

2006 ACCESSORIES & EQUIPMENT

Wipers/Washer Systems - Impala

SPECIFICATIONS

FASTENER TIGHTENING SPECIFICATIONS

Fastener Tightening Specifications

Application	Specification	
	Metric	English
Washer Solvent Container Nuts	10 N.m	89 lb in
Wiper Arm Nut	35 N.m	25 lb ft
Wiper Module Bolts	10 N.m	89 lb in
Wiper Motor Bolts	4.5 N.m	40 lb in
Wiper Motor Support Bracket Screws	5.5 N.m	49 lb in

SCHEMATIC AND ROUTING DIAGRAMS

WIPER/WASHER SYSTEM SCHEMATICS

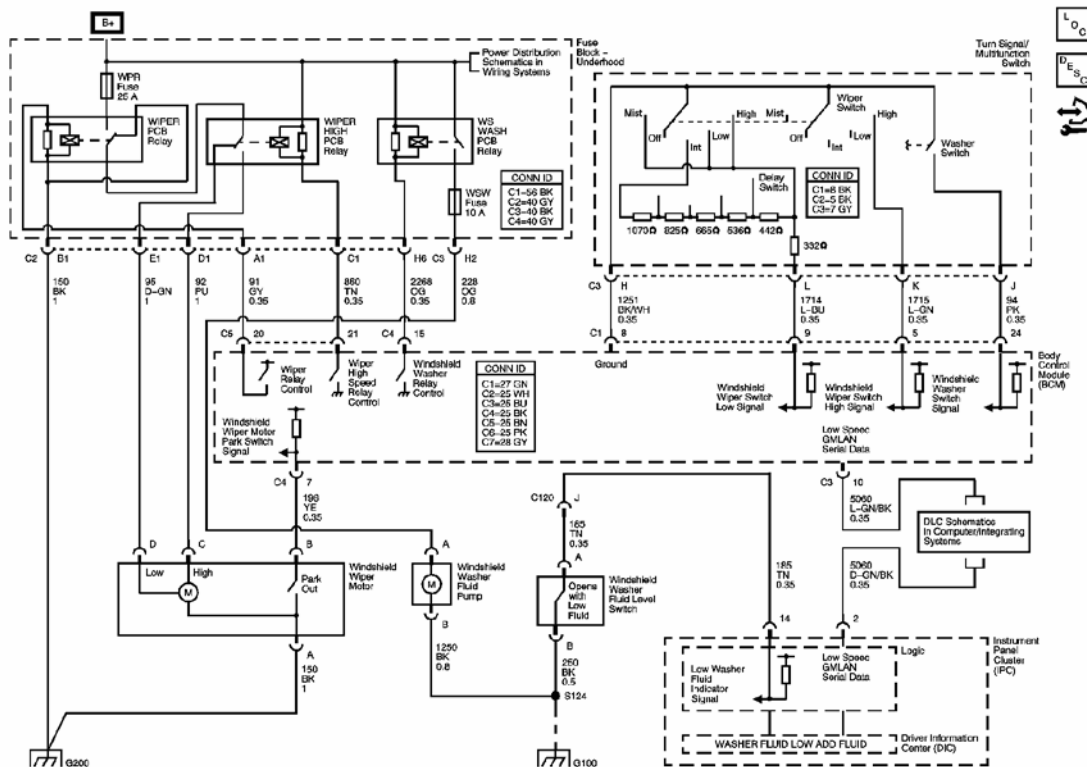


Fig. 1: Wiper/Washer System Schematics - Wiring Diagram
 Courtesy of GENERAL MOTORS CORP.

COMPONENT LOCATOR

WIPER/WASHER SYSTEM COMPONENT VIEWS

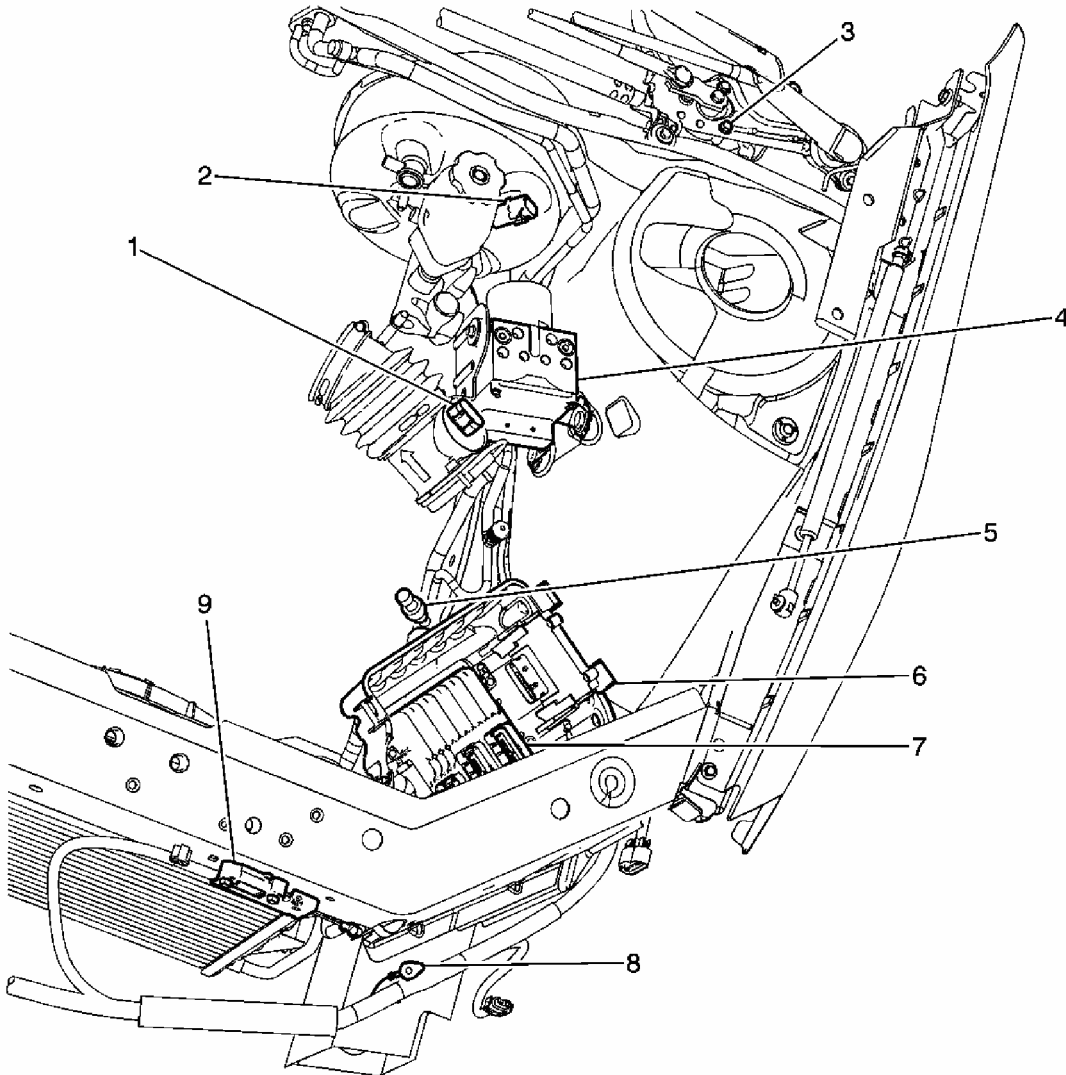


Fig. 2: LF of the Engine Compartment
 Courtesy of GENERAL MOTORS CORP.

Callouts For Fig. 2

Callout	Component Name
1	Mass Air Flow (MAF) / Intake Air Temperature (IAT) Sensor
2	Brake Fluid Level Switch
3	Windshield Wiper Motor
4	Electronic Brake Control Module (EBCM)
5	A/C Refrigerant Pressure Sensor

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6	Transmission Control Module (TCM)
7	Engine Control Module (ECM)
8	G101
9	Inflatable Restraint Front end Sensor - Left

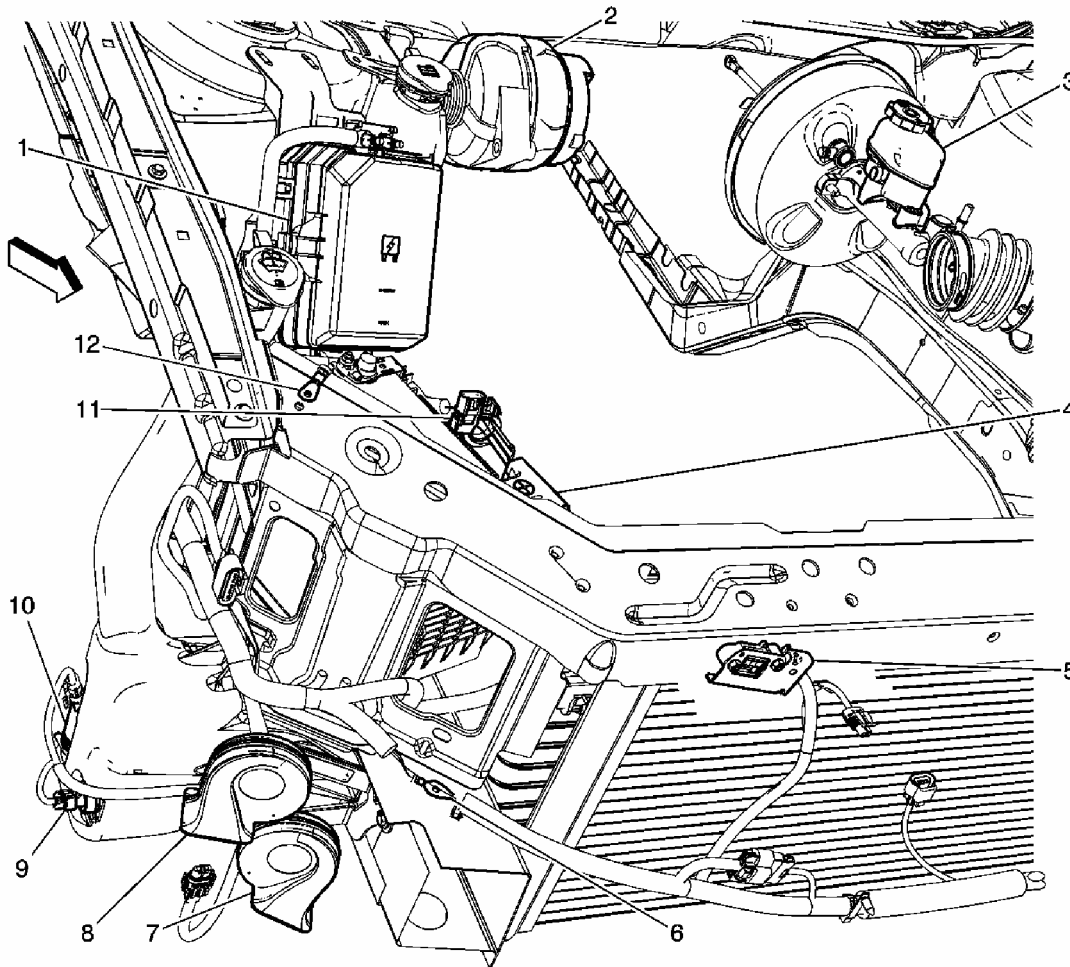


Fig. 3: RF of the Engine Compartment
Courtesy of GENERAL MOTORS CORP.

Callouts For Fig. 3

Callout	Component Name
1	Fuse Block - Underhood
2	Generator
3	Brake Fluid Level Switch
4	Battery
5	Inflatable Restraint Front end Sensor - Right
6	G100

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7	Horn Assembly
8	Windshield Washer Fluid Container
9	Windshield Washer Fluid Level Switch
10	Windshield Washer Fluid Pump
11	Battery Current Sensor
12	G102

WIPER/WASHER SYSTEM CONNECTOR END VIEWS

Windshield Washer Fluid Level Switch

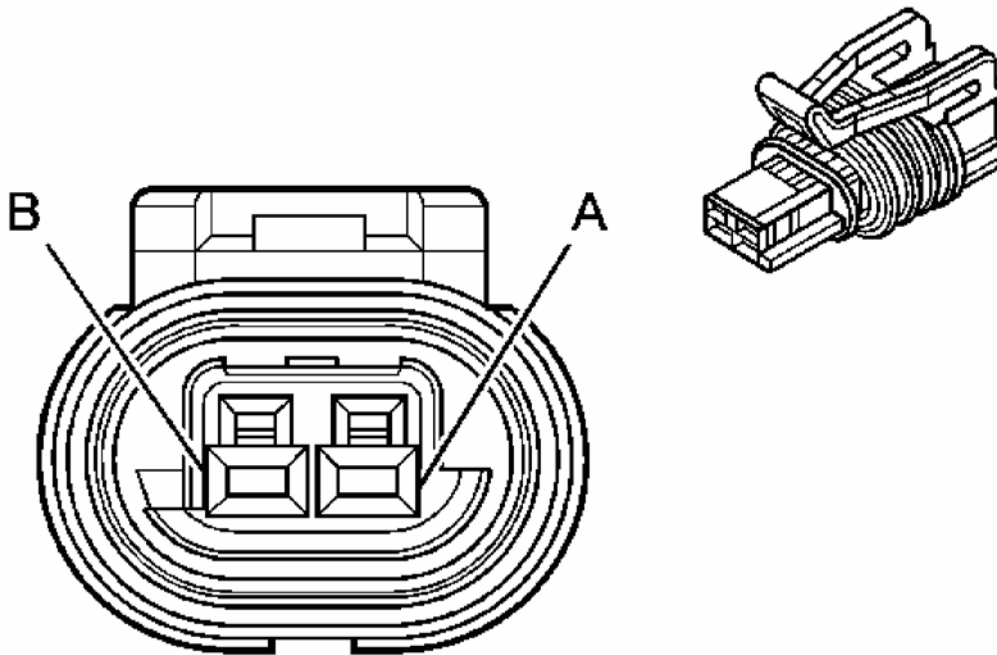


Fig. 4: Windshield Washer Fluid Level Switch End View
Courtesy of GENERAL MOTORS CORP.

