

2008 Isuzu Ascender LS

2008 Accessories & Equipment Wipers & Washers - Ascender, Envoy & Trailblazer

2008 Accessories & Equipment

Wipers & Washers - Ascender, Envoy & Trailblazer

SPECIFICATIONS

FASTENER TIGHTENING SPECIFICATIONS

Application	Specification	
	Metric	English
Air Inlet Panel Grille Nuts	4 N.m	35 lb in
Front Wiper Arm Nuts	30 N.m	22 lb ft
Front Wiper Motor Cover Screws	3 N.m	27 lb in
Rear Wiper Arm Nut	20 N.m	15 lb ft
Rear Wiper Arm Park Ramp Bolts	9 N.m	79 lb in
Rear Wiper Motor Bolts	8 N.m	71 lb in
Rear Wiper Motor Shaft Nut	8 N.m	71 lb in
Washer Solvent Container Assembly Nuts	10 N.m	89 lb in
Wiper Transmission Assembly Bolts	8 N.m	71 lb in

SCHEMATIC & ROUTING DIAGRAMS

WIPER/WASHER SCHEMATICS

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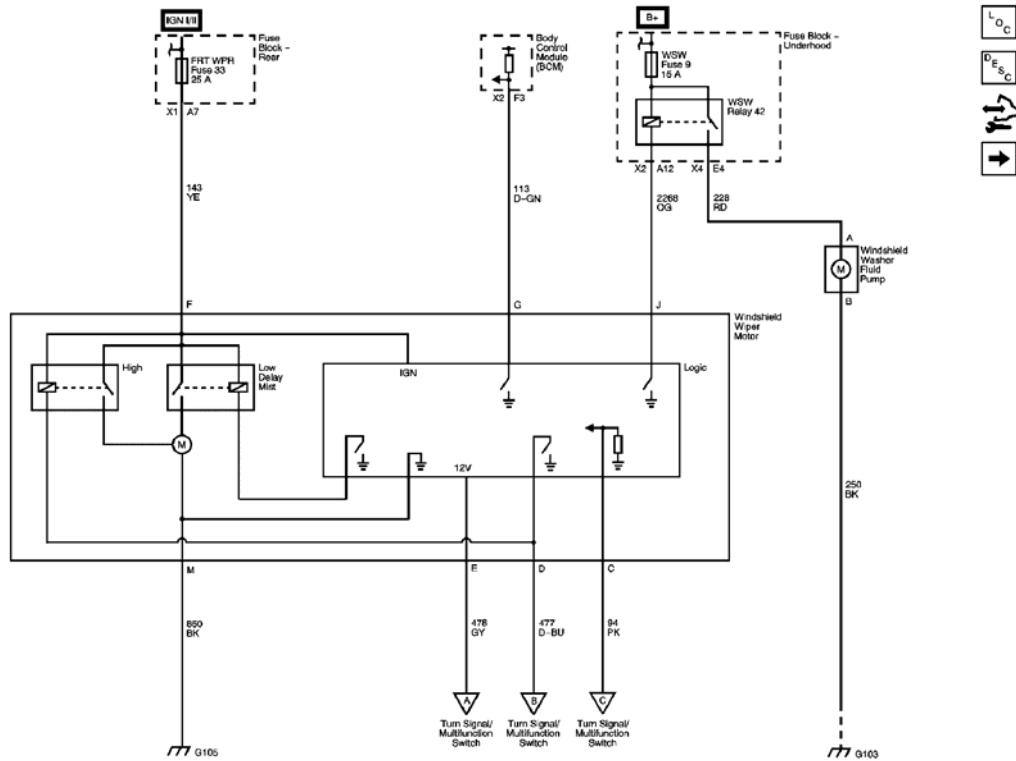


Fig. 1: Windshield Wiper/Washer Motors Schematic
Courtesy of GENERAL MOTORS CORP.

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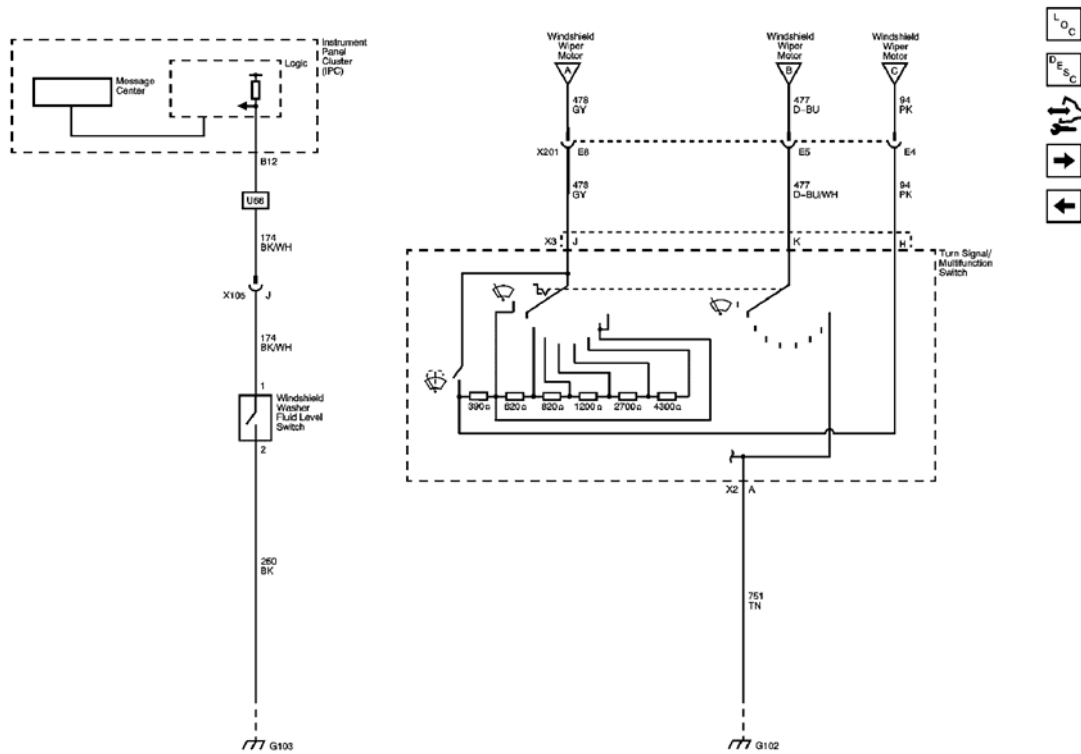


Fig. 2: Wiper/Washer Switch and Washer Fluid Level Switch Schematic
Courtesy of GENERAL MOTORS CORP.

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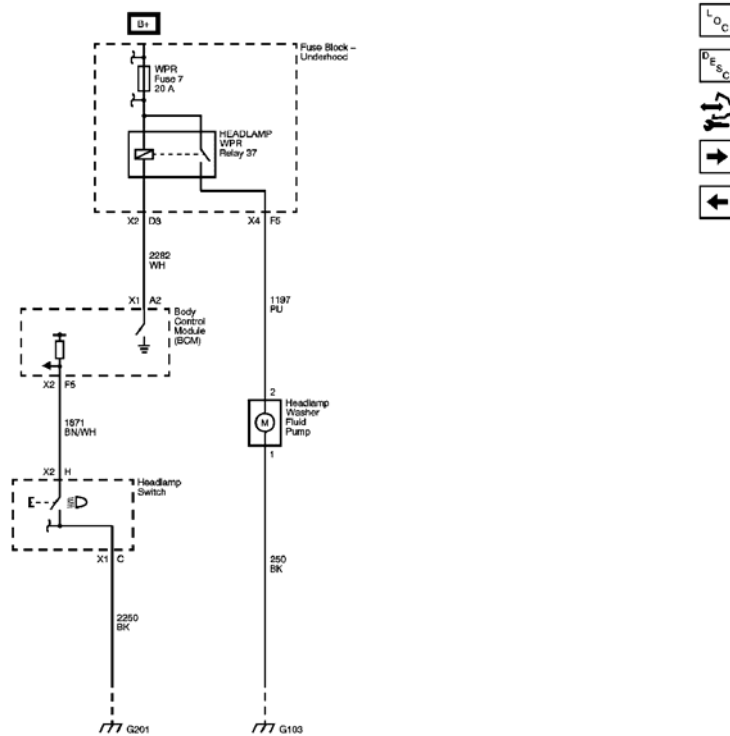


Fig. 3: Headlamp Washer Schematic - CE4
Courtesy of GENERAL MOTORS CORP.

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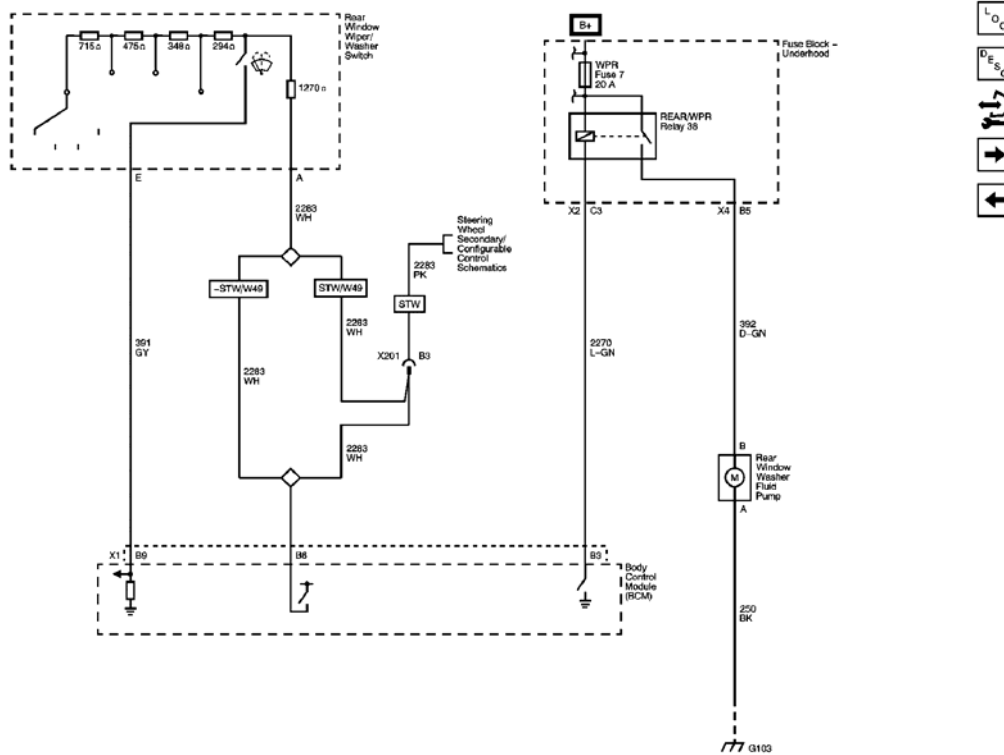


Fig. 4: Rear Wiper/Washer Controls Schematic
Courtesy of GENERAL MOTORS CORP.

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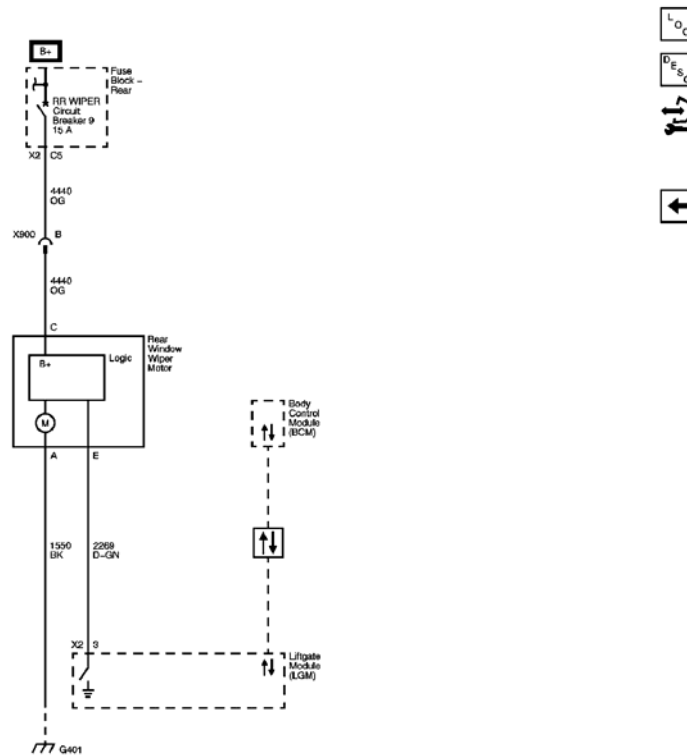


Fig. 5: Rear Window Wiper Motor Schematic
Courtesy of GENERAL MOTORS CORP.

DIAGNOSTIC INFORMATION & PROCEDURES

DIAGNOSTIC CODE INDEX

DIAGNOSTIC CODE INDEX

DTC	Description
<u>DTC B1017 or B3970</u>	B1017: Output Driver Module Performance
<u>DTC B2697</u>	B2697: Headlamp Washer Request Circuit
<u>DTC B3810 or B3811</u>	B3810: Headlamp Washer Relay Circuit B3811: Rear Washer Relay Circuit

DIAGNOSTIC STARTING POINT - WIPER/WASHER SYSTEMS

Begin wiper/washer system diagnosis with the **Diagnostic System Check - Vehicle** . The Diagnostic System Check will provide the following information:

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

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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.

DTC B1017 OR B3970

Diagnostic Instructions

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

DTC Descriptor

DTC B1017

Output Driver Module Performance

Circuit/System Description

The rear wiper motor is supplied battery positive voltage and ground. The liftgate control module controls rear wiper motor operation through the rear wiper motor speed signal circuit. The rear wiper motor speed signal circuit is supplied a battery positive reference voltage by the rear wiper motor module and is pulse width modulated to ground by the liftgate control module. The duty cycle of the pulse width modulation (PWM) determines the rear wiper motor operating mode.

Conditions for Running the DTC

The battery voltage must be between 9-16 volts.

Conditions for Setting the DTC

The rear wiper motor speed signal circuit is open or shorted to ground.

Action Taken When the DTC Sets

The rear wiper/washer system will be disabled for as long as the DTC is current.

Conditions for Clearing the DTC

- This DTC will clear on current status after the condition for setting the fault is corrected and the ignition is cycled.
- A history DTC will clear after 100 consecutive ignition cycles without a fault present.

Reference Information

Schematic Reference

Wiper/Washer Schematics**Connector End View Reference****Component Connector End Views****Description and Operation****Rear Wiper/Washer System Description and Operation****Electrical Information Reference**

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

Scan Tool Reference**Control Module References** for scan tool information**Circuit/System Testing**

1. Ignition OFF, disconnect the harness connector at the rear window wiper motor.
2. Test for less than 1.0 ohm of resistance between the ground circuit terminal A and ground.
 - If greater than the specified range, test the ground circuit for an open/high resistance.
3. Verify that a test lamp illuminates between the B+ circuit terminal C and ground.
 - If the test lamp does not illuminate, test the B+ circuit for a short to ground or an open/high resistance.
4. Connect the harness connector at the rear window wiper motor.
5. Disconnect the X2 harness connector at the LGM.
6. Ignition ON, test for 10.0 - 14.0 volts between the signal circuit terminal 3 and ground.
 - If less than the specified range, test the signal circuit for a short to ground or an open/high resistance. If the circuit tests normal, replace the rear window wiper motor.
7. If all circuits test normal, replace the LGM.

Repair Procedures

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

- **Rear Window Wiper Motor Replacement (Trailblazer, Envoy)**
- **Control Module References** for LGM replacement, programming, and setup.

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Diagnostic Instructions

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

DTC Descriptor

DTC B2697

Headlamp Washer Request Circuit

Circuit/System Description

The headlamp washer switch signal circuit is supplied a B+ reference through a resistor then monitored within the body control module (BCM). The headlamp washer switch is open when in an inactive state. When the headlamp washer switch is activated the signal circuit is closed to ground. When the headlamp washer switch signal circuit is closed to ground the reference voltage is dropped across the resistor within the BCM. The low voltage on the headlamp washer switch signal circuit indicates to the BCM the switch status is active.

Conditions for Running the DTC

The battery voltage must be between 9-16 volts.

Conditions for Setting the DTC

The headlamp washer switch signal to the BCM is low longer than 10 seconds.

Action Taken When the DTC Sets

The headlamp washers will be disabled for as long as the DTC is current.

Conditions for Clearing the DTC

- This DTC will clear on current status after the condition for setting the fault is corrected.
- A history DTC will clear after 100 consecutive ignition cycles without a fault present.

Reference Information

Schematic Reference

Wiper/Washer Schematics

Connector End View Reference

Component Connector End Views

Description and Operation

Headlamp Washer System Description and Operation

Electrical Information Reference

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

Scan Tool Reference

Control Module References for scan tool information

Circuit/System Verification

Ignition ON, observe the Headlamp Wash parameter while pressing and releasing the headlamp wash switch. The reading should change between On and Off.

Circuit/System Testing

1. Ignition OFF, disconnect the X1, X2 harness connectors at the headlamp switch.
2. Test for less than 1.0 ohm of resistance between the ground circuit terminal C X1 and ground.
 - If greater than the specified range, test the ground circuit for an open/high resistance.
3. Ignition ON, verify the scan tool Headlamp Wash parameter is Off.
 - If not the specified value, test the signal circuit terminal H X2 for a short to ground. If the circuit tests normal, replace the BCM.
4. Install a 3A fused jumper wire between the signal circuit terminal H X2 and the ground circuit terminal C X1. Verify the scan tool Headlamp Wash parameter is On.
 - If not the specified value, test the signal circuit for a short to voltage or an open/high resistance. If the circuit tests normal, replace the BCM.
5. If all circuits test normal, test or replace the headlamp switch

Repair Procedures

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

- **Headlamp Switch Replacement**
- **Control Module References** for BCM replacement, programming, and setup.

DTC B3810 OR B3811

Diagnostic Instructions

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

DTC Descriptor

DTC B3810

Headlamp Washer Relay Circuit

DTC B3811

Rear Washer Relay Circuit

Circuit/System Description

Battery positive voltage is supplied to the coil and switch sides of the rear washer and headlamp washer relays. The body control module (BCM) energizes a relay by grounding the relay coil through the relay control circuit. When a relay is energized, the relay switch is closed and battery positive voltage is supplied to the washer pump control circuit.

Conditions for Running the DTC

The battery voltage must be between 9-16 volts.

Conditions for Setting the DTC

B3810

The headlamp washer relay control circuit is shorted to ground or open while the relay is de-energized, or shorted to B+ while the relay is energized.

B3811

The rear washer relay control circuit is shorted to ground or open while the relay is de-energized, or shorted to B+ while the relay is energized.

Action Taken When the DTC Sets

- The DTC will be current for as long as the fault is present.
- The headlamp washers will be disabled for as long as the B3810 is current.
- The rear washers will be disabled for as long as the B3811 is current.

Conditions for Clearing the DTC

- This DTC will clear on current status after the condition for setting the fault is corrected.

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- A history DTC will clear after 50 consecutive ignition cycles without a fault present.

Reference Information

Schematic Reference

Wiper/Washer Schematics

Connector End View Reference

Component Connector End Views

Description and Operation

- Headlamp Washer System Description and Operation
- Rear Wiper/Washer System Description and Operation

Electrical Information Reference

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

Scan Tool Reference

Control Module References for scan tool information

Circuit/System Testing

1. Ignition OFF, disconnect the affected relay.
2. Verify that a test lamp illuminates between the B+ circuit terminal 85 and ground.
 - If the test lamp does not illuminate, test the B+ circuit for a short to ground or an open/high resistance. If the circuit tests normal and the B+ circuit fuse is open, test the washer pump control circuit terminal 30 for a short to ground. If the circuit tests normal, test or replace the affected relay.
3. Connect a test lamp between the B+ circuit terminal 85 and the relay control circuit terminal 86.
4. Command the affected washer pump 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, replace the BCM.
 - 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, replace the BCM.
5. If all circuits test normal, test or replace the affected relay.

Repair Procedures

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

- **Relay Replacement (Attached to Wire Harness)** or **Relay Replacement (Within an Electrical Center)**
- **Control Module References** for BCM replacement, programming, and setup.

SYMPTOMS - WIPER/WASHER SYSTEMS

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

1. Perform the **Diagnostic System Check - Vehicle** , before using the Symptom Tables in order to verify that all of the following are true:
 - There are no DTCs set.
 - The control modules can communicate via the serial data link.
2. Review the system operation in order to familiarize yourself with the system functions.
 - **Wiper/Washer System Description and Operation**
 - **Rear Wiper/Washer System Description and Operation**
 - **Headlamp Washer System Description and Operation**

Visual/Physical Inspection

- Inspect for aftermarket devices which could affect the operation of the 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**
- **Windshield Wiper System Malfunction**
- **Low Washer Fluid Indicator Malfunction**
- **Rear Wiper System Malfunction**
- **Rear Wiper Washer System Malfunction**

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- **Headlamp Washer Malfunction**

WINDSHIELD WIPER WASHER SYSTEM MALFUNCTION

Diagnostic Instructions

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

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Washer Pump Relay Control	2	1	-	-
Washer Pump Control	1	1	2	-
Washer Pump Ground	-	1	-	-
1. Windshield washer pump inoperative 2. Windshield washer pump always on				

Circuit/System Description

The windshield washer pump is controlled through the windshield wash relay. The windshield wash relay coil and switch is supplied battery positive voltage, and during WASH mode the wiper motor module grounds the washer relay control circuit energizing the relay. When the relay is energized battery positive voltage to the switch side of the relay is supplied to the washer pump control circuit.

Reference Information

Schematic Reference

Wiper/Washer Schematics

Connector End View Reference

Component Connector End Views

Description and Operation

Wiper/Washer System Description and Operation

Electrical Information Reference

- **Circuit Testing**
- **Connector Repairs**

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

Scan Tool Reference

Control Module References for scan tool information

Circuit/System Verification

Ignition ON, press and release the windshield washer switch. The washer pump and wiper motor should operate for as long as the switch is pressed, and the wiper motor will continue to operate several cycles after the switch is released.

- If the wiper motor is inoperative during wash mode, refer to **Windshield Wiper System Malfunction**.
- If the washer pump is inoperative during wash mode, refer to **Washer Pump Control Circuit Test**.

Circuit/System Testing

Washer Pump Control Circuit Test

1. Ignition OFF, disconnect the WSW relay.
2. Ignition ON, verify that a test lamp does not illuminate between the washer pump control circuit terminal 87 and ground.
 - If the test lamp illuminates, test the control circuit for a short to voltage.
3. Verify that a test lamp illuminates between the B+ circuit terminal 85 and ground.
 - If the test lamp does not illuminate, test the B+ circuit for a short to ground or an open/high resistance. If the circuit tests normal and the B+ circuit fuse is open, test the washer pump control circuit terminal 87 for a short to ground. If the circuit tests normal, test or replace the WSW relay.
4. Verify that a test lamp illuminates between the B+ circuit terminal 30 and ground.
 - If the test lamp does not illuminate, test the B+ circuit for an open/high resistance.
5. Disconnect the harness connector at the washer pump.
6. Test for less than 1.0 ohm between the washer pump ground circuit terminal B and ground.
 - If greater than the specified range, test the ground circuit for an open/high resistance.
7. Connect the harness connector at the washer pump.
8. Connect a 15A fused jumper wire between the B+ circuit terminal 30 and the control circuit terminal 87. Verify the washer pump is activated.
 - If the washer pump does not activate, test the control circuit for an open/high resistance. If the circuit tests normal, test or replace the washer pump.
9. Connect a test lamp between the B+ circuit terminal 85 and the relay control circuit terminal 86.
10. Press and release the windshield washer switch. The test lamp should turn ON and OFF when changing between the commanded states.
 - If the test lamp is always ON, test the relay control circuit for a short to ground. If the circuit tests

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normal, replace the wiper motor cover.

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

11. If all circuits test normal, test or replace the WSW relay.

Repair Procedures

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

- **Windshield Washer Pump Replacement**
- **Wiper Motor Cover Replacement**

WINDSHIELD WIPER SYSTEM MALFUNCTION

Diagnostic Instructions

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

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Wiper Motor Supply	1	1	-	-
Wiper Switch 12-volt Reference	2	2		-
Wiper Switch Signal 1	2	2		-
Wiper Switch High Signal	3	4	-	-
Wiper Switch Ground	-	4	-	-
Wiper Motor Ground	-	1	-	-
1. Wiper motor inoperative in all modes 2. Wiper motor inoperative in all low speed modes 3. Wiper motor always on at high speed 4. Wiper motor inoperative in high speed				

Circuit/System Description

Accessory voltage and ground is supplied to the windshield wiper motor and provides the power for operating the wiper motor and logic power to the wiper motor module. The WASH, MIST, LOW, and DELAY modes are controlled by the windshield wiper/washer switch through a series of internal resistors. The windshield wiper switch supply voltage circuit is a 12-volt reference from the wiper motor module to the wiper/washer switch, and the switch position determines the point on the resistor assembly where the reference voltage is applied. The windshield wiper switch signal 1 circuit supplies the voltage from the resistor assembly to the wiper motor module and the signal voltage determines the operating mode. High speed operation is controlled by the windshield wiper/washer switch through the windshield wiper switch high signal circuit. The windshield wiper

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switch high signal circuit is supplied 12 volts by the wiper motor module and when the wiper/washer switch is turned to the HIGH position the windshield wiper switch high signal circuit is grounded through the switch ground circuit.

Reference Information

Schematic Reference

Wiper/Washer Schematics

Connector End View Reference

Component Connector End Views

Description and Operation

Wiper/Washer System Description and Operation

Electrical Information Reference

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

Scan Tool Reference

Control Module References for scan tool information

Circuit/System Verification

Ignition ON, verify wiper motor operation in all switch positions.

- If the wiper motor is inoperative in all modes, refer to Wiper Motor/Module Circuit Test.
- If the wiper motor is inoperative in high or all low speed modes only, refer to Wiper Motor Switch Circuit Test.
- If the wiper motor is inoperative in delay modes, low, or mist, but operates in wash mode, test or replace the turn signal/multifunction switch.

Circuit/System Testing

Wiper Motor Switch Circuit Test

1. Disconnect the X2, X3 harness connectors at the turn signal/multifunction switch.

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2. Test for less than 1.0 ohm of between the ground circuit terminal A X2 and ground.
 - If greater than the specified range, test the ground circuit for an open/high resistance.
3. Ignition ON, test for 11.0-13.0 volts between the 12-volt reference circuit terminal J X3 and ground.
 - If less than the specified range, test the 12-volt reference circuit for a short to ground or an open/high resistance. If the circuit tests normal, replace the wiper motor cover.
4. Install a 3A fused jumper wire between the signal circuit terminal K X3 and the 12-volt reference circuit terminal J X3. Ignition ON, verify the wiper motor operates in the wash mode.
 - If the wiper motor does not operate, test the signal circuit for an open/high resistance or short to ground. If the circuit tests normal, refer to **Wiper Motor/Module Circuit Test**.
5. Install a 3A fused jumper wire between the signal circuit terminal H X3 and ground. Ignition ON, verify the wiper motor operates in the high speed mode.
 - If the wiper motor does not operate, test the signal circuit for an open/high resistance. If the circuit tests normal, refer to **Wiper Motor/Module Circuit Test**.
6. If all circuits test normal, test or replace the turn signal/multifunction switch.

Wiper Motor/Module Circuit Test

1. Ignition OFF, disconnect the harness connector at the windshield wiper motor cover.
2. Test for less than 1.0 ohm between the ground circuit terminal M and ground.
 - If greater than the specified range, test the ground circuit for an open/high resistance.
3. Verify that a test lamp illuminates between the B+ circuit terminal F and ground.
 - If the test lamp does not illuminate, test the B+ circuit for a short to ground or an open/high resistance.
4. Remove the wiper motor cover.
5. Connect the harness connector at the windshield wiper motor cover.
6. Connect a test lamp between the circuit board terminals T1 and T3.
7. Ignition ON, wiper switch in low, verify the test lamp turns on for 15 seconds.
 - If the test lamp does not turn on, replace the wiper motor cover.
8. If all circuits test normal, test or replace the windshield wiper motor.

Component Testing

1. Ignition OFF, disconnect the X2, X3 harness connectors at the turn signal/multifunction switch.
2. Test the resistance between terminals H X3 and J X3. Rotate the wiper switch and compare the resistance readings to the values in the Windshield Wiper Switch Values table below for WASH, MIST, each DELAY and LOW speed.
 - If the resistance is not within the specified range, replace the turn signal/multifunction switch.
3. Wiper switch in HIGH position, test the resistance between terminals K X3 and A X2. The reading should be between 0.0-1.0 ohm.
 - If the resistance is not within the specified range, replace the turn signal/multifunction switch.

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Switch Position	Resistance
Off	Infinite
Wash	0.0-1.0 ohm
Mist	360-420 ohms
Delay 1	0.980-1.40K ohms
Delay 2	1.80-1.86K ohms
Delay 3	3.00-3.60K ohms
Delay 4	5.70-5.76K ohms
Delay 5	8.40-8.46K ohms
Low	360-420 ohms

Repair Procedures

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

- **Turn Signal Multifunction Switch Replacement**
- **Windshield Wiper Transmission Replacement**
- **Wiper Motor Cover Replacement**

LOW WASHER FLUID INDICATOR MALFUNCTION

Diagnostic Instructions

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

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Washer Fluid Level Switch Signal	1	2	-	-
Washer Fluid Level Switch Ground	-	2	-	-
1. Low washer fluid message always displayed 2. Low washer fluid message never displayed				

Circuit/System Description

The Check Washer Fluid message is controlled by the instrument panel cluster using an input from the washer fluid level switch. The washer fluid level signal circuit is supplied ignition voltage through a resistor then monitored within the instrument cluster. The washer fluid level switch is normally open so the instrument cluster detects ignition voltage on the washer fluid level signal circuit whenever the washer fluid level is not low. When the washer fluid reaches the point where the driver should be informed that the washer fluid is low, the washer fluid level switch closes. When the washer fluid level switch is closed the washer fluid level signal

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circuit voltage is pulled low, and the instrument panel displays the Check Washer Fluid message on the driver information center. In order to prevent the Check Washer Fluid message from being displayed while sloshing is occurring in the washer fluid container, the instrument cluster is programmed with a 1 minute delay before changing states of the Check Washer Fluid message during an ignition cycle.

Reference Information

Schematic Reference

Wiper/Washer Schematics

Connector End View Reference

Component Connector End Views

Description and Operation

Wiper/Washer System Description and Operation

Electrical Information Reference

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

Scan Tool Reference

Control Module References for scan tool information

Circuit/System Verification

1. Verify the windshield washer fluid level is above the minimum level.
 - If not above the minimum level, fill the reservoir and inspect for leaks.
2. Verify the scan tool IPC Washer Fluid Level parameter is OK.

Circuit/System Testing

1. Ignition OFF, disconnect the harness connector at the washer fluid level switch.
2. Test for less than 1.0 ohm between the ground circuit terminal 2 and ground.
 - If greater than the specified range, test the ground circuit for an open/high resistance.
3. Ignition ON, verify the scan tool Washer Fluid Level parameter is OK.
 - If not the specified value, test the signal circuit terminal 1 for a short to ground. If the circuit tests normal, replace the IPC.

