

ACCESSORIES & EQUIPMENT Wipers
and Washers - Coupe And Wagon

SPECIFICATIONS

FASTENER TIGHTENING SPECIFICATIONS

Fastener Tightening Specifications

Application	Specification	
	Metric	English
Air Inlet Grille Panel Screw	3 N.m	27 lb in
Air Inlet Grille Panel to Fender Flange Screw	3 N.m	27 lb in
Rear Window Wiper Arm Nut-Wagon	10 N.m	89 lb in
Rear Window Wiper Motor Bolt to Wiper Motor Bracket	6 N.m	53 lb in
Windshield Washer Solvent Container Nut	9 N.m	80 lb in
Windshield Washer Solvent Container Screw	9 N.m	80 lb in
Windshield Wiper Arm Pivot Shaft Assembly Nut	32 N.m	24 lb ft
Windshield Wiper Transmission to Plenum Mounting Bolts	10 N.m	89 lb in
Windshield Wiper Transmission to Fender Flange Mounting Nut	10 N.m	89 lb in
Windshield Wiper Motor Crank Arm Nut	32 N.m	24 lb ft
Windshield Wiper Motor to Transmission Mounting Bolts	10 N.m	89 lb in

SCHEMATIC WIRING DIAGRAMS

WIPER/WASHER WIRING SCHEMATICS

Front Wiper System

Washer System and Rear Wiper System (Wagon)

Headlamp Washer System (CE4)

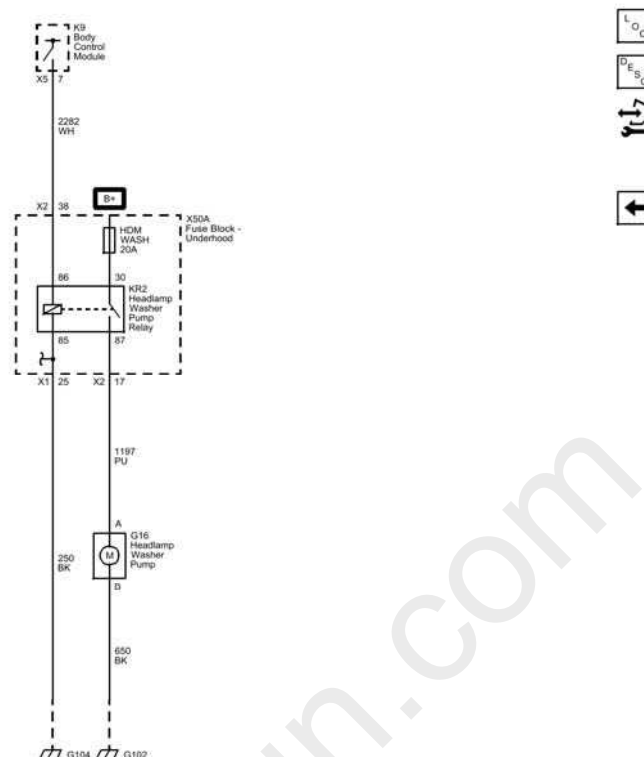


Fig. 3: Headlamp Washer System (CE4)
Courtesy of GENERAL MOTORS COMPANY

DIAGNOSTIC INFORMATION AND PROCEDURES

DIAGNOSTIC CODE INDEX

DIAGNOSTIC CODE INDEX

DTC	Description
<u>DTC B370C or B370D</u>	DTC B370C 00 Rain Sensor Intensity Signal Circuit. DTC B370D 00 Rain Sensor Mode Control Circuit.
<u>DTC B3715</u>	DTC B3715 02 Front Wiper Relay Drive Circuit Short to Ground
<u>DTC B3873</u>	DTC B3873 00 Front Washer Relay Circuit
<u>DTC B3875</u>	DTC B3875 00 Wiper High Speed Relay Circuit
<u>DTC B3922</u>	DTC B3922 00 Front Wiper Function Select Circuit

DTC B370C OR B370D: RAIN SENSOR

Diagnostic Instructions

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

- **Diagnostic Procedure Instructions** provides an overview of each diagnostic category.

DTC Descriptors

DTC B370C 00

Rain Sensor Intensity Signal Circuit.

DTC B370D 00

Rain Sensor Mode Control Circuit.

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Ignition Voltage	1	1	1	-
Control Circuit	B370D	B370D	1	-
Signal Circuit	B370C	B370C	1	-
Ground	-	1	-	-
1. Rain Sensing Feature is Inoperative				

Circuit/System Description

Ignition voltage is supplied to the rain sensor from the body control module (BCM). Whenever the ignition is in the run or accessory positions, the BCM sends the wiper/washer switch status using a pulse width modulated (PWM) signal through the rain sensor control circuit to the rain sensor. When a wipe cycle is needed, the rain sensor sends a PWM voltage signal through the rain sensor signal circuit back to the BCM requesting the wiper operation.

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

Conditions for Running the DTC

Ignition in Run or Accessory positions.

Conditions for Setting the DTC

B370C

An open or short to ground has been detected on the signal circuit.

B370D

An open or short to ground has been detected on the signal circuit.

Action Taken When the DTC Sets

Rain sensitive wiper operation is suspended so long as the fault is present. The wipers will still operate normally in all other modes.

Conditions for Clearing the DTC

- A current DTC will clear when the fault is no longer present.
- A history DTC will clear after 40 malfunction-free ignition cycles.

Reference Information

Schematic Reference

Wiper/Washer Schematics

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX - COUPE AND WAGON

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 Testing

1. Ignition OFF and all vehicle systems OFF, disconnect the B117 rain sensor. It may take up to 2 minutes for all vehicle systems to power down.
2. Test for less than 10 ohms between the ground circuit terminal 3 and ground.
 - **If 10 ohms or greater**
 1. Ignition OFF.
 2. Test for less than 2 ohms in the ground circuit end to end.

- If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, repair the open/high resistance in the ground connection.
 - **If less than 10 ohms**
- 3. Ignition ON.
- 4. Verify a test lamp illuminates between the ignition circuit terminal 4 and the ground circuit terminal 3.
 - **If the test lamp does not illuminate and the circuit fuse is good**
 1. Ignition OFF.
 2. Test for less than 2 ohms in the ignition circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, verify the fuse is OK and there is voltage at the circuit.
 - **If the test lamp does not illuminate and the circuit fuse is open**
 1. Ignition OFF.
 2. Test for infinite resistance between the ignition circuit and ground.
 - If less than infinite resistance, repair the short to ground in the circuit.
 - If infinite resistance, replace the K9 body control module.
 - **If test lamp illuminates**
- 5. Test for 500-900 ohms between the signal circuit terminal 1 and ground.
 - **If less than 500 ohms**
 1. Disconnect the X4 harness connector at the K9 body control module.
 2. Test for infinite resistance between the signal circuit and ground.
 - If less than infinite resistance, repair the short to ground on the circuit.
 - If infinite resistance, replace the K9 body control module.
 - **If greater than 900 ohms**
 1. Disconnect the X4 harness connector at the K9 body control module, ignition ON.
 2. Test for less than 1 V between the signal circuit and ground.
 - If 1 V or greater, repair the short to voltage on the circuit.
 - If less than 1 V
 - 3. Ignition OFF.
 - 4. Test for less than 2 ohms in the signal circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, replace the K9 body control module.
 - **If between 500-900 ohms**
- 6. Test for 8-10 V between the control circuit terminal 2 and ground.
 - **If less than 8 V**
 1. Ignition OFF, disconnect the X4 harness connector at the K9 body control module.
 2. Test for infinite resistance between the control circuit and ground.
 - If less than infinite resistance, repair the short to ground on the circuit.
 - If infinite resistance

3. Ignition OFF.
4. Test for less than 2 ohms in the control circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, replace the K9 body control module.
 - **If greater than 10 V**
1. Disconnect the X4 harness connector at the K9 body control module.
2. Test for less than 1 V between the control circuit and ground.
 - If 1 V or greater, repair the short to voltage on the circuit.
 - If less than 1 V, replace the K9 body control module.
 - **If between 8-10 ohms**
7. If all circuits test normal, replace the B117 rain sensor.

Repair Instructions

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

- **Windshield Outside Moisture Sensor Replacement**
- **Control Module References** for BCM replacement, programming and setup

DTC B3715: FRONT WIPER RELAY DRIVE CIRCUIT SHORT TO GROUND

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 B3715 02

Front Wiper Relay Drive Circuit Short to Ground

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
WPR HI Relay B+	1, 2	1, 2	-	-
Windshield Wiper Switch Signal	1	1	1	-
Windshield Wiper Switch High Signal	4	2	2	-
Windshield Wiper Motor Park Switch Signal	3	3	-	-

WPR Relay Control	B3715 02	1	4	-
WPR HI Relay Control	4	2	B3875 00	-
Windshield Wiper Motor High Speed Control	2	2	4	-
Windshield Wiper Motor Low Speed Control	1	1	4	-
Windshield Wiper Switch Low Reference	-	1, 2	1, 2	-
Windshield Wiper Motor Ground	-	1, 2, 3	-	-
WPR Relay Ground	-	1	-	-
1. Delay or Low Speed Wipers Inoperative 2. High Speed Wipers Inoperative 3. Wipers Do Not Park 4. Wipers Always ON				

Circuit/System Description

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

Conditions for Running the DTC

The BCM output is actively being requested.

Conditions for Setting the DTC

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

Action Taken When the DTC Sets

The BCM will not activate the output.

Conditions for Clearing the DTC

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

Reference Information

Schematic Reference

Wiper/Washer Schematics

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX - COUPE AND WAGON

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 Testing

1. Ignition OFF, disconnect the WPR relay.
2. Connect a test lamp between the control circuit terminal 86 and ground circuit terminal 85.
3. Ignition ON, command the low speed wipers ON and OFF using the wiper switch. The test lamp should turn ON and OFF when changing between the commanded states.
 - If the test lamp is always ON, test the control circuit for a short to voltage. If the circuit tests normal, replace the BCM.
 - If the test lamp is always OFF, test for a short to ground or an open/high resistance on the control circuit. If the circuit tests normal, replace the BCM.
4. If all circuits test normal, test or replace the WPR relay.

Component Testing

1. Ignition OFF, disconnect the WPR relay.
2. Test for 60-200 ohms between terminals 85 and 86.
 - If the resistance is not within the specified range, replace the relay.
3. Test for infinite resistance between the following terminals:
 - 30 and 86
 - 30 and 87
 - 30 and 85
 - 85 and 87
 - If not the specified value, replace the relay.
4. Test for less than 2 ohms between terminals 30 and 87A.

- If greater than the specified range, replace the relay.
- 5. Install a 10A fused jumper wire between relay terminal 85 and 12 volts. Install a jumper wire between relay terminal 86 and ground. Test for less than 2 ohms between terminals 30 and 87.
 - If greater than the specified range, replace the relay.

Repair Instructions

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

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

DTC B3873: FRONT WASHER RELAY

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 B3873 00

Front Washer Relay Circuit

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Windshield Washer Switch Signal	2	1	1	-
Windshield Washer Fluid Pump Control	1	1	2	-
Windshield Washer Relay Control	2	1	B3873 00	-
Windshield Washer Fluid Pump Ground	-	1	-	-
1. Washer Inoperative 2. Washers Always ON				

Circuit/System Description

The body control module (BCM) controls the washer motor based on an input from the windshield wiper washer switch. The BCM monitors the washer switch through the windshield washer switch signal circuit.

When the WASH switch is closed, ground is supplied to the windshield washer switch signal circuit. When this is seen, the BCM will command the windshield washer fluid pump and the low speed wipers on.

Conditions for Running the DTC

A washer request is present.

Conditions for Setting the DTC

A short to voltage is detected in the windshield washer relay control circuit.

Action Taken When the DTC Sets

Washer operation is suspended.

Conditions for Clearing the DTC

- A current DTC will clear when the condition for setting the fault is no longer seen.
- A history DTC will clear after 50 consecutive ignition cycles without a fault present.

Reference Information

Schematic Reference

Wiper/Washer Schematics

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX - COUPE AND WAGON

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

Operate the washers using the WASH switch. Verify the washer pump activates.

Circuit/System Testing

1. Ignition OFF, disconnect the FRT/WSW relay.
2. Connect a test lamp between the control circuit 86 and B+.
3. Ignition ON, command the washers ON and OFF using the WASH switch. 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.
4. If all circuits test normal, test or replace the FRT/WSW fuse.

Repair Instructions

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

Control Module References for BCM replacement, setup, and programming

DTC B3875: WIPER HIGH SPEED RELAY

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 B3875 00

Wiper High Speed Relay Circuit

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
WPR HI Relay B+	1, 2	1, 2	-	-
Windshield Wiper Switch Signal	1	1	1	-
Windshield Wiper Switch High Signal	4	2	2	-
Windshield Wiper Motor Park Switch Signal	3	3	-	-
WPR Relay Control	B3715 02	1	4	-

WPR HI Relay Control	4	2	B3875 00	-
Windshield Wiper Motor High Speed Control	2	2	4	-
Windshield Wiper Motor Low Speed Control	1	1	4	-
Windshield Wiper Switch Low Reference	-	1, 2	1, 2	-
Windshield Wiper Motor Ground	-	1, 2, 3	-	-
WPR Relay Ground	-	1	-	-
1. Delay or Low Speed Wipers Inoperative 2. High Speed Wipers Inoperative 3. Wipers Do Not Park 4. Wipers Always ON				

Circuit/System Description

The body control module (BCM) controls the wiper motor based on input from the windshield wiper washer switch. The BCM monitors the wiper washer switch through three separate signal circuits and a ground circuit. The windshield wiper switch high signal circuit is used to determine high speed wiper operation, the windshield wiper switch low signal is used to determine low speed, intermittent, and mist operation through the use of a resistor ladder, and windshield washer switch signal circuit is used to determine washer operation.

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

Conditions for Running the DTC

A high speed wiper request is present.

Conditions for Setting the DTC

A short to voltage is detected in the windshield wiper high speed relay control circuit.

Action Taken When the DTC Sets

High speed wiper operation is suspended.

Conditions for Clearing the DTC

- A current DTC will clear when the condition for setting the fault is no longer seen.
- A history DTC will clear after 50 consecutive ignition cycles without a fault present.

Reference Information

Schematic Reference

Wiper/Washer Schematics

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX - COUPE AND WAGON

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 Testing

1. Ignition OFF, disconnect the WPR HI relay.
2. Connect a test lamp between the control circuit terminal 86 and B+.
3. Ignition ON, command the high speed wipers ON and OFF using the wiper switch. 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.
4. If all circuits test normal, test or replace the WPR HI relay.

Component Testing

1. Ignition OFF, disconnect the WPR HI relay.
2. Test for 60-200 ohms between terminals 85 and 86.
 - If the resistance is not within the specified range, replace the relay.
3. Test for infinite resistance between the following terminals:
 - 30 and 86
 - 30 and 87
 - 30 and 85
 - 85 and 87
 - If not the specified value, replace the relay.
4. Test for less than 2 ohms between terminals 30 and 87A.

- If greater than the specified range, replace the relay.
- 5. Install a 10A fused jumper wire between relay terminal 85 and 12 volts. Install a jumper wire between relay terminal 86 and ground. Test for less than 2 ohms between terminals 30 and 87.
 - If greater than the specified range, replace the relay.

Repair Instructions

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

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

DTC B3922: FRONT WIPER FUNCTION SELECT CIRCUIT

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 B3922 00

Front Wiper Function Select Circuit

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
WIPER SPEED Relay B+	1, 2	1, 2	-	-
Windshield Wiper Switch Signal	B3922 00	1	1	-
Windshield Wiper Switch High Signal	4	2	2	-
Windshield Wiper Motor Park Switch Signal	3	3	-	-
WIPER CONTROL Relay Control	B3715 02	1	4	-
WIPER SPEED Relay Control	4	2	B3875 00	-
Windshield Wiper Motor High Speed Control	2	2	4	-
Windshield Wiper Motor Low Speed Control	1	1	4	-
Windshield Wiper Switch Low Reference	-	1, 2	1, 2	-

Windshield Wiper Motor Ground	-	1, 2, 3	-	-
WIPER CONTROL Relay Ground	-	1	-	-
1. Delay or Low Speed Wipers Inoperative 2. High Speed Wipers Inoperative 3. Wipers Do Not Park 4. Wipers Always ON				

Circuit/System Description

The body control module (BCM) controls the wiper motor based on input from the windshield wiper washer switch. The BCM monitors the wiper washer switch through three separate signal circuits and a ground circuit. The windshield wiper switch high signal circuit is used to determine high speed wiper operation, the windshield wiper switch low signal is used to determine low speed, intermittent, and mist operation through the use of a resistor ladder, and windshield washer switch signal circuit is used to determine washer operation.

Conditions for Running the DTC

The ignition switch is in the ON position.

