

2013 ACCESSORIES & EQUIPMENT

Wipers and Washers - Malibu

SPECIFICATIONS

FASTENER TIGHTENING SPECIFICATIONS

Fastener Tightening Specifications

Application	Specification	
	Metric	English
Air Inlet Grille Panel Screw	2.5 N.m	22 lb in
Dash Panel Brace Bolt	9 N.m	79 lb in
Windshield Washer Solvent Container Nut	9 N.m	80 lb in
Windshield Wiper Arm Nut	25 N.m	18 lb ft
Windshield Motor Crank Arm Bolt	32 N.m	24 lb ft
Windshield Wiper Motor Bracket Bolt	8.5 N.m	75 lb in
Windshield Wiper System Module Bolt	8 N.m	70 lb in

SCHEMATIC WIRING DIAGRAMS

WIPER/WASHER WIRING SCHEMATICS

Wiper Wiring Schematics

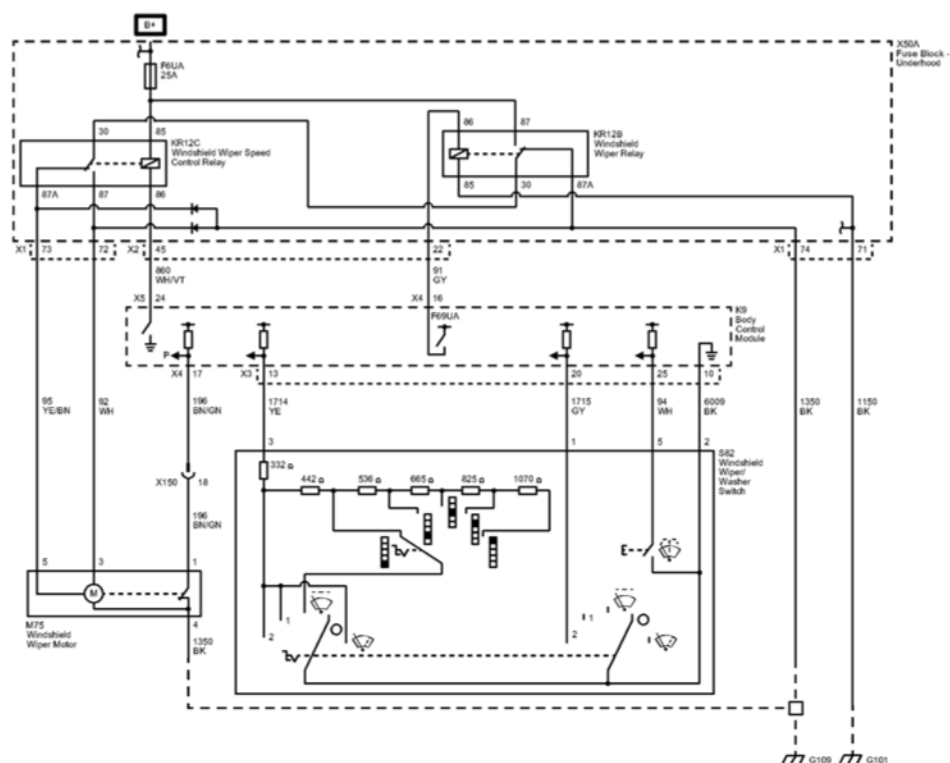


Fig. 1: Wiper Wiring Schematics
 Courtesy of GENERAL MOTORS COMPANY

Headlamp Washer (CE4) and Washer Wiring Schematics

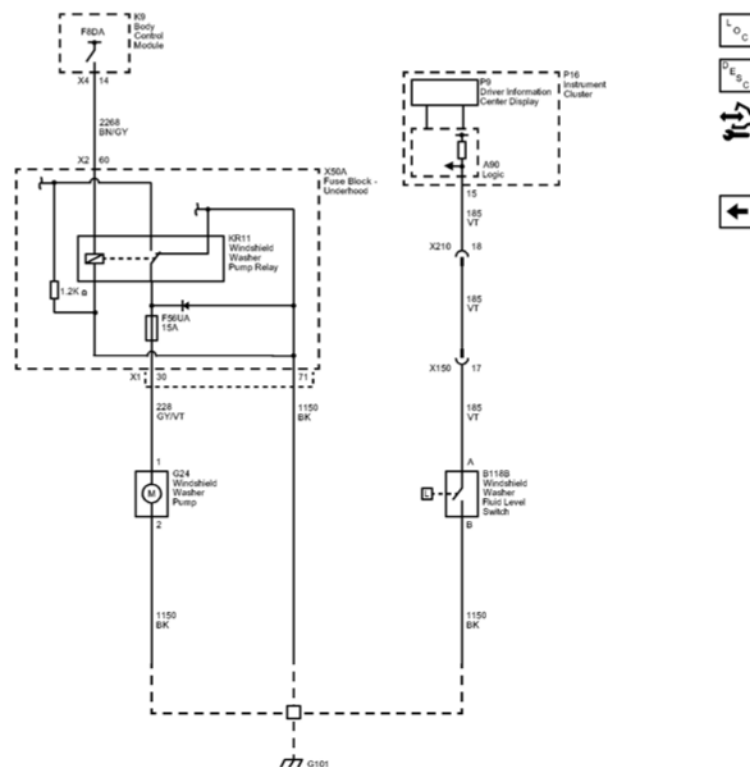


Fig. 2: Headlamp Washer (CE4) and Washer Wiring Schematics
 Courtesy of GENERAL MOTORS COMPANY

DIAGNOSTIC INFORMATION AND PROCEDURES

DIAGNOSTIC CODE INDEX

DIAGNOSTIC CODE INDEX

DTC	Description
<u>DTC B3715 or B3875</u>	DTC B3715 01 Windshield Wiper Relay Circuit Short to Battery
	DTC B3715 02 Windshield Wiper Relay Circuit Short to Ground
	DTC B3715 04 Windshield Wiper Relay Circuit Open
	DTC B3875 01 Windshield Wiper High Speed Relay Circuit Short to Battery
	DTC B3875 02 Windshield Wiper High Speed Relay Circuit Short to Ground
	DTC B3875 04 Windshield Wiper High Speed Relay Circuit Open
	DTC B3873 01 Front Washer Relay Circuit Short to Battery

DTC B3873

DTC B3873 02 Front Washer Relay Circuit Short to Ground
DTC B3873 04 Front Washer Relay Circuit Open Circuit

DTC B3715 OR B3875**Diagnostic Instructions**

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

DTC Descriptors**DTC B3715 01**

Windshield Wiper Relay Circuit Short to Battery

DTC B3715 02

Windshield Wiper Relay Circuit Short to Ground

DTC B3715 04

Windshield Wiper Relay Circuit Open

DTC B3875 01

Windshield Wiper High Speed Relay Circuit Short to Battery

DTC B3875 02

Windshield Wiper High Speed Relay Circuit Short to Ground

DTC B3875 04

Windshield Wiper High Speed Relay Circuit Open

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Windshield Wiper Switch Low Signal terminal 3	1	1	1	-
Windshield Wiper Switch	4	2	2	-

High Signal terminal 1				
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	-	-
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

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 below- 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 below- 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 below- 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 below- 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 ohms between the low reference circuit terminal 2 and ground.

- **If 10 ohms or greater**

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

2. Test for less than 2 ohms in the low reference circuit end to end.

- If 2 ohms or greater, repair the open/high resistance in the circuit.

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

- **If less than 10 ohms**

3. Ignition ON.
4. Verify the scan tool Windshield Wiper High Speed Switch parameter is Inactive.
 - **If not Inactive**
 1. Ignition OFF, disconnect the harness connector at the K9 Body Control Module.
 2. Test for infinite resistance between the signal circuit terminal 1 and ground.
 - If less than infinite resistance, repair the short to ground on the circuit.
 - If infinite resistance, replace the K9 Body Control Module.
 - **If Inactive**
5. Install a 3 A fused jumper wire between the signal circuit terminal 1 and the low reference circuit terminal 2.
6. Verify the scan tool Windshield Wiper High Speed Switch parameter is Active.
 - **If not Active**
 1. Ignition OFF, remove the jumper wire, disconnect the harness connector at the K9 Body Control Module, ignition ON.
 2. Test for less than 1 V between the signal circuit and ground.
 - If 1 V or greater, repair the short to voltage on the circuit.
 - If less than 1 V
 3. Test for less than 2 ohms in the signal circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, replace the K9 Body Control Module.
 - **If Active**
7. Test for greater than 8 V between the signal circuit terminal 3 and ground.
 - **If less than 8 V**
 1. Ignition OFF, disconnect the harness connector at the K9 Body Control Module.
 2. Test for infinite resistance between the signal circuit and ground
 - If less than infinite resistance, repair the short to ground on the circuit.
 - If infinite resistance
 3. Test for less than 2 ohms in the signal circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, replace the K9 Body Control Module.
 - **If 8 V or greater**
8. Ignition OFF, disconnect the X3 harness connector at the K9 Body Control Module, 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 ohms between the ground circuit terminal 4 and ground.
 - o **If 10 ohms or greater**
 1. Ignition OFF.
 2. Test for less than 2 ohms in the ground circuit end to end.
 - o If 2 ohms or greater, repair the open/high resistance in the circuit.
 - o If less than 2 ohms, repair the open/high resistance in the ground connection.
 - o **If less than 10 ohms**
3. Ignition ON.
4. Verify the scan tool Windshield Wiper Park Switch parameter is Inactive.
 - o **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.
 - o If less than infinite resistance, repair the short to ground on the circuit.
 - o If infinite resistance, replace the K9 Body Control Module.
 - o **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.
 - o **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.
 - o If 1 V or greater, repair the short to voltage on the circuit.
 - o If less than 1 V
 3. Test for less than 2 ohms in the signal circuit end to end.
 - o If 2 ohms or greater, repair the open/high resistance in the circuit.
 - o If less than 2 ohms, replace the K9 Body Control Module.
 - o **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 ohms between the ground circuit terminals listed below and ground.
 - KR12B Windshield Wiper Relay - terminal 85
 - KR12B Windshield Wiper Relay - terminal 87A
 - o **If 10 ohms or greater**

1. Ignition OFF.
2. Test for less than 2 ohms in the ground circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, repair the open/high resistance in the ground connection.
- **If less than 10 ohms**
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 ohms in the control circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, replace the K9 Body Control Module.
 - **If the test lamp is always ON**
 - 1. Ignition OFF, remove the test lamp, disconnect the harness connector at the K9 Body Control Module, 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 ohms between the control circuit terminal 30 and ground.