Wiper/Washer System Connector End Views

Connector Part Information

- OEM: 15449028
- Service: 88987978
- Description: 2-Way F GT 150 Sealed (BK)

Terminal Part Information

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- Pins: A, B
- Terminal/Tray: 15326267/19
- Core/Insulation Crimp: Pins A - See Terminal Repair Kit
- Core/Insulation Crimp: Pins B - E/4
- Release Tool/Test Probe: 15315247/J-35616-2A (GY)

Windshield Washer Fluid Level Switch

Pin	Wire Color	Circuit No.	Function
A	TN	185	Low Washer Fluid Indicator Control
B	BK	1250	Ground

Windshield Washer Fluid Pump

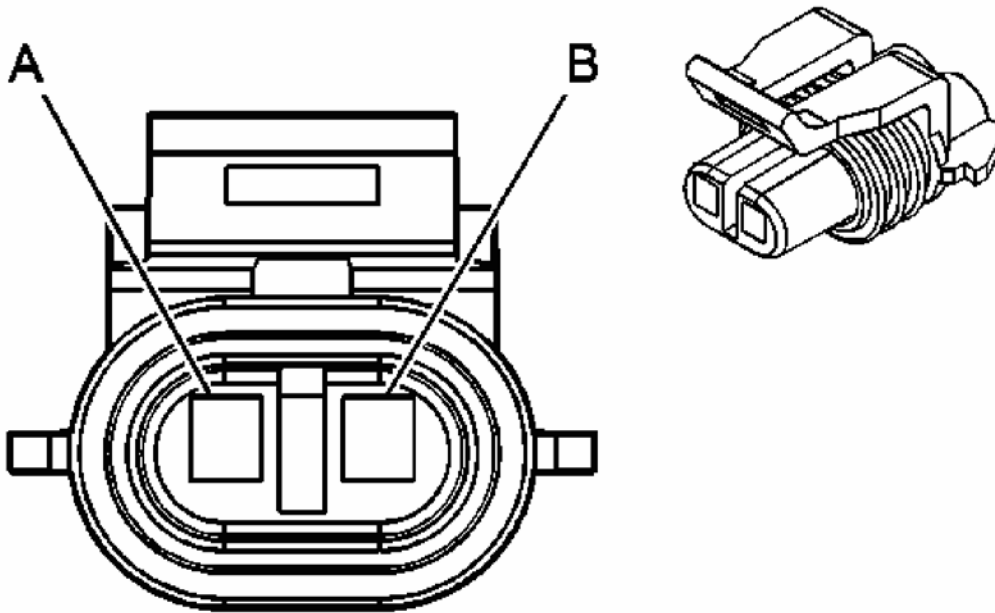


Fig. 5: Connector End Views

Courtesy of GENERAL MOTORS CORP.

Wiper/Washer System Connector End Views

Connector Part Information

- OEM: 12052641
- Service: 12102747

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- Description: 2-Way F Metri-Pack 150 Sealed (BK)

Terminal Part Information

- Terminal/Tray: 12048074/2
- Core/Insulation Crimp: E/1
- Release Tool/Test Probe: 12094429/J-35616-2A (GY)

Windshield Washer Fluid Pump

Pin	Wire Color	Circuit No.	Function
A	OG	228	Windshield Washer Pump Control
B	BK	1250	Ground

Windshield Wiper Motor

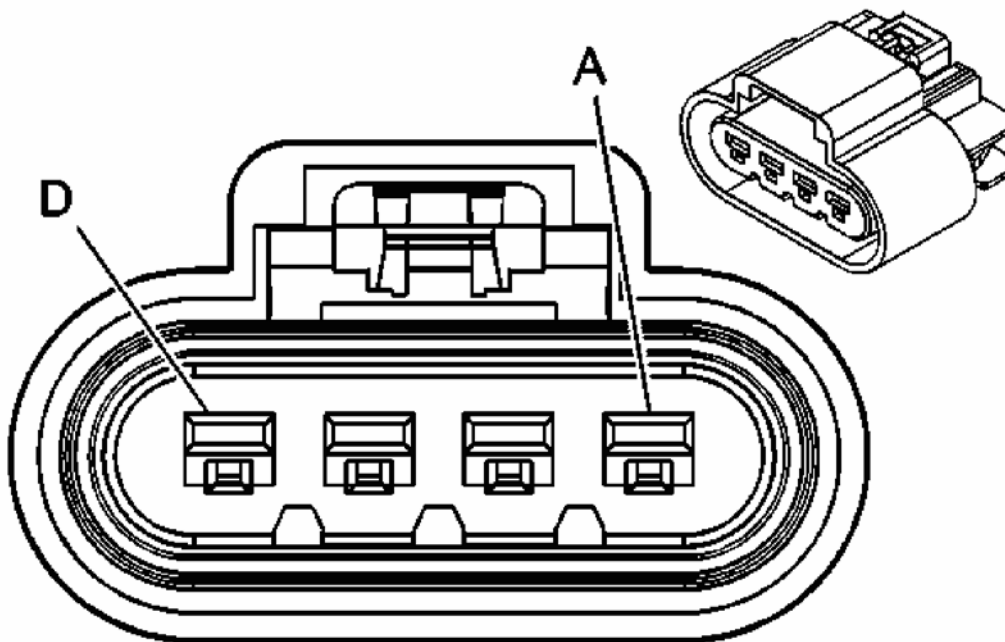


Fig. 6: Windshield Wiper Motor Connector End View
Courtesy of GENERAL MOTORS CORP.

Wiper/Washer System Connector End Views

Connector Part Information

- OEM: 15326631

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- Service: 15306360
- Description: 4-Way F GT 280 Sealed (BK)

Terminal Part Information

- Pins: A, C, D, B
- Terminal/Tray: 15304719/19
- Core/Insulation Crimp: Pins A, C, D - See Terminal Repair Kit
- Core/Insulation Crimp: Pins B - E/5
- Release Tool/Test Probe: 15315247/J-35616-4A (PU)

Windshield Wiper Motor

Pin	Wire Color	Circuit No.	Function
A	BK	150	Ground
B	YE	196	Windshield Wiper Motor Park Switch Signal
C	PU	92	Windshield Wiper Motor High Speed Control
D	D-GN	95	Windshield Washer Switch Signal

DIAGNOSTIC INFORMATION AND PROCEDURES

DIAGNOSTIC CODE INDEX

DIAGNOSTIC CODE INDEX

DTC	Description
DTC B3715	Front Wiper Relay Drive Circuit
DTC B3873	Front Washer Relay Circuit
DTC B3875	Wiper High Speed Relay Circuit
DTC B3922	Front Wiper Function Select Circuit

DIAGNOSTIC STARTING POINT - WIPER/WASHER SYSTEMS

Begin diagnosis with the **Diagnostic System Check - Vehicle** in Vehicle DTC Information. The Diagnostic System Check will provide the following information:

- The identification of the control modules which command the system
- The ability of the control modules to communicate through the serial data circuit
- The identification of any stored diagnostic trouble codes (DTCs) and their status

The use of the Diagnostic System Check will identify the correct procedure for diagnosing the system and where the procedure is located.

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SCAN TOOL OUTPUT CONTROLS

Scan Tool Output Controls

Scan Tool Output Control	Additional Menu Selection	Description
Wiper Motor Relay	Miscellaneous Test	This output control commands the wiper 1 relay On and Off. The wiper motor will operate at Low speed when the wiper 1 relay is On.
Wiper Motor Low/Hi Speed Relay	Miscellaneous Test	This output control commands the wiper Hi relay On or Off.

SCAN TOOL DATA LIST

Scan Tool Data List

Scan Tool Parameter	Data List	Units Displayed	Typical Data Value
Ignition On/Engine Off			
Low Washer Fluid	Inputs	Low/OK	OK
Wiper High Speed Switch	Inputs	On/Off	Off
Wiper Motor Low/Hi Speed Relay	Outputs	On/Off	Off
Wiper Motor Park Switch	Inputs	Active/Inactive	Active
Wiper Motor Relay	Outputs	On/Off	Off
Wiper Washer Motor	Outputs	On/Off	Off
Wiper Washer Switch	Inputs	Active/Inactive	Off

SCAN TOOL DATA DEFINITIONS

Use the scan tool data display values and definitions information in order to assist in diagnosing vehicle malfunctions. Compare the vehicles actual scan tool data display with the typical data value in the table. Use the data in order to aid in understanding the nature of the concern when the vehicle data display does not match the typical data values. Refer to **Scan Tool Data List**.

The typical scan tool data values were taken from a known good vehicle under the following conditions:

- The ignition switch is in the ON position.
- The windshield wiper/washer switch is OFF.

Low Washer Fluid

This input displays the washer fluid level. Low is displayed when the level is Low and OK is displayed if it is above the switch threshold.

Wiper High Speed Switch

This input displays On if the wiper washer switch is in the Hi position.

Wiper Motor Low/Hi Speed Relay

This output displays the state of the wiper Hi relay. On is wipers Hi speed and Off is wipers Low speed.

Wiper Motor Park Switch

The body control module (BCM) uses this input to determine if the wipers are approaching the park position. The scan tool displays Active when the BCM detects ground on the windshield wiper motor park switch signal circuit.

Wiper Motor Relay

This output displays whether or not the BCM is providing voltage for the wiper relay. ON is displayed when the BCM detects the correct signal from the windshield wiper switch.

Wiper Washer Motor

This output displays the operation mode of the washer pump.

Wiper Washer Switch

The BCM uses this input to determine if the wash switch is depressed. If it is depressed, the BCM commands the wiper 1 relay ON and keeps it ON until 2 wipe cycles have completed after the switch has been released.

DTC B3715

Circuit Description

The body control module (BCM) monitors the control circuit of the wiper ON/OFF relay. The voltage level should be low while the wiper relay is de-energized and near system voltage when the relay is energized. After the BCM receives a low, intermittent, or mist signal from the wiper/washer switch, it responds by applying battery voltage through the wiper relay control circuit to the coil side of the relay, energizing the WIPER relay. Ground is supplied at all times to the coil side of the WIPER relay from G104.

DTC Descriptor

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This diagnostic procedure supports the following DTC:

DTC B3715

Front Wiper Relay Drive Circuit

Conditions for Running the DTC

This DTC can set only when the output is actively being requested by the CPU.

Conditions for Setting the DTC

If the BCM detects a short to ground or an open in the WIPER relay control circuit.

Action Taken When the DTC Sets

The BCM will not activate the output.

Conditions for Clearing the DTC

- The current DTC will become history when the request for the output is removed or when the condition for setting the fault is corrected.
- The history DTC will clear after 50 consecutive ignition cycles without a fault present.

Test Description

The numbers below refer to the step numbers on the diagnostic table.

3: This step tests for constant voltage in the control circuit of the wiper relay.

4: This step verifies that the BCM is applying voltage through the control circuit to the wiper relay.

5: This step tests for an open in the ground circuit of the wiper relay.

DTC B3715

Step	Action	Yes	No
Schematic Reference: Wiper/Washer System Schematics			
Connector End View Reference: Wiper/Washer System Connector End Views			
1	Did you perform the Diagnostic System Check - Vehicle?	Go to Step 2	Go to Diagnostic System Check - Vehicle in Vehicle DTC Information
	1. Turn ON the ignition.	Go to Testing for Intermittent	

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2	2. Turn the wiper switch to LOW. Do the low speed wipers operate?	Conditions and Poor Connections in Wiring Systems	Go to Step 3
3	1. Turn OFF the ignition. 2. Remove the WIPER relay. Refer to <u>Relay Replacement (Within an Electrical Center)</u> or <u>Relay Replacement (Attached to Wire Harness)</u> . 3. Turn ON the ignition, with the engine OFF. 4. Turn the wiper switch to the OFF position. 5. Connect a test lamp from the control circuit of the wiper relay socket to a good ground. Does the test lamp illuminate?	Go to Step 7	Go to Step 4
4	With the test lamp still connected to the control circuit of the wiper relay, turn the wiper switch to the low speed position. Does the test lamp illuminate?	Go to Step 5	Go to Step 6
5	1. Connect the test lamp between the control circuit of the wiper relay and the ground circuit of the wiper relay. 2. Turn the wiper switch to the low speed position Does the test lamp illuminate?	Go to Step 8	Go to Step 10
6	Test the control circuit of the wiper relay for a short to ground or an open. Refer to <u>Circuit Testing</u> and <u>Wiring Repairs</u> in Wiring Systems. Did you find and correct the condition?	Go to Step 13	Go to Step 9
7	1. Turn ON the ignition, with the engine OFF. 2. Test the control circuit of the wiper relay for a short to voltage. Refer to <u>Circuit Testing</u> and <u>Wiring Repairs</u> in Wiring Systems.		

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	Did you find and correct the condition?	Go to Step 13	Go to Step 9
8	Inspect for poor connections at the connector of the wiper relay. Refer to Testing for Intermittent Conditions and Poor Connections and Connector Repairs in Wiring Systems. Did you find and correct the condition?	Go to Step 13	Go to Step 11
9	Inspect for poor connections at the harness connector of the body control module (BCM). Refer to Testing for Intermittent Conditions and Poor Connections and Connector Repairs in Wiring Systems. Did you find and correct the condition?	Go to Step 13	Go to Step 12
10	Repair the open in the ground circuit of the wiper relay. Refer to Wiring Repairs in Wiring Systems. Did you complete the repair?	Go to Step 13	-
11	Replace the wiper relay. Refer to Relay Replacement (Within an Electrical Center) or Relay Replacement (Attached to Wire Harness) . Did you complete the replacement?	Go to Step 13	-
12	Replace the BCM. Refer to Control Module References in Computer/Integrating Systems for replacement, setup, and programming. Did you complete the replacement?	Go to Step 13	-
13	1. Use the scan tool in order to clear the DTCs. 2. Operate the vehicle within the Conditions for Running the DTC. Does the DTC reset?	Go to Step 2	System OK

DTC B3873

Circuit Description

The body control module (BCM) monitors the windshield washer pump low reference circuit only when a wash cycle is active. When a wash cycle is requested, the BCM responds by applying a ground through the windshield washer pump low reference circuit to the coil side of the relay, energizing the windshield washer relay.