Conditions for Setting the DTC

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

Action Taken When the DTC Sets

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

Conditions for Clearing the DTC

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

Reference Information

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Wiper/Washer Schematics

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX - COUPE AND WAGON

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Wiper/Washer System Description and Operation

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- **Wiring Repairs**

Scan Tool Reference

Control Module References for scan tool information

Circuit/System Verification

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

Circuit/System Testing

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

Component Testing

Turn Signal Multifunction Switch

1. Ignition OFF, disconnect the harness connector at the turn signal multifunction switch.
2. With the wiper switch in the HIGH position, test for less than 2 ohms between the low reference terminal 2 and the signal terminal 3.
 - If greater than the specified range, replace the windshield wiper washer switch.

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

3. While cycling the wiper switch through each delay and speed position, test for the specified resistance between the low reference terminal 2 and the signal terminal 1.

Wiper Switch Values

Switch Position	Resistance
Off	Infinite
Mist	300-364 ohms
Delay 1	3.48k-4.25k ohms

Delay 2	2.52k-3.08k ohms
Delay 3	1.78k-2.18k ohms
Delay 4	1.17k-1.44k ohms
Delay 5	697-851 ohms
Low	300-364 ohms
High	300-364 ohms

- If any switch position is not within the specified range, replace the turn signal multifunction switch.

Repair Instructions

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

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

SYMPTOMS - WIPER/WASHER SYSTEMS

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

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

Visual/Physical Inspection

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

Intermittent

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

Symptom List

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

- **Headlamp Washer Malfunction**

- **Low Washer Fluid Indicator Malfunction**
- **Moisture Sensing Feature Inoperative**
- **Rear Wiper System Malfunction**
- **Washer Malfunction (Wagon)**
- **Windshield Wiper System Malfunction**

WINDSHIELD WIPER SYSTEM MALFUNCTION

Diagnostic Instructions

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

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
WPR HI Relay B+	1, 2	1, 2	-	-
Windshield Wiper Switch Signal	1	1	1	-
Windshield Wiper Switch High Signal	4	2	2	-
Windshield Wiper Motor Park Switch Signal	3	3	-	-
WPR Relay Control	B3715 02	1	4	-
WPR HI Relay Control	4	2	B3875 00	-
Windshield Wiper Motor High Speed Control	2	2	4	-
Windshield Wiper Motor Low Speed Control	1	1	4	-
Windshield Wiper Switch Low Reference	-	1, 2	1, 2	-
Windshield Wiper Motor Ground	-	1, 2, 3	-	-
WPR Relay Ground	-	1	-	-
1. Delay or Low Speed Wipers Inoperative 2. High Speed Wipers Inoperative 3. Wipers Do Not Park 4. Wipers Always ON				

Circuit/System Description

The body control module (BCM) controls the wiper motor based on input from the windshield wiper washer switch. The BCM monitors the wiper washer switch through three separate signal circuits and a ground circuit. The windshield wiper switch high signal circuit is used to determine high speed wiper operation, the windshield

wiper switch low signal is used to determine low speed, intermittent, and mist operation through the use of a resistor ladder, and windshield washer switch signal circuit is used to determine washer operation.

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

Reference Information

Schematic Reference

Wiper/Washer Schematics

Connector End View Reference

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Description and Operation

Wiper/Washer System Description and Operation

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- **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, wiper switch in the OFF position, verify the scan tool Windshield Washer Switch parameter is Inactive.
 - If not the specified value, refer to **Washer Malfunction (Wagon)**.
2. Wiper switch in the OFF position, verify the scan tool Windshield Wiper Switch parameter is Off.
 - If not the specified value, refer to Multifunction Switch Circuit Malfunction.
3. Wiper switch in the OFF position, verify the scan tool Wiper High Speed Switch parameter is Inactive.
 - If not the specified value, refer to Multifunction Switch Circuit Malfunction.
4. Wiper switch in the LO position, verify the scan tool Windshield Wiper Switch parameter is Low.
 - If not the specified value, refer to Multifunction Switch Circuit Malfunction.
5. Wiper switch in the HIGH position, verify the scan tool Wiper High Speed Switch parameter is Active
 - If not the specified value, refer to Multifunction Switch Circuit Malfunction.

6. Wiper switch in the INT position, verify the scan tool Windshield Wiper Switch parameter is Intermittent.
 - If not the specified value, test or replace the multifunction switch.
7. Wiper switch in the INT position, observe the scan tool Wiper Delay Setting parameter while cycling the delay adjustment switch from long delay to short delay. The parameter should cycle between D1 and D5 as each delay position is selected.
 - If not the specified value, test or replace the multifunction switch.
8. Wiper switch in the LO position, verify the windshield wipers are cycling at the low speed.
 - If the wipers are not operating at the low speed, refer to Windshield Wiper Motor Circuit Malfunction.
9. Wiper switch in the HIGH position, verify the windshield wipers are cycling at the high speed.
 - If the wipers are not operating at the low speed, refer to Windshield Wiper Motor Circuit Malfunction.
10. Wiper switch in the INT position, cycling the delay adjustment switch from long delay to short delay. Verify the wiper delay time decreases from long delay to short delay as each delay position is selected.
 - If the delay does not change as specified, refer to Windshield Wiper Motor Circuit Malfunction.
11. Observe the scan tool BCM Wiper Park Switch parameter. The reading should display Active when the wipers are parked and Inactive with the wipers ON or out of the park position.
 - If the Wiper Park Switch parameter is always Active or Inactive, perform Wipers Do Not Park.

Circuit/System Testing

Multifunction Switch Circuit Malfunction

1. Ignition OFF, disconnect the X1 harness connector at the multifunction switch.
2. Ignition OFF, test for less than 80 ohms between the ground circuit terminal 2 and ground.
 - If greater than the specified range, test the ground circuit for an open/high resistance. If the circuit test normal, replace the BCM.
3. Ignition ON, verify the scan tool Windshield Wiper Switch parameter is Off.
 - If not the specified value, test the signal circuit terminal 1 for a short to ground. If the circuit tests normal, replace the BCM.
4. Verify the scan tool Wiper High Speed Switch parameter Inactive.
 - If not the specified value, test the signal circuit terminal 3 for a short to ground. If the circuit tests normal, replace the BCM.
5. Install a 3 A fused jumper wire between the signal circuit terminal 1 and ground. Verify the scan tool Windshield Wiper Switch parameter is Switch Fault.
 - 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.
6. Install a 3 A fused jumper wire between the signal circuit terminal 3 and ground. Verify the scan tool Wiper High Speed Switch parameter is Active.
 - 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.
7. If all circuits test normal, test or replace the multifunction switch.

Windshield Wiper Motor Circuit Malfunction

1. Ignition OFF, disconnect WPR relay.
2. Test for less than 5 ohms between the ground circuit terminal 85 and ground.
 - If greater than the specified range, test the ground circuit for an open/high resistance.
3. Test for less than 20 ohms between the ground circuit terminal 87A and ground.
 - If greater than the specified range, test the ground circuit for an open/high resistance.
4. Ignition ON, verify a test lamp illuminates between the B+ circuit terminal 87 and ground.
 - If the test lamp does not illuminate, test or replace the underhood fuse block.
5. Install a test lamp between the control circuit terminal 86 and the ground circuit terminal 85.
6. Using the multifunction switch, command the low speed wipers ON and OFF. The test lamp should turn ON and OFF as commanded.
 - If the test lamp is always ON, test the control circuit for a short to voltage. If the circuit tests normal, replace the BCM.
 - If the test lamp is always OFF, test the control circuit for a short to ground or an open/high resistance. If the circuit tests normal, replace the BCM.
7. Ignition OFF, disconnect the WPR HI relay.
8. Test for less than 2 ohms between the control circuit terminal 30 at the WPR relay and the control circuit terminal 30 at the WPR HI relay.
 - If greater than the specified range, replace the underhood fuse block.
9. Connect the WPR relay.
10. Test for less than 20 ohms between the control circuit terminal 30 and ground.
 - If greater than the specified range, test or replace the WPR relay.
11. Ignition ON, verify a test lamp illuminates between the B+ circuit terminal 85 and ground.
 - If the test lamp does not illuminate, test or replace the underhood fuse block.
12. Install a test lamp between the control circuit terminal 30 and ground.
13. Using the multifunction switch, command the low speed wipers ON. The test lamp should turn illuminate.
 - If the test lamp does not illuminate, replace the WPR relay.
14. Install a test lamp between the B+ circuit terminal and the control circuit terminal 86.
15. Using the multifunction switch, command the high speed wipers ON and OFF. The test lamp should turn ON and OFF as commanded.
 - 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.
16. Ignition OFF, connect the WPR HI relay. Disconnect the harness connector at the windshield wiper motor.
17. Test for less than 20 ohms between the ground circuit terminal 5 (with LHD) or 4 (with RHD) and ground.
 - If greater than the specified range, test the ground circuit for an open/high resistance.

18. Connect a test lamp between the control circuit terminal 1 (with LHD) or 5 (with RHD) and ground.
19. Using the multifunction switch, command the low speed wipers ON and OFF. The test lamp should turn ON and OFF as commanded.
 - If the test lamp is always ON, test the control circuit for a short to voltage. If the circuit tests normal, test or replace the WPR HI relay.
 - If the test lamp is always OFF, test the control circuit for a short to ground or an open/high resistance. If the circuit tests normal, test or replace the WPR HI relay.
20. Connect a test lamp between the control circuit terminal 4 (with LHD) or 3 (with RHD) and ground.
21. Using the multifunction switch, command the high speed wipers ON and OFF. The test lamp should turn ON and OFF as commanded.
 - If the test lamp is always ON, test the control circuit for a short to voltage. If the circuit tests normal, test or replace the WPR HI relay.
 - If the test lamp is always OFF, test the control circuit for a short to ground or an open/high resistance. If the circuit tests normal, test or replace the WPR HI relay.
22. If all circuits test normal, test or replace the windshield wiper motor.

Wipers Do Not Park

1. Ignition OFF, disconnect the harness connector at the windshield wiper motor.
2. Test for less than 5 ohms between the ground terminal 2 and ground.
 - If greater than the specified value, test the circuit for an open/high resistance.
3. Verify the scan tool parameter Wiper Park Switch is Inactive
 - If not the specified value, test the signal circuit terminal 3 (with LHD) or 1 (with RHD) for a short to ground. If the circuit tests normal, replace the BCM.
4. Install a 3 A fused jumper wire between the signal circuit terminal 3 (with LHD) or 1 (with RHD) and the ground circuit terminal 2. Verify the scan tool parameter Wiper Park Switch is Active.
 - 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 windshield wiper motor.

Component Testing

Multifunction Switch

1. Disconnect the X1 harness connector at the multifunction switch.
2. With the wiper switch in the HIGH position, test for less than 2 ohms between the low reference terminal 2 and the signal terminal 3 .
 - If greater than the specified range, replace the windshield wiper washer switch.
3. While cycling the wiper switch through each delay and speed position, test for the specified resistance between the low reference terminal 2 and the signal terminal 1 .

NOTE: If the switch tests open in any switch position other than Off, test the signal

circuits for a short to voltage before replacing the switch.

Wiper Switch Values

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

- If any switch position is not within the specified range, replace the windshield wiper washer switch.

Windshield Wiper Motor

1. Ignition OFF, disconnect the harness connector at the windshield wiper motor.
2. Install a 25 A fused jumper wire between the control terminal 1 (with LHD) or 5 (with RHD) and 12 V. Install a jumper wire between the ground terminal 5 and ground.
3. Verify the wiper motor is operating in the low speed mode.
 - If the wiper motor is not in the low speed mode, replace the windshield wiper motor.
4. Install a 25 A fused jumper wire between the control terminal 4 (with LHD) or 3 (with RHD) and 12 V. Install a jumper wire between the ground terminal 5 and ground.
5. Verify the wiper motor is operating in the high speed mode.
 - If the wiper motor is not in the high speed mode, replace the windshield wiper motor.

Repair Instructions

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

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

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
Low Washer Fluid Indicator Signal	1	2	2	-
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 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 - INDEX - COUPE AND WAGON

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 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. Ignition ON, verify the scan tool Washer Fluid Level parameter is OK.
 - If not the specified value, test the signal circuit terminal B for a short to ground. If the circuit tests normal, replace the IPC.
4. Install a 3A fused jumper wire between the signal circuit terminal B 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.

Component Test

1. Ignition OFF, disconnect the harness connector at the washer fluid level sensor.
2. Washer fluid level switch open, test for infinite resistance between the signal terminal B and the ground terminal A.
 - If not the specified value, replace the washer fluid level sensor.
3. Washer fluid level switch closed, test for less than 2 ohms of resistance between the signal terminal B and the ground terminal A.
 - If not within the specified range, replace the washer fluid level sensor.

Repair Instructions

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

- **Windshield Washer Solvent Container Replacement (Without CE4), Windshield Washer Solvent Container Replacement (With CE4)**
- **Windshield Washer Solvent Level Indicator Replacement**
- **Control Module References** for IPC replacement, setup, and programming

WASHER MALFUNCTION (WAGON)

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.

Circuit/System Description

The washer fluid pump is a reversible motor and is used to wash both the windshield and rear window.

When the windshield wash switch is pressed, ground is applied to the BCM. This comes from the switch contacts and the windshield washer switch signal circuit indicating the wash request. The BCM energizes the windshield washer pump relay by grounding the control circuit. With the windshield washer pump relay energized, battery voltage is supplied to the windshield wash control circuit of the washer fluid pump. The washer pump is grounded through the de-energized rear window washer fluid pump relay.

When the rear window wash switch is pressed, rear wash switch voltage is applied through the switch contacts and the rear window wiper/washer switch signal circuit to the rear window wiper motor module. The rear window wiper motor module energizes the rear window wash relay by applying battery voltage to the relay control circuit. With the rear window washer fluid pump relay energized, battery voltage is supplied to the rear window wash control circuit of the washer fluid pump and grounded through the de-energized windshield washer pump relay.

Reference Information

Schematic Reference

Wiper/Washer Schematics

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX - COUPE AND WAGON

Description and Operation

Wiper/Washer System Description and Operation

Electrical Information Reference

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

Scan Tool Reference

Control Module References for scan tool information

Circuit/System Verification

1. Ignition ON, verify the rear wiper operates normally using the rear wiper switch.
 - If the rear wiper does not operate properly, refer to **Rear Wiper System Malfunction**.
2. Ignition ON, observe the scan tool Windshield Washer Switch parameter while pressing and releasing the front washer switch. The reading should change between Active and Inactive.
 - If not the specified values refer to Front Washer Switch Circuit Test.
3. Press the front washer switch. The washer pump should operate and fluid should be seen at the front washer.
 - If the washer pump does not operate, refer to Washer Pump Circuit Test.
4. Press the rear washer switch. The washer pump should operate and fluid should be seen at the rear washer.
 - If the washer pump does not operate, refer to Washer Pump Circuit Test.

Circuit/System Testing

Front Washer Switch Circuit Test

1. Ignition OFF, disconnect the harness connector at the windshield wiper/washer switch.
2. Ignition OFF, RAP OFF, wait 1 minute and test for less than 25 ohms between the low reference circuit terminal 2 and ground.
 - If greater than the specified range, test the low reference circuit for an open/high resistance. If the circuit tests normal, replace the BCM.
3. Ignition ON, test for B+ between the signal circuit terminal 5 and ground.
 - If less than the specified value, test the signal circuit for a short to ground or an open/high resistance. If the circuit tests normal, replace the BCM.
4. If all the circuits test normal, replace the windshield wiper/washer switch.

Rear Washer Switch Circuit Test

1. Ignition OFF, disconnect the harness connector at the windshield wiper/washer switch.
2. Ignition OFF, RAP OFF, wait 1 minute and test for less than 25 ohms between the low reference circuit terminal 2 and ground.
 - If greater than the specified range, test the low reference circuit for an open/high resistance. If the circuit tests normal, replace the BCM.
3. Ignition ON, test for B+ between the signal circuit terminal 4 and ground.
 - If less than the specified value, test the signal circuit for a short to ground or an open/high resistance. If the circuit tests normal, replace the BCM.
4. If all the circuits test normal, replace the windshield wiper/washer switch.

