

2017 ACCESSORIES & EQUIPMENT

Wipers and Washers - Impala

SPECIFICATIONS

FASTENER SPECIFICATIONS

Reusable Threaded Fastener Tightening Specifications

NOTE:

All fasteners listed in this table can be reused after removal.

Application	Specification
	Metric (English)
Windshield Washer Solvent Container Nut	9 N.m (80 lb in)
Windshield Wiper Arm Nut	38 N.m (28 lb ft)
Windshield Wiper Motor Bolt	8 N.m (71 lb in)
Windshield Wiper Transmission Bolt	8 N.m (71 lb in)

SCHEMATIC WIRING DIAGRAMS

WIPER/WASHER WIRING SCHEMATICS

Wiper/Washer Control

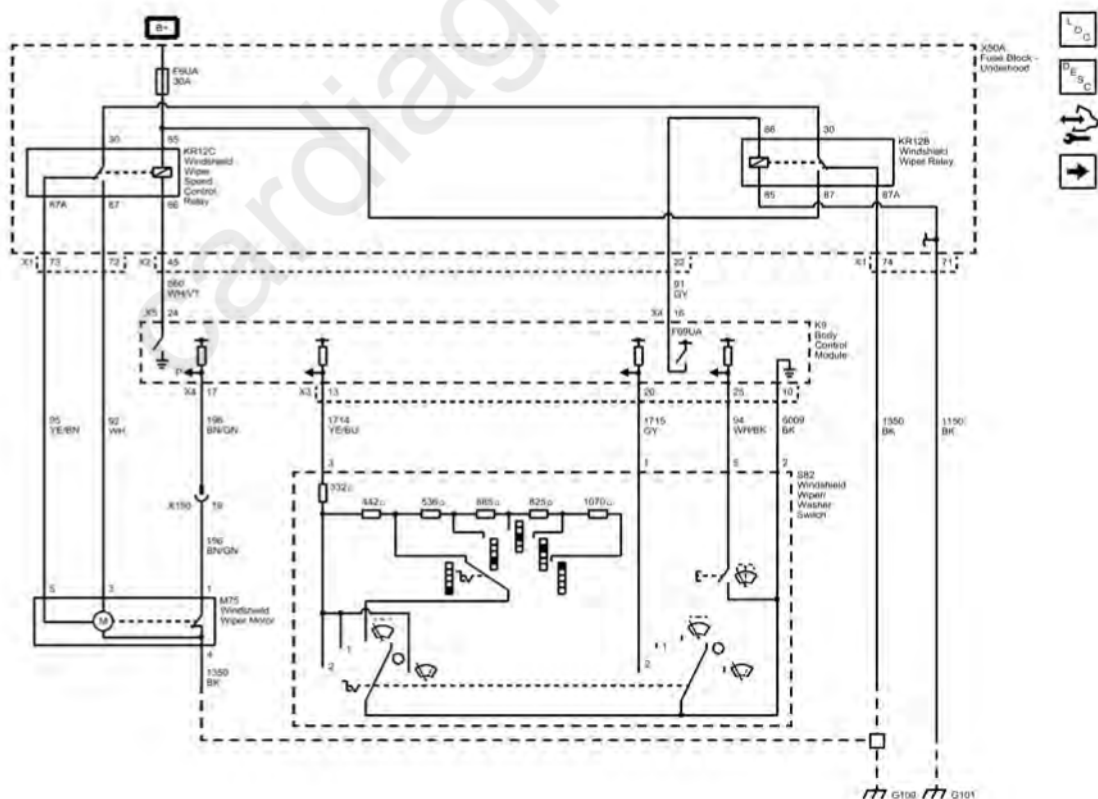


Fig. 1: Wiper/Washer Control

Courtesy of GENERAL MOTORS COMPANY

Windshield Wiper Control (CE1)

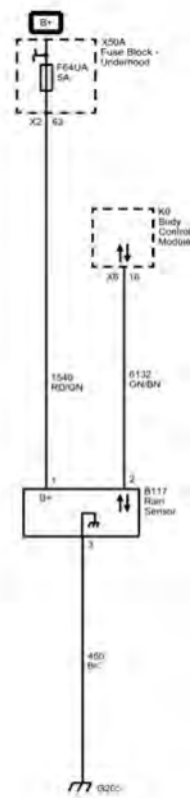


Fig. 2: Windshield Wiper Control (CE1)
Courtesy of GENERAL MOTORS COMPANY

Washer Pump and Fluid Level

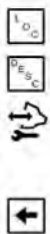
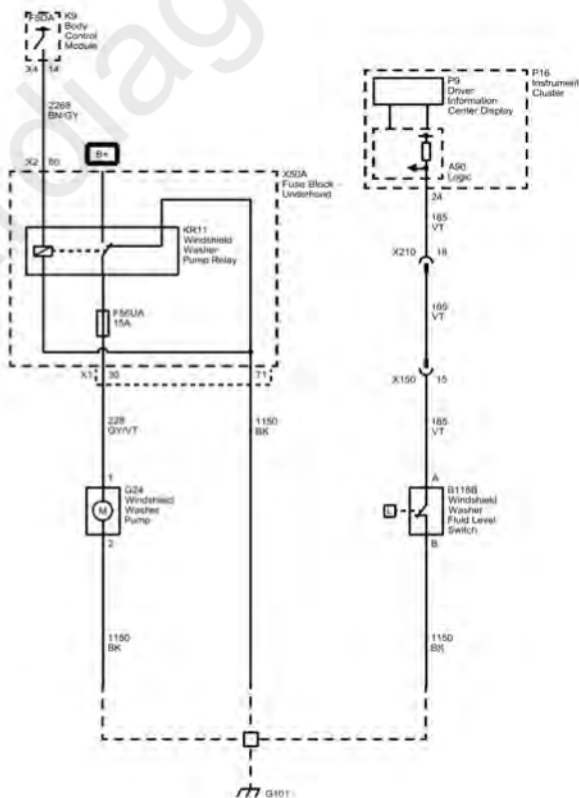


Fig. 3: Washer Pump and Fluid Level
Courtesy of GENERAL MOTORS COMPANY

DIAGNOSTIC INFORMATION AND PROCEDURES

DTC B370A: RAIN SENSOR

Diagnostic Instructions

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

DTC Descriptor

DTC B370A

Rain Sensor

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

Diagnostic Fault Information

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

Circuit/System Description

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

Conditions for Running the DTC

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

Conditions for Setting the DTC

Communication between the BCM and the rain sensor is interrupted, and an interruption in communication is a serial data fault.

Action Taken When the DTC Sets

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

Conditions for Clearing the DTC

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

Reference Information

Schematic Reference

[Wiper/Washer Schematics](#)

Connector End View Reference

[COMPONENT CONNECTOR END VIEWS - INDEX](#)

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, U153A are not set.
 - **If the DTCs are set**

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

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

Circuit/System Testing

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

- **If the test lamp illuminates**

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

- **If less than 5.0 V**

1. 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 Ω in the serial data circuit end to end.

- If 2 Ω or greater, repair the open/high resistance in the circuit.
- If less than 2 Ω , replace the K9 Body Control Module.

- **If greater than 10.0 V**

1. 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 5.0 - 10.0 V**

6. Test or replace the B117 Rain Sensor.

Repair Instructions

- Perform the [Diagnostic Repair Verification](#) after completing the repair.
- Refer to [Windshield Outside Moisture/Ambient Light and Humidity Sensor Replacement](#)
- Refer to [Control Module References](#) for body control module replacement, programming and setup.

DTC B3715 OR B3875: WINDSHIELD WIPER RELAY CIRCUITS

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.
- Refer to [Diagnostic Procedure Instructions](#) to provide an overview of each diagnostic category.

DTC Descriptors

DTC B3715

Windshield Wiper Relay Circuit

DTC B3875

Windshield Wiper High Speed 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
Windshield Wiper Switch Low Signal terminal 3	1	1	1	-
Windshield Wiper Switch High Signal terminal 1	4	2	2	-
Windshield Wiper Motor Park Switch Signal terminal 1	3	3	-	-
Windshield Wiper Relay Control terminal 86	B3715 02	B3715 04	B3715 01	-

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Windshield Wiper High Speed Relay Control terminal 86	B3875 02	B3875 04	B3875 01	-
Windshield Wiper Motor Control terminal 5	1	1	4	-
Windshield Wiper Motor High Speed Control terminal 3	2	2	4	-
Windshield Wiper Switch Low Reference terminal 2	-	1, 2	1, 2	-
Windshield Wiper Motor Ground terminal 4	-	1, 2, 3	-	-
Windshield Wiper Relay Ground terminal 85	-	1	-	-
1. Delay or Low Speed Wipers Inoperative 2. High Speed Wipers Inoperative 3. Wipers Do Not Park 4. Wipers Always ON				

Circuit/System Description

The body control module (BCM) controls the wiper motor based on input from the windshield wiper/washer switch. The BCM monitors the wiper/washer switch through two separate signal circuits and a 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 washer operation.

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

Conditions for Running the DTC

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

Conditions for Setting the DTC

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

Description and Operation

Wiper/Washer System Description and Operation

- [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 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**
3. 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**
4. 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**
5. 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 Windshield Wiper Motor does not cycle between Off, Low, and High**
Refer to Circuit/System Testing - Windshield Wiper Motor Malfunction
 - **If the Windshield Wiper Motor cycles between Off, Low, and High**
6. Ignition OFF.
7. Verify the scan tool Windshield Wiper Park Switch parameter is Active.
 - **If the parameter does not change**
Refer to Circuit/System Testing - Windshield Wiper Motor Malfunction.
 - **If the parameter changes**
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 Ω between the low reference circuit terminal 2 and ground.
 - **If 10 Ω or greater**
 1. Ignition OFF, disconnect the harness connector at the K9 Body Control Module.

2. Test for less than 2 Ω in the low reference circuit end to end.
 - If 2 Ω or greater, repair the open/high resistance in the circuit.
 - If less than 2 Ω , replace the K9 Body Control Module.
- **If less than 10 Ω**
3. Ignition ON.
4. 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, ignition ON.
 2. Test for less than 1 V between the signal circuit and ground.
 - If 1 V or greater, repair the short to voltage on the circuit.
 - If less than 1 V
 3. Test for less than 2 Ω in the signal circuit end to end.
 - If 2 Ω or greater, repair the open/high resistance in the circuit.
 - If less than 2 Ω , replace the K9 Body Control Module.
 - **If Active**
7. Test for greater than 8 V between the signal circuit terminal 3 and ground.
 - **If less than 8 V**
 1. Ignition OFF, disconnect the harness connector at the K9 Body Control Module.
 2. Test for infinite resistance between the signal circuit and ground
 - If less than infinite resistance, repair the short to ground on the circuit.
 - If infinite resistance
 3. Test for less than 2 Ω in the signal circuit end to end.
 - If 2 Ω or greater, repair the open/high resistance in the circuit.
 - If less than 2 Ω , replace the K9 Body Control Module.
 - **If 8 V or greater**
8. Ignition OFF, disconnect the X3 harness connector at the K9 Body Control Module, ignition ON.
9. Test for less than 1 V between the S82 Windshield Wiper/Washer Switch signal circuit terminal 3 and ground.
 - **If 1 V or greater**

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

Windshield Wiper Motor Malfunction

1. Ignition OFF and all vehicle systems OFF, disconnect the harness connector at the M75 Windshield Wiper Motor. It may take up to 2 min for all vehicle systems to power down.
2. Test for less than 10 Ω between the ground circuit terminal 4 and ground.
 - **If 10 Ω or greater**
 1. Ignition OFF.
 2. Test for less than 2 Ω in the ground circuit end to end.
 - If 2 Ω or greater, repair the open/high resistance in the circuit.

- If less than 2 Ω , repair the open/high resistance in the ground connection.

- **If less than 10 Ω**

3. Ignition ON.

4. Verify the scan tool Windshield Wiper Park 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 ground circuit terminal 4.
6. Verify the scan tool Windshield Wiper Park Switch parameter is Active.

- **If not Active**

1. Ignition OFF, remove the jumper wire, disconnect the harness connector at the K9 Body Control Module, ignition ON.
2. Test for less than 1 V between the signal circuit and ground.
 - If 1 V or greater, repair the short to voltage on the circuit.
 - If less than 1 V
3. Test for less than 2 Ω in the signal circuit end to end.
 - If 2 Ω or greater, repair the open/high resistance in the circuit.
 - If less than 2 Ω , replace the K9 Body Control Module.

- **If Active**

7. Ignition OFF and all vehicle systems OFF, disconnect the KR12B Windshield Wiper Relay. It may take up to 2 min for all vehicle systems to power down.

8. Test for less than 10 Ω between the ground circuit terminals listed below and ground.

- KR12B Windshield Wiper Relay - terminal 85
- KR12B Windshield Wiper Relay - terminal 87A

- **If 10 Ω or greater**

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

- **If less than 10 Ω**

9. Ignition ON.

10. Verify a test lamp illuminates between the B+ circuit terminal 87 and the ground circuit terminal 87A.

- **If the test lamp does not illuminate and the circuit fuse is good**

Replace the X50A Fuse Block - Underhood.

