

ACCESSORIES & EQUIPMENT

Wipers and Washers - CTS Sedan

SPECIFICATIONS

FASTENER TIGHTENING SPECIFICATIONS

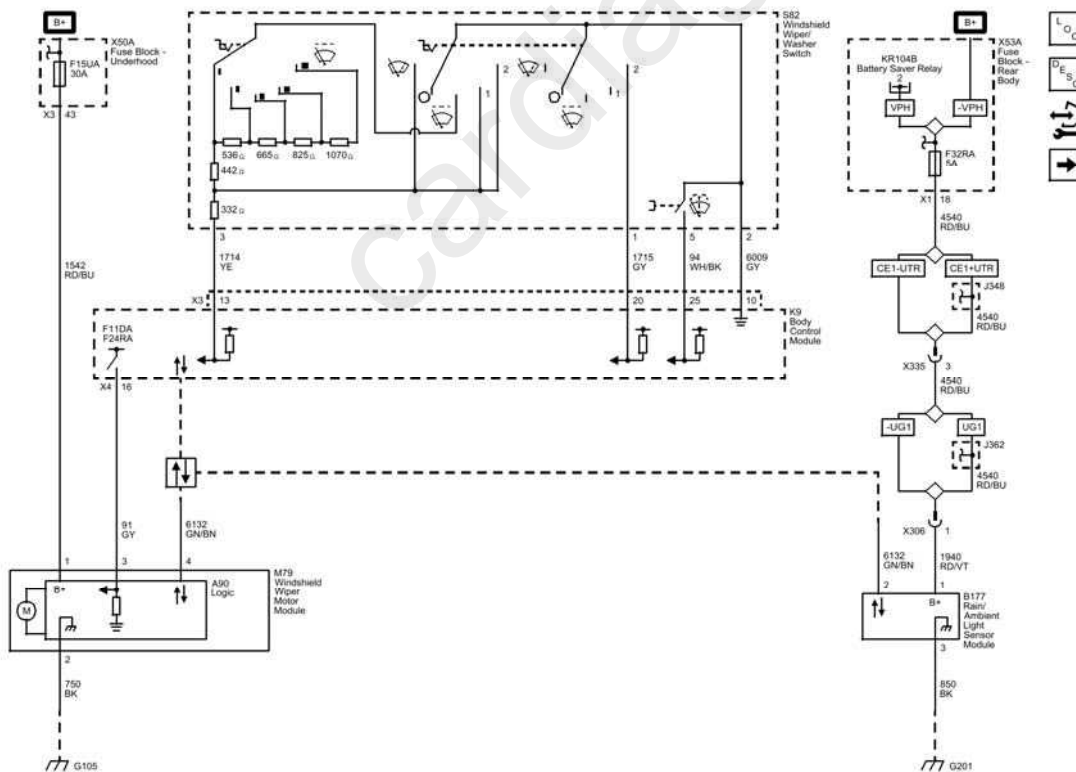
Fastener Tightening Specifications

Application	Specification	
	Metric	English
Windshield Washer Solvent Container Bolts	6 N.m	53 lb in
Windshield Washer Solvent Container Filler Pipe Bracket Bolt	6 N.m	53 lb in
Windshield Wiper Arm Nut	33 N.m	24 lb ft

SCHEMATIC WIRING DIAGRAMS

WIPER/WASHER WIRING SCHEMATICS

Front Wipers (without T79)



Front Wipers (T79)

Headlamp Washer (CE4) and Washer

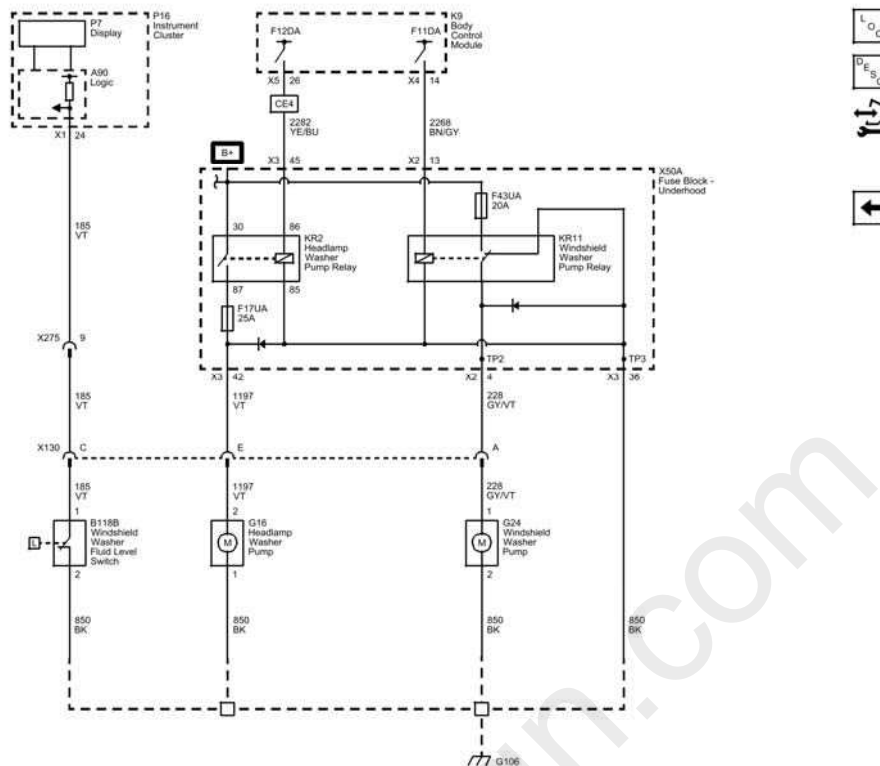


Fig. 3: Headlamp Washer (CE4) and Washer
Courtesy of GENERAL MOTORS COMPANY

DIAGNOSTIC INFORMATION AND PROCEDURES

DIAGNOSTIC CODE INDEX

DIAGNOSTIC CODE INDEX

DTC	Description
<u>DTC B370A</u>	DTC B370A 39 Rain Sensor Internal Malfunction
<u>DTC B3715</u>	DTC B3715 Windshield Wiper Relay Circuit
<u>DTC B371A</u>	DTC B371A 39 Windshield Wiper Motor Internal Malfunction
<u>DTC B3810</u>	DTC B3810 02 Headlamp Washer Relay Circuit Short to Ground
<u>DTC B3873</u>	DTC B3873 01 Front Washer Relay Circuit Short to Battery DTC B3873 04 Front Washer Relay Circuit Open Circuit

DTC B370A: RAIN SENSOR 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 B370A 39

Rain Sensor Internal Malfunction

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Rain Sensor B+	1	1	-	-
Rain Sensor LIN	U151A 00	U151A 00	U151A 00	B370A 39
Rain Sensor Ground	-	1	-	-
1. Rain Sensor Malfunction				

Circuit/System Description

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

Conditions for Running the DTC

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

Conditions for Setting the DTC

The system voltage is between 9-16 V.

Action Taken When the DTC Sets

- If the BCM loses communication with the Rain Sensor while the Rain Sensor is requesting single wipes, it shall fail soft the wipers operation to front wiper manual - intermittent with a fixed dwell time of 4 seconds.
- If the BCM loses communication with the Rain Sensor while the Rain Sensor is continuously requesting low, it shall fail soft the wipers operation to front wiper manual - low.
- If the BCM loses communication with the Rain Sensor while the Rain Sensor is continuously requesting high, it shall fail soft the wipers operation to front wiper manual - high.

Conditions for Clearing the DTC

A current DTC clears when the diagnostic runs and passes.

Reference Information

Schematic Reference

Wiper/Washer Schematics

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX - SEDAN

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 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 wipers operate at low speed when the Windshield Wiper Switch is in the LOW position.
 - **If the wipers are not operating at low speed**

Refer to **Windshield Wiper System Malfunction.**

- **If the wipers are operating at low speed**
4. Place the Windshield Wiper Switch in the delay mode/moisture sensitivity settings Delay 1 through Delay 5 and spray the outside of the windshield in the rear view mirror/rain sensor region with a water bottle.
5. Verify the wipers operate at low speed.

- **If the wipers are not operating at low speed**

Test or replace the B177 Rain/Ambient Light Sensor Module.

- **If the wipers are operating at low speed**

6. All OK.

Circuit/System Testing

1. Ignition OFF, all vehicle systems OFF, disconnect the harness connector at the B177 Rain/Ambient Light Sensor Module. It may take up to 2 min for all vehicle systems to power down.
2. Test for less than 10 ohms between the ground circuit terminal 3 and ground.
 - **If 10 ohms or greater**
 1. Ignition OFF.
 2. Test for less than 2 ohms in the ground circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, repair the open/high resistance in the ground connection.
 - **If less than 10 ohms**
3. Ignition ON, 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. Ignition OFF, remove the test lamp.
 2. Test for less than 2 ohms in the B+ circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, 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. Ignition 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 B177 Rain/Ambient Light Sensor Module.
 - **If the test lamp illuminates**
4. Ignition OFF, remove the test lamp, ignition ON.
5. Test for 4.0-12.0 V between the serial data circuit terminal 2 and ground.
 - **If less than 4.0 V**
 1. Ignition OFF, disconnect the harness connector at the K9 Body Control Module.
 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 ohms in the serial data circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.

- If less than 2 ohms, replace the K9 Body Control Module.
- **If greater than 12.0 V**
 1. Ignition OFF, disconnect the harness connector at the K9 Body Control Module, ignition 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, replace the K9 Body Control Module.
- **If between 4.0-12.0 V**
- 6. Test or replace the B177 Rain/Ambient Light Sensor Module.

Repair Instructions

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

- **Windshield Outside Moisture/Ambient Light and Humidity Sensor Replacement**

DTC B3715: WINDSHIELD WIPER 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 B3715

Windshield Wiper 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
M79 Windshield Wiper Motor Serial Data	U1515 00	U1515 00	U1515 00	-
S82 Windshield Wiper/Washer Switch Signal Terminal 3	4	3	-	-
S82 Windshield Wiper/Washer Switch Signal Terminal 1	4	2	-	-
M79 Windshield Wiper Motor Control	5	5	-	-
S82 Windshield Wiper/Washer	-	1	1	-

Switch Low Reference				
1. Windshield Wipers Inoperative 2. Windshield Wipers High Speed Inoperative 3. Windshield Wipers Intermittent or Low Speed Inoperative 4. Windshield Wipers Always ON 5. In the event the LIN serial data circuit is inoperative, Wipers inoperable				

Circuit/System Description

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

The BCM controls the windshield wiper motor low, high, intermittent, and park operations through a serial data circuit. If serial data communication is interrupted, a control circuit is used as a backup to ensure that wiper functionality is not lost. B+ is applied to the control circuit and will allow limited wiper operation when the windshield wiper/washer switch is in the HIGH position.

Conditions for Running the DTC

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

Conditions for Setting the DTC

- A short to ground is detected in the front wiper relay control circuit or in the high speed relay control circuit.

Action Taken When the DTC Sets

The BCM will not activate the wiper output.

Conditions for Clearing the DTC

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

Reference Information

Schematic Reference

Wiper/Washer Schematics

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX - SEDAN

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 that there are no communications DTCs set.
 - **If any communication DTCs are set**

Refer to **Diagnostic Trouble Code (DTC) List - Vehicle** .

- **If no communication DTCs are set**
3. Verify that DTC B371A is not set.
 - **If DTC B371A is set**

Refer to **DTC B371A**.

- **If DTC B371A is not set**
4. Verify the scan tool Windshield Wiper High Speed Switch parameter changes between Active and Inactive when activating the high speed windshield wipers.
 - **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 Off and Low when activating the low speed windshield wipers.
 - **If the parameter does not change**

Refer to Circuit/System Testing - Windshield Wiper/Washer Switch Malfunction.

- **If the parameter changes**

6. Verify the scan tool Windshield Wiper Switch parameter changes between Delay 1 and Delay 5 when cycling the intermittent speed windshield wipers.

- **If the parameter does not change**

Test or replace the S82 Windshield Wiper/Washer Switch.

- **If the parameter changes**

7. Verify the M75 Windshield Wiper Motor changes between Off, Low, and High when cycling the S82 Windshield Wiper/Washer Switch between Off, Low, and High.

- **If the M75 Windshield Wiper Motor does not cycle between Off, Low, and High**

Refer to Circuit/System Testing - Windshield Wiper Motor Malfunction

- **If the M75 Windshield Wiper Motor cycles between Off, Low, and High**

8. All OK.

Circuit/System Testing

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

Windshield Wiper Motor Malfunction

1. Ignition OFF and all vehicle systems OFF, disconnect the harness connector at the appropriate M79 Windshield Wiper Motor Module. It may take up to 2 minutes for all vehicle systems to power down.
2. Test for less than 10 ohms between the ground circuit terminal 2 and ground.
 - **If 10 ohms or greater**
 1. Ignition OFF.
 2. Test for less than 2 ohms in the ground circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.

- If less than 2 ohms, repair the open/high resistance in the ground connection.
 - **If less than 10 ohms**
- 3. 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. Ignition OFF.
 2. Test for less than 2 ohms in the B+ circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, 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. Ignition 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 M79 Windshield Wiper Motor Module
 - **If the test lamp illuminates**
- 4. Connect a test lamp between control circuit terminal 3 and ground:
- 5. Verify the test lamp turns ON and OFF when turning the high speed wipers ON and OFF.
 - **If the test lamp is always OFF**
 1. Ignition OFF, remove the test lamp, disconnect the 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 ohms in the control circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, replace the K9 Body Control Module.
 - **If the test lamp is always ON**
 1. Ignition OFF, remove the test lamp, disconnect the harness connector at the K9 Body Control Module, vehicle in Service Mode.
 2. Test for less than 1 V between the control 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 the test lamp turns ON and OFF**
- 6. Remove the test lamp.
- 7. Test for 8-9 V between the serial data circuit terminal 4 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 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 ohms in the serial data circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, replace the K9 Body Control Module.
 - **If greater than 9 V**
- 1. Ignition 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 or greater, replace the K9 Body Control Module.
 - **If 8-9 V**
- 8. Test or replace the M79 Windshield Wiper Motor Module.

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 1 and the low reference terminal 2 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 ohms between the signal circuit terminal 1 and the low reference circuit terminal 2 with the high speed switch in the closed position.
 - **If 2 ohms or greater**

Replace the S82 Windshield Wiper/Washer Switch.

 - **If less than 2 ohms**
4. Test for infinite resistance between the signal terminal 3 and the low reference terminal 2 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. 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 : 3.75-3.85kohms

- Delay 2 : 2.75-2.85kohms
- Delay 3 : 1.95-2.05kohms
- Delay 4 : 1.25-1.35kohms
- Delay 5 : 765-775ohms
- **If not within the specified range**

Replace the S82 Windshield Wiper/Washer Switch.

- **If within the specified range**

6. All OK

Repair Instructions

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

- **Windshield Washer Pump Replacement**
- **Windshield Wiper System Module Replacement**
- **Windshield Wiper and Washer Switch Replacement**
- **Front Compartment Fuse Block Housing Replacement**
- **Control Module References** for 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 ignition is ON or in accessory position, 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 - SEDAN

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 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 B3810P: HEADLAMP WASHER RELAY CIRCUIT SHORT TO GROUND

Diagnostic Instructions

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

DTC Descriptor

DTC B3810 02

Headlamp Washer Relay Circuit Short to Ground

Diagnostic Fault Information

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

Circuit/System Description

The body control module (BCM) controls the washer motor based on an input from the windshield wiper washer switch. The BCM monitors the washer switch through the windshield washer switch signal circuit. When the washer switch is closed, low reference is supplied to the front washer switch signal circuit. When this

is seen, the BCM will command the front washer pump and the low speed wipers on. When headlamp wash is equipped, the headlamps shall be sprayed with wash fluid as a result of an extended windshield wash switch activation. In order to preserve wash fluid, the feature shall only be allowed to activate if the low or high beam headlamps are active. In addition, after the initial headlamp wash operation has been performed, additional headlamp washes shall not be performed for the next 4 windshield wash activations or for 48 hours, whichever occurs first.