Washer Pump Circuit Test

1. Ignition OFF, disconnect the windshield washer pump relay.

2. Test for less than 10 ohms between the ground circuit terminal B2 and ground.
 - If greater than the specified range, test the ground circuit for an open/high resistance.
3. Ignition ON, verify a test lamp illuminates between the following B+ circuit terminals and ground:
 - B+ circuit terminal A1
 - B+ circuit terminal A2
 - If the test lamp does not illuminate, test the B+ circuit for a short to ground or an open/high resistance. If the circuits test normal and the B+ circuit fuse is open, test the washer pump control circuits for a short to ground.
4. Install a test lamp between the B+ terminal A1 and the control circuit terminal C2.
5. Using the windshield wiper/washer switch, command the front washers ON and OFF. The test lamp should turn ON and OFF as commanded.
 - 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.
6. Ignition OFF, connect the windshield washer pump relay. Disconnect the rear window washer fluid pump relay.
7. Test for less than 10 ohms between the ground circuit terminal B2 and ground.
 - If greater than the specified range, test the ground circuit for an open/high resistance.
8. Test for less than 10 ohms between the control circuit terminal C2 and ground.
 - If greater than the specified range, test the control circuit for an open/high resistance. If the circuit tests normal, test or replace the Windshield Washer Pump - Front Relay.
9. Ignition ON, verify a test lamp illuminates between the B+ circuit terminal A2 and ground.
 - If the test lamp does not illuminate, test the B+ circuit for a short to ground or an open/high resistance.
10. Install a test lamp between the B+ terminal A1 and the control circuit terminal C2.
11. Using the windshield wiper/washer switch, command the rear washers ON and OFF. The test lamp should turn ON and OFF as commanded.
 - If the test lamp is always ON, test the control circuit for a short to voltage. If the circuit tests normal, replace the rear wiper motor.
 - If the test lamp is always OFF, test the control circuit for a short to ground or an open/high resistance. If the circuit tests normal, replace the rear window wiper motor.
12. Ignition OFF, connect the Rear Window Washer Fluid Pump Relay. Disconnect the harness connector at the windshield washer fluid pump.
13. Test for less than 10 ohms between the control circuit terminal B and ground.
 - If greater than the specified range, test the control circuit for an open/high resistance. If the circuit tests normal, test or replace the windshield washer pump relay.
14. Test for less than 10 ohms between control circuit terminal A and ground.
 - If greater than the specified range, test the control circuit for an open/high resistance. If the circuit tests normal, test or replace the rear window washer fluid pump relay.
15. Connect a test lamp between control circuit terminal A and ground.

16. Ignition ON, command the rear washer on with the windshield wiper/washer switch. Verify that the test lamp turns on and off with the switch.
 - If the test lamp is always on, test the control circuit for a short to B+. If the circuit tests normal, replace the rear window washer fluid pump relay.
 - If the test lamp is always off, test the control circuit for an open/high resistance. If the circuit tests normal, replace the rear window washer fluid pump relay.
17. Connect a test lamp between control circuit terminal B and ground.
18. Ignition ON, command the front washer on with the windshield wiper/washer switch. Verify that the test lamp turns on and off with the switch.
 - If the test lamp is always on, test the control circuit for a short to B+. If the circuit tests normal, replace the windshield washer pump relay.
 - If the test lamp is always off, test the control circuit for an open/high resistance. If the circuit tests normal, replace the windshield washer pump relay.
19. If all circuits test normal, replace the windshield washer fluid pump.

Component Testing

Relay Test

1. Ignition OFF, disconnect the relay.
2. Test for 30-150 ohms between terminals A1 and C2.
 - If not within the specified range, replace the relay.
3. Test for infinite resistance between the following terminals:
 - C1 and C2
 - C1 and A2
 - C1 and A1
 - A1 and A2
 - If not the specified value, replace the relay.
4. Test for less than 5 ohms between terminals C1 and A2.
 - If greater than the specified range, replace the relay.
5. Install a 10 A jumper wire between relay terminal A1 and B+. Install a jumper wire between terminal C2 and ground. Test for less than 5 ohms between terminals C1 and A2.
 - If greater than the specified range, replace the relay.

Repair Instructions

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

- **Windshield Wiper and Washer Switch Replacement**
- **Rear Window Wiper Motor Replacement (Wagon)**
- **Body Control Module Replacement**
- **Windshield Washer Pump Replacement**

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

MOISTURE SENSING FEATURE INOPERATIVE

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
Ignition Voltage	1	1	1	-
Control Circuit	B370D	B370D	1	-
Signal Circuit	B370C	B370C	1	-
Ground	-	1	-	-
1. Rain Sensing Feature is Inoperative				

Circuit/System Description

Accessory voltage is supplied to the outside moisture sensor through the BCM. Whenever the ignition is in the run or accessory positions, the BCM sends the wiper/washer switch status using a pulse width modulation (PWM) signal through the outside moisture sensor signal 1 circuit to the outside moisture sensor. When a wipe cycle is needed, the moisture sensor sends a PWM voltage signal through the moisture sensor signal 2 circuit back to the BCM requesting the wiper operation.

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

Reference Information

Schematic Reference

Wiper/Washer Schematics

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX - COUPE AND WAGON

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, wiper switch in the LOW position. The windshield wipers should operate at low speed. If the windshield wipers do not operate, refer to **Windshield Wiper System Malfunction**.

Circuit/System Testing

1. Ignition OFF and all vehicle systems OFF, disconnect the B117 rain sensor. It may take up to 2 minutes for all vehicle systems to power down.
2. Test for less than 10 ohms between the ground circuit terminal 3 and ground.
 - **If 10 ohms or greater**
 1. Ignition OFF.
 2. Test for less than 2 ohms in the ground circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, repair the open/high resistance in the ground connection.
 - **If less than 10 ohms**
3. Ignition ON.
4. Verify a test lamp illuminates between the ignition circuit terminal 4 and the ground circuit terminal 3.
 - **If the test lamp does not illuminate and the circuit fuse is good**
 1. Ignition OFF.
 2. Test for less than 2 ohms in the ignition circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, verify the fuse is OK and there is voltage at the circuit.
 - **If the test lamp does not illuminate and the circuit fuse is open**
 1. Ignition OFF.
 2. Test for infinite resistance between the ignition circuit and ground.
 - If less than infinite resistance, repair the short to ground in the circuit.
 - If infinite resistance, replace the K9 body control module.
 - **If test lamp illuminates**

5. Test for 500-900 ohms between the signal circuit terminal 1 and ground.
 - **If less than 500 ohms**
 1. Disconnect the X4 harness connector at the K9 body control module.
 2. Test for infinite resistance between the signal circuit and ground.
 - If less than infinite resistance, repair the short to ground on the circuit.
 - If infinite resistance, replace the K9 body control module.
 - **If greater than 900 ohms**
 1. Disconnect the X4 harness connector at the K9 body control module, ignition ON.
 2. Test for less than 1 V between the signal circuit and ground.
 - If 1 V or greater, repair the short to voltage on the circuit.
 - If less than 1 V
 3. Ignition OFF.
 4. Test for less than 2 ohms in the signal circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, replace the K9 body control module.
 - **If between 500-900 ohms**
6. Test for 8-10 V between the control circuit terminal 2 and ground.
 - **If less than 8 V**
 1. Ignition OFF, disconnect the X4 harness connector at the K9 body control module.
 2. Test for infinite resistance between the control circuit and ground.
 - If less than infinite resistance, repair the short to ground on the circuit.
 - If infinite resistance
 3. Ignition OFF.
 4. Test for less than 2 ohms in the control circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, replace the K9 body control module.
 - **If greater than 10 V**
 1. Disconnect the X4 harness connector at the K9 body control module.
 2. Test for less than 1 V between the control circuit and ground.
 - If 1 V or greater, repair the short to voltage on the circuit.
 - If less than 1 V, replace the K9 body control module.
 - **If between 8-10 ohms**
7. If all circuits test normal, replace the B117 rain sensor.

Repair Instructions

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

- **Windshield Outside Moisture 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.

Circuit/System Description

The rear wiper is controlled based on an input from the rear wiper/washer switch. When the switch is in the ON or DELAY, a voltage signal is sent to the rear window wiper motor indicating the desired speed. Each switch position has resistor that drops the voltage to a specified value which is interpreted by the rear window wiper motor as ON or DELAY. The rear wiper motor receives B+ voltage from the I/P fuse block and accessory voltage from the body control system (BCM).

Reference Information

Schematic Reference

Wiper/Washer Schematics

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX - COUPE AND WAGON

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 front wipers operate in all modes.

- If the front wipers do not operate in all modes, refer to **Windshield Wiper System Malfunction**.
- 2. Press and release the rear window washer switch. The rear window wiper motor and pump should operate continuously for as long as the wash switch is pressed and several wipe cycles will occur after the switch is released.
 - If the rear wiper motor and the rear washer pump are inoperative, refer to Rear Wiper Washer Switch Circuit Test.
 - If the rear washer pump operates normal and the rear wiper motor is inoperative, refer to the Rear Wiper Motor Circuit Test.
 - If the rear wiper motor operates and the rear washer pump is inoperative, refer to **Washer Malfunction (Wagon)**.

Circuit/System Testing

Rear Wiper Washer Switch Circuit

1. Ignition OFF, disconnect the harness connector at the rear wiper motor.
2. Test for less than 5 ohms between ground terminal C and ground.
 - If greater than the specified range, test the ground circuit for an open/high resistance.
3. Verify a test lamp illuminates between the B+ terminal E and ground.
 - If test lamp does not illuminate, test the B+ circuit for a short to ground or open/high resistance.
4. Ignition ON, verify a test lamp illuminates between ignition circuit terminal B and ground.
 - If test lamp does not illuminate, test the ignition circuit for a short to ground or open/high resistance.
5. Test for less than 1 V between signal circuit terminal A and ground.
 - If greater than the specified voltage, test the signal circuit for a short to voltage.
6. Ignition OFF, connect the rear wiper motor connector. Disconnect the rear wiper switch connector.
7. Ignition ON, test for B+ between the signal circuit terminal 4 and ground.
 - If less than the specified value, test the signal circuit for a short to ground or an open/high resistance. If circuit tests normal, replace the rear window wiper motor.
8. Perform the Rear Window Wiper Switch Component Test.
 - If the switch fails the component test, replace the switch.
9. If all circuits test normal, replace the rear wiper motor.

Rear Wiper Motor Circuit Test

1. Ignition OFF, disconnect the harness connector at the rear wiper motor.
2. Test for less than 5 ohms between ground terminal C and ground.
 - If greater than the specified range, test the ground circuit for an open/high resistance.
3. Verify a test lamp illuminates between the B+ terminal E and ground.
 - If test lamp does not illuminate, test the B+ circuit for a short to ground or open/high resistance.
4. Ignition ON, verify a test lamp illuminates between ignition circuit terminal B and ground.

- If test lamp does not illuminate, test the ignition circuit for a short to ground or open/high resistance.
- 5. If all circuits test normal, test or replace the rear wiper motor.

Component Testing

Rear Window Wiper Switch

1. Ignition OFF, disconnect the harness connector at the rear wiper switch.
2. Rear wiper switch in the WASH position, test for 5500-6750 ohms between the signal circuit terminal A and ground.
 - If not within the specified range, test or replace the rear wiper washer switch.
3. Rear wiper switch in the DELAY position, test for 1500-2500 ohms between the signal circuit terminal A and ground.
 - If not within the specified range, test or replace the rear wiper washer switch.
4. Rear wiper switch in the ON position, test for 600-675 ohms between the signal circuit terminal A and ground.
 - If not within the specified range, test or replace the rear wiper washer switch.

Repair Instructions

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

- **Windshield Wiper and Washer Switch Replacement**
- **Rear Window Wiper Motor Replacement (Wagon)**

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	2	1	-	-
Headlamp Washer Pump Relay Control	1	1	-	-
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 - INDEX - COUPE AND WAGON

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. Verify headlamps are turned on.
2. Ignition ON, observe the scan tool Headlamp Washer Relay Command parameter while pressing and releasing the windshield washer switch. The reading should change between On and Off.
 - If not the specified value, refer to Multifunction Switch Circuit Test.
3. If the switch input to the BCM functions normal refer to Headlamp Washer Pump Circuit Test.

Circuit/System Testing

Windshield Washer Switch

1. Ignition OFF, disconnect the X1, harness connector at the multifunction switch.
2. Test for less than 1.0 ohms between the ground circuit terminal 2 and ground.
 - If greater than the specified range, test the low reference circuit for an open/high resistance, if the circuit tests normal, replace the BCM.
3. Ignition ON, verify the scan tool Headlamp Wash parameter is Off.
 - If not the specified value, test the signal circuit terminal 4 for a short to ground. If the circuit tests normal, replace the BCM.
4. Install a 3 A fused jumper wire between the signal circuit terminal 4 and the ground. 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 multifunction switch.

Headlamp Washer Pump Circuit Test

1. Ignition OFF, disconnect the HEADLAMP WASH relay.
2. Test for less than 10.0 ohms between the ground circuit terminal 85 and ground.
 - If greater than the specified range, test the ground circuit for an open/high resistance.
3. 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.
4. Disconnect the harness connector at the headlamp washer fluid pump.
5. Test for less than 5.0 ohms between the headlamp washer fluid pump ground circuit terminal B and ground.
 - If greater than the specified range, test the ground circuit for an open/high resistance.
6. Connect the harness connector at the headlamp washer fluid pump.
7. Connect a 20 A fused jumper wire between the B+ circuit terminal 30 and the washer pump control circuit terminal 87. Verify the headlamp washer fluid pump is activated.
 - If the headlamp washer fluid pump does not activate, test the control circuit for an open/high resistance. If the circuit tests normal, test or replace the headlamp washer fluid pump.
8. Connect a test lamp between the B+ circuit terminal 86 and the relay control circuit terminal 85.

NOTE: Turn the headlamps on prior to performing the test in step 9. During the test, the test lamp may not turn ON for up to five cycles of the headlamp washer fluid pump.

9. 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.

10. If all circuits test normal, test or replace the HEADLAMP WASH relay.

Repair Instructions

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

- **Headlamp Washer Pump Replacement (V Series CE4)**
- **Turn Signal Multifunction Switch Replacement**
- **Underhood Electrical Center or Junction Block Replacement**
- **Control Module References** for BCM replacement, programming, and setup

WIPER BLADE ELEMENT CHECK

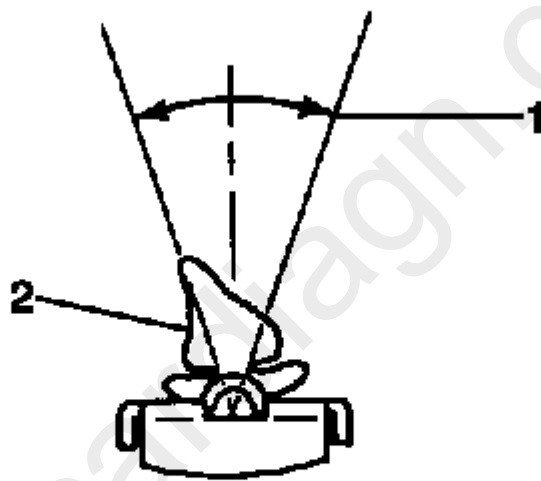


Fig. 4: Wiper Blade Element Check
Courtesy of GENERAL MOTORS COMPANY

1. Remove the wiper blade from the wiper arm. Refer to **Windshield Wiper Blade Replacement**.
2. Look down the entire length of the blade element.
3. The rubber part of the element (2) that contacts the window must be on the center line of the blade plus or

minus 15 degrees (1).

4. Replace the blade element (2) if the element exceeds 15 degrees from the centerline of the blade, or if the element is cracked or torn. Refer to **Windshield Wiper Blade Replacement**
5. Install the wiper blade onto the windshield wiper arm.

REPAIR INSTRUCTIONS

WINDSHIELD WIPER AND WASHER SWITCH REPLACEMENT

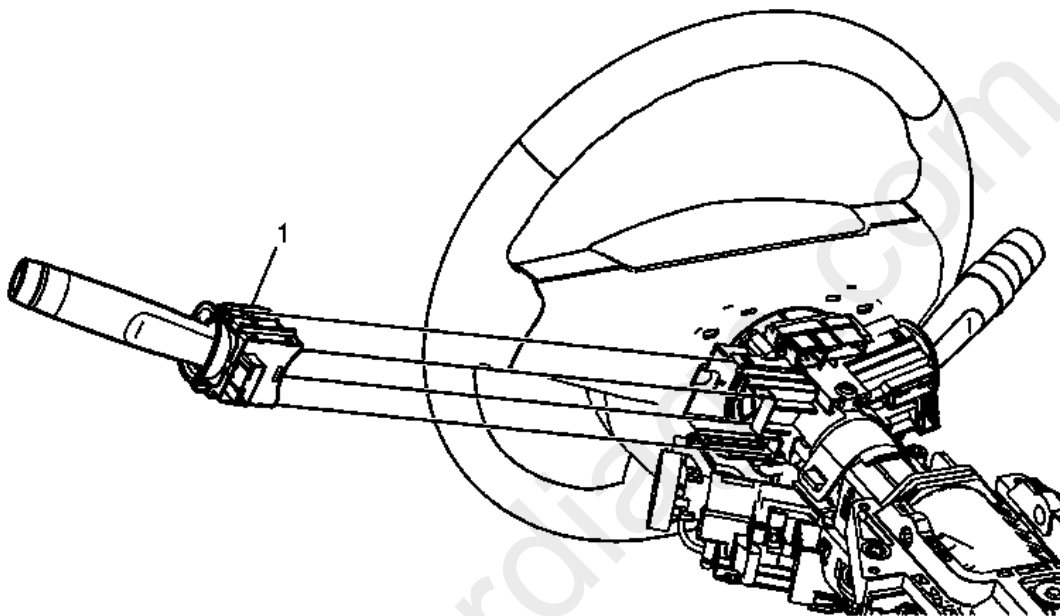


Fig. 5: Windshield Wiper and Washer Switch
Courtesy of GENERAL MOTORS COMPANY

Windshield Wiper and Washer Switch Replacement

Callout	Component Name
Preliminary Procedure Remove the steering column shroud. Refer to <u>Steering Column Shroud Replacement (Without Key Release Lever Knob)</u> , <u>Steering Column Shroud Replacement (With Key Release Lever Knob)</u> .	
1	Windshield Wiper and Washer Switch Procedure 1. Disconnect any electrical connectors as needed. 2. Release the plastic retaining tabs and remove the windshield wiper and washer switch from the turn signal switch bracket.

