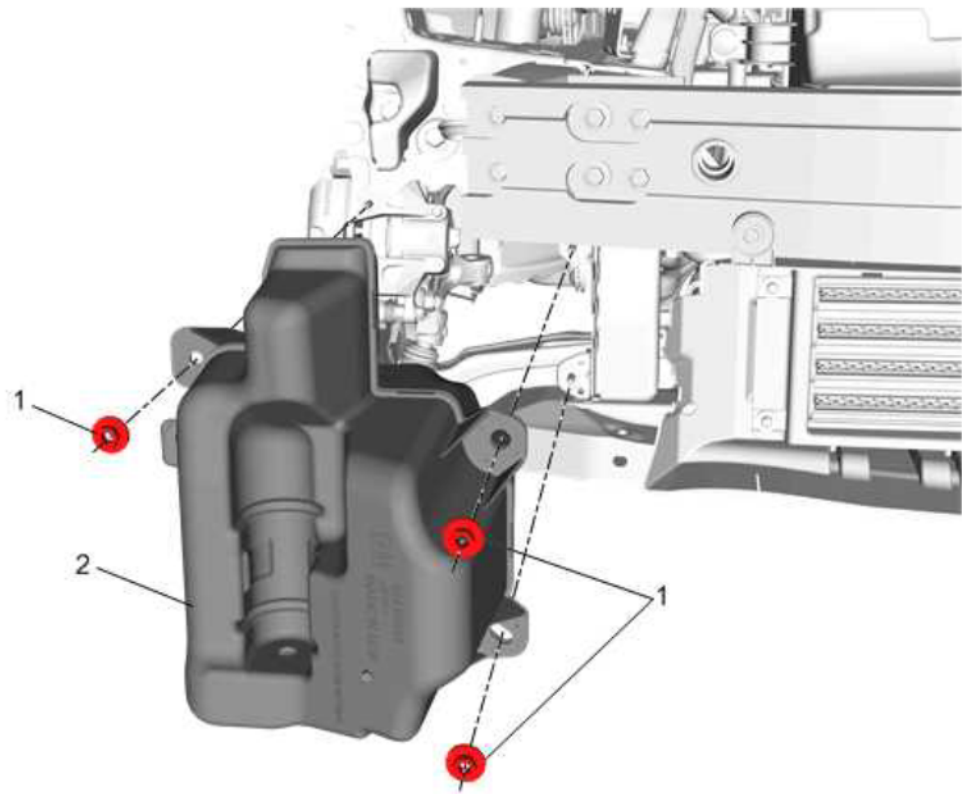


Fig. 9: Windshield Washer Solvent Container
 Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedures Front Bumper Fascia Replacement (North America) Front Bumper Fascia Replacement (Europe, Korea) Windshield Washer Solvent Container Filler Tube Replacement	
1	Windshield Washer Solvent Container Nut (Qty: 3) CAUTION: Fastener Caution Tighten 5 N.m (44 lb in)

Callout	Component Name
2	Windshield Washer Solvent Container Procedure 1. Unclip the harness and hose from the container. 2. Drain the windshield washer solvent into a suitable clean container. 3. Transfer components as necessary. 4. Fill the windshield washer solvent container after installation. NOTE: Inspect windshield washer pump seal and replace it, if damaged.

WINDSHIELD WASHER PUMP REPLACEMENT

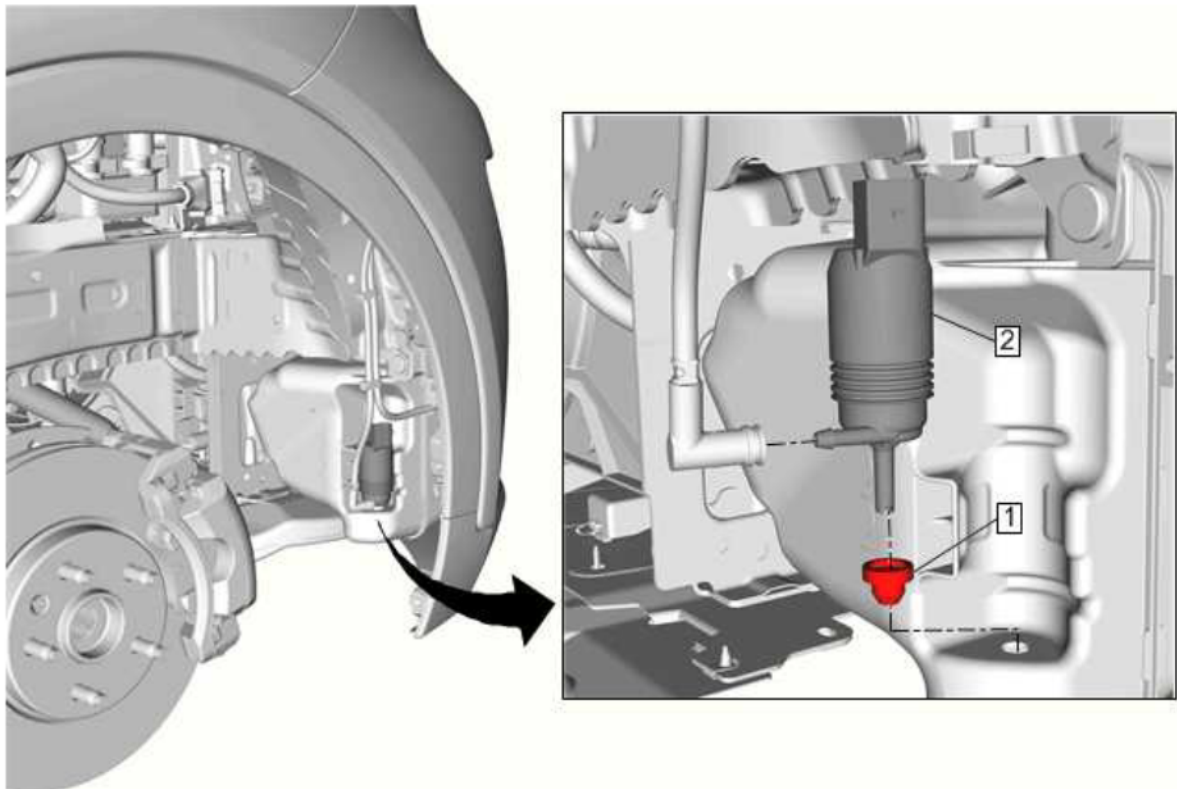


Fig. 10: Windshield Washer Pump
Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedure Remove Front Wheelhouse Liner - Right Side Front Wheelhouse Liner Replacement	
1	Windshield Washer Pump Grommet Procedure Using a small flat-bladed tool, remove the windshield washer pump grommet from the windshield washer solvent container and inspect the grommet. Replace if damaged.
2	Windshield Washer Pump Procedure 1. Disconnect the electrical connector. 2. Drain the windshield washer solvent container into a clean suitable container. 3. Disconnect Windshield Washer Pump Hose@Windshield Washer Pump 4. Using a small flat-bladed tool, remove the windshield washer pump from the windshield washer solvent container.