- **If the test lamp does not illuminate and the circuit fuse is open**

1. Ignition OFF, remove the test lamp. Disconnect the KR12C Windshield Wiper Speed Control Relay.
2. Test for infinite resistance between the control circuits listed below and ground.
 - KR12C Windshield Wiper Speed Control Relay - terminal 87A
 - KR12C Windshield Wiper Speed Control Relay - terminal 87
 - If less than infinite resistance, repair the short to ground on the circuit.
 - If infinite resistance, replace the M75 Windshield Wiper Motor

- **If the test lamp illuminates**

11. Connect a test lamp between the control circuit terminal 86 and the ground circuit terminal 85.

12. Verify the test lamp turns ON and OFF when commanding the Windshield Wiper Motor Relay Low and Off with a scan tool.

- **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 Ω in the control circuit end to end.
 - If 2 Ω or greater, repair the open/high resistance in the circuit.
 - If less than 2 Ω , replace the K9 Body Control Module.
- **If the test lamp is always ON**
 1. Ignition OFF, remove the test lamp, disconnect the 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**
13. Ignition OFF, connect the KR12B Windshield Wiper Relay and disconnect the KR12C Windshield Wiper Speed Control Relay, ignition ON.
14. Test for less than 10 Ω between the control circuit terminal 30 and ground.
 - **If 10 Ω or greater**

Test or replace the KR12B Windshield Wiper Relay.
 - **If less than 10 Ω**
15. Connect a test lamp between the control circuit terminal 30 and ground.
16. Verify the test lamp turns ON and OFF when commanding the Windshield Wiper Motor Relay Low and Off with a scan tool.
 - **If the test lamp does not turn ON and OFF**

Test or replace the KR12B Windshield Wiper Relay.
 - **If the test lamp turns ON and OFF**
17. Verify a test lamp illuminates between the B+ circuit terminal 85 and ground.
 - **If the test lamp does not illuminate**

Replace the X50A Fuse Block - Underhood.
 - **If the test lamp illuminates**
18. Connect a test lamp between the B+ circuit terminal 85 and the control circuit terminal 86.
19. Verify the test lamp turns ON and OFF when commanding the Windshield Wiper Motor Relay High and Off with a scan tool.
 - **If the test lamp is always OFF**
 1. Ignition OFF, remove the test lamp, disconnect the 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
 3. Ignition OFF.
 4. Test for less than 2 Ω in the control circuit end to end.
 - If 2 Ω or greater, repair the open/high resistance in the circuit.
 - If less than 2 Ω , replace the K9 Body Control Module.
 - **If the test lamp is always ON**
 1. 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, replace the K9 Body Control Module.

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

20. Ignition OFF, connect the KR12C Windshield Wiper Speed Control Relay.
21. Connect a test lamp between the M75 Windshield Wiper Motor control circuit terminal 5 and ground circuit terminal 4, ignition ON.
22. Verify the test lamp turns ON and OFF when commanding the Windshield Wiper Motor Relay Low and Off with a scan tool.

- **If the test lamp is always OFF**

1. Ignition OFF, remove the test lamp, disconnect the KR12C Windshield Wiper Speed Control Relay.
2. Test for infinite resistance between the control circuit and ground.
 - If less than infinite resistance, repair the short to ground on the circuit.
 - If infinite resistance
3. Test for less than 2 Ω in the control circuit end to end.
 - If 2 Ω or greater, repair the open/high resistance in the circuit.
 - If less than 2 Ω , test or replace the KR12C Windshield Wiper Speed Control Relay.

- **If the test lamp is always ON**

1. Ignition OFF, remove the test lamp, disconnect the KR12C Windshield Wiper Speed Control Relay, 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, test or replace the KR12C Windshield Wiper Speed Control Relay.

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

23. Connect a test lamp between the M75 Windshield Wiper Motor control circuit terminal 3 and ground circuit terminal 4, ignition ON.
24. Verify the test lamp turns ON and OFF when commanding the Windshield Wiper Motor Relay High and Off with a scan tool.

- **If the test lamp is always OFF**

1. Ignition OFF, remove the test lamp, disconnect the KR12C Windshield Wiper Speed Control Relay.
2. Test for infinite resistance between the control circuit and ground.
 - If less than infinite resistance, repair the short to ground on the circuit.
 - If infinite resistance
3. Test for less than 2 Ω in the control circuit end to end.
 - If 2 Ω or greater, repair the open/high resistance in the circuit.
 - If less than 2 Ω , test or replace the KR12C Windshield Wiper Speed Control Relay.

- **If the test lamp is always ON**

1. Ignition OFF, remove the test lamp, disconnect the KR12C Windshield Wiper Speed Control Relay, 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, test or replace the KR12C Windshield Wiper Speed Control Relay.

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

25. Test or replace the M75 Windshield Wiper Motor.

Component Testing

Windshield Wiper/Washer Switch

1. Ignition OFF, disconnect the harness connector at the S82 Windshield Wiper/Washer Switch.
2. Test for infinite resistance between the signal terminal 1 and the low reference terminal 2 with the S82 Windshield Wiper/Washer Switch in the Off position.

- **If less than infinite resistance**

Replace the S82 Windshield Wiper/Washer Switch.

- **If infinite resistance**

3. Test for less than $2\ \Omega$ between the signal circuit terminal 1 and the low reference circuit terminal 2 with the S82 Windshield Wiper/Washer Switch in the High position.

- **If $2\ \Omega$ or greater**

Replace the S82 Windshield Wiper/Washer Switch.

- **If less than $2\ \Omega$**

4. Test for infinite resistance between the signal terminal 3 and the low reference terminal 2 with the S82 Windshield Wiper/Washer Switch in the Off 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 when cycling the S82 Windshield Wiper/Washer Switch between each delay position.

- Delay 1 : $3.75\text{-}3.85\text{k}\ \Omega$
- Delay 2 : $2.75\text{-}2.85\text{k}\ \Omega$
- Delay 3 : $1.95\text{-}2.05\text{k}\ \Omega$
- Delay 4 : $1.25\text{-}1.35\text{k}\ \Omega$
- Delay 5 : $765\text{-}775\ \Omega$

- **If not within the specified range**

Replace the S82 Windshield Wiper/Washer Switch.

- **If within the specified range**

6. All OK

Relay Test

1. Ignition OFF, disconnect the appropriate relay.
2. Test for $60 - 200\ \Omega$ between terminals 85 and 86.

- **If less than 60 or greater than 200**

Replace the relay.

- **If between $60 - 200\ \Omega$**

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 relay.

- **If infinite resistance**

4. Test for less than $5\ \Omega$ between terminals 30 and 87A.

- **If $5\ \Omega$ or greater**

Replace the relay.

- **If less than $5\ \Omega$**

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 $5\ \Omega$ between terminals 30 and 87.

- **If $5\ \Omega$ or greater**

Replace the relay.

- If less than 5 Ω

7. All OK

Repair Instructions

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

- Refer to [Windshield Wiper Motor Replacement](#)
- Refer to [Relay Replacement \(Attached to Wire Harness\)](#) [Relay Replacement \(Within an Electrical Center\)](#)
- Refer to [Windshield Wiper and Washer Switch Replacement](#)
- Refer to [Control Module References](#) for BCM replacement, programming and setup

DTC B3873: WINDSHIELD WASHER

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.
- Refer to [Diagnostic Procedure Instructions](#) to provide an overview of each diagnostic category.

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
B+	B3873 02	B3873 04	-	-
Windshield Washer Relay Control	B3873 02	B3873 04	B3873 01	-
Windshield Wiper Speed Control Relay Control	B3873 02	B3873 04	-	-
Ground	-	B3873 04	-	-

Circuit/System Description

The windshield washer pump is controlled by the body control module (BCM) via a removable relay. When the washer switch is depressed, the BCM monitors the signal circuit by the washer request circuit. The BCM then applies voltage through a control circuit to the removable windshield washer pump relay. With the relay energized, fused battery voltage is applied through the switch contacts of the relay and the control circuit to activate the windshield washer pump.

Reference Information

Schematic Reference

[Wiper/Washer Schematics](#)

Connector End View Reference

[COMPONENT CONNECTOR END VIEWS - INDEX](#)

Description and Operation

[Wiper/Washer System Description and Operation](#)

Electrical Information Reference

- [Circuit Testing](#)
- [Connector Repairs](#)
- [Testing for Intermittent Conditions and Poor Connections](#)
- [Wiring Repairs](#)

Scan Tool Reference

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 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**
4. 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 5 Ω between the low reference circuit terminal 2 and ground.
 - **If 5 Ω or greater**
 1. Ignition OFF.
 2. Test for less than 2 Ω in the low reference circuit end to end.
 - If 2 Ω or greater, repair the open/high resistance in the circuit.
 - If less than 2 Ω , replace the K9 Body Control Module.
 - **If less than 5 Ω**
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 Ω in the signal circuit end to end.
 - If 2 Ω or greater, repair the open/high resistance in the circuit.
 - If less than 2 Ω , replace the K9 Body Control Module.
 - **If Active**
7. Test or replace the S82 Windshield Wiper/Washer Switch.

Windshield Washer Pump Malfunction

1. Ignition OFF and all vehicle systems OFF, disconnect the KR11 Windshield Washer Pump Relay. It may take up to 2 min for all vehicle systems to power down.
2. Test for less than 10 Ω between the ground circuit terminal 85 and ground.
 - **If 10 Ω or greater**
 1. Ignition OFF.
 2. Test for less than 2 Ω in the ground circuit end to end.
 - If 2 Ω or greater, repair the open/high resistance in the circuit.
 - If less than 2 Ω , repair the open/high resistance in the ground connection.
 - **If less than 10 Ω**
3. Ignition ON.
4. Verify a test lamp illuminates between the B+ circuit terminal 87 and ground.
 - **If the test lamp does not illuminate**

Replace the X50 Fuse Block-Underhood.
 - **If the test lamp illuminates**
5. Connect a test lamp between the control circuit terminal 86 and the ground circuit terminal 85.
6. Verify the test lamp turns ON and OFF when commanding the Windshield Washer Relay On and Off with a scan tool.
 - **If the test lamp is always OFF**
 1. Ignition OFF, remove the test lamp, disconnect the X4 harness connector at the K9 Body Control Module.
 2. Test for infinite resistance between the control circuit terminal 14 X4 and ground.
 - If less than infinite resistance, repair the short to ground on the circuit.
 - If infinite resistance
 3. Test for less than 2 Ω in the control circuit end to end.
 - If 2 Ω or greater, repair the open/high resistance in the circuit.
 - If less than 2 Ω , replace the K9 Body Control Module.
 - **If the test lamp is always ON**
 1. Ignition OFF, remove the test lamp, disconnect the X4 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 G24 Windshield Washer Pump. It may take up to 2 min for all vehicle systems to power down.
9. Test for less than 10 Ω between the ground circuit terminal 2 and ground.
 - **If 10 Ω or greater**
 1. Ignition OFF.
 2. Test for less than 2 Ω in the ground circuit end to end.
 - If 2 Ω or greater, repair the open/high resistance in the circuit.
 - If less than 2 Ω , repair the open/high resistance in the ground connection.
 - **If less than 10 Ω**
10. Connect the harness connector at the G24 Windshield Washer Pump.

11. Ignition ON, connect a 3 A fused jumper wire between the B+ circuit terminal 87 and the control circuit terminal 30.
12. Verify the G24 Windshield Washer Pump is activated.
 - **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 terminal 1 and ground.
 - If less than infinite resistance, repair the short to ground on the circuit.
 - If infinite resistance
 3. Test for less than 2 Ω in the control circuit end to end.
 - If 2 Ω or greater, repair the open/high resistance in the circuit.
 - If less than 2 Ω , test or replace the G24 Windshield Washer Pump.
 - **If the G24 Windshield Washer Pump activates**
13. Test or replace the KR11 Windshield Washer Pump Relay.

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 Ω between the signal circuit terminal 5 and the low reference circuit terminal 2 with the switch in the closed position.
 - **If 2 Ω or greater**

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

Repair Instructions

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

- Refer to [Fuse Block Replacement](#)
- Refer to [Windshield Washer Pump Replacement](#)
- Refer to [Windshield Washer Solvent Container Level Sensor Replacement](#)
- Refer to [Windshield Wiper and Washer Switch Replacement](#)
- Refer to [Control Module References](#) for BCM and Instrument Cluster replacement, programming, and setup

SYMPTOMS - WIPER/WASHER SYSTEMS

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

1. Perform [Diagnostic System Check - Vehicle](#) , in order to verify that all of the following conditions are true:
 - No DTCs are set.
 - The control modules can communicate via the serial data link.
2. Refer to [Wiper/Washer System Description and Operation](#) in order to familiarize yourself with the system functions.

Visual/Physical Inspection

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

Intermittent

Faulty electrical connections or wiring may be the cause of intermittent conditions. Refer to [Testing for Intermittent Conditions and Poor Connections](#) .

Symptom List

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

- [Windshield Wiper System Malfunction](#)
- [Washer Malfunction](#)
- [Rain Sensor Malfunction](#)

WINDSHIELD WIPER SYSTEM MALFUNCTION

Diagnostic Instructions

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

DTC Descriptors

DTC B3715

Windshield Wiper Relay Circuit

DTC B3875

Windshield Wiper High Speed 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
Windshield Wiper Switch Low Signal terminal 3	1	1	1	-
Windshield Wiper Switch High Signal terminal 1	4	2	2	-
Windshield Wiper Motor Park Switch Signal terminal 1	3	3	-	-
Windshield Wiper Relay Control terminal 86	B3715 02	B3715 04	B3715 01	-
Windshield Wiper High Speed Relay Control terminal 86	B3875 02	B3875 04	B3875 01	-
Windshield Wiper Motor Control terminal 5	1	1	4	-
Windshield Wiper Motor High Speed Control terminal 3	2	2	4	-
Windshield Wiper Switch Low Reference terminal 2	-	1, 2	1, 2	-
Windshield Wiper Motor Ground terminal 4	-	1, 2, 3	-	-

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Windshield Wiper Relay Ground terminal 85	-	1	-	-
1. Delay or Low Speed Wipers Inoperative 2. High Speed Wipers Inoperative 3. Wipers Do Not Park 4. Wipers Always ON				

Circuit/System Description

The body control module (BCM) controls the wiper motor based on input from the windshield wiper/washer switch. The BCM monitors the wiper/washer switch through two separate signal circuits and a 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 washer operation.