WINDSHIELD WASHER NOZZLE HOSE REPLACEMENT

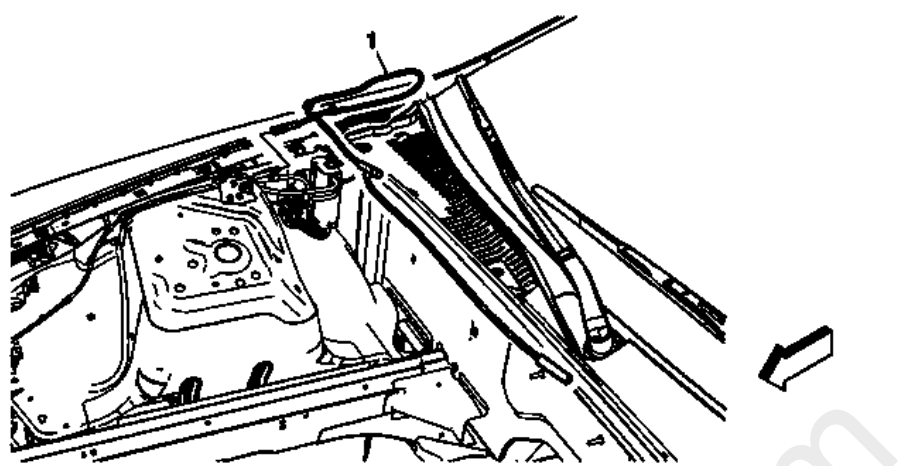


Fig. 6: Windshield Washer Nozzle Hose
Courtesy of GENERAL MOTORS COMPANY

Windshield Washer Nozzle Hose Replacement

Callout	Component Name
Preliminary Procedure 1. Open and support the hood. 2. Remove the hood insulator in order to access the windshield washer nozzle hose connections. Refer to Hood Insulator Replacement . 3. Disconnect the windshield washer hose from the washer nozzles.	
1	Windshield Washer Nozzle Hose Procedure 1. Disconnect the windshield washer hose from the windshield washer solvent heater connection (if equipped). 2. Disengage the two retainers from the lower and upper hood hinge. 3. Remove the windshield washer hose from around the hood hinge. 4. Remove the hose from the vehicle.

WINDSHIELD WASHER NOZZLE REPLACEMENT

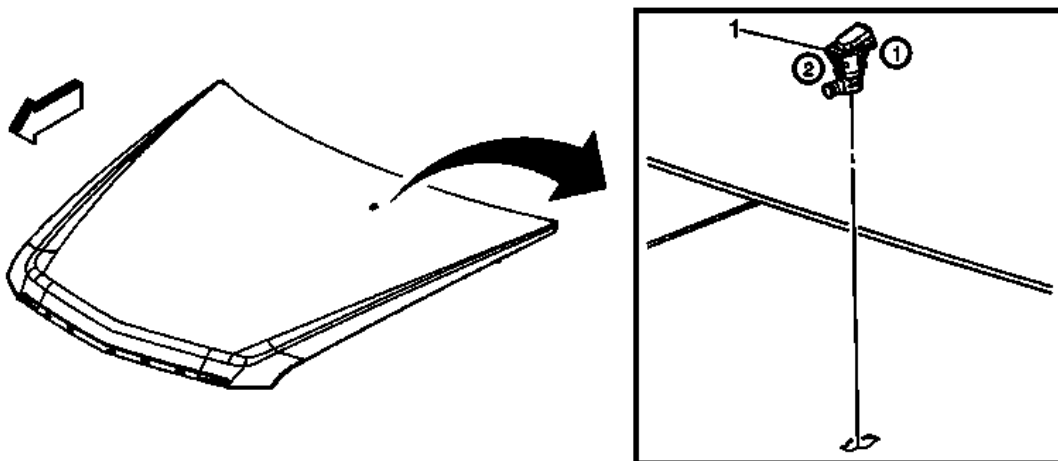


Fig. 7: Windshield Washer Nozzle
 Courtesy of GENERAL MOTORS COMPANY

Windshield Washer Nozzle Replacement

Callout	Component Name
Preliminary Procedures	
1. Remove the hood insulator. Refer to Hood Insulator Replacement . 2. Disconnect the windshield washer hose from the washer nozzles.	
1	Windshield Washer Nozzle (Qty: 2) Procedure 1. Pinch the rear retainer on the washer nozzle first followed by the front retainer. 2. Push the nozzles outward from the hood in order to remove.

REAR WINDOW WASHER NOZZLE REPLACEMENT (WAGON)

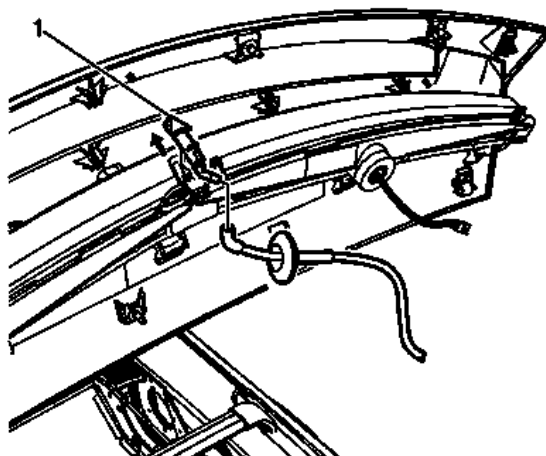


Fig. 8: Rear Window Washer Nozzle (Wagon)
 Courtesy of GENERAL MOTORS COMPANY

Rear Window Washer Nozzle Replacement (Wagon)

Callout	Component Name
Preliminary Procedures	
1. Remove the high mount stop lamp assembly. Refer to <u>High Mount Stop Lamp Replacement (Wagon)</u> . 2. Disconnect the windshield washer liftgate extension rear hose from the rear washer nozzle spout. 3. Release the clip and slide the rear window washer nozzle from the high mount stop lamp assembly.	
1	Rear Window Washer Nozzle TIP: Prime the rear window washer system after replacement of the washer nozzle.

HEADLAMP WASHER NOZZLE HOLE COVER REPLACEMENT (CE4)

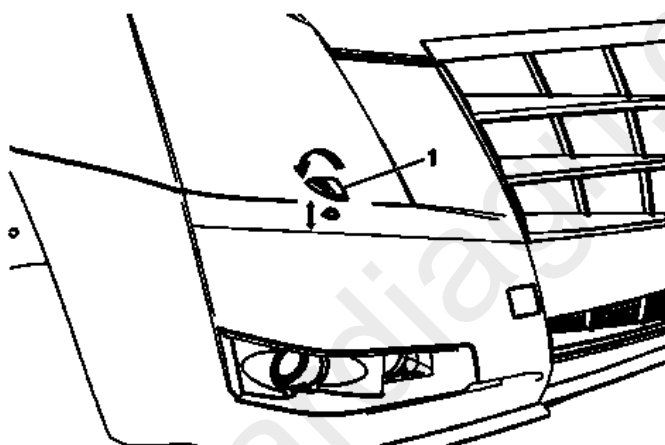


Fig. 9: Headlamp Washer Nozzle Hole Cover (CE4)
 Courtesy of GENERAL MOTORS COMPANY

Headlamp Washer Nozzle Hole Cover Replacement (CE4)

Callout	Component Name
1	Headlamp Washer Nozzle Cover TIP: Lightly push downward on the cover and rotate in order to remove the cover from the headlamp washer nozzle.

HEADLAMP WASHER NOZZLE REPLACEMENT

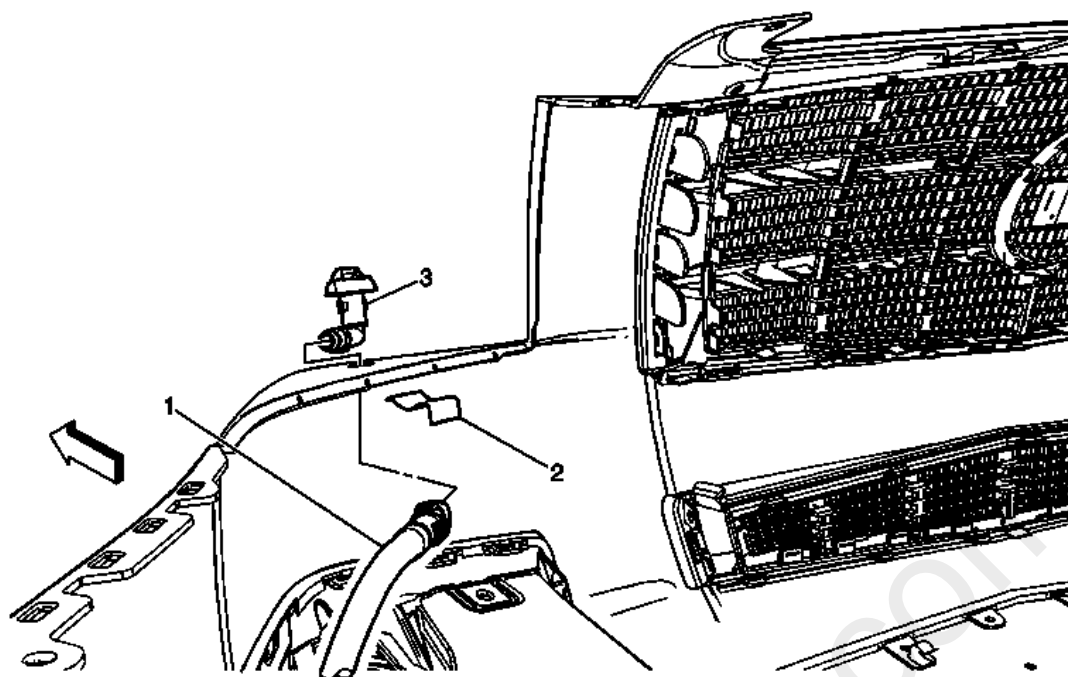


Fig. 10: Headlamp Washer Nozzle Assembly
 Courtesy of GENERAL MOTORS COMPANY

Headlamp Washer Nozzle Replacement

Callout	Component Name
Preliminary Procedure Remove the front wheelhouse extension. Refer to <u>Wheelhouse Extension Replacement</u> .	
1	Headlamp Washer Hose Assembly NOTE: Disengage the retention clip on the hose from the headlamp washer nozzle.
2	Headlamp Washer Nozzle Assembly Clip NOTE: Slide the clip from under the headlamp washer nozzle.
3	Headlamp Washer Nozzle Assembly NOTE: Remove the nozzle up through the front bumper fascia hole opening.

HEADLAMP WASHER HOSE REPLACEMENT (CE4 WITH TT6 TT7 TT8)

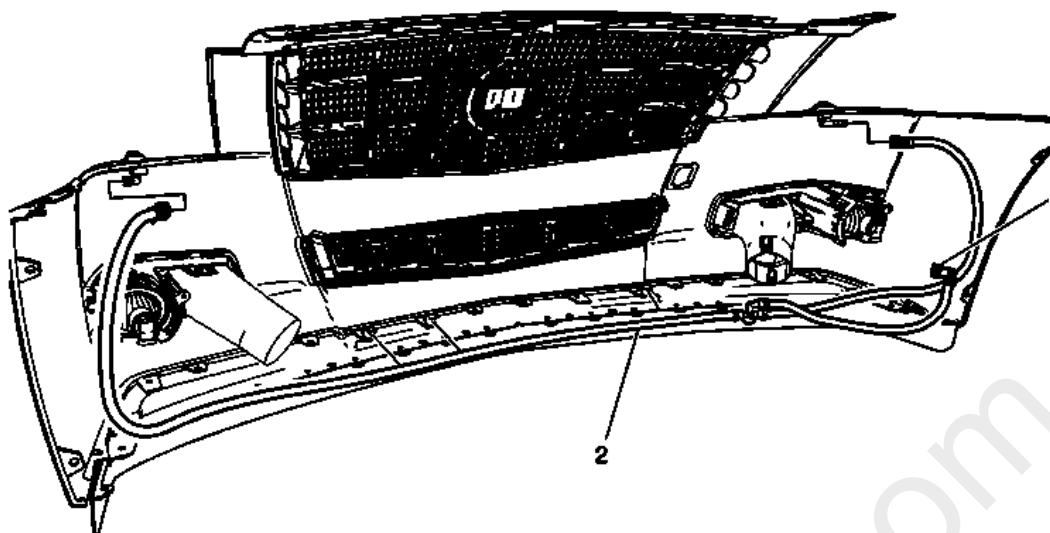


Fig. 11: Headlamp Washer Hose (CE4 with TT6 TT7 TT8)
 Courtesy of GENERAL MOTORS COMPANY

Headlamp Washer Hose Replacement (CE4 with TT6 TT7 TT8)

Callout	Component Name
Preliminary Procedure	
Remove the front bumper fascia. Refer to Front Bumper Fascia Replacement .	
1	Headlamp Washer Pump Connection
2	Headlamp Washer Hose Assembly
	Procedure
	1. Place a clean suitable container at the windshield washer pump spout prior to disconnecting the washer hose from the windshield washer pump. 2. Contain all lost windshield washer solvent when disconnecting the washer pump hoses. 3. Disconnect the headlamp washer hose from both headlamp washer nozzle assemblies. 4. Disconnect the hose from the retainer clips on the lower radiator air baffles. 5. Disconnect the headlamp washer hose from the retainer clips on the lower inside edge of the front bumper fascia. 6. Remove the headlamp washer hose from the front bumper fascia.

WINDSHIELD WASHER HOSE REPLACEMENT (WITHOUT XA7)

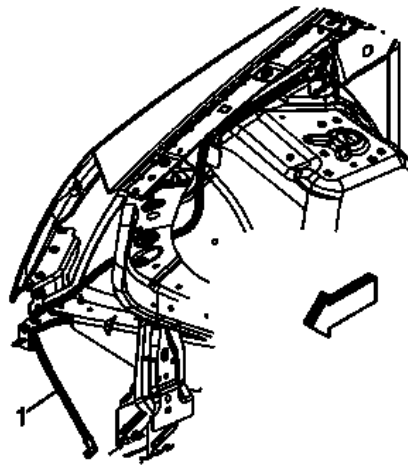


Fig. 12: Windshield Washer Hose Replacement (w/o XA7)
 Courtesy of GENERAL MOTORS COMPANY

Windshield Washer Hose Replacement (Without XA7)

Callout	Component Name
Preliminary Procedure 1. Open and support the hood. 2. Remove the front compartment sight shield. Refer to <u>Front Compartment Sight Shields Replacement</u> . 3. To help aid in the removal and installation of the windshield washer hose, the right front headlamp assembly will need to be removed. Refer to <u>Headlamp Capsule Replacement</u> .	
1	Windshield Washer Solvent Container Hose Procedure 1. Place a suitable clean container under the windshield washer solvent container to contain solvent spillage. 2. Remove the washer hose elbow from the windshield washer pump. 3. Disconnect the retainer clips securing the hose to the front upper wheelhouse panel reinforcement. 4. Disconnect the washer hose at the windshield washer solvent heater, if equipped. 5. If not equipped, disconnect the washer pump hose from the windshield washer nozzle hose.