Conditions for Running the DTC

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

Conditions for Setting the DTC

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

Action Taken When the DTC Sets

Washer operation is suspended.

Conditions for Clearing the DTC

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

Diagnostic Aids

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

Reference Information

Schematic Reference

Wiper/Washer Schematics

Connector End View Reference

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Wiper/Washer System Description and Operation

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- **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 headlamps washers turn ON and OFF when commanding the Headlamp Washer Relay Command ON and OFF with a scan tool.
 - **If the headlamp washers do not turn ON and OFF**

Refer to Circuit/System Testing

- **If the headlamp washers turn ON and OFF**
3. All OK.

Circuit/System Testing

1. Ignition OFF and all vehicle systems OFF, disconnect the KR2 Headlamp Washer Pump Relay. It may take up to 2 min for all vehicle systems to power down.
2. Test for less than 10 ohms between the ground circuit terminal 86 and ground.
 - **If 10 ohms or greater**
 1. Ignition OFF.
 2. Test for less than 2 ohms in the ground circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, repair the open/high resistance in the ground connection.
 - **If less than 10 ohms**
3. Ignition ON.
4. Verify a test lamp illuminates between the B+ circuit terminal 30 and ground.
 - **If the test lamp does not illuminate and the circuit fuse is OK**
 1. Ignition OFF, remove test lamp.
 2. Test for less than 2 ohms in the ignition circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, 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. Ignition OFF, remove the test lamp, repair the short to ground on the circuit
 2. 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, replace the KR2 Headlamp Washer Pump Relay.
 - **If the test lamp illuminates**
5. Connect a test lamp between the control circuit terminal 85 and the ground circuit terminal 86.
 6. Verify the test lamp turns ON and OFF when commanding the Headlamp Washer Relay Command ON and OFF with a scan tool.
 - **If the test lamp is always OFF**
 1. Ignition OFF, remove the test lamp, disconnect the X5 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 ohms in the control circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, replace the K9 Body Control Module.
 - **If the test lamp is always ON**
 1. Ignition OFF, remove the test lamp, disconnect the X5 harness connector at the K9 Body Control Module, ignition ON.
 2. Test for less than 1 V between the control 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 the test lamp turns ON and OFF**
 7. Verify that a test lamp does not illuminate between the control circuit terminal 87 and ground.
 - **If the test lamp illuminates**

Repair the short to voltage on the control circuit

 - **If the test lamp does not illuminate**
 8. Ignition OFF and all vehicle systems OFF, remove the test lamp, disconnect the harness connector at the G16 Headlamp Washer Pump. It may take up to 2 min for all vehicle systems to power down.
 9. Test for less than 10 ohms between the ground circuit terminal 1 and ground.
 - **If 10 ohms or greater**
 1. Ignition OFF.
 2. Test for less than 2 ohms in the ground circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, repair the open/high resistance in the ground connection.
 - **If less than 10 ohms**
 10. Connect the harness connector at the G16 Headlamp Washer Pump.
 11. Ignition ON, connect a 3 A fused jumper wire between the B+ circuit terminal 30 and the control circuit

terminal 87.

12. Verify the G16 Headlamp Washer Pump is activated.
 - **If the G16 Headlamp Washer Pump does not activate**
 1. Ignition OFF, remove the jumper wire, disconnect the harness connector at the G16 Headlamp 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 ohms in the control circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, test or replace the G16 Headlamp Washer Pump.
 - **If the G16 Headlamp Washer Pump activates**
13. Test or replace the KR2 Headlamp Washer Pump Relay.

Component Testing

Relay Test

1. Ignition OFF, disconnect the KR2 Headlamp Washer Pump Relay.
2. Test for 60-200 ohms between terminals 85 and 86.
 - **If less than 60 or greater than 200**

Replace the KR2 Headlamp Washer Pump Relay.

- **If between 60-200 ohms**
3. Test for infinite resistance between the terminals listed below:
 - 30 and 86
 - 30 and 87
 - 30 and 85
 - 85 and 87
 - **If less than infinite resistance**

Replace the KR2 Headlamp Washer Pump Relay.

- **If infinite resistance**
4. Test for less than 10 ohms between terminals 30 and 87A.
 - **If 10 ohms or greater**

Replace the KR2 Headlamp Washer Pump Relay.

- **If less than 10 ohms**
5. Install a 10 A fused jumper wire between relay terminal 85 and 12 V. Install a jumper wire between relay

terminal 86 and ground.

6. Test for less than 10 ohms between terminals 30 and 87.

- **If 10 ohms or greater**

Replace the KR2 Headlamp Washer Pump Relay.

- **If less than 10 ohms**

7. All OK.

Repair Instructions

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

- **Relay Replacement (Within an Electrical Center)** , **Relay Replacement (Attached to Wire Harness)**
- **Headlamp Washer Pump Replacement**
- **Windshield Wiper and Washer Switch 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 01

Front Washer Relay Circuit Short to Battery

DTC B3873 04

Front Washer Relay Circuit Open Circuit

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Windshield Washer Switch Signal	2	1	1	-
Windshield Washer Fluid Pump Control	1	1	2	-
Windshield Washer Relay				

Control	1	B3873 04	B3873 01	-
Windshield Washer Fluid Pump Ground	-	1	-	-
1. Washer Inoperative 2. Washer Always ON				

Circuit/System Description

The Body Control Module (BCM) controls the windshield washer fluid pump based on an input from the Windshield Wiper/Washer Switch. The BCM monitors the washer switch through the windshield washer switch signal circuit. When the washer switch is closed, ground is supplied to the windshield washer switch signal circuit. When this is the case, the BCM will command the windshield washer fluid pump and the low speed wipers on.

Conditions for Running the DTC

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

Conditions for Setting the DTC

- A short to ground or an open/high resistance is detected in the windshield washer relay control circuit.
- A short to voltage is detected in the windshield washer relay control circuit.

Action Taken When the DTC Sets

Washer operation is suspended.

Conditions for Clearing the DTC

A current DTC clears when the diagnostic runs and passes.

Reference Information

Schematic Reference

Wiper/Washer Schematics

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX - SEDAN

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 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 scan tool Instrument Cluster Washer Fluid Level Switch parameter changes between Closed when the fluid level is full and Open when the fluid level is low.
 - **If the parameter does not change**
 Refer to Circuit/System Testing - Windshield Washer Fluid Level Switch Malfunction.
 - **If the parameter changes**
4. Verify the Windshield Washers turn On when commanding the Windshield Washer Relay Active with a scan tool.
 - **If the Windshield Washers do not turn ON**
 Refer to Circuit/System Testing - Windshield Washer Pump Malfunction
 - **If the Windshield Washers turn ON**
5. All OK.

Circuit/System Testing

Windshield 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 ohms between the low reference circuit terminal 2 and ground.
 - **If 10 ohms or greater**
 1. Ignition OFF.

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

Windshield Washer Fluid Level Switch Malfunction

1. Ignition OFF and all vehicle systems OFF, disconnect the harness connector at the B118B Windshield Washer Fluid Level Switch. It may take up to 2 min for all vehicle systems to power down.
2. Test for less than 10 ohms between the ground circuit terminal 2 and ground.
 - **If 10 ohms or greater**
 1. Ignition OFF.
 2. Test for less than 2 ohms in the ground circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, repair the open/high resistance in the ground connection.
 - **If less than 10 ohms**
3. Ignition ON.

4. Verify the scan tool Washer Fluid Level Switch parameter is Open.
 - **If not Open**
 1. Ignition OFF, disconnect the harness connector at the P16 Instrument Cluster.
 2. Test for infinite resistance between the signal circuit terminal 1 and ground.
 - If less than infinite resistance, repair the short to ground on the circuit.
 - If infinite resistance, replace the P16 Instrument Cluster.
 - **If Open**
5. Install a 3 A fused jumper wire between the signal circuit terminal 1 and the ground circuit terminal 2.
6. Verify the scan tool Washer Fluid Level Switch parameter is Closed.
 - **If not Closed**
 1. Ignition OFF, remove the jumper wire, disconnect the harness connector at the P16 Instrument Cluster, 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 ohms in the signal circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, replace the P16 Instrument Cluster.
 - **If Closed**
7. Test or replace the B118B Windshield Washer Fluid Level Switch.

Windshield Washer Pump Malfunction

1. Ignition 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 ohms between the ground circuit terminal 2 and ground.
 - **If 10 ohms or greater**
 1. Test for less than 2 ohms in the ground circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, repair the open/high resistance in the ground connection.
 - **If less than 10 ohms**
3. Connect a test lamp between the control circuit terminal 1 and the ground circuit terminal 2, ignition ON.
4. Verify the test lamp does NOT 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. Ignition OFF, connect the harness connector at the G24 Windshield Washer Pump. Disconnect the X2

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 ohms between the ground circuit terminal 2 and ground.
 - **If 10 ohms or greater**
 1. Test for less than 2 ohms in the ground circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, repair the open/high resistance in the ground connection.
 - **If less than 10 ohms**
7. Ignition ON.
8. Verify the G24 Windshield Washer Pump is not activated.
 - **If the G24 Windshield Washer Pump is activated**
 1. Ignition OFF, disconnect the harness connector at the G24 Windshield Washer Pump, ignition ON.
 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 4 and B+.
10. Verify the G24 Windshield Washer Pump activates.
 - **If the G24 Windshield Washer Pump does not activate**
 1. Ignition 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 ohms in the control circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, replace the G24 Windshield Washer Pump.
 - **If the G24 Windshield Washer Pump activates**
11. Ignition OFF, connect the X2 harness connector at the X50A Fuse Block - Underhood. Disconnect the X4 harness connector at the K9 Body Control Module, ignition ON.
12. Verify the G24 Windshield Washer Pump is not activated.
 - **If the G24 Windshield 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 control circuit 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**
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. 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 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 ohms in the control circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, 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. 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 2 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 ohms between the signal circuit terminal 5 and the low reference circuit terminal 2 with the switch in the closed position.
 - **If 2 ohms or greater**

Replace the S82 Windshield Wiper/Washer Switch.

- **If less than 2 ohms**

4. All OK

Windshield Washer Fluid Level Switch

1. Ignition OFF, disconnect the harness connector at the B118B Windshield Washer Fluid Level Switch.
2. Test for infinite resistance between the signal circuit terminal 1 and the ground circuit terminal 2 with the switch in the open position.
 - **If less than infinite resistance**

Replace the B118B Windshield Washer Fluid Level Switch.

- **If infinite resistance**
- 3. Test for less than 2 ohms between the signal circuit terminal 1 and the ground circuit terminal 2 with the switch in the closed position.
 - **If 2 ohms or greater**

Replace the B118B Windshield Washer Fluid Level Switch.

- **If less than 2 ohms**
4. All OK

Repair Instructions

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

- **Front Compartment Fuse Block Housing Replacement**
- **Windshield Washer Pump Replacement**
- **Windshield Washer Solvent Level Sensor Replacement**
- **Windshield Wiper and Washer Switch Replacement**
- **Control Module References** for BCM and Instrument Cluster replacement and 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**
- **Headlamp Washer Malfunction**

WINDSHIELD WIPER SYSTEM MALFUNCTION

Diagnostic Instructions

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

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
M79 Windshield Wiper Motor Serial Data	U1515 00	U1515 00	U1515 00	-
S82 Windshield Wiper/Washer Switch Signal Terminal 3	4	3	-	-
S82 Windshield Wiper/Washer Switch Signal Terminal 1	4	2	-	-
M79 Windshield Wiper Motor Control	5	5	-	-
S82 Windshield Wiper/Washer Switch Low Reference	-	1	1	-
1. Windshield Wipers Inoperative 2. Windshield Wipers High Speed Inoperative 3. Windshield Wipers Intermittent or Low Speed Inoperative 4. Windshield Wipers Always ON 5. In the event the LIN serial data circuit is inoperative, Wipers inoperable				

Circuit/System Description

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

The BCM controls the windshield wiper motor low, high, intermittent, and park operations through a serial data circuit. If serial data communication is interrupted, a control circuit is used as a backup to ensure that wiper functionality is not lost. B+ is applied to the control circuit and will allow limited wiper operation when the windshield wiper/washer switch is in the HIGH position.

Reference Information

Schematic Reference

Wiper/Washer Schematics

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX - SEDAN

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 that there are no communications DTCs set.
 - **If any communication DTCs are set**

Refer to **Diagnostic Trouble Code (DTC) List - Vehicle** .

- **If no communication DTCs are set**
3. Verify that DTC B371A is not set.
 - **If DTC B371A is set**

Refer to **DTC B371A**.

- **If DTC B371A is not set**

4. Verify the scan tool Windshield Wiper High Speed Switch parameter changes between Active and Inactive when activating the high speed windshield wipers.
 - **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 Off and Low when activating the low speed windshield wipers.
 - **If the parameter does not change**

Refer to Circuit/System Testing - Windshield Wiper/Washer Switch Malfunction.
 - **If the parameter changes**
6. Verify the scan tool Windshield Wiper Switch parameter changes between Delay 1 and Delay 5 when cycling the intermittent speed windshield wipers.
 - **If the parameter does not change**

Test or replace the S82 Windshield Wiper/Washer Switch.
 - **If the parameter changes**
7. Verify the M75 Windshield Wiper Motor changes between Off, Low, and High when cycling the S82 Windshield Wiper/Washer Switch between Off, Low, and High.
 - **If the M75 Windshield Wiper Motor does not cycle between Off, Low, and High**

Refer to Circuit/System Testing - Windshield Wiper Motor Malfunction
 - **If the M75 Windshield Wiper Motor cycles between Off, Low, and High**
8. All OK.

Circuit/System Testing

Windshield 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 ohms between the low reference circuit terminal 2 and ground.
 - **If 10 ohms or greater**
 1. Ignition OFF, disconnect the harness connector at the K9 Body Control Module.
 2. Test for less than 2 ohms in the low reference circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, replace the K9 Body Control Module.
 - **If less than 10 ohms**

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

Windshield Wiper Motor Malfunction

1. Ignition OFF and all vehicle systems OFF, disconnect the harness connector at the appropriate M79 Windshield Wiper Motor Module. It may take up to 2 minutes for all vehicle systems to power down.
2. Test for less than 10 ohms between the ground circuit terminal 2 and ground.
 - **If 10 ohms or greater**
 1. Ignition OFF.
 2. Test for less than 2 ohms in the ground circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, repair the open/high resistance in the ground connection.
 - **If less than 10 ohms**
3. 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. Ignition OFF.
 2. Test for less than 2 ohms in the B+ circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, 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. Ignition 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 M79 Windshield Wiper Motor Module
 - **If the test lamp illuminates**
4. Connect a test lamp between control circuit terminal 3 and ground:
5. Verify the test lamp turns ON and OFF when turning the high speed wipers ON and OFF.
 - **If the test lamp is always OFF**
 1. Ignition OFF, remove the test lamp, disconnect the 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 ohms in the control circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, replace the K9 Body Control Module.
 - **If the test lamp is always ON**
 1. Ignition OFF, remove the test lamp, disconnect the harness connector at the K9 Body Control

Module, vehicle in Service Mode.

