

2007 Cadillac Escalade

2007 ACCESSORIES & EQUIPMENT Wipers and Washers - Avalanche, Escalade, Suburban, Tahoe & Yukon

2007 ACCESSORIES & EQUIPMENT

Wipers and Washers - Avalanche, Escalade, Suburban, Tahoe & Yukon

SPECIFICATIONS

FASTENER TIGHTENING SPECIFICATIONS

Fastener Tightening Specifications

Application	Specification	
	Metric	English
Air Inlet Grille Panel Screws	1.6 N.m	14 lb in
Plenum Reinforcement Panel Bolts	9 N.m	80 lb in
Rear Window Wiper Arm Nut	9 N.m	80 lb in
Rear Window Wiper Arm Park Ramp Bolt	9 N.m	80 lb in
Rear Window Wiper Motor Assembly Bolts	4.0 N.m	35 lb in
Rear Window Wiper Motor Shaft Nut	4.9 N.m	43 lb in
Windshield Washer Solvent Container Bolts	9 N.m	80 lb in
Windshield Wiper Arm Pivot Shaft Nuts	33 N.m	24 lb ft
Windshield Wiper System Module Bolts to Plenum	9 N.m	80 lb in

SCHEMATIC AND ROUTING DIAGRAMS

WIPER/WASHER SCHEMATICS

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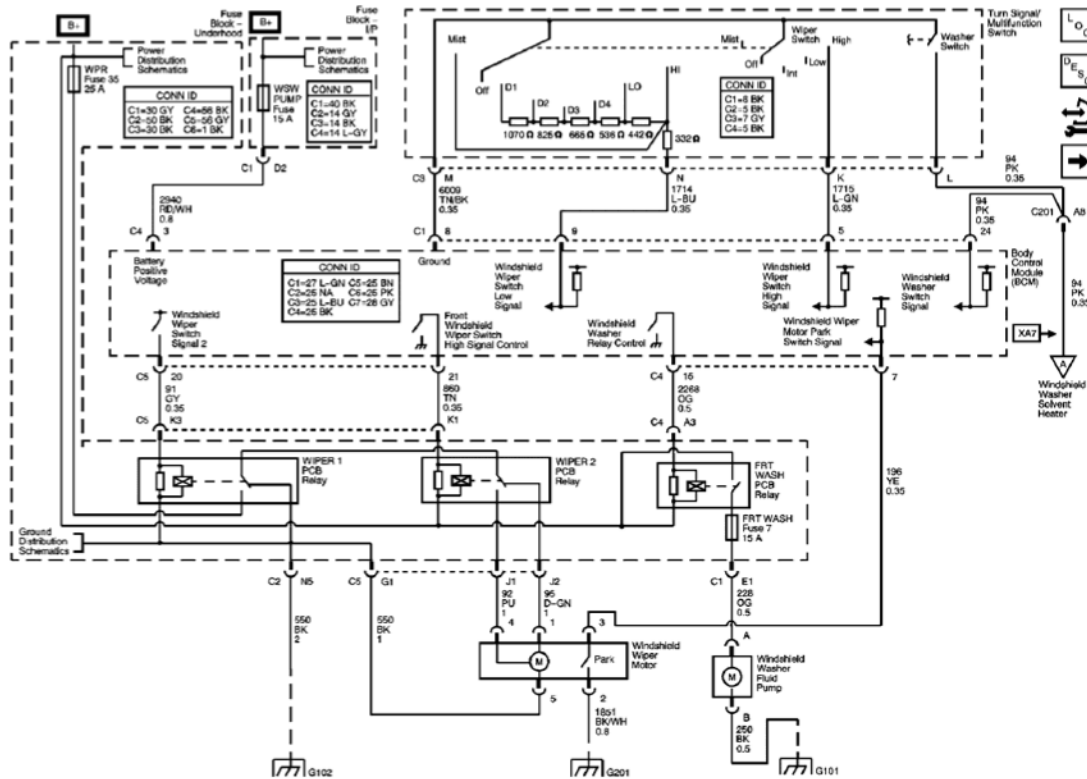
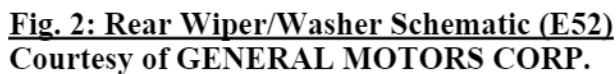


Fig. 1: Front Wiper/Washer Schematic
Courtesy of GENERAL MOTORS CORP.

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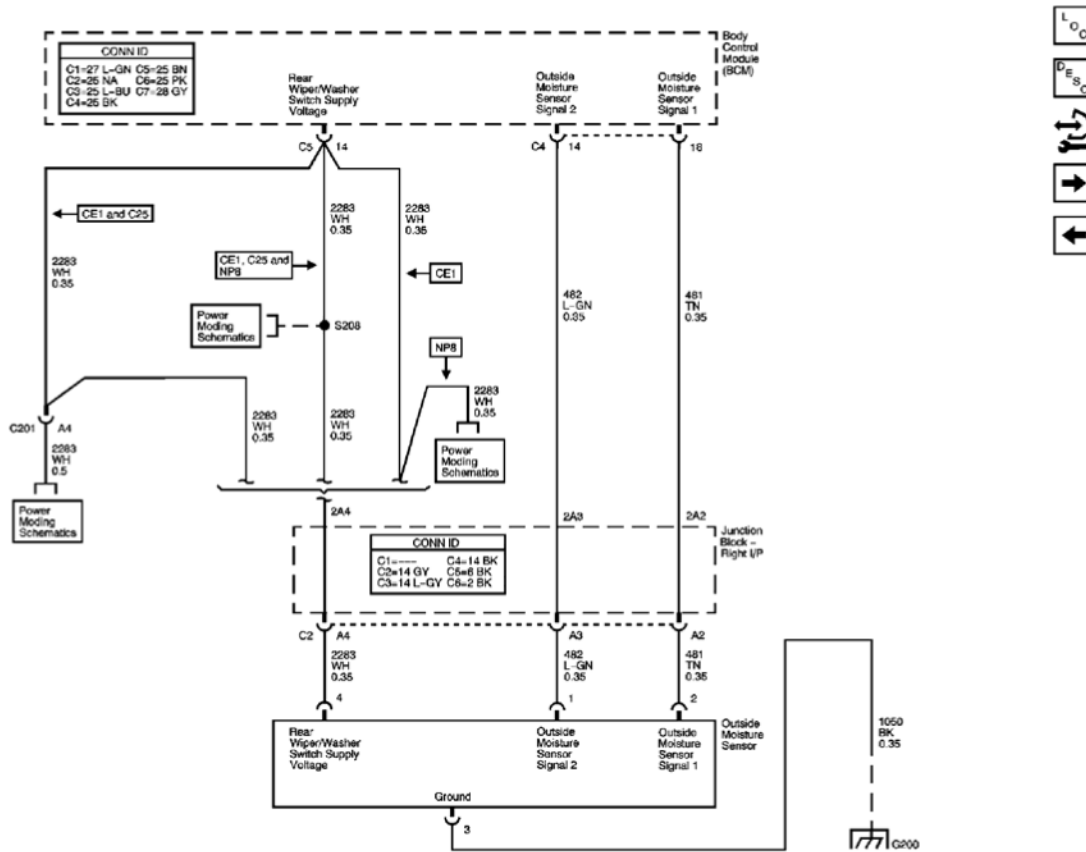
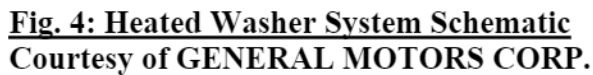


Fig. 3: Outside Moisture Sensor Schematic
Courtesy of GENERAL MOTORS CORP.

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2007 Cadillac Escalade

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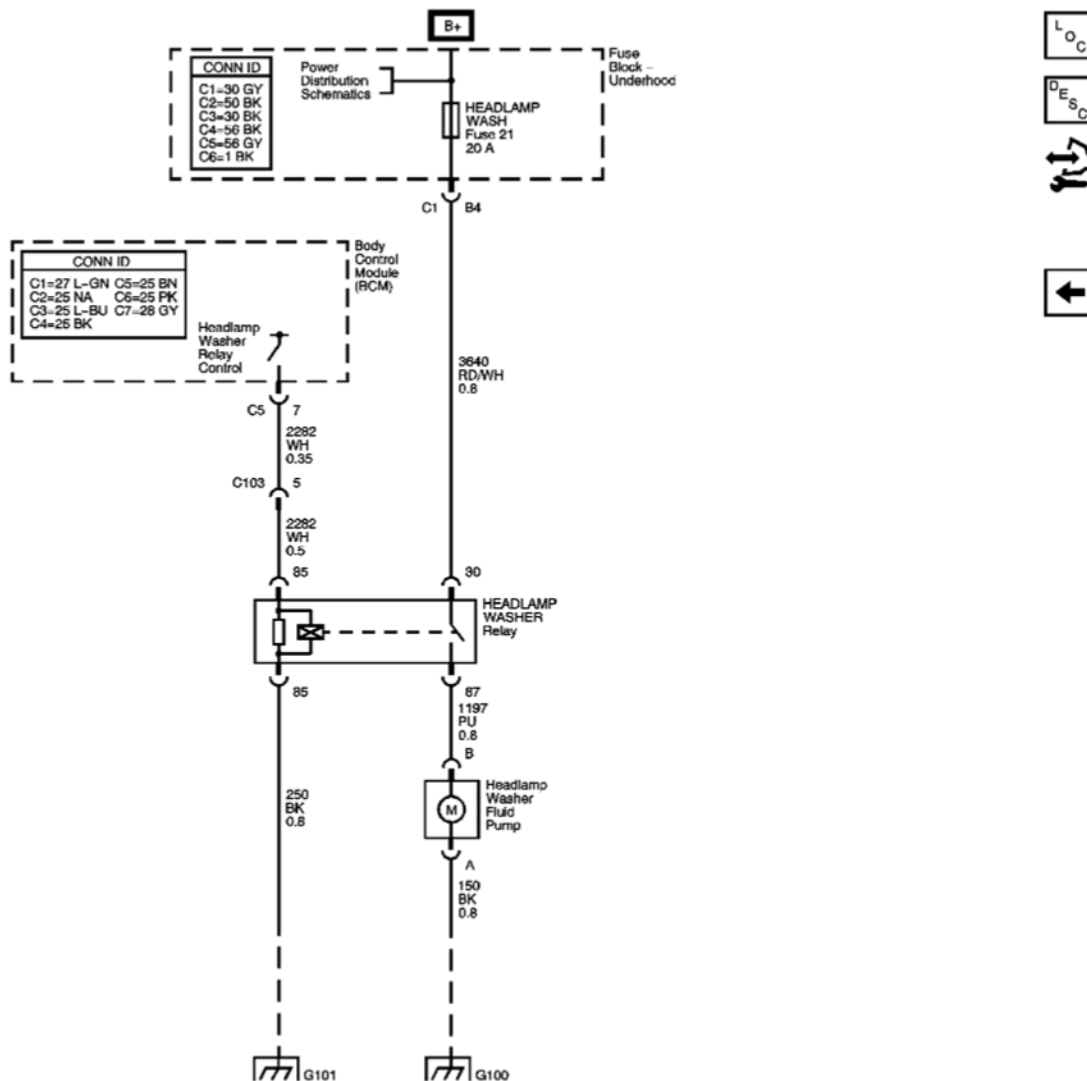


Fig. 5: Headlamp Washers Schematic - Export
 Courtesy of GENERAL MOTORS CORP.

COMPONENT LOCATOR

WIPER/WASHER COMPONENT VIEWS

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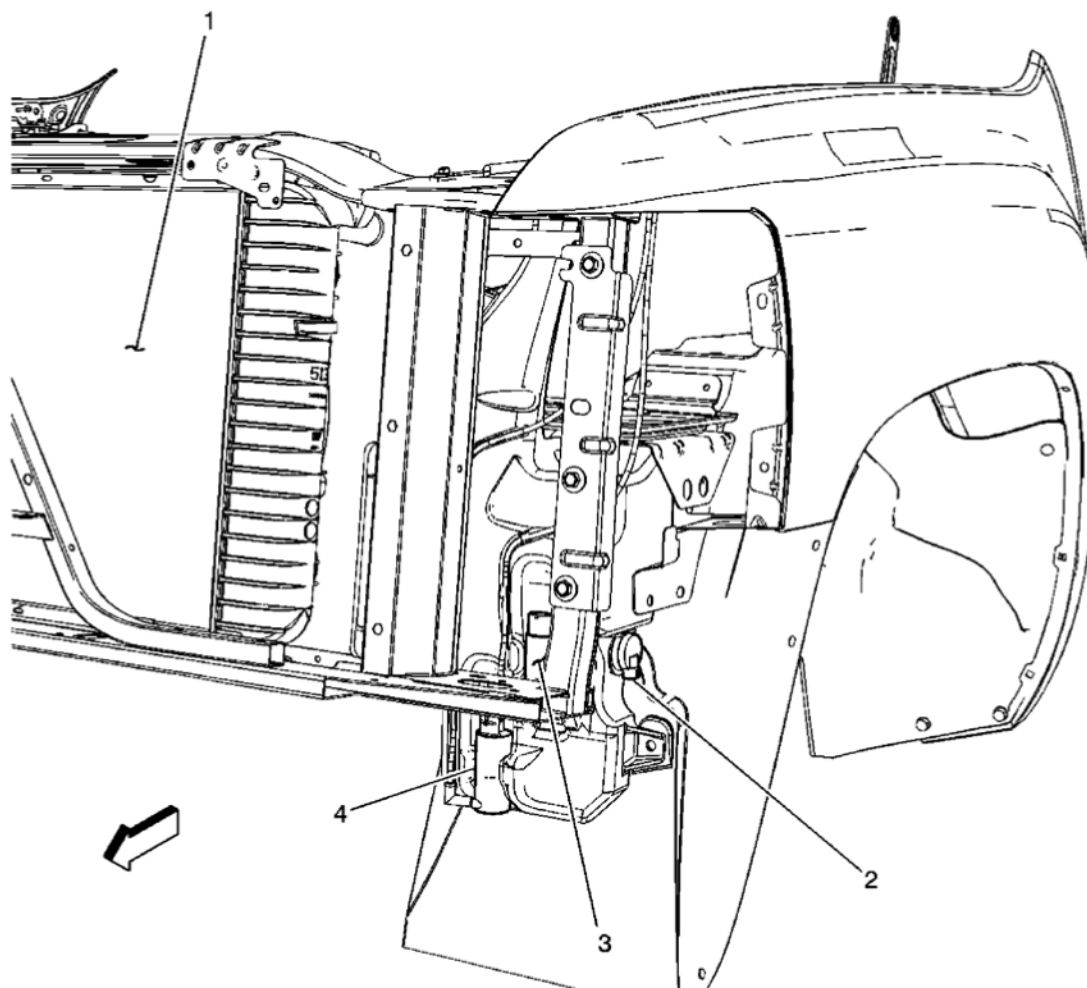


Fig. 6: Windshield Washer Container Components
Courtesy of GENERAL MOTORS CORP.

Callouts For Fig. 6

Callout	Component Name
1	Radiator
2	Washer Fluid Level Switch
3	Rear Window Washer Fluid Pump
4	Windshield Washer Fluid Pump

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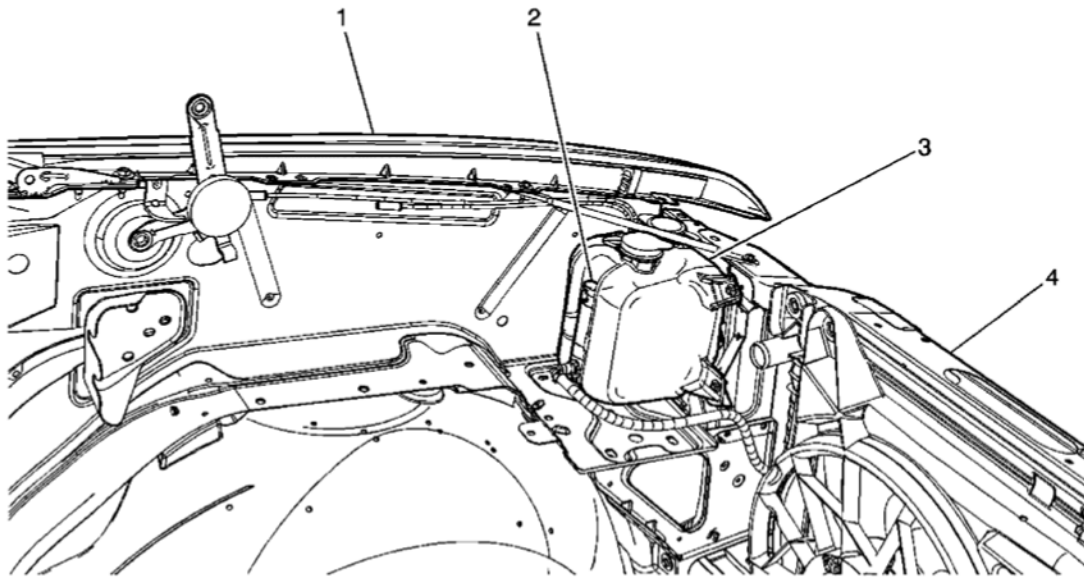


Fig. 7: Front Headlamp Washer Bottle Components
Courtesy of GENERAL MOTORS CORP.

Callouts For Fig. 7

Callout	Component Name
1	LF Fender
2	Headlamp Washer Fluid Pump (CE4)
3	Headlamp Washer Fluid Reservoir (CE4)
4	Radiator

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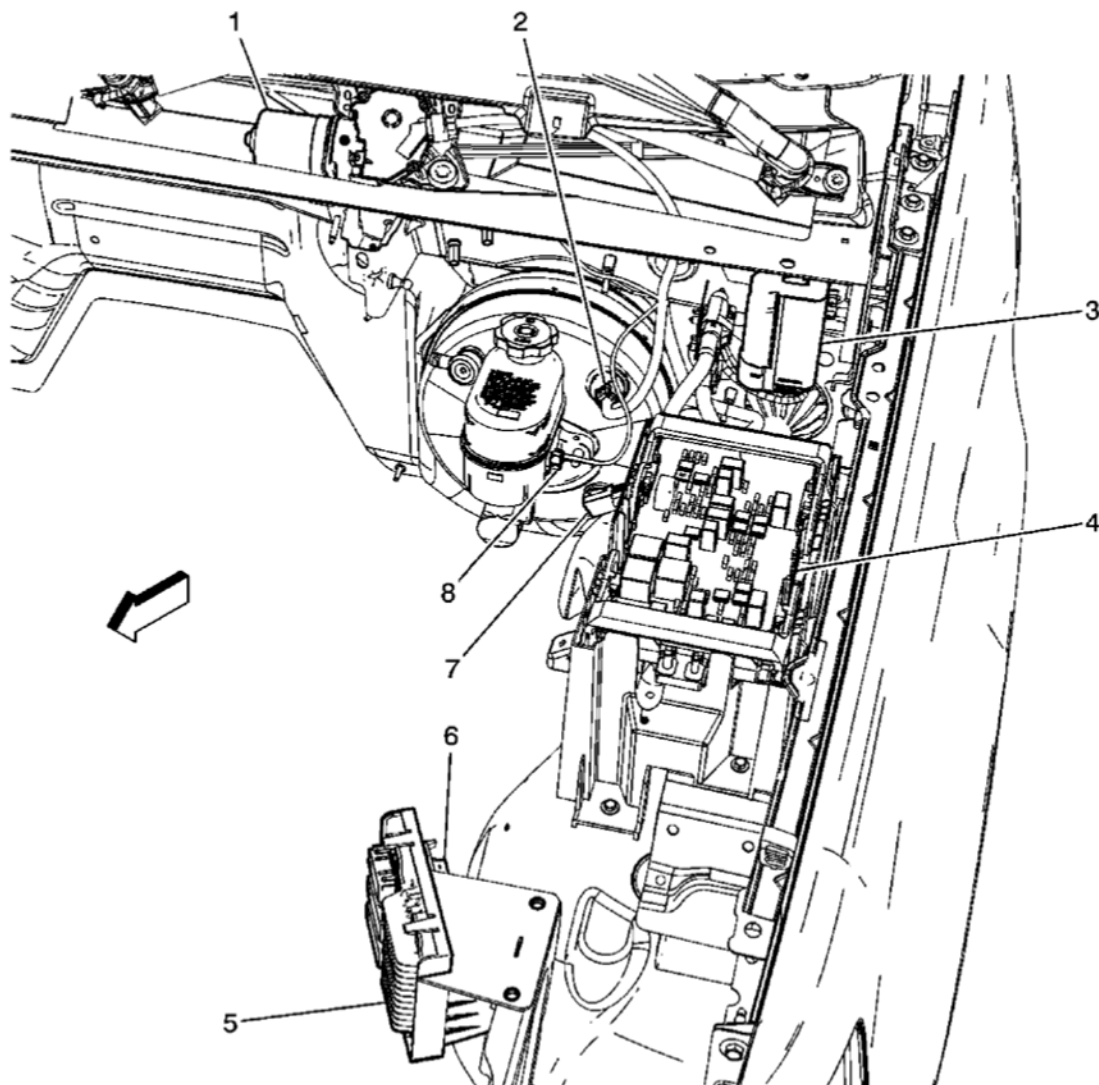


Fig. 8: Left Side of the Engine Compartment
Courtesy of GENERAL MOTORS CORP.

Callouts For Fig. 8

Callout	Component Name
1	Windshield Wiper Motor
2	Power Brake Booster
3	Windshield Washer Solvent Heater
4	Fuse Block - Underhood
5	Engine Control Module (ECM)
6	Transmission Control Module (TCM)
7	Brake Booster Vacuum Sensor
8	Brake Fluid Level Switch

2007 Cadillac Escalade

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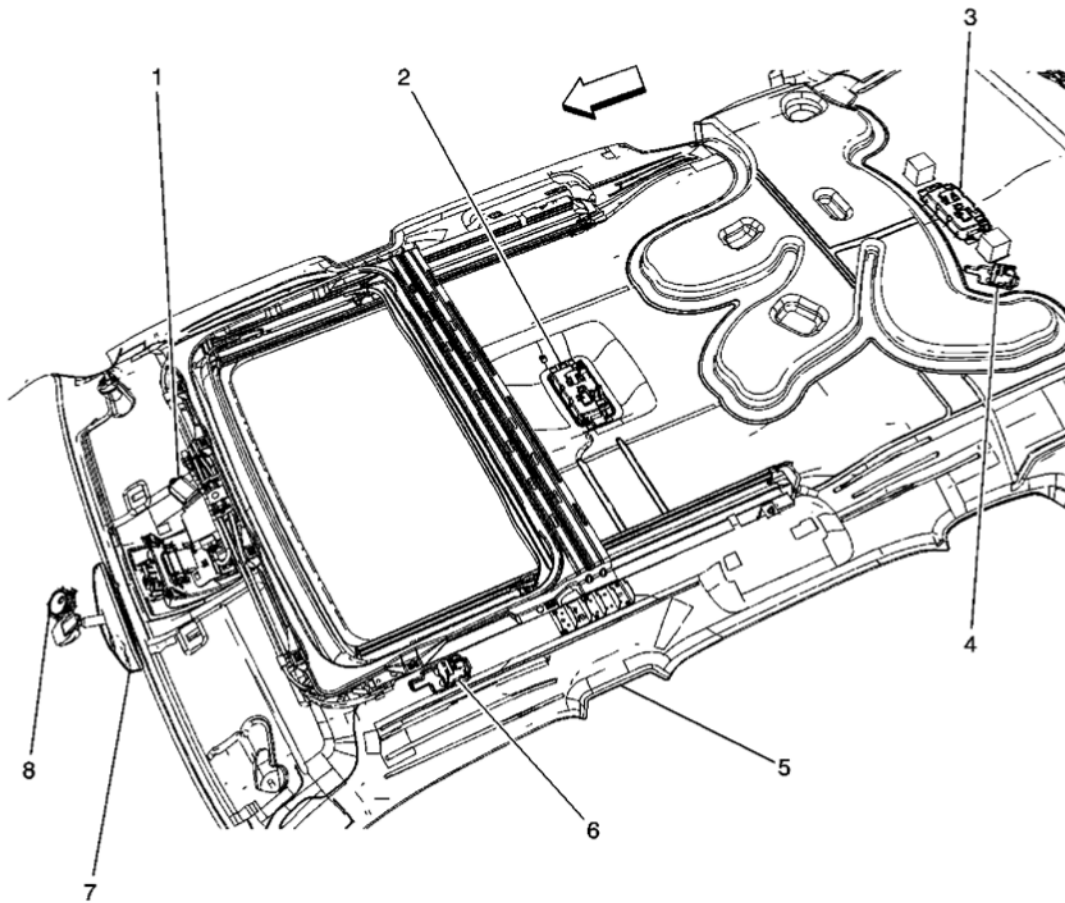


Fig. 9: Above the Headliner

Courtesy of GENERAL MOTORS CORP.