REAR WINDOW WASHER PUMP REPLACEMENT

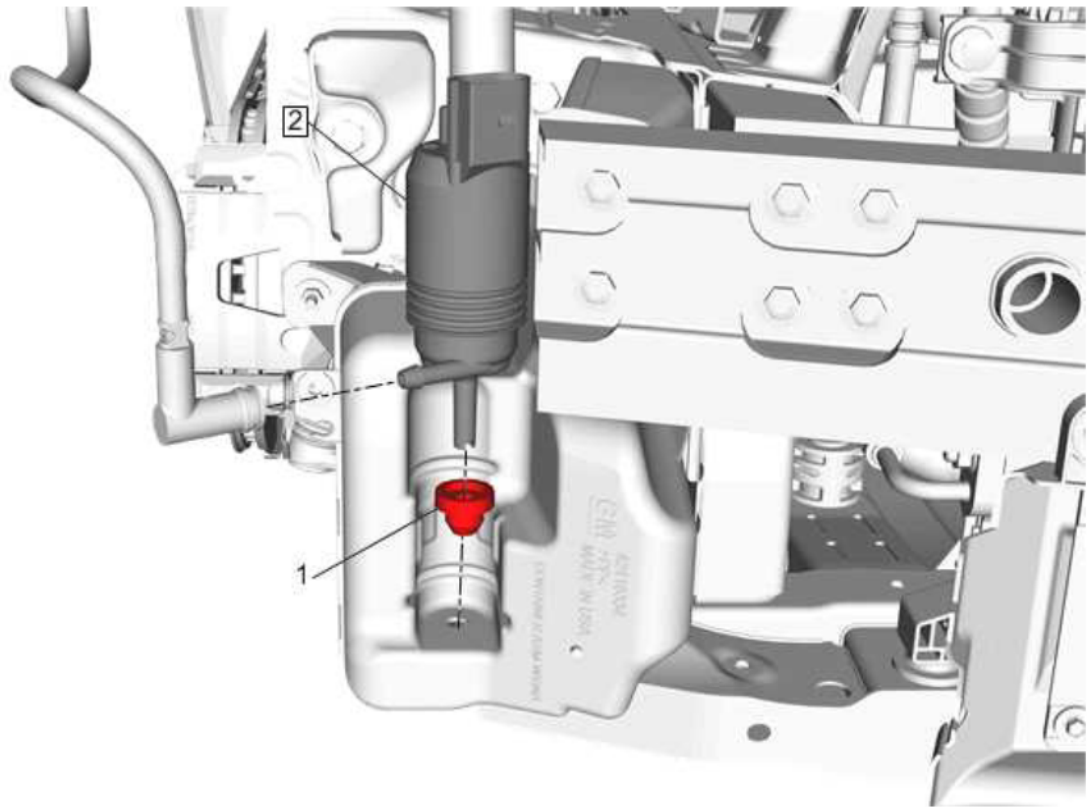


Fig. 11: Rear Window Washer Pump
Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedure <u>Front Bumper Fascia Replacement (North America) Front Bumper Fascia Replacement (Europe, Korea)</u>	
1	Rear Window Washer Pump Grommet Procedure Using a small flat-bladed tool, remove the rear window washer pump grommet from the windshield washer solvent container and inspect the grommet. Replace if damaged.
2	Rear Window Washer Pump Procedure 1. Disconnect the electrical connector. 2. Drain the windshield washer solvent container into a clean suitable container. 3. Disconnect Windshield Washer Pump Hose@Windshield Washer Pump 4. Using a small flat-bladed tool, remove the rear window washer pump from the windshield washer solvent container.

DASH PANEL UPPER EXTENSION PANEL EXTENSION REPLACEMENT

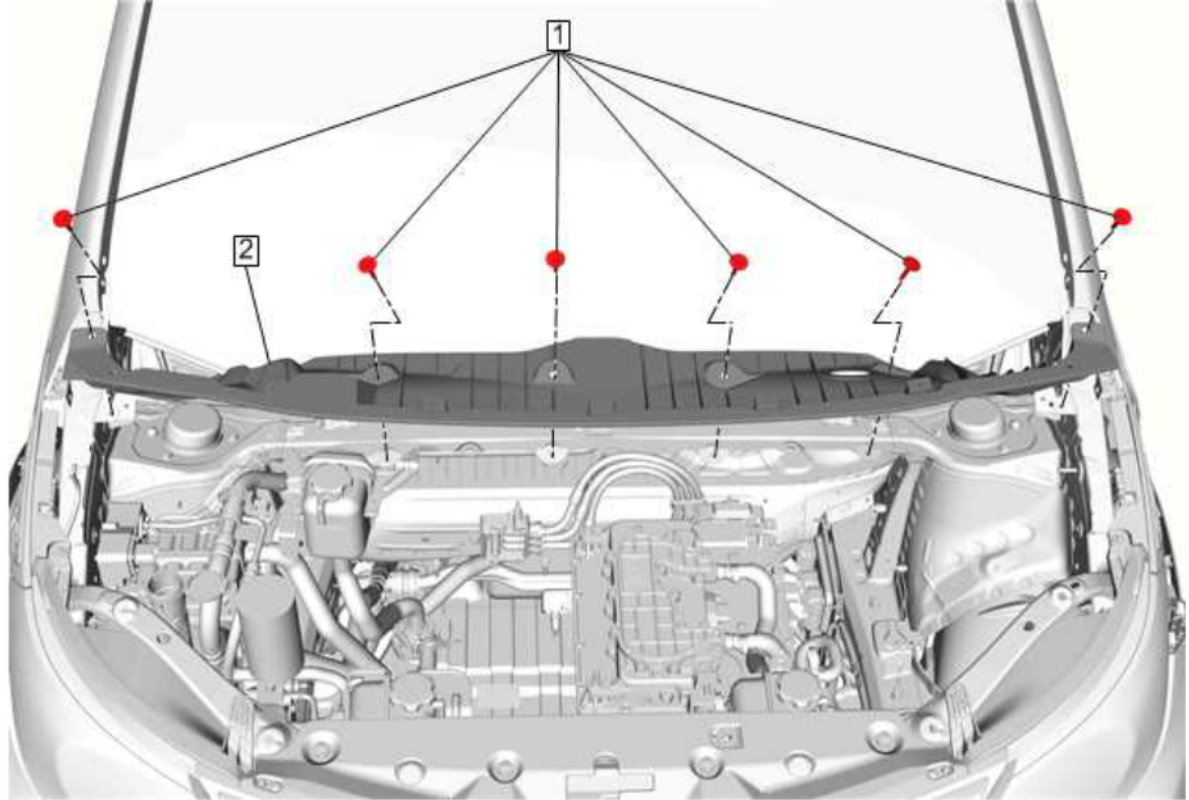


Fig. 12: Dash Panel Upper Extension Panel Extension

Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedures <u>Air Inlet Grille Panel Replacement</u> <u>Windshield Wiper System Module Replacement</u>	
1	Air Inlet Grille Panel Bolt (Qty: 6) CAUTION: <u>Fastener Caution</u> Tighten 4.5 N.m (40 lb in)
2	Dash Panel Upper Extension Panel Extension Procedure Route the electrical harness passthroughs through the extension panel.

AIR INLET GRILLE PANEL REPLACEMENT

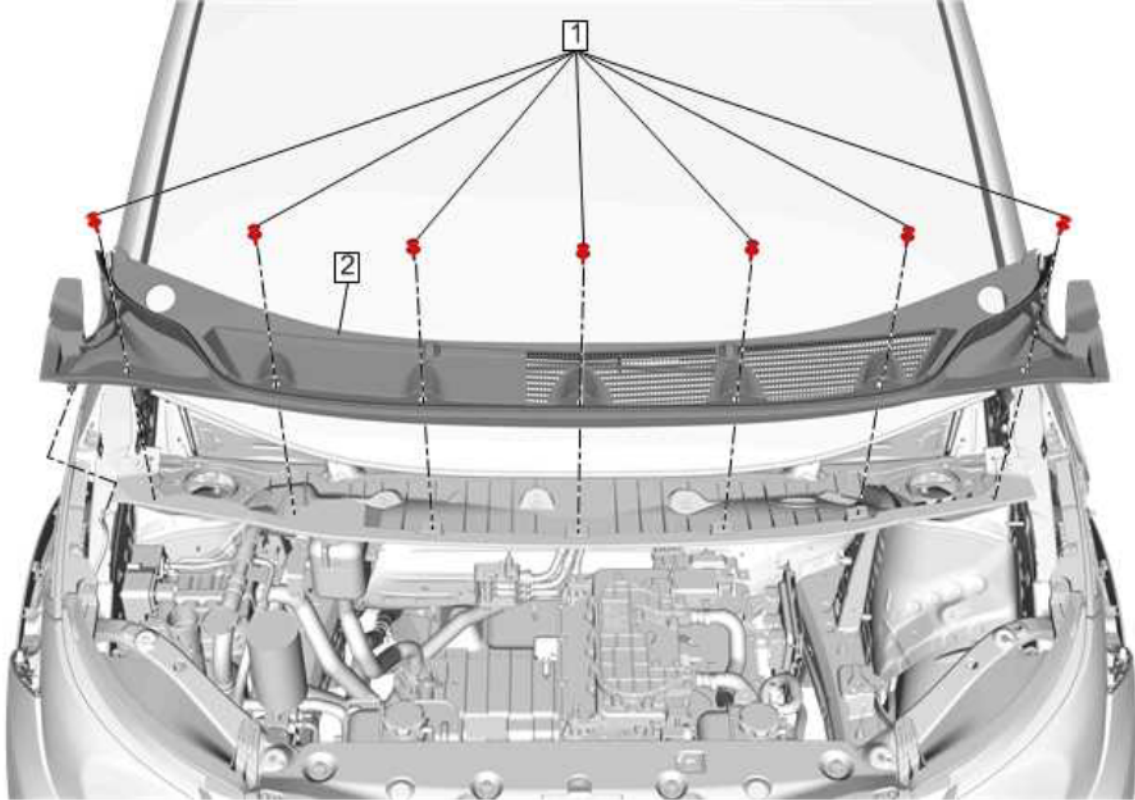


Fig. 13: Air Inlet Grille Panel
 Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedures Windshield Wiper Arm Replacement Air Inlet Grille Panel Extension Replacement	
1	Air Inlet Grille Panel Retainer Procedure Remove Air Inlet Grille Panel Retainer@Air Inlet Grille Panel
2	Air Inlet Grille Panel Procedure Disconnect Windshield Washer Nozzle Hose@Windshield Washer Pump Hose Windshield Washer Nozzle Hose Replacement