WINDSHIELD WASHER HOSE REPLACEMENT (WITH XA7)

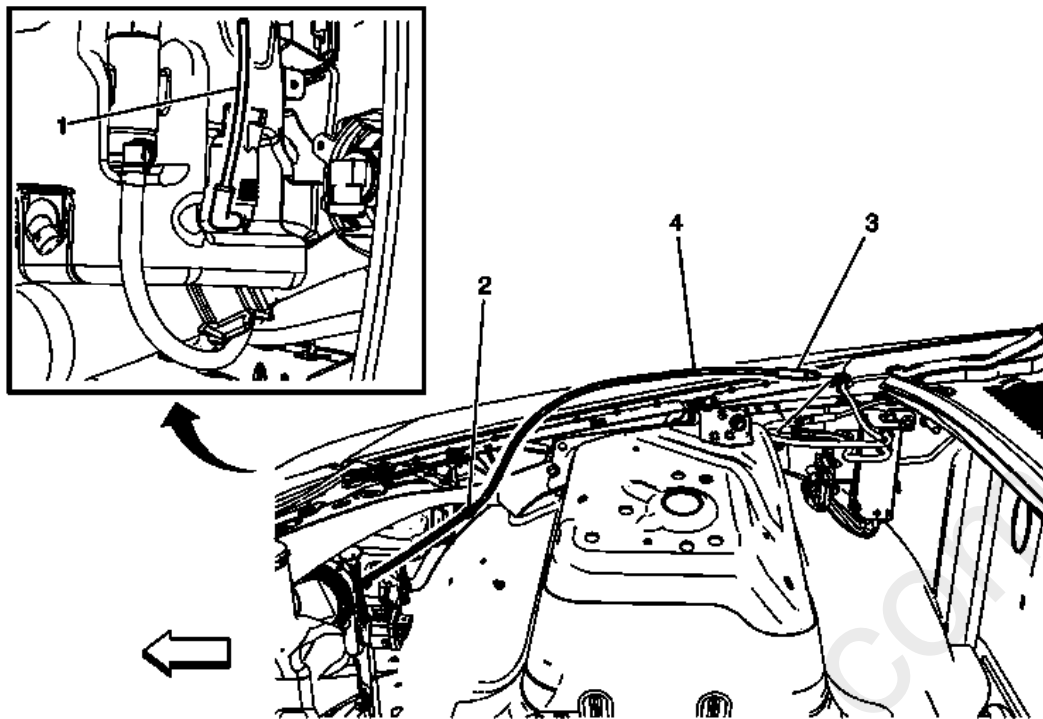


Fig. 13: Windshield Washer Hose Replacement (w/ XA7)
 Courtesy of GENERAL MOTORS COMPANY

Windshield Washer Hose Replacement (With XA7)

Callout	Component Name
Preliminary Procedure	
1. Remove the front wheelhouse extension in order to access the windshield washer pump connection. Refer to <u>Wheelhouse Extension Replacement</u> . 2. Place a suitable clean pan under the container to contain any loss windshield washer solvent. 3. Open and support the hood. 4. Remove the front compartment side sight shield, passenger side in order to access the washer hose connections.	
1	Windshield Washer Pump Hose Connection TIP: Tie a string to the washer hose elbow in order to re-route the new washer hose under the front headlamp assembly.
2	Windshield Washer Solvent Container Hose Retainer TIP: Disengage the retainer from the wheelhouse panel.
3	Windshield Washer Solvent Container Hose Connection TIP: Disconnect the washer container hose from the windshield washer solvent heater hose (if equipped).
4	Windshield Washer Solvent Container Hose TIP: Pull the hose rearward in order to access the string from under the headlamp. Use the string to route the new washer solvent container hose.

WINDSHIELD WASHER LIFTGATE EXTENSION REAR HOSE REPLACEMENT (CTS WAGON)

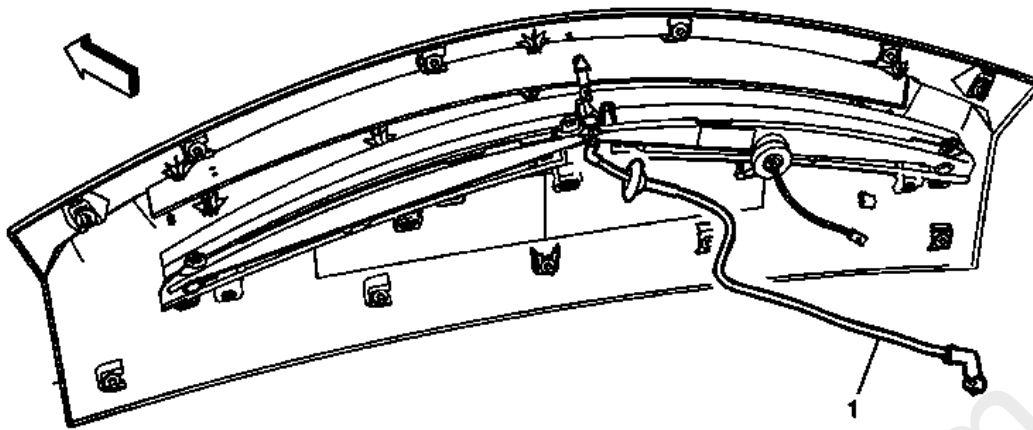


Fig. 14: Windshield Washer Liftgate Extension Rear Hose (CTS Wagon)

Courtesy of GENERAL MOTORS COMPANY

Windshield Washer Liftgate Extension Rear Hose Replacement (CTS Wagon)

Callout	Component Name
Preliminary Procedure Remove the liftgate upper applique assembly. Refer to <u>Liftgate Upper Applique Replacement (Wagon)</u> .	
1	Windshield Washer Liftgate Extension Rear Hose Assembly Procedure 1. Disconnect the rear hose from the rear liftgate washer nozzle. 2. Upon assembly, ensure to prime the rear window wiper washer system. 3. Inspect the operation of the rear wiper washer system

REAR WINDOW WASHER SOLVENT CONTAINER HOSE REPLACEMENT

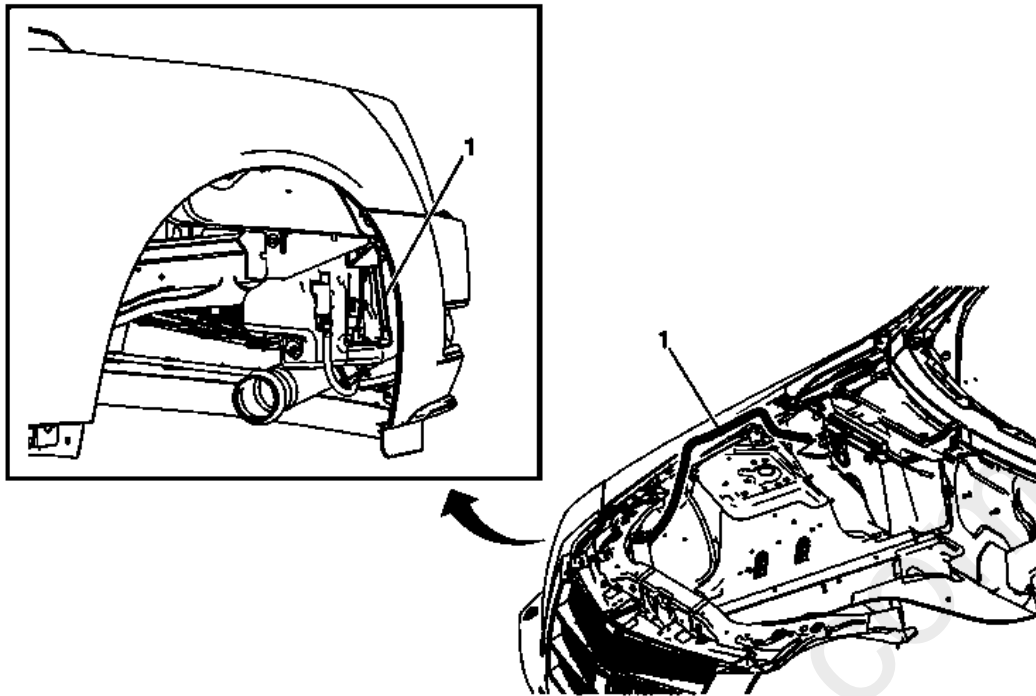


Fig. 15: Rear Window Washer Solvent Container Hose
 Courtesy of GENERAL MOTORS COMPANY

Rear Window Washer Solvent Container Hose Replacement

Callout	Component Name
Preliminary Procedure 1. Remove the front right wheelhouse extension in order to access the rear windshield washer pump connection. Refer to <u>Wheelhouse Extension Replacement</u> . 2. Place a suitable clean pan under the container to contain any loss windshield washer solvent. 3. Open and support the hood. 4. Remove the front compartment side sight shield, passenger side in order to access the washer hose connections.	
1	Rear Window Washer Solvent Container Hose Procedure 1. Tie a string to the washer hose elbow in order to re-route the new washer hose under the front headlamp assembly. 2. Disconnect the washer hose at the pump and at the rear side of the front wheelhouse panel.

WINDSHIELD WASHER SOLVENT CONTAINER REPLACEMENT (WITH CE4)

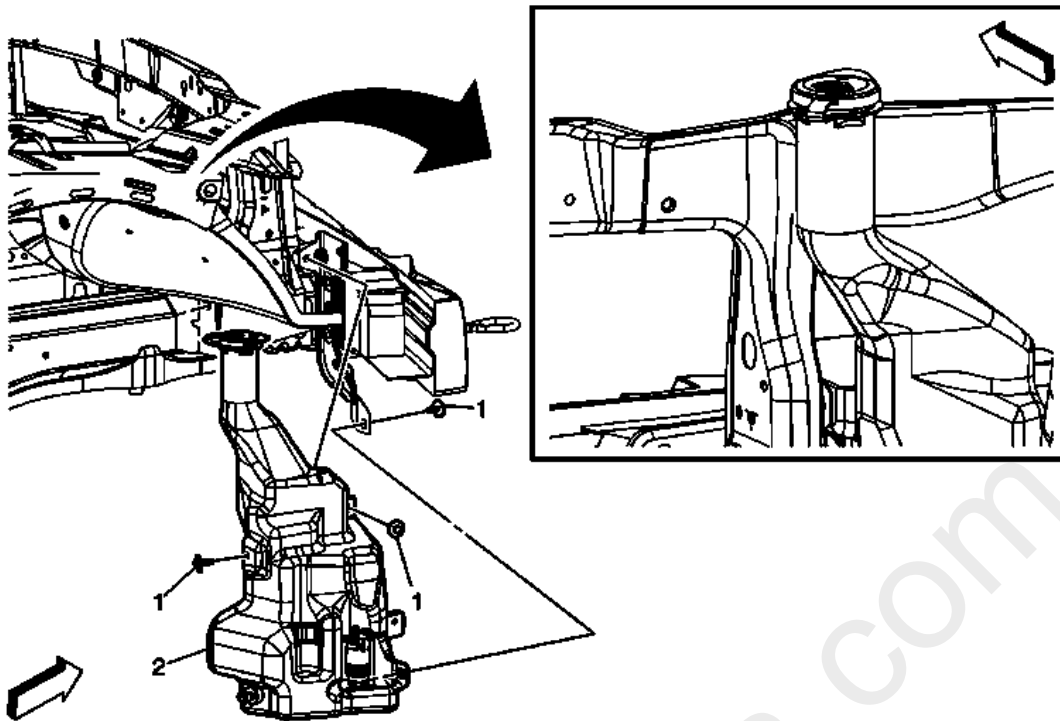


Fig. 16: Windshield Washer Solvent Container (With CE4)
 Courtesy of GENERAL MOTORS COMPANY

Windshield Washer Solvent Container Replacement (With CE4)

Callout	Component Name
Preliminary Procedure 1. Remove the front wheelhouse extension. Refer to <u>Wheelhouse Extension Replacement</u> . 2. Remove the front brake caliper cooling duct. Refer to <u>Front Brake Rotor Cooling Duct Replacement (European)</u> , <u>Front Brake Rotor Cooling Duct Replacement (North America)</u> . 3. Disconnect the forward lamp harness electrical connectors from the windshield washer pump, headlamp washer pump and the windshield washer solvent level indicator. 4. Remove the harness from the washer container. 5. Disconnect the windshield washer pump hose at the pump spout. 6. Disconnect the headlamp washer pump hose at the pump spout. 7. Remove the windshield washer container cap.	
1	Washer Container Bolt (Qty: 3) CAUTION: Refer to <u>Fastener Caution</u> . Tighten 9 N.m (80 lb in)

Windshield Washer Solvent Container

Procedure

2

1. Remove washer solvent container from the front compartment panel assembly and lower the washer container from the wheelhouse compartment.
2. Drain the windshield washer solvent into a suitable clean container.
3. Transfer the component parts as needed.
4. Install new grommets prior to installing the windshield and headlamp washer pumps and the level indicator into the washer solvent container.
5. Fill the windshield washer solvent after completion.

WINDSHIELD WASHER SOLVENT CONTAINER REPLACEMENT (WITHOUT CE4)

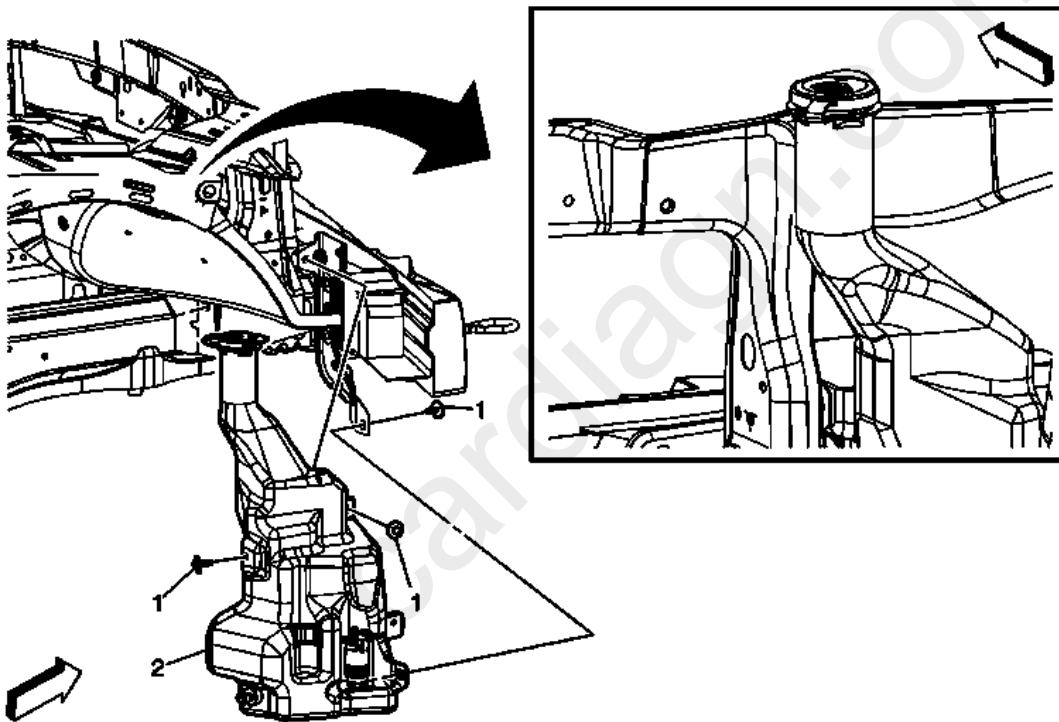


Fig. 17: Windshield Washer Solvent Container (Without CE4)

Courtesy of GENERAL MOTORS COMPANY

Windshield Washer Solvent Container Replacement (Without CE4)

Callout	Component Name
Preliminary Procedure	
1. Remove the front wheelhouse extension. Refer to <u>Wheelhouse Extension Replacement</u> . 2. Drain the windshield washer solvent into a suitable clean container. 3. Disconnect the forward lamp harness from the container and electrical connectors from the	

windshield washer container pump and windshield washer solvent level indicator.

4. Remove the windshield washer container cap.
5. Transfer the component parts as needed.

1	Washer Container Bolt (Qty: 3) CAUTION: Refer to <u>Fastener Caution</u> . Tighten 9 N.m (80 lb in)
2	Washer Container TIP: Lift the container from the stud on the front compartment panel assembly and lower the washer container from the vehicle.

HEADLAMP WASHER PUMP REPLACEMENT (V SERIES CE4)

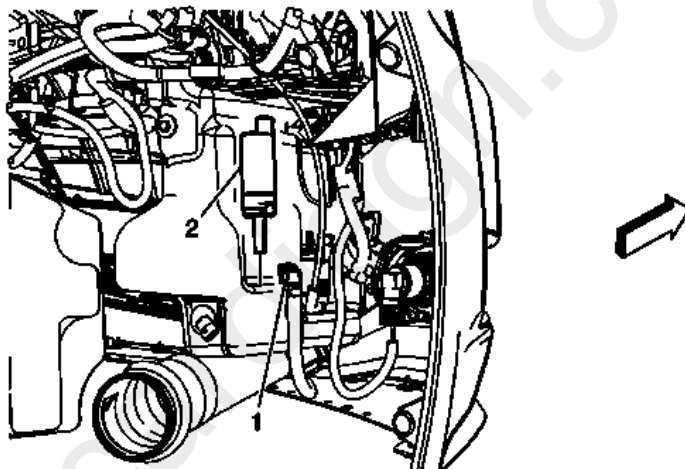


Fig. 18: Headlamp Washer Pump Replacement (V Series CE4)
Courtesy of GENERAL MOTORS COMPANY

Headlamp Washer Pump Replacement (V Series CE4)

Callout	Component Name
Preliminary Procedure Remove the right front wheelhouse extension. Refer to <u>Wheelhouse Extension Replacement</u> .	
1	Headlamp Washer Pump Hose Procedure 1. Place a clean suitable clean container under the washer container to secure spillage when removing the headlamp washer pump from the windshield washer solvent container.