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DTC Descriptor

This diagnostic procedure supports the following DTC:

DTC B3873

Front Washer Relay Circuit

Conditions for Running the DTC

This DTC can set only when the BCM output to the windshield washer relay is active.

Conditions for Setting the DTC

The BCM detects an short to battery voltage in the windshield washer pump low reference circuit.

Action Taken When the DTC Sets

The BCM will not activate the output to the windshield washer relay.

Conditions for Clearing the DTC

- The current DTC will become history when the request for the output is removed or when condition for setting the fault is corrected.
- The history DTC will clear after 50 consecutive ignition cycles without a fault present.

Test Description

The numbers below refer to the step numbers on the diagnostic table.

3: This step tests for constant ground in the low reference circuit of the wiper relay.

4: This step verifies that the BCM is applying a ground through the low reference circuit to the wiper relay.

5: This step tests for an open in the battery positive voltage circuit of the wiper relay.

DTC B3873

Step	Action	Yes	No
Schematic Reference: Wiper/Washer System Schematics			
Connector End View Reference: Wiper/Washer System Connector End Views			
1	Did you perform the Diagnostic System Check - Vehicle?	Go to Step 2	Go to Diagnostic System Check - Vehicle in Vehicle DTC Information

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2	1. Turn ON the ignition. 2. Press the windshield washer switch. Do the windshield washers operate?	Go to Testing for Intermittent Conditions and Poor Connections in Wiring Systems	Go to Step 3
3	1. Turn OFF the ignition. 2. Remove the windshield washer relay. Refer to Relay Replacement (Within an Electrical Center) or Relay Replacement (Attached to Wire Harness). 3. Turn ON the ignition, with the engine OFF. 4. Turn the wiper switch to the OFF position. 5. Connect a test lamp between the low reference circuit of the windshield washer relay socket and battery voltage. Does the test lamp illuminate?	Go to Step 7	Go to Step 4
4	With the test lamp still connected to the low reference circuit of the windshield washer relay, press the windshield washer switch. Does the test lamp illuminate?	Go to Step 5	Go to Step 6
5	1. Connect the test lamp between the low reference circuit of the windshield washer relay and the battery positive voltage circuit of the windshield washer relay. 2. Press the windshield washer switch. Does the test lamp illuminate?	Go to Step 8	Go to Step 10
6	Test the low reference circuit of the windshield washer relay for a short to battery voltage or an open. Refer to Circuit Testing and Wiring Repairs in Wiring Systems. Did you find and correct the condition?	Go to Step 13	Go to Step 9
	1. Turn ON the ignition, with the engine		

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7	OFF. 2. Test the low reference circuit of the windshield washer relay for a short to ground. Refer to Circuit Testing and Wiring Repairs in Wiring Systems. Did you find and correct the condition?	Go to Step 13	Go to Step 9
8	Inspect for poor connections at the connector of the windshield washer relay. Refer to Testing for Intermittent Conditions and Poor Connections and Connector Repairs in Wiring Systems. Did you find and correct the condition?	Go to Step 13	Go to Step 11
9	Inspect for poor connections at the harness connector of the body control module (BCM). Refer to Testing for Intermittent Conditions and Poor Connections and Connector Repairs in Wiring Systems. Did you find and correct the condition?	Go to Step 13	Go to Step 12
10	Repair the short to ground or open in the battery positive voltage circuit of the windshield washer relay. Refer to Wiring Repairs in Wiring Systems. Did you complete the repair?	Go to Step 13	-
11	Replace the windshield washer relay. Refer to Relay Replacement (Within an Electrical Center) or Relay Replacement (Attached to Wire Harness). Did you complete the replacement?	Go to Step 13	-
12	Replace the BCM. Refer to Control Module References in Computer/Integrating Systems for replacement, setup, and programming. Did you complete the replacement?	Go to Step 13	-
13	1. Use the scan tool in order to clear the DTCs. 2. Operate the vehicle within the Conditions for Running the DTC. Does the DTC reset?	Go to Step 2	System OK

Circuit Description

The body control module (BCM) monitors the wiper high speed relay control circuit only when wiper high speed mode is active. When the wiper high speed mode is requested, the BCM responds by applying a ground through the wiper high speed relay control circuit to the coil side of the relay, energizing the wiper high relay.

DTC Descriptor

This diagnostic procedure supports the following DTC:

DTC B3875**Wiper High Speed Relay Circuit****Conditions for Running the DTC**

This DTC can set only when the BCM output to the wiper high relay is requested by PCU.

Conditions for Setting the DTC

The BCM will set this DTC if it detects a short to ground or an open in the control circuit of the wiper high relay.

Action Taken When the DTC Sets

The BCM will not activate the output to the relay.

Conditions for Clearing the DTC

- The current DTC will become history when the request for the output is removed or when the condition for setting the fault is corrected.
- The history DTC will clear after 50 consecutive ignition cycles without a fault present.

Test Description

The numbers below refer to the step numbers on the diagnostic table.

3: This step tests for constant ground in the control circuit of the wiper relay.

4: This step verifies that the BCM is applying a ground through the control circuit to the wiper relay.

5: This step tests for an open in the battery positive voltage circuit of the wiper relay.

DTC B3875

Step	Action	Yes	No

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Schematic Reference: Wiper/Washer System Schematics**Connector End View Reference: Wiper/Washer System Connector End Views**

1	Did you perform the Diagnostic System Check - Vehicle?	Go to Step 2	Go to <u>Diagnostic System Check - Vehicle</u>
2	1. Turn the ignition to the ON position. 2. Turn the wiper switch to HIGH. Do the high speed wipers operate?	Go to <u>Testing for Intermittent Conditions and Poor Connections</u>	Go to Step 3
3	1. Turn OFF the ignition. 2. Remove the WIPER HI relay. Refer to <u>Relay Replacement (Within an Electrical Center)</u> or <u>Relay Replacement (Attached to Wire Harness)</u> . 3. Turn ON the ignition, with the engine OFF. 4. Turn the wiper switch to the OFF position. 5. Connect a test lamp from the control circuit of the wiper high relay to a good ground. Does the test lamp illuminate?	Go to Step 7	Go to Step 4
4	With the test lamp still connect to the control circuit of the wiper high relay, place the wiper switch in the HIGH speed position. Does the test lamp illuminate?	Go to Step 5	Go to Step 6
5	1. Connect a test lamp between the control circuit of the wiper high relay and the ground circuit of the wiper high relay. 2. Place the wiper switch in the HIGH speed position. Does the test lamp illuminate?	Go to Step 8	Go to Step 10
	Test the control circuit of the wiper high speed relay for a short to ground or an open.		

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6	Refer to Circuit Testing and Wiring Repairs in Wiring Systems. Did you find and correct the condition?	Go to Step 13	Go to Step 9
7	Test the control circuit of the wiper high speed relay for a short to battery positive voltage. Refer to Circuit Testing and Wiring Repairs in Wiring Systems. Did you find and correct the condition?	Go to Step 13	Go to Step 9
8	Inspect for poor connections at the connector of the WIPER HI relay. Refer to Testing for Intermittent Conditions and Poor Connections and Connector Repairs in Wiring Systems. Did you find and correct the condition?	Go to Step 13	Go to Step 11
9	Inspect for poor connections at the harness connector of the body control module (BCM). Refer to Testing for Intermittent Conditions and Poor Connections and Connector Repairs in Wiring Systems. Did you find and correct the condition?	Go to Step 13	Go to Step 12
10	Repair the open in the ground circuit of the wiper high relay. Refer to Wiring Repairs	Go to Step 13	-
11	Replace the WIPER HI relay. Refer to Relay Replacement (Within an Electrical Center) or Relay Replacement (Attached to Wire Harness) . Did you complete the replacement?	Go to Step 13	-
12	Replace the body control module (BCM). Refer to Control Module References for replacement, setup, and programming. Did you complete the replacement?	Go to Step 13	-
13	1. Use the scan tool in order to clear the DTCs. 2. Operate the vehicle within the Conditions For Running the DTC as specified in the supporting text. Does the DTC reset?	Go to Step 2	System OK

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Circuit Description

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The body control module (BCM) monitors the windshield wiper switch low signal circuit. When the wiper switch is placed in the low position, battery voltage is applied through the switch contacts, a series of resistors, and the wiper switch low signal circuit to the BCM. The BCM then applies battery positive voltage to the wiper relay control circuit which energizes the wiper relay. This allows battery voltage from the WIPER/WS fuse through the switch side of the relay to the windshield wiper motor.

DTC Descriptor

This diagnostic procedure supports the following DTC:

DTC B3922

Front Wiper Function Select Circuit

Conditions for Running the DTC

- The ignition is ON.
- The ignition voltage is between 9-16 volts.

Conditions for Setting the DTC

The BCM detects a short to ground or a short to battery voltage on the windshield wiper switch low signal circuit.

Action Taken When the DTC Sets

- The BCM will not activate the low speed output.
- The windshield wipers will only operate in the high speed mode.

Conditions for Clearing the DTC

- The DTC will clear on current status after the condition for setting the fault is corrected.
- A history DTC will clear after 50 consecutive ignition cycles without a fault present.

Diagnostic Aids

Perform a visual inspection for loose or poor connections at all related components. Refer to **Testing for Intermittent Conditions and Poor Connections**.

DTC B3922

Step	Action	Yes	No
Schematic Reference: Wiper/Washer System Schematics Connector End View Reference: Master Electrical Component List			
	Did you perform the Diagnostic System		Go to

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1	Check - Vehicle?	Go to Step 2	<u>Diagnostic System Check - Vehicle</u>
2	1. Turn the ignition to the ON position. 2. Rotate the windshield wiper switch through all positions. Does the windshield wipers operate correctly?	Go to <u>Testing for Intermittent Conditions and Poor Connections</u>	Go to Step 3
3	1. Turn the ignition OFF. 2. Disconnect the windshield wiper switch connector. 3. With a scan tool, observe the Windshield Wiper Switch parameter in the Body Control Module data list. 4. Turn ON the ignition, with the engine OFF. Does the Windshield Wiper Switch parameter display OFF?	Go to Step 5	Go to Step 4
4	Test the wiper switch low signal circuit for the following conditions: • A short to ground • A short to battery voltage Refer to <u>Circuit Testing</u> and <u>Wiring Repairs</u> . Did you find and correct the condition?	Go to Step 9	Go to Step 6
5	Inspect for poor connections at the harness connector of the windshield wiper/washer switch. Refer to <u>Testing for Intermittent Conditions and Poor Connections</u> and <u>Connector Repairs</u> . Did you find and correct the condition?	Go to Step 9	Go to Step 7
6	Inspect for poor connections at the harness connector of the body control module (BCM). Refer to <u>Testing for Intermittent Conditions and Poor Connections</u> and <u>Connector Repairs</u> . Did you find and correct the condition?	Go to Step 9	Go to Step 8

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7	Replace the windshield wiper switch. Did you complete the replacement?	Go to Step 9	-
8	Replace the body control module (BCM). Refer to Control Module References for replacement, setup, and programming. Did you complete the replacement?	Go to Step 9	-
9	1. Use the scan tool in order to clear the DTCs. 2. Operate the vehicle within the Conditions For Funning the DTC as specified in the supporting text. Does the DTC reset?	Go to Step 2	System OK

SYMPTOMS - WIPER/WASHER SYSTEMS

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

1. **Perform the 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. **Review the system operation in order to familiarize yourself with the system functions. Refer to Wiper/Washer System Description and Operation.**

Visual/Physical Inspection

- Inspect the washer fluid reservoir for the proper fluid level and condition.
- Inspect the easily accessible or visible system components for obvious damage or conditions which could cause the symptom.
- Inspect for aftermarket devices which could affect the operation of the Windshield Wiper/Washer System.

Intermittent

- If the wipers operate at low speed for approximately 3 seconds and then stop, the wiper motor park switch, or its signal circuit, may be malfunctioning. Refer to **Wipers Inoperative - One or More Modes**.
- Faulty electrical connections or wiring may be the cause of intermittent conditions. Refer to **Testing for Intermittent Conditions and Poor Connections** .