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

Reference Information

Schematic Reference

Wiper/Washer Schematics

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX

Description and Operation

Wiper/Washer System Description and Operation

Electrical Information Reference

- [Circuit Testing](#)
- [Connector Repairs](#)
- [Testing for Intermittent Conditions and Poor Connections](#)
- [Wiring Repairs](#)

Scan Tool Reference

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

Circuit/System Verification

1. Ignition ON.
2. Verify the scan tool 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**
3. 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**

4. 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**
5. 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 Windshield Wiper Motor does not cycle between Off, Low, and High**

Refer to Circuit/System Testing - Windshield Wiper Motor Malfunction
 - **If the Windshield Wiper Motor cycles between Off, Low, and High**
6. Ignition OFF.
7. Verify the scan tool Windshield Wiper Park Switch parameter is Active.
 - **If the parameter does not change**

Refer to Circuit/System Testing - Windshield Wiper Motor Malfunction.
 - **If the parameter changes**
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 Ω between the low reference circuit terminal 2 and ground.
 - **If 10 Ω or greater**
 1. Ignition OFF, disconnect the harness connector at the K9 Body Control Module.
 2. Test for less than 2 Ω in the low reference circuit end to end.
 - If 2 Ω or greater, repair the open/high resistance in the circuit.
 - If less than 2 Ω , replace the K9 Body Control Module.
 - **If less than 10 Ω**
3. Ignition ON.
4. 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, ignition ON.
 2. Test for less than 1 V between the signal circuit and ground.
 - If 1 V or greater, repair the short to voltage on the circuit.
 - If less than 1 V
 3. Test for less than 2 Ω in the signal circuit end to end.
 - If 2 Ω or greater, repair the open/high resistance in the circuit.
 - If less than 2 Ω , replace the K9 Body Control Module.

- **If Active**

7. Test for greater than 8 V between the signal circuit terminal 3 and ground.

- **If less than 8 V**

1. Ignition OFF, disconnect the harness connector at the K9 Body Control Module.

2. Test for infinite resistance between the signal circuit and ground

- If less than infinite resistance, repair the short to ground on the circuit.
- If infinite resistance

3. Test for less than 2 Ω in the signal circuit end to end.

- If 2 Ω or greater, repair the open/high resistance in the circuit.
- If less than 2 Ω , replace the K9 Body Control Module.

- **If 8 V or greater**

8. Ignition OFF, disconnect the X3 harness connector at the K9 Body Control Module, ignition ON.

9. Test for less than 1 V between the S82 Windshield Wiper/Washer Switch signal circuit terminal 3 and ground.

- **If 1 V or greater**

Repair the short to voltage on the circuit.

- **If less than 1 V**

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

Windshield Wiper Motor Malfunction

1. Ignition OFF and all vehicle systems OFF, disconnect the harness connector at the M75 Windshield Wiper Motor. It may take up to 2 min for all vehicle systems to power down.

2. Test for less than 10 Ω between the ground circuit terminal 4 and ground.

- **If 10 Ω or greater**

1. Ignition OFF.

2. Test for less than 2 Ω in the ground circuit end to end.

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

- **If less than 10 Ω**

3. Ignition ON.

4. Verify the scan tool Windshield Wiper Park 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 ground circuit terminal 4.

6. Verify the scan tool Windshield Wiper Park Switch parameter is Active.

- **If not Active**

1. Ignition OFF, remove the jumper wire, disconnect the harness connector at the K9 Body Control Module, ignition ON.

2. Test for less than 1 V between the signal circuit and ground.

- If 1 V or greater, repair the short to voltage on the circuit.
- If less than 1 V

3. Test for less than 2 Ω in the signal circuit end to end.

- If 2 Ω or greater, repair the open/high resistance in the circuit.
- If less than 2 Ω , replace the K9 Body Control Module.

- **If Active**

7. Ignition OFF and all vehicle systems OFF, disconnect the KR12B Windshield Wiper Relay. It may take up to 2 min for all vehicle systems to power down.
8. Test for less than 10 Ω between the ground circuit terminals listed below and ground.
 - KR12B Windshield Wiper Relay - terminal 85
 - KR12B Windshield Wiper Relay - terminal 87A
 - **If 10 Ω or greater**
 1. Ignition OFF.
 2. Test for less than 2 Ω in the ground circuit end to end.
 - If 2 Ω or greater, repair the open/high resistance in the circuit.
 - If less than 2 Ω , repair the open/high resistance in the ground connection.
 - **If less than 10 Ω**
9. Ignition ON.
10. Verify a test lamp illuminates between the B+ circuit terminal 87 and the ground circuit terminal 87A.
 - **If the test lamp does not illuminate and the circuit fuse is good**

Replace the X50A Fuse Block - Underhood.
 - **If the test lamp does not illuminate and the circuit fuse is open**
 1. Ignition OFF, remove the test lamp. Disconnect the KR12C Windshield Wiper Speed Control Relay.
 2. Test for infinite resistance between the control circuits listed below and ground.
 - KR12C Windshield Wiper Speed Control Relay - terminal 87A
 - KR12C Windshield Wiper Speed Control Relay - terminal 87
 - If less than infinite resistance, repair the short to ground on the circuit.
 - If infinite resistance, replace the M75 Windshield Wiper Motor
 - **If the test lamp illuminates**
11. Connect a test lamp between the control circuit terminal 86 and the ground circuit terminal 85.
12. Verify the test lamp turns ON and OFF when commanding the Windshield Wiper Motor Relay Low and Off with a scan tool.
 - **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 Ω in the control circuit end to end.
 - If 2 Ω or greater, repair the open/high resistance in the circuit.
 - If less than 2 Ω , replace the K9 Body Control Module.
 - **If the test lamp is always ON**
 1. Ignition OFF, remove the test lamp, disconnect the 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**
13. Ignition OFF, connect the KR12B Windshield Wiper Relay and disconnect the KR12C Windshield Wiper Speed Control Relay, ignition ON.
14. Test for less than 10 Ω between the control circuit terminal 30 and ground.
 - **If 10 Ω or greater**

Test or replace the KR12B Windshield Wiper Relay.
 - **If less than 10 Ω**
15. Connect a test lamp between the control circuit terminal 30 and ground.

16. Verify the test lamp turns ON and OFF when commanding the Windshield Wiper Motor Relay Low and Off with a scan tool.
 - **If the test lamp does not turn ON and OFF**

Test or replace the KR12B Windshield Wiper Relay.
 - **If the test lamp turns ON and OFF**
17. Verify a test lamp illuminates between the B+ circuit terminal 85 and ground.
 - **If the test lamp does not illuminate**

Replace the X50A Fuse Block - Underhood.
 - **If the test lamp illuminates**
18. Connect a test lamp between the B+ circuit terminal 85 and the control circuit terminal 86.
19. Verify the test lamp turns ON and OFF when commanding the Windshield Wiper Motor Relay High and Off with a scan tool.
 - **If the test lamp is always OFF**
 1. Ignition OFF, remove the test lamp, disconnect the 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
 3. Ignition OFF.
 4. Test for less than 2 Ω in the control circuit end to end.
 - If 2 Ω or greater, repair the open/high resistance in the circuit.
 - If less than 2 Ω , replace the K9 Body Control Module.
 - **If the test lamp is always ON**
 1. 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, replace the K9 Body Control Module.
 - **If the test lamp turns ON and OFF**
20. Ignition OFF, connect the KR12C Windshield Wiper Speed Control Relay.
21. Connect a test lamp between the M75 Windshield Wiper Motor control circuit terminal 5 and ground circuit terminal 4, ignition ON.
22. Verify the test lamp turns ON and OFF when commanding the Windshield Wiper Motor Relay Low and Off with a scan tool.
 - **If the test lamp is always OFF**
 1. Ignition OFF, remove the test lamp, disconnect the KR12C Windshield Wiper Speed Control Relay.
 2. Test for infinite resistance between the control circuit and ground.
 - If less than infinite resistance, repair the short to ground on the circuit.
 - If infinite resistance
 3. Test for less than 2 Ω in the control circuit end to end.
 - If 2 Ω or greater, repair the open/high resistance in the circuit.
 - If less than 2 Ω , test or replace the KR12C Windshield Wiper Speed Control Relay.
 - **If the test lamp is always ON**
 1. Ignition OFF, remove the test lamp, disconnect the KR12C Windshield Wiper Speed Control Relay, 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, test or replace the KR12C Windshield Wiper Speed Control Relay.
 - **If the test lamp turns ON and OFF**

23. Connect a test lamp between the M75 Windshield Wiper Motor control circuit terminal 3 and ground circuit terminal 4, ignition ON.
24. Verify the test lamp turns ON and OFF when commanding the Windshield Wiper Motor Relay High and Off with a scan tool.
- **If the test lamp is always OFF**
 1. Ignition OFF, remove the test lamp, disconnect the KR12C Windshield Wiper Speed Control Relay.
 2. Test for infinite resistance between the control circuit and ground.
 - If less than infinite resistance, repair the short to ground on the circuit.
 - If infinite resistance
 3. Test for less than 2 Ω in the control circuit end to end.
 - If 2 Ω or greater, repair the open/high resistance in the circuit.
 - If less than 2 Ω , test or replace the KR12C Windshield Wiper Speed Control Relay.
 - **If the test lamp is always ON**
 1. Ignition OFF, remove the test lamp, disconnect the KR12C Windshield Wiper Speed Control Relay, 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, test or replace the KR12C Windshield Wiper Speed Control Relay.
 - **If the test lamp turns ON and OFF**
25. Test or replace the M75 Windshield Wiper Motor.

Component Testing

Windshield Wiper/Washer Switch

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

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

Replace the S82 Windshield Wiper/Washer Switch.
 - **If less than 2 Ω**
4. Test for infinite resistance between the signal terminal 3 and the low reference terminal 2 with the S82 Windshield Wiper/Washer Switch in the Off 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 when cycling the S82 Windshield Wiper/Washer Switch between each delay position.
 - Delay 1 : 3.75-3.85k Ω
 - Delay 2 : 2.75-2.85k Ω
 - Delay 3 : 1.95-2.05k Ω
 - Delay 4 : 1.25-1.35k Ω
 - Delay 5 : 765-775 Ω
 - **If not within the specified range**

Replace the S82 Windshield Wiper/Washer Switch.

- **If within the specified range**

6. All OK

Relay Test

1. Ignition OFF, disconnect the appropriate relay.
2. Test for 60 - 200 Ω between terminals 85 and 86.

- **If less than 60 or greater than 200**

Replace the relay.

- **If between 60 - 200 Ω**

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 relay.

- **If infinite resistance**

4. Test for less than 5 Ω between terminals 30 and 87A.

- **If 5 Ω or greater**

Replace the relay.

- **If less than 5 Ω**

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 5 Ω between terminals 30 and 87.

- **If 5 Ω or greater**

Replace the relay.

- **If less than 5 Ω**

7. All OK

Repair Instructions

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

- Refer to [Windshield Wiper Motor Replacement](#)
- Refer to [Relay Replacement \(Attached to Wire Harness\)](#) [Relay Replacement \(Within an Electrical Center\)](#)
- Refer to [Windshield Wiper and Washer Switch Replacement](#)
- Refer to [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.
- Refer to [Diagnostic Procedure Instructions](#) to provide an overview of each diagnostic category.

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
B+	B3873 02	B3873 04	-	-
Windshield Washer Relay Control	B3873 02	B3873 04	B3873 01	-
Windshield Wiper Speed Control Relay Control	B3873 02	B3873 04	-	-
Ground	-	B3873 04	-	-

Circuit/System Description

The windshield washer pump is controlled by the body control module (BCM) via a removable relay. When the washer switch is depressed, the BCM monitors the signal circuit by the washer request circuit. The BCM then applies voltage through a control circuit to the removable windshield washer pump relay. With the relay energized, fused battery voltage is applied through the switch contacts of the relay and the control circuit to activate the windshield washer pump.

Reference Information

Schematic Reference

Wiper/Washer Schematics

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX

Description and Operation

Wiper/Washer System Description and Operation

Electrical Information Reference

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

Scan Tool Reference

Control Module References for scan tool information

Circuit/System Verification

1. Ignition ON.
2. Verify the scan tool 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 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**
4. 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 5 Ω between the low reference circuit terminal 2 and ground.
 - **If 5 Ω or greater**
 1. Ignition OFF.
 2. Test for less than 2 Ω in the low reference circuit end to end.
 - If 2 Ω or greater, repair the open/high resistance in the circuit.
 - If less than 2 Ω , replace the K9 Body Control Module.
 - **If less than 5 Ω**
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 Ω in the signal circuit end to end.
 - If 2 Ω or greater, repair the open/high resistance in the circuit.
 - If less than 2 Ω , replace the K9 Body Control Module.
 - **If Active**
7. Test or replace the S82 Windshield Wiper/Washer Switch.

Windshield Washer Pump Malfunction

1. Ignition OFF and all vehicle systems OFF, disconnect the KR11 Windshield Washer Pump Relay. It may take up to 2 min for all vehicle systems to power down.
2. Test for less than 10 Ω between the ground circuit terminal 85 and ground.
 - **If 10 Ω or greater**
 1. Ignition OFF.
 2. Test for less than 2 Ω in the ground circuit end to end.
 - If 2 Ω or greater, repair the open/high resistance in the circuit.
 - If less than 2 Ω , repair the open/high resistance in the ground connection.
 - **If less than 10 Ω**
3. Ignition ON.
4. Verify a test lamp illuminates between the B+ circuit terminal 87 and ground.
 - **If the test lamp does not illuminate**

Replace the X50 Fuse Block-Underhood.
 - **If the test lamp illuminates**
5. Connect a test lamp between the control circuit terminal 86 and the ground circuit terminal 85.
6. Verify the test lamp turns ON and OFF when commanding the Windshield Washer Relay On and Off with a scan tool.
 - **If the test lamp is always OFF**

1. Ignition OFF, remove the test lamp, disconnect the X4 harness connector at the K9 Body Control Module.
2. Test for infinite resistance between the control circuit terminal 14 X4 and ground.
 - If less than infinite resistance, repair the short to ground on the circuit.
 - If infinite resistance
3. Test for less than 2 Ω in the control circuit end to end.
 - If 2 Ω or greater, repair the open/high resistance in the circuit.
 - If less than 2 Ω , replace the K9 Body Control Module.
- **If the test lamp is always ON**
 1. Ignition OFF, remove the test lamp, disconnect the X4 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 G24 Windshield Washer Pump. It may take up to 2 min for all vehicle systems to power down.
9. Test for less than 10 Ω between the ground circuit terminal 2 and ground.
 - **If 10 Ω or greater**
 1. Ignition OFF.
 2. Test for less than 2 Ω in the ground circuit end to end.
 - If 2 Ω or greater, repair the open/high resistance in the circuit.
 - If less than 2 Ω , repair the open/high resistance in the ground connection.
 - **If less than 10 Ω**
10. Connect the harness connector at the G24 Windshield Washer Pump.
11. Ignition ON, connect a 3 A fused jumper wire between the B+ circuit terminal 87 and the control circuit terminal 30.
12. Verify the G24 Windshield Washer Pump is activated.
 - **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 terminal 1 and ground.
 - If less than infinite resistance, repair the short to ground on the circuit.
 - If infinite resistance
 3. Test for less than 2 Ω in the control circuit end to end.
 - If 2 Ω or greater, repair the open/high resistance in the circuit.
 - If less than 2 Ω , test or replace the G24 Windshield Washer Pump.
 - **If the G24 Windshield Washer Pump activates**
13. Test or replace the KR11 Windshield Washer Pump Relay.