Callouts For Fig. 9

Callout	Component Name
1	Sunroof Module (CF5)
2	Courtesy/Reading Lamps - 2nd Row
3	Courtesy/Reading Lamps - 3rd Row
4	Inside Air Temperature Sensor - Rear (CJ2)
5	Headliner
6	Inside Air Temperature Sensor - Front (CJ2)
7	Inside Rearview Mirror (ISRVM)
8	Outside Moisture Sensor (CE1)

2007 Cadillac Escalade

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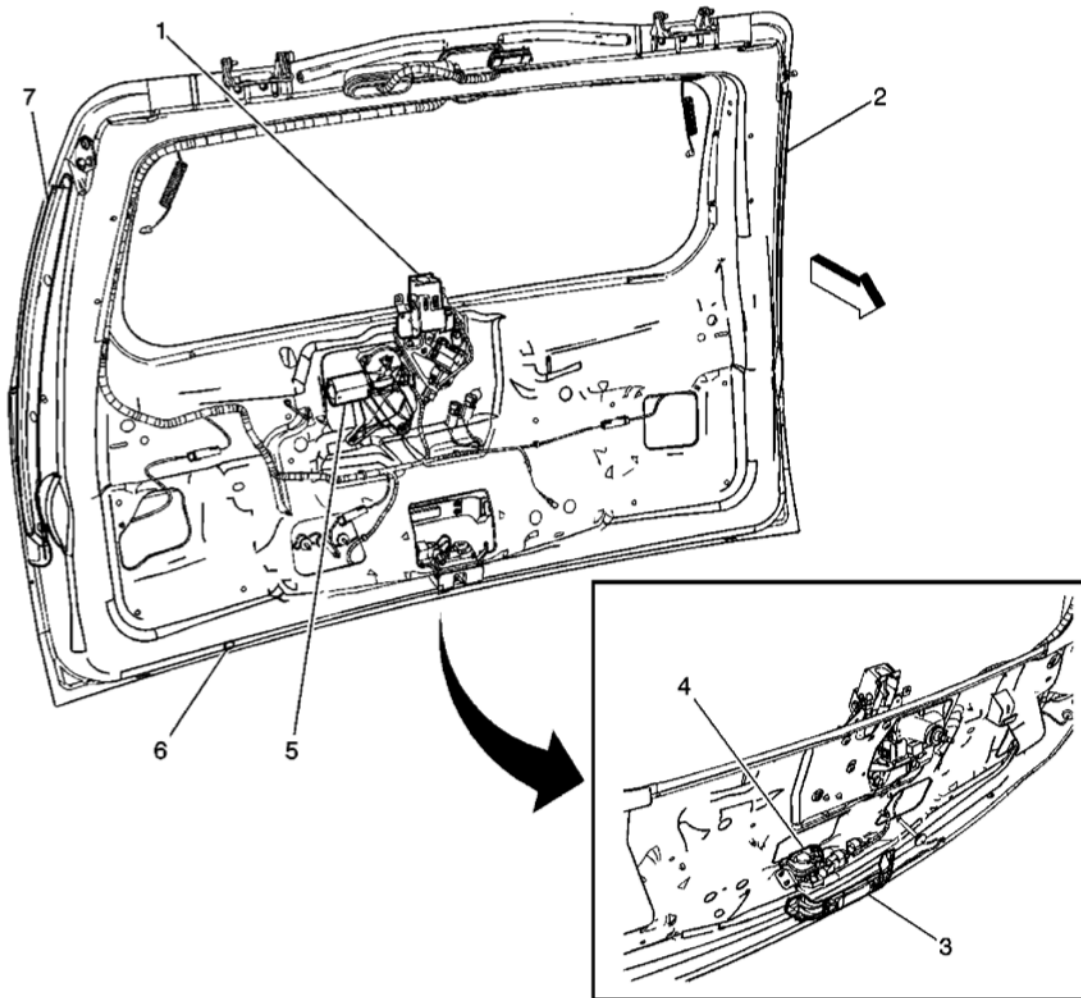


Fig. 10: Liftgate Components

Courtesy of GENERAL MOTORS CORP.

Callouts For Fig. 10

Callout	Component Name
1	Liftglass Latch Assembly
2	Liftgate Object Sensor - Left (E61)
3	Liftgate Handle Switch (E61)
4	Liftgate Latch Assembly
5	Rear Window Wiper Motor
6	Liftgate Object Sensor - Right (E61)

WIPER/WASHER CONNECTOR END VIEWS

Headlamp Washer Fluid Pump (CE4)

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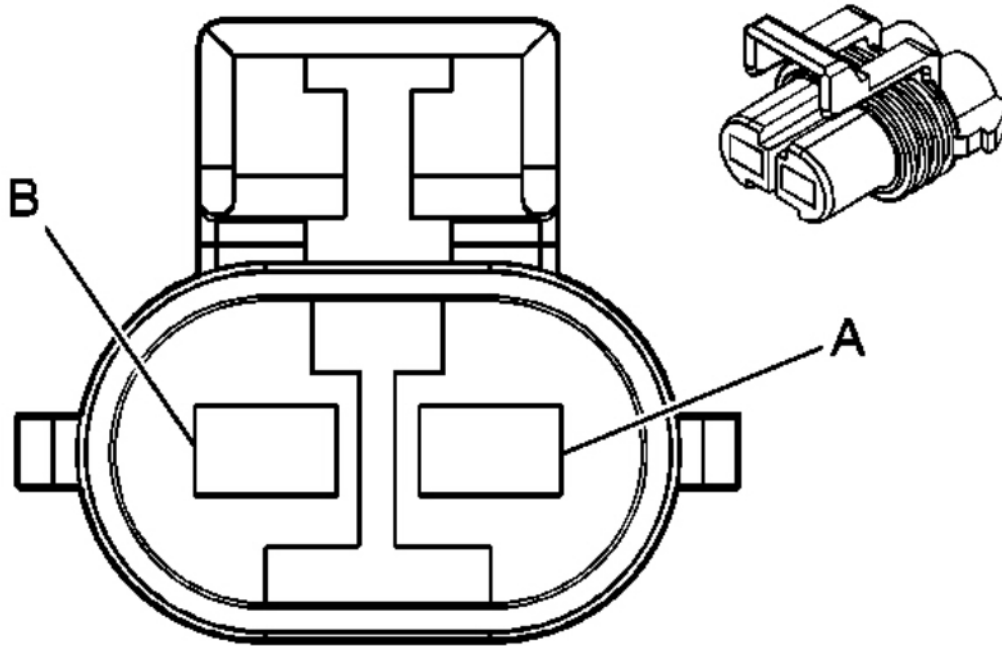


Fig. 11: Headlamp Washer Fluid Pump (CE4) Connector End View
Courtesy of GENERAL MOTORS CORP.

Headlamp Washer Fluid Pump (CE4) Connector Parts Information

Connector Part Information

- OEM: 12052613
- Service: 12085212
- Description: 2-Way F Metri-Pack 480 Series, Sealed (BK)

Terminal Part Information

- Terminal/Tray: 12048451/2
- Core/Insulation Crimp: F/3
- Release Tool/Test Probe: 12094430/J-35616-40 (BU)

Headlamp Washer Fluid Pump (CE4) Connector Terminal Identification

Pin	Wire Color	Circuit No.	Function
A	BK	150	Ground
B	PU	1197	Headlamp Washer Pump Control

Headlamp Washer Fluid Pump Relay (CE4)

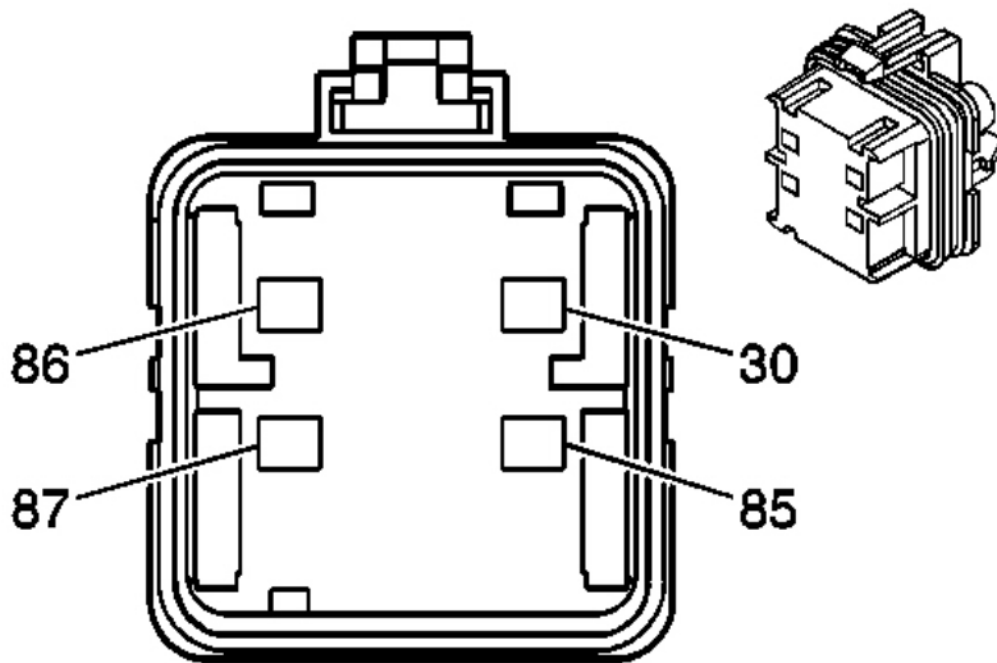


Fig. 12: Headlamp Washer Fluid Pump Relay (CE4) Connector End View
Courtesy of GENERAL MOTORS CORP.

Headlamp Washer Fluid Pump Relay (CE4) Connector Parts Information

Connector Part Information

- OEM: 12129716
- Service: 15306045
- Description: 4-Way F Metri-Pack 280 Series, Flexlock (M-GY)

Terminal Part Information

- Terminal/Tray: 12110847/4
- Core/Insulation Crimp: C/5
- Release Tool/Test Probe: 15315247/J-35616-4A (PU)

Headlamp Washer Fluid Pump Relay (CE4) Connector Terminal Identification

Pin	Wire Color	Circuit No.	Function

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30	RD/WH	3640	Battery Positive Voltage
85	BK	250	Ground
86	WH	2282	Headlamp Washer Relay Control
87	PU	1197	Headlamp Washer Pump Control

Outside Moisture Sensor (CE1)

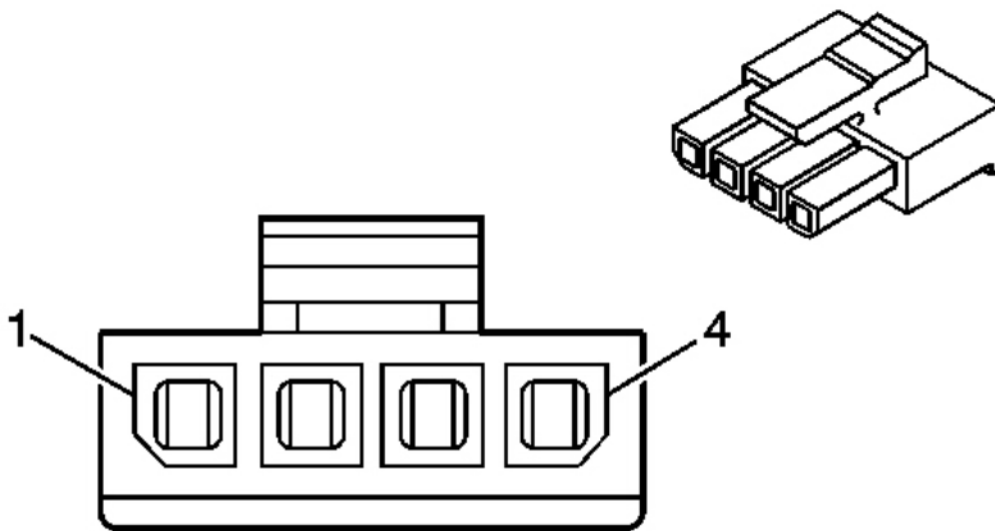


Fig. 13: Outside Moisture Sensor (CE1) Connector End View
Courtesy of GENERAL MOTORS CORP.

Outside Moisture Sensor (CE1) Connector Parts Information

Connector Part Information

- OEM: 15324252
- Service: 15306387
- Description: 4-Way F Micro-Fit Series (BK)

Terminal Part Information

- Terminal/Tray: 43030-0010/23
- Core/Insulation Crimp: H/H
- Release Tool/Test Probe: J-38125-213/J-35616-64B (L-BU)

Outside Moisture Sensor (CE1) Connector Terminal Identification

2007 Cadillac Escalade

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Pin	Wire Color	Circuit No.	Function
1	L-GN	482	Outside Moisture Sensor Signal 2
2	TN	481	Outside Moisture Sensor Signal 1
3	BK	1050	Ground
4	WH	2283	Rear Wiper/Washer Switch Supply Voltage

Rear Window Washer Fluid Pump

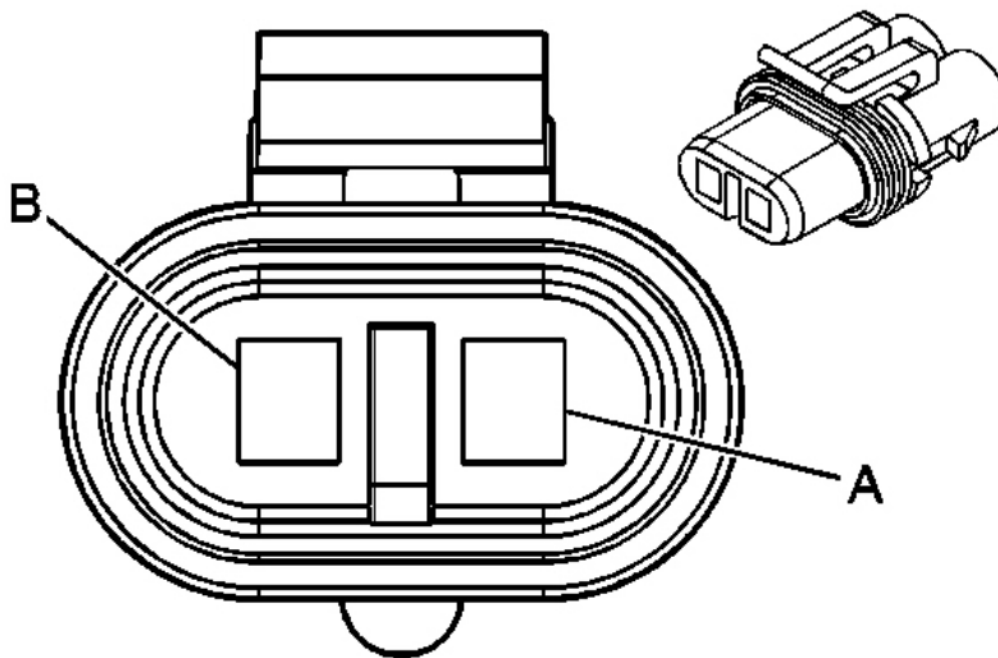


Fig. 14: Rear Window Washer Fluid Pump Connector End View
Courtesy of GENERAL MOTORS CORP.

Rear Window Washer Fluid Pump Connector Parts Information

Connector Part Information

- OEM: 12020599
- Service: 12102664
- Description: 2-Way F Metri-Pack 280 Series (BK)

Terminal Part Information

- Terminal/Tray: 12077411/2

2007 Cadillac Escalade

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- Core/Insulation Crimp: 2/5
- Release Tool/Test Probe: 12094430/J-35616-4A (PU)

Rear Window Washer Fluid Pump Connector Terminal Identification

Pin	Wire Color	Circuit No.	Function
A	D-GN/WH	266	Rear Window Washer Pump Supply Voltage
B	BK	250	Ground

Rear Window Wiper Motor (E52)

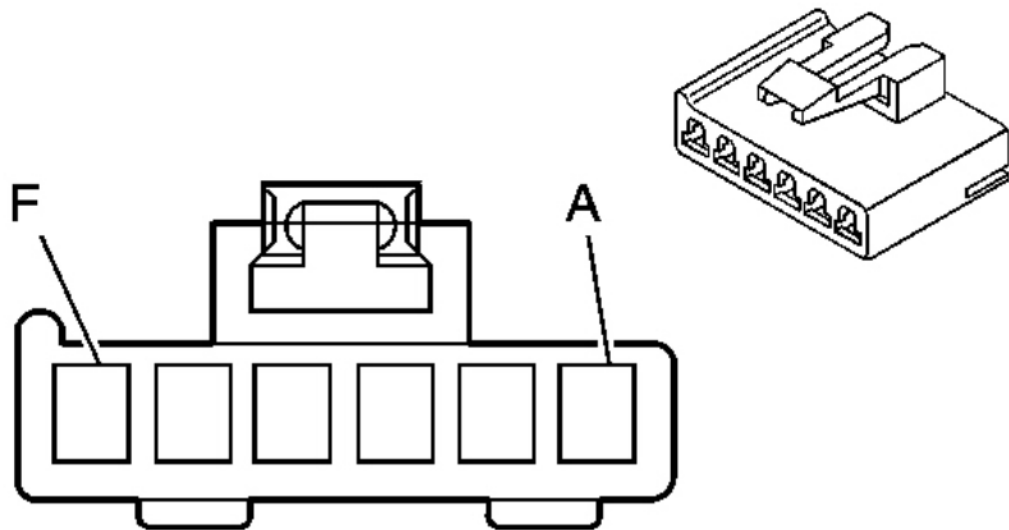


Fig. 15: Rear Window Wiper Motor (E52) Connector End View
Courtesy of GENERAL MOTORS CORP.

Rear Window Wiper Motor (E52) Connector Parts Information

Connector Part Information

- OEM: 12092254
- Service: 12126021
- Description: 6-Way F Metri-Pack 280 Series (BK)

Terminal Part Information

- Pins: E

2007 Cadillac Escalade

2007 ACCESSORIES & EQUIPMENT Wipers and Washers - Avalanche, Escalade, Suburban, Tahoe & Yukon

- Terminal/Tray: 12015858/4
- Core/Insulation Crimp: TBD
- Release Tool/Test Probe: TBD

- Pins: A, B, C, F
- Terminal/Tray: 12034046/2
- Core/Insulation Crimp: E/A
- Release Tool/Test Probe: 12094430/J-35616-4A (PU)

- Pins: D
- Terminal/Tray: 12066214/2
- Core/Insulation Crimp: F/D
- Release Tool/Test Probe: 12094430/J-35616-4A (PU)

Rear Window Wiper Motor (E52) Connector Terminal Identification

Pin	Wire Color	Circuit No.	Function
A	GY	391	Rear Window Wiper Switch Signal
B	TN	6188	Lift Glass/Trunk Motor Release Control
C	PK/BK	1303	Liftgate Ajar Switch Signal
D	BK	1450	Ground
E	RD/WH	2040	Battery Positive Voltage
F	L-BU	6795	Lift Glass/Trunk Motor Release Control 2

Washer Fluid Level Sensor

2007 Cadillac Escalade

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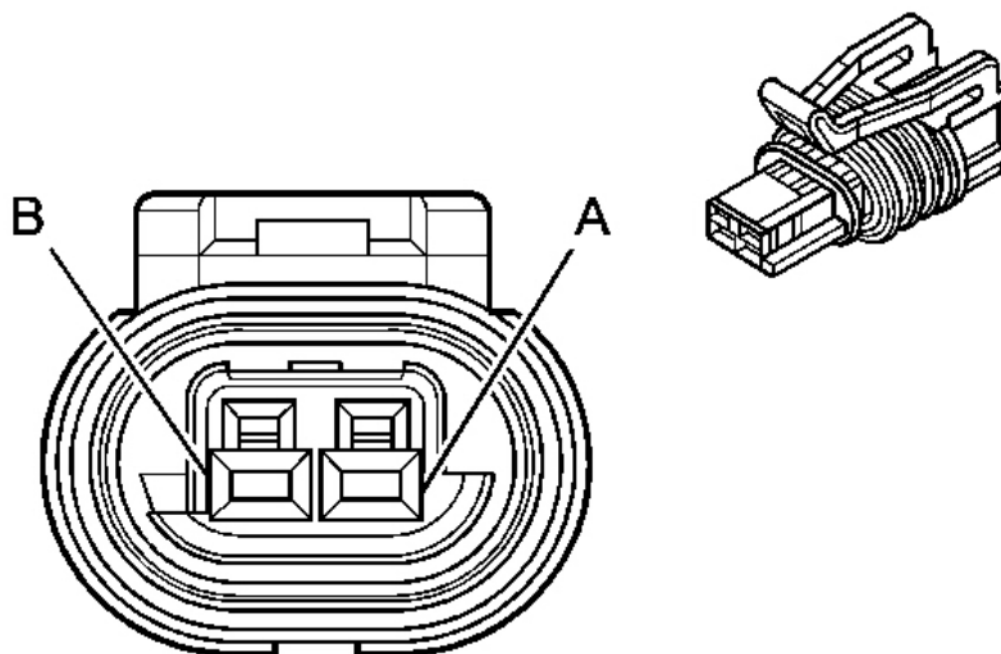


Fig. 16: Washer Fluid Level Sensor Connector End View
Courtesy of GENERAL MOTORS CORP.

Washer Fluid Level Sensor Connector Parts Information

Connector Part Information

- OEM: 15449028
- Service: 88987993
- Description: 2-Way F 150 GT Series Sealed (BK)

Terminal Part Information

- Terminal/Tray: 15326267/19
- Core/Insulation Crimp: Pins A - E/4
- Core/Insulation Crimp: Pins B - E/1
- Release Tool/Test Probe: 15315247/J-35616-2A (GY)

Washer Fluid Level Sensor Connector Terminal Identification

Pin	Wire Color	Circuit No.	Function
A	TN	185	Low Washer Fluid Indicator Control

B	BK	150	Ground
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Windshield Washer Fluid Pump

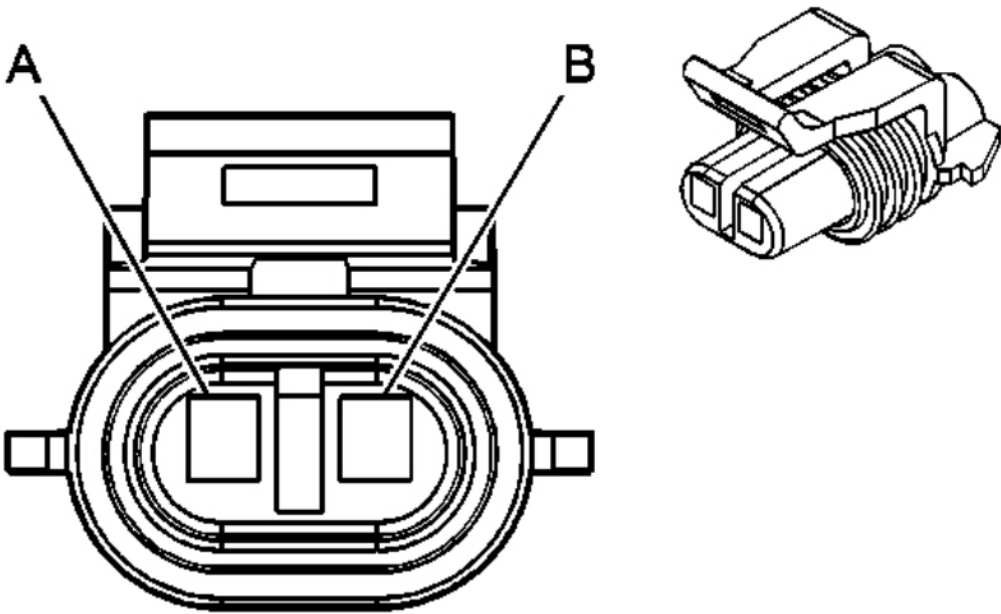


Fig. 17: Windshield Washer Fluid Pump Connector End View
 Courtesy of GENERAL MOTORS CORP.