2. Test for less than 1 V between the control 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 the test lamp turns ON and OFF**
6. Remove the test lamp.
7. Test for 8-9 V between the serial data circuit terminal 4 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 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 ohms in the serial data circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, replace the K9 Body Control Module.
 - **If greater than 9 V**
 1. Ignition 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 or greater, replace the K9 Body Control Module.
 - **If 8-9 V**
 - 8. Test or replace the M79 Windshield Wiper Motor Module.

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 1 and the low reference terminal 2 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 ohms between the signal circuit terminal 1 and the low reference circuit terminal 2 with the high speed switch in the closed position.
 - **If 2 ohms or greater**

Replace the S82 Windshield Wiper/Washer Switch.

- **If less than 2 ohms**

4. Test for infinite resistance between the signal terminal 3 and the low reference terminal 2 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. 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 : 3.75-3.85kohms
- Delay 2 : 2.75-2.85kohms
- Delay 3 : 1.95-2.05kohms
- Delay 4 : 1.25-1.35kohms
- Delay 5 : 765-775ohms

- **If not within the specified range**

Replace the S82 Windshield Wiper/Washer Switch.

- **If within the specified range**

6. All OK

Repair Instructions

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

- **Windshield Washer Pump Replacement**
- **Windshield Wiper System Module Replacement**
- **Windshield Wiper and Washer Switch Replacement**
- **Front Compartment Fuse Block Housing Replacement**
- **Control Module References** for BCM 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.

DTC Descriptors

DTC B3873 01

Front Washer Relay Circuit Short to Battery

DTC B3873 04

Front Washer Relay Circuit Open Circuit

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Windshield Washer Switch Signal	2	1	1	-
Windshield Washer Fluid Pump Control	1	1	2	-
Windshield Washer Relay Control	1	B3873 04	B3873 01	-
Windshield Washer Fluid Pump Ground	-	1	-	-
1. Washer Inoperative 2. Washer Always ON				

Circuit/System Description

The Body Control Module (BCM) controls the windshield washer fluid pump based on an input from the Windshield Wiper/Washer Switch. The BCM monitors the washer switch through the windshield washer switch signal circuit. When the washer switch is closed, ground is supplied to the windshield washer switch signal circuit. When this is the case, the BCM will command the windshield washer fluid pump and the low speed wipers on.

Reference Information

Schematic Reference

Wiper/Washer Schematics

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX - SEDAN

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 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 scan tool Instrument Cluster Washer Fluid Level Switch parameter changes between Closed when the fluid level is full and Open when the fluid level is low.
 - **If the parameter does not change**
Refer to Circuit/System Testing - Windshield Washer Fluid Level Switch Malfunction.
 - **If the parameter changes**
4. Verify the Windshield Washers turn On when commanding the Windshield Washer Relay Active with a scan tool.
 - **If the Windshield Washers do not turn ON**
Refer to Circuit/System Testing - Windshield Washer Pump Malfunction
 - **If the Windshield Washers turn ON**
5. All OK.

Circuit/System Testing

Windshield 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 ohms between the low reference circuit terminal 2 and ground.
 - **If 10 ohms or greater**
 1. Ignition OFF.
 2. Test for less than 2 ohms in the low reference circuit end to end.

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

Windshield Washer Fluid Level Switch Malfunction

1. Ignition OFF and all vehicle systems OFF, disconnect the harness connector at the B118B Windshield Washer Fluid Level Switch. It may take up to 2 min for all vehicle systems to power down.
2. Test for less than 10 ohms between the ground circuit terminal 2 and ground.
 - **If 10 ohms or greater**
 1. Ignition OFF.
 2. Test for less than 2 ohms in the ground circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, repair the open/high resistance in the ground connection.
 - **If less than 10 ohms**
3. Ignition ON.
4. Verify the scan tool Washer Fluid Level Switch parameter is Open.

- **If not Open**

1. Ignition OFF, disconnect the harness connector at the P16 Instrument Cluster.
2. Test for infinite resistance between the signal circuit terminal 1 and ground.
 - If less than infinite resistance, repair the short to ground on the circuit.
 - If infinite resistance, replace the P16 Instrument Cluster.

- **If Open**

5. Install a 3 A fused jumper wire between the signal circuit terminal 1 and the ground circuit terminal 2.
6. Verify the scan tool Washer Fluid Level Switch parameter is Closed.

- **If not Closed**

1. Ignition OFF, remove the jumper wire, disconnect the harness connector at the P16 Instrument Cluster, 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 ohms in the signal circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, replace the P16 Instrument Cluster.

- **If Closed**

7. Test or replace the B118B Windshield Washer Fluid Level Switch.

Windshield Washer Pump Malfunction

1. Ignition 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 ohms between the ground circuit terminal 2 and ground.
 - **If 10 ohms or greater**
 1. Test for less than 2 ohms in the ground circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, repair the open/high resistance in the ground connection.
 - **If less than 10 ohms**
3. Connect a test lamp between the control circuit terminal 1 and the ground circuit terminal 2, ignition ON.
4. Verify the test lamp does NOT 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. Ignition OFF, connect the harness connector at the G24 Windshield Washer Pump. Disconnect the X3 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 ohms between the ground circuit terminal 36 and ground.
 - **If 10 ohms or greater**
 1. Test for less than 2 ohms in the ground circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, repair the open/high resistance in the ground connection.
 - **If less than 10 ohms**
7. Ignition ON.
8. Verify the G24 Windshield Washer Pump is not activated.
 - **If the G24 Windshield Washer Pump is activated**
 1. Ignition OFF, disconnect the harness connector at the G24 Windshield Washer Pump, ignition ON.
 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 4 and B+.
10. Verify the G24 Windshield Washer Pump activates.
 - **If the G24 Windshield Washer Pump does not activate**
 1. Ignition 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 ohms in the control circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, replace the G24 Windshield Washer Pump.
 - **If the G24 Windshield Washer Pump activates**
11. Ignition OFF, connect the X3 harness connector at the X50A Fuse Block - Underhood. Disconnect the X4 harness connector at the K9 Body Control Module, ignition ON.
12. Verify the G24 Windshield Washer Pump is not activated.
 - **If the G24 Windshield 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 control circuit 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**
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. 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 13 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 ohms in the control circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, 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. 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 2 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 ohms between the signal circuit terminal 5 and the low reference circuit terminal 2 with the switch in the closed position.
 - **If 2 ohms or greater**

Replace the S82 Windshield Wiper/Washer Switch.

- **If less than 2 ohms**

4. All OK

Windshield Washer Fluid Level Switch

1. Ignition OFF, disconnect the harness connector at the B118B Windshield Washer Fluid Level Switch.
2. Test for infinite resistance between the signal circuit terminal 1 and the ground circuit terminal 2 with the switch in the open position.
 - **If less than infinite resistance**

Replace the B118B Windshield Washer Fluid Level Switch.

- **If infinite resistance**

3. Test for less than 2 ohms between the signal circuit terminal 1 and the ground circuit terminal 2 with the switch in the closed position.

- **If 2 ohms or greater**

Replace the B118B Windshield Washer Fluid Level Switch.

- **If less than 2 ohms**

4. All OK

Repair Instructions

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

- **Front Compartment Fuse Block Housing Replacement**
- **Windshield Washer Pump Replacement**
- **Windshield Washer Solvent Level Sensor Replacement**
- **Windshield Wiper and Washer Switch Replacement**
- **Control Module References** for BCM and Instrument Cluster replacement and programming and setup

RAIN SENSOR 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
Rain Sensor B+	1	1	-	-
Rain Sensor LIN	U151A 00	U151A 00	U151A 00	B370A 39
Rain Sensor Ground	-	1	-	-
1. Rain Sensor Malfunction				

Circuit/System Description

B+ voltage is supplied to the Rain Sensor. Whenever the ignition is ON, or accessory positions, the body control module (BCM), sends the turn signal/multifunction switch status by using data communication. 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 turn signal/multifunction switch in the delay

positions to operate the Windshield Wiper Motor at continuous variable delay intervals.

Reference Information

Schematic Reference

Wiper/Washer Schematics

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX - SEDAN

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 DTC B370A is not set.
 - **If DTC B370A is set**

Please Refer to **DTC B370A**

- **If DTC B370A is not set**

3. Verify DTC U151A is not set.
 - **If DTC U151A is set**

Please Refer to **DTC U1500-U15FF**

- **If DTC U151A is not set**

4. Verify the wipers operate at low speed when the Windshield Wiper Switch is in the LOW position.
 - **If the wipers are not operating at low speed**

Refer to **Windshield Wiper System Malfunction.**

- **If the wipers are operating at low speed**

5. Place the Windshield Wiper Switch in the delay mode/moisture sensitivity settings Delay 1 through Delay 5 and spray the outside of the windshield in the rear view mirror/rain sensor region with a water bottle.
6. Verify the wipers operate at low speed.

- **If the wipers are not operating at low speed**

Refer to Circuit System Testing.

- **If the wipers are operating at low speed**

7. All OK.

Circuit/System Testing

1. Ignition OFF, all vehicle systems OFF, disconnect the harness connector at the B177 Rain/Ambient Light Sensor Module. It may take up to 2 min for all vehicle systems to power down.
2. Test for less than 10 ohms between the ground circuit terminal 3 and ground.
 - **If 10 ohms or greater**
 1. Ignition OFF.
 2. Test for less than 2 ohms in the ground circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, repair the open/high resistance in the ground connection.
 - **If less than 10 ohms**
3. Ignition ON, 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. Ignition OFF, remove the test lamp.
 2. Test for less than 2 ohms in the B+ circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, 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. Ignition 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 B177 Rain/Ambient Light Sensor Module.
 - **If the test lamp illuminates**
4. Ignition OFF, remove the test lamp, ignition ON.
5. Test for 4.0-12.0 V between the serial data circuit terminal 2 and ground.
 - **If less than 4.0 V**
 1. Ignition OFF, disconnect the harness connector at the K9 Body Control Module.

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 ohms in the serial data circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, replace the K9 Body Control Module.
 - **If greater than 12.0 V**
 1. Ignition OFF, disconnect the harness connector at the K9 Body Control Module, ignition 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, replace the K9 Body Control Module.
 - **If between 4.0-12.0 V**
6. Test or replace the B177 Rain/Ambient Light Sensor Module.

Repair Instructions

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

- **Windshield Outside Moisture/Ambient Light and Humidity Sensor Replacement**
- **Control Module References** for BCM replacement, programming and setup

HEADLAMP WASHER MALFUNCTION

Diagnostic Instructions

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

DTC Descriptor

DTC B3810 02

Headlamp Washer Relay Circuit Short to Ground

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Headlamp Washer Pump Control	1	1	2	-
Headlamp Washer Relay Control	B3810 02	1	2	-

Headlamp Washer Pump Ground	-	1	1	-
1. Headlamp Washer Inoperative 2. Headlamp Washers Always ON				

Circuit/System Description

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

Conditions for Running the DTC

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

Conditions for Setting the DTC

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

Action Taken When the DTC Sets

Washer operation is suspended.

Conditions for Clearing the DTC

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

Diagnostic Aids

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

Reference Information

Schematic Reference

Wiper/Washer Schematics

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX - SEDAN

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 headlamps washers turn ON and OFF when commanding the Headlamp Washer Relay Command ON and OFF with a scan tool.
 - **If the headlamp washers do not turn ON and OFF**

Refer to Circuit/System Testing
 - **If the headlamp washers turn ON and OFF**
3. All OK.

Circuit/System Testing

1. Ignition OFF and all vehicle systems OFF, disconnect the KR2 Headlamp Washer Pump Relay. It may take up to 2 min for all vehicle systems to power down.
2. Test for less than 10 ohms between the ground circuit terminal 86 and ground.
 - **If 10 ohms or greater**
 1. Ignition OFF.
 2. Test for less than 2 ohms in the ground circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, repair the open/high resistance in the ground connection.
 - **If less than 10 ohms**
3. Ignition ON.
4. Verify a test lamp illuminates between the B+ circuit terminal 30 and ground.
 - **If the test lamp does not illuminate and the circuit fuse is OK**

1. Ignition OFF, remove test lamp.
2. Test for less than 2 ohms in the ignition circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, 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. Ignition OFF, remove the test lamp, repair the short to ground on the circuit
2. 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, replace the KR2 Headlamp Washer Pump Relay.
 - **If the test lamp illuminates**
5. Connect a test lamp between the control circuit terminal 85 and the ground circuit terminal 86.
6. Verify the test lamp turns ON and OFF when commanding the Headlamp Washer Relay Command ON and OFF with a scan tool.
 - **If the test lamp is always OFF**
1. Ignition OFF, remove the test lamp, disconnect the X5 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 ohms in the control circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, replace the K9 Body Control Module.
 - **If the test lamp is always ON**
1. Ignition OFF, remove the test lamp, disconnect the X5 harness connector at the K9 Body Control Module, ignition ON.
2. Test for less than 1 V between the control 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 the test lamp turns ON and OFF**
7. Verify that a test lamp does not illuminate between the control circuit terminal 87 and ground.
 - **If the test lamp illuminates**

Repair the short to voltage on the control circuit

- **If the test lamp does not illuminate**
- 8. Ignition OFF and all vehicle systems OFF, remove the test lamp, disconnect the harness connector at the G16 Headlamp Washer Pump. It may take up to 2 min for all vehicle systems to power down.
- 9. Test for less than 10 ohms between the ground circuit terminal 1 and ground.
 - **If 10 ohms or greater**

1. Ignition OFF.
2. Test for less than 2 ohms in the ground circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, repair the open/high resistance in the ground connection.
 - **If less than 10 ohms**
10. Connect the harness connector at the G16 Headlamp Washer Pump.
11. Ignition ON, connect a 3 A fused jumper wire between the B+ circuit terminal 30 and the control circuit terminal 87.
12. Verify the G16 Headlamp Washer Pump is activated.
 - **If the G16 Headlamp Washer Pump does not activate**
 1. Ignition OFF, remove the jumper wire, disconnect the harness connector at the G16 Headlamp 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 ohms in the control circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, test or replace the G16 Headlamp Washer Pump.
 - **If the G16 Headlamp Washer Pump activates**
13. Test or replace the KR2 Headlamp Washer Pump Relay.

Component Testing

Relay Test

1. Ignition OFF, disconnect the KR2 Headlamp Washer Pump Relay.
2. Test for 60-200 ohms between terminals 85 and 86.
 - **If less than 60 or greater than 200**

Replace the KR2 Headlamp Washer Pump Relay.

- **If between 60-200 ohms**
3. Test for infinite resistance between the terminals listed below:
 - 30 and 86
 - 30 and 87
 - 30 and 85
 - 85 and 87
 - **If less than infinite resistance**

Replace the KR2 Headlamp Washer Pump Relay.

- **If infinite resistance**

4. Test for less than 10 ohms between terminals 30 and 87A.

- **If 10 ohms or greater**

Replace the KR2 Headlamp Washer Pump Relay.

- **If less than 10 ohms**

5. Install a 10 A fused jumper wire between relay terminal 85 and 12 V. Install a jumper wire between relay terminal 86 and ground.

6. Test for less than 10 ohms between terminals 30 and 87.

- **If 10 ohms or greater**

Replace the KR2 Headlamp Washer Pump Relay.