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 Ω between the signal circuit terminal 5 and the low reference circuit terminal 2 with the switch in the closed position.

- **If 2 Ω or greater**

Replace the S82 Windshield Wiper/Washer Switch.

- **If less than 2 Ω**

4. All OK

Repair Instructions

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

- Refer to [Fuse Block Replacement](#)
- Refer to [Windshield Washer Pump Replacement](#)
- Refer to [Windshield Washer Solvent Container Level Sensor Replacement](#)
- Refer to [Windshield Wiper and Washer Switch Replacement](#)
- Refer to [Control Module References](#) for BCM and Instrument Cluster replacement, 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.
- Refer to [Diagnostic Procedure Instructions](#) to provide an overview of each diagnostic category.

DTC Descriptor

DTC B370A

Rain Sensor

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

Diagnostic Fault Information

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

Circuit/System Description

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

Conditions for Running the DTC

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

Conditions for Setting the DTC

Communication between the BCM and the rain sensor is interrupted, and an interruption in communication is a serial data fault.

Action Taken When the DTC Sets

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

Conditions for Clearing the DTC

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

Reference Information

Schematic Reference

Wiper/Washer Schematics

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX

Description and Operation

Wiper/Washer System Description and Operation

Electrical Information Reference

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

Scan Tool Reference

Control Module References for scan tool information

Circuit/System Verification

1. Ignition ON.
2. Verify DTC U151A, U153A are not set.
 - **If the DTCs are set**
Refer to DTC U1500-U15FF
 - **If the DTCs are not set**
3. Place the S82 Windshield Wiper/Washer Switch in the intermittent delay setting and spray the outside of the windshield in the area of the B177 Rain Sensor with a water bottle. It may be necessary to increase the sensitivity of the intermittent delay to achieve windshield wiper operation.
4. Verify the windshield wipers operate at low speed.
 - **If the wipers are not operating at low speed**
Refer to Circuit/System Testing.
 - **If the wipers are operating at low speed**
5. All OK.

Circuit/System Testing

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

Repair Instructions

- Perform the [Diagnostic Repair Verification](#) after completing the repair.
- Refer to [Windshield Outside Moisture/Ambient Light and Humidity Sensor Replacement](#)
- Refer to [Control Module References](#) for body control module replacement, programming and setup.

WIPER BLADE ELEMENT CHECK

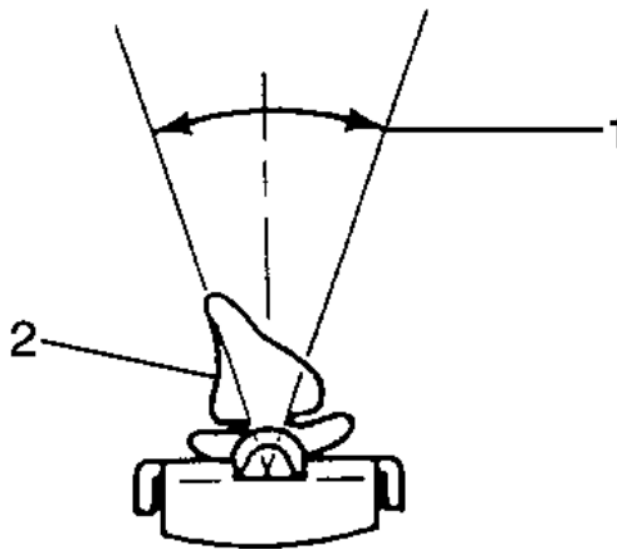


Fig. 4: Wiper Blade Element Check

Courtesy of GENERAL MOTORS COMPANY

1. Remove the wiper blade from the wiper arm. Refer to [Windshield Wiper Blade Replacement](#).
2. Look down the entire length of the blade element.
3. The rubber part of the element (2) that contacts the window must be on the center line of the blade plus or minus 15 degrees (1).
4. Replace the blade element (2) if the element exceeds 15 degrees from the centerline of the blade, or if the element is cracked or torn. Refer to [Windshield Wiper Blade Replacement](#)
5. Install the wiper blade onto the windshield wiper arm.

REPAIR INSTRUCTIONS

WINDSHIELD WIPER AND WASHER SWITCH REPLACEMENT

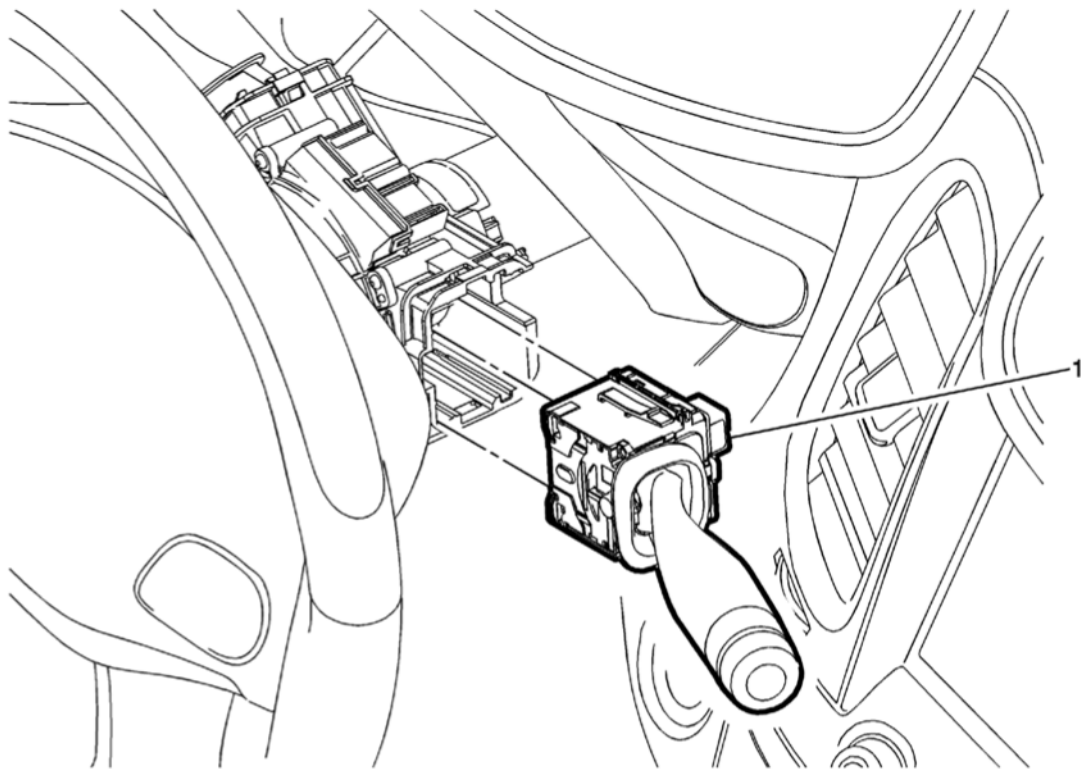


Fig. 5: Windshield Wiper & Washer Switch

Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedure Remove Steering Column Lower Trim Cover. Refer to Steering Column Lower Trim Cover Replacement (N38) Steering Column Lower Trim Cover Replacement (N37) .	
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

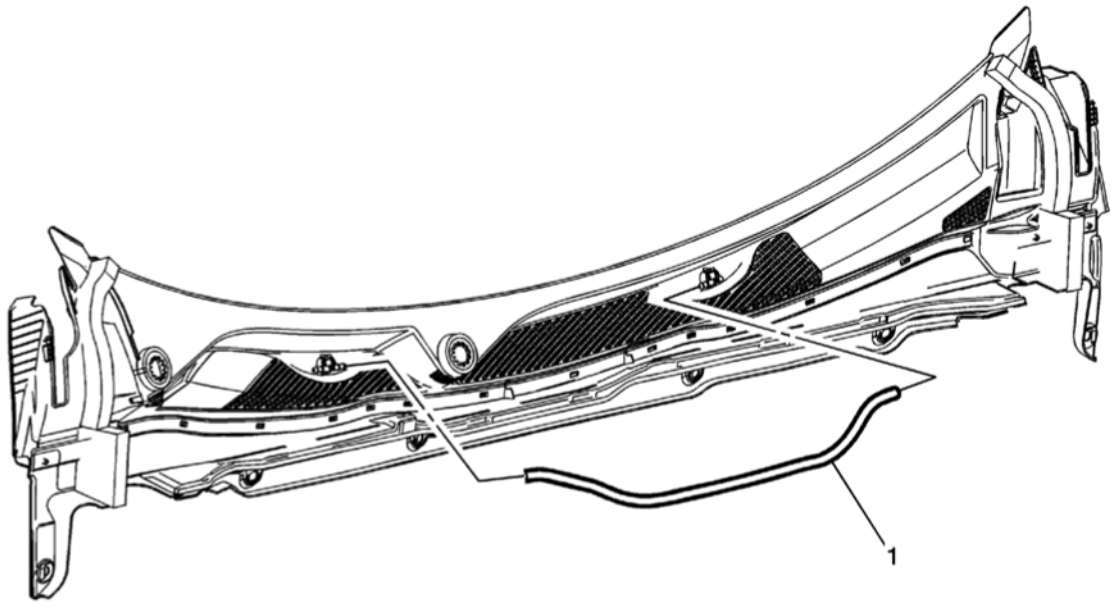


Fig. 6: Windshield Washer Nozzle Hose
 Courtesy of GENERAL MOTORS COMPANY

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

WINDSHIELD WASHER NOZZLE REPLACEMENT

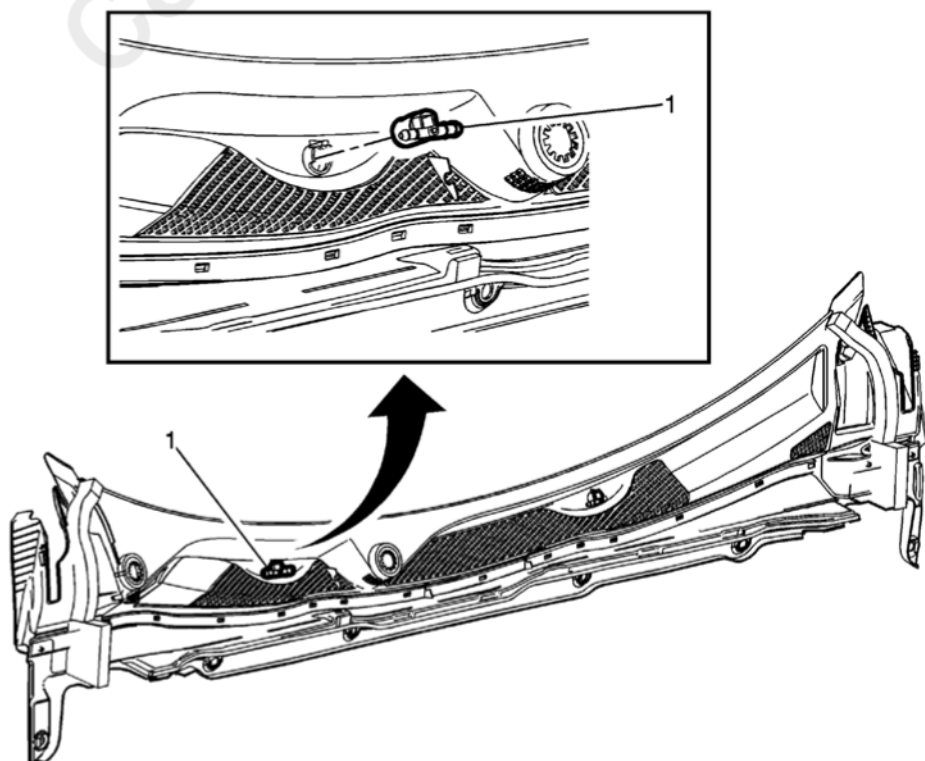


Fig. 7: Windshield Washer Nozzle
 Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedure Remove the air inlet grille panel. Refer to Air Inlet Grille Panel Replacement .	
1	Windshield Washer Nozzle Procedure 1. Disconnect the windshield washer nozzle hose at the windshield washer nozzle being serviced. 2. Use a small flat bladed tool to release the air inlet grille panel locking tab. 3. Pull the windshield washer nozzle through the air inlet grille panel.