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Symptom List

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

- **Washers Always On**
- **Washers Inoperative**
- **Wipers Always On**
- **Wipers Inoperative - All Modes**
- **Wipers Inoperative - One or More Modes**

WASHERS ALWAYS ON

Washers Always On

Step	Action	Yes	No
Schematic Reference: Wiper/Washer System Schematics Connector End View Reference: Master Electrical Component List in Wiring Systems			
1	Did you perform the Diagnostic System Check - Vehicle?	Go to Step 2	Go to Diagnostic System Check - Vehicle in Vehicle DTC Information
2	Turn the ignition to the ON position. Is the windshield washer pump ON?	Go to Step 3	Go to Testing for Intermittent Conditions and Poor Connections in Wiring Systems
3	Disconnect the windshield wiper/washer switch. Does the washer turn OFF?	Go to Step 7	Go to Step 4
4	Disconnect the body control module (BCM) connector C3. Does the washer turn OFF?	Go to Step 8	Go to Step 5
5	Disconnect the BCM connector C1. Does the washer turn OFF?	Go to Step 9	Go to Step 6
6	Test for a short to battery positive voltage in the windshield washer pump control circuit. Refer to Circuit Testing and Wiring Repairs in Wiring Systems. Did you find and correct the condition?	Go to Step 11	Go to Step 10

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7	Replace the windshield wiper/washer switch. Refer to Multifunction, Turn Signal Switch Replacement in Steering Wheel and Column. Did you complete the replacement?	Go to Step 11	-
8	Repair a short to ground in the windshield washer switch signal circuit. Refer to Circuit Testing and Wiring Repairs in Wiring Systems. Did you complete the repair?	Go to Step 11	-
9	Replace the BCM. Refer to Control Module References in Computer/Integrating Systems for replacement, setup, and programming. Did you complete the replacement?	Go to Step 11	-
10	Replace the windshield washer fluid pump. Refer to Washer Pump Replacement . Did you complete the replacement?	Go to Step 11	-
11	Operate the system in order to verify the repair. Did you correct the condition?	System OK	Go to Step 3

WASHERS INOPERATIVE

Washers Inoperative

Step	Action	Yes	No
Schematic Reference: <u>Wiper/Washer System Schematics</u> Connector End View Reference: <u>Master Electrical Component List</u> in Wiring Systems			
1	Did you perform the Diagnostic System Check - Vehicle?	Go to Step 2	Go to Diagnostic System Check - Vehicle in Vehicle DTC Information
2	1. Turn the ignition to the ON position. 2. Press the windshield washer switch. Does the windshield washer pump operate?	Go to Testing for Intermittent Conditions and Poor Connections in Wiring Systems	Go to Step 3
	1. Disconnect the body control module		

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3	(BCM) connector C1. 2. Install a fused jumper between battery positive voltage and the windshield washer pump control circuit. Does the windshield washer fluid pump operate?	Go to Step 6	Go to Step 4
4	1. Disconnect the windshield washer pump. 2. Connect the BCM connector C1. 3. Using a test lamp probe between windshield washer pump control circuit and ground. 4. Turn the ignition to the ON position. 5. Press the washer switch. Does the test lamp illuminate?	Go to Step 5	Go to Step 8
5	Test for a poor connection or an open in the ground circuit of the windshield washer fluid pump. Refer to Circuit Testing and Wiring Repairs in Wiring Systems. Did you find and correct the condition?	Go to Step 12	Go to Step 9
6	1. Disconnect the windshield wiper/washer switch. 2. Install a jumper between windshield washer switch signal circuit and ground. 3. Turn the ignition to the ON position. Does the windshield washer fluid pump operate?	Go to Step 10	Go to Step 7
7	Test for a poor connection, an open, or a short to battery positive voltage in the windshield washer switch signal circuit. Refer to Circuit Testing and Wiring Repairs in Wiring Systems. Did you find and correct the condition?	Go to Step 12	Go to Step 11
8	Repair a poor connection, an open, or a short to ground in the windshield washer pump control circuit. Refer to Circuit Testing and Wiring Repairs in Wiring		

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	Systems. Did you complete the repair?	Go to Step 12	-
9	Replace the windshield washer fluid pump. Refer to Washer Pump Replacement . Did you complete the replacement?	Go to Step 12	-
10	Replace the windshield washer switch. Refer to Multifunction, Turn Signal Switch Replacement in Steering Wheel and Column. Did you complete the replacement?	Go to Step 12	-
11	Replace the BCM. Refer to Control Module References in Computer/Integrating Systems for replacement, setup, and programming. Did you complete the replacement?	Go to Step 12	-
12	Operate the system to verify the repair. Did you correct the condition?	System OK	Go to Step 3

WIPERS ALWAYS ON

Wipers Always On

Step	Action	Yes	No
Schematic Reference: Wiper/Washer System Schematics Connector End View Reference: Master Electrical Component List in Wiring Systems			
1	Did you perform the Diagnostic System Check - Vehicle?	Go to Step 2	Go to Diagnostic System Check - Vehicle in Vehicle DTC Information
2	Turn the ignition to the ON position. Are the windshield wipers ON?	Go to Step 3	Go to Testing for Intermittent Conditions and Poor Connections in Wiring Systems
3	Remove the WPR2 relay. Are the windshield wipers ON?	Go to Step 4	Go to Step 7
4	Are the windshield wipers operating at a high speed?	Go to Step 5	Go to Step 6
	Test for a short to battery positive voltage in the windshield wiper motor high speed		

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5	circuit. Refer to Circuit Testing and Wiring Repairs in Wiring Systems. Did you find and correct the condition?	Go to Step 24	Go to Step 20
6	Test for a short to battery positive voltage in the windshield wiper motor low speed circuit. Refer to Circuit Testing and Wiring Repairs in Wiring Systems. Did you find and correct the condition?	Go to Step 24	Go to Step 20
7	Using a test lamp connected to ground, probe the WPR2 relay control circuit at the underhood fuse block. Does the test lamp illuminate?	Go to Step 13	Go to Step 8
8	1. Install the WPR2 relay. 2. Remove the WPR1 relay. Are the windshield wipers ON?	Go to Step 20	Go to Step 9
9	Using a test lamp connected to ground, probe the WPR1 relay control circuit. Does the test lamp illuminate?	Go to Step 10	Go to Step 21
10	1. Install the WPR1 relay. 2. Disconnect the windshield wiper/washer switch. Are the windshield wipers ON?	Go to Step 11	Go to Step 22
11	1. Disconnect the body control module (BCM) connector C3. 2. Using a test lamp connected to battery positive voltage, probe the windshield wiper switch low signal circuit at the windshield wiper/washer switch. Does the test lamp illuminate?	Go to Step 17	Go to Step 12
12	1. Disconnect the BCM connector C1. 2. Remove the WPR1 relay. 3. Using a test lamp connected to ground, probe the WPR1 relay control circuit at the underhood electrical center. Does the test lamp illuminate?	Go to Step 18	Go to Step 23
	1. Disconnect the windshield wiper/washer switch.		

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13	2. Using a test lamp connected to ground, probe the WPR1 relay control circuit at the underhood electrical center. Does the test lamp illuminate?	Go to Step 14	Go to Step 22
14	1. Disconnect the BCM connector C3. 2. Using a test lamp connected to battery positive voltage, probe the windshield wiper switch high signal circuit. Does the test lamp illuminate?	Go to Step 19	Go to Step 15
15	1. Disconnect the BCM connector C1. 2. Using a test lamp connected to ground, probe the WPR2 relay control circuit at the BCM. Does the test lamp illuminate?	Go to Step 16	Go to Step 23
16	Test for a short to ground in the WPR2 relay control circuit. Refer to Circuit Testing and Wiring Repairs in Wiring Systems. Did you find and correct the condition?	Go to Step 24	Go to Step 20
17	Repair a short to ground in the windshield wiper switch low signal circuit. Refer to Circuit Testing and Wiring Repairs in Wiring Systems. Did you complete the repair?	Go to Step 24	-
18	Repair a short to battery positive voltage in the WPR1 relay control circuit. Refer to Circuit Testing and Wiring Repairs in Wiring Systems. Did you complete the repair?	Go to Step 24	-
19	Repair a short to ground in the windshield wiper switch high signal circuit. Refer to Circuit Testing and Wiring Repairs in Wiring Systems. Did you complete the repair?	Go to Step 24	-
20	Replace the underhood electrical fuse block. Refer to Underhood Electrical Center or Junction Block Replacement in Wiring Systems. Did you complete the replacement?	Go to Step 24	-
	Replace the WPR1 relay. Refer to Relay		

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21	<u>Replacement (Within an Electrical Center) or Relay Replacement (Attached to Wire Harness)</u> in Wiring Systems. Did you complete the replacement?	Go to Step 24	-
22	Replace the windshield wiper/washer switch. Refer to <u>Multifunction, Turn Signal Switch Replacement</u> in Steering Wheel and Column. Did you complete the repair?	Go to Step 24	-
23	Replace the BCM. Refer to <u>Control Module References</u> in Computer/Integrating Systems for replacement, setup, and programming. Did you complete the replacement?	Go to Step 24	-
24	Operate the system in order to verify the repair. Did you correct the condition?	System OK	Go to Step 3

WIPERS INOPERATIVE - ALL MODES

Wipers Inoperative - All Modes

Step	Action	Yes	No
Schematic Reference: <u>Wiper/Washer System Schematics</u> Connector End View Reference: <u>Master Electrical Component List</u> in Wiring Systems			
1	Did you perform the Diagnostic System Check - Vehicle?	Go to Step 2	Go to <u>Diagnostic System Check - Vehicle</u> in Vehicle DTC Information
2	1. Turn the ignition to the ON position. 2. Attempt to operate the wipers in each mode. Are the wipers inoperative in all modes?	Go to Step 3	Go to <u>Testing for Intermittent Conditions and Poor Connections</u> in Wiring Systems
3	1. Disconnect the windshield wiper motor. 2. Using a test lamp connected to ground, probe the windshield wiper motor low speed circuit. 3. Turn the ignition to the ON position.		

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	4. Turn the windshield wipers to a low speed.		
	Does the test lamp illuminate?	Go to Step 4	Go to Step 5
4	Test for a poor connection or an open in the ground circuit of the windshield wiper motor. Refer to Circuit Testing and Wiring Repairs in Wiring Systems. Did you find and correct the condition?	Go to Step 16	Go to Step 11
5	1. Connect the windshield wiper motor. 2. Remove the WPR2 relay from the underhood fuse block. 3. Using a test lamp connected to battery positive voltage, probe the WPR2 relay switched input circuit. 4. Turn the wiper switch OFF. 5. Turn the ignition to the OFF position. Does the test lamp illuminate?	Go to Step 9	Go to Step 6
6	1. Remove the WPR1 relay. 2. Using a test lamp connected to battery positive voltage, probe the ground circuit of the WPR1 relay. Does the test lamp illuminate?	Go to Step 7	Go to Step 12
7	Using a test lamp connected to ground, probe the FRT WPR fuse circuit of the WPR1 relay. Does the test lamp illuminate?	Go to Step 8	Go to Step 13
8	Replace the WPR1 relay. Refer to Relay Replacement (Within an Electrical Center) or Relay Replacement (Attached to Wire Harness) in Wiring Systems. Do the windshield wipers operate normally?	Go to Step 16	Go to Step 13
9	1. Disconnect the windshield wiper/washer switch. 2. Install a jumper between the ground circuit and the windshield wiper switch low signal circuit at the windshield wiper/washer switch connector. 3. Turn the ignition to the ON position.		

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	Do the windshield wipers operate normally?	Go to Step 14	Go to Step 10
10	Test for a poor connection or an open in the ground circuit of the windshield wiper/washer switch. Refer to Circuit Testing and Wiring Repairs in Wiring Systems. Did you find and correct the condition?	Go to Step 16	Go to Step 15
11	Replace the windshield wiper motor. Refer to Wiper Motor Replacement (Impala) or Wiper Motor Replacement (Monte Carlo) . Did you complete the replacement?	Go to Step 16	-
12	Repair a poor connection or an open in the ground circuit of the WPR1 relay. Refer to Circuit Testing and Wiring Repairs in Wiring Systems. Did you complete the repair?	Go to Step 16	-
13	Replace the underhood fuse block. Refer to Underhood Electrical Center or Junction Block Replacement in Wiring Systems. Did you complete the replacement?	Go to Step 16	-
14	Replace the windshield wiper/washer switch. Refer to Multifunction, Turn Signal Switch Replacement in Steering Wheel and Column. Did you complete the replacement?	Go to Step 16	-
15	Replace the body control module (BCM). Refer to Control Module References in Computer/Integrating Systems for replacement, setup, and programming. Did you complete the replacement?	Go to Step 16	-
16	Operate the system in order to verify the repair. Did you correct the condition?	System OK	Go to Step 3

WIPERS INOPERATIVE - ONE OR MORE MODES

Wipers Inoperative - One or More Modes

Step	Action	Yes	No
Schematic Reference: Wiper/Washer System Schematics Connector End View Reference: Master Electrical Component List in Wiring Systems			

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1	Did you perform the Diagnostic System Check - Vehicle?	Go to Step 2	Go to Diagnostic System Check - Vehicle in Vehicle DTC Information
2	1. Turn the ignition to the ON position. 2. Attempt to operate the wipers in each mode. Are the wipers inoperative in all modes?	Go to Step 3	Go to Testing for Intermittent Conditions and Poor Connections in Wiring Systems
3	Are the wiper inoperative in high speed mode?	Go to Step 5	Go to Step 4
4	Are all of the low speed mode inoperative?	Go to Step 13	Go to Step 18
5	1. Disconnect the windshield wiper motor. 2. Using a test lamp connected to ground, probe the windshield wiper motor high speed circuit. 3. Turn the ignition to the ON position. 4. Turn the wiper to the high speed setting. Does the test lamp illuminate?	Go to Step 19	Go to Step 6
6	1. Connect the windshield wiper motor. 2. Remove the WPR2 relay. 3. Using a test lamp connected to battery positive voltage, probe the ground circuit of the WPR2 relay. Does the test lamp illuminate?	Go to Step 7	Go to Step 20
7	1. Using a test lamp connected to ground, probe the WPR2 relay control circuit at the WPR1 relay. 2. Turn the ignition to the ON position. 3. Turn the wipers to the high speed setting. Does the test lamp illuminate?	Go to Step 8	Go to Step 10
	1. Leave the switch in the high position.		