- **If 10 ohms or greater**

Test or replace the KR12B Windshield Wiper Relay.

- **If less than 10 ohms**

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 High Speed 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 ohms in the control circuit end to end.

- If 2 ohms or greater, repair the open/high resistance in the circuit.

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

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

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

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 ohms in the control circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, test or replace the 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 High Speed 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 ohms in the control circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, test or replace the 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 high speed switch in the open position.

○ **If less than infinite resistance**

Replace the S82 Windshield Wiper/Washer Switch.

○ **If infinite resistance**

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

○ **If 2 ohms or greater**

Replace the S82 Windshield Wiper/Washer Switch.

○ **If less than 2 ohms**

4. Test for infinite resistance between the signal terminal 3 and the low reference terminal 2 with the low speed switch in the open position.

○ **If less than infinite resistance**

Replace the S82 Windshield Wiper/Washer Switch.

○ **If infinite resistance**

5. Verify the resistance readings are within the specified range listed below between the signal circuit terminal 3 and the low reference circuit terminal 1 by pushing the switch in the listed positions below.

- Delay 1 : 3.75-3.85kohms
- Delay 2 : 2.75-2.85kohms
- Delay 3 : 1.95-2.05kohms
- Delay 4 : 1.25-1.35kohms
- Delay 5 : 765-775ohms

○ **If not within the specified range**

Replace the S82 Windshield Wiper/Washer Switch.

○ **If within the specified range**

6. All OK

Relay Test

1. Ignition OFF, disconnect the appropriate relay.
2. Test for 60-200 ohms between terminals 85 and 86.
 - **If less than 60 or greater than 200**

Replace the relay.

- **If between 60-200 ohms**

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

Replace the relay.

- **If infinite resistance**

4. Test for less than 5 ohms between terminals 30 and 87A.
 - **If 5 ohms or greater**

Replace the relay.

- **If less than 5 ohms**

5. Install a 10 A fused jumper wire between relay terminal 85 and 12 V. Install a jumper wire between relay terminal 86 and ground.
6. Test for less than 5 ohms between terminals 30 and 87.
 - **If 5 ohms or greater**

Replace the relay.

- **If less than 5 ohms**

7. All OK

Repair Instructions

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

- **Windshield Wiper Motor Replacement**
- **Relay Replacement (Within an Electrical Center) , Relay Replacement (Attached to Wire Harness)**

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

DTC B3873

Diagnostic Instructions

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

DTC Descriptors

DTC B3873 01

Front Washer Relay Circuit Short to Battery

DTC B3873 02

Front Washer Relay Circuit Short to Ground

DTC B3873 04

Front Washer Relay Circuit Open Circuit

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Windshield Washer Switch Signal	2	1	1	-
Windshield Washer Pump Control	1	1	2	-
Windshield Washer Relay Control	B3873 02	B3873 04	B3873 01	-
Windshield Washer Pump Ground	-	1	-	-
1. Washer Inoperative 2. Washer Always ON				

Circuit/System Description

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

Conditions for Running the DTC

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

Conditions for Setting the DTC

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

Action Taken When the DTC Sets

Washer operation is suspended.

Conditions for Clearing the DTC

A current DTC clears when the diagnostic runs and passes.

Reference Information

Schematic Reference

Wiper/Washer Schematics

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX

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 below- Windshield Wiper/Washer Switch Malfunction.

- **If the parameter changes**

3. Verify the scan tool Instrument Cluster Washer Fluid Level Switch parameter changes between Open when the fluid level is full and Closed when the fluid level is low.

- **If the parameter does not change**

Refer to Circuit/System Testing below- Windshield Washer Fluid Level Switch Malfunction.

- **If the parameter changes**

4. Verify the Windshield Washers turn On when commanding the Windshield Washer Relay Active with a scan tool.

- **If the Windshield Washers do not turn ON**

Refer to Circuit/System Testing below- Windshield Washer Pump Malfunction

- **If the Windshield Washers turn ON**

5. All OK.

Circuit/System Testing

Windshield Wiper/Washer Switch Malfunction

1. Ignition OFF and all vehicle systems OFF, disconnect the harness connector at the S82 Windshield Wiper/Washer Switch. It may take up to 11 min for all vehicle systems to power down.
2. Test for less than 5 ohms between the low reference circuit terminal 2 and ground.
 - **If 5 ohms or greater**
 1. Ignition OFF.
 2. Test for less than 2 ohms in the low reference circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, replace the K9 Body Control Module.
 - **If less than 5 ohms**
3. Ignition ON.
4. Verify the scan tool Windshield Washer Switch parameter is Inactive.
 - **If not Inactive**
 1. Ignition OFF, disconnect the harness connector at the K9 Body Control Module.
 2. Test for infinite resistance between the signal circuit terminal 5 and ground.
 - If less than infinite resistance, repair the short to ground on the circuit.

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

Windshield Washer Fluid Level Switch Malfunction

1. Ignition OFF and all vehicle systems OFF, disconnect the harness connector at the B118B Windshield Washer Fluid Level Switch. It may take up to 2 min for all vehicle systems to power down.
2. Test for less than 10 ohms between the ground circuit terminal B and ground.
 - **If 10 ohms or greater**
 1. Ignition OFF.
 2. Test for less than 2 ohms in the ground circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, repair the open/high resistance in the ground connection.
 - **If less than 10 ohms**
3. Ignition ON.
4. Verify the scan tool Washer Fluid Level Switch parameter is Open.
 - **If not Open**
 1. Ignition OFF, disconnect the harness connector at the P16 Instrument Cluster.
 2. Test for infinite resistance between the signal circuit terminal A and ground.
 - If less than infinite resistance, repair the short to ground on the circuit.
 - If infinite resistance, replace the P16 Instrument Cluster.
 - **If Open**
5. Install a 3 A fused jumper wire between the signal circuit terminal A and the ground circuit terminal B.
6. Verify the scan tool Washer Fluid Level Switch parameter is Closed.
 - **If not Closed**

1. Ignition OFF, remove the jumper wire, disconnect the harness connector at the P16 Instrument Cluster, ignition ON.
2. Test for less than 1 V between the signal circuit and ground.
 - If 1 V or greater, repair the short to voltage on the circuit.
 - If less than 1 V
3. Test for less than 2 ohms in the signal circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, replace the P16 Instrument Cluster.

- **If Closed**

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

Windshield Washer Pump Malfunction

1. Ignition OFF, and all vehicle systems OFF. Disconnect the harness connector at the G24 Windshield Washer Pump. It may take up to 2 min for all vehicle systems to power down.
2. Test for less than 10 ohms between the ground circuit terminal 2 and ground.
 - **If 10 ohms or greater**
 1. Test for less than 2 ohms in the ground circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, repair the open/high resistance in the ground connection.
 - **If less than 10 ohms**
3. Connect a test lamp between the control circuit terminal 1 and the ground circuit terminal 2, ignition ON.
4. Verify the test lamp does NOT turn ON and OFF when commanding the Windshield Washer Relay Active and Inactive with a scan tool.

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

Test or replace the G24 Windshield Washer Pump.

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

5. Ignition OFF, connect the harness connector at the G24 Windshield Washer Pump. Disconnect the X1 harness connector at the X50A Fuse Block - Underhood, It may take up to 2 min for all vehicle systems to power down.
6. Test for less than 10 ohms between the ground circuit terminal 71 and ground.
 - **If 10 ohms or greater**
 1. Test for less than 2 ohms in the ground circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, repair the open/high resistance in the ground connection.
 - **If less than 10 ohms**
7. Ignition ON.
8. Verify the G24 Windshield Washer Pump is not activated.

- **If the G24 Windshield Washer Pump is activated**
 1. Ignition OFF, disconnect the harness connector at the G24 Windshield Washer Pump, ignition ON.
 2. Test for less than 1 V between the control circuit terminal 1 and ground.
 - If 1 V or greater, repair the short to voltage on the circuit.
 - If less than 1 V, replace the G24 Windshield Washer Pump.
- **If the G24 Windshield Washer Pump is not activated**
 9. Connect a 20 A fused jumper wire between the control circuit terminal 30 and B+.
 10. Verify the G24 Windshield Washer Pump activates.
 - **If the G24 Windshield Washer Pump does not activate**
 1. Ignition OFF, remove the jumper wire, disconnect the harness connector at the G24 Windshield Washer Pump, ignition ON.
 2. Test for infinite resistance between the control circuit and ground.
 - If less than Infinite resistance, repair the short to ground on the circuit.
 - If infinite resistance
 3. Test for less than 2 ohms in the control circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, test or replace the G24 Windshield Washer Pump.
 - **If the G24 Windshield Washer Pump activates**
 11. Ignition OFF, connect the X1 harness connector at the X50A Fuse Block - Underhood. Disconnect the X4 harness connector at the K9 Body Control Module, ignition ON.
 12. Verify the G24 Windshield Washer Pump is not activated.
 - **If the G24 Windshield Washer Pump is activated**
 1. Ignition OFF, disconnect the X2 harness connector at the X50A Fuse Block - Underhood.
 2. Test for less than 1 V between the K9 Body Control Module control circuit terminal 14 and ground.
 - If 1 V or greater, repair the short to voltage on the circuit.
 - If less than 1 V, replace the X50A Fuse Block - Underhood.
 - **If the G24 Windshield Washer Pump is not activated**
 13. Connect a 3 A fused jumper wire between the control circuit terminal 14 and B+.
 14. Verify the G24 Windshield Washer Pump activates.
 - **If the G24 Windshield Washer Pump does not activate**
 1. Ignition OFF, remove the jumper wire, disconnect the X2 harness connector at the X50A Fuse Block - Underhood, ignition ON.
 2. Test for infinite resistance between the K9 Body Control Module control circuit terminal 14 and ground.
 - If less than infinite resistance, repair the short to ground on the circuit.
 - If infinite resistance
 3. Test for less than 2 ohms in the control circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.