Windshield Washer Fluid Pump Connector Parts Information

Connector Part Information			
•	OEM:	12052641	
•	Service:	12102747	
•	Description:	2-Way F Metri-Pack 150 Series (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 Connector Terminal Identification

Pin	Wire Color	Circuit No.	Function
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2007 Cadillac Escalade

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A	OG	228	Windshield Washer Pump Control
B	BK	250	Ground

Windshield Washer Solvent Heater C1 (XA7)

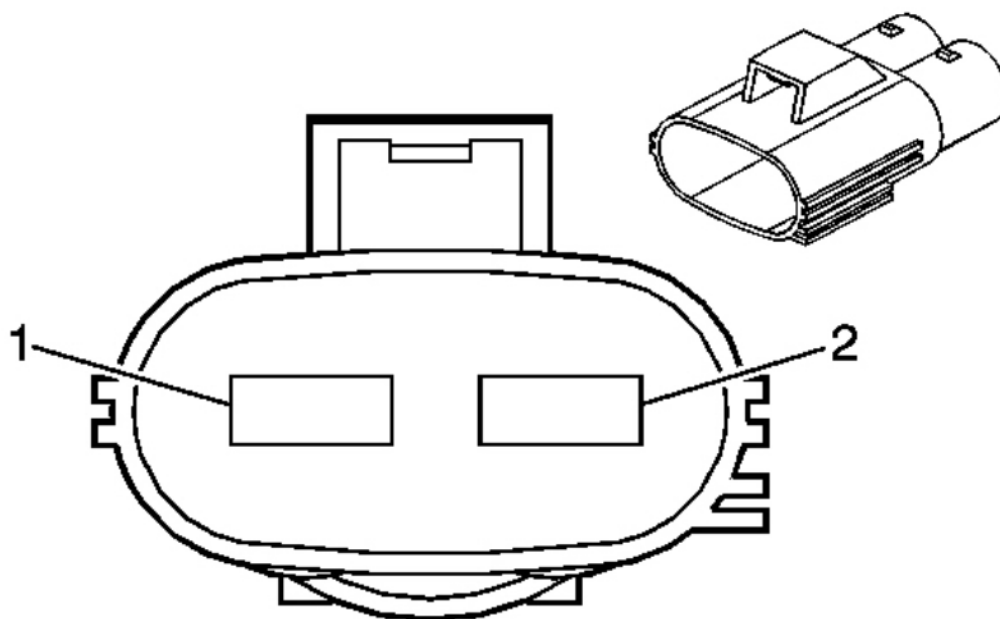


Fig. 18: Windshield Washer Solvent Heater C1 (XA7) Connector End View
Courtesy of GENERAL MOTORS CORP.

Windshield Washer Solvent Heater C1 (XA7) Connector Parts Information

Connector Part Information

- OEM: 15489811
- Service: 19115654
- Description: 2-Way M Y-Type 9.5 Series, Sealed (BK)

Terminal Part Information

- Terminal/Tray: 7114-3250/14
- Core/Insulation Crimp: G/3
- Release Tool/Test Probe: 12094430/J-35616-21 (RD)

Windshield Washer Solvent Heater C1 (XA7) Connector Terminal Identification

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Pin	Wire Color	Circuit No.	Function
1	RD/BK	1642	Battery Positive Voltage
2	BK	1350	Ground

Windshield Washer Solvent Heater C2 (XA7)

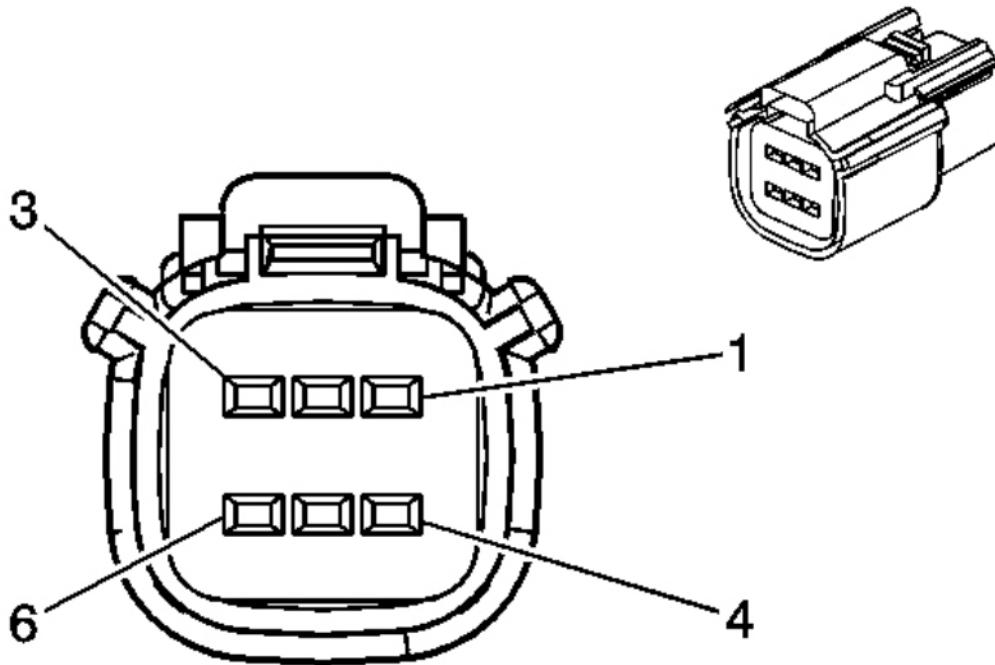


Fig. 19: Windshield Washer Solvent Heater C2 (XA7) Connector End View
Courtesy of GENERAL MOTORS CORP.

Windshield Washer Solvent Heater C2 (XA7) Connector Parts Information

Connector Part Information

- OEM: 15423411
- Service: 19115669
- Description: 6-Way F 1.5 Sealed (BK)

Terminal Part Information

- Terminal/Tray: 33012-1003/23
- Core/Insulation Crimp: 2-E/2

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- Release Tool/Test Probe: J-38125-217/J-35616-2A (GY)

Windshield Washer Solvent Heater C2 (XA7) Connector Terminal Identification

Pin	Wire Color	Circuit No.	Function
1	L-GN	6096	Washer Fluid Heated Control Switch Signal
2	D-BU/WH	5970	Washer Fluid Heated Control Switch LED Supply Voltage
3	-	-	Not Used
4	BK/WH	1851	Ground
5	PK	94	Windshield Washer Switch Signal
6	OG	300	Ignition 3 Voltage

Windshield Wiper Motor

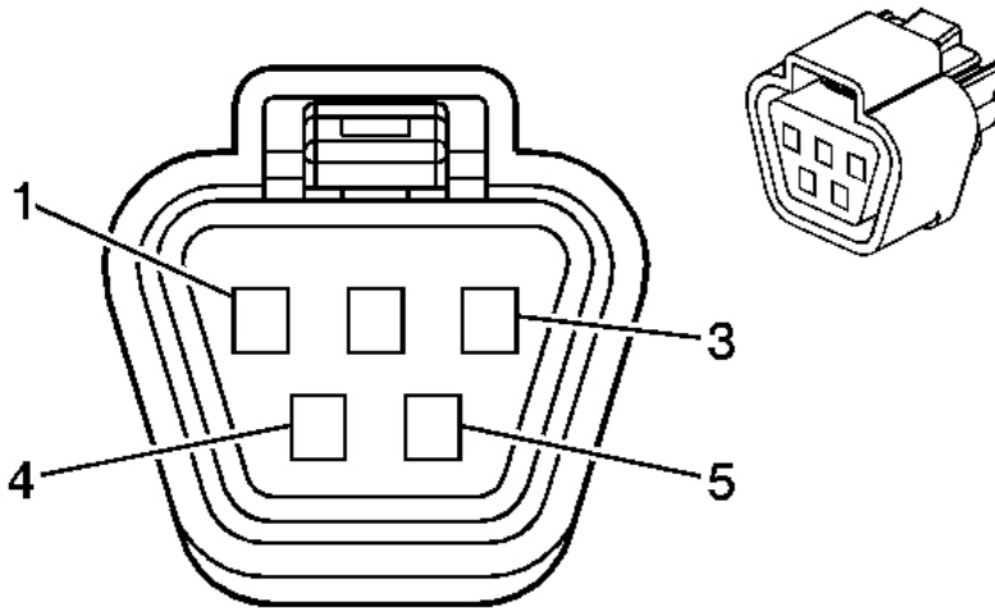


Fig. 20: Windshield Wiper Motor Connector End View
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Windshield Wiper Motor Connector Parts Information

Connector Part Information

- OEM: 15316488

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- Service: 19149298
- Description: 5-Way F 090 Series Sealed (GY)

Terminal Part Information

- Pins: 1, 4, 5
- Terminal/Tray: 8100-0461/6
- Core/Insulation Crimp: 2/1
- Release Tool/Test Probe: 15315247/J-35616-2A (GY)
- Pins: 2, 3
- Terminal/Tray: 8100-0460/6
- Core/Insulation Crimp: E/1
- Release Tool/Test Probe: 15315247/J-35616-2A (GY)

Windshield Wiper Motor Connector Terminal Identification

Pin	Wire Color	Circuit No.	Function
1	D-GN	95	Windshield Washer Switch Signal
2	BK/WH	1851	Ground
3	YE	196	Windshield Wiper Motor Park Switch Signal
4	PU	92	Windshield Wiper Motor High Speed Control
5	BK	550	Ground

DIAGNOSTIC INFORMATION AND PROCEDURES

DIAGNOSTIC CODE INDEX

DIAGNOSTIC CODE INDEX

DTC	Description
<u>DTC B3715</u>	Front Wiper Relay Drive Circuit Short to Ground
<u>DTC B3873</u>	Front Washer Relay Circuit
<u>DTC B3875</u>	Wiper High Speed Relay Circuit
<u>DTC B3922</u>	Front Wiper Function Select Circuit

DIAGNOSTIC STARTING POINT - WIPER/WASHER SYSTEMS

Begin the system diagnosis with **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 identification of any stored diagnostic trouble codes (DTCs) and their status

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

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.

2007 Cadillac Escalade

2007 ACCESSORIES & EQUIPMENT Wipers and Washers - Avalanche, Escalade, Suburban, Tahoe & Yukon

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

DTC Descriptor

DTC B3715 02

Front Wiper Relay Drive Circuit Short to Ground

Diagnostic Fault Information

IMPORTANT: Always perform the Diagnostic System Check - Vehicle prior to using this diagnostic procedure.

DTC B3715

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Windshield Washer Switch Signal	6	8	1	-

2007 Cadillac Escalade

2007 ACCESSORIES & EQUIPMENT Wipers and Washers - Avalanche, Escalade, Suburban, Tahoe & Yukon

	8			
Windshield Wiper Motor Relay Coil Supply Voltage	B3715 00	2	6	-
Windshield Wiper Switch High Signal	6	4	1	-
Windshield Wiper Switch Low Signal	B3922 00	3	1	-
Windshield Wiper Motor Park Switch Signal	5	5	-	-
Windshield Wiper Motor High Speed Control	2	4	-	-
Windshield Wiper Motor Low Speed Control	2	3	-	-
Windshield Wiper Motor Ground	-	2	-	-
Windshield Wiper Switch Ground	-	1	-	-
Wiper High Speed Relay Control	7	4	B3875 00	-
Wiper Relay Ground	-	2	-	-
1. Wipers and washers inoperative all modes 2. Wipers inoperative all modes and washers work 3. Delay or low speed wipers inoperative 4. High speed wipers inoperative 5. Wipers do not park 6. Wipers always on 7. Wipers operate at high speed in the low speed mode 8. Washer malfunction				

Circuit/System Description

The body control module (BCM) monitors the control circuit of the wiper 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.

Conditions for Running the DTC

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

Conditions for Setting the DTC

If the BCM detects a short to ground in the wiper relay control circuit.

Action Taken When the DTC Sets

The BCM will not activate the output.

Conditions for Clearing the DTC

2007 Cadillac Escalade

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- 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.

Reference Information

Schematic Reference

Wiper/Washer Schematics

Connector End View Reference

Wiper/Washer Connector End Views

Electrical Information Reference

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

Scan Tool Reference

- Scan Tool Output Controls
- Scan Tool Data List
- Scan Tool Data Definitions

Circuit/System Testing

1. Ignition OFF, disconnect the C2 harness connector at the underhood fuse block.
2. Connect a test lamp between the control circuit terminal 27 and ground.
3. Command the Wiper Relay ON and OFF with a scan tool. The test lamp should turn ON and OFF when changing between the commanded states.
 - If the test lamp is always ON, test the control circuit for a short to voltage. If the circuit tests normal, test or replace the body control module.
 - If the test lamp is always OFF, test for a short to ground or an open/high resistance on the control circuit. If the circuit tests normal, test or replace the body control module.
4. If all circuits test normal, test or replace the underhood fuse block.

Repair Procedures

IMPORTANT: Always perform the Diagnostic Repair Verification after completing the diagnostic procedure.

2007 Cadillac Escalade

2007 ACCESSORIES & EQUIPMENT Wipers and Washers - Avalanche, Escalade, Suburban, Tahoe & Yukon

- **Underhood Electrical Center or Junction Block Replacement**
- **Control Module References** for BCM replacement, setup, and programming

DTC B3873

DTC Descriptor

DTC B3873 00

Front Washer Relay Circuit

Diagnostic Fault Information

IMPORTANT: Always perform the **Diagnostic System Check - Vehicle** prior to using this diagnostic procedure.

DTC B3873

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Windshield Washer Switch Signal	2	1	3	-
Windshield Washer Pump Control	1	1	2	-
Windshield Washer relay Control	2	1	B3873	-
Windshield Washer Pump Ground	-	1	-	-
Windshield Wiper Switch Ground	-	3	-	-
1. Washer Inoperative 2. Washers Always ON 3. Windshield Wiper System Malfunction				

Circuit/System Description

The windshield washer function is controlled by the body control module (BCM). When the washer switch is pressed, ground is applied through the switch contacts and the signal circuit to the BCM indicating the wash request. The BCM then applies ground through the control circuit to the coil side of the WSH Relay energizing the relay. With the relay energized, battery voltage from the WPR fuse is applied through the switch contacts of the relay, the WSW/PUMP Fuse, and the control circuit to the windshield washer fluid pump.

Conditions for Running the DTC

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

2007 Cadillac Escalade

2007 ACCESSORIES & EQUIPMENT Wipers and Washers - Avalanche, Escalade, Suburban, Tahoe & Yukon

Conditions for Setting the DTC

This DTC sets if the BCM detects a short to battery voltage in the windshield washer pump 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.

Reference Information

Schematic Reference

Wiper/Washer Schematics

Connector End View Reference

Wiper/Washer Connector End Views

Electrical Information Reference

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

Scan Tool Reference

- Scan Tool Output Controls
- Scan Tool Data List
- Scan Tool Data Definitions

Circuit/System Testing

1. Ignition OFF, disconnect the C2 harness connector at the underhood fuse block.
2. Connect a test lamp between the control circuit terminal 13 and battery voltage.
3. Command the Wiper Washer Motor ON and OFF with a scan tool. The test lamp should turn ON and OFF when changing between the commanded states.
 - If the test lamp is always ON, test the control circuit for a short to ground. If the circuit tests normal, test or replace the body control module.

2007 Cadillac Escalade

2007 ACCESSORIES & EQUIPMENT Wipers and Washers - Avalanche, Escalade, Suburban, Tahoe & Yukon

- If the test lamp is always OFF, test the control circuit for a short to voltage or an open/high resistance. If the circuit tests normal, test or replace the body control module.

4. If all circuits test normal, test or replace the underhood fuse block.

Repair Procedures

IMPORTANT: Always perform the Diagnostic Repair Verification after completing the diagnostic procedure.

- Underhood Electrical Center or Junction Block Replacement
- Control Module References for BCM replacement, programming, and setup

DTC B3875

DTC Descriptor

DTC B3875 00

Wiper High Speed Relay Circuit

Diagnostic Fault Information

IMPORTANT: Always perform the Diagnostic System Check - Vehicle prior to using this diagnostic procedure.

DTC B3875

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Windshield Washer Switch Signal	6 8	8	1	-
Windshield Wiper Motor Relay Coil Supply Voltage	B3715 00	2	6	-
Windshield Wiper Switch High Signal	6	4	1	-
Windshield Wiper Switch Low Signal	B3922 00	3	1	-
Windshield Wiper Motor Park Switch Signal	5	5	-	-
Windshield Wiper Motor High Speed Control	2	4	-	-
Windshield Wiper Motor Low Speed Control	2	3	-	-
Windshield Wiper Motor Ground	-	2	-	-
Windshield Wiper Switch Ground	-	1	-	-
Wiper High Speed Relay Control	7	4	B3875 00	-
Wiper Relay Ground	-	2	-	-

2007 Cadillac Escalade

2007 ACCESSORIES & EQUIPMENT Wipers and Washers - Avalanche, Escalade, Suburban, Tahoe & Yukon

1. Wipers and washers inoperative all modes
2. Wipers inoperative all modes and washers work
3. Delay or low speed wipers inoperative
4. High speed wipers inoperative
5. Wipers do not park
6. Wipers always on
7. Wipers operate at high speed in the low speed mode
8. Washer malfunction

Circuit/System 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 WPR HI Relay.

Conditions for Running the DTC

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

Conditions for Setting the DTC

This DTC sets if the BCM detects a short to battery voltage on the wiper high speed 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.

Reference Information

Schematic Reference

Wiper/Washer Schematics

Connector End View Reference

Wiper/Washer Connector End Views

Electrical Information Reference

- Circuit Testing
- Connector Repairs

2007 Cadillac Escalade

2007 ACCESSORIES & EQUIPMENT Wipers and Washers - Avalanche, Escalade, Suburban, Tahoe & Yukon

- Testing for Intermittent Conditions and Poor Connections
- Wiring Repairs

Scan Tool Reference

- Scan Tool Output Controls
- Scan Tool Data List
- Scan Tool Data Definitions

Circuit/System Testing

1. Ignition OFF, disconnect the C2 harness connector at the underhood fuse block.
2. Connect a test lamp between the control circuit terminal 11 and battery voltage.
3. Command the Wiper High Speed Relay ON and OFF with a scan tool. The test lamp should turn ON and OFF when changing between the commanded states.
 - If the test lamp is always ON, test the control circuit for a short to ground. If the circuit tests normal, test or replace the body control module.
 - If the test lamp is always OFF, test the control circuit for a short to voltage or an open/high resistance. If the circuit tests normal, test or replace the body control module.
4. If all circuits test normal, test or replace the underhood fuse block.

Repair Procedures

IMPORTANT: Always perform the Diagnostic Repair Verification after completing the diagnostic procedure.

- Underhood Electrical Center or Junction Block Replacement
- Control Module References for BCM replacement, setup, and programming

DTC B3922

DTC Descriptor

DTC B3922 00

Front Wiper Function Select Circuit

Diagnostic Fault Information

Perform the Diagnostic System Check - Vehicle prior to using this diagnostic procedure.

DTC B3922

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
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2007 Cadillac Escalade

2007 ACCESSORIES & EQUIPMENT Wipers and Washers - Avalanche, Escalade, Suburban, Tahoe & Yukon

Windshield Washer Switch Signal	6 8	8	1	-
Windshield Wiper Switch High Signal	6	4	1	-
Windshield Wiper Switch Low Signal	B3922 00	3	1	-
Windshield Wiper Motor Park Switch Signal	5	5	-	-
Windshield Wiper Motor High Speed Control	2	4	-	-
Windshield Wiper Motor Low Speed Control	2	3	-	-
Wiper Relay Control	B3715 00	2	6	-
Windshield Wiper Motor Ground	-	2	-	-
Windshield Wiper Switch Ground	-	1	-	-
Wiper High Speed Relay Control	7	4	B3875 00	-
Wiper Relay Ground	-	2	-	-
1. Wipers and washers inoperative all modes 2. Wipers inoperative all modes and washers work 3. Delay or low speed wipers inoperative 4. High speed wipers inoperative 5. Wipers do not park 6. Wipers always on 7. Wipers operate at high speed in the low speed mode 8. Washer malfunction				

Circuit/System Description

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 voltage through the wiper relay control circuit to energize the WPR Relay. When energized, battery voltage from the WPR Fuse is applied through the switch side of the WPR relay then through the switch side of the WPR HI relay to the windshield wiper motor.

Conditions for Running the DTC

The ignition switch is in the ON position.

Conditions for Setting the DTC

The BCM detects a short to ground 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.

2007 Cadillac Escalade

2007 ACCESSORIES & EQUIPMENT Wipers and Washers - Avalanche, Escalade, Suburban, Tahoe & Yukon

Conditions for Clearing the DTC

- The DTC will clear the current status when the condition for setting the fault is corrected.
- 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

Wiper/Washer Connector End Views

Electrical Information Reference

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

Scan Tool Reference

- Scan Tool Output Controls
- Scan Tool Data List
- Scan Tool Data Definitions

Circuit/System Verification

Ignition ON, observe the scan tool Windshield Wiper Switch parameter while rotating the wiper switch. The reading should change between Off, Intermittent, and Low.

Circuit/System Testing

1. Ignition OFF, disconnect the C1 harness connector at the turn signal/multifunction switch.
2. Ignition ON, verify the scan tool Windshield Wiper Switch parameter is not Switch Fault.
 - If Switch Fault, test the windshield wiper switch low signal circuit terminal L for a short to ground. If the circuit tests normal, replace the BCM.
3. If all circuits test normal, test or replace the turn signal/multifunction switch.

Component Testing

Multifunction Switch

2007 Cadillac Escalade

2007 ACCESSORIES & EQUIPMENT Wipers and Washers - Avalanche, Escalade, Suburban, Tahoe & Yukon

1. With the ignition OFF, disconnect the C1 harness connector at the turn signal/multifunction switch.
2. Test the resistance between terminals H and L. Rotate the wiper switch and compare the resistance readings to the values in the Windshield Wiper Switch Values table below for MIST, each DELAY and LOW speed.
 - If the resistance is not within the specified range, replace the turn signal/multifunction switch.
3. Test for infinite resistance between terminals H and K while rotating the wiper switch to MIST, each DELAY and LOW speed positions.
 - If the less than infinite, replace the turn signal/multifunction switch.
4. Test for less than 5 ohms of resistance with the wiper switch in the High speed position.
 - If greater than 5 ohm, replace the turn signal/multifunction switch.
5. Test for infinite resistance between terminals H and J while rotating the wiper switch to MIST, each DELAY and LOW speed positions.
 - If less than infinite, replace the turn signal/multifunction switch.
6. Test for less than 5 ohm of resistance while pressing the WASHER switch.
 - If greater than 5 ohm, replace the turn signal/multifunction switch.

IMPORTANT: If the switch tests open in any switch position other than Off, test the wiper/washer switch signal circuits for a short to voltage before replacing the switch.