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8	2. Using a test lamp, probe between the WPR2 relay control circuit and the windshield wiper motor high speed circuit. Does the test lamp illuminate?	Go to Step 22	Go to Step 9
9	Test for a poor connection, an open or a short to ground in the windshield wiper motor high speed circuit. Refer to Circuit Testing and Wiring Repairs in Wiring Systems. Did you find and correct the condition?	Go to Step 23	Go to Step 20
10	1. Disconnect the windshield wiper switch. 2. Install the WPR2 relay. 3. Install a jumper between ground and windshield wiper switch high signal circuit. 4. Turn the ignition to the ON position. Do the high speed wipers operate?	Go to Step 18	Go to Step 11
11	Test for a poor connection, short to battery or an open in the windshield wiper switch high signal circuit. Refer to Circuit Testing and Wiring Repairs in Wiring Systems. Did you find and correct the condition?	Go to Step 23	Go to Step 12
12	Test for a poor connection, short to ground or an open in the WPR2 relay control circuit. Refer to Circuit Testing and Wiring Repairs in Wiring Systems. Did you find and correct the condition?	Go to Step 23	Go to Step 21
13	1. Disconnect the windshield wiper motor. 2. Using a test lamp connected to ground, probe the windshield wiper motor low speed circuit. 3. Turn the ignition to the ON position. 4. Turn the wiper switch to a low position. Does the test lamp illuminate?	Go to Step 19	Go to Step 14

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14	1. Connect the windshield wiper motor. 2. Leave the windshield wiper switch in a low position. 3. Disconnect the WPR2 relay. 4. Using a test lamp connected between battery positive voltage and the windshield wiper motor low control circuit. Does the test lamp illuminate?	Go to Step 16	Go to Step 15
15	Test for a poor connection or an open in the windshield wiper motor low control circuit. Refer to Circuit Testing and Wiring Repairs in Wiring Systems. Did you find and correct the condition?	Go to Step 23	Go to Step 20
16	1. Disconnect the windshield wiper/washer switch. 2. Install the WPR1 relay. 3. Install a jumper between ground and the windshield wiper switch low signal circuit. 4. Turn the ignition to the ON position. Does the windshield wiper turn ON in a low position?	Go to Step 18	Go to Step 17
17	Test for a poor connection or an open in the windshield wiper switch low signal circuit. Refer to Circuit Testing and Wiring Repairs in Wiring Systems. Did you find and correct the condition?	Go to Step 23	Go to Step 21
18	Replace the windshield wiper/washer switch. Refer to Multifunction, Turn Signal Switch Replacement in Steering Wheel and Column. Did you complete the replacement?	Go to Step 23	-
19	Replace the windshield wiper motor. Refer to Wiper Motor Replacement (Impala) or Wiper Motor Replacement (Monte Carlo). Did you complete the replacement?	Go to Step 23	-
	Replace the underhood fuse block. Refer to		

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20	<u>Underhood Electrical Center or Junction Block Replacement</u> in Wiring Systems. Did you complete the replacement?	Go to Step 23	-
21	Replace the body control module (BCM). Refer to <u>Control Module References</u> in Computer/Integrating Systems for replacement, setup, and programming. Did you complete the replacement?	Go to Step 23	-
22	Replace the WPR2 relay. Refer to <u>Relay Replacement (Within an Electrical Center) or Relay Replacement (Attached to Wire Harness)</u> in Wiring Systems. Did you complete the replacement?	Go to Step 23	-
23	Operate the system in order to verify the repair. Did you correct the condition?	System OK	Go to Step 3

WIPER ARM TIP PRESSURE CHECK**Wiper Arm Pressure Check**

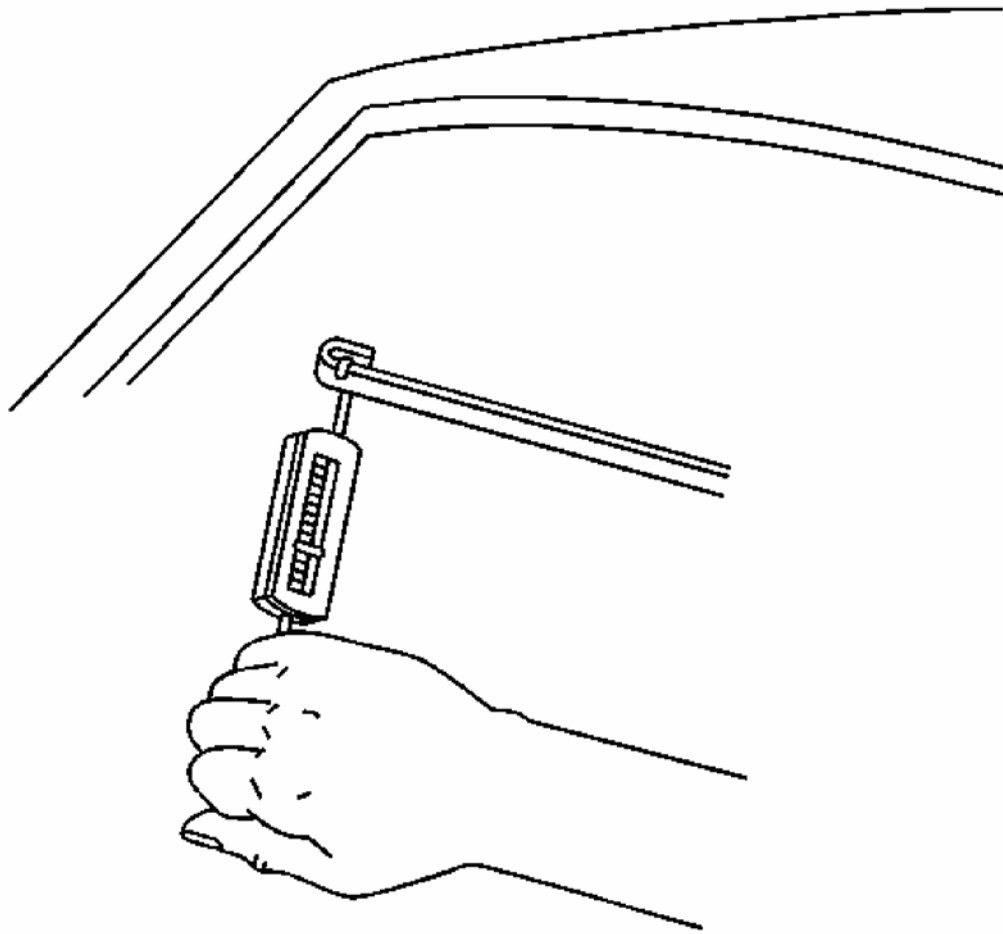


Fig. 7: Attaching A Scale To End Of Wiper Arm
Courtesy of GENERAL MOTORS CORP.

1. Ensure that the wiper arms are set to the PARK position.
2. Remove the wiper blades from the wiper arms. Refer to **Wiper Arm Blade Replacement**.
3. Attach a scale to the end of the wiper arm and measure the force required to lift the wiper arm perpendicular to the windshield to normal working height (height with the blade attached).
4. Replace the wiper arm if the measurement is not within the specification. Refer to **Wiper Arm Replacement**.

Driver Side Tip Pressure: 7.4-9.1 N (27-33 oz)

Passenger Side Tip Pressure: 7.2-8.8 N (26-32 oz)

5. Install the wiper blades on the wiper arms. Refer to **Wiper Arm Blade Replacement**.

WIPER BLADE ELEMENT CHECK

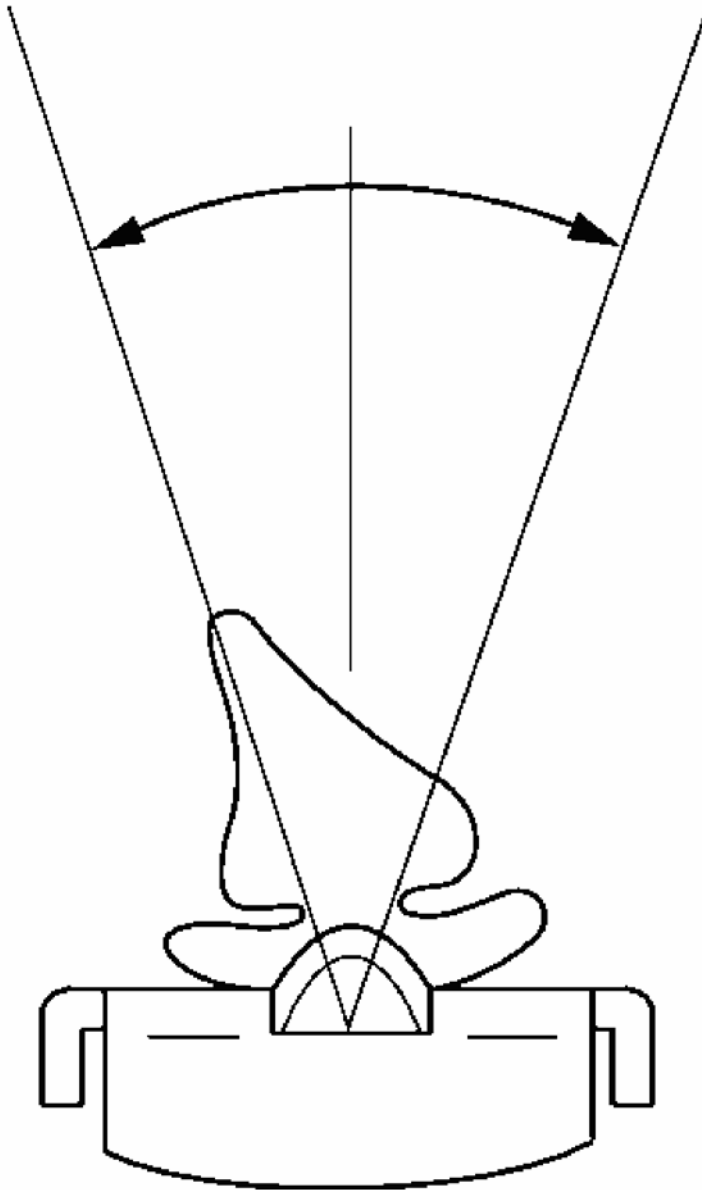


Fig. 8: Measuring Wiper Blade Element Centerline Contact
Courtesy of GENERAL MOTORS CORP.

1. Remove the wiper blades from the wiper arms. Refer to **Wiper Arm Blade**

Replacement.

2. Look down the length of the blade element.
3. Replace the wiper blade element if the rubber element which contacts the glass is deflected more than 15 degrees from the centerline of the blade. Refer to **Wiper Blade Element Replacement**.
4. Install the wiper blades on the wiper arms. Refer to **Wiper Arm Blade Replacement**.

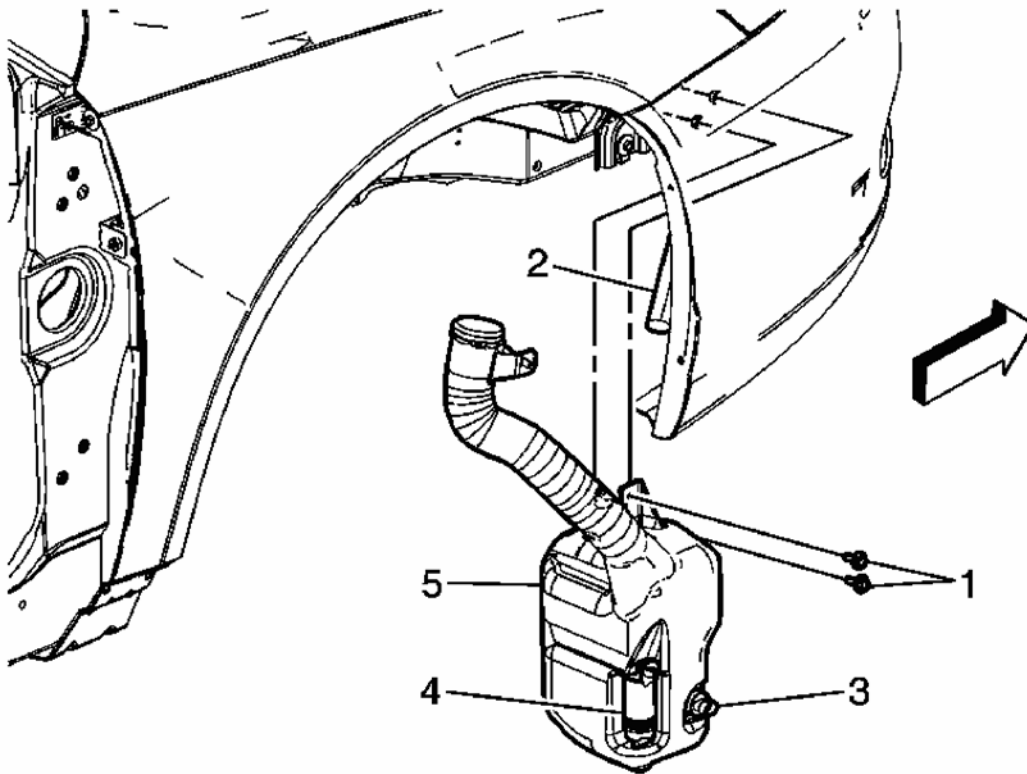
REPAIR INSTRUCTIONS**WASHER SOLVENT CONTAINER REPLACEMENT**

Fig. 9: Replacing Washer Solvent Container
Courtesy of GENERAL MOTORS CORP.

Washer Solvent Container Replacement

Callout	Component Name
NOTE: Refer to <u>Fastener Notice</u> .	

Fastener Tightening Specifications: Refer to **Fastener Tightening Specifications**.

Preliminary Procedures

1. Remove the right front wheelhouse panel liner. Refer to **Front Fender Liner Replacement**.
2. Disconnect the electrical connector from the windshield washer solvent level sensor switch.
3. Disconnect the electrical connector at the windshield washer pump.
4. Lower the vehicle.
5. Remove the push pin for the filler neck from the RF fender flange.
6. Remove the washer solvent container filler cap.

1	Windshield Washer Solvent Container Bolts (Qty: 2) Tighten: 6 N.m (53 lb in) Tip: Transfer the cap and lower mounting bracket on the container to the new washer solvent container.
2	Windshield Washer Pump Hose Assembly Tip: Disconnect the hose from the windshield washer pump spout and drain washer solvent into a suitable clean container.
3	Windshield Washer Level Sensor Switch
4	Windshield Washer Pump Tip: Discard old grommet and replace with a new grommet. Transfer the old pump to the new container.
5	Windshield Washer Container Assembly Tip: Lower the windshield washer container from RH chassis rail in between the RF fender bracket and bumper fascia.