	- Press the retainer clip and remove the headlamp washer hose from the washer pump spout. - Disconnect the electrical connection at the headlamp washer pump.
2	Headlamp Washer Pump Procedure - Using two flat-bladed tools placed under the headlamp washer pump, gently pry upward in order to release the pump from the container grommet. - Release and remove the headlamp washer pump and contain the windshield washer solvent. - Discard the old headlamp washer pump grommet.

WINDSHIELD WASHER PUMP REPLACEMENT

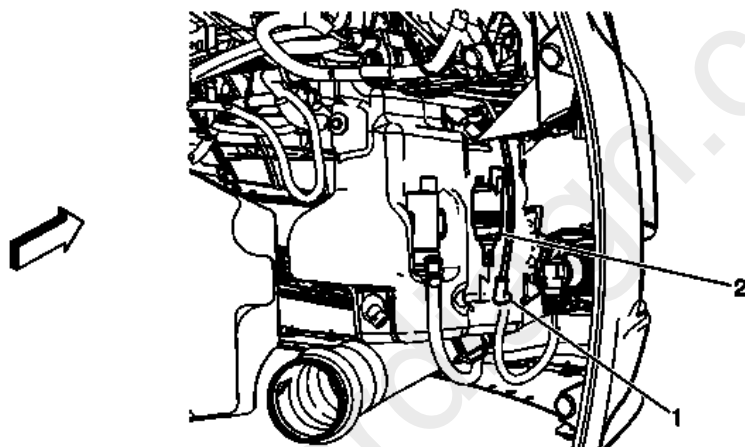


Fig. 19: Windshield Washer Pump
Courtesy of GENERAL MOTORS COMPANY

Windshield Washer Pump Replacement

Callout	Component Name
Preliminary Procedure Remove the right front wheelhouse extension. Refer to <u>Wheelhouse Extension Replacement</u> .	
1	Windshield Washer Hose Procedure - Place a clean suitable clean container under the washer container to secure spillage when removing the pump from the windshield washer solvent container. - Remove the washer hose from the washer pump spout. - Disconnect the electrical connection at the windshield washer pump.
	Windshield Washer Pump

2	Procedure 1. Using two flat-bladed tools placed under the pump, gently pry upward in order to release the pump from the container grommet. 2. Release and remove the pump and contain the windshield washer solvent. 3. Discard the old windshield washer pump grommet.
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WINDSHIELD WASHER SOLVENT LEVEL INDICATOR REPLACEMENT

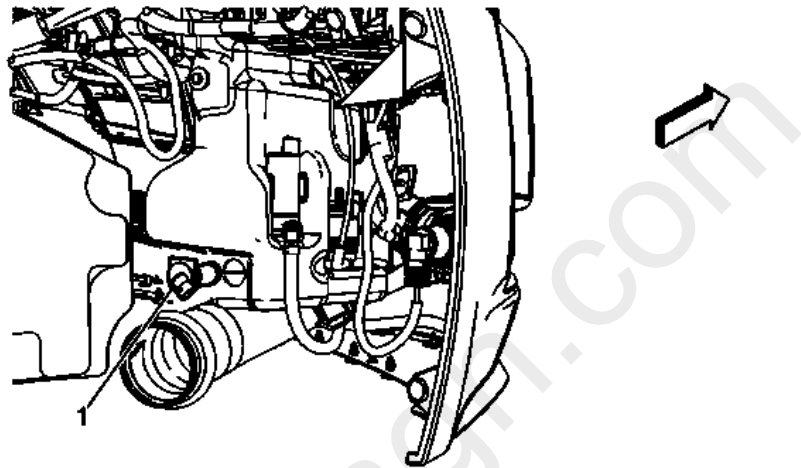


Fig. 20: Windshield Washer Solvent Level Indicator
 Courtesy of GENERAL MOTORS COMPANY

Windshield Washer Solvent Level Indicator Replacement

Callout	Component Name
Preliminary Procedure Remove the right front wheelhouse extension. Refer to <u>Wheelhouse Extension Replacement</u> .	
1	Windshield Washer Level Indicator Procedure 1. Place a clean suitable clean container under the washer container to secure spillage when removing the level indicator from the windshield washer solvent container. 2. Disconnect the electrical connection at the windshield washer level indicator. 3. Using two flat-bladed tools placed under the tab on the level indicator, gently pry outward in order to release the level indicator from the washer container grommet. 4. Remove the level indicator and contain the windshield washer solvent. 5. Discard the old windshield washer level indicator grommet.

AIR INLET GRILLE PANEL REPLACEMENT

Removal Procedure

1. Open the hood.
2. Remove the windshield wiper arms. Refer to Windshield Wiper Arm Replacement.
3. Remove the rear hood seal from the hem flange on the air inlet grille panel.

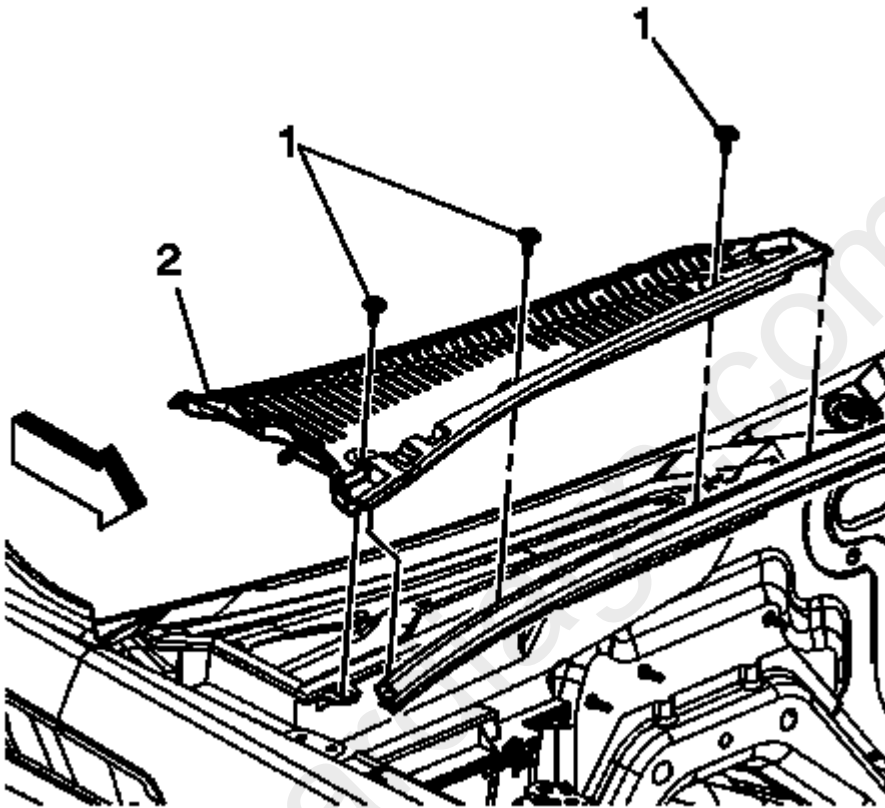


Fig. 21: View of Air Inlet Panel and Screws
Courtesy of GENERAL MOTORS COMPANY

4. Remove the screws (1) securing the passenger side air inlet panel (2) to the plenum.
5. Lift the passenger side air inlet grille panel (2) inward in order to disengage the three integral clips from the driver side panel.
6. Remove the air inlet panel from the vehicle.

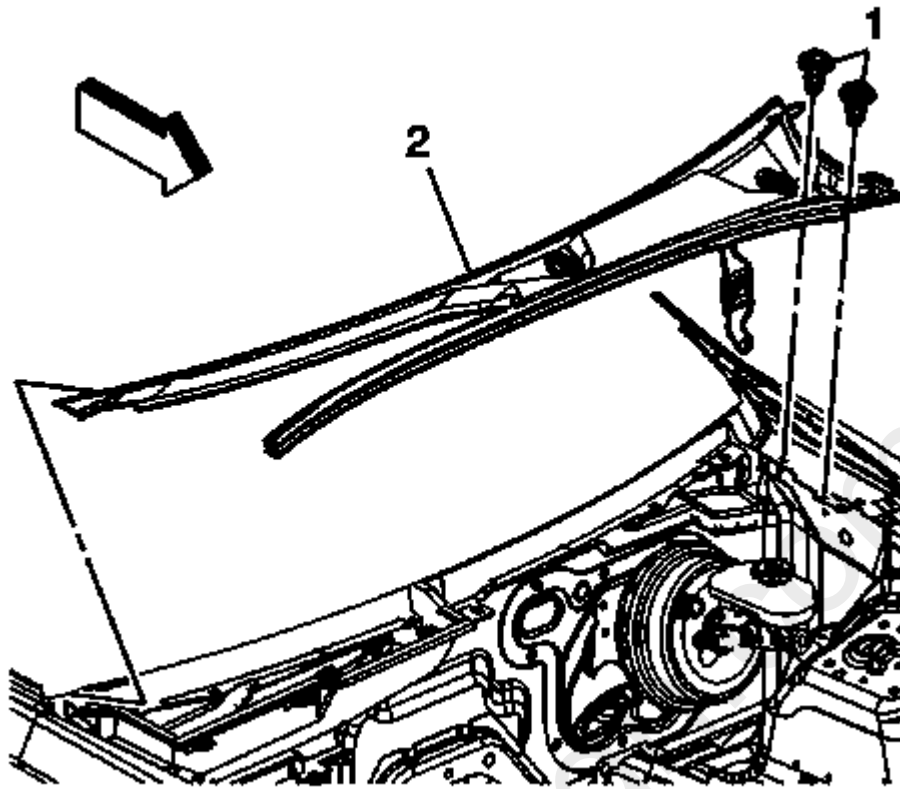


Fig. 22: Air Inlet Grill Panel & Clips
Courtesy of GENERAL MOTORS COMPANY

7. Lift the driver side air inlet grille panel (2) over the wiper arm drive spindle and disengage the air inlet panel from the seven windshield frame and plenum panel clips.
8. Remove the driver side air inlet panel from the vehicle.

Installation Procedure

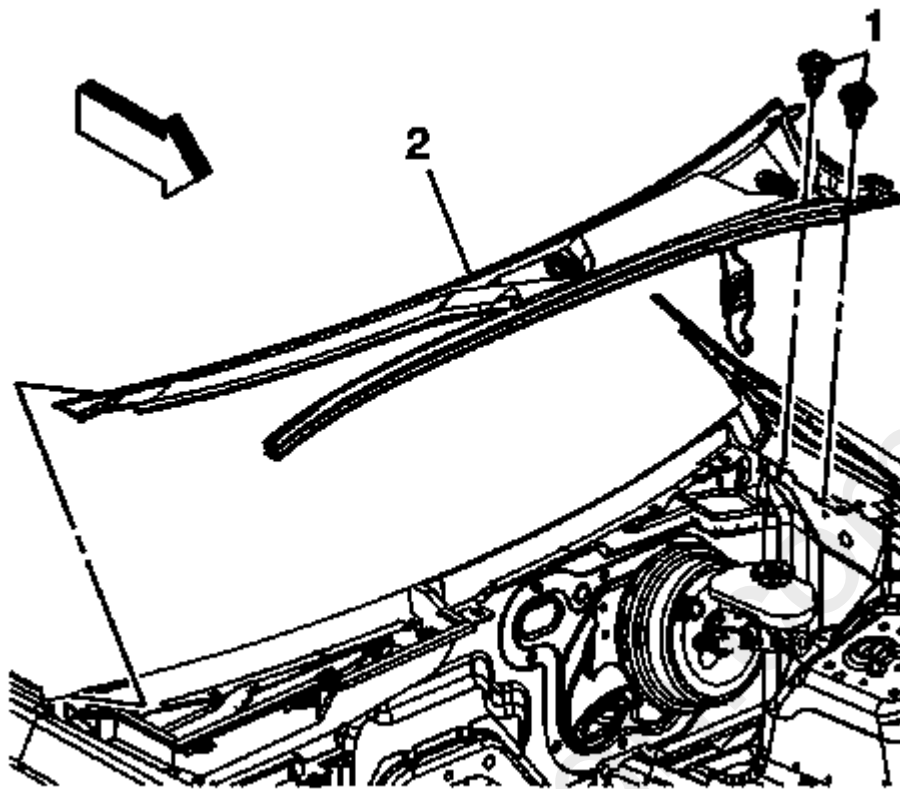


Fig. 23: Air Inlet Grill Panel & Clips
Courtesy of GENERAL MOTORS COMPANY

1. Position the driver side air inlet grille panel (2) to the vehicle, over the wiper arm drive spindles and secure the integral retainers to the seven windshield frame and plenum panel clips.

CAUTION: Refer to Fastener Caution .

2. Install the screws (1) to the inner fender flange and tighten to 3 N.m (27 lb in).

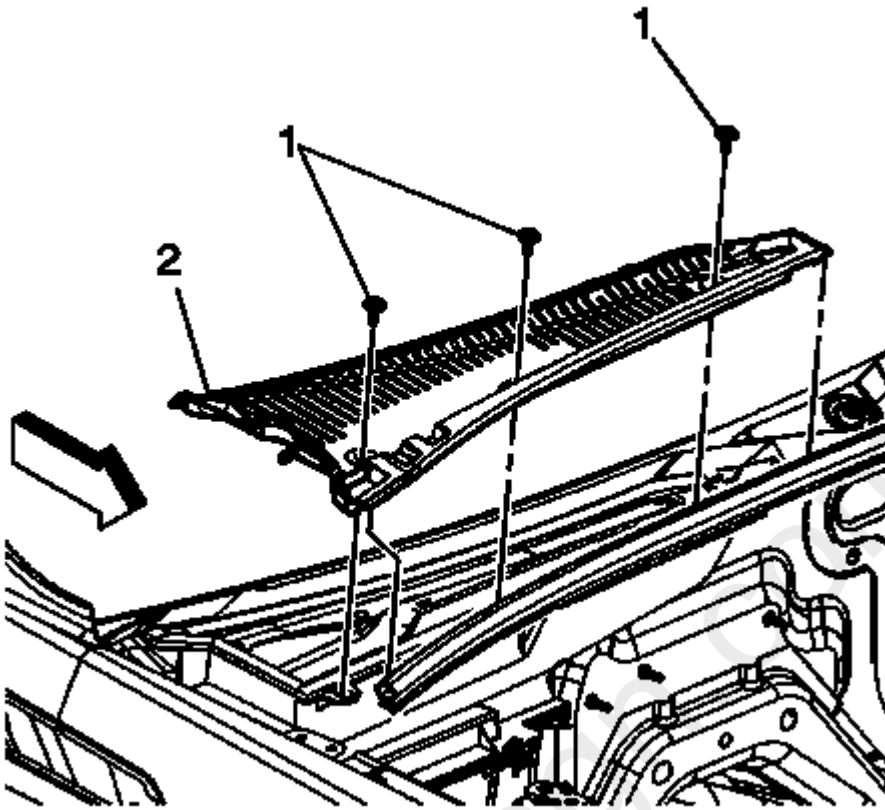


Fig. 24: View of Air Inlet Panel and Screws
Courtesy of GENERAL MOTORS COMPANY

3. Position the passenger side air inlet grille panel three integral clips under the driver side air inlet panel.
4. Position to the air inlet grille panel to the plenum.
5. Install the screws (1) in order to secure the air inlet panel to the plenum and tighten to 3 N.m (27 lb in).
6. Install the rear hood seal onto the hem flange of the air inlet grille panel.
7. Apply palm pressure across the seal in order to secure.
8. Install the windshield wiper arms. Refer to **Windshield Wiper Arm Replacement**.
9. Close the hood.

AIR INLET GRILLE PANEL SIDE SEAL REPLACEMENT

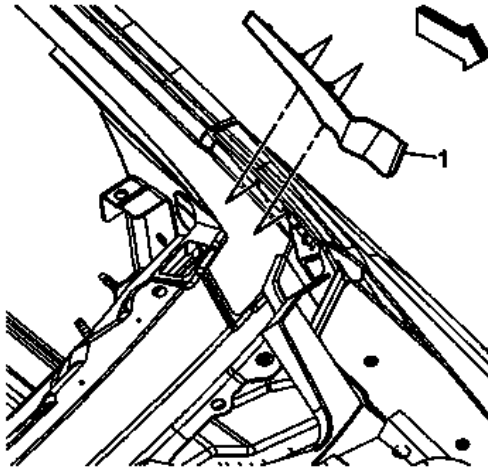


Fig. 25: Air Inlet Grille Panel Side Seal
 Courtesy of GENERAL MOTORS COMPANY

Air Inlet Grille Panel Side Seal Replacement

Callout	Component Name
Preliminary Procedure Open and support hood in order to access the air inlet grille panel side seal.	
1	Air Inlet Grille Panel Side Seal Procedure 1. Release the tabs securing the air inlet grille panel side seal to the rear upper fender flange. 2. Disengage the rearward edge of the seal from under the top edge of the fender flange.