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

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

15. Replace the K9 Body Control Module.

Component Testing

Windshield Wiper/Washer Switch

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

- **If less than infinite resistance**

Replace the S82 Windshield Wiper/Washer Switch.

- **If infinite resistance**

3. Test for less than 2 ohms between the signal circuit terminal 5 and the low reference circuit terminal 2 with the switch in the closed position.

- **If 2 ohms or greater**

Replace the S82 Windshield Wiper/Washer Switch.

- **If less than 2 ohms**

4. All OK

Windshield Washer Fluid Level Switch

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

- **If less than infinite resistance**

Replace the B118B Windshield Washer Fluid Level Switch.

- **If infinite resistance**

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

- **If 2 ohms or greater**

Replace the B118B Windshield Washer Fluid Level Switch.

- **If less than 2 ohms**

4. All OK

Repair Instructions

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

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

SYMPTOMS - WIPER/WASHER SYSTEMS

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

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

Visual/Physical Inspection

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

Intermittent

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

Symptom List

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

- **Windshield Wiper System Malfunction**
- **Washer Malfunction**

WINDSHIELD WIPER SYSTEM MALFUNCTION

Diagnostic Instructions

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

DTC Descriptors

DTC B3715 01

Windshield Wiper Relay Circuit Short to Battery

DTC B3715 02

Windshield Wiper Relay Circuit Short to Ground

DTC B3715 04

Windshield Wiper Relay Circuit Open

DTC B3875 01

Windshield Wiper High Speed Relay Circuit Short to Battery

DTC B3875 02

Windshield Wiper High Speed Relay Circuit Short to Ground

DTC B3875 04

Windshield Wiper High Speed Relay Circuit Open

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Windshield Wiper 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	-	-
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

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

- **If not Active**

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

- **If Active**

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

- **If less than 8 V**

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

- **If 8 V or greater**

8. Ignition OFF, disconnect the X3 harness connector at the K9 Body Control Module, 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 ohms between the ground circuit terminal 4 and ground.
 - **If 10 ohms or greater**
 1. Ignition OFF.
 2. Test for less than 2 ohms in the ground circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, repair the open/high resistance in the ground connection.

- **If less than 10 ohms**
- 3. Ignition ON.
- 4. Verify the scan tool 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 ohms in the signal circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, replace the K9 Body Control Module.
 - **If Active**
- 7. 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 ohms between the ground circuit terminals listed below and ground.
 - KR12B Windshield Wiper Relay - terminal 85
 - KR12B Windshield Wiper Relay - terminal 87A
 - **If 10 ohms or greater**
 1. Ignition OFF.
 2. Test for less than 2 ohms in the ground circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, repair the open/high resistance in the ground connection.
 - **If less than 10 ohms**
- 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 ohms in the control circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, replace the K9 Body Control Module.
 - **If the test lamp is always ON**
 1. Ignition OFF, remove the test lamp, disconnect the harness connector at the K9 Body Control Module, 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 ohms between the control circuit terminal 30 and ground.
 - **If 10 ohms or greater**

Test or replace the KR12B Windshield Wiper Relay.
 - **If less than 10 ohms**
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 High Speed 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 ohms in the control circuit end to end.

- If 2 ohms or greater, repair the open/high resistance in the circuit.

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

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

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

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 ohms in the control circuit end to end.
 - o If 2 ohms or greater, repair the open/high resistance in the circuit.
 - o If less than 2 ohms, test or replace the KR12C Windshield Wiper Speed Control Relay.
 - o **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.
 - o If 1 V or greater, repair the short to voltage on the circuit.
 - o If less than 1 V, test or replace the KR12C Windshield Wiper Speed Control Relay.
 - o **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 High Speed Relay High and Off with a scan tool.
 - o **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.
 - o If less than infinite resistance, repair the short to ground on the circuit.
 - o If infinite resistance
3. Test for less than 2 ohms in the control circuit end to end.
 - o If 2 ohms or greater, repair the open/high resistance in the circuit.
 - o If less than 2 ohms, test or replace the KR12C Windshield Wiper Speed Control Relay.
 - o **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.
 - o If 1 V or greater, repair the short to voltage on the circuit.
 - o If less than 1 V, test or replace the KR12C Windshield Wiper Speed Control Relay.
 - o **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 high speed switch in the open position.
 - o **If less than infinite resistance**

Replace the S82 Windshield Wiper/Washer Switch.

- **If infinite resistance**

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

- **If 2 ohms or greater**

Replace the S82 Windshield Wiper/Washer Switch.

- **If less than 2 ohms**

4. Test for infinite resistance between the signal terminal 3 and the low reference terminal 2 with the low speed switch in the open position.

- **If less than infinite resistance**

Replace the S82 Windshield Wiper/Washer Switch.

- **If infinite resistance**

5. Verify the resistance readings are within the specified range listed below between the signal circuit terminal 3 and the low reference circuit terminal 1 by pushing the switch in the listed positions below.

- Delay 1 : 3.75-3.85kohms
- Delay 2 : 2.75-2.85kohms
- Delay 3 : 1.95-2.05kohms
- Delay 4 : 1.25-1.35kohms
- Delay 5 : 765-775ohms

- **If not within the specified range**

Replace the S82 Windshield Wiper/Washer Switch.

- **If within the specified range**

6. All OK

Relay Test

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

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

Replace the relay.

- **If between 60-200 ohms**

3. Test for infinite resistance between the terminals listed below:
 - 30 and 86
 - 30 and 87

- 30 and 85
- 85 and 87
- **If less than infinite resistance**

Replace the relay.

- **If infinite resistance**

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

- **If 5 ohms or greater**

Replace the relay.

- **If less than 5 ohms**

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

6. Test for less than 5 ohms between terminals 30 and 87.

- **If 5 ohms or greater**

Replace the relay.

- **If less than 5 ohms**

7. All OK

Repair Instructions

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

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

WASHER MALFUNCTION

Diagnostic Instructions

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

DTC Descriptors

DTC B3873 01

Front Washer Relay Circuit Short to Battery

DTC B3873 02

Front Washer Relay Circuit Short to Ground

DTC B3873 04

Front Washer Relay Circuit Open Circuit

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Windshield Washer Switch Signal	2	1	1	-
Windshield Washer Pump Control	1	1	2	-
Windshield Washer Relay Control	B3873 02	B3873 04	B3873 01	-
Windshield Washer Pump Ground	-	1	-	-
1. Washer Inoperative 2. Washer Always ON				

Circuit/System Description

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

Conditions for Running the DTC

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

Conditions for Setting the DTC

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

Action Taken When the DTC Sets

Washer operation is suspended.

Conditions for Clearing the DTC

A current DTC clears when the diagnostic runs and passes.

Reference Information

Schematic Reference

Wiper/Washer Schematics

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX

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 below- Windshield Wiper/Washer Switch Malfunction.

- **If the parameter changes**

3. Verify the scan tool Instrument Cluster Washer Fluid Level Switch parameter changes between Open when the fluid level is full and Closed when the fluid level is low.

- **If the parameter does not change**

Refer to Circuit/System Testing below- Windshield Washer Fluid Level Switch Malfunction.

- **If the parameter changes**

4. Verify the Windshield Washers turn On when commanding the Windshield Washer Relay Active with a scan tool.

- **If the Windshield Washers do not turn ON**

Refer to Circuit/System Testing below- Windshield Washer Pump Malfunction

- **If the Windshield Washers turn ON**

5. All OK.

Circuit/System Testing

Windshield Wiper/Washer Switch Malfunction

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

- If less than 2 ohms, replace the K9 Body Control Module.
- **If Active**
- 7. Test or replace the S82 Windshield Wiper/Washer Switch.

Windshield Washer Fluid Level Switch Malfunction

1. Ignition OFF and all vehicle systems OFF, disconnect the harness connector at the B118B Windshield Washer Fluid Level Switch. It may take up to 2 min for all vehicle systems to power down.
2. Test for less than 10 ohms between the ground circuit terminal B and ground.
 - **If 10 ohms or greater**
 1. Ignition OFF.
 2. Test for less than 2 ohms in the ground circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, repair the open/high resistance in the ground connection.
 - **If less than 10 ohms**
3. Ignition ON.
4. Verify the scan tool Washer Fluid Level Switch parameter is Open.
 - **If not Open**
 1. Ignition OFF, disconnect the harness connector at the P16 Instrument Cluster.
 2. Test for infinite resistance between the signal circuit terminal A and ground.
 - If less than infinite resistance, repair the short to ground on the circuit.
 - If infinite resistance, replace the P16 Instrument Cluster.
 - **If Open**
5. Install a 3 A fused jumper wire between the signal circuit terminal A and the ground circuit terminal B.
6. Verify the scan tool Washer Fluid Level Switch parameter is Closed.
 - **If not Closed**
 1. Ignition OFF, remove the jumper wire, disconnect the harness connector at the P16 Instrument Cluster, ignition ON.
 2. Test for less than 1 V between the signal circuit and ground.
 - If 1 V or greater, repair the short to voltage on the circuit.
 - If less than 1 V
 3. Test for less than 2 ohms in the signal circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, replace the P16 Instrument Cluster.
 - **If Closed**
7. Test or replace the B118B Windshield Washer Fluid Level Switch.