WINDSHIELD WASHER SOLVENT CONTAINER FILLER TUBE REPLACEMENT

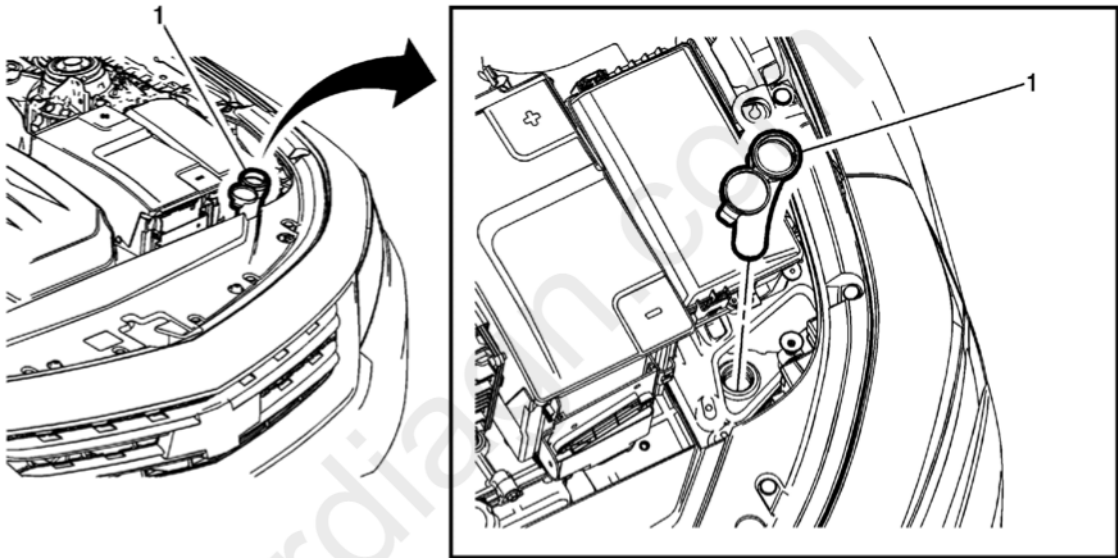


Fig. 8: Windshield Washer Solvent Container Filler Tube
 Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedure Open and support the hood.	
1	Windshield Washer Solvent Container Filler Tube Procedure Firmly pull upward on the windshield washer solvent container filler tube in order to disengage from the windshield washer solvent container grommet. Transfer parts as necessary.

WINDSHIELD WASHER SOLVENT CONTAINER GROMMET REPLACEMENT

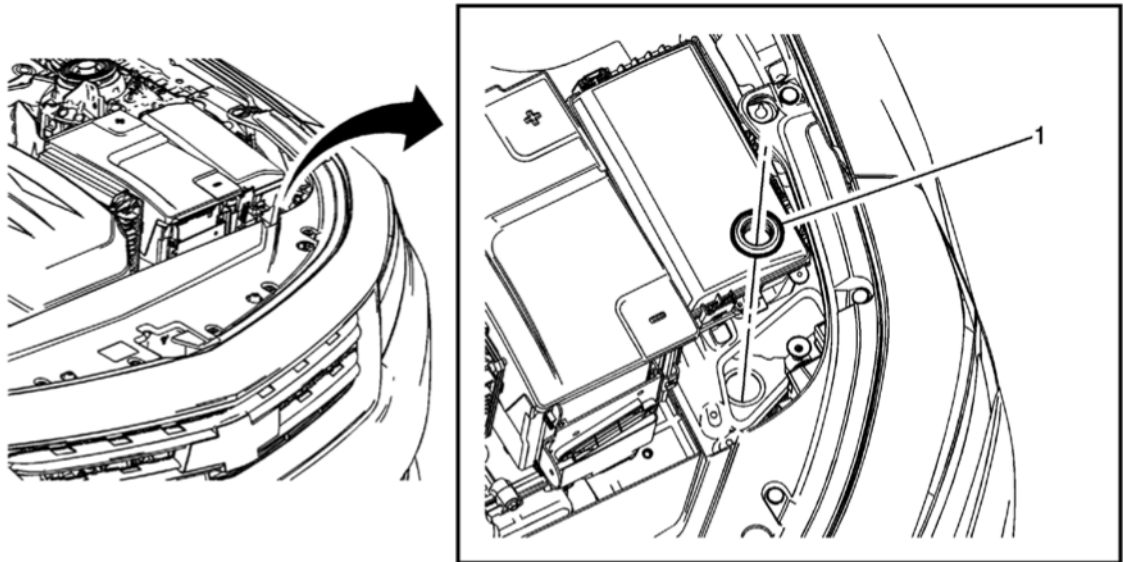


Fig. 9: Windshield Washer Solvent Container Grommet

Courtesy of GENERAL MOTORS COMPANY

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

WINDSHIELD WASHER SOLVENT CONTAINER REPLACEMENT

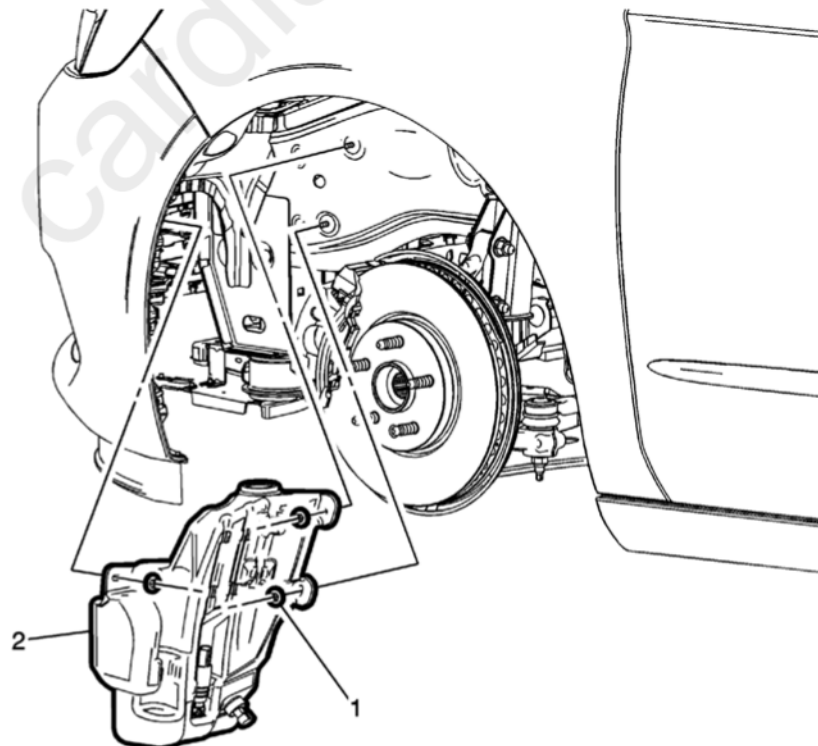


Fig. 10: Windshield Washer Solvent Container

Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name

Callout	Component Name
Preliminary Procedure 1. Remove the windshield washer solvent container filler tube. Refer to Windshield Washer Solvent Container Filler Tube Replacement. 2. Reposition the left front wheelhouse liner. Only do those steps in the front wheelhouse liner replacement procedure that will remove the wheelhouse liner enough to gain access to the part. Refer to Front Wheelhouse Liner Replacement.	
1	Windshield Washer Solvent Container Nut (Qty: 3) CAUTION: Refer to Fastener Caution . Tighten 9 N.m (80 lb in)
2	Windshield Washer Solvent Container Procedure 1. Place a clean suitable drain pan under the windshield washer container to recover the windshield washer solvent when the windshield washer hose is disconnected. 2. Disconnect windshield washer nozzle hose. 3. Disconnect the electrical connectors. 4. Remove the windshield washer solvent container from the vehicle. 5. Empty the windshield washer solvent into the clean suitable drain pan. 6. Transfer parts as needed.

WINDSHIELD WASHER PUMP REPLACEMENT

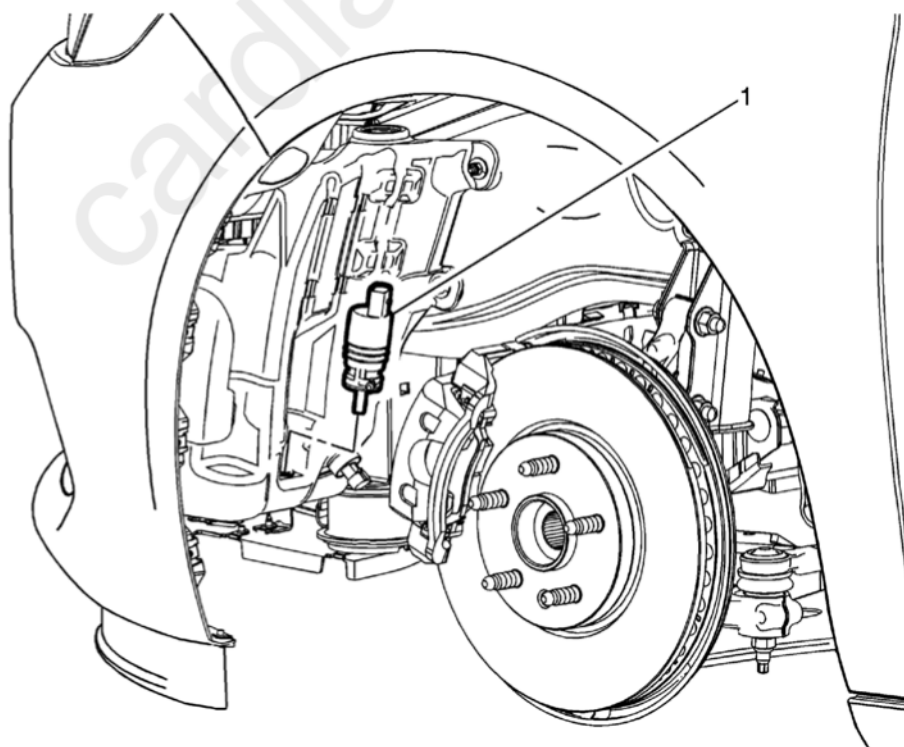


Fig. 11: Windshield Washer Pump
Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name

Callout	Component Name
Preliminary Procedure Reposition the left front wheelhouse liner. Only do those steps in the front wheelhouse liner replacement procedure that will remove the wheelhouse liner enough to gain access to the part. Refer to Front Wheelhouse Liner Replacement .	
1	Windshield Washer Pump Procedure 1. Place a clean suitable drain pan under the windshield washer solvent container to recover the windshield washer solvent when the windshield washer solvent container hose is disconnected. 2. Disconnect the electrical connector. 3. Place two flat-bladed tools at the base of the windshield washer pump, twist in opposite directions to lift and disengage from the windshield washer solvent container.

WINDSHIELD WASHER PUMP SEAL REPLACEMENT

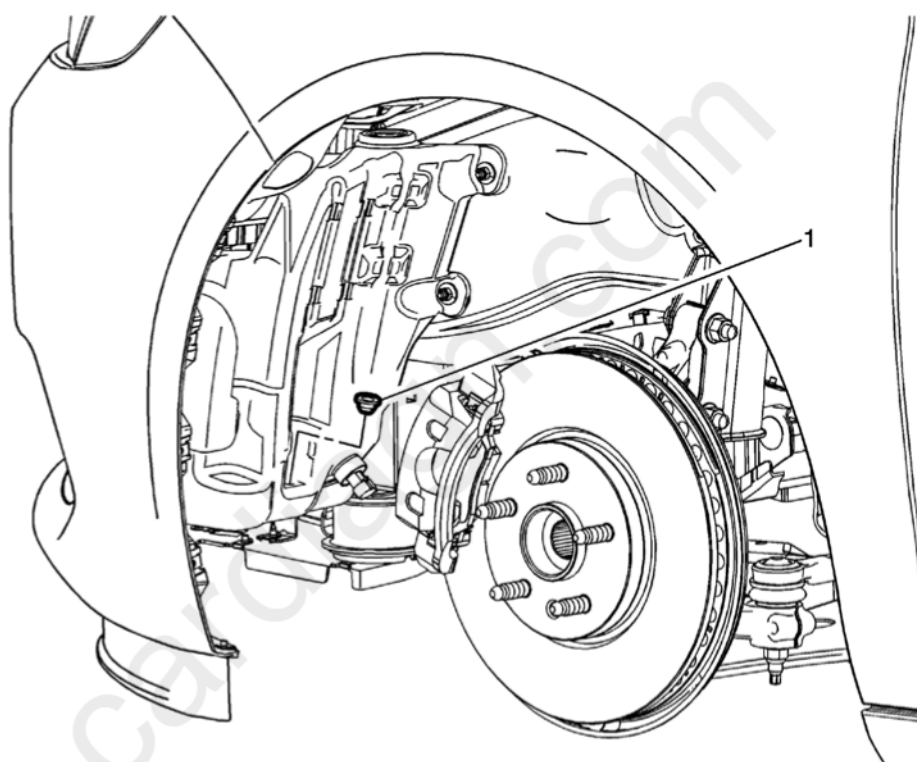


Fig. 12: Windshield Washer Pump Seal

Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedure Remove the windshield washer pump. Refer to Windshield Washer Pump Replacement .	
1	Windshield Washer Pump Seal Procedure Using a plastic flat bladed tool pry windshield washer pump seal from windshield washer solvent container.

WINDSHIELD WASHER SOLVENT CONTAINER LEVEL SENSOR REPLACEMENT

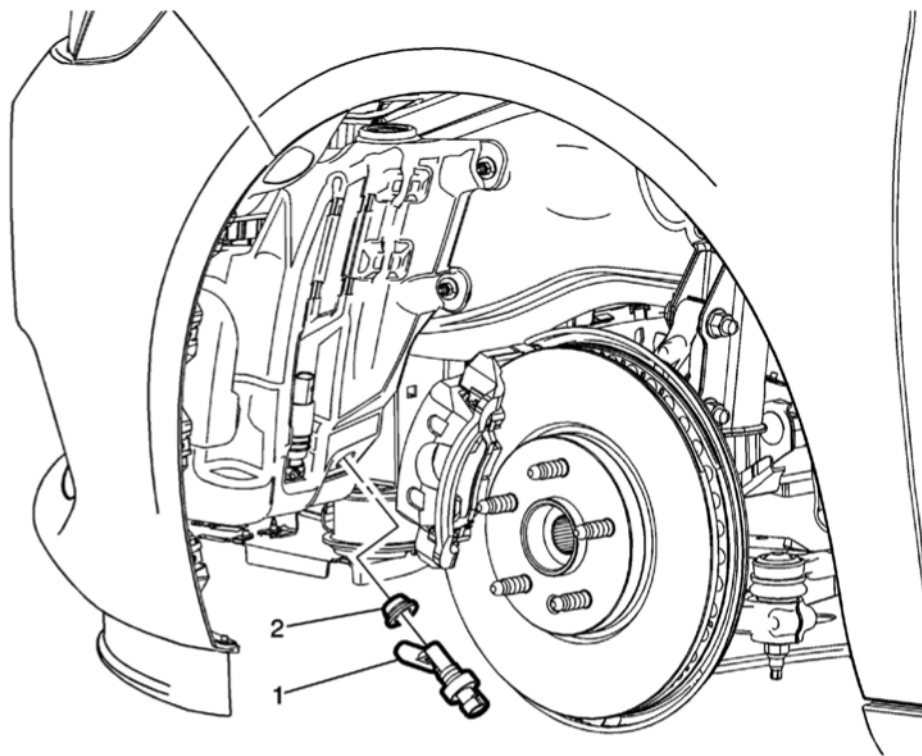


Fig. 13: Windshield Washer Solvent Level Sensor

Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedure Reposition the left front wheelhouse liner. Only do those steps in the front wheelhouse liner replacement procedure that will remove the wheelhouse liner enough to gain access to the part. Refer to <u>Front Wheelhouse Liner Replacement</u> .	
1	Windshield Washer Solvent Level Sensor Procedure 1. Place a clean suitable drain pan under the windshield washer solvent container to recover the windshield washer solvent when the windshield washer solvent level sensor is removed. 2. Disconnect the electrical connector. 3. Place two flat bladed tools under each side of the windshield washer solvent level sensor seal. 4. Twist the two flat bladed tools in opposite directions to lift and disengage the windshield washer solvent level sensor from the windshield washer solvent container.
2	Windshield Washer Solvent Level Sensor Seal NOTE: Install a new windshield washer solvent level sensor seal upon replacement of the windshield washer solvent level sensor.