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4. Install a 3A fused jumper wire between the signal circuit terminal A and ground. Verify the scan tool Washer Fluid Level parameter is Low.
 - If not the specified value, test the signal circuit for a short to voltage or an open/high resistance. If the circuit tests normal, replace the IPC.
5. If all circuits test normal, test or replace the washer fluid level switch.

Repair Procedures

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

- **Washer Solvent Container Level Sensor Replacement**
- **Control Module References** for IPC replacement, programming, and setup.

REAR WIPER SYSTEM MALFUNCTION

Diagnostic Instructions

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

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Rear Wiper Motor Supply	1	1	-	-
Rear Wiper Switch 12-volt Reference	1	1	-	-
Rear Wiper Switch Signal	1	1	1	-
Rear Wiper Motor Speed Signal	1	1	1	-
Rear Wiper Motor Ground	-	1	-	-
1. Rear wiper motor inoperative				

Circuit/System Description

The rear wiper motor is supplied battery positive voltage and ground. The liftgate control module controls rear wiper motor operation through the rear wiper motor speed signal circuit. The rear wiper motor speed signal circuit is supplied a battery positive reference voltage by the rear wiper motor module and is pulse width modulated to ground by the liftgate control module. The duty cycle of the pulse width modulation (PWM) determines the rear wiper motor operating mode.

Reference Information

Schematic Reference

Wiper/Washer Schematics

Connector End View Reference

Component Connector End Views

Description and Operation

Rear Wiper/Washer System Description and Operation

Electrical Information Reference

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

Scan Tool Reference

Control Module References for scan tool information

Circuit/System Verification

Ignition ON, command the rear wiper motor functions ON and OFF with a scan tool. If the rear wiper motor functions normal, refer to **Rear Wiper Switch Circuit Test**.

- If the rear wiper motor can not be operated with a scan tool, refer to **Rear Wiper Motor Control Circuit Test**.

Circuit/System Testing

Rear Wiper Switch Circuit Test

1. Ignition OFF, disconnect the harness connector at the rear wiper washer switch.
2. Ignition ON, test for 12 volts at the 12-volt reference circuit terminal B9.
 - If not the specified value, test the 12-volt reference circuit for an open/high resistance or short to ground. If the circuit tests normal, replace the BCM.
3. Connect the harness connector at the rear wiper washer switch.
4. Ignition OFF, disconnect the X1 harness connector at the BCM.
5. Rear wiper switch OFF, test for 3.10K ohms between the 12-volt reference circuit terminal B9 and the signal circuit terminal B6.
 - If not the specified value, test the signal circuit for an open/high resistance or short to ground. If the circuit tests normal, replace the rear wiper washer switch.
6. If all circuits test normal, test or replace the BCM.

Rear Wiper Motor Control Circuit Test

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1. Ignition OFF, disconnect the harness connector at the rear wiper motor.
2. Test for less than 1.0 ohm between the ground circuit terminal A and ground.
 - If greater than the specified range, test the ground circuit for an open/high resistance.
3. Verify that a test lamp illuminates between the B+ circuit terminal C and ground.
 - If the test lamp does not illuminate, test the B+ circuit for a short to ground or an open/high resistance.
4. Connect a test lamp between the B+ circuit terminal C and the control circuit and the speed signal circuit terminal E.
5. Ignition ON, verify the brightness of the test lamp decreases gradually as the rear wiper switch is turned from OFF to 3.
 - If the test lamp does not illuminate or brightness does not change, test the signal circuit for an open/high resistance, short to ground, or short to voltage. If the circuit tests normal replace the LGM.
6. If all circuits test normal, test or replace the rear wiper motor.

Repair Procedures

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

- **Rear Window Wiper and Washer Switch Replacement**
- **Rear Window Wiper Motor Replacement (Trailblazer, Envoy)**
- **Control Module References** for BCM or LGM replacement, programming, and setup.

REAR WIPER WASHER SYSTEM MALFUNCTION

Diagnostic Instructions

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

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Rear Wiper Washer Switch Reference Voltage	1	1	-	-
Rear Wiper Washer Switch Signal	1	1	1	-
Rear Washer Pump Relay Control	B3811	B3811	-	-
Rear Washer Pump Control	2	2	3	-
Rear Washer Pump Ground	-	2	-	-
1. Rear wiper washer inoperative 2. Rear washer pump inoperative				

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3. Rear washer pump always on

Circuit/System Description

Battery positive voltage is supplied to the coil and switch sides of the rear washer relay. The body control module (BCM) energizes the relay by grounding the relay coil through the relay control circuit. When the relay is energized, the relay switch is closed and battery positive voltage is supplied to the washer pump control circuit.

Reference Information

Schematic Reference

Wiper/Washer Schematics

Connector End View Reference

Component Connector End Views

Description and Operation

Rear Wiper/Washer System Description and Operation

Electrical Information Reference

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

Scan Tool Reference

Control Module References for scan tool information

Circuit/System Verification

1. Ignition ON, verify the rear wiper motor operates using the rear washer switch.
 - If the rear wiper does not operate normally, refer to Rear Wiper System Malfunction.
2. If the rear washer pump does not operate properly, refer to the Rear Washer Pump Circuit Test.

Circuit/System Testing

Rear Washer Pump Circuit Test

1. Ignition OFF, disconnect the REAR/WPR relay.

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2. Ignition ON, verify that a test lamp does not illuminate between the washer pump control circuit terminal 30 and ground.
 - If the test lamp illuminates, test the control circuit for a short to voltage.
3. Disconnect the harness connector at the rear washer pump.
4. Test for less than 1.0 ohm between the rear washer pump ground circuit terminal A and ground.
 - If greater than the specified range, test the ground circuit for an open/high resistance.
5. Connect the harness connector at the rear washer pump.
6. 8. Connect a 20A fused jumper wire between the B+ circuit terminal 87 and the washer pump control circuit terminal 30. Verify the rear washer pump is activated.
 - If the rear washer pump does not activate, test the control circuit for an open/high resistance. If the circuit tests normal, test or replace the rear washer pump.
7. Connect a test lamp between the B+ circuit terminal 85 and the relay control circuit terminal 86.
8. Operate the rear washer switch ON and OFF. The test lamp should turn ON and OFF when changing between the commanded states.
 - If the test lamp is always ON, test the relay control circuit for a short to ground. If the circuit tests normal, replace the BCM.
 - 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, replace the BCM.
9. If all circuits test normal, test or replace the REAR/WPR relay.

Repair Procedures

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

- **Rear Window Washer Pump Replacement**
- **Control Module References** for BCM replacement, programming, and setup.

HEADLAMP WASHER MALFUNCTION

Diagnostic Instructions

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

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Headlamp Washer Switch Signal	B2697	1	-	-
Headlamp Washer Pump Relay Control	B3810	B3810	-	-

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Headlamp Washer Pump Control	1	1	2	-
Headlamp Washer Pump Ground	-	1	-	-
1. Headlamp washer pump inoperative 2. Headlamp washer pump always on				

Circuit/System Description

Battery positive voltage is supplied to the coil and switch sides of the headlamp washer relay. The body control module (BCM) energizes the relay by grounding the relay coil through the relay control circuit. When the relay is energized, the relay switch is closed and battery positive voltage is supplied to the washer pump control circuit.

Reference Information

Schematic Reference

Wiper/Washer Schematics

Connector End View Reference

Component Connector End Views

Description and Operation

Headlamp Washer System Description and Operation

Electrical Information Reference

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

Scan Tool Reference

Control Module References for scan tool information

Circuit/System Verification

1. Ignition ON, observe the scan tool Headlamp Wash parameter while pressing and releasing the headlamp washer switch. The reading should change between On and Off.
 - If not the specified value, refer to Headlamp Washer Switch Circuit Test.
2. If the switch input to the BCM functions normal refer to Headlamp Washer Pump Circuit Test.

Circuit/System Testing

Headlamp Washer Switch Circuit Test

1. Ignition OFF, disconnect the X1, X2 harness connectors at the headlamp switch.
2. Test for less than 1.0 ohm between the ground circuit terminal C X1 and ground.
 - If greater than the specified range, test the ground circuit for an open/high resistance.
3. Ignition ON, verify the scan tool Headlamp Wash parameter is Off.
 - If not the specified value, test the signal circuit terminal H X2 for a short to ground. If the circuit tests normal, replace the BCM.
4. Install a 3A fused jumper wire between the signal circuit terminal H X2 and the ground circuit terminal C X1. Verify the scan tool Headlamp Wash parameter is On.
 - If not the specified value, test the signal circuit for a short to voltage or an open/high resistance. If the circuit tests normal, replace the BCM.
5. If all circuits test normal, test or replace the headlamp switch.

Headlamp Washer Pump Circuit Test

1. Ignition OFF, disconnect the HEADLAMP WPR relay.
2. Ignition ON, verify that a test lamp does not illuminate between the washer pump control circuit terminal 30 and ground.
 - If the test lamp illuminates, test the control circuit for a short to voltage.
3. Disconnect the harness connector at the headlamp washer pump.
4. Test for less than 1.0 ohm between the headlamp washer pump ground circuit terminal 1 and ground.
 - If greater than the specified range, test the ground circuit for an open/high resistance.
5. Connect the harness connector at the headlamp washer pump.
6. 8. Connect a 20A fused jumper wire between the B+ circuit terminal 87 and the washer pump control circuit terminal 30. Verify the headlamp washer pump is activated.
 - If the headlamp washer pump does not activate, test the control circuit for an open/high resistance. If the circuit tests normal, test or replace the headlamp washer pump.
7. Connect a test lamp between the B+ circuit terminal 85 and the relay control circuit terminal 86.
8. Operate the headlamp washer switch ON and OFF. The test lamp should turn ON and OFF when changing between the commanded states.
 - If the test lamp is always ON, test the relay control circuit for a short to ground. If the circuit tests normal, replace the BCM.
 - 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, replace the BCM.
9. If all circuits test normal, test or replace the HEADLAMP WPR relay.

Repair Procedures

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

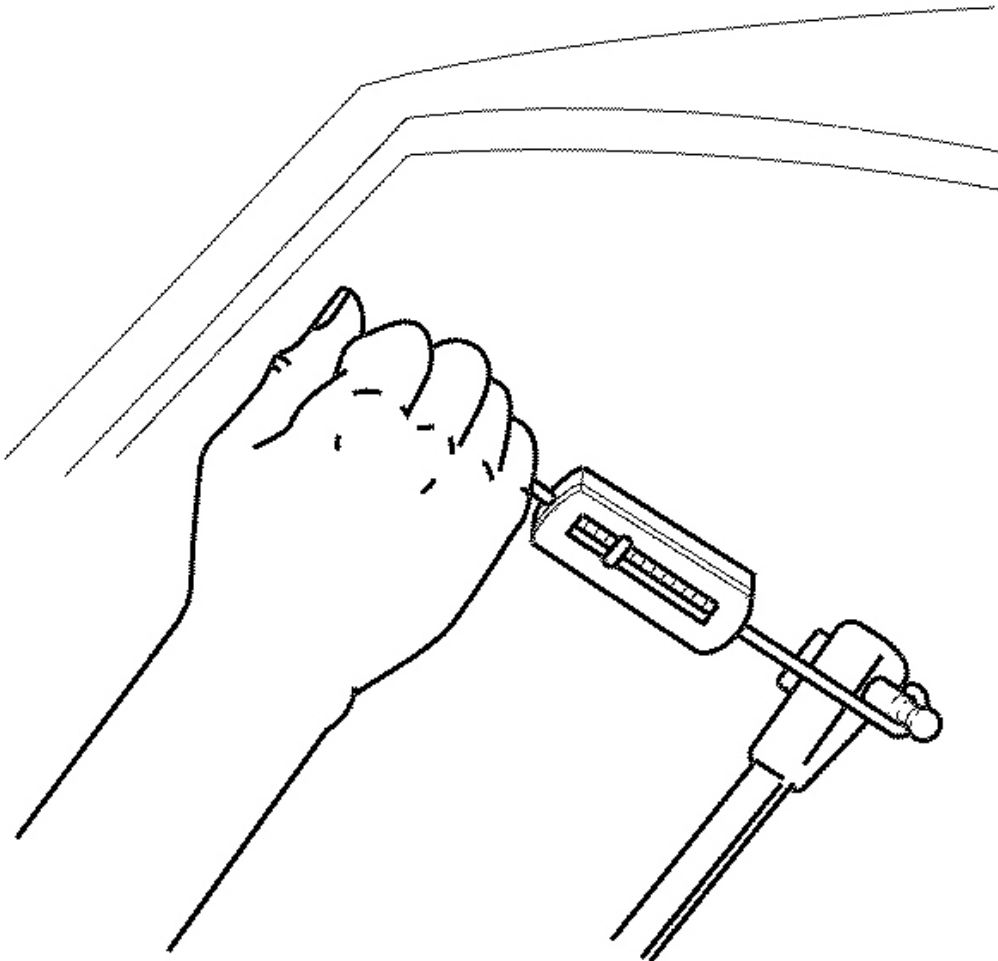
- **Headlamp Washer Pump Replacement**

- **Headlamp Switch Replacement**
- **Control Module References** for BCM replacement, programming, and setup.

WIPER ARM TIP PRESSURE CHECK

Wiper Arm Pressure Check

1. Run the wiper arms to the mid-wipe position.
2. Remove the wiper blades from the wiper arms. Refer to **Windshield Wiper Blade Replacement**.
3. Attach a scale to the end of the wiper arm and measure the force required to lift the wiper arm perpendicular to the windshield to the normal working height (the height with the blade attached).



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Fig. 6: Wiper Arm Pressure Check

Courtesy of GENERAL MOTORS CORP.

4. Replace the wiper arms if the measurement is not within the specified values. Refer to **Windshield Wiper Blade Replacement**.

Tip Pressure: 7.8-9.5 (28-34 oz)

WIPER BLADE ELEMENT CHECK

Blade Element Set Check

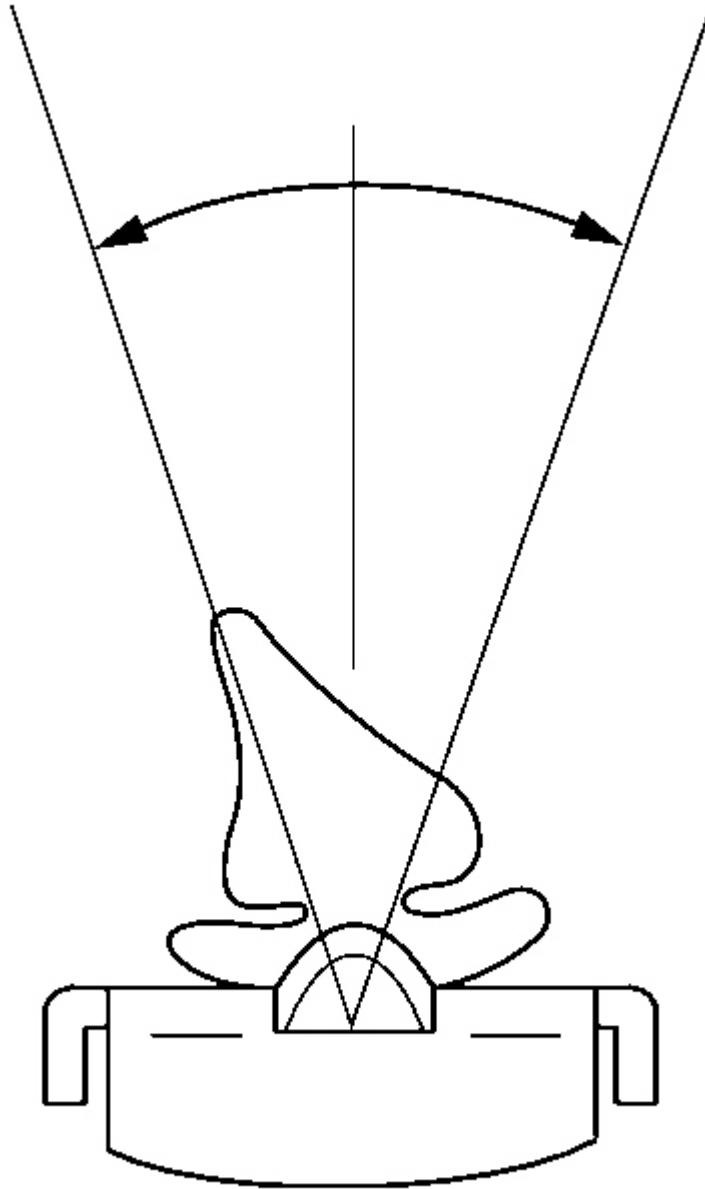


Fig. 7: Measuring Wiper Blade Element Centerline Contact
Courtesy of GENERAL MOTORS CORP.

1. Remove the wiper blades from the wiper arms. Refer to **Windshield Wiper Blade Replacement**.
2. Look down the length of the blade element.

3. Replace the wiper blade element if the rubber element which contacts the glass is not on the centerline of the blade +/-15 degrees. Refer to **Wiper Blade Element Replacement**.
4. Install the wiper blades on the wiper arms. Refer to **Windshield Wiper Blade Replacement**.

REPAIR INSTRUCTIONS

REAR WINDOW WIPER & WASHER SWITCH REPLACEMENT

Removal Procedure

1. Remove the instrument panel (I/P) accessory trim plate. Refer to **Instrument Panel Accessory Trim Plate Replacement (GMC)** .

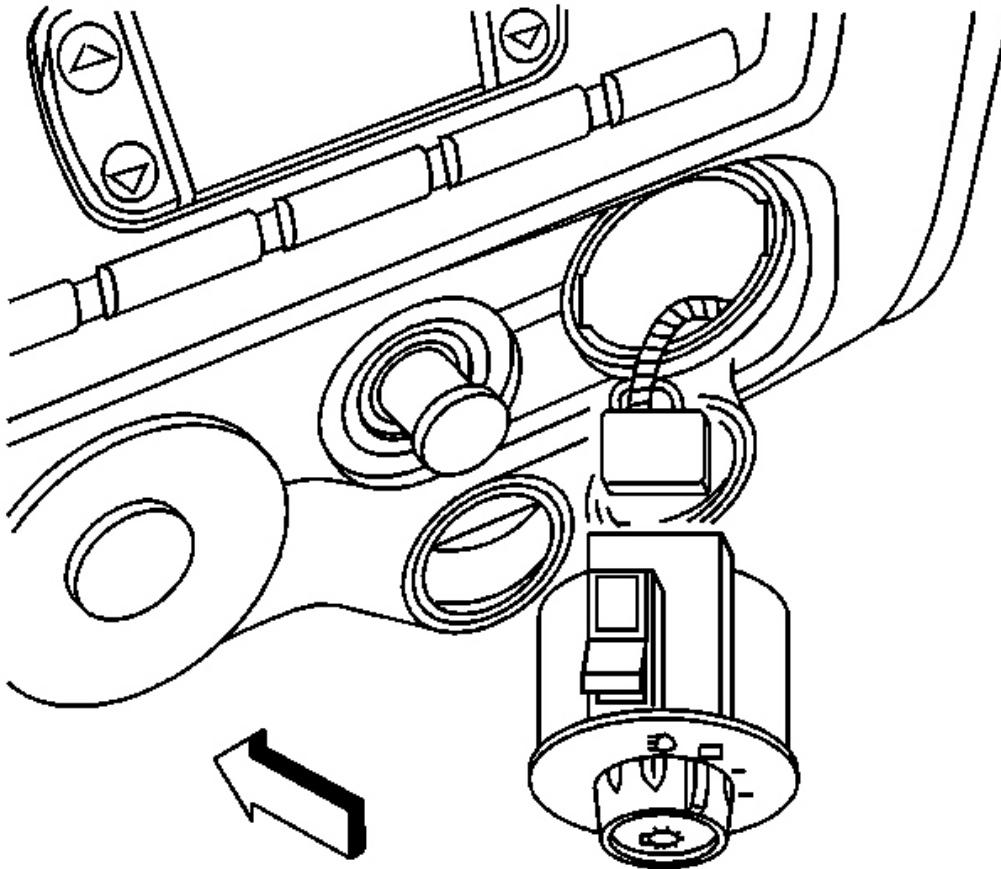


Fig. 8: View Of Wiper/Washer Switch
Courtesy of GENERAL MOTORS CORP.

2. Disconnect the electrical connector from the wiper washer switch.
3. Release the wiper washer switch locking tabs.
4. Remove the switch from the trim plate.

Installation Procedure

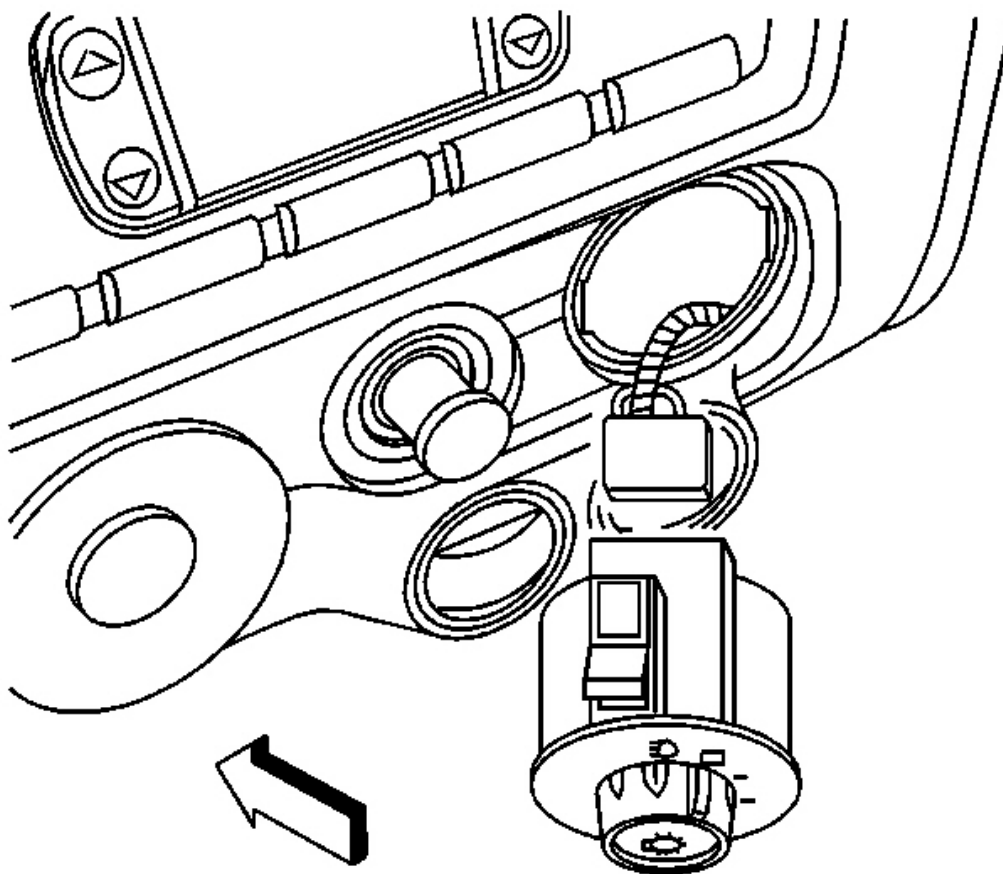


Fig. 9: View Of Wiper/Washer Switch
Courtesy of GENERAL MOTORS CORP.

1. Position the switch to the trim plate.
2. Connect the electrical connector to the wiper washer switch.
3. Install the switch to the instrument panel trim plate, ensuring that the locking tabs are properly seated.
4. Install the I/P accessory trim plate. Refer to **Instrument Panel Accessory Trim Plate Replacement (GMC)** .

WINDSHIELD WASHER NOZZLE REPLACEMENT

Removal Procedure

1. Remove the wiper arms. Refer to **Windshield Wiper Arm Replacement (GMC Envoy)** or **Windshield Wiper Arm Replacement (SS)**.
2. Remove the air inlet grille panel. Refer to **Air Inlet Grille Panel Replacement (Envoy, TrailBlazer)**.

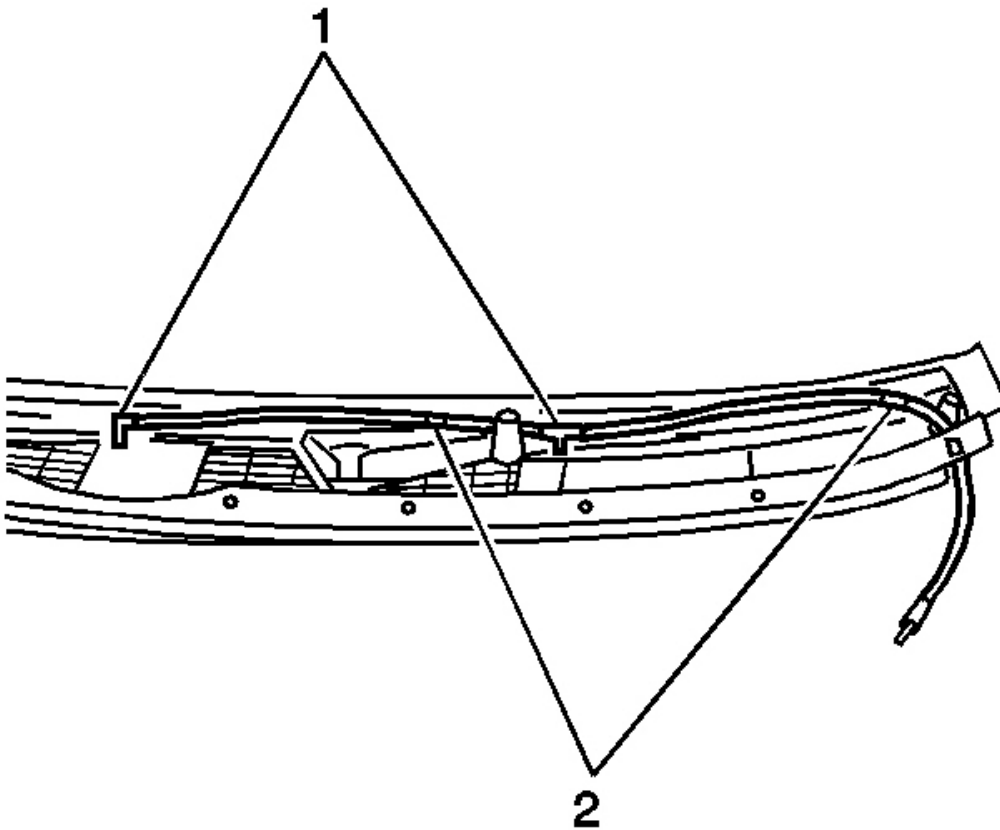


Fig. 10: Identifying Windshield Washer Hose Routing
Courtesy of GENERAL MOTORS CORP.

3. Remove the washer hose connection (1) from the nozzle.

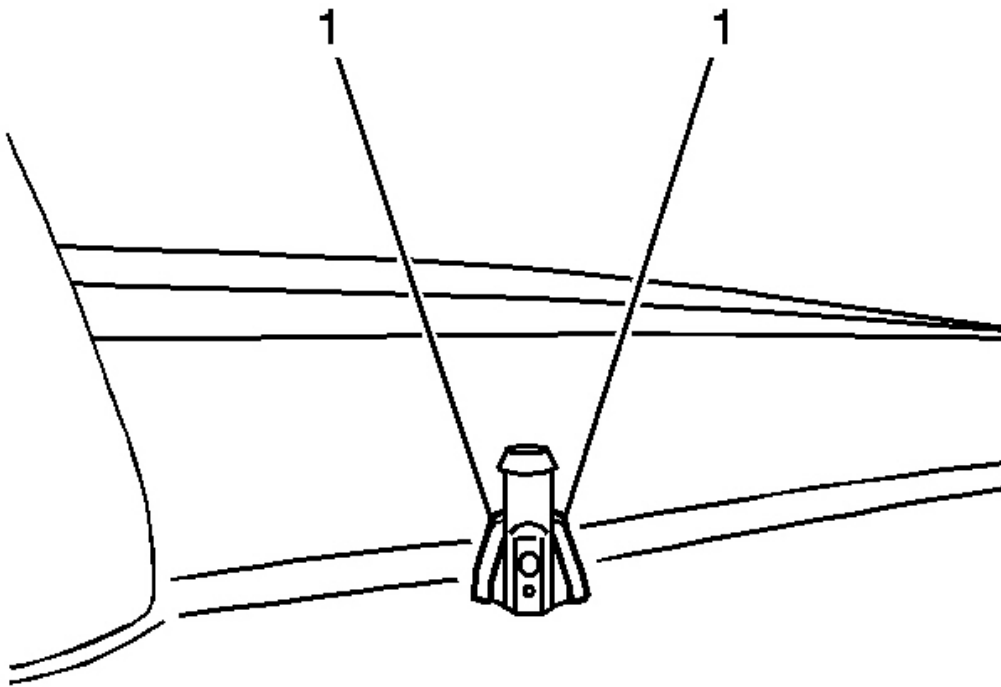


Fig. 11: Washer Nozzles Retaining Tabs
Courtesy of GENERAL MOTORS CORP.

4. Remove the washer nozzles from the air inlet grille panel by squeezing the retaining tabs (1) and pushing outward.

Installation Procedure

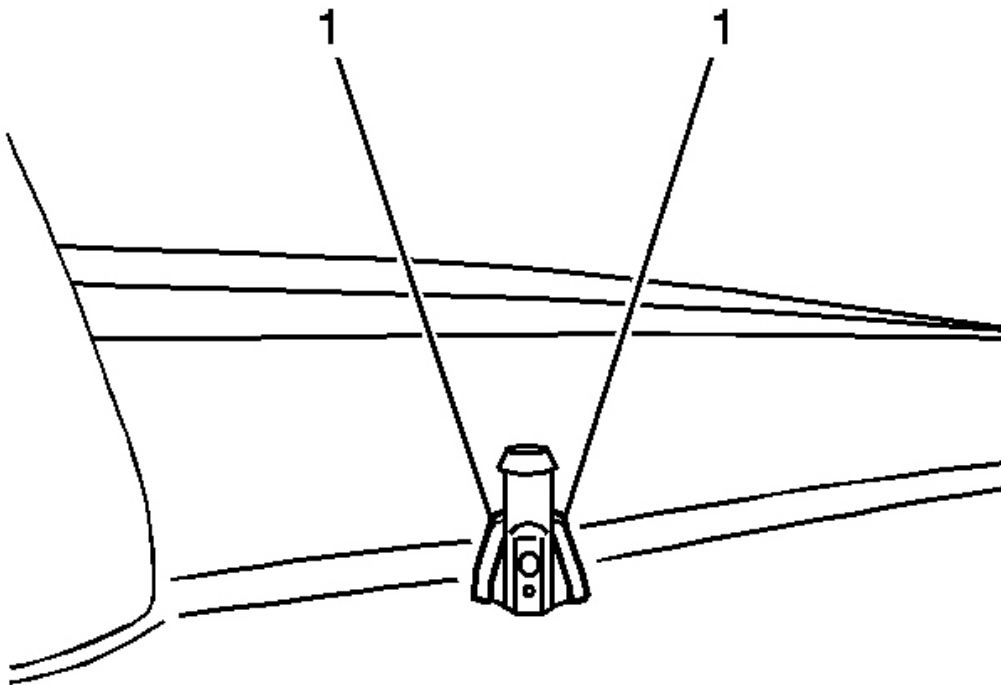


Fig. 12: Washer Nozzles Retaining Tabs
Courtesy of GENERAL MOTORS CORP.