- **If less than 10 ohms**

7. All OK.

Repair Instructions

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

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

REPAIR INSTRUCTIONS

WINDSHIELD WIPER AND WASHER SWITCH REPLACEMENT

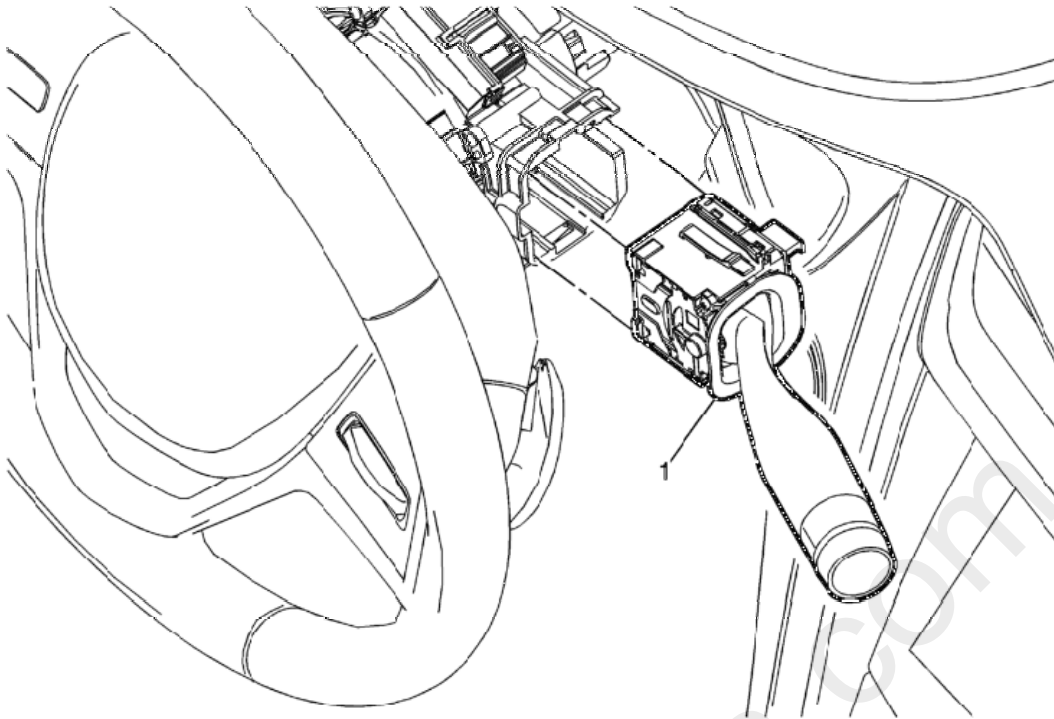


Fig. 4: Windshield Wiper And Washer Switch
 Courtesy of GENERAL MOTORS COMPANY

Windshield Wiper and Washer Switch Replacement

Callout	Component Name
Preliminary Procedure Remove the steering column lower trim cover. Refer to <u>Steering Column Lower Trim Cover Replacement (With N38)</u> , <u>Steering Column Lower Trim Cover Replacement (Without N38)</u> .	
1	Windshield Wiper and Washer Switch Procedure 1. Disconnect the electrical connector. 2. Release the retaining tabs and remove the windshield wiper and washer switch from the turn signal switch bracket.

WINDSHIELD WASHER NOZZLE HOSE REPLACEMENT

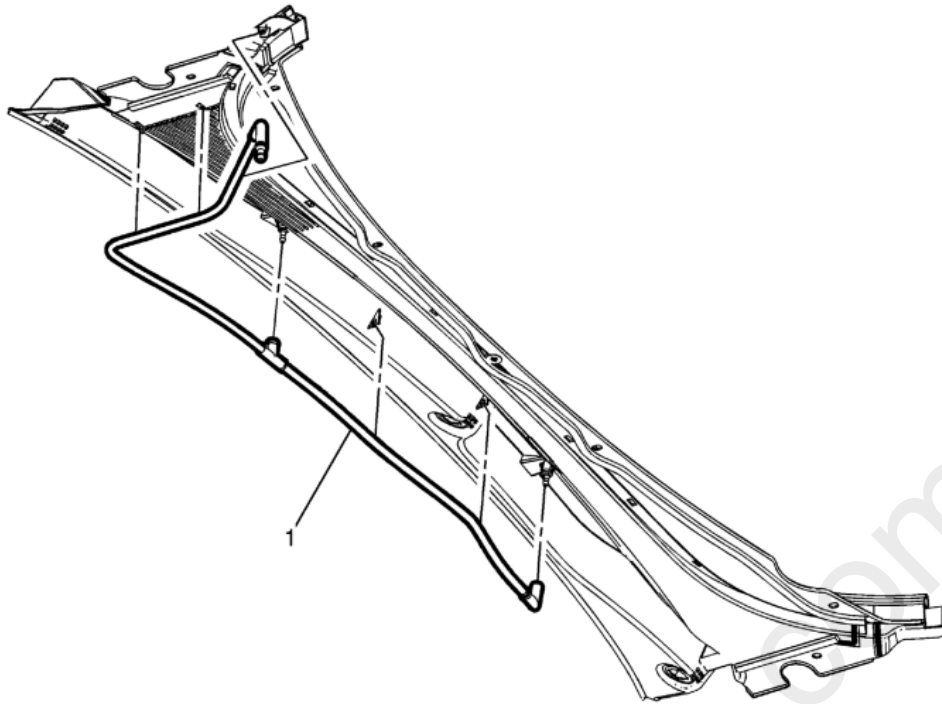


Fig. 5: Windshield Washer Nozzle Hose
 Courtesy of GENERAL MOTORS COMPANY

Windshield Washer Nozzle Hose Replacement

Callout	Component Name
Preliminary Procedure	
Remove the air inlet grille panel. Refer to <u>Air Inlet Grille Panel Replacement.</u>	
1	Windshield Washer Nozzle Hose Procedure 1. Disconnect the windshield washer hose at both windshield washer nozzle spouts. 2. Remove the windshield washer hose from the air inlet grille panel retainers.

WINDSHIELD WASHER NOZZLE REPLACEMENT

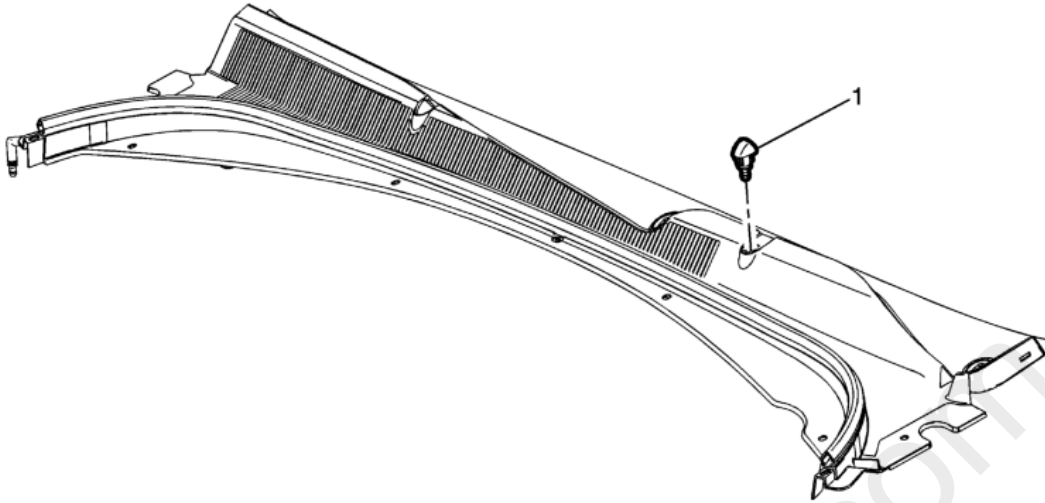


Fig. 6: Windshield Washer Nozzle
 Courtesy of GENERAL MOTORS COMPANY

Windshield Washer Nozzle Replacement

Callout	Component Name
Preliminary Procedure	
Remove the air inlet grille panel. Refer to <u>Air Inlet Grille Panel Replacement.</u>	
1	Windshield Washer Nozzle Procedure 1. Disconnect the windshield washer hose at the windshield washer nozzle being serviced. 2. Compress the locking tabs on the windshield washer nozzle. 3. Push the windshield washer nozzle up from the air inlet grille panel.

HEADLAMP WASHER NOZZLE BRACKET REPLACEMENT

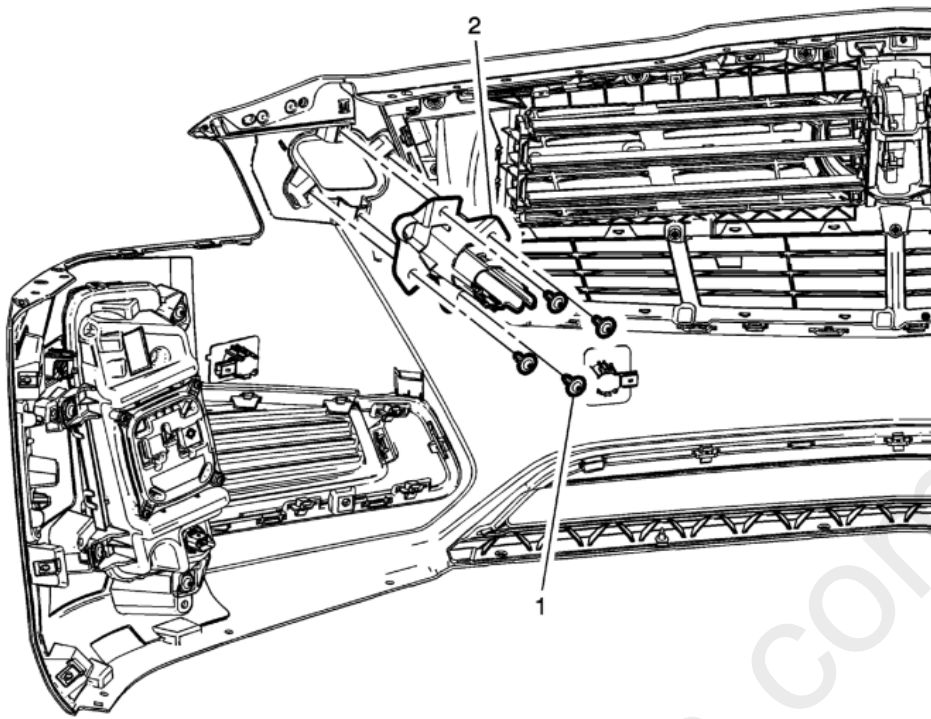


Fig. 7: Headlamp Washer Nozzle Bracket
 Courtesy of GENERAL MOTORS COMPANY

Headlamp Washer Nozzle Bracket Replacement

Callout	Component Name
Preliminary Procedure 1. Remove the front bumper fascia. Refer to Front Bumper Fascia Replacement . 2. Remove the headlamp washer nozzle. Refer to Windshield Washer Nozzle Replacement.	
1	Headlamp Washer Bracket Bolt (Qty: 4) CAUTION: Refer to Fastener Caution . Tighten 2.5 N.m(22 lb in)
2	Headlamp Washer Nozzle Bracket

HEADLAMP WASHER NOZZLE REPLACEMENT

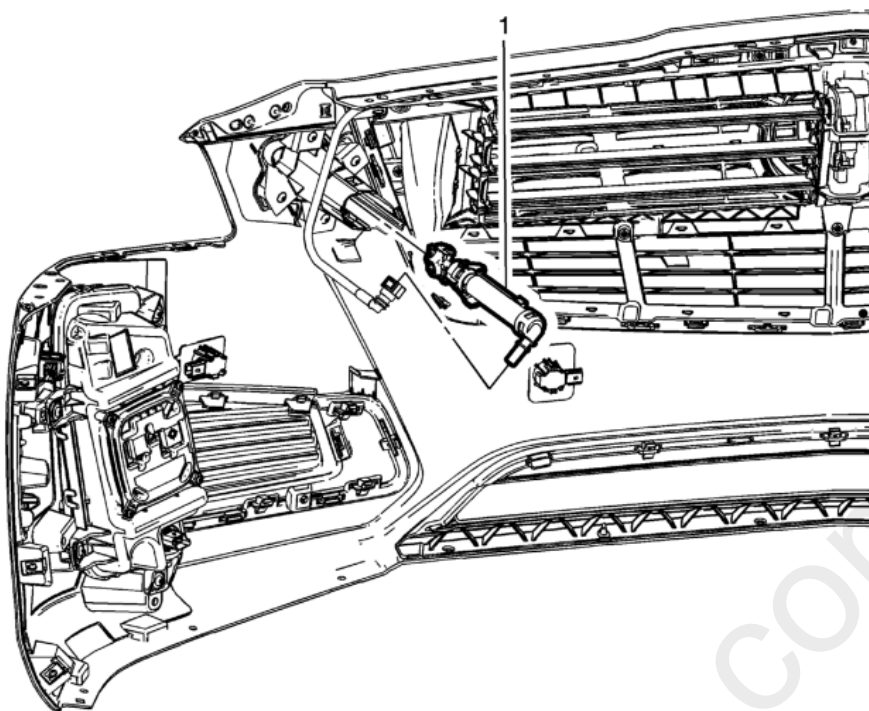


Fig. 8: Headlamp Washer Nozzle

Courtesy of GENERAL MOTORS COMPANY

Headlamp Washer Nozzle Replacement

Callout	Component Name
Preliminary Procedure	
Remove the front bumper fascia. Refer to Front Bumper Fascia Replacement .	
1	Headlamp Washer Nozzle Procedure 1. Disconnect the headlamp washer nozzle hose. 2. Compress the headlamp washer nozzle locking tabs and pull from the headlamp washer nozzle bracket.

HEADLAMP WASHER HOSE REPLACEMENT

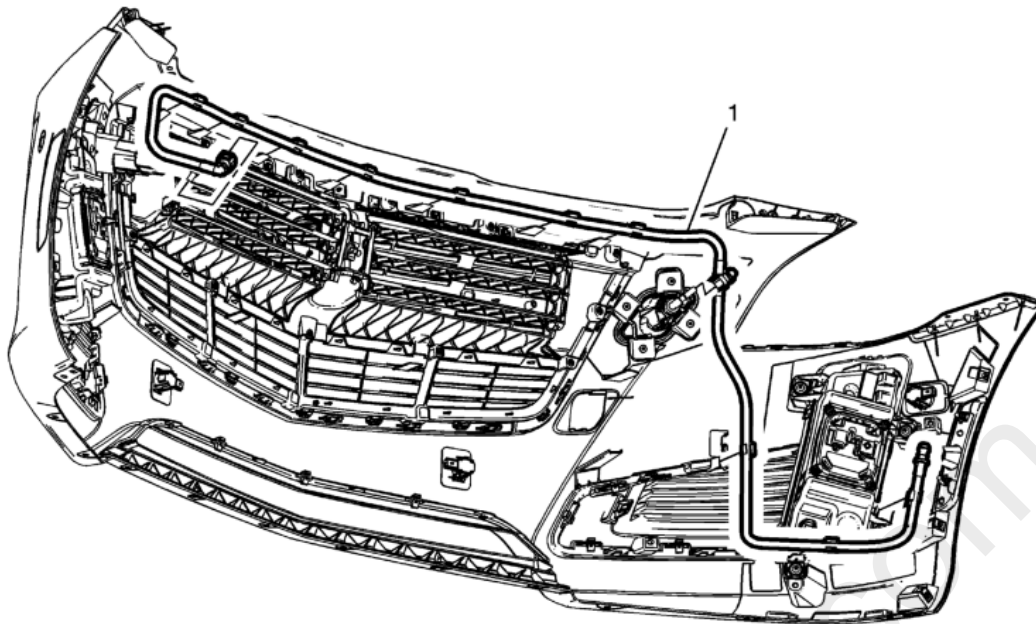


Fig. 9: Headlamp Washer Hose
 Courtesy of GENERAL MOTORS COMPANY

Headlamp Washer Hose Replacement

Callout	Component Name
Preliminary Procedure	
Remove the front bumper fascia. Refer to Front Bumper Fascia Replacement .	
1	Headlamp Washer Nozzle Procedure 1. Disconnect the headlamp washer nozzle hose from the headlamp washer nozzle. 2. Pull the headlamp washer nozzle hose spring clips from the front bumper fascia tabs.