WASHER SOLVENT CONTAINER LEVEL SENSOR REPLACEMENT

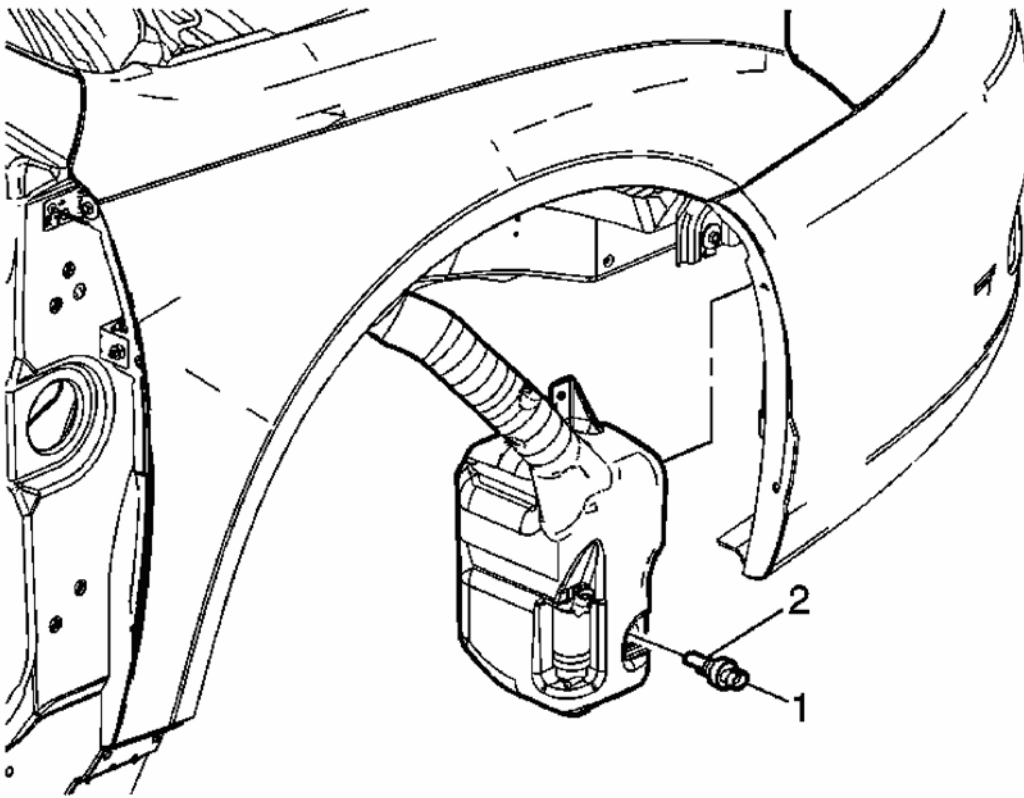


Fig. 10: Replacing Washer Solvent Container Level Sensor
 Courtesy of GENERAL MOTORS CORP.

Washer Solvent Container Level Sensor Replacement

Callout	Component Name
Fastener Tightening Specifications: Refer to <u>Fastener Tightening Specifications</u> .	
Preliminary Procedures	
1. Remove the right front wheelhouse panel liner. Refer to <u>Front Fender Liner Replacement</u>. 2. Remove the windshield washer solvent container. Refer to <u>Washer Solvent Container Replacement</u>. 3. Drain the washer solvent into a suitable clean container.	
1	Switch, Windshield Washer Level Sensor Tip: Use two flat-bladed tools and pry outward in order to release the level sensor from the washer solvent container grommet.
	Grommet, Windshield Washer Level Sensor

Tip

2

1. Discard the old level sensor grommet.
2. Install a new grommet into the washer solvent container prior to installing the new level sensor.
3. Lubricate the new grommet with straight washer fluid.

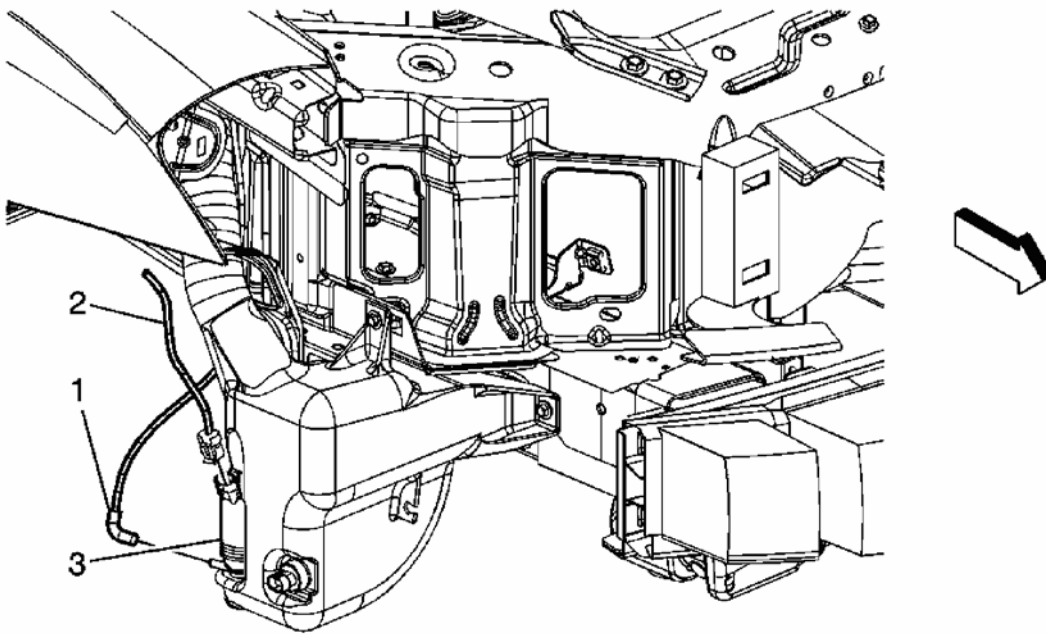
WASHER PUMP REPLACEMENT

Fig. 11: Replacing Washer Pump
 Courtesy of GENERAL MOTORS CORP.

Washer Pump Replacement

Callout	Component Name
Fastener Tightening Specifications: Refer to <u>Fastener Tightening Specifications</u> .	
Preliminary Procedures	
1. Raise and support the vehicle. Refer to <u>Lifting and Jacking the Vehicle</u>. 2. Remove the right front wheelhouse panel liner. Refer to <u>Front Fender Liner Replacement</u>. 3. Drain the washer solvent into a suitable clean container.	
1	Hose, Windshield Washer Pump
	Connector, Washer Pump Electrical

2	Tip: Disconnect and position out of the way.
3	Pump, Windshield Washer Tip 1. Use two flat-bladed tools and pry upward in order to release the washer pump from the washer solvent container grommet. 2. Discard the old washer pump grommet. 3. Install a new grommet into the washer solvent container prior to installing the new washer pump. 4. Lubricate the new grommet with straight washer fluid. 5. Secure the new pump to the washer solvent container.

WINDSHIELD WASHER HOSE REPLACEMENT (IMPALA)

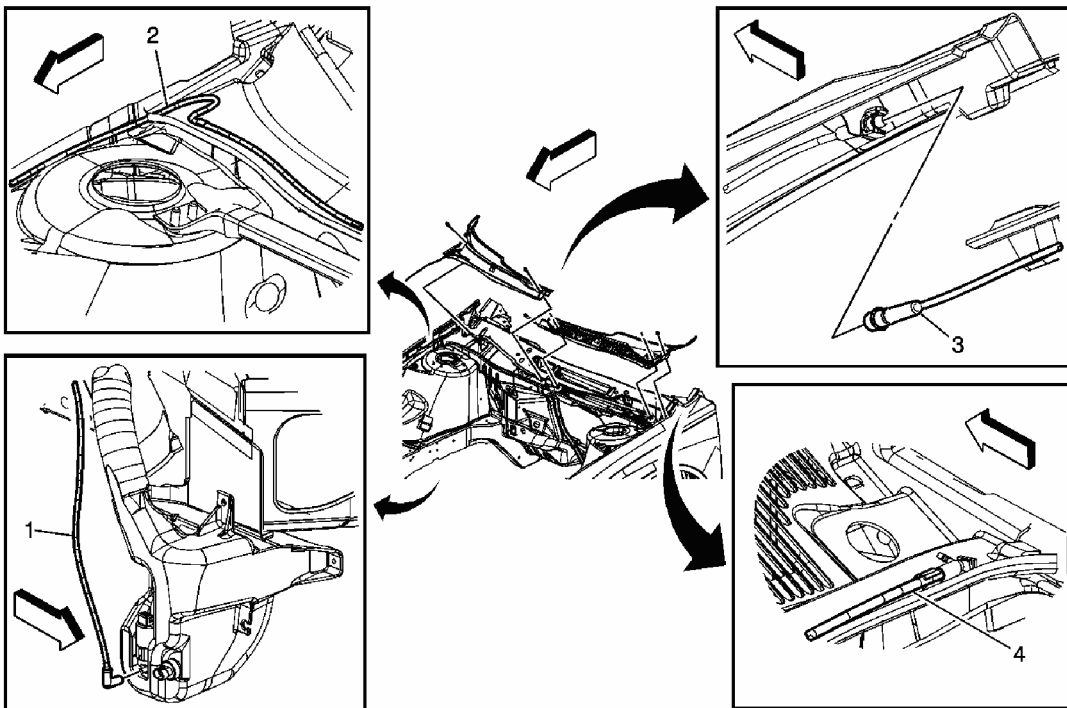


Fig. 12: Replacing Windshield Washer Hose
 Courtesy of GENERAL MOTORS CORP.

Hose Replacement - Windshield Washer (Impala)

Callout	Component Name
NOTE: Refer to Fastener Notice.	

Fastener Tightening Specifications: Refer to **Fastener Tightening Specifications**.

Preliminary Procedures

1. Raise and support the vehicle. Refer to **Lifting and Jacking the Vehicle** .
2. Remove the washer hose from the washer pump spout.
3. Drain the washer solvent into a suitable container.
4. Lower the vehicle.
5. Open the hood.
6. Remove the passenger side wiper arm. Refer to **Wiper Arm Replacement**.
7. Remove the passenger side air inlet grille panel. Refer to **Air Inlet Grille Panel Replacement** .

1	Connection, Windshield Washer Hose to Washer Pump
2	Hose, Washer Pump Tip: Note the routing of the washer hose to the air inlet grille panel.
3	Hose, Windshield Washer Solvent Pump to Driver Side Washer Hose Tip: Ensure washer hose is re-connected upon passenger side air inlet grille installation.
4	Hose, Windshield Washer Container Tip: Remove the washer hose from the large hole in behind the right front headlamp and fender assembly bracket.

WINDSHIELD WASHER HOSE REPLACEMENT (MONTE CARLO)

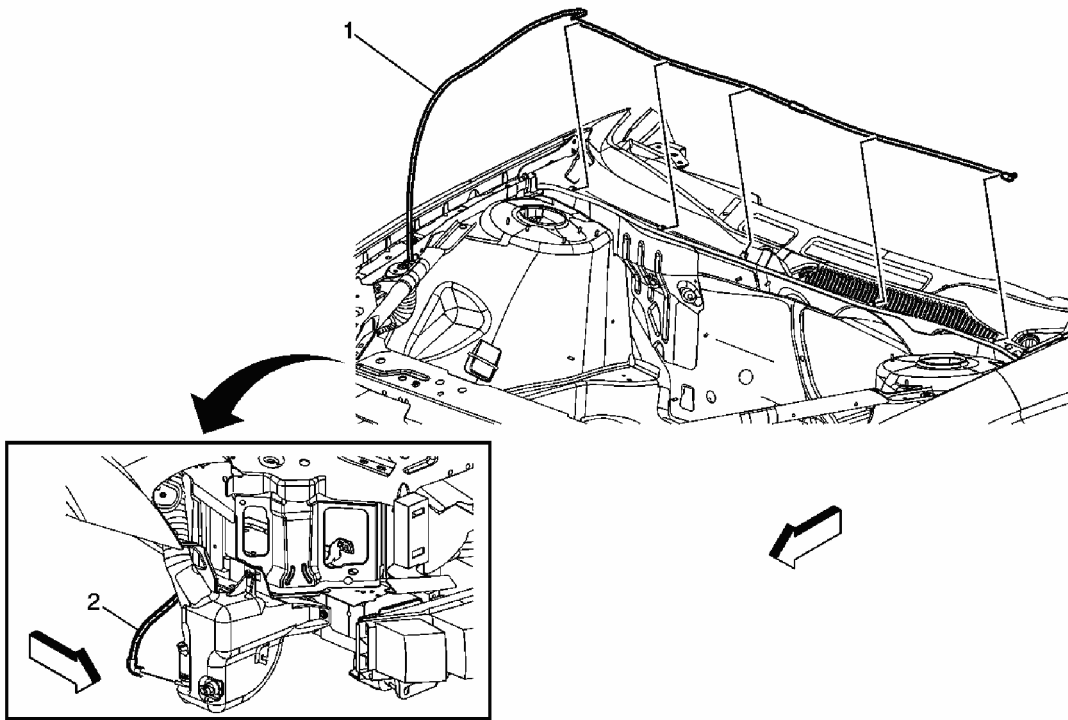


Fig. 13: Replacing Windshield Washer Hose
 Courtesy of GENERAL MOTORS CORP.