1. Install the washer nozzles to the air inlet grille panel, by indexing the tab in the air inlet grille panel to the washer nozzle.
2. Be sure the retaining tabs (1) are secure.

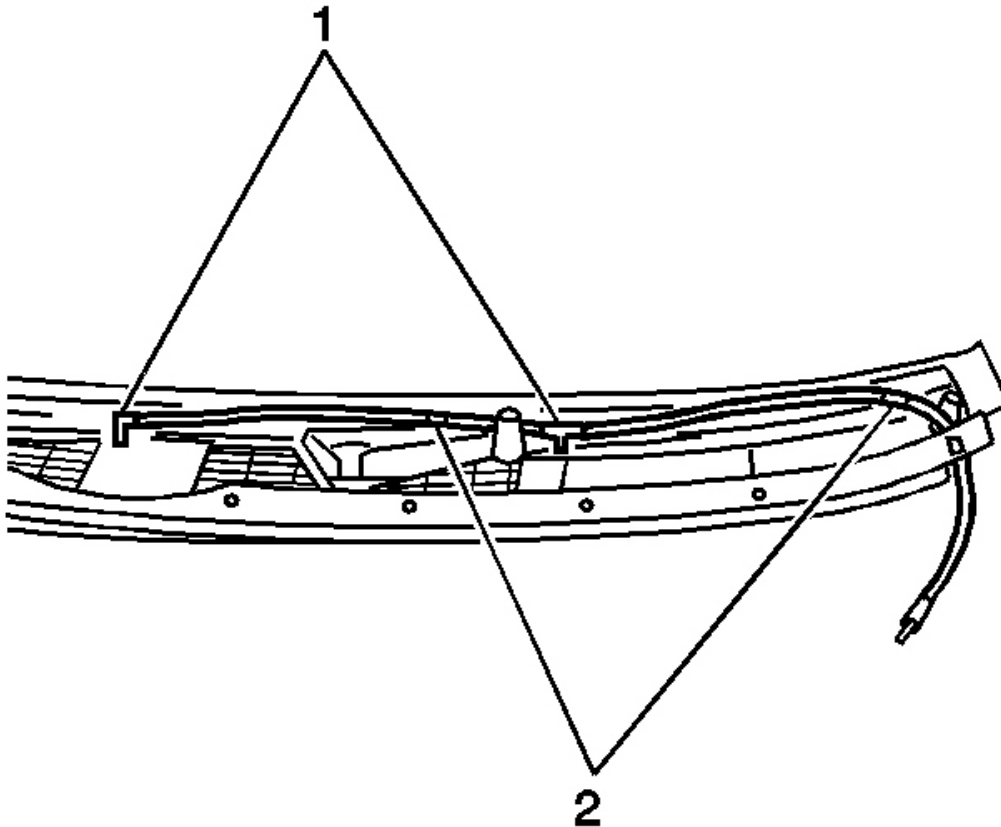


Fig. 13: Identifying Windshield Washer Hose Routing
Courtesy of GENERAL MOTORS CORP.

3. Install the washer hose connection (1) to the washer nozzle.
4. Install the air inlet grille panel. Refer to **Air Inlet Grille Panel Replacement (Envoy, TrailBlazer)**.
5. Install the wiper arms. Refer to **Windshield Wiper Arm Replacement (GMC Envoy)** or **Windshield Wiper Arm Replacement (SS)**.

REAR WINDOW WASHER NOZZLE REPLACEMENT (TRAILBLAZER, ENVOY)

Removal Procedure

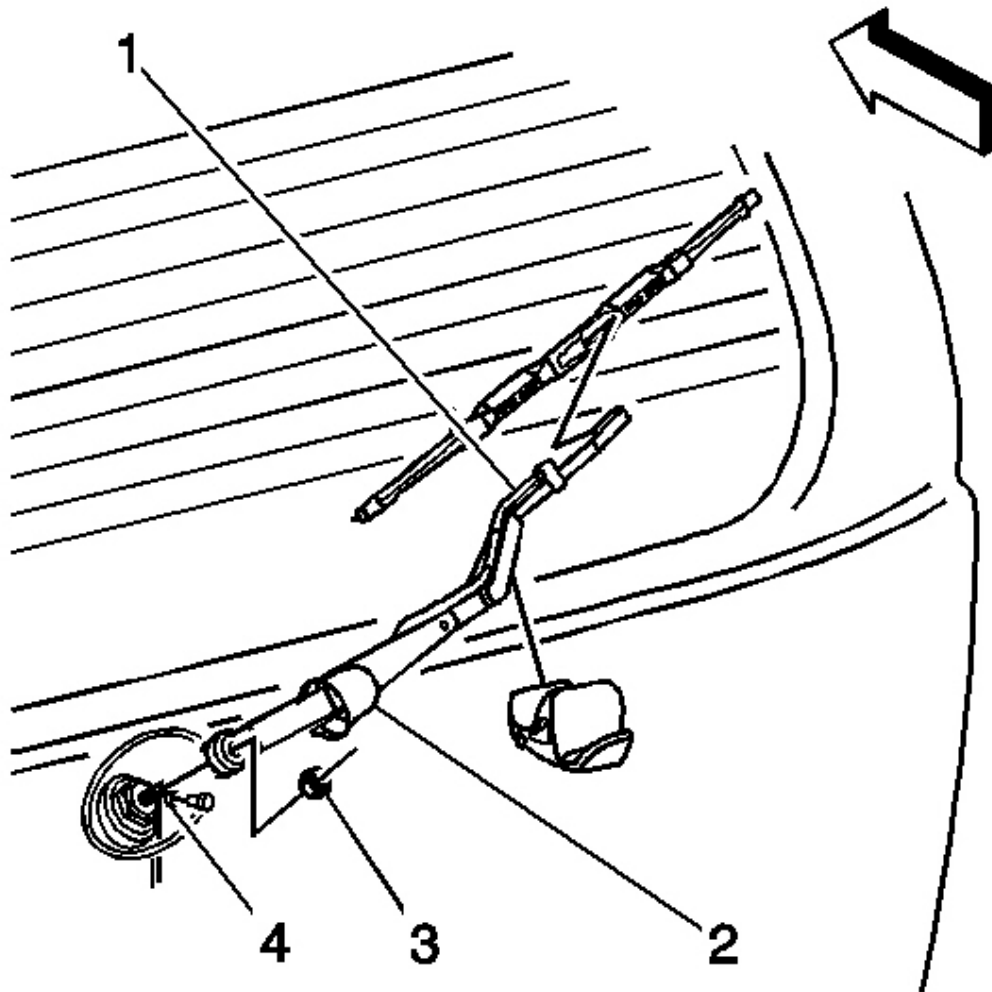


Fig. 14: View Of Rear Wiper Components
Courtesy of GENERAL MOTORS CORP.

1. Disconnect the washer nozzle (1) from the rear wiper arm.
2. Remove the nozzle from the washer hose.

Installation Procedure

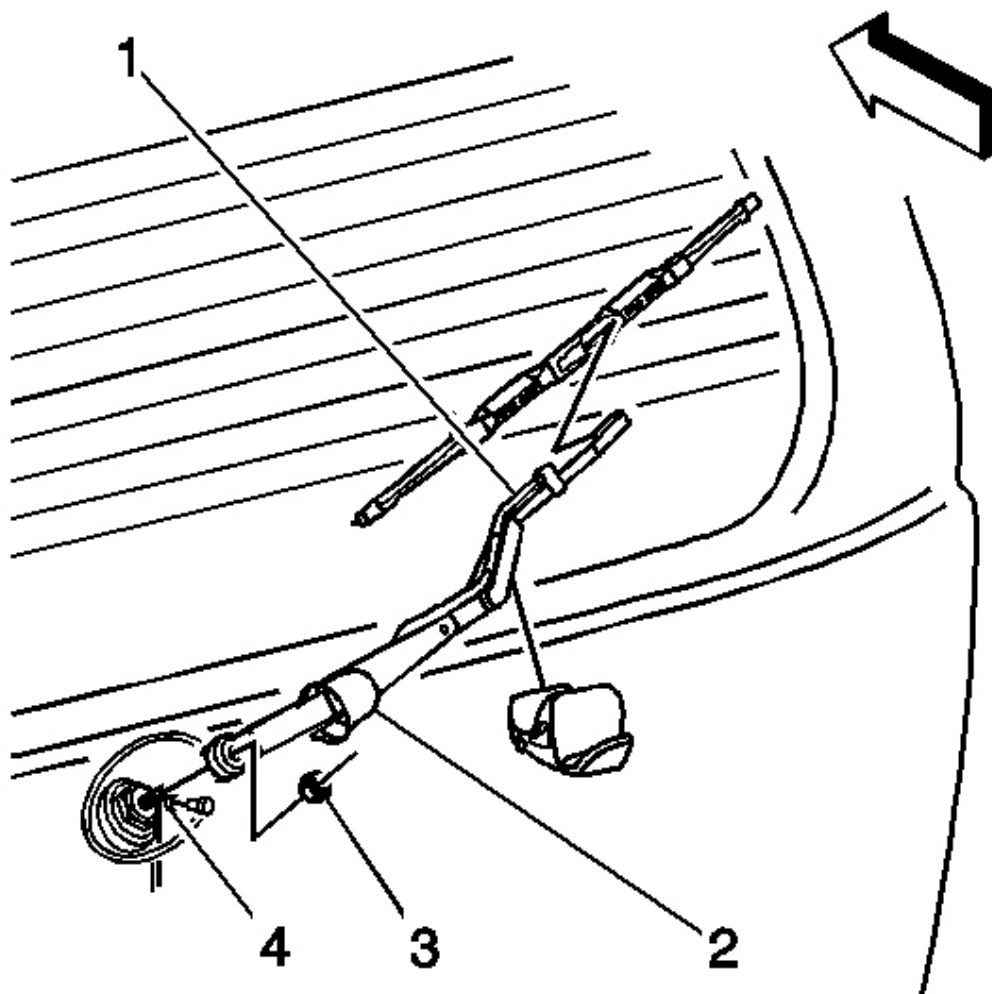


Fig. 15: View Of Rear Wiper Components
Courtesy of GENERAL MOTORS CORP.

1. Lubricant the end of the washer hose.
2. Install the washer nozzle to the washer hose.
3. Connect the washer nozzle (1) to the rear wiper arm.

HOSE REPLACEMENT (TRAILBLAZER, ENVOY, ASCENDER)

Removal Procedure

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1. Remove the wiper arms. Refer to **Windshield Wiper Arm Replacement (GMC Envoy)** or **Windshield Wiper Arm Replacement (SS)**.
2. Remove the air inlet grille panel. Refer to **Air Inlet Grille Panel Replacement (Envoy, TrailBlazer)**.

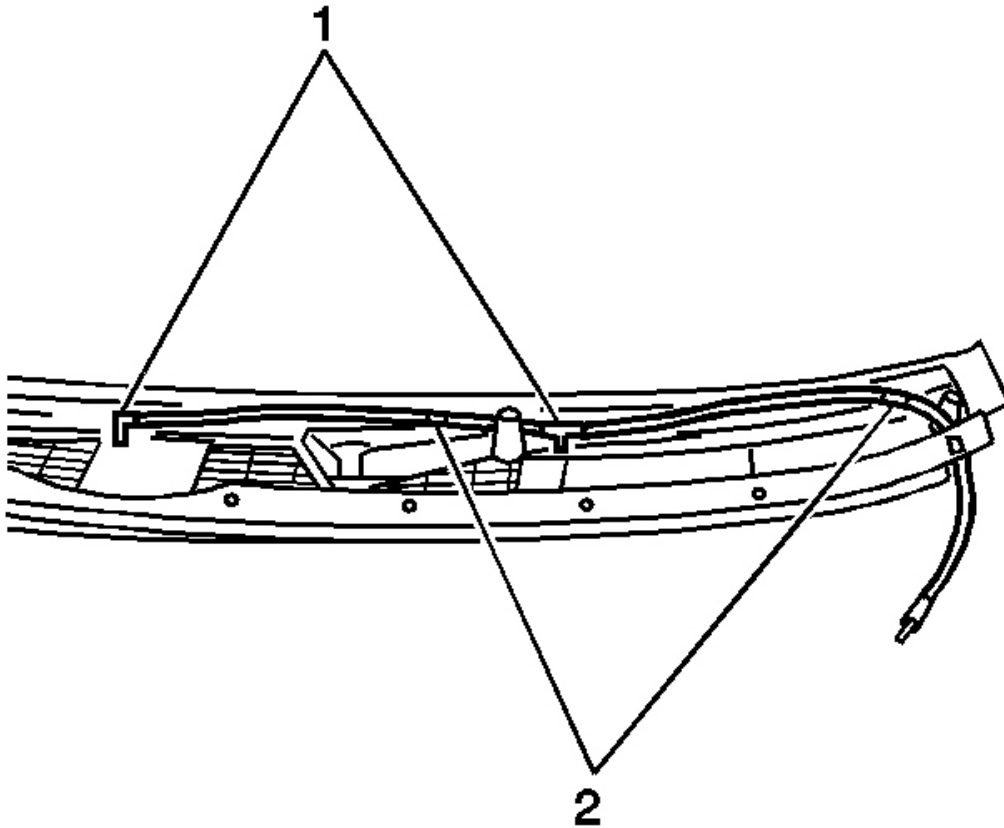


Fig. 16: Identifying Windshield Washer Hose Routing
Courtesy of GENERAL MOTORS CORP.

3. Disconnect the washer hose connections (1) from the washer nozzles.
4. Disconnect the washer hose from the clips (2) on the air inlet grille panel.
5. Remove the washer hose from the air inlet grille panel.

Installation Procedure

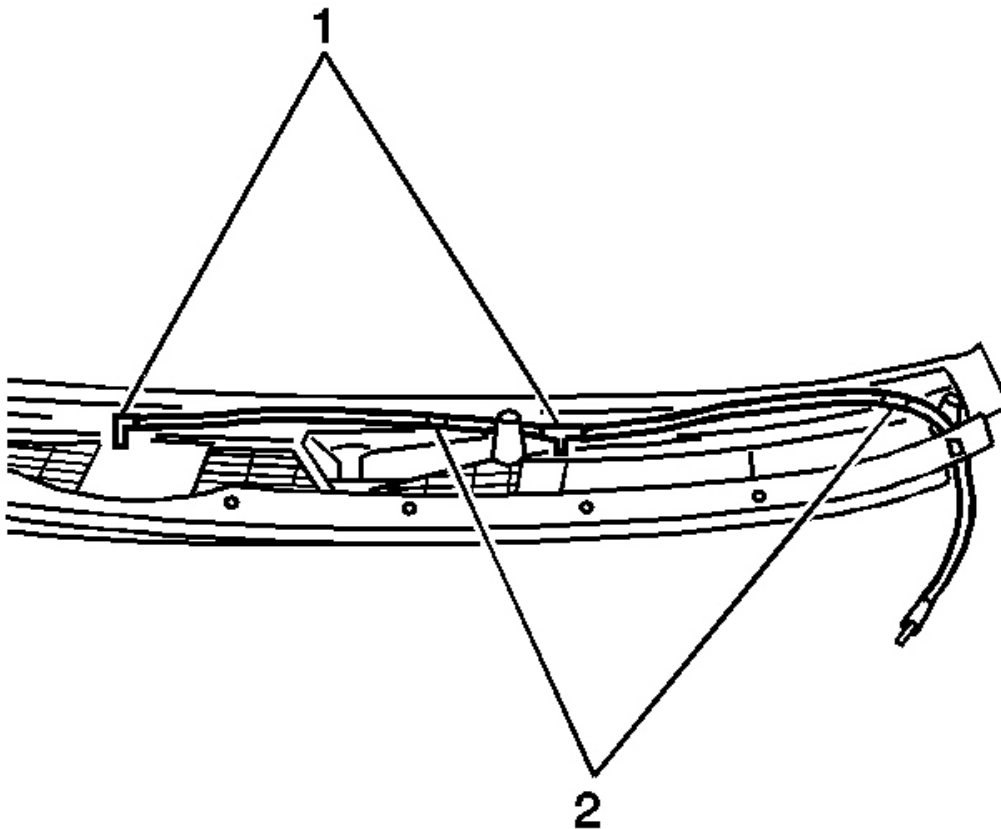


Fig. 17: Identifying Windshield Washer Hose Routing
Courtesy of GENERAL MOTORS CORP.

1. Install the washer hose to the air inlet grille panel.
2. Connect the washer hose connections (1) to the washer nozzles.
3. Connect the washer hose to the clips (2) on the air inlet grille panel.
4. Install the air inlet grille panel. Refer to **Air Inlet Grille Panel Replacement (Envoy, TrailBlazer)**.
5. Install the wiper arms. Refer to **Windshield Wiper Arm Replacement (GMC Envoy)** or **Windshield Wiper Arm Replacement (SS)**.

HEADLAMP WASHER HOSE REPLACEMENT (TRAILBLAZER)

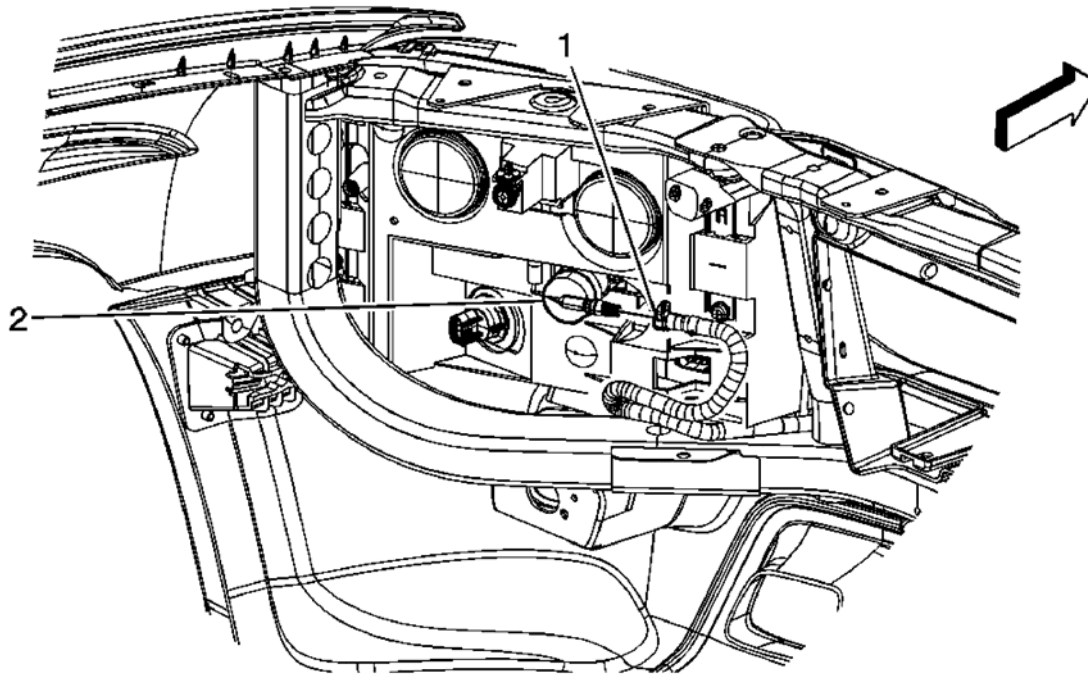


Fig. 18: View Of Headlamp Washer Hose Components
Courtesy of GENERAL MOTORS CORP.

Callout	Component Name
Fastener Tightening Specifications: Refer to <u>Fastener Tightening Specifications</u> .	
Preliminary Procedure	
<ol style="list-style-type: none"> 1. Open the hood. 2. Remove the front grille assembly. Refer to <u>Grille Replacement (Envoy)</u> or <u>Grille Replacement (TrailBlazer)</u> . 3. Disconnect the headlamp washer hose retention clips across the front impact bar area. 	
1	Headlamp Washer Nozzle Hose Tip: Disconnect the quick disconnect hose from the washer nozzle spout.
2	Headlamp Washer Nozzle Spout

WINDSHIELD WASHER HOSE REPLACEMENT

Removal Procedure

1. Remove the wiper arms. Refer to Windshield Wiper Arm Replacement (GMC Envoy) or Windshield Wiper Arm Replacement (SS).
2. Remove the air inlet grille panel. Refer to Air Inlet Grille Panel Replacement (Envoy, TrailBlazer).

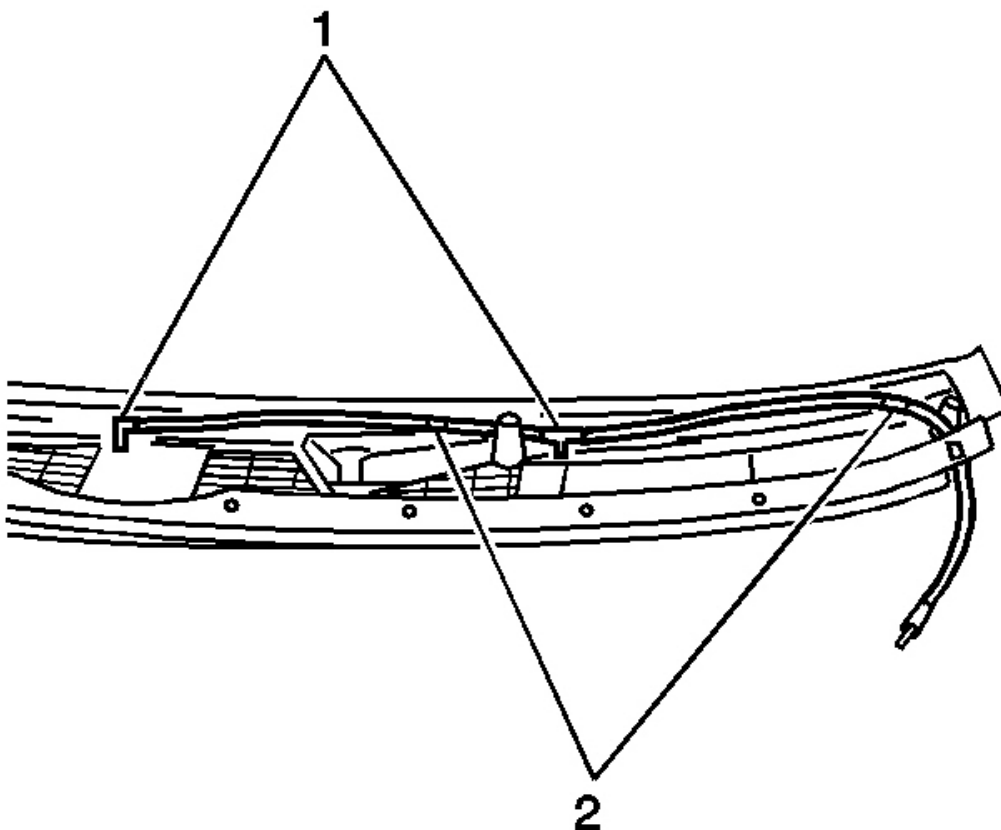


Fig. 19: Identifying Windshield Washer Hose Routing
Courtesy of GENERAL MOTORS CORP.

3. Disconnect the washer hose connections (1) from the washer nozzles.
4. Disconnect the washer hose from the clips (2) on the air inlet grille panel.
5. Remove the washer hose from the air inlet grille panel.

Installation Procedure

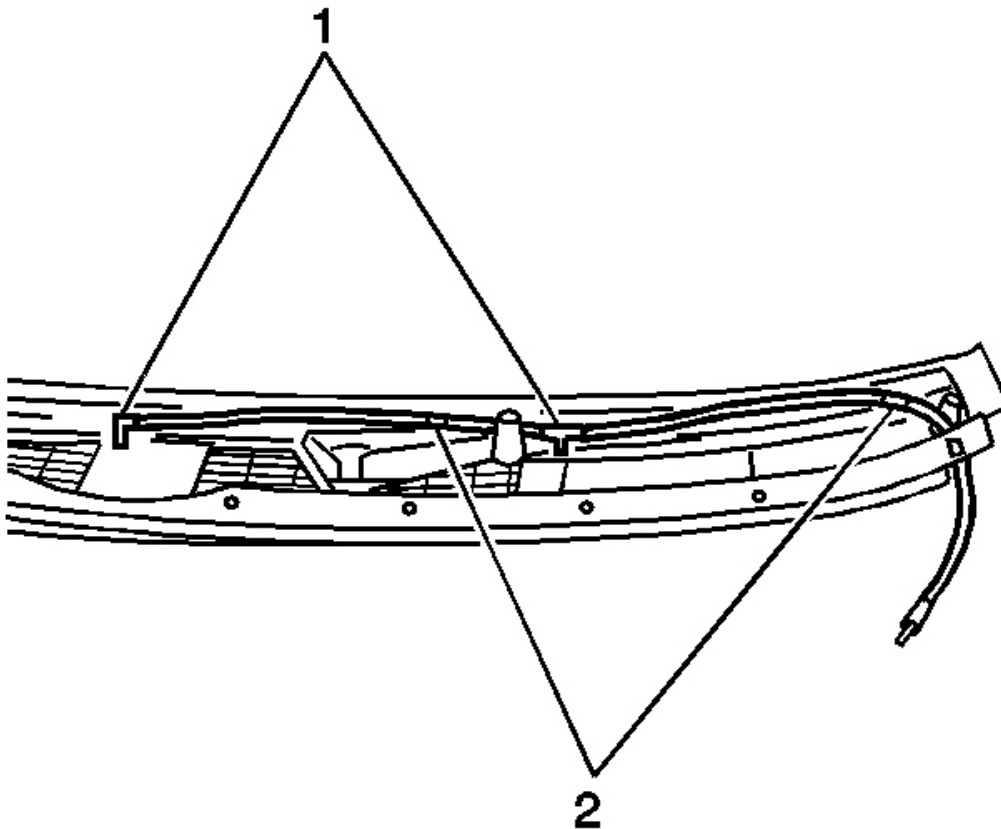


Fig. 20: Identifying Windshield Washer Hose Routing
Courtesy of GENERAL MOTORS CORP.

1. Install the washer hose to the air inlet grille panel.
2. Connect the washer hose connections (1) to the washer nozzles.
3. Connect the washer hose to the clips (2) on the air inlet grille panel.
4. Install the air inlet grille panel. Refer to **Air Inlet Grille Panel Replacement (Envoy, TrailBlazer)**.
5. Install the wiper arms. Refer to **Windshield Wiper Arm Replacement (GMC Envoy)** or **Windshield Wiper Arm Replacement (SS)**.

REAR WINDOW WASHER PUMP HOSE REPLACEMENT - LIFTGATE

Removal Procedure

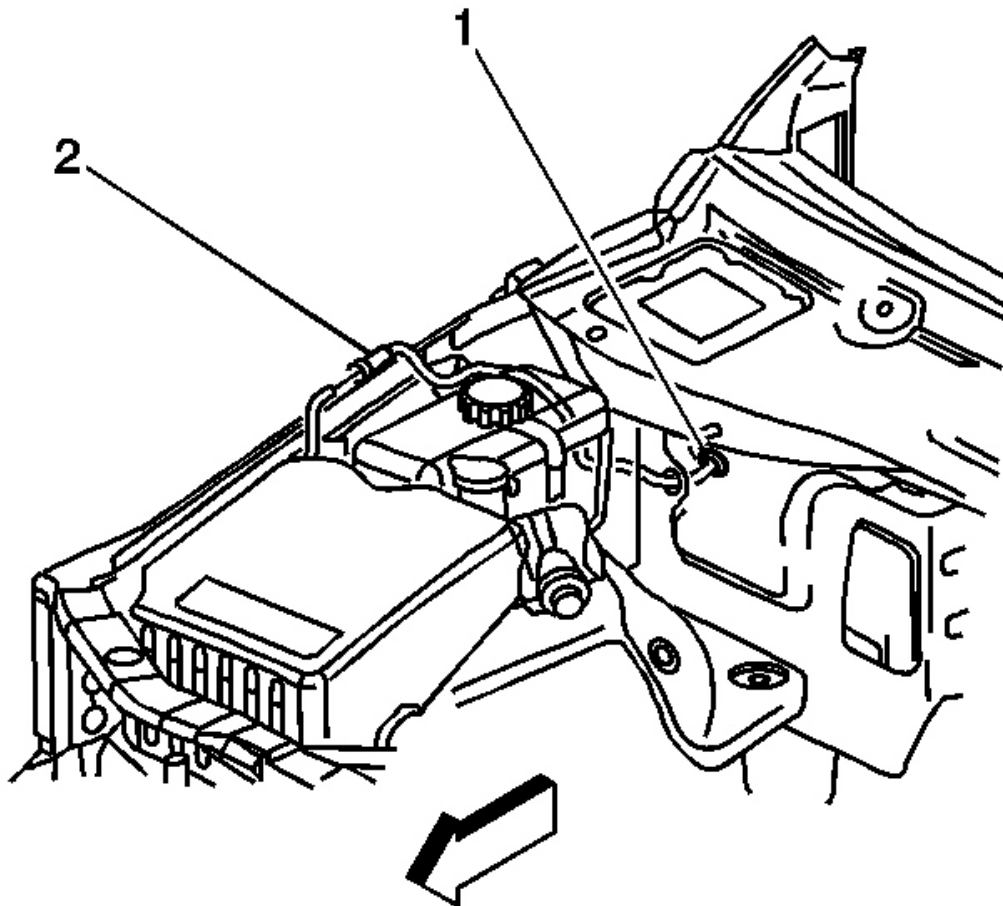


Fig. 21: Locating Rear Washer Hose Connection, Near Coolant Tank (TrailBlazer, Envoy)
Courtesy of GENERAL MOTORS CORP.

1. Disconnect the rear washer hose connection (2) near the coolant tank.
2. Remove the washer hose grommet (1) from the hole in the bulkhead, and feed the washer hose into the vehicle.
3. Remove the right front sill plate. Refer to **Front Side Door Sill Plate Replacement** .
4. Remove the right rear sill plate. Refer to **Rear Side Door Sill Plate Replacement** .
5. Roll the carpet inward to expose the wiring harness/hose assembly.
6. Remove the rear seat backs.
7. Remove the rear compartment anchors.
8. Roll the carpet forward to expose the wiring harness/hose assembly.
9. Remove the left rear quarter upper trim panel. Refer to **Rear Quarter Upper Trim Panel Replacement**

(TrailBlazer, Envoy) .