WINDSHIELD WASHER SOLVENT CONTAINER FILLER TUBE REPLACEMENT

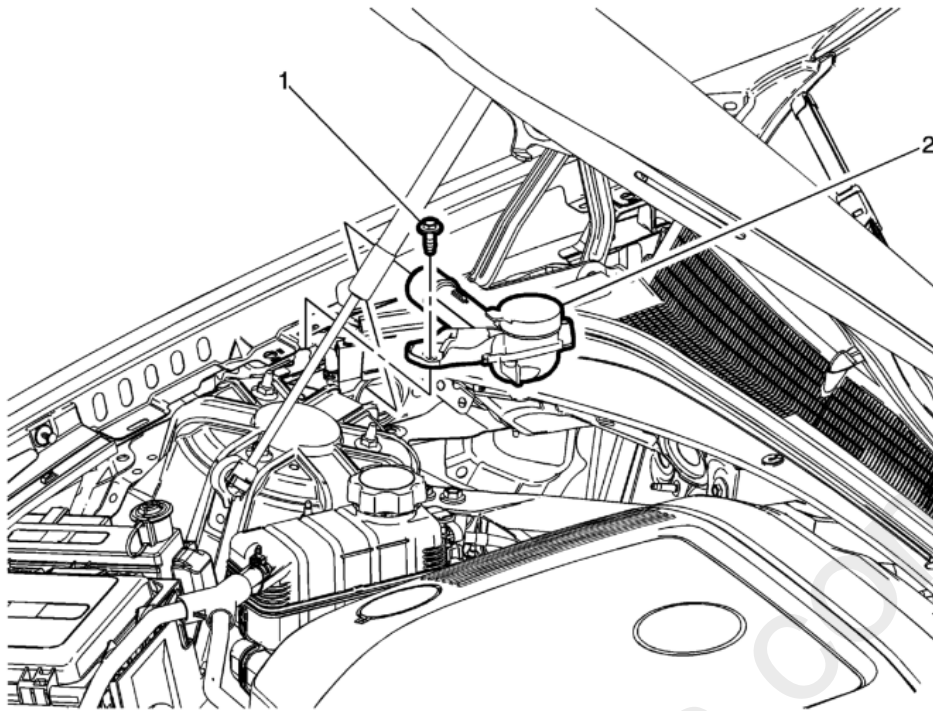


Fig. 10: Windshield Washer Solvent Container Filler Tube
 Courtesy of GENERAL MOTORS COMPANY

Windshield Washer Solvent Container Filler Tube Replacement

Callout	Component Name
Preliminary Procedure Remove the front compartment side sight shield. Refer to <u>Front Compartment Side Sight Shield Replacement</u> .	
1	Windshield Washer Solvent Container Filler Tube Nut CAUTION: Refer to <u>Fastener Caution</u> . Tighten 6 N.m (53 lb in)
2	Windshield Washer Solvent Container Filler Tube Procedure Gently rock the windshield washer solvent container filler tube side to side to release from the windshield washer solvent container.

WINDSHIELD WASHER SOLVENT CONTAINER GROMMET REPLACEMENT

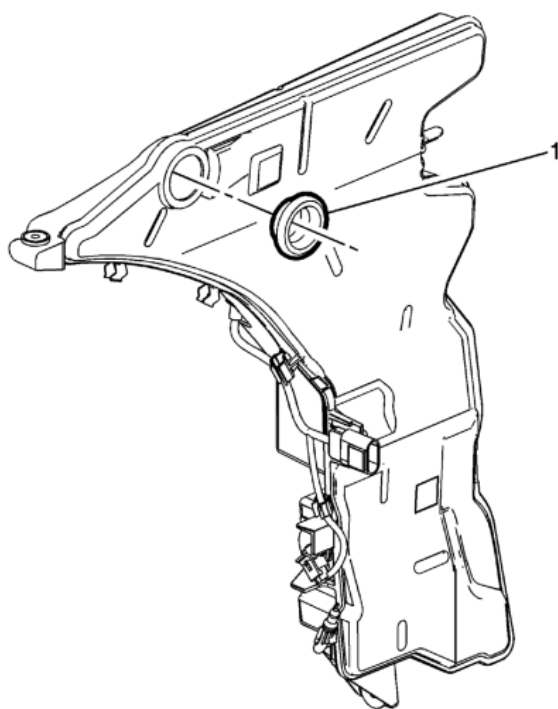


Fig. 11: Windshield Washer Solvent Container Grommet
 Courtesy of GENERAL MOTORS COMPANY

Windshield Washer Solvent Container Grommet Replacement

Callout	Component Name
Preliminary Procedure Remove the windshield washer solvent container. Refer to <u>Windshield Washer Solvent Container Replacement.</u>	
1	Windshield Washer Solvent Container Grommet

WINDSHIELD WASHER SOLVENT CONTAINER REPLACEMENT

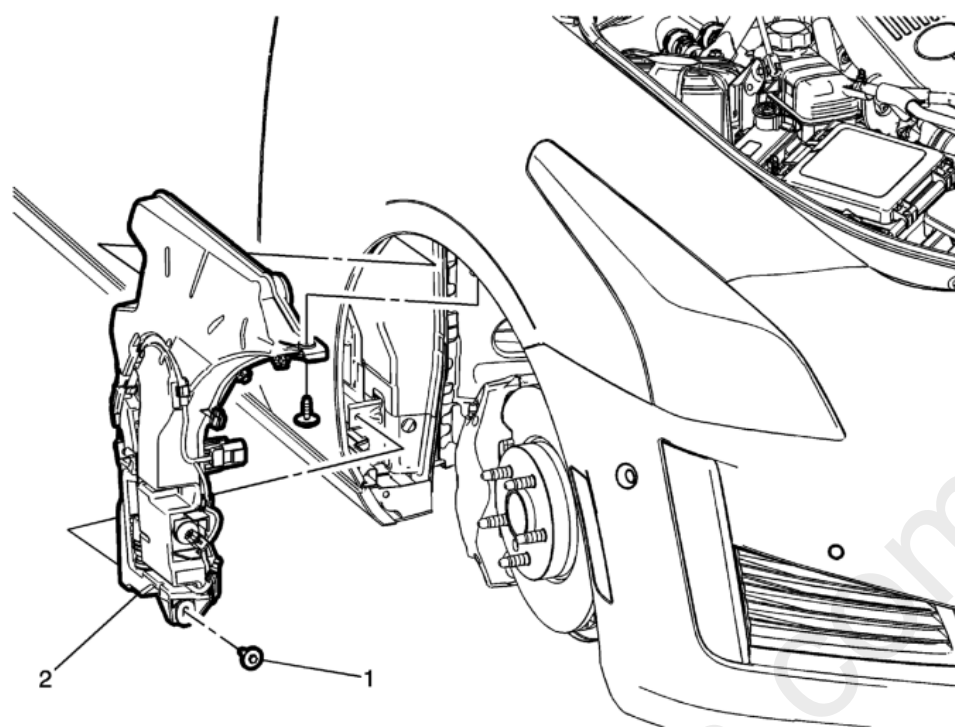


Fig. 12: Windshield Washer Solvent Container
 Courtesy of GENERAL MOTORS COMPANY

Windshield Washer Solvent Container Replacement

Callout	Component Name
Preliminary Procedure 1. Remove the front wheelhouse front liner. Refer to <u>Front Wheelhouse Liner Replacement</u> . 2. Remove the windshield washer solvent container filler tube. Refer to <u>Windshield Washer Solvent Container Filler Tube Replacement</u>.	
1	Windshield Washer Solvent Container Bolt (Qty: 2) CAUTION: Refer to <u>Fastener Caution</u> . Tighten 6 N.m (53 lb in)
2	Windshield Washer Solvent Container Procedure 1. Place a clean suitable drain pan under the windshield washer pump area to recover the windshield washer solvent when the windshield washer hose is disconnected.

2. Disconnect windshield washer nozzle hose from windshield washer pump hose.
3. Disconnect the electrical connector.
4. Remove the windshield washer solvent container from the vehicle.
5. Empty the windshield washer solvent into a suitable clean container.
6. Transfer parts as needed.

HEADLAMP WASHER PUMP REPLACEMENT

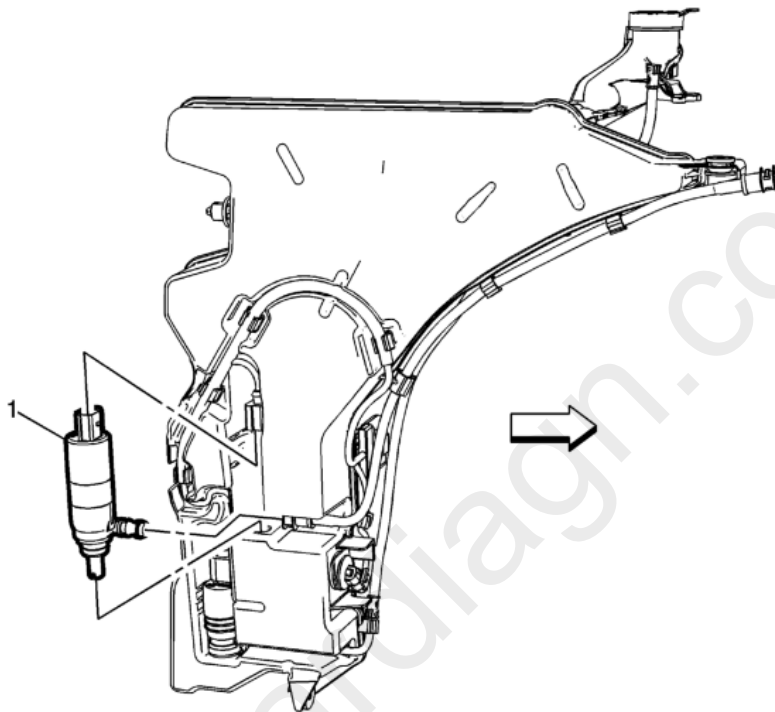


Fig. 13: Headlamp Washer Pump
Courtesy of GENERAL MOTORS COMPANY

Headlamp Washer Pump Replacement

Callout	Component Name
Preliminary Procedure Remove the windshield washer solvent container. Refer to <u>Windshield Washer Solvent Container Replacement</u> .	
	Headlamp Washer Pump
	Procedure 1. Disconnect the electrical connector from the headlamp washer pump. 2. Carefully pull outward at the top of the headlamp washer pump, to disengage the pump from the windshield washer solvent container.

1	3. Disconnect the headlamp washer pump hose from the headlamp washer pump spout.
	4. Rotate the washer pump, so the spout points outward, from the washer solvent container.
	5. Using two flat-bladed tools, place the blades under the headlamp washer pump seal on each side of headlamp washer pump.
	6. Twist the two flat-bladed tools in opposite directions to lift and disengage the headlamp washer pump from the windshield washer solvent container.
	7. Install a new headlamp washer pump seal upon replacement of the headlamp washer pump.

WINDSHIELD WASHER PUMP REPLACEMENT

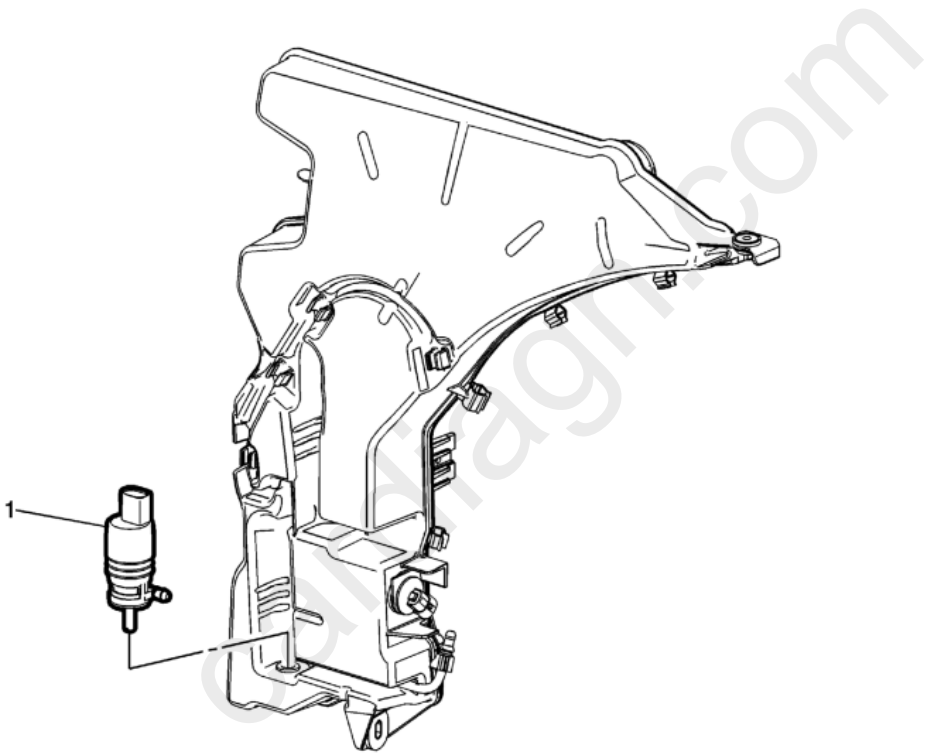


Fig. 14: Windshield Washer Pump
 Courtesy of GENERAL MOTORS COMPANY

Windshield Washer Pump Replacement

Callout	Component Name
Preliminary Procedure	
Remove the windshield washer solvent container. Refer to <u>Windshield Washer Solvent Container Replacement</u> .	
	Windshield Washer Pump
	Procedure

- | | |
|---|--|
| 1 | <ol style="list-style-type: none"> 1. Disconnect the electrical connector from the windshield washer pump. 2. Using two flat-bladed tools, place the blades under the windshield washer pump seal on each side of washer pump. 3. Twist the two flat-bladed tools in opposite directions to lift and disengage the windshield washer pump from the windshield washer solvent container. 4. Install a new windshield washer pump seal upon replacement of the windshield washer pump. |
|---|--|

WINDSHIELD WASHER SOLVENT LEVEL SENSOR REPLACEMENT

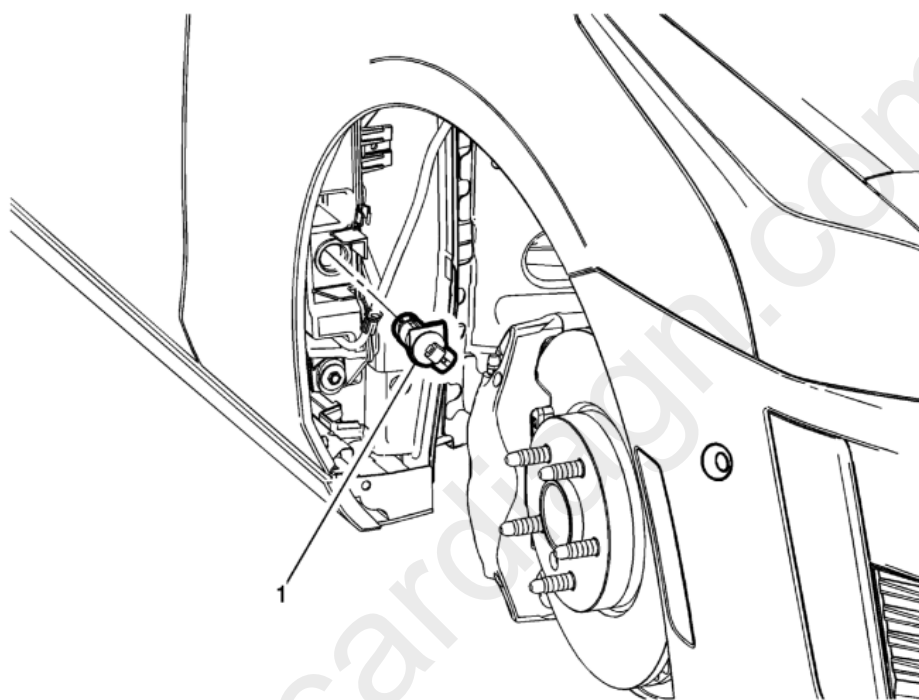


Fig. 15: Windshield Washer Solvent Level Sensor
 Courtesy of GENERAL MOTORS COMPANY

Windshield Washer Solvent Level Sensor Replacement

Callout	Component Name
Preliminary Procedure	
Remove the front wheelhouse liner. Refer to <u>Front Wheelhouse Liner Replacement</u> .	
1	Windshield Washer Solvent Level Sensor Procedure 1. Disconnect the electrical connector. 2. Place a clean suitable drain pan under the windshield washer solvent container to secure the windshield washer solvent when the level sensor and seal are removed.