Windshield Washer Pump Malfunction

1. Ignition OFF, and all vehicle systems OFF. Disconnect the harness connector at the G24 Windshield

Washer Pump. It may take up to 2 min for all vehicle systems to power down.

2. Test for less than 10 ohms between the ground circuit terminal 2 and ground.
 - **If 10 ohms or greater**
 1. Test for less than 2 ohms in the ground circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, repair the open/high resistance in the ground connection.
 - **If less than 10 ohms**
3. Connect a test lamp between the control circuit terminal 1 and the ground circuit terminal 2, ignition ON.
4. Verify the test lamp does NOT turn ON and OFF when commanding the Windshield Washer Relay Active and Inactive with a scan tool.
 - **If the test lamp turns ON and OFF**

Test or replace the G24 Windshield Washer Pump.

- **If the test lamp does not turn ON and OFF**
5. Ignition OFF, connect the harness connector at the G24 Windshield Washer Pump. Disconnect the X1 harness connector at the X50A Fuse Block - Underhood, It may take up to 2 min for all vehicle systems to power down.
 6. Test for less than 10 ohms between the ground circuit terminal 71 and ground.
 - **If 10 ohms or greater**
 1. Test for less than 2 ohms in the ground circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, repair the open/high resistance in the ground connection.
 - **If less than 10 ohms**
 7. Ignition ON.
 8. Verify the G24 Windshield Washer Pump is not activated.
 - **If the G24 Windshield Washer Pump is activated**
 1. Ignition OFF, disconnect the harness connector at the G24 Windshield Washer Pump, ignition ON.
 2. Test for less than 1 V between the control circuit terminal 1 and ground.
 - If 1 V or greater, repair the short to voltage on the circuit.
 - If less than 1 V, replace the G24 Windshield Washer Pump.
 - **If the G24 Windshield Washer Pump is not activated**
 9. Connect a 20 A fused jumper wire between the control circuit terminal 30 and B+.
 10. Verify the G24 Windshield Washer Pump activates.
 - **If the G24 Windshield Washer Pump does not activate**
 1. Ignition OFF, remove the jumper wire, disconnect the harness connector at the G24 Windshield Washer Pump, ignition ON.
 2. Test for infinite resistance between the control circuit and ground.
 - If less than Infinite resistance, repair the short to ground on the circuit.

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

Component Testing

Windshield Wiper/Washer Switch

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

Replace the S82 Windshield Wiper/Washer Switch.

- **If infinite resistance**

3. Test for less than 2 ohms between the signal circuit terminal 5 and the low reference circuit terminal 2 with the switch in the closed position.

- **If 2 ohms or greater**

Replace the S82 Windshield Wiper/Washer Switch.

- **If less than 2 ohms**

4. All OK

Windshield Washer Fluid Level Switch

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

- **If less than infinite resistance**

Replace the B118B Windshield Washer Fluid Level Switch.

- **If infinite resistance**

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

- **If 2 ohms or greater**

Replace the B118B Windshield Washer Fluid Level Switch.

- **If less than 2 ohms**

4. All OK

Repair Instructions

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

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

REPAIR INSTRUCTIONS

WINDSHIELD WIPER AND WASHER SWITCH REPLACEMENT

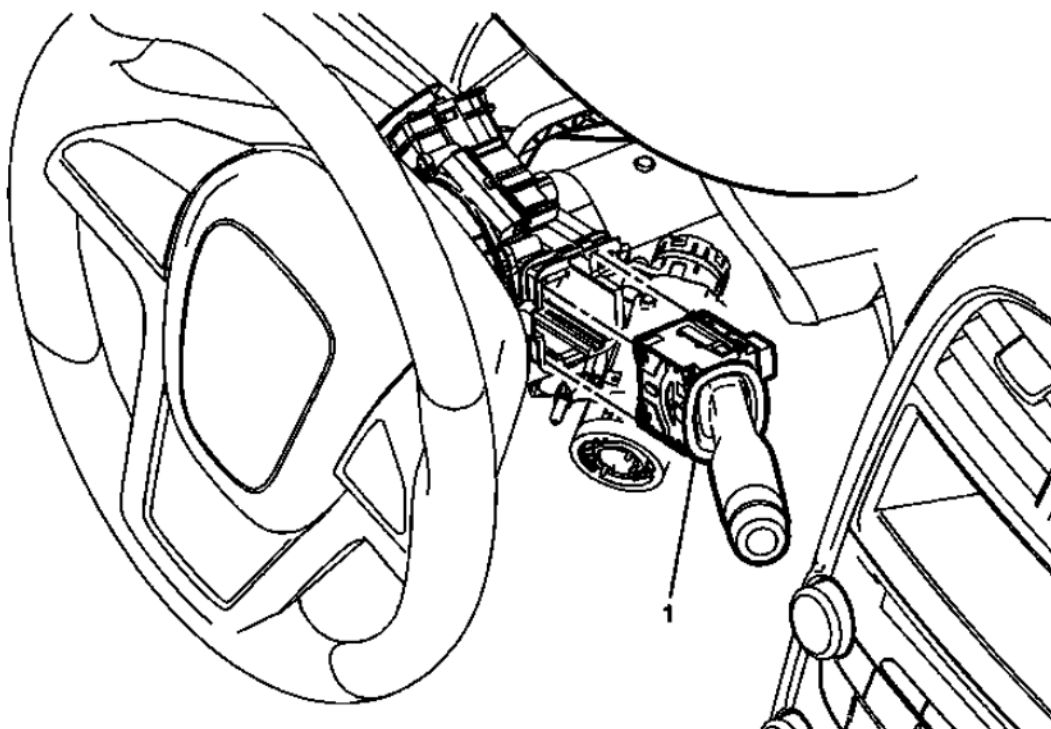


Fig. 3: Windshield Wiper and Washer Switch
 Courtesy of GENERAL MOTORS COMPANY

Windshield Wiper and Washer Switch Replacement

Callout	Component Name
Preliminary Procedures 1. Remove the steering column upper trim cover. Refer to <u>Steering Column Upper Trim Cover Replacement</u>. 2. If equipped with BTM, remove the steering column lower trim cover. Refer to <u>Steering Column Lower Trim Cover Replacement</u>. 3. If not equipped with BTM, remove the ignition lock cylinder bezel. Refer to <u>Ignition Lock Cylinder Bezel Replacement (Without BTM)</u>.	
1	Windshield Wiper and Washer Switch Procedure 1. Disconnect any electrical connectors. 2. Release the retaining tabs and remove the windshield wiper and washer switch from the turn signal switch bracket.