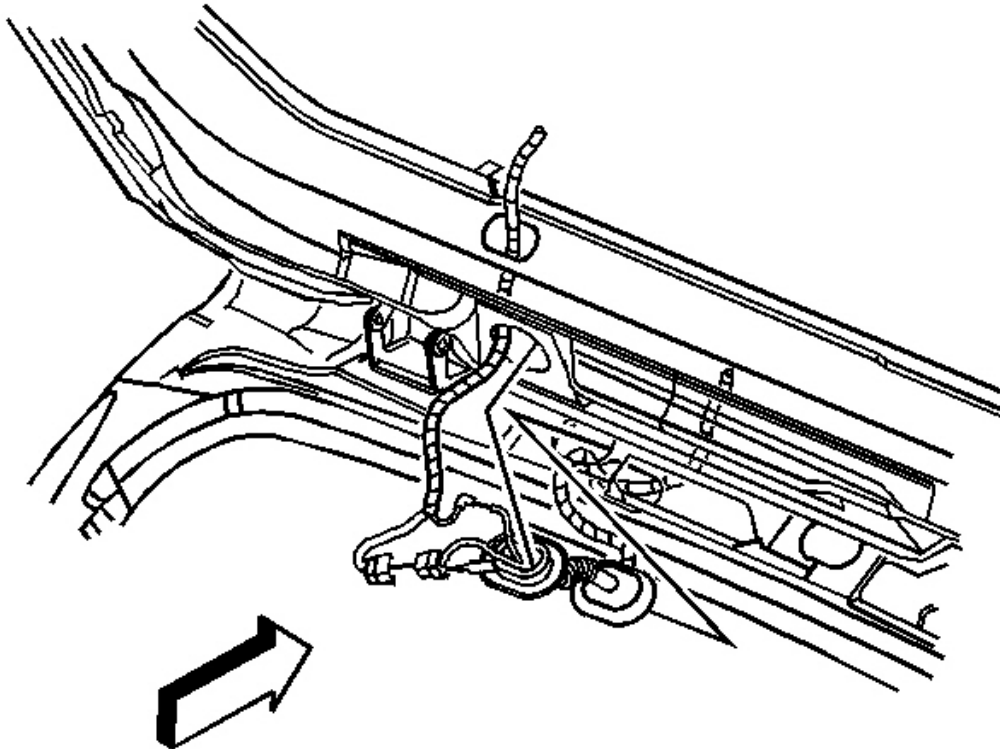


Fig. 22: Identifying Wiring Harness Pass Through Boot To Liftgate
Courtesy of GENERAL MOTORS CORP.

10. Open the liftgate to access the pass-through grommet.
11. Disconnect the grommet from the liftgate to access the washer hose connection.
12. Cut the exposed ends of the washer hose from the body wiring harness.
13. Remove the hose from the vehicle.

Installation Procedure

1. Install the washer hose to the vehicle.
2. Route the hose along the body wiring harness.
3. Tape the washer hose to the body wiring harness with 3 wraps of electrical tape, every 100 mm (4 in).
4. Roll the carpet back into place along the floor panel.
5. Install the rear compartment anchors.

6. Install the rear seat backs.
7. Install the right front sill plate. Refer to **Front Side Door Sill Plate Replacement** .
8. Install the right rear sill plate. Refer to **Rear Side Door Sill Plate Replacement** .

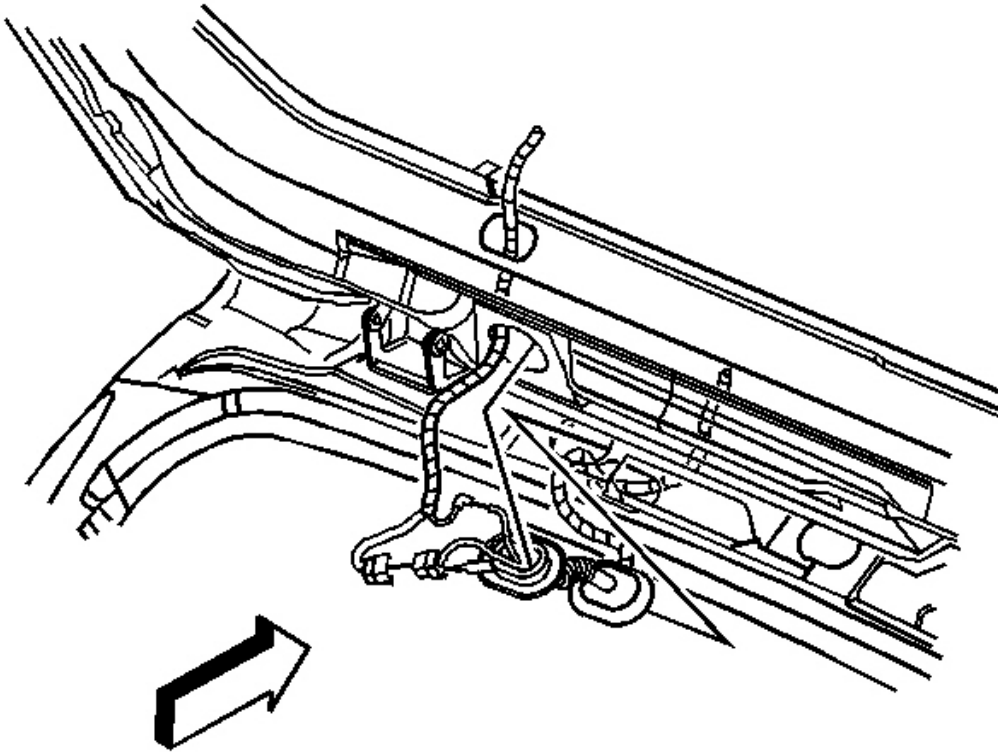


Fig. 23: Identifying Wiring Harness Pass Through Boot To Liftgate
Courtesy of GENERAL MOTORS CORP.

9. Connect the washer hose connection at the liftgate.
10. Connect the pass-through grommet the liftgate.
11. Install the left rear quarter upper trim panel. Refer to **Rear Quarter Upper Trim Panel Replacement (TrailBlazer, Envoy)** .

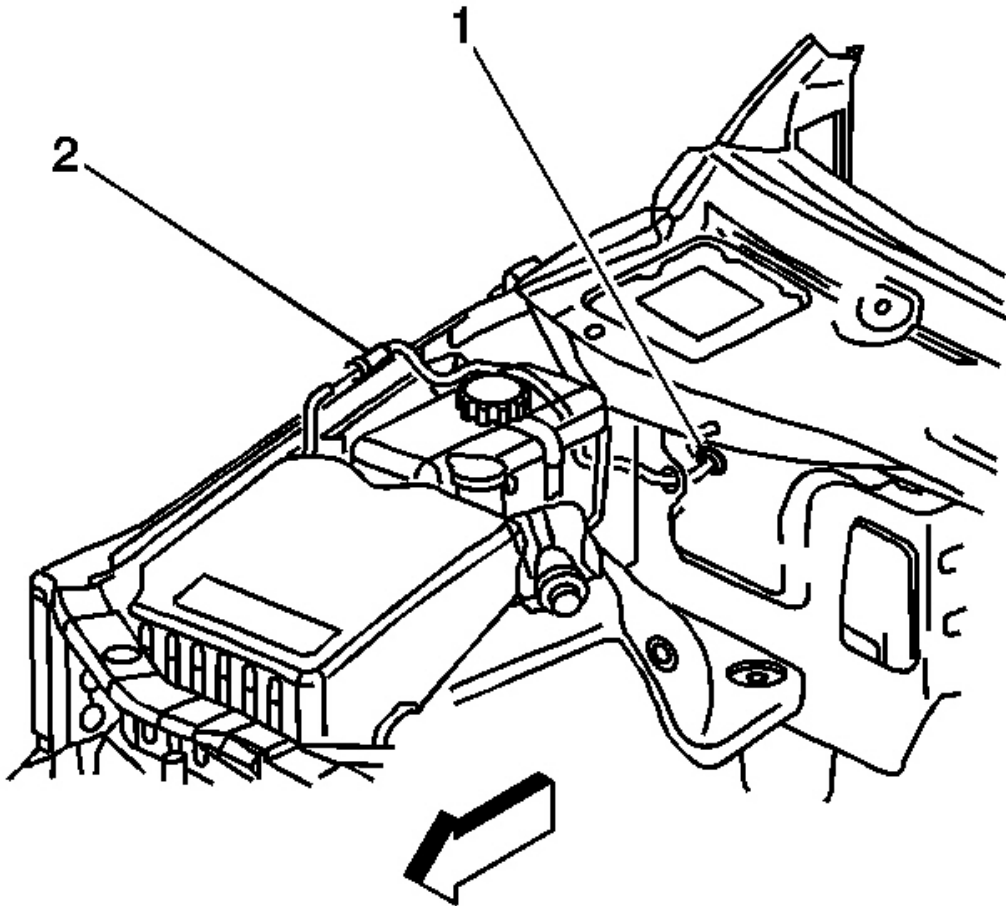


Fig. 24: Locating Rear Washer Hose Connection, Near Coolant Tank (TrailBlazer, Envoy)
Courtesy of GENERAL MOTORS CORP.

12. Install the rear washer hose out through the bulkhead, and seat the grommet (1).
13. Connect the rear washer hose connection (2) near the coolant tank.

WINDSHIELD WASHER SOLVENT CONTAINER REPLACEMENT (ENVOY, TRAILBLAZER)

Removal Procedure

1. Remove the air cleaner element. Refer to **Air Cleaner Element Replacement** .
2. Remove the air cleaner/washer container assembly. Refer to **Air Cleaner Assembly Replacement** .

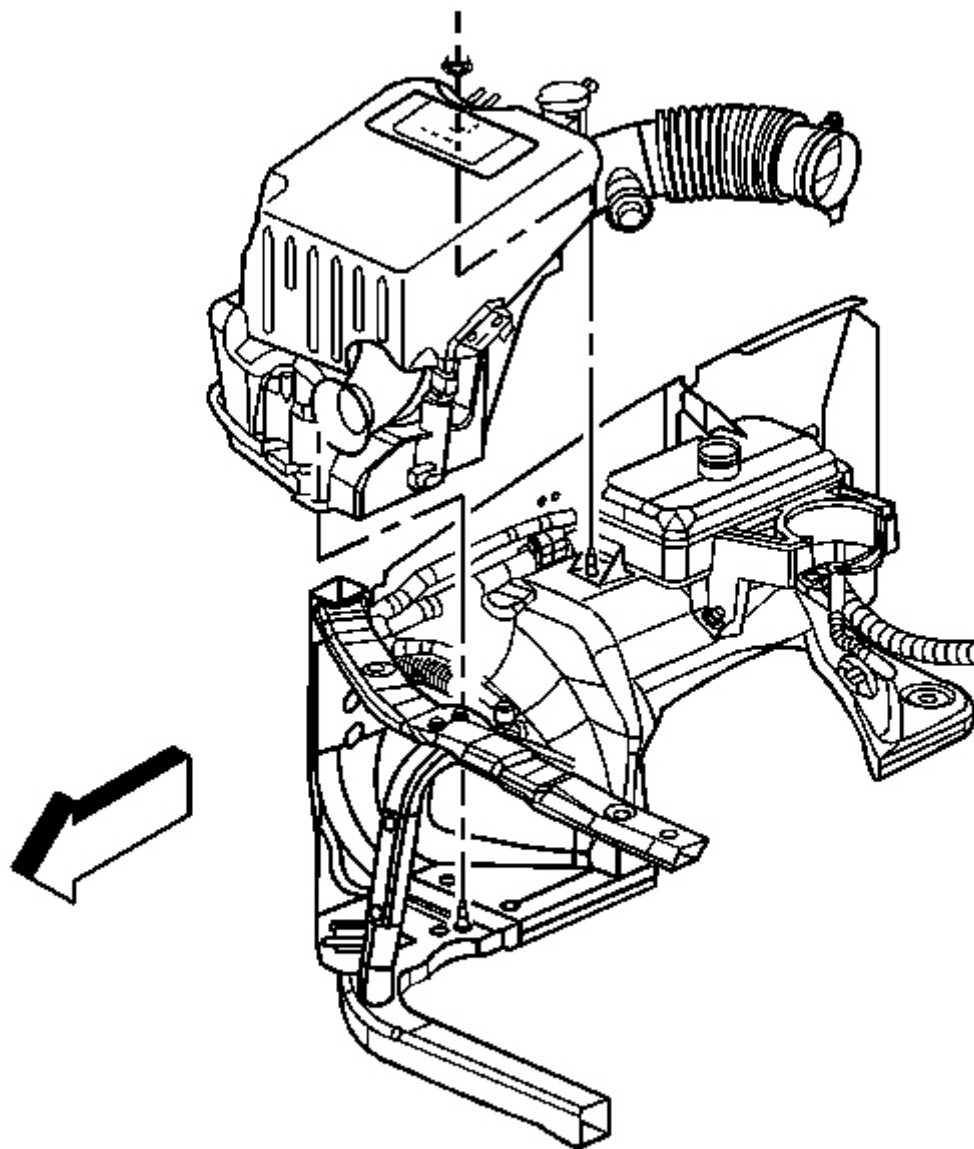


Fig. 25: View Of Washer Pumps & Container Assembly
Courtesy of GENERAL MOTORS CORP.

3. Remove the washer pumps from the container assembly. Refer to **Headlamp Washer Pump Replacement**, **Windshield Washer Pump Replacement**, and **Rear Window Washer Pump Replacement**.

Installation Procedure

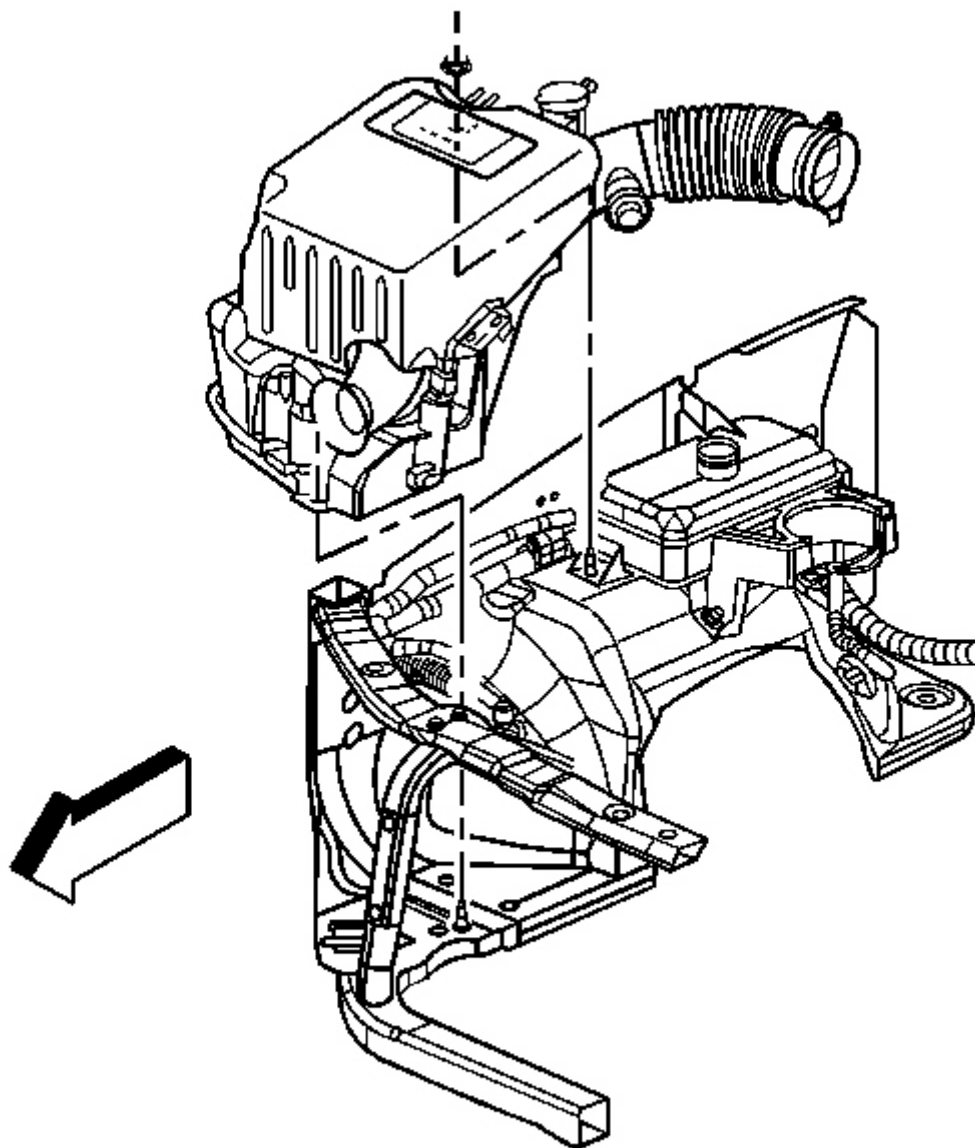


Fig. 26: View Of Washer Pumps & Container Assembly
Courtesy of GENERAL MOTORS CORP.

1. Install the washer pumps to the container assembly. Refer to **Headlamp Washer Pump Replacement**, **Windshield Washer Pump Replacement** and **Rear Window Washer Pump Replacement**.

2. Install the air cleaner/washer container assembly. Refer to **Air Cleaner Assembly Replacement** .
3. Install the air cleaner element. Refer to **Air Cleaner Element Replacement** .

HEADLAMP WASHER PUMP REPLACEMENT

Removal Procedure

1. Remove the washer solvent container. Refer to **Windshield Washer Solvent Container Replacement (Envoy, TrailBlazer)**.
2. Disconnect the headlamp washer hose from the pump (1).

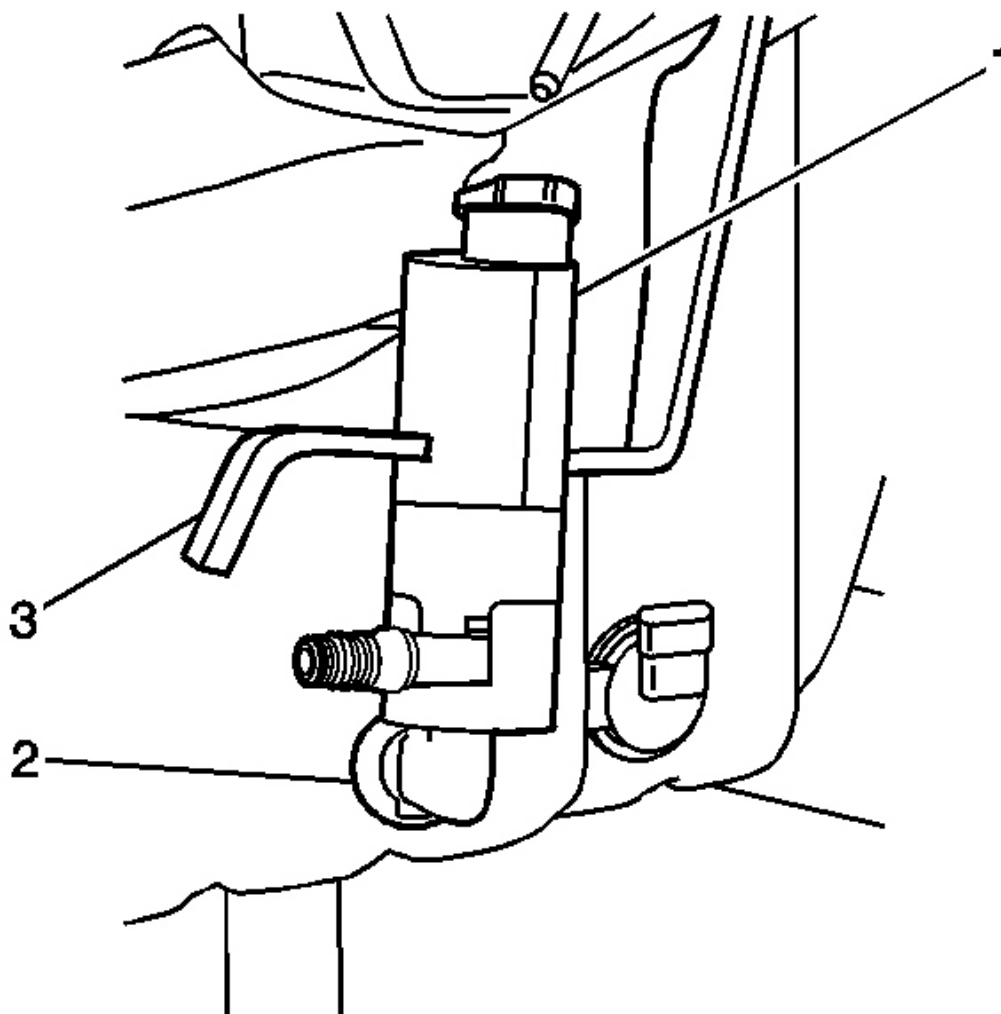


Fig. 27: Locating Headlight Washer Pump
Courtesy of GENERAL MOTORS CORP.

3. Remove the pump (1) from the solvent container by carefully pulling the pump outward from the retainer (3).
4. Remove the pump (1) from the sealing grommet (2) and discard the grommet.

Installation Procedure

1. Install a new washer pump grommet into the washer container.
2. Lubricate the grommet with clean washer solvent.

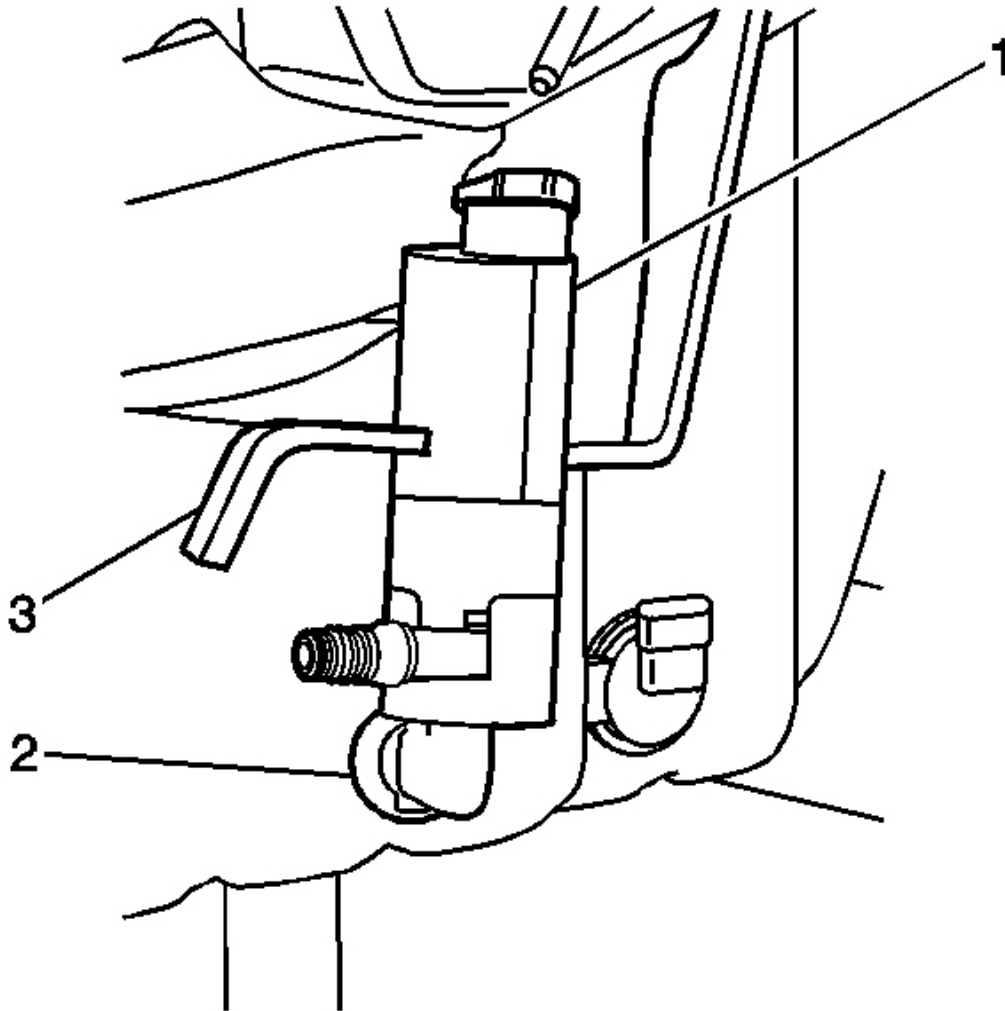


Fig. 28: Locating Headlight Washer Pump
Courtesy of GENERAL MOTORS CORP.

3. Install the pump (1) to the sealing grommet (2).
4. Install the pump (1) to the retainer (3) on the solvent container.
5. Connect the headlamp washer hose to the pump (1).
6. Install the washer solvent container. Refer to **Windshield Washer Solvent Container Replacement (Envoy, TrailBlazer)**.

Removal Procedure

1. Remove the washer solvent container. Refer to **Windshield Washer Solvent Container Replacement (Envoy, TrailBlazer)**.
2. Disconnect the washer hose (4) from the pump (2).

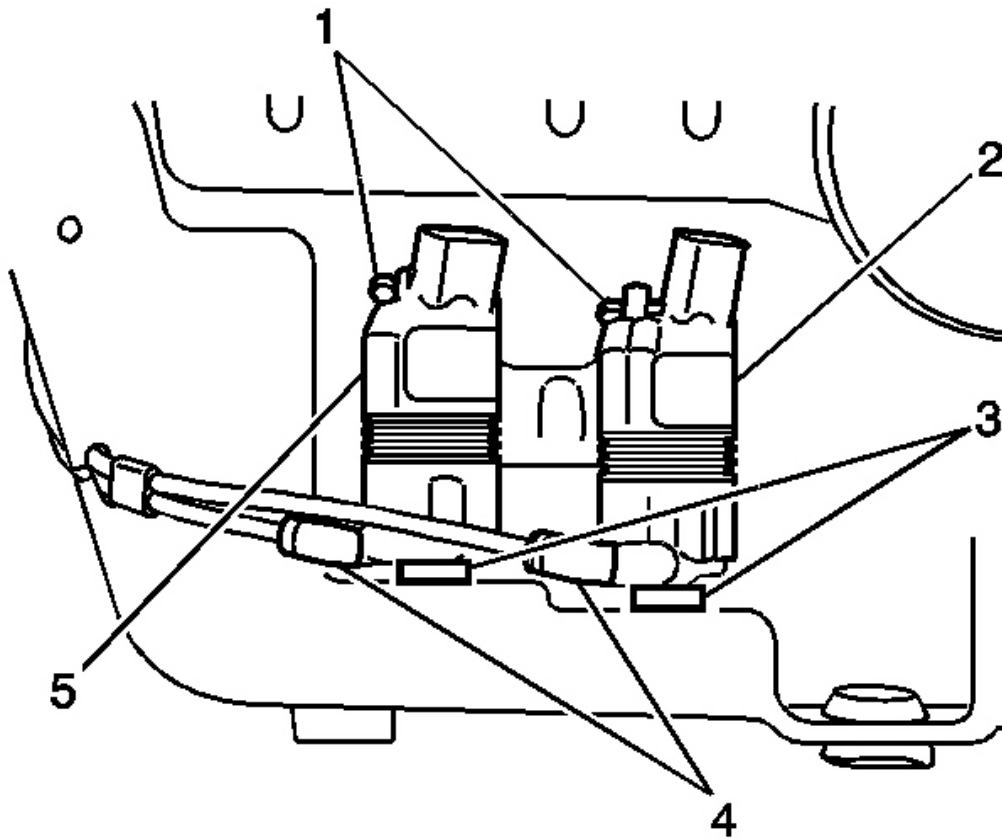


Fig. 29: Washer Pump, Sealing Grommet, Retainer & Washer Hose
Courtesy of GENERAL MOTORS CORP.

3. Remove the pump (2) from the solvent container by carefully pulling pump from the retainer (1).
4. Remove the pump (2) from the sealing grommet (3).
5. Discard the old grommet.

Installation Procedure

1. Install a new washer pump sealing grommet.

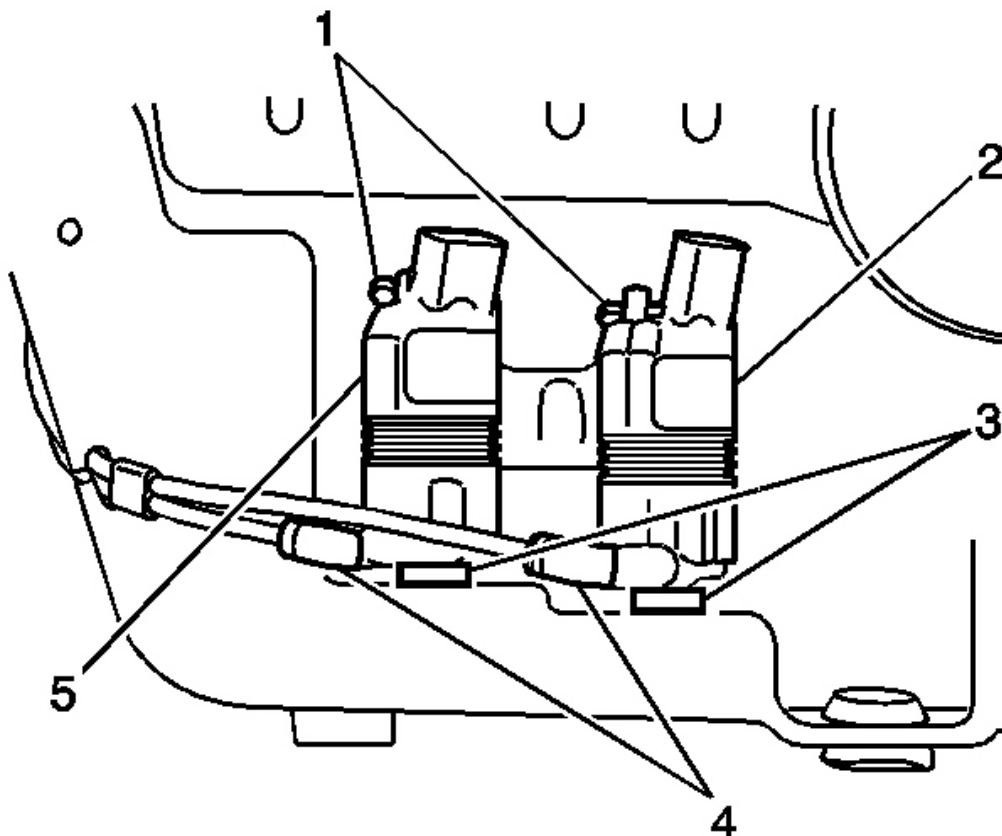


Fig. 30: Washer Pump, Sealing Grommet, Retainer & Washer Hose
Courtesy of GENERAL MOTORS CORP.

2. Install the pump (2) to the sealing grommet (3). Push downward to seat the pump.
3. Install the pump (2) to the retainer (1) on the solvent container. Push pump into the tank in order to secure the pump.
4. Connect the washer hose (4) to the pump (2).
5. Install the washer solvent container. Refer to **Windshield Washer Solvent Container Replacement (Envoy, TrailBlazer)**.