AIR INLET GRILLE PANEL REPLACEMENT

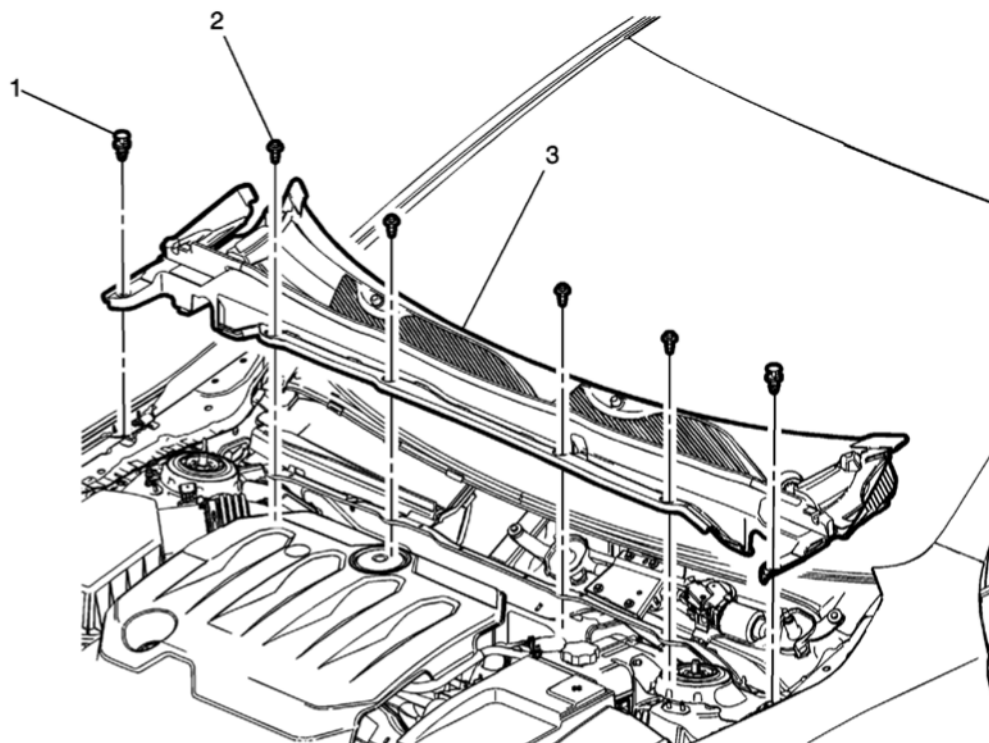


Fig. 14: Air Inlet Grille Panel

Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedure 1. Remove the windshield wiper arms. Refer to Windshield Wiper Arm Replacement. 2. Remove the air inlet grille panel extension. Refer to Air Inlet Grille Panel Extension Replacement.	
1	Air Inlet Grille Panel Retainer (Qty: 2)
2	Air Inlet Grille Panel Bolts (Qty: 4) CAUTION: Refer to Fastener Caution .
3	Air Inlet Grille Panel Procedure 1. Lift up the front edge of the air inlet grille panel and separate from the electrical wiring harness grommets at each end. 2. Use a suitable plastic tool to release the air inlet grille panel from the windshield retainer. 3. Pull the air inlet grille panel forward from both hood hinges. 4. Disconnect the windshield washer hose. 5. Transfer parts as needed.

AIR INLET GRILLE PANEL EXTENSION REPLACEMENT

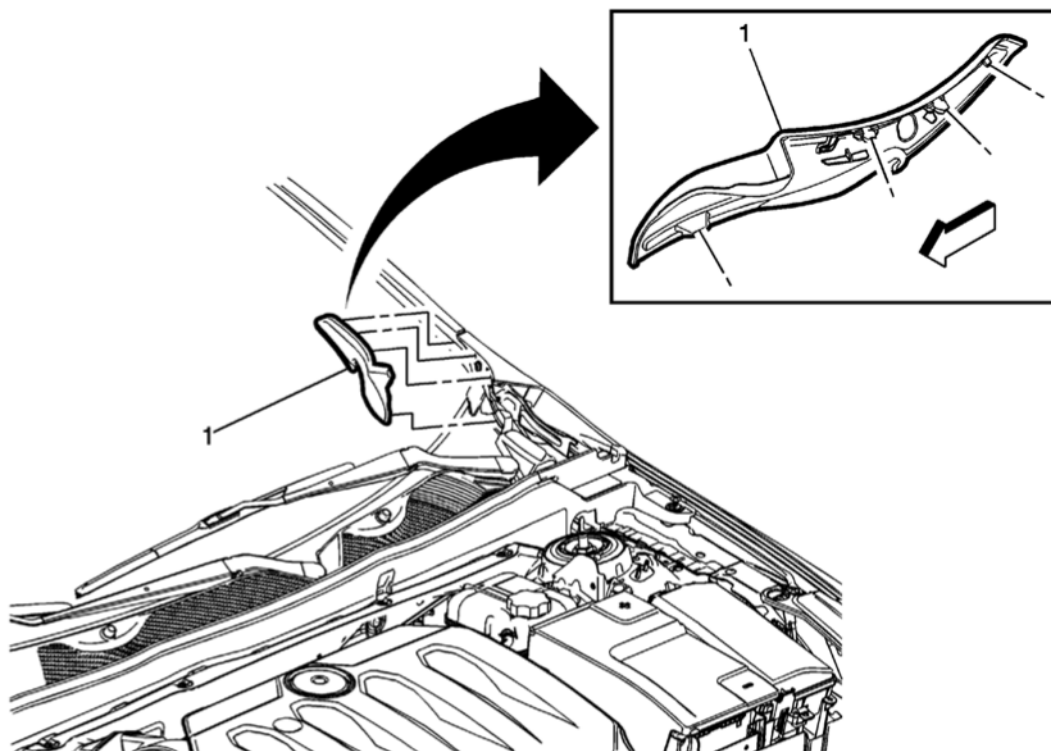


Fig. 15: Air Inlet Grille Panel Extension

Courtesy of GENERAL MOTORS COMPANY

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. Slide the extension rearward to release the integral hook retainer.

AIR INLET GRILLE PANEL WATER DEFLECTOR REPLACEMENT

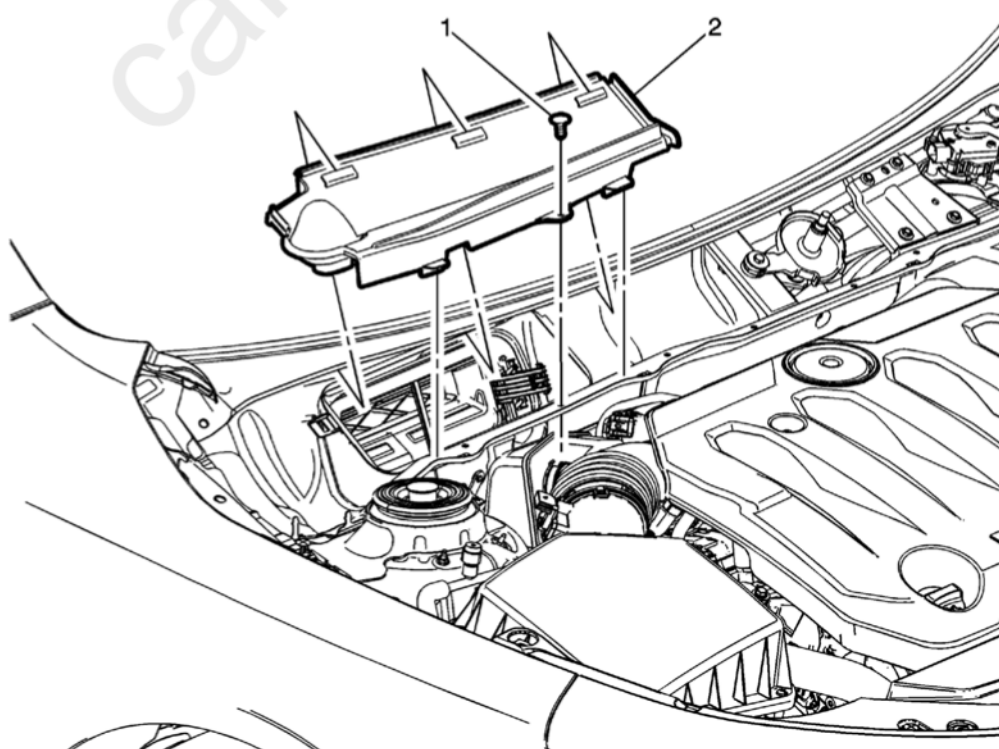


Fig. 16: Air Inlet Grille Panel Water Deflector

Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedure Remove the air inlet grille panel. Refer to Air Inlet Grille Panel Replacement .	
1	Air Inlet Grille Panel Water Deflector Retainer Procedure Use a trim-type release tool to release air inlet grille panel water deflector retainer.
2	Air Inlet Grille Panel Water Deflector Procedure Pull air inlet grille panel water deflector forward so retaining tabs release from plenum upper panel reinforcement and lift from vehicle.

WINDSHIELD WIPER ARM REPLACEMENT

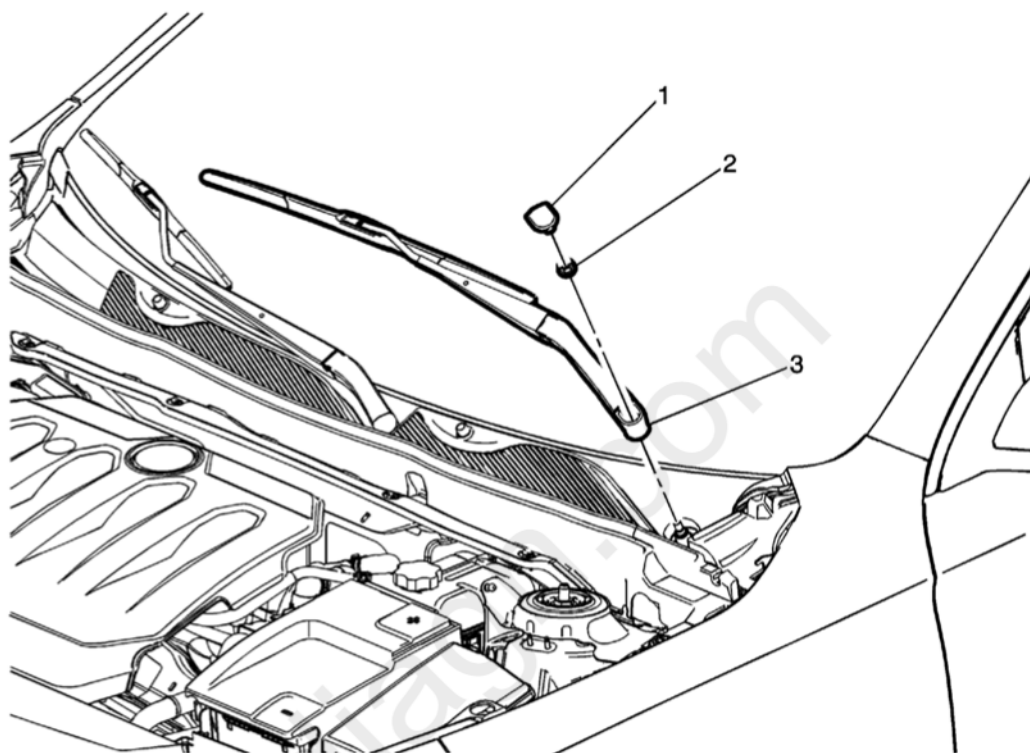


Fig. 17: Windshield Wiper Arm

Courtesy of GENERAL MOTORS COMPANY

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 Fastener Caution . Tighten 38 N.m (28 lb ft)

Callout	Component Name
3	Windshield Wiper Arm Procedure 1. Grasp the windshield wiper arm near the pivot shaft and gently rock it side to side until the arm releases. 2. Clean the pivot shaft knurls with a soft wire brush before installing a new windshield wiper arm.