Wiper Switch Values

Switch Position	Resistance
Off	Infinite
Mist	300-364 ohms
Delay 1	3.48K-4.25K ohms
Delay 2	2.52K-3.08K ohms
Delay 3	1.78K-2.18K ohms
Delay 4	1.17K-1.44K ohms
Delay 5	697-851 ohms
Low	300-364 ohms

Repair Procedures

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

- **Turn Signal Multifunction Switch Replacement**
- **Control Module References** for BCM replacement, setup, and programming

SYMPTOMS - WIPER/WASHER SYSTEMS

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

2007 Cadillac Escalade

2007 ACCESSORIES & EQUIPMENT Wipers and Washers - Avalanche, Escalade, Suburban, Tahoe & Yukon

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 the system description and operation in order to familiarize yourself with the system functions:
 - **Wiper/Washer System Description and Operation**
 - **Rear Wiper/Washer System Description and Operation**

Visual/Physical Inspection

- Inspect for aftermarket devices which could 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 could 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 Washer System Malfunction**
- **Low Washer Fluid Indicator Malfunction**
- **Washer Malfunction**
- **Windshield Washer Solvent Heater Malfunction**
- **Moisture Sensing Feature Inoperative**
- **Washer Inoperative - Rear**
- **Wiper Always On - Rear**
- **Wiper Inoperative - Rear**

WINDSHIELD WIPER WASHER SYSTEM MALFUNCTION

Diagnostic Fault Information

IMPORTANT: Always perform the **Diagnostic System Check - Vehicle** prior to using this diagnostic procedure.

Windshield Wiper Washer System Malfunction

	Short to	Open/High	Short to	Signal
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2007 Cadillac Escalade

2007 ACCESSORIES & EQUIPMENT Wipers and Washers - Avalanche, Escalade, Suburban, Tahoe & Yukon

Circuit	Ground	Resistance	Voltage	Performance
Windshield Washer Switch Signal	6 8	8	1	-
Windshield Wiper Motor Relay Coil Supply Voltage	B3715 00	2	6	-
Windshield Wiper Switch High Signal	6	4	1	-
Windshield Wiper Switch Low Signal	B3922 00	3	1	-
Windshield Wiper Motor Park Switch Signal	5	5	-	-
Windshield Wiper Motor High Speed Control	2	4	-	-
Windshield Wiper Motor Low Speed Control	2	3	-	-
Windshield Wiper Motor Ground	-	2	-	-
Windshield Wiper Switch Ground	-	1	-	-
Wiper High Speed Relay Control	7	4	B3875 00	-
Wiper Relay Ground	-	2	-	-
1. Wipers and washers inoperative all modes 2. Wipers inoperative all modes and washers work 3. Delay or low speed wipers inoperative 4. High speed wipers inoperative 5. Wipers do not park 6. Wipers always on 7. Wipers operate at high speed in the low speed mode 8. Washer malfunction				

Circuit/System Description

Wiper Mist, Delay 1-5, and Low are all low speed wiper motor functions that are controlled by the body control module (BCM). When the wiper switch is placed in one of the LOW speed wiper modes, ground is applied through the switch contacts a series of internal resistors and the wiper switch low signal circuit to the BCM. In response to this signal, the BCM energizes the WPR Relay by applying battery voltage through the wiper relay control circuit to the coil side of the relay. This allows battery positive voltage from the WPR fuse to flow through the switch input side of the WPR Relay and out to the switch input side of the WIPER HI Relay. Since the wiper high relay is de-energized and its switch contacts are normally closed to the low speed control circuit of the windshield wiper motor, the motor will operate at low speed.

When the wiper switch is placed in the HIGH speed position, ground is applied through the switch contacts and the wiper switch high signal circuit to the BCM indicating the wiper high speed request. The BCM then energizes WPR Relay as stated above and the WIPER HI Relay by applying ground through the control circuit to the coil side of the relay. With the wiper high relay energized and its switch contacts closed to the high speed control circuit of the wiper motor, the motor will operate at high speed.

Diagnostic Aids

2007 Cadillac Escalade

2007 ACCESSORIES & EQUIPMENT Wipers and Washers - Avalanche, Escalade, Suburban, Tahoe & Yukon

1. A short to ground in the following circuits will open the WPR fuse:
 - Ignition 1 voltage
 - Windshield wiper motor relay coil supply voltage
 - Windshield wiper switch high signal
 - Windshield wiper motor low speed control
 - Windshield wiper motor high speed control
2. A short to B+ on any of the wiper/washer switch signal circuits will open the ground trace in the wiper switch.

Reference Information

Schematic Reference

Wiper/Washer Schematics

Connector End View Reference

Wiper/Washer Connector End Views

Electrical Information Reference

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

Scan Tool Reference

- Scan Tool Output Controls
- Scan Tool Data List
- Scan Tool Data Definitions

Circuit/System Verification

BCM and Wiper Switch Verification

1. Ignition ON, observe the scan tool BCM Windshield Wiper Switch parameter. The reading should display Off, Intermittent, Low and High while rotating the wiper switch.
 - If one or more of the wiper delay parameters are inoperative and the wiper low speed parameter functions, replace the turn signal/multifunction switch.
 - If the low speed and/or high speed parameters are inoperative, perform the Multifunction Switch Circuit/System Testing and/or the Multifunction Switch Component Test.
2. Observe the scan tool BCM Wiper Park Switch parameter. The reading should display Active when the

2007 Cadillac Escalade

2007 ACCESSORIES & EQUIPMENT Wipers and Washers - Avalanche, Escalade, Suburban, Tahoe & Yukon

wipers are parked and Inactive with the wipers ON or out of the park position.

- If the Wiper Park Switch parameter is always Active or Inactive, perform the Wipers do not Park Circuit/System Testing.
3. If all wiper position parameters displayed correctly on the scan tool, perform the Wiper Motor Circuit/System Testing and/or the Wiper Motor Component Test

BCM and Wiper Motor Verification

1. Command the windshield wiper motor to the off, low speed and high speed modes with a scan tool. The wipers should perform the commanded state.
 - If one or more of the commanded states do not work, perform the Wiper Motor tests in Circuit/System Testing and/or Component test.
2. If all the wiper motor speeds function, perform the Multifunction Switch Circuit/System Testing and/or the Multifunction Switch Component Test.

Circuit/System Testing

Multifunction Switch Circuit/System Testing

1. Ignition OFF, disconnect the C1 harness connector at the turn signal/multifunction switch.
2. Ignition OFF, test for less than 15 ohms of resistance between the ground circuit terminal H and ground.
 - If greater than 15 ohms, test the ground circuit for an open/high resistance. If the circuit tests normal, test or replace the body control module.
3. Verify the scan tool Windshield Wiper Switch parameter is Off.
 - If not Off, test the signal circuit terminal L for a short to ground. If the circuit tests normal, test or replace the body control module.
4. Verify the scan tool Wiper High Speed Switch parameter is Inactive.
 - If not Inactive, test the signal circuit terminal K for a short to ground. If the circuit tests normal, test or replace the body control module.
5. Install a 3-amp fused jumper wire between the signal circuit terminal L and ground. Verify the scan tool Windshield Wiper Switch parameter is Switch Fault.
 - If not Switch Fault, test the signal circuit for a short to voltage or an open/high resistance. If the circuit tests normal, test or replace the body control module.
6. Install a 3-amp fused jumper wire between the signal circuit terminal K and ground. Verify the scan tool Wiper High Speed Switch parameter is Active.
 - If not Active, test the signal circuit for a short to voltage or an open/high resistance. If the circuit tests normal, test or replace the body control module.
7. If all circuits test normal, test or replace the turn signal/multifunction switch.

Wipers Do Not Park Circuit/System Testing

1. Ignition OFF, disconnect the harness connector at the windshield wiper motor.
2. Ignition ON, verify the scan tool BCM Wiper Park Switch parameter is Inactive.

2007 Cadillac Escalade

2007 ACCESSORIES & EQUIPMENT Wipers and Washers - Avalanche, Escalade, Suburban, Tahoe & Yukon

- If not Inactive, test the signal circuit terminal C for a short to ground. If the circuit tests normal, test or replace the body control module.
- 3. Install a 3-amp fused jumper wire between the wiper motor park switch signal circuit terminal C and ground. Verify the scan tool Wiper Park Switch parameter is Active.
 - If not Active, test the signal circuit for an open/high resistance. If the circuit tests normal, replace the body control module.
- 4. If all circuits test normal, test or replace the windshield wiper motor.

Wiper Motor Circuit/System Testing

1. Ignition OFF, disconnect the C1 harness connector at the underhood fuse block.
2. Test for less than 5 ohms of resistance between the wiper relay ground circuit terminal 16 and ground.
 - If greater than 5 ohms, test the ground circuit for an open/high resistance.
3. Ignition OFF, disconnect the C2 harness connector at the underhood fuse block.
4. Connect a test lamp between the control circuit terminal 27 and ground.
5. Command the Wiper Relay ON and OFF with a scan tool. The test lamp should turn ON and OFF when changing between the commanded states.
 - If the test lamp is always ON, test the control circuit for a short to voltage. If the circuit tests normal, test or replace the body control module.
 - If the test lamp is always OFF, test the control circuit for a short to ground or an open/high resistance. If the circuit tests normal, test or replace the body control module.
6. Connect a test lamp between the control circuit terminal 11 and battery voltage.
7. Command the Wiper High Speed Relay ON and OFF with a scan tool. The test lamp should turn ON and OFF when changing between the commanded states.
 - If the test lamp is always ON, test the control circuit for a short to ground. If the circuit tests normal, test or replace the body control module.
 - If the test lamp is always OFF, test the control circuit for a short to voltage or an open/high resistance. If the circuit tests normal, test or replace the body control module.
8. Ignition OFF, connect the C1 and C2 harness connectors at the underhood fuse block.
9. Disconnect the harness connector at the wiper motor.
10. Test for less than 1 ohm of resistance between the wiper motor ground circuit terminal D and ground.
 - If greater than 1 ohm, test the ground circuit for an open/high resistance.
11. Connect a test lamp between the control circuit terminal B and ground.
12. Command the Wiper Relay ON and OFF with a scan tool. The test lamp should turn ON and OFF when changing between the commanded states.
 - If the test lamp is always ON, test the control circuit for a short to voltage. If the circuit tests normal, test or replace the underhood fuse block.
 - If the test lamp is always OFF, test the control circuit for a short to ground or an open/high resistance. If the circuit tests normal, test or replace the underhood fuse block.
13. Connect a test lamp between the control circuit terminal A and ground.
14. Command the Wiper High Speed Relay ON and OFF with a scan tool. The test lamp should turn ON and

2007 Cadillac Escalade

2007 ACCESSORIES & EQUIPMENT Wipers and Washers - Avalanche, Escalade, Suburban, Tahoe & Yukon

OFF when changing between the commanded states.

- If the test lamp is always ON, test the control circuit for a short to voltage. If the circuit tests normal, test or replace the underhood fuse block.
- If the test lamp is always OFF, test the control circuit for a short to ground or an open/high resistance. If the circuit tests normal, test or replace the underhood fuse block.

15. If all circuits test normal, test or replace the Windshield Wiper Motor.

Component Testing

Multifunction Switch

1. With the ignition OFF, disconnect the C1 harness connector at the turn signal/multifunction switch.
2. Test the resistance between terminals H and L. Rotate the wiper switch and compare the resistance readings to the values in the Windshield Wiper Switch Values table below for MIST, each DELAY and LOW speed.
 - If the resistance is not within the specified range, replace the turn signal/multifunction switch.
3. Test for infinite resistance between terminals H and K while rotating the wiper switch to MIST, each DELAY and LOW speed positions.
 - If the less than infinite, replace the turn signal/multifunction switch.
4. Test for less than 5 ohms of resistance with the wiper switch in the High speed position..
 - If greater than 5 ohm, replace the turn signal/multifunction switch.
5. Test for infinite resistance between terminals H and J while rotating the wiper switch to MIST, each DELAY and LOW speed positions.
 - If less than infinite, replace the turn signal/multifunction switch.
6. Test for less than 5 ohm of resistance while pressing the WASHER switch.
 - If greater than 5 ohm, replace the turn signal/multifunction switch.

IMPORTANT: If the switch tests open in any switch position other than Off, test the wiper/washer switch signal circuits for a short to voltage before replacing the switch.

Wiper Switch Values

Switch Position	Resistance
Off	Infinite
Mist	300-364 ohms
Delay 1	3.48K-4.25K ohms
Delay 2	2.52K-3.08K ohms
Delay 3	1.78K-2.18K ohms
Delay 4	1.17K-1.44K ohms
Delay 5	697-851 ohms
Low	300-364 ohms

2007 Cadillac Escalade

2007 ACCESSORIES & EQUIPMENT Wipers and Washers - Avalanche, Escalade, Suburban, Tahoe & Yukon

Windshield Wiper Motor Dynamic Test

1. Ignition OFF, disconnect the harness connector at the windshield wiper motor.
2. Install a 25-amp fused jumper wire between the control terminal B and 12 volts. Install a jumper wire between the ground terminal A and ground.
3. The wiper motor should be in low speed mode.
 - o If the wiper motor is not in the low speed mode replace the motor.
4. Install a 25-amp fused jumper wire between the control terminal A and 12 volts. Install a jumper wire between the ground terminal D and ground.
5. The wiper motor should be in the high speed mode.
 - o If the wiper motor is not in the high speed mode replace the motor.

Repair Procedures

IMPORTANT: Always perform the Diagnostic Repair Verification after completing the diagnostic procedure.

- Turn Signal Multifunction Switch Replacement
- Wiper Motor Module Replacement
- Underhood Electrical Center or Junction Block Replacement
- Control Module References for BCM replacement, programming, and setup

LOW WASHER FLUID INDICATOR MALFUNCTION

Low Washer Fluid Indicator Malfunction

Step	Action	Yes	No
Schematic Reference: <u>Wiper/Washer Schematics</u> Connector End View Reference: <u>Wiper/Washer Connector End Views</u> DEFINITION: The check washer fluid message is always displayed or does not display with low washer fluid.			
1	Did you review the Wiper/Washer System Description and Operation and perform the necessary inspections?	Go to Step 2	Go to <u>Symptoms - Wiper/Washer Systems</u>
2	Verify that the low washer fluid indicator malfunction fault is present. Does the system operate as described in the system description and operation?	Go to <u>Testing for Intermittent Conditions and Poor Connections</u>	Go to Step 3
3	Is the check washer fluid message always On?	Go to Step 4	Go to Step 5
4	1. Turn OFF the ignition. 2. Disconnect the windshield washer fluid level switch connector. 3. Turn ON the ignition.		

2007 Cadillac Escalade

2007 ACCESSORIES & EQUIPMENT Wipers and Washers - Avalanche, Escalade, Suburban, Tahoe & Yukon

	Is the check washer fluid message displayed on the driver information center (DIC)?	Go to Step 7	Go to Step 9
5	1. Turn OFF the ignition. 2. Disconnect the windshield washer fluid level switch connector. 3. Connect a 3-amp fused jumper wire from the washer fluid level switch signal circuit terminal in the washer fluid level switch connector to a good ground. 4. Turn ON the ignition. Is the check washer fluid message displayed on the DIC?	Go to Step 6	Go to Step 8
6	1. Turn OFF the ignition. 2. Connect the 3-amp fused jumper wire across the washer fluid level switch harness connector terminals. 3. Turn ON the ignition. Is the check washer fluid message displayed on the DIC?	Go to Step 9	Go to Step 11
7	Test the signal circuit of the windshield washer fluid level switch for a short to ground. Refer to <u>Circuit Testing</u> and <u>Wiring Repairs</u> . Did you find and correct the condition?	Go to Step 14	Go to Step 10
8	Test the signal circuit of the windshield washer fluid level switch for a high resistance or an open. Refer to <u>Circuit Testing</u> and <u>Wiring Repairs</u> . Did you find and correct the condition?	Go to Step 14	Go to Step 10
9	Inspect for poor connections at the harness connector of the windshield washer fluid level 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 14	Go to Step 12
10	Inspect for poor connections at the harness connector of the instrument panel cluster (IPC). 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 14	Go to Step 13
11	Repair the high resistance or open in the ground circuit of the washer fluid level switch. Refer to <u>Circuit Testing</u> and <u>Wiring Repairs</u> . Is the repair complete?	Go to Step 14	-
	Replace the windshield washer fluid level switch.		

2007 Cadillac Escalade

2007 ACCESSORIES & EQUIPMENT Wipers and Washers - Avalanche, Escalade, Suburban, Tahoe & Yukon

12	Refer to Washer Solvent Container Level Sensor Replacement . Is the repair complete?	Go to Step 14	-
13	Replace the IPC. Refer to Control Module References for replacement, setup, and programming. Is the repair complete?	Go to Step 14	-
14	Operate the system in order to verify the repair. Did you correct the condition?	System OK	Go to Step 2

WASHER MALFUNCTION

Diagnostic Fault Information

IMPORTANT: Always perform the **Diagnostic System Check - Vehicle** prior to using this diagnostic procedure.

Washer Malfunction

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Windshield Washer Switch Signal	2	1	3	-
Windshield Washer Pump Control	1	1	2	-
Windshield Washer Relay Control	2	1	B3873 00	-
Windshield Washer Pump Ground	-	1	-	-
Windshield Wiper Switch Ground	-	3	-	-
1. Washers Inoperative 2. Washers Always On 3. Windshield Wiper System Malfunction				

Circuit/System Description

The windshield washer function is controlled by the body control module (BCM). When the washer switch is pressed, ground is applied through the switch contacts and the signal circuit to the BCM indicating the wash request. The BCM then applies ground through the control circuit to the coil side of the WSH Relay energizing the relay. With the relay energized, battery voltage is applied through the switch contacts of the relay, the WSW/PUMP Fuse and the control circuit to the windshield washer fluid pump.

Reference Information

Schematic Reference

Wiper/Washer Schematics

Connector End View Reference

Wiper/Washer Connector End Views

Electrical Information Reference

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

Scan Tool Reference

- **Scan Tool Output Controls**
- **Scan Tool Data List**
- **Scan Tool Data Definitions**

Circuit/System Testing**Washers Inoperative Starting Point**

Ignition ON, with a test lamp connected to ground, probe each of the test points on the WSW/PUMP Fuse while activating the washer switch. The test lamp should illuminate at one or both of the fuse test points.

- If the test lamp does not illuminate at either test point, refer to the **Washer Switch Test**.
- If the test lamp illuminates, refer to the **Washer Fluid Pump Test**.

Washer Switch Test

1. Ignition ON, verify that the scan tool Windshield Washer Switch parameter is Active while pressing the washer switch.
 - If not Active, test the following:
 - Perform the multifunction switch component test.
 - Test the windshield washer switch signal circuit for an open/high resistance. If the washer switch and circuit test normal, test or replace the body control module.
2. Ignition OFF, disconnect the C2 harness connector at the underhood fuse block.
3. Ignition ON, verify that a test lamp illuminates between the windshield washer pump relay control circuit terminal 13 and battery voltage while pressing the washer switch.
 - If the test lamp does not illuminate, test the washer relay control circuit terminal 13 for a short to voltage or an open/high resistance. If the circuit tests normal, test or replace the body control module.
4. If all circuits test normal, test or replace the underhood fuse block.

Washer Fluid Pump Test

1. Ignition OFF, disconnect the harness connector at the windshield washer fluid pump.
2. Test for less than 1 ohm of resistance between the ground circuit terminal B and ground.

2007 Cadillac Escalade

2007 ACCESSORIES & EQUIPMENT Wipers and Washers - Avalanche, Escalade, Suburban, Tahoe & Yukon

- If greater than 1 ohm, repair the ground circuit for an open/high resistance.
- 3. Ignition ON, verify that a test lamp illuminates between the washer pump control circuit terminal A and ground while pressing the washer switch.
 - If the test lamp does not illuminate, test the control circuit for a short to ground or an open/high resistance. If the circuit tests normal, test or replace the underhood fuse block.
- 4. If all the circuits test normal, test or replace the windshield washer fluid pump.

Washers Always On

1. Remove the WSW fuse from the underhood fuse block. The washer pump should turn OFF.
 - If the washer pump does not turn OFF, test the washer pump control circuit for a short to voltage.
2. Ignition ON, verify the scan tool Windshield Washer Switch parameter is Inactive.
 - If not Inactive, test the following:
 - Perform the multifunction switch component test.
 - Test the windshield washer switch signal circuit for a short to ground. If the washer switch and circuit test normal, test or replace the body control module.
3. Ignition OFF, disconnect the C2 harness connector at the underhood fuse block.
4. Ignition ON, verify that a test lamp does not illuminate between the windshield washer relay control circuit terminal 13 and battery voltage.
 - If the test lamp illuminates, test the control circuit for a short to ground. If the circuit tests normal, test or replace the body control module.
5. If all circuits test normal, test or replace the underhood fuse block.

Component Testing

Multifunction Switch

1. With the ignition OFF, disconnect the C1 harness connector at the turn signal/multifunction switch.
2. Test the resistance between terminals H and L. Rotate the wiper switch and compare the resistance readings to the values in the Windshield Wiper Switch Values table below for MIST, each DELAY and LOW speed.
 - If the resistance is not within the specified range, replace the turn signal/multifunction switch.
3. Test for infinite resistance between terminals H and K while rotating the wiper switch to MIST, each DELAY and LOW speed positions.
 - If the less than infinite, replace the turn signal/multifunction switch.
4. Test for less than 5 ohms of resistance with the wiper switch in the High speed position.
 - If greater than 5 ohms, replace the turn signal/multifunction switch.
5. Test for infinite resistance between terminals H and J while rotating the wiper switch to MIST, each DELAY and LOW speed positions.
 - If less than infinite, replace the turn signal/multifunction switch.
6. Test for less than 5 ohms of resistance while pressing the WASHER switch.

2007 Cadillac Escalade

2007 ACCESSORIES & EQUIPMENT Wipers and Washers - Avalanche, Escalade, Suburban, Tahoe & Yukon

- If greater than 5 ohms, replace the turn signal/multifunction switch.

IMPORTANT: If the switch tests open in any switch position other than Off, test the wiper/washer switch signal circuits for a short to voltage before replacing the switch.

Wiper Switch Values

Switch Position	Resistance
Off	Infinite
Mist	300-364 ohms
Delay 1	3.48K-4.25K ohms
Delay 2	2.52K-3.08K ohms
Delay 3	1.78K-2.18K ohms
Delay 4	1.17K-1.44K ohms
Delay 5	697-851 ohms
Low	2.52K-3.08K ohms

Repair Procedures

IMPORTANT: Always perform the Diagnostic Repair Verification after completing the diagnostic procedure.

- Turn Signal Multifunction Switch Replacement
- Washer Pump Replacement - Windshield
- Underhood Electrical Center or Junction Block Replacement
- Control Module References for BCM replacement, programming, and setup.

WINDSHIELD WASHER SOLVENT HEATER MALFUNCTION

Diagnostic Fault Information

Perform the Diagnostic System Check - Vehicle prior to using this diagnostic procedure.

Windshield Washer Solvent Heater Malfunction

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Battery Positive Voltage	1	1	-	-
Ignition 3 Voltage	1	1	-	-
Washer Fluid Heated Control Switch Signal	3	1	1	-
Windshield Washer Switch Signal	4	1	4	-
Washer Fluid Heated Control Switch LED Supply Voltage	2	2	1	-

2007 Cadillac Escalade

2007 ACCESSORIES & EQUIPMENT Wipers and Washers - Avalanche, Escalade, Suburban, Tahoe & Yukon

Washer Solvent Heater Assembly Ground	-	1	-	-
Washer Solvent Heater Assembly Logic Ground	-	1	-	-
1. Windshield Washer Solvent Heater Malfunction 2. Windshield Washer Solvent Heater Indicator Inoperative 3. Windshield Washer Solvent Heater Indicator Always ON 4. Windshield Wiper System Malfunction				

Circuit/System Description

The windshield washer solvent heater operates with the standard windshield wiper washer system, and when a heated washer cycle is activated the solvent heater controls the windshield washers through the washer switch signal circuit to the body control module (BCM). The heater is supplied with high current power and ground circuits that are used to energize the heater coils. The low current logic voltage is supplied to the heater through the RUN relay in the underhood fuse block. The RUN relay is a PCB relay energized by the BCM only while the engine is running. The heated washer cycle operation is activated by a separate switch located on the instrument panel accessory switch assembly. When the heated washer fluid switch is pressed the heated washer switch signal circuit is momentarily grounded and the heated washer cycle is activated. During the heated wash cycle the 3 heater elements in the solvent heater are energized, and when the solvent temperature reaches approximately 70° C (160° F) the heater grounds the washer switch signal circuit until the heated solvent is dispensed. The heated washer cycle will run 4 heat and wash actions unless deactivated by the heated washer switch signal.