REAR WINDOW WASHER PUMP REPLACEMENT

Removal Procedure

1. Remove the washer solvent container. Refer to **Windshield Washer Solvent Container Replacement (Envoy, TrailBlazer)**.

2. Disconnect the washer hose (4) from the pump (5).

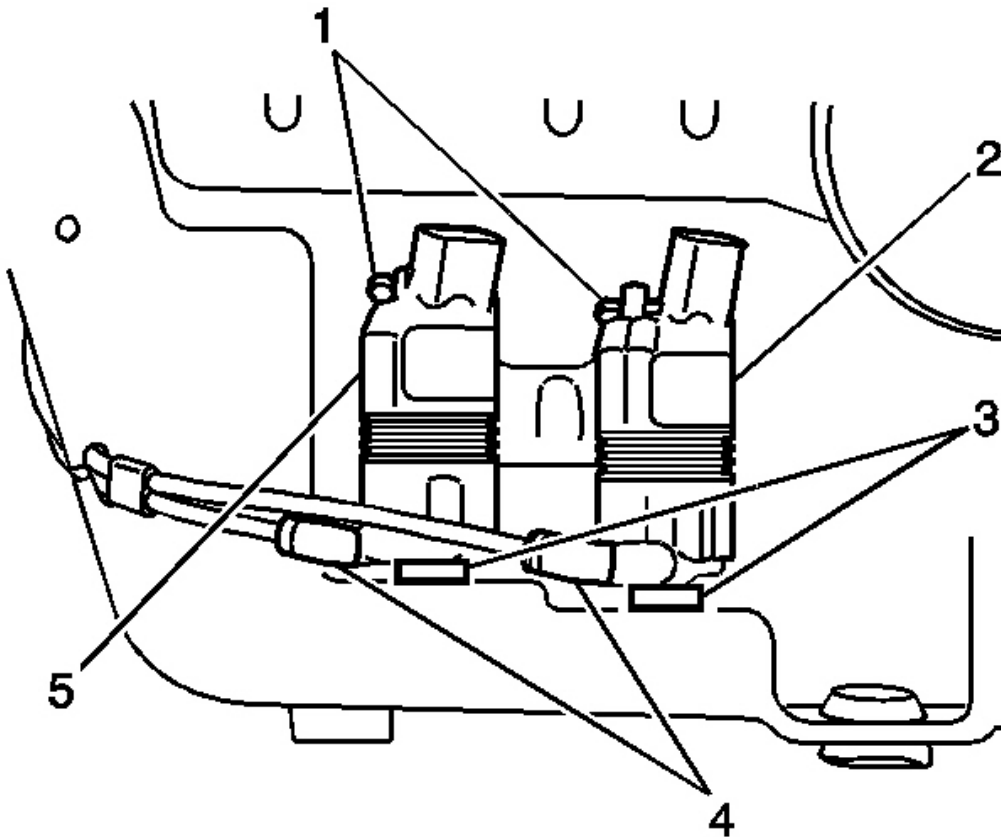


Fig. 31: Washer Pump, Sealing Grommet, Retainer & Washer Hose
Courtesy of GENERAL MOTORS CORP.

3. Remove the pump (5) from the solvent container by carefully pulling pump from the retainer (1).
4. Remove the pump from the sealing grommet (3) by pulling the pump upwards.
5. Discard the grommet.

Installation Procedure

1. Install a new sealing grommet into the container. Lubricate the grommet with clean washer solvent.

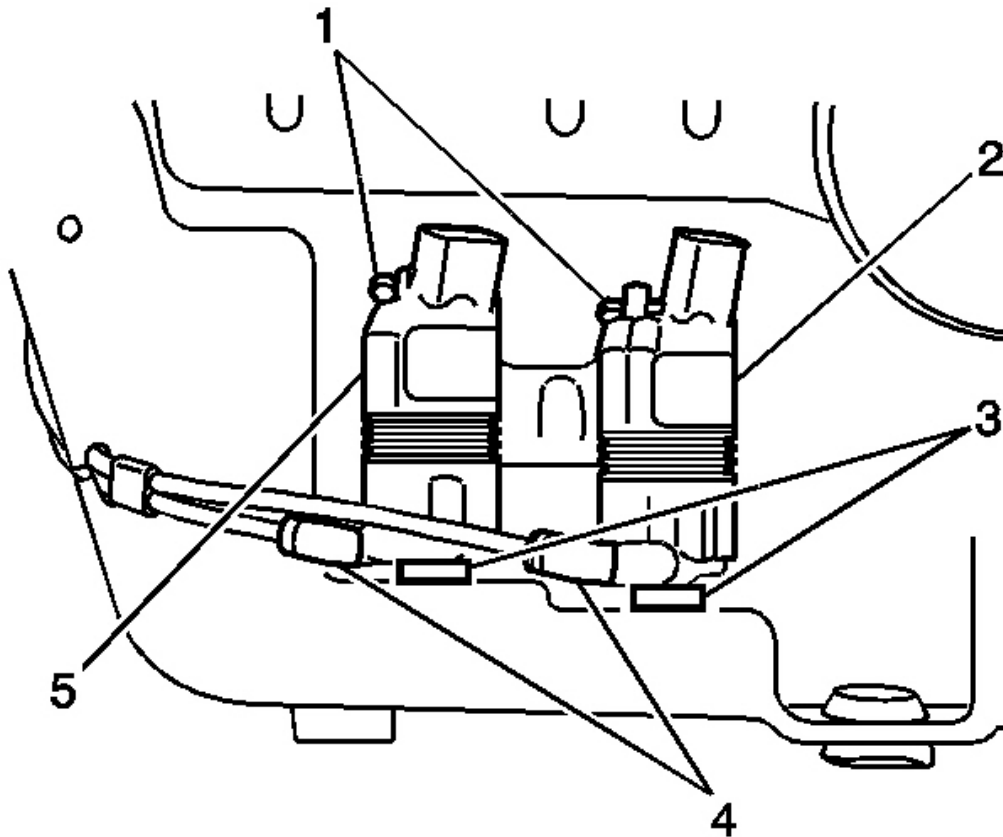


Fig. 32: Washer Pump, Sealing Grommet, Retainer & Washer Hose
Courtesy of GENERAL MOTORS CORP.

2. Install the pump (5) to the sealing grommet (3).
3. Install the pump (5) to the retainer (1) on the solvent container.
4. Connect the washer hose (4) to the pump (5).
5. Install the washer solvent container. Refer to **Windshield Washer Solvent Container Replacement (Envoy, TrailBlazer)**.

WASHER SOLVENT CONTAINER LEVEL SENSOR REPLACEMENT

Removal Procedure

1. Remove the washer solvent container. Refer to **Windshield Washer Solvent Container Replacement (Envoy, TrailBlazer)**.

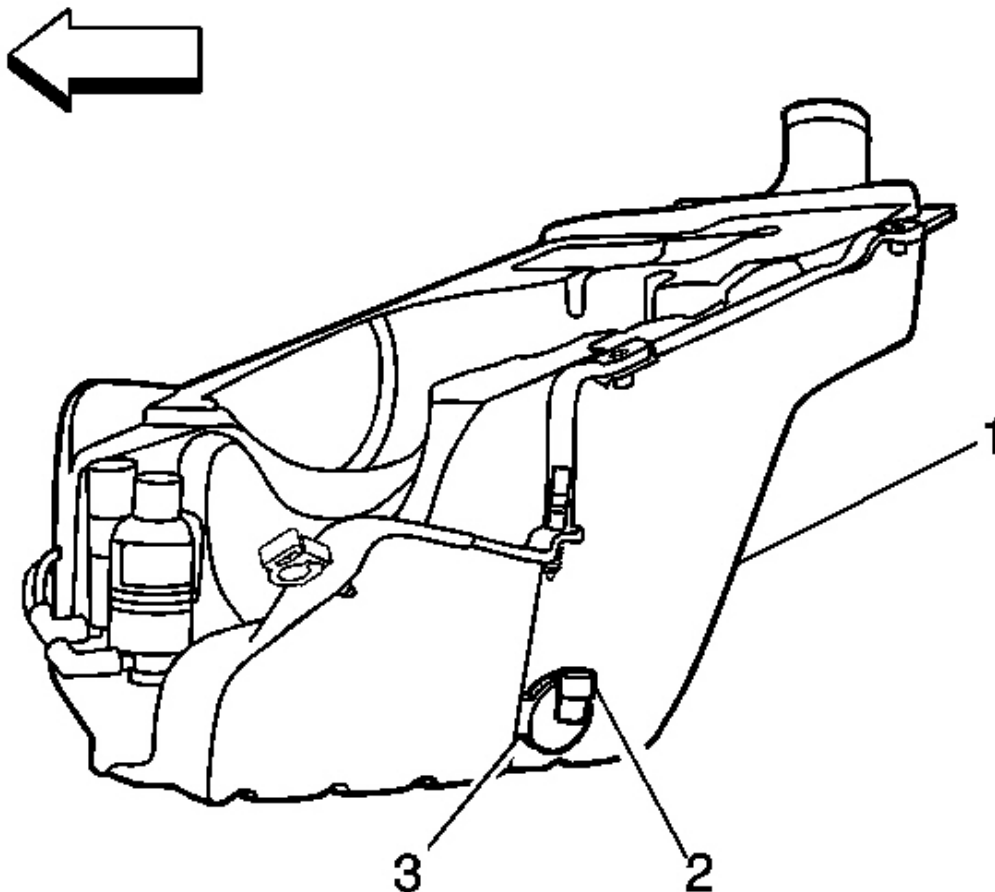


Fig. 33: Locating Washer Solvent Container Level Sensor
Courtesy of GENERAL MOTORS CORP.

2. Using 2 flat-bladed tools, gently pry the level sensor switch (2) from the container (1).
3. Remove the level sensor switch grommet and discard.

Installation Procedure

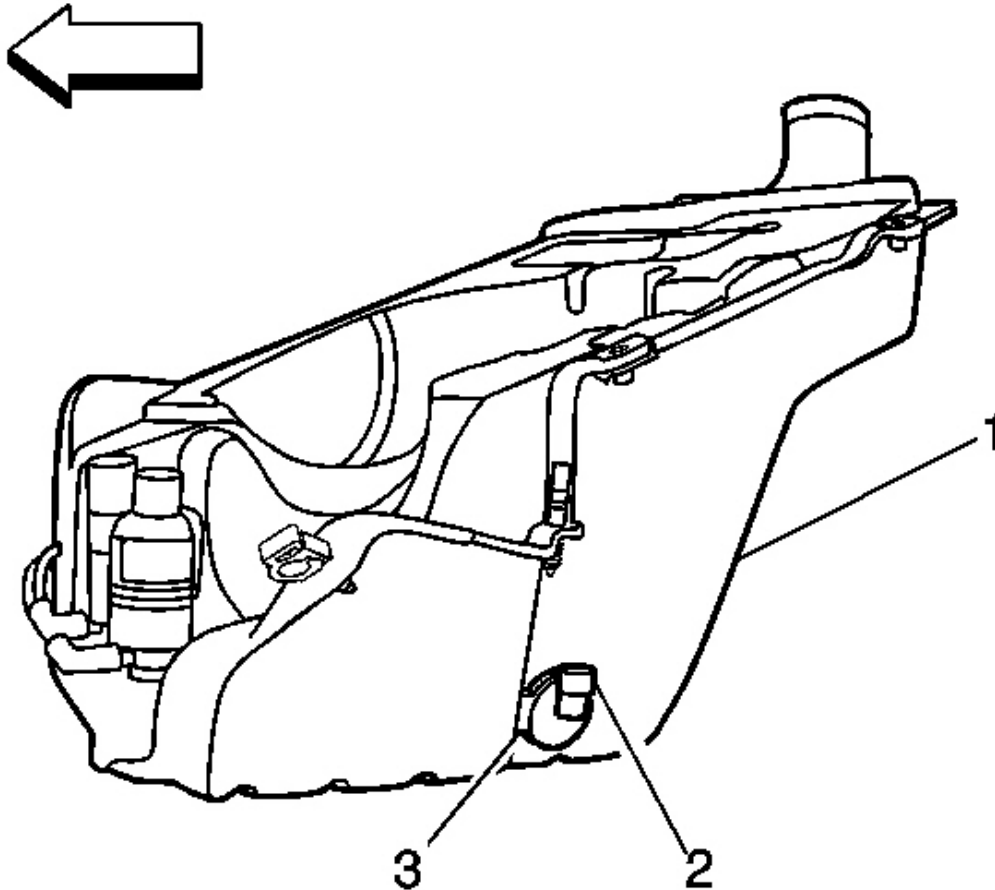


Fig. 34: Locating Washer Solvent Container Level Sensor
Courtesy of GENERAL MOTORS CORP.

1. Install a new level sensor switch grommet into the washer solvent container (1).
2. Lubricate the grommet with washer fluid to aid in the installation of the level sensor switch.
3. Ensure the square tab (3) is positioned vertical to the washer container.
4. Push inward in order to seat the level sensor (2) into the grommet.
5. Install the washer solvent container. Refer to **Windshield Washer Solvent Container Replacement (Envoy, TrailBlazer)**.

AIR INLET GRILLE PANEL REPLACEMENT (ENVOY, TRAILBLAZER)

Removal Procedure

1. Remove the windshield wiper arms. Refer to Windshield Wiper Arm Replacement (GMC Envoy) or Windshield Wiper Arm Replacement (SS).

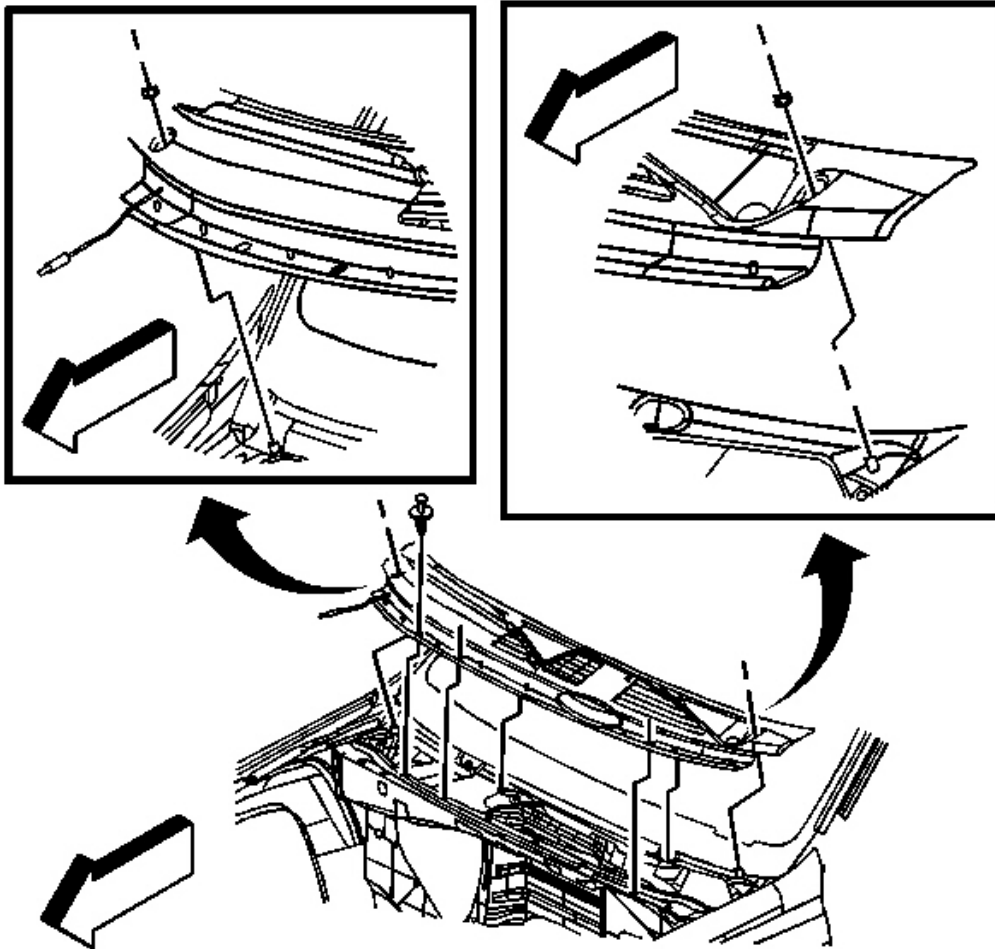


Fig. 35: View Of Air Inlet Grille Panel & Push-Pin Retainers
Courtesy of GENERAL MOTORS CORP.

2. Remove the air inlet grille panel retaining nuts.
3. Remove the air inlet grill panel push-pin retainers.
4. Disconnect the washer hose.
5. Remove the air inlet grille panel from the vehicle, by pulling upwards in order to disengage the retaining clips.
6. Place the air inlet grille panel on a clean, prepared surface.

7. Remove the rear hood seal from the air inlet grille panel studs.

Installation Procedure

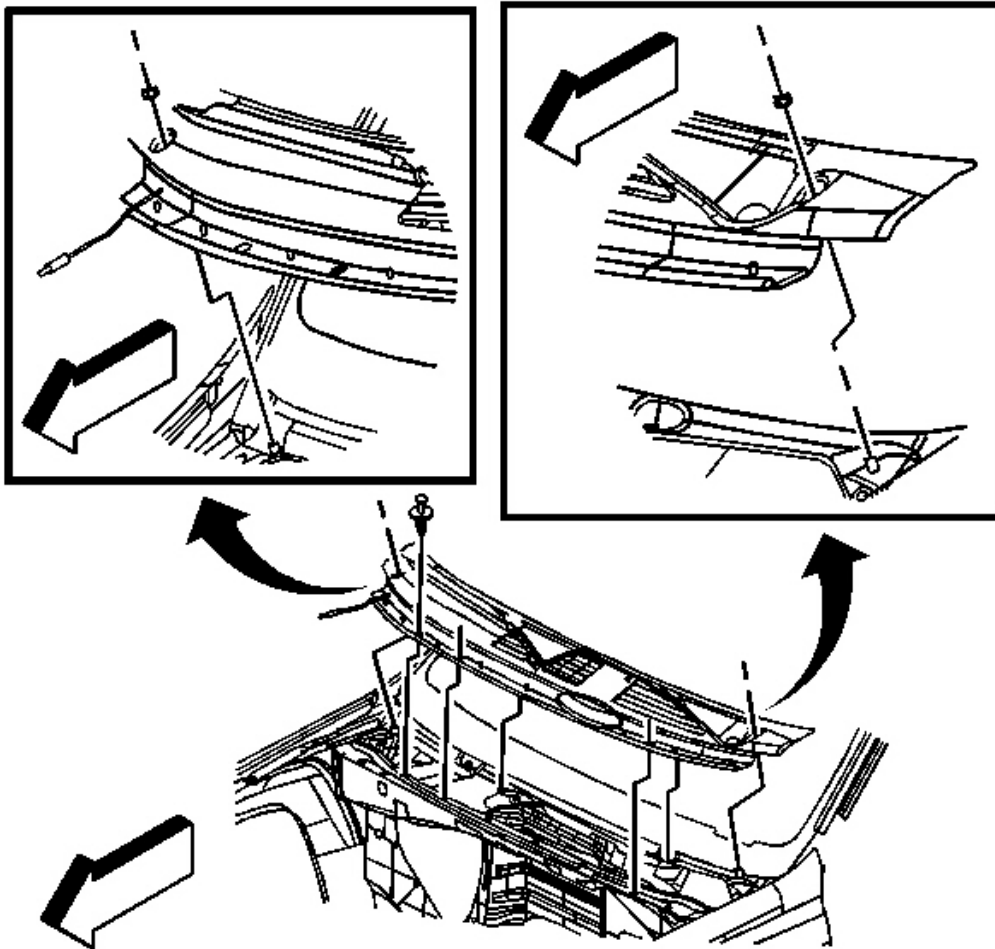


Fig. 36: View Of Air Inlet Grille Panel & Push-Pin Retainers
Courtesy of GENERAL MOTORS CORP.

1. Position the rear hood seal to the air inlet grille panel.
2. Install the rear hood seal to the air inlet grille panel studs.
3. Position the air inlet grille panel to the vehicle.
4. Push downward on the air inlet grille panel to seat the retaining clips.
5. Connect the washer hose.

6. Install the push-pin retainers.

NOTE: Refer to Fastener Notice .

7. Install the air inlet grille retaining nuts.

Tighten: Tighten the air inlet grille nuts to 4 N.m (35 lb in).

8. Install the windshield wiper arms. Refer to Windshield Wiper Arm Replacement (GMC Envoy) or Windshield Wiper Arm Replacement (SS).

WINDSHIELD WIPER ARM REPLACEMENT (GMC ENVOY)

Removal Procedure

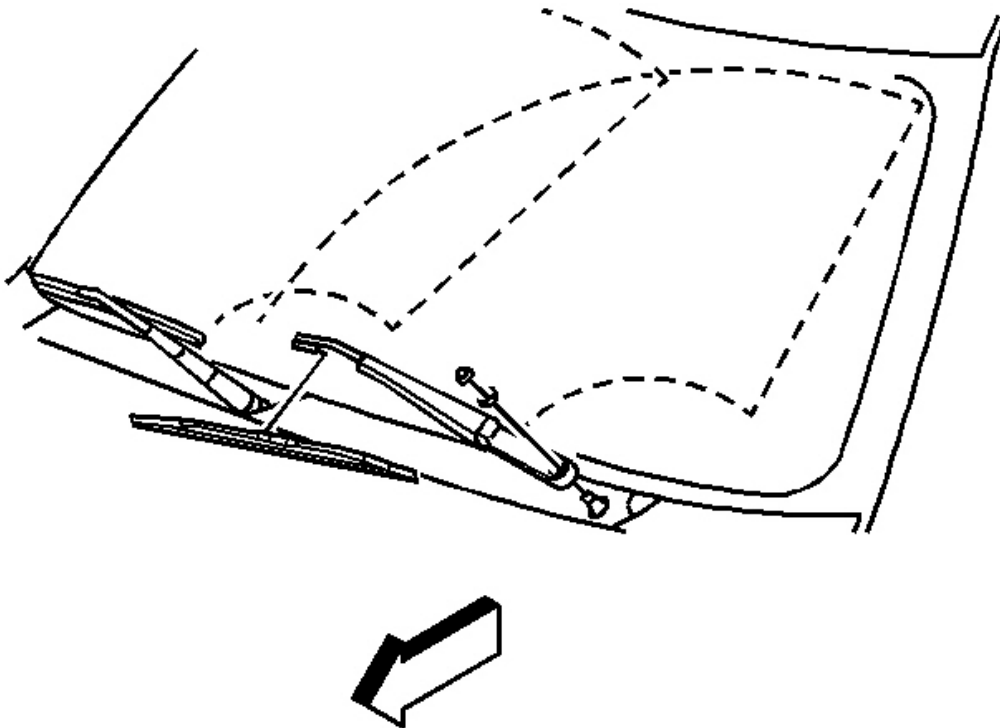


Fig. 37: View Of Wiper Arm Blade & Wiper Arm
Courtesy of GENERAL MOTORS CORP.

1. Remove the cover from the nut on the wiper arm.

2. Hold the wiper arm and remove the nut from the wiper arm.

IMPORTANT: Use a battery terminal puller to remove the wiper arm if rocking the wiper arm fails to loosen it from the drive shaft.

3. Push inward at the wiper arm pivot in order to loosen it from the drive shaft.
4. Remove the wiper arm from the pivot shaft.
5. Remove the wiper arm blade from the wiper arm. Refer to Windshield Wiper Blade Replacement.
6. Clean the knurls of the drive shaft with a wire brush.

Installation Procedure

1. Install the wiper arm blade to the wiper arm. Refer to Windshield Wiper Blade Replacement.

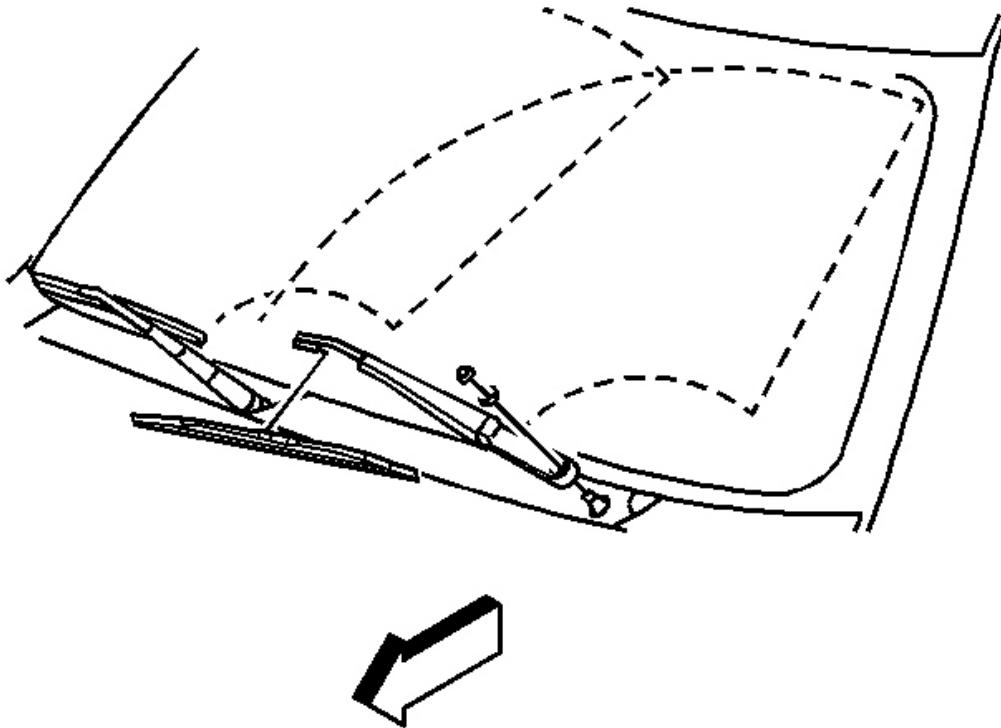


Fig. 38: View Of Wiper Arm Blade & Wiper Arm
Courtesy of GENERAL MOTORS CORP.

2. Install the wiper arm onto the drive shaft.

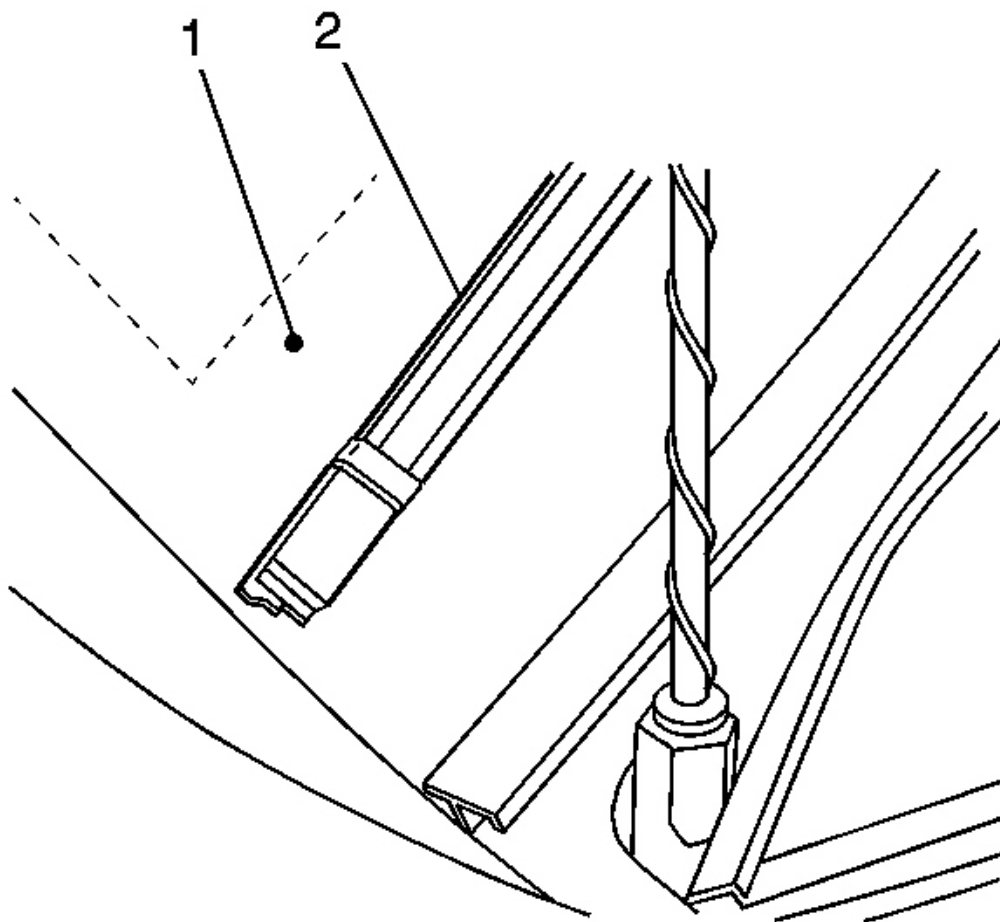


Fig. 39: Positioning Passenger Side Wiper Blade
Courtesy of GENERAL MOTORS CORP.

3. Hold the wiper arm blade (2) in position to the dots (1) in the windshield blackout area.

NOTE: Refer to Fastener Notice .

4. Install the nut on the drive shaft.

Tighten: Tighten the nut to 30 N.m (22 lb ft).

5. Install the cover on the nut.
6. Operate the wipers and inspect for proper operation.

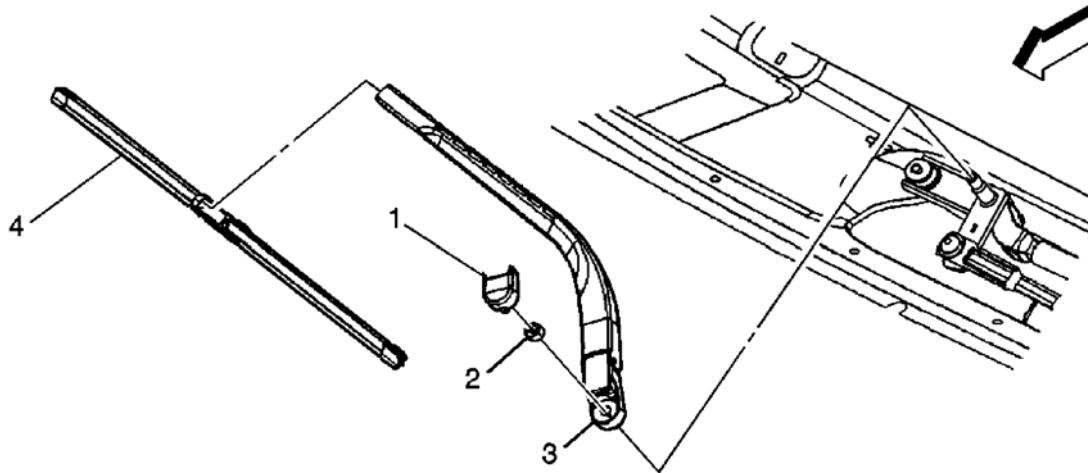
WINDSHIELD WIPER ARM REPLACEMENT (SS)

Fig. 40: View Of Wiper Arm Components
 Courtesy of GENERAL MOTORS CORP.