Hose Replacement - Windshield Washer (Monte Carlo)

Callout	Component Name
Fastener Tightening Specifications: Refer to <u>Fastener Tightening Specifications</u> .	
Preliminary Procedures	
1. Raise and support the vehicle. Refer to Lifting and Jacking the Vehicle. 2. Remove the right front fender liner in order to access the washer pump. Refer to Front Fender Liner Replacement. 3. Remove the washer hose from the washer pump spout. 4. Drain the washer solvent into a suitable container. 5. Lower the vehicle. Refer to Lifting and Jacking the Vehicle. 6. Open the hood. 7. Disconnect the washer hose from the driver side wiper hose. 8. Remove the washer hose from the plenum flange clips.	
1	Windshield Washer Hose Tip: Note the routing of the washer hose to the air inlet grille panel.
2	Windshield Washer Hose to Washer Pump

WIPER ARM REPLACEMENT

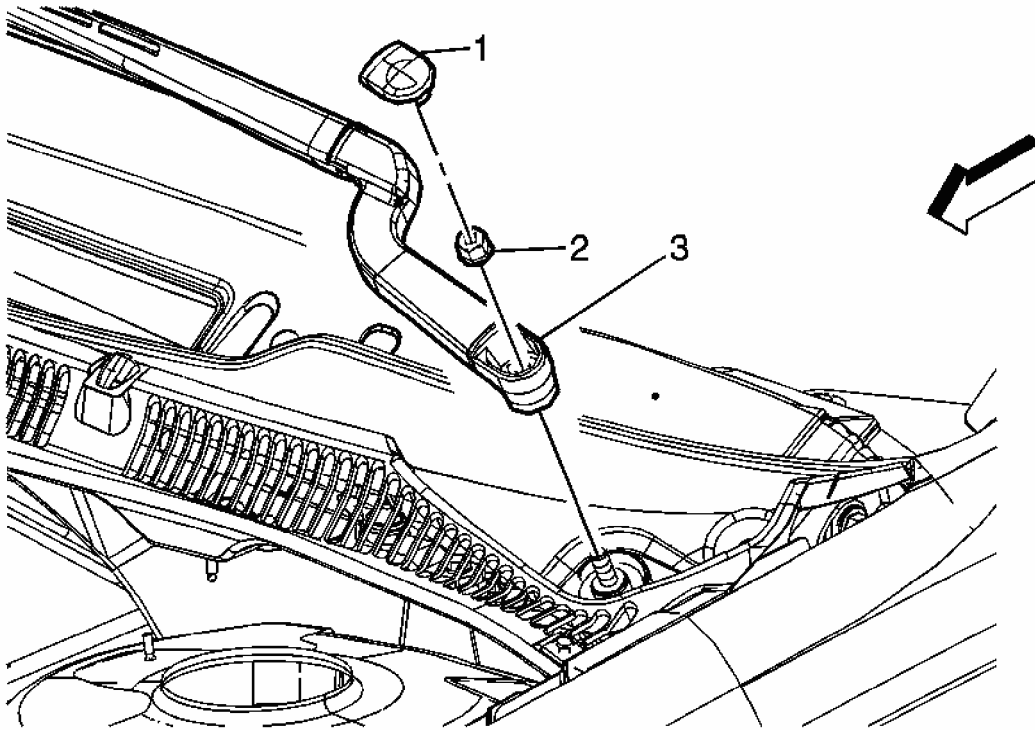


Fig. 14: Replacing Wiper Arm
 Courtesy of GENERAL MOTORS CORP.

Wiper Arm Replacement

Callout	Component Name
NOTE: Refer to Fastener Notice . Fastener Tightening Specifications: Refer to Fastener Tightening Specifications . Preliminary Procedure: Remove the wiper arm blades. Refer to Wiper Arm Blade Replacement .	
1	Cap, Windshield Washer Transmission Nut Tip: Use a small flat-bladed tool to remove the transmission cap.
2	Nut, Windshield Washer Transmission Support Tip: Hold the wiper arm blade tip to the target points in the lower blackout area of the windshield while tightening the nut. Tighten: 32 N.m (24 lb ft).
	Arm Assembly, Windshield Washer

3

Tip: Use a **J 39637** or slightly rock the arm on the wiper pivot shaft to remove. See **Special Tools**.

WIPER ARM BLADE REPLACEMENT

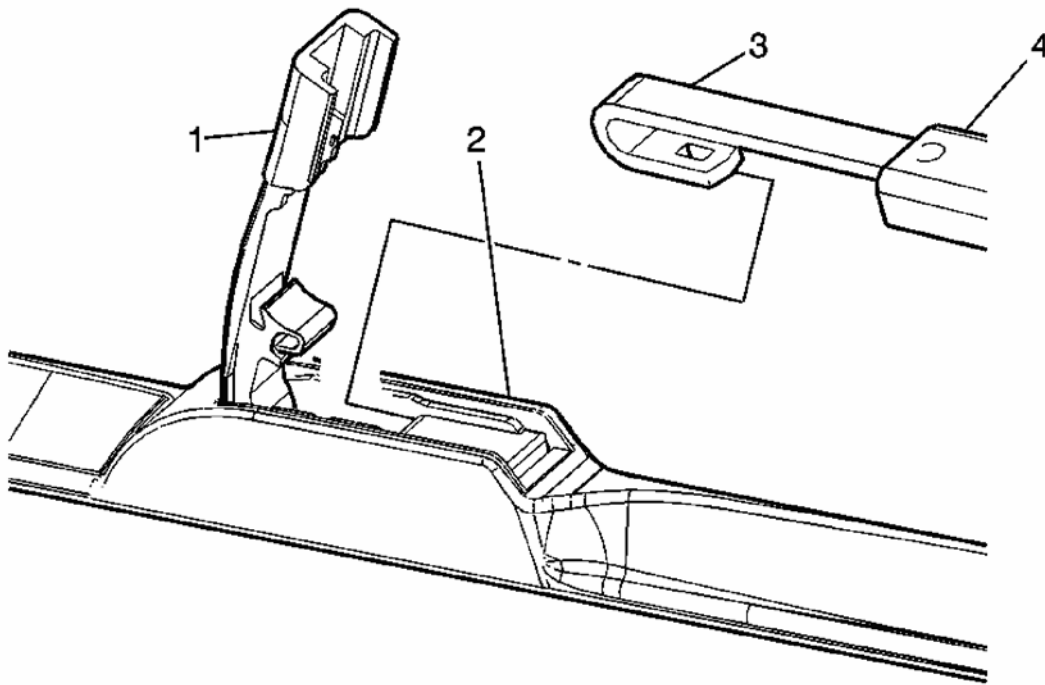


Fig. 15: Replacing Wiper Arm Blade
Courtesy of GENERAL MOTORS CORP.

Wiper Arm Blade Replacement

Callout	Component Name
Fastener Tightening Specifications: Refer to Fastener Tightening Specifications .	
Preliminary Procedures	
1. Open the hood.	
2. Raise the wiper blade off the glass.	
1	Retention Clip, Windshield Wiper Blade Tip: Lift the locking tab away from the wiper arm hook in order to disengage the wiper arm from the wiper blade.
2	Blade, Windshield Wiper Arm
3	Hook, Wiper Arm Sheep Tip: Push the wiper blade assembly onto the hook, pull the blade outward

then secure the locking tab to the arm assembly.

4 Arm Assembly, Windshield Wiper

WIPER BLADE ELEMENT REPLACEMENT

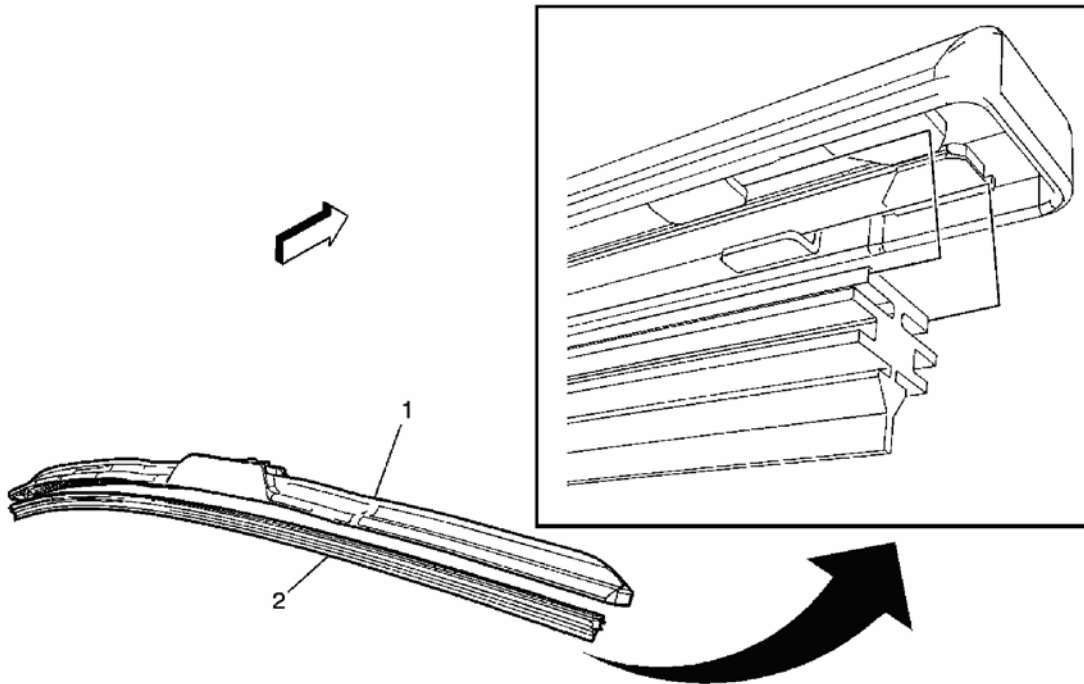


Fig. 16: Replacing Wiper Blade Element
Courtesy of GENERAL MOTORS CORP.

Wiper Blade Element Replacement

Callout	Component Name
Fastener Tightening Specifications: Refer to Fastener Tightening Specifications .	
Preliminary Procedures	
1. Position the wiper blade at a mid-wipe on the windshield. 2. Cycle the ignition key to the OFF position. 3. Raise the wiper blade off the glass.	
1	Blade Assembly, Windshield Washer
2	Element Assembly, Windshield Washer Tip: With a small pair of needle-nose pliers, secure the end of the wiper element and pull outward from the wiper blade claws in order to remove the element.

WIPER DRIVE SYSTEM MODULE REPLACEMENT (IMPALA)

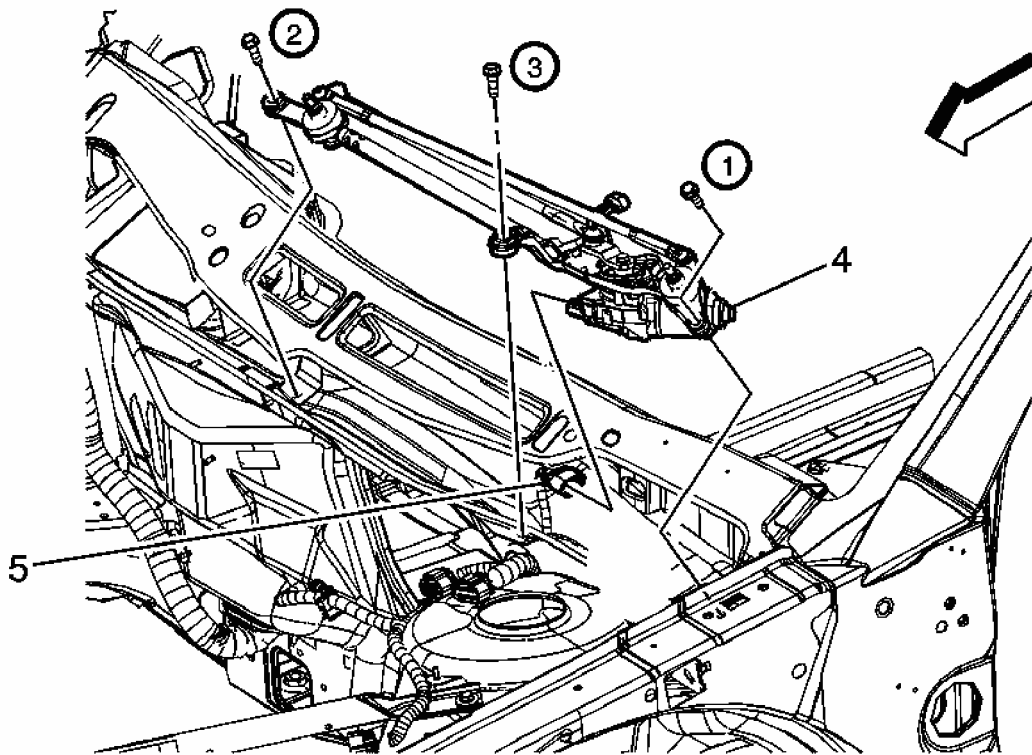


Fig. 17: Replacing Wiper Drive System Module
Courtesy of GENERAL MOTORS CORP.

Wiper Drive System Module Replacement (Impala)

Callout	Component Name
NOTE: Refer to <u>Fastener Notice</u> .	
Fastener Tightening Specifications: Refer to <u>Fastener Tightening Specifications</u> .	
Preliminary Procedures	
1. Remove the wiper arms. Refer to Wiper Arm Replacement .	
2. Remove the air inlet grille panels. Refer to Air Inlet Grille Panel Replacement .	
1	Bolt, Windshield Wiper Module IMPORTANT: Tighten bolts in sequence as shown upon installation.

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	Tighten: 9 N.m (80 lb in)
2	Bolt, Windshield Wiper Module Tighten: 9 N.m (80 lb in)
3	Bolt, Windshield Wiper Module Tighten: 9 N.m (80 lb in)
4	Module Assembly, Windshield Washer System 1. Raise the forward edge of the windshield washer module assembly out of the plenum panel first followed by disconnecting the wiper motor electrical connector. 2. Upon installation of the windshield washer module, turn the module 180 degrees, slide the module under the hood and align the rear locator to the backside of the plenum. 3. Tighten the bolts in sequence as shown.
5	Connector, Windshield Wiper Motor Tip: Connect the electrical connector to the wiper motor prior to installing the module assembly back into the plenum.