Diagnostic Aids

Verify that the standard windshield wiper washer system operates normally before attempting to diagnose a heated washer system concern.

Reference Information

Schematic Reference

Wiper/Washer Schematics

Connector End View Reference

Wiper/Washer Connector End Views

Electrical Information Reference

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

Scan Tool Reference

- **Scan Tool Output Controls**
- **Scan Tool Data List**
- **Scan Tool Data Definitions**

Circuit/System Testing**Windshield Washer Solvent Heater Malfunction**

1. Ignition OFF, disconnect the C1 harness connector at the windshield washer solvent heater assembly.
2. Ignition ON, verify that a test lamp illuminates between the battery positive voltage circuit terminal 1 and ground.
 - If the test lamp does not illuminate, test the battery positive voltage circuit for a short to ground or an open/high resistance.
3. Verify that a test lamp illuminates between the washer solvent heater assembly ground circuit terminal 2 and battery voltage.
 - If the test lamp does not illuminate, test the ground circuit for an open/high resistance.
4. Ignition OFF, disconnect the C2 harness connector at the windshield washer solvent heater assembly.
5. Engine running, verify that a test lamp illuminates between the ignition 3 voltage circuit terminal 6 and ground.
 - If the test lamp does not illuminate, test the ignition 3 voltage circuit for a short to ground or an open/high resistance.
6. Verify that a test lamp illuminates between the washer solvent heater assembly ground circuit terminal 4 and battery voltage.
 - If the test lamp does not illuminate, test the ground circuit for an open/high resistance.
7. Verify that a test lamp does not illuminate between the washer fluid heated control switch signal circuit terminal 1 and battery voltage.
 - If the test lamp is illuminated, test the signal circuit for a short to ground. If the circuit tests normal, test or replace the heated washer fluid switch.
8. With a test lamp connected between the washer fluid heated control switch signal circuit terminal 1 and battery voltage, press the heated washer fluid switch and verify that the test lamp illuminates.
 - If the test lamp does not illuminate, test the switch signal and ground circuits for a short to voltage or an open/high resistance. If the circuit test normal, test or replace the heated washer fluid switch.
9. If all circuits test normal, test or replace the windshield washer solvent heater assembly.

Windshield Heated Washer Fluid Indicator Inoperative

1. Ignition OFF, disconnect the C2 harness connector at the windshield washer solvent heater assembly.
2. Ignition ON, install a 3-amp fused jumper wire between the washer fluid heated control switch LED control circuit terminal 2 and ground. Verify the heated washer switch indicator is illuminated.
 - If the indicator is not illuminated, test the control circuit for an open/high resistance. If the circuit

2007 Cadillac Escalade

2007 ACCESSORIES & EQUIPMENT Wipers and Washers - Avalanche, Escalade, Suburban, Tahoe & Yukon

tests normal, replace the accessory switch assembly.

3. If all circuits test normal, replace the windshield washer solvent heater assembly.

Windshield Heated Washer Fluid Indicator Always On

1. Ignition OFF, disconnect the C2 harness connector at the windshield washer solvent heater assembly.
2. Ignition ON, the heated washer switch indicator should not be illuminated.
 - o If illuminated, test the washer fluid heated control switch LED control circuit for a short to voltage. If the circuit tests normal, replace the accessory switch assembly.
3. If all circuits test normal, replace the windshield washer solvent heater assembly.

Component Testing

Heated Washer Fluid Switch

1. Ignition OFF, disconnect the harness connector at the instrument panel accessory switch assembly.
2. Test for infinite resistance between the switch signal circuit terminal and the ground circuit terminal with the switch in the open position.
 - o If less than infinite, replace the accessory switch assembly.
3. Test for less than 3 ohms between the switch signal circuit terminal and the ground circuit terminal with the switch in the closed position.
 - o If greater than 3 ohms, replace the accessory switch assembly.

Repair Procedures

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

- **Accessory Switch Replacement (Cadillac)** or **Accessory Switch Replacement (Except Cadillac)**
- **Windshield Washer Solvent Heater Replacement**

MOISTURE SENSING FEATURE INOPERATIVE

Moisture Sensing Feature Inoperative

Step	Action	Yes	No
Schematic Reference: <u>Wiper/Washer Schematics</u> Connector End View Reference: <u>Wiper/Washer Connector End Views</u>			
1	Did you perform the Diagnostic System Check - Vehicle?	Go to Step 2	Go to <u>Diagnostic System Check - Vehicle</u>
2	Verify that the moisture sensing inoperative fault is present. Does the system operate normally?	Go to <u>Testing for Intermittent Conditions and Poor Connections</u>	Go to Step 3
	While the windshield wiper/washer system is in the		

2007 Cadillac Escalade

2007 ACCESSORIES & EQUIPMENT Wipers and Washers - Avalanche, Escalade, Suburban, Tahoe & Yukon

3	automatic mode does the wiper motor operate at normal delay intervals?	Go to Step 5	Go to Step 4
4	1. Turn the ignition ON. 2. Operate the windshield wiper/washer switch from the OFF position through all of the delay positions. Does the wiper motor cycle once and stop every time the switch is advanced to the next delay position?	Go to Step 5	Go to <u>Windshield Wiper Washer System Malfunction</u>
5	1. Disconnect the outside moisture sensor connector. 2. Connect a test lamp from the accessory voltage circuit of the moisture sensor connector to a good ground. Does the test lamp illuminate?	Go to Step 6	Go to Step 10
6	Connect a test lamp between the accessory voltage circuit of the moisture sensor connector and the ground circuit of the moisture sensor connector. Does the test lamp illuminate?	Go to Step 7	Go to Step 11
7	Test the outside moisture sensor signal 1 circuit for the following conditions: • An open • A short to ground • A short to voltage Refer to <u>Circuit Testing</u> and <u>Wiring Repairs</u> . Did you find and correct the condition?	Go to Step 13	Go to Step 8
8	Test the outside moisture sensor signal 2 circuit for the following conditions: • An open • A short to ground • A short to voltage Refer to <u>Circuit Testing</u> and <u>Wiring Repairs</u> . Did you find and correct the condition?	Go to Step 13	Go to Step 9
9	Inspect for poor connections at the harness connector of the outside moisture sensor. Refer to <u>Testing for Intermittent Conditions and Poor Connections</u> and <u>Connector Repairs</u> .		

2007 Cadillac Escalade

2007 ACCESSORIES & EQUIPMENT Wipers and Washers - Avalanche, Escalade, Suburban, Tahoe & Yukon

	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 accessory voltage circuit of the outside moisture sensor. Refer to <u>Circuit Testing</u> and <u>Wiring Repairs</u> . Is the repair complete?	Go to Step 13	-
11	Repair the high resistance or open in the ground circuit of the outside moisture sensor. Refer to <u>Circuit Testing</u> and <u>Wiring Repairs</u> . Is the repair complete?	Go to Step 13	-
12	Replace the outside moisture sensor Refer to <u>Windshield Outside Moisture Sensor Replacement</u> . Did you complete the replacement?	Go to Step 13	-
13	Operate the system in order to verify the repair. Did you correct the condition?	System OK	Go to Step 2

WASHER INOPERATIVE - REAR

Diagnostic Fault Information

IMPORTANT: Always perform the **Diagnostic System Check - Vehicle** prior to using this diagnostic procedure.

Washer Inoperative - Rear

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Switch Supply Voltage	1	1	-	-
Switch Signal	1	2	4	-
Washer Pump Relay Control	1	3	5	-
Washer Pump Control	3	3	5	-
Washer Pump Ground	-	3	-	-
1. All rear wiper washer system functions inoperative. 2. Rear wiper motor inoperative. 3. Rear washer pump inoperative. 4. Rear wiper motor always on. 5. Rear washer pump always on.				

Circuit/System Description

The rear window washer pump is controlled by the rear window wiper washer switch through the rear washer pump relay. The switch supply voltage is from the body control module (BCM), and when the WASH switch is pressed battery voltage is applied to the rear washer relay control circuit and to the rear wiper switch signal circuit. When the rear wiper motor module receives battery voltage on the rear wiper switch signal circuit, the wiper motor will operate continuously for as long as the voltage is present and several cycles after the switch is released. The rear washer relay control circuit is used to energize the relay coil and close the rear washer pump control circuit to battery voltage.

2007 Cadillac Escalade

2007 ACCESSORIES & EQUIPMENT Wipers and Washers - Avalanche, Escalade, Suburban, Tahoe & Yukon

Reference Information

Schematic Reference

Wiper/Washer Schematics

Connector End View Reference

Wiper/Washer Connector End Views

Electrical Information Reference

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

Circuit/System Verification

1. Ignition ON, Press the rear window washer switch.
 - If the rear wiper motor and the rear washer pump are inoperative perform the Rear Wiper Washer Switch Circuit Test.
 - If the rear wiper motor operates and the rear washer pump is inoperative perform the Rear Washer Pump Circuit Test.
 - If the rear wiper motor is inoperative and the rear washer pump operates perform the Rear Wiper Motor Circuit Test.

Circuit/System Testing

Rear Wiper Washer Switch Circuit Test

1. Disconnect the rear wiper washer switch pigtail connector.
2. Ignition ON, verify that a test lamp illuminates when connected from the switch supply circuit terminal in the harness connector to ground.
 - If the test lamp does not illuminate test the switch supply circuit for an open or short to ground. If the circuit tests normal replace the BCM.
3. If the circuits test normal replace the rear wiper washer switch.

Rear Washer Pump Circuit Test

1. Remove the REAR WASH 15A fuse in the underhood fuse block and connect a fused jumper wire to the washer pump output fuse terminal in the fuse block.
2. Verify that the rear washer pump operates when the other end of the fused jumper wire is connected to battery voltage.
 - If the washer pump does not operate, test the washer pump control and ground circuits for an open

2007 Cadillac Escalade

2007 ACCESSORIES & EQUIPMENT Wipers and Washers - Avalanche, Escalade, Suburban, Tahoe & Yukon

or short to ground. If the circuits test normal replace the rear washer pump.

3. Disconnect the underhood fuse block connector C4 and connect a test lamp from the rear washer pump relay control circuit terminal in the harness connector to ground.
4. Ignition on, verify that a test lamp illuminates when the rear washer switch is pressed.
 - o If the test lamp does not illuminate test the relay control circuit for an open or short to ground. If the circuit tests normal replace the rear wiper washer switch.
5. If the circuits test normal replace the underhood fuse block.

Rear Wiper Motor Circuit Test

1. Disconnect the rear wiper motor connector and connect a test lamp from the rear wiper switch signal circuit terminal in the harness connector to ground.
2. Ignition on, verify that the test lamp will illuminate when the WASH switch is pressed.
 - o If the test lamp does not illuminate test the rear wiper switch signal circuit for an open or short to ground. If the circuit tests normal replace the rear wiper washer switch.
3. If the circuits test normal replace the rear wiper motor.

Repair Procedures

IMPORTANT: Always perform the Diagnostic Repair Verification after completing the diagnostic procedure.

- Wiper/Washer Switch Replacement - Rear
- Washer Pump Replacement - Rear
- Wiper Motor Replacement - Rear
- Underhood Electrical Center or Junction Block Replacement

WIPER ALWAYS ON - REAR

Wiper Always On - Rear

Step	Action	Yes	No
Schematic Reference: <u>Wiper/Washer Schematics</u> Connector End View Reference: <u>Wiper/Washer Connector End Views</u> DEFINITION: Rear wiper is always ON.			
1	Did you review the Rear Wiper/Washer System Description and Operation and perform the necessary inspections?	Go to Step 2	Go to <u>Symptoms - Wiper/Washer Systems</u>
2	1. Turn the ignition ON. 2. Turn the rear wiper/washer switch to the OFF position. Is the rear wiper always on?	Go to Step 3	Go to <u>Testing for Intermittent Conditions and Poor Connections</u>

2007 Cadillac Escalade

2007 ACCESSORIES & EQUIPMENT Wipers and Washers - Avalanche, Escalade, Suburban, Tahoe & Yukon

3	1. Turn the ignition OFF. 2. Disconnect the rear wiper/washer switch. 3. Turn the ignition ON. Is the rear wiper always on?	Go to Step 4	Go to Step 6
4	1. Turn the ignition OFF. 2. Disconnect the window wiper module-rear. 3. Turn the ignition ON. Test the rear wiper switch signal circuit for a short to voltage. Refer to <u>Circuit Testing</u> and to <u>Wiring Repairs</u> .Did you find and correct the condition?	Go to Step 10	Go to Step 5
5	Test the rear window washer switch signal circuit for a short to voltage. Refer to <u>Circuit Testing</u> and to <u>Wiring Repairs</u> . Did you find and correct the condition?	Go to Step 10	Go to Step 8
6	Inspect for poor connections at the rear wiper/washer switch. Refer to <u>Testing for Intermittent Conditions and Poor Connections</u> and to <u>Connector Repairs</u> . Did you find and correct the condition?	Go to Step 10	Go to Step 7
7	Replace the rear wiper/washer switch. Refer to <u>Wiper/Washer Switch Replacement - Rear</u>. Is the repair complete?	Go to Step 10	-
8	Inspect for poor connections at the window wiper module-rear. Refer to <u>Testing for Intermittent Conditions and Poor Connections</u> and to <u>Connector Repairs</u> . Did you find and correct the condition?	Go to Step 10	Go to Step 9
9	Replace the window wiper module-rear. Refer to <u>Wiper Motor Replacement - Rear</u>. Is the repair complete?	Go to Step 10	-
10	Operate the system in order to verify the repair. Did you correct the condition?	System OK	Go to Step 3

WIPER INOPERATIVE - REAR

Wiper Inoperative - Rear

Step	Action	Yes	No
Schematic Reference: <u>Wiper/Washer Schematics</u> Connector End View Reference: <u>Wiper/Washer Connector End Views</u> DEFINITION: The rear wiper motor is inoperative in one or more modes, the rear washer pump may or may not operate.			
1	Did you review the Rear Wiper/Washer System Description and Operation and perform the necessary		Go to <u>Symptoms - Wiper/Washer</u>

2007 Cadillac Escalade

2007 ACCESSORIES & EQUIPMENT Wipers and Washers - Avalanche, Escalade, Suburban, Tahoe & Yukon

	inspections?	Go to Step 2	<u>Systems</u>
2	1. Turn the ignition ON. 2. Operate the rear wiper/washer system in all the switch positions, including the washer position. Does the rear wiper/washer system operate normally?	Go to <u>Testing for Intermittent Conditions and Poor Connections</u>	Go to Step 3
3	Does the rear washer pump operate when the rear washer switch is pressed?	Go to Step 4	Go to Step 8
4	1. Install a scan tool. 2. Turn the ignition ON, with the engine OFF. 3. Observe the Cargo Door Ajar Switch parameter in body control module (BCM) inputs display screen, with the liftgate closed and opened. Did the parameter displayed Open and the Closed accordingly?	Go to Step 5	Go to <u>Courtesy Lamps Always On</u>
5	1. Disconnect the rear wiper motor/module connector. 2. Connect a test lamp from the rear wiper switch signal circuit terminal in the harness connector to a good ground. 3. Operate the rear window wiper switch to the WASH position. Does the test lamp illuminate?	Go to Step 6	Go to Step 9
6	Connect a test lamp from the battery supply circuit terminal in the wiper motor harness connector to a good ground. Does the test lamp illuminate?	Go to Step 7	Go to Step 10
7	Connect a test lamp from the battery supply circuit terminal to the ground circuit terminal in the wiper motor harness connector. Does the test lamp illuminate?	Go to Step 13	Go to Step 11
8	Test the rear wiper/washer switch accessory voltage supply circuit for an open or short to ground. Refer to <u>Circuit Testing</u> and to <u>Wiring Repairs</u> . Did you find and correct the condition?	Go to Step 16	Go to Step 12
9	Test the rear wiper/washer switch signal circuit for an open or high resistance. Refer to <u>Circuit Testing</u> and to <u>Wiring Repairs</u> . Did you find and correct the condition?	Go to Step 16	Go to Step 12
10	Repair the rear wiper motor battery supply circuit for an open or short to ground. Refer to <u>Circuit Testing</u>		

2007 Cadillac Escalade

2007 ACCESSORIES & EQUIPMENT Wipers and Washers - Avalanche, Escalade, Suburban, Tahoe & Yukon

	and to <u>Wiring Repairs</u> . Is the repair complete?	Go to Step 16	-
11	Repair the rear wiper motor ground circuit for an open or high resistance. Refer to <u>Circuit Testing</u> and to <u>Wiring Repairs</u> . Is the repair complete?	Go to Step 16	-
12	Inspect for poor connections at the rear wiper/washer switch. Refer to <u>Testing for Intermittent Conditions and Poor Connections</u> and to <u>Connector Repairs</u> . Did you find and correct the condition?	Go to Step 16	Go to Step 14
13	Inspect for poor connections at the rear wiper motor/module. Refer to <u>Testing for Intermittent Conditions and Poor Connections</u> and to <u>Connector Repairs</u> . Did you find and correct the condition?	Go to Step 16	Go to Step 15
14	Replace the rear wiper/washer switch. Refer to <u>Wiper/Washer Switch Replacement - Rear</u> . Is the repair complete?	Go to Step 16	-
15	Replace the rear wiper motor/module. Refer to <u>Wiper Motor Replacement - Rear</u> . Is the repair complete?	Go to Step 16	-
16	Operate the system in order to verify the repair. Did you correct the condition?	System OK	Go to Step 2

REPAIR INSTRUCTIONS

WIPERS/WASHER SWITCH REPLACEMENT

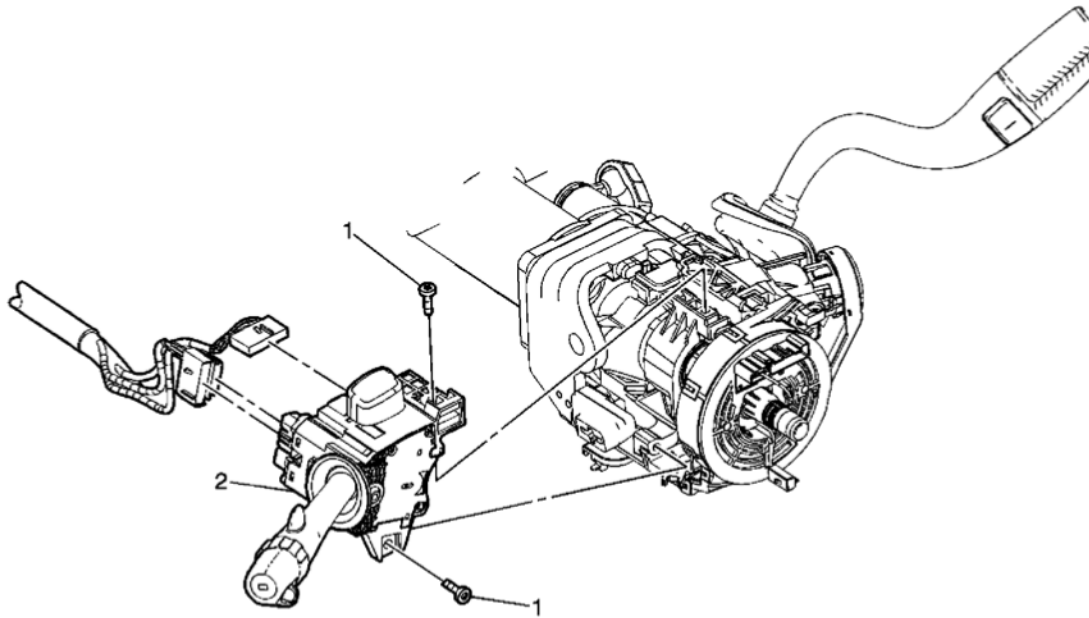


Fig. 21: View Of Multifunction Turn Signal Switch & Screws
Courtesy of GENERAL MOTORS CORP.

Wipers/Washer Switch Replacement

Callout	Component Name
CAUTION: Refer to <u>SIR Caution</u> .	
Preliminary Procedure 1. Disable the SIR system. Refer to <u>SIR Disabling and Enabling</u> . 2. Remove the upper and lower trim covers. Refer to <u>Steering Column Trim Covers Replacement</u> .	
1	Multifunction, Turn Signal Switch Screw (Qty: 2) NOTE: Refer to <u>Fastener Notice</u> . Tighten: 3 N.m (27 lb in)
2	Multifunction, Turn Signal Switch Tip: 1. The wiper switch is integral to the multifunction lever. 2. Disconnect the electrical connectors.

WIPER/WASHER SWITCH REPLACEMENT - REAR

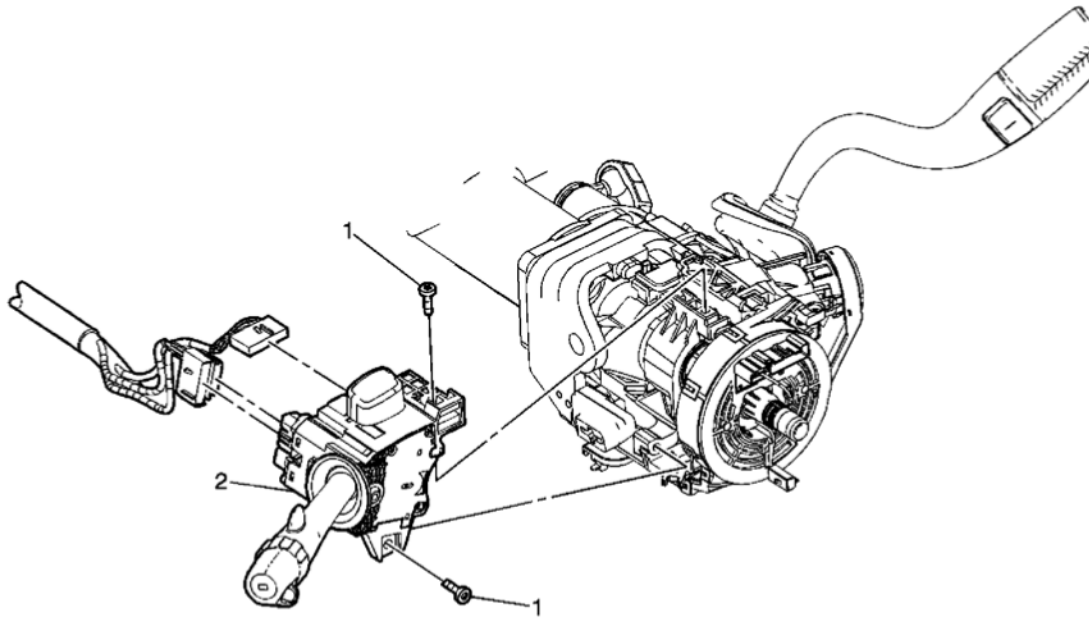


Fig. 22: View Of Multifunction Turn Signal Switch & Screws
Courtesy of GENERAL MOTORS CORP.

Wiper/Washer Switch Replacement - Rear

Callout	Component Name
CAUTION: Refer to <u>SIR Caution</u> .	
Preliminary Procedure 1. Disable the SIR system. Refer to <u>SIR Disabling and Enabling</u> . 2. Remove the upper and lower trim covers. Refer to <u>Steering Column Trim Covers Replacement</u> .	
1	Multifunction, Turn Signal Switch Screw (Qty: 2) NOTE: Refer to <u>Fastener Notice</u> . Tighten: 3 N.m (27 lb in)
2	Multifunction, Turn Signal Switch Tip: 1. The rear wiper switch is integral to the multifunction lever. 2. Disconnect the electrical connectors.