Callout	Component Name
1	Windshield Washer Arm Finish Cover Tip: Use a small flat-bladed tool to remove finish cap.
2	Windshield Washer Arm Nut NOTE: Refer to <u>Fastener Notice</u> . Tip: Hold wiper arm blade tip to the target marks in the lower blackout area of the windshield while tightening the nut. Tighten: 35 N.m (26 lb ft).
3	Windshield Washer Arm Tip: Use a J 39637 Wiper Arm Puller or slightly rock the arm on the wiper pivot shaft to remove.
4	Windshield Wiper Arm Blade Tip: Pinch the wiper blade tabs and rotate the blade away from the arm and gently push outward in order to remove the blade from the arm.

REAR WINDOW WIPER ARM REPLACEMENT (TRAILBLAZER, ENVOY)**Removal Procedure**

1. Place the arm in the mid-wipe position on the rear glass.

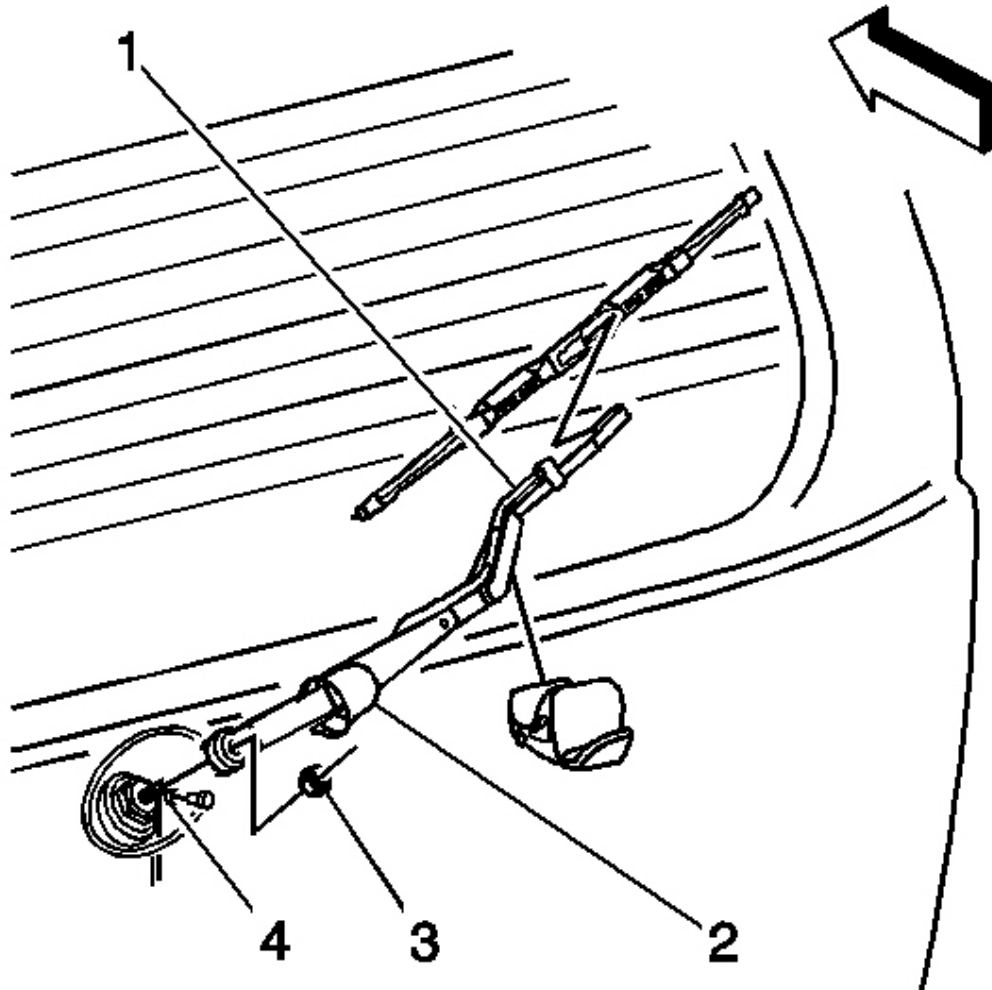


Fig. 41: View Of Rear Wiper Components
Courtesy of GENERAL MOTORS CORP.

2. Disconnect the washer hose (4).
3. Remove the wiper arm cover (2).
4. Disengage the nut (3) retaining the wiper arm to the pivot shaft.
5. Remove the wiper arm from the pivot shaft.
6. Remove the wiper arm blade from the wiper arm, if necessary. Refer to **Rear Window Wiper Blade Replacement (Envoy)**.

1. Park the rear wiper motor.
2. Install the wiper arm blade to the wiper arm, if removed. Refer to **Rear Window Wiper Blade Replacement (Envoy)**.

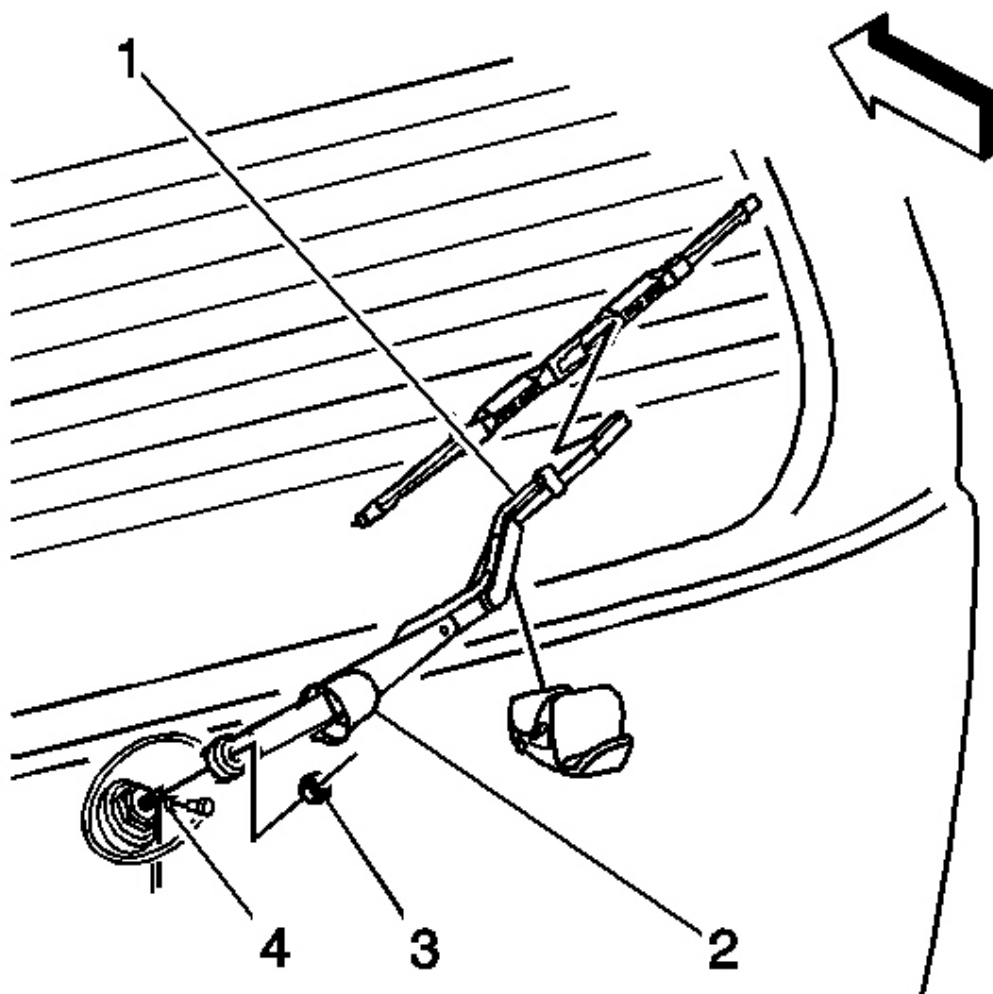


Fig. 42: View Of Rear Wiper Components
Courtesy of GENERAL MOTORS CORP.

3. Position the wiper arm into the park ramp.

NOTE: Refer to **Fastener Notice** .

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4. Install the wiper arm onto the motor shaft with the nut (3). Hold the wiper arm into the park ramp while torquing the nut.

Tighten: Tighten the nut (3) to 20 N.m (15 lb ft).

5. Reposition the wiper arm cover (2).
6. Connect the washer hose (4).

REAR WINDOW WIPER ARM REPLACEMENT (TRAILBLAZER SS)

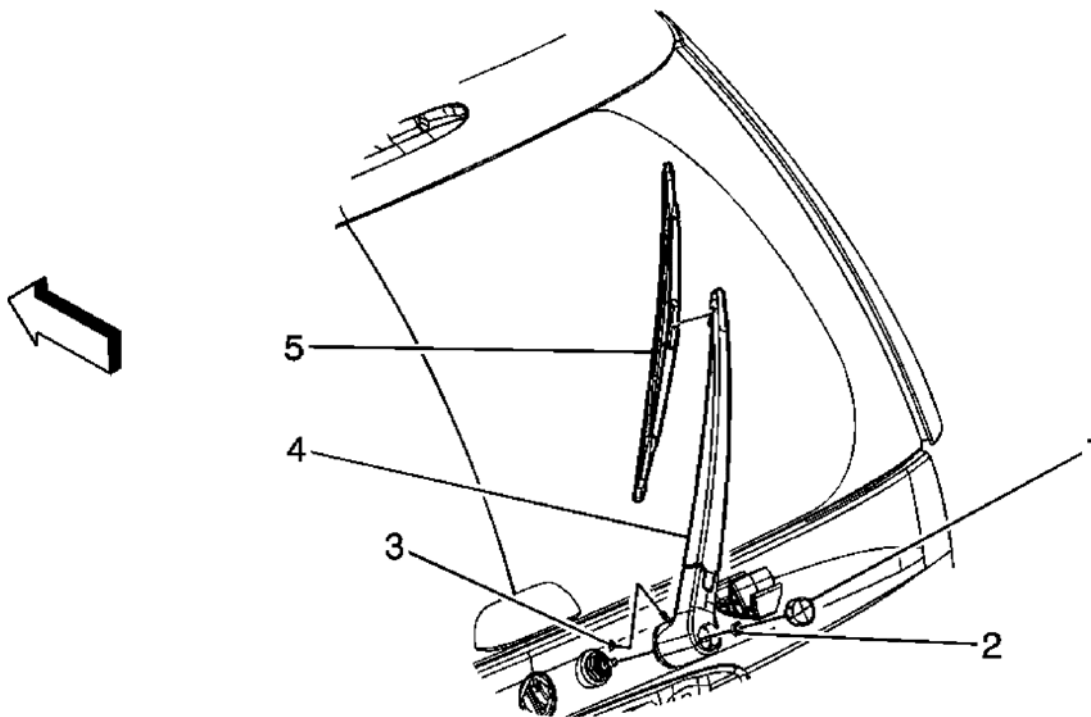


Fig. 43: View Of Rear Wiper Arm Assembly
Courtesy of GENERAL MOTORS CORP.

Callout	Component Name
NOTE: Refer to <u>Fastener Notice</u> .	
Fastener Tightening Specifications: Refer to <u>Fastener Tightening Specifications</u> . Preliminary Procedure: Position the rear wiper arm at the mid-wipe position on the glass and cycle the ignition key to the OFF position.	
1	Wiper Arm Nut Finish Cover
2	Rear Wiper Arm Pivot Shaft Nut

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	Tighten: 10 N.m (89 lb in)
3	Rear Wiper Arm Washer Hose
4	Rear Wiper Arm Tip: <ol style="list-style-type: none">1. Cycle the ignition key on and park the wiper motor.2. Park the rear wiper motor prior to installing the arm to the pivot shaft.3. Place the wiper arm onto the pivot shaft and in the wiper pocket in the full park position.4. Hold the arm in the pocket while torquing the wiper arm nut to specification.
5	Rear Wiper Arm Blade

WINDSHIELD WIPER BLADE REPLACEMENT

Removal Procedure

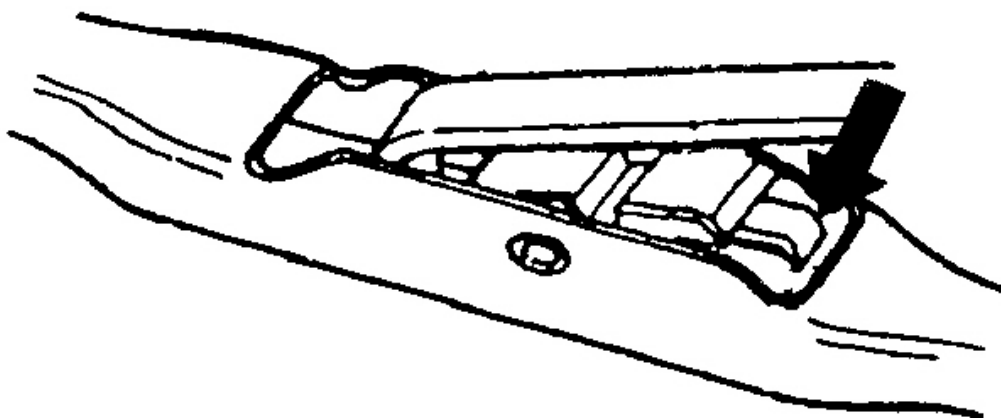


Fig. 44: Locating Wiper Blade Clip Locking Tab
Courtesy of GENERAL MOTORS CORP.

IMPORTANT: Do not allow the wiper arm to fall back and strike the windshield.

1. Lift the wiper arm until it is in the vertical position.
2. Push in the locking tab of the wiper blade clip and pull downward on the wiper arm blade.

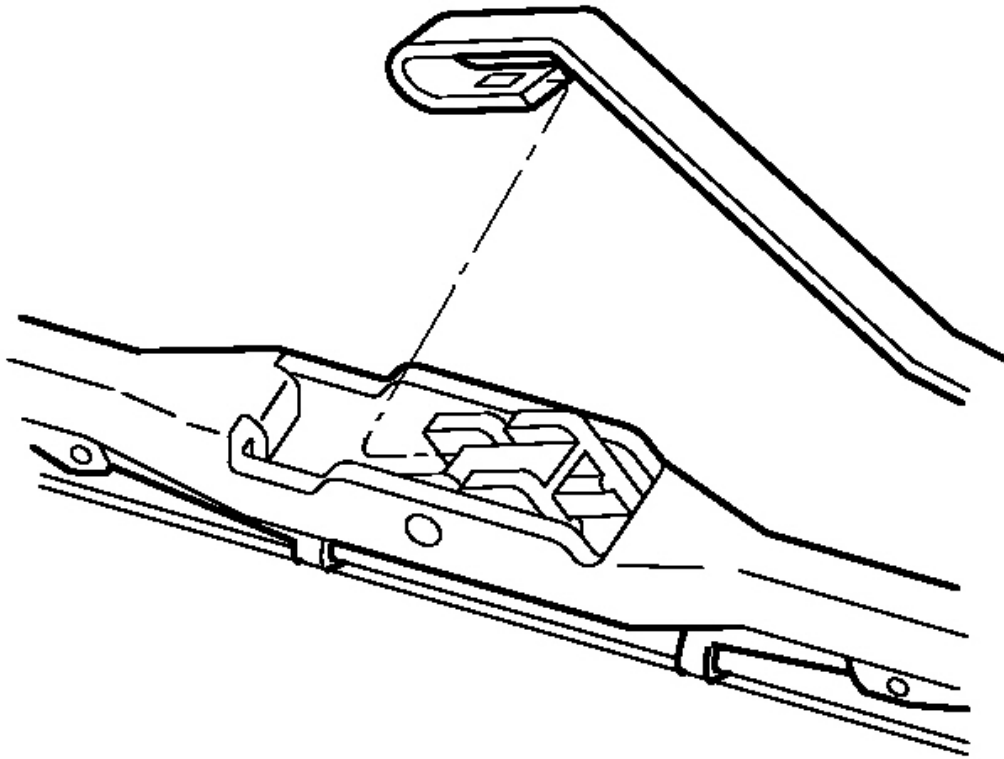


Fig. 45: Identifying Wiper Arm Hook & Blade
Courtesy of GENERAL MOTORS CORP.

3. Remove the wiper blade from the inside radius of the wiper arm.
4. Bring the wiper blade out through the opening in the wiper arm.

Installation Procedure

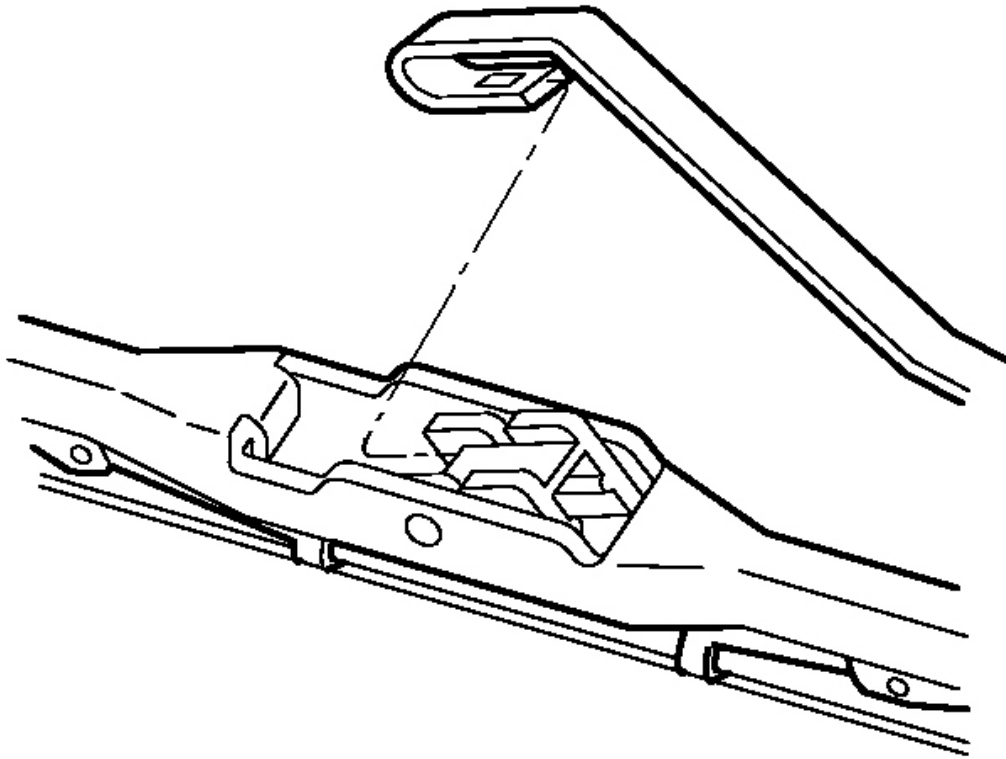


Fig. 46: Identifying Wiper Arm Hook & Blade
Courtesy of GENERAL MOTORS CORP.

1. Insert the hook of the wiper arm through the opening in the wiper blade.
2. Position the wiper blade in the inside radius of the wiper arm hook.

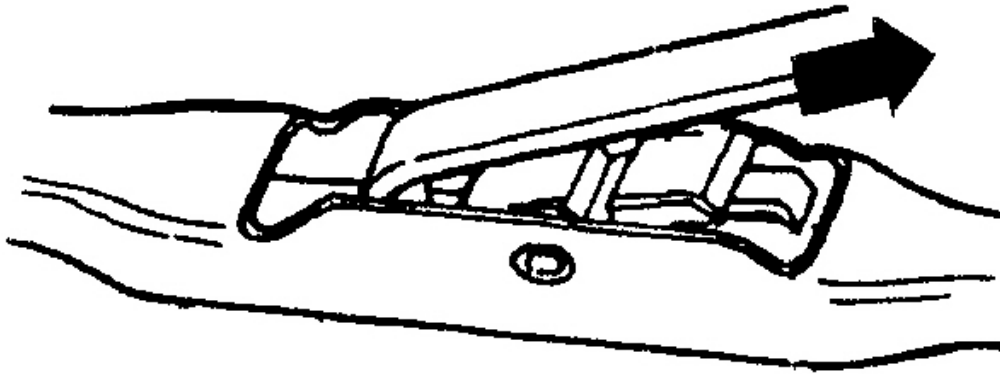


Fig. 47: View Of Locking Tab

Courtesy of GENERAL MOTORS CORP.

3. Pull upward until the locking tab of the pivot engages the slot in the hook.
4. Carefully lower the wiper arm and blade onto the windshield.

REAR WINDOW WIPER BLADE REPLACEMENT (ENVOY)

Removal Procedure

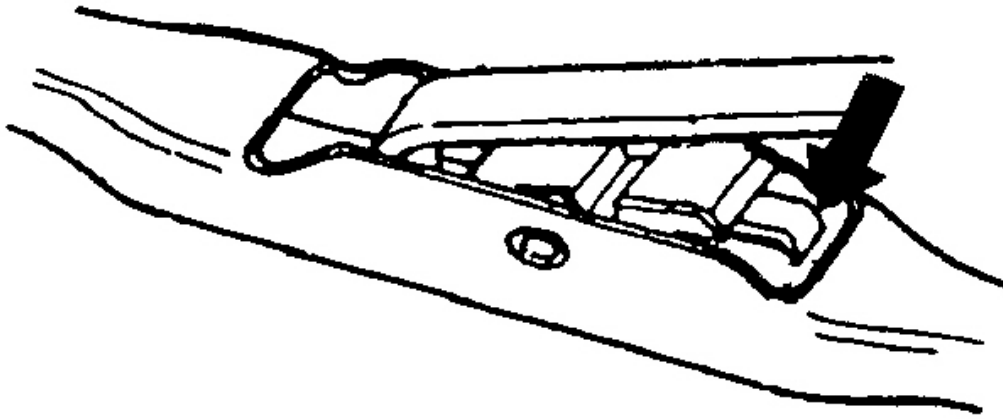


Fig. 48: Locating Wiper Blade Clip Locking Tab
Courtesy of GENERAL MOTORS CORP.

IMPORTANT: Do not allow the wiper arm to fall back and strike the liftgate.

1. Lift the wiper arm off the park ramp.
2. Push in the locking tab of the wiper blade clip and pull downward on the wiper arm blade.

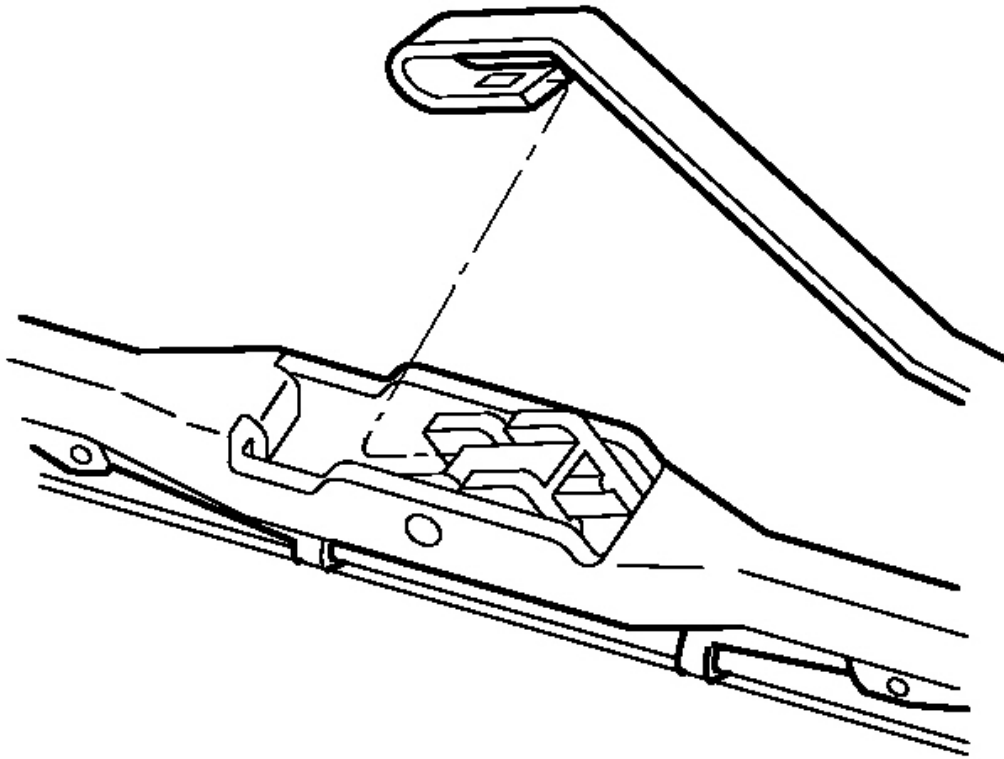


Fig. 49: Identifying Wiper Arm Hook & Blade
Courtesy of GENERAL MOTORS CORP.

3. Remove the wiper blade from the inside radius of the wiper arm.
4. Bring the wiper arm out through the opening in the wiper blade.

Installation Procedure

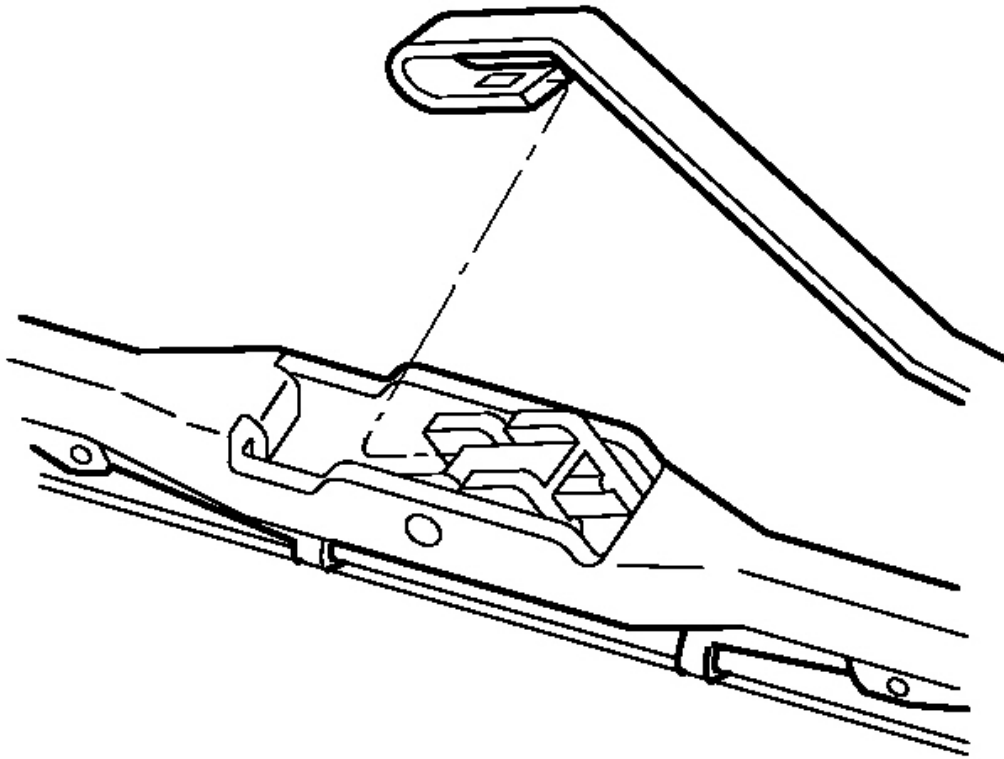


Fig. 50: Identifying Wiper Arm Hook & Blade
Courtesy of GENERAL MOTORS CORP.

1. Insert the hook of the wiper arm through the opening in the wiper blade.
2. Position the wiper blade in the inside radius of the wiper arm hook.

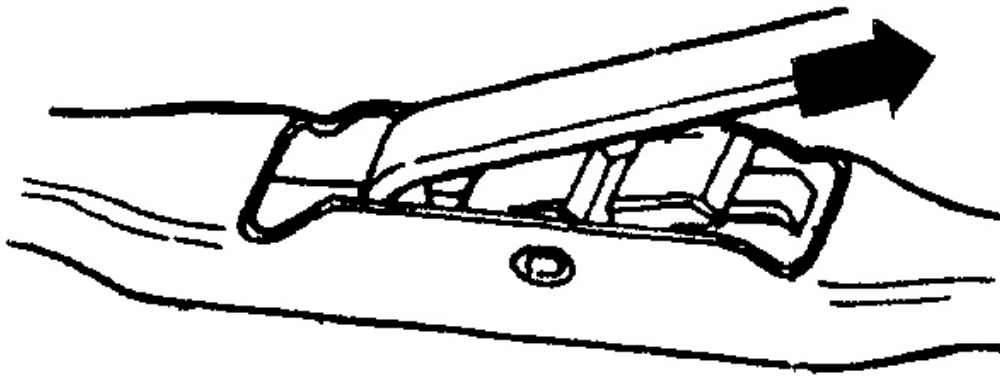


Fig. 51: View Of Locking Tab

Courtesy of GENERAL MOTORS CORP.

3. Pull upward until the locking tab of the pivot engages the slot in the hook.
4. Carefully lower the wiper arm and blade onto the park ramp.

WIPER BLADE ELEMENT REPLACEMENT

Removal Procedure

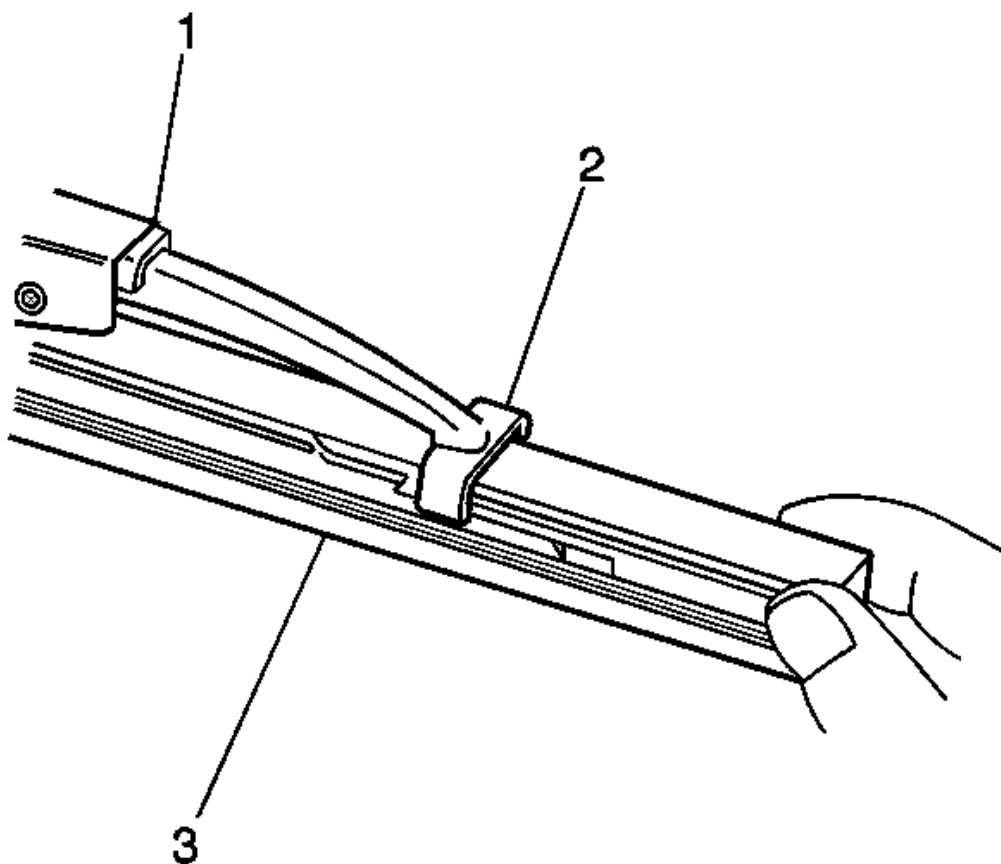


Fig. 52: Identifying Wiper Blade & Components
Courtesy of GENERAL MOTORS CORP.