WINDSHIELD WIPER ARM REPLACEMENT

Special Tools

J 39637 Wiper Arm Puller

Removal Procedure

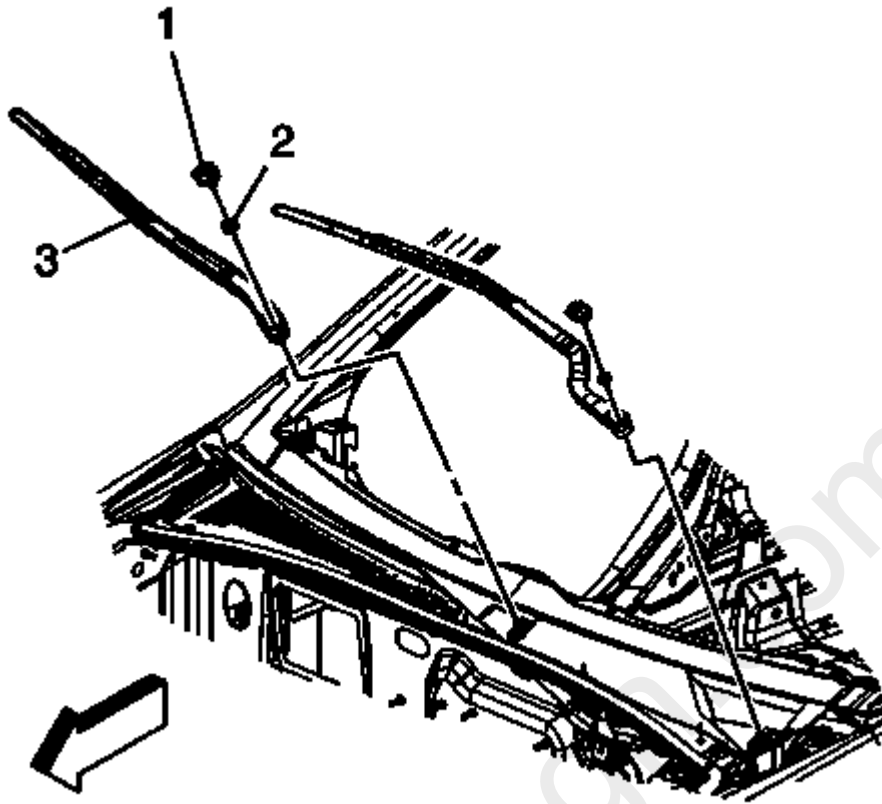


Fig. 26: View of Wiper Arms
Courtesy of GENERAL MOTORS COMPANY

1. Set the wipers in the Park position.
2. Open the hood assembly.
3. The driver side wiper aligns with an orange dot at the tip of the wiper blade located at the center lower windshield blackout.
4. The passenger side wiper (3) aligns with an orange dot approximately 50.8 mm (2 in) in from the tip of the wiper blade located on the right lower side of the windshield blackout.
5. Remove the windshield wiper arm nut caps (1) from the wiper arms.
6. Remove the nut (2) from the wiper arm drive pivot shaft.

NOTE: Use the J 39637 wiper arm puller in order to remove the wiper arm if the wiper arm fails to loosen from the wiper arm drive spindle.

7. Remove the wiper arm from the wiper arm drive pivot shaft.
8. Clean the wiper drive pivot shaft knurls with a fine wire brush.
9. Remove the wiper blade from the wiper arm. Refer to Windshield Wiper Blade Replacement.

Installation Procedure

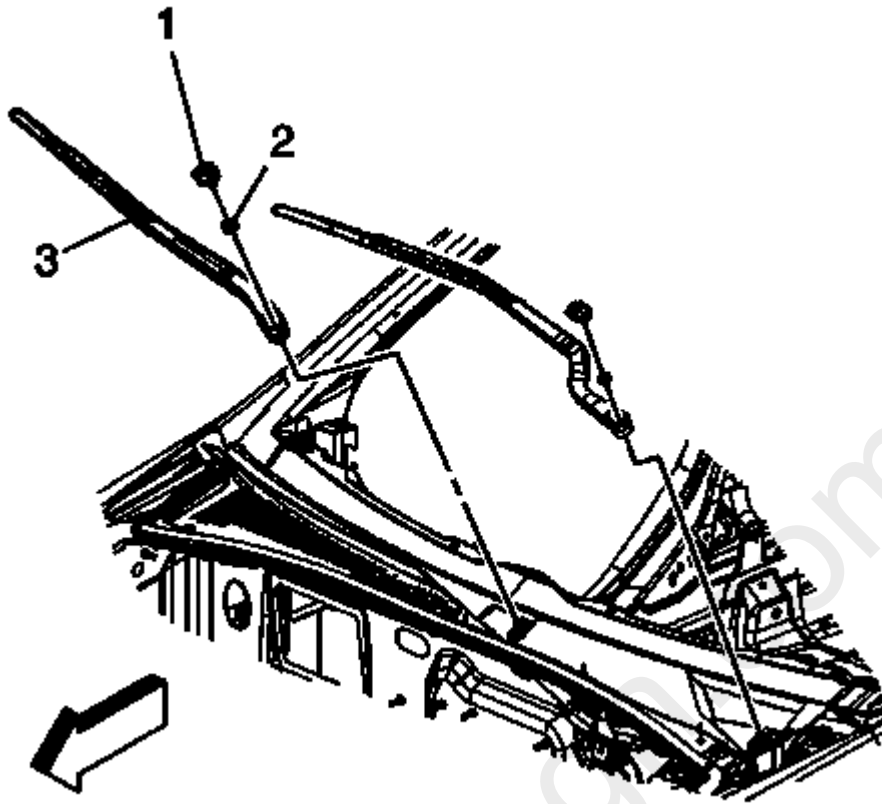


Fig. 27: View of Wiper Arms

Courtesy of GENERAL MOTORS COMPANY

1. Install the wiper blade onto the wiper arm. Refer to Windshield Wiper Blade Replacement.
2. Install the wiper arm onto the wiper arm drive pivot shaft.
3. Position the passenger side wiper arm so the wiper blade tip aligns with the orange dot on the lower outer edge of the windshield.
4. Position the driver side wiper arm so that the wiper blade tip aligns with the orange dot on the lower center of the windshield.

CAUTION: Refer to Fastener Caution .

NOTE: Hold the wiper arm into position while tightening the nut.

5. Install the nut (2) on the wiper arm pivot shaft and tighten to 32 (24 lb ft).
6. Install the windshield wiper arm nut caps (1).

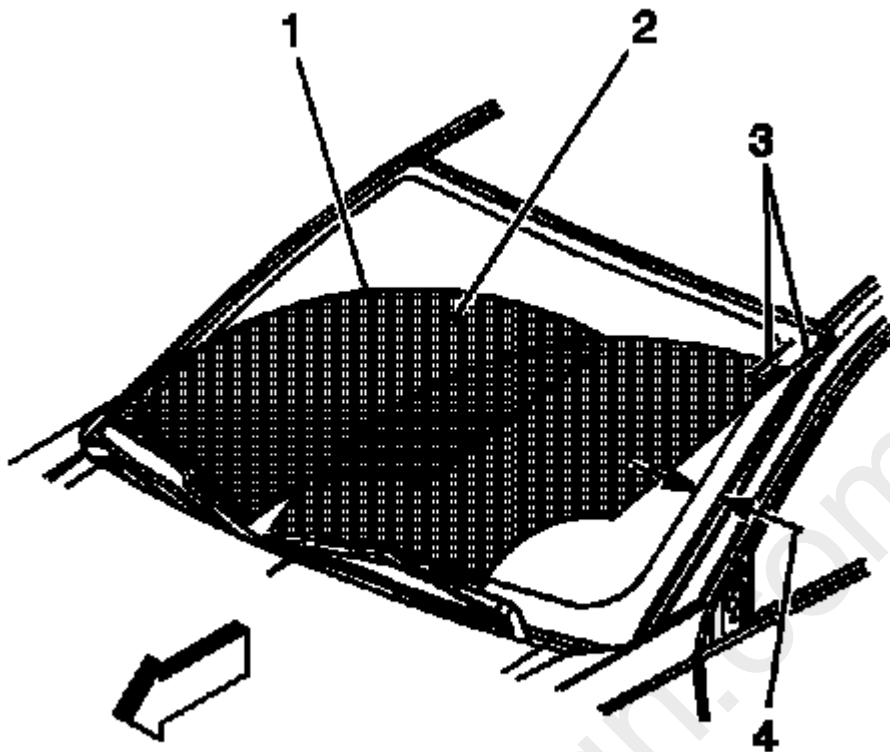


Fig. 28: View Of Proper Wiper Operation
Courtesy of GENERAL MOTORS COMPANY

7. Operate the wipers and wash pattern (2) in order to verify the operation and park position of the wiper arms.
8. Verify the driver side wiper does not exceed the wipe area (3).

REAR WINDOW WIPER ARM REPLACEMENT (WAGON)

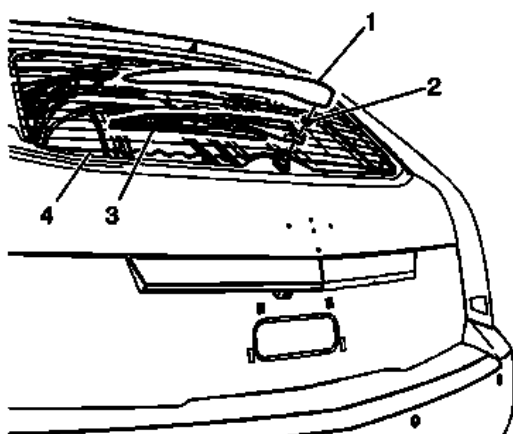


Fig. 29: Rear Window Wiper Arm Components (Wagon)
 Courtesy of GENERAL MOTORS COMPANY

Rear Window Wiper Arm Replacement (Wagon)

Callout	Component Name
1	Rear Window Wiper and Washer Switch Opening Cover TIP: Release the center clip from the rear window wiper and washer switch opening cover and pull the cover rearward from the wiper arm hinge.
2	Rear Window Wiper Arm Nut CAUTION: Refer to <u>Fastener Caution</u> . Tighten 10 N.m (89 lb in)
3	Rear Window Wiper Arm Assembly Procedure 1. Clean the knurls on the rear wiper motor pivot shaft with a soft wire brush prior to re-installation of the rear wiper arm. 2. Position and install the wiper arm to the wiper motor pivot shaft. 3. Hold the wiper blade at the center of the wavy defroster grid line upon securing the wiper arm to the wiper motor pivot shaft.
4	Rear Window Defroster Grid Line

WINDSHIELD WIPER BLADE REPLACEMENT

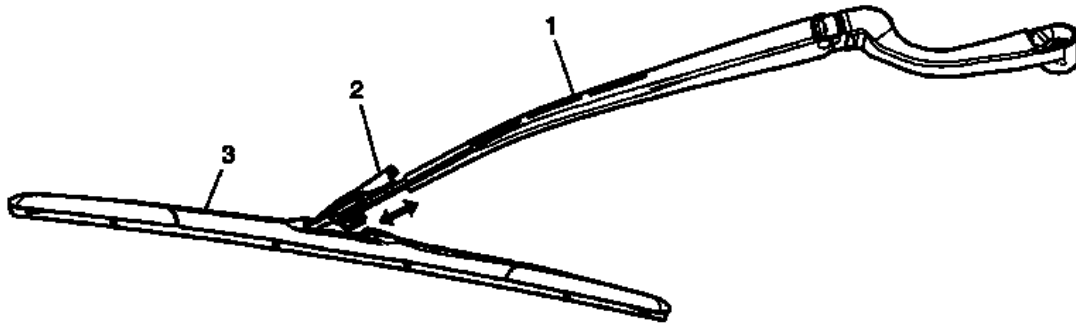


Fig. 30: Windshield Wiper Blade
 Courtesy of GENERAL MOTORS COMPANY

Windshield Wiper Blade Replacement

Callout	Component Name
Preliminary Procedure Lift the wiper arm up off the windshield to the service up position.	
1	Windshield Wiper Arm
2	Windshield Wiper Arm Blade Lock TIP: Disengage the wiper blade lock from the wiper arm.
3	Windshield Wiper Arm Blade TIP: Pull the wiper blade rearward to release the blade from the wiper arm sheep hook.

WINDSHIELD WIPER MOTOR REPLACEMENT

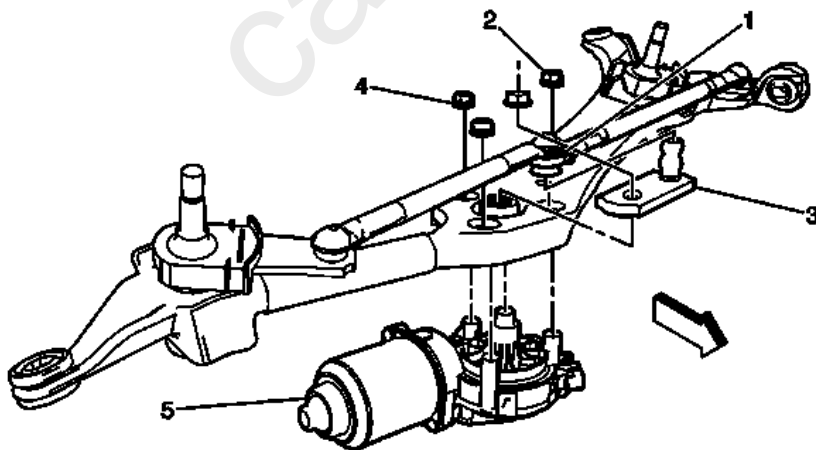


Fig. 31: Windshield Wiper Motor
 Courtesy of GENERAL MOTORS COMPANY

Windshield Wiper Motor Replacement

Callout	Component Name
Preliminary Procedure Remove the windshield wiper transmission assembly. Refer to <u>Windshield Wiper Transmission Replacement</u> .	
1	Transmission Drive Linkage Using a J 39232 wiper linkage separator or equivalent, disconnect the wiper linkage ball sockets from the wipers transmission linkage. Special Tools J 39232 Wiper Linkage Separator
2	Windshield Wiper Crank Arm Nut CAUTION: Refer to <u>Fastener Caution</u> . Procedure 1. Secure the wiper motor to the wiper transmission. 2. Loosely install the wiper crank arm to the motor pivot shaft. 3. Secure the transmission linkage to the crank arm ball sockets. 4. Use the J 39529 wiper linkage installer or equivalent. 5. Align the transmission linkage parallel with the transmission assembly. 6. Secure the crank arm nut. Tighten 32 (24 lb ft) Special Tools J 39529 Wiper Linkage Installer
3	Windshield Wiper Crank Arm
4	Windshield Wiper Motor Bolt (Qty: 3) Tighten 10 (89 lb ft)
5	Windshield Wiper Motor TIP: The new wiper motor will come pre-timed from the factory. Do not electrically charge the new motor unless the old motor is being re-installed.

REAR WINDOW WIPER MOTOR REPLACEMENT (WAGON)

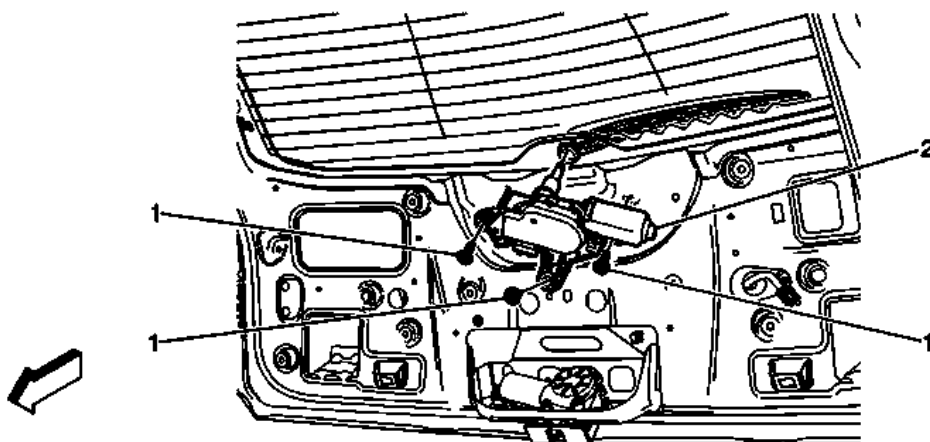


Fig. 32: Rear Window Wiper Motor (Wagon)
 Courtesy of GENERAL MOTORS COMPANY

Rear Window Wiper Motor Replacement (Wagon)

Callout	Component Name
Preliminary Procedures 1. Open and support the liftgate assembly. 2. Remove the rear liftgate wiper arm assembly. Refer to <u>Rear Window Wiper Arm Replacement (Wagon)</u>. 3. Remove the liftgate lower trim finish panel. Refer to <u>Liftgate Lower Trim Finish Panel Replacement (Wagon)</u>.	
1	Rear Window Wiper Motor Assembly Bolt (Qty: 3) CAUTION: Refer to <u>Fastener Caution</u> . Tighten 6 N.m (53 lb in)
2	Rear Window Wiper Motor Assembly Procedure 1. Disconnect the electrical connector from the rear window wiper motor. 2. Inspect the wiper motor pivot shaft seal grommet for any cracks, replace as needed.