WINDSHIELD WASHER NOZZLE HOSE REPLACEMENT

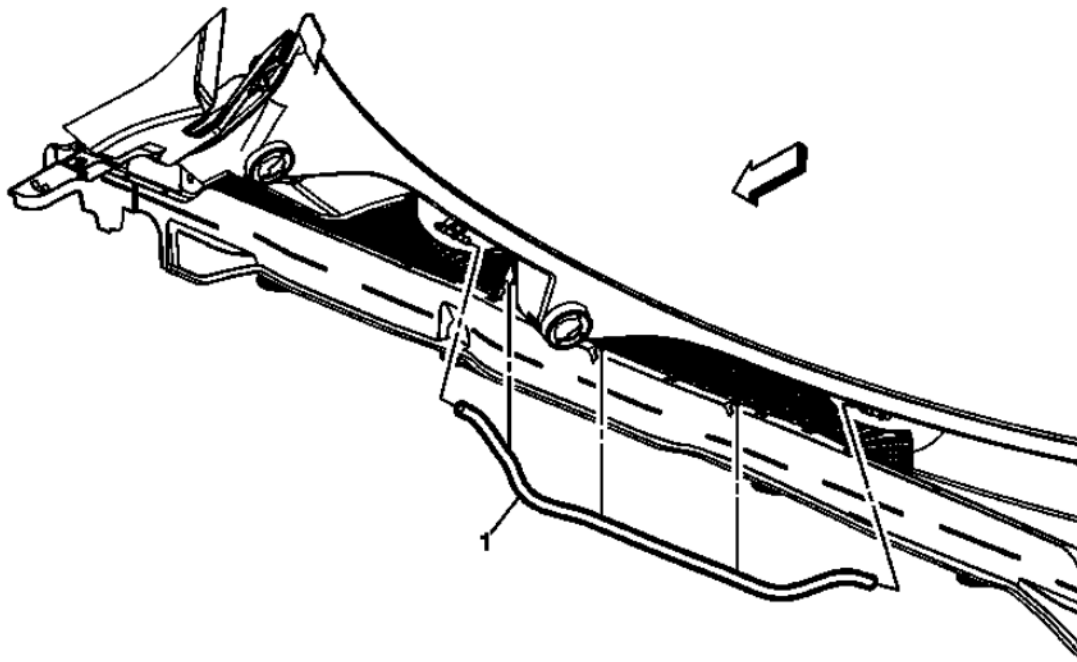


Fig. 4: Windshield Washer Nozzle Hose
 Courtesy of GENERAL MOTORS COMPANY

Windshield Washer Nozzle Hose Replacement

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

WINDSHIELD WASHER SOLVENT CONTAINER FILLER TUBE REPLACEMENT

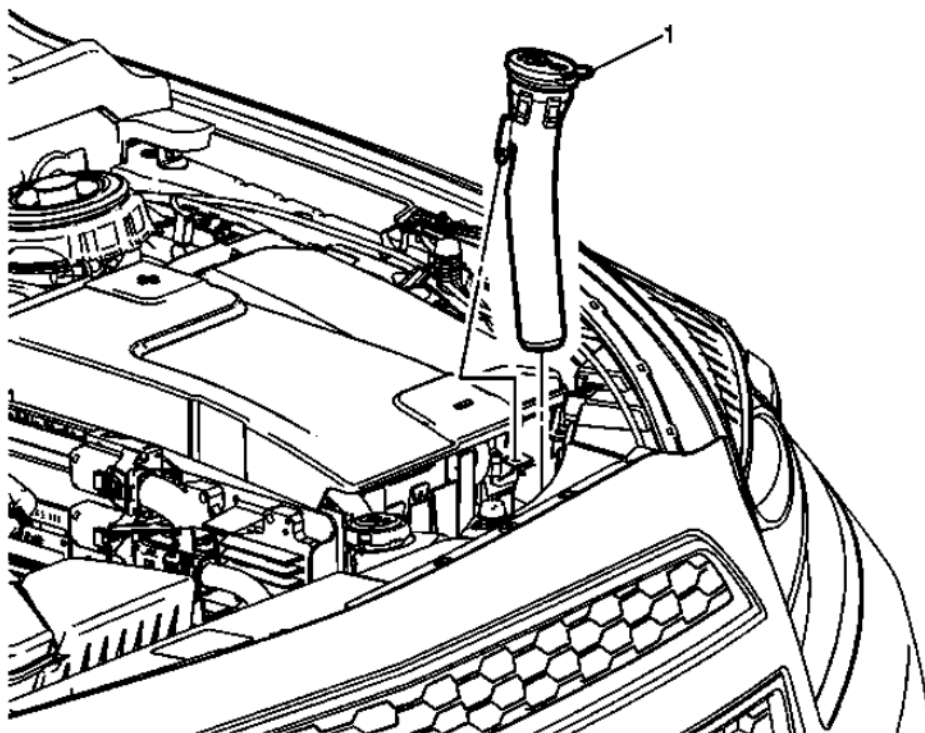


Fig. 5: Windshield Washer Solvent Container Filler Tube
 Courtesy of GENERAL MOTORS COMPANY

Windshield Washer Solvent Container Filler Tube Replacement

Callout	Component Name
1	Windshield Washer Solvent Container Filler Tube Procedure Pull upward on the solvent container filler tube in order to disconnect the filler tube from the windshield washer solvent container grommet.

WINDSHIELD WASHER SOLVENT CONTAINER REPLACEMENT

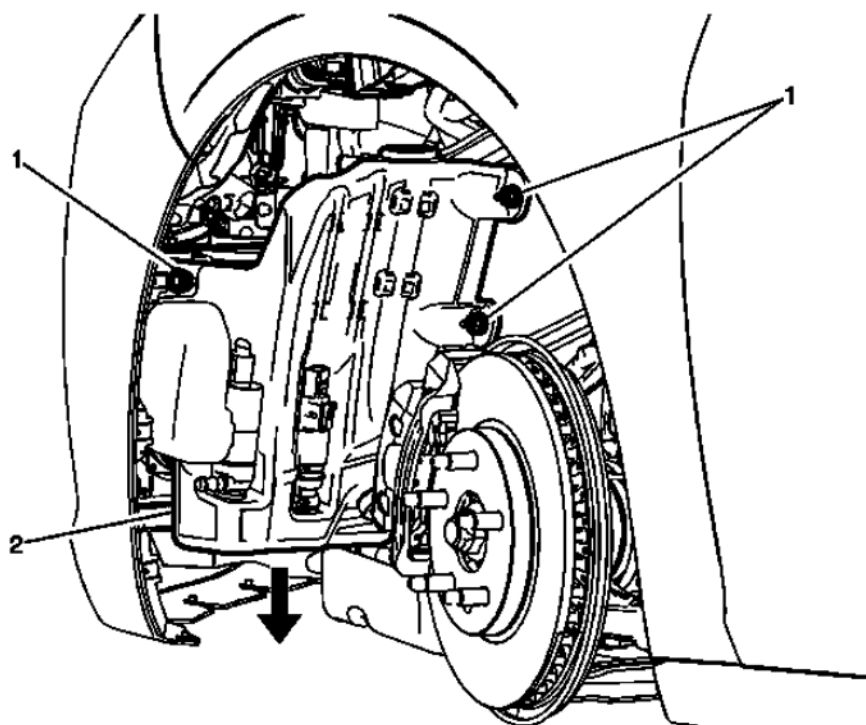


Fig. 6: Windshield Washer Solvent Container
 Courtesy of GENERAL MOTORS COMPANY

Windshield Washer Solvent Container Replacement

Callout	Component Name
Preliminary Procedures 1. Remove the front left front wheelhouse liner. Refer to <u>Front Wheelhouse Front Liner Replacement (Left Side)</u> , <u>Front Wheelhouse Front Liner Replacement (Right Side)</u> . 2. Remove the windshield washer solvent container filler tube. Refer to <u>Windshield Washer Solvent Container Filler Tube Replacement</u>. 3. Place a clean suitable drain pan under the windshield washer pump area to recover the windshield washer solvent when the windshield and headlamp washer hose is disconnected. 4. Disconnect the windshield and headlamp washer hose from the windshield washer solvent container. 5. Disconnect all electrical connector from the windshield and headlamp washer pumps.	
1	Windshield Washer Solvent Container Nut (Qty: 3) CAUTION: Refer to <u>Fastener Caution</u> . Tighten 9 N.m (80 lb in)

	Windshield Washer Solvent Container
	Procedure
2	1. Remove the windshield washer solvent container from the three studs on the front compartment front outer side rail. 2. Empty the windshield washer solvent into a suitable clean container. 3. Transfer parts as needed.

WINDSHIELD WASHER PUMP REPLACEMENT

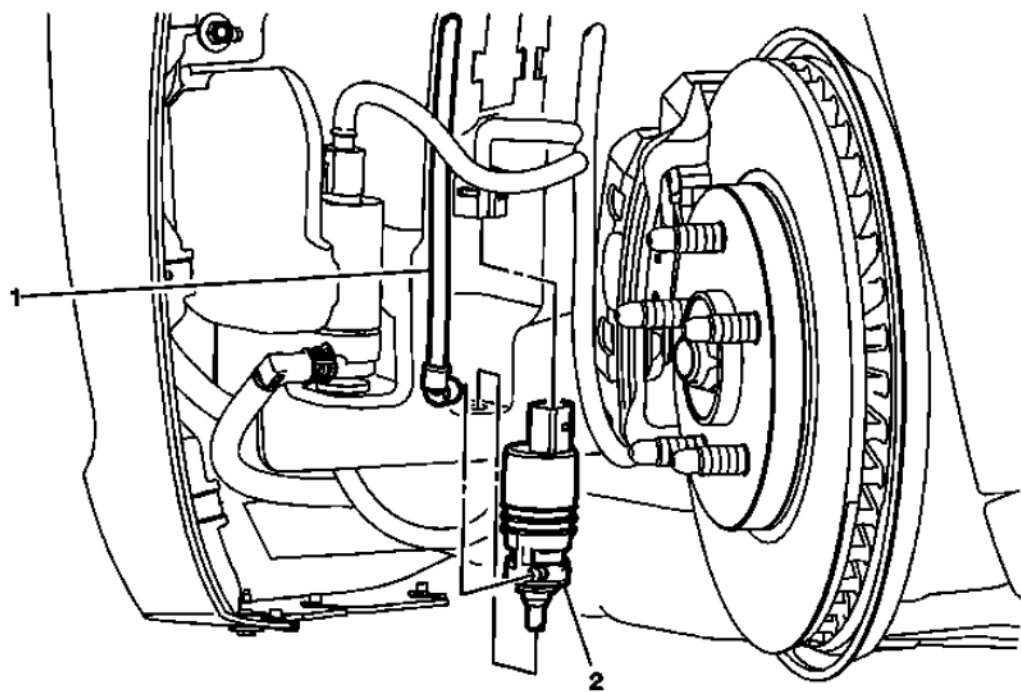


Fig. 7: Windshield Washer Pump
 Courtesy of GENERAL MOTORS COMPANY

Windshield Washer Pump Replacement

Callout	Component Name
Preliminary Procedure Remove the front left front wheelhouse liner. Refer to Front Wheelhouse Front Liner Replacement (Left Side) , Front Wheelhouse Front Liner Replacement (Right Side) .	
1	Windshield Washer Pump Hose Procedure 1. Place a clean suitable drain pan under the windshield washer pump

	container area to recover the windshield washer solvent when the windshield washer pump hose is disconnected. 2. Disconnect the windshield washer pump hose.
2	Windshield Washer Pump Procedure 1. Disconnect the electrical connector from the windshield washer pump. 2. Using two flat-bladed tools, place the blades under the windshield washer pump seal on each side of washer pump. 3. Twist the two flat-bladed tools in opposite directions to lift and disengage the washer pump from the windshield washer solvent container. 4. Remove and discard the windshield washer pump seal and replace with NEW.