HOSE REPLACEMENT - WINDSHIELD WASHER

2007 Cadillac Escalade

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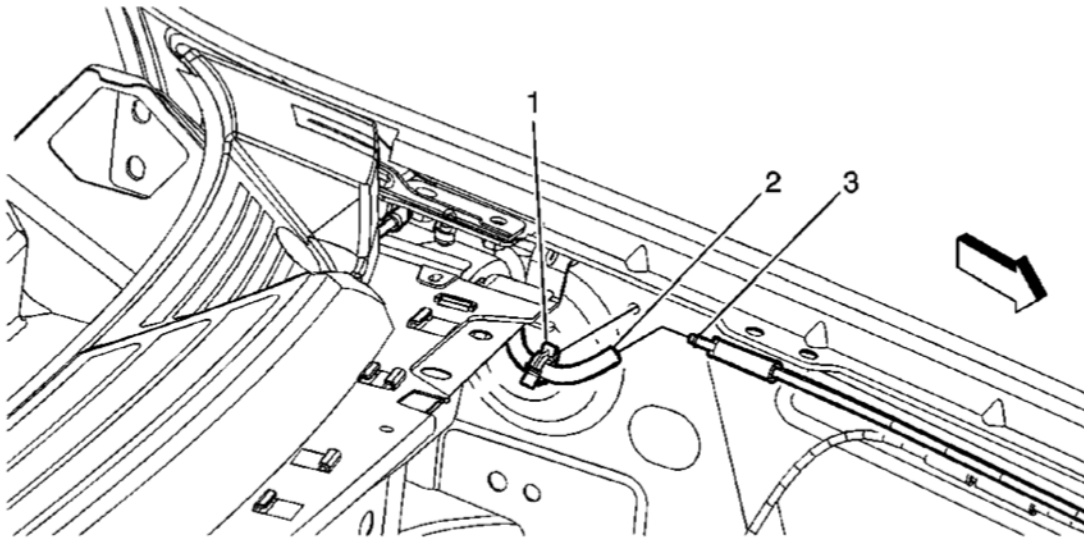


Fig. 23: View Of Windshield Washer Pump Hose Assembly & Components
Courtesy of GENERAL MOTORS CORP.

Hose Replacement - Windshield Washer

Callout	Component Name
Preliminary Procedure	
1. Open the hood.	
2. Remove the left front wheelhouse liner. Refer to <u>Front Wheelhouse Liner Replacement</u> .	
3. Disconnect the washer hose from the washer pump spout.	
1	Windshield Washer Hose Retainer Clip
2	Windshield Washer Nozzle Hose Tip: Disconnect the hose at the left rear fender flange.
3	Windshield Washer Pump Hose Assembly Tip: Route the new hose in the same location as the old hose was removed from.

WASHER SOLVENT CONTAINER REPLACEMENT (CHEVROLET/GMC)

Removal Procedure

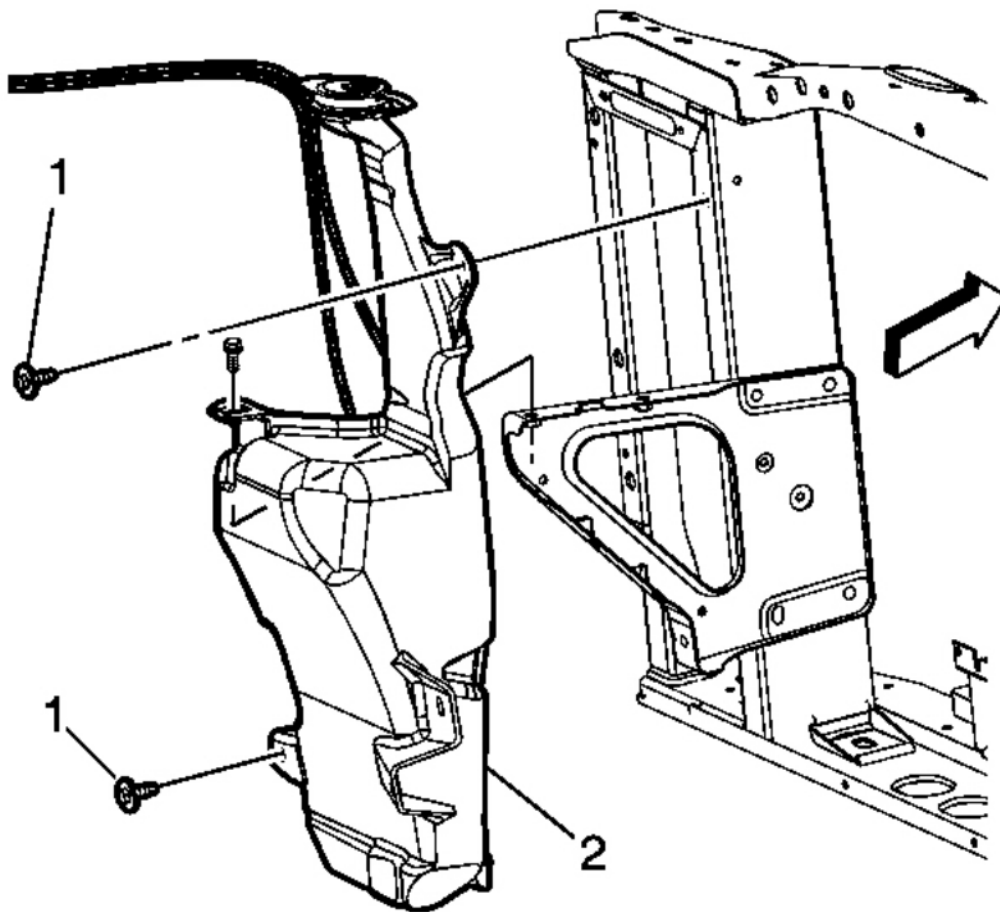


Fig. 24: View Of Washer Solvent Container & Screws
Courtesy of GENERAL MOTORS CORP.

1. Raise and support the vehicle. Refer to Lifting and Jacking the Vehicle .
2. Remove the left front wheel assembly. Refer to Tire and Wheel Removal and Installation .
3. Remove the left front wheelhouse liner. Refer to Front Wheelhouse Liner Replacement .

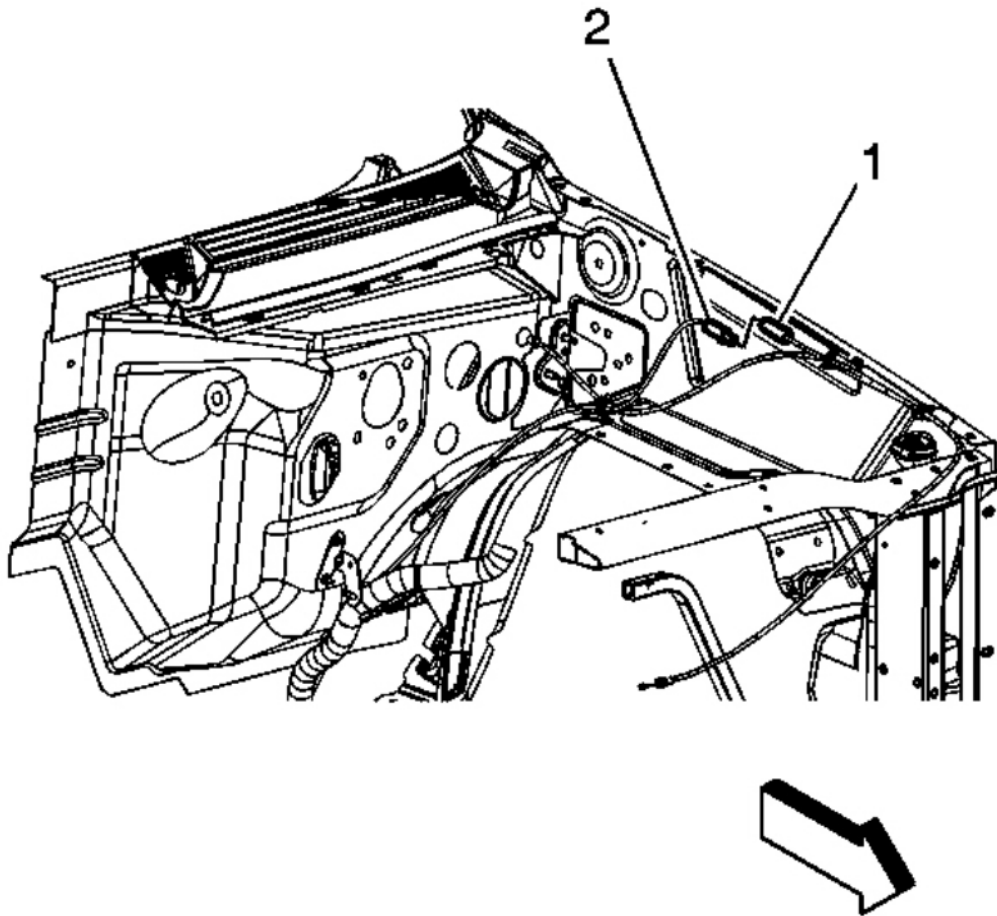


Fig. 25: Locating Washer Pump Hoses
Courtesy of GENERAL MOTORS CORP.

4. Disconnect the washer pump hoses (1,2) from the left side fender flange. Refer to **Hose Replacement - Windshield Washer**.
5. Drain the windshield washer solvent into a suitable container.
6. Disconnect the electrical connectors.
7. Lower the vehicle in order to access the hood latch.
8. Open the hood.
9. Remove the windshield washer solvent cap.
10. Remove the auxiliary battery tray, if equipped. Refer to **Battery Tray Replacement** .

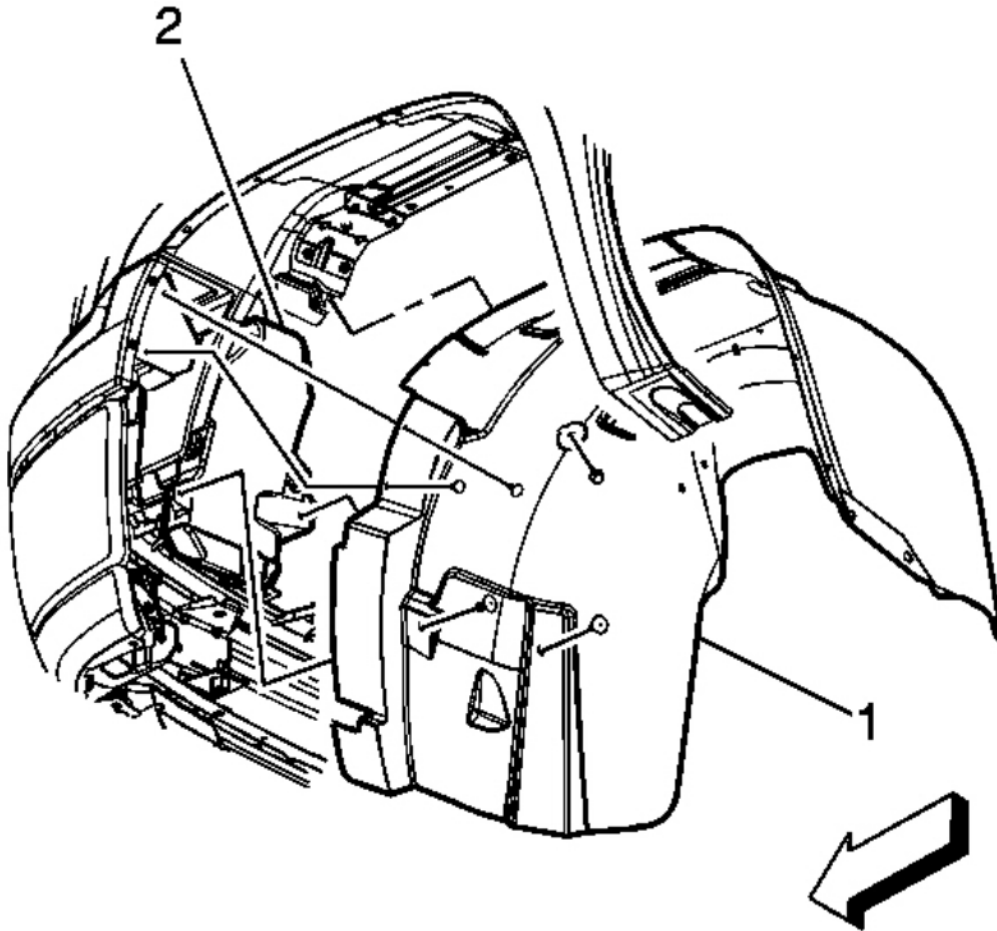


Fig. 26: View Of Wheelhouse & Windshield Washer Solvent Container Assembly
Courtesy of GENERAL MOTORS CORP.

11. Remove the upper windshield washer container bolt from under the auxiliary battery tray, if equipped.

IMPORTANT: Remove the washer container from the underside of the vehicle through the wheelhouse opening.

12. Remove the windshield washer solvent container assembly (2).

Installation Procedure

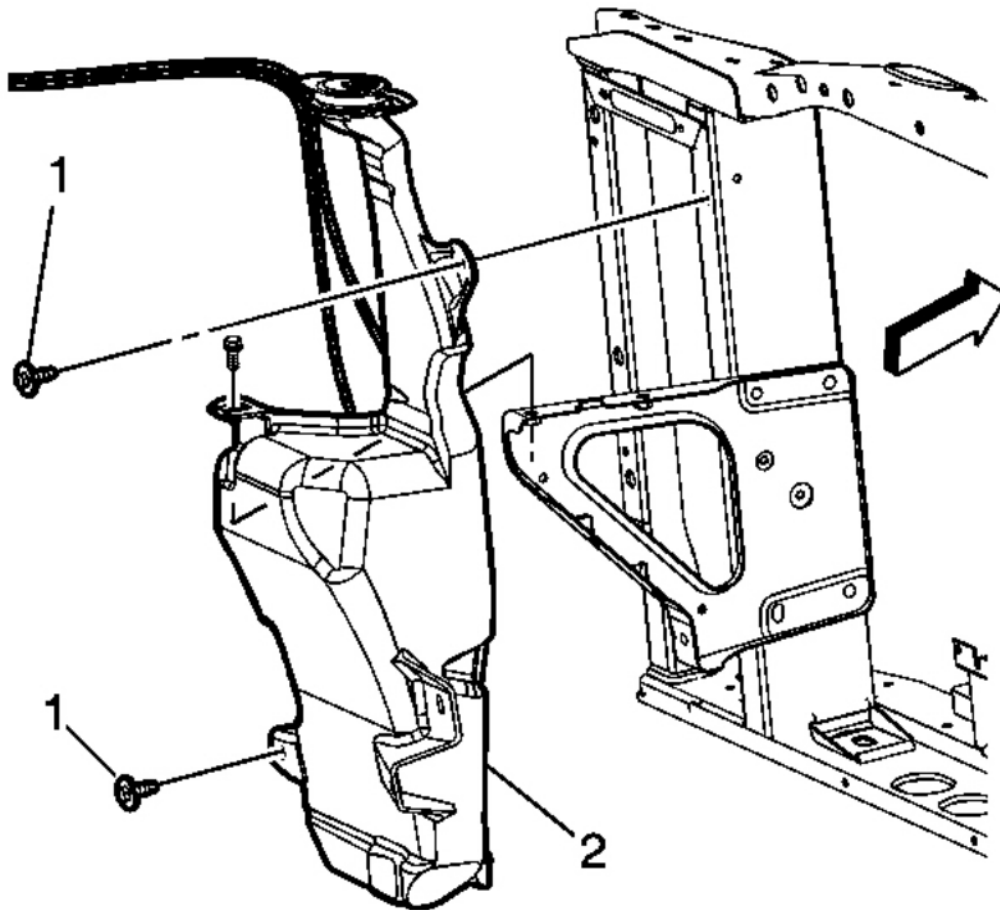


Fig. 27: View Of Washer Solvent Container & Screws
Courtesy of GENERAL MOTORS CORP.

1. Transfer washer pumps and level indicator to the new washer solvent container.

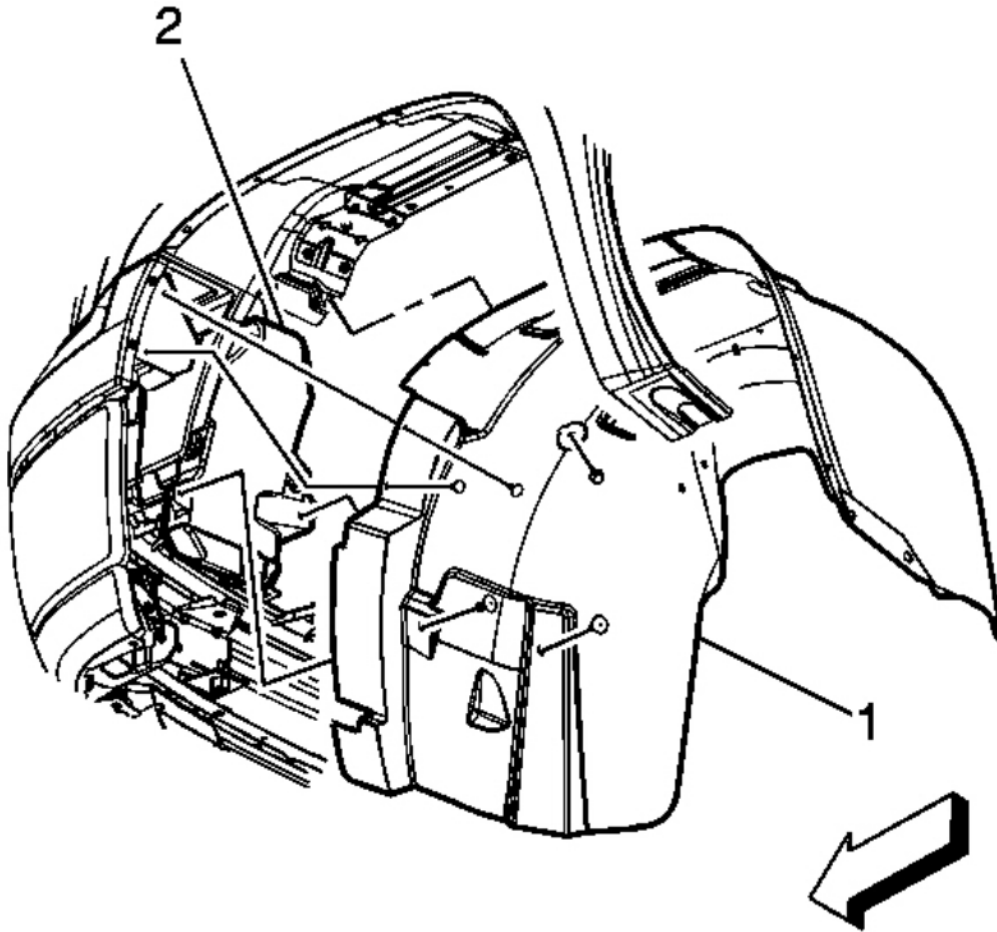


Fig. 28: View Of Wheelhouse & Windshield Washer Solvent Container Assembly
Courtesy of GENERAL MOTORS CORP.

2. Install the windshield washer container assembly.
3. Install the upper windshield washer container bolt to the auxiliary battery tray, if equipped.

NOTE: Refer to Fastener Notice .

4. Install the upper windshield washer solvent container bolts.

Tighten: Tighten the bolts to 9 N.m (80 lb in).

5. Install the auxiliary battery tray, if equipped. Refer to Battery Tray Replacement .

6. Install the windshield washer solvent cap.
7. Connect the electrical connectors.

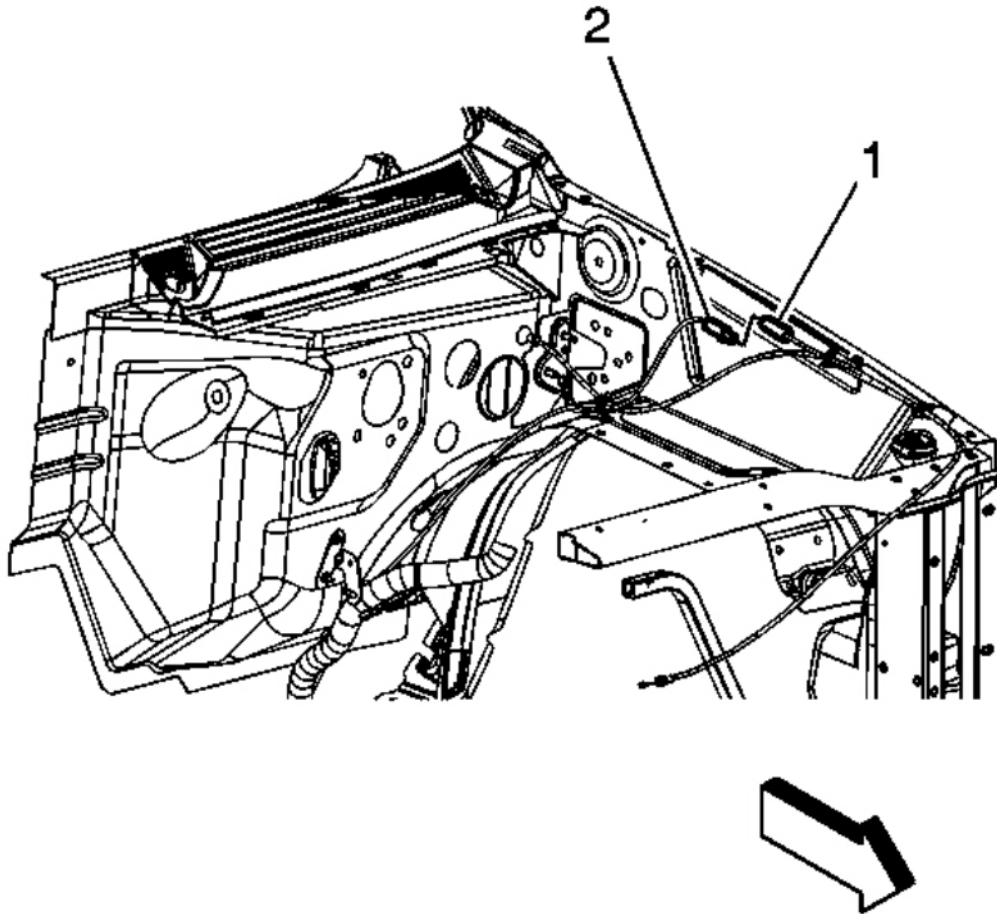


Fig. 29: Locating Washer Pump Hoses
Courtesy of GENERAL MOTORS CORP.

8. Connect the washer pump hoses (1,2). Refer to **Hose Replacement - Windshield Washer**.
9. Install the left front wheelhouse liner. Refer to **Front Wheelhouse Liner Replacement**.
10. Install the left front wheel assembly. Refer to **Tire and Wheel Removal and Installation**.
11. Fill the washer solvent container with windshield solvent. Refer to **Fluid and Lubricant Recommendations**.