3. Using two flat-bladed tools, place the ends under each side of the windshield washer solvent level sensor grommet.
4. Twisting in opposite directions, pry outward, the level sensor from the washer solvent container.
5. Remove and discard the windshield washer level sensor grommet and replace with new.

AIR INLET GRILLE PANEL REPLACEMENT

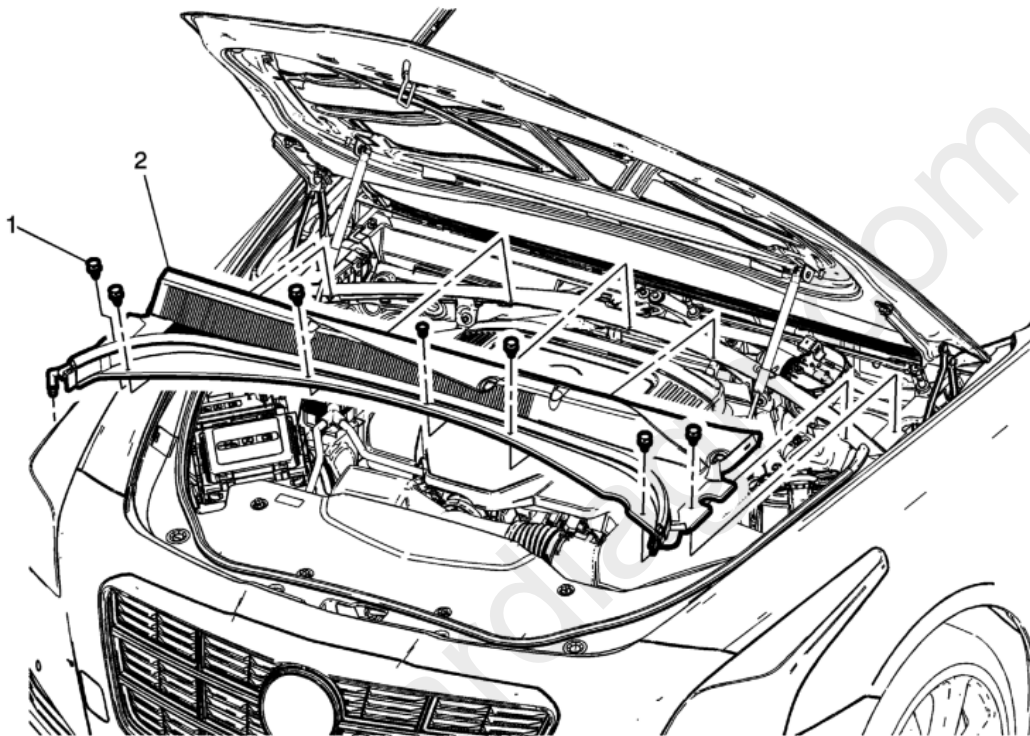


Fig. 16: Air Inlet Grille Panel
Courtesy of GENERAL MOTORS COMPANY

Air Inlet Grille Panel Replacement

Callout	Component Name
Preliminary Procedures	
1.	Remove the windshield wiper arms. Refer to <u>Windshield Wiper Arm Replacement</u> .
2.	Release the inboard ends of the air inlet grille panel extension. Refer to <u>Air Inlet Grille Panel Extension Replacement (Left Hand)</u> , <u>Air Inlet Grille Panel Extension Replacement (Right Hand)</u> .
3.	Remove both front compartment side sight shields. Refer to <u>Front Compartment Side Sight Shield Replacement</u>

1	Air Inlet Grille Panel Retainer (Qty: 6)
2	Air Inlet Grille Panel Procedure 1. Using a trim type release tool, disengage the center air inlet grille panel retainer. 2. Use a suitable plastic tool to release the air inlet grille panel from the windshield lower molding. 3. Disconnect the windshield washer hose. 4. Transfer parts as needed.

AIR INLET GRILLE PANEL EXTENSION REPLACEMENT (LEFT HAND)

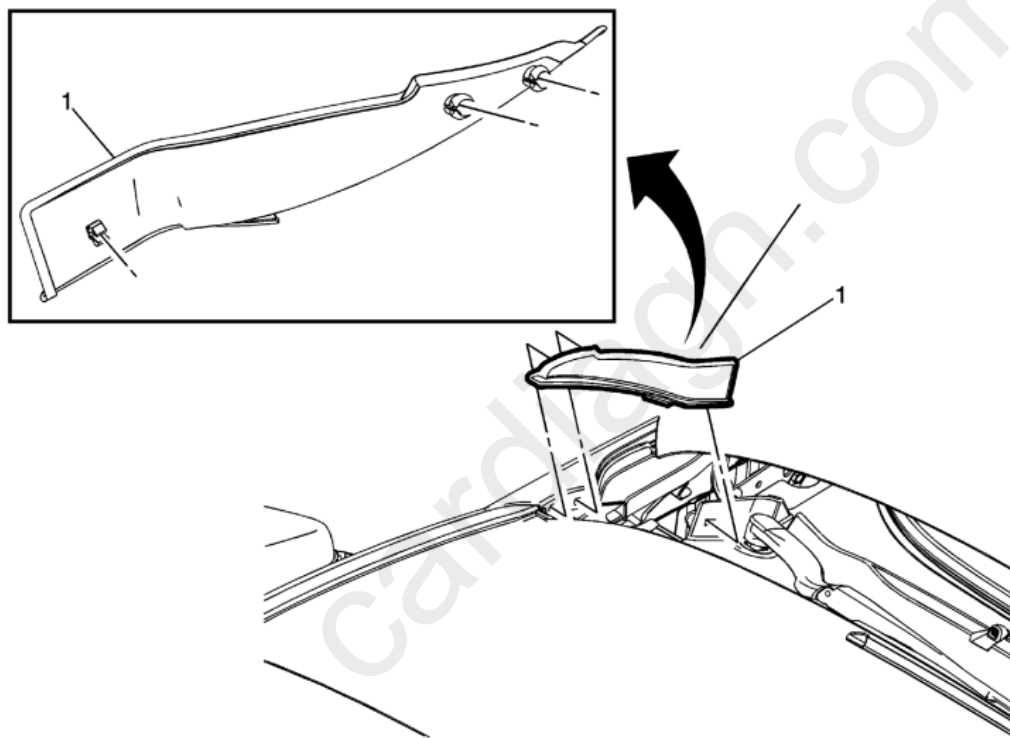


Fig. 17: Air Inlet Grille Panel Extension (Left Hand)
 Courtesy of GENERAL MOTORS COMPANY

Air Inlet Grille Panel Extension Replacement (Left Hand)

Callout	Component Name
Preliminary Procedure Open and support the hood.	
1	Air Inlet Grille Panel Extension Procedure Grasp the air inlet grille panel extension and disengage the retainers from the top edge of the fender and the end of the air inlet grille panel.

AIR INLET GRILLE PANEL EXTENSION REPLACEMENT (RIGHT HAND)

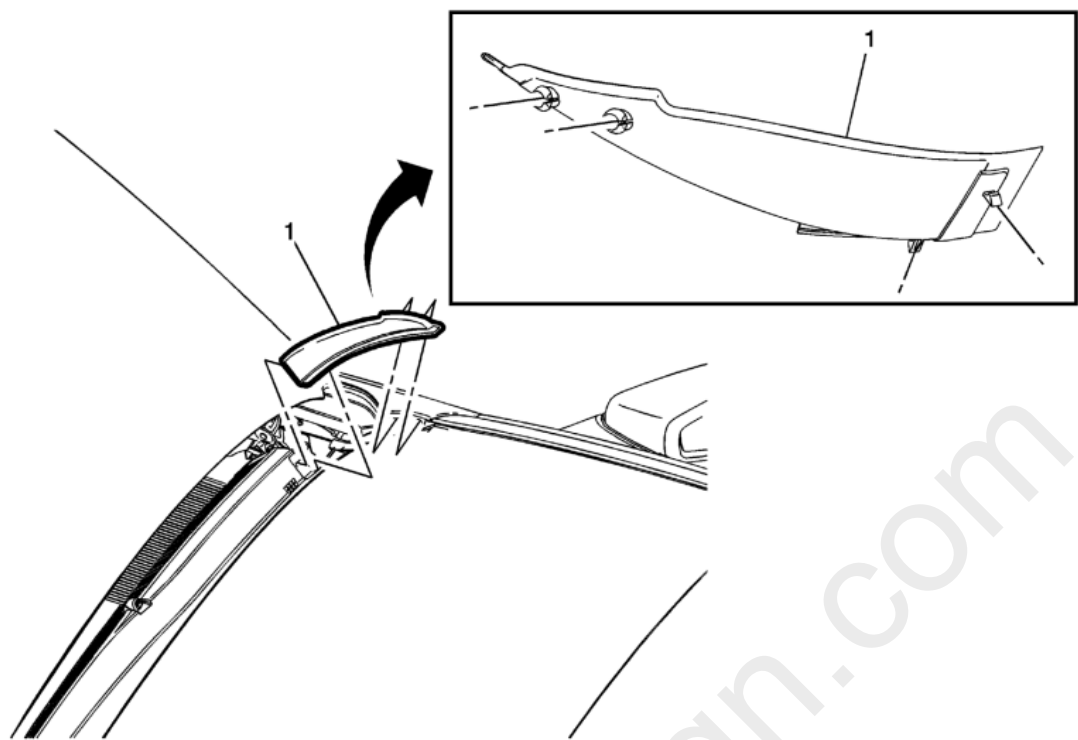


Fig. 18: Air Inlet Grille Panel Extension (Right Hand)
 Courtesy of GENERAL MOTORS COMPANY

Air Inlet Grille Panel Extension Replacement (Right Hand)

Callout	Component Name
Preliminary Procedure Open and support the hood.	
1	Air Inlet Grille Panel Extension Procedure Grasp the air inlet grille panel extension and disengage the retainers from the top edge of the fender and the end of the air inlet grille panel.

AIR INLET GRILLE PANEL AIR DEFLECTOR REPLACEMENT

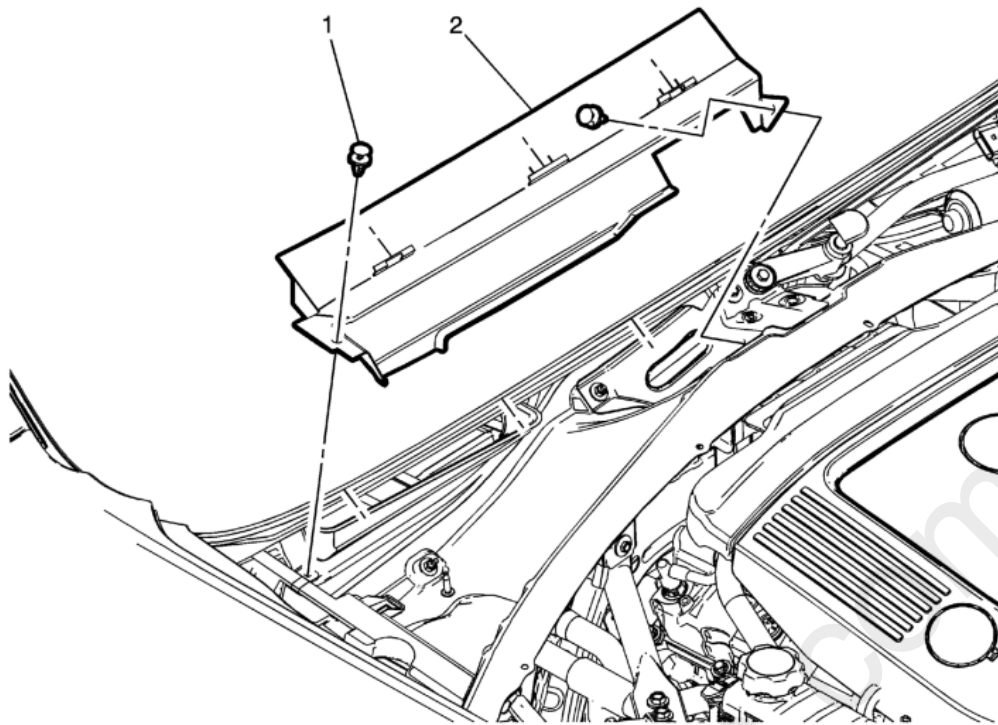


Fig. 19: Air Inlet Grille Panel Air Deflector
 Courtesy of GENERAL MOTORS COMPANY

Air Inlet Grille Panel Air Deflector Replacement

Callout	Component Name
Preliminary Procedure Remove the air inlet grille panel. Refer to <u>Air Inlet Grille Panel Replacement.</u>	
1	Air Inlet Grille Panel Air Deflector Retainer (Qty: 2)
2	Air Inlet Grille Panel Air Deflector Procedure Pull air inlet grille panel air deflector forward so retaining tabs release from shroud upper panel.