WINDSHIELD WASHER SOLVENT LEVEL SENSOR REPLACEMENT

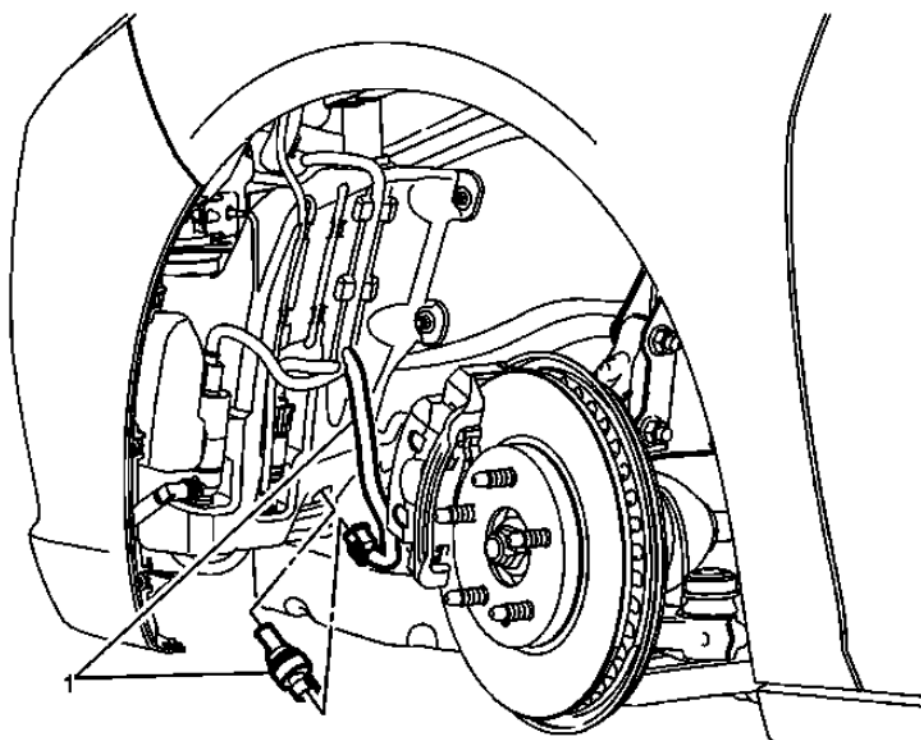


Fig. 8: Windshield Washer Solvent Level Sensor
 Courtesy of GENERAL MOTORS COMPANY

Windshield Washer Solvent Level Sensor Replacement

Callout	Component Name

Preliminary Procedures

1. Remove the left front wheelhouse front liner. Refer to **Front Wheelhouse Front Liner Replacement (Left Side)** , **Front Wheelhouse Front Liner Replacement (Right Side)** .
2. Disconnect the electrical connector from the windshield washer solvent level sensor.
3. Place a clean suitable drain pan under the windshield washer solvent container to secure the windshield washer solvent when the level sensor and seal are removed.

Windshield Washer Solvent Level Sensor

Procedure

1

1. Using two flat-bladed tools, place the ends of the flat blades under each side of the windshield washer solvent level sensor seal.
2. Twisting in opposite directions, pry outward, the level sensor from the washer solvent container.
3. Remove and discard the windshield washer level sensor grommet.

AIR INLET GRILLE PANEL REPLACEMENT

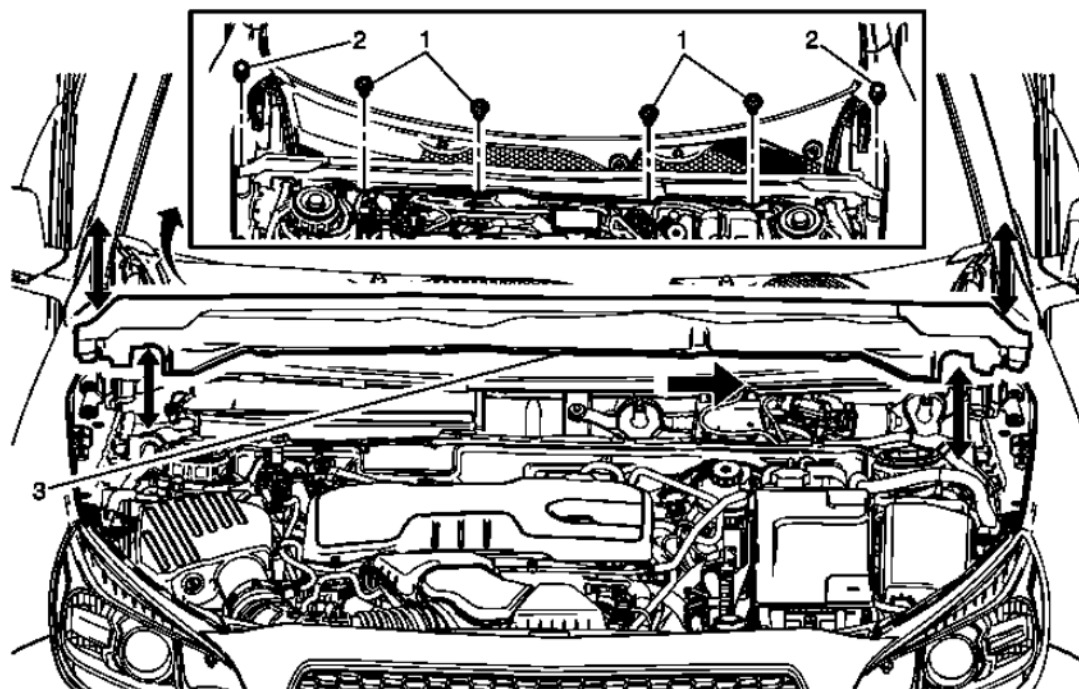


Fig. 9: Air Inlet Grille Panel

Courtesy of GENERAL MOTORS COMPANY

Air Inlet Grille Panel Replacement

Callout	Component Name
Preliminary Procedure 1. Remove both wiper arm assemblies. Refer to <u>Windshield Wiper Arm Replacement</u>. 2. Remove the air inlet grille panel extensions. Refer to <u>Air Inlet Grille Panel Extension Replacement</u>	
1	Air Inlet Panel Screw (Qty: 4) CAUTION: Refer to <u>Fastener Caution</u> . Tighten 2.5 N.m (22 lb in)
2	Air Inlet Grille Panel Push-In Retainer (Qty: 2)
3	Air Inlet Grille Panel Procedure 1. Lift the front edge of the grille panel up. 2. Use a suitable plastic tool to release the air inlet grille panel from the windshield. 3. Slide the air inlet grille panel forward from both hood hinges. 4. Disconnect the windshield wiper hose from the air inlet grille panel. 5. Remove the air inlet grille panel from the vehicle. 6. Ensure all foam seals are in place.

AIR INLET GRILLE PANEL EXTENSION REPLACEMENT

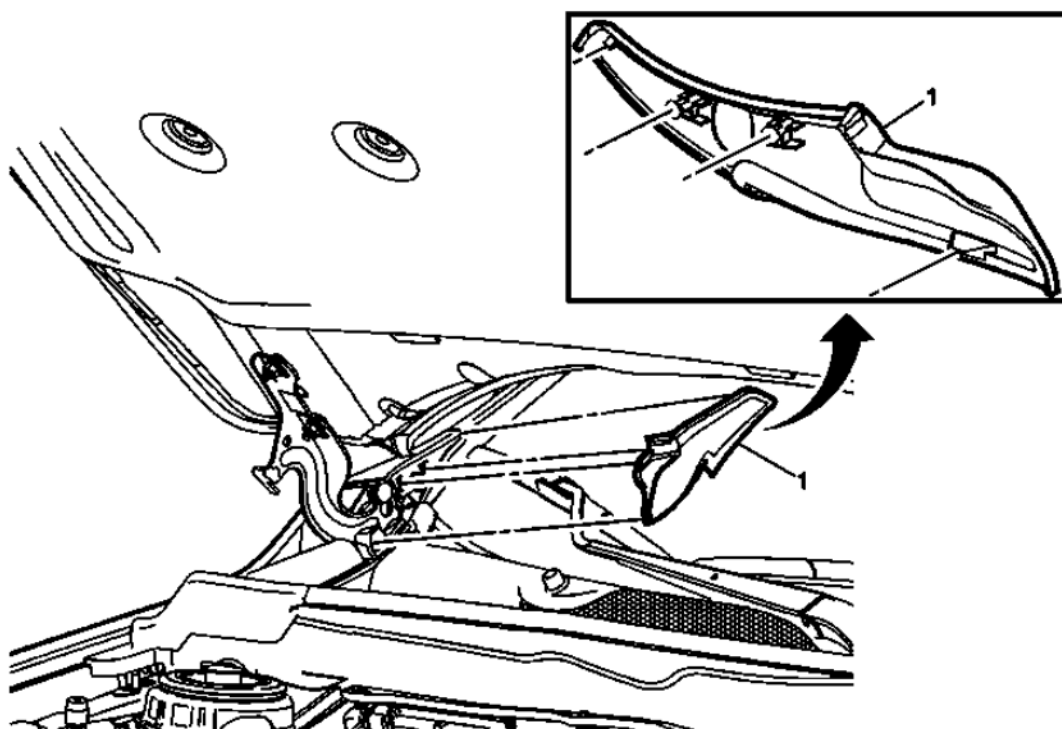


Fig. 10: Air Inlet Grille Panel Extension
 Courtesy of GENERAL MOTORS COMPANY

Air Inlet Grille Panel Extension Replacement

Callout	Component Name
1	Air Inlet Grille Panel Extension Procedure Grasp the grille panel extension and disengage the retainers from the rear edge of the fender and rear edge of the air inlet panel.

AIR INLET GRILLE PANEL WATER DEFLECTOR REPLACEMENT

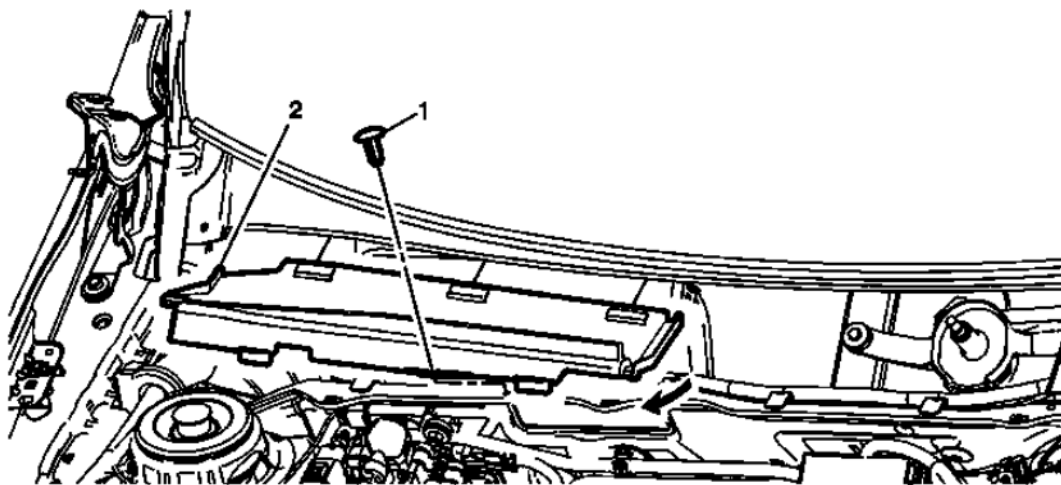


Fig. 11: Air Inlet Grille Panel Water Deflector
 Courtesy of GENERAL MOTORS COMPANY

Air Inlet Grille Panel Water Deflector Replacement

Callout	Component Name
Preliminary Procedure Remove the air inlet grille panel assembly. Refer to <u>Air Inlet Grille Panel Replacement</u> .	
1	Air Inlet Grille Water Deflector Push-In Retainer
2	Air Inlet Grille Water Deflector Procedure Release the integral clips and remove the water deflector from the dash panel plenum rotating up and out.