WINDSHIELD WIPER TRANSMISSION REPLACEMENT

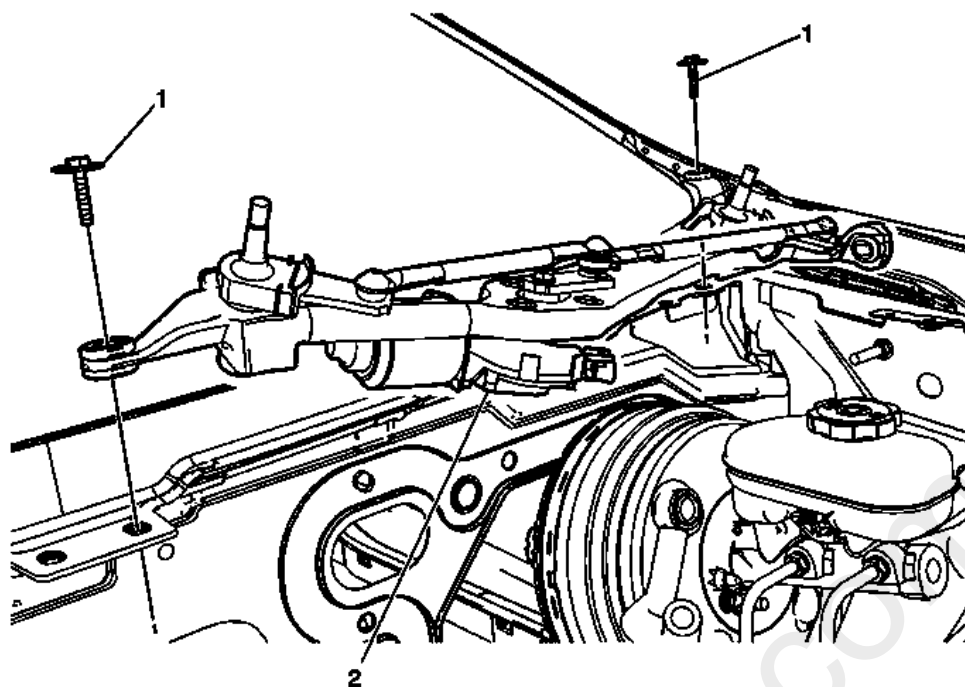


Fig. 33: Windshield Wiper Transmission
 Courtesy of GENERAL MOTORS COMPANY

Windshield Wiper Transmission Replacement

Callout	Component Name
Preliminary Procedure Remove the air inlet grille panel. Refer to <u>Air Inlet Grille Panel Replacement</u> .	
1	Windshield Wiper Transmission Bolt (Qty: 2) CAUTION: Refer to <u>Fastener Caution</u> . Procedure Secure the outboard plenum flange bolt first followed by the inboard wiper transmission bolt second. Tighten 10 N.m (89 lb in)
2	Windshield Wiper Transmission Assembly Procedure 1. Release the transmission assembly from the fender flange stud, raise the transmission assembly from the plenum and disconnect the wiper motor electrical connector. 2. Remove the windshield wiper motor from the transmission. Refer to <u>Windshield</u>

WINDSHIELD OUTSIDE MOISTURE SENSOR REPLACEMENT

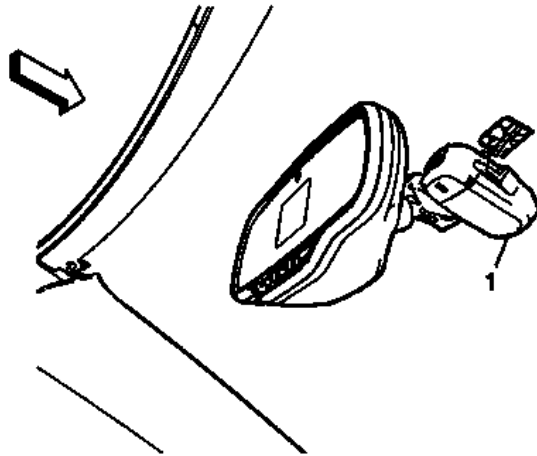


Fig. 34: Windshield Outside Moisture Sensor
Courtesy of GENERAL MOTORS COMPANY

Windshield Outside Moisture Sensor Replacement

Callout	Component Name
Preliminary Procedure	
- Slide upward the plastic mirror harness cover. - Disconnect the electrical connector at the top side of the windshield outside moisture sensor.	
1	Windshield Outside Moisture Sensor Assembly Procedure - Pinch the tabs on both outer edges of the moisture sensor. - Push the sensor upward from the windshield base. - Remove the sensor from the vehicle.

WINDSHIELD GLASS CLEANING

Clean the windshield with windshield cleaner, GM P/N 89021822 (Canadian P/N 992727) or equivalent. The cleaner should not harm the paint finish or scratch the glass. The glass is clean when the water no longer beads, but sheets across the entire glass surface.

WIPER BLADE ELEMENT CLEANING

Lift each blade assembly off of the windshield and clean the element with a cloth saturated with full strength washer solvent. Hold the blade in one hand and wipe the element with the saturated cloth until the black residue disappears. Then rinse the blade assembly elements with clean drinkable water.

WIPER CHATTER REPAIR

Some vehicles may exhibit a condition where the windshield wipers chatter and/or wipe unevenly. Several items may contribute to this condition. To completely repair this condition, ALL of the items listed should be inspected and corrected as necessary.

1. Inspect the wiper blade element set. Refer to **Wiper Blade Element Check**
2. Clean the wiper blade elements. Refer to **Wiper Blade Element Cleaning**
3. Clean the windshield. Refer to **Windshield Glass Cleaning**

DESCRIPTION AND OPERATION

HEADLAMP WASHER SYSTEM DESCRIPTION AND OPERATION

Headlamp Washer System Components

The headlamp washer system consists of the following components:

- Headlamp washer relay
- Washer fluid level switch
- Headlamp washer pump
- HDLP WASH 30A circuit breaker

Headlamp Washer System Controls

The headlamp washer system is controlled by the following components:

- Headlamp washer relay
- Dash integration module
- Washer fluid level switch
- Windshield wiper/washer switch

Headlamp Washer System Operation

Battery voltage is supplied to the headlamp washer relay switched input. The windshield washer pump control circuit is spliced to the headlamp washer relay. When the windshield washer switch is pressed, battery voltage is supplied on washer switch signal circuit to the headlamp washer relay which energizes the relay. This allows battery voltage from the headlamp washer relay switched input to relay switched output to supply voltage circuit of the headlamp washer pump. The windshield washer fluid level switch also provides a signal circuit to the headlamp washer relay and does not allow the relay to be energized when the fluid level is insufficient for pump operation. The dash integration module controls the ground of the headlamp washer relay and the headlamps must be on for the relay to receive ground and operate. On the early production vehicles, the headlamp washers activate with each windshield washer cycle on the domestic vehicles and after every 3 windshield washer cycles on the exports. For later production vehicles, all headlamp washer systems activate after every 5 windshield washer cycles.

REAR WIPER/WASHER SYSTEM DESCRIPTION AND OPERATION

The rear wipe/wash function is controlled by the use of a rear wiper motor with an integrated electronic control module.

Both the front and rear wash operations are accomplished by the use of a single reversing washer fluid pump motor. In this system the wash motor is operated in one direction to spray fluid on the front windshield and then operated in the reverse direction to spray fluid on the rear window. Thus there is a relay connected to each input of the washer pump motor.

The rear wiper/washer signal is received by the rear wiper motor/module and is the result of three resistors in the rear wiper switch configured as a resistor ladder network. This signal is connected to a digital input which also provides a switched battery pull-up for the circuit. Depending on the function selected (Intermittent 1, Intermittent 2, Off, Wash), the rear wiper control switch connects a different set of resistors into the circuit resulting in different voltages appearing on the rear wiper motor/module input. By monitoring this voltage, the BCM determines how to control the rear wiper motor and the rear washer relay.

WIPER/WASHER SYSTEM DESCRIPTION AND OPERATION

Wiper/Washer System Components

The Wiper/Washer System consists of the following components:

- Windshield wiper/washer switch
- Body control module (BCM)
- WPR Relay
- WPR HI Relay
- Windshield wiper motor
- Windshield washer fluid pump
- Windshield washer fluid level switch
- Rain sensor module
- Instrument panel cluster (IPC)
- WPR Fuse 25 A
- WSW/PUMP Fuse 10 A
- RAP Fuse 10 A

Refer to **Master Electrical Component List** .

Power and Grounds

With the ignition in the ON position, accessory voltage is supplied through the 25A WPR fuse to the WIPER relay, the WIPER HI relay and the WSH relay that are all located in the underhood fuse block. Refer to **Wiper/Washer Schematics**.

G101 provides ground for the windshield wiper motor. G104 provides ground for the WPR relay, the WPR HI

relay, the windshield washer fluid pump and the windshield washer fluid level switch.

Modes of Operation

The normal wiper system function positions are as follows:

- MIST
- DELAY
- MANUAL LOW
- MANUAL HIGH
- WASH

Automatic Modes of Operation

- AUTOMATIC DELAY
- AUTOMATIC LOW
- AUTOMATIC HIGH

Automatic low speed and automatic high speed wiper modes are continuous wiper operations that are controlled by the outside moisture sensor. Automatic low and high speed operation is utilized when the amount of precipitation on the windshield exceeds the automatic delay or low threshold.

Moisture Sensitive Wipers

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

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

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

Low Speed Operation

When the wiper switch is in the low speed position, ground is applied through a resistor internal to the switch and the wiper switch low signal circuit to the body control module (BCM). In response to this signal, the BCM

energizes the WPR relay by applying battery voltage through the wiper relay control circuit to the coil side of the relay. This allows battery positive voltage from the WPR fuse to flow through the switch input side of the WPR relay and out to the switch input side of the WPR HI relay. Since the wiper high relay is de-energized and its switch contacts are normally closed to the low speed control circuit of the windshield wiper motor, the motor will operate at low speed.

Wiper motor low speed operation and the WPR relay can also be commanded ON/OFF by using a scan tool. Refer to **Control Module References** .

Mist Operation

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

Delay Operation

Windshield wiper delay operation is a low speed wiper motor function with a variable delay interval between the wiper motor cycles. The delay interval is determined by a series of 6 resistors within the wiper/washer switch. The body control module (BCM) monitors the wiper switch low signal circuit to determine the delay interval between the low speed wiper motor wipe cycles.

High Speed Operation

When the wiper switch is in the high speed position, ground is applied through the windshield wiper switch high signal circuit to the body control module (BCM) indicating the wiper high speed request. In response to this signal, the BCM then energizes the WPR relay, as stated above, and the WPR HI relay by applying ground through the control circuit to the coil side of the relay. With the wiper high relay energized and its switch contacts closed to the high speed control circuit of the wiper motor, the motor will operate at high speed.

The wiper high speed relay can also be commanded ON/OFF by using a scan tool. However, before commanding the wiper motor high speed mode ON/OFF using a scan tool, the WPR relay must be energized by placing the wiper switch in the low speed position. Refer to **Control Module References** .

Wash Operation

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

The WSH relay can also be commanded ON/OFF by using a scan tool. Refer to **Control Module References** .

Park Position Operation

Windshield wiper motor park operation is controlled by the body control module (BCM) using an input from the park switch that is located within the wiper motor assembly. The BCM monitors the windshield wiper motor park switch signal circuit, to determine if the windshield wiper blades are at the bottom of the glass. During wiper operation, each time the wiper blades are at the bottom of the glass, the park switch is momentarily closed to ground signaling the BCM the wiper position. When the wiper switch is turned to the OFF position while the wiper motor is somewhere in mid-cycle, the BCM will continue to operate the motor until the wipers reach the park position. If the ignition is turned OFF while the wipers are in mid-cycle, the wipers will stop immediately where they are. The BCM will park the wipers the next time the ignition is turned ON.

Washer Fluid LOW ADD FLUID Message

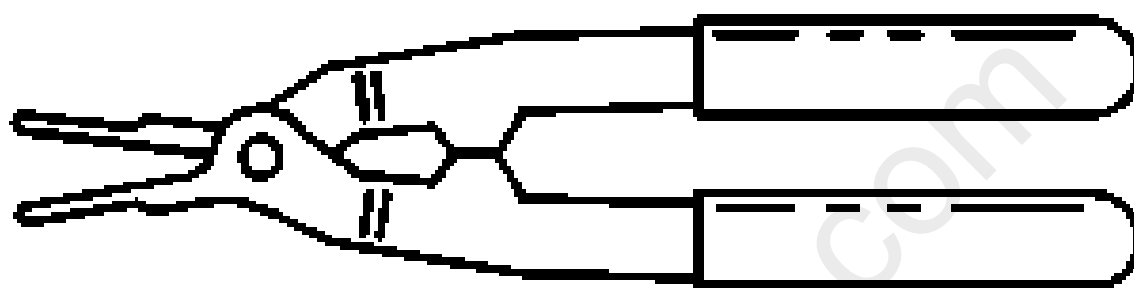
The WASHER FLUID LOW ADD FLUID message is controlled by the instrument panel cluster (IPC) using an input from the washer fluid level switch. With the ignition in the ON position, the IPC applies ignition voltage through an internal resistor and the windshield washer fluid level signal circuit to the windshield washer fluid level switch. The IPC then monitors this voltage to determine the washer fluid level. With the washer fluid above a determined level, the washer fluid level switch is open and the IPC detects voltage on the signal circuit. 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 is pulled low and the IPC displays the WASHER FLUID LOW ADD FLUID message on the driver information center (DIC). In order to prevent the WASHER FLUID LOW ADD FLUID message from being displayed while sloshing is occurring in the washer fluid container, the IPC is programed with a 1 minute delay before changing states of the WASHER FLUID LOW ADD FLUID message during an ignition cycle.

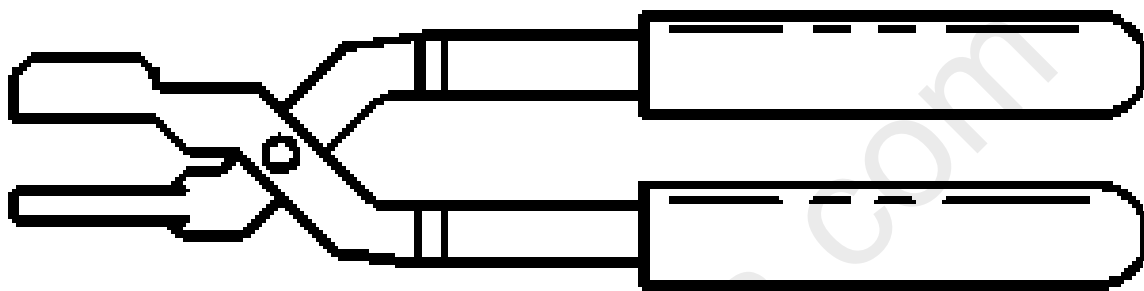
SPECIAL TOOLS AND EQUIPMENT

SPECIAL TOOLS

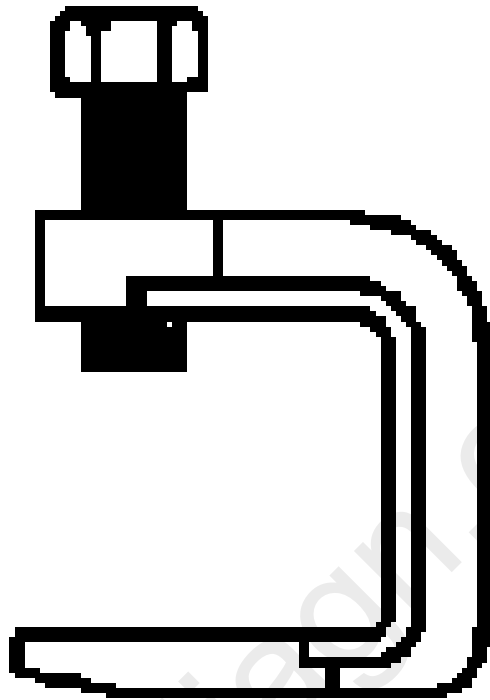
Illustration	Tool Number/Descrip
	J 39232 Wiper Linkage

Separator





J 39529
Wiper Linkage
Installer



J 39637
Wiper Arm Pull