AIR INLET GRILLE PANEL EXTENSION REPLACEMENT

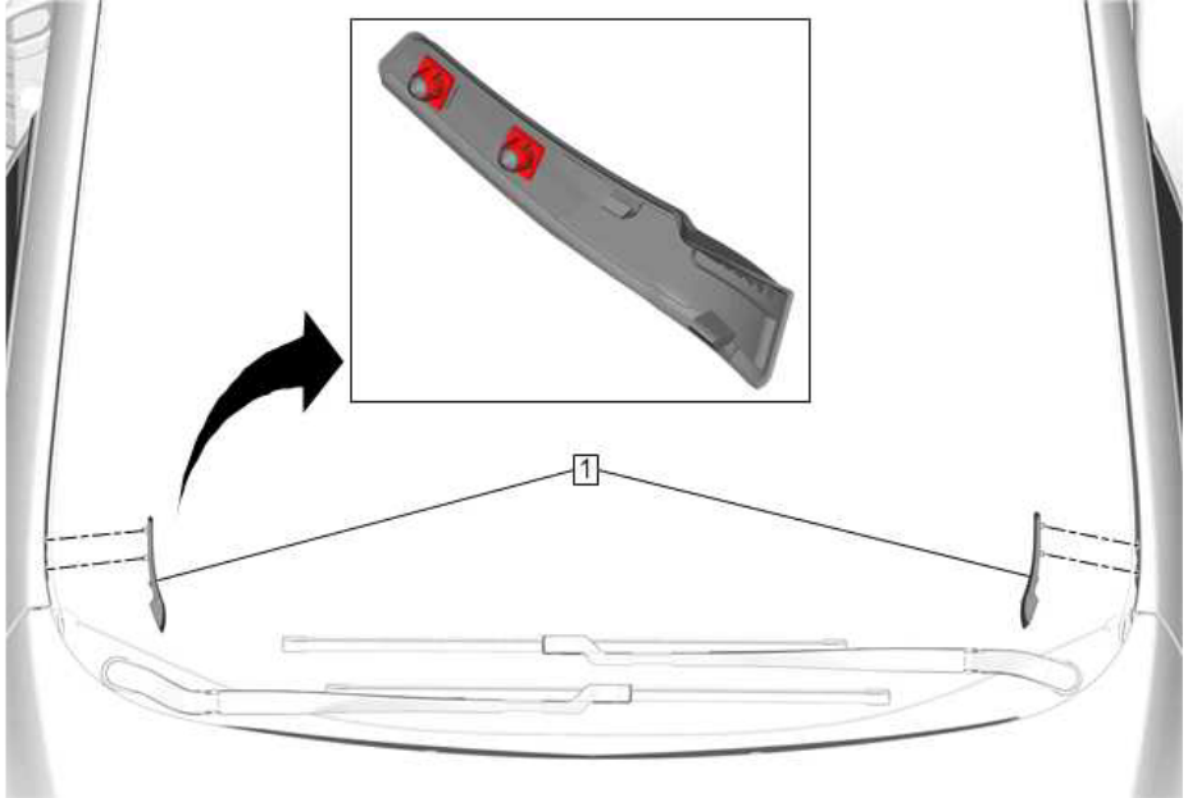


Fig. 14: Air Inlet Grille Panel Extension

Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
1	Air Inlet Grille Panel Extension Procedure Grasp the air inlet grille panel extension and disengage the retainers from the body side outer.

WINDSHIELD WIPER ARM REPLACEMENT

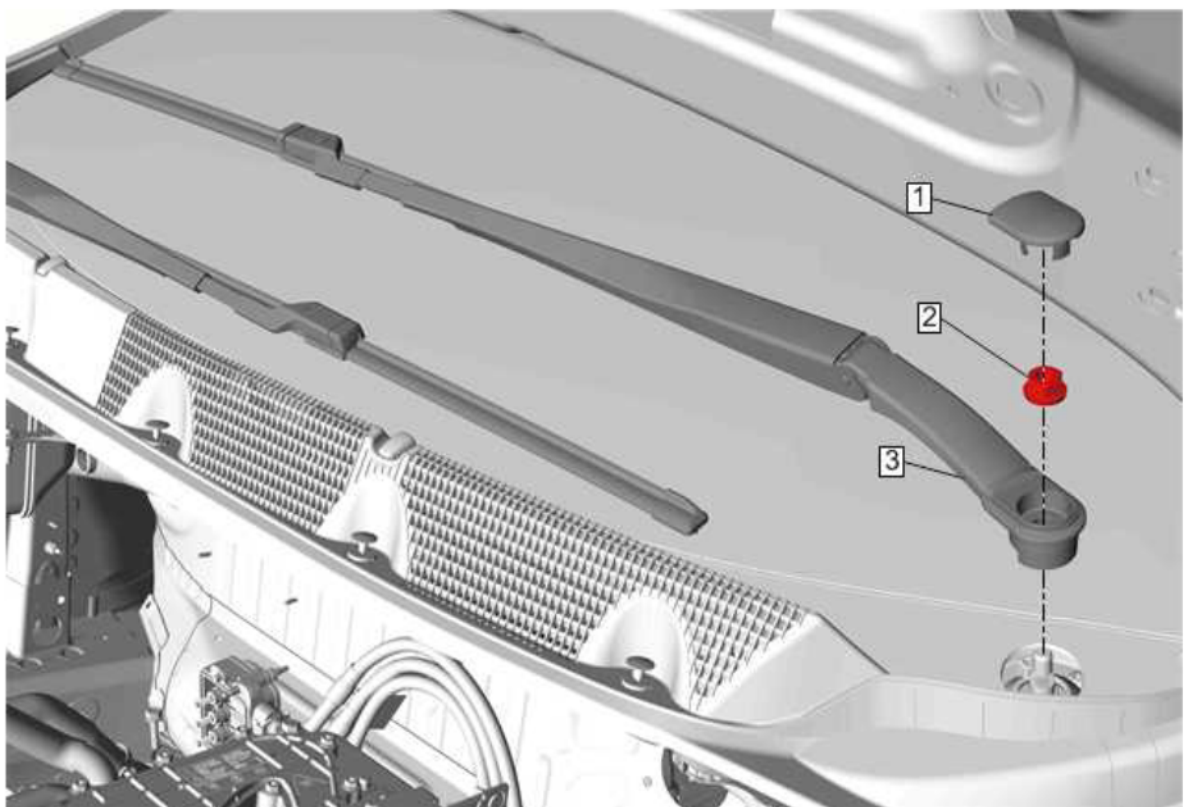


Fig. 15: Windshield Wiper Arm

Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name	cardiagn.com

Callout	Component Name
1	Windshield Wiper Arm Finish Cap Procedure Use a flat bladed plastic tool to remove.
2	Windshield Wiper Arm Nut CAUTION: <u>Fastener Caution</u> Tighten 30 N.m (22 lb ft)
3	Windshield Wiper Arm Procedure 1. Gently rock the windshield wiper arm to remove it from the windshield wiper transmission pivot shaft. 2. Clean the pivot shaft knurls with a soft wire brush before installing a NEW windshield wiper arm. 3. Windshield Wiper Arm - Adjust - <u>Windshield Wiper Arm Adjustment</u> NOTE: Turn the ignition switch ON. The powering on of the motor before arm installation is required to prevent module pivot shaft rotation when fastening the nut.