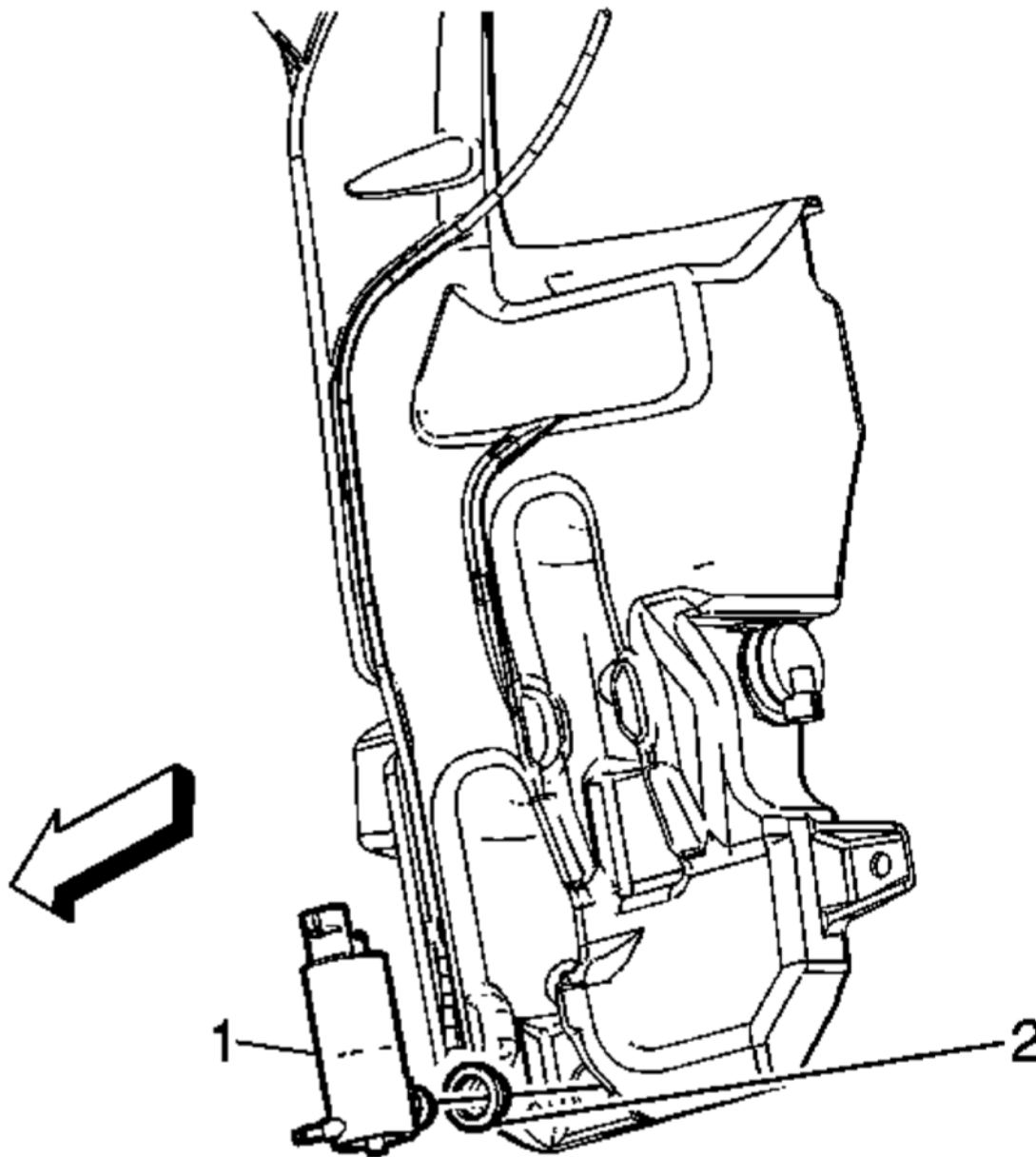


Fig. 30: View Of Windshield Washer Solvent Pump & Grommet
Courtesy of GENERAL MOTORS CORP.

Washer Pump Replacement - Windshield

Callout	Component Name
Preliminary Procedures	
1.	Remove the windshield washer container. Refer to <u>Washer Solvent Container Replacement (Chevrolet/GMC)</u> .
2.	Using 2 flat-bladed tools, gently pry the windshield washer solvent pump from the front side of the

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2007 ACCESSORIES & EQUIPMENT Wipers and Washers - Avalanche, Escalade, Suburban, Tahoe & Yukon

washer container.

3. Discard the old windshield washer solvent pump grommet.

1	Windshield Washer Solvent Pump
2	Windshield Washer Solvent Pump Grommet Tip: Discard the old grommet and use the new grommet in the kit.

WASHER PUMP REPLACEMENT - REAR

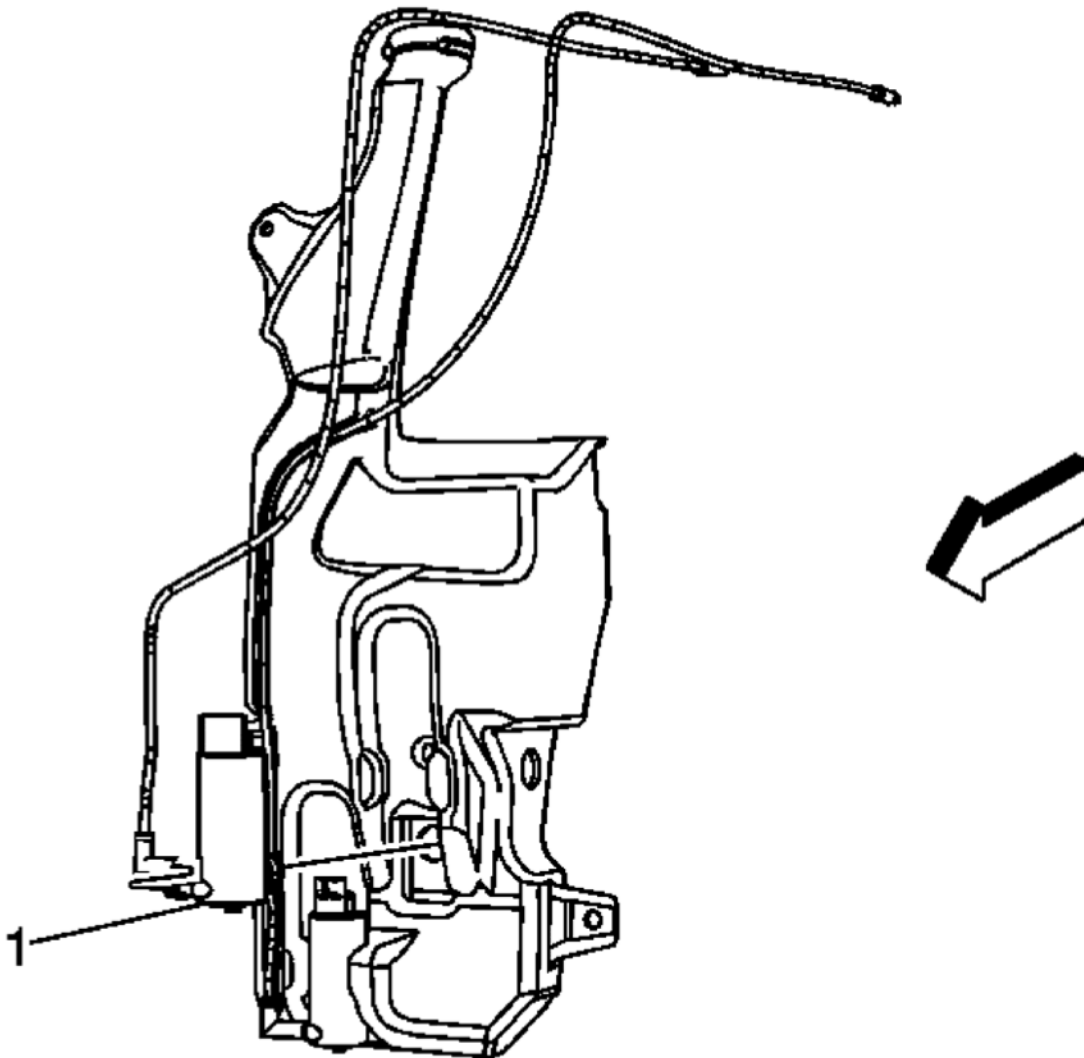


Fig. 31: View Of Rear Windshield Washer Pump Assembly
Courtesy of GENERAL MOTORS CORP.

Washer Pump Replacement - Rear

Callout	Component Name
Preliminary Procedures	

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1. Remove the windshield washer container. Refer to **Washer Solvent Container Replacement (Chevrolet/GMC)**.
2. Using 2 flat-bladed tools, gently pry the rear washer solvent pump from the front side of the washer container.
3. Discard the old rear washer solvent pump grommet.

1

Rear Windshield Washer Pump Assembly

Tip: Discard the old grommet and use the new grommet in the kit.

WASHER SOLVENT CONTAINER LEVEL SENSOR REPLACEMENT

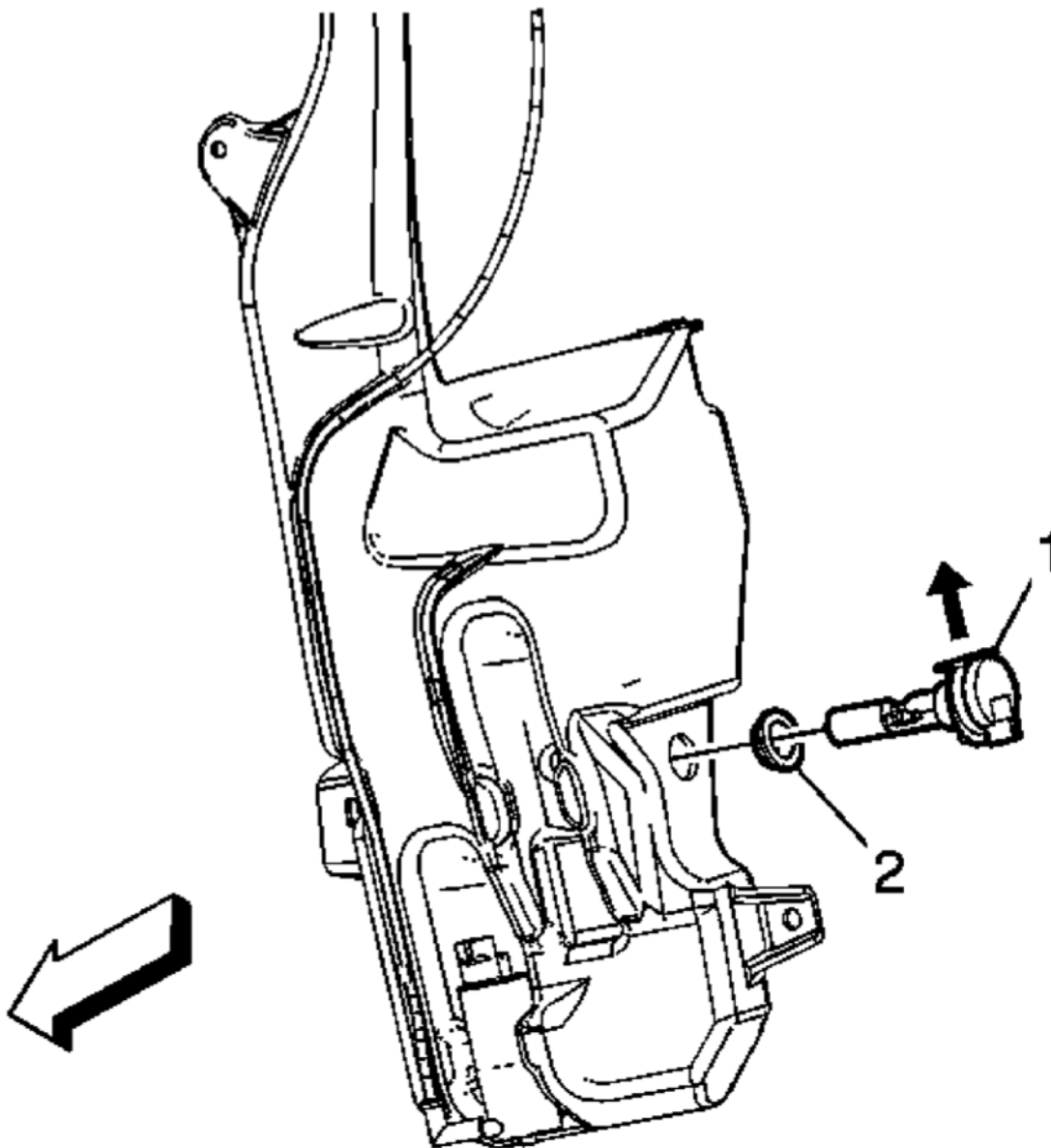


Fig. 32: View Of Windshield Washer Solvent Level Indicator & Grommet
 Courtesy of GENERAL MOTORS CORP.

Washer Solvent Container Level Sensor Replacement

Callout	Component Name
Preliminary Procedures	
1.	Remove the windshield washer container. Refer to Washer Solvent Container Replacement (Chevrolet/GMC) .
2.	Using 2 flat-bladed tools, gently pry the windshield washer solvent level indicator from the side of the washer container.
3.	Discard the old windshield washer solvent level indicator grommet.
1	Windshield Washer Solvent Level Indicator Tip: Ensure the square edge faces upward upon installation of the new level indicator.
2	Windshield Washer Solvent Level Indicator Grommet Tip: Discard the old grommet and use the new grommet in the kit.

WINDSHIELD WASHER SOLVENT HEATER REPLACEMENT

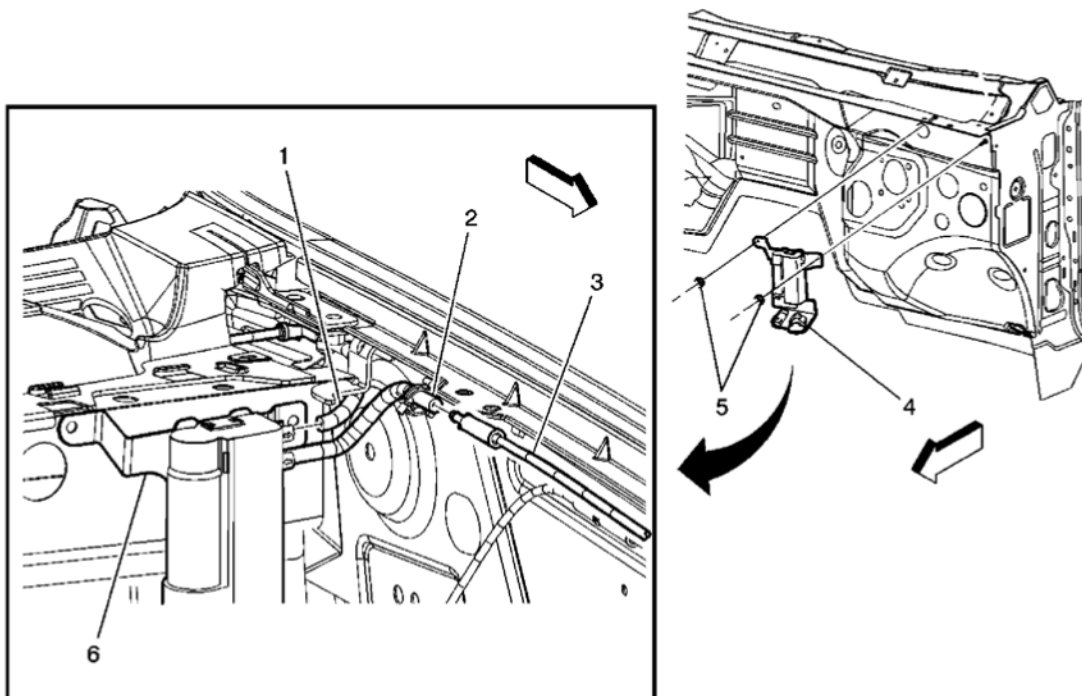


Fig. 33: View Of Windshield Washer Solvent Heater Assembly & Components
 Courtesy of GENERAL MOTORS CORP.

Windshield Washer Solvent Heater Replacement

Callout	Component Name
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1	Windshield Washer Nozzle Hose (Outlet) Tip: Disconnect the air inlet panel hose from the outlet side of the heater assembly.
2	Windshield Washer Pump Hose (Inlet)
3	Windshield Washer Pump Hose
4	Windshield Washer Solvent Heater Assembly Electrical Connectors (Qty: 2) Tip: Disconnect the electrical connectors.
5	Windshield Washer Solvent Heater Assembly Nuts (Qty: 2) NOTE: Refer to <u>Fastener Notice</u> . Tighten: 10 N.m (89 lb in)
6	Windshield Washer Solvent Heater Assembly

AIR INLET GRILLE PANEL REPLACEMENT

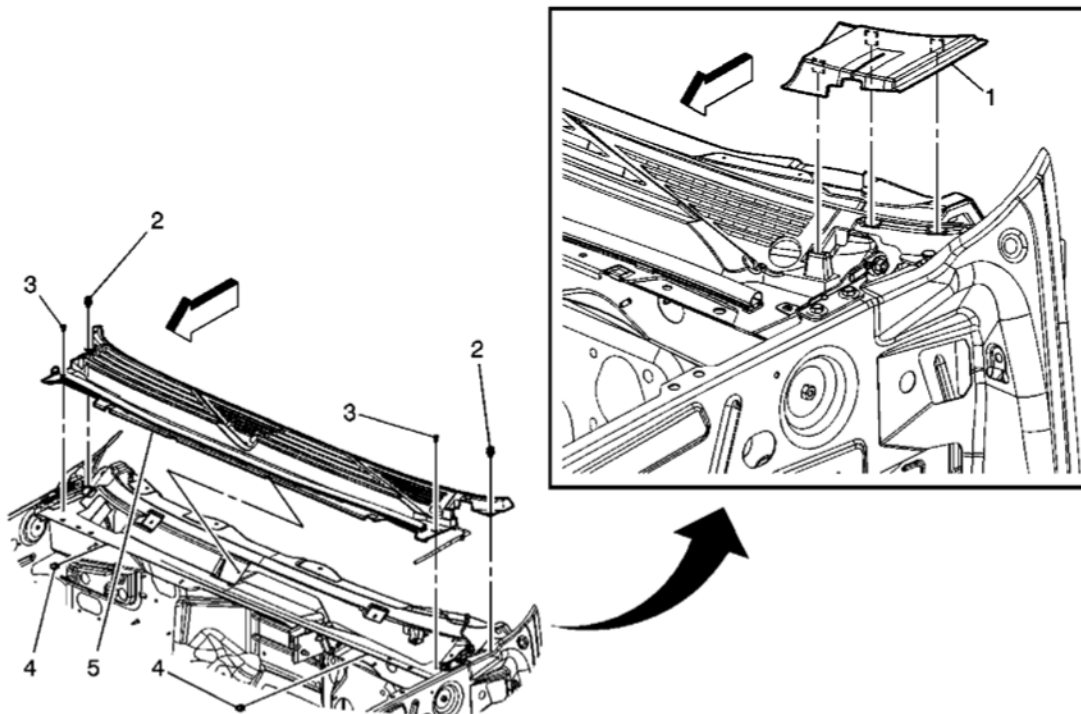


Fig. 34: View Of Air Inlet Panel & Components
Courtesy of GENERAL MOTORS CORP.

Air Inlet Grille Panel Replacement

Callout	Component Name
Preliminary Procedure	

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1. Remove the fixed antenna, if equipped. Refer to **Fixed Antenna Replacement (Avalanche/Escalade EXT)** .
2. Remove the windshield wiper arms. Refer to **Wiper Arm Replacement**.
3. Remove the rear hood seal. Refer to **Hood Rear Seal Replacement** .

1	Air Inlet Panel End Panel
2	Air Inlet Panel Retainer (Qty: 2)
3	Air Inlet Panel Screw (Qty: 2)
	NOTE: Refer to <u>Fastener Notice</u> .
	Tighten: 9 N.m (80 lb in)
4	Air Inlet Panel Clip
5	Air Inlet Panel

WIPER ARM REPLACEMENT

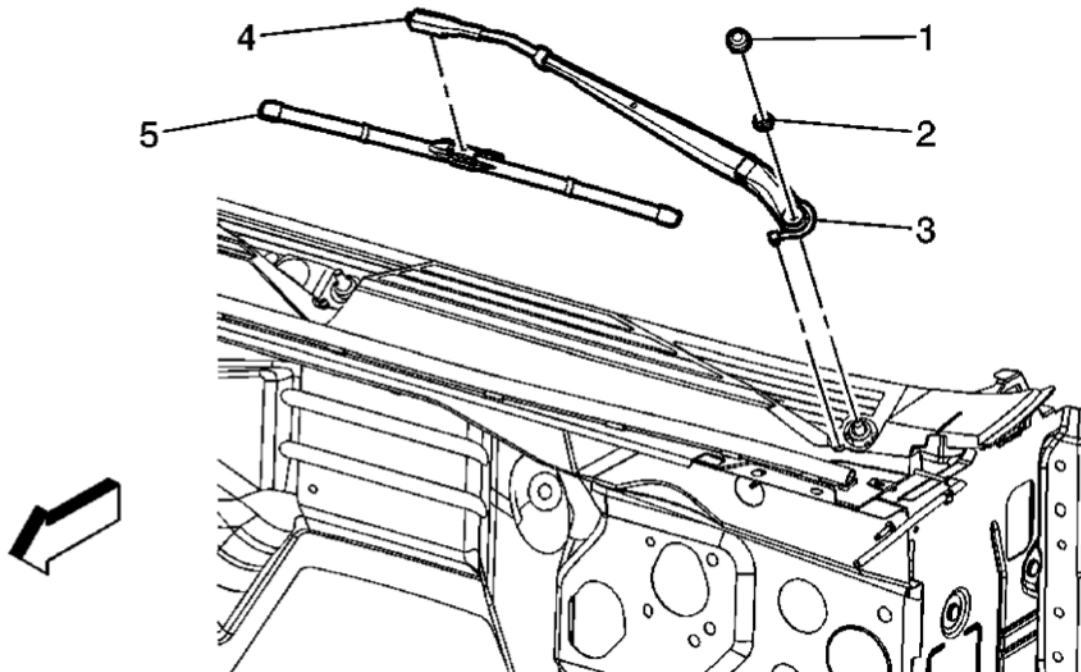


Fig. 35: View Of Windshield Washer Blade Assembly & Components
Courtesy of GENERAL MOTORS CORP.

Wiper Arm Replacement

Callout	Component Name
Preliminary Procedure:	

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Open the hood in order to access and remove the wiper arm assembly.

1	Windshield Washer Arm Finish Cap Tip: Use a small flat-bladed tool to remove the finish cap.
2	Windshield Washer Arm Nut NOTE: Refer to <u>Fastener Notice</u> . Tighten: Tighten the nut to 35 N.m (26 lb ft) while holding the wiper blade arm to the vertical black bar target mark located at the lower portion of the windshield.
3	Windshield Washer Arm Hose Tip: Rotate the hose clockwise around the end of the washer wiper arm upon installation.
4	Windshield Washer Arm Assembly Tip: Use the J 39637 Wiper Arm Remover Tool. See <u>Special Tools</u> .
5	Windshield Washer Blade Assembly Tip: Pinch the 2 outer tabs on the arm, rotate the blade rearward and slide the blade forward to release the wiper blade from the wiper arm assembly.

WIPER ARM BLADE REPLACEMENT

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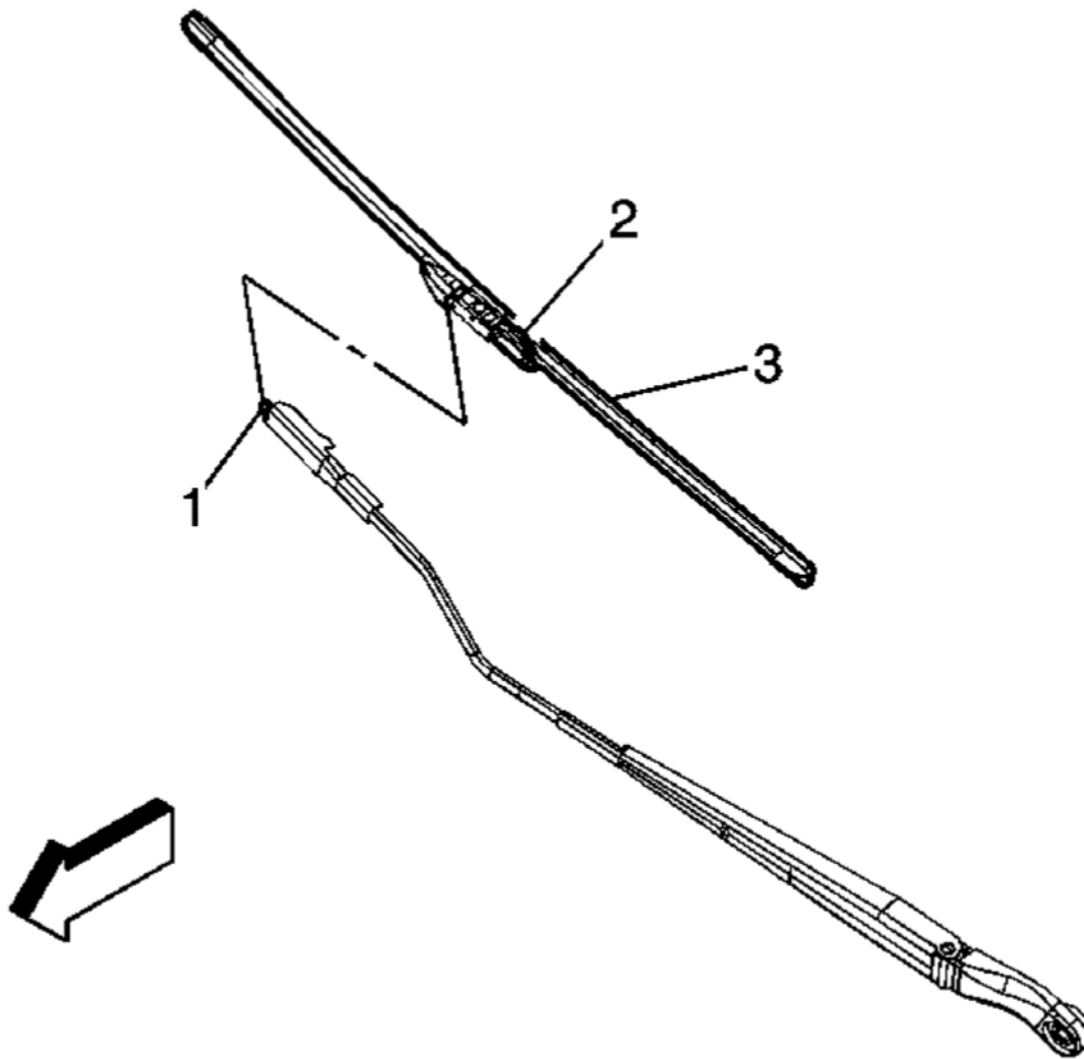


Fig. 36: Identifying Wiper Arm Components
Courtesy of GENERAL MOTORS CORP.