WINDSHIELD WIPER ARM REPLACEMENT

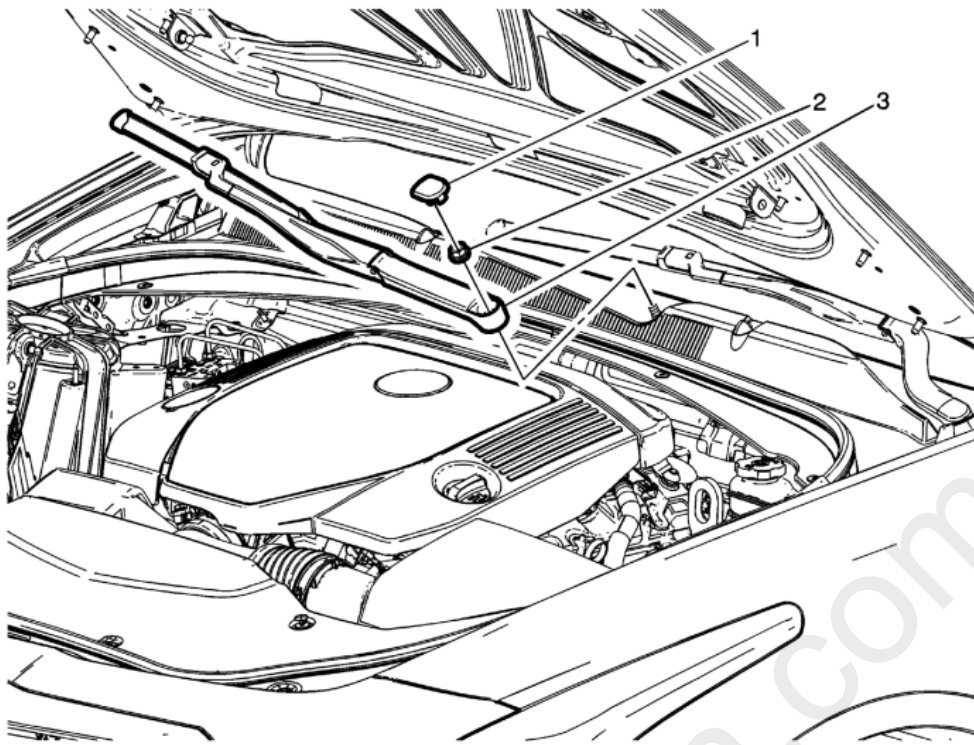


Fig. 20: Windshield Wiper Arm
 Courtesy of GENERAL MOTORS COMPANY

Windshield Wiper Arm Replacement

Callout	Component Name
Preliminary Procedure Open and support the hood.	
1	Windshield Wiper Arm Nut Cap NOTE: Use a small flat-bladed tool in order to release the finish cap from the wiper arm assembly.
2	Windshield Wiper Arm Nut CAUTION: Refer to <u>Fastener Caution</u> . Tighten 33 N.m (24 lb ft)
	Windshield Wiper Arm Procedure 1. Gently rock the windshield wiper arm to remove it from the pivot shaft.

3

2. Clean the pivot shaft knurls with a soft wire brush before installing a new windshield wiper arm.
3. Adjust the windshield wiper arms when they are reinstalled. Refer to **Windshield Wiper Arm Adjustment**.

WINDSHIELD WIPER BLADE REPLACEMENT

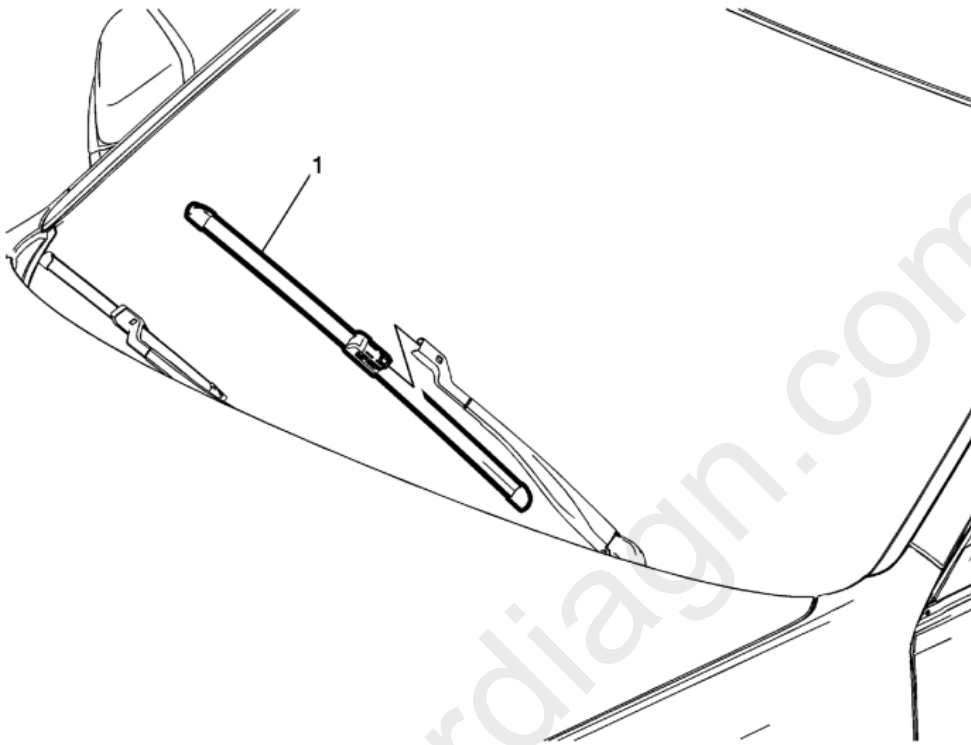


Fig. 21: Windshield Wiper Blade
Courtesy of GENERAL MOTORS COMPANY

Windshield Wiper Blade Replacement

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

WINDSHIELD WIPER SYSTEM MODULE REPLACEMENT

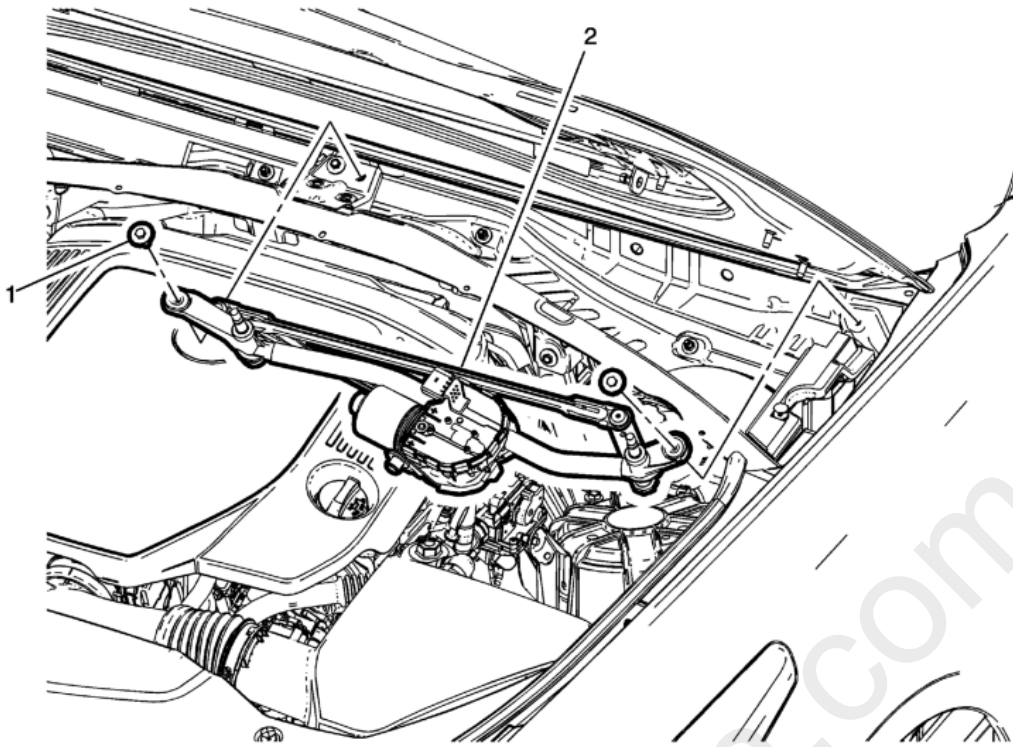


Fig. 22: Windshield Wiper System Module
 Courtesy of GENERAL MOTORS COMPANY

Windshield Wiper System Module Replacement

Callout	Component Name
Preliminary Procedure Remove the air inlet grille panel. Refer to <u>Air Inlet Grille Panel Replacement</u> .	
1	Windshield Wiper System Module Bolt (Qty: 2) CAUTION: Refer to <u>Fastener Caution</u> . Procedure Bend back the plenum side panel foam pad to access the bolt.
2	Windshield Wiper System Module Procedure 1. Disconnect the electrical connector. 2. Release the windshield wiper system module retaining feature by sliding it towards the passenger side of the vehicle. 3. Remove the windshield wiper transmission from the vehicle.

WINDSHIELD MULTIFUNCTION SENSOR MOUNT BRACKET COVER REPLACEMENT (WITH UEU, UFL)

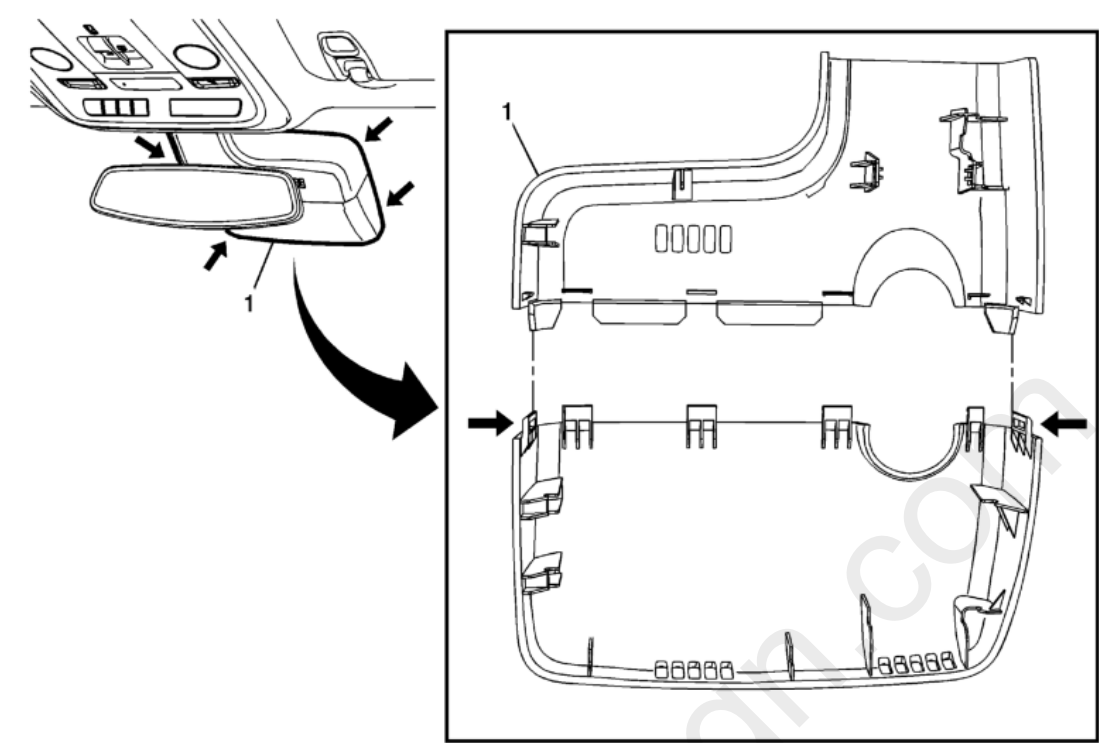


Fig. 23: Windshield Multifunction Sensor Mount Bracket Cover (With UEU, UFL)
Courtesy of GENERAL MOTORS COMPANY

Windshield Multifunction Sensor Mount Bracket Cover Replacement (With UEU, UFL)

Callout	Component Name
	Windshield Multifunction Sensor Mount Bracket Cover
1	Procedure 1. Disengage the cover from the sides of the bracket by lifting on the sides of the cover next to the glass surface. 2. With the cover assembly loose, disengage the locking tabs on each side to separate the top and bottom halves of the cover. NOTE: This is a blind operation: to unlock the top and bottom covers, flex the top cover at the locking tab outboard and flex the bottom cover at the tab inboard.

WINDSHIELD MULTIFUNCTION SENSOR MOUNT BRACKET COVER REPLACEMENT (WITHOUT UEU, UFL)

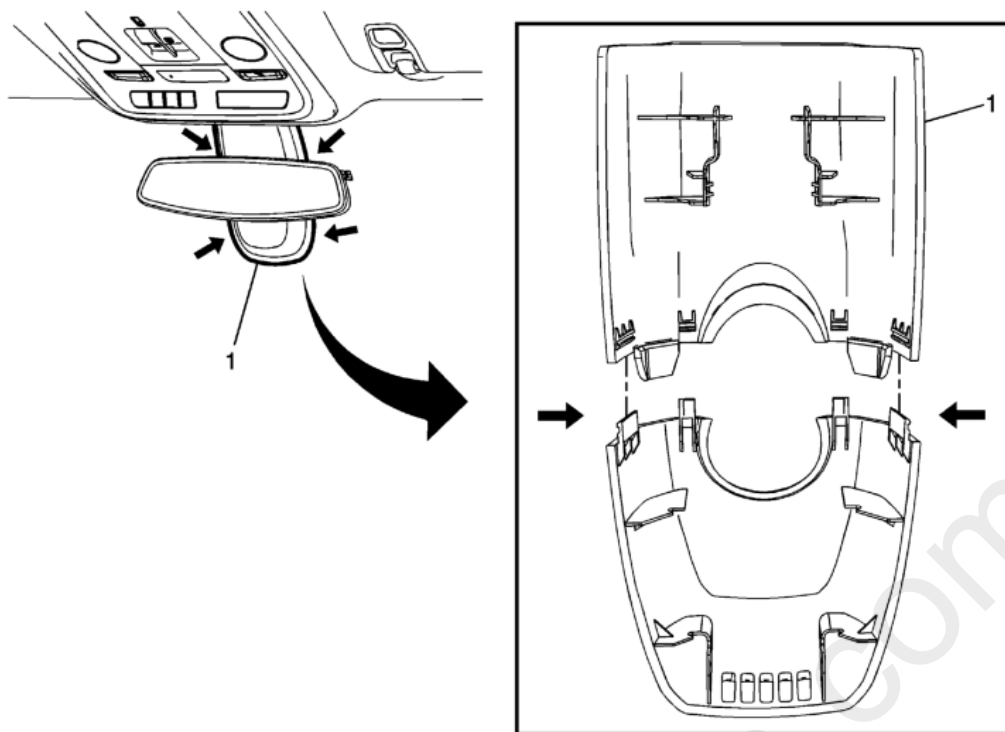


Fig. 24: Windshield Multifunction Sensor Mount Bracket Cover (Without UEU, UFL)
 Courtesy of GENERAL MOTORS COMPANY

Windshield Multifunction Sensor Mount Bracket Cover Replacement (Without UEU, UFL)

Callout	Component Name
1	Windshield Multifunction Sensor Mount Bracket Cover Procedure 1. Disengage the cover from the sides of the bracket by lifting on the sides of the cover next to the glass surface. 2. With the cover assembly loose, disengage the locking tabs on each side to separate the top and bottom halves of the cover. NOTE: This is a blind operation: to unlock the top and bottom covers, flex the top cover at the locking tab outboard and flex the bottom cover at the tab inboard.