REAR WINDOW WIPER ARM REPLACEMENT

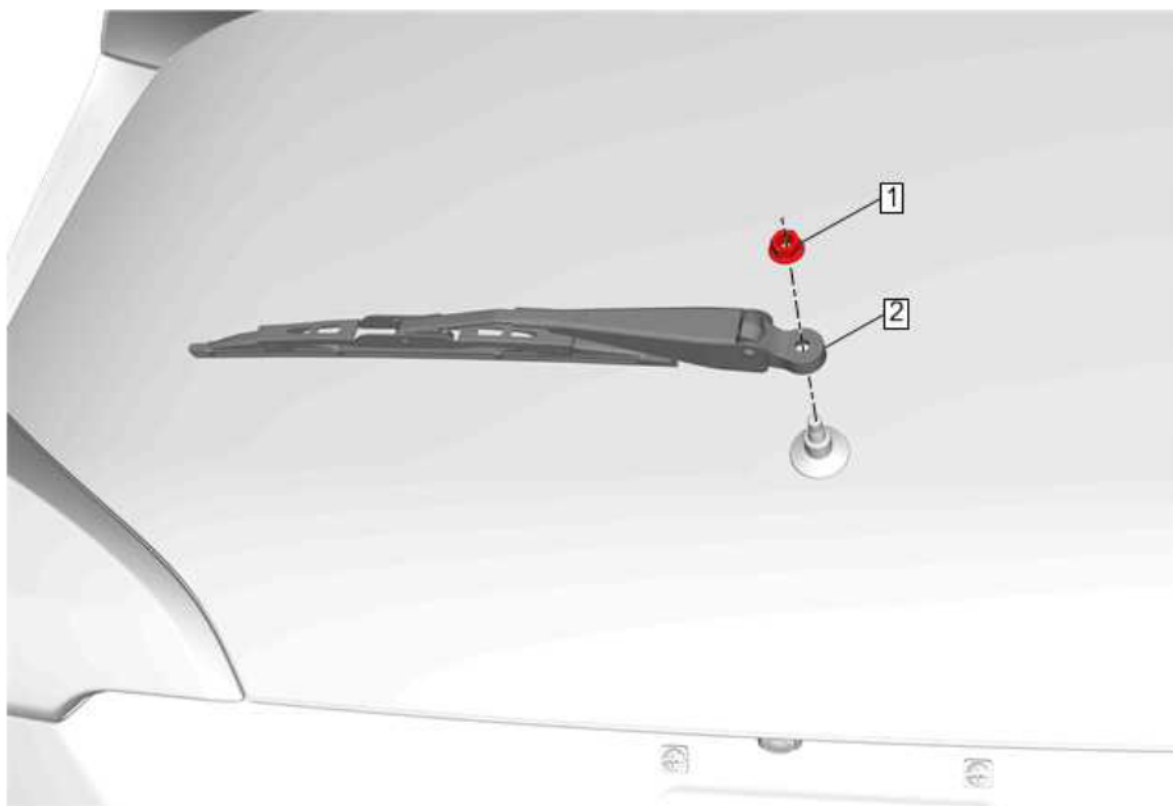


Fig. 16: Rear Window Wiper Arm
 Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedure <u>Rear Window Wiper Cover Replacement</u>	
cardiagn.com	

Callout	Component Name
1	Rear Window Wiper Arm Nut CAUTION: <u>Fastener Caution</u> Tighten 10 N.m (89 lb in)
2	Rear Window Wiper Arm Procedure 1. Note the location of the arm and mark it with tape. 2. Gently rock the arm to release it. 3. Use the J-39822 Wiper Arm Puller or equivalent, if difficulty is encountered. Special Tools J-39822 Wiper Arm Puller For equivalent regional tools, refer to <u>Special Tools</u> .

WINDSHIELD WIPER BLADE REPLACEMENT

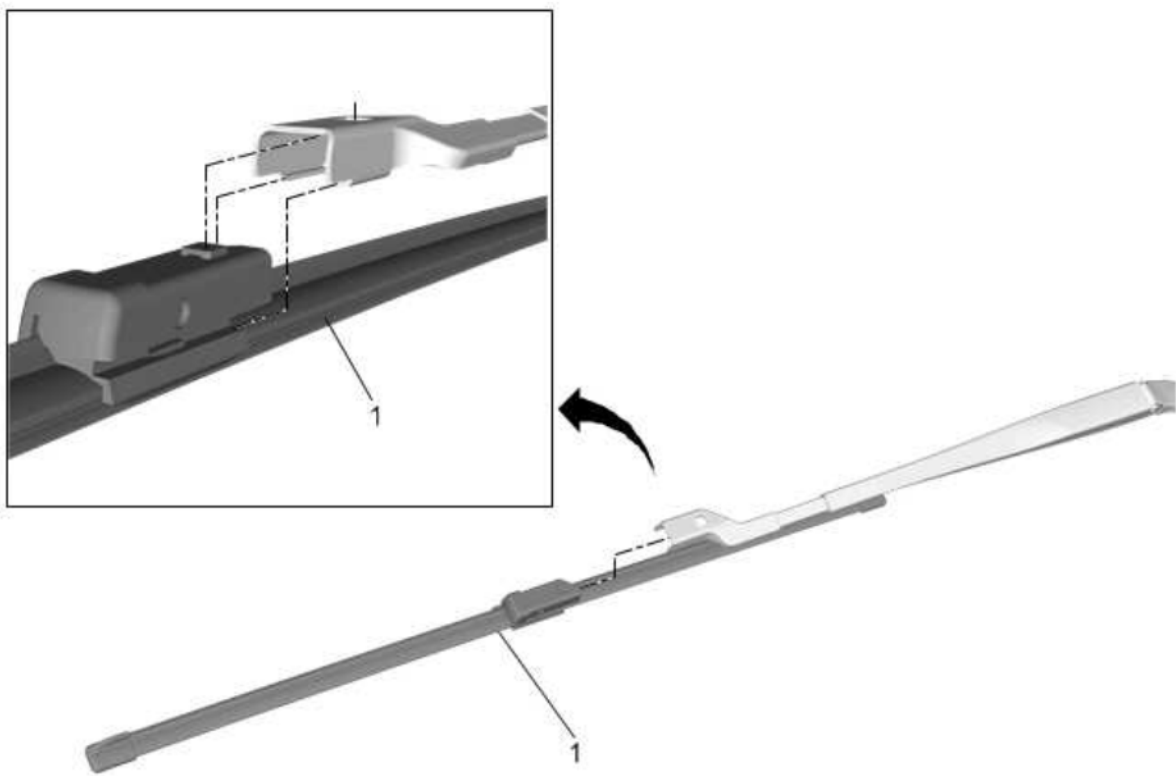


Fig. 17: Windshield Wiper Blade
Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name

Callout	Component Name
1	Windshield Wiper Blade Procedure 1. Lift the windshield wiper arm off the windshield to the service up position. 2. Depress the windshield wiper arm tab at the small square hole in the windshield wiper arm. 3. Slide the windshield wiper blade forward and remove it from the windshield wiper arm. 4. Gently return the windshield wiper arm to the windshield.

REAR WINDOW WIPER BLADE REPLACEMENT

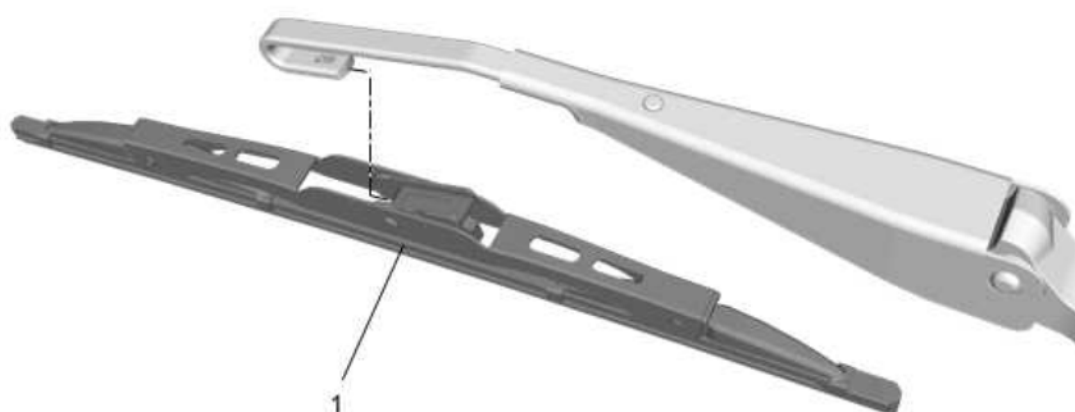


Fig. 18: Rear Window Wiper Blade

Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedure <u>Rear Window Wiper Cover Replacement</u>	
1	Rear Window Wiper Blade Procedure 1. Lift the rear window wiper arm off the liftgate glass. 2. Depress the rear window wiper arm tab at the small square hole in the rear window wiper arm. 3. Rotate the rear window wiper blade slightly and slide the rear window wiper blade downward from the rear window wiper arm. 4. Gently return the rear window wiper arm to the liftgate glass.