WINDSHIELD WIPER ARM REPLACEMENT

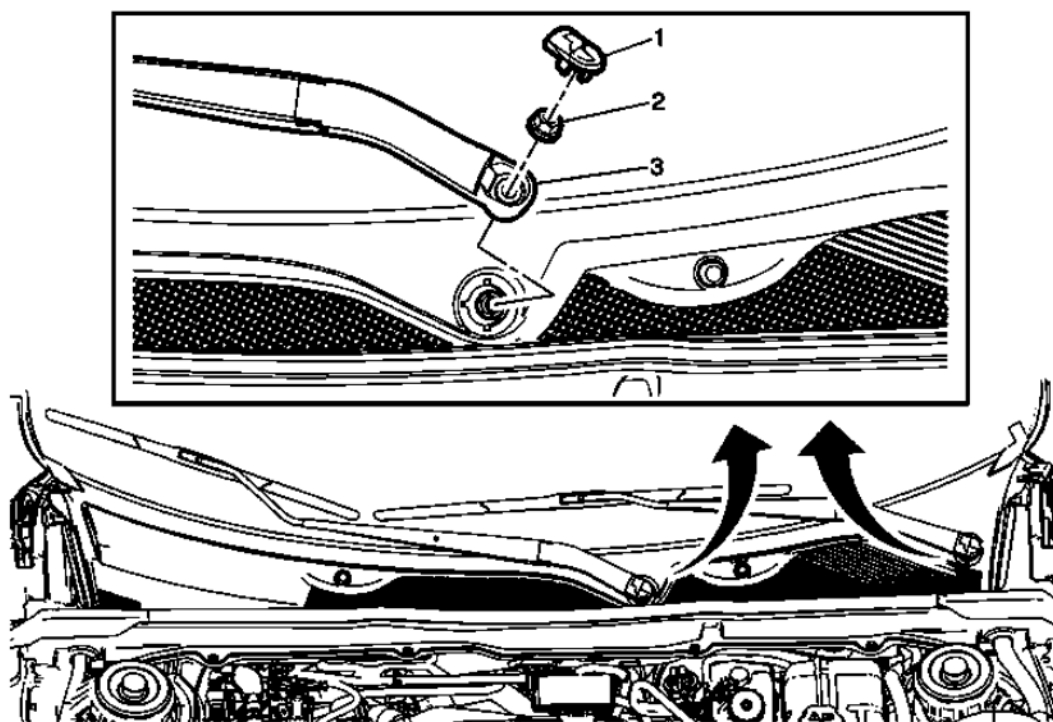


Fig. 12: Windshield Wiper Arm
 Courtesy of GENERAL MOTORS COMPANY

Windshield Wiper Arm Replacement

Callout	Component Name
1	Windshield Wiper Arm Nut Cap NOTE: Use a small flat-bladed tool to release the finish cap from the windshield wiper arm.
2	Windshield Wiper Arm Nut CAUTION: Refer to <u>Fastener Caution</u> . Tighten 38 N.m (27 lb ft)
3	Windshield Wiper Arm Procedure 1. Gently rock the windshield wiper arm to remove from the windshield wiper system module pivot shaft. 2. Remove the windshield wiper arm from the pivot shaft.

3. Clean the pivot shaft knurls with a soft wire brush before installing a new windshield wiper arm.
4. If needed adjust the windshield wiper arms. Refer to **Windshield Wiper Arm Adjustment**.

WINDSHIELD WIPER BLADE REPLACEMENT

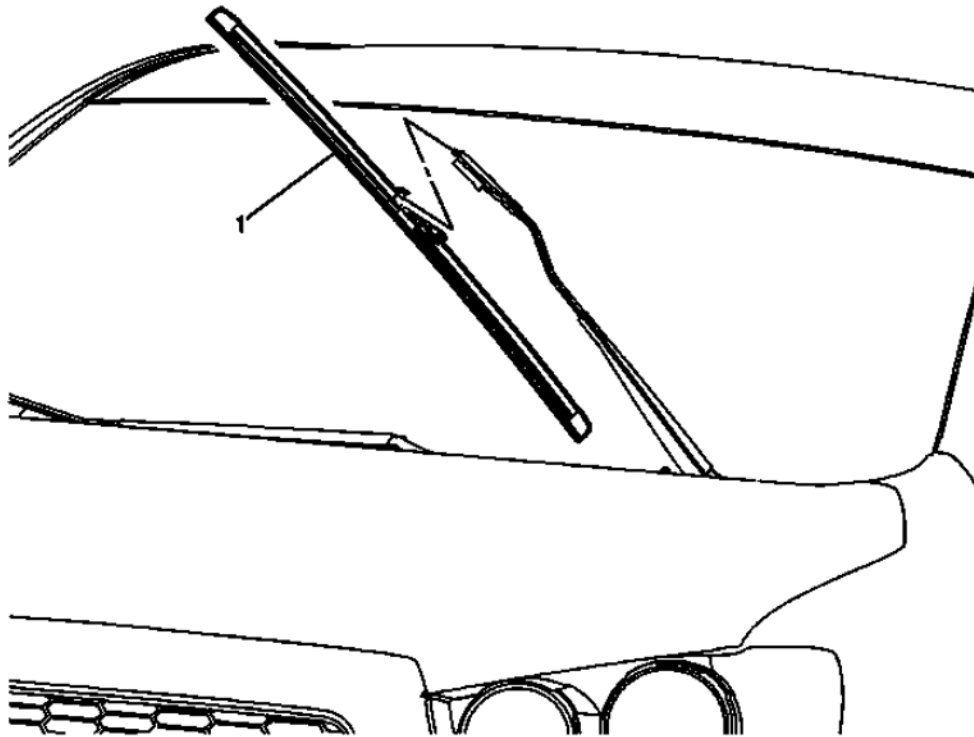


Fig. 13: Windshield Wiper Blade
Courtesy of GENERAL MOTORS COMPANY

Windshield Wiper Blade Replacement

Callout	Component Name
1	Windshield Wiper Blade Assembly Procedure 1. Reposition and hold the wiper arm off the windshield to perform the wiper blade replacement. 2. Open the cover. 3. Detach the wiper blade from the hook end of the windshield wiper arm. 4. Install the new wiper blade to the hook end of the windshield wiper arm. 5. Close the cover.

6. Carefully reposition the wiper arm onto the windshield.
7. Inspect the wiper arm for proper operation.

WINDSHIELD WIPER MOTOR REPLACEMENT

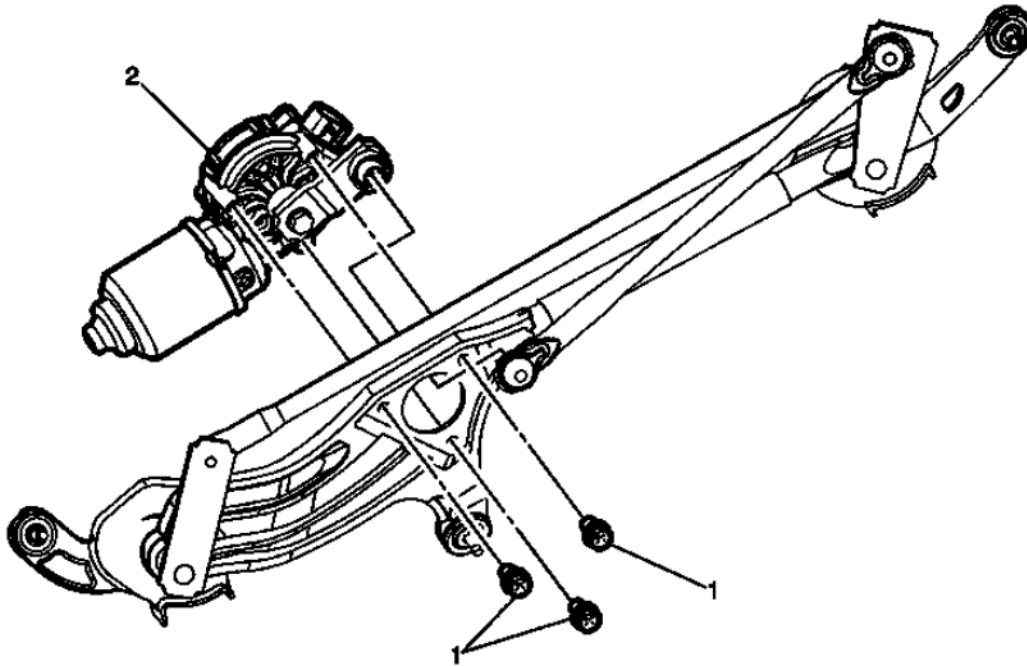


Fig. 14: Windshield Wiper Motor
Courtesy of GENERAL MOTORS COMPANY

Windshield Wiper Motor Replacement

Callout	Component Name
Preliminary Procedure Remove the windshield wiper system module. Refer to Windshield Wiper System Module Replacement .	
1	Windshield Wiper Motor Bolt (Qty: 3) Tighten 8.5 N.m (75 lb in)
	Windshield Wiper Motor Procedure 1. Using the J-39232 separator or similar tool, remove the windshield wiper transmission drive link from the wiper motor crank arm ball stud. 2. Using the J-39529 installer or similar tool, install the windshield