WIPER DRIVE SYSTEM MODULE REPLACEMENT (MONTE CARLO)

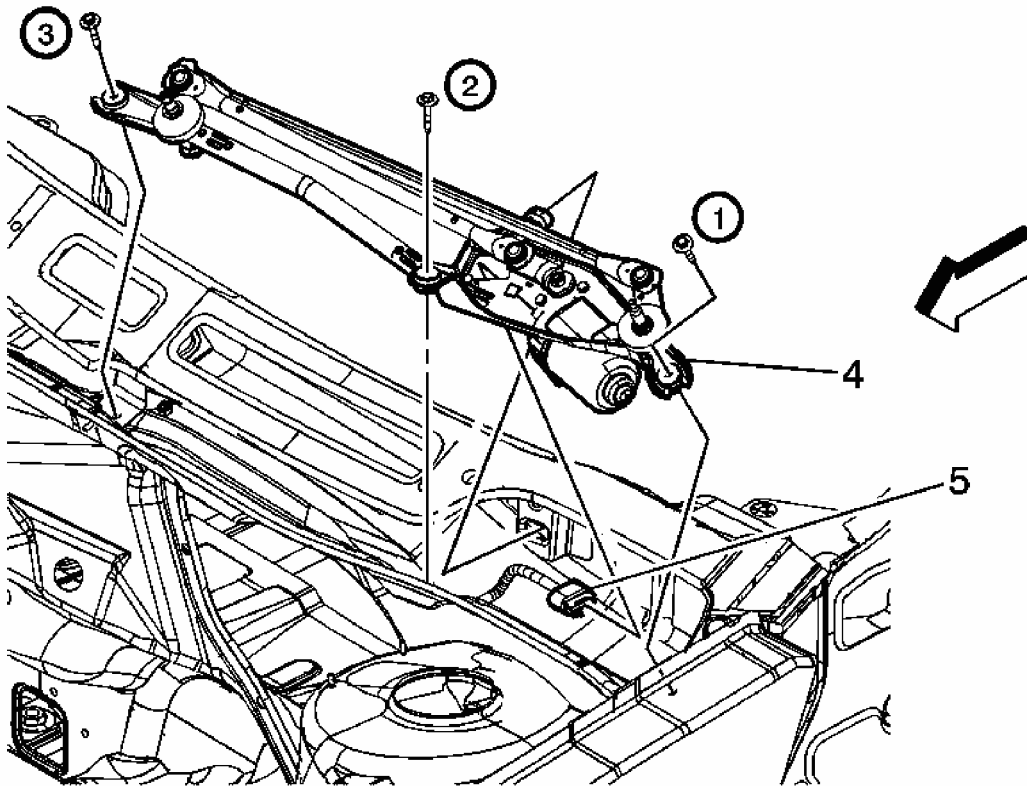


Fig. 18: Replacing Wiper Drive System Module
 Courtesy of GENERAL MOTORS CORP.

Wiper Drive System Module Replacement (Monte Carlo)

Callout	Component Name
NOTE: Refer to Fastener Notice .	
Fastener Tightening Specifications: Refer to Fastener Tightening Specifications .	
Preliminary Procedures	
1. Remove the wiper arms. Refer to Wiper Arm Replacement . 2. Remove the air inlet grille panels. Refer to Air Inlet Grille Panel Replacement .	
1	Windshield Wiper Module Bolt Tip: Tighten bolts in sequence to the specified torque value. Tighten: 9 N.m (80 lb in)
	Windshield Wiper Module Bolt

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2	Tighten: 9 N.m (80 lb in)
3	Windshield Wiper Module Bolt Tighten: 9 N.m (80 lb in)
4	Module Assembly, Windshield Washer System 1. Raise the forward edge of the windshield washer module assembly out of the plenum panel first followed by disconnecting the wiper motor electrical connector. 2. Upon installation of the windshield washer module, turn the module 180 degrees, slide the module under the hood and align the rear locator to the backside of the plenum. 3. Tighten the bolts in sequence as shown.
5	Windshield Wiper Motor Electrical Connector Tip: Connect the electrical connector to the wiper motor prior to installing the module assembly back into the plenum.

WIPER MOTOR REPLACEMENT (IMPALA)

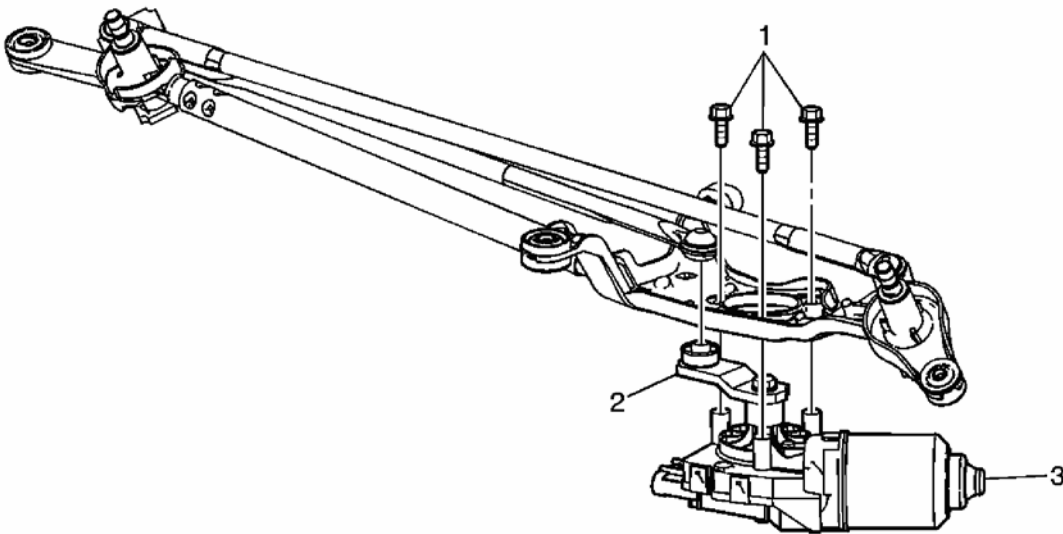


Fig. 19: Replacing Wiper Motor
Courtesy of GENERAL MOTORS CORP.

Wiper Motor Replacement (Impala)

Callout	Component Name
NOTE: Refer to <u>Fastener Notice</u> .	

Fastener Tightening Specifications: Refer to Fastener Tightening Specifications.

Preliminary Procedures

1. Remove the wiper arms. Refer to Wiper Arm Replacement.
2. Remove the air inlet grille panel. Refer to Air Inlet Grille Panel Replacement.
3. Remove the wiper drive system module. Refer to Wiper Drive System Module Replacement (Impala) or Wiper Drive System Module Replacement (Monte Carlo).

1	Windshield Wiper Motor Bolts (Qty: 3) Tighten: 8 N.m (71 lb in)
2	Windshield Wiper Motor Crank Arm Tip: 1. Use the J 39232 or equivalent to separate the transmission arm from the wiper motor crank arm pivot. 2. Use the J 39529 or equivalent to install the transmission arm onto the wiper motor crank arm pivot.
3	Windshield Wiper Motor

WIPER MOTOR REPLACEMENT (MONTE CARLO)

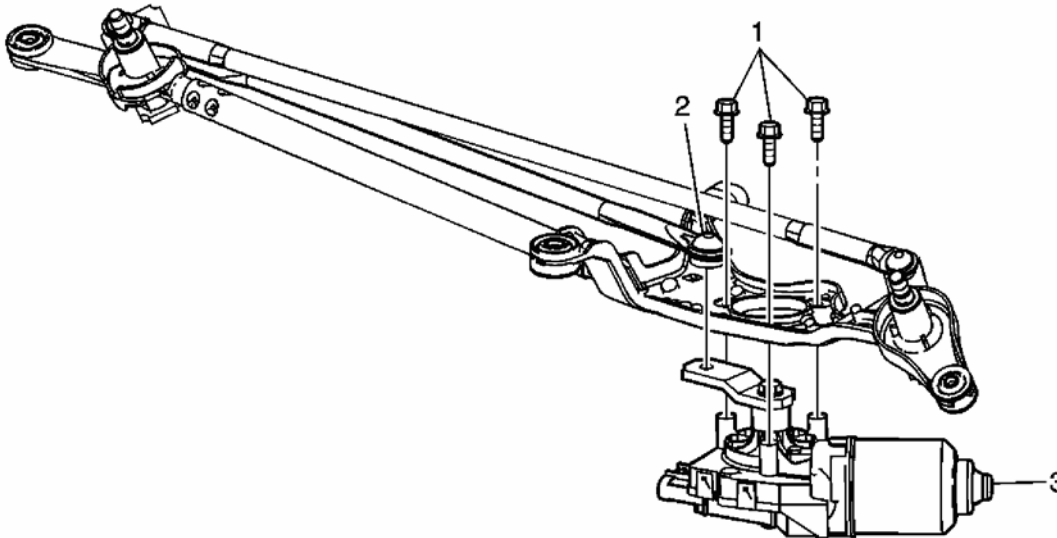


Fig. 20: Replacing Wiper Motor
Courtesy of GENERAL MOTORS CORP.

Wiper Motor Replacement (Monte Carlo)

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Callout	Component Name
NOTE: Refer to Fastener Notice . Fastener Tightening Specifications: Refer to Fastener Tightening Specifications . Preliminary Procedures 1. Remove the wiper arms. Refer to Wiper Arm Replacement . 2. Remove the air inlet grille panel. Refer to Air Inlet Grille Panel Replacement . 3. Remove the wiper drive system module. Refer to Wiper Drive System Module Replacement (Impala) or Wiper Drive System Module Replacement (Monte Carlo) .	
1	Windshield Wiper Motor Bolts (Qty: 3) Tighten: 8 N.m (71 lb in)
2	Windshield Wiper Motor Crank Arm Tip: 1. Use the J 39232 or equivalent to separate the transmission arm from the wiper motor crank arm pivot. 2. Use the J 39529 or equivalent to install the transmission arm onto the wiper motor crank arm pivot.
3	Windshield Wiper Motor

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 **Blade Element Cleaning**.
- Perform the wiper arm tip pressure test. Refer to **Wiper Arm Tip Pressure Check**.
- Inspect the wiper blade element set. Refer to **Wiper Blade Element Check**.

WINDSHIELD GLASS CLEANING

Clean the windshield with windshield cleaner, GM P/N 1050011 (Canadian P/N 992727) or equivalent. The cleaner should not harm the paint finish or scratch the glass. The glass is clean when the water no longer beads, but sheets across the entire glass surface.

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.

DESCRIPTION AND OPERATION**WIPER/WASHER SYSTEM DESCRIPTION AND OPERATION****Wiper/Washer System Components**

The Wiper/Washer System consists of the following components:

- Windshield wiper/washer switch
- Body control module (BCM)
- WPR1 relay
- WPR2 relay
- Windshield wiper motor
- Windshield washer pump

Refer to **Wiper/Washer System Component Views**.

Wiper/Washer System Description

The body control module (BCM) controls wiper motor low speed operation, washer pump and high speed operation. The windshield wiper/washer switch supplies a low or ground on the signal circuits to the BCM for windshield wiper/washer operation. When WASH, MIST, DELAY, LOW, or HIGH is detected, the BCM energizes the WPR1 relay by supplying low signal to the relay coil. This allows battery voltage from the FRT WPR fuse to flow through the relay switched input then through the contacts and out the relay switched output to the WPR2 relay switched contacts. Since the WPR2 relay switched contacts are normally closed to the low speed circuit of the windshield wiper motor, the motor will operate at low speed. For HI speed operation, the BCM supplies the same low signal to the WPR1 relay control circuit and also supplies a low signal to the WPR2 relay control circuit. The WPR2 relays normally opened contacts are now in series with the current supplying WPR1 relay contacts. The WPR2 relay normally open contact at this point supply current to the wiper motors HI input.

Wash Operation

In the WASH position windshield wiper/washer switch supplies a ground signal to the body control module (BCM). The BCM monitors for a low signal condition on this circuit to detect when a WASH cycle is requested. After a short delay, the BCM energizes the wiper relay which will operate the windshield wiper motor at low speed. The wiper motor will continue to operate for 2 wipe cycles after the wash switch is released.

Mist Operation

Windshield wiper/washer system MIST operation is identical to LOW 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 one cycle is complete. If the wiper switch is moved to the MIST position and held, the wiper motor will operate in the LOW mode until the switch is released.

In the MIST position, voltage is supplied through an internal resistor to the signal circuit of the windshield wiper/washer switch of the body control module (BCM). The BCM will energize the wiper relay which will operate the windshield wiper motor at low speed.

Intermittent Operation

Windshield wiper DELAY operation is a low speed wiper motor function with a variable delay interval between the wiper motor cycles. The DELAY interval is determined by a series of 5 resistors within the wiper/washer switch. During DELAY wiper operation the signal circuit voltage is further reduced through the DELAY resistors. The body control module (BCM) monitors the voltage on the signal circuit to determine the delay interval between the low speed wiper motor cycles.

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.

Low Speed Operation

When the wiper switch is in the Low position, voltage is supplied through an internal resistor to the signal circuit. The body control module (BCM) monitors the windshield wiper switch signal circuit, and energizes the wiper relay which will operate the windshield wiper motor. The wiper motor will operate at low speed, since the wiper HI relay is de-energized. Low speed can also be commanded with a scan tool, by commanding wiper relay ON and OFF. Refer to **Scan Tool Output Controls**.

High Speed Operation

In the High position, the windshield wiper/washer switch supplies voltage to both the wiper and wiper HI relay coils. This energizes both relays and allows battery voltage from the wiper relay switched output to the switched input of the wiper HI relay through its contacts and out the switched output of the wiper HI relay to the high speed circuit of the windshield wiper motor. The windshield wiper motor will operate at high speed.

Park Position Operation

Windshield wiper motor park operation is controlled by the body control module (BCM) using an input from the park switch within the wiper motor assembly. The BCM monitors

the windshield wiper motor park switch circuit to determine if the windshield wiper blades are at the bottom of the glass. The circuit will be pulled to ground by the wiper motor park switch while the windshield wiper motor is operating. 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 ignition is turned OFF while the wipers are in mid-cycle, the wipers will stop immediately where they are. The BCM will park the wipers the next time the ignition is cycled ON.

The BCM provides stall protection for the wiper motor by monitoring the park switch. If the park switch does not transition for 3 seconds while the wipers are operating, the BCM will assume that the wiper motor is stalled, and will de-energize the wiper relay until the wiper switch is cycled OFF and ON again.

Windshield Wiper/Washer System Power and Ground

The power source for the wiper system is supplied from the fuse block underhood. The WIPER/WS fuse supplies the current for the drive motor. The WASHER/RVC fuse supplies current to the body control module (BCM) for the control of the washer pump. G100 supplies the ground for the washer pump and washer fluid level switch. Refer to

Wiper/Washer System Schematics.

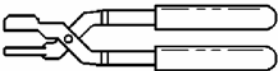
G200 provides ground for the following:

- Windshield wiper motor
- WPR1 relay
- WPR2 relay

SPECIAL TOOLS AND EQUIPMENT

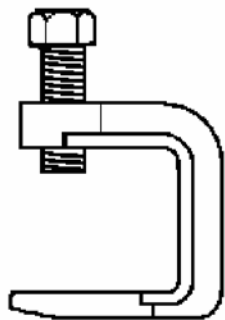
SPECIAL TOOLS

Special Tools

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

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J 39637
Wiper Arm Remover Tool