REAR WINDOW WIPER MOTOR REPLACEMENT

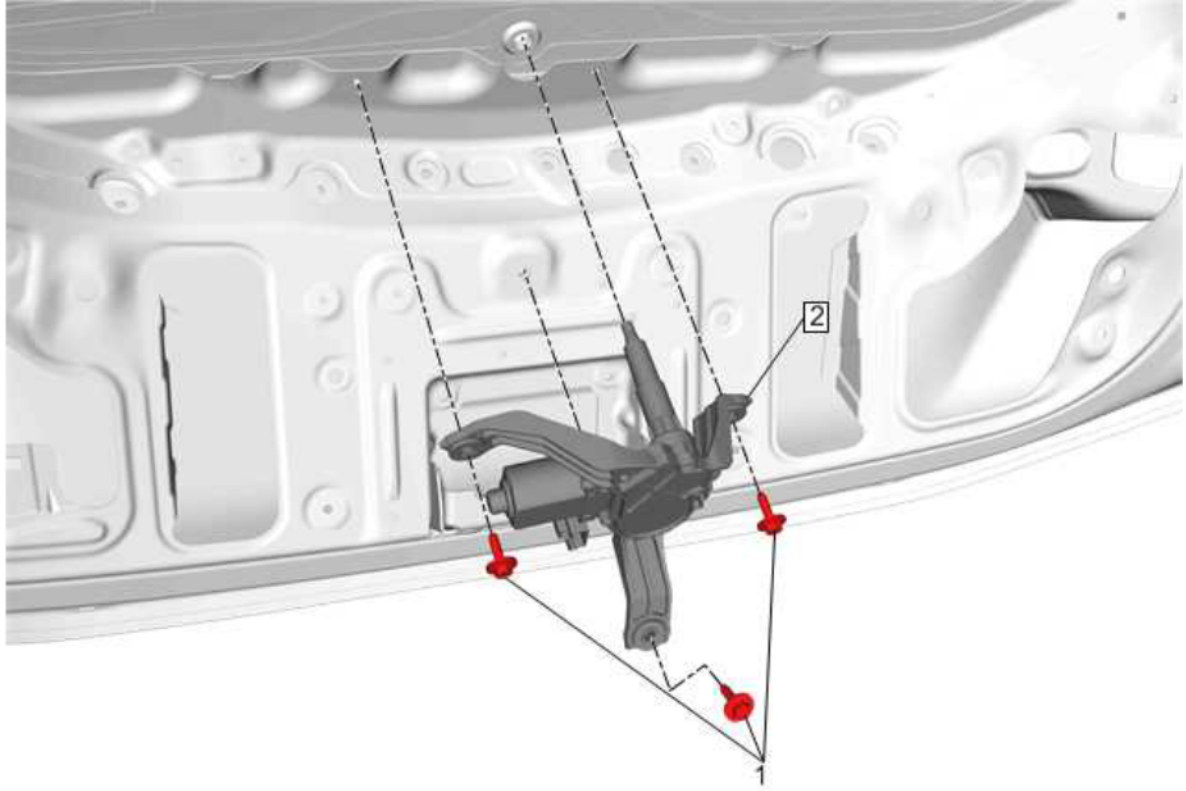


Fig. 19: Rear Window Wiper Motor
 Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedures <u>Liftgate Lower Trim Finish Panel Replacement</u> <u>Rear Window Wiper Arm Replacement</u>	
1	Rear Window Wiper Motor Bolt (Qty: 3) CAUTION: <u>Fastener Caution</u> Tighten 9 N.m (80 lb in)
2	Rear Window Wiper Motor Procedure 1. Pull the rear window wiper motor inward from the rear liftgate. 2. Disconnect the electrical connector. 3. Inspect the rear window wiper motor grommet for damage. Replace if needed.

REAR WINDOW WIPER COVER REPLACEMENT



Fig. 20: Rear Window Wiper Cover
 Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
1	Rear Window Wiper Cover Procedure 1. Release the integral retainers at the pivot side. 2. Slide the cover toward the arm side to release the hook feature (towards the arrow).

WINDSHIELD WIPER SYSTEM MODULE REPLACEMENT

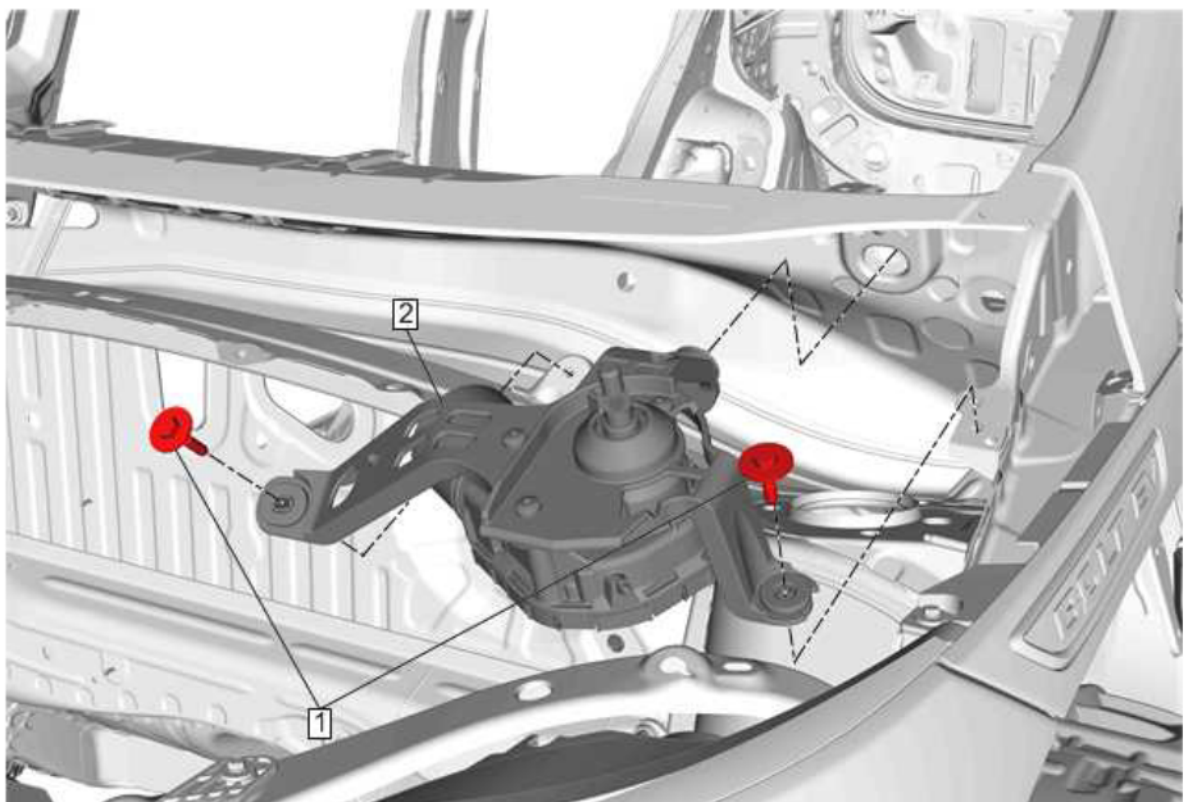


Fig. 21: Windshield Wiper System Module
 Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedure <u>Air Inlet Grille Panel Replacement</u>	
1	Windshield Wiper System Module Bolt (Qty: 2) CAUTION: <u>Fastener Caution</u> Tighten 9 N.m (80 lb in)
2	Windshield Wiper System Module Procedure Disconnect the electrical connector.