2	wiper transmission drive link onto the wiper motor crank arm ball stud. NOTE: Apply a small amount of grease to the inner cup on the transmission links to aid in installation. Special Tools • J-39232 Wiper Linkage Separator • J-39529 Wiper Linkage Installer For equivalent regional tools, refer to Special Tools.
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WINDSHIELD WIPER SYSTEM MODULE REPLACEMENT

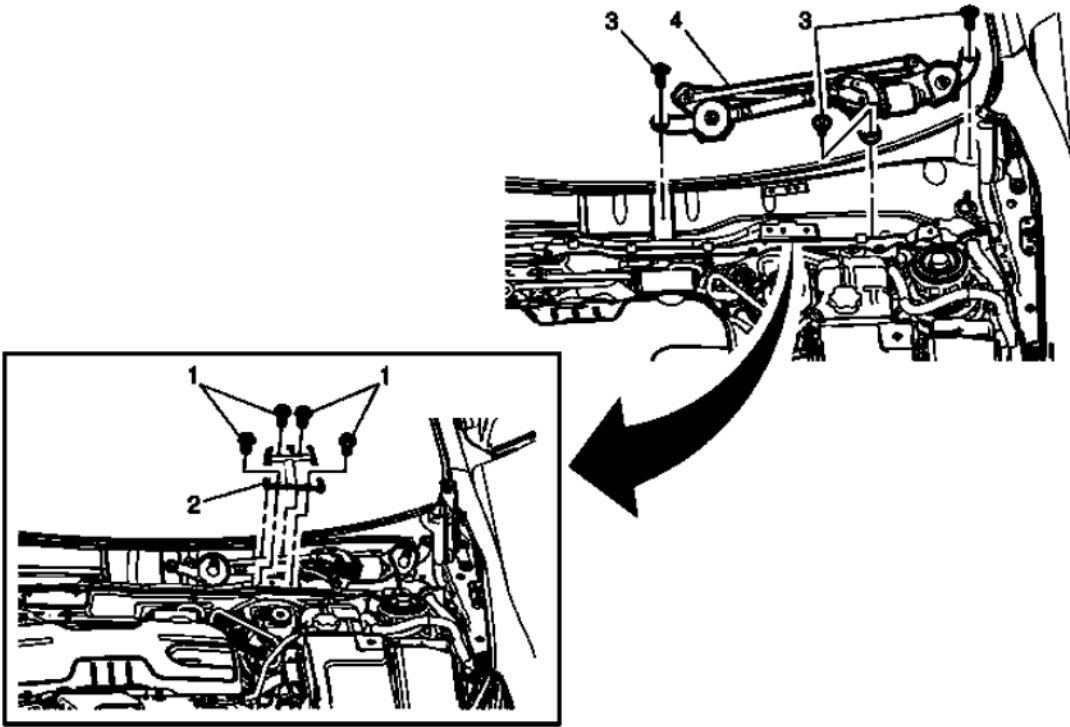


Fig. 15: Windshield Wiper System Module
Courtesy of GENERAL MOTORS COMPANY

Windshield Wiper System Module Replacement

Callout	Component Name
Preliminary Procedures 1. Remove the air inlet grille panel. Refer to Air Inlet Grille Panel Replacement.	

2. Disconnect and reposition the electrical connector and harness from the windshield wiper motor and module.

1	Dash Panel Brace Bolt (Qty: 4) CAUTION: Refer to <u>Fastener Caution</u> . Tighten 9 N.m (79 lb in)
2	Dash Panel Brace
3	Windshield Wiper System Module Bolt (Qty: 3) Tighten 8 N.m (70 lb in)
4	Windshield Wiper System Module

WINDSHIELD GLASS CLEANING

Clean the windshield with windshield cleaner, or equivalent. The cleaner should not harm the paint finish or scratch the glass. The glass is clean when the water no longer beads, but sheets across the entire glass surface.

WIPER BLADE ELEMENT CLEANING

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

- Clean the windshield glass. Refer to **Windshield Glass Cleaning**.
- Clean the wiper blade elements. Refer to **Wiper Blade Element Cleaning**.
- Inspect the wiper blade element set.

WINDSHIELD WIPER ARM ADJUSTMENT

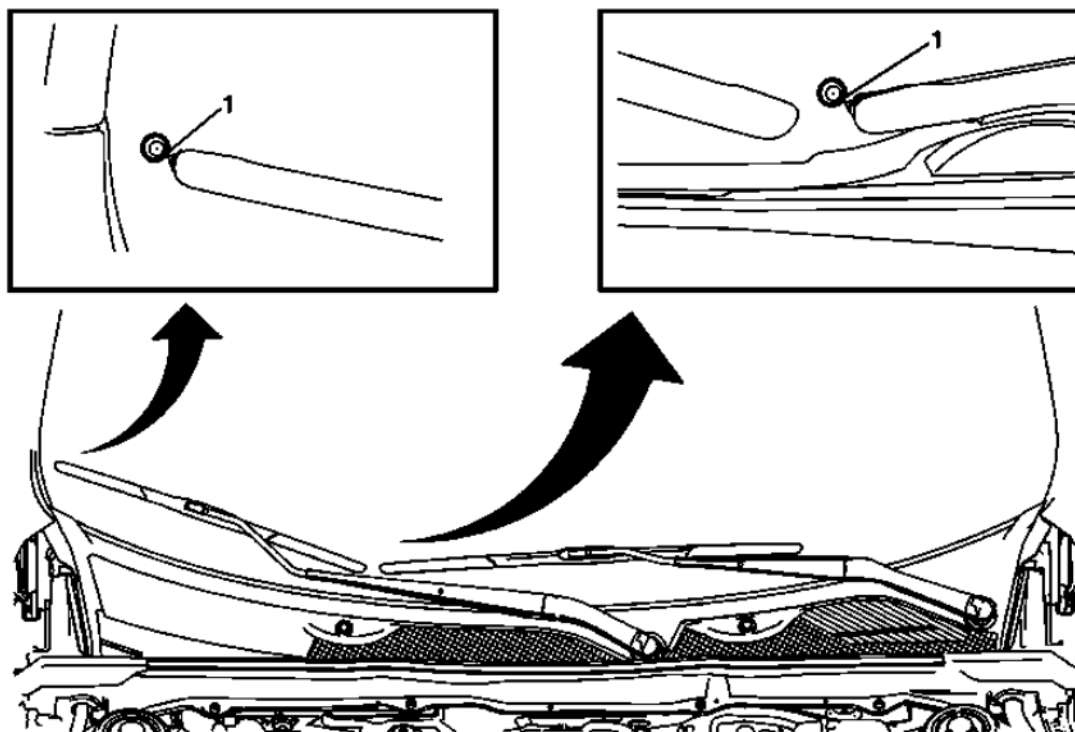


Fig. 16: Windshield Wiper Arm
 Courtesy of GENERAL MOTORS COMPANY

Windshield Wiper Arm Adjustment

Callout	Component Name
1	Windshield Wiper Arm Procedure 1. Lubricate the windshield with washer fluid. 2. Run the wipers and turn off the wipers. 3. Ensure the wipers are in the full park position. 4. Inspect the wipers for proper position to the circle on the windshield. 5. Realign the wiper arm to the circle if required. Refer to <u>Windshield Wiper Arm Replacement</u>.

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 module

Windshield Wiper System

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

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

The BCM controls front wiper motor operation through two output signals and the monitoring of one input signal. The two outputs (one high side drive, one low side drive) are used to control two external wiper motor relays: front wiper motor on/off relay: which provides the wiper motor with battery power when it is activated by the high side drive signal (switched battery) from the BCM. When left deactivated, the normally closed contacts provide a ground to the wiper motor. Wiper high/low speed relay: when activated by a low side drive signal (ground) from the BCM, it switches the power supplied by the wiper motor's on/off relay to the 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.

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

Windshield Washer System

The BCM controls the windshield wash operation and windshield wash activated wiper operation. When the BCM detects the activation of the momentary windshield wash control switch, it activates its washer pump relay drive output which supplies battery power to the coil of the washer pump relay. This energizes the relay, which switches battery power to the pump motor. The BCM will also activate continuous low speed windshield wiper 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.

Moisture Sensitive Wipers

The outside moisture sensor monitors moisture accumulation on the windshield and uses a windshield wiper/washer switch status input to provide wipe commands to the body control module (BCM). The DELAY positions on the wiper/washer switch are used to activate the AUTOMATIC rain sensing operating mode. They are also used to adjust the level of sensitivity to moisture accumulation, which determines the dwell time for commanding a wiper motor wipe cycle.

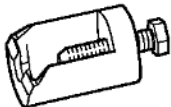
Accessory voltage is supplied to the outside moisture sensor through the 10A RAP Fuse, located in the rear fuse block. The sensor is grounded through the ground circuit and G402. Whenever the ignition is in the run or accessory positions, the BCM sends the wiper/washer switch status using a pulse width modulation (PWM) signal through the outside moisture sensor signal 1 circuit to the outside moisture sensor. When a wipe cycle is needed, the moisture sensor sends a PWM voltage signal through the moisture sensor signal 2 circuit back to the BCM requesting the wiper operation.

The outside moisture sensor uses the moisture sensor signal 2 circuit to command wiper motor wipe cycles and to confirm the moisture sensor signal 1 is being received. If at anytime communication between the outside moisture sensor and BCM is lost, the BCM will use the inputs from the windshield wiper/washer switch in the delay positions to operate the wiper motor at continuous variable delay intervals.

SPECIAL TOOLS AND EQUIPMENT

SPECIAL TOOLS

Illustration	Tool Number/Description
	BO-6626

	KM-6626 Wiper Arm Puller
	J 39232 Wiper Linkage Separator
	J 39529 Wiper Linkage Installer