WINDSHIELD WIPER BLADE REPLACEMENT

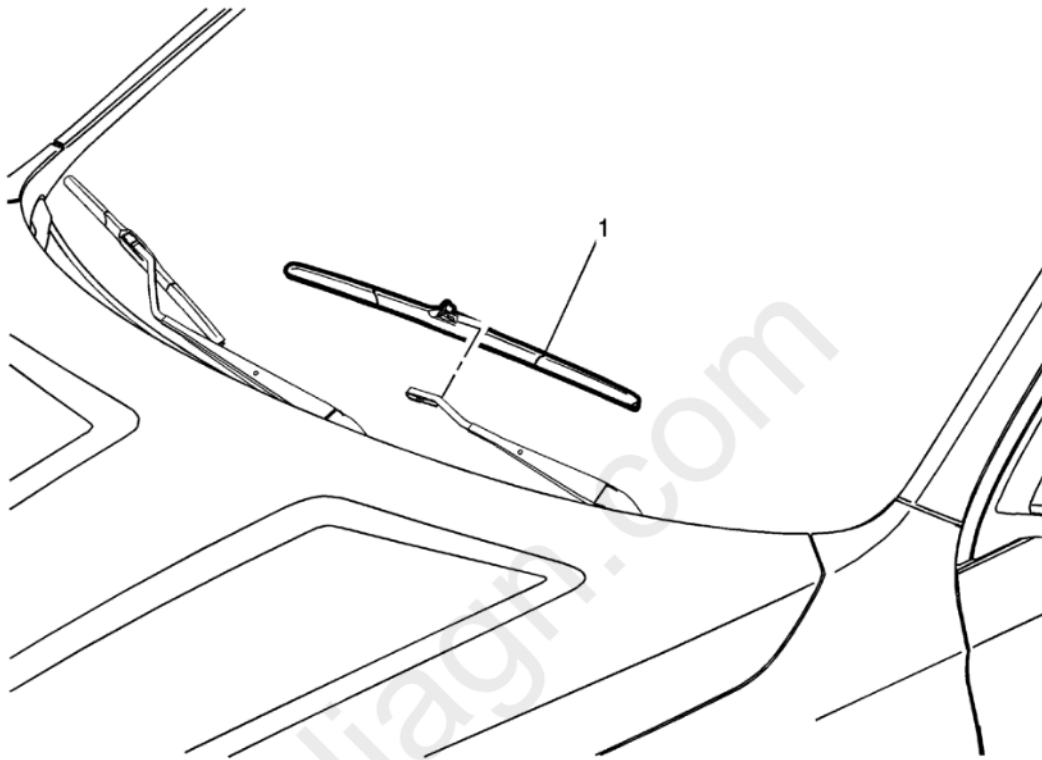


Fig. 18: Windshield Wiper Blade
Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
1	Windshield Wiper Blade Procedure 1. Lift the windshield wiper arm from the windshield. 2. Disengage the windshield wiper blade lock from the windshield wiper arm. 3. Release the retention tab securing the windshield wiper blade to the windshield wiper arm. 4. Pull the windshield wiper blade from the windshield wiper arm. 5. Remove the windshield wiper blade.

WINDSHIELD WIPER MOTOR REPLACEMENT

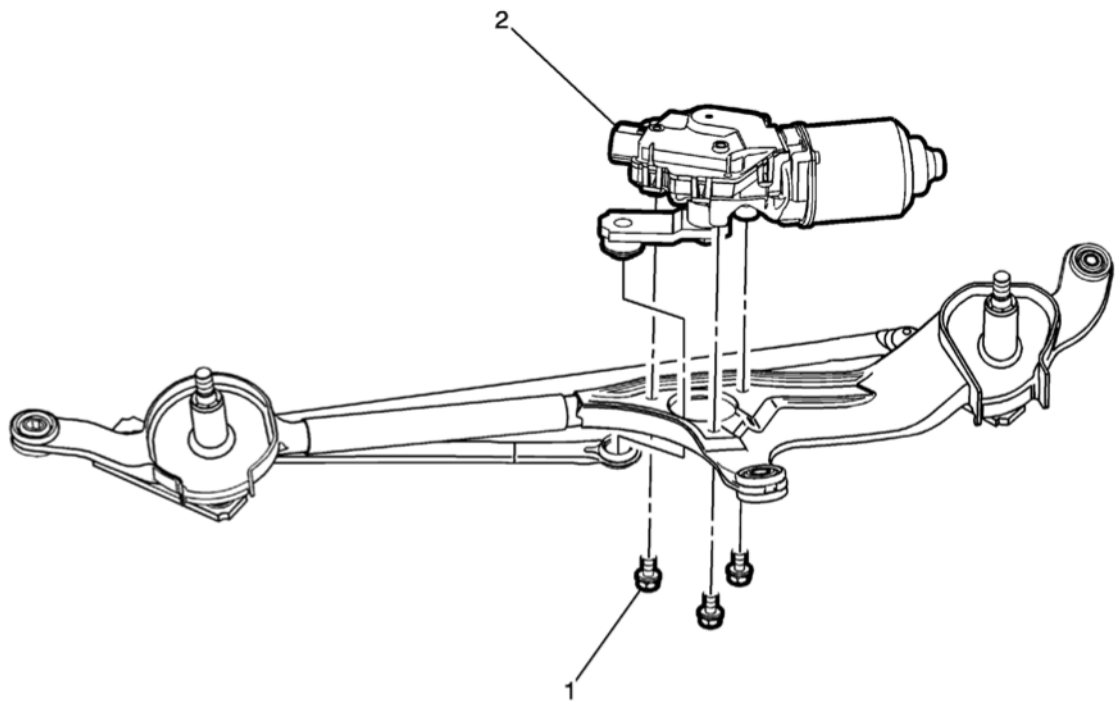


Fig. 19: Windshield Wiper Motor
 Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedure Remove the windshield wiper transmission. Refer to Windshield Wiper Transmission Replacement .	
1	Windshield Wiper Motor Bolt (Qty: 3) CAUTION: Refer to Fastener Caution . Tighten 8 N.m (71 lb in)
2	Windshield Wiper Motor Procedure - Using the J 39232 separator remove the windshield wiper motor crank arm from the transmission link. - Remove the windshield wiper motor from the windshield wiper transmission. - Position the new windshield wiper motor to the windshield wiper transmission. - Align the transmission links to the windshield wiper motor crank arm. - Using the J 39529 installer secure the windshield wiper motor crank arm ball to the transmission link ball socket. Tools Required J 39232 Wiper Linkage Separator J 39529 Wiper Linkage Installer For equivalent regional tools, refer to Special Tools .

WINDSHIELD WIPER TRANSMISSION REPLACEMENT

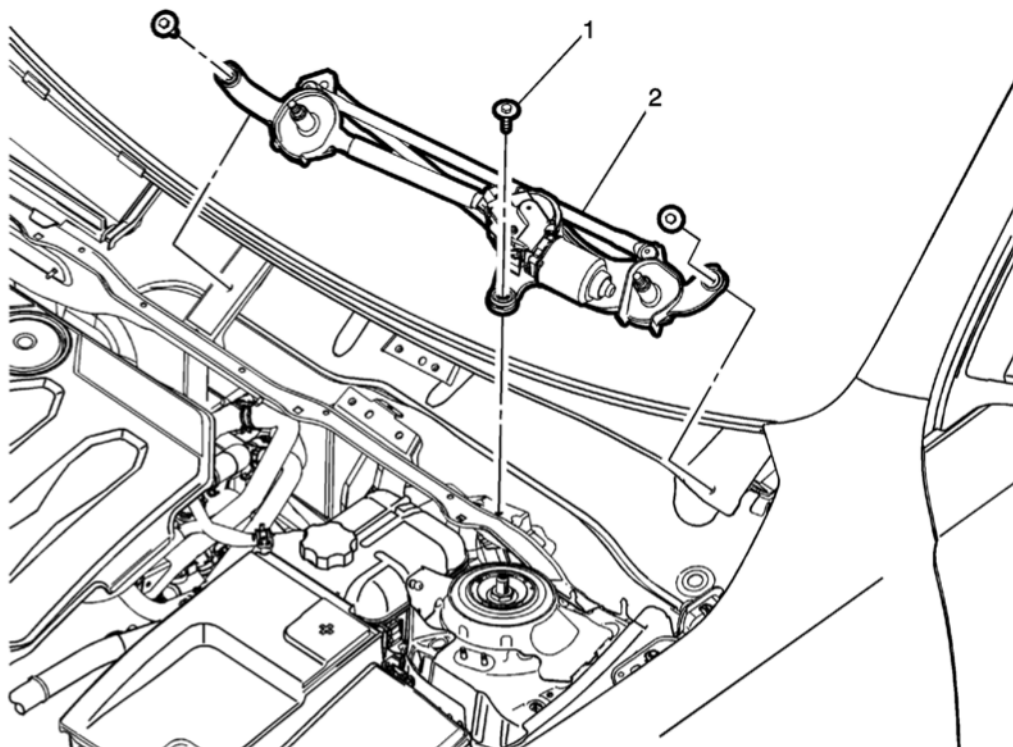


Fig. 20: Windshield Wiper Transmission
 Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedure Remove the dash panel brace. Refer to Dash Panel Brace Replacement .	
1	Windshield Wiper Transmission Bolt (Qty: 3) CAUTION: Refer to Fastener Caution . Tighten 8 N.m (71 lb in)
2	Windshield Wiper Transmission Procedure 1. Disconnect the windshield wiper motor electrical connector. 2. Remove the windshield wiper transmission from the vehicle. 3. Transfer parts as necessary.

WINDSHIELD OUTSIDE MOISTURE/AMBIENT LIGHT AND HUMIDITY SENSOR REPLACEMENT

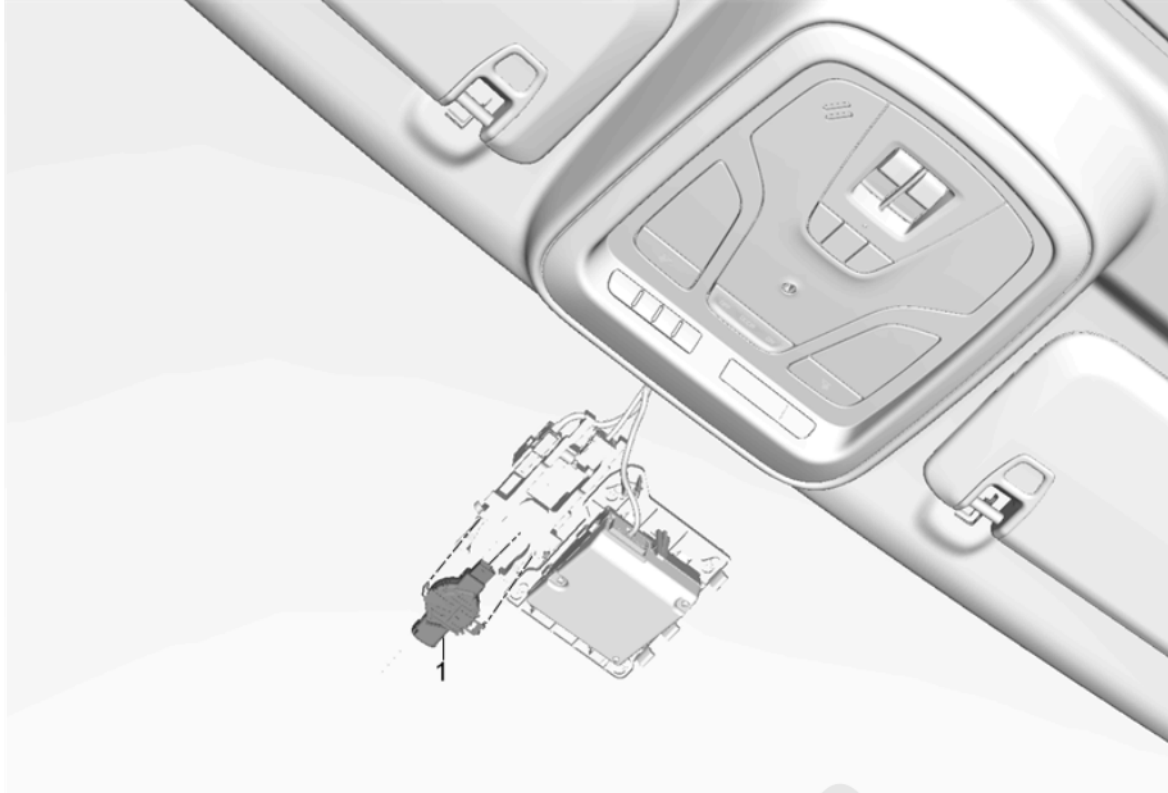


Fig. 21: Windshield Outside Moisture/Ambient Light and Humidity Sensor

Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedure	
Remove Inside Rearview Mirror. Refer to Inside Rearview Mirror Replacement	
1	Windshield Outside Moisture/Ambient Light And Humidity Sensor Procedure 1. Release the windshield outside moisture/ambient light and humidity sensor retainers from the inside rear view mirror support bracket and pull down and forward. 2. Disconnect the electrical connector.

WINDSHIELD GLASS CLEANING

Exterior

Clean the windshield with windshield cleaner, GM P/N 19287404 (18 oz.) or 19259280 (6 oz.) (Canadian P/N 88865156) 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.

Interior

The interior glass should be cleaned with plain water only applied with a clean terry cloth towel. Water only eliminates any film or haze on the window and helps prevent fogging.