WINDSHIELD MULTIFUNCTION SENSOR MOUNT BRACKET COVER REPLACEMENT (WITH FRONT VIEW CAMERA)

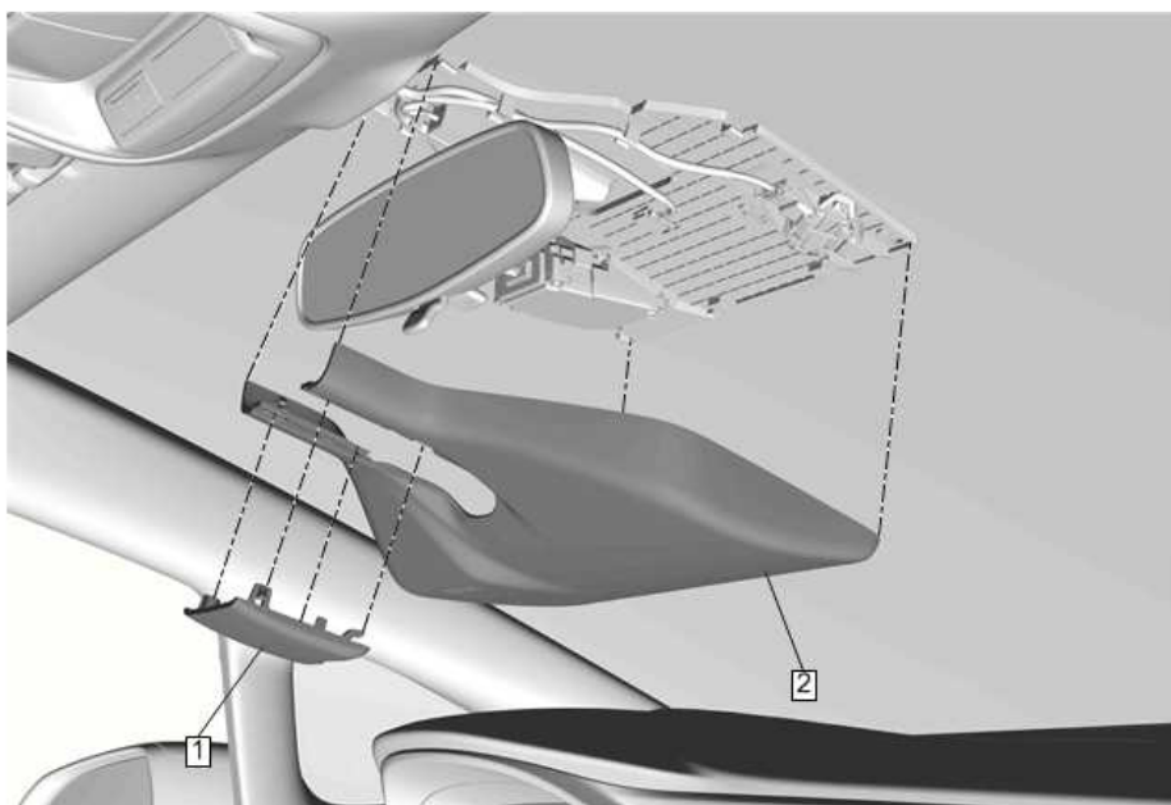


Fig. 22: Windshield Multifunction Sensor Mount Bracket Cover

Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
1	Windshield Multifunction Sensor Mount Bracket Cover Insert
2	Windshield Multifunction Sensor Mount Bracket Cover Procedure 1. Using a plastic trim tool, release the cover from the windshield bracket. 2. Remove Windshield Multifunction Sensor Mount Bracket Cover Insert@Windshield Multifunction Sensor Mount Bracket Cover

WINDSHIELD MULTIFUNCTION SENSOR MOUNT BRACKET COVER REPLACEMENT (WITHOUT FRONT VIEW CAMERA)

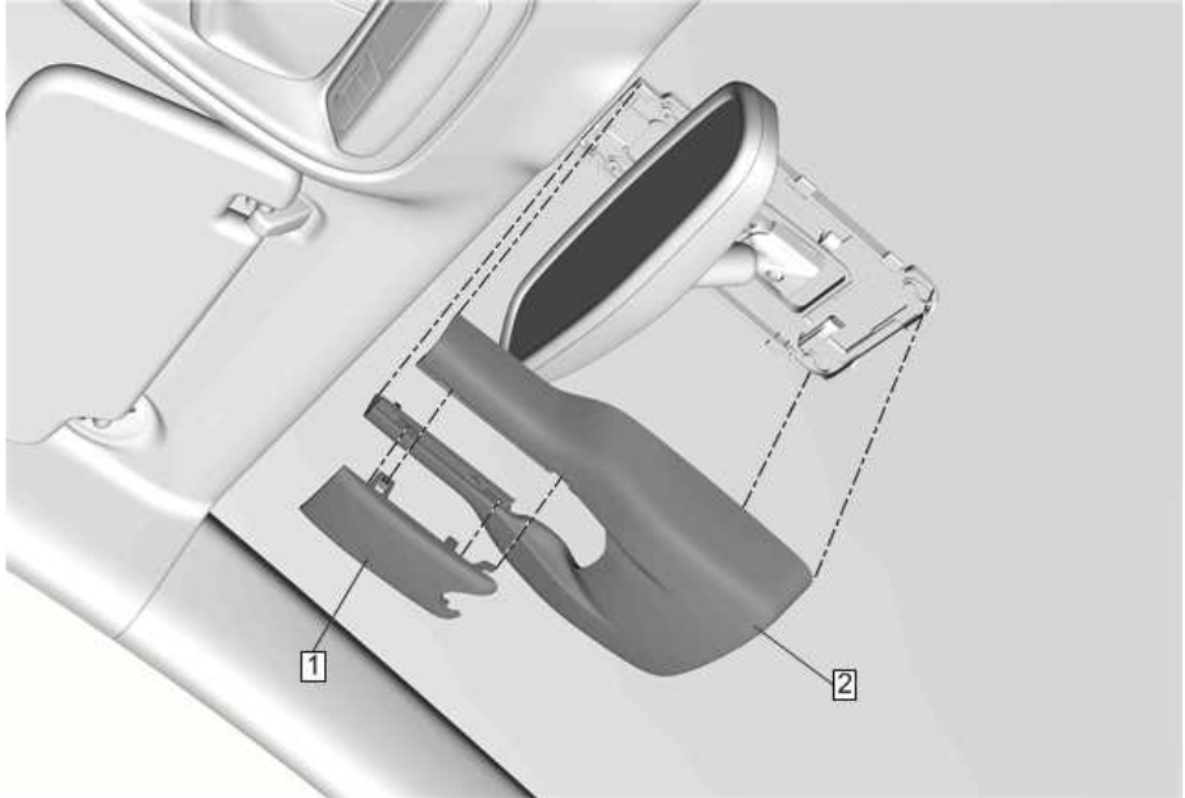


Fig. 23: Windshield Multifunction Sensor Mount Bracket Cover

Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
1	Windshield Multifunction Sensor Mount Bracket Cover Insert
2	Windshield Multifunction Sensor Mount Bracket Cover Procedure 1. Using a plastic trim tool, release the cover from the windshield bracket. 2. Remove Windshield Multifunction Sensor Mount Bracket Cover Insert@Windshield Multifunction Sensor Mount Bracket Cover