IMPORTANT: Replace the wiper blade element if it is removed from the wiper blade.

1. Remove the wiper blade from the wiper arm. Refer to **Windshield Wiper Blade Replacement**.
2. Pull the wiper blade element (3) out through the wiper blade claws (2).

Installation Procedure

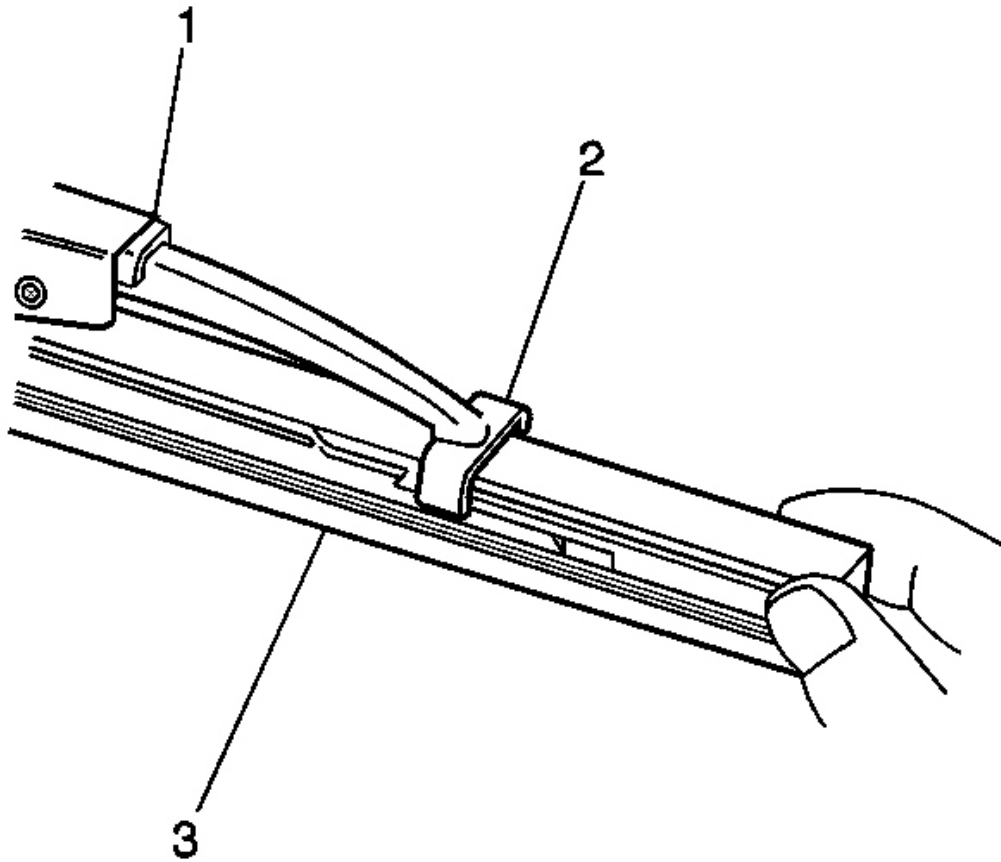


Fig. 53: Identifying Wiper Blade & Components
Courtesy of GENERAL MOTORS CORP.

IMPORTANT: Keep the wiper blade claws in the rubber claw channel of the wiper blade element. Do not allow the claws of the wiper blade to contact the metal spline of the wiper blade element.

1. Insert the open end of the wiper blade element (3) into the bottom claws of the wiper blade (2).
2. Guide the wiper blade element (3) through the wiper blade (1) claw sets.
3. Engage the bottom claw (2) of the wiper blade (1) into the notches in wiper blade element (3).
4. Install the wiper blade onto the wiper arm. Refer to **Windshield Wiper Blade Replacement**.

REAR WINDOW WIPER BLADE ELEMENT REPLACEMENT (TRAILBLAZER, ENVOY)

Removal Procedure

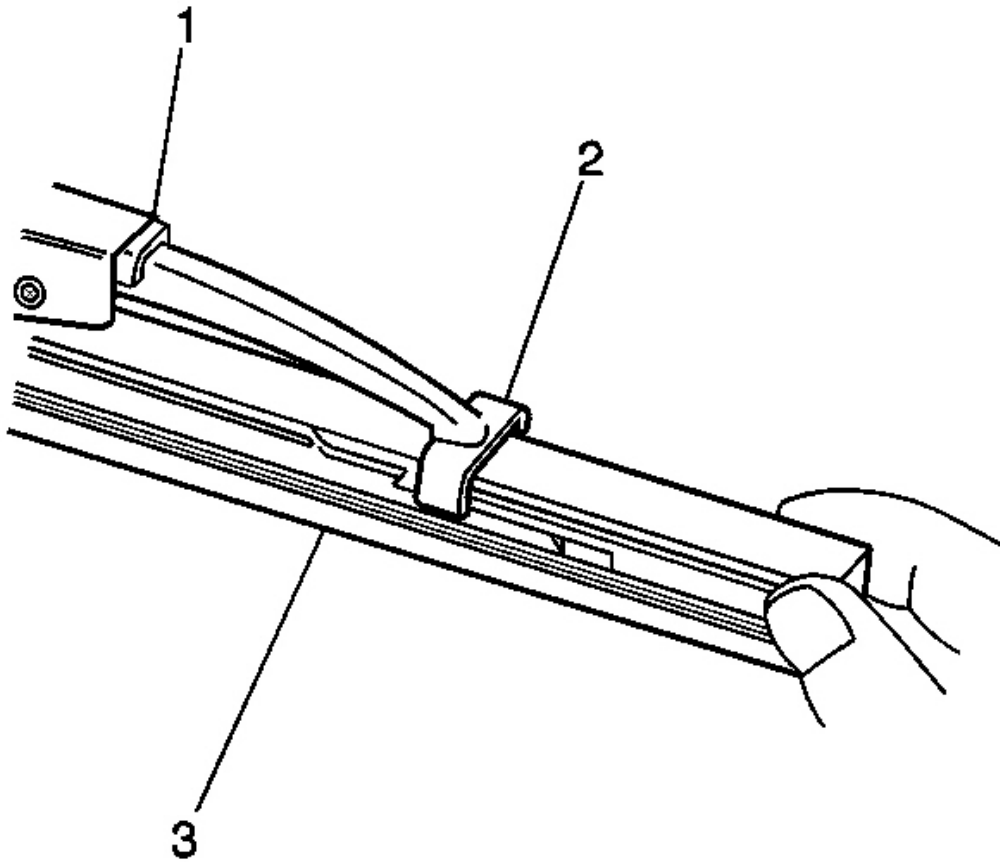


Fig. 54: Identifying Wiper Blade & Components
Courtesy of GENERAL MOTORS CORP.

IMPORTANT: Replace the rear wiper blade element if it is removed from the wiper blade.

1. Remove the rear wiper blade from the rear wiper arm. Refer to **Rear Window Wiper Blade Replacement (Envoy)**.
2. Remove the bottom claws (2) of the wiper blade (1) from the notches in the wiper blade element (3).
3. Pull the wiper blade element (3) out through the wiper blade claws (2).

Installation Procedure

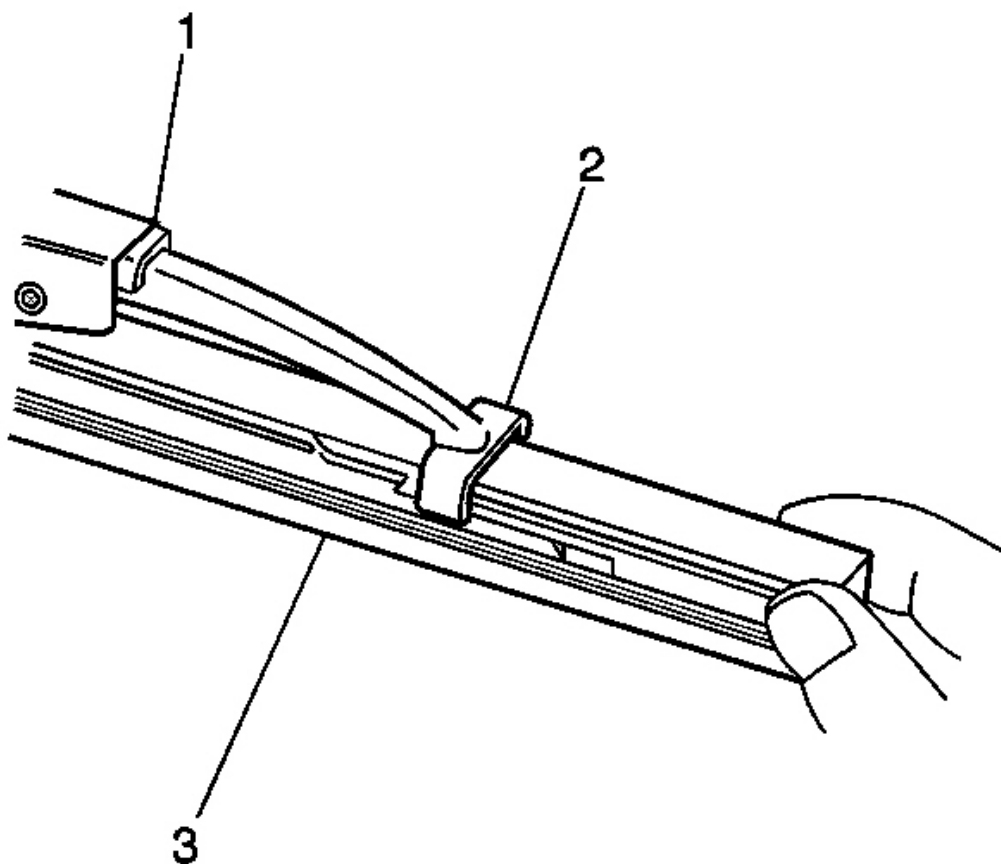


Fig. 55: Identifying Wiper Blade & Components
Courtesy of GENERAL MOTORS CORP.

IMPORTANT: Keep the wiper blade claws in the rubber claw channel of the wiper blade element. Do not allow the claws of the wiper blade to contact the metal spline of the wiper blade element.

1. Insert the open end of the wiper blade element (3) into the bottom claws of the wiper blade (2).
2. Guide the wiper blade element (3) through the wiper blade (1) claw sets.
3. Engage the bottom claw (2) of the wiper blade (1) into the notches in wiper blade element (3).
4. Install the rear wiper blade onto the rear wiper arm. Refer to **Rear Window Wiper Blade Replacement (Envoy)**.

Removal Procedure

1. Remove the wiper transmission assembly. Refer to **Windshield Wiper Transmission Replacement**.

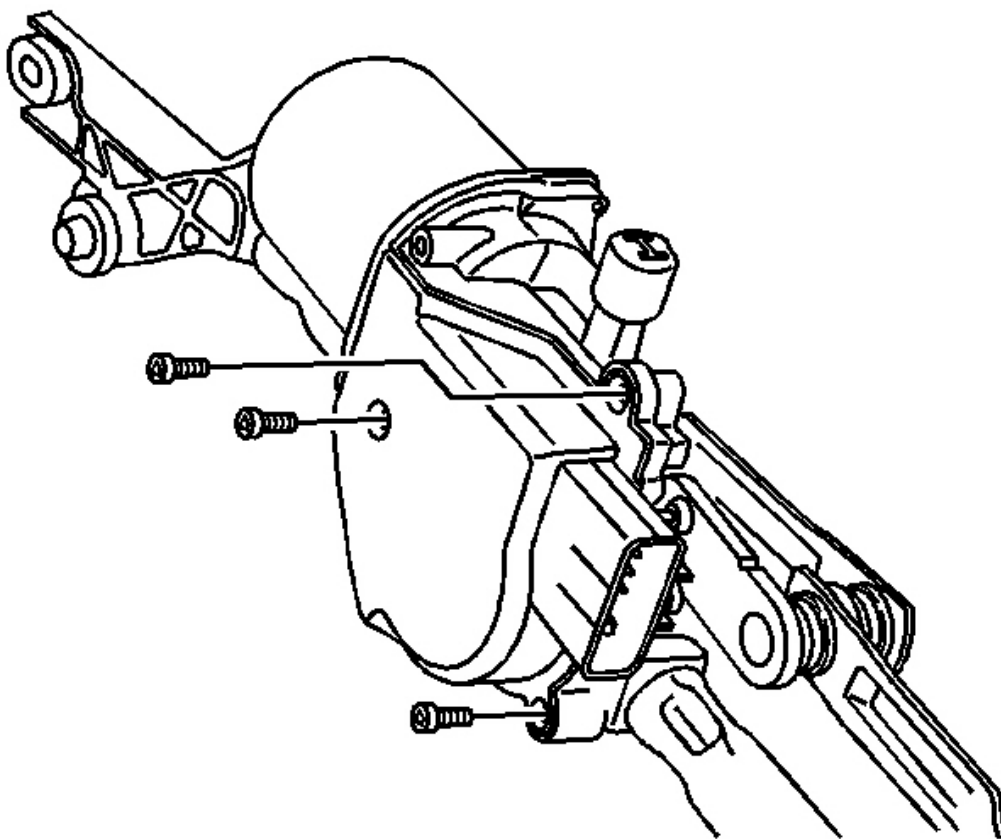


Fig. 56: View Of Wiper Motor Cover Retaining Screws
Courtesy of GENERAL MOTORS CORP.

2. Remove the 3 screws retaining the wiper motor cover to the motor.
3. Remove the wiper cover and module from the motor.

Installation Procedure

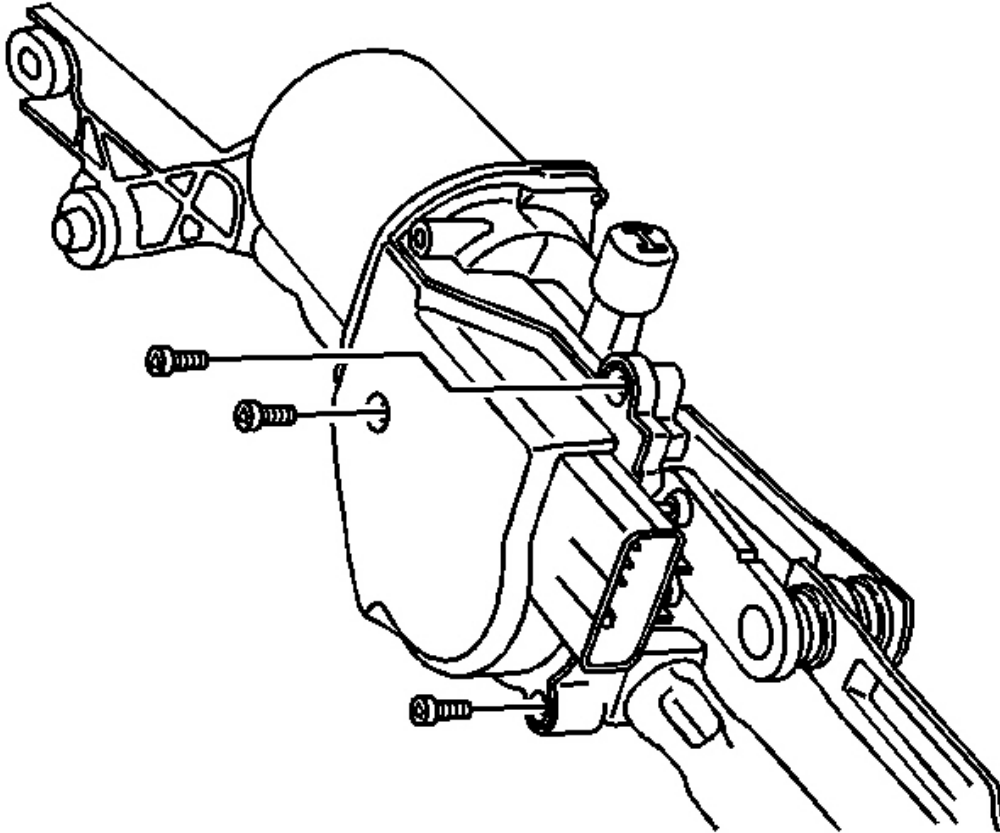


Fig. 57: View Of Wiper Motor Cover Retaining Screws
Courtesy of GENERAL MOTORS CORP.

1. Install the wiper cover and module to the wiper motor.

NOTE: Refer to **Fastener Notice** .

2. Install the 3 screws retaining the wiper motor cover to the wiper motor.

Tighten: Tighten the 3 wiper motor cover screws to 3 N.m (27 lb in).

3. Install the wiper transmission assembly to the vehicle. Refer to **Windshield Wiper Transmission Replacement**.

Removal Procedure

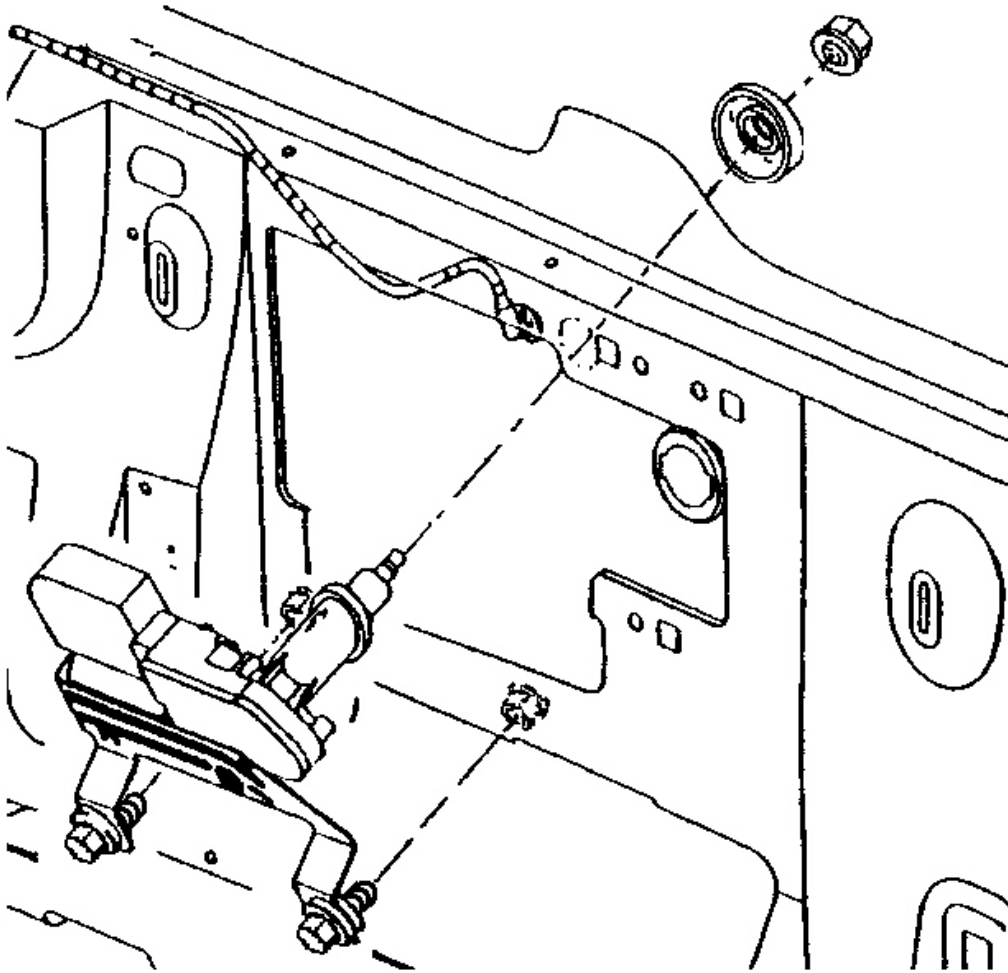


Fig. 58: View Of Rear Wiper Motor Components
Courtesy of GENERAL MOTORS CORP.

1. Remove the wiper arm. Refer to **Rear Window Wiper Arm Replacement (TrailBlazer, Envoy)** or **Rear Window Wiper Arm Replacement (TrailBlazer SS)**.
2. Remove the nut and spacer from the wiper motor shaft.
3. Remove the interior trim panel from the liftgate. Refer to **Liftgate Trim Panel Replacement**.
4. Disconnect the wiper motor electrical connector.
5. Remove the 2 bolts retaining the wiper motor to the liftgate.
6. Remove the wiper motor.

Installation Procedure

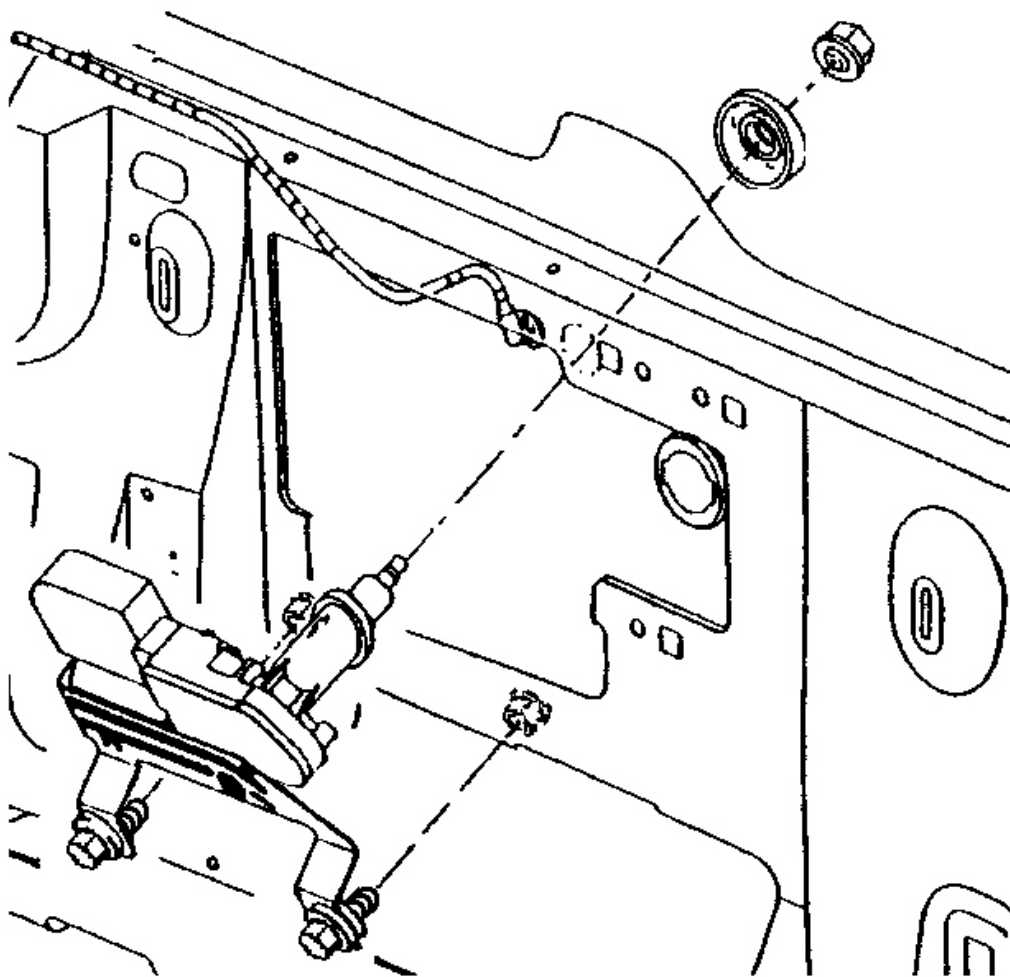


Fig. 59: View Of Rear Wiper Motor Components
Courtesy of GENERAL MOTORS CORP.

1. Install the wiper motor.

NOTE: Refer to Fastener Notice .

2. Install the 2 bolts retaining the motor to the liftgate.

Tighten: Tighten the bolts to 8 N.m (71 lb in).

3. Connect the wiper motor electrical connector.
4. Install the interior trim panel to the liftgate. Refer to **Liftgate Trim Panel Replacement** .
5. Install the spacer and the nut on the wiper motor drive shaft.

Tighten: Tighten the nut to 8 N.m (71 lb in).

6. Install the wiper arm. Refer to **Rear Window Wiper Arm Replacement (TrailBlazer, Envoy)** or **Rear Window Wiper Arm Replacement (TrailBlazer SS)**.

WINDSHIELD WIPER TRANSMISSION REPLACEMENT

Removal Procedure

1. Remove the windshield wiper arms. Refer to **Windshield Wiper Arm Replacement (GMC Envoy)** or **Windshield Wiper Arm Replacement (SS)**.
2. Remove the air inlet grille panel. Refer to **Air Inlet Grille Panel Replacement (Envoy, TrailBlazer)**.

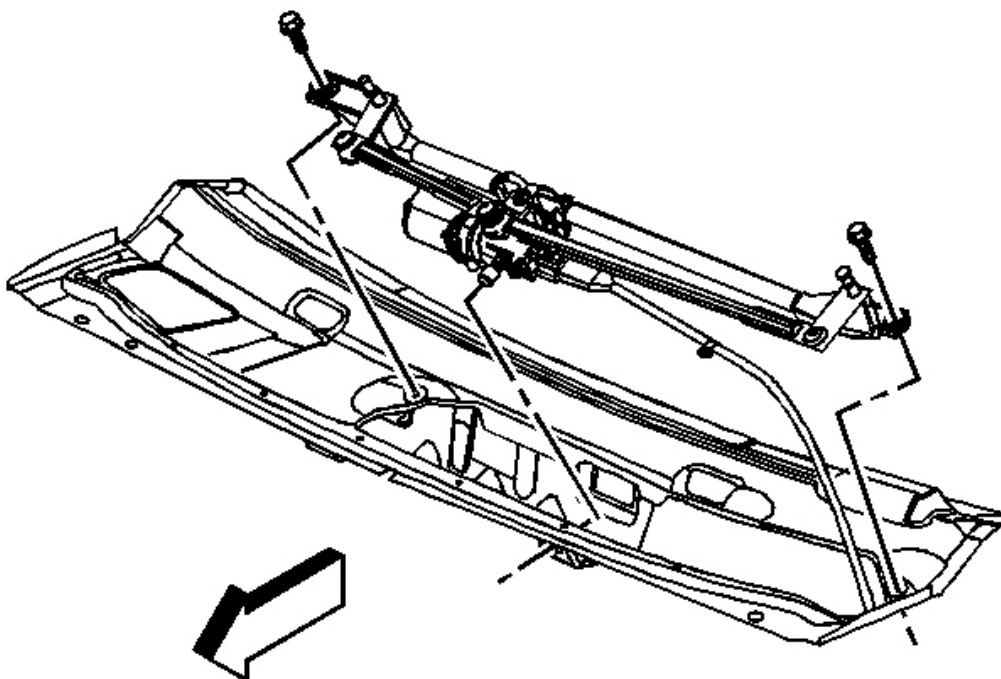


Fig. 60: View Of Wiper Transmission Assembly & Retaining Bolts
Courtesy of GENERAL MOTORS CORP.

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3. Remove the bolts retaining the wiper transmission assembly to the vehicle.
4. Carefully push the wiper transmission assembly rearward to disengage the wiper motor from the slot in the plenum.
5. Disconnect the wiper motor electrical connector.
6. Remove the wiper transmission assembly from the cowl panel plenum.

Installation Procedure

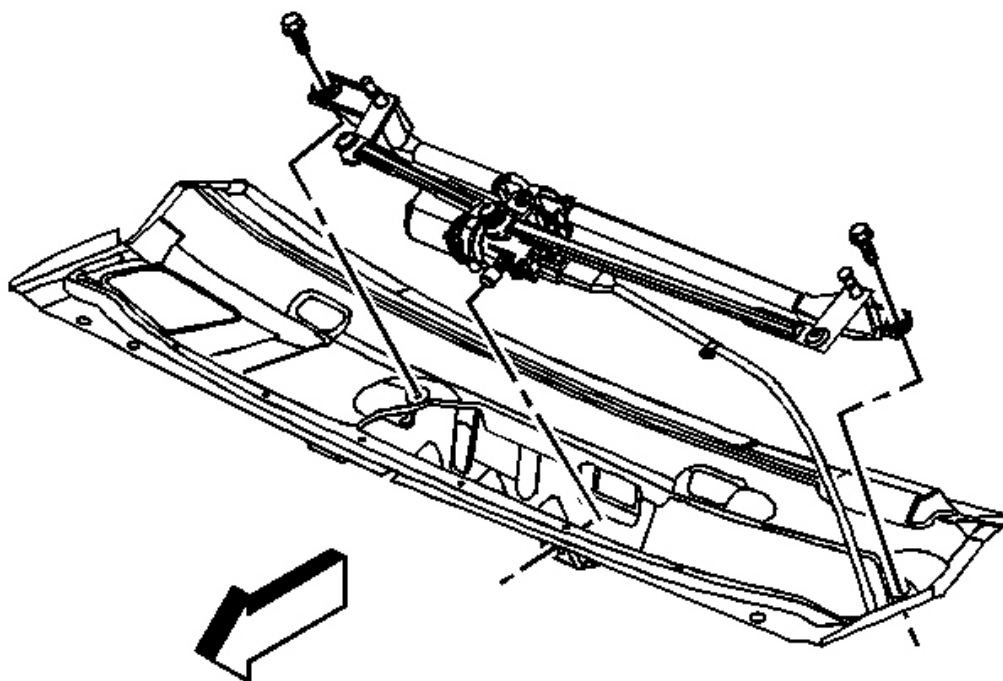


Fig. 61: View Of Wiper Transmission Assembly & Retaining Bolts
Courtesy of GENERAL MOTORS CORP.

1. Position the wiper transmission assembly to the cowl panel plenum.
2. Connect the electrical connector to the wiper motor.
3. Insert the wiper motor post into the slot in the plenum, push the transmission assembly forward to seat the post.

NOTE: Refer to **Fastener Notice** .

4. Install the bolts retaining the wiper transmission assembly to the vehicle.

Tighten: Tighten the wiper transmission assembly bolts to 8 N.m (71 lb in).

5. Install the air inlet grille panel. Refer to **Air Inlet Grille Panel Replacement (Envoy, TrailBlazer)**.
6. Install the windshield wiper arms. Refer to **Windshield Wiper Arm Replacement (GMC Envoy)** or **Windshield Wiper Arm Replacement (SS)**.