Wiper Arm Blade Replacement

Callout	Component Name
Preliminary Procedure: Raise the wiper arm to the full up position (service up).	
1	Windshield Washer Arm Assembly
2	Windshield Wiper Arm Blade Removal Tabs Tip: Squeeze both tabs and rotate the blade away from the arm to remove.
3	Windshield Washer Blade Assembly Tip: Discard if rubber appears worn or does not wipe the windshield clean.

WIPER ARM BLADE REPLACEMENT - REAR

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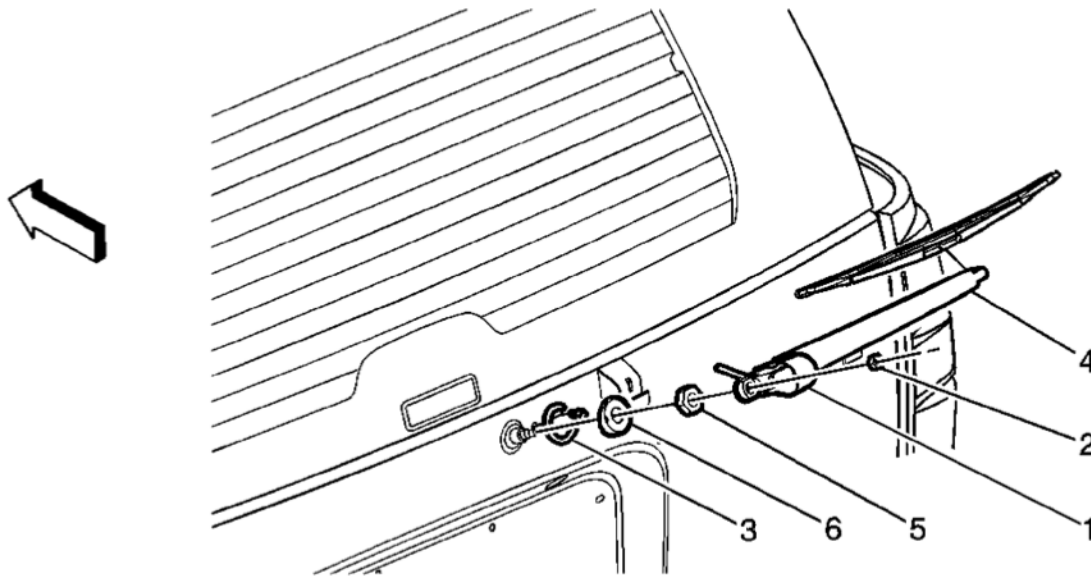


Fig. 37: Identifying Wiper Arm Components
Courtesy of GENERAL MOTORS CORP.

Wiper Arm Blade Replacement - Rear

Callout	Component Name
1	Rear Arm Cap Tip: Use a small flat-bladed tool to disengage the cover from the rear wiper arm.
2	Rear Window Wiper Arm Nut NOTE: Refer to <u>Fastener Notice</u> . Tighten: Tighten the nut to 9 N.m (80 lb in) while holding the wiper arm park finger on the arm securely to inside the channel on the park ramp.
3	Rear Window Washer Nozzle Hose Assembly Tip: Rotate the hose counterclockwise around the end of the rear wiper washer arm upon installation.
4	Rear Window Wiper Arm Assembly Tip: • Clean the knurls on the rear wiper motor pivot shaft after the rear wiper arm has been removed. • Use the J 39637 Wiper Arm Remover Tool. See <u>Special Tools</u>.
5	Rear Window Wiper Motor Nut Tighten: Ensure the nut is tightened to 4.9 N.m (43 lb in) prior to the rear arm installation.
6	Rear Window Wiper Motor Spacer

WIPER MOTOR REPLACEMENT - REAR

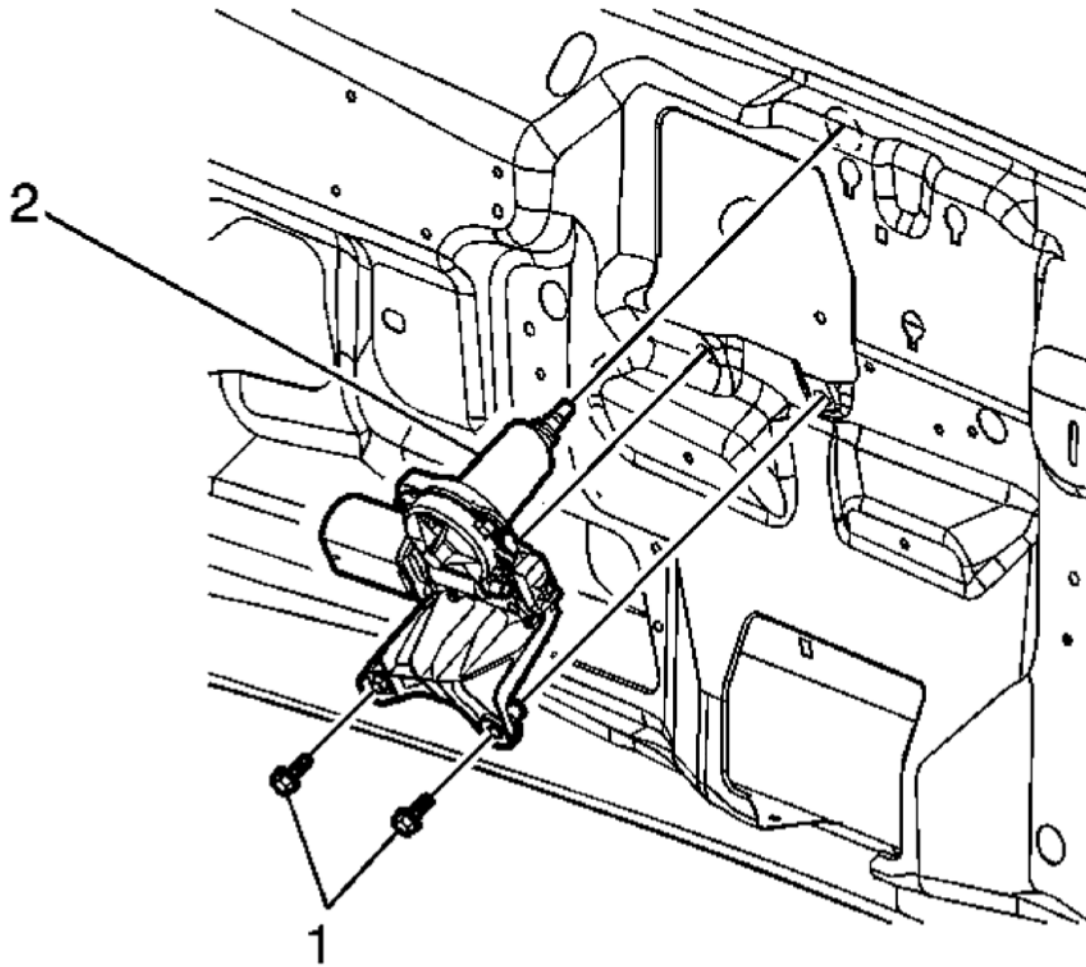


Fig. 38: Identifying Rear Wiper Arm Components
Courtesy of GENERAL MOTORS CORP.

Wiper Motor Replacement - Rear

Callout	Component Name
Preliminary Procedures	
1. Remove the liftgate interior trim panel. Refer to Liftgate Trim Panel Replacement .	
2. Remove the rear wiper arm assembly. Refer to Wiper Arm Blade Replacement - Rear .	
3. Remove the rear wiper motor pivot shaft nut and spacer.	
NOTE: Refer to Fastener Notice .	

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Tighten: Tighten the rear wiper motor pivot shaft nut to 4.9 N.m (43 lb in) after the motor and spacer have been installed.

1

Rear Window Wiper Motor Assembly Bolts (Qty: 2)

Tighten: 9 N.m (80 lb in)

2

Rear Window Wiper Motor Assembly

Tip:

1. Pull the wiper motor forward towards the front of the vehicle.
2. Disconnect the electrical connector.
3. Remove the rear wiper motor from the inner liftgate panel.
4. Check the rear wiper shaft spacer upon installation of the new wiper motor to ensure proper position of the spacer to the rear liftgate panel.

WIPER MOTOR MODULE REPLACEMENT

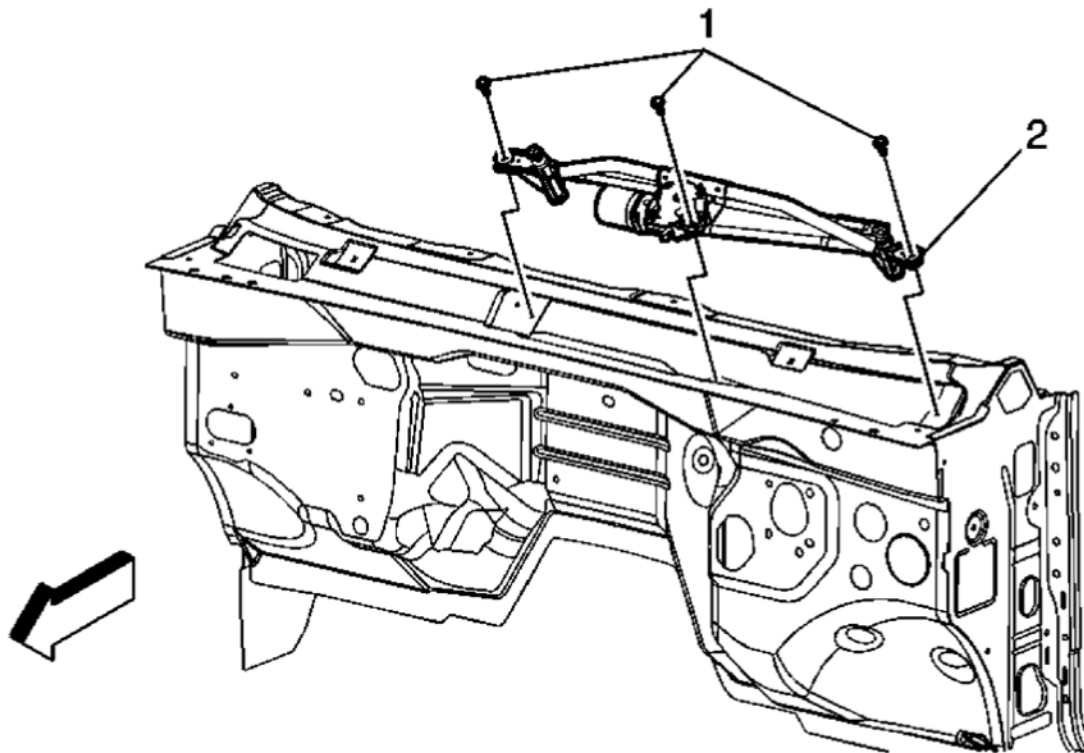


Fig. 39: View Of Windshield Wiper System Module Assembly & Bolts
Courtesy of GENERAL MOTORS CORP.

Wiper Motor Module Replacement

Callout	Component Name
Preliminary Procedure	

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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 System Module Assembly Bolt (Qty: 3) NOTE: Refer to <u>Fastener Notice</u> . Tighten: 9 N.m (80 lb in)
2	Windshield Wiper System Module Assembly Tip: Raise the module and disconnect the electrical connector.

WINDSHIELD OUTSIDE MOISTURE SENSOR REPLACEMENT

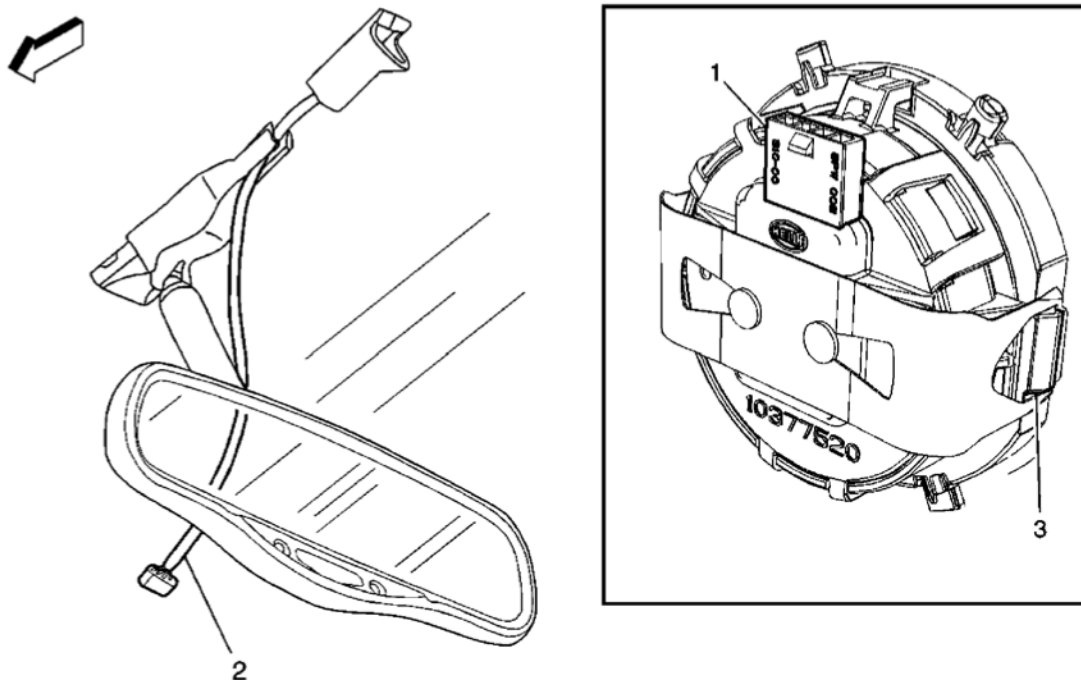


Fig. 40: View Of Rain Sensor Module & Components
Courtesy of GENERAL MOTORS CORP.

Windshield Outside Moisture Sensor Replacement

Callout	Component Name
1	Rain Sensor Module Mount Plate Tip: 1. Gently pry the trim cover outward in order to remove the cover from the rain sensor module.

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	2. Release the windshield coupler retaining clips.
2	Electrical Connector Tip: Disconnect the electrical connector from the rain sensor module.
3	Rain Sensor Module Tip: The rain sensor module plate is not serviced separately.

WIPER PARK RAMP REPLACEMENT

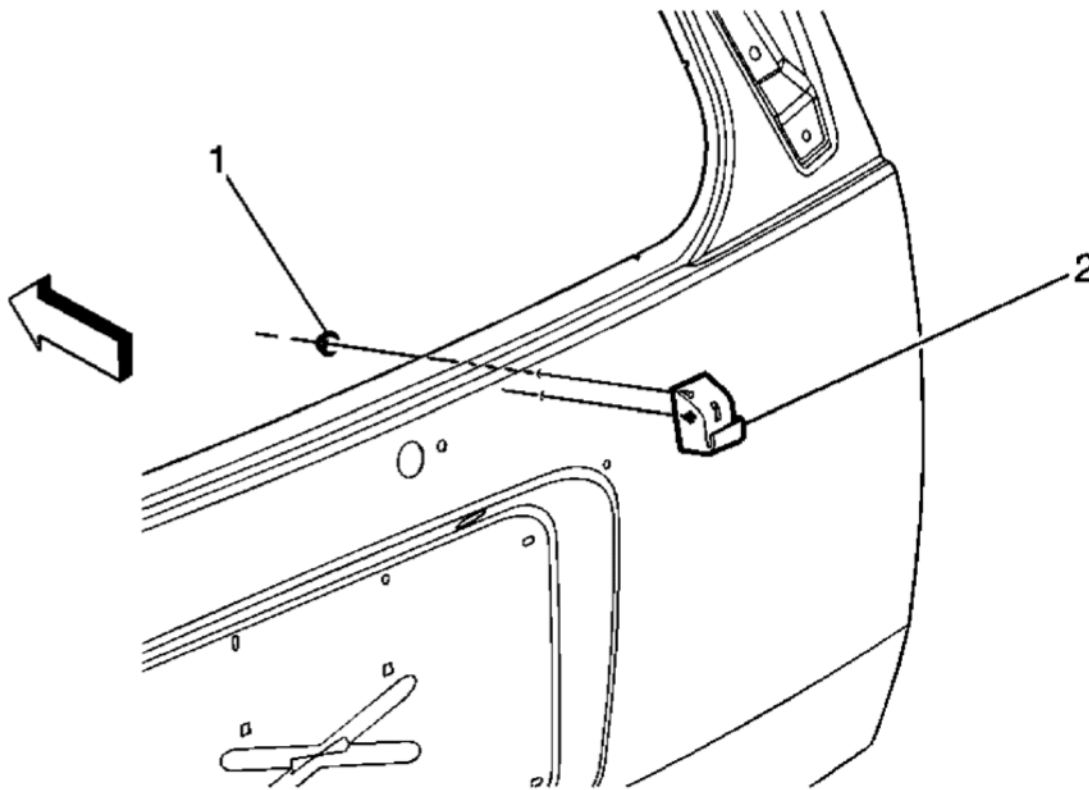


Fig. 41: View Of Rear Window Wiper Arm Park Ramp & Nut
Courtesy of GENERAL MOTORS CORP.

Wiper Park Ramp Replacement

Callout	Component Name
Preliminary Procedure	
1. Open the liftgate.	
2. Remove the interior liftgate trim panel. Refer to <u>Liftgate Trim Panel Replacement</u> .	
1	Rear Window Wiper Arm Park Ramp Nut NOTE: Refer to <u>Fastener Notice</u> .

2007 Cadillac Escalade

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	Tighten: 9 N.m (80 lb in)
2	Rear Window Wiper Arm Park Ramp Tip: Upon installation, align the pin in the rear of the ramp to the hole in the liftgate outer panel.

WINDSHIELD GLASS CLEANING

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

BLADE ELEMENT CLEANING

1. Lift the wiper blade assemblies off of the windshield glass.
2. Clean the wiper blade element with a clean cloth saturated with full strength washer solution.
3. Rinse the wiper blade assemblies with water.
4. Place the wiper blade assemblies back onto the windshield glass.

WIPER CHATTER REPAIR

Some vehicles may exhibit a condition where the windshield wiper blades chatter or wipe unevenly. Several different conditions can cause the wiper blade chatter. To completely repair wiper blade chatter, all of the following should be checked and repaired as necessary:

- The windshield glass must be clean.
- The wiper blade element must be clean.
- The wiper arm tip pressure must be within specifications.
- The wiper blade element set must be within specifications.

DESCRIPTION AND OPERATION

WIPER/WASHER SYSTEM DESCRIPTION AND OPERATION

Windshield Wipers

The windshield wiper/washer switch signal circuits are inputs to the body control module (BCM) and the BCM controls wiper motor low speed operation, washer pump and high speed operation. The windshield wiper/washer switch is provided a low reference from the BCM and each of the switch signal circuits is supplied 12 volts through a resistor and monitored within the BCM. During LOW or INTERMITTENT operation the wiper switch low signal circuit is closed to the low reference circuit through a series of resistors within the switch assembly and the signal circuit voltage monitored by the BCM will depend on the switch contact location to the resistor assembly. During HIGH or WASH operation the high and wash switch signal circuits are closed directly to the low reference circuit within the switch assembly and nearly all the signal circuit voltage will be dropped across the BCM resistors. The BCM controls the wiper motor through the Wiper

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Relay and the Wiper High Relay. During any wiper motor function that uses low speed the BCM supplies the voltage to energize the Wiper Relay and battery voltage will be supplied from the Wiper Relay through the de-energized Wiper High Relay to the wiper motor low speed control circuit. During high speed wiper motor operation the Wiper Relay is energized as in low speed and the BCM provides a ground to energize the Wiper High Relay and the battery voltage is supplied to the wiper motor high speed control circuit. Wiper motor park operation is controlled by the BCM using an input from the park switch within the wiper motor assembly. The BCM supplies the park switch signal circuit 12 volts through a resistor then monitors the circuit. Whenever the wiper motor is out of the park position the park switch signal circuit is closed to ground and nearly all the signal circuit voltage will be dropped across the BCM resistor. 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 and the BCM will park the wipers the next time the ignition is cycled ON.

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 from the BCM. The sensor is grounded through the ground circuit and G200. 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.

Windshield Washers

When the windshield Wash switch is pressed, ground is applied through the switch contacts and the windshield washer switch signal circuit to the body control module (BCM) indicating the windshield wash request. The BCM then energizes the WPR relay, as stated above, and the WSH relay by applying ground through the control circuit to the coil side of the relay. With the wash relay energized, battery voltage from the WPR fuse is applied through the switch side of the relay and out to the control circuit of the windshield washer fluid pump. The wiper motor will operate for 2 wipe cycles after the wash switch is released.

Heated Windshield Washers

The windshield washer solvent heater operates with the standard windshield wiper washer system, and when a heated washer cycle is activated the solvent heater controls the windshield washers through the washer switch signal circuit to the body control module (BCM). The heater is supplied with high current power and ground circuits that are used to energize the heater coils. The low current logic voltage is supplied to the heater through the RUN relay in the underhood fuse block. The RUN relay is a PCB relay energized by the BCM only while

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the engine is running. The heated washer cycle operation is activated by a separate switch located on the instrument panel accessory switch assembly. When the heated washer fluid switch is pressed the heated washer switch signal circuit is momentarily grounded and the heated washer cycle is activated. During the heated wash cycle the 3 heater elements in the solvent heater are energized, and when the solvent temperature reaches approximately 70° C (160° F) the heater grounds the washer switch signal circuit until the heated solvent is dispensed. The heated washer cycle will run 4 heat and wash actions unless deactivated by the heated washer switch signal.

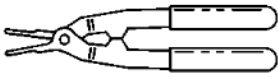
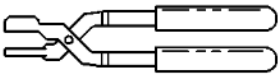
REAR WIPER/WASHER SYSTEM DESCRIPTION AND OPERATION

The rear wiper module controls rear wiper motor operation. Battery voltage supplied to the module is used to operate the wiper motor in all modes and to return the rear wiper arm to the park position after the ignition is turned off. Accessory voltage supplied to the rear wiper/washer switch is used to supply the rear window wiper and washer switch signal circuits. In wiper switch positions 1, 2 and WASH the wiper switch signal circuit voltage level to the wiper motor module determines the wiper motor operating mode. A second wash switch contact is used as the washer pump relay control circuit and the washer pump relay will remain energized for as long as the rear washer switch is pressed. The liftgate ajar switch signal circuit provides information to the rear window wiper module about the status of the liftgate. If the liftgate or liftglass is open the rear wiper operation is not performed.

SPECIAL TOOLS AND EQUIPMENT

SPECIAL TOOLS

Special Tools

Illustration	Tool Number/ Description
	J 39232 Wiper Transmission Separator
	J 39529 Wiper Transmission Installer
	J 39637 Wiper Arm Remover Tool

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