WINDSHIELD WIPER ARM ADJUSTMENT

Adjustment Procedure

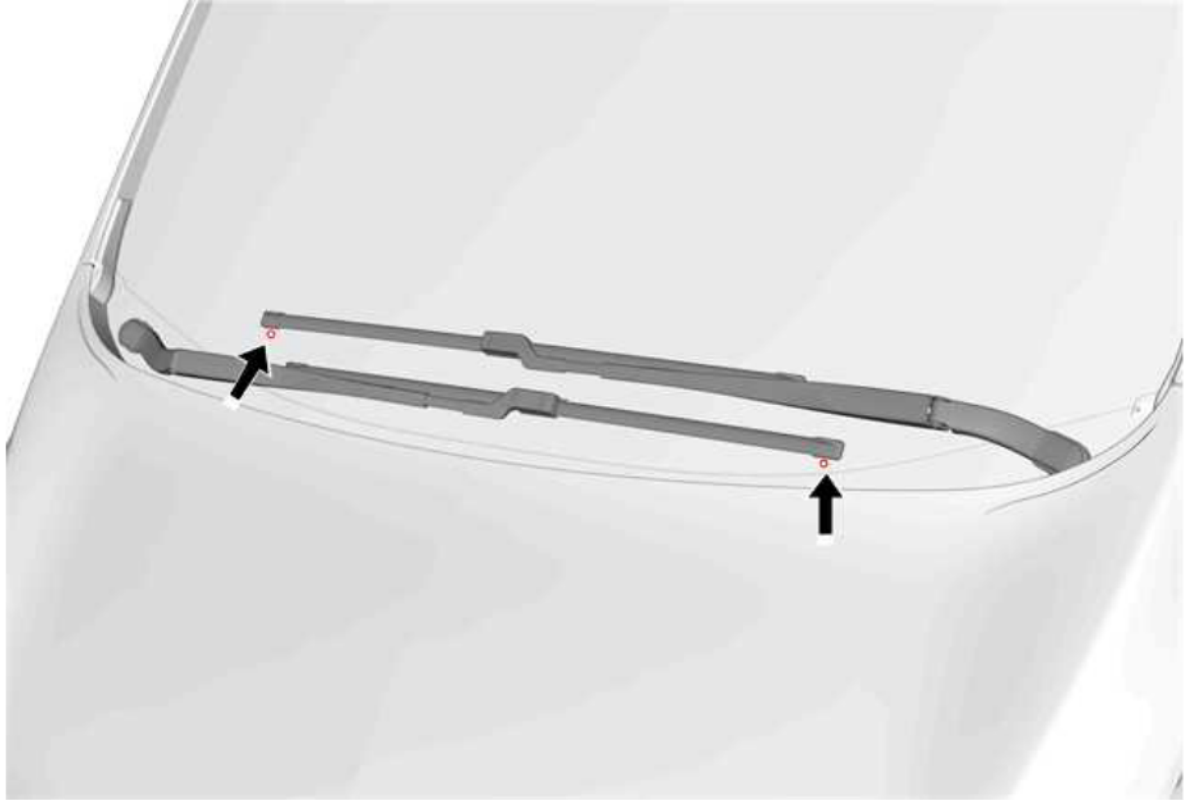


Fig. 24: Windshield Wiper Arms

Courtesy of GENERAL MOTORS COMPANY

1. Check the mark to install the wiper arm at the lower blackout of the windshield.
2. Position the wiper arm blade to this mark.

NOTE: When installing the windshield wiper arm, perform this procedure for wiper arm to be in original position.

DESCRIPTION AND OPERATION

WIPER/WASHER SYSTEM DESCRIPTION AND OPERATION

Wiper/Washer System Components

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

- Windshield Washer Pump Relay
- Windshield Washer Pump
- Windshield Wiper Motor Module Right
- Windshield Wiper Motor Module Left
- Windshield Wiper/Washer Switch
- Body Control Module (BCM)
- Windshield Washer Fluid Level Switch
- Underhood Fuse Block (Contains Windshield Washer Pump PCB Relay)
- Rain Sensor
- Instrument Cluster
- Instrument Panel Right

Windshield Wiper System

The body control module (BCM) controls the wiper motor based on an input from the wiper switch, and when wiper operation is requested, the BCM will send serial data messages to the windshield wiper motor module. The front wiper systems consists of the driver's side (Windshield Wiper Motor Module Left), and the passenger's side Wiper Arm (Windshield Wiper Motor Module Right) which are connected by a mechanical linkage driven by both windshield wiper motor modules. The windshield wiper motor module contains the necessary electronics, motor, and position sensors to execute front wiper commands from the BCM. These internal electronics are integrated into the

cover of the wiper motor gear housing and are not considered a serviceable item. The windshield wiper motor module wipes the front windshield by controlling the up and down wiper arm movement by the use of a reversing motor and an internal position sensor. The sensor keeps track of the gear wheel position and when the Controller determines that the wiper arms are at a position to reverse direction, it reverses the motor supply voltage by use of its internal motor control circuitry. The BCM also provides a hardwired redundant output that switches Battery power to the Wiper Motor upon activation of its low assertion High Speed Wiper Switch input.

The BCM utilizes resistive multiplexing through the wiper switch to discern the requested action from the driver. The BCM will respond by commanding the specific wiper function to operate as follows:

1. Using intermittent wipes, the wipers pause briefly on the windshield. If the wiper level is moved to OFF or if additional wipes are not required, the wipers may move to the base of the windshield.
2. If the ignition is put in OFF while the wipers are on LO, HI, or INT, they will immediately stop.
3. If the ignition is put in OFF while the wipers are performing wipes due to windshield washing, the wipers continue to run until they reach the base of the windshield.
4. Perform one immediate wipe by issuing a serial data signal set to low wipes. The windshield wiper motor shall initiate low speed wiper operation and send a serial data signal back set to low wiping.
5. Upon the wipers leaving their PARKED position, the windshield wiper motor shall send a serial data signal indicating the wipers are no longer in park.
6. Upon receipt of the Wiper out of Park serial data signal, the BCM shall transition the windshield wiper motor command serial data signal to Park. While the wiper system smart is in the process of moving the wipers to their parked position, it shall set the value of its wiper front status serial data signal to Parking.

The wipe delay interval is a function of the INTERMITTENT Delay Interval Switch setting. When enabled, the Intermittent with Speed feature affects each of the 5 normal Intermittent Delay Intervals as a function of vehicle Speed. The Delay Intervals shall be biased to a shorter delay period with faster vehicle speeds and to a longer delay period with a slower vehicle speed.

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 (1X) 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.

To initiate high speed wiping operation, the BCM provides continuous high speed wiper operation through setting the serial data signal to high speed Wipe. When the wiper switch lever is moved to the high position (HI) and released, high speed wiper motor operation is started and high speed wiping operation is performed.

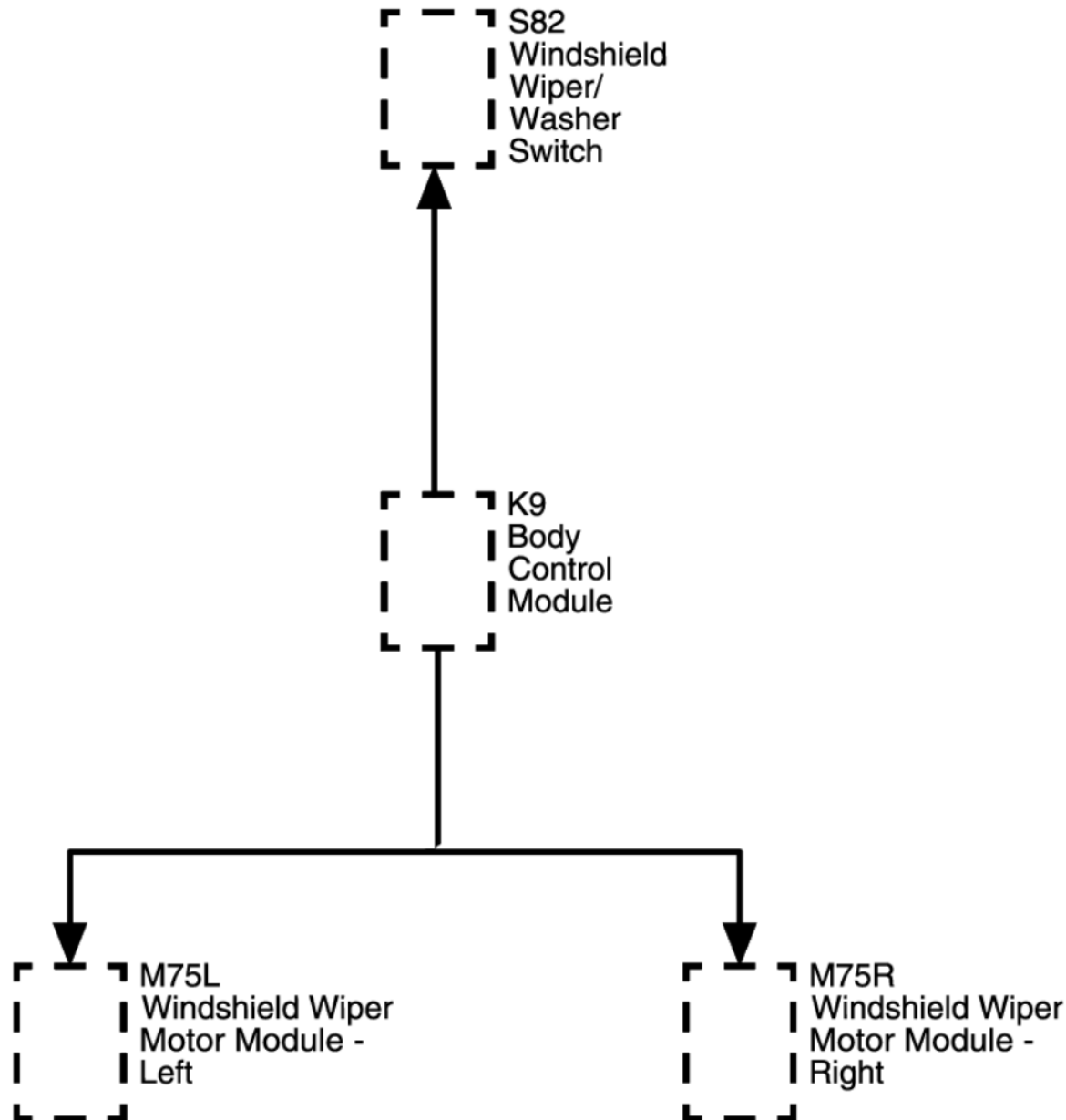


Fig. 25: Windshield Wiper/Washer Switch
 Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
S82	S82 Windshield Wiper/Washer Switch
K9	K9 Body Control Module
M75R	Windshield Wiper Motor Module - Right
M75L	Windshield Wiper Motor Module - Left