REAR WIPER PARK REPLACEMENT (TRAILBLAZER ENVOY)

Removal Procedure

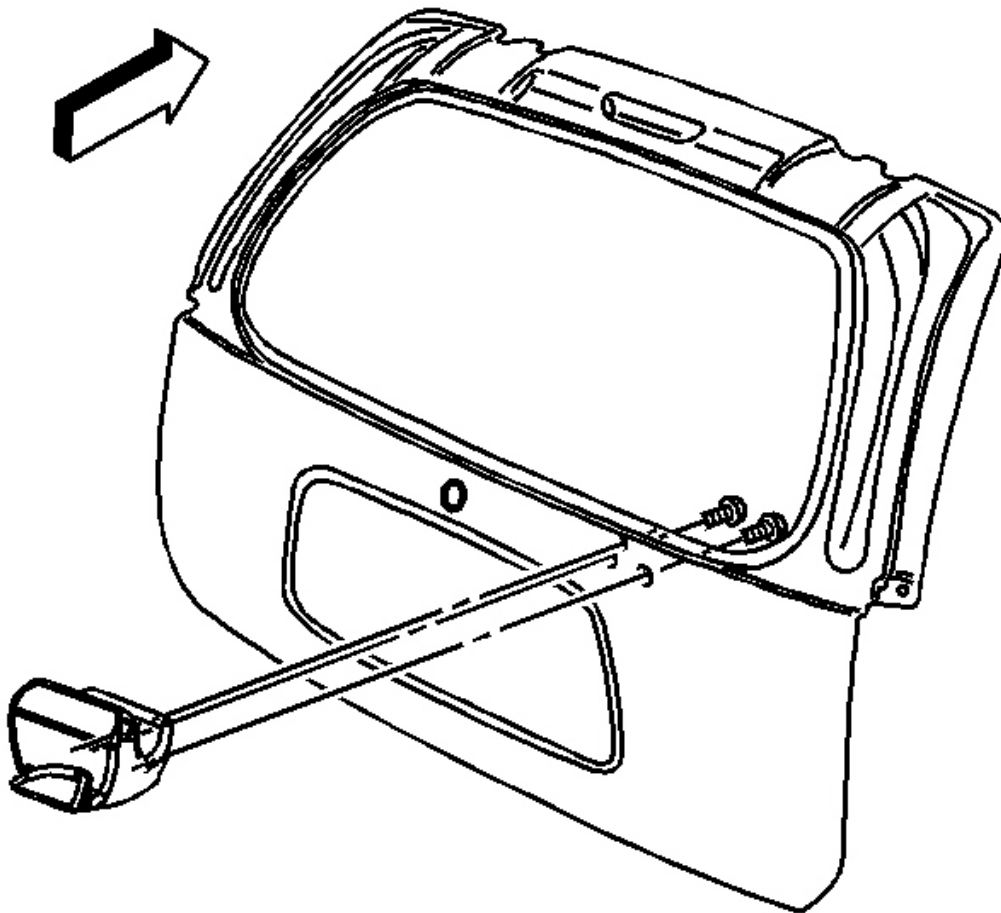


Fig. 62: View Of Wiper Arm Park Ramp & Bolts
Courtesy of GENERAL MOTORS CORP.

1. Remove the liftgate interior trim panel. Refer to **Liftgate Trim Panel Replacement** .

2. Remove the 2 bolts retaining the wiper arm park ramp to the liftgate.
3. Remove the wiper arm park ramp from the vehicle.

Installation Procedure

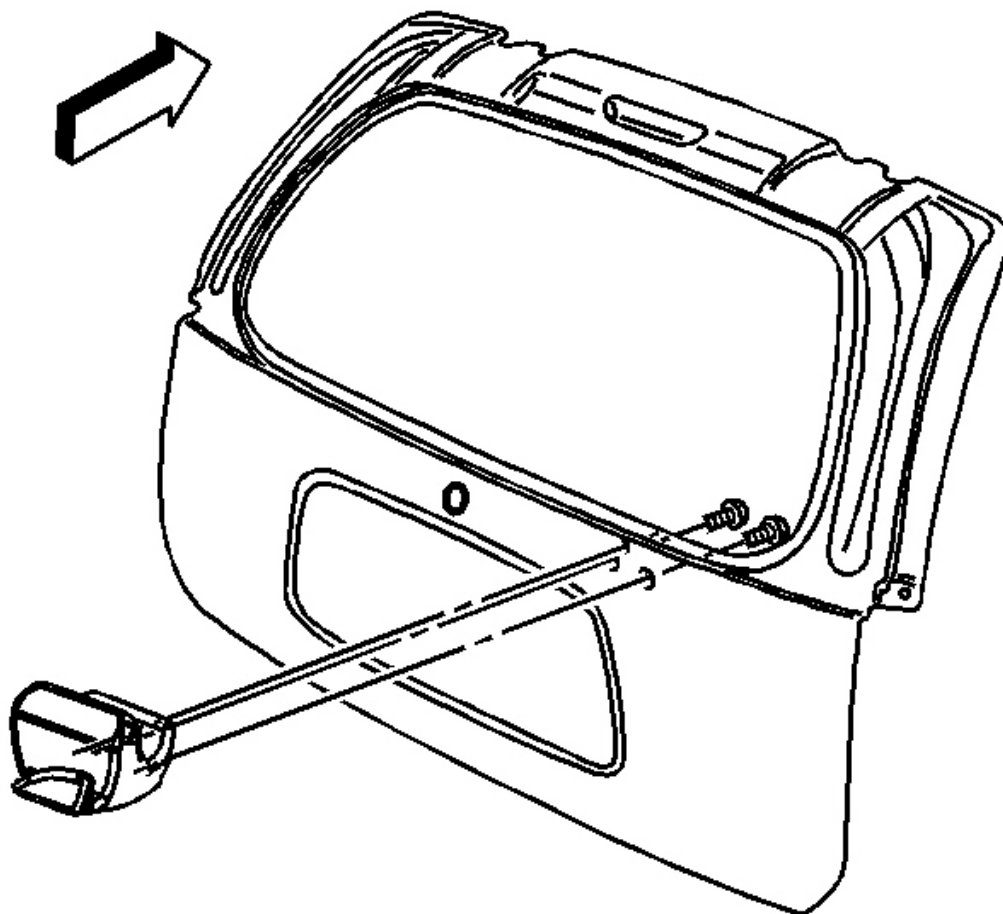


Fig. 63: View Of Wiper Arm Park Ramp & Bolts
Courtesy of GENERAL MOTORS CORP.

1. Install the wiper arm park ramp to the vehicle.

NOTE: Refer to **Fastener Notice** .

2. Install the 2 bolts retaining the wiper arm park ramp to the liftgate.

Tighten: Tighten the 2 bolts to 9 N.m (79 lb in).

3. Install the liftgate interior trim panel. Refer to **Liftgate Trim Panel Replacement** .

REAR WIPER PARK REPLACEMENT (TRAILBLAZER SS)

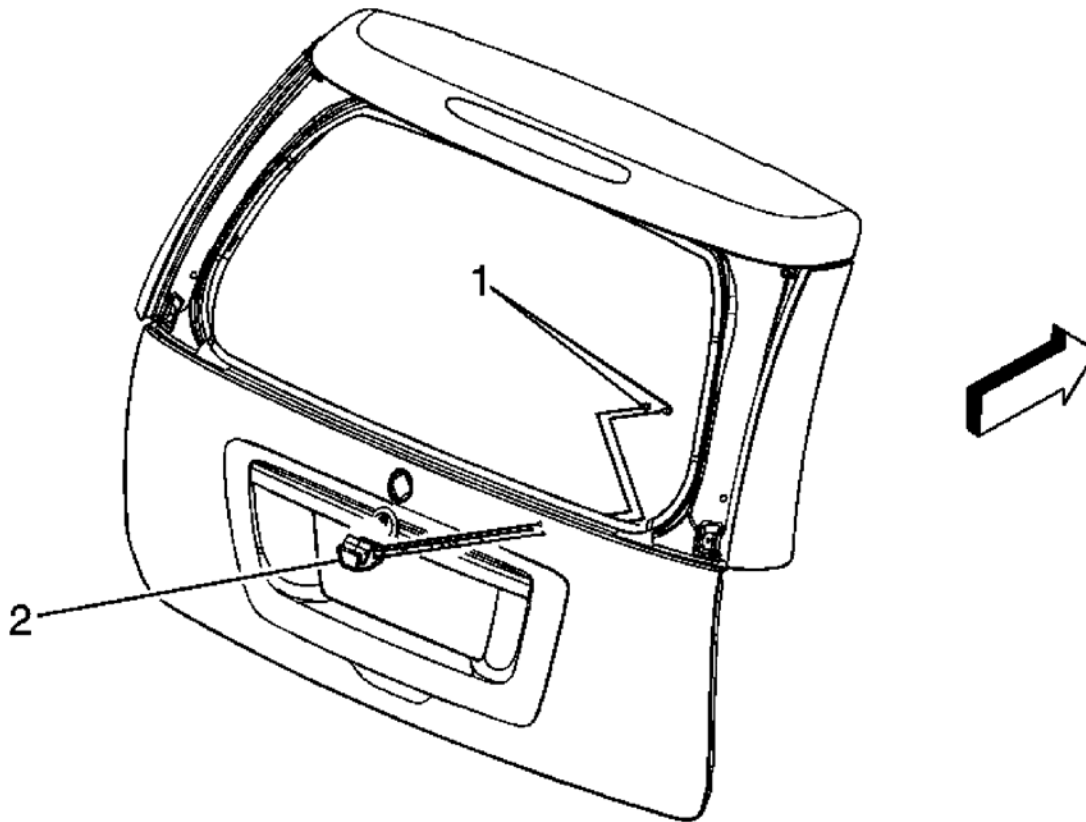


Fig. 64: View Of Rear Wiper Arm
Courtesy of GENERAL MOTORS CORP.

Callout	Component Name
NOTE: Refer to <u>Fastener Notice</u> .	
Fastener Tightening Specifications: Refer to <u>Fastener Tightening Specifications</u> . Preliminary Procedure: Remove the liftgate interior trim panel. Refer to <u>Liftgate Trim Panel Replacement</u> .	
1	Park Ramp Screws Tighten: 9 N.m (79 lb in)
2	Park Ramp Tip: Index the park ramp to the exterior lift gate panel prior to installing the screws.

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.

REAR WASHER HOSE REPLACEMENT (TRAILBLAZER, ENVOY)**Removal Procedure**

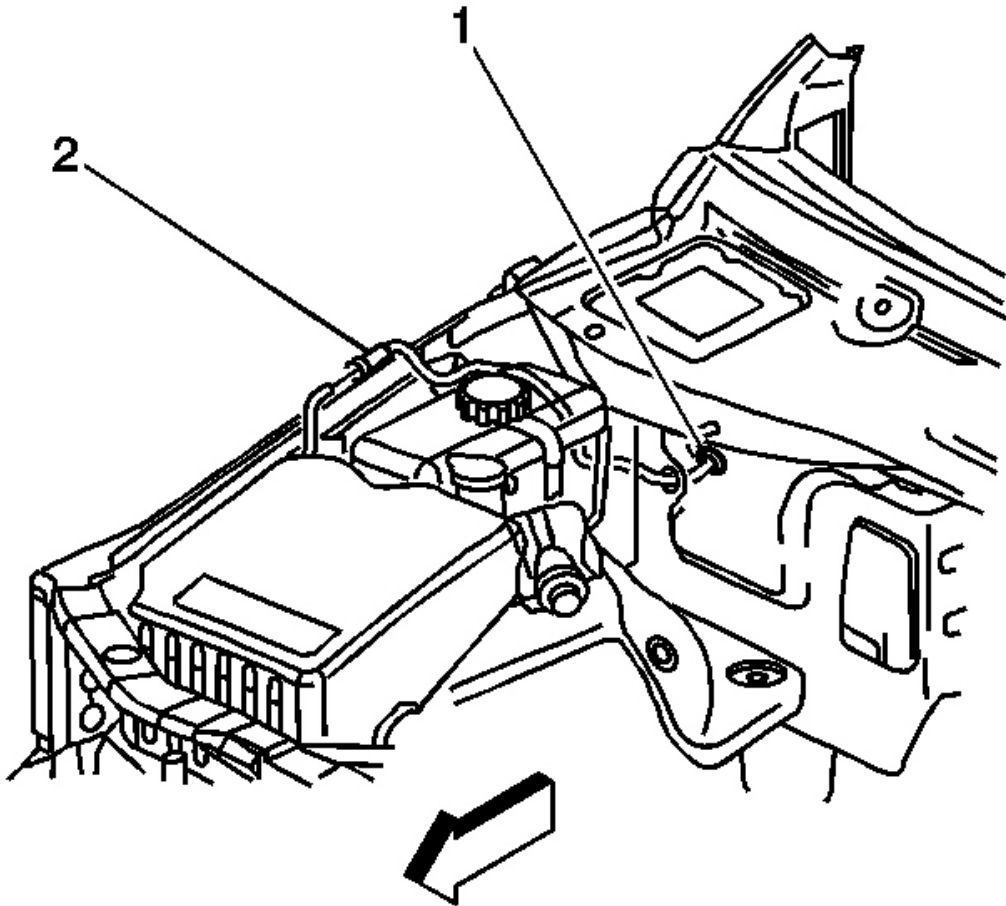


Fig. 65: Locating Rear Washer Hose Connection, Near Coolant Tank (TrailBlazer, Envoy)
Courtesy of GENERAL MOTORS CORP.

1. Disconnect the rear washer hose connection (2) near the coolant tank.
2. Remove the washer hose grommet (1) from the hole in the bulkhead, and feed the washer hose into the vehicle.
3. Remove the right front sill plate. Refer to **Rear Side Door Sill Plate Replacement** .
4. Roll the carpet inward to expose the wiring harness/hose assembly.
5. Remove the rear seat backs.
6. Remove the rear compartment anchors.
7. Roll the carpet forward to expose the wiring harness/hose assembly.
8. Remove the left rear quarter upper trim panel. Refer to **Rear Quarter Upper Trim Panel Replacement (TrailBlazer, Envoy)** .

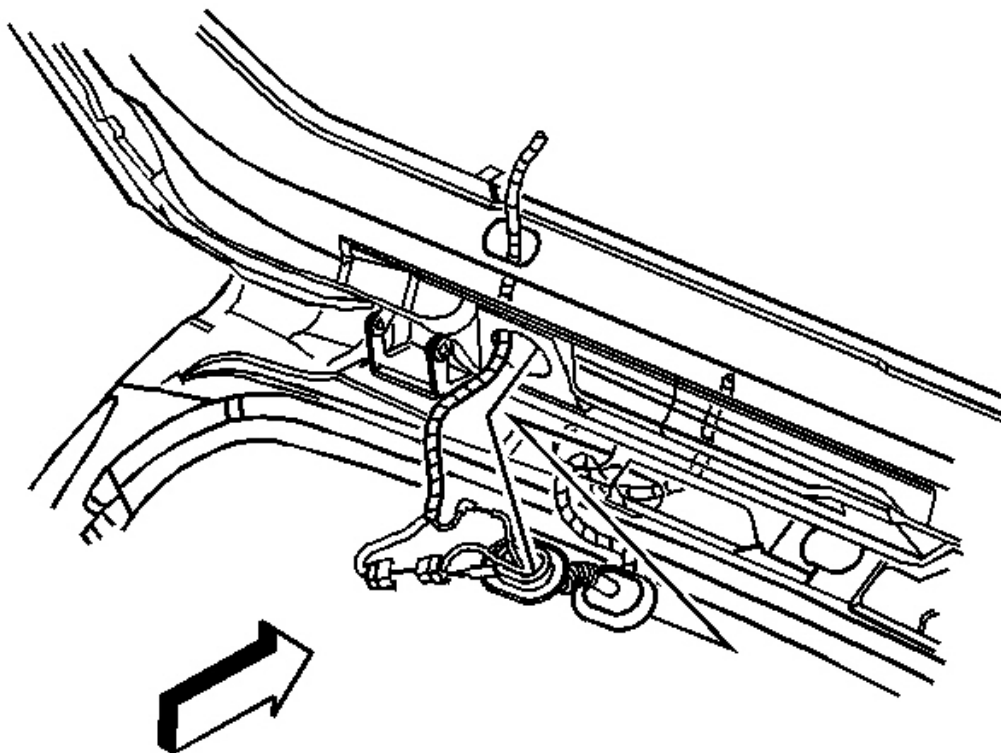


Fig. 66: Identifying Wiring Harness Pass Through Boot To Liftgate
Courtesy of GENERAL MOTORS CORP.

9. Open the liftgate to access the pass-through grommet.
10. Disconnect the grommet from the liftgate to access the washer hose connection.
11. Cut the exposed ends of the washer hose from the body wiring harness.
12. Remove the hose from the vehicle.

Installation Procedure

1. Install the washer hose to the vehicle.
2. Route the hose along the body wiring harness.
3. Tape the washer hose to the body wiring harness with 3 wraps of electrical tape, every 100 mm (4 in).
4. Roll the carpet back into place along the floor panel.
5. Install the rear compartment anchors.
6. Install the rear seat backs.
7. Install the right front sill plate. Refer to **Rear Side Door Sill Plate Replacement**.

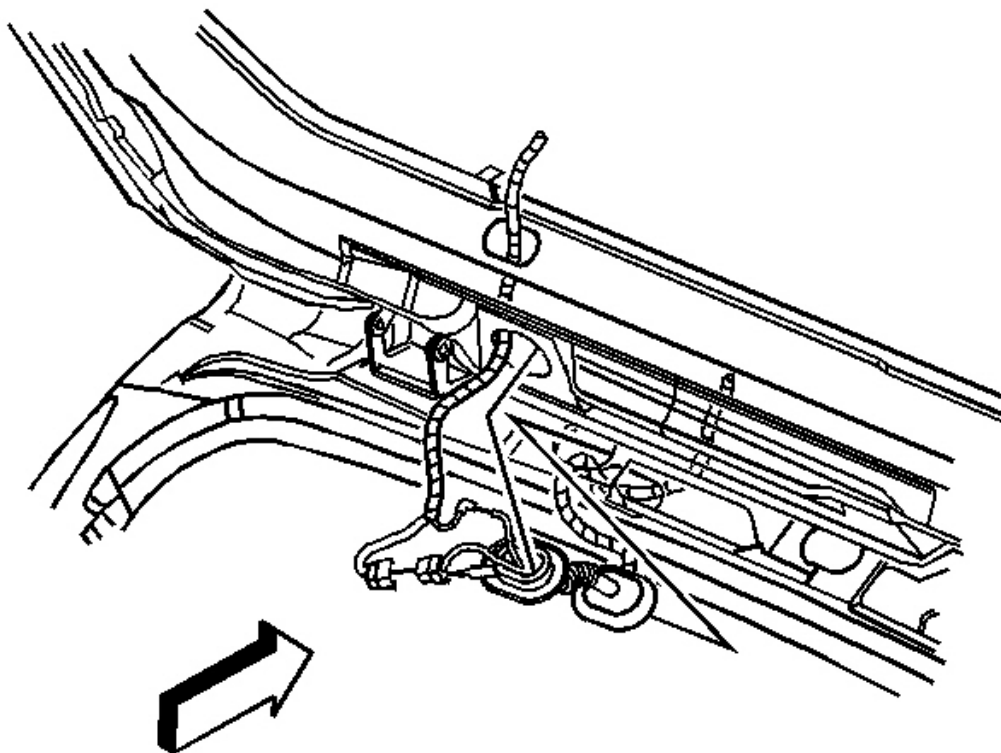


Fig. 67: Identifying Wiring Harness Pass Through Boot To Liftgate
Courtesy of GENERAL MOTORS CORP.

8. Connect the washer hose connection at the liftgate.
9. Connect the pass-through grommet the liftgate.
10. Install the left rear quarter upper trim panel. Refer to **Rear Quarter Upper Trim Panel Replacement (TrailBlazer, Envoy)**.

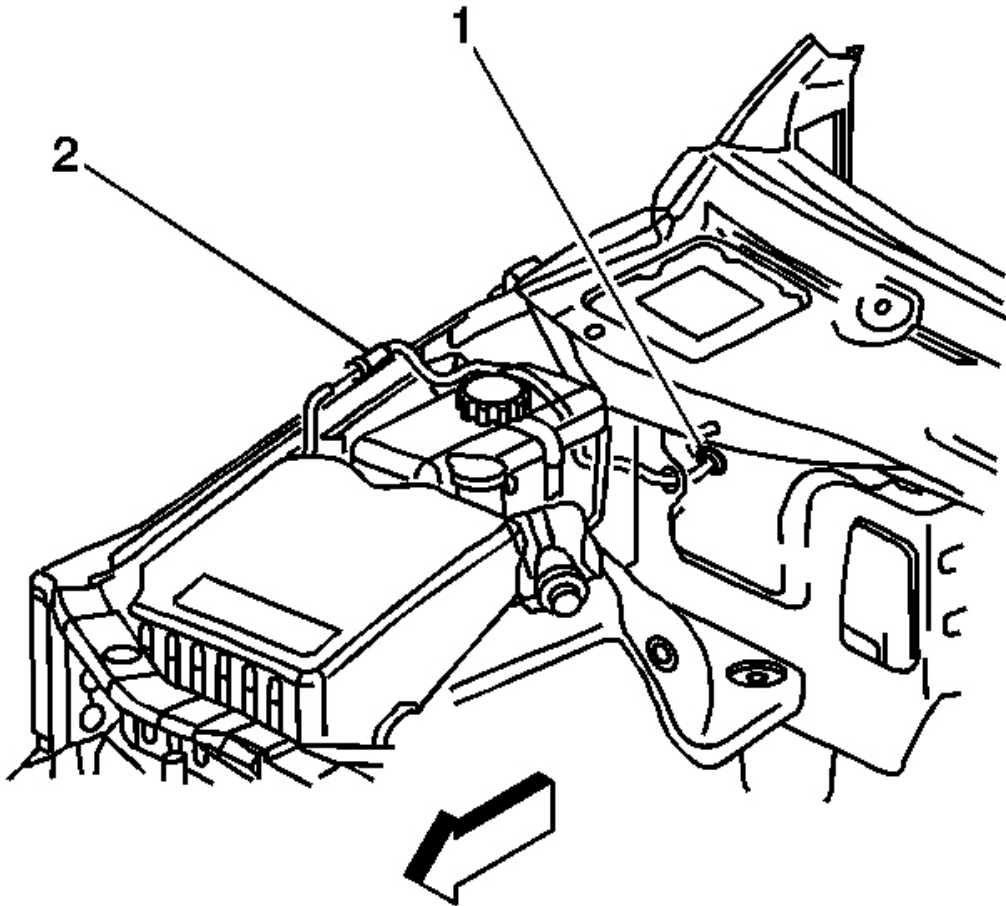


Fig. 68: Locating Rear Washer Hose Connection, Near Coolant Tank (TrailBlazer, Envoy)
Courtesy of GENERAL MOTORS CORP.

11. Install the rear washer hose out through the bulkhead, and seat the grommet (1).
12. Connect the rear washer hose connection (2) near the coolant tank.

DESCRIPTION & OPERATION

HEADLAMP WASHER SYSTEM DESCRIPTION & OPERATION

Headlamp Washer System Components

The headlamp washer system consists of the following components:

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- Headlamp washer pump
- Headlamp wash relay
- Headlamp washer switch
- WASH 20A fuse

Headlamp Washer System Controls

- Body control module
- Headlamp washer switch

Headlamp Washer System Operation

The body control module controls the headlamp washer pump using a programmed pulse type wash sequence. The pulse washing sequence is a wash cycle for a programmed amount of time followed by a programmed amount of delay time to let the water soak which is then followed by another wash cycle for a programmed amount of time. The headlamp washer pump is controlled by the body control module through the headlamp washer relay. The headlamp washer switch signal circuit is supplied a 12-volt reference through a resistor then monitored within the body control module. The headlamp washer switch is open when in an inactive state. When the headlamp washer switch is activated the signal circuit is closed to ground. When the headlamp washer switch signal circuit is closed to ground the reference voltage is dropped across the resistor within the body control module. The low voltage on the headlamp washer switch signal circuit indicates to the body control module the switch status is active. Battery positive voltage is supplied to the coil and switch sides of the headlamp washer relay. When a headlamp wash request is active the body control module energizes the headlamp washer relay by grounding the relay coil through the headlamp washer relay control circuit. When the relay is energized battery positive voltage to the relay switch is supplied to the washer pump control circuit.

WIPER/WASHER SYSTEM DESCRIPTION & OPERATION

Windshield Wiper/Washer System Components

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

- Windshield wiper/washer switch
- Windshield wiper motor
- Windshield washer pump
- Windshield washer relay
- Outside moisture sensor
- FRT WIPER 25A fuse
- W/S WASH 15A fuse

Windshield Wiper/Washer System Operation

Accessory voltage and ground is supplied to the windshield wiper motor and provides the power for operating the wiper motor and logic power to the wiper motor module. The WASH, MIST, LOW, and DELAY modes are controlled by the windshield wiper/washer switch through a series of internal resistors. The windshield wiper

switch supply voltage circuit is a 12-volt reference from the wiper motor module to the wiper/washer switch, and the switch position determines the point on the resistor assembly where the reference voltage is applied. The windshield wiper switch signal 1 circuit supplies the voltage from the resistor assembly to the wiper motor module and the signal voltage determines the operating mode. High speed operation is controlled by the windshield wiper/washer switch through the windshield wiper switch high signal circuit. The windshield wiper switch high signal circuit is supplied 12 volts by the wiper motor module and when the wiper/washer switch is turned to the HIGH position the windshield wiper switch high signal circuit is grounded through the switch ground circuit. The windshield washer pump is controlled through the windshield wash relay. The windshield wash relay coil and switch is supplied battery positive voltage, and during WASH mode the wiper motor module grounds the washer relay control circuit energizing the relay. When the relay is energized battery positive voltage to the switch side of the relay is supplied to the washer pump control circuit.

Moisture Sensitive Wipers

The outside moisture sensor monitors moisture accumulation on the windshield and provides an input to the windshield wiper motor module. If no moisture is detected, the wipers will not operate in the DELAY modes. The windshield wiper switch signal 1 circuit is used to activate the automatic operating mode and to adjust the level of sensitivity to moisture accumulation when commanding a wiper motor wipe cycle. The moisture sensor sends a PWM voltage signal to the wiper motor module through the moisture sensor signal 1 circuit whenever the ignition is in the accessory or run positions. If at anytime the moisture sensor signal 1 circuit PWM voltage signal input to the wiper motor module is lost, the wiper motor module will use the input from the windshield wiper switch signal 1 circuit to operate the wiper motor at continuous variable delay intervals.

Check Washer Fluid Message

The Check Washer Fluid message is controlled by the instrument panel cluster using an input from the washer fluid level switch. The washer fluid level signal circuit is supplied ignition voltage through a resistor then monitored within the instrument cluster. The washer fluid level switch is normally open so the instrument cluster detects ignition voltage on the washer fluid level signal circuit whenever the washer fluid level is not low. When the washer fluid reaches the point where the driver should be informed that the washer fluid is low, the washer fluid level switch closes. When the washer fluid level switch is closed the washer fluid level signal circuit voltage is pulled low, and the instrument panel displays the Check Washer Fluid message on the driver information center. In order to prevent the Check Washer Fluid message from being displayed while sloshing is occurring in the washer fluid container, the instrument cluster is programmed with a 1 minute delay before changing states of the Check Washer Fluid message during an ignition cycle.

REAR WIPER/WASHER SYSTEM DESCRIPTION & OPERATION

Rear Wiper/Washer System Components

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

- Rear window wiper motor
- Rear washer pump
- Rear wash relay
- Rear wiper/washer switch
- RR WIPER Circuit Breaker 15A / ENDGLASS REG Circuit Breaker 30A

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- WASH 20A fuse
- Body control module (BCM)
- Liftgate control module (LGM) / End gate module (EGM)

Rear Washer Operation

The rear window washer pump is controlled by the BCM through the rear washer relay. Battery positive voltage is supplied to the coil and switch sides of the rear washer relay. When the rear window wash request is active the BCM energizes the relay by grounding the relay coil through the rear washer relay control circuit. When the relay is energized battery positive voltage to the relay switch is supplied to the washer pump control circuit.

Rear Wiper Operation (with LGM)

The rear window wiper/washer switch is an input to the BCM. The requested rear wiper mode is sent to the LGM by the BCM, as a message on the serial data circuit. The rear window wiper motor is controlled by the LGM. The switch power circuit to the rear wiper/washer switch is a 12-volt reference supplied by the BCM during ignition on, accessory or RAP power modes. The rear wiper/washer switch is composed from a series of resistors and the switch position is determined by the voltage of the rear wiper/washer switch signal circuit to the BCM. The rear wiper/washer switch has continuity at all times and the BCM expects a rear wiper/washer switch signal voltage in all switch positions including OFF. The rear wiper motor is supplied battery positive voltage and ground. The LGM controls rear wiper motor operation through the rear window motor speed signal circuit. The rear window motor speed signal circuit is supplied a battery positive reference voltage by the rear window wiper motor module and is pulse width modulated to ground by the LGM. The duty cycle of the pulse width modulation determines the rear wiper motor operating mode. The liftglass and liftgate ajar switches are inputs to the LGM and must be in an inactive state in order for rear wiper washer system operation to be enabled. When an ajar switch is active the LGM suspends wiper motor operation directly and sends the ajar switch status messages over the serial data circuit enabling the BCM to suspend washer pump operation.

Rear Wiper Operation (with EGM)

The rear window wiper/washer switch is an input to the BCM. The requested rear wiper mode is sent to the EGM by the BCM, as a message on the serial data circuit. The rear window wiper motor is controlled by the EGM. The switch power circuit to the rear wiper/washer switch is a 12-volt reference supplied by the BCM. The rear wiper/washer switch is composed from a series of resistors and the switch position is determined by the voltage of the rear wiper/washer switch signal circuit to the BCM. The rear wiper/washer switch has continuity at all times and the BCM expects a rear wiper/washer switch signal voltage in all switch positions including OFF. The rear wiper motor is supplied battery positive voltage and ground. The EGM controls rear wiper motor operation through the rear window motor speed signal circuit. The rear window motor speed signal circuit is supplied a battery positive reference voltage by the rear window wiper motor module and is pulse width modulated to ground by the EGM. The duty cycle of the pulse width modulation determines the rear wiper motor operating mode. The rear window motor park signal circuit provides position status of the rear wiper to the EGM.

The rear wiper and washer operation is allowed if the following conditions are true:

- Power mode is run or accessory.
- Lower left ajar switch is closed.

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- Upper left ajar switch is closed.
- Upper right ajar switch is closed.
- Upper left dome switch is closed.
- The end gate window is fully closed.
- No end gate window express down, up, or down is requested.
- No gate swing open or drop open is requested.

If rear wiper/washer operation is attempted and the end gate window is open the driver information center (DIC) displays "Tailgate Glass Down". If the rear wiper is not in the park position and an attempt to open end gate window is done, the DIC displays "Rear Wiper Obstruction".