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 element set. Refer to [Wiper Blade Element Check](#)

2. Clean the wiper blade elements. Refer to [Wiper Blade Element Cleaning](#)
3. Clean the windshield. Refer to [Windshield Glass Cleaning](#)

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
- Body Control Module (BCM)
- Rain Sensor

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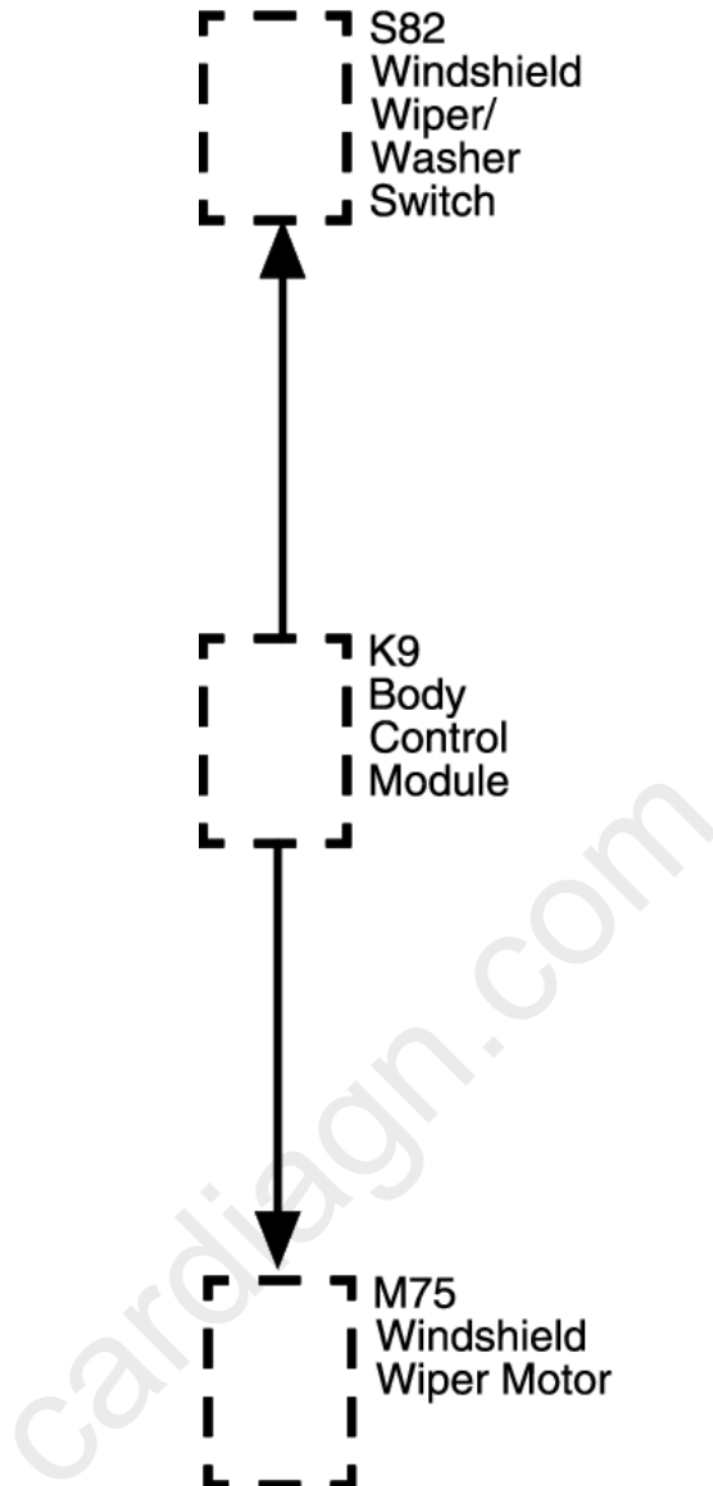


Fig. 22: Wiper/Washer System Component Block Diagram
 Courtesy of GENERAL MOTORS COMPANY

Windshield Wiper System

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

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

circuit is pulled to battery by the BCM. When the wiper switch is in the high speed position, the switch pulls the circuit low. The BCM determines how to control the Wiper high/low speed relay from this input. The third signal received from the front wiper switch is from the momentary windshield wash control switch. When the washer switch is not active the switch is open and the signal circuit is pulled to battery by the BCM. When the washer switch is active, the switch pulls the circuit low. The BCM controls the windshield wash and windshield wash activated wiper operation based on this input.

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

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

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

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

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

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

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

1. The BCM will initiate a single wipe by activating its front wiper ON/OFF relay output.
2. At the completion of a single wipe, the BCM will park the wipers as described above.
3. The BCM will then pause the wipers in their park position for the time duration associated with intermittent delay switch setting.

4. When the delay time expires repeat Steps 1 and 3 until the system is turned off or taken out of intermittent mode. If the wiper switch is moved from a longer delay interval to a shorter delay interval, the BCM will command an immediate wipe cycle and reset the delay timer to the shorter delay interval.

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

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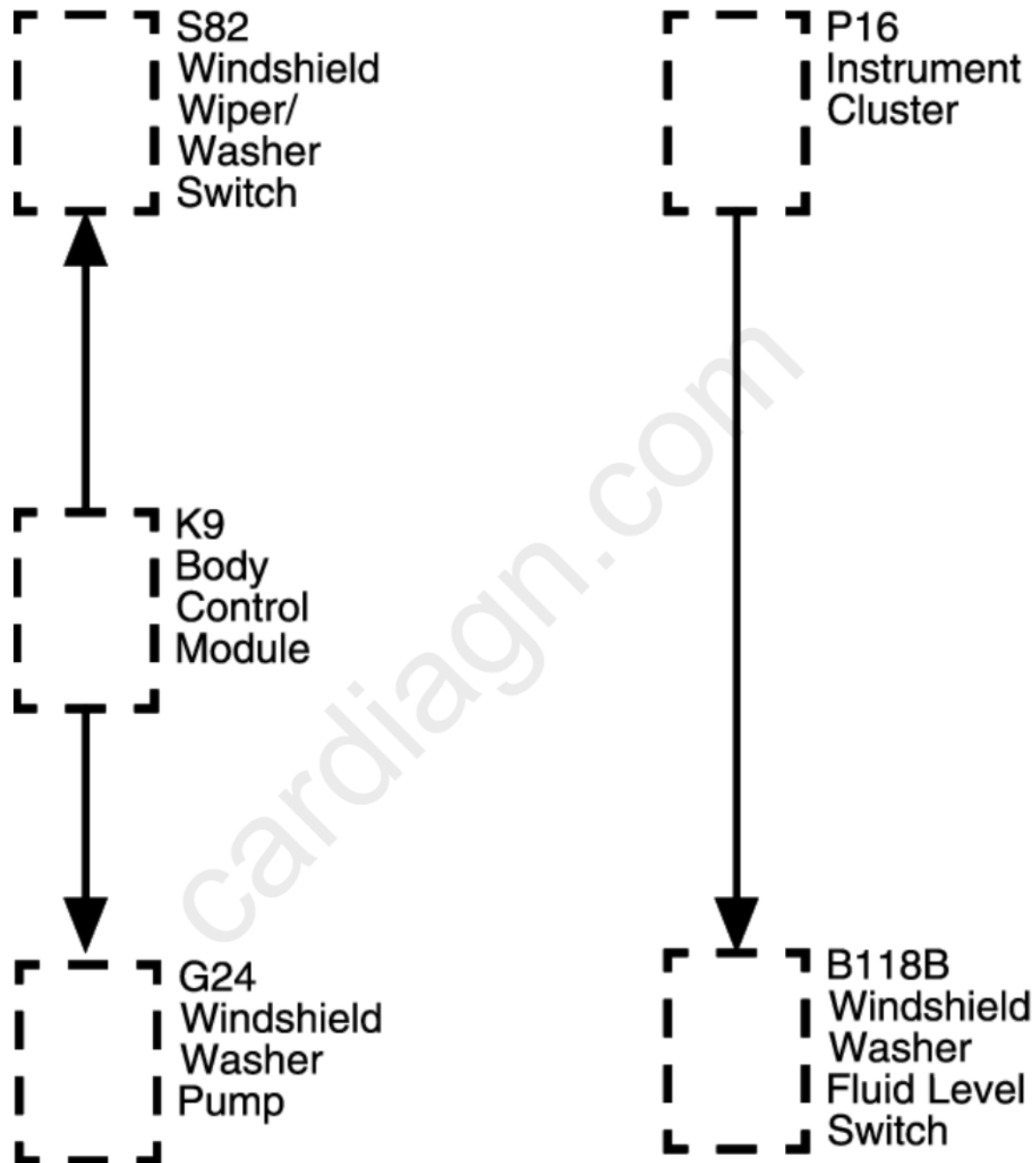


Fig. 23: Windshield Washer System Block Diagram

Courtesy of GENERAL MOTORS COMPANY

Windshield Washer System

The BCM controls the windshield wash operation and windshield wash activated wiper operation. When the BCM detects the activation of the momentary windshield wash control switch, it activates its washer pump relay drive output which supplies battery power to the coil of the washer pump relay. This energizes the relay, which switches battery power to the pump motor. The BCM will also activate continuous low speed windshield wipes as described above. Upon deactivation of the windshield wash control switch, the wiper control module (BCM) shall deactivate

the wash motor and will also park the wiper motor as described above unless the drip wipe feature is enabled. On some vehicles the drip wipe feature will be enabled and cause the system to provide additional wiping of the windshield after the switch has been released and fluid is no longer being applied. The front wash feature may attempt to detect a stuck switch. When enabled, activation of the wash feature shall be limited to 10 s.

Rain Sensor Indicator

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

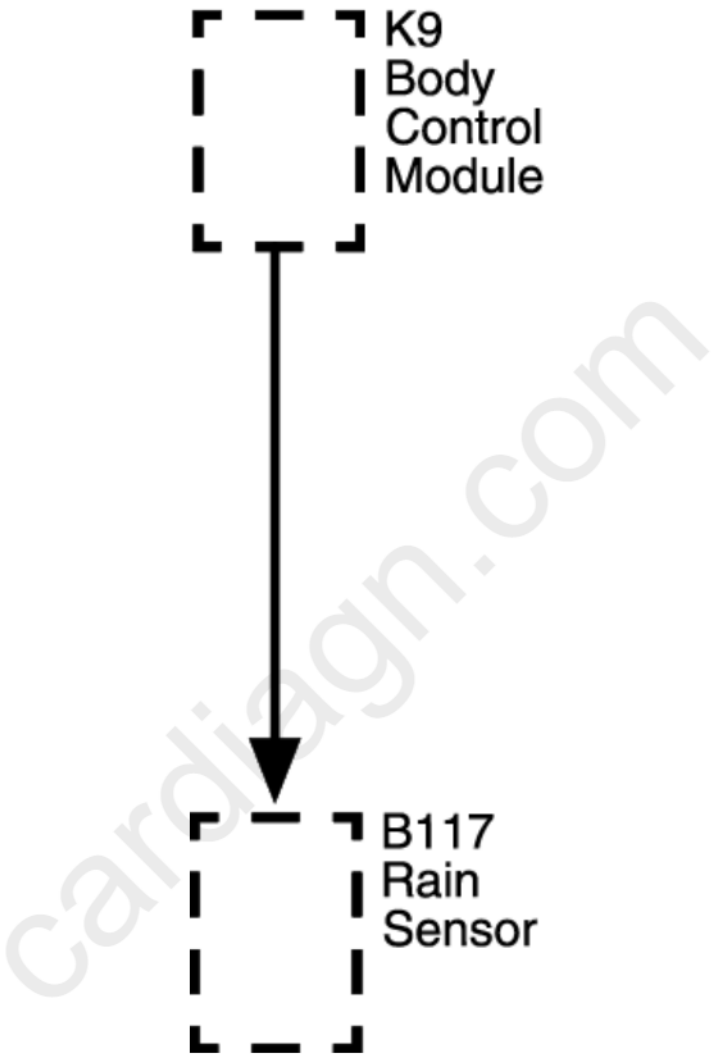


Fig. 24: Rain Sensor Indicator Block Diagram
Courtesy of GENERAL MOTORS COMPANY

SPECIAL TOOLS AND EQUIPMENT

SPECIAL TOOLS

Illustration	Tool Number/Description

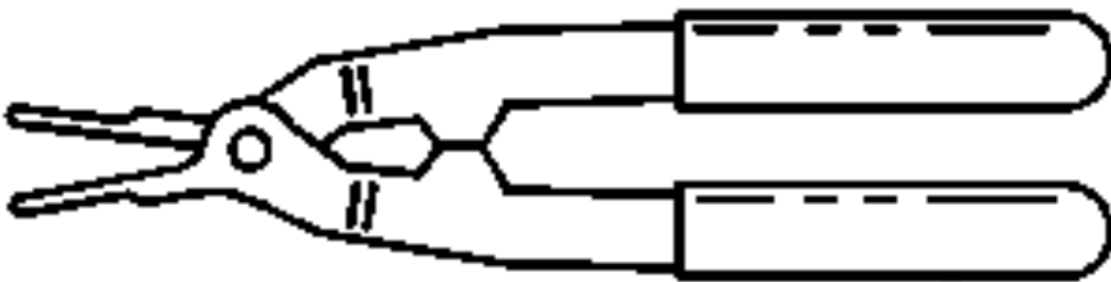
Illustration	Tool Number/Description
	J 39232 Wiper Linkage Separator

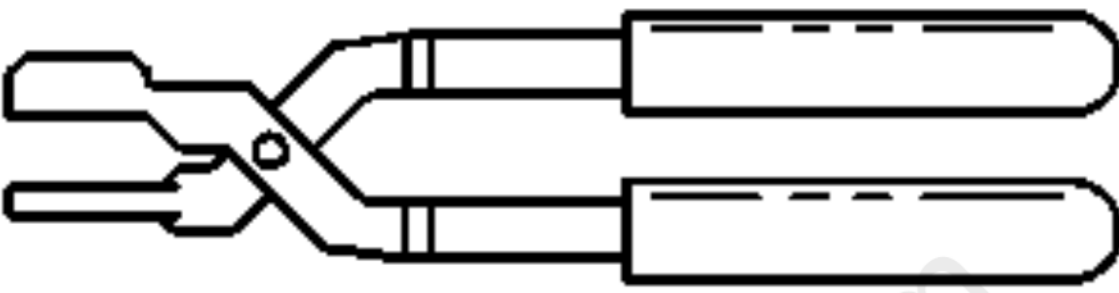
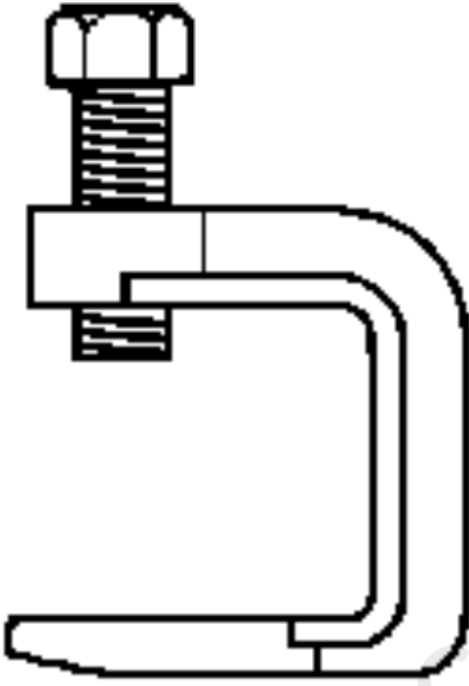
Illustration	Tool Number/Description
	J 39529 Wiper Linkage Installer

Illustration	Tool Number/Description
	BO 6626 Wiper Arm Puller