Windshield Washer System

The windshield washer pump is controlled by the body control module (BCM) via a printed circuit board (PCB) relay. When the washer switch is depressed, the BCM's internally pulled high resistor is pulled low by the washer request circuit. The BCM then applies voltage through a control circuit to the PCB windshield washer pump relay. With the relay energized, fused battery voltage is applied through the switch contacts of the relay and the control circuit to activate the windshield washer fluid pump.

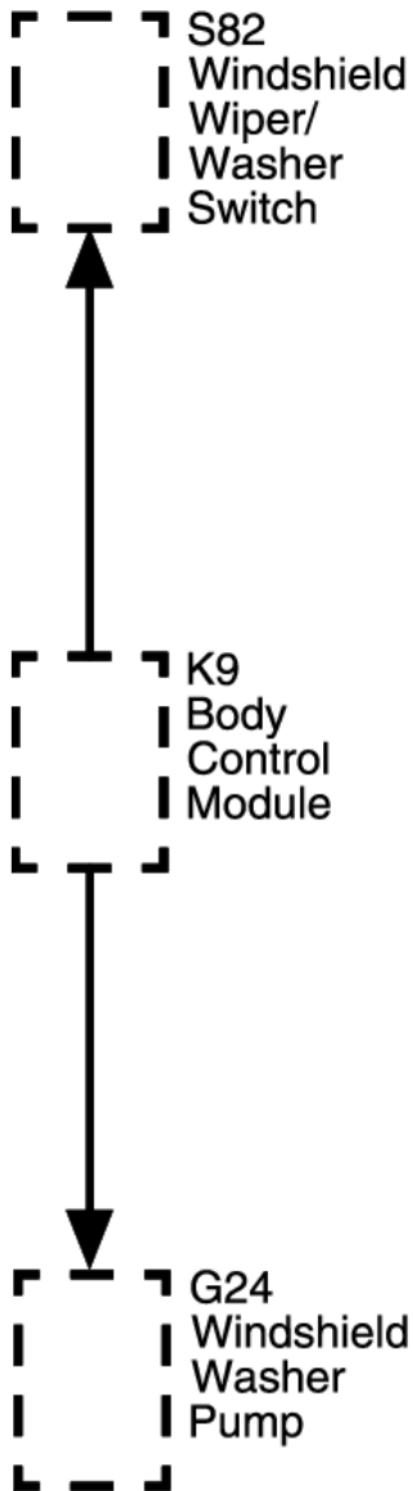


Fig. 26: Rear Wash System Block Diagram
 Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
S82	S82 Windshield Wiper/Washer Switch
K9	K9 Body Control Module
G24	G24 Windshield Washer Pump

Washer Fluid Level Indicator

The check washer fluid message is controlled by the instrument cluster using an input from the washer fluid level switch. The washer fluid level signal circuit is supplied ignition voltage through a resistor then monitored within the instrument cluster. The washer fluid level switch is normally open so the instrument cluster detects ignition voltage on the washer fluid level signal circuit whenever the washer fluid level is not low. When the washer fluid reaches the point where the driver should be informed that the washer fluid is low, the washer fluid level switch closes. When the washer fluid level switch is closed the washer fluid level signal circuit voltage is pulled low, and the instrument cluster displays the Check Washer Fluid message on the driver information center. In order to prevent the check

washer fluid message from being displayed while sloshing is occurring in the washer fluid container, the instrument cluster is programmed with a 1 min delay before changing states of the check washer fluid message during an ignition cycle.

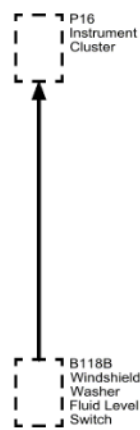


Fig. 27: Washer Fluid Level Block Diagram
Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
P16	P16 Instrument Cluster
B118B	B118B Windshield Washer Fluid Level Switch

Rain Sense Mode and Rain Sense Indicator

B+ voltage is supplied to the rain sensor. Whenever the ignition switch is in the on, or accessory positions, the body control module (BCM), sends the windshield wiper/washer switch status by using serial data. When a wipe cycle is needed, the rain sensor sends a data communication message to the BCM, requesting the wiper operation. The BCM commands the Windshield Wiper Motor wipe cycles. If at anytime a fault occurs between the rain 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.

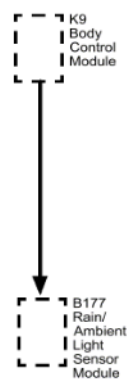


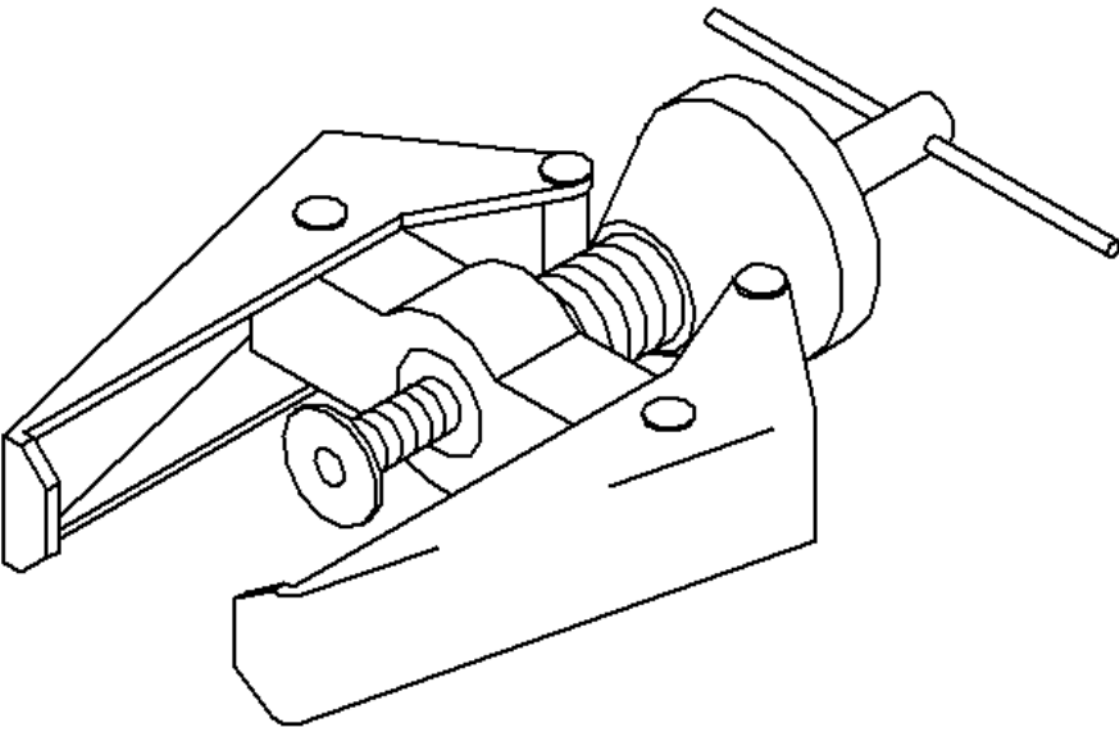
Fig. 28: Rain Sensor Block Diagram
 Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
K9	K9 Body Control Module
B177	B177 Rain/Ambient Light Sensor Module

SPECIAL TOOLS AND EQUIPMENT

SPECIAL TOOLS

Illustration	Tool Number/Description

Illustration	Tool Number/Description
	J 39822 Wiper Arm Puller