WINDSHIELD OUTSIDE MOISTURE/AMBIENT LIGHT AND HUMIDITY SENSOR REPLACEMENT

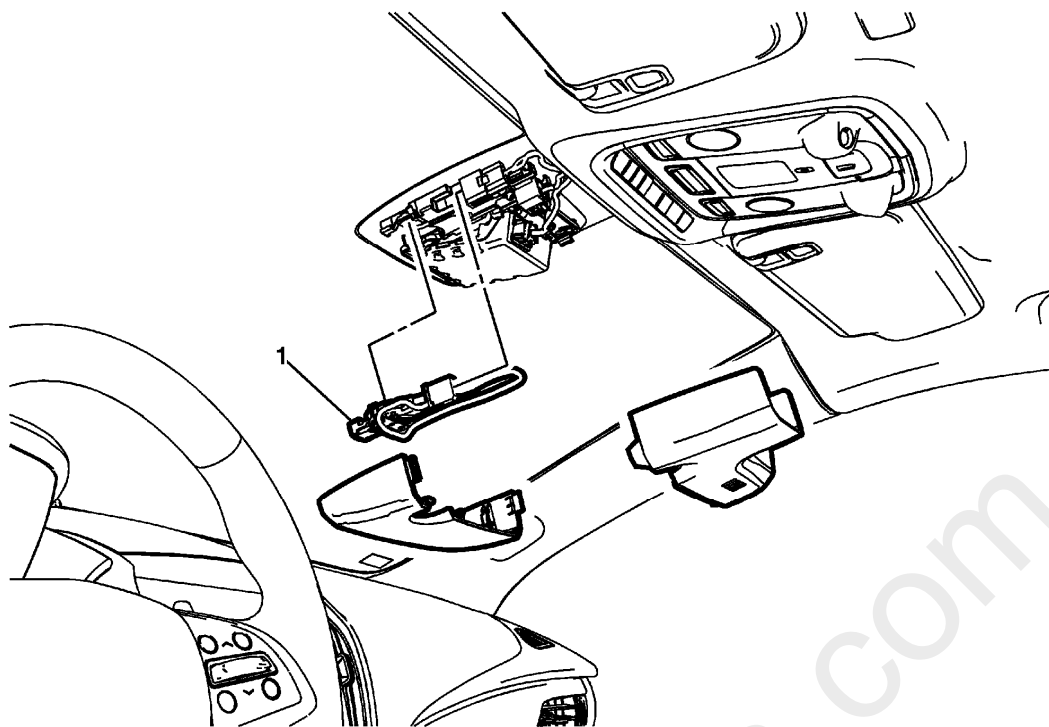


Fig. 25: Inside Air Moisture and Windshield Temperature Sensor
 Courtesy of GENERAL MOTORS COMPANY

Windshield Outside Moisture/Ambient Light and Humidity Sensor Replacement

Callout	Component Name
Preliminary Procedure	
Remove the inside rearview mirror. Refer to <u>Inside Rearview Mirror Replacement</u> .	
1	Windshield Outside Moisture/Ambient Light and Humidity Sensor
	Procedures
	1. Unlatch the windshield outside moisture/ambient light and humidity sensor from the inside rear view mirror support bracket. 2. Disconnect the electrical connector.

WINDSHIELD GLASS CLEANING

Clean the windshield with windshield cleaner, GM P/N 89021822 (Canadian P/N 992727) or equivalent. The cleaner should not harm the paint finish or scratch the glass. The glass is clean when the water no longer beads, but sheets across the entire glass surface.

WIPER BLADE ELEMENT CLEANING

Lift each blade assembly off of the windshield and clean the element with a cloth saturated with full strength washer solvent. Hold the blade in one hand and wipe the element with the saturated cloth until the black residue

disappears. Then rinse the blade assembly elements with clean drinkable water.

WIPER CHATTER REPAIR

Some vehicles may exhibit a condition where the windshield wipers chatter and/or wipe unevenly. Several items may contribute to this condition. To completely repair this condition, ALL of the items listed should be inspected and corrected as necessary.

- 1. Inspect the wiper blade elements and replace as needed. Refer to Windshield Wiper Blade Replacement.
- 2. Clean the wiper blade elements. Refer to Wiper Blade Element Cleaning.
- 3. Clean the windshield. Refer to Windshield Glass Cleaning.

WINDSHIELD WIPER ARM ADJUSTMENT

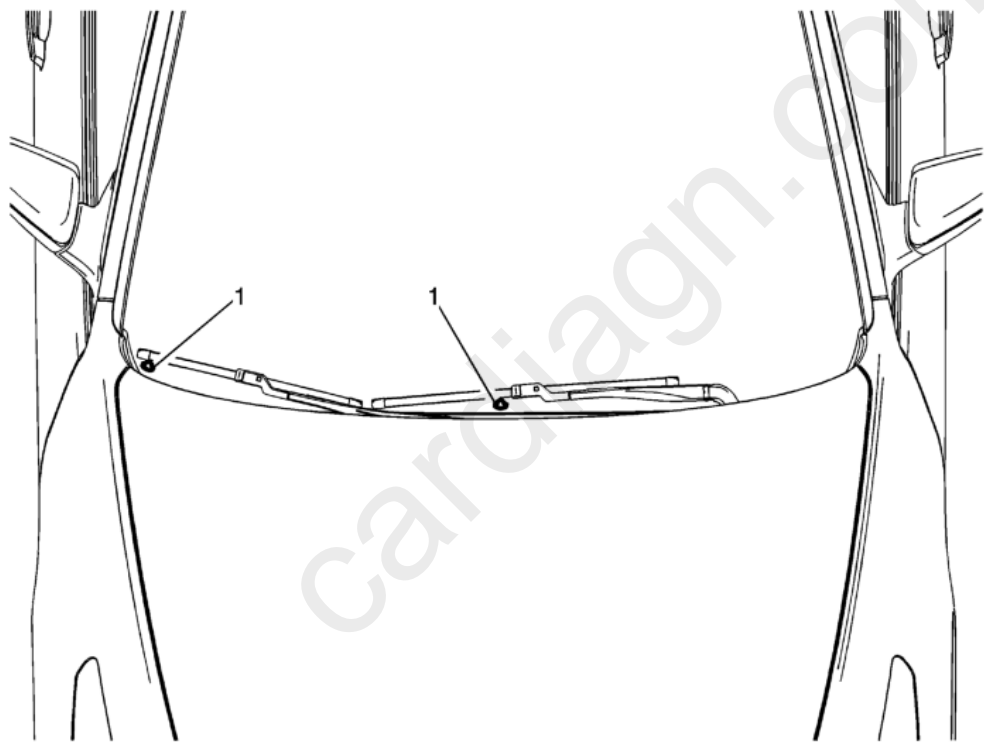


Fig. 26: Windshield Wiper Arm Adjustment
Courtesy of GENERAL MOTORS COMPANY

Windshield Wiper Arm Adjustment

Callout	Component Name
	Windshield Wiper Arm
Procedure	
1. Lubricate the windshield with washer fluid.	

1

2. Run the windshield wipers and turn off the windshield wipers.
3. Ensure the windshield wipers are in the full park position.
4. Inspect the windshield wipers for proper position to the circle on the windshield.
5. Realign the windshield wiper arm to the circle if required. Refer to **Windshield Wiper Arm Replacement**.

DESCRIPTION AND OPERATION

WIPER/WASHER SYSTEM DESCRIPTION AND OPERATION

Wiper/Washer System Components

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

- Windshield Wiper Relay
- Windshield Wiper Speed Control Relay
- Windshield Washer Pump Relay
- Windshield Washer Fluid Pump
- Windshield Wiper Motor
- Window Wiper/Washer Switch
- Windshield Wiper Motor 30
- Windshield Washer Fluid Pump
- Body Control Module (BCM)
- Headlamp Washer Fluid Pump Relay
- Headlamp Washer Fluid Pump
- Windshield Washer Fluid Level Switch
- Rain Sensor

Windshield Wiper System

On Wiper System Smart equipped vehicles, the body control module (BCM) will command front wiper operations via local interconnect network (LIN) serial data communications instead of via ON/OFF and HIGH/LOW Wiper Motor Relay Drive Outputs. In front wiper systems using the Wiper System Smart - Single configuration, the Driver's side and Passenger's side Wiper Arm are connected by a mechanical linkage with a single integrated Front Wiper Motor/Controller operating them. The Front Wiper Motor/Controller contains the necessary electronics, motor, and position sensors to execute front wiper commands from the Body Control Module. These internal electronics are integrated into the cover of the wiper motor gear housing and are not considered a serviceable item. The Front Wiper Motor/Controller 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 interface between the BCM and the Front Wiper Motor/Controller utilizes a Master/Slave configuration using a LIN serial data system for communication. The BCM is designated as the master, and the Front Wiper

Motor/Controller is configured as the slave. As the System Master, the BCM uses the LIN communication bus to command Front Wiper operation, and communicate vehicle information to the Wiper Motor controller. The Front Wiper Motor/Controller provides system status and diagnostic information to the BCM for diagnostic reporting and operational purposes. The Body Control Module (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 will do this, even if the module has lost all microprocessor control. The Front Wiper Motor/Controller gives priority to its LIN input over this Redundant Control Input, however, in the event that LIN communications are lost between the BCM and the Front Wiper Motor/Controller this redundant signal is used to command the required fail-soft wiper actions including Power Mode. While under Redundant Input control the Front Wiper Motor/Controller shall provide Continuous Low Speed Wiper operation when the input is Active, and will park the Wipers and go to Low Power Mode when the Redundant Input is Inactive.

While the Front Wiper Switch is either held in the MIST position (momentary contact switch) or is in its LOW position (latching switch), the BCM provides continuous Low Speed Wiper operation by commanding uninterrupted Low Speed Wiper operation by setting the transmitted LIN signal to Low Speed Wipe.

The BCM shall command the Wiper System Smart to perform Intermittent Wipes as follows:

1. Perform one immediate wipe by issuing a LIN signal set to Low Wipes. The Front Wiper Motor/Controller shall initiate Low Speed Wiper Operation and send a LIN signal back set to Low Wiping.
2. Upon the wipers leaving their PARKED position, the Front Wiper Motor/Controller shall send a LIN signal indicating the wipers are no longer in park.
3. Upon receipt of the Wiper out of Park LIN signal, the BCM shall transition the Front Wiper Command LIN 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 LIN signal to Parking.
4. The current wipe cycle will be completed and the wipers parked. Upon parking the wipers, the wiper system smart sends the Wiper Front Status LIN signal set to Parked.
5. Upon the transition of the LIN signal from Parking to Parked, the BCM pauses the Wipers in their Park Position for the time duration associated with the current intermittent delay interval switch setting and repeats the process

As called out above, 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.

Front Wiper Block Diagram

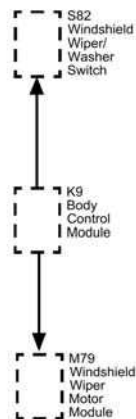


Fig. 27: Front Wiper Block Diagram
 Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
HW	Hard-Wired
HW	Hard-Wired
S82	S82 Windshield Wiper/Washer Switch
K9	K9 Body Control Module
M79	M79 Windshield Wiper Motor Module

Windshield Washer System

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

On vehicles with the Rear Wash feature a single reversing wash motor may be utilized for both the front and rear wash operation. In this system the wash motor is operated in one direction to spray fluid on the front

windshield and then operated in the reverse direction to spray fluid on the rear window. The BCM Controls the reversing wash motor through two High Side Drive outputs. One controls the Front Wiper Motor Relay and one controls the Rear Wiper Relay.

Front Washer-Washer Fluid Level Block Diagram

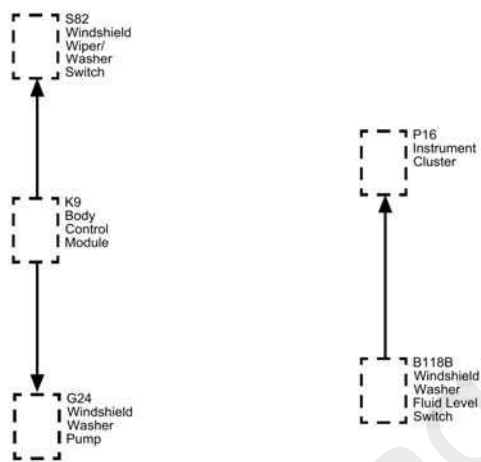


Fig. 28: Front Washer-Washer Fluid Level Block Diagram
Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
HW	Hard-Wired
HW	Hard-Wired
HW	Hard-Wired
S82	S82 Windshield Wiper/Washer Switch
K9	K9 Body Control Module
G24	G24 Windshield Washer Pump
P16	P16 Instrument Cluster

Headlamp Washer System

When Headlamp Wash Equipped, the headlamps shall be sprayed with wash fluid as a result of an extended Windshield Wash Switch Activation. In order to preserve wash fluid, the feature shall only be allowed to activate if the Low or High Beam Headlamps are active. In addition, after the initial Headlamp Wash operation has been performed, additional headlamp washes shall not be performed for the next 4 Windshield Wash activations or for 48 h whichever comes first. In the event that the system has detected a Stuck Front Wash Switch condition, the Headlamp Wash Feature shall be disabled.

Headlamp Washer Pump Block Diagram

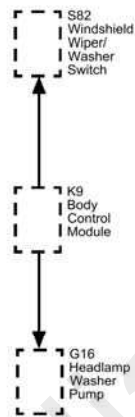


Fig. 29: Headlamp Washer Pump Block Diagram
Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
HW	Hard-Wired
HW	Hard-Wired
S82	S82 Windshield Wiper/Washer Switch
K9	K9 Body Control Module
G16	G16 Headlamp Washer Pump

Washer Fluid Level Indicator

The check washer fluid message is controlled by the instrument panel 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 panel 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 programed with a 1 min delay before changing states of the Check Washer Fluid message during an ignition cycle.

Front Washer-Washer Fluid Level Block Diagram

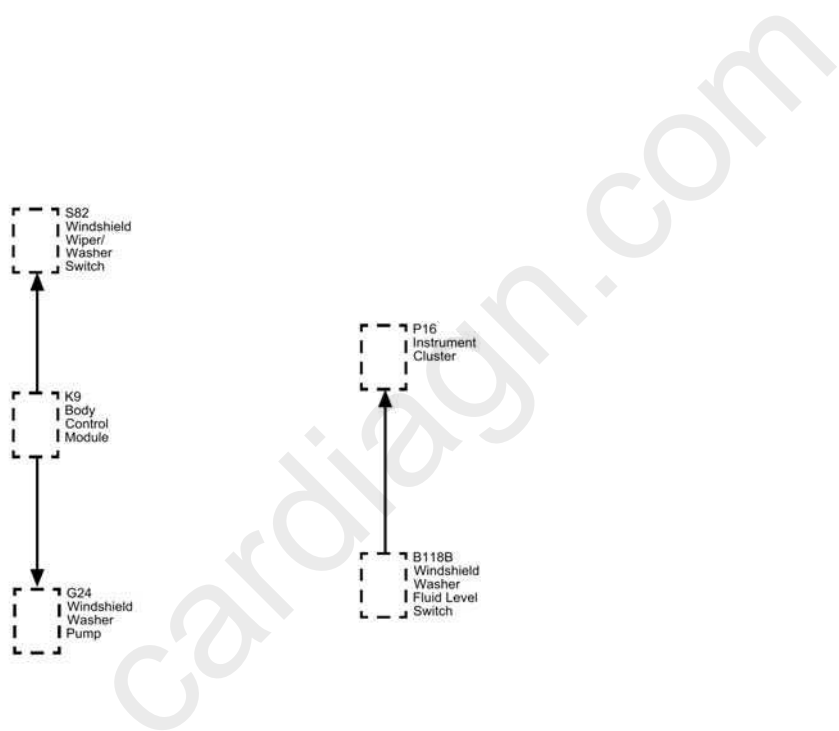


Fig. 30: Front Washer-Washer Fluid Level Block Diagram
Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
HW	Hard-Wired

HW	Hard-Wired
HW	Hard-Wired
S82	S82 Windshield Wiper/Washer Switch
K9	K9 Body Control Module
G24	G24 Windshield Washer Pump
P16	P16 Instrument Cluster
B118B	B118B Windshield Washer Fluid Level Switch

Rain Sense Mode and Rain Sense Indicator

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

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

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

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

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

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

Rain Sensor Block Diagram



Fig. 31: Rain Sensor Block Diagram
 Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
HW	Hard-Wired
K9	K9 Body Control Module
B177	B177 Rain/Ambient Light Sensor Module